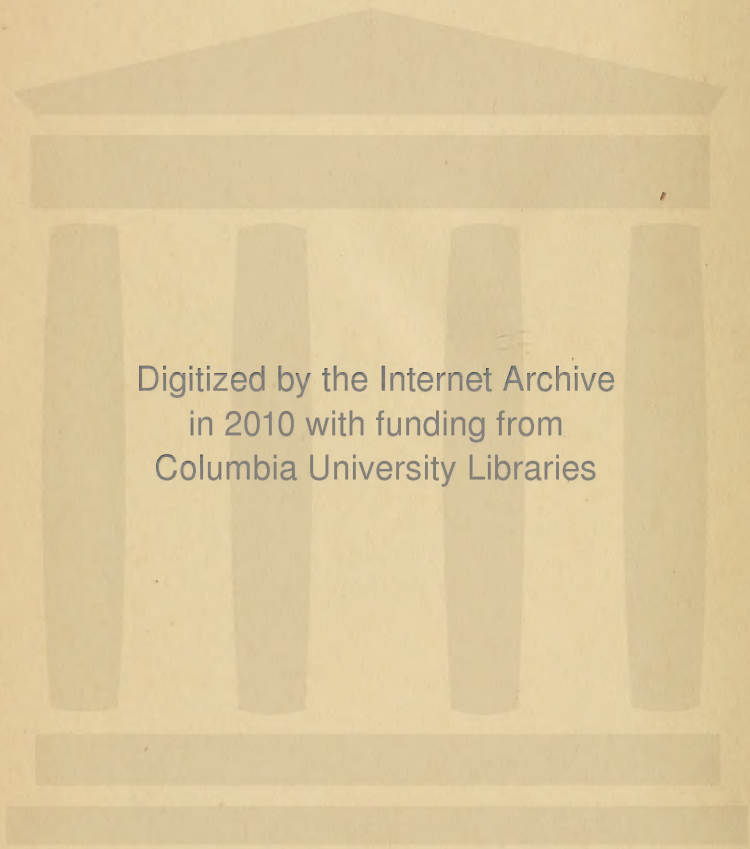

THE THIRD ANNUAL REPORT

OF THE

COMMISSIONER OF HEALTH

OF THE

COMMONWEALTH OF PENNSYLVANIA

1908

HARRISBURG:
C. E. AUGHINBAUGH, PRINTER TO THE STATE OF PENNSYLVANIA
1909.

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LETTER OF TRANSMITTAL.

Commonwealth of Pennsylvania,
State Capitol Harrisburg,

December 31, 1909.

To His Excellency, Edwin S. Stuart, Governor of Pennsylvania:

Sir: In compliance with the requirements of Section 13 of the act "Creating a Department of Health and defining its duties and powers," approved the 27th day of April, A. D. 1905, I have the honor to submit to your Excellency my third annual report upon "the vital statistics and sanitary conditions and prospects of the State," covering the year ending December 31, 1908.

SAMUEL G. DIXON,
Commissioner of Health.

1—17—1908

THIRD ANNUAL REPORT

OF THE

COMMISSIONER OF HEALTH

OF THE

Commonwealth of Pennsylvania.

It is my sad duty to call your Excellency's attention to a vacancy existing on the Advisory Board of the Department, caused by the sudden death of Dr. Samuel T. Davis, while on a hunting trip in a remote valley in the mountains of Mexico. Dr. Davis was the only member of that Board who had served on the old State Board of Health, in the creation of which he took an active part, as a member of the Legislature, and of which he was President for many years. His large experience made him a valuable member of the Board and his genial qualities constituted him an acceptable associate.

The approaching completion of the Tuberculosis Sanatorium at Mt. Alto and consequent rapid increase of the number of patients rendered necessary an increase of the resident medical staff at that place. Dr. Fred C. Johnson, the Chief of the Division of Medical Inspection, was therefore transferred to the South Mountain Sana-

torium, becoming Medical Director, while Dr. A. M. Rothrock, the former Resident Physician, continued in service with the title of Vice Medical Director.

Dr. A. B. Moulton, former Assistant Medical Inspector, was promoted to the position of Chief Medical Inspector, and his desk was occupied by Dr. B. Franklin Royer, who for four and a half years was Chief Resident Physician to the Municipal Hospital of Philadelphia, thus enjoying unusual opportunities for becoming familiar with the diagnosis of communicable diseases. Dr. Royer's title is Associate Chief Medical Inspector.

The increasing claims upon the Tuberculosis Dispensaries have made it necessary to establish additional Dispensaries in many counties, and as it was often impossible for the County Medical Inspector in those Counties to take charge of two dispensaries, this necessitated the appointment of Physicians-in-Charge.

The Counties in which more than one dispensary is established with the names of the Physicians-in-Charge are:

County.	Town.	Physician-in-Charge.
Allegheny,	McKeesport,	Dr. D. P. Blose.
	Carnegie,	Dr. F. E. Herriott.
	Homestead,	Dr. A. P. Fogelman.
Beaver,	Beaver Falls,	Dr. Bruce Snodgrass.
Blair,	Tyrone,	Dr. W. S. Musser.
Bucks,	Bristol,	Dr. J. de B. Abbott.
Cambria,	Hastings,	Dr. D. S. Rice.
Carbon,	Lansford,	Dr. J. H. Young.
Center,	Philipsburg,	Dr. C. E. McGirk.
	Coatesville,	Dr. E. A. Graves.
	Phoenixville,	Dr. C. A. Yocum.
Clearfield,	DuBois,	Dr. R. R. Jordan.
Columbia,	Bloomsburg,	Dr. S. B. Arment.
Crawford,	Titusville,	Dr. J. M. Waide.
Cumberland,	W. Fairview,	Dr. Harvey Bashore.
Dauphin,	Lykens,	Dr. M. D. Lehr.
Erie,	Corry,	Dr. C. B. Kibler.
Fayette,	Connellsville,	Dr. T. B. Echard.
Jefferson,	Brookville,	Dr. J. A. Haven.
Lackawanna,	Carbondale,	Dr. W. J. Lowry.
Lancaster,	Columbia,	Dr. J. P. Kennedy.
Luzerne,	Hazleton,	Dr. W. C. Gayley.
	Pittston,	Dr. S. L. Underwood.
Montgomery,	Jenkintown,	Dr. W. B. Jamison.
	Pottstown,	Dr. T. E. Wills.
Northampton,	Bangor,	Dr. H. S. Sherrer.
	S. Bethlehem,	Dr. W. D. Chase.
Northumberland,	Mt. Carmel,	Dr. W. T. Williams.
	Milton,	Dr. R. B. Tule.
Philadelphia,	Phila. (Frankford),	Dr. Alfred Stengel.
Schuylkill,	Shenandoah,	Dr. H. M. Wasley.
	Tamaqua,	Dr. E. E. Shifferstein.
Susquehanna,	Susquehanna,	Dr. Sam'l Birdsall.
Tioga,	Wellsboro,	Dr. Penrose Houser.
Venango,	Franklin,	Dr. H. F. McDowell.
Washington,	Washington,	Dr. E. M. Hazlett.
Westmoreland,	Mt. Pleasant,	Dr. M. W. Horner.
	Monessen,	Dr. M. J. Cramer.
York,	Hanover,	Dr. J. H. Bittinger.

At many of the Dispensaries the number of the patients has been so great that it was absolutely impossible for one man to do the work with anything like justice to the patients. It has therefore become imperative to appoint assistants to the County Medical Inspectors and Physicians-in-Charge. These appointments have been as follows:

Name.	Place.
Dr. I. H. Alexander,	Pittsburg.
Dr. J. M. Long,	Pittsburg.
Dr. J. F. Edwards,	Pittsburg.
Dr. S. Hamilton,	Pittsburg.
Dr. C. J. McKee,	Pittsburg.
Dr. F. Stalzenbach,	Pittsburg.
Dr. C. W. Sample,	Pittsburg.
Dr. G. H. Boyd,	Pittsburg.
Dr. H. B. Stone,	Kittanning.
Dr. E. B. Miller,	Altoona.
Dr. T. M. Maxwell,	Butler.
Dr. J. McAneney,	Johnstown.
Dr. Thom,	Johnstown.
Dr. Jos. Cohen,	Berwick.
Dr. W. E. Hyskell,	Meadville.
Dr. R. Plank,	Carlisle.
Dr. J. W. Ellenberger,	Harrisburg.
Dr. C. R. Phillipps,	Harrisburg.
Dr. E. S. Haines (resigned),	Chester.
Dr. J. W. Wood,	Chester.
Dr. A. H. Roth,	Erie.
Dr. C. Falkowsky,	Scranton.
Dr. Jos. Wagner,	Scranton.
Dr. S. H. Heller,	Lancaster.
Dr. H. F. Myers,	Lancaster.
Dr. J. D. Tucker,	New Castle.
Dr. H. E. Maulfair,	Lebanon.
Dr. W. D. Kline,	Allentown.
Dr. F. C. Bausch,	Allentown.
Dr. J. W. Geist,	Wilkes-Barre.
Dr. S. Reichard,	Wilkes-Barre.
Dr. S. D. Wyckoff,	Wilkes-Barre.
Dr. G. W. Carr,	Wilkes-Barre.
Dr. J. A. Hilbert,	Wilkes-Barre.
Dr. G. R. Grosser,	Wilkes-Barre.
Dr. R. Wadhams,	Wilkes-Barre.
Dr. Walter Davis,	Wilkes-Barre.
Dr. G. H. McConnon,	Wilkes-Barre.
Dr. T. C. Zulick,	Easton.
Dr. W. P. Thompson,	Easton.
Dr. W. H. McIlkaney,	Easton.
Dr. J. E. Fretz,	Easton.
Dr. C. H. Malone,	Shamokin.
Dr. A. P. Francine,	Philadelphia.
Dr. W. G. Turnbull,	Philadelphia.
Dr. George Wood,	Philadelphia.
Dr. Fannie Davis,	Oil City.
Dr. Roland Jessup,	York.
Dr. B. F. Parker,	York.
Dr. J. H. Bennet,	York.
Dr. L. S. Weaver,	York.
Dr. H. D. Smyser,	York.
Dr. E. Meisenhelder,	York.
Dr. B. W. Shirey,	York.
Dr. L. M. Hartman,	York.
Dr. W. C. Smith,	York.

At the close of the year therefore the organization of the Department was as follows:

STATE CAPITOL, HARRISBURG.

Commissioner of Health, Samuel G. Dixon, M. D.

ADVISORY BOARD.

Adolph Koenig, M. D. Lee Masterson, C. E.
Leonard Pearson, M. D. Charles B. Penrose, M. D.
B. H. Warren, M. D.

Assistant to the Commissioner, Benjamin Lee, M. D.
Secretary to the Commissioner, Wilbur Morse.
Stenographers, Miss Ivy E. Huber.
Miss Mary Stephen Mark.
Messenger, Edward F. Eisely.
Janitor, John B. Sample.

MEDICAL DIVISION.

Chief Medical Inspector, Arthur B. Moulton, M. D.
Associate Chief Medical Inspector, B. Franklin Royer, M. D.
Stenographers, Miss Fannie A. Houseknecht.
Miss Dorothy Sterline.
Connected with this Division are 723 Township Health Officers.

COUNTY MEDICAL INSPECTORS.

County.	Inspector.	Post Office.
Adams,	John R. Dickson,	Gettysburg.
Allegheny,	S. M. Rinehart,	Northside, Pittsburg.
Armstrong,	T. N. McKee,	Kittanning.
Beaver,	E. S. H. McCauley,	Beaver,
Bedford,	D. de la M. Hill,	Everett.
Berks,	Isreal Cleaver,	Reading.
Blair,	Wm. M. Findley,	Altoona.
Bradford,	S. M. Woodburn,	Towanda.
Bucks,	I. S. Plymire,	Doylestown.
Butler,	H. D. Heckenberry,	West Sunbury.
Cambria,	Wm. E. Matthews,	Johnstown.
Cameron,	H. S. Falk,	Emporium.
Carbon,	John K. Henry,	Mauch Chunk.
Centre,	George F. Harris,	Bellefonte.
Chester,	Joseph Scattergood,	West Chester.
Clarion,	J. T. Riner,	Clarion.
Clearfield,	S. C. Stewart,	Clearfield.
Clinton,	R. B. Watson,	Lock Haven.
Columbia,	S. B. Ament,	Bloomsburg.
Crawford,	J. R. Roberts,	Meadville.
Cumberland,	Harvey B. Bashore,	West Fairview.
Dauphin,	Paul A. Hartman,	Harrisburg.
Delaware,	Robert S. Maison,	Chester.
Elk,	W. L. Williams,	Ridgway.
Erie,	J. W. Wright,	Erie.
Fayette,	O. R. Altman,	Uniontown.
Forest,	T. J. Bovard,	Tionesta.
Franklin,	H. X. Bonbrake,	Chambersburg.
Fulton,	J. W. Mosser,	McConnellsburg.

COUNTY MEDICAL INSPECTORS.—Continued.

County.	Inspector.	Post Office.
Greene,	John T. Iams,	Waynesburg.
Huntingdon,	W. C. Frontz,	Huntingdon.
Indiana,	N. F. Ehrenfeld,	Indiana.
Jefferson,	J. E. Grube,	Punxsutawney.
Juniata,	William H. Banks,	Mifflintown.
Lackawanna,	J. C. Reifsynder,	Scranton.
Lancaster,	J. L. Mowrey,	Lancaster.
Lawrence,	J. D. Moore,	New Castle.
Lehigh,	Morris F. Cawley,	Allentown.
Lebanon,	A. J. Riegel,	Lebanon.
Luzerne,	C. H. Miner,	Wilkes-Barre.
Lycoming,	Charles H. Youngman,	Williamsport.
McKean,	W. C. Hogan,	Bradford.
Mercer,	P. P. Fisher,	Sharon.
Mifflin,	C. H. Brisbin,	Lewistown.
Monroe,	W. E. Gregory,	Stroudsburg.
Montgomery,	H. H. Whitcomb,	Norristown.
Montour,	G. A. Shock,	Danville.
Northampton,	E. M. Green,	Easton.
Northumberland,	R. H. Simmons,	Shamokin.
Perry,	A. R. Johnston,	New Bloomfield.
Pike,	Wm. B. Kenworthy,	Milford.
Potter,	E. H. Ashcraft,	Coudersport.
Schuylkill,	L. T. Kennedy,	Pottsville.
Snyder,	F. J. Wagenseller,	Selinsgrove.
Somerset,	Charles P. Large,	Meyersdale.
Sullivan,	J. L. Christian,	Lopez.
Susquehanna,	H. B. Lathrop,	Springville.
Tioga,	S. P. Hakes,	Tioga.
Union,	C. H. Dimm,	Mifflinburg.
Venango,	J. P. Strayer,	Oil City.
Warren,	M. V. Ball,	Warren.
Washington,	C. B. Wood,	Monongahela.
Wayne,	H. B. Ely,	Honesdale.
Westmoreland,	I. M. Portser,	Greensburg.
Wyoming,	E. E. Bidleman,	Tunkhannock.
York,	J. S. Miller,	York.

RAILROAD MEDICAL INSPECTORS.

(Commissioned by the Commissioner of Health but not paid by the State.)

PENNSYLVANIA RAILROAD COMPANY.

Dr. S. W. Latta, Chief Medical Inspector, Philadelphia.

Dr. D. W. Nead, Philadelphia.
Dr. E. C. Town, Philadelphia.
Dr. J. L. Wright, Columbia.
Dr. S. M. Crawford, Harrisburg.
Dr. C. J. Roberts, Williamsport.
Dr. S. A. Bonnafon, Erie.
Dr. H. W. Pownall, Tyrone.
Dr. C. F. Hough, Cresson.
Dr. D. N. Easter, Youngwood.
Dr. J. B. Hileman, Pitcairn.
Dr. W. B. Reynolds, Olean.
Dr. I. H. Boyd, Philadelphia.
Dr. J. L. Bower, Reading.
Dr. W. T. Bishop, York.
Dr. A. T. Poffenberger, Sunbury.
Dr. J. B. Lincoln, Renovo.
Dr. R. H. Moore, Huntingdon.
Dr. W. B. Diefenderfer, Altoona.
Dr. C. W. Banks, Derry.
Dr. W. K. T. Sann, Pittsburg.
Dr. J. C. Lemmer, Oil City.
Dr. H. E. Westhaeffer, Monongahela City.

PHILADELPHIA AND READING RAILWAY COMPANY.

Dr. Caspar Morris, Chief Medical Inspector, Philadelphia.

Dr. Frederick E. Briester, Phila.
Dr. Norris S. McDowell, Phila.
Dr. J. Henry Orff, Reading.
Dr. Albert F. Bronson, Tamaqua.
Dr. Francis S. Ferris, Phila.
Dr. Charles F. Detweiler, Reading.
Dr. Thomas F. Heebner, Pottsville.
Dr. Wm. R. Brothers, Harrisburg.

BALTIMORE AND OHIO RAILROAD COMPANY.

Dr. John L. Burkholder, New Castle Junction.

Dr. I. D. Chaney, Connellsville.
Dr. W. A. Funk, Pittsburg.
Dr. M. H. Koehler, Connellsville.
Dr. W. B. Rogers, Pittsburg.
Dr. H. F. Atkinson, Connellsville.
Dr. E. M. Baker, Valencia.
Dr. J. A. Batton, Uniontown.
Dr. H. J. Bell, Dawson.
Dr. F. C. Blessing, Pittsburg.
Dr. W. J. Bryson, Pittsburg.
Dr. M. C. Cameron, Pittsburg.
Dr. C. L. Clover, Knox.
Dr. Arthur E. Crow, Uniontown.
Dr. C. L. DeWolfe, Chicora.
Dr. E. L. Dickey, St. Petersburg.
Dr. E. A. Donnan, New Castle.
Dr. John Foster, New Castle.
Dr. E. A. Fleetwood, Pittsburg.
Dr. G. R. Gaver, Pittsburg.
Dr. A. L. Porter, Philadelphia.
Dr. D. E. Stephen, New Castle Junction.
Dr. W. J. Bailey, Connellsville.
Dr. H. Baker, Connellsville.
Dr. J. E. S. Bell, Pittsburg.
Dr. J. B. Black, Cristy Park.
Dr. Robt. W. Brace, Philadelphia.
Dr. L. N. Burchinal, Point Marion.
Dr. W. H. Cameron, Pittsburg.
Dr. John B. Critchfield, Ralphton.
Dr. C. L. Curll, Pittsburg.
Dr. W. L. DeWolfe, Butler.
Dr. W. F. Donaldson, Pittsburg.
Dr. F. H. Evans, Chester.
Dr. W. S. Foster, Pittsburg.
Dr. J. S. Garman, Berlin.
Dr. W. D. Haight, Johnstown.
Dr. James M. Hess, Marienville.
Dr. A. M. Hoover, Parker's Landing.
Dr. T. L. Kane, Kane.
Dr. Bruce Lichty, Meyersdale.
Dr. A. K. Lyon, Allegheny.
Dr. H. I. Marsden, Somerset.
Dr. G. B. Masters, Rockwood.
Dr. W. T. Messmore, Smithfield.
Dr. E. S. Montgomery, Pittsburg.
Dr. E. J. Morris, Philadelphia.
Dr. William F. Morrison, Phila.
Dr. W. S. Mountain, Confluence.
Dr. W. D. O'Brien, Pittsburg.
Dr. Benj. W. Phillips, Tylersburg.
Dr. R. T. Pollard, Garrett.
Dr. S. E. Ralston, Zelienople.
Dr. F. P. Righter, Markleton.
Dr. J. Q. Robinson, West Newton.
Dr. W. T. Rowe, Meyersdale.
Dr. W. A. Shannon, Ellwood City.
Dr. M. B. Shupe, Connellsville.
Dr. J. N. Sprowls, Claysville.
Dr. C. J. Styber, Allegheny.
Dr. B. Thompson, Landenburg.
Dr. J. N. Timmons, W. Alexander.
Dr. W. E. Walker, McKeesport.
Dr. W. A. Garman, Berlin.
Dr. H. R. Hardtmayer, Allegheny.
Dr. Hiram Miller, Chester.
Dr. E. O. Kane, Kane.

Dr. A. M. Lichty, Elk Lick.
Dr. D. C. Lindley, New Castle.
Dr. F. L. Marsh, Mt. Pleasant.
Dr. R. S. McKee, New Haven.
Dr. H. A. Miller, Pittsburg.
Dr. R. H. Pillow, Butler.
Dr. J. H. Price, Allison Park.
Dr. D. T. Rees, Hyndman.
Dr. W. F. Robeson, Pittsburg.
Dr. C. C. Ross, Clarion.
Dr. J. H. Shannon, Washington.
Dr. J. C. Sheridan, Johnstown.
Dr. A. R. Shuster, Finleyville.
Dr. W. S. Stewart, Braddock.
Dr. V. F. Thomas, Evans City.
Dr. W. R. Thompson, Washington.
Dr. A. W. Urmson, New Castle.
Dr. W. W. Weaver, Philadelphia.
Dr. F. H. Weidmann, Confluence.
Dr. C. H. Wilson, Glenwood.
Dr. W. M. Woodward, McKeesport.
Dr. T. H. White, Connellsville.
Dr. H. R. Wilson, Callery.
Dr. H. A. Zimmerman, Holsopple.

SUB-DIVISION, SANATORIA AND DISPENSARIES FOR THE TREATMENT OF TUBERCULOSIS.

Medical Director, Mt. Alto Tuberculosis Sanatorium, Fred C. Johnson, M. D.
Chief Resident Physician, A. M. Rothrock, M. D.
Medical Inspector of Dispensaries, Thomas H. A. Stites, M. D.
Stenographers, Miss Olive E. Jamison.
Miss Nellie M. Tittle.
Miss Josephine Hill.

SUB-DIVISION SPECIAL MEDICAL INSPECTION.

Special Medical Inspector, John A. Bouse, M. D.
Stenographer, Miss Mary E. Sandoe.

COUNTY DISPENSARIES FOR TUBERCULOSIS.

County.	Location.	Chief (Assisted by Medical Staff and Nurses).
Adams,	Gettysburg,	J. R. Dickson, M. D.
Allegheny,	Pittsburg,	S. M. Rinehart, M. D.
		J. F. Edwards, M. D.
Armstrong,	Kittanning,	T. N. McKee, M. D.
Beaver,	Rochester,	E. S. H. McCauley, M. D.
Bedford,	Everett,	W. de la M. Hill, M. D.
Berks,	Reading,	Israel Cleaver, M. D.
Blair,	Altoona,	Joseph D. Findley, M. D.
Bradford,	Towanda,	S. M. Woodburn, M. D.
Bucks,	Doylestown,	I. S. Plumire, M. D.
Butler,	Butler,	H. D. Hockenberry, M. D.
Cambria,	Johnstown,	William E. Matthews, M. D.
Cameron,	Emporium,	H. S. Falk, M. D.
Carbon,	Mauch Chunk,	J. K. Henry, M. D.
Centre,	Bellefonte,	Geo. F. Harris, M. D.

COUNTY DISPENSARIES FOR TUBERCULOSIS.—Continued.

County.	Location.	Chief (Assisted by Medical Staff and Nurses).
Chester,	West Chester,	Joseph Scattergood, M. D.
Clarion,	Clarion,	J. T. Rimer, M. D.
Clearfield,	Clearfield,	S. C. Stewart, M. D.
Clinton,	Lock Haven,	R. B. Watson, M. D.
Columbia,	Berwick,	S. B. Arment, M. D.
Crawford,	Meadville,	J. K. Roberts, M. D.
Cumberland,	Carlisle,	H. B. Bashore, M. D.
Dauphin,	Harrisburg,	Paul A. Hartman, M. D. J. W. Ellenberger, M. D.
Delaware,	Chester,	Robert S. Maison, M. D.
Elk,	Ridgway,	J. E. Rutherford, M. D.
Erie,	Erie,	J. W. Wright, M. D.
Fayette,	Uniontown,	O. R. Altman, M. D.
Forest,	Tionesta,	T. J. Bovard, M. D.
Franklin,	Chambersburg,	H. X. Bonbrake, M. D.
Fulton,	McConnellsburg,	J. W. Mosser, M. D.
Greene,	Waynesburg,	John T. Iams, M. D.
Huntingdon,	Huntingdon,	H. C. Frontz, M. D.
Indiana,	Indiana,	William A. Simpson, M. D
Jefferson,	Punxsutawney,	J. E. Grube, M. D.
Juniata,	Mifflintown,	William H. Banks, M. D.
Lackawanna,	Scranton,	J. C. Reifsynder, M. D.
Lancaster,	Lancaster,	J. L. Mowery, M. D.
Lawrence,	New Castle,	J. D. Moore, M. D.
Lebanon,	Lebanon,	A. J. Riegel, M. D.
Lehigh,	Allentown,	Morris F. Cawley, M. D.
Luzerne,	Wilkes-Barre,	Chas. H. Miner, M. D.
Lycoming,	Williamsport,	Frank Seely, M. D.
McKean,	Bradford,	W. C. Hogan, M. D.
Mercer,	Sharon,	P. P. Fisher, M. D.
Mifflin,	Lewistown,	C. H. Brisbin, M. D.
Monroe,	Stroudsburg,	W. E. Gregory, M. D.
Montgomery,	Norristown,	H. H. Whitcomb, M. D.
Montour,	Danville,	George A. Stock, M. D.
Northampton,	Easton,	E. M. Green, M. D. T. C. Zulick, M. D.
Northumberland,	Shamokin,	R. H. Simmons, M. D.
Perry,	New Bloomfield,	A. R. Johnston, M. D.
Philadelphia,	Philadelphia,	Alfred Stengel, M. D. A. P. Francine, M. D.
Pike,	Milford,	Wm. B. Kenworthy, M. D.
Potter,	Coudersport,	E. H. Ashcraft, M. D.
Schuylkill,	Pottsville,	L. T. Kennedy, M. D.
Snyder,	Selinsgrove,	F. J. Wagenseller, M. D.
Somerset,	Somerset,	Charles P. Large, M. D.
Sullivan,	Dushore,	J. L. Christian, M. D. P. G. Biddle, M. D.
Susquehanna,	Montrose,	H. B. Lathrop, M. D. J. G. Wilson, M. D.
Tioga,	Tioga,	S. P. Hakes, M. D.
Union,	Mifflinburg,	C. H. Dimm, M. D.
Venango,	Oil City,	J. P. Strayer, M. D.
Warren,	Warren,	M. V. Ball, M. D.
Washington,	Monongahela City,	C. B. Wood, M. D.
Wayne,	Honesdale,	H. B. Ely, M. D.
Westmoreland,	Greensburg,	I. M. Porster, M. D.
Wyoming,	Tunkhannock,	B. E. B. Heman, M. D.
York,	York,	J. S. Miller, M. D.

CENTRAL BUREAU OF VITAL STATISTICS.

State Registrar, Wilmer R. Batt, M. D.

Chief Clerk, Herbert B. Nelson.

Clerks, Elmer W. Ehler.
H. E. Fox.

Stenographers, Miss Erma R. Longenecker.
Miss Lila H. Connelly.
Miss Anna Madeburg.
Miss Margaret D. Prescott.

Morbidity Statistics Sub-Division in charge of Wilmer R. Batt, M. D.
Clerks, Mrs. Edith L. M. Huber.
Miss Katharine Irene McCauley.
Miss Martha E. McGranagan.

Marriage Statistics Sub-Division in charge of Wilmer R. Batt, M. D.
Clerks, Miss Emilie Charters.
Miss Teresa Neupert.
Miss Josephine Snavely.
Miss Martha Ziegler.

In this Department are employed 972 Local Registrars, each with a Deputy, and 214 Sub-registrars.

DIVISION OF SANITARY ENGINEERING.

Chief Engineer, F. Herbert Snow, C. E.

Principal Assistant Engineer in charge of General Office Work, Walter S. Hanna.

Principal Assistant Engineer in charge of Special Investigation, Charles H. Cummings.

Principal Assistant Engineer in charge of design and construction, Thomas Fleming.

Assistant Engineer, William H. Ennis.

Engineer and Draftsman, John M. Mahon, Jr.

Chief Draftsman, James L. W. Gibbs.

Engineering Inspector, H. A. Otto.

Engineering Inspector, F. L. Gardner.

Transitmen, Chester A. Eckbert.
C. R. Forbes.

Rodmen, Edgar R. Barnes.
Ivan M. Glace.

Tracers, J. W. German, Jr.
Max Matthes.
F. M. Sourbier, Jr.

Chief Clerk in charge of nuisance complaints, Daniel V. Ness.

Chief Clerk in charge of local health officer work, B. C. Dickinson.

Clerk, Mrs. Ellen Johnston.

Stenographers, Miss M. Irene Cuenot.
Miss M. Louise Eckels.
Miss Jane Gilbert.
Miss M. Ethel Hurst.
Miss Mary E. Russell.
Mrs. Mary K. Sourbier.

Chief Sanitary Inspector, M. K. Ely.

Field Officers in charge, James M. Clark.
David H. Coleman.
John J. Considine.
J. B. Nightingale.
John W. Pinkham.
William R. Teats.
Special Field Inspectors, Wilson W. Ritter.
Daniel Zellers.
Ira F. Ziegler.
Field Officers, Henry Andrews.
W. R. Claypool.
John W. Downes.
Richard F. Einstein.
Morris Z. Frederick.
Howard M. Haines.
Thomas Hickey.
Warren S. Hood.
J. Alfred Judge.
H. S. Kauffman.
W. F. Lerch.
Chas. T. Maclay.
William P. Miller.
Thomas R. Nicholson.
Otto F. Nickel.
W. W. Reno.
Roy Souder.
Chas. P. Spelker.
H. C. Weirick.

LABORATORIES AND EXPERIMENTAL STATION.

Director of Pathology ,Allen J. Smith, M. D., University of Pennsylvania, Philadelphia.
Chief of the Laboratories, Herbert Fox, M. D.
Bacteriologist, Damaso Rivas.
Assistant Bacteriologist, James B. Rucker, M. D.
Assistant, Miss Lucy H. Irwin.
Stenographer, Miss Helen M. O'Donnell.
Laboratory Diener, John R. Taylor.
Animal Diener, Leon J. Harris.

DIVISION OF DISTRIBUTION OF BIOLOGICAL PRODUCTS.

Chief of Division, Henry W. Pierson.
Stenographer, Mrs. Lucy A. Thompson.
Clerk, Miss Mabel E. Thorn.
There are 532 Antitoxin Distributors throughout the State.

DVISION OF ACCOUNTING AND PURCHASING.

Office 1900 Race Street, Philadelphia.

Accounting and Purchasing Agent, E. I. Simpson.
Bookkeepers, Miss Agnes E. Bean.
Miss Mary L. Thompson.
Stenographers, Miss Minnie A. Light.
Miss Mary G. Lynch.

DIVISION OF SUPPLIES.

Superintendent, Charles Hartzell.
Clerks, Miss Susan J. Riegel.
Miss Rosie E. VanHorn.
Miss Maud E. VanOrmer.

ESTABLISHMENT OF NEW BOARDS.

Allusion was made in the last annual report to the absence of or defective organization of the health boards in many boroughs and first-class townships and to the serious handicap which this condition entailed in perfecting the sanitary organization of the State. The action then taken in appointing a special Medical Inspector to inquire into this condition both by correspondence and by personal visitation has been amply justified. Ignorance of the requirements of the law and the methods of sanitary procedure together with the entirely inadequate appropriations made by councils for this purpose were found to be the main causes of our backwardness in these matters. The personal interest taken by the Department in the sanitary welfare of the smaller towns is, however, awakening a gratifying response. During the year, seventy-two new boards were organized in fifty-two separate counties. Many of these were in towns remote from centres of population and in the mountainous districts of the State. In the month of September the report of this officer showed that the number of boroughs in the State was 882, of which 718 had organized boards. Of these 449 had filed reports with the Department. This left 173 still unprovided.

The number of counties in which every borough organized was 18. The number in which five or less than five boroughs were unorganized was 38, and the number in which more than five were unorganized was 11. The circular of the Department on room disinfection was warmly welcomed, on account of its clearness and definiteness, and was adopted by many of the old boards as well as those just organized. A detailed report of this work will be found under the Operations of the Divisions.

THE PREVENTION OF BLINDNESS.

The American Medical Association at its last annual meeting authorized the issue of the Report of the Committee on Ophthalmia Neonatorum, which called attention to the fact that a very large percentage of the cases of blindness which the State is called upon to support is caused by that disease, which is an easily preventable one, and urged the necessity for concerted action on the part of the medical profession in all the States of the Union to curtail this serious evil. That this appeal is timely is sufficiently indicated by a recent report of the Pennsylvania School for the Blind, which shows that in the past eight years more than one-third of the persons admitted to that institution have owed their affliction to this cause.

It was therefore thought desirable to revive and put into effect a law which has for many years lain dormant on our statute book, which reads as follows:

AN ACT.

For the prevention of blindness, imposing a duty upon all midwives, nurses or other persons having the care of infants, and also upon the health officer, and fixing a penalty for neglect thereof.

Whereas, Statistics compiled in this country and Europe demonstrate that fully twenty-five per centum of the blind owe their affliction to an inflammation of the conjunctiva appearing a few days after birth;

And Whereas, Experience has proved that the inflammation can be cured and the eyesight saved in the majority of cases if treatment be instituted at an early stage of the disease;

And Whereas, Destruction of the eyes and blindness are usually the result of delay of treatment.

Section 1. Be it enacted, etc., That should one or both eyes of an infant become inflamed or swollen or reddened at any time within two weeks after birth, it shall be the duty of the midwife or nurse, or other person having the care of such infant, to report in writing, within six hours after the discovery thereof, to the health officer or legally qualified practitioner of the city, town or district in which the mother of the child resides, the fact that such inflammation or swelling or redness exists.

Section 2. That it shall be the duty of said health officer, immediately upon receipt of said written report, to notify the parents or the person having charge of said infant of the danger to the eye or eyes of said infant by reason of said condition from neglect of proper treatment of the same, and he shall also enclose to them directions for the proper treatment thereof.

Section 3. Every health officer shall furnish a copy of this act to each person who is known to him to act as midwife or nurse in the city or town for which such health officer is appointed, and the Secretary of State shall cause a sufficient number of copies of this act to be printed and supply the same to such health officers on application.

Section 4. Any failure to comply with the provisions of this act shall be punishable by fine not to exceed two hundred dollars, or imprisonment not to exceed thirty days, or both.

APPROVED.—The 26th day of June A. D. 1895.

DANIEL H. HASTINGS.

Copies of the above law were distributed to all physicians and midwives throughout the State, together with letters of explanation and instruction.

The following instructions were sent to Health Officers of the Department of Health:

"In order to carry out the provisions of the above law, it becomes your duty to acquaint yourself with the names and adddesses of all midwives and nurses residing or practicing in your district and to place a copy of the law in the hands of each, instructing her as to its requirements.

"Immediately on receiving notification from a midwife or nurse of the occurrence of a case of red or swollen eyes in a young infant, you will inform the attending physician of the fact, and will place in the hands of the midwife or nurse the accompanying instructions, explaining that she is to follow them ONLY UNTIL A PHYSICIAN ARRIVES to take charge of the case. If no physician has been employed you will urge upon the family the necessity for obtaining one, as otherwise the child may become permanently blind."

"Instructions to Nurses and Midwives for Treating Inflamed Eyes in Newborn Infants UNTIL THE PHYSICIAN ARRIVES:

To one pint of boiled water add two teaspoonfuls of boric acid and half a teaspoonful of table salt, and keep covered in a jar which has been boiled. With a perfectly clean cloth or a wad of absorbent cotton bathe the lids with this solution, and drop a few drops in the eye three times a day."

Of course the intention of the law is that the physician shall treat the eye with a salt of silver, or some equally efficacious agent, but deeming it inexpedient to entrust the use of so strong an application to the unskilled hands of a nurse or midwife, we suggested the use of the above harmless but efficacious detergent until the services of a physician could be secured. It is hoped by the enforcement of this law to put an end to a fertile cause of misery and disability and save the state from a serious burden. In this connection the following communications were addressed to County Medical Inspectors and local boards of health:

Dr. ————,

County Medical Inspector.

Dear Sir: Your attention is called to the enclosed copy of the law of June 26, 1895, P. L. 373, designed to prevent blindness in a large and increasing number of cases in this state.

The statistics of the Pennsylvania School for the Blind show that the average annual percentage of cases of blindness received in that

school for the past eight years directly attributable to Ophthalmia Neonatorum, has been 33. All of this misery and disability is preventable.

As you will observe the onus of the enforcement of the law rests upon the health officers and midwives and nurses. I trust, however, that you will lose no opportunity to use your influence to aid them in the discharge of this important duty.

Yours very truly,

SAMUEL G. DIXON,
Commissioner.

To the Secretary of Board of Health of

_____

_____

Dear Sir: Allow me to call your attention to the enclosed copy of the Act of June 26, 1895, P. L. 373, having for its object the prevention of blindness. If its provisions are carried out there is reason to hope that one-third of the cases of that sad affliction, which so greatly diminishes the productive value of the individual and too often renders him a burden on society, may be prevented.

This Department is already taking steps through its County Medical Inspectors and Health Officers to enforce the law in the rural districts. I venture to express the hope that your Board will appreciate the serious importance of the question and adopt such measures as will lead to its early enforcement in the municipality under your jurisdiction.

Yours very truly,

SAMUEL G. DIXON,
Commissioner.

THE STATE'S OFFICIAL CAMPAIGN AGAINST TUBERCULOSIS.

The opening of the year found the campaign of the Department against Tuberculosis fairly inaugurated. I was able to report the Dispensary system as thoroughly organized, seventy-two dispensaries fully officered and equipped being in active operation and four hundred and thirty-five applicants having received attention.

Eighty-three have been opened during the year, making the present number one hundred and five, and a further extension of the system is in contemplation. Under the report of the Medical Inspector of Dispensaries will be found a list of the location and a statement of the equipment of the dispensaries and of the method of dispensary work, and other details of interest.

It was felt that in addition to notices in the public press it was desirable to give the fact of the inauguration of this movement the

widest publicity in those quarters where it would be most likely to reach the sufferers. The following letters were therefore addressed to different classes of individuals, private and well as official:

To the Secretary of each local Board of Health.

"Dear Sir: It is desirable that you and the members of your Board should have accurate information with regard to the campaign which this Department is inaugurating against that deadly foe of human life, Pulmonary Tuberculosis, generaally known as Consumption of the Lungs.

"By your own personal investigations, as well as through your Health Officer, you become acquainted with the health conditions of every family in your town. You are informed through your system of vital statistics of every death from this disease that occurs, and you have learned that it is a communicable disease.

I therefore earnestly request you to make use of the facts which you thus officially obtain to disseminate to all whom it may especially concern a knowledge of the fact that the State Department of Health has opened a Tuberculosis Dispensary at ———— under the care of Dr. ————, County Medical Inspector, at which competent medical advice will be given and milk and eggs, the principal food of consumptives, will be furnished free of expense to indigent cases as well as such medicine as may be necessary.

In order to secure speedy recovery, cases should apply in the earliest stage of the disease.

Trusting that we shall have your earnest support in the contest against this inveterate enemy of the human race,

I am, Yours very truly,

Commissioner."

To the Secretary of each County Medical Society.

"Dear Doctor: Your Society is of course deeply interested in the wave of enthusiasm which is spreading all over our Country in a combined effort to check the ravages of Tuberculosis Pulmonalis. I feel sure, therefore, that the State Department of Health will have the active cooperation of your Society and of every member of the same in its endeavor to put our own State in the fore front of this important movement. In addition to the Sanatoria which the Legislature has authorized we are establishing a Tuberculosis Dispensary in each County of the State. In your own County it is located at ———— and will be under the charge of Dr. ————, County Medical Inspector.

Our object will be to place reliable medical advise within the reach of those whose means are so limited as to make it impossible for them to consult an expert or go to a pay Sanatorium.

To such persons as it seems necessary we shall also furnish milk and eggs and such medicines as seem to be essential free of cost.

Recent experience, as you are well aware, renders it of the utmost importance that the treatment of these cases should be begun at the earliest possible moment before the bacillus has produced much destruction of the lung tissue.

You are in a position to see and recognize suspicious cases long before the patient or the patient's friends suspect the presence of the organism.

I have most earnestly to request that whenever in your practice you meet a case that you feel to be needing and deserving State aid, you will lose no time in giving the necessary information, which may in a large proportion of cases lead to an arrest of the disease and the removal of a menace to the community.

Believe me, dear Doctor, Yours very truly,

Commissioner."

To each Township Health Officer.

"Dear Sir: The Department of Health desires to avail itself of your services in carrying on its campaign against Pulmonary Tuberculosis or Consumption of the Lungs. In order to reduce the prevalence and mortality of this most deadly of all diseases, we are establishing a Tuberculosis Dispensary in each County in the State, at which indigent persons threatened with or suffering from this disease can not only receive competent medical advice, but also food in the shape of milk and eggs and medicine, if needed.

Your duties give you an intimate knowledge of the conditions of life and pecuniary circumstances of the population of your district. You will be likely to learn of consumptives or of persons in failing health, and you will therefore enjoy an opportunity of advising such persons of the hope of recovery thus held out to them.

You are, therefore, instructed, in your visits throughout your district, to lose no chance of spreading this information as generally as possible and especially in families where you have reason to think that it is needed.

The dispensary of your County is located at ————, and the physician is Dr. ————, County Medical Inspector.

Yours truly,

Commissioner."

To the Secretary of Womens Clubs and Aid Associations, through clergymen:

"Will the pastor kindly see that this letter is placed in the hands of the Secretary of the Ladies' Aid Society or similar organization of the church and make such public announcement of the dispensary work from his pulpit as he may think best?

"Dear Madam: The Department of Health of the Commonwealth of Pennsylvania is desirous of obtaining the co-operation of yourself and the members of your association in its great fight against Tuberculosis of the Lungs, usually known as Consumption. It is now establishing in each county in the State a dispensary for the treatment of indigent persons suffering from this disease, a disease which is responsible for the deaths of a larger number of our people than any other. In your own county the dispensary is located at ———— and the County Medical Inspector who has charge of it is Dr. ————.

Any persons who suspect that their lungs are becoming affected and whose means do not permit them to go to a private sanatorium or expert, can, on applying at the dispensary on the advertised days, obtain a reliable opinion as to whether or not they have the disease in its early stage If they prove to need the special care here given they will receive exact instructions as to their diet and mode of living, and in cases where it seems desirable and practicable, they will be furnished the milk and eggs, which should constitute the greater part of their food, free of expense. Medicines, if needed, will also be furnished free.

Patients will, of course, be treated in any stage of the disease, but so far as the work of these dispensaries is to be curative, it is a matter of the utmost importance that cases should be seen as early as possible. It is here especially that the knowledge which your members possess of those needing aid can be of the greatest possible assistance. The patients themselves will be missionaries and educators in their own family and circle of acquaintances, disseminating the knowledge of the precautions which are absolutely essential for the protection of those around them from acquiring the disease.

"Nurses will also visit the homes of the patients in order to make sure that the instructions of the physician are faithfully carried out as well as to detect unsanitary conditions which might retard the patient's recovery. Trusting that you and your public-spirited associates will appreciate the field for usefulness thus opened and lend us your valuable assistance in this most important effort, in which to insure success, the whole people must join, I am Yours very truly,

SAMUEL G. DIXON,
Commissioner."

To employers of Labor.

"Dear Sir: As an employer of large numbers of operatives it is a matter of considerable importance to you that a high standard of health should be maintained among these whose daily labor contributes to the success of your enterprise. The experience of our Department will probably be corroborated by your own that Pulmonary Tuberculosis or Consumption of the Lungs is one of the most constant and serious obstacles to the steady prosecution of labor, striking down its victims, as it does, just at the time of life when their services are most valuable. I feel sure, therefore, that the State Department of Health will receive your ready co-operation in the effort which it is making to restrict the spread of this most serious of all infections.

The plan which this Department is developing is, in addition to the forest sanatoria authorized by law, to establish a Tuberculosis Dispensary in every County in the State, where sufferers from this deadly disease whose pecuniary means are limited, may obtain competent medical advice, food in the shape of milk and eggs, and, if necessary, medicine, free of expense.

The instructions which they will receive as to the precautions necessary to be taken to prevent them from transmitting the disease to other members of their families will be conveyed by them to the others and thus becomes a means of education to the entire community. In this way it is hoped to soon diminish this terrible leak in the productive resources of the country.

Allow me to suggest that it might be a remunerative scheme for you to institute a systematic Medical Inspection of your employees in order to detect the disease in its earliest stage when it is capable of cure, and to advise all suspicious cases to apply to the State County Dispensary for advice.

The Dispensary for ——— County is located at ..... It is in charge of ——— and is open

Yours very truly,
Commissioner."

It was owing to this effort in part as well as to the kindly and universal aid of the newspapers of the State that patients began to flock to the Dispensaries as soon as they were opened.

The total number applying at the Dispensaries during the year was 8699. The number remaining under treatment at the end of the year was 5204. The number in whom the disease was arrested was 105, and of those who left improved 1041. There were 500 deaths and 1249 applicants who paid only a single visit. The total number of visits at the dispensaries was 47,318, and the number of visits to patients at their homes by the nurses was 33,305. The number of quarts of milk dispensed was 385,818, and the number of dozen of eggs 54,403.

THE SOUTH MOUNTAIN SANATORIUM.

The work in preparation of the Sanatorium near Mont Alto in Franklin County was then described as well advanced and the temporary accommodation of a large number of incipient cases in new tents, manufactured for the purpose, under the direction of the Adjutant General was reported. Although the winter was a somewhat severe one, as the supply of blankets of good quality was adequate, there were few complaints of the cold, and not a single case of Penumonia developed. During the year the cottages then in process of erection have been completed to the number of forty-one and have proved to be entirely satisfactory. These afforded accommodations for 328 patients.

The advantage of the cottage system over that of the huge and costly hospital, with its magnificent architectural display and its large, crowded wards, is daily impressing itself on the minds of those in charge. Apart from the more complete ventilation thus secured, during the hours of sleep, the necessity of going into the open air for meals, and for visiting the bath and toilet houses, is of the greatest importance, as it overcome the inevitable tendency of patients to remain unnecessarily in bed, without the exercise of compulsion on the part of the physicians or other officers, which is always resented.

It is undoubtedly theoretically possible to restore an incipient consumptive to health in a city or near the sea level, but there is also practically no room for doubt that a moderate altitude, remote from the contaminating influences of the city, ensures a purity of atmosphere and equability of temperature which greatly hasten and facilitate the cure. Add to this an environment of balsamic forests through which the outside air is, so to speak, filtered and which serve to check violent meteorological commotions, and you have all the conditions usually sought after for a tuberculosis sanatorium at home or abroad.

Such are the natural conditions which prevail at South Mountain. A copious supply of pure water, adequate modern drainage and sewerage facilitates, with a disposal plant, good roads and paths, and a careful selection of sites for the camps have so enhanced these natural advantages, as to have led an enthusiastic visitor to entitle the settlement "The Hillside City of Hope."

Detailed descriptions of the cottages, pavilions and other buildings in the camp will be found in the Catalogue of the Exhibit of the Department at the International Tuberculosis Exhibition under the head of Operations of the Divisions.

The Representation of the Department at the International Congress on Tuberculosis at Washington, D. C.

Early in the year the following communication was received from the Governor of the State, with the request that an exhibit for this purpose, adequate to the importance of the Commonwealth and the occasion, should be prepared and forwarded to Washington.

TREASURY DEPARTMENT,
Washington, December 26, 1907.

Sir: The prevention of tuberculosis is engaging the increasing attention of public health authorities and philanthropists throughout the world. There is certainly no more important public health question demanding the activities of sanitary officers at the present time, and it is desirable that our people generally recognize its importance and enlist in the campaign against tuberculosis.

The diffusion of knowledge with respect to the disease is no doubt one of the most important measures that can be instituted by public health officials. With the view to this end, an International Congress on Tuberculosis will be held in Washington, D. C., September 21 to October 12, 1908. At this Congress all phases of the problem will be considered, a number of eminent specialists from abroad having signified their intention to participate in the deliberations.

Section VI will be devoted to the National, State and Municipal control of the disease, and it is urged that all public health officials attend its sessions, participate in the benefits to be derived from discussions of the governmental responsibilities and activities, and as a result be better prepared to assist in a systematic campaign aginst the disease throughout the country.

Respectfully,
WALTER WYMAN,
Surgeon-General.

By request of Surgeon-General Wyman I accepted the appointment of Vice-President of the Section referred to, of which he was himself the President. As Chairman of the Pennsylvania State Committee of the Congress, I shared in the preparation of the exhibits of the various voluntary organizations for the prevention of

tuberculosis throughout the State in addition to devising and arranging that of the Department. The State Registrar of Vital Statistics was deputed to supervise the transportation and installation of the latter. A descriptive catalogue of the Exhibit in pamphlet form, 31 pp. octavo, was distributed to visitors. This will be found later in the report.

Several members of the medical staff of the Department were present during the congress, explaining the exhibits in detail and giving lectures. Personally attending and presiding over the Section referred to, I read a paper, entitled "The Governmental Control of Tuberculosis Patients in Pennsylvania." Further reference to this congress will be made later as well as to the Seventh International Conference held at Philadelphia in September, where also I read a paper. These occasions assembled scientific students of the problems of tuberculosis from all parts of the world and undoubtedly gave a great impulse to the popular awakening on this question which the last few years have witnessed. It is proposed to install the Exhibit of the Department in the State Capitol for the information of the members of the Legislature and the citizens of Harrisburg during the coming Winter, and, after the adjournment of that body, to despatch it on a tour of instruction through the State, accompanied by a corps of carefully selected demonstrators and lecturers.

MORBIDITY REPORTS.

In a State where the reporting of disease has been to a great extent neglected, and in which indeed by many of the population the attempt to take a census has been violently opposed on religious grounds, it could not reasonably be expected that the first efforts to collect such figures would be in the least degree successful. In regard to mortality returns, the case is quite different. The necessity for burial affords a lever which can be worked with an approach to certainty. The number of deaths which fail of being reported is extremely small. But in illness there are elements of uncertainty apart from the carelessness or tardiness of the physician. In many cases no physician is called. In others the fear of quarantine leads to concealment. Hence it need not surprise us that the total number of cases of communicable diseases returned in 1908 was 113,357 as compared with 70,864 in 1907. An increase of 37 per cent. in a single year is of course not for a moment to be thought of and can only be attributed to increased faithfulness on the part of physicians in reporting and increased vigilance on the part of health officers and registrars.

Scarlet Fever has been extremely prevalent all over the State. It has, however, been of the same mild type which has marked it of late years.

Measles, too, has been epidemic in many places. Until the popular heresy that this is so mild a disease as to be negligible and that it is a good thing for children to "have it and be over with it," ceases to be held, this disease will continue not only to reap a large harvest of young lives, but to leave in its train an army of the blind, the dumb and the consumptive to be a burden on the community.

It is encouraging to notice that physicians are becoming alive to the importance of reporting that serious contagious infection of the eye, Trachoma, which is responsible for so many cases of blindness.

WORK DONE BY HEALTH OFFICERS OF THE DEPARTMENT FOR THE YEAR 1908.

No. of reports received from physicians,	30,671	
No. of premises placarded,	12,369	
No. of quarantine permits issued,	8,634	
No. of premises disinfected,	13,705	
No, of rooms disinfected,	27,290	
Total amount of air space in cu. ft. disinfected,	29,686,501	
Total number of pts. of Formaldehyde used,	297,045	
No. of measures of Potassium Permanganate used (8 oz. to the measure),	312,348	
Bichloride of Mercury used,	153	bottles
Carbolic Acid used,	35	lbs.
Sulphur used,	420	"
Lime used,	1,014	"
Chloride of Lime used,	114	"
No. of Creameries inspected,	178	
No. of Dairy inspections made,	15,359	
No. of schools inspected,	19,027	

MORTALITY.

The total number of deaths in the State for the year was 112,246. This was a decrease as compared with the year before of 3723.

The principal cause of death was Tuberculosis, which claimed 10,180 victims. Of these 8,688 perished from the pulmonary form of the disease and 1,492 from other forms. Pneumonia was an easy second in the race of death, carrying off 7,264. This, however, was a diminution from the showing of the year before, which was 7,849, a decrease of 585.

COMMUNICABLE DISEASES.

SMALLPOX.

We are fortunate in being able to record the fact that during the year not a single death from this disease took place. This is a decrease of a hundred per cent. from last year, when one death was reported.

From one point of view, however, it is not so fortunate, as it will throw our people off their guard and thus strengthen the argument of the antivaccinationists that smallpox is now a negligible disease and that vaccination is, therefore, an unnecessary hardship. No doubt the next Legislature will see a renewal of the hysterical efforts which were made before the last Legislature to procure the repeal of the excellent law which makes vaccination a pre-requisite to admission to school.

TUBERCULOSIS.

The mortality from Tuberculosis in all its forms amounted to 10,211, a decrease of 614 from the year 1907.

While this is gratifying as a general statement, still more gratifying is it to be able to state that all of this decrease was in pulmonary tuberculosis, against which the Department has been making its especial fight, the actual decrease having been 614, a reduction of more than six per cent.

TYPHOID FEVER.

This disease, which is the special opprobrium of Pennsylvania, carried off 2,450 of our population. This is fewer than the number of typhoid deaths for 1907 by 1,088, a reduction of more than 30 per cent. When it is remembered that the 1907 report showed an improvement over 1906 of 379, it is impossible to escape the conviction that the faithful labors of the agents of the Department in the removal of sources of pollution from the watersheds combined with the improvements in municipal water supplies, the latter principally in the matter of filteration, are bearing fruit. The reduction in three years has been from 56.5 per hundred thousand in 1906 to 50.3 in 1907 and 34.3 in 1908.

SCARLET FEVER.

The deaths from Scarlet Fever were greatly in excess of those for the year previous and indeed for many years, reaching the figures of 1,217, the tendency to increase malignancy as well as to numerical increase observed in the last report having continued throughout the year

Measles also exhibited increased virulence, having caused 1,215 deaths, as compared with 714 in 1907, and more than scarlet fever.

Whoopingcough was responsible for 1,264 deaths, 23 less than in the preceding year and 286 fewer than in the year before than. Measles and whoopingcough combined, therefore, carried off 2,481 children, notwithstanding that they are so lightly regarded by the public.

Diphtheria is credited with 1,970 deaths. This is a gratifying diminution from the year 1907, which also showed a decrease from 1906 of 300, the decrease in the two years since the free distribution

of antitoxin to the indigent by the Department began having been 468. As pointed out by the Registrar of Vital Statistics, if the same death rate from diphtheria as prevailed in the U. S. registration area in 1890 had prevailed in Pennsylvania in 1908, the number of deaths would have been 6,980 instead of 1,970.

The attempt by the Department to fight Malaria and therefore to abate the Mosquito pest, which is responsible for it, was by the majority of people looked upon as chimerical. Our tables, however, seem to show that we are actually making headway in this unequal contest, the number of deaths from Malaria having been 99 in 1906, 81 in 1907 and only 44 in 1908, a diminution of more than one-half in two years. This certainly is a sufficient reply to the inquiry whether the Department was justified in making a mosquito survey of the State.

HOUSE AND ROOM DISINFECTION.

The duty of disinfecting premises after the presence of an infective disease is assigned to the Health Officers. For the destruction of the germs of communicable diseases the Department depends principally on the action of formaldehyde gas, as evolved from an official (U. S. P.) thirty-seven and a half per cent solution, by the action of Potassium Permanganate, in an apparatus provided by the Department.

The dimensions of this vessel have been fixed by empirical trial as ample for the diffusion of the gas, thus preventing its ignition when in contact with a live flame, an accident which might have most serious consequences. Each health officer is furnished with a supply of chemicals, the unit of supply being 5 pounds of formaldehyde and 22 pounds of potassium permanganate. During the year 3,485 units have been sent to the different health officers, besides 176 pounds of formaldehyde, and 170½ pounds of Permanganate, making a total of 153,516 pounds of Formaldehyde, which equals approximately 17,425 gallons, and 76,777 1-2 pounds of Potassium Permanganate.

Health Officers are instructed to notify the Department when their supply of disinfectants is running low, so that they may be ready for any emergency.

DIVISION OF LABORATORIES.

While the physicians of the State have been quick to appreciate and avail themselves of the immense advantages afforded them in the matter of diagnosis and prognosis by the laboratories of the Department. they have not yet learned the importance of furnishing clinical data and other information together with their samples, and this has greatly delayed the service by reason of the time consumed in correspondence.

Daily reports have been made to the Division of Medical Inspection by my instructions in order to act as a control on the Morbidity reports of communicable diseases. The rapid increase of work has necessitated the appointment of a Diener of Supplies to care for all outfits for the sending of specimens. The number of examinations made during the year has been 9,065, more than twice as many as during 1907, the greater number being in sputum and water.

During the year our Chief Bacteriologist has introduced improved methods of analysis of water, enabling us to differentiate the Bac. coli from allied species in water, making the diagnosis more exact and greatly shortening the time required for the search of this micro-organism.

The research work has been continued, covering investigations on the products of the tubercle bacillus and efforts at the production of immunity, the effects of repeated injections of Old Tuberculin in cows, the similarity between Barium Carbonate Poisoning and Rabies in dogs, and the study of the specimens from a case of combined leprosy and tuberculosis. Full details will be found in the report of this Division.

Experience has demonstrated that the examination of the sputa of tuberculosis patients is by no means devoid of danger to the examiner and even to others working in the laboratory. A device was introduced early in the year with the object of minimizing this risk as far as possible. This consisted in the erection of a cage over the desk at which the spreading and drying of the sputa is done. This was made by supporting a glass plate on the sides and front by a wooden frame fitted with a wire screen, and so slanted that it shall be two inches higher at the back than at the front.

At the back is a solid wooden partition, from which a vent leads to a six-inch galvanized iron pipe containing a large Bunsen flame. All the dried particles escaping into the air go up this flue and are destroyed by the high temperature of the air or walls. The top of the shelter is hinged so that it can be lifted when not in use. When the specimens are dry they are rendered innocuous by fixation in the flame. Notwithstanding the liberal accommodations furnished us by the University of Pennsylvania, the work is growing to such an extent that the possibility of being forced to seek additional space outside is forcing itself upon us.

SCHOOL INSPECTION.

Early in the year the following instructions were sent to the township health officers:

"The second inspection of township schools in your district is hereby authorized.

Advise us forthwith of the number of schools in *each township* in your district that we may make permanent records of same and send you Form 51.

When making returns note on the reverse side of the sheet existing nuisances or conditions otherwise prejudicial to the health of pupils, as well as sanitary improvements in such conditions effected since your first inspection.

In addition to answering the question on the blanks you will please note on the reverse side of the blank the schools not complying with the following laws, and mention specifically wherein the respective requirements have been violated in each instance.

'That boards of schools directors and controllers shall provide suitable and convenient water-closets for each of the schools under their official jurisdiction, not less than two for each school or school building, where both sexes are in attendance in their respective school districts, with separate means of access for each; and unless placed at remote distances one from the other, the approaches or walks thereto shall be separated by a substantial close fence, not less than seven feet in height, and it shall be the duty of the directors or controllers to make provision for keeping the water-closets in a clean, comfortable and heathful condition.'

'That the boards of school directors and controllers of each school district of this Commonwealth be and they are hereby required at least once during each full school term, and prior to the first of January of each year, and within thirty days after the close of each annual school term, to have taken out, removed and hauled away all excrement and waste matter from every outhouse or water-closet connected with or standing upon the premises of every public school house in the Commonwealth or have the same properly disinfected; and they are required to have every outhouse or water-closet properly scrubbed, washed out and cleaned, the inside walls whitewashed and the vaults or receptacles covered with a layer of fresh dirt or slacked lime within ten days of the opening of each annual school term.'

On a separate sheet of paper, but attached to each school inspection blank, we desire you to copy the names of unvaccinated school children attending school, as well as the name and address of their parent or guardian as recorded in the school register, observing the following arrangement:

Pupil, ... Parent, ... P. O. Address, ...

Observing the same arrangement, record on an additional sheet (also appended to the blank) the names of all children debarred from this school for not complying with the vaccination law.

Your are to take no action otherwise, and any remarks that may occur to you should be made *only* to the Department on the separate sheet upon which such names are recorded."

The results of this inspection are seen in the following report. It will be observed that the school directors in the country are far from appreciating the requirements which the Legislature makes for the observation of the laws not of sanitation only but even of decency. Still a slight improvement may be noted over the conditions observed last year.

The apparent discrepancy between the rating of the schools for the Spring and Fall inspections for this year does not indicate, as

might at first appear, a deterioration in the condition of the schools in the Fall as compared with that in the Spring, but simply a difference in the plan of rating, with greater precision as to details and more care in analysis. The general designation of "sanitary" appeared unsatisfactory and was therefore omitted.

SCHOOL INSPECTIONS, FALL 1908.

Number of Schools Inspected,	11,392
Number in excellent condition,	588
Number having one or more insanitary condition,	10,804

DETAILS OF INSANITARY CONDITIONS.

SCHOOL HOUSE.	
Rooms overcrowded,	309
Ventilation poor,	658
Light poor,	107
Rooms not warm,	628
Stoves not jacketed,	5,859
Floors not warm,	1,107
Rooms not clean,	321
Cloak rooms not clean,	274
No cellar,	2,382
Cellar not clean,	98
Cellar used for storage,	60
WATER SUPPLY.	
Water not clear,	416
Water not free from odor,	352
Water unpleasant to taste,	990
Bucket not covered,	8,227
Bucket not scalded daily,	8,968
No individual cups,	10,093
Cups dipped in bucket,	8,390
Fresh supply not secured for each session,	1,620
Water carried by scholars,	9,329
No provisions to exclude surface drainage,	1,412
Waste water can seep back,	1,032
Nuisances within 200 feet,	509
GROUNDS AND OUTHOUSES.	
Grounds not clean,	504
Only one privy,	293
Not separate,	507
Privies in bad repair,	2,645
Privies not clean,	3,239
Approaches not screened,	7,333
No dividing fences,	7,799
Fences in bad repair,	141
No pits or vaults,	4,153

Vaults not tight,	6,498
Vaults full,	1,489
Vaults overflowing,	1,143
Privies offensive,	3,433
Lime or ashes not used,	6,823
Drainage not prevented,	4,933
Can drain into stream,	2,139

DAIRY INSPECTION.

Every community of any size in the State avails itself of the law to prevent the sale of impure or adulterated milk, but this effort only touches the circumference of the evil produced by the consumption of infected or filthy milk. The place to attack this serious source of disease is rather at the centre, where the milk is produced. For this reason I waited only until a sufficient number of township health officers had been appointed and had become somewhat familiar with their routine duties, to institute a systematic inspection of the dairies of the State, with a view to eventually weeding out all such as failed to conform to the regulations prescribed by the Department and thus securing an approximately pure food supply of this most important of our food products, especially important during the period of infancy.

It is true that some cities had already adopted a scheme of inspection of their own, but this was always rendered more or less ineffective by reason of absence of legal authority and could not be accomplished without the permission of the dairymen. With an absolute knowledge of the responsibility of this article of food for the spread of many of the most common communicable diseases on the one hand and of the comparative ignorance of the average farmer of the precautions necessary to be used to protect its purity on the other, the duty of the Department seemed very plain. In the month of July, therefore, the following letter of instructions was issued to the township health officers:

"To the Health Officer.

Dear Sir: We enclose dairy inspection blanks with the request that all dairy farms supplying milk to the general public in your district be inspected prior to August 20th.

We wish you to learn the name and location of dairymen, arrange your route and complete the work with as little expense and loss of time as possible.

See that all questions are answered definitely and legibly, leaving nothing for conjecture.

In answering question No. 5, 'Is it polluted?' it should be borne in mind that any water supply which receives drainage from sewers, privies, barnyards, manure piles, slaughter houses or industrial waste can only be considered as polluted. If you report pollution

of any water supply the evidence of such pollution should be apparent to the casual observer. Question No. 7 is especially important. The presence of stagnant pools, streams or swamps receiving sewage, through which the cattle may wade should be noted.

With regard to the cooling of milk, the appearance of the water in the cooling tank should be noted, whether it is clean and without sediment or whether ill-smelling, with or without sediment.

In view of the natural feeling that a man's home is his castle and that conditions existing thereon are matters of purely personal responsibility, the Health Officer's attitude must at all times be kindly considerate and his remarks free from criticism. The Health Officer is sent to the premises to obtain information only and the questions asked should be presented as tactfully as possible in order that no antagonism may be aroused. Our work is in the interest both of the milkmen and the consumers. The Department's aim is to be helpful to the farmer and not meddlesome.

After securing the data required, a copy of the accompanying circular of suggestions should be given to the farmer, with the request that same be tacked up in the stable.

Should any difficulty be encountered a detailed report of same should be made to this Department forthwith.

If more inspection blanks are required, advise us at once. If the whole supply is not needed, return those not required."

The following is a copy of the card furnished the inspector to guide him in his investigation:

COMMONWEALTH OF PENNSYLVANIA,
DEPARTMENT OF HEALTH.
SANITARY INSPECTION OF DAIRIES.
FOR THE PURPOSE OF
PROTECTING THE MILK FROM DIRT AND DISEASE PRODUCING GERMS.

Owner of Farm,
P. O. Address,
Township,
Sold at wholesale or retail,
Place marketed,
Name of Dealer,
P. O. Address,

CLEANLINESS OF COWS.

1. Are teats clean?
2. Are udders clean?
3. Are flanks clean?
4. Are tails clean?

WATER SUPPLY FOR CATTLE.

5. From Spring? Running Stream, Public Supply?
6. Is it polluted?
7. If polluted, what from?
8. Can cattle wade in polluted water?

STABLE.

9. Is the floor of the stable clean and dry?
10. Is the ceiling clean?
11. Is the ceiling tight?
12. Is the manure removed daily?
13. Can the cows lie down in their droppings?
14. How is the stable ventilated?
15. Has it sunlight?

COW YARD.

16. Is the stable manure scattered on the ground so the cattle can lie in the same?
17. Are there any pools of manure water in the yard?

MILK HOUSE.

18. If not separate, what else is kept in the same building?
19. Are all the windows, doors and outlets screened from flies?
20. Is there any provision for hot water where the utensils are washed?
21. Are the utensils clean?
22. Is the water supply used in the milk house from spring? Running water? Public supply?
23. Is it polluted?
24. If polluted, from what?

MILKING.

25. Do the milkers wear a clean covering over their clothes when milking?
26. Do they wash their hands before milking?
27. Do they wash the teats and udders of the cows?
28. Are the milking stools which they handle clean?
29. Do they milk the fore milk into the can?
30. Do they use milk on the hands and teats when milking?

HANDLING OF MILK.

31. Is milk cooled immediately after milking? How?
32. What dirty habits did you notice?
33. Has scarlet fever, typhoid fever, dysentery or any diarrhoeal condition existed within the household or among the employes of the dairy farm during the past year?
If so, which? Dates?
Doctor's name?
P. O. Address?

The circular of suggestions to the farmer was as follows:

"TO DAIRYMEN,

My Dear Sir:

Milk being one of the most valuable of food stuffs, the following suggestions are offered that it may be more generally used than at present and to prevent disease that is produced by dirty milk.

THE STABLES.

1. The floors, walls and ceilings of the stable should be tight, walls and ceilings being kept free from cobwebs. There should be as few dust-catching ledges and projections as possible.

2. Do not allow musty or dirty litter or strong smelling material in the stable. It is well to sprinkle the floor with air slaked lime or land plaster daily.

THE MILK HOUSE.

3. Cans should not be taken into the stable to be filled. Remove the milk of each cow at once from the stable to a clean room and strain immediately. Canton flannel or absorbent cotton makes a good strainer. The milk should be cooled as soon as strained. All milk houses should be screened from flies.

4. Milk utensils should be made of metal, with all joints smoothly soldered, or, when possible, should be made of stamped metal. Never allow utensils to become rusty or rough inside. Use milk utensils for nothing but handling, storing or delivering milk.

5. To clean dairy utensils use pure water only. First rinse the utensils in cold water; then wash inside and out in hot water; rinse again; sterilize with boiling water or steam; then keep inverted in a clean place or expose to the sun where no dirt can be blown or dropped into them.

MILKING AND HANDLING OF MILK.

6. The milker should wash his hands immediately before milking. The practice of moistening the hands with milk when milking is most vicious and uncleanly and should be avoided. He should wear a clean outer garment, which should be kept in a clean place when not in use. Tobacco should not be used while milking.

7. The first few drops of milk from each teat should not be milked into the can as it will be apt to injure the milk both as to keeping qualities and as to healthfulness for food stuff.

8. If any part of the milk is bloody, stringy, or unnatural in appearance, or if by accident dirt gets into the milk pail, the whole mess should be rejected.

9. Never mix warm milk with that which has been cooled, and do not allow milk to freeze.

10. Do not feed dry, dusty food previous to or during milking time.

11. Persons suffering from tuberculosis or skin disease, or those suffering from or exposed to those suffering from a contagious disease must not handle either the cows, the milk or milk utensils.

12. It is needless to say that the shorter the time between the production of milk and its delivery, and between delivery and use, the better will be the quality of the milk, providing it is cooled before transported."

The total number of dairies inspected was 17,618. Of these 2,442 were found to be in a condition which entitled them to the highest commendation. Of the remainder many were comparatively clean and carefully conducted but failed in one or more of the eight particulars noted in the card of questions.

For instance, on 480 farms the cattle were found to be drinking polluted water. In somewhat more than twenty-five hundred the floors of the stables were in an extremely filthy condition. In about the same number the milkers did not wash their hands or the udders of the cows before milking or wear clean protective covering to prevent dust and filth from their clothing falling into the milk.

Possibly about half would have passed without criticism by an ordinary uninstructed observer. It was gratifying to discover that so far from appearing antagonistic, the dairymen were generally most ready to co-operate with the agents of the Department in the inspections and to afford every facility, evidently appreciating that it was to their interest to comply with all the instructions furnished by us and thus secure the confidence of the public in the purity of their product.

DAIRY INSPECTIONS, FALL 1908.

Total number of dairies inspected,	17,618
Number in a sanitary condition,	2,442
Number in an insanitary condition,	15,176

INSANITARY CONDITION OF COWS.	
Teats unclean,	451
Udders unclean,	487
Flanks unclean,	1,077
Tails unclean,	1,127
WATER SUPPLY FOR CATTLE.	
Water polluted,	451
Cattle can wade in water,	737
STABLE.	
Floor wet or unclean,	2,388
Ceiling unclean,	6,277
Ceilings not tight,	6,072
Manure not removed daily,	2,427
Cows can lie in their droppings,	5,806
Stable not well ventilated,	427
No sunlight,	2,165

COW YARD.	
Stable manure scattered so that the cattle can lie in it,	6,723
Pools of manure water in the yard,	1,586
MILK HOUSE.	
Not separate,	751
Doors and windows not screened against flies,	6,544
No provisions for hot water,	505
Milk utensils not clean,	134
Water supply polluted,	160
MILKING.	
Milkers do not wear clean coverings when milking,	10,314
Do not wash their hands before milking,	2,789
Teats and udders not washed,	7,768
Milking stools not clean,	1,889
Fore milk not discarded,	9,972
Milk used on the hands and teats when milking,	3,609
HANDLING OF THE MILK.	
Milk not immediately cooled,	833
DISEASES.	
Typhoid fever has existed within the last year,	61
Dysentery has existed within the last year,	8
Diarrhoeal conditions have existed within the last year,	5

EPIDEMICS.

TYPHOID FEVER.

The epidemic prevalence of Typhoid Fever in Pittsburgh to an alarming extent led the Mayor of that city to institute a special investigation with the object of discovering its cause. For that purpose he appointed a commission, consisting of three distinguished sanitary authorities from different parts of the United States, and requested me to join them in their study. A full account of the meeting, which took place late in May, will appear under the head of Conferences. During the early part of the year there was little alarming prevalence of the disease in the State, but towards midsummer the excessive drought which prevailed began to deplete the water supplies and intensify the organic poisons which they contained. In January there was a slight outbreak at Reading and in the Lehigh Valley along the Lehigh, Jordan and Little Lehigh Rivers, which called for activity on the part of the Department's officers. In July a threatening condition at Hastings, Cambria County, led the Department to issue a bulletin stating in a general way the measures to be adopted when this disease made its appearance in a community in ferreting out its cause and checking its spread, and which would be pursued by its officers in all cases, thus outlining the campaign which it was forseen was necessarily soon

to be entered upon. This statement, which was given a wide publicity in the public press, was substantially as follows: "When the State Department of Health takes hold of a typhoid fever epidemic with the local health authorities a census is at once taken of the existing cases to learn what possible medium of infection has been common to all or the majority of existing cases. That is, are the victims using the same milk or ice supply; have they been getting shell fish or oysters from the same source, and more particularly, is there a common water supply? Of course, in the meantime, strict precautionary measures have been taken to shut off all possible avenues of infection. "Boil all water and milk" is insisted upon from the first. If the census cases point to an infected milk supply, it is quite possible that upon the dairy farm from which the milk served to these patients has been secured, will be found a case of typhoid fever. If so, this particular supply is at once stopped, and the health authorities do not permit the milk to be marketed until the recovery of the case and thorough disinfection, or unless the milk is handled entirely by persons not living on the premises. If there is any suspicion of the dairy farm water supply prior to examination, the use of such water is not permitted in conducting the dairy. A study of the case, however, may convince the health authorities that the epidemic is the result of a polluted water supply, and a rigid search will probably locate a typhoid fever case somewhere on the watershed. If so, the premises are thoroughly disinfected and all existing nuisances abated. Should the municipality have a storage supply, the reservoir is treated with copper sulphate for the purpose of destroying or inhibiting the growth of bacteria without being harmful to human economy. Where possible, the discharge pipe from such reservoir is elevated so that the discharge of water containing sediment that may be laden with the specific organism of typhoid fever is avoided. A system of flushing the main is instituted, the precaution being observed to thoroughly open and flush household taps and any dead ends that may exist in the system. Where a municipality has no system of sewerage, the Department urges a systematic disinfection of all privy vaults with lime. This is done with a double object—first, to prevent the further spread of the disease through the medium of flies and also to prevent pollution of surface walls, which occasionally follows and prolongs an epidemic, as was the case at Plymouth in 1885.

In fighting an epidemic of typhoid fever or, in fact, all other communicable diseases, it is most important to safeguard the purity of the milk supply. The State Department of Health during the existence of such an epidemic requires the abolition of milk bottles, which are a source of so much danger during epidemics of typhoid and other communicable diseases. Each householder is required

to furnish his own container and into this the milkman is directed to pour the milk without handling or allowing his own can or other vessel to come in contact with that of the householder's. The indestructible milk ticket is also tabooed and milkmen are required to adopt the coupon ticket, that can be used but once and destroyed.

Warning notices are placed on all premises within which there are cases of typhoid fever. This is useful to the nursing corps, which is frequently made up of strangers, and is an aid in carrying out milk regulations. Such warning placards also prevent many people from entering the premises who might be of annoyance to patients and who might carelessly contract the disease themselves.

Warning notices cautioning the citizens to boil all water and milk before use are posted everywhere throughout the town and thus the stranger particularly is warned against the danger of infection.

The employment of a corps of visiting nurses is one of the most efficient weapons in combating an epidemic of typhoid fever. These nurses as they go from one house to another give practical demonstrations of the technique of disinfection. They instruct the members of the household in the precautionary measures that are necessary in order to escape contracting the disease. Such precautionary measures are particularly important in the prevention of secondary cases. The condition of the patient is under the constant observation of the trained eye of the nurse and emergencies are promptly reported to the attending physician.

The physicians of a town are usually taxed almost beyond the power of human endurance at such a time and the service which a well equipped and properly managed corps of nurses can give in fighting the spread of the disease cannot be overestimated.

It has been too common in the past for the town authorities to try to suppress all news of the presence of an epidemic of typhoid, whereas safety lies in the widest publicity.

This step was justified by the appearance of the disease in rapid succession in Spring City, Royersford and East Vincent, Chester County; Pottsville, Schulykill County; Easton, Bethlehem and South Bethlehem, Northampton County; Canonsburg and Morganza Reform School, Washington County; Carbondale, Lackawanna County; Wilkes-Barre and Avoca, Luzerne County; Altoona, Blair County; Reading, Berks County; Confluence, Somerset County; Darby, Delaware County. None of these presented any features making it worthy of especial mention except that at Reading. A few cases had been noted in that city in January; these disappeared, and again in August there was a sudden and rather alarming outbreak. This in its turn abated, to a great extent, a few cases, however, continuing to appear until in November they suddenly began to multiply with startling rapidity. The Mayor then applied to this Department for

assistance. The Chief Engineer and the Chief Medical Inspector were therefore despatched on the thirtieth of the month, and joining forces with the local authorities, they immediately inaugurated a campaign as above outlined. Before the end of December 626 cases and 26 deaths had taken place. As the epidemic continued until February, 1909, a full history of it cannot be presented until the report of that year.

EPIDEMIC OF SMALLPOX IN CUMBERLAND COUNTY.

Early in September it was rumored that there was much chickenpox in the eastern part of Cumberland County. An investigation was ordered, and on September 16th twenty-nine cases of true (though mild) smallpox were discovered. Soon after the Postmaster of one of the villages was attacked. The office was immediately closed and thoroughly disinfected and then turned over to the U. S. authorities. Fifty cases occurred before the disease was checked. All the patients were unvaccinated but one, and that one forty years ago. Vaccination within two days after contact usually prevented the development of the disease; but not later. The unvaccinated in the quarantined houses were always attacked.

One hundred and fifty children were kept out of school for eighteen days, making a loss of twenty-seven hundred days of schooling for this little section of the county, vastly more than the vaccination of all the children in the county would have necessitated.

FOURTH OF JULY TETANUS.

As in the previous year a warning was addressed to the public in the hope of diminishing the death list from injuries due to the senseless and barbarous manner in which our national birthday has been celebrated of late years. While it referred to the danger from Tetanus alone it was hoped that the attention of parents and guardians would thus be attracted to the subject in general and that thus a diminution of the evil might be effected. The following was the notice which was widely published by the papers of the State

"Every explosive wound, no matter how slight, should be treated as serious, for the germ of tetanus may be there.

"Not a moment should be lost in sending for a physician, and in the meantime the wound should be carefully washed and then fomented with a hot antiseptic solution. A fatal result may often be prevented by immediate treatment.

"The wound from a toy pistol or other explosive may seem slight. The minute puncture may scarcely leave a trace on the skin. The deadly germ of tetanus, however, may have buried itself in the child's hand and the little one's life may soon pay the penalty."

LEPROSY.

The young Chinese who has been under the combined care of the Department and the health authorities of Harrisburg since July, 1907, died at the close of the present year. The necropsy, the protocol of which will be found later, disclosed the following conditions as the cause of death: Pulmonary tuberculosis with many cavities, bronchopneumonia, and extensive tubercular ulceration of the intestines. The leprosy lesions had made very little progress since he had been under observation.

WORK DONE BY THE COUNTY MEDICAL INSPECTORS FOR THE YEAR 1908.

No of cases examined, reported by Health Officers, supposed to be:	
Variola,	113
Typhoid Fever,	529
Diphtheria,	267
Scarlet Fever,	621
Cerebrospinal Meningitis,	1
Varicella,	660
Pertussis,	975
No. of Dairy Farms inspected on account of:	
Typhoid Fever,	188
Variola,	20
Diphtheria,	57
Scarlet Fever,	108
Cerebrospinal Meningitis,	1
Stock ordered transferred on	33
Sale of milk stopped on	93

CONFERENCES, CONVENTIONS AND ADDRESSES.

EASTON.

On February 14, 1908, I met the citizens of Easton in mass meeting by the urgent request of the authorities, the occasion being the discussion of a proposal to issue bonds to the extent of $241,000.00 for the purpose of constructing a sanitary sewer, and the vote to be taken on the Tuesday following.

The situation arose out of the fact that inasmuch as the city of Easton had failed to hand in to the Commissioner of Health plans of its sewer system within the limit of time fixed by the law it thus made itself liable to State prohibition of the extension of its sewers.

The Commission, consisting of the Governor, the Attorney General and the Commissioner of Health therefore refused to issue such permit on the ground that the general interests of the public health would not be subserved thereby, as the system is at present constructed.

It was to provide for the substitution of a complete modern system instead of the old imperfect and antiquated system that the bond issue was proposed.

I endeavored to make the situation entirely clear to the meeting, and then appealed to the patriotism and humanity of the citizens not to continue to poison the waters of a stream which was used as a source of drinking water by so many hundred thousand of their fellows.

PENNSYLVANIA STATE COMMITTEE OF THE INTERNATIONAL CONGRESS ON TUBERCULOSIS.

On the 24th of February, 1908, a meeting of the Pennsylvania State Committee of the International Congress on Tuberculosis was held in the office of the Commissioner. The Commissioner, as Chairman, presided and took occasion to define distinctly the limitations of the scope of the Committee as distinct from that of the State Department of Health in the matter of exhibits.

Several subsequent meetings of this Committee were held at the same place.

ALUMNI OF LAFAYETTE COLLEGE.

By invitation of the faculty of Lafayette College I addressed the Alumni of that institution at their anniversary meeting in commemoration on the founding of the college, held in Philadelphia, March 12, pointing out the necessity for the co-operation of educational bodies with the State departments which are striving for the uplift of the people.

THE ACADEMY OF NATURAL SCIENCES.

March 28, in response to a request from the Biological Section of The Academy of Natural Sciences of Philadelphia I read a paper on "What the Miscrope has done for Medicine."

MEDICAL CLUB OF PHILADELPHIA.

On April 10th, in acknowledging the compliment of a reception by the Medical Club of Philadelphia, I took occasion to urge the importance of the active and earnest support of the medical profession in the efforts of the State to check the spread of epidemic diseases, and to express my appreciation of the aid already given.

AMERICAN SCHOOL HYGIENE ASSOCIATION.

In response to a request from the American School of Hygiene Association I presented a paper at the meeting of that body at Atlantic City, April 17, on "The Medical and Sanitary Inspections of Schools and their Relation to the Tuberculosis Problem.

ANNUAL CONFERENCE OF STATE AND TERRITORIAL BOARDS OF HEALTH WITH THE SURGEON GENERAL OF THE P. H. AND M. H. SERVICE.

Being unable to attend the annual conference of the State Boards of Health with the Surgeon General of the Public Health and Marine Hospital Service at Washington, April 27th, I commissioned Dr. Herbert Fox, the Chief of the Laboratories of the Department, to represent the State on that occasion.

MEETING OF THE COUNTY MEDICAL INSPECTORS FOR THE STUDY OF TUBERCULOSIS.

In taking up the grave duty of the adoption of means to prevent the spread of Tuberculosis in the State, a duty imposed upon the Department by the last Legislature, it seemed desirable to establish a well equipped Tuberculosis Dispensary in every county. It also appeared wise to assign the duty of conducting these dispensaries, so far as possible, to the County Medical Inspectors of the several counties. This, of course, made it necessary that these officers should be men in the prime of life and full of vigor of health, and should also possess a reasonable knowledge of modern methods of diagnosis of the disease in question. Certain changes in the personnel of this corps therefore became unavoidable.

Furthermore, as the opportunities for physicians living remote from the great medical centres for becoming familiar with the niceties of manipulation and use of instruments of precision in the study of pulmonary affections introduced of recent years are extremely rare, it seemed important for the credit of the Department, for their own satisfaction and for the welfare of the State, that the physicians, taking up this special line of work, should be afforded occasions of witnessing demonstrations and listening to lectures by acknowledged leaders in the diagnosis of tuberculosis.

The first meeting of this kind took place in the city of Philadelphia, Tuesday and Wednesday, May twelfth and thirteenth, 1908.

Arrangements had been made with prominent medical teachers of that city, who had given especial attention to this department of medicine, and who kindly volunteered their services to deliver a series of clinical lectures on the diagnosis of the disease in its various phases. The subjects were assigned as follows: To Dr. William E.

Hughes, Philadelphia General Hospital, "Miliary Tuberculosis;" to Dr. Alfred Stengel, Hospital of the University of Pennsylvania, "Pulmonary Tuberculosis," to Dr. James M. Anders, Medico-Chirurgical College, "Tuberculosis of the viscera and serous cavities;" to Dr. James C. Wilson, Jefferson Medical College, "Tuberculosis in Children." Visits were also planned to the Laboratories of the Pennsylvania Department of Health at the University of Pennsylvania and the Bacteriological Laboratories of the Philadelphia Zoological Gardens, in which so many researches have been prosecuted on tuberculosis in animals.

The members of the Advisory Board and the heads of the several Divisions of the Department also attended the demonstrations, which were most instructive. I took occasion to address a few words to the assembled inspectors on the subject of their relations to the Department and their general duties as well as their special work in connection with the dispensaries. The opportunity for personal intercourse and interchange of views and experiences between the inspectors must result in mutual improvement and in the development of an esprit de corps which cannot but be most beneficial.

MEETING OF THE COMMISSION TO INVESTIGATE THE CAUSES OF TYPHOID FEVER IN AND ABOUT PITTSBURG.

On May 22nd I attended a meeting of the Commission appointed by his Honor, Mayor Guthrie, of Pittsburgh, and the Director of the Russell Sage Foundation, to inquire into the origin and prevalence of Typhoid fever in and and in the neighborhood of that city and to determine its cause or causes. It consisted of J. F. Edwards, M. D., Superintendent Bureau of Health, Chairman; Samuel G. Dixon, M. D., State Commissioner of Health; John W. Boyce, M. D., Pittsburgh; W. T. Sedgwick, Ph. D., Mass. Institute of Technology; Milton J. Rosenau, M. D., Director Hygienic Laboratory, U. S. Public Health and Marine Hospital Service; Morris Knowles, C. E., Consulting Engineer; Frank E. Wing, A. B., Assoc. Director, Pittsburgh Survey, Secretary and Treasurer; and E. G. Matson, M. D., Executive Officer.

The subject was discussed from all points of view and a committee was appointed to formulate a report.

CONFERENCE WITH FORESTRY COMMISSION.

On June 10th I met the Forestry Commissioner of the State and other members of the Forestry Commission and of the School of Forestry, explained to them the modern theory of the treatment of Tuberculosis, and accompanied them in an inspection of the State South Mountain Sanatorium for Tuberculosis at Mt. Alto, Franklin County.

PAN-AMERICAN MEDICAL CONGRESS.

The Pan-American Medical Congress held its annual meeting at the city of Guatemala on August 5th, and the U. S. Government commissioned me to represent it. Being unable on account of the length of time which it would have consumed to attend, I forwarded a communication to the Secretary, in which I gave a detailed statement of the history and working of this Department, accompanied by documents and forms.

AMERICAN PUBLIC HEALTH ASSOCIATION.

Being for a similar reason prevented from attending the annual meeting of the American Public Health Association at Winnepeg, Manitoba, I contributed a paper on "Measures to promote the Health of School Children," which was read by Dr. Wilmer R. Batt, State Registrar, who was commissioned to represent the Department on the occasion, which took place August 25-29th.

CONFERENCE OF STATE AND PROVINCIAL BOARDS OF HEALTH OF NORTH AMERICA.

On September 19th the Department was represented at the Annual Conference of State and Provincial Boards of Health, held at Washington, by Dr. Wilmer R. Batt, State Registrar, who presented a paper on "Suggestions for New Regulations for the Transportation of the Dead."

SEVENTH INTERNATIONAL TUBERCULOSIS CONFERENCE.

At Philadelphia, September 25th, I attended the Seventh International Conference on Tuberculosis, and read a paper on "Legal Rights and Tuberculosis."

INTERNATIONAL CONGRESS ON TUBERCOLOSIS.

From September 28th to October 3rd I attended the meetings of the third International Congress on Tuberculosis at Washington as Vice-President of the Section on State and Municipal Control of Tuberculosis, and presented a paper on "The Governmental Control of Tuberculous Patients in Pennsylvania."

The Department was also represented by Dr. Wilmer R. Batt, State Registrar, and Dr. T. N. McKee, County Medical Inspector, who were in charge of the installation, care and demonstration of the Depart-

ment's exhibit, and by Private Secretary Wilbur Morse, Dr. Benjamin Lee, Assistant to the Commissioner, Chief Engineer F. Herbert Snow, Dr. Thomas H. A. Stites, Medical Inspector of Tuberculosis Dispensaries, Dr. F. C. Johnson, Chief Medical Inspector, Dr. A. B. Moulton, Assistant Medical Inspector, and by County Medical Inspectors Joseph Scattergood, J. C. Reifsnyder, Charles H. Miner, Edgar M. Green, all of whom gave demonstrations, and Dr. A. M. Rothrock, Resident Physician of the Mont Alto Tuberculosis Sanatorium. A paper was read by Dr. T. H. A. Stites on the day known as "Social Workers' Day," on the "Tuberculosis Dispensaries of the Department of Health of Pennsylvania."

Although I had expressly stipulated in sending the exhibit that it should not be considered as "in competition," the Committee on Prizes and Awards saw fit to make the following awards. "Gold Medal to the Department of Health of the State of Pennsylvania in recognition of its work in establishing a magnificent system of dispensaries and sanatoria."

"Silver Medal to the State Department of Health of Pennsylvania for a model cottage for incipient cases of tuberculosis."

"Honorable mention to the Department of Health of the State of Pennsylvania for twelve beautiful autotone films of human lungs, showing tuberculosis conditions, this being the first application of this process in medical uses.

Silver Medal to the State of Pennsylvania for best exhibit of any State of the United States illustrating organization.

ANNUAL MEETING OF THE MEDICAL SOCIETY OF THE STATE OF PENNSYLVANIA.

The 58th Annual Session of the Medical Society of the State of Pennsylvania was held at Cambridge Springs, September 15-17. The Department was represented by Dr. A. B. Moulton and Dr. T. H. A. Stites, Inspector of Tuberculosis Dispensaries, the latter of whom presented a paper before the Section on Medicine on "The Dispensary System of the Pennsylvania Department of Health. A sketch of its Organization and Methods."

ANNUAL CONFERENCE OF SANITARY OFFICERS OF THE STATE OF NEW YORK.

By invitation from Dr. Eugene Porter, Health Commissioner of the State of New York, on December 3rd I attended the annual conference of the Sanitary Officers of the State of New York at Albany, and at his suggestion addressed the members on "The Public Health Administration in Pennsylvania."

STATE COLLEGE OF PENNSYLVANIA.

"Farmers' Week."

By request of the Faculty of the State College of Pennsylvania I prepared an address to the assembled farmers and students on the subject, "The Control of Tuberculosis in Man." In this address I called attention to the effort the Department is making to stamp out tuberculosis and to the facilities for diagnosis and treatment afforded by the one hundred dispensaries maintained throughout the State, as well as to the fact that the period of college life is one especially liable to the attacks of the tubercle bacillus. Being prevented by stress of work from visiting the college personally, I deputized Dr. T. H. A. Stites, Inspector of Tuberculosis Dispensaries, to attend and present the address as well as represent the work of the Department in that important field. Occurring as it did on the evening of the last day in the year it formed a fitting close to twelve months of incessant activity on the part of the Department, much of which was devoted to this especial object.

DIVISION OF MEDICAL INSPECTION.

ARTHUR B. MOULTON, M. D., *Chief Medical Inspector.*

THE DIVISION OF MEDICAL INSPECTION

COMMUNICABLE DISEASES.

During the past year this Division has taken part in the suppression of communicable diseases as follows:

SMALLPOX.

CHESTER COUNTY.

Dr. Joseph Scattergood, C. M. I. Coatesville. On December 9th, on receipt of information from Dr. A. Carmichael that a case of smallpox existed just outside of the borough limits of Coatesville, special investigation was begun at once, the diagnosis was confirmed, absolute quarantine was established and the following history elicited: The patient, a young man had been with a threshing crew in the vicinity of Toledo, O., for a considerable time and had left there on the morning of the 5th of December, arriving in Coatesville at 5.40 A. M. Sunday, going immediately to the residence of his father. He gave a history of having been vaccinated in Toledo and of having failed to secure re-vaccination three years ago. Notice was at once sent to the Agent of the Pennsylvania Railroad so that the coach might be located and suitably disinfected.

LINESVILLE, CRAWFORD COUNTY.

Dr. J. K. Roberts, C. M. I., Crawford county. August 7, 1908, Dr. J. K. Roberts writes as follows: "I have the honor to submit to you the following report in regard to the smallpox in Linesville borough and Conneaut township, this county.

"On Monday morning, August 3, I was notified by Dr. Carpenter, one of the physicians of the borough that they had a suspicious eruptive disease in the community and that no doctor had been called and that there was no disposition on the part of the local Board of Health to take action in the case. I immediately visited the case and found the patient had developed variola in the pustular stage and advised that a physician be called. Dr. Collins saw the case with me and agreed with the diagnosis I had made. The case was regularly reported to the local Board of Health and has been properly quarantined." "The Misses E. and F. D., of Erie, had been

visiting in this G. home but had gone home on Saturady previous to the quarantine. I understand that they have been vaccinated. No other precautions were used."

"While investigating the above case I found that the family had recently come to Crawford county from Troy, Ohio, and had been visiting at C. P.'s in Conneaut township. I went to the home of Mr. P. and found him suffering from smallpox in the pustular stage with the date of onset about the same as R. L., in Linesville. I saw that the home of Mr. P. was properly quarantined and inmates vaccinated as well as the homes of W. P. and H. L., of Conneaut township, who had been exposed."

"I understand that there is an epidemic of variola at Troy, O., and that there were twenty cases under treatment when these people left there."

CUMBERLAND COUNTY.

Dr. Harvey B. Bashore, C. M. I. A great many cases of mild smallpox developed in the southern section of Cumberland county during the last quarter of the year. A brief report by Dr. Bashore follows:

"Sometime in August, 1908, a farm hand from Reading came to H. H.'s, back of Camp Hill. He became slightly ill and developed a rash; no doctor. In due time H. and his entire family became sick with the same disease: no doctor. H. had a milk route in the West Fairview-Enola district and continued to serve his customers, although there were many scabs on the face and hands; so much from heresay."

"In September there were cases of chickenpox reported to the Department in the B., H., C., G., and K houses at Enola. B. and H. being related to H. (1), and C. G. and K. being neighbors and visitors at B.'s. These cases reported by four different doctors were claimed to be chickenpox, although in every family adults were affected."

"On September 16, the Department began investigation and found every case to be typical smallpox. The H. house was thoroughly fumigated, and the other families quarantined for smallpox. Meanwhile the health officers were hunting "contacts." Ninety-three families comprising the H. relatives and milk route were put under surveillance. One of these, W. father-in-law to B., having a case in his family, was quarantined. After this only four families became infected. A few more 'contacts' were hunted up and the epidemic at this place ended with C. B., who was quarantined on October 17, and with whom there had been no 'contacts.' In all twenty-nine cases. At the outset of the epidemic Health Officer Hoover resigned, and I immediately sent for Health Officer Weaver, who served me most faithfully.

"On September 17, Postmaster H. walked into my office with a third-day eruption of smallpox, having just returned from a convention at Ford City, Pa., and having left home four days before; he probably contracted the disease from one of the 'perambulating' cases from Enola. The postoffice was immediately closed, thoroughly disinfected and then turned over to the postoffice authorities. I notified the Department of Mr. H.'s trip, his stopping place while at Ford City and the coach on which he traveled. From his case I believe only two or three new ones developed but of this the Department has record."

"Although extreme vigilance was used in hunting 'contacts' one escaped, Mrs. C. W., of New Kingston, related to C., in whose house she probably was the day it was quarantined. She went home and in due time, so the story goes, she herself and children became ill with a rash (no doctor) and the disease was concealed for the time. Her husband became ill and on October 22, the second day of the rash, was found working in McC. store in Carlisle. He was immediately sent home and all 'contacts' in Carlisle vaccinated and put on parole, the local board following my advice in every particular."

"Meanwhile we learned that the W. woman in the role of a book agent, had visited practically every house in New Kingston, and the whole community was put under surveillance. Health Officer Mackey being ordered to take up his residence in the village."

"In fourteen days the first crop of 'contacts' developed in H., H., P., B. and C. M., a teacher in Fairview High School in Middlesex township. All were quarantined and about twenty-five 'contacts' vaccinated and put on parole."

"In fourteen days the second crop developed in the houses of P. and H., already quarantined and only one outside—the B. family which had been under quarantine, they having been vaccinated three days after the contact. In this family one child developed a very modified case which consisted of only five pocks, but they were perfectly typical. Cases in this place all told, twenty-one, making a total of fifty for our epidemic and about four hundred 'contacts.'"

"On December 1, W. W., of Carlisle, who had been in a factory visited by one of the H. children from New Kingston, was found to have smallpox. On December 17, two other families infected by Mrs. K., who evidently had a mild attack, contracted from the same factory, developed. These cases of course belong to the borough of Carlisle."

"While this epidemic seemed to differ in no wise from any other smallpox epidemic, the following facts attracted my attention:

1. The unvaccinated in the quarantined houses invariably got smallpox, except in one instance, while the vaccinated did not get it.

2. Vaccination one or two days after 'contact' generally prevented the development of the disease, three or four days after did not prevent.

3. One hundred and fifty children were kept out of school for eighteen days, which is equivalent to twenty-seven hundred days of schooling lost to the children of Cumberland county on account of smallpox; likely more than would have been lost by the enforcement of the vaccination law.

4. Five (5) doctors called the disease chickenpox although in each house adults were affected.

5. A number of children were reported to be vaccinated and had certificates of vaccination, but were not successfully vaccinated as shown by entire absence of scar.

6. All patients were unvaccinated save one, and that one forty years ago."

DAUPHIN COUNTY.

Dr. Paul A. Hartman, County Medical Inspector. The first case of smallpox in 1908 really commenced in December 17, 1907. This was a mail clerk running between New York and Pittsburg who is supposed to have contracted the disease while handling foreign mail, while on duty in his car. This man while sick and on duty slept in the dormitory both in the New York postoffice and in Pittsburg, giving full opportunity for a great epidemic. From this case we have had but two others in Harrisburg. Great precautions were taken by the Pennsylvania Railroad, the U. S. postal authorities and the city of Harrisburg, in vaccination of mail clerks, disinfecting cars and sleeping quarters of clerks, and the hunting down of contacts for vaccination to the end that an epidemic might not occur, which proved successful. March 10, (1908), I was called to Millersburg to see a subject by Dr. Hottenstein. This case proved to be smallpox in the convalescent stage and was at work in a factory employing several hundred hands, and examination of the hands in the cutting department was made at that time and four or five were sent home into quarantine, they having almost passed through the disease. The factory was temporarily shut down and thoroughly disinfected and then thrown open to the hands. From this epidemic there resulted about 20 to 30 cases (the reports of cases are on file in your office). This trouble was started by a mail clerk in the postoffices of Millersburg, he having had the disease in a mild form which was not recognized and which he contracted by handling mail from the crews in the Pennsylvania Railroad between New York and Pittsburg.

April 11, I saw a case in Halifax. This was a young man who had been exposed to the disease in the Millersburg factory.

On October 3, I was called in to see R. M., living just outside of Harrisburg, in Susquehanna township. He was then in the pustular stage of smallpox. He had been attending a convention of some secret organization in the State and while there roomed with a man who was post-master of a Cumberland county, who was sick at that time with an eruptive disease which proved to be smallpox. Fortunately for us no other cases occurred from this one.

December 19th, a case occurred in the upper part of this city (Emerald St.) in a young woman who conducted a millinery business and who had been in contact with numerous other people. From this case we have to this time (June 20th) but one other, and I believe the trouble is now over. None of these cases had ever been vaccinated.

SMALLPOX IN CONVENTION, FORD CITY, PA.

On the 17th of September, F. H———, Postmaster of West Fairview, Cumberland county, walked into the office of the County Medical Inspector, Dr. H. B. Bashore, with a three-day eruption of Smallpox covering his body. Dr. Bashore in eliciting a history of his illness and travels, learned that this man had just returned from a Convention of the State Council of the Order of Independent Americans in Ford City, Pa., the sessions of which were held on September 15th and 16th, and that the eruption was appearing on his body during a part of the time when he was on the floor of the convention hall. Information of this exposure was at once forwarded to the Commissioner of Health and steps were immediately taken toward learning the name and address of every person attending this Convention, toward learning the destination of the car on which he returned and to give as wide publicity as possible to this information so that those who had been exposed to the contagion of Smallpox might avail themselves of vaccination.

The Secretary of the State Council of this Order, Mr. W. A. Pike, co-operated with the Department of Health in every possible way, sending to the Department a complete list of all the 109 delegates who attended the convention, together with their post-office addresses and street numbers. In addition the following circular was issued by the State Councilor, Mr. Edward Wilson, with the Secretary's attest, and was mailed to each member of the Order.

Organized June 25, 1904. Incorporated July 22, 1905.

STATE COUNCIL OF PENNSYLVANIA

ORDER OF INDEPENDENT AMERICANS

IMPORTANT.

Philadelphia, Pa., September 19th, 1908.

To the Officers and Members of the Councils of the State Council of Pennsylvania, Order of Independent Americans, Incorporated.

Dear Sirs and Brothers:

Your attention is called to the fact that one of the Representatives who attended the Session of the State Council held at Ford City, September 15th and 16th, 1908, was sick with Small-Pox, and was compelled to leave for his home, where he has since been quarantined by the State Department of Health.

On my return to the City, I was immediately communicated with by Dr. Joseph Neff, Director of the Department of Health and Charities of the City of Philadelphia, who requested that we co-operate with the State and City Health Departments to prevent the spread of the disease.

In compliance with that request, I hereby recommend to the members of the Order, and especially to the Representatives and members who attended the Session, to take every necessary precaution by having themselves vaccinated and complying with the requests of the health authorities of their respective communities in which they reside.

This is not only our public duty, but also a possible saving of money to the various Councils, through the payment of sick and death benefits.

A strict compliance with the above will be appreciated.

Fraternally yours,

EDWARD WILSON,

State Councilor.

Attest:

WM. C. PIKE,

S. C. Secretary.

On receipt of the list of delegates the Department got into telephonic or telgraphic communication with the Secretaries of the Boards of Health of each of the districts whence these delegates came, and within a few days all of them were offered vaccination and placed under observation.

Notice was at once sent to the Superintendent of the Railway Mail Service telling him that the Postmaster had sickened with smallpox and with his co-operation the Postoffice building and all mails were disinfected; the mails which had been sent from West Fairview to Harrisburg were apprehended and together with the Harrisburg Post Office were disinfected. Fortunately but a single mail had left the Post Office and it was easily located in Harrisburg and held for proper disinfection.

The coach of the Pennsylvania Railway on Which Mr. H———, returned from Ford City was located and disinfected, as well as the electric car on which this man traveled from Harrisburg to West Fairview.

It is very gratifying to note that but three of those who came in contact with Mr. H———, sickened with smallpox. R. M———, No. 1834 State Street, Harrisburg, who slept with H———, in Ford City, sickened on September 28th—the characteristic eruption of smallpox appearing on October 1st. E. E———, a delegate to this Convention, living in Coventry township, Chester county, sickened about the first day of October with smallpox of a mild type; and M. C———, an unvaccinated girl of 14, at the residence of M. S———, in West Fairview, developed the disease about the 1st of October. She had probably come in contact with this man at the Post Office.

While it is gratifying to find so many of these men willing to cooperate with the Department and have vaccination practiced at once, it is doubly gratifying to know that where these contacts refused vaccination and contracted the disease with the rigid quarantine regulations established and thorough vaccination practiced no secondary outbreaks occurred.

SMALLPOX IN THE RAILWAY MAIL SERVICE.

About the 16th of December, 1907, a case of smallpox developed in a clerk in the Railway Mail Service of the Pennsylvania Railroad. In spite of active cooperation on the part of the Railway Mail and widespread disinfection of dormitories, coaches, etc., three cases subsequently developed and gave the Department considerable anxiety during the entire month of January. It is indeed a pleasure to note the cordial co-operation of Mr. V. J. Bradley, Superintendent of the Mail Service and Mr. Burkhill, Superintendent of the Harrisburg Service. The following special orders were issued to assist the Department in stamping out the infection.

"On account of three cases of smallpox having developed among the New York and Pittsburg clerks between December 16th and 31, precautionary measures of fumigation were generally taken and all clerks on the line instructed to be vaccinated. As nearly three weeks had elapsed since the last case was reported there was reason to

believe that these precautions had been effective and final. A case of smallpox is now reported on the Elmira and Baltimore line, and it is necessary that all clerks running in connection with the New York and Pittsburg or Elmira & Baltimore lines be vaccinated if they have not been recently vaccinated, and in either case submit certificate to the Chief Clerks at Harrisburg or Williamsport to this effect. It is desired that this action be taken immediately and Chief Clerks will report any undue delay.

A number of cases of smallpox are reported in New York State, although not in the R. M. S., and it is therefore recommended that all clerks running in the Second Division be vaccinated without delay, not only as a duty to the position they hold, but in the interests of themselves and their families." (Issued 1-24 & 1-27-08).

"In order that the Post Office Department and the Department of Health of Pennsylvania may be assured that the clerks of this Division, referred to in General Order No. 4393, Sec. 44, dated Jan. 27, 1908, are immune from smallpox, it is necessary that all of these clerks submit to their Chief Clerks certificates of successful vaccination. Arrangements have been made by which the Medical Examiners of the Pennsylvania Railroad Relief Association will examine the cicatrix on these clerks and endorse their certificates when their vaccinations are found to have been successful. These examiners will be found at their offices during the business hours of the day at Pittsburg, Harrisburg, Williamsport, Philadelphia, Trenton and Jersey City. Where it is not convenient or practicable for a clerk to call at the office of any of these Examiners, he may have such examination and endorsement made by any physician representing the Pennsylvania State Department of Health. No fee will be charged for these examinations.

The Chief Clerks at Harrisburg and Williamsport will supply clerks with blank certificates (Form 11) for this purpose, and clerks will be expected to give this matter immediate attention." (Issued 2-26-08).

As rapidly as contacts were located in these cases the Boards of Health throughout the State and in adjoining states, were warned and within a few weeks the conditions were brought under control. In order that the Department of Health should assist the Railway Service in enforcing the orders requiring vaccination certain of our County Medical Inspectors were detailed to inspect vaccination scars at terminals and stations where numbers of these employees were apt to report and in this way the entire corps of Railway Clerks were satisfactorily vaccinated, or were forced to submit for inspection scars showing a good vaccination.

In addition to securing the services of our County Medical Inspectors for this verification, through the good offices of Dr. Casper Morris, Chief Medical Examiner for the Philadelphia & Reading Relief Association and Dr. Samuel W. Latta, Chief Medical Examiner of the Pennsylvania Railroad Voluntary Relief Department, certain of their Medical Examiners already commissioned as special Inspectors of the Department for their roads were called upon to assist

in this work. Through the combined offices of all these medical men more than five hundred certificates of vaccination were inspected and verified and nearly as many Railway Clerks were vaccinated.

As will be seen by referring to the orders, these precautionary measures extended to the states of New York, New Jersey and the adjoining divisions of the Railway Mail Service and resulted in general observation of vaccination.

FAYETTE COUNTY.

Lemont. On receipt of telegraphic information that a smallpox case had been reported at Lemont, Fayette county, an investigation was undertaken by Dr. C. B. Wood, County Medical Inspector for Washington county, in which he found the attending physician and Health Officer had already secured absolute quarantine with guards and was actively engaged in vaccinating all contacts.

"This young man arrived in New York City on the Baltic—one of the White Star Liners,—on the 14th of March, 1908, going directly to Lemont, Clearfield county, thence to Lemont Furnace, Fayette county. The eruption of smallpox appeared on the 26th of March and was diagnosed by Dr. Salisbury, the attending physician on the 27th.

The patient is 24 years of age and gives a history of having been successfully vaccinated at the age of one year and of never having been revaccinated.

All contacts were held under observation until the period of incubation was over and several of them were provided with the necessities of life during this time, through the good offices of the Superintendent of the A. C. Frick Coke Company.

LEHIGH COUNTY.

New Smithfield. Dr. M. F. Cawley, C. M. I. "On receipt of a telephone message, March 30th, from Dr. Hottenstein, Kutztown, reporting a case of smallpox at New Smithfield, in the family H. G———, an immediate inspection was made. The patient was found to have varioloid; his wife and the other members of the family were vaccinated and the usual quarantine with guards was established. On obtaining a history of two persons having visited this man, I began to search for the contacts and found that M. F———, aged 23, was then in the third week of the disease. The attending physician had pronounced this latter illness chickenpox and mumps. The usual quarantine was established and the names of other contacts were secured and the cases investigated. This investigation revealed no more cases of smallpox but did uncover several unreported cases of chickenpox and led to the proper disinfection after this disease.

It is very gratifying to the Department to know that after rigid quarantine had been established and vaccination practiced no secondary cases developed.

SCARLET FEVER.

ALLEGHENY COUNTY.

Dr. S. M. Rinehart, C. M. I. On receipt of telegraphic orders, September 8th, special investigation was made of alleged breaking of quarantine on the premises of R. D. W———, of Verona, on the part of the Librarian of the Carnegie Library at Bessemer in Penn township. By special arrangement with this man and the local Health Officer, careful disinfection of his personal clothing was performed and an antiseptic bath was taken and the gentleman removed to a house with the distinct understanding that he would remain away from his home until quarantine had been lifted.

ARMSTRONG COUNTY.

Gilpin Township. Dr. T. N. McKee, C. M. I. At the request of Mr. C. G. S———, a school director, I visited Gilpin township where I found that two children with well marked scarlet fever have been attending the Riggle School in said township for some days. I also found two other cases in that district—one confined to bed and the other to his room—with the same disease.

In order to protect those not already infected I ordered the school closed until the building was thoroughly disinfected. The Health Officer was directed to enforce the usual rules in the house where the disease exists."

BRADFORD COUNTY.

Dr. S. M. Woodburn, C. M. I. An unusual amount of scarlet fever was present throughout the entire county during the year, morbidity rates from this disease running unusually high from the boroughs as early as April—the greatest prevalence in the rural districts being reached during August, September and October. The Department was called upon in many instances to render aid.

EAST TROY.

By order of the Department a visit was made to East Troy February 7th to investigate alleged violation of quarantine in regard to scarlet fever where "I found that there were two cases of scarlet fever, one at L. V———, and one at C. L———, both under quarantine. At V——— some 23 cows were milked and the milk taken to the creamery. V——— was helping with the milking and helping to care for the sick child. I informed him that he could not be per-

mitted to have anything to do with the milk or milk utensils, if the milk was disposed of to the public. He promised to make other arrangements for caring for the milk."

"It appears that there were a couple of cases of scarlet fever in that vicinity the latter part of December in which the quarantine was not well observed. They have recovered, the houses have been disinfected and the quarantine has been lifted.

WYALUSING TOWNSHIP.

In Wyalusing township in a community of four or five families of lawless individuals eleven patients were found sick with scarlet fever at the same time. It became necessary to provide absolute quarantine and place a guard to enforce it in order to preserve the regulations of the Department.

COLUMBUS TOWNSHIP.

A special inspection of the dairy farm of T. A———, in Columbus township, was made. The dairyman was found in contact with his three children ill with scarlet fever and was taking care of 15 cows and delivering milk to a creamery twice a week. He was ordered to take an antiseptic bath, put on a clean suit of clothes, to remain out of the house during the illness and to make special provision for handling the milk utensils at a point far enough distant from the house to be free from danger.

SPRINGFIELD TOWNSHIP.

On July 16th special investigation was made of quarantine conditions on the dairy farm of R. Y———, in Springfield township, and the regulations of the Department were found to be neglected. Strict enforcement of the regulations was instituted and satisfactory arrangements made for the complete isolation of the patient and her care taker during the remainder of the illness.

WYALUSING TOWNSHIP.

On receipt of information that scarlet fever was prevalent in Wyalusing township and the cases were not being treated by a physician a special investigation was made on the 21st of September, resulting in the location of a nine year old girl, L. L———, who had been in attendance at the Wyalusing School typically ill with scarlet fever; in finding a five year old girl, P. Y——— in the home of F. E———, about two miles from this school, in an active stage of desquamation

one month after the onset of what was believed to have been scarlet fever, and in the locating of what was believed to have been scarlet fever in the home of F. E——— and H. Y——— in the same community. Patients in both instances being well and through desquamating. It is probable that through these sources others were infected.

STEVENSVILLE.

Under order from the Department a special investigation was made at Stevensville on the 10th of November; "I found four families under quarantine in Stevensville and vicinity for scarlet fever. L. G———, 21 months' old babe had it some three weeks ago. Three children in the family that have not had the disease. A girl thirteen years old at home of J. G——— had the disease three weeks ago. Six younger children in the family have not had it.

The 12 year old daughter of M. W———, living two miles from Stevensville, was taken with it about three weeks ago. I passed Mr. W——— on the road with his team coming from the mill. He said he had a permit from the Health Officer. On inquiry he admitted that attendants of the patient came into his room, and on inquiry at the house, learned that he went in and ate with the family in the same room with the patient. Orders were issued that he must stay on his premises until disinfected."

"I found four cases at I. E———'s about four miles from Stevensville, four children seven to sixteen years of age, sick about one week. Three families had been released from quarantine. One case, Geo. C——— had died a couple of weeks ago. He lived alone. The house has been disinfected."

CARBON COUNTY.

Sendel School. Dr. J. K. Henry, C. M. I. A special investigation of an epidemic of scarlet fever in Mahoning Valley in the Sendel School in the early part of March led to the closing of the school and of an investigation of the scarlet fever conditions in the houses of the community. A total of 28 cases of scarlet fever was found in 11 families. Many of these children had not been treated by a physician but certain evidence seemed to show that reports of some of the first cases were suppressed. The physicians who were at fault in each case excused themselves on the ground of not having received from the Department proper cards on which to send notice to the Health Officer.

The usual quarantine was established at each household, the school disinfected and cases were properly kept under observation until the close of the quarantine period. It is probable that from one of these

households infection was carried by a milk supply to a household in the borough of Mauch Chunk. Evidence was not convincing enough to lead to absolute discontinuance of the sale of milk and the transfer of the stock.

By the middle of April the epidemic had practically subsided. The Sendel school was reopened on the 13th of April and the children gradually returned as release from quarantine was granted.

CARBON COUNTY.

Palmerton. Dr. J. K. Henry, C. M. I. An epidemic of considerable proportion was studied in Palmerton on the 18th of May. The onset was supposed to have been about the 5th of May and the early cases were apparently not recognized because of their mild character. Investigation led to the closing of one millinery store and one dental office, the closing of the Sunday Schools for several weeks and the location of a case that had escaped quarantine and succeeded in reaching the town of Bethlehem, where suitable supervision was enforced by the health authorities.

CUMBERLAND COUNTY.

Upper Mifflin township. Dr. H. B. Bashore, C. M. I. The following report received from the Medical Inspector: "I beg to report that I visited the farm of L. M———, Upper Mifflin township, August 22nd, on account of sale of milk from a house placarded for scarlet fever. The neighbors agreed to undertake the milking and marketing of the milk and I therefore permitted the sale to continue."

DELAWARE COUNTY.

Darlington Creamery. Dr. Robt. S. Maison, C. M. I. "On receipt of information from the Health Officer, December 24th, that scarlet fever existed in the family of one of the employees of the Darlington Creamery, I visited Darlington, Middletown township, and arranged with the man to board away from the Creamery and remain away during the entire period of quarantine. The personal clothing and the body of the man were properly disinfected before allowing him to move to his new quarters.

ASTON TOWNSHIP.

Dr. Robt. S. Maison, C. M. I. On receipt of a request from Aston (First-class township) Board of Health for advice in regard to handling a case of scarlet fever in the township, in which case the mother refused to keep the child isolated, and as to their best method of procedure in securing a physician and as to methods

for the support of the family in case of absolute quarantine, Dr. Maison took up the matter with the Board and the following advice from this Department was issued:—

"Replying to your letter of the 4th inst., concerning the conditions existing in Aston township, I would say that since the Board of Health in first-class townships has the same power as Boards of Health in boroughs and third-class cities, it is perfectly proper that they should have the physician for their Board visit the family, make the diagnosis and prescribe the precautionary measures that are to be carried out by the family and who is allowed to leave the premises, and if they are unwilling to observe such precautions it will be necessary to establish absolute quarantine and guards to enforce its provisions—such guards to be paid by the Board. An Order of Relief should however be issued, which provides for medical attention and the necessaries of life, as stipulated in the Act of May 7, 1907, a copy of which is enclosed. If requested, you are authorized by this Department to visit the case in question and assist in diagnosis."

GLEN MILLS.

November 1st, on receipt of information from Health Officer Speakman that scarlet fever existed on the dairy farm of J. M———, Glenn Mills, Thornbury township, I made an inspection and found that they ship 45 quarts of milk to a milk dealer named E. W. W———, 4709 Lancaster Ave., Via. P. R. R. house, no milk brought to the house except that used for the family and that all scalding and cooling of the cans was done at the spring house and every precaution was being used."

WILLIAMSON SCHOOL.

On receipt of information from the Commissioner of Health that a patient, O. H———, ill with scarlet fever, had been taken from the Williamson School at his home, No. 937 North 50th Street, Philadelphia, a special investigation was begun, developing the following information:

This boy on the 13th of March had reported to the nurse in charge of the Infirmary that he had a sore throat and had been given by her some local application. On the 14th he was allowed to go home and on the 15th his family physician in Philadelphia reported the case to the local Board of Health as one of scarlet fever. The Superintendent of the school knew nothing of the child's symptoms and had no idea that the child was suffering from scarlet fever. The particular cottage in the school in which the boy lived was quarantined, disinfected and a systematic examination of the pupils in this cottage and other cottages, where exposure placed its inmates under suspicion was begun by the nurse and the school physician. A distinct

understanding was had with the Superintendent that on the slightest symptoms of scarlet fever the boys would be isolated in the Infirmary, with the result that what promised to be the beginning of an epidemic was stamped out in a very short time.

"I investigated conditions existing at Ronco, German township, as reported by Dr. J. J. Mechem, yesterday (October 18). Health Officer Geo. Jacobs and Dr. Mechem accompanied me. I found conditions worse than reported by the doctor. Mr. Jacobs the Health Officer has certainly done his part, as he spent over one week having the town cleaned and drained properly, besides disinfecting a number of houses as well as the school house, the latter was under my instrctions, and the school board agreed to pay for all materials. The first home I visited was H. W———, the house was disinfected last week for typhoid fever. Five of the family are in the hospital suffering with the disease, the first boy affected with the disease was at home supposed to be well, his only nurse a sister seven years old. I found this boy in bed with a relapse seriously sick. I ordered the house placarded again. My next visit was to an adjoining house, No. 166. I found a bad case of scarlet fever and two children desquamating. I ordered a quarantine with strict observation. I next visited No. 153, the home of J. C——— and found a case of typhoid. This house I placarded. These were all the new cases found. I also visited No. 203, L. F———, suffering with diphtheria, No. 13, F. P———, one child with scarlet fever, one child with diphtheria, the home of L. J———, No. 190, three children with scarlet fever. These homes were under quarantine.

From very conclusive evidence many cases have existed that were not reported and in this way many have been exposed to diphtheria and scarlet fever. I established quarantine and the Health Officer who seems to be doing all possible, will keep in close touch with conditions. If the spread continues the school and church will be closed, but these conditions can be checked if every one will do their part. The Superintendent of the works has been faithful in cleaning the whole town. He has had a big squad of men cleaning and disinfecting under the supervision of the Health Officer, for ten days, so I don't see what can be done further at this time. If the disease continues to spread I would suggest a guard."

"P. S.—The Health Officer informs me by 'phone that the families quarantined for scarlet fever refuse to keep their children in the house. Would it be too severe to place a guard over these families? It seems impossible to keep them in check. It is a coal town and thickly populated."

Telegram—"Place guards scarlet fever, Ronco." Sam'l G. Dixon.

LACKAWANNA COUNTY.

Blakely. Dr. J. C. Reifsnyder, C. M. I. "Pursuant to instructions from the Chief Medical Inspector, I met the Board of Health at Blakely by invitation, on Sunday morning, April 12th, and discussed with them the outbreak of scarlet fever in the borough of Blakely. This outbreak was easily traced to the house of H. M———, and it, in turn, to an infected house in Priceburg.

The high water mark of the epidemic was reached on the 6th of April when 11 cases were reported.

It was evident in this meeting that the call upon the Department for assistance was more for the purpose of obtaining your approval of what is being done by their Board than for the reason that any particular need existed. Their Board seemed to be doing everything that was necessary and are active.

The points taken up were quarantine—absolute quarantine was being enforced and so far no need for assistance was found. The Board are perfectly conversant with the fact that pecuniary relief must come from the same source as any other case of borough poverty. I suggested that wage earners be given permits under suitable restrictions.

Disinfection—they were using the system of evaporating formaldehyde by artificial heat. My suggestion was that they adopt the Department's method by using potassium permanganate with formaldehyde in the proper proportions.

The schools and churches had been ordered closed and it had already been determined that they should be kept closed so long as necessity existed.

I suggested that the teachers make a list of absentees for the last ten days before closing the schools and that special inspection be made in every family in which an absentee was noted, and that books found in the hands of any child with the disease should be burned.

Milk—Orders had already been issued to discontinue the sale of milk from infected dairies, against the serving of milk in bottles, and requiring consumers to furnish receptacles at the door. Suggestions were made as to tracing the possible source of infection in conjunction with the milk routes.

Doctors were found to be very careless in reporting to their local Board. I strongly urged action in one flagrant violation on the part of a physician, discussed at this meeting.

Subsequent to this meeting arrangements were made for joint action with the Board of Health and School Board to determine the time for reopening the schools."

LANCASTER COUNTY.

Dr. J. L. Mowery, C. M. I. "Complaint having reached me that scarlet fever was present in the Pleasant Hill School, West Donegal township, a special investigation was begun on the 7th of October. Four children were found attending school in various stages of desquamation. The infected pupils were suspended and reported to the Health Officer for quarantine.

On the same day, having received reports of scarlet fever in East Hempfield township, I visited ——— school and found one case of pronounced scarlet fever, quarantined one typical case not reported who was being attended by Dr. R——— of Mt. Joy, two of the children in the family attending school and no precautionary measures being taken. In this district I also found several families having illness among their children accompanied by rash of a very evanescent type in which it was impossible to determine the diagnosis. The usual modified quarantine was established in each instance. The schools were closed and disinfected. I would respectfully recommend that action be taken against the delinquent.

LEHIGH COUNTY.

Summit Lawn School (Salisburg township). Dr. M. F. Cawley, C. M. I. "I was notified by Health Officer Brown that, at the Summit Lawn School in Salisbury township, a child became sick during the session and vomited in the school room, and that it undoubtedly had scarlatina. This is the school in which the epidemic occurred which is just about over and in which four deaths occurred. The first case in school began in this way and the whole school was infected so that out of about 45 pupils only 10 remained for a long time. There are 14 attending now. This report was a false alarm as the child had had the disease four years ago. I made the inspection yesterday morning and report at length because it might seem as not having been necessary."

POTTER COUNTY.

Austin. Dr. E. H. Ashcraft, C. M. I. April 21st. "In response to telegraphic orders an inspection was made in Austin with reference to scarlet fever, which was not being well handled by the local Board of Health. Investigation showed that but five cases were present in the town and in one or two instances a dispute as to the diagnosis had led to neglect of quarantine measures—in one case the child of a laundryman in the house from which the agency was conducted—it was deemed wise to advise complete fumigation of the entire lower part of the house, and that all wrapped bundles of laundry be opened and disinfected at the same time; and that the father of the child

should have the usual antiseptic bath and have all his personal clothing disinfected and remain away from home during the remainder of the quarantine period. This was agreed to and was entirely satisfactory to all parties concerned."

MEASLES.

ALLEGHENY COUNTY.

Dr. S. M. Rinehart, C. M. I. On February 12, by order of the Department, inspection was made of the schools at Blythedale where an epidemic of measles had been reported. 34 children out of a total of 79 were out of school, on account of the disease. Dr. Rinehart reports as follows: "This is a mining community, made up almost altogether of foreigners. In this school of seventy-nine, there are only ten children of American parents. A good many cases of measles have occurred in this community that have never been reported, on account of the parents never having a physician for the children, so that it has spread very rapidly. At present, however, the doctors seem to be reporting the cases to the Health Officer, Mr. Jones, and I have no doubt the progress of the disease will be checked soon. I visited two or three of the cases that had not been reported and found them to be measles in a stage of convalescence, so that there can be no doubt about the nature of the epidemic. Most of those children at present in the school have had the disease by this time."

ARMSTRONG COUNTY.

Yatesboro. Dr. T. N. McKee, C. M. I. "At the request of the Health Officer and school authorities of Cowanshannock township, I visited Yatesboro November 12th and after going over the situation carefully with the Health Officer, Principal of the Schools and local physician, deemed it advisable, on account of number of cases of measles developing within the last few days, to order the school (4 rooms) in that district closed until the building had been thoroughly disinfected and the epidemic gotten under control."

"I am glad to report that the school authorities manifest a desire to co-operate with the Department in protecting the health of those under their care."

CLARION COUNTY.

Fairmount City. Dr. J. T. Rimer, C. M. I. On receipt of telegraphic orders, the schools of Fairmount City, consisting of three public school-rooms and one high school room, were closed on the 30th of March because of a general epidemic of measles in Red Bank township. Dr. C. E. Sayres, Health Officer, was especially deputized to

investigate the alleged cases in the district and found measles in active or declining stage in forty-four dwellings, totalling about one hundred cases. The school rooms were closed and disinfected. The children from the uninfected houses were readmitted.

As modified quarantine had been established about the same time in all of these houses, it became necessary to employ additional disinfectors in order to accomplish prompt release from quarantine and carry out the wishes of the Department.

TIOGA COUNTY.

Crooked Creek. Dr. S. P. Hakes, C. M. I. "I beg to report that today (February 1) I examined cases reported by Health Officer Howell, alleged to be measles, whom he states had no attending physician. I found one case at G. W———, Crooked Creek, and four cases in the family of J. N. L———, Crooked Creek, both families residing in Charleston township; two cases in W. C———'s family, Crooked Creek in Middlebury township. All these families had been visited by Dr. C. W. H———, of Wellsboro, and none had been reported to the Health Officer.

On communicating with the physician by telephone he very willingly consented to make report of any future cases he visits and consented to assist the Health Officer in locating any other cases that have no attending physician. He realizes that he did wrong and I think in the future he will do better."

LEHIGH COUNTY.

Slatedale. Dr. M. F. Cawley, C. M. I. "April 1st, having been notified by Health Officer Heintzleman of a number of unreported cases of measles at Slatedale and Reiningers School, Washington township, I visited seven families, examined twelve persons and reported eleven cases suffering from the disease. Two of the physicians in the vicinity were plainly violating the law and evidence is hereby submitted which seems to be sufficient to secure their conviction. I would respectfully recommend that proceedings be instituted against them at once."

BLUE CHURCH SCHOOL.

"January 15th I visited Blue Church School, in Upper Saucon township, near Coopersburg, and ordered the school closed for disinfection. Out of an enrollment of 50 pupils there were about one dozen left. All the others are now suffering with measles.

In nine families physicians had not been called and the cases had not been reported.

REXTOWN.

Rextown. March 24th. "I desire to report an inspection of Rextown and vicinity in Washington township on account of the existence of a number of cases of measles without any medical attendance. I visited four schools and nine families, examining in all a total of 15 persons, finding 12 of them having measles. In two instances I closed the schools for disinfection."

SLATEDALE.

Slatedale. December 26th. "I desire to report an inspection of schools for measles at Slatedale, today. Fourteen cases—seventeen persons examined. Found the teachers in Slatedale were admitting children from houses placarded for measles."

DIPHTHERIA.

CUMBERLAND COUNTY.

Carlisle. Dr. H. B. Bashore, C. M. I. "I beg to report that I visited Carlisle, August 13th, on account of sale of milk and butter from H——— house in North Middletown township, placarded for diphtheria. I found that the patient had died a short time before my arrival and that there would be no sale of milk or butter until after disinfection. I gave instructions for a private funeral to be held within thirty-six hours. As this is the second death from diphtheria the last month in the county, it looks to me as though some of our physicians are afraid to use antitoxin sufficiently early."

LEHIGH COUNTY.

Dr. M. F. Cawley, C. M. I. On receipt of information that diphtheria was prevalent in the Children's Home, an asylum for orphan children, having a population of 35 inmates, located in Salisbury township, investigation was made on the 14th of May and developing the fast that the attending physician had not diagnosed the earliest cases as diphtheria and it was only when the child of the Superintendent sickened with the disease and Dr. S——— of Bethlehem was called that the disease was properly diagnosed. All of the children with a history of sore throat were isolated from those who were well, given curative doses of antitoxin and the usual regulations of the Department were instituted. All inmates who were exposed to the infection were given immunizing doses of antitoxin with the result that no further spread of the disease occurred. The total number of cases contracting the disease were six of the orphan children and the one child of the Superintendent.

WHOOPING COUGH.

LANCASTER COUNTY.

Western School, Earl township. Dr. J. L. Mowery, C. M. I. "On receipt of information October 6th that Whoopingcough existed in the Western School, I made a special investigation and found three cases of well developed Whoopingcough and three somewhat in doubt and in whom I think the disease is developing, in attendance at school. The school was closed to be disinfected and the regulations of the Department enforced with regard to school exclusion."

BROWNSTOWN & TALMAGE SCHOOLS, WEST EARL TOWNSHIP.

Brownstown and Talmage Schools, West Earl township. "On the 12th of October I investigated the Brownstown and Talmage school districts in West Earl township, in which Whoopingcough was alleged to exist and found twelve cases in the school actually suffering from the disease. I ordered the school closed and disinfected and the children excluded for the usual time.

WEST EARL TOWNSHIP.

West Earl township. "On October 23rd, by appointment with the school board of West Earl township I visited with a representative of their Board two schools for the purpose of determining whether or not whoopingcough existed. We took up the cases in these schools and found whoopingcough in each. The Directors wish to eliminate as much as possible all communicable diseases from the schools under their care and willing to co-operate with the work of the Department in every way."

PROSPECT SCHOOL, EAST DRUMORE TOWNSHIP.

Prosepect School, East Drumore township. "On receipt of information from the teacher at Prospect School in East Drumore township, on October 21st, that Whoopingcough existed among his pupils, I made a special investigation and found a number of cases in the school, ordered the schools closed and disinfected and infected children dismissed.

On the same day, with Dr. Heller, we completed our investigation at Brownstown where whoopingcough was alleged to exist in the village and succeeded in finding 49 cases. In each instance the regulations of the Department were enforced."

LEHIGH COUNTY.

Hartzel's School (Upper Milford township). Dr. M. F. Cawley, C. M. I. "I made an inspection today at Hartzel's School in Upper Milford township on account of alleged cases of whoopingcough.

I visited two families and the school, and while it is quite probable that whoopingcough is developing it has not reached the stage at which I would feel justified in making the diagnosis. The people have promised me however that should cough become severe, or should whoopingcough be noted they would keep their children from school.

"I also visited Riegel's School in the same township for the same reason; these children have paroxysms, which, though I have not seen them, from the description given by the mothers, I would pronounce to be whoopingcough. I visited two families here and saw seven children.

"I visited these places because the Health Officer reported to me that people were complaining and that they were afraid of sending their children to school for fear of their contracting the disease."

TIOGA COUNTY.

Morris. Dr. S. P. Hakes, C. M. I. October 30th. "Last week complaint was made to me that children with pertussis were attending school at Morris, Pa., and requested me to correct the conditions. I am also enclosing a letter with complaints along the same lines and at the same time the Health Officer of that district called my attention to the matter. I have made an inspection and submit the following report:

"Morris is an unincorporated settlement of about 1,500 to 2,000 people, having a large tannery, some small coal mining interests and some agricultural interests, etc. They have a Township High School, with four rooms and four teachers and an attendance of from 160 to 170 pupils. I met Health Officer Vandergrift there and with him visited the school. We inspected all rooms and from the history given us by the teachers and pupils themselves, and by the physical examination which I made, I picked out about thirty pupils in whom I could safely make a diagnosis of pertussis."

"I made out the Forms M. S. No. 1 for the Health Officer and he did the placarding. I went over the matter with the school directors, and requested the President of the School Board to close the school until the rooms were disinfected. The Health Officer writes me this was done."

TYPHOID FEVER.

ADAMS COUNTY.

Dr. J. R. Dickson, C. M. I. On receipt of notice that typhoid fever was existing on the dairy farm of J. Mc——— in Straban township, special inspection was made and the following report submitted: "August 8th, 1908. The conditions are as follows:—Patient is isolated. No one connected with the milk, utensils or stock comes in contact with the patient, or goes into his room. No one coming in

contact with the patient, or who enters his room, comes in contact with the milk, utensils or stock, or with any one having such contact in charge. The cattle are watered from a well and from a stream. The well is at the edge of, but within the barnyard. The well floor is not impervious and excrementatious matter is deposited on it from the feet of the farm laborers. The well wall does not exclude surface drainage. The stream Rock Creek, receives the barnyard drainage at a point probably four hundred and fifty feet distant. The stream also receives about one hundred and fifty feet above the point of entrance of the barnyard drain, drainage from a spring. This spring drain passes through a small lot of ground, used, recently, as a hog pasture. Less than two hundred feet from the spring drain, on slightly elevated ground, sloping toward it, is located the water closet. It stands on the surface of the ground and is used regularly by not more than three people daily, throughout the year.

The spring is the source of water supply for the family and also supplies the cemented trough in the spring house with water, into which milk containers are placed. Water from this spring is used to wash the milk utensils, after previous boiling, it is claimed. The spring is distant from the drain carrying the barnyard waste about eighty feet, and at a lower level by probably two feet, but owing to artificial protection does not receive such waste except during a freshet which it is reported has not happened within two years. Water is obtained from the spring by pump, a wooden one, surrounded by a floor. Waste water from mouth of pump returns directly to spring by a wooden receiver."

BLAIR COUNTY.

Altoona. Dr. Jos. D. Findley, C. M. I. The Department through Dr. Findley investigated an outbreak of typhoid fever in the city of Altoona and was able to assist in tracing it pretty definitely to a dairy farm supplying a number of people with their milk. More than ——— families were taking milk from the dairy of one J. W———, where a careful inspection revealed the following conditions:—

"On May 2nd W———'s brother went to the Altoona Hospital and developed a mild case of typhoid. Nothing further occurred to attract attention until less than two weeks ago when we began to have some cases of typhoid in families that used W———'s milk. Almost all of these cases had been away from the city within three weeks and the Altoona authorities explained them on that ground. But a week ago last Sunday, August 16th, a girl working for W——— was removed to the hospital with symptoms of typhoid. As soon as we learned of it we went to W——— and told him that he could not handle any more milk at his own house and barn."

Since then he has kept his cows away from his own water supply and used the supply of a neighbor to water them and to scald his cans and has boiled all the water used on his own premises and washed his hands before milking.

As soon as knowledge of this serious condition reached the Department the following letter was addressed to the Secretary of the Board of Health:—

August 27, 1908.

Mr. Samuel B. Trees,
Sec. Board of Health,
Altoona, Pa.

My dear Sir:—We have your valued favor of the 26th of August at hand, and are pleased to learn that your board is so active in its endeavors to avoid the further spread of typhoid fever in your city.

While we presume that your board has taken up nearly all, if not all of the points which would occur to us in the control of this disease, we beg your indulgence for outlining a few of the points which occur to us as requiring attention and which may perhaps in some one instance prove of value to you.

Whenever typhoid fever becomes at all prevalent, we believe it is absolutely necessary that notices warning the public to boil all milk and water intended for domestic use for at least twenty minutes before using should be posted about town, especially in the affected neighborhoods. All premises where typhoid fever exists should be placarded. It is valuable in that the dairymen who may have routes in your town shall know where the disease exists and thereby may be able to carry out your instructions relative to the leaving of milk bottles. We presume that you have already given orders that no milk bottles should be left at or taken away from premises where typhoid fever exists. If this is not done through the interchange of milk in the bottles or perhaps by infection of the general milk supply, the milk may become a great factor in spreading this disease. Instead of leaving milk bottles, the families should provide a container into which dairymen may pour the milk without the necessity of handling the container.

Lime should be distributed to all homes where this disease exists, in order that the privy vaults may be thoroughly limed, which will materially assist in preventing the infection of disease by transmission through flies.

One or more visiting nurses should be employed to go from house to house, instructing those having care of the sick, where a trained nurse is not in attendance, in the proper method of disinfecting the discharges and caring for the patient in order that secondary cases may be limited.

We have taken the liberty of sending to Dr. Findley, to be used in this emergency, typhoid circulars and as many placards.

A copy of the report from our laboratory relative to the examination of water specimens and milk sent to the laboratory lies before us, and while we fail to note that these reports show pollution by sewage, we would deem it advisable that your board have other examinations made of the general water supply used by the families now afflicted or wells which may exist in their neighborhood and of the

milk suspected, as well as the wells located on the premises from which the milk is taken. For this purpose we are having sent to you a box of bottles for the collection of water specimen samples.

Assuring you that we shall be pleased to advise you with regard to any troublesome conditions which may arise, and trusting that this outbreak may be speedily suppressed, I remain,

Yours very truly,

SAMUEL G. DIXON,
Commission of Health.

This letter was pulished in all of the daily papers of Altoona.

The Board of Health of Altoona having definitely determined that the milk supply was at fault, had it discontinued. A campaign of education was waged with householders so that all reasonable precautions were taken throughout the city to protect the well from those already sick, and the epidemic quickly subsided.

Such epidemics show us the very great importance of having every case of typhoid fever on dairy farms reported at the earliest possible moment, and impress upon us the importance of keeping such farms in first-class sanitary condition.

BRADFORD COUNTY.

Dr. S. M. Woodburn, C. M. I. Many investigations were made of typhoid fever on dairy farms, and the regulations of the Department enforced in all cases where laxity was found in their observance.

CAMBRIA COUNTY.

Hastings. Dr. W. E. Matthews, C. M. I. In July, 1908, the Department was called upon to render assistance to the borough of Hastings, where an epidemic of typhoid fever developed. The County Medical Inspector, Mr. R. E. Irwin, of the Engineering Division and Miss O'Halloran of the Nursing Staff, were detailed to study the situation and render all assistance possible to the borough Board of Health. A careful study of the water supply and milk supply of this borough pointed pretty conclusively to a polluted water supply as the direct cause of the epidemic. A sanitary survey showed the entire town to be filled with nuisances and gross pollutions of all sorts were readily found.

At joint meetings of the borough Board of Health and Borough Council it was decided to raise funds for enforcing the abatement of nuisances, for the equipping of an emergency hospital and for such other sanitary measures as might be deemed necessary in stamping out the epidemic. Work was at once begun under the general supervision of the borough Board of Health and Dr. Matthews; notices were served on all property owners to abate nuisances within 24 or 48 hours; lime wagons distributed disinfecting agents to every house

in which fever existed and to every house where nuisances were reported; full and overflowing privy vaults were emptied by an organized corps who distributed the contents on a farm at a distant point from the town and where it was plowed under each night; the town was placarded with warning signs; an educational campaign was begun to induce every one to boil all drinking water; the Nursing Corps, by house to house visit and by means of the emergency hospital, conducted an aggressive campaign for carefully disinfecting all excreta, and bed and body linen; and the Water Company began systematic efforts to prevent surface drainage entering the springs supplying reservoirs, building water-tight wells, condemning polluted privated water supplies and conducting a general sanitary campaign.

The Engineering Division secured 240 samples of milk and water for laboratory study, made special search for pollution on all premises infected with typhoid fever and aided the borough in supervising the disinfection of all open sewers; assisted with disinfection of the water supplies and with the cleansing and flushing of the water mains.

A total of 58 cases were reported as having typhoid fever, or were found by making a house to house canvass. Three secondary cases developed in the interval while the work was being prosecuted.

The suspicion that the water supply was the source of the outbreak was confirmed by detailed study of the milk and water samples sent to the laboratory.

The Pennsylvania Railroad, during the height of the trouble, while the wells were being repaired and water supplies disinfected, gave the borough, gratuitously, 6,000 gallons of pure water each day, from one of their tank cars.

An emergency hospital was opened by renting a seven-room house and placing it under the charge of Miss O'Halloran and a corps of nurses.

CAMBRIA COUNTY.

Richland township. Dr. W. E. Matthews, C. M. I. The following correspondence indicates the activity of the Health Department in other parts of Cambria county:—

"Yesterday (September 14), I received notice that a case of typhoid fever existed in the home of H. H ——, Richland township. I at once made an investigation and found a little girl suffering from typhoid fever. Mr. H——— conducts a dairy farm, supplying milk to the greater part of the borough of Windber. We went over the situation very fully with Mr. H——— and arranged to have the cows removed at once to the adjoining premises and for the disinfecting

and cleaning up of the premises in general. The water supply is from two springs; one has not been used for some time except for watering the cattle. When the water was low in the spring used for drinking purposes they began drinking the water from the spring used for the cattle. Two weeks following this the little girl developed typhoid fever. From the history of the case it seems about the only source from which the child could have contracted the disease. This spring is located very near a public road and the water being cold many travelers would stop and drink from it. Until we can determine positively that this is the source of infection I nailed the spring shut placing a warning sign on the same. I also sent to Dr. Herbert Fox, last evening, samples of water from each spring."

CAMERON COUNTY.

Emporium. Dr. H. S. Falk, C. M. I. In the early part of November an unusual prevalence of typhoid fever was noted in the borough of Emporium, and the good offices of the Department were solicited toward helping to determine the source of infection and to help stamp out the disease.

With the assistance of the Laboratory Division, 16 samples of water were examined bacteriologically, from the various intakes, reservoirs and spigots of the borough and from wells, and four samples were examined from a dairy farm supplying a good part of this borough with milk. These studies, together with an analysis of the cases in the borough, pointed conclusively toward the water supply as the source of the infection, and pointed especially toward the West Creek Reservoir of the Emporium Water Company.

Among those who contracted the disease and lost their lives in the early part of the epidemic was the young man who ran the pumping station supplying this reservoir with water.

During the course of this outbreak the people of the borough were assisted for a time by Miss O'Halloran, the nurse usually detailed for this kind of epidemic work, and from her notes it appears that 16 families were afflicted with typhoid fever. Of this number, at the time of her arrival, 7 had trained nurses—the remaining 9 families were assisted in every way by having the visiting nurse see the patients once or twice a day, and, in some cases requiring a great deal of attention frequent visits were made. Families were taught to care for the bed and body linen of the patient and were given instructions as to the proper disposal of the excreta, the care of dishes, and practical instructions as to the ventilation of the rooms.

One patient was found living in a miserable shanty on the side of a mountain, being nursed in a small room, used as a kitchen and general living room for a family of seven. Miss O'Halloran succeeded in getting the consent of the father of the patient to have him enter

a hospital. Arrangements were made by which he was removed in an ambulance to the railway station, thence to the Ridgway Hospital, where suitable care was given. The house was then disinfected by the Health Officer and cleaned up in the usual fashion.

The work of the nursing corps, together with the aggressive campaign waged by the local Board of Health, stamped out the disease during the month, and no new cases were reported for a period of two weeks prior to the nurses leaving.

CARBON COUNTY.

Bowmans and Hazards. J. K. Henry, C. M. I. "On receipt of information that an epidemic of typhoid fever was impending at Bowmans and Hazards an inspection was made at once. Dr. J. K. Henry and Health Officer H. N. Blunt met me at Bowmans on the 9th of September. Their study of the existing cases of typhoid and conditions in the community led to an immediate inspection of certain dairy farms in Lizard Creek Valley, East Penn township. The first farm, that of Mrs. O. S——— was in a sanitary condition and gave no history of contagious or infectious disease in its buildings for several years. The second farm, that of A. S——— No. 1, was in good sanitary condition, but two cases of typhoid fever had recently been treated in the farm dwelling. The water supply for this farm house is secured on the adjoining farm of A. S——— No. 2. The sanitary inspection of the last named farm showed stabling conditions to be satisfactory, no milk was sold, but the spring from which the water supply for both farms is secured in insufficeiently protected. A history was elicited of a possible pollution by the wallowing of animals in the spring and by surface drainage. The milk from the farm of A. S——— No. 1 was not retailed by A. S——— but was sold at wholesale to Mrs. O. S——— and retailed by her with product from her own dairy, with the residents of Bowmans and Hazards.

A history of 12 cases of typhoid fever was elicited in the occupants of the house and farm of A. S——— No. 2. All cases of typhoid in Bowmans and Hazards secured their milk supply from the retail delivery of Mrs. O. S———.

It looks at this time as if the water of the spring of A. S——— No. 2 is the source of trouble and that A. S——— No. 1 in securing the water supply for his family and dairy in this spring has infected not only his family but also his milk and that this milk has been the source of infection along the dairy route of Mrs. O. S———. In all about 15 cases of typhoid are present in Hazards and four in Bowmans. An order was issued to Mrs. O. S——— to discontinue the sale of milk for a few days until bacteriologic studies had been completed.

Samples of water from the spring were sent to the laboratory, the spring was disinfected and sufficiently protected to prevent the same sources of pollution occurring again.

CHESTER COUNTY.

Spring City and Royersford. On receipt of information from two citizens of Spring City, one of whom enclosed a clipping from a local paper, giving us information that typhoid fever was unduly prevalent in Royersford and Spring City, the Department assigned County Medical Inspectors, Joseph Scattergood and H. H. Whitcomb, to take up with the borough Boards of Health the details of the outbreaks, and the Engineering Division detailed Messrs. W. W. Ritter and Ira F. Ziegler to visit these boroughs and study their water supply and examine carefully the sewage disposal methods on each property where disease was said to exist, and within twenty-four hours special nurses were detailed to report in both towns for the purpose of making a house to house canvass and establishing a system of training the nurses and care takers in proper methods for the disposal of excreta and methods for general care of those having typhoid fever.

The first reports submitted by Dr. Scattergood convinced us that at least eighty cases of typhoid fever were then under treatment in Spring City and vicinity and that of those ill a large proportion of them were using the Spring City public water supply and that a goodly number were using water from dip wells.

The first preliminary study made of the outbreak convinced us that the water in good part was responsible for the outbreak of the disease. As soon as these facts reached us the following letter was addressed to Dr. J. C. Mewhinney, Secretary of the Spring City Board of Health and a duplicate letter was sent to Mr. C. O. Grander, Secretary of the Board of Health of Royersford:—

August 22, 1908.

Dear Sir:—The reports sent to us by our County Medical Inspector and by citizens of your borough bring to our attention the fact that your Board has to deal with a typhoid epidemic.

The following points are brought to your attention.

In handling of any epidemic of typhoid fever there are a number of things which assume a considerable importance and I desire to bring these matters to your attention and would ask whether you have instituted any regulations along the lines indicated and if so, to what extent?

Especially in time of epidemics of any disease the physicians should be compelled to promptly report all cases either conclusively diagnosed or presenting the clinical symptoms of the disease in question. If physicians are negligent in the matter of reporting typhoid fever to your Board at the present time they should be arrested and fined in order that no case may be neglected and thereby allowed to become a focus for secondary infection.

All houses in which typhoid fever exists should be placarded with a penalty attached for the removal of such placards. Circulars setting forth the rules and regulations to be observed by nurses or attendants having the care of typhoid fever should be distributed in every household where the disease exists and for this purpose I am sending you under separate cover a number of the Department circulars on typhoid fever.

The Health Officer should placard the house and ascertain the conditions existing on the premises, character of the privy, cesspool or whatever means are used for the disposal of excreta and the needs of the family, reporting the same to your Board and a lime wagon should be started to distribute freshly burned unslacked lime to the houses where the owners or occupiers are unable to provide the same for their individual use, this lime to be used in the form of milk of lime for the disinfection of excreta and for use in all closets or privies. The work of the lime distibutor should be checked up by the district nurse, who should visit each home where typhoid fever exists and where they are unable to procure the services of a nurse, directing them as to the precautions to be observed and seeing that the instructions of the physician are carried out.

Wherever possible in indigent families the patient should be transferred to a hospital at once and the room and its contents thoroughly disinfected, together with the privies.

Warning placards should be posted in conspicuous places; preferably on telegraph poles, in saloons and in the street cars directing all people to boil their water and milk for at least thirty minutes prior to its use for domestic purposes.

The delivering of milk in milk bottles should be prohibited and all dairymen should be compelled to deliver their milk into an individual container supplied by the householder, this container not to be handled by the dairyman at all. Unless this precaution is taken due to the interchange of individual milk bottles or the infection of the general milk supply of the dairyman, the infection is very apt to be carried in this manner.

All proprietors of meat markets and of meat carts which go about the streets peddling meat should be compelled to have their meat so placed in their markets that the handlings of the same by customers should be prohibited and all those delivering meat from wagons should be instructed that the customers must not handle meat before purchase, that the rear curtain of their wagon should be closed and that sales should be from the front of the wagon. In other words, no meat should be handled by prospective customers.

If the municipal water supply is found to be at fault the mains should be repeatedly flushed, all dead ends bled and copper sulphate introduced into the reservoir or screening chambers in the proportion of one to a million, this addition to be kept up for at least ten days.

Our records show that your Board has been derelict in making reports, and we expect weekly reports to be sent this office promptly henceforth.

Yours truly,

SAMUEL G. DIXON.

A detailed report from Dr. Whitcomb, prepared on the 21st of August, led us to believe that the situation in Royersford was not so serious and that about 40 cases were ill with the disease in this borough. Further investigation showed that many of the patients were being well cared for by professional nurses.

Those detailed to study these outbreaks received little aid from the Board of Health records in Spring City. Physicians up to this time had not been reporting typhoid fever and no records had been kept in the office of the secretary.

In order to determine the location of all persons sick with the disease every physician in the two boroughs was communicated with and from them were secured fairly complete lists of all typhoid cases treated since July 1st, and all cases under treatment at the present time in which a diagnosis had already been established or in whom they had reason to suspect typhoid might be developing.

On the 22nd of August the nurses detailed for special investigation and instruction began a routine canvass resulting in their visiting, in the period of sixteen days, ninety-nine patients in the borough of Spring City and vicinity and forty-two in the borough of Royersford. In each instance nurses and care takers were taught by practical demonstration the precautionary measures to be observed regarding excreta, bed and body linen of the patient, etc.

Investigation on the part of the representatives of the Department showed gross violations of the law on the part of nearly all physicians practicing in Spring City and on the part of some of those practicing in Royersford. So flagrant were these violations that it was deemed wise by the Department to secure enough evidence to convict two of the physicians practicing in Spring City. Information was therefore secured by Dr. Scattergood, charging two of these physicians with failure to report forthwith communicable diseases, under the Act of June 18, 1895. Conviction was easily secured in each instance and on the 16th of September one of these physicians, after pleading guilty of the charge, was fined $25.00 and costs, amounting in the total to $52.56; and on the 28th of September the other physician was convicted and fined $25.00 and all costs save that of bringing witnesses from Harrisburg.

A careful study of the water and milk supplies—a total of 93 samples—showed positive indication of sewage pollution in the some of the water supply; and on the dairy of A. H———, showed a total of 12,500 colon in one cubic centimeter of the milk. A detailed study will be found in the report of the Engineering Division.

The following tables show the number of cases found to have suffered from the disease between the 1st of July and the end of the year. They are arranged in quinquennial age periods, by sex, and are classified by age and attending physicians. A total number of

129 cases occurred in Spring City, 49 in Royersford and 16 in East Vincent, Chester county. Three patients died in Spring city, 4 in Royersford and 2 in East Vincent township.

CLASSIFIED BY AGE.

1 to 5,	19	31 to 35,	8
6 to 10,	39	36 to 40,	13
11 to 15,	25	41 to 45,	1
16 to 20,	36	46 to 50,	3
21 to 25,	22	51 to 55,	1
26 to 30,	18	56 to 60,	4

BY SEX.

Male,	90
Female,	94

Note.—During the time covered by this outbreak, 15 cases were reported to this Department in the borough of Spring City and 7 cases in East Vincent township—a total of 22. There should have been reported during this time 124 cases in the borough and 16 in East Vincent township.

In Royersford during the same period of time 45 cases were reported to the local Board of Health in the borough and 4 cases in the adjoining rural districts; in other words Royersford the physicians supported the Board of Health and the Board of Health was active and alive to the interests of the people. In Spring City the physicians were careless and the Board of Health did nothing.

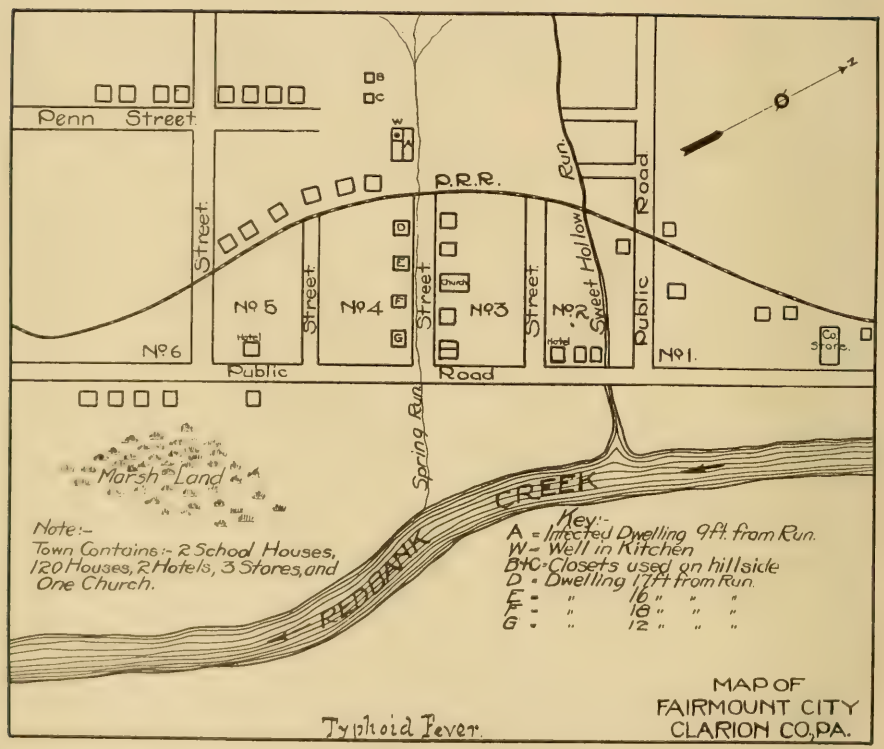
CHESTER COUNTY.

Dr. Jos. Scattergood, C. M. I. W. Bradford Township. An investigation was made October 12th of a small epidemic of typhoid fever in West Bradford township, on the dairy farm of I. L———, resulting in the enforcement of the regulations of the Department in regard to the care of the patients and the excreta and the transfer of the cows to a neighboring farm during the remainder of the illness.

SPRING CITY.

Considerable time was spent in investigating the epidemic of typhoid fever in Spring City (See special report of typhoid conditions in Royersford and its vicinity).

Gross violation of the Act of June 18, 1895, was easily proven against several physicians in the district who had wilfully neglected to report cases of typhoid fever, and some of the County Medical In-


Penn Street
P.R.R.
Run
Road
Street
Street
Street
Street
Sweet Hollow
Public
Road
No 5
No 4
No 3
No 2
No 1
No 6
Public
Road
Spring Run
Marsh Land
CREEK
REDBANK
Co Store
Note:-
Town Contains:- 2 School Houses,
120 Houses, 2 Hotels, 3 Stores, and
One Church.
Key:-
A = Infected Dwelling 9 ft. from Run.
W = Well in Kitchen
B+C = Closets used on hillside
D = Dwelling 17 ft from Run.
E = " 16 " " "
F = " 18 " " "
G = " 12 " " "
MAP OF
FAIRMOUNT CITY
CLARION CO., PA.
Typhoid Fever.

spector's efforts were expended in securing the evidence upon which the Department proceeded to secure conviction against the physician violating the law.

CLARION COUNTY.

Dr. J. T. Rimer, C. M. I. Fairmount City. On receipt of complaint August 14, from certain citizens of Fairmount City that the regulations of the Department were being violated in a tenement house on the banks of a small stream just outside of this village, Dr. J. T. Rimer made a special investigation and reported as follows:

I found an American family occupying half of the tenement house. They had one case of typhoid convalescent. They had carried out the doctor's instructions. In the end of the house next to the street, and next to the stream, lives an Italian family, with one case of typhoid convalescing, and four others with all the premonitory symptoms of typhoid. They were using the closet with a vault dug in the ground, and paid no attention to disinfection in any particular.

All waste and house sewage and excreta from the patient already ill with typhoid were being thrown into the stream or on the ground between the house and the stream.

I ordered 10 pounds of copperas and a half bushel of unslaked lime to each vault to be used every other day until thoroughly disinfected in the double closet. I ordered a trench dug on the upper end of the lot above the closets 3 feet deep, 1 foot wide and 3 feet long, had them put two inches of lime in the bottom, to receive their slops, and cover it with a board. I insisted that the weeds be cut from the banks of the little stream passing the house and that lime be thrown along the banks of the stream. I also ordered that the people along the street further down the stream to cut the weeds in front of their houses and put lime along its course. The constable was appointed as policeman to see that the family of Italians carry out their instructions with regard to the disinfection of excreta and the care of their slops, his appointment to continue for a short time, at $2.00 a day until they were sure that everything was thoroughly cleaned up, and that the instructions were being faithfully observed.

The well is underneath the kitchen part of the house from which both families have their water for cooking and drinking and all household purposes. They have been instructed to boil the water.

On receipt of the report from the Medical Inspector the following messages were telegraphed the towns of South Bethlehem and New Bethlehem and letters were written the secretaries of the Boards of Health of these boroughs advising them of the possible pollution so that warning messages might be issued to their people.

"J. B. Dobson,
New Bethlehem, Clarion Co., Pa.

Dr. Rimer, Clarion, reports possible pollution water supply. Would suggest warning people boil water. Letter."

(LETTER.)

"We confirm telegram of to-day noting the fact that we have been advised by our County Medical Inspector, Dr. J. T. Rimer, of Clarion, of the existence of cases of typhoid fever among Italians in Red Bank township, in which it is feared that pollution of the Citizens' Water Company supply may have resulted through carelessness in the management of cases on these premises.

"While Dr. Rimer personally supervised the abatement and disinfection of existing nuisances on the premises and placed a guard to see that our instructions were carried out, we are of course unable to state what harm may have occurred before the matter was brought to the attention of our representative and would suggest therefore that consumers of this water supply be instructed to thoroughly boil it before using for drinking purposes."

Dr. J. T. Rimer, C. M. I. Rimersburg. The aid of the Department was invoked, July 20, in caring for certain cases of typhoid fever near the borough of Rimersburg in Toby township. In this particular outbreak among Italian miners, the first cases were reported in a house on top of the hill, and subsequently a series of cases in homes further down the slope. Inasmuch as these houses have been seats of former outbreaks it was deemed wise to have an investigation and the bacterial content of waters from the spring supplying this community tested in our laboratory. Notices were posted urging the boiling of all water used for domestic purposes, from these springs, and the usual precautions of the Department were enforced with regard to the disinfection of the excreta. The laboratory report showed no evidence of sewage pollution.

CUMBERLAND COUNTY.

Dr. H. B. Bashore, C. M. I. S. Newton Township. "I beg to report that I visited the home of H. B. in S. Newton Township, Conedoguinette watershed, September 5, on account of the presence of typhoid fever. I ordered every precaution to be taken in the disposal of discharges, and notified the Health Board at Carlisle of my action."

DELAWARE COUNTY.

Dr. Robt. S. Maison, C. M. I. Bromall. "On receipt of information, November 2, from Health Officer Field, I visited Broomall, on account of the existence of typhoid fever. The patient is a daughter of A. M., and has been under the care of Dr. J. G. Thomas, of Newtown Square for the past three weeks."

"There are 28 cows on this dairy with a daily output of 200 quarts of milk. It is sent to Philadelphia to a milk dealer named W. who lives at Llanerch. The milk dealer cleans all the cans and they are taken directly to the spring house which is 600 feet from the house and are chilled there. Those who come in contact with the sick have nothing to do with the milk. I can see no reason to apprehend any infection from the case of typhoid fever at this place."

BRANDYWINE SUMMIT.

"On receipt of information from Health Officer Speakman I visited Brandywine Summit on July 25, on account of butter being sold from a farm where typhoid fever existed. The patient, a child of I. B. was lying in the front room on the first floor with thousands of flies going from this room at meal time to light on the food in the dining room and kitchen adjoining. The butter is made in the cellar and the separator smelled mouldy. I ordered the patient's room to be properly screened and all dejecta to be disinfected. I also directed the Health Officer to visit the house in a few days to see if the orders had been carried out and, if not, to stop the sale of the butter."

HUNTINGDON COUNTY.

Dr. H. C. Frontz, C. M. I. Robertsdale. On receipt of a letter May 29, from A. E. Bachert, General Superintendent of the Rockhill Iron & Coal Company, Robertsdale, Pa., stating: "That there existed in Robertsdale a case of typhoid fever in the person of J. C., at the home of Mrs. P., and that the stools from this patient without being disinfected were being dumped into Trough Creek, which flows back of the house and through part of the town of Robertsdale, and that all the efforts of Dr. E. W. Black, the physician and himself, were of no avail toward correcting the condition." Dr. H. C. Frontz was detailed and reported as follows:

"I communicated by telephone with Health Officer of District No. 493 and directed him to go to the place and have the stools of this patient disposed of in accordance with the requirements of the Department of Health. He 'phoned me on the evening of June 1st that he had been to Robertsdale and that he did not believe the things would be corrected properly."

"A personal inspection was made, Mr. Bachert and Dr. Black accompanying me. I found the home of Mrs. P. in a very unsanitary condition. The stools were being dumped into a ditch about fifteen feet from Trough Creek. I found the privy located right on the bank of the creek and its contents could easily drain into it. The house belonged to the Rockhill Iron & Coal Co.

"I asked Mr. Bachert to remove the privy to a safe distance from the creek, and directed that a ditch be dug at least one hundred feet from the creek, in accordance with the instructions of the Department of Health, and that all stools be deposited in it and that lime be used as per regulations. These things I believe will now be done as Mr. Bachert is in position to see that my instructions are carried out, and is very willing to cooperate in the work."

"I endeavored to discover the source of this case of typhoid fever but could find no source other than that it might have developed from the drinking water which comes from the head-waters of Trough Creek which supply the Woodvale reservoir some distance above Robertsdale. As this water is being used by almost all the residents of Robertsdale I thought it wise to have a specimen of it examined, and so wrote you last night to send a bottle to Dr. F. W. Black, Robertsdale, for the purpose."

LACKAWANNA COUNTY.

Dr. J. C. Reifsnyder, C. M. I. Carbondale. On receipt of a letter from the Secretary of the Board of Health at Carbondale, August 21, 1908, relative to an outbreak of typhoid fever in that city, stating that 20 cases were then under treatment and that during three days of the week in which the letter was written 18 cases had been reported to their office, Dr. J. C. Reifsnyder was detailed to go over the conditions with them and special arrangements were made to make immediate inspection of every dairy supplying the city with milk. Permission was granted for a laboratory study of the water supply of the city, and Dr. Fox reported to their Board on the various samples, as follows:

No. 4 Pond: Bacteria per cubic centimeter, 420. Bac. Coli found in one cubic centimeter, 4.

Crystal Lake: Bacteria per cubic centimeter, 720. No. Bac. Coli.

Brownell Dam: Bacteria per cubic centimeter, 8. No Bac. Coli.

After receiving the report of the Medical Inspector and studying the letter of the Secretary of their Board to this office together with the laboratory reports of Dr. Fox, the following reply and advice was addressed to the Secretary:

"Mr. Fred W. Lewis,

Carbondale, Aug. 25.

Dear Sir:

Yours of recent date with regard to typhoid fever at that place is at hand and contents noted. From the reports it appears that water supply known as "No. 4 Pond" shows evidence of sewage pollution and we would strongly urge upon you to warn householders to boil this and other suspicious water supplies before using for drinking purposes.

If you will kindly advise us of the name and township location of dairymen from whose premises milk is marketed in your borough we will be glad to have them inspected at once. A representative of the Department has been detailed to make a sanitary survey of your watershed.

Very truly yours,"

Inspection of the dairies supplying milk to the city resulted in the finding of active typhoid fever on one farm, that of A. K. and, in convalescent typhoid fever on a neighboring farm, a full-fledged dairy, that of G. R. The regulations of the Department were enforced in each instance.

LANCASTER COUNTY.

Dr. J. L. Mowery, C. M. I. "On receipt of information that no report had been made of a case of typhoid fever existing on the farm of J. S., in East Earl township, near Goodville, a personal inspection was made and Dr. W. was found in attendance upon the patient, when I called. The doctor admitted that the patient had had typhoid fever since the 22nd of August and was unable to give any reason why he had not reported it to the Department. He told me he would report the case at once, and after I had defined the regulations of the Department to the family and arranged for the exclusion of one of the family to take care of the milk, I stated to the physician that I would report his derelict procedure to the Department to be considered by them. I might say that in searching for the source of infection, suspicion was plainly directed toward the small spring from which the house supply of water is drawn, coming underground by a pipe. Above this spring is a small watershed through which pours an open drain and near which are a number of surface closets. Under my direction the Health Officer will undertake to have these nuisances abated at once."

PENN TOWNSHIP.

"On receipt of information on the 22nd of September that milk was retailed to individuals from the premises of J. G., in Penn township, where typhoid existed, I made a personal inspection, and after being unable to make satisfactory arrangements to completely isolate some member of the family to continue handling the milk, I fixed upon the only remaining plan, viz: discontinued the sale of milk. I would say in connection with this case that the patient has been ill for a period of six weeks and was for the greater part of this time under the care of Dr. S. B., of Manheim, and that it was reported a few days ago at a time when it seemed as if the patient's life was in great jeopardy."

LEBANON COUNTY.

Dr. A. J. Riegel, C. M. I. Myerstown. On receipt of a letter June 24, from Mr. E. K., whose son was sick with typhoid fever, telling us that a number of cases had appeared in this town and in the adjoining country, a special investigation was ordered, and report from Dr. Riegel detailed a most disgraceful amount of pollution in the abandoned canal running parallel with Tulpehocken Creek, in the section of the town adjoining the properties of Mr. J. B. and A. Z., on both of which places slaughter houses were conducted with the filth from each handled in complete disregard of the health of the community, and giving rise to odors so abominable as to cause many complaints in the community and to furnish good cause to have our engineering division abate the nuisance at once.

About eight cases of the disease were specially investigated by Dr. Riegel without being able to find any one assignable cause as to the source of the infection.

POTTER COUNTY.

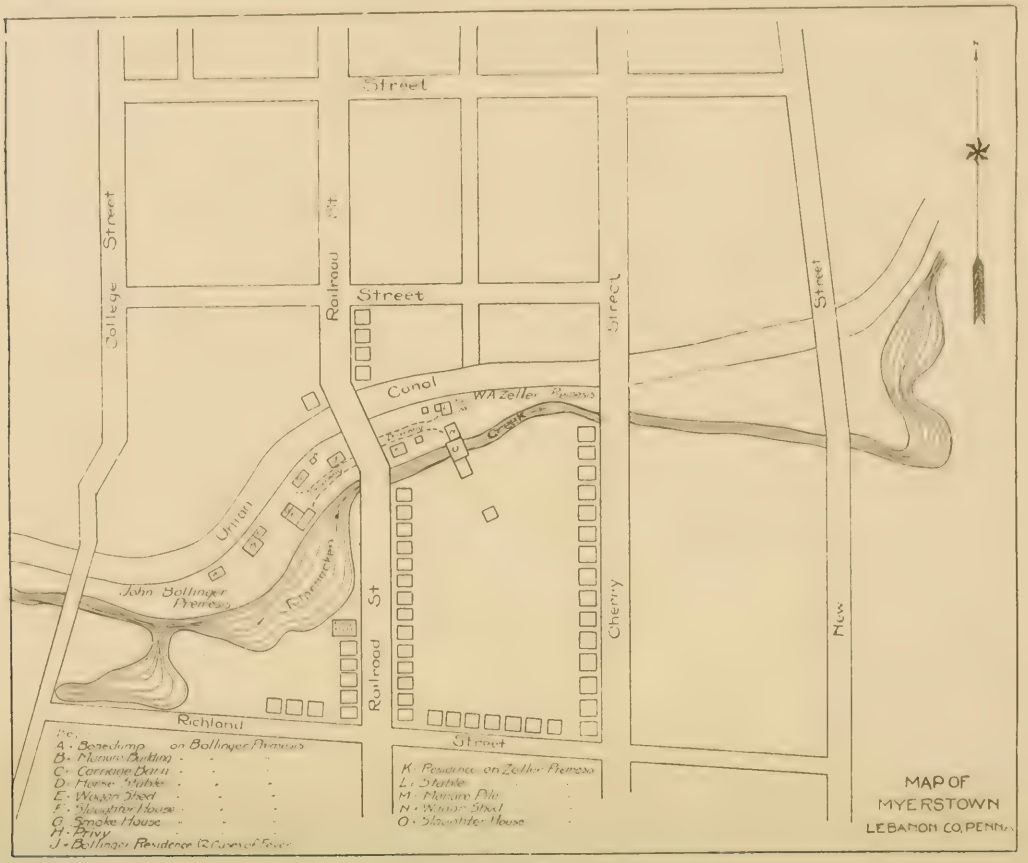
Lumber Camp. Dr. E. H. Ashcraft, C. M. I. "In accordance with your instructions of August 22, I made an inspection of the lumber camps on the Nine Mile on the 26th, where I found the following conditions:

"Two camps situated about 30 rods apart, one owned by Mr. F., of Roulette, this county, and one owned by Mr. C. C. R., of Coudersport, the former having a capacity of about 20 men, and the latter 30. Both are using water from the same spring properly piped to each building and apparently of excellent quality, and the spring not situated where likely to be contaminated.

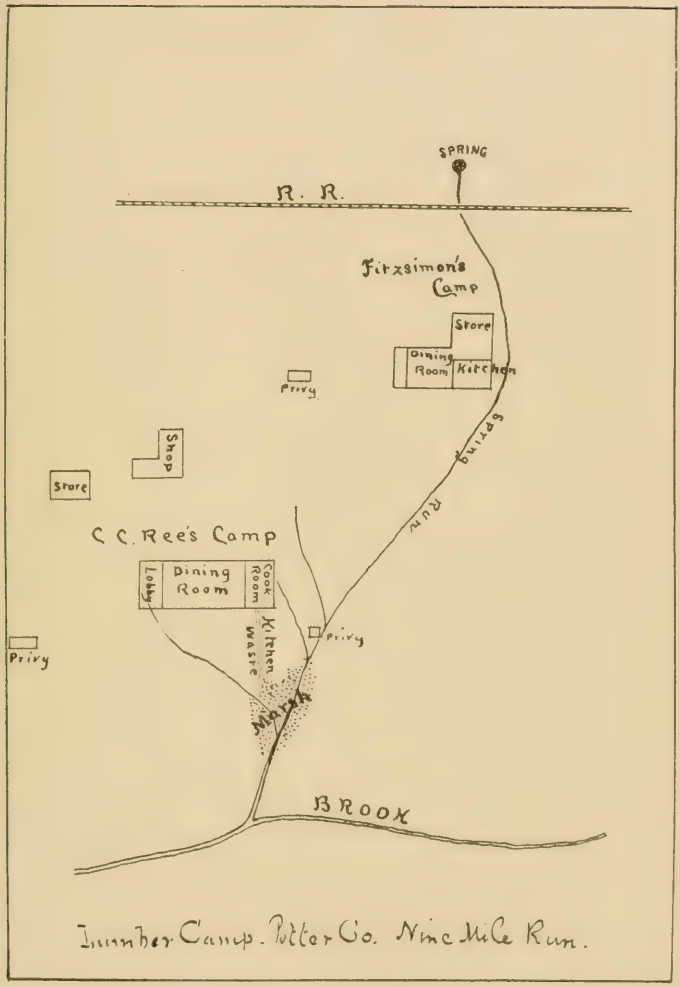
"The first two cases of typhoid fever occurred in Mr. F.'s camp. They were his own sons who were in the habit of spending their Sundays in their home in Roulette where, you will note, several cases of typhoid fever have been reported.

"Subsequently eight cases were contracted in the camp of C. C. R. None of the men in F.'s camp have contracted fever except those visiting Roulette. I found F.'s camp exceptionally clean and sanitary; all that could be expected under the circumstances, but the camp of C. C. R was the most insanitary of any camp I ever visited. There are about three small springs coming out near and under the camp with no ditch to convey the water away, and the hogs have a real heaven in the mire.

"But the worst feature of the camp is that a privy was placed over the spring run about 20 feet from the back door, and this privy was used by the first case in this camp. The water below the privy spreads out over the low ground which is also used as a dumping ground for kitchen refuse and among this rubbish there were numerous hog wallows.



Outbreak of Typhoid Fever.



Outbreak of Typhoid Fever.

"The surroundings furnish such a clear demonstration of the causative factors that I enclose you a rough sketch of the same, which will speak louder than words. It furnished such a good example of the means of contagion. I wish it could be spread broadcast throughout the State as an object lesson.

"These privies are infested with flies that go back and forth from the privy through the always open window to the dining room, alight upon the dishes, which are left, together with portions of food stuff, from one meal to another, and there perched upon these things they make their toilet, scraping off their germ laden legs on the food and dishes.

"The hogs wallow in the ooze flowing from the typhoid stools below the closet and then bask in the sunshine until their coats dry and they begin to itch, when they grunt and rub themselves on convenient stumps until the ground is literally reeking with germ laden dust. The men with their corked shoes track it in on the floor, and after the dishes have been washed and returned to the table the cook sweeps, a cloud of germ laden dust settles on the dishes and food, the men eat it with their food and wonder where they contracted typhoid fever.

"It is the old story. A previous case, flies, insanitary surroundings.

1st. I recommended that one of these closets be burned, and that the others be moved to a place which I designated, and log heaps be built over the vaults and a fire continued there for two days.

2nd. That a fence be built around a dry knoll a distance from the camp and the hogs removed to it and there confined.

3rd. All stagnant pools and wet ground be ditched, the weeds cut allowing the sunlight and air access to this wet ground.

4th. That the floors be flooded with a 1 to 1,000 Bichloride solution which I left.

5th. That slaked lime should be liberally scattered over such ground as I designated.

6th. That all empty cans and other garbage should be collected in a suitable receptacle and carried some distance from the camp and there burned periodically."

LEBANON COUNTY.

Dr. A. J. Riegel, C. M. I. Annville. "On receipt of information, August 13th, that a typhoid epidemic was impending in the town of Annville, special investigation with inspection of properties at the residence of eight of those who were ill showed no definite source of infection. In the course of the inspection attention was directed to the Reading Dairy Company's milk station, which furnishes milk and cream to many of the residents of Annville, and on a detailed inspec-

tion this building was found to be in a most insanitary condition. A full report of these findings was submitted by the Health Officer and this nuisance abated by order of the Engineering Division."

LUZERNE COUNTY.

Wilkes-Barre. Dr. Chas. H. Miner, C. M. I. In searching for a source of infection in cases of typhoid fever in the city of Wilkes-Barre late in August, information led to the inspection of certain dairy farms where typhoid fever was believed to exist. The dairy of R. showed a considerable number of cases along the route of his delivery. Inspection showed the farm to be in a very insanitary condition, but improvements were under way that would greatly remedy the conditions found. The water at this dairy was piped from the spring on a neighboring farm and on this neighbor's farm a case of typhoid fever was under treatment.

On the recommendation of Dr. Miner, County Medical Inspector, the Sanitary Committee stopped the delivery of milk from this dairy until such time as the possibility of infection had been definitely determined and sanitary conditions had been improved.

In all, a series of 24 cases developed in the families of those who had used this milk. Bacteriological examination of the water supply on the farm showed no sewage contamination. The bacterial content of the milk was high, however, and for a considerable time the milk of this dairy was refused by the Sanitary Committee of Wilkes-Barre. Conditions improved by the end of October and the services of the Department were no longer solicited.

SOMERSET COUNTY.

Boswell. Dr. Chas. P. Large, C. M. I. On receipt of information that typhoid fever was unusually prevalent in Boswell, Dr. Charles P. Large, Medical Inspector of the county was directed to confer with the officials operating the company supplying Boswell with water and to report upon conditions found. His investigations developed the fact that previous to December 15, 1907, the town of Boswell received its water supply from artesian wells; that about this date the pumps used in drawing this water from the wells were so damaged that the officials deemed it necessary to take their supply from Quemahoning Creek at a point in the stream below which a part of the sewage supply empties and near a point where slaughter house offal is received. This creek two miles further up received sewage from a mining town known as Jenner No. 2.

Shortly after this change of water supply was authorized typhoid fever developed and within sixty days from 150 to 160 persons were ill with this disease. It happened that previous to this change of

water supply the town had suffered from an epidemic of measles and la grippe and many of those suffering with enteric fever were convalescent from these diseases.

In Dr. Large's study of the situation samples of water were taken from the Creek at the intake above and below the point polluted with slaughter house offal and at the pumping station, and from three wells in the community, establishing the fact that colon bacilli were present in three samples taken from the creek.

After a conference with the authorities the artesian well supply was at once restored; notices were posted in public places advising that all water for drinking purposes be boiled and a campaign of education was instituted with such vigor that within a few weeks the disease was practically stamped out.

Eighteen deaths were reported in this epidemic and they may be justly charged to this unwise use of a visibly polluted water supply.

SUSQUEHANNA COUNTY.

Oakland.—Dr. H. B. Lathrop, C. M. I. On receipt of a petition signed by 80 citizens of the borough of Oakland and complaining of the insanitary conditions of the town and disregard of quarantine measures, special investigation was begun by Dr. H. B. Lathrop, who reports as follows, November 8th:

"In accordance with your instructions I visited Oakland, November 4th to investigate the conditions complained of in the petition which you forwarded to me and which I return herewith.

"I interviewed several of the petitioners and other citizens as to the cause of their complaint, called upon the Secretary of the Oakland Board of Health and found that a meeting of the board had been called for that evening. I was requested to meet with them and did so. At this meeting we discussed the management of communicable diseases, the regulations they have adopted and the individual cases complained of.

"Since October 1 there have been ten cases of communicable diseases reported to the Board: four of typhoid fever—no deaths—two of scarlet fever with one death and four of diphtheria with two deaths. At the present time there are in the borough three cases of typhoid fever, one of scarlet fever and one of diphtheria, all said to be convalescent. No new cases during the past ten days.

"From what I learned concerning these cases I concluded that quarantine had not originally been very strictly maintained.

"One of the cases particularly complained of was that of a child who was ill with scarlet fever in a boarding house where a number of workmen boarded. These men were allowed to come and go as

they wished. The physician in attendance and the Health Officer explain this by saying that the child was kept upstairs in a back room and that the men did not go near the patient or her nurse.

"I do not think that the rules of the Department as given in Circular No. 4 were strictly adhered to, and I suggested to them that in all such cases the rules as laid down should be observed to the letter or else the case placed in absolute quarantine. This child died, the house has been disinfected and no other cases have arisen from it.

"The Board of Health have adequate regulations and I think they are at present taking good care of their cases of communicable disease.

"Oakland is a borough of about 1,000 population on the opposite side of the Susquehanna River from Susquehanna borough. Most of the town is on a steep hillside. The town has an excellent water supply but is badly sewered. Only two streets have sewers and these do not extend very far. Consequently filth accumulates in some places until the rains wash it away. The cesspools and private drains should be looked after more thoroughly."

TIOGA COUNTY.

Mansfield. Dr. S. P. Hakes, C. M. I. "Yesterday (September 7) and to-day, I have been in Mansfield with the Borough Board of Health and the superintendent of the water works and on the water shed going over the matter of preventing the contamination of the water supply from the typhoid on said watershed.

"The superintendent of the water works sent workmen to the watershed and I have been there directing the placing of the typhoid fever premises in sanitary condition or so near that as possible. The outhouse that was located on the ravine close to the bank of Lambs Creek that was so objectionable because a patient had used it until taking to his bed, we removed to a safe place; and the contents were removed with a goodly amount of the surrounding earth, placed in a deep pit, and thoroughly covered with unslaked lime. We then filled the excavation with fresh earth well rounded up."

WASHINGTON COUNTY.

Morganza Home. Dr. C. B. Wood, C. M. I. "By order of the Chief Medical Inspector I visited the Morganza Reformed school on the 18th day of August and investigated an epidemic of typhoid fever reported in the institution, Health Officer Dr. Runion going with me. Dr. Johnson, the attending physician, had reported 20 cases of well developed enteric fever, eight or ten boys were under observation. We found the dairy barn, cattle and milk house all in excellent condition

and at the present time it looks as though the water supply is responsible for the outbreak. The source of water for all domestic purposes, excepting for drinking, is Chartiers Creek, at present a very small stream and not much better than a sewer. This creek water is pumped into reservoirs on the hill above the Home and is distributed throughout the buildings. The water used for drinking purposes is taken from two strong springs with perfectly clean surroundings and without visible evidence of pollution.

The superintendent of the Home has done all in his power to prevent the boys drinking water from taps but many do it in spite of his orders. Samples of the water from the creek, reservoir, the springs, and samples of milk were sent to the State Laboratory for bacteriologic study, and the water in the reservoir was, with the consent and advice of Mr. Snow, the Chief Engineer, treated by adding chlorine—eight parts to a million. Infection probably took place through the water used for domestic purposes drawn from Chartiers Creek.

With the observance of these precautions the epidemic subsided."

The laboratory studies confirmed the suspicion that the water supply was contaminated and also showed that the milk contained colon bacilli—this most probably reaching the milk through water used in washing and rinsing containers.

ACUTE ANTERIOR POLIOMYELITIS.

ADAMS COUNTY.

Gettysburg. Dr. J. R. Dickson, C. M. I. In July and August cases of cerebrospinal fever and acute anterior poliomyelitis were reported in the boroughs of Gettysburg, McSherrystown, McKnightstown, New Oxford, Cashtown and Fairfield. About the same time scattering cases of these diseases were reported in rural districts. With both diseases present in each community some confusion in diagnosis occurred.

On receipt of the following letter from Dr. G. H. S., of New Oxford, "You have, no doubt, heard that our vicinity is visited by an epidemic of cerebrospinal fever. The disease seems to be increasing, Gettysburg has a large number of cases. I have two in this town. The people are very much alarmed, and I do not wonder that they are. I have not been able to make a spinal puncture in my cases to demonstrate the germ, on account of the family objecting, but I consider my cases acute anterior poliomyelitis and should like very much to have these cases investigated so we could know better about the isolation, etc. I should be glad for any information you may be able to give me."

Dr. Dickson visited New Oxford and investigated these cases with Dr. S. and agreed with him that the patients were suffering from acute anterior poliomyelitis. They were not able to secure permission from the family to do lumbar puncture and thus to exclude positively by bacteriologic study the diagnosis of cerebrospinal fever.

Considerable anxiety was felt in several of the boroughs of the county. Special action was taken requiring the report of both anterior poliomyelitis and cerebrospinal fever by the borough Board of Health in Gettysburg.

REPORTS OF SCHOOL INSPECTIONS.

1908.

SCHOOL INSPECTIONS, SPRING, 1908.

County.	Total No. of Schools Inspected.	No. Having One or More Unsanitary Conditions.	No. in Excellent Condition.	Percentage in Clean Condition.
Adams,	153	12	141	.921
Allegheny,	180	36	144	.800
Armstrong,	259	90	169	.652
Beaver,	71	10	61	.859
Bedford,	186	43	143	.763
Berks,	274	44	230	.839
Blair,	134	38	96	.716
Bradford,	232	47	185	.797
Bucks,	216	8	208	.962
Butler,	172	55	117	.680
Cambria,	225	97	128	.568
Cameron,	20			
Carbon,	80	20	60	.750
Centre,	192	48	144	.750
Chester,	236	32	204	.864
Clarion,	72	8	64	.888
Clearfield,	222	131	91	.409
Clinton,	67	8	59	.880
Columbia,	148	26	122	.824
Crawford,	290	104	186	.641
Cumberland,	182	31	151	.829
Dauphin,	139	19	120	.863
Delaware,	99	6	93	.929
Elk,	80	30	50	.625
Erie,	168	21	147	.875
Fayette,	280	163	117	.417
Forest,	80	17	63	.787
Franklin,	255	54	201	.788
Fulton,	78	22	56	.717
Greene,	38	28	10	.263
Huntingdon,	158	40	118	.746
Indiana,	229	118	111	.484
Jefferson,	133	31	102	.766
Juniata,	95	25	70	.736
Lackawanna,	51	26	25	.490
Lancaster,	372	196	176	.473
Lawrence,	140	84	56	.400
Lebanon,	216	101	115	.532
Lehigh,	198	94	104	.525
Luzerne,	119	81	38	.318
Lycoming,	202	120	82	.405
McKean,	120	40	80	.666
Mercer,	202	143	59	.292
Mifflin,	62	33	29	.467
Monroe,	96	56	40	.416
Montgomery,	165	133	32	.193
Montour,	46	13	33	.715
Northampton,	142	63	79	.556
Northumberland,	120	64	56	.466
Perry,	92	32	60	.652
Pike,	36	12	24	.666
Potter,	71	36	35	.492
Schuylkill,	216	87	129	.597
Snyder,	21	10	11	.523
Somerset,	158	59	99	.626
Sullivan,	87	16	71	.816
Susquehanna,	91	29	62	.681
Tioga,	204	109	95	.465
Union,	71	20	51	.718
Venango,	156	68	88	.564
Warren,	134	56	78	.582
Washington,	249	86	163	.654
Wayne,	76	19	57	.750
Westmoreland,	196	122	74	.377
Wyoming,	78	32	36	.461
York,	258	99	159	.616

REPORT OF SCHOOL INSPECTIONS BY COUNTIES, SPRING, 1908.

County.	No. of Schools Inspected.	No. in which Conditions were Sanitary.	No. in which Ventilation was Poor.	No. in which light was Poor.	No. in which Water was Poor.	No. in which Privies were Dirty.	No. in which Privy Vaults were Full.	No. in which Privy Vaults were Overflowing.	No. in which Privy Vaults were Offensive.	No. in which Dividing Fences Needed Repair.	No. in which Grounds were Unclean.	No. Admitting Unvaccinated Children.	No. of Unvaccinated Children in Attendance.
Adams,	153	141	0	0	0	9	4	3	12	1	3	34	247
Allegheny,	180	144	----	----	8	16	8	5	29	8	5	61	377
Armstrong,	259	169	----	5	8	90	25	33	75	32	28	81	695
Beaver,	71	61	----	----	11	10	3	9	8	1	----	32	567
Bedford,	186	143	----	----	----	43	35	31	40	6	14	95	3,535
Berks,	274	230	1	----	----	13	31	26	23	12	----	21	17
Blair,	134	96	2	----	2	35	36	21	30	2	89	----	938
Bradford,	232	185	3	----	3	46	21	18	47	2	8	65	254
Bucks,	216	208	----	----	4	4	6	3	7	----	----	30	62
Butler,	172	117	4	----	5	42	38	29	42	----	----	71	1,027
Cambria,	225	128	3	3	10	69	73	54	74	----	35	111	1,860
Cameron,	20	1	----	----	----	5	1	1	4	----	4	19	54
Carbon,	80	60	2	----	----	15	12	9	15	----	----	23	159
Centre,	192	144	2	----	----	38	35	25	41	----	----	121	1,981
Chester,	236	204	1	3	----	25	20	14	17	----	6	82	617
Clarion,	72	64	----	----	2	7	1	----	5	----	3	26	92
Clearfield,	222	91	12	7	23	118	78	68	108	10	57	135	2,161
Clinton,	67	59	----	----	6	----	3	2	6	2	5	42	75
Columbia,	148	122	----	----	6	10	10	6	15	----	----	57	186
Crawford,	290	186	8	1	7	72	50	60	73	----	22	248	2,532
Cumberland,	182	151	----	----	2	29	24	25	28	----	17	78	902
Dauphin,	139	120	----	----	----	8	7	5	10	----	5	42	129
Delaware,	99	93	----	----	3	4	2	----	3	----	1	16	38
Elk,	80	50	----	----	1	29	7	6	31	----	----	4	13
Erie,	168	147	----	----	2	17	----	15	20	----	2	158	2,899
Fayette,	280	117	5	6	23	77	25	44	66	----	19	174	4,922

Forest,	80	63	----------	1	1	12	9	5	14	----------	4	40	138	
Franklin,	255	201	1	----------	----------	47	6	14	47	----------	3	206	4,678	
Fulton,	78	56	----------	----------	----------	19	12	11	16	----------	----------	34	204	
Greene,	38	10	1	----------	----------	17	6	11	17	----------	----------	32	504	
Huntingdon,	158	118	1	----------	----------	33	11	16	34	----------	2	50	536	
Indiana,	229	111	13	3	14	80	44	60	78	----------	34	53	306	
Jefferson,	133	102	----------	----------	6	30	11	10	32	----------	3	19	148	
Juniata,	95	70	1	----------	3	13	9	9	22	----------	4	76	1,624	
Lackawanna,	51	25	1	----------	2	5	4	4	12	----------	----------	24	418	
Lancaster,	372	176	25	4	4	115	75	70	120	----------	9	126	345	
Lawrence,	140	56	3	----------	3	46	19	9	46	----------	4	67	700	
Lebanon,	216	115	1	1	12	69	68	43	84	----------	12	112	1,429	
Lehigh,	198	104	----------	----------	1	70	30	22	64	1	1	1	11	
Luzerne,	119	38	3	----------	3	57	24	26	37	----------	16	44	263	
Lycoming,	202	82	5	----------	5	70	28	26	74	----------	5	85	542	
McKean,	120	80	10	----------	----------	24	20	15	32	----------	8	19	54	
Mercer,	202	59	----------	----------	2	40	73	65	120	----------	2	96	1,074	
Mifflin,	62	29	----------	----------	----------	25	8	3	25	----------	----------	16	484	
Monroe,	96	40	----------	----------	----------	31	37	37	48	----------	9	11	32	
Montgomery,	165	32	----------	1	8	65	80	73	92	----------	7	18	59	
Montour,	46	33	----------	----------	----------	6	12	11	13	----------	----------	13	46	
Northampton,	142	79	----------	----------	3	40	19	16	55	----------	20	----------	50	
Northumberland,	120	56	5	----------	5	53	15	16	42	----------	2	48	800	
Perry,	92	60	----------	----------	2	26	10	5	16	----------	2	22	37	
Pike,	36	24	----------	----------	----------	13	7	----------	7	----------	----------	1	11	
Potter,	71	35	2	----------	----------	35	10	10	31	----------	2	3	45	
Schuylkill,	216	129	2	----------	----------	69	28	23	54	----------	9	78	979	
Snyder,	21	11	----------	----------	----------	9	5	2	10	----------	2	----------	143	
Somerset,	158	99	1	----------	1	15	28	28	45	----------	10	134	3,976	
Sullivan,	87	71	1	----------	2	15	4	2	16	----------	2	----------	67	
Susquehanna,	91	62	----------	----------	----------	26	15	8	22	----------	4	68	479	
Tioga,	204	95	3	----------	1	98	43	47	75	----------	2	55	295	
Union,	71	51	10	----------	1	15	1	1	4	----------	1	20	69	
Venango,	156	88	13	----------	16	57	37	33	62	----------	----------	104	1,406	
Warren,	134	78	----------	----------	9	51	23	24	49	----------	4	29	434	
Washington,	249	163	4	----------	8	37	8	24	45	----------	10	67	629	
Wayne,	76	57	----------	----------	1	14	3	2	13	----------	4	18	28	
Westmoreland,	196	74	----------	----------	5	105	59	68	104	----------	17	98	883	
Wyoming,	78	36	3	----------	2	30	13	15	55	----------	3	31	61	
York,	258	159	5	----------	----------	60	25	54	68	----------	4	86	671	

SCHOOL INSPECTIONS, FALL, 1908.

County.	Total No. of Schools Inspected.	No. Having One or More Unsanitary Conditions.	No. in Excellent Condition.	Per Cent. Clean Schools.
Adams,	159	147	12	.075
Allegheny,	254	240	14	.055
Armstrong,	249	243	6	.024
Beaver,	83	83		.000
Bedford,	198	195	3	.015
Berks,	385	358	27	.070
Blair,	137	134	3	.021
Bradford,	269	262	7	.027
Bucks,	221	201	20	.090
Butler,	209	204	5	.023
Cambria,	189	185	4	.021
Cameron,	39	38	1	.025
Carbon,	81	77	4	.049
Centre,	184	182	2	.010
Chester,	253	233	20	.078
Clarion,	151	141	10	.066
Clearfield,	252	236	16	.063
Clinton,	77	72	5	.065
Columbia,	154	152	2	.014
Crawford,	297	287	10	.033
Cumberland,	148	135	13	.087
Dauphin,	162	152	10	.061
Delaware,	53	49	4	.075
Elk,	94	89	5	.053
Erie,	209	181	28	.143
Fayette,	294	257	37	.125
Forest,	73	56	17	.232
Franklin,	211	205	6	.028
Fulton,	78	78		.000
Greene,	161	161		.000
Huntingdon,	157	157		.000
Indiana,	234	219	15	.068
Jefferson,	162	157	5	.030
Juniata,	91	91		.000
Lackawanna,	94	91	3	.031
Lancaster,	384	379	5	.013
Lawrence,	140	136	4	.028
Lebanon,	224	197	27	.011
Lehigh,	172	147	25	.142
Luzerne,	161	157	4	.024
Lycoming,	208	193	15	.072
McKean,	135	130	5	.037
Mercer,	218	218		.000
Mifflin,	99	97	2	.020
Monroe,	67	67		.000
Montgomery,	166	122	44	.265
Montour,	46	40	6	.130
Northampton,	189	159	30	.157
Northumberland,	91	81	10	.109
Perry,	129	125	4	.031
Pike,	44	43	1	.022
Potter,	132	128	4	.030
Schuylkill,	260	250	10	.038
Snyder,	61	61		.000
Sullivan,	75	75		.000
Susquehanna,	148	143	5	.033
Somerset,	334	334		.000
Tioga,	229	229		.000
Union,	75	70	5	.066
Venango,	187	187		.000
Warren,	174	159	15	.086
Washington,	259	255	4	.015
Wayne,	100	96	4	.040
Westmoreland,	366	346	20	.054
Wyoming,	90	90		.000
York,	367	342	25	.068
Total,				

	School Houses.														Water Supply.								
	Rooms overcrowded.	Ventilation poor.	Light poor.	Rooms not warm.	Stoves not jacketed.	Floors not warm.	Rooms not clean.	Cloak rooms not clean.	No cellar.	Cellar not clean.	Cellar used for storage.	Water not clear.	Water not free from odor.	Water unpleasant to taste.	Bucket not covered.	Bucket not scalded daily.	No individual cups.	Cups dipped in bucket.	Fresh supply not secured for each session.
Adams,	6	2	1	----	103	----	----	4	2	----	----	2	----	2	198	122	15	145	31
Allegheny,	27	14	6	24	124	42	36	5	7	7	----	34	33	52	200	201	240	205	13
Armstrong,	6	4	1	2	148	12	14	----	1	1	----	7	----	7	206	209	224	213	39
Beaver,	4	----	----	3	65	5	----	4	----	3	----	----	11	21	77	77	81	61	26
Bedford,	7	24	5	9	134	11	27	13	----	----	----	15	23	36	182	184	199	179	41
Berks,	2	8	2	3	75	10	----	8	----	----	----	5	7	83	80	276	303	64	15
Blair,	9	----	----	4	63	9	----	----	----	----	----	8	4	14	119	121	123	121	14
Bradford,	7	5	3	26	214	35	11	----	----	----	----	5	7	22	253	242	254	223	53
Bucks,	5	8	3	----	59	1	3	2	----	4	----	4	1	23	116	107	145	123	7
Butler,	3	3	----	2	102	4	6	8	----	2	2	13	12	147	140	308	308	139	14
Cambria,	15	5	----	17	157	19	10	6	----	7	----	5	3	20	176	175	171	174	44
Cameron,	----	19	----	1	12	2	----	----	----	----	----	----	----	1	32	33	32	32	----
Carbon,	4	3	3	4	24	8	1	5	43	1	----	1	----	1	68	63	68	66	2
Centre,	4	19	----	8	126	39	3	3	166	2	----	3	1	12	158	164	148	148	7
Chester,	4	11	3	7	50	13	4	1	71	4	----	13	5	21	144	163	186	133	17
Clarion,	4	6	1	14	77	18	11	3	----	1	2	5	6	7	125	125	135	131	45
Clearfield,	15	43	6	31	133	43	23	2	----	----	----	16	15	19	227	228	225	223	19
Clinton,	1	2	----	3	50	3	----	----	----	----	----	2	----	7	60	61	68	67	4
Columbia,	2	3	----	10	116	12	1	1	116	8	8	6	7	17	133	139	138	140	25
Crawford,	4	22	1	29	211	41	4	3	260	----	1	9	18	55	274	261	274	273	275
Cumberland,	1	5	----	----	86	29	----	20	86	----	----	5	3	17	98	137	138	120	19
Dauphin,	5	4	1	2	89	7	4	7	88	----	----	4	----	5	94	113	113	99	17
Delaware,	4	----	2	22	3	----	----	----	12	1	----	1	2	10	21	25	31	15	5
Elk,	3	1	1	3	21	6	----	64	----	----	1	4	6	20	81	83	81	81	15
Erie,	1	5	----	10	65	15	2	----	176	----	15	6	4	28	165	172	151	162	8
Fayette,	23	5	3	26	103	32	1	2	----	4	4	20	17	37	254	255	233	200	53

	School Houses.											Water Supply.							
	Rooms overcrowded.	Ventilation poor.	Light poor.	Rooms not warm.	Stoves not jacketed.	Floors not warm.	Rooms not clean.	Cloak rooms not clean.	No cellar.	Cellar not clean.	Cellar used for storage.	Water not clear.	Water not free from odor.	Water unpleasant to taste.	Bucket not covered.	Bucket not scalded daily.	No individual cups.	Cups dipped in bucket.	Fresh supply not secured for each session.
Forest	3	5		1	36	2	2					3	4	7	63	61	60	59	5
Franklin		6	2	9	58	22	1	1						3	143	189	194	152	5
Fulton		5			47								1	4	76	72	77	76	3
Greene	6	10	2	6	142	23	6					4	1	7	144	142	148	143	9
Huntingdon	10	24	4	9	100	31	1	4	84				1	8	142	140	147	147	8
Indiana	12	10	2	13	71	22	6	3	197	6		11	5	26	179	164	213	179	46
Jefferson	7	2		9	42	13	3		135			5	2	9	141	137	154	145	11
Juniata	1		1	4	54	6	3	16					1	2	87	85	83	89	7
Lackawanna	2	4	1	5	50	4		2		1		5	3	12	65	83	91	65	18
Lancaster		51		10	167	27		4		3		8	5	17	136	336	277	174	27
Lawrence	10	11		5	107	15	5	1		2		12	4	7	111	106	120	112	14
Lebanon	2	9	2	3	66	7	1		1			4	3	2	105	135	176	125	28
Lehigh	6				40	2	1								19	18	121	17	8
Luzerne	1	3	2	7	141	12	14	3				7	3	9	147	145	159	148	40
Lycoming	1	16	3	26	155	34	1	19				5	6	16	143	156	204	148	30
McKean	1	13		14	104	16		1				8	8	27	122	118	129	125	21
Mercer		11	2	13	169	17	3	2	174	1	1	7	10	41	167	145	213	169	20
Mifflin	1	7	1	3	47	6			57	2	1	4	1		63	69	88	67	14
Monroe			1	4	68	10			53			1		3	63	63	62	63	18
Montgomery	8	25	3	1	29	15	1			13	20	8	12	25	62	82	140	65	16
Montour				43	5		8					1	10	20	43	46	47	44	7
Northampton	1	3	2	5	54	8	3	7		12		3	5	17	107	145	165	114	18
Northumberland	2	7		4	44	7		1		1		1	7	14	57	68	85	64	6
Perry	1	5		1	103	2	3	1				2	3	13	111	106	115	107	11
Pike	2	2	1	5	37	7	5	1	1			1		5	44	44	43	43	1
Potter	3	57	4	14	114	19	10			3	1	3	2	10	123	106	124	122	19

Schuylkill,	11	5	1	2	47	5	4	7		4	3	2	8	237	210	230	221	18
Snyder,	2	2		4	51	5					1		5	47	49	48	51	3
Somerset,	9	5	2	25	121	37	26				6	8	7	212	211	219	216	73
Sullivan,	4	6		6	47	10					1	2	3	64	65	65	67	12
Susquehanna,	2	3	1	7	138	20		4	120	1	1		7	134	135	145	145	19
Tioga,	4	12	4	51	124	67	9	5	109		3	4	9	220	221	224	223	46
Union,			1	3	18	18		2	69		1		3	141	71	75	48	7
Venango,		30		15	144	11		4	132	1	14	6	10	164	166	174	165	15
Warren,		28		20	97	28	3	6	103		27	5	14	133	133	143	129	17
Washington,		14		22	205	30	7	2	56	3	1	1	24	134	130	188	139	13
Wayne,	7	4		10	49	21	1				50	23	1	89	76	93	92	5
Westmoreland,	3	12	5	31	79	65	36	6	3	3			36	285	285	294	307	48
Wyoming,	22	13	4	11	82	16	1				2	1	1	82	80	84	87	14
York,	3	5	1	10	131	23	6	1			1	5	17	209	301	349	111	12

					Grounds and Outhouses.																
	Water carried by scholars.	No provisions to exclude surface drainage.	Waste water can seep back.	Nuisance within 200 feet.	Grounds not clean.	Only one privy.	Not separate.	Privies in bad repair.	Privies not clean.	Approaches not screened.	No dividing fences.	Fences in bad repair.	No pits or vaults.	Vaults not tight.	Vaults full.	Vaults overflowing.	Privies offensive.	Lime or ashes not used.	Drainage not prevented.	Can drain into stream.
Adams,	146	9	22	1	------	8	9	21	22	109	95	4	63	143	4	1	18	7	46	2
Allegheny,	203	53	40	14	23	5	42	85	85	134	158	11	76	176	15	9	63	18	106	73
Armstrong,	192	58	17	5	17	------	------	59	91	157	184	18	1	180	42	30	38	119	133	76
Beaver,	75	9	5	2	------	------	------	24	24	53	68	12	38	76	28	21	31	71	32	4
Bedford,	186	41	29	3	42	4	16	55	69	162	172	22	96	170	32	37	52	145	154	90
Berks,	289	45	33	7	5	25	75	45	44	259	215	20	132	212	65	59	108	259	113	53
Blair,	109	22	10	13	18	------	------	42	53	96	96	16	64	72	27	21	42	60	83	31
Bradford,	261	29	29	17	3	------	------	89	102	190	186	37	151	24	42	17	106	195	148	41
Bucks,	181	12	15	2	3	------	------	25	35	99	115	8	95	28	11	5	32	116	49	16
Butler,	137	27	12	3	1	2	------	77	86	185	183	4	84	160	25	33	94	133	140	49
Cambria,	173	34	17	1	7	2	27	26	49	126	122	2	73	121	22	15	57	112	77	47
Cameron,	32	5	3	------	------	------	3	12	19	33	33	------	------	28	4	4	12	24	14	4
Carbon,	60	12	8	3	5	1	------	11	14	48	58	8	20	54	14	11	17	52	8	1
Centre,	165	19	7	6	18	10	7	33	30	146	160	14	19	109	28	15	35	89	36	10
Chester,	169	8	4	2	2	------	22	33	29	81	131	------	93	94	6	6	30	146	60	11
Clarion,	132	13	5	1	6	2	2	37	36	104	114	4	52	95	12	5	31	41	69	49
Clearfield,	236	31	18	22	23	3	10	76	112	189	191	3	61	102	37	33	113	141	108	172
Clinton,	64	11	4	------	6	4	4	18	26	38	44	4	9	46	12	5	25	32	20	2
Columbia,	136	16	6	5	------	------	1	25	39	52	66	17	67	48	5	2	36	97	31	18
Crawford,	269	20	8	50	18	8	6	119	94	221	242	23	133	161	25	34	95	208	136	43
Cumberland,	134	6	12	1	3	4	------	15	17	102	107	------	69	100	6	4	12	84	43	12
Dauphin,	112	5	5	1	2	4	------	29	34	84	87	16	71	97	11	9	28	86	65	19
Delaware,	21	3	4	1	------	------	1	4	10	2	7	2	11	17	2	------	11	28	6	2
Elk,	83	22	21	1	------	2	------	21	41	41	49	8	20	53	5	7	37	55	48	15
Erie,	191	9	10	1	------	1	1	45	40	162	179	7	38	165	24	4	32	92	90	12
Fayette,	257	36	43	9	10	5	20	59	85	201	191	208	146	198	24	54	88	111	144	82

Forest,	54	13	4	2	1	1	1	20	16	59	61	7	20	43	10	4	13	40	32	8
Franklin,	193	13	16	6	3	3	2	38	49	124	148	10	190	147	2	3	32	136	105	3
Fulton,	72	6	5	1	------	------	1	13	18	36	50	4	45	56	11	6	22	26	35	9
Greene,	146	27	18	9	18	1	------	37	48	141	143	6	115	42	25	11	91	89	118	85
Huntingdon,	137	12	4	1	3	2	7	30	32	102	99	7	84	109	12	8	44	62	60	35
Indiana,	160	63	56	14	20	3	5	54	71	117	153	7	74	117	40	32	65	129	127	60
Jefferson,	147	20	7	1	5	-----	5	41	39	141	148	1	62	93	29	15	36	57	82	35
Juniata,	88	13	4	3	1	1	------	10	27	67	83	------	38	64	5	1	26	34	29	7
Lackawanna,	84	16	8	2	------	1	------	22	18	63	64	2	34	75	11	11	40	68	27	5
Lancaster,	347	12	14	45	7	------	------	49	63	159	254	11	234	192	87	71	120	306	149	91
Lawrence,	107	21	21	23	11	1	------	44	52	74	100	7	12	72	10	3	40	104	43	21
Lebanon,	157	15	9	2	3	4	------	32	50	154	141	5	14	99	42	18	63	127	54	13
Lehigh,	80	------	10	15	------	14	------	28	39	89	76	2	1	123	30	11	70	71	58	32
Luzerne,	142	32	18	2	14	1	1	27	58	121	118	23	26	87	26	17	61	105	49	15
Lycoming,	184	22	19	12	5	17	36	41	49	92	78	19	41	109	36	26	57	128	57	27
McKean,	124	47	33	7	6	3	1	46	43	103	106	12	76	82	39	28	74	93	81	71
Mercer,	163	22	14	------	------	5	6	71	84	194	179	5	89	139	35	6	66	146	117	22
Mifflin,	70	15	8	7	1	6	23	20	36	34	50	2	3	45	7	1	48	74	32	15
Monroe,	57	16	13	2	1	18	11	21	31	51	61	2	63	39	15	5	62	52	28	4
Montgomery,	75	10	10	11	4	5	10	37	46	99	130	7	97	138	35	39	59	128	92	13
Montour,	46	13	12	9	7	1	4	22	21	32	34	6	19	35	11	11	23	34	34	15
Northampton,	118	13	9	5	23	28	63	26	33	122	117	19	34	132	33	12	66	121	39	27
Northumberland,	71	5	3	------	------	3	15	15	9	54	65	1	14	32	6	1	14	56	6	12
Perry,	113	14	14	8	2	9	12	27	31	91	98	1	33	91	4	7	8	68	42	14
Pike,	44	8	2	1	1	8	2	13	12	30	38	3	4	30	7	3	7	12	5	2
Potter,	121	20	6	4	10	2	4	58	62	106	111	2	53	85	32	22	88	101	76	27
Schuylkill,	230	14	15	5	9	9	3	37	46	170	162	6	13	133	28	14	54	147	56	19
Snyder,	45	1	3	1	------	6	7	18	32	39	51	4	3	49	9	------	34	42	31	5
Somerset,	162	58	27	16	17	4	------	71	80	187	194	22	70	140	9	29	87	167	204	99
Sullivan,	69	13	10	7	2	1	------	24	30	28	39	12	1	58	3	1	34	58	31	9
Susquehanna,	140	16	13	2	------	2	16	40	32	94	85	5	111	127	10	6	48	108	77	54
Tioga,	216	51	36	19	11	3	4	58	77	163	183	3	147	181	57	44	92	185	161	79
Union,	67	2	1	15	------	------	1	3	19	35	35	5	45	43	------	------	31	43	39	21
Venango,	159	18	19	------	3	1	------	41	37	134	162	2	44	136	34	30	57	78	69	24
Warren,	130	35	32	11	4	5	4	56	52	104	112	5	87	118	18	5	72	127	94	33
Washington,	155	48	36	7	24	------	4	84	102	198	198	8	124	159	18	26	78	159	155	71
Wayne,	94	16	19	8	2	------	------	26	31	71	68	11	88	1	13	4	16	76	60	27
Westmoreland,	324	68	62	35	49	9	------	145	182	255	244	44	72	148	59	81	175	234	223	55
Wyoming,	84	19	12	3	3	------	------	32	28	68	73	13	2	66	6	2	16	51	37	6
York,	343	30	23	18	14	5	13	73	68	258	252	43	238	275	77	89	101	236	160	54

REPORT OF DAIRY INSPECTIONS

1908.

DAIRY INSPECTIONS, 1908.

Total number of dairies inspected,	17,618
Number in a sanitary condition,	2,442
Number in an insanitary condition,	15,176
INSANITARY CONDITION OF COWS.	
Teats unclean,	451
Udders unclean,	487
Flanks unclean,	1,077
Tails unclean,	1,127
WATER SUPPLY FOR CATTLE.	
Water polluted,	499
Cattle can wade in water,	737
STABLE.	
Floor wet or unclean,	2,388
Ceilings unclean,	6,277
Ceilings not tight,	6,072
Manure not removed daily,	2,427
Cows can lie in their droppings,	5,806
Stable not well ventilated,	427
No sunlight,	2,165
COW YARD.	
Stable manure scattered so that the cattle can lie in it,	6,723
Pools of manure water in the yard,	1,586
MILK HOUSE.	
Not separate,	751
Doors and windows not screened against flies,	6,544
No provisions for hot water,	505
Milk utensils not clean,	134
Water supply polluted,	160
MILKING.	
Milkers do not wear clean coverings when milking,	10,314
Do not wash their hands before milking,	2,789
Teats and udders not washed,	7,768
Milking stools not clean,	1,889
Fore-milk not discarded,	9,972
Milk used on the hands and teats when milking,	3,609
HANDLING OF THE MILK.	
Milk not immediately cooled,	833
DISEASES.	
Typhoid Fever has existed within the last year,	61
Dysentery has existed within the last year,	8
Diarrheal conditions have existed within the last year,	5

DETAIL TABLE OF DAIRY INSPECTIONS, 1908.

	Insanitary Condition of Cows.				Water Supply For Cattle.		Stable.							Cow Yard.	
	Teats unclean.	Udders unclean.	Flanks unclean.	Tails unclean.	Water polluted.	Cattle can wade in water.	Floor wet or unclean.	Ceiling unclean.	Ceiling not tight.	Manure not removed daily.	Cows can lie in their droppings.	Stable not well ventilated.	No Sunlight.	Stable manure scattered so that the cattle can lie in it.	Pools of manure water in the yard.
Adams,							2	16	27	5	24	26	29	40	1
Allegheny,	2	3	5	4	5	10	50	130	146	49	47	4	23	83	37
Armstrong,							4	12	20	4	6		3	2	
Beaver,	1	1	1	1		1	9	109	92	6	19	2	7	38	17
Bedford,								1	1	1	5		2	6	
Berks,	17	22	18	23	14	137	117	211	213	182	228	1	35	424	37
Blair,	7	7	7	6	3	4	20	113	117	27	132	8	19	180	78
Bradford,	2	2	1	3	5	6	103	280	222	56	70	89	85	242	34
Bucks,	16	20	36	57	3	7	65	197	197	20	222	17	60	326	102
Butler,	6	6	6	8	1	2	16	61	65	14	23	1	4	22	10
Cambria,		2	6	8	2	2	21	46	49	11	23	1	12	29	20
Cameron,							1	1	1	1			2	1	
Carbon,	5	3	17	8	2		24	74	73	14	66		25	105	36
Center,							1	6	5	3	5		2	4	3
Chester,	4	4	21	29	22	34	89	332	674	102	491	17	240	776	101
Clarion,									2	1				1	
Clearfield,	1	2	5	4			13	25	22	10	8		7	11	7
Clinton,		1	1	1			5	13	15	4	16	3	7	13	2
Columbia,	1	1	1	1	2	1		37	50	9	33	3	10	44	2

Crawford,				1			3	25	42	6	14	3	9	4	5	
Cumberland,	2	2	2	3	31	31	41	129	206	106	237	14	92	179	67	
Dauphin,	2	2	3	4		15	24	54	41	51	86	3	12	112	22	
Delaware,	1	2	9	8	1	19	95	165	123	40	51	19	58	19	34	
Elk,					1		4	3	7	4	5		3	7	4	
Erie,					8	7	6	13	16	6	6	1	1	16	2	
Fayette,						1	9	25	27	2	21	1	4	17	4	
Forest,								2	3				2			
Franklin,	7	9	9	11	3	3	19	62	51	21	61	5	27	73	7	
Fulton,									2		1		1			
Greene,						1		2	5	2			1			
Huntingdon,	1	1	1	1	1	2	13	23	32	14	30	2	12	21	9	
Indiana,			8	4	22	12	40	88	81	41	79	36	51	13	4	
Jefferson,								4	3				2		1	
Juniata,	1		9	7	2	2	26	47	16	49	63	4	37	28	6	
Lackawanna,						1	8	38	44	16	10	5	19	22	1	
Lancaster,	63	64	265	263	33	29	276	866	473	278	1,128	1	170	987	152	
Lawrence,	4	3	6	4		4	44	194	166	42	119	4	21	114	14	
Lebanon,	3	4	4	8	1	1	7	119	48	39	61		22	5	1	
Lehigh,	35	35	47	49	27	30	38	188	136	119	211	14	49	220	53	
Luzerne,	4	4	14	12		1	31	110	136	21	92	1	43	146	19	
Lycoming,	2	2	1	1	4	7	13	66	60	6	36	15	53	134	28	
McKean,	1	1	2	3	2	4	26	33	40	22	6	15	47	38	17	
Mercer,	1	1		1		3	17	57	49	13	24	2	9	23	14	
Mifflin,	2	2	2	1		1	10	27	11	19	21	21	2	11	40	
Monroe,					14	15	26	180	170	21	124		41	184	34	
Montgomery,	22	32	138	105	10	8	253	238	162	72	167	1	55	146	85	
Montour,			1	1		2	1	4	13		5		4	11	2	
Northampton,	6	8	37	76	17	25	60	228	174	45	210	8	88	288	22	
Perry,			16	17		15	10	64	42	5	46	1	1	52	15	
Northumberland,							2	14	8	7	11			16	2	
Pike,					1		1	4	2		6		3	3	10	
Potter,					1	5	24	35	35	7	16	2	15	19	10	
Schuylkill,	40	48	163	104	55	53	141	304	231	215	198	4	42	260	119	
Snyder,			1	1		1		3	2		3	1	5	2		
Somerset,	2	1	3	1	4	7	67	68	60	14	18		19	12		
Sullivan,							4	7	7	1	2	3	3	2		
Susquehanna,	1	1	1	1	3	3	93	101	108	67	28	10	89	62	10	
Tioga,					3	16	43	69	60	20	28	2	39	49	21	
Union,	4	5	4	6		3	5	30	37	25	61		37	98	7	
Venango,	1			1	2	4	5	30	24	4		3	6	5	2	
Warren,							3	17	15	1	2	3	3	1	1	
Washington,	172	171	177	181	173	162	229	292	242	85	220	11	94	230	167	
Wayne,						4	38	178	256	16	51	30	83	31	6	
Westmoreland,	5	5	7	8	12	13	113	235	248	46	154	18	87	104	31	
Wyoming,	2	2	2	2	4	4	45	134	147	41	23	11	33	58	13	
York,	6	8	20	29	7	19	85	173	230	319	543		90	543	72	

DETAIL TABLE OF DAIRY INSPECTION.—Continued.

	Milk House.					Milking.							Diseases.		
	Not separate.	Doors and windows not screened against flies.	No provisions for hot water.	Milk Utensils not clean.	Water supply polluted.	Milkers do not wear clean covering when milking.	Do not wash their hands before milking.	Teats and udders not washed.	Milking stools not clean.	Fore milk not discarded.	Milk used on the hands and teats when milking.	Milk not immediately cooled—Handling of the milk.	Typhoid fever has existed within the last year.	Dysentery has existed within the last year.	Diarrheal conditions have existed within the last year.
Adams,		19			1	38	34	10		39	36		1		
Allegheny,	9	244	12	11	12	245	14	57	21	256	79	6			
Armstrong,	2	33	4	2		20		4	1	9	6				
Beaver,	6	95		1	1	139	9	67	14	118	47				
Bedford,		1				4	2	5		5	1				
Berks,	16	251	19		1	260	255	265	29	460	499	7	1		
Blair,	2	74	48	4	1	156	62	150	4	151	52	8	5		
Bradford,	1	326	2			519	231	404	172	488	51	43			
Bucks,	1	230	44	6		376	77	281	149	362	105	6	5		
Butler,	6	54	4	10	1	79	44	39	12	114	30	4			
Cambria,	9	44	2			43	6	23	5	34	6	2	1		
Cameron,		2				5	2	4		5					
Carbon,		29			2	54	4	61	7	82	17	16	1		
Center,		14				16	3	10	2	12	1	9			
Chester,	3	573	34	3	3	1,242	385	1,004	226	1,299	272	48	3	1	
Clarion,	3	4				2		5		5	1				
Clearfield,	8	25				36	7	13	2	22	5	2			
Clinton,		14				11	1	10	2	22	9				
Columbia,	1	29				42	4	38	9	49	6	11	1		

Crawford,	5	45	3			56	16	32	5	72	7	5			
Cumberland,		121	2	1		293	97	363	9	405	73	134			
Dauphin,	23	99	1			132	34	101	14	149	53	10			
Delaware,	3	198		1	1	230	26	229	139	224	56	2	7	1	
Elk,	5	26	6	1		13	7	10	3	18	1	1			
Erie,	5	64				87	3	60	4	81	7	9	1		
Fayette,	1	27	2	2	1	34	21	29	13	19	5	8	2		
Forest,	1	1				2		2							
Franklin,	3	18		4		49	14	83	20	66	43	55			
Fulton,		2				3				3					
Greene,	5	11				12	4	4		11					
Huntingdon,		48			4	34	9	22	1	67	21	5		1	
Indiana,	21	82	1	1		96	27	58	21	72	30	41	4		
Jefferson,	1	1				8	1	1		9					
Juniata,		73				74	28	34	7	72	8				
Lackawanna,	3	139				209	51	178	27	158	21	1	2		
Lancaster,	85	217	3	1	3	1,010	202	774	205	1,129	517	107	5		
Lawrence,	21	189				364	213	316	62	107	89	15	1		
Lebanon,	37	143		9		148	85	85	5	61	99	1			
Lehigh,	20	154	40	20	4	121	35	224	31	171	123	10	4		
Luzerne,	18	189	44	3		204		108	18	137	38	5	4	1	
Lycoming,	12	85	2	1	1	159	32	67	20	43	8	3			
McKean,	2	42	2		1	39	8	25	10	41	5	5			
Mercer,	8	57	1	1		80	21	35	17	67	39	1			
Mifflin,	4	15	2		2	43	6	13	13	33	4				
Monroe,	50	45			1	166	28	136	78	172	55	24			
Montgomery,	36	253	70	9	3	346	82	294	18	394	281	1	7		
Montour,		4				10	1	16	4	18	4	2		1	
Northampton,	55	162	53			173	9	99	59	171	32	3			
Northumberland,		21	2			45	5	41	4	35	3	3			
Perry,		10				19		5	1	15	2				
Pike,	10	4				12		8		11	6				
Potter,		13	3			47	11	46		41	4	4	1		
Schuylkill,	106	249	1	1	4	216	15	62	34	397	207	103	1		4
Snyder,	2	2				2		8		4	2				
Somerset,	17	50	20	2	1	52	12	32	10	61	58	5		1	
Sullivan,	1	9	1			10		6	1	13	13				
Susquehanna,	14	209		3	1	456	59	371	26	362	16	7	1		
Tioga,	2	52				178	47	183	23	142	20	21	3		1
Union,	12	57	1			69	1	41	2	67	6	1			
Venango,	10	22				30	3	11	7	22	4	1			
Warren,	2	11				14	5	10	4	26	7	1			
Washington,	17	307	9	14	109	318	86	253	204	255	121	10	1		
Wayne,	11	305	3	1	4	442	24	362	33	289	85	1	3	1	
Westmoreland,	20	211	3	8	3	229	37	139	27	246	104	42	7		
Wyoming,	5	166	3	3	4	328	39	259	32	163	10	11			
York,	31	275	58	15	1	366	34	75	23	406	102	3	2		

Division of Laboratories and Experimental Station.

ALLEN J. SMITH, M. D., *Director of Pathology.*

HERBERT FOX, M. D., *Chief of Laboratories.*

OPERATIONS

OF THE

LABORATORIES AND EXPERIMENTAL STATION

FOR THE YEAR 1908.

The end of 1908 completes the second full year of the work of the Laboratories. During 1907 much was learned as to how the opportunities would be used. The physicians of the State quickly appreciated the advantage of the Laboratories and since the methods became known, they have been, with very few exceptions, willing, even anxious to comply with our regulations to obtain pathological data. The care with which material has been handled and shipped to us has been considerably greater in the past year than before and we have had to add but few names to our black list of men who sent specimens of infective material in a dangerous manner. We regret to report, however, that so far as data, direct requests and clinical helps from the doctors, are concerned, there has been little improvement. The service is delayed by this reason and time consuming correspondence required. We trust that this condition will improve as the applicants become more familiar with our work. Those doctors who received letters requesting further information have been very punctual in reply and satisfactory in answers.

The routine procedure of handling specimens has been the same as heretofore. This was described fully in our 1907 report and there has been no occasion or necessity for any material change. We have been more rigid in our requirements, during this year because some little confusion occurred over one or two examinations. No specimen is examined now without a request card properly filled out by the physician in charge. The water reports are checked off by both Dr. Rivas and the Chief of the Laboratories, thus making the facts doubly sure. Near the end of the year the Commissioner directed that the Laboratory reports should be used as a help to control the morbidity reports on Tuberculosis, Typhoid and Diphtheria, and any communicable disease whose infective agent should be discovered

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in feces examinations. Since that time, in accordance with this order, the Laboratory has made daily reports to the Division of Medical Inspection of the positive findings of that day's work.

During the year the Laboratory has received the following publications:

Bulletins of the United States Marine Hospital Service.

Bulletins of the United States Bureau of Animal Industry.

Thirty-fourth Annual Report of the Bureau of Animal Industry, 1907.

American Medical Directory.

Smull's Legislative Handbook.

Map of Pennsylvania.

The great increase of the work has required an augmentation of the staff in the position of diener of supplies. This man has charge of all outfits for the sending of specimens. The University has allowed us to use a large room in the basement which has been fitted up as a supply department. These outfits will be described under their repsective headings. The cages for small animals have been extended so that we now can accommodate several hundred. Two new microscopes have been purchased for the Laboratory. One is a Zeiss, fitted with apochromatic lenses and compensation oculars, and is intended for the finest work. It has already served for some observations upon the structure of the tubercule bacillus after the treatment in preparing our Product No. 5 according to the formula of the Commissioner. The other microscope is the latest improved Bausch and Lomb, with a lever micrometer screw and achromatic objectives. It is used for regular work on Sputum, Widals and the like. A large Arnold Steam Sterilizer was also purchased to meet the demands in the sterilization of sputum cans, and tubercle bacillus and water media.

EXAMINATIONS.

The number of examinations made during the year (9065) is tabulated in the accompanying chart. This is more than twice as many as were made during 1907. The greatest increases were made in sputum and water. The sputum takes the first place numerically (4735) because of the dispensary service in the various counties. The number of water analyses may be seen to rise gradually until August, then fall off until December when it took a great leap, due to the large number sent from Reading during the typhoid fever epidemic in that city. Widals have increased but little (11) during the year; August has the highest number until we come to December when the Reading epidemic again shows its effect. All the others increased over 1907 except the malaria blood examinations, which dropped off 23. The number of examinations for the successive months show an irregular but very definite rising course.

EXAMINATIONS DURING THE YEAR 1908.

1908.	A	B	C	D	E	F	G	H	J	K	Total.
January,	1	20	240	1	4	16	.....	40	4	15	341
February,	.....	7	248	4	1	8	5	32	3	14	322
March,	1	16	401	5	4	16	1	74	4	13	535
April,	3	26	445	2	10	13	2	96	2	9	608
May,	.....	13	438	18	6	12	6	31	7	8	539
June,	1	23	336	25	5	15	3	192	3	3	607
July,	3	45	421	25	4	9	6	396	2	5	916
August,	8	50	397	14	2	5	5	538	6	5	1,030
September,	7	44	395	16	10	7	22	492	4	3	1,000
October,	8	38	463	15	1	12	1	307	2	6	853
November,	2	46	425	6	6	9	6	278	.....	14	792
December,	5	52	526	17	7	6	9	889	3	8	1,522
	39	380	4,735	149	60	128	66	3,365	40	103	9,065

A—Malaria.
B—Widal.
C—Sputum.
D—Urine.
E—Pathological fluid.
F—Pathological growth.
G—Milk and butter.
H—Water.
J—Feces.
K—Miscellaneous.

MALARIA.

During the year no positive malarial blood has been found. No noteworthy number have come from any one locality. The blood smears are usually extremely well made. It is to be regretted that the physicians give quinine first and then send the blood smears. It would do the patient no harm if the specimens were taken before the drug was exhibited. We might then find an explanation to the source of some unexplained chills or continued fevers.

WIDAL TEST.

The samples of blood for the Widal test have come from scattered districts except during the early year when they came principally from the Allegheny Valley and in December when Reading supplied the majority. They have only increased 11 over 1907 and the percentage of positive has risen three per cent., being 20.4 per cent. in 1907 and 23.7 per cent. in the past year. This can of course bear no relation to the established cases of Typhoid Fever. Fourteen (3.7 per cent.) samples have been unfit for examination, a thing which usually occurs because the paper is placed in the envelope before the blood is dry. Among the females the percentage of positive is 28.1, higher than that of the males which is 20.6.

The dry blood method, while convenient to collect and mail is not as accurate as the fluid serum technic. The Commissioner has approved a new type of outfit which is in the form of a spindle shaped glass bulb in which the blood is collected and allowed to coagulate. The serum when drawn out in the Laboratory is clear, and permits of accurate dilution. This will not be put in use until 1909.

SPUTUM.

The tests on the sputum have been confined entirely to the Tubercle Bacillus. Our methods of handling, staining and viewing the specimens have remained the same, whether the tubercle bacillus alone was considered or we were looking for some mixed infection at the physician's request. The number of specimens is nearly five and a half times as many as in 1907. It does not seem worth while to set down the percentages of positives and negatives of the two sexes, because many of our examinations are repeated upon specimens from the same patients, as many as five times in some instances; moreover, the information is sometimes not celar or intentionally misleading. It was related to one of the staff of the Laboratory that a physician had sent two specimens from the same patient under different names to see if any attention would be paid to the first examination. No attention is paid to the patient's name, it might be added here, this being merely a mark of identification for the physician. For the same reasons, figures upon occupation would not be accurate. While a percentage of positive cases cannot be statistically valuable, it might be well to mention that we expect an average of one in every three sputums to contain tubercle bacilli. This is, curiously enough, quite regular and while one day or week may run quite low, it will be balanced by a high percentage during the next similar period.

One thing can be said from our figures about the packing and condition of the specimens. In 1907, 6 per cent. of 869 specimens were unfit for examination, while in 1908 only 3 per cent. of 4,735 were unfit.

When specimens are sent by the physicians they should be marked 1st, 2nd, or more as the case may be. This is done regularly by the dispensary physicians, but should be done by all. If no tubercle bacilli have been found in the first two specimens, it is the practice of the laboratory to digest the tenacious mucus and centrifuge the fluid, the sediment being stained as the original sputum. This requires three days, a fact which should be borne in mind after sending the third specimen.

By reason of the enormous increase in this work, 2,000 more double tin mailing cases were purchased for this service. In some were placed the screw topped salve box, as heretofore, and in others, a new heavy shell vial containing about two cubic centimeters of 1-2000 bichloride of mercury solution and fitted with a pitch cork. These are intended for sputum only and are so marked.

At the beginning of the year a cage was erected over the desk at which the spreading and drying of the sputum is done. This cage consists of a glass plate supported on the sides and front by a wooden frame fitted with wire screen and slanted, so that it is two inches

higher at the back than at the front. At the back is a solid wooden partition from which a vent leads to a 6-inch galvanized iron pipe containing a large Bunsen flame to create a draught. All the dried particles go up this flue and are destroyed by the high temperature of the air or walls. The top of the shelter is hinged so that it can be lifted up out of the way. It is down while the operator is handling the specimens and while they are drying after being spread. When dry, they are rendered innocuous by fixation in the flame and the shelter is not used further. The device serves to protect all members of the laboratory staff but especially the worker who examines the sputum.

URINE.

These examinations have been greatly increased this year by reason of special examinations for the local dispensary. The Laboratory stands ready to examine any case for tubercle bacilli. The requests for diazo have been few (13). It is curious that more physicians do not avail themselves of the facility to gain one more fact to aid in the diagnosis of Thyphoid Fever.

PATHOLOGICAL FLUIDS.

These maintain the usual character. The requests and descriptions have been fuller and clearer than in former years. They increased but few over the previous year.

PATHOLOGICAL GROWTHS.

These specimens have been handled as described in our last report. They increased nearly fifty per cent. The descriptions are too meagre and many cards contain such words as "Don't know," giving no source, or hint of clinical conditions. The examination is in charge of Prof. Allen J. Smith. They comprise the usual kinds of material submitted to a pathological laboratory for diagnosis, principally taken by operation.

MILK.

These specimens have increased only 2. They are sent well for the most part. The senders are usually men who have direct interest in the character of the milk. The larger part have been to exclude the milk as the source of Typhoid infection. No butter has been examined. The method of examining the milk is the same as for water and the details given are the same unless special requests, such as leucocyte

count and streptococci, are made. The following is the tabulated list as to county, of towns from which milk has been sent. The figures indicate the number of samples from the respective places:

BLAIR,		MIFFLIN,	
Altoona,	1	Lewistown,	1
CHESTER,		MONTGOMERY,	
E. Vincent Twp.,	2	Royersford,	11
Mendenhall,	1	Reedsville,	4
CLEARFIELD,		Lansdale,	1
DuBois,	6	Trappe,	1
FAYETTE,		SCHUYLKILL,	
Uniontown,	7	Pottsville,	2
FRANKLIN,		SUSQUEHANNA,	
Mont Alto,	4	Susquehanna,	3
INDIANA,		WASHINGTON,	
Indiana,	6	Morganza,	1
LAWRENCE,		Monongahela,	1
Wampum,	3	YORK,	
LUZERNE,		Dallastown,	3
Nanticoke,	1	WARREN,	
Wilkes-Barre,	5	Warren,	1
LYCOMING,			
Jersey Shore,	2		

WATER.

The analyses of water come next to the sputum in number. They have increased about thirty per cent. The method of receiving, handling, labelling and examining the samples has remained essentially the same. Bacteriologist Rivas has made a few improvements in his method, which will be described further on.

The same type of bottle is still used; a ground stoppered flint glass bottle of 4 ounces capacity. To insure a tight fitting of these stoppers and necks, they are all numbered in the pairs as originally received from the manufacturers before they are put into service at all. Until the Autumn these bottles had been fitted with string by which they could be drawn from the water after filling. After consultation with the Chief Engineer this was abandoned and a muslin cover substituted. This cap is so cut that it can be tied over the stopper and neck far enough to protect the junction of the stopper and neck from contamination with dust or dirt from melted ice. A new tag form was also adopted containing spaces for the name of sender, source and time of collection. This last is extremely valuable, especially in the warmer part of the year, but is rarely given except by the Department's Inspectors.

During the year 1908 several improvements have been made in the bacteriological analysis of the water by Dr. Rivas, the most important of which is the differentiation of Bacillus coli communis from allied

species in water, in which by certain reactions and differential tests it has been possible to make a more exact diagnosis and to lesson by one-half the time required for the search of this micro-organism. The work is fully described in the 1907 Report and has been repeatedly verified. Dr. Rivas has also succeeded in elaborating a simpler method for the presumptive test for Bacillus coli communis in water, at present in print, a resume of which follows:

One cubic centimeter of the suspected water is plated on litmus lactose agar and inoculated at 37 degrees for 18-24 hours at the end of which time a number of the suspected pink colonies, resembling Bacillus coli communis, are inoculated on 1 per cent. dextrose fermentation tubes and kept at 37 degrees C. for 24-48 hours.

Based on the principle that Bacillus coli communis, due to an excess of lactic acid production in dextrose bouillon, does not show a complete exhaustion of the sugar in the medium, while allied species called "Saccharolytes," also fermenting dextrose, exhaust the sugar, tests for remaining sugar may be made after 48 hours and those showing its absence can be positively excluded as Bacillus coli.

The number of Bacillus coli communis by this method can be detemined with fair accuracy as follows:

Given the case that 1 cubic centimeter of water plated on litmus lactose ajar, twelve suspicious pink colonies are found and four inoculated on 1 per cent. dextrose fermentation tubes, from which two are found to ferment without exhausting the dextrose, it is assumed that such a water contains about six Bacillus coli communis per cubic centimeter, which can be proven by applying the other tests characteristic of this micro-organism.

By means of this method most of the difficulties of the old presumptive test methods have been eliminated and it has been possible for the laboratory to make a preliminary report of the suspected water 72 hours after it has been received for examination.

The importance of such a method is obvious. It gives not only a general idea as to the quality of the water, but it also predicts with a certain accuracy as to the degree of pollution if such should be found to exist, and what is more, the short time required for such preliminary research has proven to be an important factor in quickly locating polluted sources, thus greatly shortening the time in controlling epidemics due to contamination of the water supply. By the use of this test, the laboratory was able to assist the Division of Sanitary Engineering in the Reading Epidemic by showing in three days just where the pollution was.

The following is a list of places as to county from which water has been received. The figures opposite the names indicate the number of samples from the respective places.

ADAMS.
- Cashtown, ... 6
- Gettysburg, ... 3

ALLEGHENY.
- Coraopolis, ... 6
- Glenshaw, ... 2
- Homestead, ... 6
- Oakmont, ... 6
- Pittsburg, ... 34

ARMSTRONG.
- Ford City, ... 8
- Freeport, ... 4
- Gastown, ... 1
- Kelly Station, ... 2
- Kittanning, ... 117

BEAVER.
- Rochester, ... 1

BEDFORD.
- Bedford, ... 4
- Everett, ... 4
- Saxton, ... 3

BERKS.
- Reading, ... 786
- Heidelberg Twp., ... 2
- Shoemakersville, ... 2
- Stony Run, ... 1

BLAIR.
- Altoona, ... 24
- Duncanville, ... 1
- Tyrone, ... 11
- Williamsburg, ... 1

BRADFORD.
- Athens, ... 4
- Sheshequin, ... 1
- Towanda, ... 1
- Wyalusing, ... 3

BUCKS.
- Chalfont, ... 6
- Ivyland, ... 4
- Newhope, ... 3
- Selinsgrove, ... 2
- Southampton, ... 2
- Trumbauersville, ... 1

BUTLER.
- Bruin, ... 6

CAMBRIA.
- Cresson, ... 1
- Daisytown, ... 6
- Emigh, ... 1
- Hastings, ... 246

CAMBRIA—Contiued.
- Johnstown, ... 155
- South Fork, ... 7
- Patton, ... 2

CAMERON.
- Emporium, ... 16

CARBON.
- Lehighton, ... 7
- Palmerton, ... 48

CENTRE.
- Fleming, ... 1
- Milesburg, ... 1

CHESTER.
- Avondale, ... 3
- Coatesville, ... 4
- East Vincent Twp., ... 4
- Kennett Square, ... 1
- Landenburg, ... 5
- Malvern, ... 1
- Mendenhall, ... 6
- Spring City, ... 70
- Phoenixville, ... 2
- West Grove, ... 1
- Devon, ... 4

CLARION.
- Clarion, ... 5
- New Bethlehem, ... 13
- Rimersburg, ... 2

CLEARFIELD.
- La Jose, ... 8
- Madera, ... 2
- Mahaffey, ... 21
- Osceola Mills, ... 2
- Woodland, ... 2
- Clearfield, ... 6

COLUMBIA.
- Berwick, ... 1
- Bloomsburg, ... 13
- Catawissa, ... 16
- Millville, ... 10
- Numidia, ... 9

CUMBERLAND.
- Camp Hill, ... 1
- Carlisle, ... 2
- Shippensburg, ... 1
- West Fairview, ... 1
- Wormleysburg, ... 6

CRAWFORD.
- Cambridge Springs, ... 26

DAUPHIN.
- Elizabethville, ... 6
- Harrisburg, ... 12
- Hershey, ... 35
- Highspire, ... 2
- Hummelstown, ... 23
- Steelton, ... 3
- Temple, ... 9
- Paxtang, ... 28
- Wiconisco, ... 1

DELAWARE.
- Chester, ... 9
- Fairview-Ridley, ... 2
- Lansdowne, ... 9
- Linwood, ... 2
- Media, ... 6
- Rutledge, ... 1
- Swarthmore, ... 6
- Trainor, ... 3
- Ridley Park, ... 1
- Upper Providence, ... 1
- Wayne, ... 31

ELK.
- St. Mary's, ... 1
- Ridgway, ... 12

ERIE.
- Corry, ... 39
- Erie, ... 14
- Northeast, ... 6

FAYETTE.
- Brownsville, ... 3
- Uniontown, ... 1

FOREST.
- Mariensville, ... 3

FRANKLIN.
- Chambersburg, ... 17
- Fannettsburg, ... 1
- Greencastle, ... 2
- Mont Alto, ... 37
- Waynesboro, ... 13

FULTON.
- McConnellsburg, ... 1
- Needmore, ... 1

HUNTINGDON.
- Huntingdon, ... 17
- Mt. Union, ... 5
- Shade Gap, ... 12
- Shirleysburg, ... 1
- Robertsdale, ... 1
- Union Furnace, ... 1

INDIANA.
- Black Lick, ... 1
- Blairsville, ... 1
- Homer City, ... 1
- Indiana, ... 3
- Kent, ... 1
- Saltsburg, ... 2

JEFFERSON.
- Punxsutawney, ... 1

JUNIATA.
- East Waterford, ... 1
- Mifflin, ... 3
- Mifflintown, ... 2

LACKAWANNA.
- Carbondale, ... 3
- Clarks Summitt, ... 2
- Dalton, ... 1
- Scranton, ... 1

LANCASTER.
- Bowmansville, ... 3
- Columbia, ... 2
- Lancaster, ... 13
- Lititz, ... 31
- Marietta, ... 1
- Maytown, ... 1
- New Holland, ... 4
- Peters Creek, ... 9

LAWRENCE.
- New Castle, ... 8
- Wilmington Junction, ... 1
- Wampum, ... 1

LEBANON.
- Annville, ... 10
- Lebanon, ... 4
- Mt. Gretna, ... 275
- Myerstown, ... 2

LEHIGH.
- Catasaqua, ... 6
- Macungie, ... 4
- Slatington, ... 2

LUZERNE.
- Beach Haven, ... 1
- Hazleton, ... 16
- Jeddo, ... 9
- Lattimer, ... 7
- Nanticoke, ... 5
- Nescopeck, ... 4
- Wilkes-Barre, ... 2

LYCOMING.
- Jersey Shore, ... 9
- Picture Rocks, ... 1

McKEAN.
- Kane, ... 6
- Bradford, ... 25

MIFFLIN.
- Lewistown, ... 2
- McVeytown, ... 2
- Reedsville, ... 2

MONROE.
- Gilberts, ... 1

MONTGOMERY.	
Ambler,	1
Bridgeport,	9
Conshohocken,	5
Hatfield,	6
Hoopeston,	1
Lansdale,	3
Lower Providence,	1
New Hanover,	5
Schwenksville,	1
Norristown,	6
MONTGOMERY.	
North Wales,	5
Red Mill,	1
Royersford,	49
Pottstown,	9
Trappe,	13
Evansburg,	1
MONTOUR.	
Danville,	7
Washingtonville,	2
NORTHAMPTON.	
Bath,	1
Bethlehem Borough,	6
Easton,	29
Northampton,	6
Fountain Hill,	6
NORTHUMBERLAND.	
Sunbury,	1
POTTER.	
Austin,	30
Galeton,	17
SCHUYLKILL.	
Ashland,	3
Auburn,	6
Girardville,	1
Schuylkill Haven,	3
Tamaqua,	7
Pottsville,	19
SNYDER.	
Freeburg,	2
SOMERSET.	
Boswell,	6
Confluence,	12
Jerome,	2
Myersdale,	3
Sand Patch,	1
Windber,	11
SUSQUEHANNA.	
Lynn,	6
Springville,	1
Susquehanna,	7
Dimock,	6
TIOGA.	
Austinburg,	6
Lawrenceville,	32
Mansfield,	5
Nelson,	6
Tioga,	6
Osceola,	1
Wellsboro,	6
Westfield,	1
VENANGO.	
Emlenton,	18
Franklin,	12
Oil City,	70
WARREN.	
Sheffield,	7
Warren,	13
WASHINGTON.	
Amity,	2
Canonsburg,	8
Charleroi,	8
Meadow lands,	1
Mongahela,	7
Morganza,	11
Prosperity,	3
WAYNE.	
Honesdale,	26
WESTMORELAND.	
Bolivar,	1
Jeanette,	4
Latrobe,	78
Mt. Pleasant,	6
Livermore,	2
Scottdale,	5
Vandegrift,	2
W. Newton,	3
Greensboro,	2
WYOMING.	
Noxen,	6
YORK.	
Dallastown,	16
Glen Rock,	2
Hanover,	4

FECES.

These have increased ten in number, 24 having some bearing upon Tuberculosis. Of this 24, six or 25 per cent. were found positive for the tubercle bacillus. This of course does not indicate such a fre-

quency of tuberculous enteritis, because many phthisical individuals are constantly excreting the organisms with the dejecta. The remaining sixteen have been sent for parasites, occult blood and Typhoid Fever. Only one in four of the last were found positive. The examination of feces for occult blood is difficult and misleading, because of the manifold sources of error. It has not been done by chemical tests; when such a request was made the report was made upon the microscopic findings.

MISCELLANEOUS.

The specimens classed under this heading consist of diphtheria culture and swabs almost entirely, with a few such specimens as gall stones, skin scrapings and wine from a communion cup, upon which our opinion was requested. Most of these unusual things have been satisfactorily examined. We were not able to discover any tubercle bacilli in the wine from a communion cup or from swabs made around the rim, although a phthisical person is said to have drunk from it but a few minutes before the specimens were taken. The examinations for diphtheria bacillus are made as formerly upon cultures or swabs sent or brought to us and report has been made frequently by telegraph at the request and expense of the physician.

RESEARCH WORK OF THE LABORATORY.

During the year the Laboratory has had the following subjects under investigation. Separate copies and reprints of published articles accompany this report.

1. First report on the products of the Tubercle bacillus and notes on efforts at producing immunity.
   Separate report.
   Work still in progress, discussion in text.
   Directed by Dr. Dixon.
2. First report on the Effect of Repeated Injections of Old Tuberculin into Healthy Cows.
   Reprint separate.
   Work still in progress, discussion in text,
   Directed by Dr. Dixon.
3. Note on Similarity of Barium Carbonate Poisoning and Rabies in Dogs.
   In progress.
   Directed by Dr. Dixon.
4. Note on the use of the Products of the Tubercle bacillus on Cows.
   In progress.
   Directed by Dr. Dixon.
5. Notes on the autopsy of Mock Sem, Leprosy and Tuberculosis, Dr. Allen J. Smith.

PRODUCTS OF THE TUBERCLE BACILLUS.

The first part of this experimental work is presented with this report. It was handed to the Commissioner during the Summer of 1908. The work has continued, our efforts being to find some method of administering the dose, which would give the highest resisting power to the experimental animals.

The text may be conveniently divided into subheadings as follows:

I. Dead Degreased Tubercle Bacilli.
   a. Injections before infecting with Tubercle bacilli.
   b. Tubercle bacilli first followed by injections of the degreased organisms.
   c. Effect of Sensitization by 2 doses at proper intervals upon subsequent injections of tubercle bacilli.

II. Tubercle Bacilli Toxin.
   a. Injections before infecting with tubercle bacilli.
   b. Tubercle bacilli first followed by injections of toxin.
   c. Effect of sensitization by 2 doses at proper intervals upon subsequent injections of tubercle bacilli.

III. Combined Effects and Special Experiments.
   a. Effect of alternate injections before Tubercle bacilli.
   b. Effect of alternate injections after Tubercle bacilli.
   c. Special work on Cows.

IV. Therapeutic use, syringes supplied to Department.

I. Dead Degreased Tubercle Bacilli.

a. Injections before infecting with Tubercle Bacilli. The later experimentation on this point has but confirmed our earlier work. There is no protective power developed in guinea pigs and rabbits by the repeated injections of a quantity, which will cause no consistent loss of weight. The following chart will show this better than notes.

No.	No. Inj.	Quantity.	T. Bc.	Length of life.	Weight change.	Post Mortem.
G. P. 204	23	.001 mg.	.5 mg.	29 d.	—150 gr.	Extensive diffuse caseous tuberculosis.
229	22	.001 mg.	.5 mg.	36 d.	—270 gr.	Same as 204.
232	22	.001 mg.	.5 mg.	30 d.	—30	Extensive caseous tuberculosis of liver, spleen and site of injection.
449 C.	0	0	.5 mg.	30 d.	—45 gr.	General diffuse caseous tuberculosis.
450 C.	0	0	.5 mg.	30 d.	—18 gr.	
Rabbit. 9	15	.05 mg.	2. mg.	61 d.	—375 gr.	General caseous infiltration of solid organs, nodular tuberculosis of glands and omentum; control had caseous pneumonia.
27 C.	0	0	2. mg.	38 d.		

Although these pigs had received weekly injections of a dose which did not cause loss of weight during the treatment, lasting over 5 months, there was no development of immunity. The rabbit lived longer than its control but the lesions were quite as advanced if not more so, because the pneumonic process shortened the life of the latter. These are the pigs reported in the separate report as having been treated a long time before injecting the organisms. They retained their weight for some time after infection and then rapidly went to pieces.

b. Tubercle bacilli first, followed by injections of the degreased organisms. The well known susceptibility of the guinea pig to the tubercle bacillus and the irregularity with which rabbits behave when infected has made it difficult to establish a proper dose to administer before proceeding with the therapeutic use of the product. It is considered wise to use a dose which will kill the controls in two or three months but occasionally this dose will be overcome or the infection may be so slow that the effect of the therapeutic injections becomes problematic. However, the results reported in the first article have been followed by others. A very large set of animals was injected with a minute quantity (about 1-30 mg.) and then weekly inoculations of No. 5 made in doses of .001 mg. One died after three injections and showed only a few miliary tubercles in the liver. Another died without lesion apparent microscopically, while a third showed a few miliary tubercles. Three are still living (about 8 months) and maintain their weights. In our report attention is drawn to the fact that while the life of the animal is not materially lengthened there is some change in the character of the lesions. This is well illustrated in one small experiment where the tubercle bacilli were introduced under the skin in fine emulsion. Two of the animals receiving doses of No. 5 therapeutically, developed caseous pneumonia while the control had miliary tuberculosis. This experimentation must eventually lead to something since all our experience is toward the modification of the process in intensity and rapidity of development. Many other sets are now under way. The regulation of bacterial dosage is most puzzling since the optimum dose cannot be expressed in definite terms.

c. Effects of Sensitization by 2 doses at proper intervals upon subsequent injection of tubercle bacilli. Although we have shown in our previous work that an injection of tubecle bacilli will not sensitive for a subsequent injection of No. 5 and that the reverse is likewise true, it was hoped that something might be learned if No. 5 were to be used on the same pig twice and tubercle bacilli given after the period of sensitization had passed. The result suggests that while anaphylaxis is not acutely shown, there must be some senitization because

the animals died with very active productive lesions, a little sooner than the controls. It seems that this is comparable to the results of attempts at active immunization described in the first paragraph, only perhaps more pronounced because of the larger does used.

II. Tubercle Bacillus Toxin No. 10.

a. Injections before infecting with tubecle bacilli. Attempts at establishing tolerance for the tubercle bacilli by injections of this material have met with the same results as heretofore and precisely to those with No. 5. They have been run along together, one set of pigs received 16 doses and another 18, but they died after the same average length of time as the controls. Rabbits are being continued and we are not ready to report on them.

b. Tubercle Bacilli injected first followed by the Tubercle toxin. This has had the same results as before, but we have not been able to lengthen the life of the animal to any material extent. The lesions seen in the animals differ from those of the set treated with dead degreased tubercle bacilli in that they are more limited in extent but show greater tendency to softening of the caseous material.

The following shows one set of animals which is being carried along with the hope that the living control will have more extensive lesions than the treated one. It shows well the irregularity of infection and how one can easily use less than the optimum dose. This work is being followed assiduously and should have good results.

No.	Quantity T. Bc.	No. inj. No. 10.	Quantity.	Life.	Weight change.	Post mortem.
312 C.	1-40 mg.	0	0	living		
313 C.	1-40 mg.	0	0	21 d.	—30 gr.	Few miliary tubercles in liver and spleen.
314	1-40 mg.	16	1. mg.	living	+195 gr.	
315	1-40 mg.	6	.1 mg.	60 d.	—105 gr.	Few miliary tubercles in spleen and liver, caseous tubercles on omentum.
316	1-40 mg.	1	.1 mg.	12 d.	—25 gr.	

c. Effect of Sensitization by two doses at proper intervals upon subsequent injections of tubercle bacilli. This experimentation has had the same results as described under Dead Degreased tubercle bacilli. The large doses necessary to produce the few symptoms of hypersusceptibility must have power of reducing the resistance to the tubercle bacillus. There have been no sudden deaths or hemor-

rhages in these tests. Injecting the tubercle bacillus into the animal first was done once with no appreciable difference in the pathologic experiments.

III. Combined Effects and Special Experiments.

a. Effect of alternate injections before tubercle bacilli. From this line of work much was hoped because the two products represent the principal constituents of the organisms, in what we think should be the easiest form for the tissues to combine with. Our expectations were not fulfilled however, because guinea pigs will not stand the alternate use of these products. When combined in one inpection the loss of weight is dangerously rapid even when using smaller doses than has been our rule. These experiments have therefore never reached the stage at which we could determine the effects of combined or alternate dosage.

b. Effect of alternate injections after the Tubercle bacilli. Of this work we can only report progress. The accident in our animal room prevented us from having animals far enough advanced to note their condition.

c. Special cow work. The accompanying chart illustrates the manner in which the work was carried out. A herd of cattle, consisting of three infected animals (No. 4 adult dry Holstein, No. 5 adult dry Red Pol, No. 6—14 month Jersey bull) 2 suspicions (No. 3 adult dry Holstein, No. 7—1 year Holstein heifer) and 2 healthy cows (No. 11 adult dry Jersey, No. 8—1 year Holstein heifer), was divided as per chart for straight dosage with 5 or 10 or for combined treatment, at first under the skin and latterly into the jugular vein. They are arranged as far as possible, to represent all phases of the work in immunization that we have tried on smaller animals. In order that the test might be severe and final we decided to put the tubercle bacilli into the vein. As a preparation for this, the last two injections were also made into the vein.

The courses of treatment consist of regular doses of No. 5 (2 cows) regular doses of No. 10 (1 cow) and alternating doses of Nos. 5 and 10 (3 cows) until the two intravenous injections when they are given together. A week after the last dose, the bovine tubercle bacilli were given. This was on the last day of 1908 and the experiment will not be completed for 3 or 4 months. It will be reported later separately. The immunizing injections lasted from June to December 1908.

No.	Condition.	Subcutaneous Injection.										Intravenous Injection.		T. Bc. Intravenously.
3	Suspicious,	20 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	10 mg. No. 5	10 mg. No. 5	100 mgs.
4	Positive,	400 mg. No. 10	100 mg. No. 10	100 mg. No. 10	100 mg. No. 10	100 mg. No. 10	100 mg. No. 10	100 mg. No. 10	100 mg. No. 10	100 mg. No. 10	100 mg. No. 10	100 mg. No. 10	100 mg. No. 10	100 mgs.
5	Positive,	20 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	5 mg. No. 5	10 mg. No. 5	10 mg. No. 5	100 mgs.
6	Positive,	10 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10	50 mg. No. 10 + 5 mg. No. 5	50 mg. No. 10 + 5 mg. No. 5	100 mgs.
7	Suspicious,	200 mg. No. 10	5 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10 + 5 mg. No. 5	50 mg. No. 10 + 5 mg. No. 5	100 mgs.
8	Healthy,	200 mg. No. 10	5 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10	5 mg. No. 5	50 mg. No. 10 + 5 mg. No. 5	50 mg. No. 10 + 5 mg. No. 5	100 mgs.
11	Healthy, Continued,	Not to be injected.												100 mgs.

IV. Therapeutic use and Syringes Supplied to the Department.

We have continued to put up these experimental products in small syringes, each containing one dose diluted in one cubic centimeter of physiologic salt solution. The doses in use are as follows: Dead Degreased Tubercle Bacilli No. 5, .000001 gram, Tubercle Bacillus Toxin, .0.001 gram. This latter figure means that a quantity of the germ free filtrate equal to that weight of living tubercle bacilli is present in one cubic centimeter of the dilution in salt solution. All syringes are controlled for purity by animal inoculations. The syringes are sent to the Department at Harrisburg for distribution to Dispensaries or physicians competent to handle the toxin. A few private individuals have been supplied. The syringes filled, controlled and supplied by the Laboratory are as follows:

Department of Health Harrisburg.

No. 5—747, No. 10—901

State Sanatorium at Mont Alto.

No. 5.—545 No. 10.—480

Hon. Charles Hodgetts, Toronto, Canada.

No. 5—4 No. 10—4

Dr. Morris Cawley, Allentown, Penna.

No. 5—5 No. 10—5

Dr. W. C. Posey, Wills Eye Hospital, Phila.

No. 5—10 No. 10—10

2. Effect of Repeated Injections of Tuberculin into Healthy Cows.

Our first work, presented as a reprint in this report, has led us to continue the experiments and find out the fate of those minute areas of necrosis in the lymphatic organs. Their character and location, described in the first article, led us to speculate as to their probable relation to blood destruction and the various degenerations consequent upon choronic intoxications such as the repeated use of tuberculin would produce. To continue this, three new cows were obtained in the late Autumn and are now being injected every two weeks and will be so treated until 8 months have passed. They will then be killed and a thorough study of their organs made.

3. Note on the Similarity of Barium Carbonate Poisoning and Rabies in Dogs.

Since the United States Department of Agriculture recommended the use of Barium Carbonate as a poison for small rodents, many cases of so called Rabies have occurred around stables where it was

used. This line of experiments was started with the idea of calling attention to the course of symptoms produced by this chemical and to emphasize the differences from Rabies. We have been able to establish the picture of an acutely fatal dose of this drug and outline somewhat vaguely however, the effects of very minute repeated doses. If the toxic dose be given in a capsule the dog will either vomit the body undissolved or in pieces. At any rate the symptoms appear to a slight extent and then rapidly subside. If however, natural conditions be approached by giving the drug in milk or meat the course is quite regular. It has been found that a quantity of .2 or .3 gram will kill a dog of 12-15 pounds in eight to fourteen hours. A half starved dog will not always eat the full amount of food given and it seems that he knows the presence of the chemical. Stomach tube administration was not tried because we did not wish to induce vomiting. About three hours after the dose mentioned above, the dog will seem restless and whining and will probably vomit small quantities of fluid green material in which barium can be found. A little later he will be noticed to drink a small quantity very frequently. A green froth may be present around his lips and teeth. When he drinks there are no convulsive movements of head, jaws or neck. He will next start to tremble and lie on his side by preference. A looseness of the bowels occurs first about 4 hours after giving the poison. The passages have no special sign of recognition at this time, but later will be fluid green. Vomiting continues with considerable regularity every quarter hour and the vomitus has the same character. Thirst increases and the animal may consume a gallon in the last three or four hours that he is able to stand. Much is of course vomited. Urination is not frequent. In the urine barium has not been found, but in the stools, early in the course of the symptoms the tests are positive. About 5 hours after receiving .2 to .3 gram a palsy of the posterior extremities appears which rapidly progresses to paralysis. If this latter appear, the dog never recovers. The paralysis advances to the anterior extremities and neck in another hour and in 8 hours all the body is motionless except the eyes. In barium carbonate poisoning there is a notable slowing of the heart similar to the digitalis effect. It starts to decrease in frequency about the 5th hour and from then until just before death, will run down to 60 or 64. A few minutes before death, the pulse becomes rapid, thready and cannot be counted. The abdomen starts to swell about 3 hours before death. This is probably due to intestinal paralysis because the small gut is enormously distended and the peristaltic movements were absent in one dog killed a few minutes before death would naturally have ensued. The animal finally dies from respiratory failure.

During the course the animal will rarely eat. When non lethal doses have been given, he may take a little food after the critical height of his symptoms has passed. At no time is there any suggestion of convulsive movements of pharynx, larynx or of the general musculature. The animal is entirely tractable and seems to desire to be helped in drinking and eating.

We have not been able to find a case of dumb or paralytic rabies, indeed any well established case, with which to compare these symptoms. The above outline seems to be clearly enough defined and should not be mistaken for hydrophobia. The desire for water, the slow pulse, the vomiting and purging all point against this latter.

When small repeated doses are given (.01 gram was used in this work) the effect is transient. There may be a little vomiting with very pronounced distaste for food on that day, and on the morning after the dose, two or three rather loose stools may be found in the cage. The dog then proceeds to take food and water with relish. One dog was given 8 doses in three weeks, losing only 4 ounces in weight. This quantity would seem to approximate what a dog might pick up around a stable on stray objects which had been soiled with the drug or carried by vermin.

The following is an autopsy report on one of our dogs. The picture is very clear as against that of Rabies. There are no negri bodies or anything which might be mistaken for them. The pronounced congestion is common to irritative poisons. This work is being continued and we hope to be able to publish a tabulated list of symptoms of the two conditions which may help in diagnosis and prevent the killing of dogs which are not mad.

Dog No. 5, Autopsy performed 9 hours after death.

Well preserved, well nourished dog, evidences of vomiting, frothy mouth, mucous membrane of the mouth slightly congested.

Lungs congested and edematous with a narrow rim of emphysema just beneath the pleura. No consolidation.

Lymph glands, small, soft, homogeneous, congested and anthracotic.

Heart distended, stopped in diastole. Chambers distended, with dark semi-clotted blood; in the conus arteriosus chicken fat clot. Muscle pale, homogeneous except near auriculoventricular septum, where it and the areolar tissue are congested. Valves are negative and seem competent.

Liver, normal in size, form and consistency. Edges sharp, section uniformly congested, slightly opaque and shows dense capillary congestion.

Spleen, normal in size and color. Slightly softer than normal. Uniform on capsule. Section shows slightly hyperplastic follicles with congested pulp especially around the follicles. Trabeculae not visible.

Kidneys, normal in size, shape and color. Capsule smooth, strips with a little difficulty but does not tear the surface. The normal purple zone between the cortex and medulla has a pale area in the middle, thus giving the impression of two purple lines, one at the junction and one in the medulla. The striae are normal, glomeruli not visible; on the surface beneath the capsule are several small, pearly, white, sharply marginated, slightly depressed areas about 1 m. m. across which have somewhat the appearance of a hyaline tubercle.

Stomach, congested on serosa, slightly foul gray granular fluid, mucosa is dull, pale purple color; the rugae are not enlarged, but slightly more tortuous than normal.

Pylorus is normal; the gall duct is patulous, the gall bladder is filled with dark viscid brown fluid. Mucosa of the duodenum is swollen, especially at the tops of the folds, and the evidences of violent contraction may be seen in the alternate pale and congested areas from the mucosa all the way through to the serosa. The jejenum is violently congested, mucosa soft and almost entirely disintegrated in places while in others it maintains its position. In the ileum the mucosa becomes paler and there are many sub-mucous hemorrhages varying from 1 to 5 m. m. in diameter; still further on the mucosa becomes almost normal in color and consistency, and the gut contains only a little tenacious yellow mucus. No food is present in any place. Ileocecal valve is normal in color and the cecum contains a little inspissated feces, the longitidunal folds are swollen and more tortuous than normal, and their tops are markedly congested, almost hemorrhagic.

Brain; dura fairly adherent along the longitidunal fissure, otherwise negative. Brain itself slightly congested on the surface. Section negative. Section of cerebellum into the brain of rabbit No. 35. Section of cerebral cortex into rabbit No. 33. Section of ammons horn into rabbit No. 34. None of these rabbits developed anything abnormal.

MICROSCOPICAL NOTES.

(1) Cerebellum: as in the first animal similarly poisoned and examined histologically there are to be noted more or less evidences of oedema and cytolytic changes involving the cells of Purkinje. No appearances at all suggesting Negri bodies.

(2) In the section of cornu ammoni there are minor evidences of oedema from the rather large spaces about the large multipolar cells and blood vessels; but the ganglionic cells are practically normal. In the cerebral cortex less marked oedema and a moderate injection of the pial vessels exist; and the ganglionic cells here show slight retrograde changes, much less marked however, than in case of the cerebellum.

(3) Cardiac muscle; presumably from the shape of the section taken from the right ventricular wall, shows some slight loss in the definiteness of the transverse striations and at places a little undue granularity of the muscle substance (probably a slight cloudy swelling). It is not marked, and there are no other features of importance noted.

(4) Wall of stomach, section taken from the cardiac end shows nothing of importance. There is a slight loss of the surface epithelium, which may well be from artefact. The glands are large, the acid cells particularly prominent and well defined; the peptic cells less well preserved and smaller. No especial injection of the mucosa, athough here and there are individual vessels injected with blood. No oedema of this membrane. The wall has in the sections separated below the muscularis mucosa; in this coat a number of the veins are turgid with blood. The muscles and outer coat seem practically normal.

(5) Several sections from the small intestine all show more or less catarrhal inflammatory change, injection of vessels, some destruction of surface epithelium and of the villi themselves; a variable but notable number of goblet cells in the crypts, some oedema of the villi and interglandular tissue of the mucosa. Similar congestive and oedematous changes in the submucosa and muscular coats.

(6) Liver; shows as its most marked feature a fairly distributed hyperemia, portal, central and capillary. There is no appreciable abnormality in the capsule or in the perilobular structures. The cells stain well, but are perhaps a little too granular and perhaps slightly swollen,—in neither case very distinct.

(7) Pancreas. This section is poorly shown, probably mainly from some fault in preparation (looks as if over-heated). There was evidently a rather marked hyperemia and the tissue seems quite loose (either oedema or artefact). The cells stain densely and without definition, seem to have largely fused together within the acini.

(8) Kidney, shows widespread injection, involving the arterial as well as the venous side of the circulation of the organ. There is well marked cloudy swelling and at places necrosis and desquamation of the tubular cells of the cortex, and mainly in the tubules but also in slight measure in the Bowman's capsules, there is more or less graular coagulate of an albuminous exudate. The interstitial tissues are mainly uninvolved, but at places show a little oedematous looseness.

(9) Spleen, capsule normal. Malpighian bodies large and about the peripheries loose and showing a slight perifollicular space because of oedema. Pulp generally markedly congested, not hemorrhagic and not pigmented. No special hyperplastic changes in pulp, follicles, or trabeculae. Capsule normal. Microscopical diagnosis; Oedema of brain, catarrhal enteritis; acute parenchymatous nephritis.

V. Autopsy Notes on Mock Sem, Leprosy and Tuberculosis.

Specimens from the post mortem examination of the Chinese patient of the Department of Health were sent to the Laboratory and examined by Dr. Allen J. Smith who reports the following:

The lungs were found extensively involved, showing both marked diffuse caseation and chronic ulcerative lesions, with enlarged and caseated bronchial lymph nodes. There was extensive ulcerative tuberculosis of the intestines, the ulcers large, numerous, with thick, overhanging edges, smooth, indurated bases and numerous miliary tubercles showing peritoneally in the wall of the intestine at the base of each ulcer.

For histological purpose there were sent to the Laboratory portions of the lungs, heart wall, liver, spleen and kidney, several cutaneous nodules from the ear lobes and a small bit of thickened and indurated skin from the face.

(1) A section of a nodule from the ear lobe shows the characteristic features of an active leprous hyperplasia, and with special staining exhibits a vast number of typical leprosy bacilli, in and between the deeper epithelial cells of the epiderm, in large lepra cells and smaller endothelioid cells and in the tissue spaces between the tissue elements of the thickened corium. Some proliferation of the epiderm, with a slight but clearly excessive penetration of the interpapillary portions into the corium, has taken place, and at least one epithelial concentric nest was noted quite a distance below the surface. The main elements forming the nodule are in the corium, where the old fibrous matrix is thickly infiltrated by embryonic cells of fibroblastic and endothelioid type, these constituting the bulk of the tissue in most microscopic fields. Scattered mast cells, lymphocytes and small plasma cells, and occasional large endothelioid cells (lepra cells) and occasional polynuclear leucocytes (some eosinophilic) are encountered.

In the skin of the face the process is evidently older; the corium is thickened largely by a fibrosis, with much smaller number of the infiltrating cells mentioned in connection with the preceding section. The epiderm shows a more definite penetrating growth, at places exhibiting slender root-like extensions into the corium which often unite into a rather fine reticulum just under the major part of the cuticle, reminding one of Unna's reticulate type of epithelioma, and occasionally showing well developed epithelial pearls. With these differences, however, the general characteristics are the same.

(2) Sections of bits of pulmonary tissue all show tuberculous changes, ranging from typical milary tubercles to rather large conglomerates with extensive caseation. For the rest catarrhal changes, hyperaemia and oedema with occasional foci of suppuration in and about bronchioles make up the general picture.

(3) Wall of heart. Epicardium missing from sections examined. No alteration of endocardium. Myocardium somewhat congested and fibres rather loosely separated from each other, probably by an oedema. The fibres themselves are typically rather slender, but show no loss of striation and no pigmentation. The nuclei are as a rule well stained and clear; are for the most part of relatively small size. No fibrosis of the tissue, and no alteration of the wall of coronary branches caught in the section.

(4) Liver. Capsule normal. No overgrowth of Glisson's capsule and no important vascular changes. Liver cells generally rather granular and somewhat swollen, a few showing fatty infiltration appearances. The main feature of the sections examined is in the presence of a number of miliary tubercles, mainly of gray type met here and there both in the perilobular tissue and in the interior of lobules.

(5) Kidneys, are not, from the sections examined, seriously changed. There is a scattered cloudy swelling of the cells of the cortical tubules; and in contrast there are many tubules which show no such alteration. At places the tubules are widely distended by a granular coagulated material within them, and occasionally such material exists in Bowman's spaces. No special interstitial change but a few of the tufts are more or less fibrosed. There is a moderate capillary injection; blood vessel walls normal.

(6) Spleen. The main feature here is a rather marked diffuse, endothelial hyperplasia of the pulp. A few miliary tubercles have been noted in the tissue in addition. The tissue is moderately hyperemic, not pigmented; the malpighian bodies are of normal size and structure; no important change in the wall of blood vessels; no marked overgrowth of the trabeculae of the organ.

PRODUCTS OF THE TUBERCLE BACILLI.

The Laboratories of the Department of Health have been busy since their opening following a line of work begun nearly a score of years ago by the Commissioner of Health, with dead, avirulent or altered tubercle bacilli and an extraction by salt solution of virulent organisms after the wax of the bacteria had been softened by ether. The work at that time was not done in a manner permitting standardization of the products in terms of the organisms. Indeed no one has elaborated an exact method by which products of the tubercle bacillus may be standardized in any terms. Our work has not allowed any more definite statements in regard to toxicity of our products

than could be said of Dr. Dixon's original solutions or of the more widely used old Tuberculin of Koch. This presentation will introduce our present methods of production of the vaccines or toxins which are based upon weights and percentages. A description of the cultures which are used for making our toxins is as follows:

1 a. An old bovine stock used in this Laboratory for 2 years with 2 passages. The original stock is practically as virulent as the newer growths. One milligram will kill a guinea pig of 400 to 500 grams in six to eight weeks.

2 c. A human stock used the same length of time with one transfer through animals, one milligram will kill a 400 to 500 gram guinea pig in six to ten weeks.

Our solid cultures are kept on blood serum plus neutral dextrose broth. The organisms are grown on neutral 5 per cent. glycerine veal boullion. The growths from which these products are made are of ten weeks duration on the fluid medium. Cultures are grown at 37 degrees C. When the growths are mature they are killed by raising to the boiling point in the autoclave and then allowed to remain in the Arnold Sterilizer with the door open two hours after the water has reached the boiling point. The organisms are then filtered off and kept under sterile precautions while the fluid filtrate in used for old tuberculin. The handling of the cultures for the product made of living organisms will be described later. The products to be described consist of dead and partially degreased organisms called No. 5, and a salt solution extract of living tubercle bacilli called No. 10. The facts to be considered about these products are included in the following headings:

NO. 5, DEAD AND PARTIALLY DEGREASED TUBERCLE BACILLI.

NO. 10. SALT SOLUTION EXTRACT OF LIVING VIRULENT TUBRCLE BACILLI.

1. Method of Production.
2. Method of Standardization.
3. Method of Arriving at Dosage.
4. Toxicity.
5. Effect upon Temperature of Healthy Animals.
6. Effect of Temperature of Tuberculous Animals.
7. Effect of Repeated Injections into Healthy Animals.
8. Effect of Repeated Injections into Tuberculous Animals.
9. Effect of Second Dose after Incubation Period.
10. Effect of Injection of Tubercle Bacilli after Incubation Period.
11. Effect of Large Dose Subsequent to Injection of Tubercle Bacilli.

Action of the two products toward one another.

12. Effect of Sensitization for one another.
13. Effect of Alternate Injection.
14. Effect of Double Injection into Tuberculous Pigs.

NO. 5. DEAD AND PARTIALLY DEGREASED TUBERCLE BACILLI.

1 and 2. Method of Production and Standardization. After the bacillary mass is removed from the filtrate it is dried of excess of moisture, over night perhaps, in the incubator, and then it is dried in a vacuum dessicator over sulphuric acid until it becomes brown and brittle. The masses are then broken into small fragments and placed in a soxhlet. An equal quantity by weight of human and bovine bacillary mass is used. The first extraction is done with absolute alcohol and is continued until the brown color of the distillate has disappeared. The alcohol is then replaced by ether and the extraction is continued until the cooled ethereal distillate is practically clear. Absolute clearness is impracticable to obtain because it seems impossible to exact all fat and wax from the tubercle bacillus. Vaudremer and Martin say that six weeks extraction with petroleum ether will not remove all the fat. The extraction necessary to bring about the above result will last six to eight days of nine hours each, depending upon the size of the clumps. When the ether extraction is complete, the mass dried twenty-four hours at 45 degrees C. The resulting mass consists of dirty yellow gray granules which break up easily into a slightly greasy powder. This is not soluble in water, salt solution, alcohol or ether and when used must be ground up in definite quantity and the per volume weight determined. The usual method is to grind up a large quantity, without previous weighing, in a ball mill with a small quantity of salt solution. A definite quantity of this suspension, say 20 cubic centimeters, is evaporated to dryness in a tared watch crystal and the same quantity of the salt solution used to make the suspension is also evaporated. The difference in these weights will equal the weight of the degreased organisms in amount of suspension used. In order that the emulsion shall be homogeneous, the suspension after grinding is centrifuged, the supernatant liquid removed and resedimented in the machine. After a third centrifugalization one obtains a homogeneous emulsion which will stand without sedimenting for a long while. Any slight sediment which occurs after three to four weeks will shake up into perfect homogeneity. 8.64 milligrams to the cubic centimeter is the highest strength I have been able to obtain in perfect emulsion. The salt solution used is .6 per cent.

Microscopic examination of the mass after extraction shows chiefly unbroken organisms which take the acid-fast staining methods very faintly but clearly. The irregularity of staining characteristic of the tubercle bacillus is more pronounced. Careful observation with high objectives and oblique light shows no irregularity in the contour of the single cell but the edges of the stained portions seems more irregular than the untreated bacillus.

Microscopic examination of the ground emulsion shows many fragments chiefly single organisms and only occasionally two, never more,

clinging together. The staining is apparently the same as before grinding.

3 and 4. Method of Dosage and Toxicity. The difficulty of expressing the value of these products in any unit of toxicity or other property, has compelled us to adopt a dose which when repeated every week or ten days causes no loss of weight in a healthy or tuberculous guinea pig of 400 to 600 grams, the latter with a control pig of the same stock and injected with Tubercle Bacilli in the same manner, but not with this product. It is not necessary to give all the details of our primary experiments, but it will be enough to state that weekly injections of .000001 gram of the organisms will be withstood without loss of weight. Repeated doses of .001 gram will give emaciation in healthy animals and rapid loss with death in infected pigs. No limit can be set upon the dose however, as one pig will endure larger doses or more frequent repetition than another. Several tests upon tuberculous pigs to obtain a definite relation between the degree of infection and the dose of this product have had no satisfactory result. Large doses such as .025 to .05 gram will cause loss of weight in healthy pigs and in tuberculosis pigs rapid emanciation and death, but not in a few hours or with a hemorrhage into the peritoneum, such as Vaughan and Wheeler found with their cellular substance. Rabbits withstand larger doses in proportion to their weight than do guinea pigs, but they are nevertheless subject to the same general rules.

5 and 6. Effect upon the Temperature of Healthy and Tuberculous Animals. The effect of .000001 gram upon the temperature of healthy rabbits and guinea pigs is nil. This dose will produce no reaction in tuberculous rabbit but a slight rise is appreciable in an infected guinea pig's temperature after this dose. Doses of .0001 or .001 gram will produce a rise in both animals varying from .6 degrees to 1. degree F. Doses of .005 and .01 gram will give a rise of 1 degree to 2 degrees F. These large doses will have no effect in raising the temperature of either animals if healthy, but .005 to .01 gram will sometimes depress the temperature of a healthy guinea pig .6 degrees to 1. degree F. if given into the abdomen, but not when given under the skin. Injections of .01 to .02 gram have no effect upon the temperature of healthy cows; such doses given to tuberculous cows are followed by a slight irregularity with a tendency to rise but with no sharp reaction.

7. Effect of Repeated Injections of Healthy Animals. If the standard dose of .000001 gram be given either under the skin or into the peritoneum of healthy pigs or rabbits, at intervals of one week, no loss of weight or other sign appears. If loss of weight occur, it will be regained if the injections be discontinued for one or two weeks.

Attempts at active immunization have been made but as yet we can say little positive in this respect. One set of three pigs lived on the average of two weeks longer than the control. This was however, while we were still using the large doses (.0001 gram) and a table would show nothing more than this statement. Of our later experiments we have three pigs which received twenty-three injections before the organisms. They still live. They have gained from 350 to 600 grams in nine months and have lost no weight since injections of the organisms.

8. Effect of Repeated Doses into Tuberculous Animals. The vaccinations of infected animals with this material has had about the same history as the attempts at active immunity but with a little better success. Our first attempts were with virulent organisms but it was found necessary to use less virulent ones. Since introduction of our small stable dose, the results have been much better. Herewith is a chart of one set of animals. It will be seen that the animals had some resistance from the degree of infection and length of life. Two unfortunately died of pneumonia.

No.	T. Bc.	Inj. of No. 5.	Weight change.	Length of life.	Post Mortem.
277	2.mg.	3	105 grm.	33 days.	Caseous of liver, spleen, omentum and gland.
78	2.mg.	1	60 grm.	10 days.	Nodule at site of inoculation catarrhal pneumonia.
279	2.mg.	1	0	21 days.	Nodules at site of inoculation, cheesy T.Bc. in liver, omentum infiltrated.
280	2.mg.	Control.	----------	9 days	Miliary and diffuse exudative.

We have three animals which have received sixteen doses each. They and the control still live, so that little can be said aside from the fact that the weight change is greater in the control than in the infected animals.

9, 10 and 11. Effect of Sensitizing doses of No. 5 for itself, and for Tubercle Bacilli and the effect of the latter as a Sensitizing body. Injection of .005 to .01 gram of No. 5 will sensitize a guinea pig so that a subsequent dose of the same or larger doses will cause a condition of restlessness and irritability for a short time followed rapidly by depression lasting a few hours. This same dose will not sensitize for subsequent injections of tubercle bacilli. These reactions will occur if the injections be made under the skin or into the abdomen. Two doses of .01 gram will not cause a condition of hypersusceptibility to the tubercle bacillus and from one experiment no

resistance seems to occur in refractory pig, either those made so by two close inoculations or in those which have passed through the second injection. An injection of .01 gram of No. 5 and .5 milligram tubercle bacilli will not sensitize for a subsequent injection of No. 5 in doses of .005 or .025 gram. In the presence of tubercle bacilli, injections of this material would seem harmless.

NO. 10. SALT SOLUTION EXTRACT OF LIVING TUBERCLE BACILLI OR TUBERCLE BACILLI EXTRACT.

1 and 2. Method of Production and Standardization. This product is made from living organisms removed from fluid media. An equal weight is taken from human and bovine strains, dried of excess water in the incubator and then washed in an excess of ether. This is renewed when it has removed the last remnants of water.

This fat separates so that it collects at the bottom of the vessel and may be removed by a Pasteur Pipette. After removing the second ether, the mass is allowed to dry until no more ether odor is perceptible. Then the separated fat is removed. The mass is weighed, ground thoroughly in a mortar and suspended in ten parts of .6 per cent. salt solution. This suspension is carried in a shaking machine eight hours and allowed to stand sixteen hours at room temperature. It is then filtered several times through porcelain, the filtrate being a light amber or pronounced straw colored fluid, our product No. 10. The standardization of the extract must depend upon its equivolent in tubercle bacilli. One cubic centimeter represents the extract of .1 gram of the organisms. Repeated microscopical examination of the sediment of large quantities fails to reveal any bacteria and injections of a single large or repeated small doses do not produce tuberculosis.

The following is a chemical analysis of the product No. 10.

	Human.	Bovine.
Color,	Deep straw yellow,	Straw yellow.
Reaction,	Faintly acid,	Faintly acid.
Total residue,	1.27%	1.23%
Sodium chloride,	0.74%	0.68%
Organic matter,	0.46%	0.44%
Sulphates,	Slight,	Slight.
Calcium,	Slight,	Slight.
Odor of residue on evaporation,	Slightly ammoniacal,	Slightly ammoniacal.
Color tests of residue with strong acids and alkalies,	None,	None.
Tanret's tests for albumens,	Positive,	Very faint.
Trichloracetic acid test for albumens,	Positive,	Faint.
Salicylsulphonic acid test for albumens,	Negative,	Negative.
Nitric acid and heat test for albumens,	Negative,	Negative.
Mayer's reagent for alkaloids,	Negative,	Negative.
Alphanaphthol test for carbohydrates,	Faint,	Negative.
Nessler's test for ammonium compounds,	Strong,	Positive.
Ammonium molybate test,	Positive,	Positive.
Tannic acid test,	Very faint turbidity,	Very faint turbidity.

We are now at work to determine the identity of the small quantity of proteid indicated in the analysis.

3 and 4. Dosage and Toxicity. As is the case with No. 5 and other tuberculins, we were compelled to establish the dosage of No. 10 by experiment. This product is distinctly more toxic than No. 5, but not so much so as old tuberculin. The glycerine content of the latter is undoubtedly the largest factor in its toxicity. In No. 10 this is entirely absent. Repeated injections of .001, .002 grams or more will cause a rapid loss of weight in both healthy and infected guinea pigs, in the latter case more rapidly than infected animals of the same stock not receiving the toxin. Guinea pigs will recover their weight if allowed to rest after one or two injections, but usually fail to do so if they have received several doses of this size. Guinea pigs of 400 to 500 grams will withstand weekly injections of .0001 gram if their weight be watched and rest given should any loss occur; some have actually gained a great deal under careful treatment. Doses up to .2 gram will not kill in a few hours or days as is the case with some solutions of bacterial proteids. The dose of .0001 gram has been taken as our standard therapeutic dose. Efforts to establish a quantity of this product which will prove fatal in tuberculous guinea pigs of standard weight have resulted in failures. Normal rabbits will withstand large quantities of this solution but tuberculous rabbits seem quite as susceptible as guinea pigs, if not more so. One rabbit died in six days after a dose of .01 gram while controls of the same lot lived six weeks longer.

5 and 6. Effect upon the Temperature of Healthy and Tuberculous Animals. The effect of all doses of this tubercle bacilli extract upon the temperature of healthy guinea pigs, rabbits and cows when given under the skin is nil. There may be a slight fall of temperature in the first named animal when the dose is given into the peritoneum. The following is the effect upon rabbits and guinea pigs, three to four weeks tuberculous by the injection of 1. milligram bovine tubercle bacilli.

	Rabbits.	Guinea Pigs.
.0001 grm.	0	.4 deg. F.
.01	1.6 deg. F.	1. deg. F.
.1	1.8 deg. F.	2. deg. F.
1.	Not tried.	

Injection of .4 gram into a tuberculous cow subcutaneously results in a slight but definite rise averaging .6 F. This is not sufficient and a more pronounced rise will be obtained when the appropriate dose is determined.

7. Repeated Injections into Healthy Animals. When starting this work the dose of the filtrate equal to the extraction of .001 gram was used. This has however, proven too great. In one set of animals in which this dose was used, both the prepared pigs and the controls died within one week of one another, and with the same kind of lesions. Since the dose has been decreased, several pigs remain having received eighteen to twenty injections with either a stable weight or a slight increase and no loss since receiving the tubercle bacilli. Nothing can be said at present in regard to the active immunity stimulated by this product. By careful watching the pigs withstand weekly inoculations of .0001 gram quite well.

8. Effect of Repeated Injections into Tuberculous Animals. Repeated injections of this solution into infected guinea pigs does not seem to postpone the fatal issue to any material extent, but they seem to have some effect upon the character of the lesions. The animals which live the longest show a tendency to regression of the lesions. In one or two animals of a later experiment this has been repeated. Especial attention is called to animal No. 293 in the accompanying chart. It lost 130 grams in twenty-seven days yet showed more resistance than the others.

	T. Bc. inj.	Inj. No. 10.	Weight change.	Life.	Lesions.
No. 293	1.mg.	2	—130 grams.	27 days.	Caseous in spleen, omentum but firm, few small tubercles in lungs, diaphragm and glands.
No. 292	1.mg.	2	—75 grams.	31 days.	Similar to No. 289 but not so much degenerated. Firm congestion and exudation around process.
No. 289	1.mg.	0	—30 grams.	20 days.	Pleurisy. Caseous tuberculosis of liver, spleen and lymphatics active progressive.
No. 290	1.mg.	2	—30 grams.	23 days.	Same as 289.
No. 291	1.mg.	2	—45 grams.	21 days.	Same as 289.

9, 10 and 11. Effect of Sensitizing Doses of No. 10 for itself and for Tubercle Bacilli, and the Effect of the latter as a SensitizingBody. One injection of No. 10 will produce a condition of hypersusceptibility for a second injection, after the lapse of fifteen days incubation period. The symptoms following the intoxicating dose consist of depression and nervousness with great irritability and excitement upon the slightest disturbance. A sensitizing dose of .01 gram of No. 10 will prepare for an intoxicating dose consisting of tubercule bacilli.

The symptoms are irritability, nervousness, scratching at the head, irregular respiration and trembling. This occurred in the first few minutes after injection and was followed in twenty minutes by quietness and depression which lasted a few hours. On the other hand a primary injection of tubercle bacilli also prepared for an intoxicating dose of No. 10. The symptoms are the same as those just mentioned but not quite so marked. The practical indication here seems to be to perform the first two injections in any animal within the incubation period and throw it into the refractory stage at once. Two injections of .02 gram of No. 10 will cause no susceptibility to a third injection consisting of organisms and from one experiment, no refractory state to this third injection is established. Action of these two products toward one another.

12. Effect of sensitization for one another. As has been stated above each of these products will sensitize for itself but our experiments show that one injection of No. 5 will not prepare for a subsequent dose of No. 10. The reverse is also true. The practical indication is that no harm can come from these materials in therapeutics if used together alternately.

13 and 14. Alternate and Combined use. The suggestion made at the end of the last paragraph that the alternate use of No. 5 and 10 would be harmless refers to symptoms of anaphylaxis in healthy animals. Experimentation must show whether or not this method is available for treatment in active tuberculous cases; healthy pigs withstand alternate doses fairly well but a close observation must be made of their weight because it sometimes falls. This in an indication to stop injections until the animals regain their loss. Our first experiments upon the effect of alternate and combined doses in tuberculous animals were cut short by an accident in our animal room. They seemed to indicate from the first few tests that a marked loss of weight and irregularity of temperature will occur and that a very small dose must be used.

PATHOLOGICAL NOTES.

Our observations upon the pathology in guinea pigs after being injected with these products are intesting. Our attention has been directed principally to the spleen and the regional lymph nodes. The former is the more important. After treatment with No. 5 there are often many small pale areas on and near the surface of the spleen quite suggestive of tubercles. There are centres of endothelial hyperplasia both in the follicles and in the pulp, chiefly the former. These areas are surrounded by a zone of small lymphoid cells. The picture is not that of a specific tubercle. There are no polynuclears in the vast majority of them. Practically none of them have softened or degenerated as seen in the areas of endothelial hyperplasia in this

organ after treatment with old tuberculin or serum extract. In no case were acid fast organisms demonstrable in them. The regional lymph nodes also show endothelial hyperplasia but by no means as marked as in the spleen. A non-specific focal necrosis is very occasionally encountered but it is not nearly so plain as those seen after serum extract or tuberculin treatment.

In spleens of guinea pigs dying from or being killed after injections of No. 10, the only histological change is a follicular lymphatic hyperplasia. The presence of necrosis has not been noted. This follicular proliferation is also met in the regional lymph glands.

SPECIAL REPORTS.

10—17—1908

SOME IMPROVEMENTS

IN THE

STERILIZATION OF CULTURE MEDIA, WITH ESPECIAL REFERENCE TO THE FRACTIONAL METHOD.

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Pennsylvania State Department of Health Laboratory.

The not infrequent occurrence in the course of bacteriological research of discrepancies of results, or even of total failure of the experiment when apparently the technical procedures were faultless, coupled with apparently inexplicable contaminations in culture or in a medium after storage for a time, have led the writer to suspect the methods of primary sterilization in vogue as lacking uniform sufficiency and induced the following study of this subject:

In a medium which had been sterilized in the autoclave at 15 to 20-pounds pressure for from fifteen minutes to one-half hour, and thereafter kept at room temperature and examined daily, it was sometimes observed that in the course of a few days a growth had occurred in some of the tubes, and only in exceptional instances were the tubes all free from contamination after a period of from three to six months. In case of nutrient gelatin, sterilized at 10-pounds pressure for ten to fifteen minutes, no instance was observed during the period of this study in which all of the tubes remained permanently sterile; and in one lot, after maintenance of the tubes for one to two weeks at 37 degrees C., over one-half were found contaminated. Similar results were obtained with culture media sterilized by the fractional method, as usually recommended (heating on three successive days at 100 degrees C. for thirty minutes, with the

media left at room temperature in the intervals). With such faults in mind it was deemed desirable to make a close study of the causes of these irregularities and to attempt some modification of procedure promising greater certainty of complete sterilization.

Satisfied from comparative examinations that the fault is one entering from incompleteness of primary sterilization, it at once suggested itself that an important proportion may be due to the presence of spores resistant to the ordinary measures to which the medium is subjected. Apparet, a century ago, was the first to discover the method of conservation of preserves in stoppered bottles after the bottles had been boiled; but in his experience, in spite of boiling the containers well for several hours, it was not an infrequent occurrence that the preserves spoiled. Globbin, in 1888, observed in case of an organism isolated from potato that the spores were capable of resisting 100 degrees C. for from five to six and one-half hours, of withstanding 109 degrees to 113 degrees C. for three hours, and required for destruction exposure to temperatures of 113 degrees C. to 116 degrees C. for twenty-five minutes, or of 130 degrees for three minutes. In the same year Koch found the spores of B. carotarum to resist 100 degrees C. for eight hours, and to require four hours' exposure to 130 degrees C. sterilization. In 1894 Flugel obtained similar results with spores of certain bacteria isolated from milk. Christ, in 1895, found spores of organisms isolated from the soil capable of resisting 130 degrees C. for one minute. The valuable researches of Heinze, in 1903, are well known in connection with B. megatherium, B. ellembachensis, and B. subtilis, the spores of the last capable of resisting 100 degrees C. for three hours. I was able to observe in experiments made along the same line in the Institute Pasteur the capability of the spores of B. subtilis to resist exposure for two and one-half hours to 100 degrees C. In case of the bacteria isolated from fresh bread it is familiar knowledge that their spores have resisted the heat of the baking oven. Many similar common examples of such resistive power readily occur to mind; and literature records numerous observations of facts of the same import, indicating the possibility of the dependence of failure to destroy original contamination of material by such heat-resisting entities.

It must be quite probable, too, that in addition to the above possible fault the protection afforded to contaminating organisms against the sterilization exposure may contribute in no unimportant measure to the same end. While the B. tuberculosis and the other non-spore-bearing organisms are easily destroyed by a direct exposure to 60 degrees C. for from ten to fifteen minutes they are capable when protected by albumenoid substances (sputum, feces, etc.) of resisting for long time an exposure of 100 degrees C. While in Berlin the writer had the opportunity of observing in the case of the tubercle

bacillus, the retention of virulence by organisms obtained in scrapings from the walls of one of the tuberculosis wards after the room had been empty for over four months. Explicable in the same principle, it is a well-known fact that the sterilization of bouillon or any liquid medium is more easily accomplished than of agar or more especially nutrient gelatin; in fact, the writer has observed the complete sterilization of bouillon after a single exposure of thirty minutes to 100 degrees C., but has never obtained similar results with gelatin.

Although the above factors (special resistance of contaminating spores and the protection afforded contaminations by the medium) might well explain imperfections of sterilization by the autoclave, it suggested itself that in case of fractional sterilization (in which as is known the spores are permitted to germinate in the intervals of heating and in their vegetative form become susceptible of destruction by the subsequent heat exposures) this failure might find another explanation, and with this in view the following investigation was pursued.

Nutrient gelatin was distributed in tubes previously sterilized by dry heat at 180 degrees to 200 degrees C. for fifteen minutes or longer (until a browning of the cotton plug appeared, which indicated the decomposition of the organic matter or complete sterilization) and sterilized by fractional or intermittent exposure to 100 degrees C. for fifteen to thirty minutes on three successive days, being left at room temperature during the intervals; but in spite of all precaution taken, in a number of these tubes, after storage at room temperature or in the incubator at 37 degrees C. in the course of from twenty-four hours to several days' contamination became apparent, the varying time apparently being related to the temperature of storage locality. This last at once suggested that in case of contamination by spores resistant to heat the room temperature exposure of the intervals might very well not be the most favorable temperature for germination of such spores in the vegetative forms; in other words, the spores present originally and not destroyed by the exposure to 100 degrees C. in the first might at the temperature of the interval remain as such (unchanged) and be equally resistant to the heat of the sterilizing process on the second day, and that the same results might follow for the second interval and on the third heating, and that subsequently during the prolonged storage of the medium they might germinate. An experiment made in this line proved such to be the case.

Old cultures of Bacillus subtilis and spore-bearing moulds were inoculated in different media and left at room temperature, daily observation showing the medium to remain perfectly clear for from one to seven days, according to the temperature of the room and season of the year. These two organisms were preferred because,

in the writer's experience, these have been found the most common and in many cases the sole agents of medium contamination. This variation in rapidity of development suggested that in the process the room temperature intervals might prevent the germination of spores, as this might well be deficient, and that, therefore, it must be desirable to provide in these intervals of sterilization surroundings of a temperature more favorable for the spores to germinate and cause the vegetative stage of growth. With this in view gelatin medium, after the first exposure to 100 degrees C. for thirty minutes, was tubed—the tubes divided into groups. Part were placed in the incubator at 37 degrees C. for six hours, other series were incubated at the same temperature for twelve, eighteen, and twenty-four hours, respectively; after such periods resterilization at 100 degrees C. for thirty minutes was again performed for each group and the tubes stood at 37 degrees C. for observation. As was expected, but few tubes subsequently were found contaminated, the results being much more favorable than when the room temperature had been employed in the intervals of heating. Further, it was noted that the short interval of incubation, for but six hours, was too short for germination of the spores even at body temperature; and that on the other hand, eighteen to twenty hours' incubation was too protracted, since in these periods the medium became undesirably clouded for growth of the organisms, while intervals of incubation for from twelve to eighteen hours gave the most favorable results. Following these determinations another series of observations were made for the purpose of comparisons between the common practice of heating three times in fractional sterilization and two exposures. A series of tubes were heated for thirty minutes to 100 degrees C., then incubated at 37 degrees C. for from twelve to eighteen hours and submitted to a final sterilization at 100 degrees C. for thirty minues. A second series of tubes were exposed on three successive days for thirty minutes at 100 degrees C. and incubated at 37 degrees C. for twelve hours in the first interval, and for twenty hours in the second interval. The results in these two series were practically identical, both being satisfactory.

With a view of determining the possibility of completing a fractional sterilization in a single day, as in case of need of some media for which the use of the autoclave is unsuited, as a sugar or gelatin medium (the high temperature of the autoclave producing undesirable changes in such media), a medium was prepared early in the morning and sterilized at 100 degrees C. as usual at about eight o'clock, then incubated at 37 degrees C. until about five o'clock in the evening, when it was again sterilized as previously. The results were quite satisfactory, again proving the efficiency of the method and establishing the advantage of material saving of time. Such procedure can,

however, be recommended only for use in emergencies, as the writer feels the need of strongly emphasizing the desirability of incubating any medium for at least forty-eight hours after sterilization is supposed to be complete, in order to detect and then eliminate any possible contamination.

It is deemed unnecessary to recommend or outline any special rule for the above procedures. Good results may be obtained by the usual practice of sterilizing on three successive days, with a first interval of twelve hours for incubation and a second interval of twenty-four hours; or by sterilizing but twice, with an interval of twelve hours for incubation; and as just stated, the sterilization can be completed in a single day. The routine method followed by the writer, with most satisfactory results, includes the preparation of the medium early in the morning and at once exposing it to 100 degrees C. for about ten or fifteen minutes, then incubating at 37 degrees C. for six to eight hours during the same day, and toward evening again subjecting it to 100 degrees C. for fifteen to twenty minutes, followed by a second interval of incubation at 37 degrees C. over night, and a final heating the next morning to 100 degrees C. for thirty minutes. This shortens the general routine by one full day, and, too, the heat exposure is reduced by one-third, each a material advantage when at the same time the final result is not impaired, but, as above indicated, rendered more sure of success. The precise method may vary with the judgment of each worker, the writer's only desire being to point out the necessity for providing a temperatture during the intervals of heating which will favor the germination of the spores, so that in their vegetative form they may be the more certainly destroyed at the next period of heating, and at the same time to urge the fact that the ordinary room temperature cannot by any means be regarded as favorable for this purpose in the intervals commonly allowed between sterilizations.

There is a further feature bearing upon the above which it is not inappropriate to bring forward in this relation. In spite of all precautions ordinarily taken in sterilizing media either in the autoclave or by the above outlined fractional method the writer has not found it always possible to avoid contamination of some of his tubes. It must be recalled that by either method the cotton plugs become more or less wet from exposure to the steam atmosphere and from the vapor arising from the heated liquid medium; and it is to be expected that by mere capillarity a more or less continuous thin sheet of the condensed moisture will intervene between the plug and the glass of the container (present in the cotton plug as well, but, perhaps, not in as perfect continuity). Through such a continuous liquid it is possible that occasionally organisms coming from the air of the

open room in which the tube is cooling might be afforded a path of entry from the exterior to the interior of the tube; and it must be realized that the lower the room temperature when the tube is first brought from the heated sterilizer the more decided a current of air is drawn through the plug as the interior air becomes cool and contracts, possibly aiding in the introduction of organisms, as just suggested. To avoid such a possibility the transference of the medium from the sterilizer to an incubation oven at 37 degrees C. for at least forty-eight hours most clearly aid, drying the surface of the plug more quickly and at the same time permitting, to a less degree, the rarefied air in the tube to cool and condense rapidly. Personally, the writer is inclined to believe that lack of this precaution is not infrequently responsible for the contaminations which enter to spoil this or that experiment, to cause contradictory results in the work of the same or different investigators, and which have added much to the uncertainties and volumes of our bacteriological literature.

Some may be disposed to hold that if the medium has been properly sterilized, subsequent incubation for forty-eight hours, as above suggested, at 37 degrees C. is unnecessary. This is in theory true, but in practice what means do we possess of knowing surely whether the medium is pure, save by subjecting it to conditions known to be most favorable for growth of contamination, if perchance contamination exists? The time is past when water analysis was limited to its physical properties alone; and just as today no one would pretend to estimate the number of bacteria in a sparkling water or its sanitary condition by its clearness in the same way, we are not justified in assuming that because a sample of bouillon or other medium remains transparent after storage at room temperature or in the refrigerator, as usually recommended, under conditions unfavorable for the germination of spores possibly present, it is, therefore, a sterile medium. The procedure recommended is logically correct and so simple that no objections of inconvenience or lack of necessity should be held material against it; and it may be urged as a definite rule of procedure that in all sterilization by steam, whether in the intervals or after the fractional method, or after the use of the autoclave, the medium should not be directly exposed to room temperature or a lower temperature, but should be placed in the incubator at 37 degrees C. because this condition will both aid in early and certain detection of possible contamination, and will in some measure favor the exclusion of organisms, liable to be drawn into the container by air suction in undue moisture of the cotton plug. The writer might add, in conclusion, that it is his opinion that the fractional method of sterilization, as above recommended, might often with the advantage replace the autoclave not only in effi-

ciency of sterilization, but more especially as evading the production of undersirable changes which the high pressure and temperature of the autoclave have been found to produce in culture media.

SMALLPOX IN CUMBERLAND COUNTY.

REPORTED BY HARVEY B. BASHORE, M. D.
County Medical Inspector.

It is reported that some time in August, 1908, a farm hand from Reading came to Harry Hoopy's, back of Camp Hill; he became slightly ill and developed a rash. No doctor was employed. In due time Hoopy and his family became sick with the same disease; no doctor employed. Hoopy had a milk route in West Fairview-Enola district, and continued to serve his customers although there were many scabs on face and hands; so much for heresay.

In September there were cases of chicken-pox reported to the Department in the Bretz, Horning, Campbell, Gardner and Kunkel houses at Enola. Bretz and Horning being related to Hoopy, and Campbell, Gardner and Kunkel being neighbors and visitors at Bretz's. These cases reported by four different doctors,—were claimed to be chicken-pox, although in every family adults were affected.

On September 16th the Department began investigation and found every case to be typical smallpox. The Hoopy house was thoroughly fumigated and the other families quarantined for smallpox. Meanwhile the health officers were hunting "contacts." Ninety-three families comprising the Hoopy relatives and milk route were put under surveillance; one of these, Westfall, father-in-law to Bretz, having a case in his family, was quarantined. After this only four families became infected.

On September 18th Postmaster Hawbaker walked into my office with a third-day eruption of smallpox, having just returned from a convention in Ford City, Pa., and having left home four days before; he probably contracted the disease from one of the "perambulating" cases from Enola. The Post Office was immediately closed and thoroughly disinfected and then turned over to the Post Office authorities. I notified the Department of the trip of Wm. Hawbaker; his stopping places while at Ford City and the railway coach in which he traveled; from his case I believe only two or three new ones developed.

A few more "contacts" were hunted up and the epidemic at this place ended with Clara Boughter, who was quarantined on December 17th and with whom there had been no "contacts." In all twenty-nine cases. At the outset of the epidemic health officer Hoover resigned and I immediately sent for health officer Weaver, who served me most faithfully.

Although extreme vigilance was used in hunting "contacts" one escaped—Mrs. Curtis Walters of New Kingston, related to Campbell, in whose house she was probably the day it was quarantined. She went home and in due time so the story goes, she herself and children became ill with a rash (no doctor) and the disease was concealed for the time. Her husband became ill and on October 22nd, the second day of the rash, was found working in McCullough's store in Carlisle. He was immediately sent home and all "contacts" in Carlisle vaccinated and put on parole.

Meanwhile, we learned that the Walters woman, in the role of a book agent, had visited practically every house in New Kingston, and the whole community was put under surveillance, health officer Mackey being ordered to take up his residence in New Kingston.

In fourteen days the first crop of "contacts" developed in Harris, Hertman, Powley, Bishop and Cora Martin, a teacher in Fairview Hall School in Middlesex township; all were quarantined and about twenty-five "contacts" vaccinated and put on parole.

In fourteen days more the second crop developed in the houses of Powley and Hertman, already quarantined, and only one outside the Black family, which had been under quarantine; they having been vaccinated three days after contact. In this family one child developed a very modified case which consisted of only five pocks, but they were perfectly typical. Cases in this place all told twenty-one making a total of fifty for our epidemic and about four hundred "contacts."

On December 1st, William Walker of Carlisle, who had been in a factory visited by one of the Hertman children from New Kingston was found to have smallpox. On December 17th two other families

infected by Mrs. Knoche, who evidently had a mild attack, contracted from the same factory, developed. These cases of course belong to Carlisle. While this epidemic seemed to differ in no wise from any other smallpox epidemic the following facts attracted my attention.

1—All patients were unvaccinated save one and that forty years ago.
2—The unvaccinated in the quarantined houses invariably got smallpox except in one instance, while the vaccinated did not get it.
3—Vaccination one or two days after "contact" generally prevented the development of the disease; three or four days after it did not prevent.
4—One hundred and fifty (150) children were kept out of school for eighteen days, which is equivalent to twenty-seven hundred days of schooling lost to the children of Cumberland County on account of smallpox: vastly more than would have been lost by the enforcement of the vaccination law.
5—Five doctors called the disease chicken-pox, although in each house adults were affected.
6.—A number of children were reported to be vaccinated and had certificates of vaccination, who were not successfully vaccinated as shown by the entire absence of scar.

The epidemic was of the non-fatal type, although some of the cases were severe.

LEPROSY.

PROTOCTOL OF NECROPSY PERFORMED ON THE BODY OF MOCK SEM, DECEMBER 23, 1908.

By B. Franklin Royer, M. D., First Associate Chief Medical Inspector, and Paul A. Hartman, M. D., County Medical Inspector Dauphin County.

EXTERNAL EXAMINATION. The body of a very much emaciated male, about five feet long, weighing approximately eighty pounds and having the facies of the Chinese race. Rigor mortis is beginning in both extremities but is not yet marked. There are no marks of external violence. The skin over the lobes of both ears and over both malar bones and for a distance of 1.5 cm. below each malar bone is very slightly elevated, feels thick to the touch, leathery and indurated. Over the neck and trunk the skin shows no gross abnormality. Beneath the left scapula some suggillation is noted. On both lower legs, beginning below the head of the fibula and extending to the external malleolous, and across the crest of the shin anteriorally,

and to the medium line posteriorly, is an area of harsh, very dark brown skin, scaly and inelastic in character, badly nourished and presenting some resemblance to the skin of an alligator. The external genitals are apparently normal. A horseshoe slough said to be an ischio-rectal abscess is noted, on the left side of the anus, just outside the spincter.

INTERNAL EXAMINATION. Very little subcutaneous fat is found beneath the skin. The muscles are thin, flabby and paler than normal. The abdominal and thoracic viscera are still warm. 250 c. c. of straw-colored serum is found in the peritoneal cavity. The intestines bear a normal relation to each other and to the other abdominal viscera. On removing the breast-plate the lungs do not collapse. The thoracic viscera are apparently in normal position.

PLEURAE. The left pleural cavity is almost obliterated by old adhesions extending from the apex to the base and across the diaphragm. The right cavity is absolutely obliterated and it is with the greatest difficulty that adhesions can be broken up. At the apex of the right lung, in attempting to break up adhesions the visceral pleura was lacerated and the hand plunged directly into a large apical cavity.

HEART. The heart is large, being about 12 cm. long, 10 cm. broad and 6 cm. thick. The right wall is thin, the muscle is a light brown in color, is fairly firm and can with difficulty be lacerated with the thumb and forefinger. The right auricle is apparently empty. The right ventricle contains a small amount of chicken-fat clot. The left wall is thinner than normal. The color and texture correspond to the right. The left auricle is empty, the left ventricle contains an irregular mass of chicken-fat clot, extending a little way through the aortic orifice. Careful examination of the endocardium in all cavities fails to reveal any microscopic abnormality. The valves of both auriculo-ventricular openings and of the pulmonary and aortic outlets are practically normal. There is no palpable evidence of arterio-sclerosis. The coronary arteries are patulous.

LUNGS. The left lung was removed with considerable difficulty and on examination shows slight crepitation in the middle part of the left lobe and very slight crepitation in the upper part of the upper lobe. It is of a grayish purple color throughout the upper lobe and anterior and upper portions of the lower lobe, and at the base posteriorly is of a much darker and more solid purplish gray color. On section the lung cuts with gritty resistance and drips blood freely at the base, less freely in the upper portions. A considerable mass of purulent matter exuded as the section was made. The incision revealed four cavities in the lower part of the upper and in the upper part of the lower lobes, varying in size from 2 cm. to 5 cm. in diameter. No further section of this viscus was made.

The right lung, as already stated, was lacerated at its apex on removal. Slight crepitation was noted at the base of the upper lobe. There is no true middle lobe. A slight attempt at middle lobe formation can be noted in the lower part of what is really the upper lobe, at its anterior aspect near the median line of the body. In color the lung is grayish purple throughout with an added darker purplish color at the base. On section the lower portion drips blood freely while the upper portion drips less blood. The cavity which was opened on removal is of irregular shape and is approximately 8 cm. by 6 cm. by 4 cm. The section passed through three cavities, two of them in the lower lobe and one in the upper, varying in size from 1.5 cm. to 3.5 cm. Several smaller cavities were found in the posterior portion of the upper lobe, but not more than a centimeter in diameter.

The bronchi contain considerable mucus and purulent brownish-colored fluid. The mucous membrane of the bronchi is slightly injected in irregular areas. The peri-bronchial glands are enlarged and cut with resistance. Some of them contain calcareous deposits.

THYMI. The thymus gland was barely demonstrable.

SPLEEN. The spleen is about 17 cm. long, 11 cm. broad and 8 cm. thick. It is a light purple in color and is soft and pliable. On section no retraction of the capsule is noted nor can it be stripped from the organ without laceration. The splenic substance is dark purple in color and on section drips blood slowly. The splenic nodules are demonstrable.

KIDNEYS. The left kidney is about 12 cm. long, 9 cm. broad and 6.5 cm. thick. On section the tissue cuts with slight resistance, the capsule does not retract but can easily be stripped from the surface of the organ, striation is demonstable in the cortex. The cortex is narrowed and the tissue is paler than normal.

The right kidney shows practically the same conditions as its fellow and is approximately of the same size.

Both ureters are apparently normal. The bladder is almost empty and shows no macroscopic lesion. The genitals are apparently normal.

LIVER. The liver in situ extends from the fifth rib anteriorally to about 3.5 cm. below the costal margin, and from the right side to a point 10 cm. beyond the median line of the abdomen. The capsule wrinkles on its superior surface when removed. In color the organ is a very dark purple, on section blood drips freely from the cut surface and on removal of the blood the color is uniform throughout. The organ is 38 cm. in its longest measurement, 24 cm. in greatest breadth and 15 cm. in greatest thickness. The gall bladder contains about 15 c. c. of bile and is apparently normal.

PANCREAS. The pancreas is soft and is apparently normal in color and resistance. The organ measures about 12 cm. in length, 3 cm. in width and 1.5 cm. in thickness.

STOMACH. The stomach lies in the usual position and appears to be normal in size. It is practically empty and the mucous membrane shows no gross abnormality.

INTESTINES. The intestinal canal was removed intact, and beginning in the jejunum and extending throughout the ileum and greater portion of the ascending transverse and descending colon are to be found ulcers, deep, sluggish, and having overhanging edges, varying in size from one centimeter to 5 cm. in diameter. At one or two points in the ileum these ulcers are almost annular. The intestines contain very little fecal matter. They were only partially emptied before being sectioned, and were not carefully cleansed before being sent to the laboratory for detailed examination.

The brain and spinal cord were not removed. The organs could not be weighed.

PATHOLOGICAL DIAGNOSIS. Widely distributed pulmonary tuberculosis with the formation of many cavities, widely diffused broncho-pneumonia, hypostatic pneumonia of both bases, extensive tubercular ulceration of the intestines, chronic congestion of the liver, ischio-rectal abscess.

Sections of skin showing induration were removed from the outer portion of the right lower leg, from the lobes of each ear and from the left cheek below the malar bone, for histologic study. Blocks of tissue were removed in duplicate from lung, heart, liver, spleen, kidney and pancreas and placed in 50 per cent. alcohol and 5 per cent. formaldehyde solution respectively. The entire left lung and these tissues were sent to Dr. Herbert Fox for accurate study in the laboratory and for preserving. All other tissue was replaced preparatory for burial.

Note.—The clinical report of this case can be seen by referring to the Report of the Commisioner of Health for the year 1907, pages 28 and 29.

PATHOLOGICAL REPORT ON THE SPECIMENS SUBMITTED, FROM MOCK SEM, A CHINESE LEPER.

D. Rivas, Bacteriologist.

No. 2,350. Philadelphia, January 14, 1909.

A specimen, received from State Health Department, December 28, 1908.

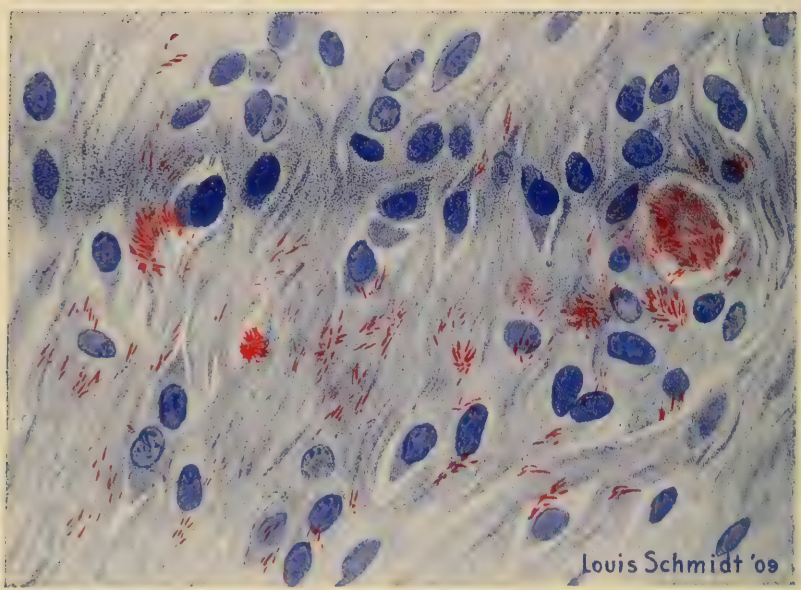
Source. Autopsy Material.

Name and address of patient, Mock Sem, a Chinese leper segregated by State Health Department, near Harrisburg, Pa.

Diagnosis: Leprosy (skin); tuberculosis of lung, liver and spleen; cloudy swelling of liver and kidney.

ALLEN J. SMITH.

In communications with reference to this specimen, please mention above number.



Section of Nodule from Ear; Drawing from a Portion of Thickened Corium, Showing Lepra Organisms,—X 1200.

GROSS AND MINUTE APPEARANCES.

The subject of this case, a young Chinaman, aged from 25 to 30 years, is believed to have been leprous when he first came into this country three or four years before his death. He came from China into British Columbia originally and managed to slip into the United States, as nearly as can be ascertained, by shipping in a coasting vessel and landing in San Francisco. He at once made his way to New York City where undetected he worked for a time in a restaurant. Thence he came to Harrisburg, where he was working as a restaurant waiter when he was detected as a leper. The city authorities are said to have sent him to Baltimore, but he at once returned and for a time remained in the neighboring town of Steelton, Penna. Then the State Department of Health with the Harrisburg authorities provided a small house of isolation for him. It was recognized at the time that not only was he suffering from a well developed case of nodular leprosy but he was also affected by pulmonary tuberculosis.

After a year to two years of isolation, during which the tuberculosis made rapid progress, he died in December of 1908 from the latter disease.

The lungs were found extensively involved, showing both marked diffuse caseation and chronic ulcerative lesions, with enlarged and caseated bronchial lymph nodes. There was extensive ulcerative tuberculosis of the intestines, the ulcers large, numerous, with thick, overhanging edges, smooth indurated bases and numerous miliary tubercles showing superitoneally in the wall of the intestine at the base of each ulcer.

For histological purpose there were sent to the laboratory portions of the lungs, heart wall, liver, spleen and kidney, several cutaneous nodules from the ear lobes and a small bit of thickened and indurated skin from the face.

(1)—A section of a nodule from the ear lobe shows the characteristic features of an active leprous hyperplasia, and with special staining exhibits a vast number of typical leprosy bacilli, in and between the deeper epithelial cells of the epiderm, in large leprous cells and smaller endothelioid cells and in the tissue spaces between the tissue elements of the thickened corium. Some proliferation of the epiderm, with a slight but clearly excessive penetration of the interpapillary portions into the corium has taken place, and at least one epithelial concentric nest was noted quite a distance below the surface. The main elements forming the nodule are in the corium, where the old fibrous matrix is thickly infiltrated by embryonic cells of fibroblastic and endotheloid type, these constituting the bulk of the tissue in most microscopic fields. Scattered mast cells lymphocytes and small plasma cells, and occasional large endothelioid cells ("lepra cells"), and occasional polynuclear leucocytes (some eosinophilic) are encountered.

In the skin of the face the process is evidently older; the corium is thickened largely by a fibrosis, with much smaller number of the infiltrating cells mentioned in connection with the preceding section. The epiderm shows a more definite penetrating growth, at places exhibiting slender root-like extensions into the corium which often unite into a rather fine reticulum just under the major part of the cuticle, reminding one of Unna's reticulate type of epithelioma, and occasionally showing well developed epithelial pearls. With these differences, however, the general characteristics are the same.

(2)—Sections of bits of pulmonary tissue all show tuberculous changes, ranging from typical miliary tubercles to rather large conglomerates with extensive caseation. For the rest catarrhal changes, hyperaemia and oedema with occasional foci of suppuration in and about bronchioles make up the general picture.

(3)—*Wall of Heart:* Epicardium missing from sections examined. No alteration of endocardium. Myocardium somewhat congested, and the fibres rather loosely separated from each other, probably by an oedema. The fibres themselves are

typically rather slender; but show no loss of striation and no pigmentation. The nuclei are as a rule well stained and clear; are for the most part of relatively small size. No fibrosis of the tissue, and no alteration of the wall of coronary branches caught in the section.

4)—*Liver:* Capsule normal. No overgrowth of Glisson's capsules and no important vascular changes. Liver cells generally rather granular and somewhat swollen, a few showing fatty infiltration appearances. The main feature of the sections examined is in the presence of a number of miliary tubercles, mainly of gray type met here and there both in the perilobular tissue and in the interior lobules.

(5)—*Kidneys:* are not from the sections examined seriously changed. There is a scattered cloudy swelling of the cells of the cortical tubules; and in contrast there are many tubules which show no such alteration. At places the tubules are widely distended by a granular coagulated material within them, and occasionally such material exists in Bowman's spaces. No special interstitial change; but a few of the tufts are more or less fibrosed. There is a moderate capillary injection; blood vessel walls normal.

(6)—*Spleen:* The main feature here is a rather marked diffuse endothelial hyperplasia of the pulp. A few more miliary tubercles have been noted in the tissue in addition. The tissue is moderately hypermic, not pigmented; the Malpighian bodies are of normal size and structure; no important change in the wall of blood vessels; no marked overgrowth of the trabeculae of the organ.

REPORT ON THE EPIDEMIC OF TYPHOID FEVER AT READING, NOVEMBER AND DECEMBER, 1908.

A. B. MOULTON, M. D., Chief Medical Inspector.

On the first of September the Morbidity reports received from Reading showed that Typhoid Fever was unusually prevalent in that city, ninety-one cases having been reported for the month of August, distributed by days as follows. During the first twenty-one days of the month 24 cases were reported. Following this day there was a rapid rise in the number of cases reported:

August 22,	2
August 24,	11
August 25,	7
August 26,	11
August 27,	20
August 28,	3
August 29,	1
August 31,	12

As shown by these figures, the increase was especially rapid during the last ten days of the month, 53 cases being reported during the week ending August 28th. In view of the great increase during the last ten days of the month, a letter was written to the Secretary of the Board of Health of Reading noting this rapid rise in the Typhoid rate, and suggesting the probability of a widely disseminated infection which was being transmitted either through the water or milk supply. We further stated that there was a possibility of a severe epidemic in their city, and requested that they advise us of the steps which were being taken to discover the source of these new cases and the means by which it was being transmitted. At the same time we outlined the method which this Department uses in quelling such outbreaks, and asked them to advise us what measures their Board had taken to prevent the further spread of the disease. Replying to this letter, the Secretary of the Board stated that our communication had been laid before the Board, and that he was authorized to give the following reply:

"That the local health authorities are investigating the water and milk supplies in order to ascertain their bearing on the spread of the disease; that the great majority of the cases are of a very mild type, as stated by the attending physicians and proven by the low mortality, only 11 deaths having occurred during the year 1908 to date, in 170 cases reported, that physicians are really reporting in harmony with your suggestions, and that other recommendations will be followed as far as possible."

At that time the situation was not looked upon with any degree of apprehension by the local Board of Health, and nothing was done other than to have printed in the local paper a request that the people boil all water and milk. No census was taken to determine any common source of infection, and there was no hint of a suspicion on the part of the local Board that the general water supply was infected.

On the 28th of November the Morbidity Reports showed that Typhoid Fever had assumed epidemic proportions in that city, and in a 'phone communication with Mayor Rick, the Department was asked to afford assistance in their endeavors to overcome the epidemic. After a careful review of the situation, the offer was made to the authorities in Reading that if they so desired the Department would take full charge and institute the necessary measures to suppress the epidemic, furnishing the necessary corps of engineers, nurses and physicians required. At a conference between the Mayor, local Board of Health, Select Council, City Solicitor and representatives of this Department, the offer made by the Commissioner of Health was accepted, it being agreed that all orders were to be issued over the signature of the Commissioner of Health and the signature of the local Board of Health; all expenses outside of those

of the officials sent by the State Department of Health were to be borne by the city, these expenses including that for district nurses, printing and such supplies as might be furnished to the poor, the work on the watersheds outside of the city limits being directly under the control of the Department. On the 30th of November Mr. Snow, the Chief Engineer of the Department of Health, and the Chief Medical Inspector, entered on the work of suppressing this epidemic. Following the acceptance of this offer a special meeting of the Board of Health was called, at which time a regulation was drawn up and signed by the President of the Board of Health and the Mayor requiring that premises where Typhoid Fever existed should be placarded. This was necessitated in view of the fact that placarding of premises where Typhoid Fever existed had not been enforced in Reading prior to this time. Your representative was authorized to issue such orders as might be necessary to meet any emergency. Models of warning placards, Typhoid placards, Health Officer and Nurses' cards, orders to milkmen, employers of labor and hotel proprietors were prepared and submitted to the local printers for proofs.

A study was made of the records of Typhoid Fever as reported to the local Board during the year 1908. Their records showed the cases occurring each month as follows:

January,	8
February,	5
March,	9
April,	7
May,	3
June,	9
July,	16
August,	91
September,	94
October,	43
November,	353
December,	286

You will note that only 52 cases had occurred in that city from January to July, inclusive, 220 cases had occurred during August and September. At the time when the correspondence, to which reference is made above, the total number of cases for the eleven months, ending November 30th, were 633, 581 of which occurred between August 1st and November 30th, inclusive, which seemed to indicate that there was an infection of the water supply sometime in the early part of July, the effect of which was fast disappearing in the early part of November, since during the first sixteen days of the

month only 14 cases had been reported. Following this date there was a rapid rise in the number of cases reported, as shown by the following table:

	Cases.
November 17,	2
November 18,	13
November 19,	13
November 20,	25
November 21,	45
November 23,	61
November 24,	33
November 25,	43
November 26,	23
November 27,	53
November 28,	18
November 29,	9
November 30,	11

This sudden rise in the last half of November seems to show that there was another portion of the infective material introduced into the stream the very last of October or the first of November. As a check upon these reports we went over the years from 1895 to 1897, inclusive, which showed an average number of cases approximating 200 per year, the greatest number of cases usually corresponding to the Fall months. The greatest number for any single year was in 1900, when they had 413 cases, and the lowest number for any single year was in 1897, when they had 139 cases. From these reports it seems that typhoid fever had been endemic in Reading for a number of years.

A telegram was sent to a head nurse to immediately proceed to Reading to take charge of the nurses. A list of the milk dealers and the dairy farms from which their supply was obtained was immediately prepared, and the Health Officers in the districts where these dairy farms were located were ordered to immediately inspect each and every dairy farm to determine whether Typhoid Fever existed upon the premises or had existed upon the premises during the past year. Wherever cases had occurred they were to make a report, giving the date of onset, and date of recovery in each instance, with the precautions that were observed to prevent the infection of the milk supply.

The records in the office of the Board of Health were studied and it was determined that about one-third of all the cases of Typhoid existing in the city came from the thirteenth ward, which was supplied with water from the Maiden Creek Reservoir, and the Chief Engineer immediately began the investigation of conditions on the watershed. A force of men was at once secured, sworn in as Special

Health Officers, and set to work placing warning placards about town, on telegraph poles and in saloons, warning people to boil all water and milk before using for domestic purposes. As soon as this work was completed they were detailed to placard houses where Typhoid Fever existed and make inspections of the outhouses and alleys.

On the head nurse's arrival she took charge of the nursing force and made visits to the homes, determining the needs of the individual families, teaching them how to care for those who were ill. The work was extremely heavy both for the nurses and Health Officers in the first few days owing to the large number of cases reported before the work was commenced.

The following routine procedure with regard to cases was carried out:

Upon receipt of a report of typhoid fever, the name and address is transferred to an alphabetical list, health officer's census card, nurse's information card and case card. In this way the list is cross-indexed both as concerns health officers and nurses, the census and information cards being arranged serially in order of the receipt of the report. The Health Officer immediately visits the premises, secures the information required of him, leaves the circular setting forth the precautions which should be observed in the household, and on leaving the premises posts the placard.

A census of the cases shows that by far the larger majority of all the cases secured or drank water from the Maiden Creek supply, while the milk was secured from 145 different sources, involving some 250 dairy farms, in one instance 29 cases occurred on one man's milk route, and in two others 20 were found on a single route. All of these were in the district supplied exclusively by the Maiden Creek water, where the greatest percentage of cases occurred.

The nurse in whose district the case has occurred visits the household, learns the condition of the patient, the environments of the patient, and the needs and the necessity of subsequent visits. At this visit the nurse is instructed to be extremely careful to make plain the necessity of disinfecting the discharges, and instructs them how to do this properly. If lime is not provided, a note to this effect is made and the lime wagon sent there the following day. The men having charge of the lime wagon secure their supply from the Reading Supply Company, receiving a check for the same. These checks, together with the names of those to whom lime is supplied, the same amount being furnished in each instance, are turned over to the City Controller in order that he may make certain there is no leak, and at all times may know how much lime is being used.

At a joint meeting of the various guilds, churches and the Associated Charities at the Common Council Rooms in City Hall, the head nurse was given full authority to secure supplies from the

various grocers in town whenever needed. At this meeting a considerable sum of money was also raised with which to buy muslin for the making of night clothes, sheets and pillow slips to be used as required. See report of supplies furnished.

On December 7th the watershed was visited by the Chief Medical Inspector and specimens of blood for Widal reactions were secured from Wilmer and Myrl Geary, and also from Eva and Mrs. Leinbach. Mrs. Leinbach showed a positive reaction. The premises of Mr. Moyer, near Fleetwood, were also visited, where a case of typhoid fever exists in the person of his daughter Eva. This case was probably contracted in Reading, as the girl was visiting an aunt of her's, who lives in the infected district, during the last week of October, and has been ill for about three weeks. Mr. Moyer ships some 30 or 40 pounds of milk to the New Jerusalem creamery daily, and besides works there himself. Since there was some probability that he came in contact with the patient, it was considered advisable to order that he cease working at the creamery until the recovery of his daughter and the disinfection of the premises.

As only a small proportion of the houses in Reading are connected with a public sewer, the sewerage being discharged into cesspools or wells, it was deemed advisable to investigate the condition of the outhouses and privies, and for this purpose special officers were detailed by the Mayor, and a house to house inspection was made of all the privies and cesspools, and orders of abatement issued wherever the vaults or pits were found full, overflowing or extremely offensive.

Since the alleys in this city belong to the abutting property owners, and in many instances are in very insanitary condition, it was deemed advisable that they should be inspected at the same time. Along these alleys run small gutters, which empty into larger gutters at the sides of the street, and finally terminate in manholes, which connect with a storm sewer. These various surface drains might be called open sewers, since all the wash-water, both from the kitchen and laundry, finds its way into them.

The following tables will be found interesting. Of the 924 cases which occurred during 1908, among which are included those occurring in the epidemic during November and December—with few exceptions and in these few exceptions there was a question of doubt—the entire number secured water either constantly or at times in that section of the city supplied by water from Maiden Creek—494 males and 430 females. Grouped in five-year periods their ages were as follows:

0 to 5 years,	26
5 to 10 years,	117
10 to 15 years,	140
15 to 20 years,	141

20 to 25 years,	121
25 to 30 years,	81
30 to 35 years,	81
35 to 40 years,	45
40 to 45 years,	32
45 to 50 years,	32
50 to 55 years,	12
55 to 60 years,	12
60 and over,	5
Not given,	94

Of occupations they were grouped as follows:

Professional,	37
At home,	215
Domestics,	20
School children,	215
Laborers,	115
Employees in stores,	42
Railroad Employees,	60
Mill hands,	36
Factory employees,	127
Not given,	57

Of this total 743 were treated at home and 158 were treated in hospitals. 106 of these premises were connected with the sewer, 159 with cesspools, while the others had outside dirt closets.

During the months of November and December there were 31 deaths from typhoid fever, showing a case death rate for these two months of approximately 5 per cent.

Milk was supplied to these patients by 136 milkmen. The largest number of cases occurring in any one milk route was 29, while 73 of them had each only one patient on his route.

Of 426 patients treated at home, 390 were nursed by members of the family, 20 by experienced nurses and 16 by trained nurses.

In 583 cases a special study was made by the visiting nurses with regard to the disinfection of the discharges, and it was found that lime was used by 196, chloride of lime by 243, carbolic acid by 67 while 25 made no pretense of disinfection, and 52 gave no outline of the method pursued. Where carbolic acid was used, and in some instances where chloride of lime was used, such small quantities were employed that the effect was practically nil. Disinfection was allowed to go on for a few minutes by 80, and one-half hour by 117, one hour by 112, and an indefinite period, which varied widely, by 197.

The number disinfecting dishes, 248; by simply boiling, 245; by the use of chloride of lime, 3. The number not disinfecting dishes, 151; number giving no satisfactory reply, 284. The number of

patients using boiled milk, 5; uncertain, 329. Number of patients using boiled water, 366; number not using boiled water, 8; unable to determine, 309.

In a few instances where a case of Typhoid Fever occurred in families, they maintained that they had been boiling both water and milk since the outbreak of Typhoid Fever in September, and they further stated that the patients had not drank water or milk away from home.

Since cases of Typhoid Fever occur almost constantly in Reading, and as there are very many parks and picnic grounds and small camps, where the populace assemble on Sundays and holidays for social gatherings, the danger of these local water supplies becoming infected is great, especially when we remember that it is claimed that one per cent. of typhoid patients harbor the germs of this disease in their system and pass them off in the excreta for long periods after the clinical systems have ceased. Special care was enjoined upon the local health authorities and the populace to safeguard these local springs and streams in order that the possibility of infection may be reduced to the minimum

REPORT OF THE NURSE IN CHARGE.

The following is a report of the work done by the District Nurses during the Typhoid Fever epidemic in Reading in the fall and winter of 1908:

The city was divided into districts, one nurse assigned to each district, eight nurses being employed. The total number of cases reported was six hundred and seventy-seven. Of this number ninety cases were found to be of secondary origin. Thirty deaths occurred.

The nurses visited the homes of each patient. Some had trained nurses, others competent caretakers, while many were transferred to the various hospitals. After a thorough canvass of the city, which included instructions in the various households, where other than trained help were caring for the patient, sixty-eight families were found to require the services of the District Nurses. The patients were visited once or twice daily, or oftener, as the needs of the patient demanded. Besides the actual care of the patient, the nurse instructed a member, or members, of the household just what to do and how to care for the patients between the times of her visits. We impressed on these the importance of isolating the patient, absolute cleanliness, and instructions were given how to properly disinfect the excreta, bed and body linen, and dishes used by the patient, etc., excreta, bed and body linen, and dishes used by the patient, etc., etc.

Many families having competent caretakers, but worn out by the long vigil, secured an occasional night's rest by the nurse remaining with the patient during this time. Seventeen families received such service. One family having seven patients (five of these were in a precarious condition and could not be removed to the hospital) required the entire attention of two nurses. Prior to the arrival of the nurses in the city the mother of this family died. The father being the only member escaping the disease, tried to be nurse and housemaid. The distress of this family and of many others who were found unable to secure the many extras incident to a siege of this kind—many of the afflicted ones were the wage-earners, others had been out of employment for a long time—prompted me to lay these facts before Mayor Rick and members of the Board of Health, suggesting that the Mayor call a meeting of the various church and charitable organizations, needlework guilds, etc., asking them to raise ways and means to meet the demands of the needy poor. With great promptness the Mayor called a meeting of the ladies from the various societies. These responded quickly and in a very substantial manner. Sufficient funds were raised at this meeting to purchase supplies, and a committee was appointed to take charge of the distribution of same under my direction. This work progressed in a very satisfactory manner. Through this system of relief ninety-six families were supplied with bed, bedding and wearing apparel. One hundred and ten patients received sick-room supplies, such as alcohol, hot-water bags, chloride of lime, etc., etc. These also received delicacies when convalescent and their families were supplied with general groceries. Fifty-six were supplied with coal, amounting to one hundred and twelve tons; twenty-seven supplied with milk, amounting to fifty-one quarts daily.

Each day found the committee at the post of duty and no delay was occasioned in filling the wants of the needy.

The epidemic occurring during the Christmas Holidays, many of the afflicted families with children to whom Christmas would have passed without any sign of a Holiday, found cheer through the generosity of some citizens. These subscribed to the amount of one hundred dollars. This amount was expended for toys, books, candies, etc. One hundred and seventy-six children were thus made happy. A merchant of the city tendered his wagon and a real Santa Claus to distribute the gifts. The B. P. O. E. supplied fowl to twenty-three families for Christmas dinner. Members of the Needlework Guild made all the garments distributed. The United Traction Company supplied the nurses with free transportation.

The total amount of money received by contribution toward the general relief fund amounted to $793.25; the total amount of money expended to cover expenses of same, $792.87. The one hundred dollars for toys was a separate item.

Letters of thanks were sent to those co-operating in the combatting of this epidemic. The nurses, through their indefatigable efforts, did much to relieve the suffering of those afflicted, and went about their work in a cheerful manner, always ready to respond to a call at any time. Besides the many duties of caring for the sick, they followed up the work of the Health Officer, kept check on the distribution of lime, reported condition of cesspools, and the general sanitary condition of premises. Milk supplies were carefully looked after. The total number of visits made by the nurses was fourteen hundred and forty-seven. Total number of baths given, seven hundred and twenty.

Respectfully submitted,

ALICE M. O'HALLORAN,
Nurse in charge.

OFFICE OF BOARD OF HEALTH.

Reading, Pa., December 1, 1908.

Dear Sir: You and your employees are hereby ordered to discontinue the delivery of milk in bottles or such containers as are again collected for use until otherwise ordered by the Board of Health.

SAMUEL G. DIXON,
Commissioner of Health.
WILLIAM RICK,
Mayor.
JOHN BECKER,
President Board of Health.

Direct inquiries to the Board of Health, City Hall.

OFFICE BOARD OF HEALTH.

Reading, Pa., December 1, 1908.

Dear Sir: Owing to the existence of typhoid fever in our city, you are hereby ordered to furnish to your employees for drinking purposes only such water as has been boiled for at least twenty minutes.

SAMUEL G. DIXON,
Commissioner of Health.
WILLIAM RICK,
Mayor.
JOHN BECKER,
President Board of Health.

Direct inquiries to the Board of Health, City Hall.

No.....

INSPECTION BLANK.

Street, ... No. .....
Occupied by .....
Owned by .....
Address .....
Connected to Sewer .....
Surface Closet.
Cesspool.
Condition—Empty.
Half Full.
Overflowing.
Offensive.
Condition of Alleys .....
....
No cases of Typhoid on premises.
Date, ...19

.....

Inspector.

DIST. NURSE CARD.

Street, ... No. ..... Householder .....
Name .....Age.....M. F. ....B. W.....M. S. W. D.....
Date .....Insp. Nurse .....
No. of rooms .....Cleanliness .....
No. of Boarders ..... No. of Children .....
Sep. Bed .....Sep. Room ..... Light.....
Nursed by .....Other cases in the family.....
Dates of onset ..... Circumstances of family .....
Do they have lime .....Chlor. Lime .....
Were discharges disinfected .....Are discharges disinfected .....
What disinfectant .....What strength .....
Stand in disinfectant solution, ..1 hr. .....½ hr. .....few min .....
How disposed of, ...Buried, ...sewer, ...privy,.....
Bed and body clothing disinfected .....What disinfectant .....
What strength .....Allowed to stand 1 hr. ½ hr. few min.
Are the eating utensils boiled .....How disinfected .....
Are milk and water boiled for 20 minutes .....
Does the nurse always disinfect her hands after handling the patient, bed or body clothing .....What disinfectant .....
What strength .....Are daily visits required .....
Needs of the family .....
Suspects .....Ill since .....Att. physician .....
Total number of visits .....
Total number of baths .....
Result .....

H. O. CENSUS CARD.

Name .....Address .....Age..M. F.....B. W..... M. S. W....

No. .....

School attended .....

Occupation ..... No. in family .....Where employed.....

Date of onset .....Date Dr's. first visit .....Dr's. name .....

Water supply: Regularly .....Occasionally .....

Milk supply: Regularly .....Occasionally .....

In bottles .....Individual containers .....

Ice: Regularly .....Occasionally .....

Dates and place of Picnics / Visits } During past 30 days .....

Uncooked vegetables used.. .....Washed with what water? .....

Was water cress eaten past 30 days? .....From whom secured? .....

Shellfish uncooked .....Where secured? .....

Soda water used? .....Where secured? .....

Is the house connected to a sewer? .....Outside privy? .....

Patient to be treated at home .... / Hospital } Have they or will they hire a trained nurse?

Are discharges disinfected? .....With what? .....What strength? .....

Are the discharges allowed to stand for one hour after disinfection? .....

What is done with the discharges? Sewer / Privy } .....

Is the bed and body clothing disinfected? .....With what? .....

In what strength? .....How long? .....

Are the eating utensils boiled? .....If not, how disinfected .....

Does the nurse or attendant always disinfect her hands after handling the patient, bed or body clothing? .....

How? .....In what strength? .....

If family is needy, state needs .....

Will the patient be allowed to go to a hospital? .....

Is lime provided? .....Are milk and water boiled for 20 minutes before using? .....Are there other cases in the house?.....

Dates of onset .....Dr's. name. .....

Placarded .....Circular left .....

Do they keep a cow? .....To whom is milk sold? .....

Name, ...

No. ....., ...

Dr..... .....

DATE	.....	Hour	T	P	R	ACTION	REMARKS
	A. M.						
	P M.						
	A. M.						
	P M.						
	A. M.						
	P M.						
	A. M.						
	P M.						
	A. M.						
	P M.						
	A. M.						
	P M.						

DIVISION OF VITAL STATISTICS.

WILMER R. BATT, M. D., *State Registrar.*

MORTALITY.

One hundred and twelve thousand two hundred and forty-six (112,246) deaths, exclusive of still-births, were registered during the calendar year. The death rate was 15.7 per 1,000 of population; a decrease of .8 in rate and of 3,723 in total deaths as compared with the previous year. When applied to the increased population of the State, this death rate represents a decrease of 5,519 deaths in 1908, as compared with 1907.

This rather remarkably low death rate in Pennsylvania was shared by other States composing the registration area of the United States, and indicates a prevailing absence of fatal epidemics, as well as an abatement of some of the ordinary causes of mortality throughout the country.

From the following table showing the death rates for the registration area, and for each of the individual States composing the same, it appears that the death rate for the entire area decreased 1.1 per 1,000 of population, between the years 1907 and 1908.

The rate for 1908, however, includes the States of Washington and Wisconsin, which were added to the registration area for that year, both of which have death rates considerably lower than the average for the registration area.

The average death rate for 1908 for the fifteen States included in the registration area in 1907, was 16.0.

COMPARISON OF DEATH RATES OF THE STATES COMPOSING THE REGISTRATION AREA FOR THE YEARS 1906, 1907, 1908.

	1906.	1907.	1908.
Average rate for registration states,	16.1	16.4	15.3
California,	17.4	18.6	18.4
Colorado,	15.9	17.6	17.0
Connecticut,	16.7	17.1	15.4
Indiana,	12.5	12.5	12.3
Maine,	16.2	16.6	16.0
Maryland,	15.7	16.1	15.5
Massachusetts,	16.6	17.5	16.5
Michigan,	14.3	13.9	13.8
New Hampshire,	17.3	17.1	16.3
New Jersey,	16.2	16.6	15.4
New York,	17.5	17.5	16.3
Pennsylvania,	16.5	16.5	15.7
Rhode Island,	17.5	18.0	16.2
South Dakota,	8.8	9.8	10.1
Vermont,	16.8	16.2	16.0
Washington,	----------	----------	14.8
Wisconsin,	----------	----------	11.6

DEATHS BY MONTHS AND QUARTERS WITH CORRESPONDING ANNUAL RATES PER 1,000 OF POPULATION.

	By Months.		By Quarters.	
	Deaths.	Rates.	Deaths.	Rates.
January,	11,620	19.2		
February,	10,639	18.7	32,737	18.4
March,	10,478	17.3		
April,	9,365	15.9		
May,	8,455	13.9	25,486	14.3
June,	7,666	13.1		
July,	9,534	15.8		
August,	9,708	16.0	28,241	15.7
September,	8,999	15.4		
October,	8,428	13.9		
November,	8,526	14.5	25,782	14.4
December,	8,828	14.6		

The month of January furnished the highest death rate, and in all of the months in the first quarter the rates exceeded those of 1907. In the remaining months the rates were all below the corresponding rates for the previous year with the exception of November, in which the rate was greater by .1.

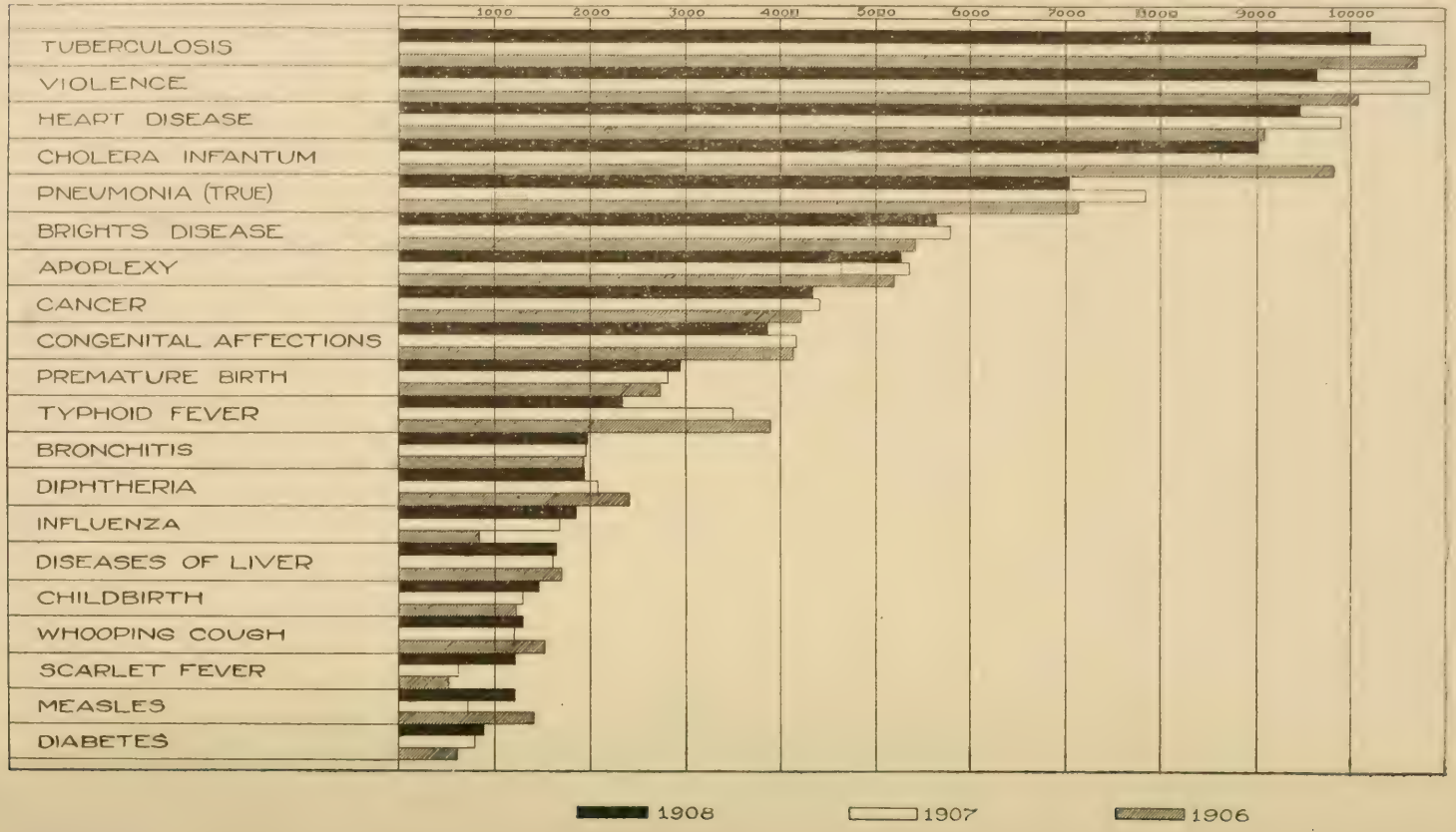
Of the total deaths, 60,861 occurred to males and 51,385 to females, giving a death rate per 1,000 of each sex of 16.8 for males and 14.6 for females.

The death rates of children under 15 years of age show a slight increase over 1907, while the rates at all subsequent age periods show a decrease. In like manner the percentage of deaths in each age period to the total at all ages shows a slight increase in the ages less than 15 years and a decrease at subsequent ages.

COMPARISON OF DEATH RATES AT CERTAIN AGE PERIODS FOR THE YEARS 1906–1908, INCLUSIVE.

Age Periods.	Death rates per 1,000 population at corresponding ages.		
	1906.	1907.	1908.
Under 5 years,	48.5	44.7	45.3
5 to 14 years,	3.3	3.0	3.1
15 to 24 years,	6.1	6.0	5.3
25 to 34 years,	7.0	7.9	7.0
35 to 44 years,	10.1	10.9	9.5
45 to 54 years,	14.8	15.6	14.9
55 to 64 years,	30.2	30.5	27.8
65 to 74 years,	54.4	63.5	58.7
75 to 84 years,	133.4	140.8	134.6
Over 85 years,	282.9	308.6	283.7

Diagram Showing the Comparative Mortality from Twenty Principal Causes of Death, by the Number of Decedents from Each Cause for the years 1906, 1907 and 1908.



DEATH BY SEX AND AGE PERIODS.

Ages.	Deaths.			Per Cent. of Deaths at each Age to Total at All Ages.			Proportional deaths of males to 100 females.
	Total.	Males.	Females.	Total.	Males.	Females.	
All ages,	112,246	60,861	51,385	100.0	100.0	100.0	118
Under 1 year,	26,643	14,939	11,704	23.7	24.6	22.8	128
1 to 2 years,	5,820	3,036	2,784	5.2	5.0	5.4	109
2 to 3 years,	2,502	1,303	1,199	2.2	2.1	2.4	108
3 to 4 years,	1,528	796	732	1.4	1.3	1.4	108
4 to 5 years,	1,065	562	503	.9	.9	.9	111
Total under 5 years,	37,558	20,636	16,922	33.4	33.9	32.9	122
5 to 9 years,	2,870	1,444	1,426	2.5	2.4	2.8	101
10 to 14 years,	1,741	898	843	1.6	1.5	1.7	106
15 to 19 years,	2,951	1,621	1,330	2.6	2.7	2.6	121
20 to 24 years,	4,234	2,320	1,914	3.8	3.7	3.8	121
25 to 29 years,	4,331	2,466	1,865	3.9	4.0	3.6	132
30 to 34 years,	4,202	2,377	1,825	3.8	3.7	3.6	130
35 to 39 years,	4,526	2,587	1,939	4.0	4.2	3.8	133
40 to 44 years,	4,227	2,491	1,736	3.8	4.0	3.4	143
45 to 49 years,	4,586	2,767	1,819	4.0	4.6	3.6	152
50 to 54 years,	4,771	2,706	2,065	4.2	4.5	4.0	131
55 to 59 years,	5,057	2,887	2,170	4.5	4.7	4.2	133
60 to 64 years,	5,875	3,202	2,675	5.2	5.3	5.2	120
65 to 69 years,	6,276	3,260	3,016	5.6	5.4	5.9	108
70 to 74 years,	6,307	3,197	3,110	5.6	5.3	5.9	102
75 to 79 years,	5,719	2,939	2,780	5.2	4.9	5.4	105
80 to 84 years,	4,176	1,931	2,245	3.8	3.2	4.3	86
85 to 89 years,	2,036	849	1,187	1.8	1.4	2.3	71
90 to 94 years,	636	230	406	.6	.4	.8	56
95 years and over,	162	49	113	.1	.09	.2	43

The death rate per 1,000 of native population was 14.7; of native males, 15.5 and of native females, 13.8.

The death rate per 1,000 of foreign population was 20.1; of foreign males, 21.2 and of foreign females, 19.8.

It would thus appear in comparison with the year 1907 that a reduction of the general death rate was influenced by the decrease of deaths among the foreign population, and particularly among foreign males. This would seem to be further borne out by a reference to the general tables in which it will be found that there is a decided reduction in deaths of males from violence, including those industrial accidents in which the foreign males are so frequently involved (mines, mills, quarries, railroad, etc.), as well as in those causes of death which are frequently influenced by male occupations through exposure, etc.

At the same time it must be remembered that the year 1908 was one of severe industrial depression throughout the State and that many males of foreign birth returned temporarily to their native homes. Therefore, there is a very strong probability that the foreign death rate based upon the estimated population appears lower than it really was. Just how much the status of foreign population was

disturbed by emigration during the year will not be ascertainable until the census of 1910. It will be noticed that the death rate of foreign females, whose number is much less likely to be affected by temporary emigration, remained practically the same as during the previous year.

Of the individual causes of death which show decided declines, the most prominent ones in addition to violence are typhoid fever, tuberculosis, diphtheria and pneumonia.

A comparison of the death rates for the several population groups with similar rates for the previous years (1906 and 1907), shows that there was a decrease in each of the nine groups, with the exception of group five (cities and boroughs of between 10,000 and 25,000 population), and group seven (boroughs of between 2,500 and 5,000 population).

It will be noted that during the years 1906 and 1907 Pittsburg appears in group two, and for the year 1908 in group one. This change became necessary through the increase in population arising from the consolidation with the city of Allegheny, which ceased to be a separate registration district on January 1, 1908.

In considering the general death rates for individual municipalities of comparatively small populations, it must be noted that the apparently high death rates in certain places are greatly augmented through deaths in hospitals and other institutions located within their limits whose inmates are recruited from a large surrounding territory, or perhaps, from the entire State. As an example, Norristown presents a high death rate, which is contributed to by the deaths in a large State Hospital for the Insane, and also by deaths in a Hospital which receives patients from quite a large area beyond its corporate and population limits.

For this reason, general death rates must be used with caution. It is hoped with the revised statistics, which should be available from the Federal Census of 1910, to present death rates for that year for all of our principal cities and boroughs which have been corrected so far as the deaths of non-residents are concerned, and also so far as distribution of population by sex, age periods and nativity may influence them.

DEATHS BY AGE PERIODS, 1906-1908.

	1906.	1907.	1908.
All ages,	114,435	115,969	112,264
Under 1 year	27,908	26,229	26,643
1 to 2 years,	6,125	5,527	5,820
2 to 3 years,	2,395	2,280	2,502
3 to 4 years,	1,463	1,379	1,528
4 to 5 years,	1,060	1,018	1,065
Total under 5 years,	38,951	36,433	37,558

DEATH BY AGE PERIODS.—Continued

	1906.	1907.	1908.
5 to 9 years,	2,916	2,710	2,870
10 to 14 years,	1,897	1,783	1,741
15 to 19 years,	3,402	3,249	2,951
20 to 24 years,	4,744	4,868	4,234
25 to 29 years,	4,779	4,887	4,331
30 to 34 years,	4,562	4,717	4,202
35 to 39 years,	4,771	4,997	4,526
40 to 44 years,	4,199	4,669	4,227
45 to 49 years,	4,457	4,751	4,586
50 to 54 years,	4,559	4,901	4,771
55 to 59 years,	4,911	5,263	5,057
60 to 64 years,	5,571	6,150	5,875
65 to 69 years,	6,026	6,510	6,276
70 to 74 years,	6,130	6,731	6,307
75 to 79 years,	5,602	5,933	5,719
80 to 84 years,	3,861	4,271	4,176
85 to 89 years,	1,972	2,199	2,036
90 to 94 years,	639	668	636
95 +	154	172	162
Unknown,	332	107	5

DEATH RATES FOR THE YEARS 1906, 1907 AND 1908, FOR CERTAIN CITIES AND BOROUGHS AND GROUPS OF POPULATION.

	1906.	1907.	1908.
Group 1:			
Cities over 500,000 population,	19.3	18.8	17.1
Philadelphia,	19.3	18.8	17.4
Pittsburg,	----------	----------	16.5
Group 2:			
Cities between 100,000 and 500,000,	18.8	18.1	16.5
Scranton,	16.5	16.9	16.5
Pittsburg,	19.9	19.2	----------
Group 3:			
Cities between 50,000 and 100,000,	14.7	15.8	15.2
Erie,	14.5	16.0	16.0
Harrisburg,	14.8	15.3	14.4
Reading,	14.5	15.3	14.4
Wilkes-Barre,	14.9	17.0	15.8
Group 4:			
Cities and boroughs between 25,000 and 50,000,	17.4	17.6	15.9
Allentown,	16.3	17.8	17.1
Altoona,	15.0	14.1	13.5
Chester,	15.5	15.2	15.3
Easton,	15.7	16.4	13.4
Johnstown,	16.9	16.1	16.0
Lancaster,	14.7	12.7	14.3
McKeesport,	19.9	19.7	16.2
New Castle,	13.8	14.6	12.3
Norristown,	25.6	26.1	24.4
Williamsport,	16.4	18.9	17.0
York,	14.8	16.1	14.4
Group 5:			
Cities and boroughs between 10,000 and 25,000,	15.7	15.4	15.6
Beaver Falls,	14.7	14.9	15.2
Braddock,	23.0	23.6	20.1
Bradford,	12.4	10.9	10.9
Butler,	22.2	23.1	19.8
Carbondale,	19.8	17.5	16.9
Carlisle,	12.8	15.5	14.2
Columbia,	11.6	11.8	11.1
DuBois,	13.7	13.0	11.1
Dunsmore,	17.0	14.0	15.9

DEATH RATES FOR THE YEARS 1906, 1907 AND 1908, FOR CERTAIN CITIES AND BOROUGHS AND GROUPS OF POPULATION.—Continued.

	1906.	1907.	1908.
Group 5—Continued:			
Duquesne,	23.0	19.1	16.2
Hazleton,	13.5	12.1	11.0
Homestead,	19.2	19.0	15.2
Lebanon,	15.7	14.0	13.6
Mahanoy City,	20.3	15.6	18.4
Meadville,	13.2	18.2	15.9
Mt. Carmel,	12.8	15.1	13.5
Nanticoke,	18.8	16.6	20.8
Oil City,	12.0	11.6	12.8
Pittston,	20.0	18.9	22.0
Plymouth,	15.4	15.0	15.2
Pottstown,	16.3	17.8	15.0
Pottsville,	19.0	21.7	21.3
Shamokin,	14.1	12.0	12.3
Sharon,	18.6	24.8	17.3
Shenandoah,	24.3	19.7	20.1
South Bethlehem,	19.1	19.1	16.7
Steelton,	18.0	18.6	13.3
Sunbury,	15.1	13.7	13.6
Warren,	11.4	9.9	10.3
West Chester,	21.0	23.4	22.0
Wilkinsburg,	14.3	12.9	12.7
Group 6:			
Cities and boroughs between 5,000 and 10,000,	17.7	17.2	16.7
Archbald,	16.4	18.1	18.0
Ashland,	14.0	14.6	14.0
Bangor,	14.0	11.3	12.4
Bethlehem,	19.0	15.5	13.0
Bloomsburg,	13.2	14.3	12.3
Bristol,	15.3	16.6	16.0
Carnegie,	24.0	18.0	16.7
Chambersburg,	17.6	14.6	19.3
Charleroi,	25.0	16.0	16.0
Clearfield,	12.0	15.7	12.1
Coatesville,	27.3	24.9	20.8
Connellsville,	22.1	19.5	15.3
Conshohocken,	18.2	17.5	17.1
Corry,	17.8	16.0	18.0
Danville,	14.2	17.3	13.9
Dickson City,	17.7	20.0	27.0
Duryea,			22.5
Edwardsville,	20.0	22.0	20.0
Etna,	15.7	15.8	14.2
Forest City,	16.3	17.0	15.5
Franklin,	16.0	13.2	15.0
Freeland,	10.0	10.0	13.1
Greensburg,	29.6	21.6	21.1
Greenville,	13.2	15.2	13.2
Hanover,	17.9	13.9	11.8
Huntingdon,	16.1	14.6	12.5
Indiana,	14.7	13.3	12.1
Jeannette,	12.5	10.6	13.7
Johnsonburg,	10.2	9.0	8.5
Kane,	12.8	13.7	12.0
Lansford,	20.3	19.0	20.0
Latrobe,	17.0	24.6	19.8
Lehighton,	11.9	9.3	12.5
Lewistown,	25.6	21.8	17.6
Lock Haven,	18.1	17.0	18.0
McKees Rocks,	29.3	24.0	20.8
Middletown,	13.6	14.6	13.8
Millvale,	17.2	11.9	11.6
Milton,	13.0	13.8	11.6
Minersville,	16.2	18.0	17.6
Monongahela,	16.8	18.3	18.5
Mt. Pleasant,	18.8	24.2	18.6
New Brighton,	15.9	17.2	15.5
North Braddock,	38.2	25.8	23.7
Old Forge,	25.0	31.2	30.0
Olyphant,	14.4	14.3	16.0
Phoenixville,	20.0	20.3	18.6
Punxsutawney,	23.8	14.9	17.6
Rochester,	25.2	23.3	17.5
Saint Clair,	24.5	18.2	16.9
Saint Marys,	10.3	11.4	10.0

DEATH RATES FOR THE YEARS 1906, 1907 AND 1908, FOR CERTAIN CITIES AND BOROUGHS AND GROUPS OF POPULATION.—Continued.

	1906.	1907.	1908.
Group 6—Continued:			
Sayre,	22.8	23.8	23.4
Scottdale,	11.1	13.1	9.0
Sharpsburg,	13.4	14.1	10.8
Tamaqua,	13.6	13.8	15.5
Tarentum,	15.2	17.6	13.7
Titusville,	13.6	14.8	14.8
Tyrone,	11.0	14.1	16.2
Uniontown,	29.4	30.4	28.9
Washington,	27.1	21.2	20.4
Waynesboro,	14.1	16.5	12.1
West Pittston,	11.2	11.8	16.0
Wilmerding,	15.2	14.0	12.4
Windber,			22.5
Group 7:			
All cities and boroughs between 2,500 and 5,000,	14.1	11.8	14.7
Group 8:			
All boroughs under 2,500,	20.1	20.0	18.0
Group 9:			
All rural districts,	13.2	14.4	13.4

TYPHOID FEVER.

Two thousand four hundred and fifty (2,450) deaths from this cause occurred during the year, a decrease of 1,088 as compared with 1907. The death rate per 100,000 of population fell from 50.3 to 34.3 during the same period.

The average rate of the registration States declined 4.7 between 1907 and 1908, and among the individual States 7 show increased and 8 decreased rates.

The total decline in the average rate for the three year period for the registration area was 7.2 and in Pennsylvania 22.2.

By reference to the morbidity statistics it will be noted that 15,157 cases of typhoid fever were reported during the year; the case rate mortality, therefore, was 15.5 per cent.

Pennsylvania's past record so far as typhoid fever is concerned has been admittedly bad, not only spasmodically bad, as illustrated by Plymouth, Butler, Scranton and numerous other smaller epidemics, but consistently and constantly bad.

In view of this fact the greatly decreasing death rate is a subject for congratulation to the people of the State.

The actual decrease in point of numbers does not truly represent the saving of life. While the deaths from typhoid fever were actually 1,088 less in 1908 than in 1907, had the death rate of 1907 existed in

1908, there would have been 3,590 deaths in place of 2,450, and likewise, if the death rate of only two years ago had prevailed, there would have been 4,029 deaths.

The same rule applies, of course, to other diseases and indicates the necessity of applying past and present death rates to the increased population in estimating the actual reduction in given causes.

A comparison of the death rates from typhoid fever per 100,000 of population for the States composing the registration area for the years 1906, 1907 and 1908 is as follows:

	1906.	1907.	1908.
Average rate,	31.6	29.1	24.4
California,	39.6	32.5	31.4
Colorado,	56.0	63.7	47.4
Connecticut,	22.1	20.5	18.5
Indiana,	35.9	34.6	32.7
Maine,	18.5	17.7	20.8
Maryland,	40.5	40.3	38.9
Massachusetts,	16.1	12.9	16.7
Michigan,	27.8	22.7	25.9
New Hampshire,	21.0	11.9	18.9
New Jersey,	16.8	18.9	14.9
New York,	19.3	20.3	16.4
Pennsylvania,	56.5	50.3	34.3
Rhode Island,	16.5	11.0	12.9
South Dakota,	21.0	19.5	20.1
Vermont,	19.4	10.8	19,3
Washington,			44.2
Wisconsin,			13.9

The following table shows the percentage of cases and deaths to total cases and deaths according to months for the years 1906, 1907 and 1908:

	Percentage of Cases.			Percentage of Deaths.		
	1906.	1907.	1908.	1906.	1907.	1908.
January,	8.9	15.4	10.9	9.3	13.4	11.8
February,	9.4	10.9	7.9	8.4	10.5	10.4
March,	7.7	5.8	6.4	7.9	8.3	8.8
April,	8.8	5.6	5.5	10.0	6.8	7.7
May,	7.6	4.9	3.8	8.8	6.7	5.3
June,	4.9	5.2	4.1	5.1	5.0	4.1
July,	5.6	5.3	6.5	5.7	5.0	5.2
August,	8.3	9.2	11.2	7.8	7.5	9.4
September,	9.6	9.7	15.7	8.9	10.5	11.9
October,	9.8	10.5	11.2	9.4	9.8	9.7
November,	7.8	9.7	9.3	8.7	8.3	7.7
December,	11.6	7.8	7.5	10.0	8.2	8.0

The diagram showing the deaths from typhoid fever by months in comparison with the preceding two years will illustrate the very general and uniform decline of this disease throughout the State, and at the same time indicate the continued tendency of the disease to increase in the late summer and early autumnal months.

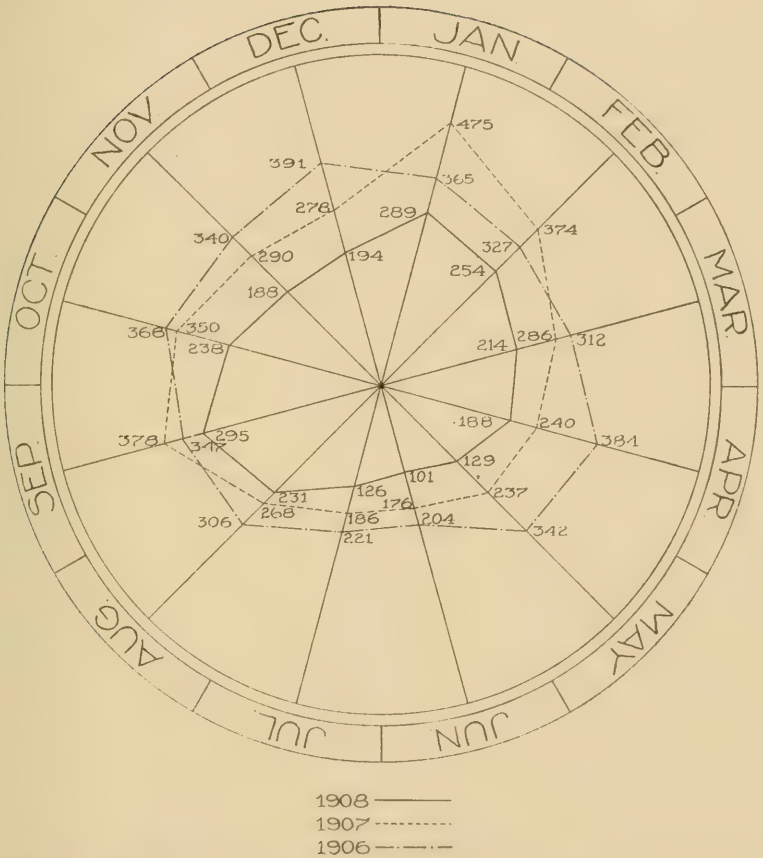


Diagram Showing the Comparative Mortality from Typhoid Fever by the number of Decedents for Each Month for the Years 1906, 1907 and 1908.

The chart further shows by the absence of any sudden variations that no localized epidemics occurred during the year.

In the following table the deaths by age periods for 1908, in comparison with the preceding two years, show a decrease in every quinquennial period up to the eightieth year.

The table also shows the tendency of this disease to attack those in early adult life, reaping its greatest harvest of deaths between the ages of 15 and 35 years.

DEATHS FROM TYPHOID FEVER BY SEX AND AGE PERIODS FOR THE YEARS 1906-1908, INCLUSIVE.

	1906.	1907.	1908.
Total at all ages,	3,917	3,538	2,450
Males,	2,393	2,152	1,449
Females,	1,524	1,386	1,001
Under 1 year,	16	17	8
1 to 2 years,	38	19	28
2 to 3 years,	38	30	31
3 to 4 years,	44	42	37
4 to 5 years,	43	34	30
Total under 5 years,	179	142	134
5 to 9 years,	234	155	148
10 to 14 years,	255	221	158
15 to 19 years,	545	515	348
20 to 24 years,	767	663	406
25 to 29 years,	559	524	328
30 to 34 years,	377	355	256
35 to 39 years,	294	291	172
40 to 44 years,	210	187	114
45 to 49 years,	137	154	116
50 to 54 years,	120	113	99
55 to 59 years,	110	80	65
60 to 64 years,	55	51	51
65 to 69 years,	38	40	25
70 to 74 years,	29	30	16
75 to 79 years,	13	13	10
80 to 84 years,	5	3	5
85 +	2	0	2

The cities and boroughs with populations exceeding 5,000 in which the death rate exceeded the State rate are as follows:

Altoona,	56.2	Phoenixville,	102.7
Braddock,	98.0	Pittsburg,	46.6
Butler,	55.8	Plymouth,	41.0
Carbondale,	45.3	Pottstown,	78.4
Chambersburg,	40.6	Pottsville,	58.9
Charleroi,	67.0	Reading,	52.5
Coatesville,	84.5	Ridgway,	152.1
Danville,	37.1	Rochester,	109.1
Erie,	62.5	Royersford,	153.1
Greensburg,	181.8	Sharon,	244.4
Harrisburg,	52.1	Steelton,	69.0
Johnstown,	87.8	St. Marys,	66.6
McKeesport,	86.5	Uniontown,	233.3
Meadville,	41.9	Washington,	200.0
New Castle,	67.2	West Chester,	121.2
Norristown,	45.4	Wilkinsburg,	41.9
Oil City,	46.3	Williamsport,	46.6
Philadelphia,	35.5		

DIPHTHERIA.

One thousand nine hundred and seventy (1,970) deaths occurred from this cause. The death rate per 100,000 of population was 27.6, a decrease of 168 in number of deaths and of 2.8 in the death rate as compared with the previous year.

The average death rates from this disease show a continued decrease in the registration area, although the rates in several of the States are slightly higher in 1908 than in the preceding year.

As an evidence of the efficiency of antitoxin, to the use of which during the past fifteen years the reduction in the death rate of diphtheria is very largely due, it is well to recall that in 1890 in the registration area of the United States the death rate per 100,000 of population was 97.8, and that this rate applied to Pennsylvania for the year 1908 would have given 6,980 deaths in place of the 1,970 which did occur.

A comparison of the death rates from diphtheria per 100,000 of population for the States composing the registration area for the years 1906, 1907 and 1908 is as follows:

	1906.	1907.	1908.
Average rate,	26.9	25.0	22.9
California,	14.3	22.3	22.4
Colorado,	15.1	21.5	28.4
Connecticut,	27.4	24.9	19.3
Indiana,	14.9	12.7	11.7
Maine,	16.2	16.7	14.1
Maryland,	25.7	15.3	13.7
Massachusetts,	25.4	24.9	24.3
Michigan,	18.1	15.9	13.1
New Hampshire,	21.0	22.2	24.3
New Jersey,	31.0	30.8	23.4
New York,	32.7	30.5	28.3
Pennsylvania,	35.2	30.4	27.6
Rhode Island,	25.7	24.8	29.5
South Dakota,	12.2	16.8	21.8
Vermont,	19.7	10.5	11.3
Washington,	----	----	35.4
Wisconsin,	----	----	17.9

DEATHS FROM DIPHTHERIA BY MONTHS.

	1906.	1907.	1908.
Total,	2,438	2,138	1,970
January,	266	259	221
February,	213	165	207
March,	205	145	173
April,	159	139	135
May,	157	125	92
June,	85	99	95
July,	89	82	84
August,	116	118	108
September,	210	167	154
October,	318	267	225
November,	308	276	242
December,	312	256	246

The percentage of deaths to reported cases, or the case rate mortality by months, shows but a slight variation in the malignancy of the disease at different seasons of the year, the rates for May and June, two of the lowest months in point of deaths, being directly comparable with November and December, the two highest months. The first quarter of the year, however, shows an average rate rather higher than any other quarter:

CASE RATE MORTALITY BY MONTHS.

	1906.	1907.	1908.
Average,	22.4	20.3	15.7
January,	25.5	23.6	20.2
February,	24.0	20.0	21.7
March,	23.9	18.8	17.1
April,	22.6	18.8	20.1
May,	22.1	21.7	13.7
June,	15.4	17.9	15.5
July,	20.3	17.3	13.5
August,	27.3	19.8	18.3
September,	21.1	20.9	13.7
October,	20.0	20.7	12.1
November,	21.1	18.7	13.9
December,	25.6	19.6	15.6

The following table shows that while 95.3 per cent. of all deaths occur under 15 years of age, no single quinquennial age period from birth to 75 years is free from this cause of mortality.

DEATHS FROM DIPHTHERIA BY SEX AND AGE PERIODS, 1906-1908, INCLUSIVE.

	1906.	1907.	1908.
Total at all ages,	2,438	2,138	1,970
Males,	1,214	1,115	999
Females,	1,224	1,023	971
Under 1 year,	173	170	168
1 to 2 years,	373	351	322
2 to 3 years,	363	337	306
3 to 4 years,	319	267	264
4 to 5 years,	303	248	214
Total under 5 years,	1,531	1,373	1,274
5 to 9 years,	648	529	500
10 to 14 years,	144	119	103
15 to 19 years,	44	48	28
20 to 24 years,	18	22	21
25 to 29 years,	15	11	9
30 to 34 years,	14	8	11
35 to 39 years,	8	6	5
40 to 44 years,	3	4	5
45 to 49 years,	4	2	2
50 to 54 years,	2	5	2
55 to 59 years,	0	2	6
60 to 64 years,	0	2	1
65 to 69 years,	4	3	1
70 to 74 years,	2	2	1
75 +	1	2	1

SCARLET FEVER.

Deaths from scarlet fever numbered 1,217, an increase of 560 as compared with the previous year. The death rate per 100,000 of population increased from 9.3 in 1907 to 17.1. During the same period the death rate in the registration area increased from 9.6 to 13.0. This increase was most noticeable in the contiguous registration States of New York, New Jersey and Pennsylvania, in which the rates are rather closely approximated, indicating the presence of this disease in an epidemic form over that territory.

The case rate mortality in 1908 was 8.4.

A comparison of the death rates from scarlet fever per 100,000 of population for the States composing the registration area for the years 1906, 1907 and 1908 is as follows:

	1906.	1907.	1908.
Average rate,	7.5	9.6	13.0
California,	3.2	4.4	6.3
Colorado,	16.2	36.5	28.2
Connecticut,	5.8	6.5	6.0
Indiana,	4.1	3.6	3.4
Maine,	0.7	2.0	2.4
Maryland,	6.0	2.3	7.4
Massachusetts,	4.7	10.1	12.4
Michigan,	9.0	6.5	7.4
New Hampshire,	3.5	2.1	1.4
New Jersey,	9.5	13.9	18.6
New York,	9.2	12.9	20.5
Pennsylvania,	8.3	9.3	17.1
Rhode Island	16.3	28.4	7.0
South Dakota,	4.7	4.2	8.2
Vermont,	2.9	2.3	2.3
Washington,			5.6
Wisconsin,			5.7

DEATHS FROM SCARLET FEVER BY SEX AND AGE PERIODS FOR THE YEARS 1906 TO 1908, INCLUSIVE.

	1906.	1907.	1908.
Total at all ages,	577	657	1,217
Males,	270	326	621
Females,	307	331	596
Under 1 year,	43	26	62
1 to 2 years,	69	50	154
2 to 3 years,	90	100	191
3 to 4 years,	92	89	170
4 to 5 years,	62	79	130
Total under 5 years,	356	394	707
5 to 9 years,	171	192	349
10 to 14 years,	23	38	80
15 to 19 years,	11	11	29
20 to 24 years,	5	10	25
25 to 29 years,	5	5	14
30 to 34 years,	4	3	7
Over 35 years,	1	4	6
Unknown,	1	0	0

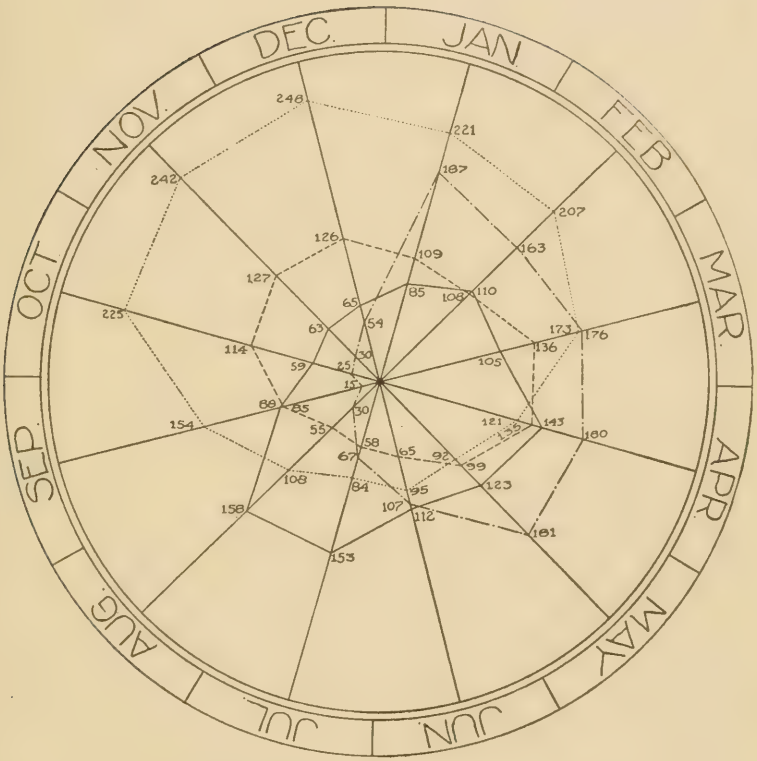


Diagram Showing the Comparative Mortality from Diphtheria, Whoopingcough, Scarlet Fever and Measles by the Number of Decedents from Each Cause by Months.

DEATHS FROM SCARLET FEVER BY MONTHS FOR THE YEARS 1906 TO 1908, INCLUSIVE.

	1906.	1907.	1908.
Total,	577	657	1,217
January,	51	65	109
February,	62	63	108
March,	59	57	136
April,	67	40	135
May,	72	39	99
June,	32	42	65
July,	38	29	58
August,	28	41	55
September,	34	52	85
October,	33	63	114
November,	53	77	127
December,	48	89	126

MEASLES.

Deaths from measles numbered 1,215, an increase of 501 as compared with 1907. The death rate per 100,000 of population was 17.0, an increase of 7.2. The death rate increased in the registration area 1.1 during the same period. The extent to which this disease prevailed during the year may be partially understood by reference to the morbidity tables, from which it will be noted that 37,981 cases of this disease were reported to the Department of Health during the year. As large as this number was, it is very probable that many cases were unreported owing to the slight regard in which the disease is held by many parents who do not employ skilled medical attention in its treatment.

A comparison of the death rates from measles per 100,000 of population for the States comprising the registration area for the years 1906, 1907 and 1908 is as follows:

	1906.	1907.	1908.
Average rate,	13.2	9.9	11.0
California,	10.1	10.9	5.2
Colorado,	3.4	30.7	10.4
Connecticut,	15.3	6.8	8.1
Indiana,	2.8	8.2	7.4
Maine,	15.2	4.5	3.1
Maryland,	5.6	10.5	6.0
Massachusetts,	11.0	8.7	15.5
Michigan,	9.9	9.4	4.5
New Hampshire,	3.7	4.6	4.1
New Jersey,	10.2	6.6	8.1
New York,	15.3	11.6	13.6
Pennsylvania,	21.1	10.2	17.0
Rhode Island,	24.9	6.2	15.9
South Dakota,	5.6	11.3	21.1
Vermont,	8.8	2.6	2.6
Washington,	----------	----------	3.4
Wisconsin,	----------	----------	4.1

DEATHS FROM MEASLES BY SEX AND AGE PERIODS, 1906 TO 1908, INCLUSIVE.

	1906.	1907.	1908.
Total at all ages,	1,463	743	1,215
Males,	785	380	640
Females,	678	334	575
Under 1 year,	366	206	291
1 to 2 years,	478	231	411
2 to 3 years,	210	112	179
3 to 4 years,	116	48	103
4 to 5 years,	70	31	64
Total under 5 years,	1,240	628	1,048
5 to 9 years,	129	51	116
10 to 14 years,	28	9	19
15 to 19 years,	19	4	8
20 to 24 years,	16	8	4
25 to 29 years,	5	2	1
30 to 34 years,	4	2	8
35 to 39 years,	7	3	5
40 to 44 years,	3	2	3
45 to 49 years,	4	4	1
Over 50 years,	5	1	2

WHOOPINGCOUGH.

Deaths from this disease numbered 1,264, a decrease of 23 as compared with 1907. The death rate per 100,000 of population decreased .6 during the same period.

The death rate in the registration area of States declined from 11.7 in 1907 to 11.1 in 1908. The greatest number of deaths occurred during the summer months, as in the previous years; 53.7 per cent. of all deaths from this cause occurred to children under one year of age and 95.8 per cent. to children under five years of age.

A comparison of the death rates from whooping cough per 100,000 of population for the States composing the registration area for the years 1906, 1907 and 1908 is as follows:

	1906.	1907.	1908.
Average rate,	16.5	11.7	11.1
California,	5.9	8.4	7.8
Colorado,	15.3	7.8	22.3
Connecticut,	20.9	12.9	8.1
Indiana,	12.0	5.9	15.0
Maine,	13.6	9.9	10.3
Maryland,	30.2	11.0	10.3
Massachusetts,	23.1	11.1	13.2
Michigan,	17.8	8.2	11.0
New Hampshire,	19.0	15.1	9.3
New Jersey,	16.7	10.6	10.3
New York,	9.9	9.1	6.0
Pennsylvania,	22.4	18.3	17.7
Rhode Island,	19.0	17.0	6.3
South Dakota,	19.3	28.7	8.6
Vermont,	6.6	14.8	13.0
Washington,	----------	----------	4.0
Wisconsin,	----------	----------	8.3

DEATHS FROM WHOOPINGCOUGH BY SEX AND AGE PERIODS FOR 1906 TO 1908, INCLUSIVE.

	1906.	1907.	1908.
Total at all ages,	1,550	1,287	1,264
Males,	679	612	532
Females,	871	675	732
Under 1 year,	881	731	679
1 to 2 years,	251	338	312
2 to 3 years,	135	114	122
3 to 4 years,	83	52	77
4 to 5 years,	58	25	32
Total under 5 years,	1,491	1,260	1,222
5 to 9 years,	51	20	37
Over 10 years,	6	7	5

TUBERCULOSIS.

Ten thousand two hundred and eleven (10,211) deaths occurred from tuberculosis in all forms during the year, a decrease of 614 as compared with the previous year. All of this decrease is to be found in the deaths from tuberculosis of the lungs, which numbered 8,703, while deaths from tuberculosis of other organs remained exactly the same as in the previous year, 1,508.

The forms of tuberculosis represented with the percentage in each group to total deaths from this cause are as follows:

	Deaths.	Per Cent.
Tuberculosis of lungs,	8,703	85.2
Tuberculosis of larynx,	102	1.0
Tuberculous meningitis	513	5.0
Abdominal tuberculosis,	394	3.8
Potts disease,	110	1.1
Tuberculous abscess,	16	0.1
White swelling,	54	0.5
Tuberculosis of other organs,	117	1.3
General tuberculosis,	202	2.0

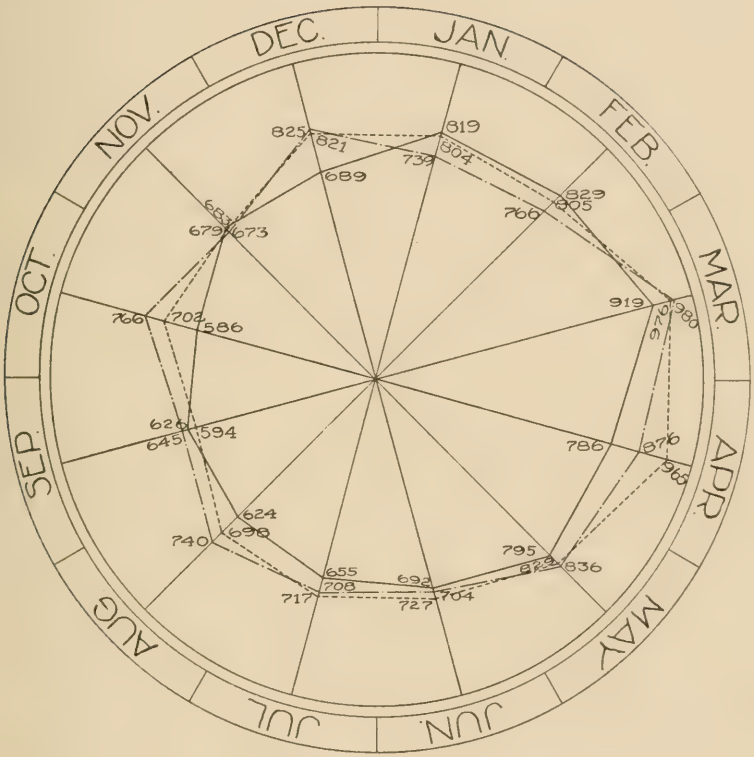
The death rate per 100,000 of population from tuberculosis in all forms was 143.6, and of tuberculosis of the lungs 121.9, a decrease of 10.3 for the former and of 10.5 for the latter.

A comparison of the death rates from tuberculosis of the lungs per 100,000 of population for the States composing the registration area for the years 1906, 1907 and 1908 is as follows:

	1906.	1907.	1908.
Average rate,	155.4	155.1	144.7
California,	231.5	244.1	235.2
Colorado,	252.9	267.7	279.3
Connecticut,	136.5	149.8	134.5
Indiana,	141.2	140.2	136.6
Maine,	131.8	134.3	121.7
Maryland,	180.6	177.7	173.9
Massachusetts,	155.6	157.5	145.4
Michigan,	90.1	88.7	85.0
New Hampshire,	129.2	111.2	109.4
New Jersey,	171.1	170.6	160.2
New York,	175.3	171.6	167.8
Pennsylvania,	133.6	132.4	121.9
Rhode Island,	166.2	163.6	170.6
South Dakota,	83.9	86.2	88.0
Vermont,	113.6	107.0	108.0
Washington,	----------	----------	134.7
Wisconsin,	----------	----------	92.7

DEATHS FROM TUBERCULOSIS OF THE LUNGS BY SEX AND AGE PERIODS FOR THE YEARS 1906-1908, INCLUSIVE.

	1906.	1907.	1908.
Total at all ages,	9,258	9,317	8,703
Males,	4,786	4,896	4,691
Females,	4,472	4,421	4,012
Under 1 year of age,	212	239	167
1 to 2 years,	103	96	92
2 to 3 years,	56	51	54
3 to 4 years,	29	36	31
4 to 5 years,	27	23	25
Total under 5 years,	427	445	369
5 to 9 years,	89	92	88
10 to 14 years,	166	174	141
15 to 19 years,	784	679	617
20 to 24 years,	1,207	1,207	1,158
25 to 29 years,	1,249	1,175	1,165
30 to 34 years,	1,129	1,112	1,055
35 to 39 years,	1,035	1,014	965
40 to 44 years,	732	791	766
45 to 49 years,	617	552	632
50 to 54 years,	473	516	496
55 to 59 years,	404	408	365
60 to 64 years,	319	383	297
65 to 69 years,	243	261	250
70 to 74 years,	194	213	171
75 to 79 years,	118	133	109
80 to 84 years,	33	39	40
Over 85 years,	14	16	18
Unknown age,	25	7	1



1906 —·—·—
1907 ----------
1908 ———

Diagram Showing the Comparative Mortality from Tuberculosis of the Lungs by the Number of Decedents by Months for the years 1906, 1907 and 1908.

DEATHS FROM TUBERCULOSIS OF THE LUNGS BY MONTHS FOR THE YEARS 1906-1908 INCLUSIVE.

	1906.	1907.	1908.
Total for the year,	9,258	9,317	8,703
January,	739	804	819
February,	766	805	829
March,	980	976	919
April,	876	965	786
May,	836	829	795
June,	704	727	692
July,	708	717	655
August,	740	698	624
September,	645	594	626
October,	766	702	586
November,	673	679	683
December,	825	821	684

MORTALITY OF TUBERCULOSIS OF THE LUNGS IN REFERENCE TO OCCUPATION.

In the annual report for 1907, death rates were given for certain occupations and groups of occupations based upon the number of persons employed in each class. Without repeating this table for 1908, which differs but slightly from the table for 1907, it may be interesting to consider this cause of mortality in reference to age and the relative importance of certain occupations in connection therewith.

For this purpose the following data are extracted from the Mortality Statistics of the United States Census Office, and cover deaths from tuberculosis of the lungs throughout the registration area comprising 51.8 per cent. of the entire population of the United States. As evidence that the statistics derived from this source are comparable to Pennsylvania it should be realized that 16.2 per cent., or practically one-sixth of all deaths in the registration area upon which the data are based are contributed by this State.

The economic value of lives lost through tuberculosis of the lungs may be better appreciated when it is considered that 66 per cent. of all deaths from this disease occur between the ages of 25 and 64 years, and that this is the period of life most valuable to the individual and the State. The average age at death from tuberculosis of the lungs was 35.5 years.

Deaths of males from all causes and at all ages in the registration area numbered 375,497, and of these 196,207 or 52.3 per cent., were stated to have a gainful occupation. Deaths of males from tuberculosis of the lungs at all ages numbered 38,055, and of these 29,433, or

77.3 per cent., were stated to have gainful occupations, thus 15.0 per cent. of the deaths of occupied males at all ages were due to tuberculosis of the lungs. Between the age periods, 25-34, the deaths of male wage earners numbered 27,336, and of this number 8,446, or 30.9 per cent. (almost one death in every three), was due to tuberculosis of the lungs.

Between the age periods, 35 to 44, the total deaths of male wage earners numbered 30,632, and of this number 7,453, or 24.3 per cent. (one in every four), was due to tuberculosis of the lungs.

Between the age periods, 45 to 54, the rate was 14.4 per cent., and between 55 and 64 the rate was 7.6 per cent.

From these facts it would seem apparent that the mortality from tuberculosis of the lungs decreases rapidly with advancing years, as the total deaths from all causes increase, while those from tuberculosis decline, thus reducing the proportional deaths from the latter cause. It must be recalled, however, that deaths from other causes than tuberculosis assume a growing importance in the advanced age periods and at the same time the actual population at similar periods decreases.

Thus it will be clearly shown by the following statistics that although the percentage of deaths from tuberculosis to total deaths in the several age periods declines rapidly, the death rate per 100,000 of population living at the several ages remains relatively stationary.

	Total.	25 to 34 Years.	35 to 44 Years.	45 to 54 Years.	55 to 64 Years.
Male population of the United States (1900), over 10 years of age (Registration States),	6,937,288	1,541,280	1,238,393	841,800	538,704
Deaths from tuberculosis,	15,690	4,616	3,507	2,164	1,330
Per cent. of deaths from tuberculosis to total deaths,	100.0	29.4	22.4	13.8	8.5
Death rate from tuberculosis per 100,000 of population at the several age periods,	226.2	299.5	283.2	257.1	246.9

Among females, the proportion engaged in gainful occupations is naturally much smaller than among males, and the earlier age period, 15 to 24, plays a more conspicuous part. During 1908 there were in the registration area 316,077 deaths of females, and of this number 26,065, or only 8.3 per cent., were returned as wage earners. Of the total deaths, 29,321 were due to tuberculosis of the lungs, and of this number 5,511, or 18.8, were assigned gainful occupations.

The following table, while disregarding entirely any consideration of the total number of persons employed in the several groups and occupations, nevertheless shows some extremely interesting and important facts.

Thus we find that of all male bookkeepers, clerks and copyists dying between the ages, 25 and 34 years, 41.9 per cent. die of tuberculosis of the lungs, and similarly that among barbers and hairdressers the proportion is 40.1 per cent., among servants 40.9 per cent., and among boot and shoemakers 44.1 per cent. These figures are important as illustrating the position occupied by tuberculosis of the lungs as a mortality factor at certain ages and in certain occupations as compared with all other causes of death.

Table showing the number and percentage of deaths from tuberculosis of the lungs of males at least 10 years of age engaged in gainful occupations as compared with deaths from all causes at corresponding ages and similar rates for certain age groups, 25 to 65 years, in certain specified occupations. (Registration area).

Occupations and Ages.	Number of deaths, tuberculosis of the lungs.	Per cent. to all causes.
ALL OCCUPATIONS, Total,	29,433	15.0
10 to 14 years,	10	4.7
15 to 19 years,	1,159	21.3
20 to 24 years,	3,586	29.9
25 to 34 years,	8,446	30.9
35 to 44 years,	7,453	24.3
45 to 54 years,	4,770	14.4
55 to 64 years,	2,524	7.6
65 years and over,	1,458	2.7
Unknown,	27	8.2
PROFESSIONAL SERVICE GROUP—		
25 to 34 years,	325	31.8
35 to 44 years,	216	19.3
45 to 54 years,	130	10.5
55 to 64 years,	52	3.9
Clergymen—		
25 to 34 years,	18	36.0
35 to 44 years,	26	23.9
45 to 54 years,	25	15.1
55 to 64 years,	7	2.9
Engineers and Surveyors—		
25 to 34 years,	113	32.3
35 to 44 years,	51	23.0
45 to 54 years,	15	8.5
55 to 64 years,	4	3.8
Lawyers—		
25 to 34 years,	29	28.4
35 to 44 years,	19	13.7
45 to 54 years,	23	10.4
55 to 64 years,	9	3.5
Physicians and Surgeons—		
25 to 34 years,	31	28.7
35 to 44 years,	23	11.6
45 to 54 years,	11	4.7
55 to 64 years,	14	4.9

Occupations and Ages.	Number of deaths, tuberculosis of the lungs.	Per cent. to all causes.
CLERICAL AND OFFICIAL GROUP—		
25 to 34 years,	1,025	40.4
35 to 44 years,	545	26.3
45 to 54 years,	269	12.9
55 to 64 years,	115	5.3
Bookkeepers, Clerks and Copyists—		
25 to 34 years,	877	41.9
35 to 44 years,	433	29.6
45 to 54 years,	193	16.5
55 to 64 years,	76	6.9
Bankers, Brokers and Officials of Companies—		
25 to 34 years,	20	24.4
35 to 44 years,	18	13.4
45 to 54 years,	21	10.5
55 to 64 years,	9	3.5
Collectors, Auctioneers and Agents—		
25 to 34 years,	76	31.5
35 to 44 years,	66	19.8
45 to 54 years,	40	7.5
55 to 64 years,	21	3.6
MERCANTILE AND TRADING GROUP—		
25 to 34 years,	563	34.4
35 to 44 years,	512	22.3
45 to 54 years,	321	11.6
55 to 64 years,	155	5.6
Merchants and Dealers—		
25 to 34 years,	187	30.7
35 to 44 years,	186	17.5
45 to 54 years,	156	9.9
55 to 64 years,	83	4.7
PUBLIC ENTERTAINMENT GROUP—		
25 to 34 years,	212	32.8
35 to 44 years,	226	21.8
45 to 54 years,	97	11.7
55 to 64 years,	32	6.6
Saloon-keepers, Liquor Dealers, Bartenders and Restaurant Keepers—		
25 to 34 years,	196	33.1
35 to 44 years,	201	23.5
45 to 54 years,	78	12.7
55 to 64 years,	23	7.3
PERSONAL SERVICE, POLICE AND MILITARY GROUP—		
25 to 34 years,	248	33.3
35 to 44 years,	256	25.5
45 to 54 years,	135	11.7
55 to 64 years,	66	5.9
Barbers and Hairdressers—		
25 to 34 years,	109	40.1
35 to 44 years,	104	30.1
45 to 54 years,	33	12.0
55 to 64 years,	18	11.1
Policemen, Watchmen and Detectives—		
25 to 34 years,	39	22.4
35 to 44 years,	59	17.5
45 to 54 years,	46	9.4
55 to 64 years,	22	3.9
LABORING AND SERVANT GROUP—		
25 to 34 years,	1,750	31.6
35 to 44 years,	1,677	27.5
45 to 54 years,	1,118	18.8
55 to 64 years,	555	11.2

Occupations and Ages.	Number of deaths, tuberculosis of the lungs.	Per cent. of all causes.
Laborers (Not Agricultural)—		
25 to 34 years,	1,477	30.3
35 to 44 years,	1,446	26.8
45 to 54 years,	1,000	18.7
55 to 64 years,	505	11.1
Servants—		
25 to 34 years,	273	40.9
35 to 44 years,	231	33.1
45 to 54 years,	118	19.6
55 to 64 years,	50	13.0
MANUFACTURING AND MECHANICAL INDUSTRY GROUP—		
25 to 34 years,	2,466	35.5
35 to 44 years,	2,415	28.2
45 to 54 years,	1,642	16.7
55 to 64 years,	805	8.2
Bakers and Confectioners—		
25 to 34 years,	53	30.8
35 to 44 years,	54	24.9
45 to 54 years,	26	11.8
55 to 64 years,	6	3.5
Blacksmiths—		
25 to 34 years,	53	27.6
35 to 44 years,	74	25.2
45 to 54 years,	55	14.2
55 to 64 years,	37	8.1
Boot and Shoe Makers—		
25 to 34 years,	115	44.1
35 to 44 years,	83	30.2
45 to 54 years,	56	16.1
55 to 64 years,	28	6.5
Butchers—		
25 to 34 years,	68	32.7
35 to 44 years,	80	29.0
45 to 54 years,	37	12.3
55 to 64 years,	11	4.3
Carpenters and Joiners—		
25 to 34 years,	149	29.2
35 to 44 years,	222	27.9
45 to 54 years,	170	14.3
55 to 64 years,	127	8.4
Compositors, Printers and Pressmen—		
25 to 34 years,	128	49.2
35 to 44 years,	116	40.6
45 to 54 years,	53	20.6
55 to 64 years,	16	8.8
Engineers and Firemen (not locomotive)—		
25 to 34 years,	107	22.7
35 to 44 years,	109	20.0
45 to 54 years,	73	10.8
55 to 64 years,	28	4.8
Iron and Steel Workers—		
25 to 34 years,	107	27.4
35 to 44 years,	117	25.1
45 to 54 years,	81	18.6
55 to 64 years,	33	9.2
Machinists—		
25 to 34 years,	220	36.6
35 to 44 years,	106	20.8
45 to 54 years,	76	14.6
55 to 64 years,	38	8.0

Occupations and Ages.	Number of deaths, tuberculosis of the lungs.	Per cent. to all causes.
Masons (Brick and Stone)—		
25 to 34 years,	46	28.2
35 to 44 years,	77	27.6
45 to 54 years,	60	17.0
55 to 64 years,	41	9.2
Mill and Factory Operatives (Textile)—		
25 to 34 years,	101	39.8
35 to 44 years,	76	31.5
45 to 54 years,	57	21.6
55 to 64 years,	23	9.6
Painters, Glaziers and Varnishers—		
25 to 34 years,	182	36.6
35 to 44 years,	200	30.0
45 to 54 years,	132	17.5
55 to 64 years,	60	8.1
Plumbers and Gas and Steam Fitters—		
25 to 34 years,	132	42.9
35 to 44 years,	116	35.7
45 to 54 years,	27	15.3
55 to 64 years,	10	7.6
Tailors—		
25 to 34 years,	115	41.2
35 to 44 years,	124	30.6
45 to 54 years,	81	19.7
55 to 64 years,	32	8.6
AGRICULTURE, TRANSPORTATION AND OTHER OUTDOOR GROUPS—		
25 to 34 years,	1,747	21.9
35 to 44 years,	1,518	18.7
45 to 54 years,	1,016	11.3
55 to 64 years,	723	7.0
Draymen, Hackmen, Teamsters, Etc.—		
25 to 34 years,	425	35.9
35 to 44 years,	389	31.1
45 to 54 years,	156	15.7
55 to 64 years,	58	8.3
Farmers, Planters and Farm Laborers—		
25 to 34 years,	828	25.6
35 to 44 years,	643	18.7
45 to 54 years,	572	11.7
55 to 64 years,	470	6.7
Gardeners, Florists, Nurserymen and Vine Growers—		
25 to 34 years,	17	21.5
35 to 44 years,	27	22.5
45 to 54 years,	21	13.1
55 to 64 years,	16	6.2
Miners and Quarrymen—		
25 to 34 years,	56	5.3
35 to 44 years,	116	11.8
45 to 54 years,	102	11.6
55 to 64 years,	90	12.8
Sailors, Pilots, Fishermen and Oystermen—		
25 to 34 years,	64	23.4
35 to 44 years,	62	21.1
45 to 54 years,	31	10.7
55 to 64 years,	24	7.1
Steam Railroad Employes—		
25 to 34 years,	139	10.5
35 to 44 years,	108	9.1
45 to 54 years,	45	4.9
55 to 64 years,	25	3.5

CANCER.

Deaths from cancer numbered 4,520, an increase of 100 as compared with 1907.

A comparison of the deaths for the three year period, 1906 to 1908, inclusive, according to locality or organ affected, is as follows:

	1906.	1907.	1908.
Total,	4,208	4,420	4,520
Cancer of the mouth,	160	114	177
Cancer of the stomach and liver,	1,620	1,666	1,733
Cancer of the intestines,	440	488	502
Cancer of the female genital organs,	595	640	738
Cancer of the breast,	399	368	452
Cancer of the skin,	160	188	169
Cancer of other or unspecified organs,	834	926	749

A comparison of the death rates from cancer per 100,000 of population for the States composing the registration area for the years 1906, 1907 and 1908 is as follows:

	1906.	1907.	1908.
Average rate,	70.9	73.6	74.6
California,	92.0	95.9	104.2
Colorado,	51.3	55.1	62.7
Connecticut,	80.6	80.1	76.1
Indiana,	53.7	57.1	64.7
Maine,	86.2	101.3	96.4
Maryland,	60.1	60.9	62.9
Massachusetts,	90.3	93.5	93.7
Michigan,	67.6	66.7	72.9
New Hampshire,	89.2	95.8	87.3
New Jersey,	66.1	65.4	67.5
New York,	76.2	78.9	79.5
Pennsylvania,	60.7	62.8	63.3
Rhode Island,	78.3	91.1	83.6
South Dakota,	35.4	38.8	46.2
Vermont,	85.3	99.0	92.2
Washington,	----	----	72.0
Wisconsin,	----	----	65.1

From the above statistics the tendency of cancer to steadily increase is quite evident, but four of the States mentioned showing a decrease as compared with the previous year. The rather large increase noted in the actual number of deaths assigned to cancer of certain specified organs or localities, notably cancer of the female genital organs, is accounted for to a certain degree by the continued effort to secure more definite information on death certificates as to

the exact location of the cancer or the special organs affected. As a result of these efforts it will be noted that deaths from cancer of other or unspecified organs decreased from 926, or 20.9 per cent. of the total in 1907, to 749, or 16.5 per cent., of the total in 1908. We hope that the day is not far distant when the term "unspecified" can be eliminated from our cancer statistics.

DISEASES OF THE NERVOUS SYSTEM.

The total number of deaths due to diseases of the nervous system was 11,372, a decrease of 855 as compared with the previous year. The death rate per 100,000 of the population was 159.3. The death rate per 100,000 of male population was 167.4, and of females 151.0. Apoplexy was the cause of 5,255 deaths, or 46.2 per cent. of the total deaths in this group.

DISEASES OF THE CIRCULATORY SYSTEM.

Deaths from diseases of the circulatory system numbered 11,345, a decrease of 432 as compared with 1907. The death rate per 100,000 of population decreased from 167.4 to 159.0.

Heart disease was responsible for 83.7 per cent. of all deaths in this group. The age periods in excess of 60 years furnished 60.3 per cent. of the total.

DISEASES OF THE RESPIRATORY SYSTEM.

Thirteen thousand nine hundred and twenty-nine (13,929) deaths occurred from diseases of this group, a decrease of 455 as compared with the previous year. The rate per 100,000 of population decreased from 204.5 to 195.1.

Pneumonia was the most important single cause in this group, causing 7,102 deaths as compared with 7,849 in 1907. The death rate per 100,000 of population decreased from 111.6 to 99.5.

A comparison of the death rates from pneumonia per 100,000 of population for the States composing the registration area for the years 1906, 1907 and 1908 is as follows:

	1906.	1907.	1908.
Average rate,	109.5	117.2	96.1
California,	106.9	119.7	104.0
Colorado,	147.7	155.2	155.7
Connecticut,	113.1	128.9	97.5
Indiana,	76.8	76.0	63.4
Maine,	106.4	129.7	111.6
Maryland,	95.6	100.6	86.5
Massachusetts,	121.6	126.5	112.7
Michigan,	74.0	83.8	66.1
New Hampshire,	104.2	112.4	96.0
New Jersey,	132.3	140.9	110.1
New York,	123.4	132.8	103.3
Pennsylvania,	106.9	111.6	99.5
Rhode Island,	141.5	140.6	119.6
South Dakota,	50.9	68.8	78.2
Vermont,	126.4	140.5	113.2
Washington,	----------	----------	83.5
Wisconsin,	----------	----------	69.8

Broncho-pneumonia was responsible for 3,311 deaths, of which 2,668, or 80.6 per cent., were under five years of age.

DISEASES OF THE DIGESTIVE SYSTEM.

Deaths from diseases of the digestive system numbered 16,306, an increase of 269 as compared with the previous year. The rate per 100,000 of population remained practically stationary, 228.4.

Deaths from diarrhoea and enteritis numbered 10,393, and of these 9,026, or 86.8 per cent., occurred in children under two years of age. The increase in the number of deaths from this cause (404) as compared with the previous year may be largely found in the climatic conditions which prevailed during the months of July and August.

DISEASES OF THE GENITO-URINARY SYSTEM.

Seven thousand five hundred and fifty-three (7,553) deaths occurred from diseases of the genito-urinary system as compared with 7,659 for the previous year. The death rate per 100,000 of population decreased from 108.9 to 105.8. Bright's disease and acute nephritis were responsible for 6,346, or 84.0 per cent., of the total deaths under this group.

VIOLENCE.

Nine thousand six hundred and thirty-one (9,631) deaths occurred from violence in all forms during the year, a decrease of 1,235 as compared with the previous year.

The death rate per 100,000 of population decreased from 154.5 to 134.9.

A comparison of the deaths from certain principal forms of violence as compared with the years 1906 and 1907 is as follows:

	1906.	1907.	1908.
Suicide,	780	892	988
Burns and scalds,	847	971	861
Drowning (accidental),	555	566	573
Gunshot wounds (accidental),	149	139	150
Injuries in mines,	983	1,508	1,326
Steam railway injuries,	2,159	2,134	1,457
Homicide,	365	406	365

From the foregoing it will be noted that deaths from injuries on steam railroads show a very material decrease from the preceding years, which is to be largely accounted for by the decline in transportation and the number of persons so employed, incident to the industrial depression, which prevailed during the year. Of the total suicides, 761 were males and 227 were females; 297 employed poison, 287 were by firearms and 180 by hanging. Two suicides were less than 15 years of age. The rate from suicide per 100,000 of population was 13.8.

BIRTHS.

There were registered during the year 194,623 births, exclusive of still-births.

This was an increase of 18,819 over the previous year and an increase in the birth rate from 24.1 per 1,000 of population in 1906 and 25.0 in 1907 to 27.3 for 1908.

As mentioned in the report for 1907, this increase in the number of births does not indicate an actual increase in the birth rate, but does indicate an increased accuracy in the registration of births.

A persistent effort has been made to overcome the difficulties that beset complete birth registration, and the results for the present year show that these efforts have not been without some gratifying results.

The native birth rate increased from 20.4 in 1907 to 21.4, and the foreign rate increased from 49.3 to 58.8 per 1,000 of each population. It was among the foreign population, therefore, that the greatest relative gain was made. This is readily understood when we consider the disproportionate number of midwives who work exclusively among the foreign born and also the large number of children among this class born without any attention other than neighborly assistance. The process of educating such persons as to the existence of registration laws and that such laws must be observed is necessarily difficult.

The excess of births over deaths for the year was 82,377, and while it was impossible in the absence of a census enumeration to determine exactly the actual birth rate of the State, the excess noted when added to the increase by immigration is somewhat closely approaching the total yearly increase of population as estimated by the Federal government.

Of the total births, 100,517 were males and 94,106 females.

There were 2,078 twin births, of which number 1,315 occurred to native mothers and 759 to foreign mothers, while in 4 the nativity of mothers was unstated.

Of triple births there were 17; among native mothers 6 and among foreign mothers 11.

Illegitimate births numbered 4,401, the illegitimate birth rate per 100,000 of population being 61.6. For natives the rate was 62.7 and for foreign-born 53.8.

Table 1 shows the births by sex and months for the entire State, and for all incorporated municipalities over 5,000; also for certain groups of municipalities, and for the rural sections of each county.

Table 2 shows the births for the same areas by age and nativity of mothers.

Table 3 shows the births for the same areas by the nativity of mothers and the number of the child.

Table 4 shows the illegitimate births by localities and nativity of mothers.

Table 5 shows plural births (twins only) by localities and nativity of mothers.

MORTALITY TABLE I.

Deaths by months for all municipalities having over 5,000 population, for groups of municipalities having less than 5,000 population, and for the rural section of each county. (Stillbirths excluded).

Area.	Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Un.
Entire State,	112,246	11,620	10,639	10,477	9,365	8,445	7,666	9,534	9,708	8,999	8,428	8,526	8,828	.....
Total of all cities and boroughs over 5,000 population.	62,912	6,766	5,937	5,888	5,220	4,829	4,446	5,479	5,123	4,785	4,647	4,809	4,983	.....
Total of all boroughs under 5,000 population,	15,408	1,709	1,427	1,359	1,264	1,116	1,009	1,354	1,421	1,243	1,150	1,130	1,225	.....
Total rural,	33,926	3,145	3,275	3,230	2,881	2,510	2,211	2,701	3,164	2,971	2,631	2,587	2,620	.....
Allentown,	783	71	69	78	56	46	53	67	67	73	77	60	66	.....
Altoona,	672	84	70	73	60	62	38	51	45	58	51	41	39	.....
Archbald,	119	9	10	9	12	7	5	12	8	15	10	12	10	.....
Ashland,	91	7	9	9	11	10	6	4	10	2	13	5	5	.....
Bangor,	62	4	5	6	8	3	7	1	5	2	5	7	9	.....
Beaver Falls,	157	16	13	15	12	13	9	18	15	11	11	16	8	.....
Bethlehem,	141	12	12	12	13	11	12	10	15	13	12	8	11	.....
Bloomsburg,	92	7	12	9	10	11	5	7	9	10	6	3	3	.....
Braddock,	410	48	46	46	32	28	37	31	37	30	26	25	24	.....
Bradford,	186	28	12	19	15	12	10	8	18	9	20	19	16	.....
Bristol,	121	13	8	18	8	9	11	6	13	7	7	5	16	.....
Butler,	249	16	27	24	22	19	13	24	36	21	21	15	11	.....
Carbondale,	261	26	14	31	31	21	13	14	22	30	25	13	21	.....
Carlisle,	160	14	23	17	15	9	9	6	19	8	15	13	12	.....
Carnegie,	134	21	16	13	10	9	9	14	13	7	4	9	9	.....
Chambersburg,	190	25	18	12	13	15	13	11	16	13	18	22	14	.....
Charleroi,	96	10	6	11	9	8	10	6	5	11	2	11	7	.....
Chester,	603	48	53	63	64	56	45	62	39	49	39	44	41	.....
Clearfield,	91	8	6	7	9	11	8	9	8	5	9	7	4	.....
Coatesville,	156	8	15	16	9	17	9	13	20	13	11	14	11	.....

Columbia,	153	10	21	12	12	10	6	13	14	13	12	18	12	
Connellsville,	130	19	11	9	5	9	8	16	10	15	8	13	7	
Conshohocken,	103	10	11	10	8	7	5	11	11	4	10	5	11	
Corry,	108	5	20	6	15	8	6	5	7	12	6	11	7	
Danville,	112	12	11	11	11	9	13	6	7	14	10	1	7	
Dickson City,	176	11	10	24	17	16	15	12	17	22	9	12	11	
DuBois,	133	16	11	13	7	11	2	9	12	11	13	16	9	
Dunsmore,	255	18	35	21	22	22	16	24	17	19	16	30	15	
Duquesne,	203	21	18	12	13	8	19	21	18	11	23	22	17	
Duryea,	122	7	8	10	8	9	13	10	13	16	7	7	14	
Easton,	392	43	44	32	36	35	25	31	39	26	21	34	26	
Edwardsville,	135	9	7	16	12	10	9	15	12	12	13	13	7	
Erie,	996	105	93	113	115	88	76	81	56	68	71	73	57	
Etna,	85	11	5	8	6	8	10	5	10	1	4	5	12	
Forest City,	87	7	3	3	9	3	1	8	18	8	9	9	9	
Franklin,	123	11	11	7	9	13	11	13	8	16	8	9	7	
Freeland,	105	9	11	7	3	2	5	11	9	16	11	15	6	
Greensburg,	243	28	13	28	18	14	12	23	27	17	18	19	26	
Greenville,	77	13	11	2	8	7	5	3	8	8	7	1	4	
Hanover,	72	10	5	2	6	7	7	7	9	4	5	5	5	
Harrisburg,	831	90	69	78	72	57	56	61	69	79	51	71	78	
Hazleton,	179	11	16	13	19	12	15	16	20	16	11	14	16	
Homestead,	254	37	33	18	15	18	19	31	19	15	15	14	20	
Huntingdon,	79	8	8	10	7	8	5	5	9	3	4	6	6	
Indiana,	68	11	9	7	5	6	7	3	4	3	3	4	6	
Jeannette,	110	9	11	11	10	2	5	11	13	13	10	10	5	
Johnsonburg,	37	3	2	5	4	0	3	4	2	8	1	2	3	
Johnstown,	730	86	53	70	51	48	49	77	73	60	44	48	71	
Kane,	86	7	6	5	12	8	9	3	6	10	6	7	7	
Lancaster,	699	57	64	73	48	49	48	60	56	65	39	63	77	
Lansford,	114	13	13	9	9	3	8	15	12	12	10	6	4	
Latrobe,	106	9	8	5	10	10	10	8	11	7	9	9	10	
Lebanon,	272	41	17	17	23	21	16	19	30	24	21	21	22	
Lehighton,	74	7	7	3	8	4	6	11	7	9	2	6	4	
Lewistown,	95	13	8	10	11	9	3	9	7	9	6	3	7	
Lock Haven,	136	12	15	14	15	12	10	13	4	14	4	13	10	
McKeesport,	748	79	71	56	51	53	66	86	63	62	51	63	47	
McKees Rocks,	218	17	24	15	25	20	17	30	20	13	13	12	12	
Mahanoy City,	281	29	24	24	22	22	15	39	24	24	23	24	11	
Meadville,	190	20	14	16	20	13	13	8	12	14	14	16	30	
Middletown,	84	10	6	4	9	10	2	9	9	9	11	0	5	
Milvale,	107	12	10	9	8	13	8	8	8	8	4	10	9	
Milton,	80	6	8	3	7	11	9	6	5	6	3	7	9	
Minersville,	103	6	9	7	9	6	3	12	16	10	12	7	6	
Monongahela,	111	16	16	17	6	6	1	14	6	5	7	11	6	
Mount Carmel,	231	18	27	16	23	19	21	21	19	22	19	16	16	
Mount Pleasant,	93	10	7	12	7	11	1	6	7	8	8	8	8	
Nanticoke,	287	14	22	24	14	30	23	39	22	27	30	20	22	
New Brighton,	121	16	13	11	19	8	9	9	10	11	4	7	4	
New Castle,	494	49	50	49	28	43	25	35	40	50	42	45	38	

TABLE 1.—Continued.

Area.	Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Un.
Norristown,	591	61	65	56	40	46	33	49	42	49	51	48	51	.....
North Braddock,	166	22	9	13	8	13	13	13	12	18	17	15	15	.....
Oil City,	194	21	16	27	16	12	9	15	15	13	21	11	18	.....
Old Forge,	250	20	27	17	14	16	12	29	32	19	21	18	25	.....
Olyphant,	126	12	11	14	9	7	2	13	10	9	14	11	11	.....
Philadelphia,	25,926	2,722	2,454	2,458	2,198	2,069	1,962	2,250	1,997	1,818	1,834	1,979	2,185	.....
Phoenixville,	181	12	21	18	18	14	9	11	16	17	22	14	9	.....
Pittsburg,	9,030	1,249	944	819	732	654	597	718	651	693	671	637	665	.....
Pittston,	316	30	26	30	19	20	21	31	35	13	33	36	22	.....
Plymouth,	260	26	25	21	21	19	19	32	24	25	23	12	13	.....
Pottstown,	210	21	18	19	12	19	15	19	15	18	15	21	18	.....
Pottsville,	362	39	29	25	33	34	27	31	30	27	27	24	36	.....
Punxsutawney,	155	19	9	4	12	12	13	11	19	19	12	17	8	.....
Reading,	1,371	148	109	148	97	90	98	123	118	83	106	140	111	.....
Rochester,	98	7	10	13	11	9	7	11	7	5	6	7	5	.....
St. Clair,	91	5	10	4	7	8	12	14	7	7	8	6	3	.....
St. Marys,	62	7	9	6	4	2	4	3	7	6	8	4	2	.....
Sayre,	124	10	15	19	8	10	6	12	9	7	12	7	9	.....
Scranton,	2,051	194	173	164	158	175	150	225	186	148	171	147	160	.....
Scottdale,	42	5	6	5	6	3	1	2	4	2	5	1	2	.....
Shamokin,	262	17	28	27	21	14	19	21	24	31	21	20	19	.....
Sharon,	212	32	25	22	20	13	6	12	23	14	12	19	14	.....
Sharpsburg,	92	8	8	3	6	10	5	10	7	9	7	10	9	.....
Shenandoah,	479	30	23	44	34	30	49	58	64	35	36	41	35	.....
South Bethlehem,	260	25	16	25	15	16	15	29	34	30	13	19	23	.....
Steelton,	193	22	20	31	17	18	8	19	14	11	11	12	10	.....
Sunbury,	155	18	18	7	16	9	11	9	11	13	13	12	18	.....
Tamaqua,	128	10	20	7	10	7	8	11	13	7	15	5	15	.....
Tarentum,	85	4	11	12	7	3	4	7	5	8	6	5	13	.....
Titusville,	124	10	7	18	12	9	10	6	11	11	10	8	12	.....
Tyrone,	112	6	12	11	14	6	7	9	16	8	11	5	7	.....
Uniontown,	237	30	21	17	29	18	14	14	21	18	17	20	18	.....
Warren,	118	14	7	12	15	8	5	5	9	9	10	11	13	.....
Washington,	249	25	21	20	20	13	15	21	27	28	17	21	21	.....
Waynesboro,	80	10	5	10	11	6	4	6	3	7	6	6	6	.....
West Chester,	236	33	13	21	21	23	17	24	19	23	12	15	15	.....
West Pittston,	120	6	8	13	6	9	6	6	11	9	15	16	15	.....
Wilkes-Barre,	997	92	101	99	69	72	60	98	68	88	79	81	90	.....
Wilkinsburg,	242	40	19	21	14	17	19	24	20	18	20	15	15	.....

Williamsport,	510	54	48	52	42	36	28	43	42	46	43	44	32	
Wilmerding,	87	13	5	8	3	5	6	8	15	5	9	5	5	
Windber,	135	11	11	9	14	7	6	17	21	11	6	12	10	
York,	591	60	67	74	55	43	46	43	64	31	41	40	27	
Counties. (Rural).														
Adams,	291	25	26	21	37	19	21	25	36	26	16	13	26	
Allegheny,	2,650	273	231	246	203	171	170	266	285	216	187	202	200	
Armstrong,	473	40	44	45	43	34	34	26	43	43	38	40	43	
Beaver,	322	28	39	32	25	29	22	26	29	25	21	28	18	
Bedford,	346	32	25	28	40	29	22	20	27	36	24	27	36	
Berks,	955	105	105	81	96	69	59	58	91	71	91	63	66	
Blair,	434	38	46	50	41	27	24	30	42	42	29	42	23	
Bradford,	578	42	57	61	64	45	35	33	42	52	52	50	45	
Bucks,	709	66	68	84	53	69	52	65	66	53	46	43	44	
Butler,	453	35	56	37	43	37	30	29	43	37	35	33	38	
Cambria,	738	66	77	80	45	49	45	52	77	64	60	63	60	
Cameron,	47	4	5	4	3	3	2	5	6	4	5	5	1	
Carbon,	353	34	22	37	24	28	22	30	46	33	33	22	27	
Centre,	408	32	41	42	29	33	26	33	41	26	34	36	35	
Chester,	856	78	87	82	81	51	62	72	83	57	61	53	89	
Clarion,	272	31	20	30	19	18	19	16	22	26	23	29	19	
Clearfield,	741	59	71	83	59	54	67	47	60	72	61	59	49	
Clinton,	188	8	27	18	5	21	21	9	16	20	17	14	12	
Columbia,	311	31	43	32	22	20	20	24	28	20	19	29	23	
Crawford,	416	57	47	35	36	33	24	30	33	28	26	31	36	
Cumberland,	373	38	43	41	23	27	24	30	39	25	22	28	33	
Dauphin,	569	48	47	49	47	44	31	52	58	51	46	42	54	
Delaware,	489	38	54	47	37	36	42	50	35	32	32	40	46	
Elk,	199	24	24	17	17	22	10	14	15	15	14	19	8	
Erie,	395	53	54	32	27	40	35	20	32	27	20	27	28	
Fayette,	1,666	149	142	180	149	112	93	163	177	154	125	122	100	
Forest,	81	9	11	11	5	5	5	3	4	6	11	5	6	
Franklin,	498	46	59	49	35	27	32	45	52	41	39	25	48	
Fulton,	104	9	12	8	13	3	6	5	15	8	9	9	7	
Greene,	226	19	19	23	33	13	11	19	9	17	26	16	21	
Huntingdon,	225	24	14	17	19	19	20	15	28	27	13	12	17	
Indiana,	628	58	63	57	49	50	33	46	60	59	45	64	44	
Jefferson,	498	42	43	55	41	39	41	27	49	41	44	40	36	
Juniata,	182	18	14	18	19	15	15	10	15	21	18	12	7	
Lackawanna,	367	36	33	36	34	19	26	27	27	34	36	30	29	
Lancaster,	1,104	106	122	97	115	74	62	80	100	101	81	75	91	
Lawrence,	329	40	31	26	32	20	25	23	33	32	30	15	22	
Lebanon,	578	54	53	54	58	46	38	45	47	53	50	36	44	
Lehigh,	673	55	72	77	48	55	41	51	65	87	48	39	35	
Luzerne,	1,647	150	178	148	130	110	96	141	156	147	148	113	130	
Lycoming,	359	27	37	29	26	40	23	27	31	33	32	26	29	
McKean,	234	20	20	15	14	34	16	19	22	21	17	20	16	
Mercer,	357	35	27	38	29	32	28	21	25	34	29	26	33	
Mifflin,	249	23	31	30	15	12	18	16	22	21	16	15	30	

TABLE 1.—Continued.

Area.	Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Un.
Monroe,	208	16	16	20	23	21	10	12	24	25	4	18	19	.....
Montgomery,	1,099	109	86	107	104	93	90	102	85	96	82	62	82	.....
Montour,	151	15	19	20	17	15	11	7	5	10	7	12	13	.....
Northampton,	534	55	58	55	44	50	24	44	45	56	36	25	42	.....
Northumberland,	546	52	49	51	41	36	46	47	38	48	48	48	42	.....
Perry,	222	22	26	18	18	8	17	15	18	19	23	15	23	.....
Pike,	69	1	7	15	12	3	5	3	4	8	3	2	6	.....
Potter,	182	18	14	14	13	20	12	13	13	14	21	13	17	.....
Schuylkill,	1,149	80	104	103	107	95	84	117	110	99	81	79	90	.....
Snyder,	171	6	14	19	20	10	13	12	16	18	8	21	14	.....
Somerset,	489	41	44	49	40	36	35	37	47	43	44	35	41	.....
Sullivan,	86	8	4	5	9	5	5	8	11	7	12	3	9	.....
Susquehanna,	285	17	27	32	34	25	20	17	22	20	28	19	24	.....
Tioga,	403	49	39	37	41	30	27	31	23	36	36	27	27	.....
Union,	141	12	17	9	14	11	10	18	9	12	12	10	7	.....
Venango,	273	35	30	17	16	21	22	17	24	24	33	19	15	.....
Warren,	389	35	37	31	32	20	34	27	26	42	38	27	40	.....
Washington,	1,125	99	92	91	97	59	49	84	102	93	64	222	73	.....
Wayne,	266	31	31	24	32	30	16	25	21	26	26	22	22	.....
Westmoreland,	1,700	164	153	157	125	120	84	166	193	152	134	109	137	.....
Wyoming,	146	17	6	14	11	16	6	6	11	17	12	17	13	.....
York,	681	58	62	60	49	58	43	48	79	67	53	44	60	.....

MORTALITY TABLE 2.

Deaths in the entire State from each cause and class of causes by sex and age. (Stillbirths excluded.)

Cause of Death.		Age.													
		All ages.	Under 1.	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
All causes,		112,246	26,643	5,820	2,502	1,528	1,065	37,558	2,870	1,741	2,951	4,234	4,331	4,202	4,526
Males,		60,861	14,939	3,036	1,303	796	562	20,636	1,444	898	1,621	2,320	2,466	2,377	2,587
Females,		51,385	11,704	2,784	1,199	732	503	16,922	1,426	843	1,330	1,914	1,865	1,825	1,939
I. General diseases,		28,575	2,319	1,607	1,032	789	562	6,309	1,560	717	1,300	1,914	1,824	1,719	1,708
Males,		14,311	1,207	809	517	403	297	3,233	692	303	607	959	989	943	939
Females,		14,264	1,112	798	515	386	265	3,076	808	414	693	955	835	776	769
Typhoid fever,	M.,	1,449	2	15	12	20	15	64	68	69	200	250	236	162	110
	F.,	1,001	6	13	19	17	15	70	80	89	148	156	92	91	62
Malarial fever,	M.,	29	2	-------	1	-------	2	5	2	-------	-------	1	2	1	3
	F.,	20	2	1	1	1	-------	5	-------	1	-------	2	2	-------	3
Smallpox,	M.,	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
	F.,	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Measles,	M.,	640	161	215	91	52	35	554	62	9	3	2	1	2	4
	F.,	575	130	196	88	51	29	494	54	10	5	2	-------	6	1
Scarlet fever,	M.,	621	40	82	97	91	75	385	165	40	9	9	5	4	1
	F.,	596	22	72	94	79	55	322	184	40	20	13	9	3	1
Whoopingcough,	M.	532	301	140	42	28	11	522	9	-------	1	-------	-------	-------	-------
	F.,	732	378	172	80	49	21	700	28	2	-------	-------	1	1	-------
Diphtheria,	M.,	804	63	139	121	113	83	519	197	44	13	11	7	4	3
	F.,	806	51	119	105	99	85	459	244	57	14	10	2	7	2
Croup,	M.,	195	34	33	45	26	22	160	34	1	-------	-------	-------	-------	-------
	F.,	165	20	31	35	26	24	136	25	1	1	-------	-------	-------	-------

TABLE 2.—Continued

Cause of Death.		Age.													
		All ages.	Under 1.	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
Influenza,	[M.,	864	97	29	15	8	7	156	10	7	17	14	17	11	28
	[F.,	999	57	22	7	6	6	98	17	11	15	23	16	17	31
Cholera nostras,	[M.,	48	6	2	1	----	1	10	2	1	1	----	1	2	3
	[F.,	71	16	1	2	1	----	20	2	1	----	1	3	1	1
Dysentery,	[M.,	207	55	24	15	17	1	112	2	----	----	4	1	2	3
	[F.,	199	39	21	7	3	1	71	3	1	----	1	1	1	1
Erysipelas,	[M.,	161	59	5	----	----	2	66	3	----	1	----	6	3	10
	[F.,	134	53	5	1	2	1	62	2	----	1	3	1	1	3
Other epidemic diseases,	[M.,	18	7	3	5	----	----	15	1	----	----	----	1	----	----
	[F.,	13	6	2	1	1	----	10	1	1	----	----	----	----	----
Septicemia,	[M.,	99	15	3	1	1	1	21	9	3	7	2	1	6	5
	[F.,	75	18	3	2	----	1	24	4	3	3	3	4	2	4
Tuberculosis of lungs,	[M.,	4,691	79	44	27	16	13	179	32	41	250	532	580	577	565
	[F.,	4,012	88	48	27	15	12	190	56	100	367	626	585	478	400
Tuberculosis of larnyx,	[M.,	69	1	----	----	----	----	1	1	1	1	10	5	7	4
	[F.,	33	1	----	----	----	----	1	----	----	3	3	5	5	7
Tuberculous meningitis,	[M.,	279	73	43	25	12	16	169	32	14	13	12	11	8	4
	[F.,	234	61	57	17	20	5	160	34	8	11	11	2	1	1
Abdominal tuberculosis,	[M.,	185	23	9	6	5	2	45	10	5	10	11	14	10	23
	[F.,	209	12	6	4	2	1	25	12	6	17	24	22	16	10
Pott's disease,	[M.,	61	1	5	1	2	1	10	6	6	6	10	6	3	----
	[F.,	49	5	----	1	2	1	9	2	3	2	2	8	5	3
Tuberculous abscess,	[M.,	10	2	----	----	----	1	3	----	1	1	----	----	1	1
	[F.,	6	2	----	----	----	----	2	1	----	2	----	----	----	1
White swelling,	[M.,	36	2	1	2	1	1	7	3	3	1	5	2	1	1
	[F.,	18	----	1	2	----	----	3	----	3	4	3	----	1	----

Tuberculosis of other organs,	M..	65	7	2	1	.....	.....	10	4	3	2	4	6	4	3
	F.,	52	3	5	3	2	1	14	6	2	3	2	1	8	2
General tuberculosis,	M.,	109	12	2	4	2	2	22	4	4	10	13	3	13	9
	F.,	93	2	5	4	.....	.....	11	5	6	5	10	9	11	10
Scrofula,	M..	8	5	.....	.....	.....	.....	5	.....	.....	.....	1	.....	1	.....
	F.,	7	3	1	2	.....	.....	6	.....	.....	.....	.....	.....	.....	1
Venereal diseases,	M..	224	114	5	1	2	.....	122	.....	1	5	5	10	16	12
	F.,	148	98	6	3	2	.....	109	1	.....	1	5	5	3	9
Cancer of mouth,	M..	140	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	2	5
	F.,	37	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	1	.....
Cancer of stomach and liver,	M..	844	.....	1	.....	.....	.....	1	.....	1	.....	5	2	11	26
	F.,	889	.....	.....	1	.....	1	2	.....	.....	1	1	7	10	29
Cancer of intestines,	M..	211	.....	.....	.....	.....	.....	.....	2	.....	3	1	4	5	11
	F.,	291	.....	.....	.....	1	1	2	.....	.....	.....	2	3	9	10
Cancer of female genital organs,	F.,	738	1	.....	.....	.....	.....	1	.....	.....	2	3	7	24	62
Cancer of breast,	F.,	452	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	3	8	28
Cancer of skin,	M..	88	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
	F.,	81	.....	.....	.....	.....	.....	.....	1	.....	1	.....	2	.....	.....
Cancer of other or unspecified organs,	M..	400	3	1	.....	1	.....	5	1	2	8	9	12	13	11
	F.,	349	.....	.....	4	1	.....	5	2	2	8	5	4	8	21
Tumor,	M..	17	2	.....	.....	.....	.....	2	.....	.....	.....	1	1	.....	1
	F.,	43	4	2	.....	.....	.....	6	.....	.....	.....	.....	1	3	5
Rheumatism,	M..	289	5	2	.....	3	3	13	22	29	18	14	7	15	20
	F.,	320	5	1	1	2	4	13	26	39	28	14	13	13	12
Diabetes,	M..	414	2	.....	2	1	1	6	8	11	18	16	15	20	15
	F.,	481	2	1	4	3	.....	10	14	17	11	14	13	13	13
Anemia, leukemia,	M..	159	20	4	1	1	1	27	2	5	7	5	12	4	8
	F.,	216	21	6	.....	.....	1	28	3	10	15	6	6	11	21
Alcoholism,	M..	250	.....	.....	.....	.....	.....	.....	.....	.....	1	9	14	31	34
	F.,	19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	5	5
Chronic poisonings,	M..	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	1	9
	F.,	11	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	.....	1
Other general diseases,	M..	65	14	.....	1	1	1	17	1	2	1	1	3	2	6
	F.,	90	6	1	.....	1	.....	8	.....	.....	5	4	4	13	9

TABLE 2.—Continued.

Cause of Death.		Age.													
		All ages.	Under 1.	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
II. Diseases of nervous system,		11,372	1,839	380	188	99	74	2,580	210	119	146	146	166	199	278
Males,		6,069	1,028	211	99	57	35	1,430	103	71	82	92	101	121	159
Females,		5,303	811	169	89	42	39	1,150	107	48	64	54	65	78	119
Encephalitis,	M.,	42	13	8		1	1	23	2	1	1	2	1	1	
	F.,	35	9	4	3		1	17	1	2	3	2	1	1	
Meningitis,	M.,	571	183	76	55	31	21	366	55	20	18	22	14	13	12
	F.,	466	148	62	41	24	20	295	64	20	13	16	7	7	9
Locomotor ataxia,	M.,	141										3	2	1	9
	F.,	53									1	1	2	1	3
Other diseases of spinal cord,	M.,	211	18	14	6	3	5	46	5	6	7	8	3	7	7
	F.,	191	11	7	6	6	4	34	9	5	3	5	3	4	3
Apoplexy,	M.,	2,701	37	14	4	1	1	57	4	4	6	13	14	36	53
	F.,	2,554	29	11	4	1	3	48	2	2	5	5	16	22	35
Softening of brain,	M.,	94				1		1				1	1		
	F.,	78							1				1		1
Paralysis,	M.,	609	6	2	2			10		4	2	5	8	8	10
	F.,	581	2	2				4	2		2	2	2	5	11
General paralysis, of the insane,	M.,	177									1		3	17	20
	F.,	63										1		3	5
Other forms of mental diseases,	M.,	139									1	8	8	7	10
	F.,	150	1					1			2	2	6	10	14
Other diseases of brain,	M.,	166	22	8	7	4	1	42	7	7	8	4	14	13	7
	F.,	118	13	6	2	2		23	8	5	6	4	2	4	15
Epilepsy,	M.,	157	12	1	1	2		16	3	7	15	16	19	10	16
	F.,	112	6		1	1		8	2	6	15	10	9	14	8

"Convulsions,"	M.,	830	702	75	18	8	3	806	6	4	4			2
		687	560	72	24	4	6	666	7	2	2	1	3	2
Tetanus,	M.,	113	20		2	3	3	28	13	12	11	6	11	4	5
	F.,	38	9			1	2	12	5		6	1	1	1	7
Other diseases of nervous system,	M.,	118	15	13	4	3		35	8	6	8	4	3	4	8
	F.,	177	23	5	8	3	3	42	6	6	6	4	12	4	8
III. Diseases of circulatory system,		11,345	199	25	25	19	15	283	142	199	183	201	254	267	406
Males,		5,943	103	13	14	9	8	147	60	83	92	97	119	126	210
Females,		5,402	96	12	11	10	7	136	82	116	91	104	135	141	196
Pericarditis,	M.,	38	1	1	1			3		2	2	2	1	1	3
	F.,	50							3	5	2		2	3	4
Endocarditis,	M.,	285	5		3	1	3	12	7	9	5	9	13	11	17
	F.,	288	11			2	1	14	12	14	12	9	9	10	9
Heart disease,	M.,	4,580	62	10	8	7	5	92	50	64	82	75	97	108	165
	F.,	4,255	58	11	9	5	6	89	60	92	77	89	106	106	168
Angina pectoris,	M.,	276	1					1		1	1	1	3		13
	F.,	183											5	7	8
Diseases of arteries,	M.,	587	1					1				2	2	3	8
	F.,	439	1					1		1			2	4	
Embolism and thrombosis,	M.,	98	4					4	2	2		1	3	1	3
	F.,	107	1					1	4	1		5	10	6	2
Diseases of veins,	M.,	14										1		1	
	F.,	18	2					2						2	2
Diseases of lymphatics,	M.,	17	7	1	2	1		11		1		1			
	F.,	13	5		1	1		7				1			
Other diseases of circulatory system,	M.,	48	22	1				23	1	4	2	5		1	1
	F.,	49	18	1	1	2		22	3	3			1	3	3
IV. Diseases of respiratory system,		13,929	4,217	1,450	544	249	167	6,627	334	128	219	256	299	321	358
Males,		7,656	2,445	735	300	131	90	3,701	170	61	137	150	172	198	225
Females,		6,273	1,772	715	244	118	77	2,926	164	67	82	106	127	123	133
Laryngitis,	M.,	38	8	5	6	1	2	22	8			1		3	
	F.,	36	8	9	3	2	1	23	5	1			1	1	

TABLE 2.—Continued.

Cause of Death.		Age.													
		All ages.	Under 1.	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
Other diseases of larnyx,	M.,	51	14	13	5	10	1	43	2					1	
	F.,	42	12	9	5	5		31	5			1			
Diseases of thyroid body,	M.,	7	2		1			3			1				
	F.,	11	1		1			2				2		2	
Acute bronchitis,	M.,	654	418	92	27	13	11	561	8	1	1	2	2	2	4
	F.,	568	295	78	29	13	3	418	7		3	2	2		1
Chronic bronchitis,	M.,	375	22	3	7		2	34	3	1	2	3	8	2	4
	F.,	399	20	8	4			32	9	1	3	3	3	3	6
Bronchopneumonia,	M.,	1,765	876	279	109	44	27	1,335	46	6	7	13	15	10	21
	F.,	1,546	579	300	99	30	25	1,033	40	13	11	8	10	12	17
Pneumonia (lobar and unqualified),	M.,	3,999	984	323	134	57	45	1,543	92	51	114	109	132	158	168
	F.,	3,103	757	290	89	63	45	1,244	89	45	57	78	94	96	96
Pleurisy,	M.,	164	7	10	5	4	2	28	6	2	4	13	6	13	11
	F.,	108	5	7	7	2		21	4	1	1	4	7	6	1
Congestion of lungs,	M.,	247	94	9	3	2		108	4		3	2	4	1	6
	F.,	269	82	10	5	2	1	100	5	3	3	3	4	1	5
Gangrene of lungs,	M.,	14									1	1			1
	F.,	6										1			
Asthma and emphysema,	M.,	180	5					5	1		1		2	3	6
	F.,	114	1	2	1			4		2		1	1		5
Hemorrhage of lungs,	M.,	34	2		1			3				3		1	3
	F.,	26	2			1	1	4			3	1	2	1	
Other diseases of respiratory system,	M.,	128	13	1	2			16			3	3	3	4	1
	F.,	55	10	2	1		1	14		1	1	2	3	1	2

V. Diseases of digestive system,	16,306	8,360	1,814	373	154	94	10,795	228	159	204	225	218	255	302
Males,	8,675	4,609	968	181	89	50	5,897	128	82	124	116	117	125	157
Females,	7,631	3,751	846	192	65	44	4,898	100	77	80	109	101	130	145
Diseases of mouth, (M.,	31	24	3	2			29			1				
(F.,	36	23	5	1		1	30			1		1		1
Tonsilitis, (M.,	52	9	5	5	1	5	25	10	3		3	1	2	1
(F.,	34	4	2	2	2	4	14	3	2	3	2	2	1	2
Other diseases of pharynx, (M.,	39	2	3	1	1		7	1	2		2	1	1	
(F.,	26	4	3	3		1	11	1	1	1	1			
Ulcer of stomach, (M.,	109	2					2		1	2	3	5	5	13
(F.,	73								1		1	6	4	7
Gastritis, (M.,	396	130	23	7		1	161	5	2	3	6	2	10	13
(F.,	416	95	13	6	5	4	123	9	2	4	8	3	10	9
Other diseases of stomach, (M.,	423	225	19	5	8	3	260	3	2	4	4	3	3	2
(F.,	350	161	20	7	1		189	3			4	2	4	7
Dentition, (M.,	16	14	2				16							
(F.,	14	8	5	1			14							
Diarrhœa and enteritis, (M.,	5,538	5,027	878	142	60	24	5,131	39	10	6	9	17	10	14
(F.,	4,855	3,356	765	154	41	22	4,338	30	9	7	10	17	16	17
Hernia, (M.,	138	23	2				25			1	3	5	2	3
(F.,	152	8	2				10				2		6	5
Obstruction of intestines, (M.,	307	68	12	10	8	3	101	10	3	9	12	7	12	11
(F.,	288	34	9	5	6	2	56	9	3	5	10	12	16	11
Other diseases of intestines, (M.,	99	29	6	1	2	4	42	3	2	1	2	2	3	1
(F.,	110	27	4	6	3	1	41	1	2		1	1	3	2
Acute yellow atrophy of liver, (M.,	14	4					4		1			1		1
(F.,	26	2					2			2	3	3	2	1
Hydatid tumors of liver, (M.,														
(F.,														
Cirrhosis of liver, (M.,	628	1			1	2	4	3	1	2	2	6	24	42
(F.,	355	1		1	2		4	1	3	1	3	2	9	17
Biliary calculi, (M.,	53										1		3	2
(F.,	134										3	2	5	13

TABLE 2.—Continued.

Cause of Death.		Age.												
		All ages.	Under 1.	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
Other diseases of liver,	M.	211	23	4	1	2	1	31	5	4	2	7	12	10	11
	F.	232	14	3	2	2	1	22	4	2	2	7	5	7	8
Diseases of spleen,	M.	10		2				2				2			1
	F.	5		1				1				1			
Peritonitis,	M.	175	26	8	4	3	5	46	11	11	20	6	10	6	8
	F.	226	14	9	2	3	3	31	15	9	22	18	19	21	21
Appendicitis,	M.	423		1	2	3	2	8	38	40	73	54	44	32	33
	F.	284		5	2		5	12	24	43	31	34	23	25	22
Other diseases of digestive system,	M.	13	2		1			3					1	2	1
	F.	15										1	3	1	1
VI. Diseases of genito-urinary system,		7,553	145	47	42	36	21	291	84	79	103	207	271	317	375
Males,		4,124	88	23	28	22	14	175	51	33	41	75	105	133	160
Females,		3,429	57	24	14	14	7	116	33	46	62	132	166	184	215
Acute nephritis,	M.	416	21	10	15	12	11	69	20	11	18	14	22	33	25
	F.	318	22	11	7	6	5	51	16	18	19	26	15	24	17
Bright's disease,	M.	3,121	41	11	11	8	3	74	27	21	22	56	72	91	127
	F.	2,491	18	13	7	8	2	48	16	27	30	52	83	84	117
Other diseases of kidneys,	M.	118	14	1	1	2		18	2	1		2	4	6	2
	F.	87	12					12			1	2	3	5	9
Calculi of urinary tract,	M.	34							1				2	1	2
	F.	13										1			
Diseases of bladder,	M.	183	7	1	1			9			1	2	2	1	3
	F.	38	3					3				1	2	1	
Uterine tumor,	F.	115											5	14	17
Other diseases of uterus,	F.	125									3	12	20	19	16
Ovarian tumor,	F.	66							1	1	1	1	7	4	9

Diseases of tubes,	F.,	152	1					1			8	34	28	31	25
Other diseases of genito-urinary system,	M.,	252	5					5	1		1	3	1	1	
	F.,	24	1					1			3	3	2	5	
VII. Childbirth,		1,460									125	338	317	292	248
Puerperal septicemia,	F.,	661									57	169	161	125	98
Puerperal convulsions,	F.,	353									52	98	56	62	56
Other causes incident to childbirth,	F.,	446									16	71	100	105	89
VIII. Diseases of skin,		534	136	11	3	4	5	159	3	3	5	8	8	4	4
Males,		286	82	5	1	2	3	93	2	3	5	7	4	2	2
Females,		248	54	6	2	2	2	66	1			1	4	2	2
Gangrene,	M.,	135	8		1		2	11		1		1	1	1	
	F.,	139	2				2	4					2		1
Carbuncle,	M.,	22	3					3			4	2			1
	F.,	20	8	3		1		12						1	
Abscess,	M.,	57	21	4		1	1	27	1	2	1	4	3	1	1
	F.,	46	17	1	2	1		21	1			1	1	1	1
Other diseases of skin,	M.,	68	50	1		1		52	1						
	F.,	43	27	2				29					1		
IX. Diseases of locomotor system,		214	60	22	12	6	2	102	14	10	8	12	8	2	8
Males,		137	38	12	5	3	2	60	7	6	6	12	6	2	4
Females,		77	22	10	7	3		42	7	4	2		2		4
Diseases of bones,	M.,	125	38	12	5	3	2	60	7	6	6	12	5	1	4
	F.,	72	21	10	7	3		41	7	4	2		2		4
Diseases of joints,	M.,	9											1	1	
	F.,	3	1					1							
Other diseases of locomotor system,	M.,	3													
	F.,	2													
X. Malformation,		1,544	1,472	30	9	6	4	1,521	12	3	5	1	1		
Males,		892	854	16	2	4	3	879	7	2	3				
Females,		652	618	14	7	2	1	642	5	1	2	1	1		
Hydrocephalus,	M.,	64	47	12	1			60	2	1	1				
	F.,	39	29	6	3	1		39							

TABLE 2.—Continued.

Cause of Death.		Age.													
		All ages	Under 1.	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
Congenital malformation of heart (cyanosis),	M.	631	613	4	1	4	1	623	4	1	2				
	F.	444	426	4	4	1	1	436	4	1	1	1	1		
Other congenital malformations,	M.	197	194				2	196	1						
	F.	169	163	4				167	1		1				
XI. Diseases of early infancy,		5,598	5,598					5,598							
Males,		3,210	3,210					3,210							
Females,		2,388	2,388					2,388							
Premature birth,	M.	1,695	1,695					1,695							
	F.	1,279	1,279					1,279							
Congenital debility,	M.	1,515	1,515					1,515							
	F.	1,109	1,109					1,109							
XII. Old age,		1,494													
Males,		632													
Females,		862													
XIII. Violence,		9,631	817	211	229	155	113	1,525	336	319	644	917	945	805	815
Males,		7,547	492	135	134	73	56	890	222	252	518	807	839	716	716
Females,		2,084	325	76	95	82	57	635	114	67	126	110	106	89	99
Suicide,	M.	761								2	23	69	89	68	91
	F.	227									31	26	33	23	28
Fractures and dislocations,	M.	5													2
	F.	3													
Burns and scalds,	M.	383	18	66	78	33	19	214	25	3	8	21	13	24	22
	F.	478	10	41	55	56	38	200	54	16	19	22	25	17	15
Heat and sunstroke,	M.	117	32	2	1			35	1			1	5	6	7
	F.	67	26	1	1	1		29	2		1		2		1

Cold and freezing,	M.,	39	3					3			1	2	2	4	2
	F.,														
Lightning,	M.,	27							1	1	6	5	2	3	3
	F.,	8							1	2					1
Drowning,	M.,	530	2	11	9	3	4	29	51	71	75	75	48	30	32
	F.,	43	2	4	2	1		13	4	8	4	4	1		2
Inhalation of poisonous gases,*	M.,	170	2	2	3	5	1	13	6	7	11	9	16	17	17
	F.,	164	1	1		1	2	5	7	12	29	18	17	12	15
Other accidental poisonings,	M.,	159	31	19	15	7	3	75	10	2	2	5	6	7	3
	F.,	104	18	10	11	9	4	52	7	2	5	2	3	7	6
Accidental gunshot wounds,	M.,	127			1	1		2	11	22	31	24	11	8	9
	F.,	23		1	2		1	4	3		6		2	1	2
Injuries by machinery,	M.,	109		1			1	2	2	10	20	19	24	16	24
	F.,	3										2			
Injuries in mines and quarries,	M.,	1,366							1	13	136	217	264	203	165
	F.,	1													1
Railroad accidents and injuries,	M.,	1,377	1	4	1		4	10	23	39	99	194	183	152	170
	F.,	80	1	1	2	3		7	2	3	14	8	5	2	9
Street car accidents,	M.,	204		1	7	6	11	25	26	12	7	16	17	15	22
	F.,	48		1	2	4	3	10	11	1	1	3		1	2
Injuries by vehicles and horses,	M.,	238	1	2	5	6	3	17	15	19	11	12	10	14	17
	F.,	36	1	4	8	2	2	17	3	3		2		3	1
Automobile accidents,	M.,	22				1		1	3	2		1	1	3	4
	F.,	7							2	2	1			1	1
Suffocation,	M.,	69	41	3	2	1		47	1	2	3		2	5	2
	F.,	31	27	1	1			29						1	
Other accidental injuries,	M.,	1,157	16	24	12	10	10	72	45	45	64	89	93	94	88
	F.,	475	14	11	10	6	6	47	14	15	10	12	10	8	8
Injuries at birth,	M.,	334	334					334							
	F.,	214	214					214							
Homicide,	M.,	293	11					11	1	2	21	48	53	47	36
	F.,	72	11				1	12	4	3	5	11	8	13	7

*Includes "conflagration."

TABLE 2.—Continued.

Cause of Death.	Age.													
	All ages.	Under 1.	1	2	3	4	Under 5.	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39
XIV. Ill-defined causes,	2,691	1,481	223	45	11	8	1,768	7	5	9	9	20	21	29
Males,	1,379	783	109	22	3	4	921	2	2	6	5	14	11	15
Females,	1,312	698	114	23	8	4	847	5	3	3	4	6	10	14
"Dropsy," M.,	75	1	1	1		1	4			1	1	1	2	2
"Dropsy," F.,	98	2	1				3		2				1	3
"Heart failure," M.,	211	32	2			1	35			3	2	7	2	6
"Heart failure," F.,	166	30	2				32	1	1	2	2	3	7	6
Other ill-defined causes, M.,	995	686	105	21	3	2	817	2	1	1		5	5	5
Other ill-defined causes, F.,	990	631	107	23	8	4	773	4		1	2	2	2	3
Unknown causes, M.,	98	64	1				65		1	1	2	1	2	2
Unknown causes, F.,	58	35	4				39					1		2

TABLE 2.—Continued.

Cause of Death.	Age.												
	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
All causes,	4,227	4,586	4,771	5,057	5,875	6,276	6,307	5,719	4,176	2,036	636	162	5
Males,	2,491	2,767	2,706	2,887	3,202	3,260	3,197	2,939	1,931	849	230	49	4
Females,	1,736	1,819	2,065	2,170	2,673	3,016	3,110	2,780	2,245	1,187	406	113	1
I. General diseases,	1,484	1,567	1,514	1,422	1,383	1,343	1,191	886	499	208	73	12	2

Males,		791	855	749	732	653	615	542	393	208	81	20	5	2
Females,		693	712	765	690	730	728	649	493	291	127	53	7	
Typhoid fever,	M.,	72	70	64	35	19	13	12	4	1				
	F.,	42	46	35	30	32	12	4	6	4	2			
Malarial fever,	M.,	1	4	3	2		1	4						
	F.,	1	1	1	2			1	1					
Smallpox,	M.,													
	F.,													
Measles,	M.,	2						1						
	F.,	1	1						1					
Scarlet fever,	M.,	2									1			
	F.,		1											
Whooping cough,	M.,													
	F.,													
Diphtheria,	M.,	1	1	1	3									
	F.,	3	1	1	2	1	1	1				1		
Croup,	M.,													
	F.,	1			1									
Influenza,	M.,	26	42	29	43	60	71	95	110	75	36	15	2	
	F.,	20	27	44	49	82	112	129	124	106	51	23	4	
Cholera nostras,	M.,	2	3	3	3	4	6	1	2	4				
	F.,	1	2	3	1	4	8	6	7	6	1	2	1	
Dysentery,	M.,	2	8	6	6	11	15	9	12	10	3	1		
	F.,	2	2	3	9	13	15	22	23	19	7	4	1	
Erysipelas,	M.,	8	10	6	6	7	5	8	8	9	4		1	
	F.,	5	9	7	4	7	7	10	4	4	2	2		
Other epidemic diseases,	M.,							1						
	F.,								1					
Septicemia,	M.,	4	5	11	4	7	3	2	4	3	1	1		
	F.,	3	4	3	3	4	6	2	2	1				
Tuberculosis of lungs,	M.,	463	429	323	239	178	133	86	56	21	6			1
	F.,	303	203	173	126	119	117	85	53	19	11	1		
Tuberculosis of larnyx,	M.,	5	3	8	6	7	4	3	3					
	F.,	2	3	2	1				1					

TABLE 2.—Continued.

Cause of Death.		Age.												
		40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
Tuberculous meningitis,	M..	5	3	4	1	3								
	F..	2	2	1	1									
Abdominal tuberculosis,	M..	14	7	5	8	13	8	1	1					
	F..	16	12	18	4	13	7	3	2	2				
Pott's disease,	M..	2	1	4	3	3	1							
	F..		1	4	4	2	2	1				1		
Tuberculous abscess,	M..		1	1			1							
	F..													
White swelling,	M..	2	2	3	1	3	1	1						
	F..		1	1		2								
Tuberculosis of other organs,	M..	5	6	4	6	2	3	1	1	1				
	F..	2	3		2	3	2		1	1				
General tuberculosis,	M..	8	7	5	3	2	5	1						
	F..	7	4	2	6	2	3		1	1				
Scrofula,	M..	1												
	F..													
Venereal diseases,	M..	11	8	8	10	8	3	3	1	1				
	F..	5	2	4	1	2	1							
Cancer of mouth,	M..	7	6	10	18	20	19	30	11	8			1	
	F..		3	2	2	5	3	7	7	3	2			
Cancer of stomach and liver,	M..	32	87	105	142	122	115	105	63	22	5			
	F..	51	86	104	100	138	123	120	76	31	9	1		
Cancer of intestines,	M..	9	15	20	31	31	28	21	20	7	2	1		
	F..	21	21	42	38	31	36	32	20	19	4	1		
Cancer of female genital organs,	F..	81	106	103	117	74	73	44	25	7	7	2		
Cancer of breast,	F..	49	63	61	44	46	46	44	34	14	7	3		

Cancer of skin,	M.,	6	3	2	6	8	16	17	16	8	4	----	----
	F.,	----	3	4	3	4	11	15	14	10	7	5	1
Cancer of other or unspecified organs,	M.,	25	33	34	41	51	46	51	30	18	8	1	1
	F.,	20	33	40	35	46	31	35	31	9	9	5	----
Tumor,	M.,	----	1	1	1	2	4	2	----	----	1	----	----
	F.,	4	2	2	3	2	4	2	4	4	1	----	----
Rheumatism,	M.,	16	13	20	15	20	14	28	17	4	4	----	----
	F.,	11	20	20	12	18	22	22	18	12	5	2	----
Diabetes,	M.,	13	26	26	55	46	62	42	19	12	3	1	----
	F.,	15	23	57	67	58	68	47	28	12	1	----	----
Anemia, leukemia,	M.,	10	12	11	13	11	14	8	6	2	2	----	----
	F.,	13	14	18	15	16	14	13	7	5	1	----	----
Alcoholism,	M.,	32	42	26	23	11	14	7	4	1	----	----	1
	F.,	2	----	3	2	----	----	----	----	----	----	----	----
Chronic poisonings,	M.,	1	5	3	3	1	3	----	1	----	----	----	----
	F.,	2	1	1	1	----	----	1	----	1	----	----	----
Other general diseases,	M.,	4	2	3	5	3	7	2	4	1	1	----	----
	F.,	8	12	6	5	6	4	3	2	1	----	----	----
II. Diseases of nervous system,		307	407	576	690	926	1,091	1,164	1,120	784	368	75	20
Males,		177	227	309	363	517	559	599	590	368	162	30	9
Females,		130	180	267	327	409	532	565	530	416	206	45	11
Encephalitis,	M.,	1	1	2	1	2	----	1	1	1	----	1	----
	F.,	4	2	2	----	----	----	----	----	----	----	----	----
Meningitis,	M.,	9	10	9	5	8	4	1	5	----	----	----	----
	F.,	9	2	4	2	3	7	4	3	1	----	----	----
Locomotor ataxia,	M.,	12	15	18	21	26	15	9	6	2	1	1	----
	F.,	4	7	4	8	9	7	2	1	3	----	----	----
Other diseases of spinal cord,	M.,	12	7	11	13	21	20	9	20	8	1	----	----
	F.,	8	10	9	8	9	23	26	18	9	3	2	----
Apoplexy,	M.,	45	95	173	230	346	398	434	396	262	108	20	7
	F.,	53	95	166	239	282	361	394	367	276	145	32	9
Softening of brain,	M.,	4	2	1	5	9	14	22	20	6	7	1	----
	F.,	----	2	8	2	4	12	14	9	15	7	2	----

TABLE 2.—Continued.

Cause of Death.		Age.												
		40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
Paralysis,	M.,	11	18	29	44	65	74	93	113	72	35	6	2	.....
	F.,	14	17	30	39	57	78	90	98	82	37	9	2	.....
General paralysis of insane,	M.,	32	26	23	8	7	13	13	9	4	1	.....	.....	.....
	F.,	8	10	8	3	5	4	4	6	4	2	.....	.....	.....
Other forms of mental diseases,	M.,	18	19	15	11	11	8	8	6	6	3	.....	.....	.....
	F.,	12	12	12	7	18	11	7	16	12	8	.....	.....	.....
Other diseases of brain,	M.,	9	17	7	8	7	5	3	5	2	1	.....	.....	.....
	F.,	4	6	6	7	5	5	4	4	8	2	.....	.....	.....
Epilepsy,	M.,	13	10	7	6	7	4	2	5	1	.....	.....	.....	.....
	F.,	7	7	4	3	6	5	5	.....	1	2	.....	.....	.....
"Convulsions,"	M.,	.....	.....	2	1	.....	.....	.....	1	1	2	1	.....	.....
	F.,	.....	1	2	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Tetanus,	M.,	4	4	7	4	3	1	.....	.....	.....	.....	.....	.....	.....
	F.,	1	.....	1	.....	.....	1	1	1	.....	.....	.....	.....	.....
Other diseases of nervous system,	M.,	7	3	5	6	5	3	4	3	3	3	.....	.....	.....
	F.,	6	9	11	9	11	17	14	7	5	.....	.....	.....	.....
III. Diseases of circulatory system,		463	594	698	912	1,176	1,358	1,508	1,286	916	381	100	18	.....
Males,		253	325	371	525	641	740	794	699	459	167	31	4	.....
Females,		210	269	327	387	535	618	714	587	457	214	69	14	.....
Pericarditis,	M.,	.....	1	3	6	2	6	5	.....	1	.....	.....	.....	.....
	F.,	6	3	2	2	1	4	6	2	4	1	.....	.....	.....
Endocarditis,	M.,	9	20	17	26	23	24	31	30	13	7	2	.....	.....
	F.,	19	13	16	21	23	26	24	23	20	10	4	.....	.....
Heart disease,	M.,	212	264	302	407	512	555	599	528	332	113	20	3	.....
	F.,	163	225	279	325	446	497	554	459	321	143	46	10	.....

Angina pectoris,	M.	10	15	20	37	36	48	43	21	18	6	2	
	F.	9	12	16	11	22	29	31	14	15	2	1	1
Diseases of arteries,	M.	12	18	24	38	56	88	101	106	82	38	7	1
	F.	5	4	5	19	34	47	83	77	85	51	18	3
Embolism and thrombosis,	M.	7	2	4	8	11	16	11	10	11	2		
	F.	6	10	7	3	5	10	13	8	9	7		
Diseases of veins,	M.	1	2	1	1		1	3	1	1	1		
	F.	1		1	3	1	3	1	1	1			
Diseases of lymphatics,	M.	1			1		1		1				
	F.			1	1		1		1	1			
Other diseases of circulatory system,	M.	1	3		1	1	1	1	2	1			
	F.	1	2		2	3	1	2	2	1			
IV. Diseases of respiratory system,		375	484	498	492	642	706	707	664	480	251	66	21	1
Males,		262	343	337	302	355	328	300	299	199	88	26	3	
Females,		113	141	161	190	287	378	407	365	281	163	40	18	1
Laryngitis,	M.			1		1		1	1					
	F.	1	1		1					1	1			
Other diseases of larynx,	M.		1	2	1				1					
	F.	1	1				2							1
Diseases of thyroid body,	M.	1	2											
	F.	1				1	1	1			1			
Acute bronchitis,	M.	4	4	3	6	7	7	8	11	16	4	2	1	
	F.	3	3		10	11	14	20	20	18	12	10	4	
Chronic bronchitis,	M.	14	9	21	27	39	41	42	58	33	28	6		
	F.	5	8	12	19	26	55	60	58	48	39	8	1	
Bronchopneumonia,	M.	28	22	30	29	44	31	44	41	26	13	4		
	F.	12	11	24	27	46	61	80	67	47	20	6	1	
Pneumonia (lobar and unqualified),	M.	183	238	213	188	193	191	154	146	92	28	6		
	F.	77	91	106	106	172	187	193	170	116	64	11	11	
Pleurisy,	M.	6	17	14	10	11	4	6	7	6				
	F.	3	7	3	7	6	14	10	7	4	2			
Congestion of lungs,	M.	5	10	5	4	9	16	16	18	20	8	6	2	
	F.	2	4	6	3	10	25	18	25	28	18	5	1	

TABLE 2.—Continued.

Cause of Death.		Age.												
		40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
Gangrene of lungs,	M.,	1	4	3	1	1		1						
	F.,	1	1			1		1	1					
Asthma and emphysema,	M.,	8	15	21	23	27	21	23	11	5	6	2		
	F.,	4	10	8	9	9	14	18	15	12	2			
Hemorrhage of lungs,	M.,	5	4	3	3	3	4	1	1					
	F.,		2	2	3	1	4	1		2				
Other diseases of respiratory system,	M.,	7	17	21	10	20	13	4	4	1	1			
	F.,	3	2		5	4	1	5	2	5	4			
V. Diseases of digestive system,		318	355	421	404	491	512	482	423	324	143	39	8	
Males,		168	205	236	208	255	258	218	199	112	55	12	3	
Females,		150	150	185	196	236	254	264	224	212	88	27	5	
Diseases of mouth,	M.,		1											
	F.,			1		1				1				
Tonsilitis,	M.,				1	2	2	1		1				
	F.,	1		2					1		1			
Other diseases of pharynx,	M.,	1	1	4		4	7	2	3		2	1		
	F.,				4	2		1	1	2	1			
Ulcer of stomach,	M.,	8	12	12	8	11	9	11	3	2	2			
	F.,	9	4	12	9	4	4	5	3	2	2			
Gastritis,	M.,	15	13	24	19	15	19	27	39	16	6	1		
	F.,	11	11	13	20	24	43	43	34	33	14	2		
Other diseases of stomach,	M.,	6	10	23	15	10	28	11	15	14	7	2	1	
	F.,	7	4	9	6	16	17	27	15	26	9	5		
Dentition,	M.,													
	F.,													

Diarrhea and enteritis,	M.	19	20	13	20	32	41	41	61	29	19	5	2
	F.	12	14	15	23	40	60	64	68	67	32	13	3
Hernia,	M.	7	8	7	11	13	15	11	14	7	6		
	F.	7	12	21	21	23	11	11	9	11	2		1
Obstruction of intestines,	M.	6	14	20	14	16	22	22	13	14	1		
	F.	17	11	18	11	23	22	24	14	16	7	3	
Other diseases of intestines,	M.	1	4	2	4	7	6	10	3	3	1	2	
	F.	3	5	2	6	8	6	5	11	9	6	2	1
Acute yellow atrophy of liver,	M.			1	1	2		1	1	1			
	F.	1	2		1	2	1	4		2			
Hydatid tumors of liver,	M.												
	F.												
Cirrhosis of liver,	M.	56	76	84	72	98	74	44	23	14	3		
	F.	33	28	37	42	43	47	38	29	17	1		
Biliary calculi,	M.	4	1	9	6	8	6	8	4	1			
	F.	16	13	15	12	10	20	8	12	3	2		
Other diseases of liver,	M.	10	13	11	14	16	15	20	12	9	8	1	
	F.	11	19	11	19	31	16	25	19	12	10	1	
Diseases of spleen,	M.	1	2	1				1					
	F.				1	1			1				
Peritonitis,	M.	8	8	7	8	9	8	4	4	1			
	F.	8	10	12	13	6	4	5	3	6	1	1	
Appendicitis,	M.	25	20	17	14	12	5	4	4				
	F.	11	16	15	6	7	3	4	3	5			
Other diseases of digestive system,	M.	1	2	1	1		1						
	F.	3	1	2	2				1				
VI. Diseases of genito-urinary system,		433	504	549	654	787	827	755	662	423	178	50	4
Males,		217	248	277	387	454	514	459	401	259	103	30	2
Females,		216	256	272	267	333	313	296	261	164	75	20	2
Acute nephritis,	M.	30	35	13	23	31	32	18	12	8	2		
	F.	20	17	19	16	14	14	11	8	7	4	1	1
Bright's disease,	M.	173	203	235	335	373	411	341	295	178	62	23	2
	F.	123	188	216	224	290	268	263	237	141	65	18	1

TABLE 2.—Continued.

Cause of Death.		Age.												
		40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
Other diseases of kidneys,	M..	8	4	6	9	12	14	11	8	5	4	2		
	F..	7	2	8	7	8	8	5	3	5	1	1		
Calculi of urinary tract,	M..	2	2	3	1	3	3	6	5	3				
	F..		1		1	3	4	2	1					
Diseases of bladder,	M..	1	2	9	9	17	23	32	29	26	14	3		
	F..	2		1	1	1	5	6	7	6	2			
Uterine tumor,	F..	19	24	8	9	5	5	3	3	1	2			
Other diseases of uterus,	F..	17	11	13	4	4	2	1	2		1			
Ovarian tumor,	F..	9	5	4	5	6	5	5		3				
Diseases of tubes,	F..	15	6	3		1								
Other diseases of genito-urinary system,	M..	3	2	11	10	18	31	51	52	39	21	2		
	F..	4	2			1	2			1				
VII. Childbirth,		125	20											
Puerperal septicemia,	F..	43	8											
Puerperal convulsions,	F..	26	3											
Other causes incident to childbirth,	F..	56	9											
VIII. Diseases of skin,		16	10	15	29	33	32	50	61	56	27	9	2	
Males,		3	4	10	15	13	17	24	43	25	11	3		
Females,		13	6	5	14	20	15	26	18	31	16	6	2	
Gangrene,	M..	2	3	3	7	7	14	19	38	21	8	2		
	F..	6	1	1	10	14	13	21	17	26	16	5	2	
Carbuncle,	M..		1	2	1	2		3	1	1	1			
	F..	2				3	2							
Abscess,	M..	1		4	5	2	2		2			1		
	F..	2	4	2	3	2		1	1	4		1		
Other diseases of skin,	M..			1	2	2	1	2	2	3	2			
	F..	3	1	2	1	1		4		1				

IX. Diseases of locomotor system,	7	6	6	7	11	4	4	2	3				
Males,	7	4	4	4	8	3	3	1					
Females,		2	2	3	3	1	1	1	3				
Diseases of bones, [M.,	4	3	3	3	6	2	2	1					
[F.,		2	1	3	3		1	1	1				
Diseases of joints, [M.,	2		1	1	2	1							
[F.,						1			1				
Other diseases of locomotor system, [M.,	1	1					1						
[F.,			1						1				
X. Malformation,	1												
Males,	1												
Females,													
Hydrocephalus, [M.,													
[F.,													
Congenital malformation of heart (cyanosis), [M.,	1												
[F.,													
Other congenital malformations, [M.,													
[F.,													
XI. Diseases of early infancy, [M.,													
Males,													
Females,													
Premature birth, [M.,													
[F.,													
Congenital debility, [M.,													
[F.,													
XII. Old age,					21	45	152	294	422	336	167	57	
Males,					11	15	78	136	185	129	62	16	
Females,					10	30	74	158	237	207	105	41	
XIII. Violence,	656	601	440	389	319	239	194	204	159	82	31	10	1
Males,	585	529	381	321	245	162	127	111	75	32	12	6	1
Females,	71	72	59	68	74	77	67	93	84	50	19	4	
Suicide, [M.,	74	83	78	70	50	28	19	11	5	1			
[F.,	19	15	13	13	12	7	3	2	1	1			

TABLE 2. —Continued.

Cause of Death.		Age.												
		40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 79	80 to 84	85 to 89	90 to 94	95 & over.	Unknown.
Fractures and dislocations,	M.,			1			1			1				
	F.,								1		2			
Burns and scalds,	M.,	14	8	4	4	10	3	1	4	4	1			
	F.,	12	17	10	7	16	12	11	13	9	2		1	
Heat and sunstroke,	M.,	4	6	7	12	5	7	8	6	4	3			
	F.,		2	1	3	4	4	3	7	6	2			
Cold and freezing,	M.,	3	7	3	4	3		1		2	1	1		
	F.,													
Lightning,	M.,	1	1		2	1			1					
	F.,			3				1						
Drowning,	M.,	35	29	14	17	9	6	3	5	1				
	F.,	2	4	1		1	1	2						
Inhalation of poisonous gases,*	M.,	13	18	10	13	4	8	4	4					
	F.,	13	8	3	5	10	4	3	1		1	1		
Other accidental poisonings,	M.,	9	10	7	6	5	6	1	1	4				
	F.,	3	4	3	2	2	2	3		1				
Accidental gunshot wounds,	M.,	3	3	1		1								
	F.,	2		1		1				1				
Injuries by machinery,	M.,	18	15	5	5	4	5							
	F.,		1											
Injuries in mines and quarries,	M.,	143	96	63	33	14	10	4	2	1		1		
	F.,													
Railroad accidents and injuries,	M.,	127	119	81	51	50	31	26	13	6	2			1
	F.,	2	6	4	7	1	4	2	2	1		1		
Street car accidents,	M.,	9	13	10	11	7	4	3	2	3	2			
	F.,	3	3	2	3	2	2	1	2	1				

Injuries by vehicles and horses,	M.,	18	26	10	16	17	12	10	8	6			
	F.,		1	1	1	2		1		1			
Automobile accidents,	M.,	1	1	2	1				2				
	F.,												
Suffocation,	M.,	3	1			2	1						
	F.,				1								
Other accidental injuries,	M.,	82	81	71	68	56	35	47	52	37	22	10	6
	F.,	12	9	16	24	23	41	36	65	63	42	17	3
Injuries at birth,	M.,												
	F.,												
Homicide,	M.,	28	12	14	8	6	5			1			
	F.,	3	2	1	2			1					
XIV. Ill-defined causes,		42	38	54	58	86	119	100	117	110	62	26	10	1
Males,		27	27	32	30	50	49	53	67	41	21	4	1	1
Females,		15	11	22	28	36	70	47	50	69	41	22	9	
"Dropsy,"	M.,	3	3	4	6	7	7	13	8	9	4			
	F.,	2	2	6	5	10	20	8	10	14	5	5	2	
"Heart failure,"	M.,	13	14	16	19	24	17	15	19	13	6			
	F.,	8	6	10	13	13	19	19	11	8	4		1	
Other ill-defined causes,	M.,	7	7	6	4	16	23	23	39	19	11	3	1	
	F.,	4	2	4	8	11	31	19	28	46	29	15	6	
Unknown causes,	M.,	4	3	6	1	3	2	2	1			1		1
	F.,	1	1	2	2	2		1	1	1	3	2		

*Includes "conflagration."

MORTALITY TABLE 3.

Deaths by age periods for the entire State for all municipalities having more than 8,000 population, for certain municipalities by color, and for the rural sections of each county, including all municipalities having less than 8,000 population. (Stillbirths excluded).

Area.		All Ages	Und. 1	1	2	3	4	Und. 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39
Aggregate, Cities,		55,982	12,701	2,965	1,289	755	547	18,257	1,440	842	1,442	2,260	2,364	2,392	2,551
Allentown,		783	200	34	30	16	17	297	48	8	21	37	31	19	26
Altoona,		672	162	40	15	8	6	231	18	14	32	23	38	26	36
Beaver Falls,		157	35	9	4	2	1	51	5	2	7	4	10	5	4
Braddock,		410	124	51	15	9	5	204	13	3	12	17	24	19	16
Bradford,		186	26	2	2	1	1	32	2	4	5	8	11	7	13
Butler,		249	63	16	5	3	1	88	9	1	7	13	13	15	8
Carbondale,		261	53	12	2	3	6	76	7	7	11	13	14	11	12
Carlisle,	Total,	160	19	6	2		1	28	2	1	6	1	3	6	7
	White,	126	13	4	1		1	19	2		3	1	3	4	6
	Colored,	34	6	2	1			9		1	3			2	1
Chambersburg,		190	29	7	9	2	4	51	6	3	4	4	3	10	3
Chester,	Total,	603	161	26	22	6	2	217	14	6	15	30	21	30	33
	White,	456	121	21	14	4	1	161	8	5	8	25	13	19	20
	Colored,	147	40	5	8	2	1	56	6	1	7	5	8	11	13
Columbia,		153	30	6	2	2		40	1	3	2	1	5	10	7
Danville,		112	26	5	4	2	1	38		4	2	1		7	3
Dubois,		133	38	11	2	2	1	54	1	1	5	5	8	7	4
Dunmore,		255	102	25	7	4	1	139	7	2	3	6	6	8	3
Duquesne,		203	86	15	14	4	8	127	12	3	3	3	6	10	4
Easton,		392	59	9	4	1	1	74	11	4	12	18	24	21	18
Erie,		996	202	37	11	7	10	267	26	13	27	42	39	46	39
Harrisburg,		831	155	32	9	7	4	207	15	10	23	45	39	38	41
Hazleton,		179	36	10	5	3		54	11	1	5	6	5	6	4
Homestead,		254	95	31	10	1		137	5	2	6	11	8	10	11

Johnstown,	730	175	48	20	12	6	261	18	11	26	56	44	37	30
Lancaster,	699	128	28	7	5	5	173	12	11	13	18	27	25	24
Lebanon,	272	51	11	7	1	2	72	4	2	4	18	7	9	15
McKeesport,	748	236	46	21	11	6	320	26	13	35	54	40	31	37
Mahanoy City,	281	100	22	8	2	6	138	4	4	3	12	9	14	9
Meadville,	190	27	3	2	-------	-------	32	3	2	5	10	7	10	11
Mt. Carmel,	231	75	22	7	6	6	116	15	3	5	5	3	5	7
Nanticoke,	287	98	20	22	7	7	154	18	4	6	6	6	8	10
Newcastle,	494	113	28	12	7	3	163	19	4	13	27	25	33	22
Norristown,	591	73	12	7	4	-------	96	2	3	7	23	26	25	27
Oil City,	194	40	9	3	3	1	56	1	2	7	7	4	5	12
Philadelphia, Total,	25,926	5,386	1,281	527	353	225	7,772	596	394	631	992	1,060	1,118	1,243
White,	23,697	4,846	1,154	462	321	204	6,987	537	350	550	852	902	967	1,086
Colored,	2,229	540	127	65	32	21	785	59	44	81	140	158	151	157
Phoenixville,	181	57	5	4	-------	-------	66	6	4	5	5	7	10	1
Pittsburg, Total,	9,030	2,195	619	259	141	112	3,326	266	137	236	384	450	395	437
White,	8,410	2,067	570	239	131	106	3,113	252	127	210	351	408	352	392
Colored,	620	128	49	20	10	6	213	14	10	26	33	42	43	45
Pittston,	316	63	22	24	22	9	140	21	6	5	9	8	10	8
Plymouth,	260	84	21	17	7	5	134	5	6	4	10	6	5	7
Pottstown,	210	31	4	1	2	-------	38	5	4	8	6	10	12	7
Pottsville,	362	70	11	4	1	1	87	6	5	8	18	17	18	22
Reading,	1,371	318	44	29	17	17	425	39	19	33	49	55	44	56
Scranton,	2,051	550	120	52	37	27	786	67	45	58	82	87	84	85
Shamokin,	262	79	15	3	3	2	102	7	5	6	12	10	5	6
Sharon,	212	49	11	5	2	3	70	4	2	11	8	14	12	11
Shenandoah,	479	212	53	14	5	3	287	7	6	6	16	16	16	23
South Bethlehem,	260	129	12	3	-------	1	145	3	2	8	3	10	12	11
Steelton, Total,	193	72	9	5	1	2	89	10	6	5	12	5	5	2
White,	164	64	9	4	1	2	80	6	3	3	10	4	5	2
Colored,	29	8	-------	1	-------	-------	9	4	3	2	2	1	-------	-------
Sunbury,	155	26	1	2	2	1	32	2	1	6	3	7	9	3
Titusville,	124	19	4	3	1	1	28	2	-------	2	3	6	6	3
Warren,	118	16	2	1	-------	1	20	1	4	3	5	5	2	4
West Chester, Total,	236	29	6	1	-------	-------	36	9	2	6	9	7	11	10
White,	172	25	3	-------	-------	-------	28	5	2	3	6	4	7	7
Colored,	64	4	3	1	-------	-------	8	4	-------	3	3	3	4	3
Wilkes-Barre,	997	248	55	17	10	12	342	24	19	35	41	42	54	56
Wilkinsburg,	242	52	4	4	1	3	64	2	2	6	11	8	12	11
Williamsport,	510	76	10	10	4	2	102	13	14	14	31	14	16	26
York,	591	123	23	14	5	8	173	10	8	14	27	14	23	23

TABLE 3.—Continued.

Area.	All Ages	Und. 1	1	2	3	4	Und. 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39
Aggregate, Rural,	56,264	13,942	2,855	1,213	773	518	19,301	1,430	899	1,509	1,974	1,967	1,810	1,975
Adams,	430	79	15	8	5	4	111	15	8	7	15	11	10	12
Allegheny,	5,185	1,455	367	136	77	64	2,099	153	70	126	210	220	207	228
Armstrong,	849	215	51	17	10	7	300	26	12	21	21	31	25	31
Beaver,	826	208	31	16	10	9	274	13	9	28	45	42	27	30
Bedford,	479	86	22	6	8	5	127	16	12	15	12	10	14	18
Berks,	1,393	282	53	22	19	7	383	46	30	70	54	46	41	48
Blair,	748	229	25	10	8	5	277	19	10	17	26	29	26	25
Bradford,	947	132	16	14	9	5	176	28	19	22	27	22	16	33
Bucks,	1,109	195	33	12	6	9	255	15	13	32	34	26	22	36
Butler,	562	120	19	6	2	1	148	6	13	18	17	17	18	21
Cambria,	1,315	470	103	41	27	12	653	52	27	49	41	47	36	50
Cameron,	89	17	3	1	1	-------	22	3	2	2	2	2	4	4
Carbon,	769	239	46	21	8	14	328	26	16	18	25	25	23	31
Centre,	594	113	20	8	6	5	152	18	12	15	14	21	18	11
Chester,	1,231	248	37	18	15	7	325	29	22	28	34	28	28	41
Clarion,	388	67	15	8	2	1	93	8	6	7	10	9	11	9
Clearfield,	987	325	62	29	17	8	441	32	23	39	24	32	32	26
Clinton,	428	87	14	4	5	2	112	4	10	13	17	16	20	17
Columbia,	611	132	26	8	9	6	181	15	10	17	18	18	18	20
Crawford,	568	47	13	4	1	1	66	9	6	11	11	12	12	11
Cumberland,	590	91	18	13	6	2	130	10	11	19	17	17	16	18
Dauphin,	893	200	31	10	9	9	259	22	11	24	34	31	26	29
Delaware,	946	174	34	9	9	11	237	21	18	30	25	45	34	33
Elk,	386	103	14	10	9	5	141	15	12	14	20	19	18	14
Erie,	667	72	13	3	8	4	100	6	5	8	17	15	14	18
Fayette,	2,323	840	177	77	39	28	1,161	55	32	62	87	92	93	93
Forest,	91	21	4	2	1	2	30	2	3	2	2	5	1	3
Franklin,	644	121	28	16	5	5	175	12	6	18	18	26	23	24
Fulton,	116	20	6	-------	2	1	29	-------	6	1	6	2	7	3
Greene,	321	57	10	5	1	2	75	8	9	12	8	11	8	12

Huntingdon,	424	87	16	5	2	1	111	9	5	18	13	10	16	12
Indiana,	819	247	65	12	15	7	346	17	12	23	29	22	22	18
Jefferson,	817	224	39	17	5	10	295	22	10	27	42	32	26	28
Juniata,	219	38	3	3	3	1	48	3	6	2	9	5	6	4
Lackawanna,	1,624	512	136	70	44	21	783	67	35	33	62	57	48	66
Lancaster,	1,357	255	47	19	6	5	332	19	17	28	42	25	21	33
Lawrence,	392	80	15	9	3		102	6	4	10	18	14	7	16
Lebanon,	570	123	19	17	9	7	175	3	14	13	24	12	18	10
Lehigh,	1,053	271	60	26	17	5	379	36	19	38	37	34	29	30
Luzerne,	3,135	946	252	107	88	60	1,453	127	47	96	97	111	103	115
Lycoming,	549	114	8	13	6	2	143	10	10	7	18	16	4	13
McKean,	385	85	14	9	3	2	113	10	5	7	12	15	17	20
Mercer,	765	138	27	6	4	2	177	14	13	15	33	19	22	19
Mifflin,	354	81	8	5	9	5	108	13	11	11	11	13	5	8
Monroe,	313	51	5	6	5	1	68	7	2	6	12	7	15	12
Montgomery,	1,587	302	67	23	12	12	416	40	27	42	57	47	49	60
Montour,	155	9		2			11	1	1	1	5	3	7	11
Northampton,	1,107	288	57	21	19	13	398	33	11	34	44	41	41	25
Northumberland,	725	184	32	14	7	9	246	13	11	9	23	23	21	32
Perry,	318	55	9	6	1	2	73	8	5	8	7	6	6	7
Pike,	104	18	1				19	2	1	2	4	6	2	6
Potter,	349	77	8	6	2	2	95	6	8	16	11	18	12	14
Schuylkill,	2,260	572	139	52	34	21	918	63	24	55	86	70	83	90
Snyder,	199	37	2	4		1	44	5	4	9	4	6	5	3
Somerset,	875	264	46	24	17	11	362	26	18	25	45	41	39	28
Sullivan,	104	36	6	2	1	3	48	2	3		3	3	2	2
Susquehanna,	582	94	17	12		3	126	12	10	8	20	10	15	20
Tioga,	588	93	17	7	5	5	127	15	8	15	10	14	15	22
Union,	206	36	6	6	1	1	50	2	3	7	2	6	5	4
Venango,	489	69	15	7	8	3	102	13	10	17	22	18	14	22
Warren,	444	46	5	3	2		56	5	5	7	17	17	17	25
Washington,	2,220	616	142	56	38	20	872	46	21	64	111	137	119	95
Wayne,	404	61	11	5	8	2	87	4	6	10	12	10	8	13
Westmoreland,	3,045	1,038	211	84	53	31	1,417	72	40	78	110	138	111	107
Wyoming,	220	30	8	3	2	2	45	4	4	3	8	7	8	7
York,	1,022	220	36	18	10	7	291	21	26	20	23	27	24	29

TABLE 3.—Continued.

Area.	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95+	Un.
Aggregate, Cities,	2,475	2,664	2,608	2,767	3,075	3,060	2,775	2,286	1,605	787	209	61	2
Allentown,	23	21	31	30	36	39	41	30	24	16	4	1	
Altoona,	15	31	27	29	32	34	29	25	20	9	1	2	
Beaver Falls,	5	3	13	9	7	10	7	9	5	1			
Braddock,	22	17	17	9	14	6	5	6	2	4			
Bradford,	6	5	17	13	17	19	6	8	8	4	1		
Butler,	8	8	8	8	17	10	12	7	12	5			
Carbondale,	16	16	9	9	15	9	10	13	9	4			
Carlisle, Total,	11	6	12	9	9	19	6	9	13	7	3	2	
White,	9	5	8	7	9	15	5	9	12	7	2		
Colored,	2	1	4	2		4	1		1		1	2	
Chambersburg,	4	10	8	9	10	14	16	19	11	3	1	1	
Chester, Total,	19	33	33	34	25	31	22	19	12	6	2	1	
White,	11	24	31	28	21	26	19	19	10	6	2		
Colored,	8	9	2	6	4	5	3		2			1	
Columbia,	4	6	5	11	9	17	12	12	4	3	1		
Danville,	2	1	4	4	4	15	10	9	5	2	1		
Dubois,	3	3	5	5	7	6	9	6	3	1			
Dunmore,	13	11	7	11	1	10	7	12	5	3		1	
Duquesne,	3	6	7	3	5	5	2	2		1	1		
Easton,	14	22	16	26	29	25	22	28	20	7	1		
Erie,	34	37	36	58	74	74	76	51	38	18		1	
Harrisburg,	26	34	44	55	60	60	47	35	35	12	3	2	
Hazleton,	3	9	12	8	13	10	13	9	8	1		1	
Homestead,	7	13	6	6	11	6	8	4	2	1			
Johnstown,	42	26	28	29	24	29	30	15	12	25	2		
Lancaster,	24	34	28	48	47	38	50						
Lebanon,	11	20	17	18	15	10	17	23	6	3	1	1	
McKeesport,	25	36	29	23	15	19	20	16	5	2	2		
Mahanoy City,	9	12	11	17	10	11	10	5	2		1		

Meadville,		7	12	8	12	15	18	11	10	7	8		2	
Mt. Carmel,		11	6	7	11	7	14	4	7	3	2			
Nanticoke,		15	14	9	12	5	7	8	1	4				
Newcastle,		25	12	22	23	24	24	18	20	8	9	1	2	
Norristown,		29	30	36	33	40	49	46	61	29	18	10	1	
Oil City,		5	10	6	8	11	18	15	15	7	3	1		1
Philadelphia,	Total,	1,274	1,338	1,390	1,377	1,513	1,509	1,326	1,071	780	393	111	29	
	White,	1,138	1,233	1,289	1,300	1,445	1,450	1,284	1,046	769	380	108	24	
	Colored,	136	105	101	77	68	59	42	25	20	13	3	5	
Phoenixville,		7	4	6	7	12	10	14	8	4	4	1		
Pittsburg,	Total,	382	436	389	383	450	419	354	272	201	79	27	7	
	White,	344	394	354	365	428	408	344	265	195	78	25	5	
	Colored,	38	42	35	18	22	11	10	7	6	1	2	2	
Pittston,		18	11	18	18	9	11	9	8	3	3	1		
Plymouth,		12	8	11	10	9	15	7	7	3	1			
Pottstown,		7	2	15	9	12	21	18	19	10	4	3		
Pottsville,		19	27	14	18	26	19	26	16	8	8			
Reading,		51	55	55	64	93	85	96	59	59	24	9	1	
Scranton,		92	88	78	87	108	88	94	69	29	19	3	2	
Shamokin,		10	10	12	13	11	14	12	10	8	8			1
Sharon,		7	7	11	6	8	8	12	9	8	3		1	
Shenandoah,		18	12	12	10	18	13	14	4		1			
South Bethlehem,		9	6	7	6	7	10	10	4	5	2			
Steelton,	Total,	3	6	7	10	7	3	8	6	7			2	
	White,	2	5	6	8	7	3	7	5	6			2	
	Colored,	1	1	1	2			1	1	1				
Sunbury,		11	11	5	11	11	9	11	9	12	2			
Titusville,		3	6	5	9	10	4	14	13	8	1	1		
Warren,		4	5	7	6	7	9	11	16	7	1	1		
West Chester,	Total,	4	11	14	12	29	19	12	18	15	9	3		
	White,	4	4	8	8	23	13	8	17	13	9	3		
	Colored,		7	6	4	6	6	4	1	2				
Wilkes-Barre,		49	47	44	49	50	51	33	35	13	9	3	1	
Wilkinsburg,		16	9	7	10	14	17	21	13	12	5	2		
Williamsport,		21	31	26	36	38	30	45	29	14	8	2		
York,		17	30	17	36	25	40	39	49	27	15	4		
Aggregate, Rural,		1,752	1,922	2,103	2,290	2,800	3,216	3,532	3,433	2,571	1,249	427	101	3
Adams,		8	10	15	27	23	30	35	45	31	13	4		
Allegheny,		237	188	196	198	208	224	218	167	135	78	19	4	
Armstrong,		15	19	43	25	41	38	57	63	48	23	8	2	
Beaver,		36	30	30	44	35	51	46	39	28	15	3	1	
Bedford,		19	12	12	22	23	33	40	50	23	14	4	3	

TABLE 3.—Continued.

Area.	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95+	Un.
Berks,	50	35	48	67	74	84	95	95	80	35	9	3	------
Blair,	21	27	25	37	36	24	50	49	22	13	11	3	1
Bradford,	20	40	46	47	72	70	93	99	72	27	15	3	------
Bucks,	29	48	45	43	70	105	110	87	83	40	15	1	------
Butler,	12	14	21	19	34	37	40	49	46	25	6	1	------
Cambria,	40	49	37	38	32	44	41	38	23	19	7	2	------
Cameron,	1	5	3	4	9	11	4	4	4	3	------	------	------
Carbon,	16	28	34	30	36	36	32	37	16	10	------	2	------
Centre,	15	22	26	17	39	59	57	43	38	12	5	------	------
Chester,	38	48	53	60	77	95	87	97	76	48	15	2	------
Clarion,	13	11	20	16	29	32	40	34	18	12	8	1	1
Clearfield,	26	32	23	39	44	41	43	43	25	12	9	1	------
Clinton,	10	20	21	22	21	36	33	25	17	14	------	------	------
Columbia,	25	26	27	23	40	48	35	44	25	17	3	1	------
Crawford,	14	21	23	40	41	56	63	79	49	32	8	4	------
Cumberland,	10	16	23	29	34	54	60	57	42	16	11	------	------
Dauphin,	33	25	36	42	67	58	68	64	43	19	1	1	------
Delaware,	35	44	52	42	55	60	73	56	52	19	10	5	------
Elk,	10	16	9	14	18	13	15	16	12	7	1	2	------
Erie,	32	24	29	29	49	61	69	68	78	28	13	4	------
Fayette,	68	68	71	50	65	83	65	75	60	27	11	5	------
Forest,	2	7	1	2	7	5	4	4	8	2	------	1	------
Franklin,	16	17	19	28	41	53	61	55	34	11	5	2	------
Fulton,	1	3	2	4	10	5	11	15	9	2	------	------	------
Greene,	19	12	11	10	9	25	30	24	17	15	6	------	------
Huntingdon,	14	14	16	19	26	29	36	36	26	10	4	------	------
Indiana,	23	18	24	26	28	51	45	36	42	30	6	1	------
Jefferson,	27	22	22	36	46	38	51	51	24	11	6	1	------
Juniata,	8	4	7	12	21	18	26	23	10	5	2	------	------
Lackawanna,	59	64	47	55	61	61	44	31	31	16	3	1	------
Lancaster,	31	39	47	65	80	93	153	152	115	45	15	5	------
Lawrence,	15	8	24	14	30	28	30	29	17	10	5	------	------
Lebanon,	8	14	27	21	38	44	57	40	30	16	5	1	------
Lehigh,	19	35	35	38	56	60	67	64	44	25	7	1	------
Luzerne,	116	107	111	118	127	134	98	78	64	19	10	3	1

Lycoming,	11	16	23	40	34	39	48	61	30	21	4	1	
McKean,	13	13	25	17	21	23	22	20	20	7	3	2	
Mercer,	27	34	36	30	37	59	67	66	56	32	7	2	
Mifflin,	14	17	14	14	26	15	28	16	18	10	2		
Monroe,	9	5	18	17	25	20	28	28	25	5	4		
Montgomery,	41	61	69	91	70	107	117	143	87	40	21	2	
Montour,	9	6	8	11	16	17	19	15	11	2	1		
Northampton,	34	30	29	49	48	66	56	67	66	24	9	2	
Northumberland,	25	25	32	32	36	47	46	53	28	16	5	2	
Perry,	9	10	11	15	26	33	27	41	15	8	2	1	
Pike,	6	3	5	3	8	9	9	10	6	3			
Potter,	5	17	12	17	22	14	18	21	27	11	4	1	
Schuylkill,	74	91	99	80	109	97	113	88	71	33	12	4	
Snyder,	4	7	8	8	17	14	23	20	10	5	3		
Somerset,	25	26	17	26	32	35	36	40	31	15	6	2	
Sullivan,		6	6	4	2	7	3	7	1	3	2		
Susquehanna,	14	20	18	44	31	44	61	55	38	23	12	1	
Tioga,	10	23	28	30	37	51	63	46	41	26	5	2	
Union,	4	6	11	9	14	16	18	24	17	4	3	1	
Venango,	16	14	28	22	38	35	32	35	29	16	5	1	
Warren,	21	18	19	28	38	39	47	34	30	17	4		
Washington,	66	78	68	72	76	88	100	88	75	30	13	1	
Wayne,	8	14	18	18	26	28	38	42	36	18	8		
Westmoreland,	82	103	99	87	93	102	117	136	97	39	10	7	
Wyoming,	6	10	7	16	8	9	21	17	21	11	8		
York,	28	27	34	38	58	75	93	99	68	35	4	2	

MORTALITY TABLE 4.

Deaths from certain specified causes for each municipality in the State having more than 8,000 population, and for the rural section of each county, including all municipalities having less than 8,000 population. (Stillbirths excluded).

Area.	All causes.	Typhoid fever.	Malarial fever.	Smallpox.	Measles.	Scarlet fever.	Whooping cough.	Diphtheria—croup.	Influenza.	Other epidemic.	Tuberculosis of lungs.	Other tuberculosis.	Cancer.	Tumor.	Diabetes.	Meningitis.
Aggregate,	55,982	1,324	22	.....	641	614	475	1,004	810	324	4,931	879	2,409	30	432	460
Allentown,	783	12	.....	.....	1	45	4	28	8	4	51	9	38	.....	9	6
Altoona,	672	28	1	.....	7	10	23	9	6	2	39	12	33	.....	5	8
Beaver Falls,	157	3	.....	.....	2	.....	5	1	1	1	14	3	5	.....	2	1
Braddock,	410	20	.....	.....	18	.....	2	4	4	2	21	5	9	.....	4	3
Bradford,	186	4	1	.....	.....	1	2	1	4	.....	8	2	11	.....	3	6
Butler,	249	7	.....	.....	4	.....	3	1	6	3	22	5	10	.....	2	2
Carbondale,	261	7	1	.....	.....	1	1	12	6	4	13	2	9	.....	4	3
Carlisle, Total,	160	1	.....	.....	1	.....	4	1	9	1	17	1	5	.....	4	.....
White,	126	1	.....	.....	1	.....	3	1	7	1	10	.....	5	.....	2	.....
Colored,	34	.....	.....	.....	.....	.....	1	.....	2	.....	7	1	.....	.....	2	.....
Chambersburg,	190	4	.....	.....	8	.....	1	5	6	2	9	5	9	.....	3	1
Chester, Total,	603	10	1	.....	7	.....	7	3	5	3	64	6	19	2	3	3
White,	456	8	.....	.....	7	.....	5	3	5	3	42	6	18	2	3	3
Colored,	147	2	1	.....	.....	.....	2	.....	.....	.....	22	.....	1	.....	.....	.....
Columbia,	153	2	.....	.....	.....	1	4	.....	.....	.....	10	.....	4	.....	3	3
Danville,	112	3	.....	.....	.....	1	.....	2	.....	2	9	.....	7	.....	.....	.....
Dubois,	133	2	.....	.....	2	1	4	.....	.....	.....	6	.....	1	.....	1	.....
Dunmore,	255	.....	.....	.....	8	3	.....	6	5	2	6	2	8	.....	2	3
Duquesne,	203	.....	.....	.....	1	15	.....	13	4	.....	10	2	4	.....	2	2

Easton,	392	6	1				1	6	12		36	3	20	1	6	6
Erie,	996	39				9	6	15	12	3	64	16	47		14	9
Harrisburg,	831	30	1		6	3	7	7	10	2	57	10	43		4	2
Hazleton,	179	4					1	4	2	2	5	2	13		1	4
Homestead,	254	2			6	1	2	2	3		27	2	6			6
Johnstown,	730	40				7	13	16	6	6	52	9	26	1	5	14
Lancaster,	699	7	1		2	1	14	6	13	1	61	10	37		7	13
Lebanon,	272	5			5		1	2	10	3	17	4	7	3	1	2
McKeesport,	748	40	1		8	2	5	16	5	6	42	10	23	1	2	12
Mahanoy City,	281	1					2	9	2	4	12	1	8		2	1
Meadville,	190	5					1	1	5	3	8	4	16		1	7
Mt. Carmel,	231				1	4	2	22	1	3	14	1	7			3
Nanticoke,	287	2				17	3	29	1	2	9	1	8			3
Newcastle,	494	27			9		5	6	14		30	2	27		4	8
Norristown,	591	11			2		1	1	14	4	60	9	22		4	4
Oil City,	194	7							8		7	1	8		2	9
Philadelphia, Total,	25,926	529	10		266	208	225	489	295	108	3,031	459	1,256	14	204	153
White,	23,697	478	10		251	202	199	470	275	107	2,599	395	1,208	14	191	139
Colored,	2,229	51			15	6	26	19	20	1	432	64	48		13	14
Phoenixville,	181	10					1	8	2	3	9	3	11		1	1
Pittsburg, Total,	9,030	255	1		247	84	48	98	185	66	595	167	323	4	35	82
White,	8,410	238	1		243	81	47	95	169	61	514	137	308	4	33	78
Colored,	620	17			4	3	1	3	16	5	81	30	15		2	4
Pittston,	316	2			1	43	4	21	4		6	1	4		3	
Plymouth,	260	7			1	25		8	2	4	13	2	9		4	
Pottstown,	210	11			1		2	1	2		15	3	15		6	2
Pottsville,	362	10				1	3	2	2	2	16	6	16	1	2	6
Reading,	1,371	50	2		5	8	19	29	35	11	89	18	43	1	18	16
Scranton,	2,051	14			5	88	13	40	29	27	100	25	71		22	16
Shamokin,	262	1				1	1	8	5	3	13	2	8		3	2
Sharon,	212	30			1	1	5	1	4		15	3	4		2	3
Shenandoah,	479	4			1		8	14	2	9	14	1	1		3	8
South Bethlehem,	260	4						2	2	1	17	1	7		3	1
Steelton, Total,	193	10				2	1	1	2	2	13	3	8		1	2
White,	164	8				2		1	1	1	8	2	6		1	2
Colored,	29	2					1		1	1	5	1	2			
Sunbury,	155	1				1	4	1		2	9	2	7		1	1
Titusville,	124	1			1	1			4	3	8		6	1		2
Warren,	118	1	1			1		1	4	1	7	2	11		1	1

TABLE 4.—Continued.

Area.	All causes.	Typhoid fever.	Malarial fever.	Smallpox.	Measles.	Scarlet fever.	Whooping cough.	Diphtheria—croup.	Influenza.	Other epidemic.	Tuberculosis of lungs.	Other tuberculosis.	Cancer.	Tumor.	Diabetes.	Meningitis.
West Chester, Total,	236	13			1			2	5	1	22	3	9		2	3
White,	172	4			1			1	5	1	11	3	8		1	2
Colored,	64	9						1			11		1		1	1
Wilkes-Barre,	997	15			3	16	7	28	13	4	38	13	36		9	4
Wilkinsburg,	242	8			1	1	3	2	12	2	13	6	16		1	1
Williamsport,	510	14				7		9	10	4	30	2	28	1	8	4
York,	591	5			9	4	7	11	9	6	58	18	30		3	8
Aggregate, Rural,	56,264	1,126	27		574	603	789	966	1,053	527	3,772	629	2,111	30	463	577
Adams,	430	7					5	2	12	4	31	6	24		2	16
Allegheny,	5,185	83	3		111	52	68	75	88	51	483	66	159	1	19	58
Armstrong,	849	16			13	4	16	15	22	6	61	7	25	1	4	11
Beaver,	826	25	1		6	1	11	2	28	5	72	5	30		2	16
Bedford,	479	11			5	2	13	15	8	2	29	6	12		2	6
Berks,	1,393	26	1		31	7	11	22	23	16	92	5	54	1	12	5
Blair,	748	14			2	12	22	4	18	10	53	11	28		6	11
Bradford,	947	13			8	15	8	14	45	5	51	9	45	1	12	9
Bucks,	1,109	27	2		8	5	8	10	31	6	89	18	52		12	9
Butler,	562	11			6		2	4	12	7	19	9	22	3	8	12
Cambria,	1,315	41			26	9	30	27	18	10	69	17	32		6	25
Cameron,	89	6						1	4		7	2	1			
Carbon,	769	12	1		9	24	8	19	10	11	46	4	21		3	5
Centre,	594	6			6	1	17	12	6	1	35	4	21	1	8	5
Chester,	1,231	29			5	4	15	21	25	11	96	25	54		10	10
Clarion,	388	10			4	1	1		7	2	25	7	25	1	1	4
Clearfield,	987	21			20	14	25	14	19	8	48	12	36		5	6
Clinton,	428	9			1	2	5	2	11	7	33	7	21		6	6
Columbia,	611	10	1		3	3	6	23	15	6	31	7	23		7	5
Crawford,	568	9	1			1		5	25	7	28	5	30		13	4

Cumberland,	590	10			2	8	9	4	16	14	50	3	25		4	3
Dauphin,	893	22			4	5	8	15	12	10	74	10	28		8	12
Delaware,	946	14			5	6	8	9	14	6	112	18	56	2	5	12
Elk,	386	17			1	6		8	8	6	20	1	12		4	4
Erie,	667	10				4		5	27	6	38	5	40		8	2
Fayette,	2,323	64	1		47	7	78	28	28	10	132	28	42	1	11	29
Forest,	91	2			2		1	1	4		4		1		3	1
Franklin,	644	6	1		5	3	11	6	13	6	73	13	36		6	4
Fulton,	116	3							4	2	8	1	5		2	3
Greene,	321	14			3	3	2	3	10	3	34	6	17		2	3
Huntingdon,	424	16			1	2	11	6	6	5	30	1	19		6	1
Indiana,	819	15	1		15	5	6	15	17	9	41	8	25	1	1	11
Jefferson,	817	26			8	2	6	11	11	6	44	19	37	1	14	5
Juniata,	219	6	1				1	4	4	8	22	2	10		2	4
Lackawanna,	1,624	11			12	106	11	67	13	12	55	17	34	1	8	22
Lancaster,	1,357	18	1			4	24	7	38	15	84	15	79	1	9	7
Lawrence,	392	7			2		5	2	5	4	23	5	17			2
Lebanon,	570	18	1		12	3	3	6	11	5	41	2	13		11	5
Lehigh,	1,053	24			20	11	12	27	14	6	67	10	38		14	10
Luzerne,	3,135	21	1		29	155	23	120	35	31	158	16	80	1	22	18
Lycoming,	549	8	1		5	1	4		14	5	22	5	34		10	5
McKean,	385	9			1	6	7		10	2	32	6	14		2	4
Mercer,	765	26	2		4		6	2	16	10	42	9	37		12	11
Mifflin,	354	10				2	1	14	3	8	15	3	18		6	1
Monroe,	313	1			1	1	2	5	5	3	35		14		2	
Montgomery,	1,587	36			11	7	15	23	21	14	127	25	68		13	19
Montour,	155	1				1		1	2	1	18		10		1	1
Northampton,	1,107	17			15	15	16	23	7	12	103	15	55	1	17	11
Northumberland,	725	3			2		7	16	14	7	47	3	20	1	8	6
Perry,	318	4	1		2	1	5	1	8	8	16	3	17	3	2	1
Pike,	104	2			1	1	1		5	1	7		2		1	1
Potter,	349	13			2	4	5	2	11	2	27	6	15		4	4
Schuylkill,	2,260	22	2		9	15	28	55	31	35	122	25	63	2	19	15
Snyder,	199	12					1	3		3	13	2	7	1	2	1
Somerset,	875	40			2	1	14	38	17	7	52	6	18		9	5
Sullivan,	104	1			1	2	7	5	1	5	6		3	1	1	2
Susquehanna,	582	10	1		7	8	1	9	16	7	26	3	28	1	10	5
Tioga,	588	16			11	3	11	5	17	3	26	6	40		12	6
Union,	206	2				1	4	1		1	11	3	14		2	3
Venango,	489	12			2	1	1	2	7	2	42	12	29	1	6	10

TABLE 4.—Continued.

Area.	All causes.	Typhoid fever.	Malarial fever.	Smallpox.	Measles.	Scarlet fever.	Whooping cough.	Diphtheria—croup.	Influenza.	Other epidemic.	Tuberculosis of lungs.	Other tuberculosis.	Cancer.	Tumor.	Diabetes.	Meningitis.
Warren,	444	5	-------	-------	2	3	-------	2	10	4	44	6	20	-------	7	4
Washington,	2,220	77	1	-------	18	17	59	30	38	9	130	35	68	-------	8	21
Wayne,	404	8	1	-------	-------	4	4	7	8	2	19	-------	35	-------	7	3
Westmoreland,	3,045	62	1	-------	40	16	88	65	53	27	179	30	84	1	13	41
Wyoming,	220	5	-------	-------	1	3	3	4	6	2	18	3	15	-------	1	2
York,	1,022	14	-------	-------	5	3	9	11	16	8	85	11	54	1	10	14

TABLE 4.—Continued.

Area.	Other nervous diseases.	Diseases of the circulatory system.	Pneumonia.	Other respiratory diseases.	Diarrhea and Enteritis.		Other diseases of the digestive system.	Bright's disease.	Childbirth.	Early infancy.	Suicide.	Other violence.	Ill-defined causes.	All other causes.	Cause unknown.
					Under 2 years.	2 years and over.									
Aggregate,	4,337	5,729	3,424	3,914	4,499	630	3,097	3,888	732	2,087	546	3,688	1,103	3,322	31
Allentown,	75	79	43	30	75	12	27	35	15	40	7	52	23	55	.....
Altoona,	66	52	67	23	40	4	33	36	12	37	5	57	8	49	.....
Beaver Falls,	20	15	12	4	12	2	10	8	1	3	2	16	6	8	.....
Braddock,	18	17	21	76	66	4	35	5	6	13	2	39	2	14	.....
Bradford,	20	23	18	6	6	1	14	12	5	6	1	17	3	9	2
Butler,	23	16	12	12	24	4	22	6	4	11	1	20	9	20	.....
Carbondale,	14	26	16	13	15	3	18	13	1	13	1	37	14	14	.....
Carlisle, Total,	21	26	6	4	3	4	7	9	3	7	.....	3	6	17	.....
White,	26	21	4	2	2	4	7	7	3	4	.....	3	4	14	.....
Colored,	1	5	2	2	1	.....	.....	2	.....	3	.....	.....	2	3	.....
Chambersburg,	32	14	7	9	8	1	11	11	3	9	4	6	3	19	.....
Chester, Total,	62	67	49	32	47	7	45	29	10	37	3	37	18	26	1
White,	47	50	37	18	40	4	36	24	5	27	2	31	12	18	.....
Colored,	15	17	12	14	7	3	9	5	5	10	1	6	6	8	1
Columbia,	17	24	10	5	3	2	12	5	2	15	1	13	3	14	.....
Danville,	14	13	12	5	12	2	7	6	.....	4	.....	4	1	8	.....
Dubois,	10	15	6	10	17	5	8	9	3	7	1	15	3	7	.....
Dunmore,	44	7	29	17	39	4	10	8	.....	14	.....	18	7	13	.....
Duquesne,	7	6	20	17	40	3	10	3	.....	16	1	15	6	6	.....
Easton,	54	48	21	9	15	3	22	28	2	12	7	44	6	23	.....
Erie,	78	136	58	46	62	8	83	77	15	53	10	78	2	55	1
Harrisburg,	104	85	51	34	39	5	47	76	9	36	17	58	24	67	.....
Hazleton,	25	18	11	11	16	6	6	10	1	9	3	11	2	12	.....
Homestead,	12	10	37	19	48	2	18	15	2	13	2	7	2	10	.....

TABLE 4.—Continued.

Area.	Other nervous diseases.	Diseases of the circulatory system.	Pneumonia.	Other respiratory diseases.	Diarrhea and Enteritis.		Other diseases of the digestive system.	Bright's disease.	Childbirth.	Early infancy.	Suicide.	Other violence.	Ill-defined causes.	All other causes.	Cause unknown.
					Under 2 years.	2 years and over.									
Johnstown,	60	35	74	23	63	9	38	32	15	40	2	77	25	37	5
Lancaster,	82	88	24	37	47	10	54	70	11	24	4	28	3	44	.....
Lebanon,	51	17	12	9	11	3	12	13	6	16	2	16	12	32	.....
McKeesport,	41	47	76	48	87	8	55	12	10	56	8	73	20	34	.....
Mahanoy City,	30	13	27	24	36	2	20	15	8	12	.....	21	20	11	.....
Meadville,	17	30	8	2	6	3	19	11	4	7	2	14	.....	16	.....
Mt. Carmel,	15	14	20	19	30	2	9	5	4	9	1	12	20	13	.....
Nanticoke,	16	10	33	14	43	5	6	9	1	27	2	32	8	6	.....
Newcastle,	29	27	26	19	35	8	26	22	5	28	8	44	21	47	17
Norristown,	87	110	18	52	27	9	26	48	5	7	6	29	.....	35	.....
Oil City,	24	30	10	10	10	1	8	11	2	12	4	17	4	9	.....
Philadelphia, Total,	1,707	3,101	1,389	1,641	1,835	233	1,285	2,396	304	1,195	264	1,353	466	1,509	1
White,	1,598	2,887	1,206	1,487	1,661	219	1,190	2,245	280	1,062	256	1,261	403	1,403	1
Colored,	109	214	183	154	174	14	95	151	24	133	8	92	63	106	.....
Phoenixville,	20	17	9	6	9	1	9	11	2	19	2	11	9	7	.....
Pittsburg, Total,	580	700	686	1,015	822	130	522	365	128	464	114	597	156	560	1
White,	550	652	629	951	784	119	498	323	113	431	111	571	140	528	1
Colored,	30	48	57	64	38	11	24	42	15	33	3	26	16	32	.....
Pittston,	28	20	14	19	30	6	18	17	1	6	.....	45	12	11	.....
Plymouth,	20	10	11	14	45	3	14	14	4	16	1	17	5	11	.....
Pottstown,	30	27	15	10	7	2	12	10	2	6	2	17	5	7	.....
Pottsville,	36	51	20	21	28	2	29	26	5	14	.....	48	.....	15	.....
Reading,	208	117	55	84	87	23	86	83	16	60	10	75	45	78	.....
Scranton,	147	150	115	202	236	23	135	106	37	86	18	227	11	108	.....
Shamokin,	22	21	25	15	28	2	18	9	8	13	3	18	20	13	.....
Sharon,	21	17	13	13	14	4	8	1	1	13	1	13	7	17	.....
Shenandoah,	29	22	37	34	102	10	31	13	12	21	1	57	27	18	.....
South Bethlehem,	23	12	23	27	53	2	14	8	4	23	1	12	7	13	.....

Steelton,	Total,	10	19	15	6	31	1	10	4	3	14	----	17	2	16	----
	White,	10	15	12	5	30	1	8	4	2	12	----	16	2	15	----
	Colored,	----	4	3	1	1	----	2	----	1	2	----	1	----	1	----
Sunbury,		24	18	8	5	4	1	9	12	2	6	1	17	3	16	----
Titusville,		18	15	1	4	5	3	14	5	1	11	----	8	1	11	----
Warren,		15	19	2	5	4	----	3	5	3	3	----	10	3	15	----
West Chester,	Total,	25	30	11	7	8	5	18	22	1	12	4	17	1	14	----
	White,	21	24	6	4	8	4	15	14	1	9	4	13	1	11	----
	Colored,	4	6	5	3	----	1	3	8	----	3	----	4	----	3	----
Wilkes-Barre,		77	94	70	68	90	12	51	46	10	53	6	145	28	58	3
Wilkinsburg,		15	28	20	16	14	3	19	9	6	15	1	13	2	15	----
Williamsport,		50	52	19	18	18	7	39	44	13	29	4	37	11	52	----
York,		64	71	32	45	50	15	35	33	4	15	6	24	1	28	----
Aggregate, Rural,		5,998	5,616	3,678	2,913	4,527	737	2,816	2,458	728	2,911	442	4,955	1,432	3,681	125
Adams,		64	62	28	23	20	4	18	25	3	15	2	19	9	29	----
Allegheny,		498	381	406	388	552	63	235	178	62	305	49	369	101	280	1
Armstrong,		83	78	55	62	60	11	49	32	6	44	3	69	27	68	1
Beaver,		67	71	72	26	45	10	41	20	23	54	10	96	24	63	----
Bedford,		48	77	25	15	19	9	31	18	9	23	5	31	13	43	2
Berks,		183	145	46	71	65	23	62	54	16	65	14	233	40	70	----
Blair,		87	57	49	34	51	8	43	38	12	61	4	47	19	45	2
Bradford,		121	157	49	36	33	24	62	40	11	30	6	60	15	68	----
Bucks,		157	148	61	38	66	11	56	82	3	51	6	59	23	71	----
Butler,		73	53	50	30	39	6	42	28	9	21	6	38	12	36	4
Cambria,		93	73	99	80	162	14	44	37	22	91	5	166	28	82	9
Cameron,		8	15	4	1	7	1	3	6	----	7	1	8	1	5	1
Carbon,		71	66	37	55	88	13	45	37	14	44	5	56	20	45	----
Centre,		77	101	24	34	28	8	27	23	11	28	6	31	20	50	3
Chester,		151	172	72	50	68	8	51	87	12	49	8	80	28	89	1
Clarion,		50	55	16	28	21	3	33	23	5	16	----	17	4	27	2
Clearfield,		77	86	72	59	94	17	36	42	16	65	11	81	35	63	5
Clinton,		48	60	21	14	21	9	13	37	3	20	3	29	7	33	----
Columbia,		87	77	49	25	38	7	32	27	10	29	4	36	11	39	----
Crawford,		80	85	27	21	15	7	36	41	4	13	7	35	9	58	2
Cumberland,		86	73	35	25	22	9	38	38	7	26	1	24	15	42	1
Dauphin,		137	106	48	27	55	14	37	48	11	42	11	53	18	78	----
Delaware,		91	119	53	41	66	14	36	68	12	34	7	67	24	47	----
Elk,		23	35	41	12	25	6	24	8	3	36	4	41	5	34	2
Erie,		98	111	34	23	20	5	41	34	9	14	7	48	13	63	2

TABLE 4.—Continued.

Area.	Other nervous diseases.	Diseases of the circulatory system.	Pneumonia.	Other respiratory diseases.	Diarrhea and Enteritis.		Other diseases of the digestive system.	Bright's disease.	Childbirth.	Early infancy.	Suicide.	Other violence.	Ill-defined causes.	All other causes.	Cause unknown.
					Under 2 years.	2 years and over.									
Fayette,	169	140	239	102	257	23	97	79	31	143	30	240	129	129	18
Forest,	8	13	4	3	5	-------	8	4	-------	4	2	5	4	12	-------
Franklin,	83	88	45	28	28	3	33	35	10	27	5	32	10	33	1
Fulton,	18	12	2	9	8	1	7	4	4	6	1	4	4	8	-------
Greene,	31	32	20	9	19	7	15	12	4	15	3	25	4	23	2
Huntingdon,	51	40	17	14	32	6	26	17	2	14	1	45	12	42	1
Indiana,	77	74	52	59	71	11	54	29	9	50	4	72	27	57	3
Jefferson,	69	82	38	40	76	10	51	25	6	52	7	95	22	48	6
Juniata,	32	36	5	6	10	3	8	7	2	6	1	11	10	18	-------
Lackawanna,	148	118	125	109	200	25	78	66	17	81	7	181	28	69	3
Lancaster,	195	183	78	58	85	28	65	98	15	53	9	57	23	107	1
Lawrence,	38	46	21	25	22	2	33	23	5	21	4	34	8	23	15
Lebanon,	103	53	23	34	17	4	34	27	7	36	2	23	28	48	-------
Lehigh,	120	83	63	51	96	15	57	46	14	42	15	83	38	77	-------
Luzerne,	241	210	226	197	402	47	129	128	50	173	13	371	91	139	8
Lycoming,	83	58	41	21	30	5	28	36	7	24	3	29	11	48	1
McKean,	28	44	28	9	29	7	22	9	11	21	5	28	10	37	1
Mercer,	92	108	59	31	48	8	51	34	5	25	5	51	17	51	3
Mifflin,	52	44	16	19	22	4	15	19	10	21	1	32	6	21	-------
Monroe,	43	39	23	15	14	7	14	17	5	11	3	29	3	20	1
Montgomery,	218	201	104	77	77	14	63	87	22	88	13	103	19	122	-------
Montour,	35	36	2	6	1	2	5	7	4	6	2	6	-------	7	-------
Northampton,	126	88	65	63	74	13	32	58	18	67	8	85	31	72	-------
Northumberland,	84	68	67	35	54	9	44	30	9	31	10	82	20	48	-------
Perry,	50	64	8	9	11	1	10	18	3	15	1	19	16	20	1

Pike,	15	11	14	5	5	------		9	1	5	2	4	------	8	------
Potter,	27	38	19	8	21	6		13	6	20	3	35	10	28	1
Schuylkill,	184	162	162	198	271	34	11	91	24	128	15	206	59	113	3
Snyder,	37	25	15	7	5	5		11	1	10	2	5	5	16	1
Somerset,	69	57	43	35	80	5		27	18	64	4	111	37	71	2
Sullivan,	9	6	6	1	9	------		2	2	8	------	7	1	10	------
Susquehanna,	70	75	26	35	32	8		29	4	15	7	46	12	61	1
Tioga,	66	82	31	29	12	10		33	4	29	7	28	12	42	1
Union,	38	33	11	5	8	5		17	3	13	------	11	2	12	1
Venango,	63	63	25	19	23	9	30	25	8	15	5	27	11	38	1
Warren,	85	66	21	10	11	11	30	15	6	13	5	26	9	28	1
Washington,	151	149	167	93	210	23	102	61	24	123	10	404	52	140	------
Wayne,	41	75	29	12	15	6	23	17	4	10	6	25	8	35	------
Westmoreland,	227	193	196	157	394	36	164	75	48	186	29	316	96	190	8
Wyoming,	25	26	15	14	10	2	19	7	3	3	------	14	8	11	------
York,	158	132	54	47	53	18	53	40	9	54	7	65	18	71	2

MORTALITY TABLE 5.

Deaths from each specified cause for the entire State and for certain cities. (Stillbirths excluded).

Cause of Death.	Total.	Cities.	Rural.	Philadelphia.	*Pittsburg.	Scranton.	Erie.	Harrisburg.	Reading.	Wilkes-Barre.	Allentown.	Altoona.	Chester.	Easton.	Johnstown.	Lancaster.	McKeesport.	Newcastle.	Norristown.	Williamsport.	York.
All causes,	112,246	55,982	56,264	25,926	9,030	2,051	996	831	1,371	997	783	672	603	392	730	699	748	494	591	510	591
General diseases,	28,575	14,935	13,640	7,525	2,310	467	249	198	343	204	227	189	140	98	196	169	175	136	137	128	170
Typhoid fever,	2,450	1,324	1,126	529	255	14	39	30	50	15	12	28	10	6	40	7	40	27	11	14	5
Exanthematic typhus,																					
Relapsing fever,	1		1																		
Malarial fever,	49	22	27	10	1			1	2			1	1	1		1	1				
Smallpox,																					
Measles,	1,215	641	574	266	247	5		6	5	3	1	7	7			2	8	9	2		9
Scarlet fever,	1,217	614	603	208	84	88	9	3	8	16	45	10			7	1	2			7	4
Whooping cough,	1,264	475	789	225	48	13	6	7	19	7	4	23	7	1	13	14	5	5	1		7
Diphtheria,	1,610	847	763	444	80	34	13	7	20	23	25	7		6	12	3	15	5	1	7	10
Croup,	360	157	203	45	18	6	2		9	5	3	2	3		4	3	1	1		2	1
Influenza,	1,863	810	1,053	295	185	29	12	10	35	13	8	6	5	12	6	13	5	14	14	10	9
Miliary fever,																					
Asiatic cholera,																					
Cholera nostras,	119	47	72	15	12	5			4						1				1	1	1
Dysentery,	406	129	277	36	26	15	1		2	2	4	2	2		3		3		1	1	1
Plague,																					
Yellow fever,																					
Leprosy,	1		1																		
Erysipelas,	295	134	161	51	25	7	2	1	5	2			1		2	1	2		2	2	5
Other epidemic diseases,	29	14	15	6	3			1									1				

Septicemia,	174	83	91	19	10	10		4		6	3				2		3	3	3		
Glanders and farcy,																					
Malignant pustule and charbon,	6	4	2	3																	
Rabies,	14	8	6	3	3	1															
Actinomycosis, trichinosis, etc.,	3		3																		
Pellagra,																					
Tuberculosis of lungs,	8,703	4,931	3,772	3,031	595	100	64	57	89	38	51	39	64	36	52	61	42	30	60	30	58
Tuberculosis of larynx,	102	63	39	33	9	3	2		2	2					1						2
Tuberculous meningitis,	513	354	159	205	58	6	9	3	4	2	5	1	4	1	3	8	4		2	1	7
Abdominal tuberculosis,	394	207	187	88	51	9	1	4	7	3	1	3		1	5		4		4	1	5
Pott's disease,	110	58	52	31	8	3	2		3	1		1				1			2		1
Tuberculous abscess,	16	4	12	3	1																
White swelling,	54	29	25	16	6			3	1												
Tuberculosis of other organs,	117	59	58	28	15	3				3	1							2			1
General tuberculosis,	202	105	97	55	19	1	2		1	2	2	7	2	1		1	2		1		2
Scrofula,	15	6	9	2	2																
Syphilis,	355	213	142	101	53	2	3	4	5	1	1	2	3	4	1	2		1	1	2	5
Gonorrhea (5 years and over),	5	3	2	2			1														
Gonorrhea (under 5 years),	12	11	1	9							1									1	
Cancer of mouth,	177	99	78	62	11		31	3	1	3	1	2	1			1	1		1		2
Cancer of stomach and liver,	1,733	900	833	444	134	33	17	15	11	14	16	16	9	5	11	4	12	13	8	12	15
Cancer of intestines and peritoneum,	502	295	207	161	36	6	10	2	3	4	10	4	1	3	3	5		2	3	2	1
Cancer of female genital organs,	738	436	302	238	56	10	4	10	10	6	2	4	4	6	3	13	5	6	5	4	6
Cancer of breast,	452	220	232	114	31	2	3	2	9	1	2	3	2	2	3	6	1	2	3	5	1
Cancer of skin,	169	73	96	46	3	1	3		1		2		1			2	1	1	1	1	1
Cancer of other or unspecified organs,	749	386	363	191	52	18	7	1	8	8	5	4	1	4	6	6	3	3	1	4	4
Tumor,	60	30	30	14	4				1				2	1	1		1			1	
Acute articular rheumatism,	419	234	185	105	43	10	5	6	3	4	6	6	2	1		3	2	3		2	4
Chronic rheumatism and gout,	190	68	122	32	7	1		1		2	1	2	2			1	2	1	1	2	
Diabetes,	895	432	463	204	35	22	14	4	18	9	9	5	3	6	5	7	2	4	4	8	3
Exophthalmic goiter,	70	35	35	13	7		4					1		1		1	1			3	
Addison's disease,	27	9	18	6	1																
Leukemia,	90	50	40	25	7	1			1	1	3	1					1				
Anemia, chlorosis,	285	122	163	46	22	3	4	1	3	2	1		2		4			2	3	3	
Alcoholism,	269	150	119	42	39	5	6	2	3	3	1	2	1		8	1	3	1	1	2	1
Lead poisoning,	20	17	3	10	5					1											
Other occupational poisonings,																					
Other chronic poisonings,	21	8	13	3	2																
Scurvy,	11	8	3	5						1							1	1			
Other general diseases,	24	11	13	5	1		1			1	1					1	1				

TABLE 5.—Continued.

Cause of Death.	Total.	Cities.	Rural.	Philadelphia.	*Pittsburg.	Scranton.	Erie.	Harrisburg.	Reading.	Wilkes-Barre.	Allentown.	Altoona.	Chester.	Easton.	Johnstown.	Lancaster.	McKeesport.	Newcastle.	Norristown.	Williamsport.	York.
II. Diseases of Nervous system,	11,372	4,797	6,575	1,860	662	163	87	106	224	81	81	74	65	60	74	95	53	37	91	54	72
Encephalitis,	77	40	37	11	3	3	----	1	----	1	2	3	2	----	1	----	2	----	----	1	----
Meningitis (simple or unqualified),	798	358	440	99	69	14	9	1	14	4	5	7	2	6	14	11	11	7	4	1	8
Epidemic cerebro-spinal meningitis,	239	102	137	54	13	2	----	1	2	----	1	1	1	----	----	2	1	1	----	3	----
Locomotor ataxia,	194	106	88	63	10	2	6	----	----	2	1	----	1	----	1	2	----	2	1	1	2
Other diseases of spinal cord,	402	181	221	81	25	5	5	4	1	5	1	4	3	2	2	4	2	2	----	2	2
Apoplexy,	5,255	2,255	3,000	860	316	97	43	63	113	31	52	22	33	32	18	56	11	13	33	33	46
Softening of brain,	172	65	107	30	316	4	3	2	1	1	----	2	1	----	----	1	----	1	3	1	2
Paralysis,	1,190	410	780	186	33	7	4	9	12	10	1	11	6	10	14	6	4	4	9	7	1
General paralysis of insane,	240	100	140	53	5	----	4	----	2	----	----	----	----	3	----	----	1	----	27	----	2
Other forms of mental disease,	289	62	227	23	19	----	1	----	5	1	----	----	----	----	1	----	1	1	2	2	3
Other diseases of brain,	284	142	142	73	21	3	1	3	8	1	1	----	1	----	2	4	----	1	3	1	1
Epilepsy,	269	89	180	40	11	2	5	1	2	1	----	1	----	----	1	----	1	----	6	1	4
"Convulsions" (5 years and over,"	45	16	29	----	4	----	----	----	1	3	----	1	----	----	2	----	1	----	----	----	----
"Convulsions" (under 5 years,"	1,472	656	816	189	101	18	----	18	57	19	13	19	10	6	17	6	15	4	1	----	----
Tetanus,	151	74	77	31	13	4	3	1	----	2	1	1	1	1	----	1	1	----	1	----	1
Chorea,	16	5	11	3	1	----	----	----	----	----	----	----	----	----	1	----	----	----	----	----	----
Other diseases of nervous system,	147	52	95	17	3	----	1	1	6	----	2	1	3	----	----	2	2	1	----	----	----
Diseases of eye and adnexa,	8	6	2	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Diseases of ear,	124	78	46	45	14	2	2	1	----	----	1	1	1	----	----	----	----	----	1	1	----
III. Diseases of circulatory system,	11,345	5,729	5,616	3,101	700	150	136	85	117	94	79	52	67	48	35	88	47	27	110	52	71
Pericarditis,	88	42	46	26	7	1	1	----	2	----	----	----	----	----	----	2	----	----	----	----	----
Endocarditis,	573	406	167	277	36	9	7	5	2	2	3	3	1	----	2	2	3	----	4	5	3
Heart disease,	8,835	4,272	4,563	2,217	559	112	105	67	95	71	69	43	51	42	25	72	37	19	83	34	53
Angina pectoris,	459	200	259	107	15	4	2	2	5	5	3	2	5	2	6	3	----	2	2	1	3
Diseases of arteries,	1,026	639	387	389	54	15	17	11	9	12	3	3	7	3	1	8	6	5	20	10	12

Embolism and thrombosis,	205	106	99	53	18	6	2	----	3	4	1	1	2	1	----	----	1	----	----	2	----
Diseases of veins,	32	16	16	10	1	1	1	----	----	----	----	----	----	----	1	----	----	----	----	----	----
Diseases of lymphatics,	30	15	15	7	3	1	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----
Hemorrhages,	93	32	61	14	7	1	1	----	----	----	----	----	1	----	----	----	1	1	1	----	----
Other diseases of circulatory system,	4	1	3	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
IV. Diseases of respiratory system,	13,929	7,338	6,591	3,030	1,701	317	104	85	139	138	73	90	81	50	97	61	124	45	70	37	77
Diseases of nasal fossa,	28	5	23	1	2	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----
Laryngitis,	74	27	47	7	6	1	1	----	2	2	1	----	----	----	----	----	1	----	----	----	----
Other diseases of larynx,	93	45	48	19	5	4	3	----	----	1	1	1	----	2	----	----	1	----	----	----	----
Diseases of thyroid body,	18	8	10	4	1	----	----	----	----	1	----	----	----	----	----	----	----	----	----	1	----
Acute bronchitis,	1,212	687	525	271	205	33	4	4	17	12	6	4	5	1	2	13	11	4	7	1	3
Chronic bronchitis,	774	433	341	193	103	13	4	2	11	9	1	3	5	1	2	4	7	5	5	5	11
Bronchopneumonia,	3,311	2,014	1,297	848	566	106	30	13	38	18	16	9	18	2	7	17	23	4	34	5	30
Pneumonia (lobar and unqualified),	7,102	3,424	3,678	1,389	686	115	58	51	55	40	43	67	49	21	74	24	76	26	18	19	32
Pleurisy,	272	174	98	83	37	10	2	3	4	7	2	1	----	----	----	1	----	1	----	2	----
Congestion of lungs,	516	274	242	146	30	5	1	5	5	9	1	2	----	2	5	1	2	1	6	2	1
Gangrene of lungs,	20	11	9	3	1	----	1	----	----	1	----	----	1	----	----	----	----	2	----	----	----
Asthma,	259	131	128	33	47	3	----	6	5	3	2	1	1	----	5	1	2	1	----	1	----
Emphysema,	35	15	20	9	2	----	----	----	----	1	----	----	----	----	----	----	----	----	----	----	----
Hemorrhage of lungs,	60	26	34	5	5	1	----	----	----	1	----	1	1	----	2	----	----	----	----	1	----
Other diseases of respiratory system,	155	64	91	19	5	6	----	1	1	3	----	1	1	1	----	----	1	1	----	----	----
V. Diseases of digestive system,	16,306	8,226	8,080	3,353	1,474	394	153	88	196	153	114	77	99	40	110	111	150	69	62	64	100
Diseases of mouth,	67	28	39	11	6	----	----	1	----	----	----	1	----	----	----	----	2	1	----	----	----
Tonsilitis,	86	39	47	16	9	3	----	1	----	1	----	----	1	----	----	1	----	----	----	1	----
Diseases of pharynx,	42	17	25	7	3	----	----	1	----	----	----	----	----	----	1	----	----	----	----	----	----
Diseases of esophagus,	23	14	9	7	4	----	1	----	----	----	----	----	----	----	----	1	----	----	----	----	----
Ulcer of stomach,	182	116	66	49	20	7	3	2	4	2	----	1	2	----	----	4	3	----	1	2	----
Gastritis,	812	389	423	145	48	15	9	3	15	4	6	4	13	2	6	7	8	7	2	3	7
Other diseases of stomach,	773	331	442	106	48	27	27	3	6	7	----	3	6	----	3	10	6	3	2	9	5
Dentition,	30	20	10	7	6	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Diarrhea and enteritis (2 years and over),	9,026	4,499	4,527	1,835	822	236	62	36	87	90	75	40	47	15	63	47	87	35	27	18	50
Diarrhea and enteritis (2 years and over,	1,367	630	737	233	130	23	8	5	23	12	12	4	7	3	9	10	8	8	9	7	15
Intestinal parasites,	19	4	15	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Hernia,	290	177	113	80	30	6	3	4	7	4	3	1	5	1	----	3	2	----	1	2	2
Obstruction of intestines,	595	318	277	116	46	14	5	12	10	8	2	----	6	8	10	5	7	4	3	5	9
Other diseases of intestines,	190	85	105	37	14	3	----	----	2	1	----	1	----	1	1	----	3	2	1	1	1
Acute yellow atrophy of liver,	40	26	14	7	6	2	1	----	1	1	----	----	1	----	----	1	----	----	1	1	1

TABLE 5.—Continued

Cause of Death.	Total.	Cities.	Rural.	Philadelphia.	*Pittsburg.	Scranton.	Erie.	Harrisburg.	Reading.	Wilkes-Barre.	Allentown.	Altoona.	Chester.	Easton.	Johnstown.	Lancaster.	McKeesport.	Newcastle.	Norristown.	Williamsport.	York.
Hydatid tumors of liver,																					
Cirrhosis of liver,	983	575	408	297	115	16	26	5	13	5	4	5	2	3	5	4	3	----	3	4	5
Biliary calculi,	187	123	64	58	19	7	2	2	6	----	1	3	2	----	1	2	3	1	3	1	----
Other diseases of liver,	443	200	243	74	39	7	1	3	7	3	6	1	----	2	2	8	1	3	6	4	----
Diseases of spleen,	15	5	10	4	----	----	----	----	----	----	----	1	----	----	----	----	----	----	----	----	----
Peritonitis,	401	136	265	34	14	2	1	6	6	2	3	6	3	1	4	1	5	3	1	----	1
Appendicitis,	707	478	229	219	91	25	4	4	9	13	2	6	4	4	5	7	12	2	2	5	4
Other diseases of digestive system,	28	16	12	10	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
VI. Diseases of genito-urinary system,	**7,553**	**4,598**	**2,955**	**2,731**	**491**	130	85	90	98	58	47	41	33	34	44	81	18	36	56	63	41
Acute nephritis,	734	471	265	242	64	19	9	18	14	8	3	4	5	2	3	8	4	6	3	7	4
Bright's disease,	5,612	3,417	2,195	2,154	301	87	68	58	69	38	32	32	24	26	29	62	8	16	45	37	29
Other diseases of kidneys,	205	108	97	52	19	3	----	----	----	5	1	1	----	----	2	1	2	3	----	3	1
Calculi of urinary tract,	47	27	20	17	5	----	1	----	1	----	2	----	----	----	----	----	----	----	----	1	----
Diseases of bladder,	221	98	123	35	16	2	4	3	3	----	2	1	1	3	3	2	1	1	4	3	----
Diseases of urethra, urinary abscess, etc.,	25	20	5	11	3	1	----	----	----	----	1	----	----	----	----	----	----	----	----	----	----
Diseases of prostate,	222	113	109	57	14	5	1	5	2	2	2	----	----	----	----	1	----	3	2	4	1
Nonvenereal diseases of male genital organs,	7	2	5	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Metritis,	15	5	10	2	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Uterine hemorrhage,	15	9	6	3	1	----	----	----	----	1	----	----	----	----	1	----	----	----	----	----	1
Uterine tumor,	115	80	35	36	16	2	1	2	2	1	----	1	1	----	1	3	----	3	1	3	2
Other diseases of uterus,	95	64	31	29	7	5	1	----	4	2	1	----	2	2	1	1	1	1	----	2	1
Ovarian tumor,	66	43	23	23	4	4	----	1	2	----	----	----	----	----	3	1	----	1	1	1	----
Diseases of tubes,	**152**	**126**	**26**	**58**	**35**	2	----	2	1	1	3	2	----	**1**	**1**	**2**	**2**	**2**	----	**2**	**2**
Other diseases of female genital organs,	20	14	6	10	2	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----
Nonpuerperal diseases of breast, (cancer excepted),	2	1	1	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

VII. Childbirth,	1,460	732	728	304	128	37	15	9	16	10	15	12	10	2	15	11	10	5	5	13	4
Accidents of pregnancy,	128	66	62	25	12	5	----	----	2	2	3	----	----	----	2	3	1	1	----	2	----
Puerperal hemorrhage,	71	33	38	11	6	3	2	1	----	----	1	----	----	----	----	----	1	----	1	1	----
Other accidents of labor,	101	57	44	22	11	4	2	----	1	1	----	----	2	----	2	1	1	----	1	----	1
Puerperal septicemia,	661	347	314	139	67	16	8	4	8	5	6	5	6	1	6	4	4	2	2	7	2
Puerperal convulsions,	353	170	183	82	23	6	2	3	3	2	3	5	2	----	2	3	3	1	1	3	1
Puerperal phlegmasia alba dolens,	2	1	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Other puerperal accidents,	144	58	86	24	9	3	1	1	2	----	2	2	----	1	3	----	----	1	----	----	----
Puerperal diseases of breast,	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
VIII. Diseases of skin,	534	239	295	111	37	8	7	3	9	2	1	2	1	2	2	1	1	5	5	4	----
Gangrene,	278	114	164	51	14	4	3	3	8	1	1	----	1	1	1	1	----	1	3	3	----
Carbuncle,	42	29	13	16	5	----	1	----	----	----	----	----	----	----	----	----	----	2	1	1	----
Abscess,	103	49	54	24	11	2	1	----	1	1	----	----	----	----	----	----	----	2	----	----	----
Other diseases of skin,	111	47	64	20	7	2	2	----	----	----	----	2	----	1	1	----	1	----	1	----	----
IX. Diseases of locomotor system,	214	138	76	65	26	10	6	3	3	2	1	----	----	1	----	1	1	2	1	1	----
Diseases of bones,	197	127	70	62	23	9	6	3	3	2	1	----	----	1	----	1	1	1	1	1	----
Diseases of joints,	12	8	4	2	2	1	----	----	----	----	----	----	----	----	----	----	----	1	----	----	----
Amputation,	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Other diseases of organs of locomotion,	5	3	2	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
X. Malformations,	1,544	673	871	305	108	26	5	12	23	14	16	11	7	4	1	10	9	7	4	5	8
Hydrocephalus,	103	52	51	25	15	2	1	----	----	----	----	----	----	----	----	1	----	----	----	----	----
Congenital malformation of heart (cyanosis),	1,075	472	603	217	62	15	3	10	20	10	15	11	5	3	1	8	7	4	4	5	6
Other congenital malformations,	366	149	217	63	31	9	1	2	3	4	1	----	2	1	----	1	1	3	----	----	2
XI. Diseases of early infancy,	5,598	2,687	2,911	1,195	464	86	53	36	60	53	40	37	37	12	40	24	56	28	7	29	15
Premature birth,	2,974	1,477	1,497	658	240	66	38	19	39	27	23	22	14	8	14	16	30	17	3	12	9
Congenital debility,	2,373	1,090	1,283	488	196	16	12	13	19	25	16	13	21	4	25	6	26	11	2	16	4
Other diseases of early infancy,	227	114	113	46	27	4	1	4	2	1	1	2	2	----	1	2	----	----	2	1	2
Lack of care,	24	6	18	3	1	----	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----
XII. Old age,	1,494	522	972	262	61	7	5	17	13	6	7	17	4	4	7	12	3	7	8	8	2
Old age,	1,494	522	972	262	61	7	5	17	13	6	7	17	4	4	7	12	3	7	8	8	2

TABLE 5.—Continued

Cause of Death.	Total.	Cities.	Rural.	Philadelphia.	*Pittsburg.	Scranton.	Erie.	Harrisburg.	Reading.	Wilkes-Barre.	Allentown.	Altoona.	Chester.	Easton.	Johnstown.	Lancaster.	McKeesport.	Newcastle.	Norristown.	Williamsport.	York.
XIII. Violence,	9,631	4,234	5,397	1,617	711	245	88	75	85	151	59	62	40	51	79	32	81	52	35	41	30
Suicide by poison,	297	184	113	79	62	5	1	5	5	----	2	1	1	1	----	1	4	4	1	1	----
Suicide by asphyxia,	61	56	5	41	1	3	----	5	1	----	----	1	----	----	----	1	----	----	----	----	----
Suicide by hanging or strangulation,	180	80	100	36	11	5	3	3	1	3	3	----	----	----	1	1	1	1	----	1	2
Suicide by drowning,	62	26	36	14	2	----	2	----	----	----	1	----	----	1	----	----	1	1	----	----	----
Suicide by firearms,	287	142	145	67	24	5	3	3	3	3	1	3	2	3	1	1	1	2	2	1	2
Suicide by cutting instruments,	59	38	21	18	9	----	1	----	----	----	----	----	----	1	----	----	1	----	2	1	----
Suicide by jumping from high places,	18	10	8	5	3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1
Suicide by crushing,	8	2	6	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Other suicides,	16	8	8	3	1	----	----	1	----	----	----	----	----	1	----	----	----	----	1	----	1
Fractures,	8	6	2	3	----	1	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Dislocations,	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Burns and scalds,	861	430	431	170	71	20	7	5	4	15	14	4	7	5	5	8	15	4	7	2	2
Heat and sunstroke,	184	118	66	78	20	1	----	1	2	----	----	2	2	----	----	----	----	1	3	1	----
Cold and freezing,	39	11	28	5	1	1	----	----	----	2	----	----	----	----	----	----	----	----	----	----	----
Lightning,	35	2	33	----	----	1	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Drowning,	573	236	337	129	39	1	9	2	8	3	1	----	4	4	1	----	3	2	----	5	1
Inhalation of poisonous gases,	104	83	21	49	9	3	6	----	4	4	----	----	1	----	----	----	----	----	----	1	----
Conflagration,	230	23	207	6	5	5	----	----	1	1	----	----	----	----	----	----	----	----	1	----	2
Other accidental poisonings,	263	123	140	42	30	4	5	2	2	3	1	2	1	----	3	4	----	----	3	1	1
Accidental gunshot wounds,	150	47	103	13	4	3	2	2	----	2	1	----	1	----	3	1	1	3	----	1	----
Injuries by machinery,	172	89	83	27	22	4	3	----	3	2	1	----	----	2	----	----	3	1	----	----	1
Injuries in mines,	1,326	316	1,010	----	21	92	----	1	----	58	----	3	----	----	21	----	3	----	----	----	----
Injuries in quarries,	41	12	29	----	----	----	----	2	----	----	2	----	----	3	----	----	----	1	----	----	----
Railroad accidents (steam or unqualified),	1,457	542	915	97	97	28	12	15	18	18	7	21	5	12	26	4	20	18	3	8	2
Railroad accidents (electric),	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Street car accidents (surface or unqualified),	250	178	72	91	36	4	3	1	1	6	5	3	3	2	1	1	2	----	1	1	1
Street car accidents (elevated),	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Street car accidents (underground),	2	2	----	2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Injuries by vehicles and horses,	274	131	143	61	20	4	4	1	6	2	----	2	2	----	----	2	1	2	1	3	----

Automobile accidents,	29	22	7	11	2	2	----	----	----	----	1	----	----	----	1	----	----	2	----	1	1
Suffocation,	160	29	71	15	2	----	----	1	1	----	1	1	1	1	----	----	----	----	----	----	1
Injuries at birth,	548	297	251	141	51	9	8	1	3	3	3	2	2	1	4	2	4	1	3	2	2
Other accidental traumatisms,	1,511	766	745	322	134	33	13	18	17	19	15	12	5	12	8	4	15	7	5	11	6
Burning by corrosive substances,	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Other external violence,	117	56	61	16	7	4	2	4	2	1	1	4	1	1	----	1	----	1	----	----	2
Starvation, privation, etc.,	4	----	4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Homicide,	365	169	196	75	26	7	3	2	3	5	----	1	2	1	4	1	6	1	2	----	2
XIV. Ill-defined causes,	2,691	1,134	1,557	467	157	11	3	24	45	31	23	8	19	6	30	3	20	38	----	11	1
"Dropsy,"	173	40	133	3	1	----	----	3	6	2	2	----	----	1	2	----	1	1	----	2	----
"Heart failure,"	377	111	266	9	4	1	----	1	23	4	6	----	----	2	3	----	2	1	----	2	----
Sudden death,	42	3	39	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1	----	----	----
Unspecified or ill-defined causes of death,	261	33	228	3	----	----	----	3	----	----	----	1	2	1	----	----	----	3	----	----	1
Inanition (over 3 months),	354	217	137	105	54	1	----	5	----	3	----	4	1	1	7	1	11	8	----	----	----
Debility (over 3 months),	273	112	161	42	8	1	----	2	1	4	----	1	1	----	7	----	2	----	----	2	----
Marasmus (over 3 months),	1,015	579	436	302	89	8	2	10	15	15	15	2	14	1	5	2	4	5	----	5	----
Fever,	40	8	32	2	----	----	----	----	----	----	----	----	----	----	1	----	----	2	----	----	----
Unknown causes,	156	31	125	1	1	----	1	----	----	3	----	----	1	----	5	----	----	17	----	----	----

*Includes Allegheny, annexed December 9, 1907.

MORTALITY TABLE 6

Death by age, sex, color, general nativity and parent nativity for urban districts (including all municipalities having over 8,000 population), and for the rural section of each county, including all municipalities having less than 8,000 population. (Stillbirths excluded.)

Class—Cities.	Age.													
	All ages.	Under 1	1	2	3	4	Under 5	5-9	10-14	15-19	20-24	25-29	30-34	35-39
Males:														
Total,	30,066	7,103	1,536	666	401	287	9,993	750	444	784	1,209	1,306	1,348	1,462
White,	28,168	6,651	1,422	606	371	270	9,320	707	415	723	1,102	1,182	1,213	1,312
Native,	20,093	6,611	1,401	592	355	249	9,208	663	382	535	666	697	759	778
Both parents native,	9,829	2,929	567	259	170	115	4,040	317	206	301	373	373	343	359
One or both parents foreign,	8,656	3,397	810	320	177	131	4,835	338	167	223	257	280	348	366
Parentage unknown,	1,608	285	24	13	8	3	333	8	9	11	36	44	68	53
Parentage not stated,														
Foreign,	7,634	22	21	14	16	21	94	44	31	183	417	457	430	488
Unknown,	441	18					18		2	5	19	28	24	46
Colored,	1,898	452	114	60	30	17	673	43	29	61	107	124	135	150
Negro,	1,869	451	114	60	30	17	672	43	29	61	107	120	133	147
Indian,	1													
Chinese,	26											3	2	3
Japanese,	2	1					1					1		
Females:														
Total,	25,916	5,598	1,429	623	354	260	8,264	690	398	658	1,051	1,058	1,044	1,089
White,	24,239	5,237	1,329	572	333	247	7,718	633	362	583	944	943	932	995
Native,	18,034	5,198	1,309	563	319	240	7,629	608	340	473	713	662	664	667
Both parents native,	9,259	2,263	540	228	151	113	3,295	332	187	282	403	357	338	338
One or both parents foreign,	7,443	2,715	739	325	165	121	4,065	269	144	176	266	259	284	266
Parentage unknown,	1,332	220	30	10	3	6	269	7	9	15	44	46	42	63
Parentage not stated,														
Foreign,	6,035	21	17	9	14	7	68	25	22	108	224	274	260	321
Unknown,	170	18	3				21			2	7	7	8	7

Colored,	1,677	361	100	51	21	13	546	57	36	75	107	115	112	94
Negro,	1,673	361	99	51	21	13	545	57	36	74	107	113	112	94
Indian,	2									1		1		
Chinese,	1		1				1							
Japanese,	1											1		
Rural.														
Males:														
Total,	30,795	7,836	1,500	637	395	275	10,643	693	454	839	1,109	1,160	1,030	1,125
White,	30,128	7,691	1,469	626	386	266	10,438	679	441	814	1,084	1,114	995	1,092
Native,	24,120	7,652	1,452	601	753	252	10,332	640	408	614	642	637	561	635
Both parents native,	14,778	4,072	730	333	208	157	5,500	454	298	431	450	428	376	394
One or both parents foreign,	7,037	3,472	708	262	157	92	4,691	174	96	155	156	154	127	171
Parentage unknown,	2,305	108	14	6	10	3	141	12	14	28	36	55	58	70
Parentage not stated,														
Foreign,	5,498	30	16	24	11	14	95	36	29	190	413	432	388	406
Unknown,	510	9	1	1			11	3	4	10	29	45	46	51
Colored,	667	145	31	11	9	9	205	14	13	25	25	46	35	33
Negro,	663	145	31	11	9	9	205	14	13	25	25	44	34	33
Indian,														
Chinese,	4											2	1	
Japanese,														
Females:														
Total,	25,469	6,106	1,355	576	378	243	8,658	737	445	670	865	807	780	850
White,	24,894	5,993	1,309	562	366	233	8,463	729	424	629	829	784	744	829
Native,	21,589	5,962	1,284	551	351	223	8,371	690	410	562	687	606	576	640
Both parents native,	13,817	3,139	636	330	210	146	4,461	452	313	431	509	466	425	450
One or both parents foreign,	5,862	2,733	637	213	139	74	3,796	224	88	103	136	107	105	131
Parentage unknown,	1,910	90	11	8	2	3	114	14	9	28	42	33	46	59
Parentage not stated,														
Foreign,	3,150	26	22	11	15	10	84	34	14	64	139	167	157	183
Unknown,	155	5	3				8	5		3	3	11	11	6
Colored,	575	113	46	14	12	10	195	8	21	41	36	23	36	21
Negro,	574	113	46	14	12	10	195	8	20	41	36	23	36	21
Indian,	1								1					
Chinese,														
Japanese,														

TABLE 6.—Continued.

Class—Cities.	Age.												
	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95+	Un.
Males:													
Total,	1,450	1,599	1,508	1,574	1,661	1,558	1,318	1,095	655	282	51	17	2
White,	1,342	1,500	1,405	1,505	1,601	1,508	1,278	1,074	639	277	48	15	2
Native,	732	845	815	817	786	757	658	503	322	134	30	6	
Both parents native,	324	367	406	429	499	474	409	299	205	83	18	4	
One or both parents foreign,	328	381	303	271	172	136	108	79	39	21	4		
Parentage unknown,	80	97	106	117	115	147	141	125	78	30	8	2	
Parentage not stated,													
Foreign,	559	619	534	655	781	711	102	551	312	138	18	9	1
Unknown,	51	36	56	53	34	40	18	20	5	5			1
Colored,	108	99	103	69	60	50	40	21	16	5	3	2	
Negro,	102	96	99	64	60	49	40	21	16	5	3	2	
Indian,	1												
Chinese,	5	3	4	5		1							
Japanese,													
Females:													
Total,	1,025	1,065	1,160	1,193	1,414	1,502	1,457	1,191	950	505	158	44	
White,	935	978	1,085	1,129	1,358	1,445	1,422	1,168	929	491	153	36	
Native,	593	642	686	660	704	724	726	619	520	292	92	20	
Both parents native,	264	306	346	402	428	487	462	414	350	194	63	11	
One or both parents foreign,	274	272	254	185	192	144	154	100	83	37	14	5	
Parentage unknown,	55	64	86	73	84	93	110	105	87	61	15	4	
Parentage not stated,													
Foreign,	329	323	387	459	645	706	683	537	400	191	58	15	
Unknown,	13	13	12	10	9	15	13	12	9	8	3	1	
Colored,	90	87	75	64	56	57	35	23	21	14	5	8	
Negro,	90	87	75	64	56	57	35	23	21	14	5	8	
Indian,													
Chinese,													
Japanese,													

Rural.													
Males:													
Total,	1,041	1,168	1,198	1,313	1,541	1,702	1,878	1,844	1,276	567	178	33	3
White,	1,002	1,120	1,158	1,282	1,516	1,673	1,858	1,823	1,266	564	174	32	3
Native,	552	674	785	903	1,101	1,249	1,440	1,402	975	424	126	19	1
Both parents native,	338	435	501	619	770	872	998	970	617	256	62	9	.....
One or both parents foreign,	152	151	166	143	138	133	158	123	97	49	19	3	1
Parentage unknown,	62	88	118	141	193	244	304	309	261	119	45	7	.....
Parentage not stated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Foreign,	399	396	328	355	389	391	390	391	272	138	48	12	.....
Unknown,	51	50	45	24	26	33	28	30	19	2	.....	1	2
Colored,	39	48	40	31	25	29	20	21	10	3	4	1	.....
Negro,	38	48	40	51	25	29	20	21	10	3	4	1	.....
Indian,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chinese,	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Japanese,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Females.													
Total,	711	754	905	977	1,259	1,514	1,654	1,589	1,295	682	249	68	.....
White,	679	732	879	955	1,243	1,491	1,639	1,578	1,285	674	242	66	.....
Native,	516	598	730	770	949	1,161	1,296	1,257	1,005	529	196	40	.....
Both parents native,	344	412	515	556	686	856	960	845	658	335	120	23	.....
One or both parents foreign,	121	116	137	107	127	121	118	139	97	60	21	8	.....
Parentage unknown,	51	70	78	107	135	184	218	273	250	134	55	9	.....
Parentage not stated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Foreign,	157	132	142	180	277	320	330	309	259	135	41	26	.....
Unknown,	6	2	7	5	17	10	13	12	21	10	5	.....	.....
Colored,	32	22	26	22	16	23	15	11	10	8	7	2	.....
Negro,	32	22	26	22	16	23	15	11	10	8	7	2	.....
Indian,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chinese,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Japanese,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

MORTALITY TABLE 7.

Deaths by age, color, general nativity and parent nativity for each municipality having more than 8,000 population and for the rural section of each county including all municipalities having less than 8,000 population. (Stillbirths excluded).

Area—Cities.	Aggregate.	White.	Native.	Both par. nat.	Both par. for.	Both par. un.	F.-N. M.-F.	M.-N. F.-F.	F.-N. M.-Un.	M.-N. F.-Un.	F.-F. M.-Un.	M.-F. F.-Un.	Both par. X.	For.	Un.	Col.	Negro.	Ind.	Chi.	Jap.
Aggregate,	55,982	52,407	38,127	19,088	12,414	2,037	1,143	2,269	505	398	186	87	------	13,669	611	3,575	3,542	3	27	3
Allentown,	783	777	687	495	142	9	5	24	7	2	3	------	------	87	3	6	6	------	------	------
Altoona,	672	658	576	397	93	23	12	26	12	9	3	1	------	81	1	14	14	------	------	------
Beaver Falls,	157	154	113	52	32	7	6	5	6	------	4	1	------	39	2	3	3	------	------	------
Braddock,	410	397	271	77	154	6	12	17	3	------	2	------	------	122	4	13	13	------	------	------
Bradford,	186	181	141	95	24	6	3	3	7	1	1	1	------	38	2	5	5	------	------	------
Butler,	249	245	203	113	61	7	7	8	6	1	------	------	------	39	3	4	4	------	------	------
Carbondale,	261	261	186	87	53	8	11	23	------	1	3	------	------	73	2	------	------	------	------	------
Carlisle,	160	126	116	99	3	3	------	6	4	------	1	------	------	8	2	34	32	1	1	------
Chambersburg,	190	175	166	133	6	8	1	3	5	6	3	1	------	7	2	15	15	------	------	------
Chester,	603	456	343	174	82	26	19	22	13	5	2	------	------	104	9	147	147	------	------	------
Columbia,	153	142	117	76	18	13	------	5	3	1	1	------	------	21	4	11	11	------	------	------
Danville,	112	112	92	69	9	------	1	7	5	------	1	------	------	20	------	------	------	------	------	------
Dubois,	133	133	102	63	30	2	1	4	1	1	------	------	------	29	2	------	------	------	------	------
Dunmore,	255	254	182	52	76	34	3	8	2	7	------	------	------	63	9	1	1	------	------	------
Duquesne,	203	201	161	29	116	2	2	6	1	2	2	1	------	39	1	2	2	------	------	------
Easton,	392	381	307	227	44	9	6	12	7	2	------	------	------	68	6	11	10	------	------	1
Erie,	996	991	696	288	214	84	29	66	8	2	5	------	------	291	4	5	5	------	------	------
Harrisburg,	831	724	617	492	57	15	7	30	7	4	2	3	------	100	7	107	107	------	------	------
Hazleton,	179	179	119	67	34	------	3	12	------	2	------	1	------	60	------	------	------	------	------	------
Homestead,	254	234	184	54	107	3	10	6	2	2	------	------	------	49	1	20	20	------	------	------

Johnstown,	730	712	519	259	157	35	9	31	16	7	5	------	------	190	3	18	18	------	------	------
Lancaster,	609	679	574	460	60	3	11	28	9	3	------	------	------	104	1	20	20	------	------	------
Lebanon,	272	270	255	190	16	23	1	9	14	2	------	------	------	13	2	2	2	------	------	------
McKeesport,	748	717	507	194	256	------	26	24	------	3	2	2	------	205	5	31	30	------	1	------
Mahanoy City,	281	281	207	65	115	7	4	9	1	2	4	------	------	73	1	------	------	------	------	------
Meadville,	190	184	151	107	15	8	3	13	2	1	2	------	------	32	1	6	6	------	------	------
Mt. Carmel,	231	231	171	51	90	6	4	16	1	------	3	------	------	59	1	------	------	------	------	------
Nanticoke,	287	287	193	30	128	4	6	22	1	1	1	------	------	91	3	------	------	------	------	------
Newcastle,	494	485	378	223	93	15	11	22	5	6	2	1	------	102	5	9	9	------	------	------
Norristown,	591	558	415	253	69	37	12	16	17	6	4	1	------	122	21	33	33	------	------	------
Oil City,	194	189	145	92	22	9	7	6	5	2	2	------	------	41	3	5	5	------	------	------
Philadelphia,	25,926	23,697	16,524	7,952	5,568	1,190	513	908	106	190	56	41	------	6,822	351	2,229	2,209	2	16	2
Phoenixville,	181	179	142	87	37	8	2	6	2	------	------	------	------	37	------	2	2	------	------	------
Pittsburg,	9,630	8,410	5,838	2,243	2,480	191	247	479	79	70	33	16	------	2,485	87	620	612	------	8	------
Pittston,	316	316	218	74	124	3	5	9	1	1	1	------	------	97	1	------	------	------	------	------
Plymouth,	260	259	188	52	103	2	9	16	2	1	3	------	------	71	------	1	1	------	------	------
Pottstown,	210	209	191	152	17	7	3	6	5	1	------	------	------	17	1	1	1	------	------	------
Pottsville,	362	361	269	162	64	5	7	20	7	4	------	------	------	88	4	1	1	------	------	------
Reading,	1,371	1,356	1,212	994	137	14	11	29	23	1	3	------	------	137	7	15	15	------	------	------
Scranton,	2,051	2,040	1,353	494	612	22	50	129	23	9	8	6	------	678	9	11	11	------	------	------
Shamokin,	262	261	215	134	49	3	5	15	6	2	1	------	------	46	------	1	1	------	------	------
Sharon,	212	207	156	73	50	8	4	15	2	2	2	------	------	49	2	5	5	------	------	------
Shenandoah,	479	479	349	56	260	13	2	16	1	------	------	1	------	129	1	------	------	------	------	------
South Bethlehem,	260	259	210	68	111	11	3	7	3	1	5	1	------	49	------	1	1	------	------	------
Steelton,	193	164	138	70	54	4	2	4	1	1	1	1	------	25	1	29	29	------	------	------
Sunbury,	155	153	141	116	1	11	2	1	6	4	------	------	------	6	6	2	2	------	------	------
Titusville,	124	121	90	46	17	8	3	5	8	3	------	------	------	31	------	3	3	------	------	------
Warren,	118	117	79	42	17	9	------	6	3	2	------	------	------	38	------	1	------	------	1	------
West Chester,	236	172	138	107	2	8	4	------	11	5	1	------	------	31	3	64	64	------	------	------
Wilkes-Barre,	997	982	661	279	251	29	16	59	10	8	4	5	------	305	16	15	15	------	------	------
Wilkinsburg,	242	236	191	117	25	18	5	15	6	------	2	3	------	43	2	6	6	------	------	------
Williamsport,	510	492	413	266	42	45	9	22	16	8	5	------	------	71	8	18	18	------	------	------
York,	591	563	517	441	17	16	9	13	14	4	3	------	------	44	2	28	28	------	------	------
Aggregate, Rural,	56,264	55,022	45,709	28,595	9,820	2,433	840	1,886	1,159	623	286	67	------	8,648	665	1,242	1,237	1	4	------
Adams,	430	422	412	316	9	45	2	9	18	12	------	1	------	5	5	8	8	------	------	------
Allegheny,	5,185	4,983	3,668	1,479	1,501	143	144	266	53	27	38	17	------	1,245	70	202	201	------	1	------
Armstrong,	849	842	753	527	127	24	15	31	16	9	4	------	------	82	7	7	7	------	------	------
Beaver,	826	814	671	393	138	48	21	37	16	7	9	2	------	119	24	12	12	------	------	------
Bedford,	479	468	447	377	6	24	5	11	16	7	1	------	------	19	2	11	11	------	------	------

TABLE 7.—Continued.

Area.	Aggregate.	White.	Native.	Both par. nat.	Both par. for.	Both par. un.	F.-N. M.-F.	M.-N. F.-F.	F.-N. M.-Un.	M.-N. F.-Un.	F.-F. M.-Un.	M.-F. F.-Un.	Both par. X.	For.	Un.	Col.	Negro.	Ind.	Chi.	Jap.
Berks,	1,393	1,391	1,308	1,117	28	78	4	11	54	13	3	.....	.....	53	30	2	2	.....	.....	.....
Blair,	748	739	672	547	36	36	7	15	19	9	3	.....	.....	57	10	9	9	.....	.....	.....
Bradford,	947	940	853	600	68	89	10	20	42	19	4	1	.....	78	9	7	7	.....	.....	.....
Bucks,	1,109	1,064	937	739	86	40	13	24	14	19	2	.....	.....	119	8	45	45	.....	.....	.....
Butler,	562	559	476	292	92	21	10	21	22	10	5	3	.....	79	4	3	3	.....	.....	.....
Cambria,	1,315	1,308	1,021	484	406	25	24	55	18	2	6	1	.....	278	9	7	7	.....	.....	.....
Cameron,	80	88	73	49	10	4	.....	7	2	1	.....	.....	.....	13	2	1	1	.....	.....	.....
Carbon,	769	768	598	366	190	13	4	18	3	.....	3	1	.....	160	10	1	1	.....	.....	.....
Center,	594	583	536	399	38	44	4	14	22	13	1	1	.....	39	8	11	11	.....	.....	.....
Chester,	1,231	1,058	941	733	83	42	18	25	21	15	4	.....	.....	106	11	173	173	.....	.....	.....
Clarion,	388	386	351	270	18	19	7	14	9	11	3	.....	.....	31	4	2	2	.....	.....	.....
Clearfield,	987	982	788	457	202	32	27	47	13	9	.....	1	.....	183	11	5	5	.....	.....	.....
Clinton,	428	426	362	258	39	21	5	12	15	10	2	.....	.....	57	7	2	2	.....	.....	.....
Columbia,	611	609	553	421	52	27	6	22	14	5	4	2	.....	55	1	2	1	.....	1	.....
Crawford,	568	564	512	351	34	46	4	26	31	14	5	1	.....	45	7	4	4	.....	.....	.....
Cumberland,	590	575	560	458	11	43	5	11	20	8	4	.....	.....	12	3	15	15	.....	.....	.....
Dauphin,	893	860	779	636	58	33	8	12	18	9	5	.....	.....	71	10	33	32	.....	1	.....
Delaware,	946	838	672	438	105	36	18	43	23	5	4	.....	.....	147	19	108	108	.....	.....	.....
Elk,	386	384	266	128	82	14	4	21	5	10	1	1	.....	110	8	2	2	.....	.....	.....
Erie,	667	666	531	298	65	71	22	22	26	20	7	.....	.....	129	6	1	1	.....	.....	.....
Fayette,	2,323	2,179	1,807	888	713	72	28	47	29	15	13	2	.....	337	35	144	144	.....	.....	.....
Forest,	91	91	81	50	8	15	2	1	2	1	.....	2	.....	7	3	.....	.....	.....	.....	.....
Franklin,	644	616	597	480	16	44	3	13	26	12	3	.....	.....	13	6	28	28	.....	.....	.....
Fulton,	116	113	110	88	2	7	.....	2	7	4	.....	.....	.....	3	.....	3	3	.....	.....	.....
Greene,	321	314	303	251	7	19	.....	6	13	7	.....	.....	.....	8	3	7	7	.....	.....	.....
Huntingdon,	424	419	387	303	15	23	6	7	22	9	2	.....	.....	26	6	5	5	.....	.....	.....
Indiana,	819	812	700	417	185	36	9	26	15	6	5	1	.....	106	6	7	7	.....	.....	.....
Jefferson,	817	813	658	371	162	44	8	37	16	10	8	2	.....	148	7	4	4	.....	.....	.....
Juniata,	219	217	205	171	.....	14	.....	6	12	1	1	.....	.....	10	2	2	2	.....	.....	.....
Lackawanna,	1,624	1,621	1,132	275	683	21	50	91	3	4	4	1	.....	476	13	3	3	.....	.....	.....

Lancaster,	1,357	1,337	1,249	1,105	27	44	8	25	23	14	2	1		80	8	20	20			
Lawrence,	392	389	320	193	62	23	9	10	9	6	5	3		66	3	3	3			
Lebanon,	570	569	538	445	28	22		7	26	8	2			23	8	1	1			
Lehigh,	1,053	1,048	926	705	151	14	14	21	11	4	5	1		118	4	5	5			
Luzerne,	3,135	3,130	2,190	724	1,123	62	59	168	24	17	10	3		921	19	5	5			
Lycoming,	549	545	498	365	33	43	7	22	15	7	5	1		41	6	4	4			
McKean,	385	380	295	151	61	36	10	10	12	11	4			76	9	5	5			
Mercer,	765	759	615	365	109	51	10	37	20	13	7	3		127	17	6	1			
Mifflin,	354	352	330	274	8	18	3	8	14	4	1			18	4	2	2			
Monroe,	313	309	277	234	7	13	3	8	8	4				26	6	4	4			
Montgomery,	1,587	1,524	1,267	932	180	51	23	30	27	12	10	2		247	10	63	62	1		
Montour,	155	155	125	57	3	58		4	2		1			20	10					
Northampton,	1,107	1,102	957	700	166	29	11	28	11	10	1	1		141	4	5	5			
Northumberland,	725	722	588	400	107	26	8	22	16	5	3	1		125	9	3	3			
Perry,	318	317	302	260	2	20	2	3	10	4	1			12	3	1	1			
Pike,	104	104	76	53	14	1	2	2	1	3				24	4					
Potter,	349	348	300	185	31	41	4	14	12	7	3			41	7	1	1			
Schuylkill,	2,260	2,256	1,722	932	571	19	28	87	28	11	13			524	10	4	4			
Snyder,	199	199	197	174		11			6	6				1	1					
Somerset,	875	866	743	493	171	16	9	27	9	10	3	2		120	3	9	9			
Sullivan,	104	104	92	64	15	3	2	4	2	1		1		12						
Susquehanna,	582	577	473	303	95	26	5	14	18	10	2			98	6	5	5			
Tioga,	588	587	515	343	46	63	12	17	21	10	1	2		60	12	1	1			
Union,	206	204	197	162	4	14	1	2	9	5				5	2	2	2			
Venango,	480	480	418	271	35	41	5	24	24	13	4	1		52	10	9	9			
Warren,	444	441	336	158	38	94	4	15	19	6	2			97	8	3	3			
Washington,	2,220	2,097	1,627	828	503	88	42	93	33	23	16	1		402	68	123	123			
Wayne,	404	404	301	187	41	20	12	20	7	11	3			99	4					
Westmoreland,	3,045	2,986	2,364	1,142	880	84	44	115	47	26	22	4		595	27	59	58		1	
Wyoming,	220	220	200	150	6	17	3	5	5	12	2			14	6					
York,	1,022	999	951	813	19	42	7	14	35	17	4			37	11	23	23			

BIRTHS.

BIRTH TABLE 1.

Births by sex and months for the entire State and for all municipalities over 5,000 population, also for certain groups of municipalities, and for the rural section of each county. (Stillbirths excluded).

Area.		Aggregate.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Entire State,	To.,	194,623	16,467	16,210	17,571	15,669	16,159	15,765	16,752	16,831	16,065	15,646	15,515	15,973
	M.,	100,517	8,547	8,480	9,149	8,012	8,520	8,089	8,672	8,611	8,220	8,088	7,987	8,142
	F.,	94,106	7,920	7,730	8,422	7,657	7,639	7,676	8,080	8,220	7,845	7,558	7,528	7,831
Total of all cities and boroughs over 5,000 population.	To.,	101,125	8,581	8,303	9,062	7,898	8,389	8,191	8,901	8,634	8,189	8,271	8,208	8,498
	M.,	52,230	4,402	4,382	4,751	4,024	4,414	4,226	4,562	4,396	4,234	4,235	4,255	4,349
	F.,	48,895	4,179	3,921	4,311	3,874	3,975	3,965	4,339	4,238	3,955	4,036	3,953	4,149
Total of all boroughs between 2,500 and 5,000 population.	To.,	10,570	878	890	993	815	835	949	899	943	855	857	786	870
	M.,	5,455	432	476	517	412	446	483	464	494	444	448	385	454
	F.,	5,115	446	414	476	403	389	466	435	449	411	409	401	416
Total of all boroughs having less than 2,500 population.	To.,	21,175	1,780	1,748	1,906	1,731	1,802	1,685	1,797	1,901	1,744	1,632	1,742	1,707
	M.,	11,030	933	898	1,018	885	948	895	963	968	873	888	906	875
	F.,	10,145	847	850	888	846	854	790	834	933	871	764	836	832
Total Rural,	To.,	61,753	5,228	5,269	5,610	5,225	5,133	4,940	5,155	5,353	5,277	4,886	4,779	4,898
	M.,	31,802	2,780	2,724	2,863	2,691	2,712	2,485	2,683	2,753	2,669	2,537	2,441	2,464
	F.,	29,951	2,448	2,545	2,747	2,534	2,421	2,455	2,472	2,600	2,608	2,349	2,338	2,434
Allentown,	To.,	1,242	99	104	116	76	102	99	91	113	112	110	109	111
	M.,	656	57	55	65	42	52	56	53	52	58	60	42	64
	F.,	586	42	49	51	34	50	43	38	61	54	50	67	47
Altoona,	To.,	1,376	111	132	139	107	100	121	126	129	99	106	118	88
	M.,	702	53	72	69	52	50	56	62	64	51	60	60	53
	F.,	674	58	60	70	55	50	65	64	65	48	46	58	35
Archbald,	To.,	228	18	18	24	23	14	21	20	15	20	20	15	20
	M.,	134	10	13	17	14	9	9	13	6	8	13	12	10
	F.,	94	8	5	7	9	5	12	7	9	12	7	3	10

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Ashland,	To.,	172	13	16	9	17	20	28	10	10	15	11	13	10
	M.,	86	6	6	5	12	13	12	3	5	7	6	5	6
	F.,	86	7	10	4	5	7	16	7	5	8	5	8	4
Bangor,	To.,	108	14	9	5	12	11	12	8	6	5	12	11	3
	M.,	55	12	5	3	3	4	7	5	4	2	4	5	1
	F.,	53	2	4	2	9	7	5	3	2	3	8	6	2
Beaver Falls,	To.,	292	18	33	24	21	18	39	28	28	16	24	25	27
	M.,	152	9	20	13	9	13	13	16	12	5	15	15	12
	F.,	140	9	13	11	12	5	17	12	16	11	9	10	15
Bethlehem,	To.,	251	26	19	21	19	25	23	15	23	19	12	22	27
	M.,	140	17	9	16	11	12	11	8	9	8	7	14	18
	F.,	111	9	10	5	8	13	12	7	14	11	5	8	9
Bloomsburg,	To.,	145	12	12	11	13	10	10	13	9	16	12	19	8
	M.,	74	8	3	6	4	7	3	6	6	11	8	12	3
	F.,	71	4	9	5	9	6	7	7	3	5	4	7	5
Braddock,	To.,	854	71	72	70	71	59	77	73	78	65	80	70	68
	M.,	414	38	35	29	37	33	37	42	34	29	39	31	30
	F.,	440	33	37	41	34	26	40	31	44	36	41	39	38
Bradford,	To.,	321	22	30	33	31	31	14	31	30	24	25	19	31
	M.,	154	10	18	12	13	19	8	11	15	10	10	11	17
	F.,	167	12	12	21	18	12	6	20	15	14	15	8	14
Bristol,	To.,	210	28	20	14	11	16	10	19	19	15	20	17	21
	M.,	106	14	8	8	5	4	6	14	8	8	10	9	12
	F.,	104	14	12	6	6	12	4	5	11	7	10	8	9
Butler,	To.,	663	61	55	60	58	56	55	60	51	47	50	52	58
	M.,	360	34	28	26	27	30	34	28	33	27	30	28	35
	F.,	303	27	27	34	31	26	21	32	18	20	20	24	23
Carbondale,	To.,	449	27	48	36	34	32	44	35	49	43	30	35	36
	M.,	224	16	24	13	16	16	23	14	26	26	11	14	25
	F.,	225	11	24	23	18	16	21	21	23	17	19	21	11

Carlisle,	To.,	184	11	21	32	13	16	16	15	13	10	16	9	12
	M.,	94	6	11	11	6	13	10	10	4	3	8	5	7
	F.,	90	5	10	21	7	3	6	5	9	7	8	4	5
Carnegie,	To.,	298	25	24	26	20	35	17	16	33	29	21	31	21
	M.,	155	17	11	13	9	16	7	6	21	14	11	17	13
	F.,	143	8	13	13	11	19	10	10	12	15	10	14	8
Chambersburg,	To.,	294	23	19	21	29	21	20	29	25	33	23	27	24
	M.,	157	12	8	13	17	12	12	19	12	17	11	14	10
	F.,	137	11	11	8	12	9	8	10	13	16	12	13	14
Charleroi,	To.,	284	24	26	21	15	22	22	26	19	26	30	24	29
	M.,	139	13	12	9	7	10	12	20	8	10	13	13	12
	F.,	145	11	14	12	8	12	10	6	11	16	17	11	17
Chester,	To.,	813	74	57	54	63	78	58	74	73	70	59	79	74
	M.,	415	43	28	23	38	37	24	38	44	26	37	38	39
	F.,	398	31	29	31	25	41	34	36	29	44	22	41	35
Clearfield,	To.,	214	12	13	21	20	22	20	18	22	21	18	17	10
	M.,	111	5	6	13	9	8	13	8	13	7	11	10	8
	F.,	103	7	7	8	11	14	7	10	9	14	7	7	2
Coatesville,	To.,	337	35	42	27	20	25	21	27	34	28	30	27	21
	M.,	186	19	24	18	11	16	8	18	18	13	13	15	13
	F.,	151	16	18	9	9	9	13	9	16	15	17	12	8
Columbia,	To.,	324	24	26	27	28	29	25	25	32	27	21	29	31
	M.,	166	12	18	16	16	14	16	10	16	16	9	11	12
	F.,	158	12	8	11	12	15	9	15	16	11	12	18	19
Connellsville,	To.,	258	35	25	33	28	22	16	20	20	25	15	19	10
	M.,	125	15	13	15	11	18	5	9	11	7	7	9	5
	F.,	133	20	12	8	17	4	11	11	9	18	8	10	5
Conshohocken,	To.,	153	13	11	12	8	9	17	11	17	15	10	17	13
	M.,	85	8	7	8	4	5	11	3	11	9	5	7	7
	F.,	68	5	4	4	4	4	6	8	6	6	5	10	6
Corry,	To.,	109	13	11	5	9	6	10	12	6	8	13	4	12
	M.,	53	6	7	2	2	2	6	5	4	5	6	2	6
	F.,	56	7	4	3	7	4	4	7	2	3	7	2	6
Danville,	To.,	192	18	14	21	15	22	16	18	11	13	17	9	18
	M.,	116	10	10	10	9	19	4	11	8	9	11	5	10
	F.,	76	8	4	11	6	3	12	7	3	4	6	4	8
Dickson City,	To.,	360	28	20	32	28	19	33	27	37	33	23	44	36
	M.,	183	15	12	13	12	12	18	13	19	16	12	23	18
	F.,	177	13	8	19	16	7	15	14	18	17	11	21	18

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
DuBois,	To.,	344	36	24	24	32	27	24	43	30	31	23	26	24
	M.,	182	12	16	11	12	18	11	23	16	22	12	15	14
	F.,	162	24	8	13	20	9	13	20	14	9	11	11	10
Dunsmore,	To.,	445	20	34	41	33	28	58	39	45	36	37	38	36
	M.,	229	13	19	19	14	16	34	22	25	17	18	19	13
	F.,	216	7	15	22	19	12	24	17	20	19	19	19	23
Duquesne,	To.,	569	60	43	43	38	48	54	57	41	58	41	46	40
	M.,	284	31	17	23	18	23	25	28	25	31	16	29	18
	F.,	285	29	26	20	20	25	29	29	16	27	25	17	22
Duryea,	To.,	266	20	19	26	18	22	28	23	20	18	24	25	23
	M.,	128	9	12	15	10	10	11	14	12	4	8	14	9
	F.,	138	11	7	11	8	12	17	9	8	14	16	11	14
Easton,	To.,	573	49	44	50	40	46	44	51	40	42	49	54	64
	M.,	291	24	26	26	20	24	22	28	20	21	26	22	32
	F.,	282	25	18	24	20	22	22	23	20	21	23	32	32
Edwardsville,	To.,	232	22	17	14	16	19	25	31	28	11	18	15	16
	M.,	131	13	11	6	7	11	15	16	13	8	12	12	7
	F.,	101	9	6	8	9	8	10	15	15	3	6	3	9
Erie,	To.,	1,642	140	160	154	141	138	132	147	139	128	127	108	128
	M.,	889	76	85	89	69	75	70	77	73	76	69	60	70
	F.,	753	64	75	65	72	63	62	70	66	52	58	48	58
Etna,	To.,	191	15	13	9	11	17	17	20	23	15	21	20	10
	M.,	90	10	5	5	3	7	6	10	13	7	7	11	6
	F.,	101	5	8	4	8	10	11	10	10	8	14	9	4
Forest City,	To.,	290	19	18	28	20	23	26	39	25	23	30	21	18
	M.,	129	6	8	12	9	10	18	18	12	12	11	8	5
	F.,	161	13	10	16	11	13	8	21	13	11	19	13	13
Franklin,	To.,	239	21	18	23	19	21	23	18	22	21	12	15	26
	M.,	133	13	8	16	9	16	10	9	9	14	4	8	17
	F.,	106	8	10	7	10	5	13	9	13	7	8	7	9

Freeland,	To.,	222	16	12	19	20	14	9	20	28	25	21	19	19
	M.,	112	12	8	9	10	9	4	12	13	12	8	8	7
	F.,	110	4	4	10	10	5	5	8	15	13	13	11	12
Greensburg,	To.,	297	22	28	21	27	29	25	22	27	30	29	19	18
	M.,	150	10	14	8	12	13	11	9	17	16	18	10	12
	F.,	147	12	14	13	15	16	14	13	10	14	11	9	6
Greenville,	To.,	152	24	15	15	11	13	15	10	9	9	14	11	6
	M.,	77	15	8	3	6	7	9	7	4	6	5	5	2
	F.,	75	9	7	12	5	6	6	3	5	3	9	6	4
Hanover,	To.,	207	18	15	23	21	16	21	13	11	21	20	18	10
	M.,	105	6	8	14	7	6	19	2	5	12	9	11	6
	F.,	102	12	7	9	14	10	2	11	6	9	11	7	4
Harrisburg,	To.,	1,326	116	97	116	106	109	100	119	113	120	106	99	125
	M.,	685	66	43	58	48	58	45	63	56	67	61	57	63
	F.,	641	50	54	58	58	51	55	56	57	53	45	42	62
Hazleton,	To.,	421	33	34	27	28	28	32	40	35	45	35	29	55
	M.,	215	17	15	12	9	14	25	22	14	20	21	19	27
	F.,	206	16	19	15	19	14	7	18	21	25	14	10	28
Homestead,	To.,	738	70	65	75	36	54	54	68	73	51	71	50	71
	M.,	376	32	32	42	21	31	29	39	30	28	34	20	38
	F.,	362	38	33	33	15	23	25	29	43	23	37	30	33
Huntingdon,	To.,	139	16	15	7	7	10	14	17	9	10	11	14	9
	M.,	80	11	8	5	4	7	12	7	5	5	4	8	4
	F.,	59	5	7	2	3	3	2	10	4	5	7	6	5
Indiana,	To.,	125	9	12	10	13	12	11	13	7	11	10	8	9
	M.,	66	4	8	2	9	7	5	10	3	7	2	5	4
	F.,	59	5	4	8	4	5	6	3	4	4	8	3	5
Jeannette,	To.,	220	24	20	16	15	13	20	22	17	23	21	18	11
	M.,	120	12	11	12	9	6	8	14	10	11	12	7	8
	F.,	100	12	9	4	6	7	12	8	7	12	9	11	3
Johnsonburg,	To.,	150	13	12	11	10	21	14	14	11	10	13	9	12
	M.,	72	7	6	6	6	6	7	7	6	6	5	3	7
	F.,	78	6	6	5	4	15	7	7	5	4	8	6	5
Johnstown,	To.,	1,463	151	129	128	93	118	121	115	134	105	105	124	140
	M.,	759	82	71	71	57	55	58	58	64	57	49	63	74
	F.,	704	69	58	57	36	63	63	57	70	48	56	61	66
Kane,	To.,	223	24	24	16	23	21	19	11	11	22	13	13	26
	M.,	111	17	14	7	11	11	9	5	2	10	8	5	12
	F.,	112	7	10	9	12	10	10	6	9	12	5	8	14

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Lancaster,	To.,	894	63	67	73	59	87	80	93	84	63	62	78	85
	M.,	465	27	34	37	31	43	43	57	47	34	28	43	41
	F.,	429	36	33	36	28	44	37	36	37	29	34	35	44
Lansford,	To.,	261	15	20	24	23	26	21	22	21	27	19	21	22
	M.,	114	7	9	14	9	10	7	9	6	15	10	7	11
	F.,	147	8	11	10	14	16	14	13	15	12	9	14	11
Latrobe,	To.,	291	20	27	29	20	18	19	30	20	31	29	31	17
	M.,	154	8	15	10	10	12	9	20	12	20	10	18	10
	F.,	137	12	12	19	10	6	10	10	8	11	19	13	7
Lebanon,	To.,	360	33	26	36	22	34	27	32	25	19	35	36	35
	M.,	168	13	11	12	10	17	15	18	12	7	16	17	20
	F.,	192	20	15	24	12	17	12	14	13	12	19	19	15
Lehighton,	To.,	117	8	14	10	10	10	13	6	12	5	12	13	4
	M.,	60	5	10	5	7	2	7	2	8	1	4	6	3
	F.,	57	3	4	5	3	8	6	4	4	4	8	7	1
Lewistown,	To.,	209	16	15	24	19	19	9	18	26	18	18	13	14
	M.,	107	9	10	12	10	10	5	11	16	6	9	6	3
	F.,	102	7	5	12	9	9	4	7	10	12	9	7	11
Lock Haven,	To.,	155	16	17	13	9	19	8	14	7	20	6	11	15
	M.,	79	10	6	3	3	12	3	8	2	15	5	3	9
	F.,	76	6	11	10	6	7	5	6	5	5	1	8	6
McKeesport,	To.,	1,569	141	139	150	121	127	142	135	124	122	120	139	109
	M.,	800	76	63	83	56	71	68	70	54	68	59	79	53
	F.,	769	65	76	67	65	56	74	65	70	54	61	60	56
McKees Rocks,	To.,	417	34	34	45	27	52	28	32	34	31	29	36	35
	M.,	206	13	20	16	14	28	9	19	21	13	14	18	21
	F.,	211	21	14	29	13	24	19	13	13	18	15	18	14
Mahanoy City,	To.,	598	31	40	36	40	46	61	68	60	32	45	44	95
	M.,	338	18	16	22	22	28	32	30	41	22	21	25	61
	F.,	260	13	24	14	18	18	29	38	19	10	24	19	34

Meadville,	To.,	226	23	21	26	24	26	14	13	26	18	8	7	20	
	M.,	114	12	12	13	15	11	7	9	12	8	1	4	10	
	F.,	112	11	9	13	9	15	7	4	14	10	7	3	10	
Middletown,	To.,	150	10	16	17	11	13	10	8	16	16	12	12	9	
	M.,	79	4	7	12	1	6	5	3	6	13	8	10	4	
	F.,	71	6	9	5	10	7	5	5	10	3	4	2	5	
Millvale,	To.,	243	29	13	22	21	23	21	14	21	14	19	20	26	
	M.,	137	16	7	10	13	11	13	5	17	10	13	11	11	
	F.,	106	13	6	12	8	12	8	9	4	4	6	9	15	
Milton,	To.,	165	14	7	15	13	18	18	9	20	15	19	7	10	
	M.,	84	9	3	6	8	9	9	2	12	10	9	2	5	
	F.,	81	5	4	9	5	9	9	7	8	5	10	5	5	
Minersville,	To.,	311	22	25	27	21	23	24	24	29	29	29	28	30	
	M.,	169	18	18	14	13	17	12	10	12	13	14	14	14	
	F.,	142	4	7	13	8	6	12	14	17	16	15	14	16	
Monongahela,	To.,	235	32	17	22	17	23	17	24	14	20	19	15	15	
	M.,	124	16	14	9	9	7	9	13	9	9	10	9	10	
	F.,	111	16	3	13	8	16	8	11	5	11	9	6	5	
Mount Carmel,	To.,	632	49	45	48	53	54	51	66	61	53	49	50	53	
	M.,	337	17	28	26	29	29	29	29	36	31	27	31	25	
	F.,	295	32	17	22	24	25	22	37	25	22	22	19	28	
Mount Pleasant,	To.,	174	10	18	22	20	9	14	16	12	17	14	7	15	
	M.,	82	4	5	10	10	7	5	7	6	6	9	4	9	
	F.,	92	6	13	12	10	2	9	9	6	11	5	3	6	
Nanticoke,	To.,	561	57	38	43	47	40	34	49	43	48	54	51	57	
	M.,	299	26	18	21	34	23	22	26	19	26	25	31	28	
	F.,	262	31	20	22	13	17	12	23	24	22	29	20	29	
New Brighton,	To.,	190	15	17	19	13	14	22	16	15	12	15	19	13	
	M.,	96	6	11	11	7	6	12	8	5	6	6	11	7	
	F.,	94	9	6	8	6	8	10	8	10	6	9	8	6	
New Castle,	To.,	1,012	76	91	88	63	76	84	76	88	99	85	95	91	
	M.,	534	45	47	56	30	43	48	38	43	46	54	41	43	
	F.,	478	31	44	32	33	33	36	38	45	53	31	54	48	
Norristown,	To.,	412	43	43	37	23	27	20	23	38	39	48	36	35	
	M.,	223	21	24	21	11	11	10	12	22	25	24	19	23	
	F.,	189	22	19	16	12	16	10	11	16	14	24	17	12	
North Braddock,	To.,	474	50	42	36	38	51	30	42	30	49	30	35	41	
	M.,	242	25	26	20	17	27	19	21	14	26	11	16	20	
	F.,	232	25	16	16	21	24	11	21	16	23	19	19	21	

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Oil City,	To.,	321	39	23	27	27	24	24	31	27	23	31	23	22
	M.,	162	17	10	14	10	10	11	16	15	13	19	13	14
	F.,	159	22	13	13	17	14	13	15	12	10	12	10	8
Old Forge,	To.,	543	28	39	66	56	46	50	42	44	45	44	42	41
	M.,	268	11	21	35	20	21	26	26	22	23	24	18	21
	F.,	275	17	18	31	36	25	24	16	22	22	20	24	20
Olyphant,	To.,	240	28	17	21	19	23	12	15	27	20	20	20	18
	M.,	127	16	12	9	8	13	7	5	17	12	8	12	8
	F.,	113	12	5	12	11	10	5	10	10	8	12	8	10
Philadelphia,	To.,	36,307	2,996	2,986	3,264	2,849	2,984	3,032	3,190	3,040	2,942	3,012	2,965	3,047
	M.,	18,492	1,475	1,552	1,692	1,444	1,537	1,558	1,579	1,518	1,511	1,552	1,560	1,514
	F.,	17,815	1,521	1,434	1,572	1,405	1,447	1,474	1,611	1,522	1,431	1,460	1,405	1,533
Phoenixville,	To.,	357	20	30	27	32	30	35	37	31	33	23	38	21
	M.,	183	7	16	14	19	17	20	14	15	15	11	24	11
	F.,	174	13	14	13	13	13	15	23	16	18	12	14	10
Pittsburg,	To.,	14,436	1,254	1,187	1,321	1,132	1,221	1,087	1,326	1,217	1,118	1,231	1,171	1,171
	M.,	7,514	667	640	706	564	653	567	684	630	555	650	604	594
	F.,	6,922	587	547	615	568	568	520	642	587	563	581	567	577
Pittston,	To.,	481	35	35	44	29	35	40	50	51	40	45	32	45
	M.,	242	14	18	25	14	17	22	23	30	25	17	14	23
	F.,	239	21	17	19	15	18	18	27	21	15	28	18	22
Plymouth,	To.,	478	45	41	37	45	47	39	37	37	45	39	27	39
	M.,	237	19	22	16	26	20	21	20	24	21	18	12	18
	F.,	241	26	19	21	19	27	18	17	13	24	21	15	21
Pottsville,	To.,	440	47	40	40	27	34	49	43	39	31	35	22	33
	M.,	228	26	21	24	14	21	19	23	16	17	17	11	19
	F.,	212	21	19	16	13	13	30	20	23	14	18	11	14
Pottstown,	To.,	338	18	22	35	22	39	23	27	36	30	32	30	24
	M.,	176	9	13	16	15	21	15	13	20	13	9	17	15
	F.,	162	9	9	19	7	18	8	14	16	17	23	13	9

Punxsutawney,	To.,	225	23	20	27	12	19	20	11	21	26	16	13	17
	M.,	126	9	13	17	5	9	14	7	13	14	8	7	10
	F.,	99	14	7	10	7	10	6	4	8	12	8	6	7
Reading,	To.,	2,312	215	200	211	180	185	164	218	219	201	194	158	167
	M.,	1,229	111	97	115	93	97	81	113	124	109	104	83	102
	F.,	1,083	104	103	96	87	88	83	105	95	92	90	75	65
Rochester,	To.,	134	14	6	9	12	10	9	12	13	9	12	13	15
	M.,	69	5	4	4	8	6	5	10	6	6	6	6	3
	F.,	65	9	2	5	4	4	4	2	7	3	6	7	12
St. Clair,	To.,	199	12	13	14	16	23	19	27	14	11	5	20	25
	M.,	104	6	7	5	10	10	11	16	10	5	3	8	13
	F.,	95	6	6	9	6	13	8	11	4	6	2	12	12
St. Marys,	To.,	212	21	17	24	15	21	14	12	21	14	18	20	15
	M.,	122	11	10	18	9	14	10	7	10	7	8	12	6
	F.,	90	10	7	6	6	7	4	5	11	7	10	8	9
Sayre,	To.,	159	15	16	20	18	15	6	8	10	11	11	17	12
	M.,	67	7	9	10	10	3	2	1	3	7	3	6	6
	F.,	92	8	7	10	8	12	4	7	7	4	8	11	6
Scranton,	To.,	3,149	217	245	277	238	255	227	282	294	234	269	289	322
	M.,	1,660	113	140	155	118	118	122	155	152	130	144	143	170
	F.,	1,489	104	105	122	120	137	105	127	142	104	125	146	152
Scottdale,	To.,	140	15	11	14	6	14	10	10	16	12	6	10	16
	M.,	72	9	7	11	1	8	3	7	5	6	5	2	8
	F.,	68	6	4	3	5	6	7	3	11	6	1	8	8
Shamokin,	To.,	585	45	40	55	37	46	48	54	61	53	41	56	49
	M.,	313	21	22	29	22	33	24	30	30	30	21	26	25
	F.,	272	24	18	26	15	13	24	24	31	23	20	30	24
Sharon,	To.,	349	32	28	34	24	27	24	43	28	28	22	31	28
	M.,	178	16	17	18	12	13	14	27	12	14	8	16	11
	F.,	171	16	11	16	12	14	10	16	16	14	14	15	17
Sharpsburg,	To.,	199	20	11	14	10	13	19	24	25	14	20	15	14
	M.,	113	10	6	7	6	8	12	14	13	7	12	9	9
	F.,	86	10	5	7	4	5	7	10	12	7	8	6	5
Shenandoah,	To.,	947	78	62	72	78	84	68	84	82	74	61	90	114
	M.,	510	37	31	35	43	48	44	44	48	39	34	52	55
	F.,	437	41	31	37	35	36	24	40	34	35	27	38	59
South Bethlehem,	To.,	704	57	60	53	57	54	64	57	53	65	58	65	61
	M.,	397	40	33	28	39	34	37	33	26	39	19	38	31
	F.,	307	17	27	25	18	20	27	24	27	26	39	27	30

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Steelton,	To.,	433	56	37	43	35	35	41	36	39	22	33	39	17
	M.,	220	32	20	28	16	15	11	18	20	11	17	24	8
	F.,	213	24	17	15	19	20	30	18	19	11	16	15	9
Sunbury,	To.,	331	30	34	27	29	24	25	29	17	22	31	30	33
	M.,	179	20	22	13	14	15	13	15	8	8	19	12	20
	F.,	152	10	12	14	15	9	12	14	9	14	12	18	13
Tamaqua,	To.,	259	15	12	27	30	29	23	17	18	28	13	22	25
	M.,	136	9	4	15	14	20	9	10	10	14	7	13	11
	F.,	123	6	8	12	16	9	14	7	8	14	6	9	14
Tarentum,	To.,	209	21	20	19	13	8	20	11	23	23	26	12	13
	M.,	116	13	9	10	8	7	9	8	10	15	11	6	10
	F.,	93	8	11	9	5	1	11	3	13	8	15	6	3
Titusville,	To.,	157	14	19	13	15	12	14	13	8	14	14	9	12
	M.,	85	7	13	9	5	7	7	7	5	8	7	5	5
	F.,	72	7	6	4	10	5	7	6	3	6	7	4	7
Tyrone,	To.,	216	28	21	17	19	19	15	13	15	19	15	16	19
	M.,	107	12	8	5	11	12	8	8	6	8	9	8	12
	F.,	109	16	13	12	8	7	7	5	9	11	6	8	7
Uniontown,	To.,	290	30	24	31	23	25	20	26	28	20	22	21	20
	M.,	150	15	15	23	11	17	7	13	11	11	7	10	10
	F.,	140	15	9	8	12	8	13	13	17	9	15	11	10
Warren,	To.,	249	20	17	26	30	20	21	27	12	15	23	14	24
	M.,	148	12	8	14	19	11	12	19	8	10	13	8	14
	F.,	101	8	9	12	11	9	9	8	4	5	10	6	10
Washington,	To.,	373	33	21	38	37	40	34	33	36	27	24	21	29
	M.,	186	17	7	19	17	21	15	19	20	10	13	9	19
	F.,	187	16	14	19	20	19	19	14	16	17	11	12	10
Waynesboro,	To.,	181	17	22	18	15	9	16	14	17	17	12	13	11
	M.,	83	5	11	9	8	2	10	6	5	8	8	7	4
	F.,	98	12	11	9	7	7	6	8	12	9	4	6	7

West Chester,	To.	223	23	18	21	20	21	16	21	21	12	11	13	26
	M.	126	15	8	11	13	14	10	12	11	8	4	7	13
	F.	97	8	10	10	7	7	6	9	10	4	7	6	13
West Pittston,	To.	138	16	10	11	8	14	10	5	6	15	14	12	17
	M.	75	10	6	4	6	12	7	2	2	8	5	2	11
	F.	63	6	4	7	2	2	3	3	4	7	9	10	6
Wilkes-Barre,	To.	1,723	171	153	156	162	145	133	157	126	134	125	119	142
	M.	916	97	93	87	81	85	75	71	61	73	63	60	70
	F.	807	74	60	69	81	60	58	86	65	61	62	59	72
Wilkinsburg,	To.	527	42	46	42	48	40	40	49	40	50	35	46	49
	M.	276	16	24	22	28	20	21	21	28	28	19	26	23
	F.	251	26	22	20	20	20	19	28	12	22	16	20	26
Williamsport,	To.	692	52	49	64	59	55	73	53	47	70	65	57	48
	M.	348	24	29	32	36	28	34	29	13	36	31	31	25
	F.	344	28	20	32	23	27	39	24	34	34	34	26	23
Wilmerding,	To.	239	18	16	18	14	25	16	20	29	19	24	22	18
	M.	131	12	9	13	10	12	9	8	17	7	16	8	10
	F.	108	6	7	5	4	13	7	12	12	12	8	14	8
Windber,	To.	338	33	18	35	29	24	29	24	27	23	32	29	35
	M.	197	19	10	23	20	12	15	13	17	13	20	15	20
	F.	141	14	8	12	9	12	14	11	10	10	12	14	15
York,	To.	1,031	88	80	108	90	93	74	84	93	84	72	82	83
	M.	495	43	35	51	52	52	27	44	43	39	33	40	36
	F.	536	45	45	57	38	41	47	40	50	45	39	42	47
COUNTIES (Rural.)														
Adams,	To.	603	49	69	67	48	47	40	46	43	48	41	62	43
	M.	322	33	41	31	28	28	17	20	24	22	24	33	21
	F.	281	16	28	36	20	19	23	26	19	26	17	29	22
Allegheny,	To.	3,964	328	344	320	331	309	298	378	366	331	318	320	321
	M.	2,008	158	172	156	168	159	154	195	178	170	168	167	163
	F.	1,956	170	172	164	163	150	144	183	188	161	150	153	158
Armstrong,	To.	1,113	100	97	92	99	99	83	94	92	82	94	101	80
	M.	561	51	40	51	56	58	50	41	42	33	53	51	33
	F.	552	49	57	41	43	41	33	53	50	47	41	50	47
Beaver,	To.	528	48	60	42	30	31	55	43	49	29	46	46	49
	M.	284	22	39	21	16	22	29	19	21	19	19	26	31
	F.	244	26	21	21	14	9	26	24	28	10	27	20	18

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Bedford.	To.,	791	56	75	66	59	77	66	68	58	72	64	59	71
	M.,	406	31	42	36	31	41	27	32	34	36	33	30	33
	F.,	385	25	33	30	28	36	39	36	24	36	31	29	38
Berks,	To.,	1,704	137	157	187	122	128	140	140	155	140	140	119	139
	M.,	869	89	78	85	73	69	75	71	73	64	72	51	69
	F.,	835	48	79	102	49	59	65	69	82	76	68	68	70
Blair,	To.,	776	61	57	70	85	66	61	65	61	73	59	60	58
	M.,	394	26	23	42	50	35	29	28	42	33	34	31	21
	F.,	382	35	34	28	35	31	32	37	19	40	25	29	37
Bradford,	To.,	662	56	46	62	61	56	49	62	57	51	44	59	59
	M.,	339	32	21	28	37	29	26	30	27	28	17	35	29
	F.,	323	24	25	34	24	27	23	32	30	23	27	24	30
Bucks,	To.,	925	73	73	88	70	72	82	78	85	69	71	90	74
	M.,	475	46	35	48	37	33	39	37	52	35	27	44	42
	F.,	450	27	38	40	33	39	43	41	33	34	44	46	32
Butler,	To.,	1,066	90	93	112	83	86	84	86	90	93	73	83	93
	M.,	579	55	58	59	38	56	42	53	46	38	38	39	57
	F.,	487	35	35	53	45	30	42	33	44	55	35	44	36
Cambria,	To.,	1,848	143	169	167	168	149	162	154	155	154	146	147	134
	M.,	961	72	84	78	84	82	71	88	95	88	85	81	53
	F.,	887	71	85	89	84	67	91	66	60	66	61	66	81
Cameron,	To.,	91	8	13	8	5	6	15	6	4	9	13	4	0
	M.,	50	3	5	4	2	2	9	5	4	6	7	3	0
	F.,	41	5	8	4	3	4	6	1	0	3	6	1	0
Carbon,	To.,	644	54	61	72	65	61	43	45	41	60	47	48	47
	M.,	343	32	36	33	38	40	25	22	17	34	23	23	20
	F.,	301	22	25	39	27	21	18	23	24	26	24	25	27
Centre,	To.,	829	75	69	90	60	71	69	58	61	63	77	65	71
	M.,	415	42	35	45	32	30	36	28	32	39	38	26	32
	F.,	414	33	34	45	28	41	33	30	29	24	39	39	39

Chester,	To.	1,185	101	92	105	107	92	113	100	107	85	96	86	101
	M.	606	59	43	53	56	45	55	60	54	40	45	46	50
	F.	579	42	49	52	51	47	58	40	53	45	51	40	51
Clarion,	To.	666	38	43	60	54	60	36	61	70	75	63	50	56
	M.	363	21	22	38	31	29	21	33	45	41	35	22	25
	F.	303	17	21	22	23	31	15	28	25	34	28	28	31
Clearfield,	To.	1,875	169	158	191	162	164	148	148	157	169	136	136	137
	M.	939	86	77	109	74	77	77	73	71	81	64	75	75
	F.	936	83	81	82	88	87	71	75	86	88	72	61	62
Clinton,	To.	330	31	24	24	32	21	36	22	33	32	22	26	27
	M.	164	12	10	14	19	9	19	15	16	15	12	10	13
	F.	166	19	14	10	13	12	17	7	17	17	10	16	14
Columbia,	To.	581	61	49	54	47	55	39	35	49	54	59	40	39
	M.	297	27	26	32	24	30	16	15	25	26	33	25	18
	F.	284	34	23	22	23	25	23	20	24	28	26	15	21
Crawford,	To.	588	51	49	47	53	56	55	49	47	43	40	54	44
	M.	289	27	25	29	21	29	31	25	22	17	18	22	23
	F.	299	24	24	18	32	27	24	24	25	26	22	32	21
Cumberland,	To.	567	63	51	51	36	44	52	45	52	53	45	32	43
	M.	290	33	20	31	17	20	26	29	27	25	19	17	26
	F.	277	30	31	20	19	24	26	16	25	28	26	15	17
Dauphin,	To.	1,051	94	91	88	68	97	78	94	88	88	85	80	100
	M.	540	53	48	42	32	56	40	49	43	45	46	31	55
	F.	511	41	43	46	36	41	38	45	45	43	39	49	45
Delaware,	To.	590	40	49	64	49	50	51	47	43	51	48	49	49
	M.	299	18	26	31	18	27	29	20	22	26	26	25	31
	F.	291	22	23	33	31	23	22	27	21	25	22	24	18
Elk,	To.	623	53	55	53	52	53	64	58	37	58	43	37	60
	M.	315	26	27	22	29	33	31	29	16	34	23	21	24
	F.	308	27	28	31	23	20	33	29	21	24	20	16	36
Erie,	To.	555	43	45	49	47	52	46	51	54	47	49	35	37
	M.	282	27	19	30	23	27	21	28	26	20	28	19	14
	F.	273	16	26	19	24	25	25	23	28	27	21	16	23
Fayette,	To.	2,808	260	246	257	252	229	226	189	243	261	197	228	220
	M.	1,470	148	120	127	132	124	118	95	136	129	105	123	113
	F.	1,338	112	126	130	120	105	108	94	107	132	92	105	107
Forest,	To.	226	20	14	19	27	22	16	27	22	14	21	8	16
	M.	118	14	9	9	18	14	7	13	7	7	11	2	7
	F.	108	6	5	10	9	8	9	14	15	7	10	6	9

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Franklin,	To.,	940	80	93	80	68	83	70	76	92	86	71	76	65
	M.,	495	46	54	44	37	41	32	46	48	47	32	30	38
	F.,	445	34	39	36	31	42	38	30	44	39	39	46	27
Fulton,	To.,	245	14	20	18	17	30	18	20	29	20	32	14	13
	M.,	121	4	12	7	12	13	8	8	16	4	22	8	7
	F.,	124	10	8	11	5	17	10	12	13	16	10	6	6
Greene,	To.,	422	35	39	42	32	22	38	41	44	35	36	31	27
	M.,	202	15	17	17	15	9	17	19	23	23	21	14	12
	F.,	220	20	22	25	17	13	21	22	21	12	15	17	15
Huntingdon,	To.,	491	41	27	52	44	44	36	40	37	50	40	39	41
	M.,	257	26	18	31	23	20	15	17	16	25	26	22	18
	F.,	234	15	9	21	21	24	21	23	21	25	14	17	23
Indiana,	To.,	1,524	145	126	124	146	119	113	120	122	143	126	123	117
	M.,	800	84	72	65	71	62	64	76	56	69	69	58	54
	F.,	724	61	54	59	75	57	49	44	66	74	57	65	63
Jefferson,	To.,	1,374	101	117	129	121	118	117	107	105	139	107	103	110
	M.,	689	41	60	59	56	59	70	58	51	64	60	52	59
	F.,	685	60	57	70	65	59	47	49	54	75	47	51	51
Juniata,	To.,	314	38	22	25	16	31	30	20	29	24	25	27	27
	M.,	176	22	14	17	10	16	12	14	16	14	13	17	11
	F.,	138	16	8	8	6	15	18	6	13	10	12	10	16
Lackawanna,	To.,	454	49	31	48	27	31	12	36	45	45	44	46	40
	M.,	241	29	15	28	12	12	7	16	26	20	24	28	24
	F.,	213	20	16	20	15	19	5	20	19	25	20	18	16
Lancaster,	To.,	2,263	187	200	221	188	180	164	199	200	180	182	187	175
	M.,	1,162	105	118	109	100	89	82	101	95	87	93	92	91
	F.,	1,101	82	82	112	88	91	82	98	105	93	89	95	84
Lawrence,	To.,	541	47	56	52	41	41	40	41	61	45	36	36	45
	M.,	265	25	23	25	22	23	17	18	34	22	19	18	19
	F.,	276	22	33	27	19	18	23	23	27	23	17	18	26

Lehigh,	To.,	1,199	91	92	121	116	93	110	108	90	117	82	95	84
	M.,	571	38	45	61	58	48	57	51	42	59	44	38	30
	F.,	628	53	47	60	58	45	53	57	48	58	38	57	54
Lebanon,	To.,	943	78	70	98	81	82	72	81	90	82	69	76	64
	M.,	484	44	37	51	43	52	35	38	43	40	35	35	31
	F.,	459	34	33	47	38	30	37	43	47	42	34	41	33
Luzerne,	To.,	2,980	266	263	270	240	242	233	224	250	258	236	255	243
	M.,	1,569	137	120	149	122	144	119	121	122	145	118	142	130
	F.,	1,411	129	143	121	118	98	114	103	128	113	118	113	113
Lycoming,	To.,	685	68	54	75	62	50	49	48	67	59	55	55	43
	M.,	371	38	32	46	39	25	24	32	40	28	27	20	20
	F.,	314	30	22	29	23	25	25	16	27	31	28	35	23
McKean,	To.,	446	31	43	35	57	32	35	37	43	24	30	37	42
	M.,	221	18	27	18	22	12	19	16	18	17	15	18	21
	F.,	225	13	16	17	35	20	16	21	25	7	15	19	21
Mercer,	To.,	573	44	35	71	60	38	46	39	53	64	39	39	45
	M.,	309	28	19	34	38	19	22	21	32	29	18	22	27
	F.,	264	16	16	37	22	19	24	18	21	35	21	17	18
Mifflin,	To.,	545	57	51	60	29	48	52	39	53	42	39	33	42
	M.,	280	31	23	31	15	25	24	22	22	25	17	21	24
	F.,	265	26	28	29	14	23	28	17	31	17	22	12	18
Monroe,	To.,	357	23	28	40	26	33	20	35	36	41	28	29	18
	M.,	189	13	20	19	15	17	7	18	21	23	8	14	14
	F.,	168	10	8	21	11	16	13	17	15	18	20	15	4
Montgomery,	To.,	1,610	130	124	127	123	154	139	151	153	124	133	121	131
	M.,	826	49	64	56	67	83	70	77	91	67	70	67	65
	F.,	784	81	60	71	56	71	69	74	62	57	63	54	66
Montour,	To.,	141	12	13	13	10	17	9	12	10	15	8	8	14
	M.,	73	5	6	11	3	8	3	6	7	8	1	5	10
	F.,	68	7	7	2	7	9	6	6	3	7	7	3	4
Northampton,	To.,	895	79	89	62	76	70	76	69	78	88	65	74	69
	M.,	485	41	50	29	39	37	35	56	46	49	30	34	39
	F.,	410	38	39	33	37	33	41	13	32	39	35	40	30
Northumberland,	To.,	1,301	106	103	87	113	111	111	122	121	111	103	92	121
	M.,	656	57	49	43	56	59	57	58	64	56	54	41	62
	F.,	645	49	54	44	57	52	54	64	57	55	49	51	59
Perry,	To.,	434	41	29	42	46	34	23	39	39	34	32	36	39
	M.,	224	23	15	21	25	18	11	18	22	16	15	22	18
	F.,	210	18	14	21	21	16	12	21	17	18	17	14	21

TABLE 1.—Continued.

Area.		Aggregate.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Pike,	To.,	117	10	5	8	15	17	10	6	8	7	12	10	9
	M.,	58	4	3	6	7	5	5	2	6	5	6	3	6
	F.,	59	6	2	2	8	12	5	4	2	2	6	7	3
Potter,	To.,	332	26	22	32	25	29	29	32	34	28	32	15	28
	M.,	168	14	9	15	14	15	13	10	18	19	16	10	15
	F.,	164	12	13	17	11	14	16	22	16	9	16	5	13
Schuylkill,	To.,	2,038	174	173	179	178	163	163	189	155	182	163	161	158
	M.,	1,079	93	106	88	82	93	80	103	87	87	89	95	76
	F.,	959	81	67	91	96	70	83	86	68	95	74	66	82
Snyder,	To.,	400	33	34	38	31	29	40	31	30	36	28	33	37
	M.,	194	16	19	19	13	10	14	16	17	20	15	16	19
	F.,	206	17	15	19	18	19	26	15	13	16	13	17	18
Somerset,	To.,	1,156	92	110	90	111	77	88	105	108	88	110	83	94
	M.,	603	52	56	51	62	44	38	52	52	42	65	42	47
	F.,	553	40	54	39	49	33	50	53	56	46	45	41	47
Sullivan,	To.,	276	28	19	30	23	26	23	21	27	21	18	20	20
	M.,	143	13	11	18	10	13	14	12	12	10	12	8	10
	F.,	133	15	8	12	13	13	9	9	15	11	6	12	10
Susquehanna,	To.,	316	15	12	29	24	29	25	36	30	26	38	24	28
	M.,	166	6	7	12	13	16	13	18	14	13	26	9	19
	F.,	150	9	5	17	11	13	12	18	16	13	12	15	9
Tioga,	To.,	693	58	44	48	80	70	66	61	61	55	46	47	57
	M.,	375	29	24	24	42	36	39	34	41	29	22	31	24
	F.,	318	29	20	24	38	34	27	27	20	26	24	16	33
Union,	To.,	271	21	20	12	22	26	28	24	23	30	31	16	18
	M.,	148	13	13	6	12	15	11	16	14	13	17	9	9
	F.,	123	8	7	6	10	11	7	8	9	17	14	7	9
Venango,	To.,	435	56	41	41	47	41	41	32	23	29	27	26	31
	M.,	227	28	21	18	21	21	24	20	10	14	23	12	15
	F.,	208	28	20	23	26	20	17	12	13	15	4	14	16

Warren,	To.,	474	36	49	32	37	33	42	43	51	40	39	28	44
	M.,	236	18	22	12	15	16	21	23	31	21	18	18	21
	F.,	238	18	27	20	22	17	21	20	20	19	21	10	23
Washington,	To.,	1,665	129	163	145	143	124	121	148	131	149	133	139	140
	M.,	843	62	84	74	68	66	71	66	69	76	68	73	66
	F.,	822	67	79	71	75	58	50	82	62	73	65	66	74
Wayne,	To.,	392	25	30	30	28	33	42	36	29	36	36	33	34
	M.,	194	15	14	12	13	17	18	21	10	18	19	17	20
	F.,	198	10	16	18	15	16	24	15	19	18	17	16	14
Westmoreland,	To.,	3,569	343	306	343	309	307	254	302	318	275	282	248	282
	M.,	1,852	202	160	176	160	161	134	158	160	136	136	126	143
	F.,	1,717	141	146	167	149	146	120	144	158	139	146	122	139
Wyoming,	To.,	264	21	27	21	23	29	21	25	18	22	15	15	27
	M.,	123	10	16	9	12	14	10	7	8	11	5	7	14
	F.,	141	11	11	12	11	15	11	18	10	11	10	8	13
York,	To.,	1,489	96	140	135	118	144	127	111	141	123	121	125	108
	M.,	749	43	68	68	63	75	53	65	56	65	66	69	58
	F.,	740	53	72	67	55	69	74	46	85	58	55	56	50

BIRTH TABLE 2.

Births by nativity and ages of mothers for the entire State, for municipalities having more than 5,000 population, for certain groups of municipalities having less than 5,000 population and for the rural section of each county. (Stillbirths excluded.)

Area.		Total at all ages	Under 15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Over 50	Uns.
Entire State,	Total,	194,623	77	15,793	55,624	51,781	36,468	23,450	8,355	876	19	2,180
	Native,	128,625	67	12,230	37,169	33,368	23,677	15,108	5,278	540	10	1,178
	Foreign,	65,478	10	3,528	18,352	18,306	12,714	8,294	3,057	334	9	874
	Nat. unstated,	520		35	103	107	77	48	20	2		128
Total of all cities and boroughs over 5,000 population.	Total,	101,125	27	7,321	29,326	27,837	19,208	11,889	3,981	362	10	1,164
	Native,	59,639	22	5,351	17,732	16,093	11,122	6,542	2,008	178	6	585
	Foreign,	41,220	5	1,951	11,539	11,678	8,044	5,324	1,963	183	4	529
	Nat. unstated,	266		19	55	66	42	23	10	1		50
Total of all boroughs between 2,500 and 5,000 population.	Total,	10,570	8	811	3,118	2,870	2,006	1,219	401	46		91
	Native,	7,395	7	635	2,195	1,961	1,399	865	252	26		55
	Foreign,	3,137	1	176	918	901	602	350	146	20		23
	Nat. unstated,	38			5	8	5	4	3			13
Total of all boroughs having less than 2,500 population.	Total,	21,175	10	1,785	6,105	5,785	3,966	2,418	846	93	4	163
	Native,	15,413	8	1,403	4,398	4,158	2,871	1,784	608	66	1	116
	Foreign,	5,718	2	380	1,696	1,619	1,090	631	234	27	3	36
	Nat. unstated,	44		2	11	8	5	3	4			11
Total rural,	Total,	61,753	32	5,876	17,075	15,289	11,288	7,924	3,127	375	5	762
	Native,	46,178	30	4,841	12,844	11,156	8,285	5,917	2,410	270	3	422
	Foreign,	15,403	2	1,021	4,199	4,108	2,978	1,989	714	104	2	286
	Nat. unstated,	172		14	32	25	25	18	3	1		54
Allentown,	Total,	1,242	1	100	403	329	206	133	52	2		16
	Native,	871	1	85	256	222	154	105	37	2		10
	Foreign,	370		16	147	107	52	28	15			5
	Nat. unstated,	1										1
Altoona,	Total,	1,376	2	104	438	386	228	155	54	6		3
	Native,	1,096	2	88	352	314	174	116	43	4		3
	Foreign,	280		16	86	72	54	39	11	2		
	Nat. unstated,											

Archbald,	Total,	228	6	59	61	46	42	12	1		1
	Native,	117	2	27	34	22	24	8			
	Foreign,	111	4	32	27	24	18	4	1		1
	Nat. unstated,										
Ashland,	Total,	172	14	42	47	38	22	9			
	Native,	158	14	39	44	36	17	8			
	Foreign,	14		3	3	2	5	1			
	Nat. unstated,										
Bangor,	Total,	108	10	40	30	17	8	1	1		1
	Native,	89	10	34	25	12	7				1
	Foreign,	19		6	5	5	1	1	1		
	Nat. unstated,										
Beaver Falls,	Total,	292	25	97	90	44	21	14	1		
	Native,	206	20	68	69	29	11	9			
	Foreign,	84	5	29	20	14	10	5	1		
	Nat. unstated,	2			1	1					
Bethlehem,	Total,	251	25	87	67	38	22	11			1
	Native,	230	23	80	60	36	20	11			
	Foreign,	21	2	7	7	2	2				1
	Nat. unstated,										
Bloomsburg,	Total,	145	18	46	32	25	17	7			
	Native,	143	18	45	32	24	17	7			
	Foreign,	2				1					
	Nat. unstated,										
Braddock,	Total,	854	56	310	242	149	74	20	3		
	Native,	253	25	80	69	53	22	4			
	Foreign,	601	31	230	173	96	52	16	3		
	Nat. unstated,										
Bradford,	Total,	321	22	75	98	79	39	7			1
	Native,	262	17	59	84	63	31	7			1
	Foreign,	59	5	16	14	16	8				
	Nat. unstated,										
Bristol,	Total,	210	18	49	62	40	26	11	2		2
	Native,	142	13	36	38	29	16	8	2		
	Foreign,	50	2	10	19	5	10	3			1
	Nat. unstated,	18	3	3	5	6					1
Butler,	Total,	663	44	219	180	121	72	23	2		2
	Native,	417	27	123	115	83	52	15	1		1
	Foreign,	240	17	94	62	37	20	8	1		1
	Nat. unstated,	6		2	3	1					

TABLE 2.— Continued.

Area.		Total at all ages	Under 15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Over 50	Uns.
Carbondale,	Total,	449	1	28	87	107	81	50	16	3		76
	Native,	338		16	65	80	58	43	12	1		63
	Foreign,	106	1	12	22	26	23	7	4	2		9
	Nat. unstated,	5				1						4
Carlisle,	Total,	184		20	45	53	29	24	10		1	2
	Native,	176		20	42	49	29	24	10		1	1
	Foreign,	8			3	4						1
	Nat. unstated,											
Carnegie,	Total,	298		22	102	85	42	32	12	3		
	Native,	151		14	44	41	27	18	4	3		
	Foreign,	147		8	58	44	15	14	8			
	Nat. unstated,											
Chambersburg,	Total,	294		33	77	79	61	27	14			3
	Native,	292		33	76	79	61	26	14			3
	Foreign,	2			1			1				
	Nat. unstated,											
Charleroi,	Total,	284		30	86	82	44	31	10			1
	Native,	116		19	31	35	15	10	6			
	Foreign,	167		11	55	47	28	21	4			1
	Nat. unstated,	1										
Chester,	Total,	813		66	223	239	151	99	17	2		16
	Native,	586		53	157	173	109	69	12	2		11
	Foreign,	225		13	66	65	42	30	5			4
	Nat. unstated,	2				1						1
Clearfield,	Total,	214		26	52	54	49	23	2	1		7
	Native,	195		24	47	51	43	20	2	1		7
	Foreign,	19		2	5	3	6	3				
	Nat. unstated,											
Coatesville,	Total,	337		34	125	82	46	36	11	2		1
	Native,	291		33	104	72	42	29	9	1		1
	Foreign,	46		1	21	10	4	7	2	1		
	Nat. unstated,											

Columbia,	Total,	324		33	83	99	51	34	23		1
	Native,	311		33	79	98	50	30	20		1
	Foreign,	13			4	1	1	4	3		
	Nat. unstated,										
Connellsville,	Total,	258		36	67	70	44	31	10		
	Native,	203		34	61	52	32	20	4		
	Foreign,	54		2	6	18	12	10	6		
	Nat. unstated,	1						1			
Conshohocken,	Total,	153		11	42	38	24	26	8	2	2
	Native,	99		6	32	23	17	14	6	1	
	Foreign,	54		5	10	15	7	12	2	1	2
	Nat. unstated,										
Corry,	Total,	109		14	35	30	19	6	4		1
	Native,	96		12	31	24	18	6	4		1
	Foreign,	13		2	4	6	1				
	Nat. unstated,										
Danville,	Total,	192		14	53	45	41	33	6		
	Native,	180		14	50	43	38	29	6		
	Foreign,	12			3	2	3	4			
	Nat. unstated,										
Dickson City,	Total,	360		29	103	90	68	49	16	1	4
	Native,	73		9	24	18	14	5	3		
	Foreign,	286		20	78	72	54	44	13	1	4
	Nat. unstated,	1			1						
Du Bois,	Total,	344		30	90	97	63	51	11	2	
	Native,	250		22	68	68	50	35	6	1	
	Foreign,	94		8	22	29	13	16	5	1	
	Nat. unstated,										
Dunsmore,	Total,	445		28	113	128	92	53	18	5	8
	Native,	180		11	51	41	41	23	7	2	4
	Foreign,	265		17	62	87	51	30	11	3	4
	Nat. unstated,										
Duquesne,	Total,	569		42	174	181	92	52	20	2	6
	Native,	165		11	45	63	29	11	3	1	2
	Foreign,	404		31	129	118	63	41	17	1	4
	Nat. unstated,										
Duryea,	Total,	266		22	67	81	50	30	13		3
	Native,	52		9	19	8	6	6	3		1
	Foreign,	212		13	46	73	44	24	10		2
	Nat. unstated,	2			2						

TABLE 2.—Continued.

Area.		Total at all ages	Under 15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Over 50	Uns.
Easton,	Total,	573		61	160	173	104	57	15	2		1
	Native,	460		54	126	135	83	49	11	1		1
	Foreign,	112		7	34	37	21	8	4	1		
	Nat. unstated,	1				1						
Edwardsville,	Total,	232		23	61	60	39	33	10	2		4
	Native,	77		14	25	16	11	8	2	1		
	Foreign,	154		9	36	43	28	25	8	1		4
	Nat. unstated,	1				1						
Erie,	Total,	1,642		114	444	436	337	206	91	3		11
	Native,	1,007		73	275	282	217	109	46			5
	Foreign,	633		41	169	153	120	97	45	3		5
	Nat. unstated,	2				1						1
Etna,	Total,	191		10	63	48	34	24	11			1
	Native,	89		4	33	20	17	9	6			
	Foreign,	102		6	30	28	17	15	5			1
	Nat. unstated,											
Forest City,	Total,	290		15	100	84	58	23	9			1
	Native,	64		5	19	18	15	6	1			
	Foreign,	226		10	81	66	43	17	8			1
	Nat. unstated,											
Franklin,	Total,	239		23	68	72	44	26	4	2		
	Native,	222		20	62	68	42	24	4	2		
	Foreign,	17		3	6	4	2	2				
	Nat. unstated,											
Freeland,	Total,	222	1	14	54	56	56	28	10	3		
	Native,	112	1	6	29	28	29	18	1			
	Foreign,	109		8	25	28	27	9	9	3		
	Nat. unstated,	1						1				
Greensburg,	Total,	297		19	81	78	71	30	16	1		1
	Native,	211		16	61	62	42	20	10			
	Foreign,	85		3	20	16	29	10	6	1		
	Nat. unstated,	1										1

Greenville,	Total,	152		8	43	50	24	17	9	1		
	Native,	142		8	41	48	23	16	5	1		
	Foreign,	10			2	2	1	1	4			
	Nat. unstated,											
Hanover,	Total,	207		12	63	60	36	27	6	3		
	Native,	199		11	59	58	36	26	6	3		
	Foreign,	8		1	4	2		1				
	Nat. unstated,											
Harrisburg,	Total,	1,326	1	144	385	374	221	142	51	4		4
	Native,	1,189	1	137	340	334	200	126	45	3		3
	Foreign,	137		7	45	40	21	16	6	1		1
	Nat. unstated,											
Hazleton,	Total,	421		18	91	115	96	63	29	3		6
	Native,	287		14	63	86	54	46	17	2		5
	Foreign,	134		4	28	29	42	17	12	1		1
	Nat. unstated,											
Homestead,	Total,	738		63	243	203	141	72	13	1		2
	Native,	238		28	70	63	42	28	6			1
	Foreign,	500		35	173	140	99	44	7	1		1
	Nat. unstated,											
Huntingdon,	Total,	139	1	15	42	36	24	15	4			2
	Native,	135	1	15	42	35	24	13	4			1
	Foreign,	3				1		2				
	Nat. unstated,	1										1
Indiana,	Total,	125		10	38	37	28	9	3			
	Native,	117		8	37	36	26	8	2			
	Foreign,	8		2	1	1	2	1	1			
	Nat. unstated,											
Jeannette,	Total,	220		17	57	52	49	30	4	10		1
	Native,	170		15	44	37	39	25		9		1
	Foreign,	50		2	13	15	10	5	4	1		
	Nat. unstated,											
Johnsonburg,	Total,	150		8	45	33	38	20	5	1		
	Native,	85		7	28	23	17	8	1	1		
	Foreign,	65		1	17	10	21	12	4			
	Nat. unstated,											
Johnstown,	Total,	1,463		150	437	383	245	146	52	4		46
	Native,	859		102	259	222	138	84	28	1		25
	Foreign,	540		41	161	143	97	58	23	2		15
	Nat. unstated,	64		7	17	18	10	4	1	1		6

TABLE 2.—Continued.

Area.		Total at all ages	Under 15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Over 50	Uns.
Kane,	Total,	223		15	52	67	50	26	12	1		
	Native,	144		14	39	44	27	15	5			
	Foreign,	79		1	13	23	23	11	7	1		
	Nat. unstated,											1
Lancaster,	Total,	894		62	261	245	147	129	42	1		7
	Native,	810		58	250	220	127	114	35	1		5
	Foreign,	83		4	11	25	20	15	7			1
	Nat. unstated,	1										
Lansford,	Total,	261		19	104	58	37	31	11			1
	Native,	100		4	31	22	16	19	7			1
	Foreign,	161		15	73	36	21	12	4			
	Nat. unstated,											
Latrobe,	Total,	291		17	82	102	43	32	9	2		4
	Native,	181		13	56	60	21	21	6	2		2
	Foreign,	108		4	26	41	22	11	3			1
	Nat. unstated,	2				1						1
Lebanon,	Total,	360		37	112	87	73	37	8	1		5
	Native,	333		36	106	80	65	34	8	1		3
	Foreign,	25		1	6	7	8	3				
	Nat. unstated,	2										2
Lehighton,	Total,	117		17	37	29	21	9	3			1
	Native,	104		17	31	22	21	9	3			1
	Foreign,	13			6	7						
	Nat. unstated,											
Lewistown,	Total,	209		23	67	49	40	20	10			
	Native,	202		22	63	48	39	20	10			
	Foreign,	7		1	4	1	1					
	Nat. unstated,											
Lock Haven,	Total,	155		21	51	35	26	19	1	1		1
	Native,	133		21	47	29	17	17	1	1		
	Foreign,	22			4	6	9	2				1
	Nat. unstated,											

McKeesport,	Total,	1,569	1	105	524	411	277	171	62	10	8
	Native,	656	1	62	206	173	124	62	23	3	2
	Foreign,	913		43	318	238	153	109	39	7	6
	Nat. unstated,										
McKees Rocks,	Total,	417		29	136	111	78	39	7		17
	Native,	151		18	49	35	31	15			3
	Foreign,	266		11	87	76	47	24	7		14
	Nat. unstated,										
Mahanoy City,	Total,	598		12	113	113	114	75	23	3	145
	Native,	268		9	66	67	64	36	8		18
	Foreign,	324		3	47	46	49	39	15	3	122
	Nat. unstated,	6					1				5
Meadville,	Total,	226		20	52	60	37	19	5		33
	Native,	181		17	48	50	30	18	3		15
	Foreign,	41		3	3	10	7	1	2		15
	Nat. unstated,	4			1						3
Middletown,	Total,	150		21	46	35	25	15	6	1	1
	Native,	130		21	39	31	21	12	4	1	1
	Foreign,	20			7	4	4	3	2		
	Nat. unstated,										
Millvale,	Total,	243		21	60	65	45	32	19	1	
	Native,	163		19	48	46	27	16	7		
	Foreign,	80		2	12	19	18	16	12	1	
	Nat. unstated,										
Milton,	Total,	165		20	42	43	31	21	7	1	
	Native,	153		20	39	38	29	20	6	1	
	Foreign,	12			3	5	2	1	1		
	Nat. unstated,										
Minersville,	Total,	311		20	102	85	53	33	15	2	1
	Native,	135		14	41	30	22	18	9		1
	Foreign,	176		6	61	55	31	15	6	2	
	Nat. unstated,										
Monongahela,	Total,	235		23	74	62	45	19	6		6
	Native,	133		14	42	45	17	12	3		
	Foreign,	99		9	32	17	28	7	3		3
	Nat. unstated,	3									3
Mount Carmel,	Total,	632		46	181	155	119	88	23	4	16
	Native,	324		37	109	65	54	44	11	2	2
	Foreign,	299		8	71	87	65	43	11	2	12
	Nat. unstated,	9		1	1	3		1	1		2

TABLE 2.—Continued.

Area.		Total at all ages	Under 15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Over 50	Uns.
Mount Pleasant,	Total,	174		17	57	42	26	18	9	1		4
	Native,	104		14	37	26	11	10	3	1		2
	Foreign,	69		3	19	16	15	8	6			2
	Nat. unstated,	1			1							
Nanticoke,	Total,	561		56	182	121	101	67	25	5		4
	Native,	189		32	76	34	25	14	4	1		3
	Foreign,	371		24	105	87	76	53	21	4		1
	Nat. unstated,	1			1							
New Brighton,	Total,	190		17	62	44	40	22	1	2		2
	Native,	168		16	55	39	35	19		2		2
	Foreign,	22		1	7	5	5	3	1			
	Nat. unstated,											
New Castle,	Total,	1,012		98	299	274	180	114	40	2		5
	Native,	637		77	193	175	108	57	24	2		1
	Foreign,	375		21	106	99	72	58	20	4		8
	Nat. unstated,											
Norristown,	Total,	412		36	100	112	74	58	20	4		8
	Native,	347		35	82	103	60	41	15	4		7
	Foreign,	65		1	18	9	14	17	5			1
	Nat. unstated,											
North Braddock,	Total,	474		32	146	129	89	57	18	2		1
	Native,	199		19	68	48	36	17	8	2		1
	Foreign,	275		13	78	81	53	40	10			
	Nat. unstated,											
Oil City,	Total,	321		13	92	86	72	41	14	1		2
	Native,	272		11	78	78	62	31	11			1
	Foreign,	49		2	14	8	10	10	3	1		1
	Nat. unstated,											
Old Forge,	Total,	543		49	152	138	110	69	22	2		1
	Native,	65		9	23	13	13	6	1			
	Foreign,	476		40	129	124	96	63	21	2		1
	Nat. unstated,	2				1	1					

Olyphant,	Total,	240		23	65	64	49	25	12	2		
	Native,	80		8	25	18	16	11	2			
	Foreign,	160		15	40	46	33	14	10	2		
	Nat. unstated,											
Philadelphia,	Total,	36,307	10	2,389	10,441	10,274	7,104	4,384	1,380	96	1	228
	Native,	19,721	8	1,740	5,977	5,395	3,744	2,122	583	37		115
	Foreign,	16,554	2	646	4,459	4,869	3,355	2,258	796	59	1	109
	Nat. unstated,	32		3	5	10	5	4	1			4
Phoenixville,	Total,	357		26	114	92	71	33	18	1	1	1
	Native,	169		15	45	43	38	16	9	1	1	1
	Foreign,	188		11	69	49	33	17	9			
	Nat. unstated,											
Pittsburg,	Total,	14,436	6	976	4,132	3,969	2,755	1,648	586	59	4	301
	Native,	7,476	5	649	2,210	1,937	1,416	765	229	28	1	176
	Foreign,	6,894	1	322	1,904	1,958	1,325	878	354	31	3	118
	Nat. unstated,	66		5	18	14	14	5	3			7
Pittston,	Total,	481		22	114	142	105	75	11	2		10
	Native,	233		9	49	70	56	38	5			6
	Foreign,	248		13	65	72	49	37	6	2		4
	Nat. unstated,											
Plymouth,	Total,	478		26	134	125	100	65	20	6		2
	Native,	234		18	86	55	42	27	5			1
	Foreign,	242		2	48	70	58	38	14	6		
	Nat. unstated,	2							1			1
Pottsville,	Total,	440		18	90	113	119	56	35	2		7
	Native,	363		17	76	91	102	44	29	2		2
	Foreign,	76		1	13	22	17	12	6			5
	Nat. unstated,	1			1							
Pottstown,	Total,	338		48	103	74	50	42	16	3		2
	Native,	281		43	83	60	43	36	13	2		1
	Foreign,	57		5	20	14	7	6	3	1		1
	Nat. unstated,											
Punxsutawney,	Total,	225		14	71	57	40	32	11			
	Native,	183		12	60	47	28	27	9			
	Foreign,	42		2	11	10	12	5	2			
	Nat. unstated,											
Reading,	Total,	2,312		207	773	599	387	249	84	11		2
	Native,	1,870		190	628	470	301	243	68	9		1
	Foreign,	441		17	145	128	86	46	16	2		1
	Nat. unstated,	1				1						

TABLE 2.—Continued.

Area.		Total at all ages	Under 15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Over 50	Uns.
Rochester,	Total,	134		16	46	32	24	12	4			
	Native,	98		15	33	24	16	6	4			
	Foreign,	36		1	13	8	8	6				
	Nat. unstated,											
St. Clair,	Total,	199		7	58	44	58	22	3	1		6
	Native,	106		5	30	23	32	14	1			1
	Foreign,	93		2	28	21	26	8	2	1		5
	Nat. unstated,											
St. Marys,	Total,	212		4	45	69	45	32	12			5
	Native,	188		2	40	63	41	28	10			4
	Foreign,	23		2	5	6	4	4	2			
	Nat. unstated,	1										1
Sayre,	Total,	159		19	39	49	32	17	3			
	Native,	136		16	34	44	26	14	2			
	Foreign,	23		3	5	5	6	3	1			
	Nat. unstated,											
Scranton,	Total,	3,149	1	184	887	865	595	407	159	15		36
	Native,	1,669		110	477	459	326	198	71	7		21
	Foreign,	1,473	1	74	410	404	268	207	87	8		14
	Nat. unstated,	7				2	1	2	1			1
Scottdale,	Total,	140		5	49	40	31	8	6			1
	Native,	118		4	46	32	26	5	4			1
	Foreign,	22		1	3	8	5	3	2			
	Nat. unstated,											
Shamokin,	Total,	585		38	165	147	117	83	27	1		7
	Native,	440		32	131	108	78	66	19	1		5
	Foreign,	145		6	34	39	39	17	8			2
	Nat. unstated,											
Sharon,	Total,	349		22	93	113	68	40	9			4
	Native,	257		19	75	73	50	31	7			2
	Foreign,	91		3	18	40	18	9	1			2
	Nat. unstated,	1							1			

Sharpsburg,	Total,	199		19	54	49	41	24	7	2	3
	Native,	111		11	29	29	25	14	2		1
	Foreign,	88		8	25	20	16	10	5	2	2
	Nat. unstated,										
Shenandoah,	Total,	947		67	263	240	192	128	41	4	12
	Native,	290		38	96	57	54	38	10	1	5
	Foreign,	647		29	166	183	138	90	31	3	7
	Nat. unstated,	1			1						
South Bethlehem,	Total,	704		64	243	185	102	88	19	2	1
	Native,	243		22	65	62	50	34	9	1	
	Foreign,	461		42	178	123	52	54	10	1	1
	Nat. unstated,										
Steelton,	Total,	433		40	147	130	67	33	15	1	
	Native,	214		22	73	53	34	22	9	1	
	Foreign,	219		18	74	77	33	11	6		
	Nat. unstated,										
Sunbury,	Total,	331		33	110	87	54	33	12	1	1
	Native,	325		33	110	84	53	31	12	1	1
	Foreign,	5				3	1	1			
	Nat. unstated,	1						1			
Tamaqua,	Total,	259		18	71	72	52	31	13	1	1
	Native,	232		15	64	66	48	27	10	1	1
	Foreign,	27		3	7	6	4	4	3		
	Nat. unstated,										
Tarentum,	Total,	209		17	62	60	43	19	6	1	1
	Native,	114		15	36	30	19	11	2		1
	Foreign,	95		2	26	30	24	8	4	1	
	Nat. unstated,										
Titusville,	Total,	157		14	31	43	34	24	8	1	2
	Native,	130		14	28	33	26	20	6	1	2
	Foreign,	27			3	10	8	4	2		
	Nat. unstated,										
Tyrone,	Total,	216		24	64	57	34	25	10	2	
	Native,	210		24	62	54	34	25	10	1	
	Foreign,	6			2	3				1	
	Nat. unstated,										
Uniontown,	Total,	290		24	104	74	51	26	8	1	2
	Native,	228		18	87	58	38	18	7		2
	Foreign,	62		6	17	16	13	8	1	1	
	Nat. unstated,										

TABLE 2.— Continued.

Area.		Total at all ages	Under 15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Over 50	Uns.
Warren,	Total,	249		12	76	63	51	31	16			
	Native,	165		9	53	44	36	14	9			
	Foreign,	84		3	23	19	15	17	7			
	Nat. unstated,											
Washington,	Total,	373	2	41	112	101	68	33	15	1		
	Native,	327	2	39	100	87	62	33	13	1		
	Foreign,	46		2	12	14	6	10	2			
	Nat. unstated,											
Waynesboro,	Total,	181		22	49	43	33	25	9			
	Native,	179		22	49	42	32	25	9			
	Foreign,	2				1	1					
	Nat. unstated,											
West Chester,	Total,	223		20	64	64	27	31	14	2		1
	Native,	199		19	53	60	24	28	12	2		1
	Foreign,	24		1	11	4	3	3	2			
	Nat. unstated,											
West Pittston,	Total,	138		11	38	43	30	12	3		1	
	Native,	80		6	23	25	17	7	1		1	
	Foreign,	58		5	15	18	13	5	2			
	Nat. unstated,											
Wilkes-Barre,	Total,	1,723		90	461	472	369	246	71	7	1	6
	Native,	1,019		65	288	272	221	136	30	4	1	2
	Foreign,	703		25	173	200	148	110	41	3		3
	Nat. unstated,	1										1
Wilkinsburg,	Total,	527		18	140	150	125	55	27	2		10
	Native,	441		16	125	124	101	47	19	2		7
	Foreign,	80		2	15	25	24	6	7			1
	Nat. unstated,	6				1		2	1			2
Williamsport,	Total,	692		65	186	201	135	80	23	2		
	Native,	601		57	169	177	118	62	16	2		
	Foreign,	87		8	17	23	16	16	7			
	Nat. unstated,	4				1	1	2				

Wilmerding,	Total,	239		18	61	71	46	34	6	2	1
	Native,	103		8	21	30	20	19	3	1	1
	Foreign,	136		10	40	41	26	15	3	1	
	Nat. unstated,										
Windber,	Total,	338		33	116	93	50	32	13	1	
	Native,	132		18	43	34	13	16	8		
	Foreign,	205		15	72	59	37	16	5	1	
	Nat. unstated,	1			1						
York,	Total,	1,031		97	305	299	178	102	47	2	1
	Native,	982		96	293	284	165	98	43	2	1
	Foreign,	49		1	12	15	13	4	4		
	Nat. unstated,										
Counties (Rural).											
Adams,	Total,	603		45	144	158	115	102	33	3	3
	Native,	592		45	140	155	114	101	32	2	3
	Foreign,	10			4	3		1	1	1	
	Nat. unstated,	1					1				
Allegheny,	Total,	3,964	3	308	1,082	1,075	779	478	189	20	1	29
	Native,	2,189	3	218	601	570	407	259	117	8		6
	Foreign,	1,769		90	478	505	372	219	72	12	1	20
	Nat. unstated,	6			3							3
Armstrong,	Total,	1,113	1	106	337	290	185	127	58	2		7
	Native,	914		89	277	224	153	112	52	2		5
	Foreign,	198	1	16	60	66	32	15	6			2
	Nat. unstated,	1		1								
Beaver,	Total,	528		44	122	136	116	65	30	1		14
	Native,	427		35	102	106	94	58	21	1		10
	Foreign,	95		9	20	27	21	6	9			3
	Nat. unstated,	6				3	1	1				1
Bedford,	Total,	791		83	209	176	140	125	41	5		12
	Native,	744		82	190	170	129	118	39	5		11
	Foreign,	43		1	17	6	11	6	2			
	Nat. unstated,	4			2			1				1
Berks,	Total,	1,704	1	227	484	412	288	199	71	15		7
	Native,	1,640	1	225	470	395	275	185	70	13		6
	Foreign,	60		2	13	16	13	13		2		1
	Nat. unstated,	4			1	1		1	1			
Blair,	Total,	776		68	230	191	133	99	44	5		6
	Native,	665		61	198	158	116	87	36	5		4
	Foreign,	108		7	31	32	17	12	8			1
	Nat. unstated,	3			1	1						

TABLE 2.—Continued.

Area.		Total at all ages	Under 15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Over 50	Uns.
Bradford,	Total,	662		67	189	155	132	86	25			8
	Native,	639		66	180	152	125	83	25			8
	Foreign,	20			9	2	6	3				
	Nat. unstated,	3		1		1	1					
Bucks,	Total,	925		94	210	207	180	170	56	3		5
	Native,	817		89	188	186	154	145	49	2		4
	Foreign,	105		5	22	20	25	25	7	1		
	Nat. unstated,	3				1	1					1
Butler,	Total,	1,066		78	320	266	198	126	65	6	1	6
	Native,	789		66	228	183	148	98	54	6	1	5
	Foreign,	274		11	91	83	50	28	11			
	Nat. unstated,	3		1	1							1
Cambria,	Total,	1,848		200	525	420	327	255	96	11		14
	Native,	1,028		130	290	234	166	143	52	5		8
	Foreign,	798		69	232	183	151	109	44	6		4
	Nat. unstated,	22		1	3	3	10	3				2
Cameron,	Total,	91		11	30	19	17	9	3	1		1
	Native,	82		11	27	19	11	9	3	1		1
	Foreign,	9			3		6					
	Nat. unstated,											
Carbon,	Total,	644		75	199	159	105	74	25	4		3
	Native,	418		63	119	87	74	53	16	4		2
	Foreign,	225		12	80	72	30	21	9			1
	Nat. unstated,	1					1					
Centre,	Total,	829	1	83	226	185	154	114	46	11		9
	Native,	733	1	77	209	158	129	102	41	11		5
	Foreign,	93		6	17	27	24	10	5			4
	Nat. unstated,	3					1	2				
Chester,	Total,	1,185	1	88	310	288	245	179	62	3		9
	Native,	1,040	1	81	268	260	218	154	54			4
	Foreign,	141		6	42	27	27	25	8	3		3
	Nat. unstated,	4		1		1						2

Clarion,	Total,	666		68	168	143	140	91	41	6	9
	Native,	624		63	157	133	133	86	38	6	8
	Foreign,	40		5	11	9	7	4	3		1
	Nat. unstated,	2				1		1			
Clearfield,	Total,	1,875	4	191	503	422	309	224	106	20	96
	Native,	1,087	4	141	329	236	174	121	60	8	14
	Foreign,	786		49	173	186	135	103	46	12	82
	Nat. unstated,	2		1	1						
Clinton,	Total,	330	1	34	98	88	57	30	16		6
	Native,	297	1	33	87	82	49	29	13		3
	Foreign,	32		1	11	6	8	1	3		2
	Nat. unstated,	1									1
Columbia,	Total,	581		55	157	153	105	68	35	2	6
	Native,	536		49	146	148	94	59	34	2	4
	Foreign,	44		6	11	5	11	9	1		1
	Nat. unstated,	1									1
Crawford,	Total,	588		61	164	136	99	80	37	3	8
	Native,	571		60	159	133	95	79	36	3	6
	Foreign,	14			5	3	4	1	1		
	Nat. unstated,	3		1							2
Cumberland,	Total,	567	1	58	165	142	96	68	23	2	12
	Native,	547	1	58	159	137	94	66	23	2	7
	Foreign,	15			5	5	2	2			1
	Nat. unstated,	5			1						4
Dauphin,	Total,	1,051		121	290	259	188	125	58	3	7
	Native,	924		111	255	216	164	115	57	2	4
	Foreign,	124		10	33	43	23	10	1	1	3
	Nat. unstated,	3			2		1				
Delaware,	Total,	590		32	125	179	139	86	20	1	8
	Native,	448		28	102	134	101	60	16	1	6
	Foreign,	142		4	23	45	38	26	4		2
	Nat. unstated,										
	Total,	623		63	172	152	130	62	35	3	6
	Native,	345		45	105	75	67	33	11	3	6
	Foreign,	278		18	67	77	63	29	24		
	Nat. unstated,										
Erie,	Total,	555		48	153	127	98	92	30	3	4
	Native,	502		44	145	120	86	79	24		4
	Foreign,	53		4	8	7	12	13	6	3	
	Nat. unstated,										

TABLE 2.—Continued.

Area.		Total at all ages	Under 15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Over 50	Uns.
Fayette,	Total,	2,808	3	254	836	734	498	328	107	16		32
	Native,	1,579	3	186	472	394	264	168	72	12		8
	Foreign,	1,225		68	363	339	233	160	35	4		23
	Nat. unstated,	4			1	1	1					1
Forest,	Total,	226		25	55	49	45	38	12	1		1
	Native,	216		24	54	49	42	35	10	1		1
	Foreign,	10		1	1		3	3	2			
	Nat. unstated,											
Franklin,	Total,	940		75	250	218	182	133	61	11	1	9
	Native,	928		74	247	218	178	131	60	11	1	8
	Foreign,	8		1	2		4	1				
	Nat. unstated,	4			1			1	1			1
Fulton,	Total,	245	1	23	55	59	39	35	19	3		11
	Native,	243	1	23	55	59	39	35	19	3		9
	Foreign,											
	Nat. unstated,	2										2
Greene,	Total,	422		36	100	116	79	58	24	2		7
	Native,	410		35	99	115	77	56	23	2		3
	Foreign,	6			1	1	2	1	1			
	Nat. unstated,	6		1				1				4
Huntingdon,	Total,	491	2	59	133	100	98	48	24	5		22
	Native,	443	2	54	119	90	91	46	22	5		14
	Foreign,	38		5	13	9	6	2	2			1
	Nat. unstated,	10			1	1	1					7
Indiana,	Total,	1,524		163	443	374	262	174	69	9		30
	Native,	912		100	255	209	165	109	51	6		17
	Foreign,	604		63	184	164	96	65	18	3		11
	Nat. unstated,	8			4	1	1					2
Jefferson,	Total,	1,374	1	139	381	341	255	170	67	13		7
	Native,	798	1	87	244	189	139	89	35	10		4
	Foreign,	574		52	137	152	115	81	32	3		2
	Nat. unstated,	2					1					1

Juniata,	Total,	314		40	79	63	58	48	22	4		
	Native,	311		40	78	62	57	48	22	4		
	Foreign,	2				1	1					
	Nat. unstated,	1			1							
Lackawanna,	Total,	454		39	132	115	87	50	17	1		13
	Native,	217		18	58	62	40	22	12	1		4
	Foreign,	235		21	73	53	47	28	5			8
	Nat. unstated,	2			1							1
Lancaster,	Total,	2,263	1	182	595	555	441	287	127	7		68
	Native,	2,225	1	179	586	547	436	280	123	7		66
	Foreign,	36		3	9	8	5	7	3			1
	Nat. unstated,	2							1			1
Lawrence,	Total,	541		47	142	154	92	74	22	3		5
	Native,	358		30	94	100	58	55	16	2		3
	Foreign,	182		18	48	54	34	19	6	1		2
	Nat. unstated,	1		1								
Lebanon,	Total,	943		103	290	201	150	129	50	5		15
	Native,	893		99	274	187	144	121	49	4		15
	Foreign,	45		3	15	13	6	7	1			
	Nat. unstated,	5		1	1	1		1		1		
Lehigh,	Total,	1,199	2	139	393	272	185	143	53	2		10
	Native,	931	2	113	289	212	150	116	43	1		5
	Foreign,	267		26	104	60	35	27	10	1		4
	Nat. unstated,	1										1
Luzerne,	Total,	2,980		201	863	791	573	383	129	18		22
	Native,	1,216		112	364	312	222	139	50	6		11
	Foreign,	1,760		89	497	479	350	244	79	12		10
	Nat. unstated,	4			2		1					1
Lycoming,	Total,	685	1	60	177	154	128	105	46	10		4
	Native,	640	1	59	166	141	120	97	43	9		4
	Foreign,	45		1	11	13	8	8	3	1		
	Nat. unstated,											
McKean,	Total,	446		47	108	110	84	61	28	4		4
	Native,	313		38	80	81	51	37	20	2		4
	Foreign,	132		9	28	29	33	23	8	2		
	Nat. unstated,	1						1				
Mercer,	Total,	573		44	147	139	125	81	27	6		4
	Native,	518		42	140	130	110	70	20	3		3
	Foreign,	54		2	7	9	15	10	7	3		1
	Nat. unstated,	1						1				

TABLE 2.—Continued.

Area.		Total at all ages	Under 15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Over 50	Uns.
Mifflin,	Total,	545	1	52	155	137	104	67	24	3		2
	Native,	518	1	51	149	125	100	64	23	3		2
	Foreign,	27		1	6	12	4	3	1			
	Nat. unstated,											
Monroe,	Total,	357	1	44	107	87	54	44	16	1		3
	Native,	344	1	43	103	85	50	42	16	1		3
	Foreign,	13		1	4	2	4	2				
	Nat. unstated,											
Montgomery,	Total,	1,610	1	110	398	417	351	208	97	10		18
	Native,	1,280	1	99	323	331	277	150	78	9		12
	Foreign,	326		10	74	86	74	57	19	1		5
	Nat. unstated,	4		1	1			1				1
Montour,	Total,	141		13	37	40	26	15	9	1		
	Native,	136		12	37	40	24	14	9			
	Foreign,	4					2	1		1		
	Nat. unstated,	1		1								
Northampton,	Total,	895		104	242	231	161	97	39	13		8
	Native,	720		87	192	191	124	76	32	12		6
	Foreign,	173		17	50	39	37	21	7	1		1
	Nat. unstated,	2				1						1
Northumberland,	Total,	1,301		113	352	332	230	170	67	14		23
	Native,	920		93	267	226	160	110	46	6		12
	Foreign,	380		20	85	105	70	60	21	8		11
	Nat. unstated,	1				1						
Perry,	Total,	434		38	101	109	81	70	31	2		2
	Native,	431		38	100	108	81	69	31	2		2
	Foreign,	3			1	1		1				
	Nat. unstated,											
Pike,	Total,	117	1	13	27	31	24	14	6	1		
	Native,	98	1	13	24	27	18	11	3	1		
	Foreign,	19			3	4	6	3	3			
	Nat. unstated,											

Potter,	Total,	332		41	89	84	46	53	16	3	
	Native,	296		39	78	75	43	45	14	2	
	Foreign,	36		2	11	9	3	8	2	1	
	Nat. unstated,										
Schuylkill,	Total,	2,038		203	540	461	378	264	114	12	66
	Native,	1,429		164	398	324	265	182	72	6	18
	Foreign,	606		38	142	137	113	82	42	6	46
	Nat. unstated,	3		1							2
Snyder,	Total,	400		69	105	95	63	46	22		
	Native,	399		69	104	95	63	46	22		
	Foreign,	1			1						
	Nat. unstated,										
Somerset,	Total,	1,156	1	113	345	295	205	125	55	6	11
	Native,	908	1	93	263	221	161	105	52	5	7
	Foreign,	243		20	82	72	44	19	3	1	2
	Nat. unstated,	5				2		1			2
Sullivan,	Total,	276		33	64	62	45	49	20	2	1
	Native,	225		27	54	51	36	37	17	2	1
	Foreign,	50		6	10	11	9	11	3		
	Nat. unstated,	1						1			
Susquehanna,	Total,	316		44	98	72	53	35	11	1	2
	Native,	298		43	94	68	48	32	10	1	2
	Foreign,	16		1	3	4	4	3	1		
	Nat. unstated,	2			1		1				
Tioga,	Total,	693		56	198	171	121	105	29	7	1	5
	Native,	606		55	183	155	101	82	22	4		4
	Foreign,	86		1	15	16	20	23	7	3	1	
	Nat. unstated,	1										1
Union,	Total,	271		33	89	55	42	32	13	4		3
	Native,	268		33	89	54	41	31	13	4		3
	Foreign,	3				1	1	1				
	Nat. unstated,											
Venango,	Total,	435		40	138	97	66	57	31	4	1	1
	Native,	413		39	132	95	60	53	29	4	1	
	Foreign,	21			6	2	6	4	2			1
	Nat. unstated,	1		1								
Warren,	Total,	474	1	51	148	114	64	65	30	1		
	Native,	368	1	45	122	89	45	46	19	1		
	Foreign,	106		6	26	25	19	19	11			
	Nat. unstated,											

TABLE —.—Continued.

Area.		Total at all ages	Under 15	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Over 50	Uns.
Washington,	Total,	1,665		161	463	454	309	197	64	4		13
	Native,	1,037		108	294	251	197	135	41	3		8
	Foreign,	624		53	167	202	112	62	23	1		4
	Nat. unstated,	4			2	1						1
Wayne,	Total,	392		22	95	103	84	55	30	2		1
	Native,	356		21	90	92	73	50	28	1		1
	Foreign,	35		1	5	11	10	5	2	1		
	Nat. unstated,	1					1					
Westmoreland,	Total,	3,569	2	341	1,023	919	624	445	164	16		35
	Native,	1,654	1	192	481	392	266	221	82	9		10
	Foreign,	1,908	1	149	542	526	357	223	82	7		21
	Nat. unstated,	7				1	1	1				4
Wyoming,	Total,	264		23	84	60	39	36	14	7		1
	Native,	245		21	77	57	38	34	13	5		
	Foreign,	17		2	7	1	1	2	1	2		1
	Nat. unstated,	2				2						
York,	Total,	1,489		173	386	380	262	196	76	8		8
	Native,	1,480		173	385	376	261	194	75	8		8
	Foreign,	7				3	1	2	1			
	Nat. unstated,	2			1	1						

BIRTH TABLE 3.

Births by nativity of mothers and number of child for the entire State, for municipalities having more than 5,000 population, for certain groups of municipalities having less than 5,000 population, and for the rural section of each county. (Stillbirths excluded).

Area.		Number of Child.											
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Entire State,	Total,	191,623	52,356	39,756	29,055	21,312	14,858	10,760	7,833	5,535	3,784	2,671	1,605
	Native,	128,625	37,476	27,285	19,010	13,404	9,287	6,495	4,748	3,350	2,273	1,588	954
	Foreign,	65,478	14,765	12,379	9,983	7,846	5,540	4,235	3,065	2,169	1,503	1,074	647
	Nat. unstated,	520	115	92	62	62	31	30	20	16	8	9	4
Total of all cities and boroughs over 5,000 population,	Total,	101,125	29,388	21,468	15,042	10,535	7,020	5,116	3,608	2,521	1,756	1,158	705
	Native,	59,639	19,537	13,474	8,722	5,691	3,666	2,550	1,765	1,205	832	533	342
	Foreign,	41,220	9,782	7,948	6,297	4,809	3,334	2,553	1,835	1,310	923	620	361
	Nat. unstated,	266	69	46	23	35	20	13	8	6	1	5	2
Total of all boroughs between 2,500 and 5,000 population,	Total,	10,570	2,875	2,345	1,666	1,153	739	543	392	281	174	136	78
	Native,	7,395	2,199	1,639	1,161	765	495	358	240	176	111	81	54
	Foreign,	3,137	667	697	499	385	243	185	151	102	63	53	24
	Nat. unstated,	38	9	9	6	3	1		1	3		2	
Total of all boroughs having less than 2,500 population,	Total,	21,175	5,518	4,456	3,241	2,488	1,711	1,178	848	576	391	259	140
	Native,	15,413	4,275	3,343	2,366	1,726	1,192	794	584	412	250	169	85
	Foreign,	5,718	1,232	1,107	876	757	516	381	262	164	141	90	55
	Nat. unstated,	44	11	6	9	5	3	3	2				
Total rural,	Total,	61,753	14,575	11,487	9,096	7,136	5,388	3,923	2,985	2,157	1,463	1,118	682
	Native,	46,178	11,465	8,829	6,761	5,222	3,934	2,793	2,159	1,557	1,080	805	473
	Foreign,	15,403	3,084	2,627	2,311	1,895	1,447	1,116	817	593	376	311	207
	Nat. unstated,	172	26	31	24	19	7	14	9	7	7	2	2
Allentown,	Total,	1,242	382	265	181	156	81	48	39	23	20	13	9
	Native,	871	279	176	122	112	56	31	29	17	13	10	3
	Foreign,	370	103	88	59	44	25	17	10	6	7	3	3
	Nat. unstated,	1		1									
Altoona,	Total,	1,376	417	327	199	136	98	64	43	23	21	14	6
	Native,	1,096	348	267	156	108	71	47	32	18	12	9	3
	Foreign,	280	69	60	43	28	27	17	11	5	9	5	3
	Nat. unstated,												

TABLE 3.—Continued.

Area.		Number of Child.											
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Archbald,	Total,	228	47	39	37	24	17	11	9	12	4	5	2
	Native,	117	29	20	22	14	9	1	4	7	4	2	1
	Foreign,	111	18	19	15	10	8	10	5	5		3	1
	Nat. unstated,												
Ashland,	Total,	172	47	35	29	14	17	9	4	5	3		3
	Native,	158	44	34	27	13	14	8	3	3	3		3
	Foreign,	14	3	1	2	1	3	1	1	2			
	Nat. unstated,												
Bangor,	Total,	108	42	23	11	11	6	5	2	5	1		
	Native,	89	37	18	11	10	3	4	1	3	1		
	Foreign,	19	5	5		1	3	1	1	2			
	Nat. unstated,												
Beaver Falls,	Total,	292	98	59	45	35	10	10	9	3	7	3	1
	Native,	206	79	44	32	21	5	7	6	1	3	2	1
	Foreign,	84	19	15	13	14	4	3	2	2	4	1	
	Nat. unstated,	2					1		1				
Bethlehem,	Total,	251	83	65	35	19	16	8	8	6	6	3	
	Native,	230	76	60	2	7	5	7	7	6	6	2	
	Foreign,	21	7	5	3	2	1	1	1			1	
	Nat. unstated,												
Bloomsburg,	Total,	145	46	41	22	8	10	4	6	1	4		1
	Native,	143	46	40	22	8	10	3	6	1	4		1
	Foreign,	2		1				1					
	Nat. unstated,												
Braddock,	Total,	854	231	185	131	96	78	64	24	12	16	11	2
	Native,	253	88	63	30	23	24	13	6	3	1	1	1
	Foreign,	601	88	63	30	23	24	51	18	9	15	10	1
	Nat. unstated,												

Bradford,	Total,	321	120	64	56	19	22	12	13	4	5	----	1
	Native,	262	97	56	50	17	17	8	9	3	2	----	----
	Foreign,	59	23	8	6	2	5	4	4	1	3	----	1
	Nat. unstated,	----	----	----	----	----	----	----	----	----	----	----	----
Bristol,	Total,	210	53	34	41	15	12	12	3	6	3	1	2
	Native,	142	35	27	32	13	10	8	2	2	3	1	2
	Foreign,	50	11	7	9	2	2	4	1	4	----	----	----
	Nat. unstated,	18	7	----	----	----	----	----	----	----	----	----	----
Butler,	Total,	663	223	140	115	64	46	30	16	11	7	2	6
	Native,	417	145	90	70	38	26	21	9	8	5	----	3
	Foreign,	240	76	49	45	23	20	9	7	3	2	2	3
	Nat. unstated,	6	2	1	----	3	----	----	----	----	----	----	----
Carbondale,	Total,	449	118	101	79	45	22	24	16	8	7	3	2
	Native,	338	92	76	65	32	13	20	11	5	6	2	----
	Foreign,	106	25	22	14	13	9	4	5	3	1	1	2
	Nat. unstated,	5	1	3	----	----	----	----	----	----	----	----	----
Carlisle,	Total,	184	54	37	18	18	17	16	6	2	2	2	1
	Native,	176	54	35	16	16	15	16	6	2	2	2	1
	Foreign,	8	----	2	2	2	2	----	----	----	----	----	----
	Nat. unstated,	----	----	----	----	----	----	----	----	----	----	----	----
Carnegie,	Total,	298	86	59	56	35	19	7	15	9	2	2	1
	Native,	151	46	31	24	18	9	5	10	4	----	----	----
	Foreign,	147	40	28	32	17	10	2	5	5	2	2	1
	Nat. unstated,	----	----	----	----	----	----	----	----	----	----	----	----
Chambersburg,	Total,	294	86	60	39	32	21	20	11	11	3	5	2
	Native,	292	85	60	39	31	21	20	11	11	3	5	2
	Foreign,	2	----	----	----	----	1	----	----	----	----	----	----
	Nat. unstated,	----	----	----	----	----	----	----	----	----	----	----	----
Charleroi,	Total,	284	82	65	30	28	28	9	7	7	11	3	2
	Native,	116	44	25	11	12	10	2	1	2	1	1	2
	Foreign,	167	38	40	19	16	17	7	6	5	10	2	----
	Nat. unstated,	1	----	----	----	----	1	----	----	----	----	----	----
Chester,	Total,	813	244	180	116	89	61	41	25	25	8	5	3
	Native,	586	182	127	82	62	43	31	18	17	7	5	1
	Foreign,	225	61	52	34	27	18	10	9	8	1	----	2
	Nat. unstated,	2	1	1	----	----	----	----	----	----	----	----	----
Clearfield,	Total,	214	58	46	21	21	15	15	7	3	2	3	----
	Native,	195	54	38	21	18	15	15	7	3	2	2	----
	Foreign,	19	4	8	----	3	----	----	----	----	----	1	----
	Nat. unstated,	----	----	----	----	----	----	----	----	----	----	----	----

TABLE 3.—Continued.

Area.		Number of Child.										
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Coatesville,	Total,	337	114	72	48	35	23	17	7	10	4	1	2
	Native,	291	99	62	39	33	18	14	7	8	4	1	2
	Foreign,	46	15	10	9	2	5	3		2			
	Nat. unstated,												
Columbia,	Total,	324	95	62	33	42	31	20	10	10	6	6	2
	Native,	311	94	59	33	39	30	19	8	10	5	5	3
	Foreign,	13	1	3		3	1	1	2		1	1	
	Nat. unstated,												
Connellsville,	Total,	258	93	44	30	22	22	7	13	5	2	5	3
	Native,	203	84	35	20	16	17	5	9	4	1	4	1
	Foreign,	54	9	9	10	6	5	2	4	1	1	1	2
	Nat. unstated,	1											
Conshohocken,	Total,	153	45	20	27	17	15	10	5	5	5	1	1
	Native,	99	33	13	19	7	8	5	4	4	3		1
	Foreign,	54	12	7	8	10	7	5	1	1	2	1	
	Nat. unstated,												
Corry,	Total,	109	45	25	20	8	3		3	2	1	1	
	Native,	96	40	22	17	7	3		2	2	1	1	
	Foreign,	13	5	3	3	1			1				
	Nat. unstated,												
Danville,	Total,	192	39	45	28	21	11	14	9	14	6	3	
	Native,	180	38	42	27	20	10	11	9	12	6	3	
	Foreign,	12	1	3	1	1	1	3		2			
	Nat. unstated,												
Dickson City,	Total,	360	82	74	45	29	34	22	18	17	13	8	8
	Native,	73	24	19	6	6	4	3	3	2	3		1
	Foreign,	286	57	55	39	23	30	19	15	15	10	8	7
	Nat. unstated,	1	1										

DuBois,	Total,	344	87	71	53	38	31	18	16	12	8	3	1
	Native,	250	63	57	41	25	23	12	10	7	4	3	1
	Foreign,	94	24	14	12	13	8	6	6	5	4	.....	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunsmore,	Total,	445	99	72	59	39	44	47	27	23	8	12	6
	Native,	180	58	31	21	14	15	10	10	7	2	5	5
	Foreign,	265	41	41	38	25	29	37	171	16	6	7	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Duquesne,	Total,	569	145	118	90	56	43	36	24	17	16	2	7
	Native,	165	46	43	24	12	8	10	6	5	6	1	.....
	Foreign,	404	99	75	66	44	35	26	18	12	10	1	7
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Duryea,	Total,	266	50	45	45	37	28	15	20	6	5	6	2
	Native,	52	12	10	10	5	6	.....	3	.....	2	1	1
	Foreign,	212	36	35	35	32	22	15	17	6	3	5	1
	Nat. unstated,	2	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Easton,	Total,	573	180	149	81	55	41	20	16	7	8	3	6
	Native,	460	143	126	61	42	39	15	12	6	3	3	4
	Foreign,	112	37	22	20	13	2	5	4	1	5	.....	2
	Nat. unstated,	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Edwardsville,	Total,	2[illegible]2	62	39	38	15	18	6	10	12	10	4	1
	Native,	77	28	13	14	3	1	2	4	2	1	2	1
	Foreign,	154	33	26	24	12	17	4	6	10	9	2	.....
	Nat. unstated,	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Erie,	Total,	1,642	438	385	245	166	106	83	67	49	24	34	19
	Native,	1,[illegible]0[illegible]	310	277	153	86	53	40	31	22	9	11	5
	Foreign,	633	127	108	92	80	52	43	36	27	15	23	14
	Nat. unstated,	2	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
Etna,	Total,	191	46	29	41	21	21	7	5	6	7	1	3
	Native,	89	25	16	22	5	8	4	2	1	3	.....	2
	Foreign,	102	21	13	19	16	13	3	3	5	4	1	1
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Forest City,	Total,	290	60	55	39	39	31	26	11	9	7	6	3
	Native,	64	12	12	10	13	5	6	1	2	.....	2	1
	Foreign,	226	48	43	29	26	26	20	10	7	7	4	2
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Franklin,	Total,	239	81	67	32	21	16	10	2	3	.....	2	2
	Native,	222	76	62	29	19	16	9	2	3	.....	1	2
	Foreign,	17	5	5	3	2	.....	1	.....	.....	.....	1	.....
	Nat. unstated,	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 3.—Continued.

Area.		Number of Child.										
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Freeland,	Total,	222	40	37	37	37	22	16	6	5	9	5	1
	Native,	112	22	24	18	16	10	11	1	4	3	3	
	Foreign,	109	18	13	19	21	12	4	5	1	6	2	1
	Nat. unstated,	1						1					
Greensburg,	Total,	297	74	66	46	36	18	20	13	11	5	5	1
	Native,	211	61	55	28	24	8	12	9	4	4	3	1
	Foreign,	85	13	11	17	11	10	8	4	7	1	2	
	Nat. unstated,	1				1							
Greenville,	Total,	152	52	32	30	12	7	6	7	2	1		1
	Native,	142	50	30	29	12	7	5	6	2			
	Foreign,	10	2	2	1			1	1		1		1
	Nat. unstated,												
Hanover,	Total,	207	47	53	31	22	19	12	8	8	1	2	1
	Native,	199	46	52	29	22	19	11	8	7	1	2	1
	Foreign,	8	1	1	2			1		1			
	Nat. unstated,												
Harrisburg,	Total,	1,326	451	300	192	126	91	55	41	26	13	11	9
	Native,	1,189	411	268	175	113	81	47	34	21	11	10	8
	Foreign,	137	40	32	17	13	10	8	7	5	2	1	1
	Nat. unstated,												
Hazleton,	Total,	421	104	75	53	44	39	36	16	21	8	11	4
	Native,	287	83	54	39	22	25	27	12	10	2	7	1
	Foreign,	134	21	21	14	22	14	9	4	11	6	4	3
	Nat. unstated,												
Homestead,	Total,	738	192	170	119	87	62	36	27	13	14	5	3
	Native,	238	78	59	31	25	11	7	12	4	3	3	
	Foreign,	500	114	111	88	62	51	29	15	9	11	2	3
	Nat. unstated,												

Huntingdon,	Total,	139	45	34	26	16	5	7	2	1		1
	Native,	135	45	34	25	14	4	7	2	1		1
	Foreign,	3			1	1	1					
	Nat. unstated,	1				1						
Indiana,	Total,	125	38	34	20	17	4		9	2		
	Native,	117	35	33	19	16	4		8	2		
	Foreign,	8	4	1	1	1			1			
	Nat. unstated,											
Jeannette,	Total,	220	48	44	37	24	17	10	15	11	6	2	3
	Native,	170	44	32	26	16	13	8	12	9	2	2	3
	Foreign,	50	4	12	11	8	4	2	3	2	4		
	Nat. unstated,												
Johnsonburg,	Total,	150	29	40	16	22	12	11	6	4	3	2	4
	Native,	85	21	26	10	10	9	3	1	2		1	2
	Foreign,	65	8	14	6	12	3	8	5	2	3	1	2
	Nat. unstated,												
Johnstown,	Total,	1,463	395	301	245	178	112	80	49	28	25	15	10
	Native,	859	255	175	151	95	59	42	24	13	15	10	3
	Foreign,	540	124	113	86	71	48	34	22	14	9	5	6
	Nat. unstated,	64	16	13	8	12	5	4	3	1	1		1
Kane,	Total,	223	53	55	41	29	11	16	6	4	1	3	1
	Native,	144	41	42	24	15	7	9	4	1		1	
	Foreign,	79	12	13	17	14	4	7	2	3	1	2	1
	Nat. unstated,												
Lancaster,	Total,	894	272	190	125	80	70	41	37	22	15	14	6
	Native,	810	259	172	115	70	57	38	29	21	11	13	6
	Foreign,	83	12	18	10	10	13	3	8	1	4	1	
	Nat. unstated,	1	1										
Lansford,	Total,	261	71	58	38	25	19	14	8	13	7	4	3
	Native,	100	32	20	13	6	8	6	3	5	3	1	2
	Foreign,	161	39	38	25	19	11	8	5	8	4	3	1
	Nat. unstated,												
Latrobe,	Total,	291	70	59	48	34	28	19	18	5		5	3
	Native,	181	54	35	34	13	17	11	8	3		2	3
	Foreign,	108	15	23	14	21	11	8	10	2		3	
	Nat. unstated,	2	1	1									
Lebanon,	Total,	360	103	80	62	36	16	21	9	12	9	3	3
	Native,	333	98	75	57	34	14	19	7	10	7	3	3
	Foreign,	25	4	5	5	2	1	2	2	2	2		
	Nat. unstated,	2	1				1						

TABLE 3.—Continued.

Area.		Number of Child.											
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Lehighton,	Total,	117	30	28	21	11	8	6	4	1	4	2	1
	Native,	104	25	24	19	10	7	6	4	1	4	2	1
	Foreign,	13	5	4	2	1	1						
	Nat. unstated,												
Lewistown,	Total,	209	67	44	27	20	15	10	8	7	4	2	3
	Native,	202	66	43	25	18	15	10	7	7	4	2	3
	Foreign,	7	1	1	2	2			1				
	Nat. unstated,												
Lock Haven,	Total,	155	55	29	27	18	7	8	3	2	2	1	
	Native,	133	52	24	27	14	7	7	2	1	2	1	
	Foreign,	22	3	5	6	4		1	1	1			
	Nat. unstated,												
McKeesport,	Total,	1,569	429	306	248	173	120	98	51	47	31	18	14
	Native,	656	219	124	93	67	47	37	21	12	11	5	7
	Foreign,	913	210	182	155	106	73	61	30	35	20	13	7
	Nat. unstated,												
McKees Rocks,	Total,	417	121	73	43	37	30	15	9	6	5	3	2
	Native,	151	52	39	24	14	10	5	2	2	1		1
	Foreign,	266	69	34	19	23	20	10	7	4	4	3	1
	Nat. unstated,												
Mahanoy City,	Total,	598	103	86	60	44	27	23	25	12	6	7	3
	Native,	268	63	49	35	20	16	9	15	6	4	2	
	Foreign,	324	40	37	25	24	11	14	10	6	2	5	3
	Nat. unstated,	6											
Meadville,	Total,	226	83	53	32	26	16	6	3	3	1	1	
	Native,	181	70	46	25	18	10	5	3	2			
	Foreign,	41	11	7	7	6	6	1		1	1	1	
	Nat. unstated,	4	2			2							

Middletown,	Total,	150	49	34	18	12	10	4	6	7	5	2	2
	Native,	130	46	28	17	11	8	3	5	5	3	1	2
	Foreign,	20	3	6	1	1	2	1	1	2	2	1	
	Nat. unstated,												
Millvale,	Total,	243	52	48	29	30	24	13	10	14	9	8	
	Native,	163	45	37	20	18	17	7	3	8	3	4	
	Foreign,	80	7	11	9	12	7	6	7	6	6	4	
	Nat. unstated,												
Milton,	Total,	165	49	38	26	18	14	7	4	7	1	1	
	Native,	153	46	36	24	16	13	6	4	6	1	1	
	Foreign,	12	3	2	2	2	1	1		1			
	Nat. unstated,												
Minersville,	Total,	311	77	73	55	33	19	22	12	4	7	4	2
	Native,	135	37	42	20	13	7	6	4		4		1
	Foreign,	176	40	31	35	20	12	16	8	4	3	4	1
	Nat. unstated,												
Monongahela,	Total,	235	62	41	47	27	18	11	7	5	5	1	1
	Native,	133	40	31	25	13	7	6	5	2	1		1
	Foreign,	99	22	10	22	14	11	5	2	3	4	1	
	Nat. unstated,	3											
Mount Carmel,	Total,	632	132	94	97	74	43	61	31	27	18	12	10
	Native,	324	87	54	57	32	21	26	14	9	9	4	3
	Foreign,	279	43	39	39	41	22	35	16	16	9	8	7
	Nat. unstated,	9	2	1	1	1			1	2			
Mount Pleasant,	Total,	174	43	37	27	19	13	10	3	8	4		4
	Native,	104	32	26	12	14	5	5	1	3	3		2
	Foreign,	69	11	10	15	5	8	5	2	5	1		2
	Nat. unstated,	1		1									
Nanticoke,	Total,	561	120	101	86	59	47	27	41	24	19	9	7
	Native,	189	67	44	26	18	10	9	8	5	2		
	Foreign,	371	52	57	60	41	37	28	33	19	17	9	7
	Nat. unstated,	1	1										
New Brighton,	Total,	190	56	38	31	19	18	7	7	5	4	2	2
	Native,	168	49	34	27	16	17	7	7	4	3	1	2
	Foreign,	22	7	4	4	3	1			1	1	1	
	Nat. unstated,												
New Castle,	Total,	1,012	338	222	164	95	58	57	22	20	12	11	7
	Native,	637	212	160	102	57	35	30	10	12	7	5	3
	Foreign,	375	126	62	62	38	23	27	12	8	5	6	4
	Nat. unstated,												

TABLE 3.—Continued.

Area.		Number of Child.										
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Norristown,	Total,	412	120	96	57	42	18	18	19	15	10	1	4
	Native,	347	105	89	46	32	16	13	11	14	8		2
	Foreign,	65	15	7	11	10	2	5	8	1	2	1	2
	Nat. unstated,												
North Braddock,	Total,	474	109	106	80	58	35	40	14	15	8	2	3
	Native,	199	53	52	32	23	13	11	4	7	2	1	
	Foreign,	275	56	54	48	35	22	29	10	8	6	1	3
	Nat. unstated,												
Oil City,	Total,	321	82	83	49	33	29	13	11	3	4		
	Native,	272	71	71	45	28	25	11	8	1	3		
	Foreign,	49	11	12	4	5	4	2	3	2	1		
	Nat. unstated,												
Old Forge,	Total,	543	109	104	100	75	44	52	23	11	8	5	3
	Native,	65	15	15	8	9	3	9	3		1		
	Foreign,	476	94	89	92	65	41	43	19	11	7	5	3
	Nat. unstated,	2				1			1				
Olyphant,	Total,	240	49	40	45	29	26	14	13	4	10	2	2
	Native,	80	22	15	13	9	7	3	5		4		1
	Foreign,	160	27	25	32	20	19	11	8	4	6	2	1
	Nat. unstated,												
Philadelphia,	Total,	36,307	11,151	7,909	5,351	3,686	2,355	737	1,249	853	584	391	235
	Native,	19,721	6,997	4,542	2,790	1,797	1,077	747	520	355	252	154	109
	Foreign,	16,554	4,142	3,363	2,559	1,884	1,276	989	729	497	332	234	126
	Nat. unstated,	32	12	4	2	5	2	1		1		3	
Phoenixville,	Total,	357	101	75	71	36	27	13	18	3	4	1	2
	Native,	169	51	39	35	12	10	6	7	1	3		1
	Foreign,	188	50	36	36	24	17	7	11	2	1	1	1
	Nat. unstated,												

Pittsburg,	Total,	14,436	4,127	2,944	2,130	1,478	968	687	523	348	250	176	92
	Native,	7,476	2,532	1,624	1,075	694	413	300	207	123	88	59	29
	Foreign,	6,894	1,581	1,307	1,048	777	547	383	316	224	162	115	62
	Nat. unstated,	66	14	13	7	7	8	4		1		2	1
Pittston,	Total,	481	104	99	69	61	49	29	22	17	12	5	5
	Native,	233	53	53	29	32	22	14	9	10	4	3	1
	Foreign,	248	51	46	40	29	27	15	13	7	8	2	4
	Nat. unstated,												
Plymouth,	Total,	478	112	98	72	55	36	24	29	23	10	2	6
	Native,	234	65	63	38	21	18	6	12	5	2		1
	Foreign,	242	47	35	33	34	18	18	17	17	8	2	5
	Nat. unstated,	2			1					1			
Pottsville,	Total,	440	113	89	49	58	30	29	19	13	15	10	2
	Native,	363	101	78	41	36	26	20	17	9	15	7	2
	Foreign,	76	12	10	8	22	4	9	2	4		3	
	Nat. unstated,	1		1									
Pottstown,	Total,	338	104	69	55	31	21	14	12	11	7	4	1
	Native,	281	88	61	44	23	17	12	11	9	7	2	1
	Foreign,	57	16	8	11	8	4	2	1	2		2	
	Nat. unstated,												
Punxsutawney,	Total,	225	47	49	45	25	20	11	12	5	5	4	
	Native,	183	43	44	39	17	15	9	8	3	1	3	
	Foreign,	42	4	5	6	8	5	2	4	2	4	1	
	Nat. unstated,												
Reading,	Total,	2,312	641	533	355	250	250	111	78	53	47	32	14
	Native,	1,870	555	448	282	193	127	74	57	39	36	25	13
	Foreign,	441	85	85	73	57	41	37	21	14	11	7	1
	Nat. unstated,	1	1										
Rochester,	Total,	134	46	30	22	14	6	2	8	2	2		1
	Native,	98	39	21	17	9	3	2	3	1	2		
	Foreign,	36	7	9	5	5	3		5	1			1
	Nat. unstated,												
St. Clair,	Total,	199	52	45	25	27	14	12	7	4	3	2	5
	Native,	106	28	20	15	17	10	3	3	2	3	1	3
	Foreign,	93	24	25	10	10	4	9	4	2		1	2
	Nat. unstated,												
St. Marys,	Total,	212	38	38	44	20	21	17	7	5	8	6	4
	Native,	188	33	35	38	20	19	16	7	4	6	5	2
	Foreign,	23	5	3	5		2	1		1	2	1	2
	Nat. unstated,	1			1								

TABLE 3.—Continued.

Area.		Number of Child.											
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Sayre,	Total,	159	51	30	33	19	9	3	4	6	----	----	----
	Native,	136	47	25	30	15	5	2	3	5	----	----	----
	Foreign,	23	4	5	3	4	4	1	1	1	----	----	----
	Nat. unstated,	----	----	----	----	----	----	----	----	----	----	----	----
Scranton,	Total,	3,149	877	622	439	330	223	185	124	100	64	49	34
	Native,	1,669	533	355	229	162	106	79	55	46	26	15	14
	Foreign,	1,473	344	265	210	167	117	104	68	54	38	34	20
	Nat. unstated,	7	----	2	----	1	----	2	1	----	----	----	----
Scottdale,	Total,	140	43	40	15	12	14	3	4	4	2	----	1
	Native,	118	39	37	13	9	10	1	2	2	2	----	1
	Foreign,	22	4	3	2	3	4	2	2	2	----	----	----
	Nat. unstated,	----	----	----	----	----	----	----	----	----	----	----	----
Shamokin,	Total,	585	148	93	86	68	52	43	30	14	9	13	8
	Native,	440	116	74	64	43	43	34	21	10	7	10	8
	Foreign,	145	32	19	22	25	9	9	9	4	2	3	----
	Nat. unstated,	----	----	----	----	----	----	----	----	----	----	----	----
Sharon,	Total,	349	99	89	44	39	22	19	9	14	5	2	----
	Native,	257	78	66	35	23	16	16	6	9	4	1	----
	Foreign,	91	21	23	9	16	6	3	3	5	1	1	----
	Nat. unstated,	1	----	----	----	----	----	----	----	----	----	----	----
Sharpsburg,	Total,	199	54	40	32	19	17	12	7	6	5	2	2
	Native,	111	32	28	18	10	8	3	5	3	1	1	----
	Foreign,	88	22	12	14	9	9	9	2	3	4	1	2
	Nat. unstated,	----	----	----	----	----	----	----	----	----	----	----	----
Shenandoah,	Total,	947	287	175	128	122	68	56	40	18	27	8	3
	Native,	299	96	54	43	36	19	16	10	4	10	3	1
	Foreign,	647	191	121	84	86	49	40	30	14	17	5	2
	Nat. unstated,	1	----	----	1	----	----	----	----	----	----	----	----

South Bethlehem,	Total,	704	237	134	102	72	58	40	23	11	11	7	3
	Native,	243	66	50	33	29	22	10	13	5	6	5	2
	Foreign,	461	171	84	69	43	36	30	10	6	5	2	1
	Nat. unstated,												
Steelton,	Total,	433	131	96	57	51	30	20	16	9	7	8	3
	Native,	214	61	51	31	23	17	8	5	4	5	7	
	Foreign,	219	70	45	26	28	13	12	11	5	2	1	3
	Nat. unstated,												
Sunbury,	Total,	331	105	79	59	23	16	13	13	12	7		1
	Native,	325	104	78	58	22	16	12	12	12	7		1
	Foreign,	5		1	1	1		1	1				
	Nat. unstated,	1	1										
Tamaqua,	Total,	259	63	53	42	29	20	18	7	5	11	4	4
	Native,	232	56	49	41	19	13	13	6	3	11	4	3
	Foreign,	27	7	4	1	3	1	5	1	2			1
	Nat. unstated,												
Tarentum,	Total,	209	66	34	29	19	16	14	7	4	4	2	
	Native,	114	47	27	16	6	8	5	2	1	1		
	Foreign,	95	19	17	13	13	8	9	5	3	3	2	
	Nat. unstated,												
Titusville,	Total,	157	46	45	24	13	10	8	1	7	2	1	
	Native,	130	42	43	17	8	6	7	1	4	2		
	Foreign,	27	4	2	7	5	4	1		3		1	
	Nat. unstated,												
Tyrone,	Total,	216	63	38	36	29	17	11	7	5	4	2	1
	Native,	210	62	37	35	28	17	11	6	4	4	2	1
	Foreign,	6	1	1	1	1			1	1			
	Nat. unstated,												
Uniontown,	Total,	290	90	70	44	30	22	9	11	7	3	2	
	Native,	228	73	58	36	25	13	8	6	5	1	1	
	Foreign,	62	17	12	8	5	9	1	5	2	2	1	
	Nat. unstated,												
Warren,	Total,	249	84	56	36	34	15	4	7	6	1	4	1
	Native,	165	62	36	25	26	8	1	2	2	1	2	
	Foreign,	84	22	20	11	8	7	3	5	4		2	1
	Nat. unstated,												
Washington,	Total,	373	124	72	64	46	19	17	8	6	5	3	6
	Native,	327	115	66	57	40	16	12	7	5	2		5
	Foreign,	46	9	6	7	6	3	5	1	1	3	3	1
	Nat. unstated,												

TABLE 3. — Continued.

Area.		Number of Child.										
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Waynesboro,	Total,	181	46	42	28	28	14	9	6	2	3	1	1
	Native,	179	46	42	28	28	13	9	5	2	3	1	1
	Foreign,	2					1		1				
	Nat. unstated,												
West Chester,	Total,	223	69	48	40	23	14	7	14	1	3	3	
	Native,	199	61	42	37	21	13	6	12	1	2	3	
	Foreign,	24	8	6	3	2	1	1	2		1		
	Nat. unstated,												
West Pittston,	Total,	138	54	28	16	10	9	9	3	3	2	2	
	Native,	80	34	14	9	6	6	3	2	2	1	2	
	Foreign,	58	20	14	7	4	3	6	1	1	1		
	Nat. unstated,												
Wilkes-Barre,	Total,	1,723	446	342	226	195	149	104	71	71	32	30	12
	Native,	1,019	299	219	135	98	76	63	37	39	10	17	4
	Foreign,	703	147	123	90	97	73	41	34	32	22	13	8
	Nat. unstated,	1			1								
Wilkinsburg,	Total,	527	192	118	73	35	33	15	11	4	6	7	2
	Native,	441	165	100	67	27	23	10	7	3	5	4	2
	Foreign,	80	26	16	6	8	10	4	4	1	1	3	
	Nat. unstated,	6	1	2				1					
Williamsport,	Total,	692	222	168	108	59	39	37	21	16	10	4	4
	Native,	601	202	148	93	51	32	30	17	11	7	4	4
	Foreign,	87	20	19	14	8	6	7	3	5	3		
	Nat. unstated,	4		1	1				1				
Wilmerding,	Total,	239	60	59	40	26	14	13	12	5	4	2	2
	Native,	103	29	30	17	5	5	6	5	2	2		1
	Foreign,	136	31	29	21	9	7	7	7	3	2	2	1
	Nat. unstated,												

Windber,	Total,	338	90	70	46	48	30	19	11	12	6	1	1
	Native,	132	35	32	15	18	8	10	5	5		1	
	Foreign,	205	55	38	31	29	22	9	6	7	6		1
	Nat. unstated,	1				1							
York,	Total,	1,031	307	240	158	112	70	43	28	17	19	14	14
	Native,	982	298	230	148	107	65	40	27	15	19	14	12
	Foreign,	49	9	10	10	5	5	3	1	2			2
	Nat. unstated,												
Counties (Rural.)													
Adams,	Total,	603	127	115	74	70	57	46	32	32	18	9	11
	Native,	592	125	113	73	69	56	46	31	32	17	9	10
	Foreign,	10	2	2	1	1	1		1				1
	Nat. unstated,	1									1		
Allegheny,	Total,	3,964	916	734	594	497	360	225	198	126	88	55	34
	Native,	2,189	590	418	329	259	191	96	108	67	43	26	18
	Foreign,	1,769	326	316	262	237	169	129	90	59	45	29	16
	Nat. unstated,	6			3	1							
Armstrong,	Total,	1,113	262	197	191	144	98	82	53	31	21	12	9
	Native,	914	205	155	146	128	85	75	45	28	18	11	6
	Foreign,	198	56	42	45	16	13	7	8	3	3	1	3
	Nat. unstated,	1	1										
Beaver,	Total,	528	125	98	67	68	48	29	32	23	18	11	2
	Native,	427	107	80	53	54	40	22	25	17	15	9	1
	Foreign,	95	18	16	13	13	7	6	7	6	3	2	1
	Nat. unstated,	6		2	1	1	1	1					
Bedford,	Total,	791	179	158	105	78	73	53	41	34	23	12	13
	Native,	744	169	144	101	77	67	49	40	32	22	12	12
	Foreign,	43	10	12	4	1	5	3	1	2	1		1
	Nat. unstated,	4		2			1	1					
Berks,	Total,	1,704	447	293	239	186	129	102	101	69	45	26	23
	Native,	1,640	439	283	226	182	124	95	93	66	43	25	20
	Foreign,	60	7	10	13	4	4	7	8	2	2	1	2
	Nat. unstated,	4	1				1			1			1
Blair,	Total,	776	207	134	109	81	58	48	38	42	17	16	10
	Native,	665	184	111	89	71	53	42	32	34	15	13	9
	Foreign,	108	23	22	19	10	5	5	6	8	2	3	1
	Nat. unstated,	3		1	1			1					
Bradford,	Total,	662	176	136	108	84	48	42	26	20	10	5	4
	Native,	639	170	131	105	82	44	41	26	20	9	5	3
	Foreign,	20	4	5	3	2	4				1		1
	Nat. unstated,	3	2					1					

TABLE 3.--Continued.

Area.		Number of Child.											
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Bucks,	Total,	925	235	177	127	91	79	58	41	32	20	26	13
	Native,	817	219	156	111	78	68	47	38	26	15	21	13
	Foreign,	105	15	21	16	12	11	11	3	6	5	5	
	Nat. unstated,	3	1			1							
Butler,	Total,	1,066	265	214	172	118	97	56	52	30	19	15	9
	Native,	789	196	160	115	79	75	50	45	24	17	11	7
	Foreign,	274	67	54	56	39	22	6	7	6	2	4	2
	Nat. unstated,	3	2		1								
Cambria,	Total,	1,848	387	299	273	208	190	120	103	69	58	49	34
	Native,	1,028	222	187	126	121	107	60	58	42	35	24	16
	Foreign,	798	163	110	144	84	82	56	44	26	21	23	18
	Nat. unstated,	22	2	2	3	3	1	4	1	1	2	2	
Cameron,	Total,	91	23	20	14	10	5	5	5	2	1	1	
	Native,	82	22	18	11	10	5	4	3	2	1	1	
	Foreign,	9	1	2	3			1	2				
	Nat. unstated,												
Carbon,	Total,	644	161	111	112	78	51	35	21	22	19	9	5
	Native,	418	115	64	69	50	32	20	11	16	13	8	3
	Foreign,	225	46	47	42	28	19	15	10	6	6	1	2
	Nat. unstated,	1			1								
Centre,	Total,	829	170	152	143	90	68	51	36	44	18	18	6
	Native,	733	159	146	125	77	62	39	27	37	18	14	4
	Foreign,	93	11	6	18	13	6	11	8	6		4	2
	Nat. unstated,	3						1	1	1			
Chester,	Total,	1,185	293	242	177	132	94	62	62	35	29	18	10
	Native,	1,040	260	213	156	118	81	52	55	29	28	15	10
	Foreign,	141	32	27	20	14	13	10	7	6	1	3	
	Nat. unstated,	4	1	2	1								

Clarion,	Total,	666	165	99	93	71	58	51	42	25	20	18	11
	Native,	624	153	92	86	67	55	49	40	24	19	18	9
	Foreign,	40	12	7	5	4	3	2	2	1	1		2
	Nat. unstated,	2			2								
Clearfield,	Total,	1,875	365	289	261	208	163	133	104	76	56	48	27
	Native,	1,087	251	202	145	109	88	67	54	42	36	25	14
	Foreign,	786	113	87	116	98	75	66	50	34	20	23	13
	Nat. unstated,	2	1			1							
Clinton,	Total,	330	79	70	58	33	30	22	16	8	4	3	1
	Native,	297	73	59	52	32	29	21	16	8	4	3	1
	Foreign,	32	6	10	6	1	1	1	4				
	Nat. unstated,	1		1									
Columbia,	Total,	581	129	125	89	63	47	29	32	20	13	12	5
	Native,	536	122	119	83	58	44	27	27	19	9	10	4
	Foreign,	44	6	6	6	5	3	2	5	1	4	2	1
	Nat. unstated,	1	1										
Crawford,	Total,	588	158	139	91	54	47	38	21	17	8	8	5
	Native,	571	153	135	88	53	46	35	21	17	8	8	5
	Foreign,	14	3	4	3	1	1	2					
	Nat. unstated,	3	2					1					
Cumberland,	Total,	567	167	115	80	69	36	23	25	14	15	10	1
	Native,	547	164	108	77	67	36	22	24	13	15	10	1
	Foreign,	15	3	4	3	1		1	1	1			
	Nat. unstated,	5		3		1							
Dauphin,	Total,	1,051	268	232	130	121	72	57	44	33	35	20	9
	Native,	924	231	205	107	110	61	51	43	31	33	19	7
	Foreign,	124	37	25	23	11	10	6	1	2	2	1	2
	Nat. unstated,	3		2			1						
Delaware,	Total,	590	150	134	92	68	51	39	16	13	5	7	7
	Native,	448	113	100	68	58	43	25	14	8	3	6	5
	Foreign,	142	37	34	24	10	8	14	2	5	2	1	2
	Nat. unstated,												
Elk,	Total,	623	141	114	81	95	52	40	24	23	18	11	4
	Native,	345	89	67	36	44	29	25	13	13	10	6	1
	Foreign,	278	52	47	45	51	23	15	11	10	8	5	3
	Nat. unstated,												
Erie,	Total,	555	146	116	83	69	48	20	24	22	5	5	2
	Native,	502	140	105	79	63	43	19	17	15	4	5	2
	Foreign,	53	6	11	4	6	5	1	7	7	1		
	Nat. unstated,												

TABLE 3.—Continued.

Area.		Number of Child.											
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Fayette,	Total,	2,808	652	486	374	361	268	184	133	108	77	65	30
	Foreign,	1,579	399	274	207	188	143	99	66	62	44	37	16
	Native,	1,225	253	212	167	173	125	84	65	46	33	28	14
	Nat. unstated,	4						1	2				
Forest,	Total,	226	55	24	31	24	25	18	13	17	5	6	2
	Native,	216	53	24	30	22	23	18	12	16	5	5	2
	Foreign,	10	2		1	2	2		1	1		1	
	Nat. unstated,												
Franklin,	Total,	940	219	171	120	116	75	74	51	36	24	17	19
	Native,	928	216	169	120	113	74	73	51	36	23	17	19
	Foreign,	8	2	2		3	1						
	Nat. unstated,	4	1					1			1		
Fulton,	Total,	245	63	34	40	28	24	18	14	9	3	4	6
	Native,	243	63	34	40	28	24	18	13	9	3	4	6
	Foreign,												
	Nat. unstated,	2							1				
Greene,	Total,	422	103	83	75	55	30	26	17	12	5	7	1
	Native,	410	102	80	75	55	29	26	16	11	5	6	1
	Foreign,	6	1	1			1		1	1		1	
	Nat. unstated,	6		2									
Huntingdon,	Total,	491	113	96	62	68	54	27	23	16	4	9	2
	Native,	443	105	85	55	59	49	23	23	14	3	9	1
	Foreign,	38	7	9	4	7	5	3		2			1
	Nat. unstated,	10	1	2	3	2		1			1		
Indiana,	Total,	1,524	339	302	245	176	126	121	64	43	30	21	19
	Native,	912	207	169	138	109	76	77	42	26	23	14	7
	Foreign,	604	130	132	105	65	49	44	21	17	7	7	12
	Nat. unstated,	8	2	1	2	1	1		1				

Jefferson,	Total,	1,374	273	229	197	159	145	117	90	45	30	36	18
	Native,	798	182	151	112	88	76	60	45	19	14	23	10
	Foreign,	574	91	77	85	71	68	57	45	26	16	13	8
	Nat. unstated,	2		1			1						
Juniata,	Total,	314	86	51	48	20	31	24	15	11	13	6	1
	Native,	311	86	49	48	19	31	24	15	11	13	6	1
	Foreign,	2		1		1							
	Nat. unstated,	1		1									
Lackawanna,	Total,	454	121	73	70	64	34	28	20	7	13	4	5
	Native,	217	63	34	38	25	15	11	11	3	7	3	2
	Foreign,	235	58	39	32	39	19	17	9	4	6	1	3
	Nat. unstated,	2											
Lancaster,	Total,	2,263	579	431	339	245	188	133	105	63	51	58	20
	Native,	2,225	569	421	334	242	183	133	104	62	50	57	20
	Foreign,	36	10	10	4	3	5		1		1	1	
	Nat. unstated,	2			1					1			
Lawrence,	Total,	541	152	106	91	57	40	34	20	15	6	9	5
	Native,	358	95	71	60	37	28	25	13	10	5	5	4
	Foreign,	182	56	35	31	20	12	9	7	5	1	4	1
	Nat. unstated,	1	1										
Lebanon,	Total,	943	229	199	125	104	83	54	38	28	19	17	11
	Native,	893	221	186	117	100	79	49	36	26	18	16	10
	Foreign,	45	7	12	8	4	4	5	1	1	1	1	1
	Nat. unstated,	5	1	1					1	1			
Lehigh,	Total,	1,199	311	238	187	142	86	64	48	35	26	22	13
	Native,	931	221	195	142	111	72	51	35	29	17	20	13
	Foreign,	267	90	43	45	31	14	13	13	6	8	2	
	Nat. unstated,	1									1		
Luzerne,	Total,	2,980	589	534	435	336	278	211	180	122	90	66	35
	Native,	1,216	284	258	188	135	97	66	56	33	32	29	12
	Foreign,	1,760	305	278	246	201	181	145	124	89	58	37	23
	Nat. unstated,	4		3	1								
Lycoming,	Total,	685	141	125	108	82	65	44	34	18	28	17	6
	Native,	640	137	116	102	78	58	37	34	17	25	15	6
	Foreign,	45	4	9	6	4	7	7		1	3	2	
	Nat. unstated,												
McKean,	Total,	446	103	74	65	45	43	29	21	28	8	12	6
	Native,	313	77	57	48	32	28	14	17	16	6	6	3
	Foreign,	132	26	17	17	13	15	15	4	11	2	6	3
	Nat. unstated,	1								1			

TABLE 3.—Continued.

Area.		Number of Child.											
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Mercer,	Total,	573	133	109	94	71	60	28	27	17	17	4	4
	Native,	518	120	99	90	62	52	27	22	17	14	3	4
	Foreign,	54	13	10	4	9	8	1	4		3	1	
	Nat. unstated,	1							1				
Mifflin,	Total,	545	127	124	75	61	45	32	22	19	16	8	4
	Native,	518	119	118	74	56	44	31	20	18	16	7	4
	Foreign,	27	8	6	1	5	1	1	2	1		1	
	Nat. unstated,												
Monroe,	Total,	357	101	60	54	53	35	16	9	7	8	2	4
	Native,	344	98	58	53	51	32	15	9	6	8	2	4
	Foreign,	13	3	2	1	2	3	1		1			
	Nat. unstated,												
Montgomery,	Total,	1,610	414	351	241	178	133	78	63	46	27	24	16
	Native,	1,280	339	292	183	134	106	62	47	36	19	17	13
	Foreign,	326	74	59	57	42	27	16	16	10	8	7	3
	Nat. unstated,	4	1		1	2							
Montour,	Total,	141	36	21	23	19	17	7	4	5	3	3	3
	Native,	136	35	21	23	19	17	7	3	3	2	3	3
	Foreign,	4							1	2	1		
	Nat. unstated,	1	1										
Northampton,	Total,	895	217	163	147	111	70	63	40	30	11	14	12
	Native,	720	172	134	118	90	53	52	30	25	10	12	10
	Foreign,	173	45	29	28	20	17	11	10	5	1	2	2
	Nat. unstated,	2			1	1							
Northumberland,	Total,	1,301	281	244	171	160	109	90	59	48	36	28	18
	Native,	920	211	178	119	117	76	63	40	30	25	12	10
	Foreign,	380	69	66	52	43	33	27	19	18	11	16	8
	Nat. unstated,	1	1										

Perry,	Total,	434	100	73	63	50	43	35	21	12	12	12	4
	Native,	431	100	73	62	49	43	34	21	12	12	12	4
	Foreign,	3			1	1		1					
	Nat. unstated,												
Pike,	Total,	117	36	17	16	13	6	8	4	8	1	1	2
	Native,	98	35	12	12	11	5	5	3	8	1	1	1
	Foreign,	19	1	5	4	2	1	3	1				1
	Nat. unstated,												
Potter,	Total,	332	90	64	49	36	30	19	8	14	13	2	2
	Native,	296	86	56	42	32	26	18	7	10	10	2	2
	Foreign,	36	4	8	7	4	4	1	1	4	3		
	Nat. unstated,												
Schuylkill,	Total,	2,038	445	345	275	208	183	142	117	75	65	51	31
	Native,	1,429	335	253	209	145	124	91	80	53	41	35	19
	Foreign,	606	110	92	66	63	59	51	37	22	24	16	12
	Nat. unstated,	3											
Snyder,	Total,	400	109	84	64	41	22	32	17	14	6	7	2
	Native,	399	109	83	64	41	22	32	17	14	6	7	2
	Foreign,	1		1									
	Nat. unstated,												
Somerset,	Total,	1,156	272	209	179	139	106	65	61	34	17	27	10
	Native,	908	210	163	143	103	91	51	52	30	17	23	9
	Foreign,	243	62	46	36	34	15	14	8	4		4	1
	Nat. unstated,	5				1			1				
Sullivan,	Total,	276	64	58	29	26	20	24	19	10	5	9	5
	Native,	225	51	52	23	20	13	22	15	6	5	9	3
	Foreign,	50	13	6	6	6	6	2	4	4			2
	Nat. unstated,	1											
Susquehanna,	Total,	316	91	82	54	26	27	13	11	5		3	1
	Native,	298	91	73	53	25	23	12	11	5		1	1
	Foreign,	16		7	1	1	4	1				2	
	Nat. unstated,	2		2									
Tioga,	Total,	693	165	136	114	87	47	38	35	20	16	5	9
	Native,	606	154	125	103	77	44	30	27	13	11	3	7
	Foreign,	86	11	11	11	10	3	8	8	7	5	2	2
	Nat. unstated,	1											
Union,	Total,	271	64	59	38	37	20	14	11	13	7	2	1
	Native,	268	64	59	38	36	19	14	11	13	7	2	1
	Foreign,	3				1	1						
	Nat. unstated,												

TABLE 3.—Continued.

Area.		Number of Child.											
		Total.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.
Venango,	Total,	435	104	102	59	40	30	27	20	19	14	7	6
	Native,	413	98	101	56	39	27	26	19	18	12	6	4
	Foreign,	21	5	1	3	1	3	1	1	1	2	1	2
	Nat. unstated,	1	1										
Warren,	Total,	474	139	89	80	41	38	33	16	10	10	6	7
	Native,	368	113	73	61	32	29	25	13	4	9	2	3
	Foreign,	106	26	16	19	9	9	8	3	6	1	4	4
	Nat. unstated,												
Washington,	Total,	1,665	410	298	275	204	156	98	67	46	40	20	16
	Native,	1,037	259	199	167	119	94	52	47	30	27	10	11
	Foreign,	624	151	98	106	84	62	46	20	16	13	10	5
	Nat. unstated,	4		1	2	1							
Wayne,	Total,	392	99	82	65	40	38	23	8	15	9	4	2
	Native,	356	95	75	60	34	33	20	7	13	8	3	2
	Foreign,	35	4	7	5	6	5	3	1	2		1	
	Nat. unstated,	1									1		
Westmoreland,	Total,	3,569	790	641	493	444	326	248	191	153	74	56	44
	Native,	1,654	407	291	238	194	141	104	87	70	38	25	17
	Foreign,	1,908	382	349	255	249	185	143	104	82	36	31	26
	Nat. unstated,	7	1	1		1		1		1			1
Wyoming,	Total,	264	56	48	44	26	26	17	13	9	10	4	3
	Native,	245	54	44	41	22	25	16	13	8	9	3	3
	Foreign,	17	2	3	3	3	1	1		1	1	1	
	Nat. unstated,	2		1		1							
York,	Total,	1,489	363	259	219	158	147	101	67	53	31	19	22
	Native,	1,480	359	258	219	157	146	101	67	53	30	19	22
	Foreign,	7	3	1		1	1				1		
	Nat. unstated,	2	1										

TABLE 3.—Continued.

Area.		Number of Child.												
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	Unstated.
Entire State,	Total,	931	600	298	155	70	24	17	5	3			2	2,993
	Native,	557	374	184	97	56	11	11	4	3			2	1,456
	Foreign,	372	226	112	58	14	13	6	1					1,470
	Nat. unstated,	2		2										67
Total of all cities and boroughs over 5,000 population,	Total,	390	246	120	66	26	9	10	3	1				1,937
	Native,	172	123	62	35	18	3	8	3	1				897
	Foreign,	218	123	56	31	8	6	2						1,004
	Nat. unstated,			2										36
Total of all boroughs between 2,500 and 5,000 population,	Total,	38	27	12	4	3	2	2						100
	Native,	23	14	6	3	2	2							66
	Foreign,	15	13	6	1	1		2						30
	Foreign,													4
Total of all boroughs having less than 2,500 population,	Total,	84	50	28	22	3	6	4	2					160
	Native,	48	30	19	15	3	2	2	1					97
	Foreign,	35	20	9	7		4	2	1					59
	Nat. unstated,	1												4
Total rural,	Total,	419	277	138	63	38	7	1		2			2	796
	Native,	314	207	97	44	33	4	1		2			2	396
	Foreign,	104	70	41	19	5	3							377
	Nat. unstated,	1												23
Allentown,	Total,	7	2	2		1								13
	Native,	5	2	2		1								10
	Foreign,	2												3
	Nat. unstated,													
Altoona,	Total,	7	4	2										15
	Native,	5	4	1										15
	Foreign,	2		1										
	Nat. unstated,													

TABLE 3.—Continued.

Area.		Number of Child.												
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	Unstated.
Archbald,	Total,	2	2											17
	Native,	1	1											2
	Foreign,	1	1											15
	Nat. unstated,													
Ashland,	Total,		2											
	Native,		2											
	Foreign,													
	Nat. unstated,													
Bangor,	Total,				1									1
	Native,													1
	Foreign,				1									
	Nat. unstated,													
Beaver Falls,	Total,	3		1				1						7
	Native,			1				1						3
	Foreign,	3												4
	Nat. unstated,													
Bethlehem,	Total,				1									1
	Native,				1									1
	Foreign,													
	Nat. unstated,													
Bloomsburg,	Total,	2												
	Native,	2												
	Foreign,													
	Nat. unstated,													
Braddock,	Total,	2	1	1										
	Native,													
	Foreign,	2	1	1										
	Nat. unstated,													

Bradford,	Total,	1													4
	Native,	1													2
	Foreign,														2
	Nat. unstated,														
Bristol,	Total,				1	1									26
	Native,				1	1									5
	Foreign,														10
	Nat. unstated,														11
Butler,	Total,	2					1								
	Native,	1					1								
	Foreign,	1													
	Nat. unstated,														
Carbondale,	Total,	1	1												22
	Native,	1	1												14
	Foreign,														7
	Nat. unstated,														1
Carlisle,	Total,	1	1	1	1										7
	Native,	1	1	1	1										7
	Foreign,														
	Nat. unstated,														
Carnegie,	Total,	3	2	1					1						
	Native,	1	2						1						
	Foreign,	2		1											
	Nat. unstated,														
Chambersburg,	Total,	2													2
	Native,	2													2
	Foreign,														
	Nat. unstated,														
Charleroi,	Total,			1	1	1									9
	Native,			1	1										3
	Foreign,					1									
	Nat. unstated,														
Chester,	Total,	1		2				1							6
	Native,	1		2				1							10
	Foreign,														3
	Nat. unstated,														
Clearfield,	Total,	1		1											21
	Native,	1													19
	Foreign,			1											2
	Nat. unstated,														

TABLE 3.—Continued.

Area.		Number of Child.												
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	Unstated.
Coatesville,	Total,	1	3											
	Native,	1	3											
	Foreign,													
	Nat. unstated,													
Columbia,	Total,	4	2											
	Native,	4	2											
	Foreign,													
	Nat. unstated,													
Connellsville,	Total,	4												8
	Native,	1												6
	Foreign,	3												1
	Nat. unstated,													1
Conshohocken,	Total,													2
	Native,													2
	Foreign,													
	Nat. unstated,													
Corry,	Total,													1
	Native,													1
	Foreign,													
	Nat. unstated,													
Danville,	Total,	1	1											
	Native,	1	1											
	Foreign,													
	Nat. unstated,													
Dickson City,	Total,	2			1									7
	Native,	1			1									
	Foreign,	1												7
	Nat. unstated,													

DuBois,	Total,	2	1			1	1							1
	Native,	1				1	1							1
	Foreign,	1	1											
	Nat. unstated,													
Dunsmore,	Total,	1	1	1	1									5
	Native,			1										1
	Foreign,	1	1		1									4
	Nat. unstated,													
Duquesne,	Total,	4	2											9
	Native,													4
	Foreign,	4	2											5
	Nat. unstated,													
Duryea,	Total,	2	1											4
	Native,													2
	Foreign,	2	1											2
	Nat. unstated,													
Easton,	Total,	2		2	1									2
	Native,	2		2										2
	Foreign,				1									
	Nat. unstated,													
Edwardsville,	Total,	2	3		1	1								10
	Native,	1	1		1									3
	Foreign,	1	2			1								7
	Nat. unstated,													
Erie,	Total,	2	2	6	1	1	1							13
	Native,		1			1								8
	Foreign,	2	1	6	1		1							5
	Nat. unstated,													
Etna,	Total,	1												3
	Native,													1
	Foreign,	1												2
	Nat. unstated,													
Forest City,	Total,	1	2											1
	Native,													
	Foreign,	1	2											1
	Nat. unstated,													
Franklin,	Total,	1		1										1
	Native,	1		1										1
	Foreign,													
	Nat. unstated,													

TABLE 3.—Continued.

Area.		Number of Child.												
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	Unstated.
Freeland,	Total,	4	2											1
	Native,													
	Foreign,	4	2											1
	Nat. unstated,													
Greensburg,	Total,	1			1									1
	Native,				1									1
	Foreign,	1												
	Nat. unstated,													
Greenville,	Total,			1										1
	Native,													1
	Foreign,			1										
	Nat. unstated,													
Hanover,	Total,				1									2
	Native,				1									
	Foreign,													2
	Nat. unstated,													
Harrisburg,	Total,	1	1			1								8
	Native,	1	1			1								7
	Foreign,													1
	Nat. unstated,													
Hazleton,	Total,	4												6
	Native,	2												3
	Foreign,	2												3
	Nat. unstated,													
Homestead,	Total,	1	3											6
	Native,		1											4
	Foreign,	1	2											2
	Nat. unstated,													

Huntingdon,	Total,		1												1
	Native,		1												1
	Foreign,														
	Nat. unstated,														
Indiana,	Total,														
	Native,														
	Foreign,														
	Nat. unstated,														
Jeannette,	Total,				1										2
	Native,				1										2
	Foreign,														
	Nat. unstated,														
Johnsonburg,	Total,														1
	Native,														
	Foreign,														1
	Nat. unstated,														
Johnstown,	Total,	7	4	2	2										10
	Native,	3	2	1	1										10
	Foreign,	4	2	1	1										
	Nat. unstated,														
Kane,	Total,	2													1
	Native,														
	Foreign,	2													1
	Nat. unstated,														
Lancaster,	Total,	6	4			2	1								9
	Native,	6	3			2									8
	Foreign,		1				1								1
	Nat. unstated,														
Lansford,	Total,		1												
	Native,		1												
	Foreign,														
	Nat. unstated,														
Latrobe,	Total,		1		1										
	Native,				1										
	Foreign,		1												
	Nat. unstated,														
Lebanon,	Total,		2	1	1										2
	Native,		2	1	1										2
	Foreign,														
	Nat. unstated,														

TABLE 3.—Continued.

Area.		Number of Child.												
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	Unstated.
Lehighton,	Total,													1
	Native,													1
	Foreign,													
	Nat. unstated,													
Lewistown,	Total,	2												
	Native,	2												
	Foreign,													
	Nat. unstated,													
Lock Haven,	Total,		1											2
	Native,													2
	Foreign,		1											
	Nat. unstated,													
McKeesport,	Total,	12	8	1	1									12
	Native,	4	3											6
	Foreign,	8	5	1	1									6
	Nat. unstated,													
McKees Rocks,	Total,	1	1											71
	Native,													1
	Foreign,	1	1											70
	Nat. unstated,													
Mahanoy City,	Total,	2		1										199
	Native,	1		1										47
	Foreign,	1												146
	Nat. unstated,													6
Meadville,	Total,													2
	Native,													2
	Foreign,													
	Nat. unstated,													

Middletown,	Total,				1									
	Native,				1									
	Foreign,													
	Nat. unstated,													
Millvale,	Total,	3	1	1										1
	Native,													1
	Foreign,	3	1	1										
	Nat. unstated,													
Milton,	Total,													
	Native,													
	Foreign,													
	Nat. unstated,													
Minersville,	Total,		2		1									
	Native,		1											
	Foreign,		1		1									
	Nat. unstated,													
Monongahela,	Total,								1					9
	Native,								1					1
	Foreign,													5
	Nat. unstated,													3
Mount Carmel,	Total,	1	4	3	2									23
	Native,	1	3	1	1									2
	Foreign,		1	2	1									20
	Nat. unstated,													1
Mount Pleasant,	Total,	1	3				1							1
	Native,		1											
	Foreign,	1	2				1							1
	Nat. unstated,													
Nanticoke,	Total,	3	4											4
	Native,													
	Foreign,	3	4											4
	Nat. unstated,													
New Brighton,	Total,													1
	Native,													1
	Foreign,													
	Nat. unstated,													
New Castle,	Total,	3	1							1				1
	Native,	2								1				1
	Foreign,	1	1											
	Nat. unstated,													

TABLE 3.--Continued.

Area.		Number of Child.												
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	Unstated.
Norristown,	Total,	3	2	1	2									4
	Native,	2	2	1	2									4
	Foreign,	1												
	Nat. unstated,													
North Braddock,	Total,		2	1										1
	Native,			1										
	Foreign,		2											1
	Nat. unstated,													
Oil City,	Total,	1			1									12
	Native,													9
	Foreign,	1			1									3
	Nat. unstated,													
Old Forge,	Total,	6			1									2
	Native,	1												1
	Foreign,	5			1									1
	Nat. unstated,													
Olyphant,	Total,	2			1		1							2
	Native,	1												
	Foreign,	1			1		1							2
	Nat. unstated,													
Philadelphia,	Total,	117	82	39	24	9	2	3						530
	Native,	45	40	21	15	8	1	1						250
	Foreign,	72	42	18	9	1	1	2						278
	Nat. unstated,													2
Phoenixville,	Total,	4												2
	Native,	2												2
	Foreign,	2												
	Nat. unstated,													

Pittsburg,	Total,	54	31	17	3	4	2							602
	Native,	17	15	4		1	2							293
	Foreign,	37	16	12	3	3								301
	Nat. unstated,			1										8
Pittston,	Total,	1	1											7
	Native,	1												2
	Foreign,		1											5
	Nat. unstated,													
Plymouth,	Total,	3	3			1	1							3
	Native,		2											1
	Foreign,	3	1			1	1							2
	Nat. unstated,													
Pottsville,	Total,	7	3	2										1
	Native,	5	3	2										1
	Foreign,	2												
	Nat. unstated,													
Pottstown,	Total,	3	1	1		1								3
	Native,	1	1	1		1								2
	Foreign,	2												1
	Nat. unstated,													
Punxsutawney,	Total,	1												1
	Native,													1
	Foreign,	1												
	Nat. unstated,													
Reading,	Total,	12	8	6	1	1			1					1
	Native,	9	6	4		1			1					
	Foreign,	3	2	2	1									1
	Nat. unstated,													
Rochester,	Total,													1
	Native,													1
	Foreign,													
	Nat. unstated,													
St. Clair,	Total,	2												1
	Native,	1												
	Foreign,	1												1
	Nat. unstated,													
St. Marys,	Total,	3	1											
	Native,	2	1											
	Foreign,	1												
	Nat. unstated,													

TABLE 3.—Continued.

Area.		Number of Child.												
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	Unstated.
Sayre,	Total,	1												3
	Native,	1												3
	Foreign,													
	Nat. unstated,													
Scranton,	Total,	14	12	6	4			2						64
	Native,	4	3	3	1			2						36
	Foreign,	10	9	3	3									27
	Nat. unstated,													1
Scottdale,	Total,				1									1
	Native,				1									1
	Foreign,													
	Nat. unstated,													
Shamokin,	Total,	4	5	2										10
	Native,	3	4	1										2
	Foreign,	1	1	1										8
	Nat. unstated,													
Sharon,	Total,			1										6
	Native,													3
	Foreign,													3
	Nat. unstated,			1										
Sharpsburg,	Total,	1												2
	Native,	1												1
	Foreign,													1
	Nat. unstated,													
Shenandoah,	Total,	3	1	1	2									8
	Native,	3												4
	Foreign,		1	1	2									4
	Nat. unstated,													

South Bethlehem,	Total,	1	2	1	1													1	
	Native,		1															1	
	Foreign,	1	1	1	1														
	Nat. unstated,																		
Steelton,	Total,	2	1	2															
	Native,			2															
	Foreign,	2	1																
	Nat. unstated,																		
Sunbury,	Total,		1	1														1	
	Native,		1	1														1	
	Foreign,																		
	Nat. unstated,																		
Tamaqua,	Total,	3																	
	Native,	1																	
	Foreign,	2																	
	Nat. unstated,																		
Tarentum,	Total,	2	1															1	
	Native,	1																	
	Foreign,	1	1															1	
	Nat. unstated,																		
Titusville,	Total,																		
	Native,																		
	Foreign,																		
	Nat. unstated,																		
Tyrone,	Total,	2		1															
	Native,	2		1															
	Foreign,																		
	Nat. unstated,																		
Uniontown,	Total,	1																1	
	Native,	1																1	
	Foreign,																		
	Nat. unstated,																		
Warren,	Total,		1																
	Native,																		
	Foreign,		1																
	Nat. unstated,																		
Washington,	Total,	1	1	1															
	Native,	1		1															
	Foreign,		1																
	Nat. unstated,																		

TABLE 3.—Continued.

Area.		Number of Child.												
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	Unstated.
Waynesboro,	Total,	1	1											
	Native,	1	1											
	Foreign,													
	Nat. unstated,													
West Chester,	Total,			1										
	Native,			1										
	Foreign,													
	Nat. unstated,													
West Pittston,	Total,	1	1											
	Native,		1											
	Foreign,	1												
	Nat. unstated,													
Wilkes-Barre,	Total,	6	4	2	2									31
	Native,	2		1	1									18
	Foreign,	4	4	1	1									13
	Nat. unstated,													
Wilkinsburg,	Total,	1												30
	Native,	1												27
	Foreign,													1
	Nat. unstated,													2
Williamsport,	Total,	2	1											1
	Native,	1												1
	Foreign,	1	1											
	Nat. unstated,													
Wilmerding,	Total,	1				1								
	Native,	1												
	Foreign,					1								
	Nat. unstated,													

Windber,	Total,	3	1											
	Native,	2	1											
	Foreign,	1												
	Nat. unstated,													
York,	Total,	2	3	2	1			1						
	Native,	2	2	1	1			1						
	Foreign,		1	1										
	Nat. unstated,													
Counties (Rural.)														
Adams,	Total,	3	3	2	1	1								2
	Native,	3	2	2	1	1								2
	Foreign,		1											
	Nat. unstated,													
Allegheny,	Total,	90	15	6	5									91
	Native,	80	10	1	3									20
	Foreign,	10	5	5	2									69
	Nat. unstated,													2
Armstrong,	Total,	3	2	2	1									
	Native,	3	2	1	1									
	Foreign,			1										
	Nat. unstated,													
Beaver,	Total,		1	1										5
	Native,			1										3
	Foreign,		1											2
	Nat. unstated,													
Bedford,	Total,	5	6	2	2									7
	Native,	5	4	1	2									7
	Foreign,		2	1										
	Nat. unstated,													
Berks,	Total,	14	5	5	4	3							1	12
	Native,	14	5	5	4	3							1	12
	Foreign,													
	Nat. unstated,													
Blair,	Total,	3	2	2	2	1								6
	Native,	3	1	1	2	1								4
	Foreign,		1	1										2
	Nat. unstated,													
Bradford,	Total,	1												2
	Native,	1												2
	Foreign,													
	Nat. unstated,													

TABLE 3.—Continued.

Area.		Number of Child.												
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th	20th.	21st.	22nd.	23rd.	Unstated.
Bucks,	Total,	8	3	2	2									11
	Native,	8	3	2	2									10
	Foreign,													
	Nat. unstated,													1
Butler,	Total,	6	6	1										6
	Native,	3	4	1										2
	Foreign,	3	2											4
	Nat. unstated,													
Cambria,	Total,	18	11	6	4	2								17
	Native,	8	6	3	2									11
	Foreign,	10	5	3	2	2								5
	Nat. unstated,													1
Cameron,	Total,	2	3											
	Native,	2	3											
	Foreign,													
	Nat. unstated,													
Carbon,	Total,	4	6	3	1									6
	Native,	3	6	2										6
	Foreign,	1		1	1									
	Nat. unstated,													
Centre,	Total,	7	6	1	2	3								14
	Native,	5	6	1	2	3								8
	Foreign,	2												6
	Nat. unstated,													
Chester,	Total,	7	4	5	1	2								12
	Native,	6	4	4		2								7
	Foreign,	1		1	1									5
	Nat. unstated,													

Clarion,	Total,	4	5	2	1					1				
	Native,	4	4	2	1					1				
	Foreign,		1											
	Nat. unstated,													
Clearfield,	Total,	14	13	1	4	3								110
	Native,	11	7	1	4	2								32
	Foreign,	3	6		3	1								78
	Nat. unstated,													
Clinton,	Total,	3	1	1										1
	Native,	2	1											
	Foreign,	1		1										1
	Nat. unstated,													
Columbia,	Total,	2	2	1	1									11
	Native,	2	2	1	1									8
	Foreign,													3
	Nat. unstated,													
Crawford,	Total,			1									1	
	Native,			1									1	
	Foreign,													
	Nat. unstated,													
Cumberland,	Total,	4	2	1										5
	Native,	4	1	1										4
	Foreign,		1											
	Nat. unstated,													1
Dauphin,	Total,	10	8		1									11
	Native,	10	7		1									8
	Foreign,		1											3
	Nat. unstated,													
Delaware,	Total,	2	3											3
	Native,		3											2
	Foreign,	2												1
	Nat. unstated,													
Elk,	Total,	10	5	1	1									3
	Native,	7	3		1									1
	Foreign,	3	2	1										2
Erie,	Total,	4	3		1		1							6
	Native,	4	2											4
	Foreign,		1		1		1							2
	Nat. Unstated,													

TABLE 3.--Continued.

Area.		Number of Child.												
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	Unstated.
Fayette,	Total,	22	12	9	3	2								22
	Native,	19	12	4		1								8
	Foreign,	3		5	3	1								13
	Nat. Unstated,													1
Forest,	Total,	3				1								2
	Native,	3				1								2
	Foreign,													
	Nat. unstated,													
Franklin,	Total,	4	4	2										8
	Native,	4	4	2										7
	Foreign,													
	Nat. unstated,													1
Fulton,	Total,													2
	Native,													1
	Foreign,													
	Nat. unstated,													1
Greene,	Total,	2												6
	Native,	2												2
	Foreign,													
	Nat. unstated,													4
Huntingdon,	Total,	2	4	5	1									5
	Native,	2	4	5	1									5
	Foreign,													
	Nat. unstated,													
Indiana,	Total,	11	6		3	1	1							17
	Native,	5	6		1	1	1							10
	Foreign,	6			2									7
	Nat. unstated,													

Jefferson,	Total,	13	3	2	2														9
	Native,	6	4	1	1														6
	Foreign,	7	5	1	1														3
	Nat. unstated,																		
Juniata,	Total,	5	2	1															
	Native,	5	2	1															
	Foreign,																		
	Nat. unstated,																		
Lackawanna,	Total,		1	1															13
	Native,		1	1															3
	Foreign,																		8
	Nat. unstated,																		2
Lancaster,	Total,	16	8	5	2	2							1						17
	Native,	16	8	5	2	2							1						16
	Foreign,																		1
	Nat. unstated,																		
Lawrence,	Total,	2	2																2
	Native,	1	2																2
	Foreign,	1																	
	Nat. unstated,																		
Lebanon,	Total,	12	10	1		1													12
	Native,	11	10	1		1													12
	Foreign,																		
	Nat. unstated,	1																	
Lehigh,	Total,	7	4	3	2	2													9
	Native,	6	4	3	2	2													8
	Foreign,	1																	1
	Nat. unstated,																		
Luzerne,	Total,	23	14	11	3	3													50
	Native,	7	5	4	2	3													10
	Foreign,	16	9	7	1														40
	Nat. unstated,																		
Lycoming,	Total,	6	6	1															4
	Native,	6	4	1															4
	Foreign,		2																
	Nat. unstated,																		
McKean,	Total,	2	1	2	1														6
	Native,	1	1	2															5
	Foreign,	1			1														1
	Nat. unstated,																		

TABLE 3.—Continued.

Area.		Number of Child.												
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	Unstated.
Mercer,	Total,	2	2	1										4
	Native,	2	2	1										3
	Foreign,													1
	Nat. unstated,													
Mifflin,	Total,	2	4	2										4
	Native,	2	4	2										3
	Foreign,													1
	Nat. unstated,													
Monroe,	Total,	4		1	1									2
	Native,	4		1	1									2
	Foreign,													
	Nat. unstated,													
Montgomery,	Total,	7	8	2	2	1								19
	Native,	6	7	2	2	1								14
	Foreign,	1	1											5
	Nat. unstated,													
Montour,	Total,													
	Native,													
	Foreign,													
	Nat. unstated,													
Northampton,	Total,	5	3	3		2								4
	Native,	4	3	3		2								2
	Foreign,	1												2
	Nat. unstated,													
Northumberland,	Total,	16	7	2	2									30
	Native,	13	5	2	2									17
	Foreign,	3	2											13
	Nat. unstated,													

Perry,	Total,	3	2											4
	Native,	3	2											4
	Foreign,													
	Nat. unstated,													
Pike,	Total,	3		1										1
	Native,	3		1										
	Foreign,													1
	Nat. unstated,													
Potter,	Total,		2			1								2
	Native,		2			1								2
	Foreign,													
	Nat. unstated,													
Schuylkill,	Total,	17	5	6	1	1	3							68
	Native,	12	4	4	1		2							21
	Foreign,	5	1	2		1	1							44
	Nat. unstated,													3
Snyder,	Total,		1					1						
	Native,		1					1						
	Foreign,													
	Nat. unstated,													
Somerset,	Total,	7	2	1										27
	Native,	7	2	1										6
	Foreign,													19
	Nat. unstated,													2
Sullivan,	Total,	3	1											3
	Native,	3	1											2
	Foreign,													
	Nat. unstated,													1
Susquehanna,	Total,	1	1											1
	Native,	1	1											1
	Foreign,													
	Nat. unstated,													
Tioga,	Total,	5	6	2										8
	Native,	3	2											7
	Foreign,	2	4	2										
	Nat. unstated,													1
Union,	Total,	1	1	1	1									1
	Native,	1	1		1									1
	Foreign,			1										
	Nat. unstated,													

TABLE 3.—Continued.

Area.		Number of Child.											
		12th.	13th.	14th.	15th.	16th.	17th.	18th.	19th.	20th.	21st.	22nd.	23rd.	Unstated.
Venango,	Total,			1										6
	Native,			1										6
	Foreign,													
	Nat. unstated,													
Warren,	Total,		3											2
	Native,		2											2
	Foreign,		1											
	Nat. unstated,													
Washington,	Total,	9	6	2	2									16
	Native,	7	2		2									11
	Foreign,	2	4	2										5
	Nat. unstated,													
Wayne,	Total,	2	1	2										2
	Native,	2		2										2
	Foreign,		1											
	Nat. unstated,													
Westmoreland,	Total,	28	17	12	1	3	2							46
	Native,	10	6	6		3	1							16
	Foreign,	18	11	6	1		1							29
	Nat. unstated,													1
Wyoming,	Total,	2	2	1										3
	Native,	1	2	1										3
	Foreign,	1												
	Nat. unstated,													
York,	Total,	18	5	9	2	3								13
	Native,	18	5	9	2	3								12
	Foreign,													
	Nat. unstated,													1

BIRTH TABLE 4.

Illegitimate Births by Locality and Nativity of Mothers

	Total.	Native.	Foreign.	Nativity Unstated.
Entire State,	4,401	3,789	590	22
Total of all cities and boroughs over 5,000 population,	2,425	2,027	388	10
Total of all boroughs between 2,500 and 5,000 population,	211	182	27	2
Total of all boroughs less than 2,500 population,	360	319	37	4
Allentown,	45	34	11	0
Altoona,	39	38	1	0
Archbald,	0	0	0	0
Ashland,	6	5	1	0
Bangor,	1	1	0	0
Beaver Falls,	4	3	1	0
Bethlehem,	8	8	0	0
Bloomsburg,	9	9	0	0
Braddock,	8	5	3	0
Bradford,	7	6	1	0
Bristol,	2	2	0	0
Butler,	9	6	3	0
Carbondale,	6	5	1	0
Carlisle,	19	19	0	0
Carnegie,	6	4	2	0
Chambersburg,	7	7	0	0
Charleroi,	1	1	0	0
Chester,	28	27	1	0
Clearfield,	9	9	0	0
Coatesville,	18	18	0	0
Columbia,	14	14	0	0
Connellsville,	6	6	0	0
Conshohocken,	8	7	1	0
Corry,	1	1	0	0
Danville,	6	6	0	0
Dickson City,	2	0	2	0
DuBois,	6	5	1	0
Dunmore,	19	15	4	0
Duquesne,	2	2	0	0
Duryea,	5	0	5	0
Easton,	1	0	1	0
Edwardsville,	2	1	1	0
Erie,	26	21	5	0
Etna,	0	0	0	0
Forest City,	1	0	1	0
Franklin,	5	5	0	0
Freeland,	1	1	0	0
Greensburg,	7	6	1	0
Greenville,	2	2	0	0
Hanover,	8	8	0	0
Harrisburg,	56	53	3	0
Hazleton,	5	5	0	0
Homestead,	18	13	5	0
Huntingdon,	6	6	0	0
Indiana,	6	6	0	0
Jeannette,	6	5	1	0
Johnsonburg,	0	0	0	0
Johnstown,	39	30	9	0
Kane,	1	1	0	0
Lancaster,	23	21	2	0
Lansford,	1	1	0	0
Latrobe,	5	4	1	1
Lebanon,	4	4	0	0
Lehighton,	3	3	0	0
Lewistown,	1	1	0	0
Lock Haven,	10	10	0	0
McKeesport,	12	4	8	0
McKees Rocks,	5	5	0	0
Mahanoy City,	4	3	1	0
Meadville,	3	3	0	0
Middletown,	10	9	1	0
Millvale,	3	3	0	0
Milton,	4	4	0	0
Miuersville,	1	1	0	0
Monongahela,	7	4	3	0
Mount Carmel,	12	9	3	0

TABLE 4.—Continued.

	Total.	Native.	Foreign.	Nativity Unstated.
Mount Pleasant,	2	2	0	0
Nanticoke,	5	3	2	0
New Brighton,	6	6	0	0
New Castle,	10	8	2	0
Norristown,	13	13	0	0
North Braddock,	7	4	3	0
Oil City,	5	5	0	0
Old Forge,	1	1	0	0
Olyphant,	0	0	0	0
Philadelphia,	1,029	857	166	6
Phoenixville,	3	2	1	0
Pittsburg,	383	279	100	4
Pittston,	4	4	0	0
Plymouth,	2	2	0	0
Pottsville,	11	11	0	0
Pottstown,	9	9	0	0
Punxsutawney,	7	7	0	0
Reading,	61	61	0	0
Rochester,	1	1	0	0
St. Clair,	3	2	1	0
St. Marys,	3	3	0	0
Sayre,	0	0	0	0
Scranton,	41	31	10	0
Scottdale,	2	2	0	0
Shamokin,	11	10	1	0
Sharon,	3	2	1	0
Sharpsburg,	0	0	0	0
Shenandoah,	6	6	0	0
South Bethlehem,	6	5	1	0
Steelton,	12	11	1	0
Sunbury,	11	10	1	0
Tamaqua,	6	6	0	0
Tarentum,	0	0	0	0
Titusville,	1	1	0	0
Tyrone,	6	6	0	0
Uniontown,	8	6	2	0
Warren,	7	7	0	0
Washington,	19	19	0	0
Waynesboro,	8	8	0	0
West Chester,	11	11	0	0
West Pittston,	1	1	0	0
Wilkes-Barre,	27	21	6	0
Wilkinsburg,	6	5	1	0
Williamsport,	24	22	2	0
Wilmerding,	1	1	0	0
Windber,	5	4	1	0
York,	29	27	2	0
Total rural,	1,405	1,261	138	6
Counties.				
Adams,	8	7	1	0
Allegheny,	67	24	43	0
Armstrong,	13	13	0	0
Beaver,	7	6	1	0
Bedford,	14	14	0	0
Blair,	28	26	2	0
Bradford,	9	8	1	0
Berks,	45	44	1	0
Bucks,	28	28	0	0
Butler,	18	15	2	1
Cambria,	32	28	4	0
Cameron,	0	0	0	0
Carbon,	23	21	2	0
Centre,	31	30	1	0
Chester,	49	48	0	1
Clarion,	19	17	2	0
Clearfield,	53	46	7	0
Clinton,	7	7	0	0
Columbia,	16	14	2	0
Crawford,	8	7	0	1
Cumberland,	19	19	0	0
Dauphin,	24	23	1	0
Delaware,	10	9	1	0
Elk,	6	4	2	0
Erie,	4	4	0	0
Fayette,	84	74	10	0

TABLE 4.—Continued.

	Total.	Native.	Foreign.	Nativity Unstated.
Forest,	6	6	0	0
Franklin,	35	35	0	0
Fulton,	7	7	0	0
Greene,	19	18	0	1
Huntingdon,	21	20	1	0
Indiana,	35	32	3	0
Jefferson,	21	19	2	0
Juniata,	13	13	0	0
Lackawanna,	7	6	1	0
Lancaster,	68	68	0	0
Lawrence,	5	5	0	0
Lebanon,	25	24	1	0
Lehigh,	33	32	1	0
Luzerne,	20	15	5	0
Lycoming,	21	21	0	0
McKean,	7	6	1	0
Mercer,	10	9	1	0
Mifflin,	12	11	1	0
Monroe,	17	16	1	0
Montgomery,	35	28	6	1
Montour,	2	2	0	0
Northampton,	24	23	1	0
Northumberland,	28	24	4	0
Perry,	16	16	0	0
Pike,	7	7	0	0
Potter,	5	4	1	0
Schuylkill,	58	48	10	0
Snyder,	15	15	0	0
Somerset,	29	29	0	0
Sullivan,	3	2	1	0
Susquehanna,	10	10	0	0
Tioga,	11	11	0	0
Union,	7	7	0	0
Venango,	11	10	1	0
Warren,	6	6	0	0
Washington,	36	29	6	1
Wayne,	7	7	0	0
Westmoreland,	53	46	7	0
Wyoming,	5	5	0	0
York,	33	33	0	0

BIRTH TABLE 5.

Plural Births (Twins), by Localities and Nativity of Mothers.

	Total.	Native.	Foreign.	Nativity Unstated.
Entire State,	2,078	1,315	759	4
Total of all cities and boroughs over 5,000 population,	1,033	574	456	3
Total of all boroughs between 2,500 and 5,000 population,	109	75	34	0
Total of all boroughs less than 2,500 population,	218	145	72	1
Allentown,	8	8	0	0
Altoona,	14	11	3	0
Archbald,	5	2	3	0
Ashland,	1	1	0	0
Bangor,	0	0	0	0
Beaver Falls,	3	1	2	0
Bethlehem,	1	1	0	0
Bloomsburg,	0	0	0	0
Braddock,	4	1	3	0
Bradford,	3	1	2	0
Bristol,	3	3	0	0
Butler,	4	3	1	0
Carbondale,	4	3	1	0
Carlisle,	1	1	0	0
Carnegie,	1	1	0	0
Chambersburg,	4	4	0	0
Charleroi,	5	2	3	0
Chester,	12	6	6	0
Clearfield,	6	6	0	0
Coatesville,	6	4	2	0
Columbia,	3	3	0	0

TABLE 5.—Continued.

	Total.	Native.	Foreign.	Nativity Unstated.
Connellsville,	4	2	2	0
Conshohocken,	1	1	0	0
Corry,	1	1	0	0
Danville,	2	1	1	0
Dickson City,	2	0	2	0
DuBois,	3	2	1	0
Dunmore,	8	4	4	0
Duquesne,	5	1	4	0
Duryea,	1	0	1	0
Easton,	10	3	7	0
Edwardsville,	2	1	1	0
Erie,	16	10	6	0
Etna,	3	0	3	0
Forest City,	4	4	0	0
Franklin,	2	2	0	0
Freeland,	3	1	2	0
Greensburg,	4	2	2	0
Greenville,	1	1	0	0
Hanover,	2	1	1	0
Harrisburg,	9	7	2	0
Hazleton,	7	4	3	0
Homestead,	6	2	4	0
Huntingdon,	2	2	0	0
Indiana,	0	0	0	0
Jeannette,	5	4	1	0
Johnsonburg,	3	1	2	0
Johnstown,	14	8	6	0
Kane,	2	2	0	0
Lancaster,	8	7	1	0
Lansford,	5	1	4	0
Latrobe,	0	0	0	0
Lebanon,	3	2	1	0
Lehighton,	1	1	0	0
Lewistown,	8	7	1	0
Lock Haven,	1	0	1	0
McKeesport,	24	5	19	0
McKees Rocks,	4	3	1	0
Mahanoy City,	0	0	0	0
Meadville,	1	1	0	0
Middletown,	0	0	0	0
Millvale,	2	1	1	0
Milton,	4	4	0	0
Minersville,	2	1	1	0
Monongahela,	5	3	2	0
Mount Carmel,	2	0	2	0
Mount Pleasant,	1	1	0	0
Nanticoke,	6	0	6	0
New Brighton,	1	1	0	0
New Castle,	11	4	7	0
Norristown,	4	3	1	0
North Braddock,	6	3	6	0
Oil City,	5	5	0	0
Old Forge,	4	1	3	0
Olyphant,	4	0	4	0
Philadelphia,	355	198	157	0
Phoenixville,	4	3	1	0
Pittsburg,	179	90	87	2
Pittston,	4	1	3	0
Plymouth,	9	4	5	0
Pottsville,	5	4	1	0
Pottstown,	2	2	0	0
Punxsutawney,	0	0	0	0
Reading,	20	15	5	0
Rochester,	0	0	0	0
St. Clair,	2	0	2	0
St. Marys,	1	1	0	0
Sayre,	3	3	0	0
Scranton,	27	15	12	0
Scottdale,	4	3	1	0
Shamokin,	0	0	0	0
Sharon,	2	2	0	0
Sharpsburg,	2	1	1	0
Shenandoah,	6	0	6	0
South Bethlehem,	7	2	5	0
Steelton,	2	0	2	0
Sunbury,	2	2	0	0
Tamaqua,	3	3	0	0
Tarentum,	3	0	3	0

TABLE 5.—Continued.

	Total.	Native.	Foreign.	Nativity Unstated.
Titusville,	2	1	1	0
Tyrone,	4	4	0	0
Uniontown,	0	0	0	0
Warren,	4	2	2	0
Washington,	2	1	1	0
Waynesboro,	3	3	0	0
West Chester,	5	5	0	0
West Pittston,	2	1	1	0
Wilkes-Barre,	15	9	6	0
Wilkinsburg,	3	2	1	0
Williamsport,	7	3	4	0
Wilmerding,	6	3	3	0
Windber,	4	1	3	0
York,	8	7	1	0
Total rural,	718	521	197	0
Counties.				
Adams,	10	10	0	0
Allegheny,	53	28	25	0
Armstrong,	10	7	3	0
Beaver,	11	9	2	0
Bedford,	13	13	0	0
Blair,	13	9	4	0
Bradford,	5	5	0	0
Berks,	18	18	0	0
Bucks,	8	7	1	0
Butler,	10	8	2	0
Cambria,	27	13	14	0
Cameron,	2	2	0	0
Carbon,	6	5	1	0
Centre,	7	6	1	0
Chester,	13	12	1	0
Clarion,	5	5	0	0
Clearfield,	30	20	10	0
Clinton,	3	3	0	0
Columbia,	7	7	0	0
Crawford,	11	11	0	0
Cumberland,	7	7	0	0
Dauphin,	10	8	2	0
Delaware,	2	2	0	0
Elk,	11	5	6	0
Erie,	8	6	2	0
Fayette,	35	16	19	0
Forest,	3	3	0	0
Franklin,	12	12	0	0
Fulton,	5	5	0	0
Greene,	6	6	0	0
Huntingdon,	5	5	0	0
Indiana,	5	2	3	0
Jefferson,	17	10	7	0
Juniata,	3	3	0	0
Lackawanna,	6	4	2	0
Lancaster,	28	27	1	0
Lawrence,	6	4	2	0
Lebanon,	9	8	1	0
Lehigh,	16	14	2	0
Luzerne,	28	14	14	0
Lycoming,	10	10	0	0
McKean,	6	3	3	0
Mercer,	4	3	1	0
Mifflin,	4	4	0	0
Monroe,	8	8	0	0
Montgomery,	11	7	4	0
Montour,	1	1	0	0
Northampton,	8	6	2	0
Northumberland,	12	11	1	0
Perry,	5	5	0	0
Pike,	2	2	0	0
Potter,	1	0	1	0
Schuylkill,	18	11	7	0
Snyder,	2	2	0	0
Somerset,	16	12	4	0
Sullivan,	4	2	2	0
Susquehanna,	6	6	0	0
Tioga,	7	7	0	0
Union,	1	1	0	0

TABLE 5.—Continued.

	Total.	Native.	Foreign.	Nativity Unstated.
Venango,	4	4	0	0
Warren,	5	3	2	0
Washington,	15	11	4	0
Wayne,	7	7	0	0
Westmoreland,	45	15	30	0
Wyoming,	4	3	1	0
York,	18	18	0	0

THE SUB-DIVISION OF MORBIDITY STATISTICS.

In Charge of WILMER R. BATT, M. D., *Registrar*.

23—17—1908

MORBIDITY STATISTICS.

One hundred and thirteen thousand eight hundred and twenty-five (113,825) cases of communicable diseases were reported to the Department of Health during the year, an increase of 42,961 as compared with the previous year. From the following table it will be noted that this large total increase was due chiefly to measles, scarlet fever, tuberculosis and whooping cough. Measles was epidemic throughout the State, while the increase in tuberculosis was not due to any actual increase in the total number of cases but rather to a more complete reporting by physicians.

TOTAL CASES OF EACH COMMUNICABLE DISEASE REPORTED.

DURING 1906, 1907 and 1908.

	1906.	1907.	1908.
All communicable diseases,	88,320	70,864	113,825
Actinomycosis,	1	2	0
Anthrax,	23	26	19
Cerebro-Spinal meningitis, epidemic,	361	430	215
Chicken pox,	2,999	3,442	5,640
Diphtheria,	10,870	10,510	12,509
Epidemic dysentery,	5	3	0
Erysipelas,	1,010	972	1,095
German measles,	404	100	477
Glanders,	0	0	1
Malarial fever,	99	81	87
Measles,	23,729	11,776	37,981
Mumps,	1,337	1,115	2,548
Pneumonia,	6,169	5,282	6,285
Puerperal fever,	77	57	97
Rabies,	8	5	8
Scarlet fever,	7,670	7,699	14,413
Small-pox,	73	62	77
Tetanus,	65	74	85
Trachoma,	23	26	74
Trichiniasis,	1	0	2
Tuberculosis,	5,234	6,109	10,418
Typhoid fever,	24,471	20,080	15,155
Whooping cough,	3,691	3,013	6,637

MORBIDITY TABLE 1.

Number of cases of communicable diseases reported from the entire State and from urban and rural districts by months:

Months.	Total.	Urban.	Rural.
Total,	113,825	83,163	30,662
January,	13,151	9,691	3,460
February,	12,805	8,739	4,066
March,	12,854	8,869	3,985
April,	12,126	8,847	3,279
May,	11,219	8,751	2,468
June,	7,629	5,818	1,811
July,	5,375	4,128	1,247
August,	4,898	3,562	1,336
September,	6,468	4,646	1,822
October,	8,175	5,829	2,346
November,	9,269	6,852	2,417
December,	9,856	7,431	2,425

MORBIDITY TABLE 2.

Rates per 100,000 of poulation of all communicable diseases for the entire State and for urban and rural districts by months:

Months.	State Rate.	Urban.	Rural.
January,	184.2	210.2	136.9
February,	179.4	185.2	160.9
March,	179.5	192.3	157.7
April,	169.9	191.8	129.7
May,	157.2	189.8	97.7
June,	106.8	126.1	71.6
July,	75.3	89.5	49.3
August,	68.6	77.2	52.8
September,	90.6	100.7	72.1
October,	114.5	126.1	92.8
November,	129.8	148.6	95.7
December,	138.1	161.1	95.9

MORBIDITY TABLE 3.

Communicable Diseases Reported from Urban and Rural Districts by Months.

		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
All communicable diseases, entire State.,	Total,	113,825	13,151	12,805	12,854	12,126	11,219	7,629	5,375	4,898	6,468	8,175	6,269	9,856
	Urban,	83,163	9,691	8,739	8,869	8,847	8,751	5,818	4,128	3,562	4,646	5,829	6,852	7,431
	Rural,	30,662	3,460	4,066	3,985	3,279	2,468	1,811	1,247	1,336	1,822	2,346	2,417	2,425
Anthrax,	Total,	19	2	3	2	1			3		1	3	3	1
	Urban,	13	2	1	1	1			2		1	2	2	1
	Rural,	6	0	2	1	0			1		0	1	1	0
Cerebro spinal meningitis, epidemic,	Total,	215	26	24	30	24	15	15	23	16	8	12	10	12
	Urban,	153	23	16	20	17	12	12	16	9	4	9	6	9
	Rural,	62	3	8	10	7	3	3	7	7	4	3	4	3
Chicken pox,	Total,	5,640	750	665	526	378	314	148	62	57	140	445	889	1,266
	Urban,	4,094	540	399	359	297	273	134	48	32	73	306	697	966
	Rural,	1,546	240	266	167	81	41	14	14	25	67	139	192	300
Diphtheria,	Total,	12,509	1,098	952	1,008	670	672	597	621	589	1,122	1,857	1,742	1,581
	Urban,	9,324	829	685	667	524	506	453	469	403	841	1,379	1,337	1,231
	Rural,	3,185	269	267	341	146	166	144	152	186	281	478	405	350
Erysipelas,	Total,	1,095	164	147	141	124	82	53	38	23	39	71	94	119
	Urban,	902	138	129	114	99	63	47	29	15	36	55	78	99
	Rural,	193	26	18	27	25	19	6	9	8	3	16	16	20
German measles,	Total,	477	46	38	74	72	87	42	11	5	10	23	26	43
	Urban,	233	23	14	60	34	41	10	5	0	4	6	14	22
	Rural,	244	23	24	14	38	46	32	6	5	6	17	12	31
Glanders,	Total,	1						1						
	Urban,	0						0						
	Rural,	1						1						

MORBIDITY TABLE 3.—Continued.

		Aggregate.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
Rabies,	Total,	8	1	-------	-------	-------	2	2	-------	2	-------	-------	1	-------
	Urban,	7	1	-------	-------	-------	2	2	-------	2	-------	-------	0	-------
	Rural,	1	0	-------	-------	-------	0	0	-------	0	-------	-------	1	-------
Malarial fever,	Total,	87	4	3	5	5	8	7	8	12	16	7	7	5
	Urban,	77	4	3	5	5	8	7	8	11	10	5	6	5
	Rural,	10	0	0	0	0	0	0	0	1	6	2	1	0
Measles,	Total,	37,981	5,209	5,554	5,771	6,323	6,355	3,367	1,063	360	255	733	1,351	1,640
	Urban,	26,241	3,440	3,549	3,773	4,460	5,009	2,539	732	212	179	522	791	1,041
	Rural,	11,740	1,769	2,005	1,998	1,863	1,346	834	331	148	76	211	560	599
Mumps,	Total,	2,548	272	438	540	376	276	117	93	32	27	85	153	139
	Urban,	1,583	202	228	323	230	202	84	58	21	14	57	75	89
	Rural,	965	70	210	217	146	74	33	35	11	13	28	78	50
Pneumonia,	Total,	6,285	1,240	856	772	618	409	203	192	138	239	368	465	785
	Urban,	5,564	1,114	721	644	531	363	189	187	131	214	334	416	720
	Rural,	721	126	135	128	87	46	14	5	7	25	34	49	65
Puerperal fever,	Total,	97	10	14	18	12	7	8	4	2	4	3	9	6
	Urban,	79	7	13	16	10	6	5	4	2	2	3	6	5
	Rural,	18	3	1	2	2	1	3	0	0	2	0	3	1
Scarlet fever,	Total,	14,413	1,413	1,431	1,590	1,282	1,105	865	617	482	967	1,415	1,687	1,559
	Urban,	10,276	918	903	1,008	901	778	631	492	366	765	1,102	1,279	1,133
	Rural,	4,137	495	528	582	381	327	234	125	116	202	313	408	426
Small-pox,	Total,	77	2	2	9	9	4	2	1	3	11	13	13	11
	Urban,	20	2	1	2	3	1	0	1	0	3	0	0	7
	Rural,	57	0	1	7	6	0	2	0	3	8	13	13	4
Tetanus,	Total,	85	6	5	6	2	6	3	15	11	8	9	7	7
	Urban,	72	6	5	5	2	5	3	14	8	6	7	5	6
	Rural,	13	0	0	1	0	1	0	1	3	2	2	2	1
Trachoma,	Total,	74	3	6	2	6	2	4	12	10	8	10	7	4
	Urban,	66	3	2	2	6	0	3	12	10	7	10	7	4
	Rural,	8	0	4	0	0	2	1	0	0	1	0	0	0

Trichiniasis,	Total,	2	2											
	Urban,	2	2											
	Rural,	0	0											
Tuberculosis,	Total,	10,418	802	696	759	756	744	826	985	952	813	991	1,052	1,042
	Urban,	9,537	756	634	707	708	690	767	872	834	720	907	988	954
	Rural,	881	46	62	52	48	54	59	113	118	93	84	64	88
Typhoid fever,	Total,	15,157	1,652	1,204	970	838	583	619	945	1,708	2,386	1,702	1,406	1,144
	Urban,	11,362	1,455	1,041	830	693	448	463	730	1,241	1,556	1,006	987	912
	Rural,	3,795	197	163	140	145	135	156	215	467	830	696	419	232
Whooping cough,	Total,	6,637	449	767	631	630	551	750	682	496	414	428	347	492
	Urban,	3,558	256	395	333	326	344	475	449	265	211	119	158	227
	Rural,	3,079	193	372	298	304	207	275	233	231	203	309	189	265

TYPHOID FEVER.

Fifteen thousand one hundred and fifty-seven (15,157) cases of typhoid fever were reported during the year, a decrease of 4,923 as compared with the previous year. Urban cases decreased 6,705 and rural cases increased 1,782.

The following table shows the comparison of cases reported by months for the years 1906 to 1908, inclusive:

MORBIDITY TABLE 4.

	Total.			Urban.			Rural.		
	1906.	1907.	1908.	1906.	1907.	1908.	1906.	1907.	1908.
Total,	24,471	20,080	15,157	22,520	18,067	11,362	1,951	2,013	3,795
January,	2,177	3,099	1,652	2,009	2,978	1,455	158	121	197
February,	2,286	2,206	1,204	2,172	2,099	1,401	114	107	163
March,	1,870	1,178	970	1,751	1,107	830	119	71	140
April,	2,122	1,126	838	2,031	1,067	693	91	59	145
May,	1,829	999	583	1,720	961	448	109	38	135
June,	1,198	1,045	619	1,128	986	463	70	59	156
July,	1,404	1,092	945	1,294	996	730	110	96	215
August,	2,026	1,849	1,708	855	1,684	1,241	171	165	467
September,	2,342	1,967	2,386	1,991	1,671	1,556	251	296	830
October,	2,396	2,123	1,702	2,033	1,673	1,006	363	450	696
November,	1,894	1,830	1,406	1,705	1,487	987	189	343	419
December,	2,927	1,566	1,144	2,831	1,358	912	96	208	232

MORBIDITY TABLE 5.

Distribution of Typhoid Fever According to Age Periods for the Entire State, Urban and Rural Districts, by Percentage to Total Cases in Each Locality.

Age Periods.	State.	Urban.	Rural.
Under 5 years,	4.6	4.8	4.1
5 to 9 years,	13.2	13.4	12.4
10 to 14 years,	14.2	14.0	14.8
15 to 19 years,	15.3	14.8	16.8
20 to 24 years,	15.5	15.9	14.7
25 to 29 years,	11.6	12.2	9.8
30 to 34 years,	7.6	8.0	6.4
35 to 39 years,	5.5	5.7	4.8
40 to 44 years,	3.1	3.1	3.1
45 to 49 years,	2.7	2.7	2.7
Over 50 years,	4.0	3.4	5.9
Unstated age,	2.7	2.0	4.5

MORBIDITY TABLE 6.

Typhoid Fever by Nativity and Age Periods.

	All ages.	0-4	5-9	10-19	20-29	30-39	40-49	50-59	60-69	70	Un.
Native,	12,238	638	1,791	3,831	2,987	1,495	708	340	118	39	291
Foreign,	2,401	41	135	526	990	410	164	61	18	3	53
Unknown,	518	21	69	115	131	77	17	16	7	3	62

MORBIDITY TABLE 7.

Typhoid Fever by Color and Age Periods.

	All ages.	0-4	5-9	10-19	20-29	30-39	40-49	50-59	60-69	70	Un.
White,	14,595	663	1,878	4,332	3,948	1,915	874	407	138	44	396
Black,	560	37	117	139	160	67	15	9	5	1	10
Color unstated,	2			1				1			

MORBIDITY TABLE 8.

Typhoid Fever by Sex and Color.

	All Colors.	White.	Black.	Color Unstated.
Total,	15,157	14,595	560	2
Males,	8,589	8,297	291	1
Females,	6,568	6,298	269	1

DIPHTHERIA.

Twelve thousand five hundred and nine (12,509) cases of diphtheria were reported during the year, an increase of 1,999 as compared with the previous year.

MORBIDITY TABLE 10.

Diphtheria by Months for the Entire State, Urban and Rural Districts for Three Years, 1906, 1908 Inclusive.

	Total.			Urban.			Rural.		
	1906.	1907.	1908.	1906.	1907.	1908.	1906.	1907.	1908.
Total,	10,870	10,510	12,509	8,956	8,656	9,324	1,914	1,854	3,185
January,	1,042	1,095	1,098	824	920	829	218	175	269
February,	885	828	952	706	731	685	179	97	267
March,	852	769	1,008	701	653	667	151	116	341
April,	703	737	670	576	624	524	127	113	146
May,	688	575	672	584	496	506	104	79	166
June,	546	553	597	470	499	453	76	54	144
July,	437	473	621	366	388	469	71	85	152
August,	461	597	589	402	484	403	59	113	186
September,	994	796	1,122	826	665	841	168	131	281
October,	1,589	1,283	1,857	1,270	998	1,379	319	285	478
November,	1,458	1,501	1,742	1,190	1,196	1,337	268	305	405
December,	1,215	1,303	1,581	1,041	1,002	1,231	174	301	350

MORBIDITY TABLE 11.

Distribution of Diphtheria According to Age Periods for the Entire State, Urban and Rural Districts by Percentage to Total Cases in Each Locality.

	State.	Urban.	Rural.
Under 5 years,	33.2	36.0	24.8
5 to 9 years,	35.7	36.7	32.7
10 to 14 years,	13.5	12.8	15.7
15 to 19 years,	5.3	4.3	8.1
20 to 24 years,	3.7	3.2	5.3
25 to 29 years,	2.1	2.0	2.7
30 to 34 years,	1.7	1.4	2.4
35 to 39 years,	1.2	1.0	1.9
Over 40 years,	1.8	1.0	4.0
Unstated age,	1.8	1.6	2.4

MORBIDITY TABLE 12.

Diphtheria by Nativity and Age Periods.

	All ages.	0-4	5-9	10-19	20-29	30-39	40-49	50-59	60-69	70	Un.
Native,	11,091	3,588	4,080	2,148	621	315	124	42	10	5	162
Foreign,	998	447	174	115	89	40	25	7	2	1	8
Unknown,	420	114	124	89	22	10	5	1	0	1	54

MORBIDITY TABLE 13.

Diphtheria by Color and Age Periods.

	All ages.	0-4	5-9	10-19	20-29	30-39	40-49	50-59	60-69	70	Un.
White,	12,324	4,092	4,419	2,311	707	355	151	47	12	7	233
Black,	184	57	49	40	25	6	3	3	0	0	1
Color unstated,	1			1							

MORBIDITY TABLE 14.

Diphtheria by Sex and Color.

	All Colors.	White.	Black.	Color Unstated.
Total,	12,509	12,324	184	1
Males,	5,846	5,762	84	0
Females,	6,663	6,562	100	1

SCARLET FEVER.

Fourteen thousand four hundred and thirteen (14,413) cases of scarlet fever were reported during the year, an increase of 6,714 as compared with the previous year.

MORBIDITY TABLE 15.

Scarlet Fever by Months for the Entire State, Urban and Rural Districts for Three Years, 1906, 1908, Inclusive.

	Total.			Urban.			Rural.		
	1906.	1907.	1908.	1906.	1907.	1908.	1906.	1907.	1908.
Total,	7,670	7,697	14,413	6,107	6,132	10,276	1,563	1,567	4,137
January,	879	713	1,413	652	579	918	227	134	495
February,	875	572	1,431	677	450	903	198	122	528
March,	758	676	1,590	560	527	1,008	198	149	582
April,	687	577	1,282	529	425	901	158	152	381
May,	707	479	1,105	582	391	778	119	88	327
June,	517	495	865	447	435	631	70	60	234
July,	378	379	617	328	326	492	50	53	125
August,	350	414	482	302	362	366	48	52	116
September,	425	528	967	332	468	765	93	60	202
October,	679	715	1,415	549	577	1,102	139	138	313
November,	687	1,085	1,687	558	832	1,279	129	253	408
December,	734	1,066	1,559	591	760	1,133	143	306	426

MORBIDITY TABLE 16.

Distribution of Scarlet Fever According to Age Periods for the Entire State, Urban and Rural Districts by Percentage to Local Cases in Each Locality.

	State.	Urban.	Rural.
Under 5 years,	27.1	27.8	25.4
5 to 9 years,	41.5	43.6	36.5
10 to 14 years,	18.3	17.4	20.7
15 to 19 years,	6.2	5.1	9.0
20 to 24 years,	2.4	2.1	2.9
25 to 29 years,	1.43	1.2	1.3
30 to 34 years,	0.7	0.7	0.7
35 to 39 years,	0.4	0.4	0.3
Over 40 years,	0.4	0.4	0.5
Unknown age,	1.7	1.3	2.7

MORBITY TABLE 17.

Scarlet Fever by Nativity and Age Periods.

	All ages.	0-4	5-9	10-19	20-29	30-39	40-49	50-59	60-69	70	Un.
Native,	13,025	3,505	5,424	3,262	456	138	38	5	3	1	193
Foreign,	846	260	354	151	44	13	7	3	0	0	14
Unknown,	542	135	219	125	23	10	2	0	0	0	38

MORBITY TABLE 18.

Scarlet Fever by Color and Age Periods.

	All ages.	0-4	5-9	10-19	20-29	30-39	40-49	50-59	60-69	70	Un.
White,	14,315	3,882	5,940	3,516	516	160	47	8	3	1	242
Black,	98	18	47	22	7	1	0	0	0	0	3
Color unstated,	0	0	0	0	0	0	0	0	0	0	0

MORBIDITY TABLE 19.

Scarlet Fever By Sex and Color.

	All Colors.	White.	Black.	Color Unstated.
Total,	14,413	14,315	98	0
Male,	6,702	6,649	53	0
Female,	7,711	7,666	45	0

TUBERCULOSIS.

Ten thousand four hundred and eighteen (10,418) cases of tuberculosis were reported during the year, an increase of 4,309 as compared with the previous year. Reference to the deaths from tuberculosis will show that the increase in the number of cases reported does not indicate an increase of the disease, but simply a better registration of the living cases.

MORBIDITY TABLE 20.

Tuberculosis by Months for the Entire State and for Urban and Rural Districts by Months for the Years 1906, 1908, Inclusive.

	Total.			Urban.			Rural.		
	1906.	1907.	1908.	1906.	1907.	1908.	1906.	1907.	1908.
Total,	5,234	6,109	10,418	4,719	5,967	9,537	515	242	881
January,	483	546	802	434	525	756	49	21	46
February,	367	530	696	313	504	634	54	26	62
March,	374	477	759	341	457	707	33	20	52
April,	370	450	756	333	429	708	37	21	48
May,	402	587	744	356	569	690	46	18	54
June,	474	477	826	433	459	767	41	18	59
July,	563	475	985	532	466	872	31	9	113
August,	486	512	952	442	491	834	44	21	118
September,	401	482	813	360	470	720	41	12	93
October,	499	478	991	460	467	907	39	11	84
November,	380	476	1,052	342	451	988	38	25	64
December,	435	619	1,042	373	579	954	62	40	88

MORBIDITY TABLE 21.

Distribution of Tuberculosis According to Age Periods for the Entire State, Urban and Rural Districts by the Percentage to Total Cases in Each LLocality.

	State.	Urban.	Rural.
Under 5 years,	2.1	2.0	1.8
5 to 9 years,	2.2	2.2	3.2
10 to 14 years,	3.5	3.4	4.8
15 to 19 years,	8.7	8.5	10.9
20 to 24 years,	14.5	14.6	14.5
25 to 29 years,	14.5	14.6	16.2
30 to 34 years,	13.0	13.2	10.9
35 to 39 years,	12.0	12.2	9.6
40 to 44 years,	8.4	8.5	7.8
45 to 49 years,	5.9	6.0	4.7
50 to 54 years,	4.3	4.3	4.2
55 to 59 years,	2.9	2.8	3.2
60 to 64 years,	1.8	1.7	1.8
Over 65 years,	2.2	2.0	3.2
Age unstated,	4.0	4.0	3.2

MORBIDITY TABLE 22.

Tuberculosis by Nativity and Age Periods.

	All ages.	0–4	5–9	10-19	20-29	30-39	40-49	50-59	60-69	70	Un.
Native,	6,072	164	169	847	1,821	1,476	783	407	149	54	192
Foreign,	1,651	9	15	122	395	385	269	132	50	23	20
Unknown,	2,926	25	47	304	840	758	436	209	105	26	196

MORBIDITY TABLE 23.

Tuberculosis by Color and Age Periods.

	All ages.	0–4	5–9	10-19	20-29	30-39	40-49	50-59	60-69	70	Un.
White,	9,545	171	203	1,151	2,792	2,373	1,381	706	289	97	382
Black,	864	37	28	122	262	223	105	41	14	6	26
Color unstated,	9	28	0	0	2	3	2	1	1	0	0

MORBIDITY TABLE 24.

Tuberculosis by Sex and Color.

	All Colors.	White.	Black.	Color Unstated.
Total,	10,418	9,545	864	9
Males,	5,742	5,252	482	8
Females,	4,676	4,293	382	1

THE SUB-DIVISION OF MARRIAGE STATISTICS.

In Charge of WILMER R. BATT, M. D., *Registrar.*

MARRIAGES.

Fifty-four thousand three hundred and two (54,302) marriages were recorded during the year, a decrease of 5,941 as compared with 1907. The number of persons married per 1,000 of population was 15.3 as compared with 17.1 for the previous year. The decrease in marriages is a reflex of the industrial and financial depression existing during practically the entire year of 1908. The close association in the fluctuations of the marriage rate with varying periods of general prosperity has been frequently noted. For many years in England it was possible to trace a correspondence between the rise and fall in the marriage rate and the fluctuations in the price of wheat. In late years wheat has apparently lost its position as an index of national prosperity, and the variations in the marriage rate follow more closely the general wage earning opportunities as reflected in a variety of industrial activities.

A decrease in the marriage rate is of considerable statistical significance from the fact that it must have an influence in diminishing the birth rate, and likewise the infant death rate, as well as disturbing not only the increase of population, but distribution of population by age periods.

The average age at marriage of both brides and grooms remained practically stationary. Of the native brides, 67.3 per cent. were less than 25 years of age, and 73.2 per cent. of the foreign brides were of similar age.

Among brides there were 49,670 first marriages, 4,572 second marriages, 59 third marriages, and 1 fourth marriage.

Among grooms there were 48,836 first marriages, 5,367 second marriages, 85 third marriages and 14 fourth marriages.

Of the 4,648 re-marriages among brides, 3,608 had been previously widowed and 1,040 had been divorced.

Of the 5,353 re-marriages among grooms, 4,487 had been widowered and 866 had been divorced.

Table 1 shows the number of marriages in each county of the State by months with totals for the entire State.

Table 2 shows the marriage rate (number of persons married to each 1,000 of the population) for each county of the State for the three years, 1906 to 1908, inclusive.

Table 3 shows the ages and nativity of brides and grooms.

Table 4 shows the percentage of brides and grooms by age periods.

Table 5 shows the percentage of marriages by months.

Table 6 shows the number of marriages by age periods for brides and grooms.

Table 7 shows the ages at which re-marriages occurred among brides and grooms, and how the previous marriages were dissolved.

MARRIAGE TABLE 1.

Marrages for the Entire State and each County of the State by Months.

Area.	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Total,	54,302	4,221	4,659	3,224	4,098	3,769	6,851	3,717	4,108	5,030	5,101	5,128	4,396
Adams county,	227	20	17	17	15	17	23	9	13	29	20	19	28
Allegheny county,	8,013	694	795	429	250	649	1,010	589	598	758	675	770	526
Armstrong county,	467	46	29	29	36	32	50	33	27	36	51	46	52
Beaver county,	496	43	39	18	43	34	52	38	41	59	45	41	43
Bedford county,	237	21	23	18	25	11	19	5	28	25	23	17	22
Blair county,	722	61	55	43	56	46	98	48	66	54	58	73	64
Bradford county,	429	20	26	27	33	22	50	29	44	45	39	39	55
Berks county,	1,408	101	120	92	111	107	169	101	99	111	136	135	126
Bucks county,	409	27	28	28	49	27	61	18	25	35	45	31	35
Butler county,	541	31	38	28	53	37	69	43	42	51	42	56	51
Cambria county,	1,101	79	109	66	72	89	128	91	93	95	87	109	83
Cameron county,	58	5	1	5	9	3	6	9	2	6	5	0	7
Carbon county,	446	35	36	18	25	35	56	38	36	49	40	50	28
Centre county,	284	20	19	15	26	15	29	21	24	26	13	31	45
Chester county,	595	29	58	25	51	35	93	43	49	68	57	51	36
Clarion county,	249	7	19	8	23	15	33	19	20	21	32	23	29
Clearfield county,	682	58	63	37	48	45	84	51	57	66	59	56	58
Clinton county,	227	14	11	15	24	20	18	16	28	25	15	18	23
Columbia county,	343	32	36	21	25	19	44	18	24	29	41	23	31
Crawford county,	489	21	30	31	50	26	75	31	39	52	31	55	48
Cumberland county,	373	41	30	20	25	19	40	22	17	32	37	33	57
Dauphin county,	1,198	121	84	81	90	76	139	80	86	93	117	109	122
Delaware county,	666	49	53	32	70	46	94	39	41	61	72	70	39
Elk county,	234	12	17	13	18	16	33	16	19	33	25	17	15
Erie county,	726	42	47	56	60	42	101	51	52	84	74	78	39

MARRIAGE TABLE 1—Continued.

Area.	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Fayette county,	876	70	60	50	54	78	87	83	88	74	70	87	75
Forest county,	65	4	2	3	5	3	8	6	2	9	7	5	11
Franklin county,	352	26	22	29	31	19	30	23	17	32	31	40	52
Fulton county,	50	4	5	5	4	3	6	3	5	5	3	2	5
Greene county,	200	6	17	15	18	10	21	11	13	30	22	18	19
Huntingdon county,	261	28	16	27	21	22	26	15	12	25	22	17	30
Indiana county,	502	33	32	35	35	45	49	44	40	48	39	36	56
Jefferson county,	487	37	45	27	32	42	51	45	43	48	51	29	37
Juniata county,	121	7	4	7	12	9	13	6	9	13	11	19	11
Lackawanna county,	2,146	172	211	95	125	147	295	139	190	239	199	203	131
Lancaster county,	1,302	101	85	109	118	73	137	84	66	97	137	157	158
Lawrence county,	569	46	39	34	36	37	74	49	53	43	46	52	60
Lebanon county,	518	45	32	50	35	27	55	38	33	43	50	52	58
Lehigh county,	1,183	111	110	68	106	100	139	75	95	101	95	88	95
Luzerne county,	2,408	160	244	118	149	188	323	174	232	253	249	188	130
Lycoming county,	557	35	29	48	65	47	80	42	45	48	41	34	43
McKean county,	265	11	12	15	9	16	42	23	18	30	24	35	30
Mercer county,	398	31	35	26	39	28	58	33	16	36	32	30	34
Mifflin county,	201	14	27	9	9	17	20	14	11	18	20	23	19
Monroe county,	102	6	0	0	0	1	0	14	14	9	26	18	14
Montgomery county,	939	58	75	59	83	64	122	64	65	78	90	106	75
Montour county,	137	4	12	8	18	20	13	8	6	16	9	14	9
Northampton county,	971	83	86	49	83	61	138	66	80	83	80	80	82
Northumberland county,	893	65	87	56	48	64	91	61	70	66	90	98	97
Perry county,	159	12	14	18	11	6	8	5	13	17	17	21	17
Philadelphia county,	10,647	869	922	585	907	627	1,572	625	716	960	1,057	1,065	742
Pike county,	42	3	1	2	3	2	7	0	4	9	6	3	2
Potter county,	187	16	10	19	8	11	27	21	9	16	18	13	19
Schuylkill county,	1,625	133	200	92	87	124	170	105	151	155	142	155	111
Snyder county,	145	14	11	17	10	15	10	7	7	9	10	11	24

Somerset county,	435	32	35	33	27	37	48	32	28	34	52	32	45
Sullivan county,	64	4	5	5	1	4	5	7	9	4	5	10	5
Susquehanna county,	296	18	24	19	19	15	34	20	21	38	39	28	21
Tioga county,	302	22	14	18	28	20	39	16	23	32	31	22	37
Union county,	131	12	10	19	3	8	10	3	16	11	13	12	14
Venango county,	403	30	24	16	34	27	59	30	23	41	44	40	35
Warren county,	280	16	14	18	20	17	40	19	20	28	33	28	27
Washington county,	839	59	68	57	47	57	81	61	85	91	81	71	81
Wayne county,	172	5	6	8	10	6	24	15	13	16	28	25	16
Westmoreland county,	1,379	120	151	91	92	110	156	104	98	108	147	99	103
Wyoming county,	100	4	7	10	8	9	17	3	4	8	5	15	10
York county,	973	66	63	83	91	70	92	66	75	66	90	97	114

TABLE 2.

Number of Persons Married to Each 1,000 of Population by Counties, for the Three Years, 1906 to 1908, Inclusive.

	1906.	1907.	1908.
Entire State,	17.1	17.0	15.3
Adams county,	12.3	12.2	12.8
Allegheny county,	20.1	22.1	17.0
Armstrong county,	19.2	16.9	16.4
Beaver county,	18.2	20.1	16.3
Bedford county,	12.1	13.5	11.8
Blair county,	20.8	21.1	15.0
Bradford county,	9.0	10.6	14.6
Berks county,	19.5	18.7	15.9
Bucks county,	11.5	11.8	11.4
Butler county,	17.5	21.2	18.5
Cambria county,	22.0	22.5	16.4
Cameron county,	17.3	15.6	16.4
Carbon county,	16.2	15.2	18.2
Centre county,	16.7	15.2	13.2
Chester county,	15.1	13.8	11.8
Clarion county,	13.4	12.7	14.5
Clearfield county,	14.9	15.8	15.4
Clinton county,	16.1	15.9	15.3
Columbia county,	16.1	16.7	16.2
Crawford county,	13.1	13.5	15.3
Cumberland county,	14.7	15.3	14.1
Dauphin county,	23.2	22.7	18.7
Delaware county,	16.1	15.2	12.0
Elk county,	11.4	11.1	11.4
Erie county,	13.1	14.3	13.4
Fayette county,	19.0	18.7	13.1
Forest county,	8.0	8.7	9.9
Franklin county,	13.5	13.3	12.4
Fulton county,	11.2	10.5	10.0
Greene county,	12.3	14.1	14.0
Huntingdon county,	17.8	17.8	15.0
Indiana county,	22.0	22.2	23.4
Jefferson county,	14.1	13.9	13.8
Juniata county,	17.9	17.7	15.0
Lackawanna county,	19.2	17.3	18.4
Lancaster county,	15.7	15.9	15.6
Lawrence county,	16.8	16.9	15.8
Lebanon county,	19.0	17.3	17.8
Lehigh county,	24.4	27.2	22.1
Luzerne county,	15.1	14.5	15.8
Lycoming county,	14.3	13.8	14.0
McKean county,	6.6	7.8	9.7
Mercer county,	18.1	19.6	13.6
Mifflin county,	21.3	20.9	15.9
Monroe county,	16.7	14.4	9.3
Montgomery county,	15.1	14.3	12.3
Montour county,	12.7	14.0	17.6
Northampton county,	18.3	19.9	17.4
Northumberland county,	16.2	16.9	17.3
Perry county,	11.7	15.5	12.1
Philadelphia county,	17.7	17.5	14.4
Pike county,	5.6	6.8	9.6
Potter county,	7.4	6.0	10.2
Schuylkill county,	17.0	17.9	17.4
Snyder county,	18.9	17.6	16.7
Somerset county,	17.8	17.8	14.8
Sullivan county,	10.6	9.1	10.2
Susquehanna county,	11.4	13.0	14.8
Tioga county,	8.3	7.8	12.3
Union county,	15.1	15.7	14.0
Venango county,	16.8	16.6	15.5
Warren county,	9.2	10.0	14.0
Washington county,	19.6	18.0	15.5
Wayne county,	10.1	9.0	11.4
Westmoreland county,	17.1	16.6	14.1
Wyoming county,	12.5	10.6	11.0
York county,	17.8	16.0	15.1

TABLE 3.

Marriages by Nativity and Ages of Brides and Grooms.

Ages.	Brides.				Grooms.			
	Aggregate.	Native.	Foreign.	Nativity unstated.	Aggregate.	Native.	Foreign.	Nativity unstated.
Total,	54,302	35,145	12,160	6,997	54,302	33,670	13,666	6,966
Under 15 years,	67	41	14	12	1	1		
15-19 years,	10,995	7,746	1,484	1,765	1,962	1,588	87	287
20-24 years,	26,515	15,880	7,413	3,222	23,434	14,516	5,763	3,155
25-29 years,	8,972	6,165	1,771	1,036	15,566	8,967	4,762	1,837
30-34 years,	3,556	2,501	668	387	6,070	3,921	1,403	746
35-39 years,	1,813	1,258	341	214	2,963	1,934	665	364
40-44 years,	1,018	674	217	127	1,666	1,055	426	185
45-49 years,	695	453	129	113	1,032	676	221	135
50-54 years,	312	204	56	52	688	436	145	107
55-59 years,	195	118	42	35	382	246	93	43
60-64 years,	102	63	19	20	293	179	60	54
65-69 years,	45	31	4	10	154	94	28	32
70-74 years,	15	9	2	4	85	53	13	19
75,					5	4		1
Age unstated,	2	2			1			1

TABLE 4.

The Percentage of Brides and Grooms in Each Age Period to Total Brides and Grooms.

	Brides.	Grooms.
Under 15 years,	0.12	0.02
15-19 years,	20.2	3.6
20-24 years,	48.8	43.2
25-29 years,	16.5	28.8
30-34 years,	6.5	11.2
35-39 years,	3.3	5.5
40-44 years,	2.0	3.0
45-49 years,	1.3	1.8
Over 50 years,	1.3	2.9

TABLE 5.

The Percentage of Marriages in Each Month of the Year to Total Marriages.

January,	7.8	July,	6.8
February,	8.7	August,	7.6
March,	5.9	September,	9.3
April,	7.5	October,	9.4
May,	6.9	November,	9.4
June,	12.6	December,	8.1

TABLE 6.

Re-marriages by Age Periods of Brides and Grooms.

Ages.	Brides.					Grooms.				
	Total.	1st.	2nd.	3rd.	4th.	Total.	1st.	2nd.	3rd.	4th.
Total,	54,302	49,670	4,572	59	1	54,302	48,836	5,367	85	14
Under 15 years,	67	67				1	1			
15-19 years,	10,995	10,972	23			1,962	1,961	1		
20-24 years,	26,515	26,027	488			23,434	23,284	150		
25-29 years,	8,972	8,118	849	5		15,566	14,945	619	2	
30-34 years,	3,556	2,663	884	9		6,070	5,212	851	7	
35-39 years,	1,813	1,035	770	8		2,963	2,017	932	10	4
40-44 years,	1,018	438	572	8		1,666	830	824	11	1
45-49 years,	695	228	465	2		1,032	338	676	17	1
50-54 years,	312	66	237	9		688	143	531	13	1
55-59 years,	195	35	150	9	1	382	54	312	12	4
60-64 years,	102	7	89	6		293	30	257	5	1
65-69 years,	45	9	33	3		154	13	136	4	1
70-74 years,	15	3	12			85	7	73	4	1
75,						5		5		
Age unstated,	2	2				1	1			

TABLE 7.

Dissolvement of Prior Marriages by Age Periods of Brides and Grooms.

Ages.	Brides.			Grooms.		
	Total.	Deaths.	Divorce.	Total.	Deaths.	Divorce.
Total,	4,648	3,608	1,040	5,353	4,487	866
Under 15 years,						
15-19 years,	23	15	8	4	3	1
20-24 years,	488	310	178	163	122	41
25-29 years,	856	602	254	625	451	174
30-34 years,	894	656	238	764	658	206
35-39 years,	781	615	166	931	766	165
40-44 years,	580	491	89	837	713	124
45-49 years,	471	404	67	687	610	77
50-54 years,	250	228	22	535	486	49
55-59 years,	162	149	13	336	219	17
60-64 years,	97	93	4	251	244	7
65-69 years,	34	33	1	141	139	2
70-74 years,	12	12		73	70	3
75,				6	6	
Age unstated,						

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BROCKWAYVILLE
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TYLER
BROOKVILLE
SUMMERVILLE
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PARKERS LANDING
CURLSVILLE
RIMERSBURG
KNOX DALE
REYNOLDSVILLE
SYKESVILLE
COOL SPRING
ELEANOR
BRANCHTON
SLIPPERY ROCK
BRUIN
NEW CASTLE
WEST SUNBURY
EAST BRADY
NEW BETHLEHEM
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HUNTINGDON
McVEYTOWN
MAPLETON
MARKLESBURG
NEWTON HAMILTON
MT UNION
ORBISONIA
ICKESBURG
NEW BLOOMFIELD
NEWPORT
HALIFAX
DUNCANNON
DAUPHIN
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HARRISBURG
HUMMELSTOWN
STEELTON
MIDDLETOWN
WEST HANOVER
LINGLESTOWN
JONESTOWN
MYERSTOWN
FREDERICKSBURG
LEBANON
ANNVILLE
PALMYRA
WOMELSDORF
READING
BOYERTOWN
BIRDSBORO
POTTSTOWN
PENNSBURG
QUAKERTOWN
PERKASIE
SELLERSVILLE
SOUDERTON
DOYLESTOWN
LANSDALE
NORTH WALES
NEWTOWN
HATBORO
YARDLEY
MORRISVILLE
LANGHORNE
BRISTOL
BURGETTSTOWN
BEECHVIEW
McDONALD
CASTLE SHANNON
HICKORY
CLAIRTON
ELIZABETH
CANONSBURG
MONONGAHELA
DONORA
WEST NEWTON
LIGONIER
WINDBER
HOLSOPPLE
WOODBURY
SAXTON
ROBERTSDALE
NEW GRENADA
DRY RUN
NEWVILLE
CARLISLE
MECHANICSBURG
NEW CUMBERLAND
EAST WATERFORD
BLAIN
NEW GERMANTOWN
WASHINGTON
CLAYSVILLE
MONESSEN
CHARLEROI
MT PLEASANT
SCOTTDALE
FAYETTE CITY
DAWSON
VANDERBILT
CONNELLSVILLE
BROWNSVILLE
CADWALLADER
HOOVERSVILLE
STOYSTOWN
NEW PARIS
OSTERBURG
HOPEWELL
SHANKSVILLE
SOMERSET
BEDFORD
EVERETT
HUSTONTOWN
SHIPPENSBURG
MT HOLLY SPRINGS
DILLSBURG
YORK HAVEN
WELLSVILLE
EMIGSVILLE
YORK
DOVER
WRIGHTSVILLE
COLUMBIA
MOUNT JOY
MARIETTA
ELIZABETHTOWN
LITITZ
MANHEIM
EPHRATA
LANCASTER
MILLERSVILLE
STRASBURG
CHRISTIANA
PARKESBURG
COATESVILLE
HONEYBROOK
PHOENIXVILLE
SPRING CITY
SCHWENKSVILLE
ROYERSFORD
COLLEGEVILLE
FT WASHINGTON
NORRISTOWN
JENKINTOWN
CONSHOHOCKEN
BERWYN
MALVERN
WAYNE
BRYN MAWR
E. DOWNINGTOWN
WEST CHESTER
CONCORDVILLE
CHESTER
SWARTHMORE
UPLAND
CLARKSVILLE
RICES LANDING
CARMICHAELS
WAYNESBURG
UNIONTOWN
MASONTOWN
FAIRCHANCE
SMITHFIELD
MT MORRIS
ROCKWOOD
BOSWELL
BERLIN
GARRETT
MARKLETON
CONFLUENCE
MEYERSDALE
SOMERFIELD
ELK LICK
CLEARVILLE
McCONNELLSBURG
HYNDMAN
CHANEYSVILLE
WARFORDSBURG
CHAMBERSBURG
MERCERSBURG
GREENCASTLE
WAYNESBORO
MONT ALTO
FAIRFIELD
LITTLESTOWN
GETTYSBURG
NEW OXFORD
ARENDTSVILLE
BENDERSVILLE
EAST BERLIN
HANOVER
GLEN ROCK
STEWARTSTOWN
NEW FREEDOM
DELTA
DALLASTOWN
SPRING FORGE
RED LION
WINDSOR
HELLAM
EAST PROSPECT
QUARRYVILLE
HOPEWELL
OXFORD
WEST GROVE
AVONDALE

THE DIVISION OF DISTRIBUTION OF BIOLOGICAL PRODUCTS.

DIPHTHERIA ANTITOXIN.

From the date of the beginning of the Distribution of Diphtheria Antitoxin to the indigent throughout tthe State of Pennsylvania by the Department of Health, in October, 1905, until December 31, 1908, just three years and three months, fifteen thousand four hundred and twenty-nine persons (15,429) afflicted with Diphtheria were treated for cure, and of this number only thirteen hundred and forty-nine (1,349) or 8.74 per cent. resulted fatally.

In addition to the number mentioned that were treated for cure, ten thousand two hundred and fifty-three (10,253) persons, mostly little children who were exposed to the disease, were immunized, and of this number so immunized, only one hundred and sixty-one (161) contracted the disease, and of those who contracted the disease only thirteen died, or a death rate of .00126 per cent.

The total number of cases treated among the indigent throughout the entire State during the year 1908 was 6336, of which number only 542 resulted fatally, showing the low death rate of 8.55 per cent.

The comparison of results obtained for the years 1907 and 1908 will be found in the Summary of Observations Upon the Use of Diphtheria Antitoxin for the Year 1908, on page 395 of this report, and much interesting information in detail taken from the clinical reports received from physicians will be found in the tables beginning on page 398.

While the distribution of Antitoxin by the Department began in October, 1905, the establishment of distributing stations and the appointment of Distributors did not take place until November 4, 1905, when 473 Distributors were appointed at convenient places in every county in the State outside of the cities of Philadelphia and Pittsburg, most of them being duly registered druggists, with the exception of a few physicians and general storekeepers appointed at places where no drug stores could be found.

The number of stations was increased as the actual need for same, after careful investigation, became apparent to the Department, and at the end of December, 1906, numbered 511, an increase of 38 for that year.

The demand for additional distributing stations during the year 1907 became so imperative that the Commissioner of Health felt it his duty to increase the number already established, and December 31, 1907, found us with a total of 529 distributing stations, an increase of 18 over the year 1906.

In this connection it might be well to state that, notwithstanding the additional number of distributors appointed during 1907, the demand became so persistent (the Commissioner of Health having received in 1908 over two hundred communications from physicians and others recommending additional distributing stations at various points throughout the State), it was decided, after careful consideration, to establish still more Distributing Stations, and at the end of December 31, 1908, the total number of Distributors amounted to 569, an increase of 40 over the year 1907. A glance at the map to the left will give the reader a fair idea as to the locations of the distributing stations now existing, and the accompanying list gives the names of the distributors appointed to December 31, 1908.

DISTRIBUTORS OF

DIPHTHERIA ANTITOXIN.

Appointed by Commissioner of Health.

Antitoxin either for curative or immunizing purposes and in appropriate doses may be secured by physicians practicing in this Commonwealth upon their agreeing in writing that no charge of any kind is to be made for the Antitoxin, and that the person or persons for whom it is obtained are indigent in the sense that they cannot procure the necessities of life and at the same time purchase Antitoxin, and also that the physician will send to the Department of Health a full clinical report as specified by the Commissioner of Health.

ADAMS COUNTY.

Auker, Edward T., New Oxford.
Buehler, L. M., Gettysburg.
Cashman, Elmer W., York Springs.
Kemp, Dr. J. S., Littlestown.
Stover, Dr. J. G., Bendersville.
Trout, Dr. N. G., Fairfield.
Wolf, Charles S., East Berlin.
Wolff, W. E., Arendtsville.

ALLEGHENY COUNTY.

Burns, H. W., Coraopolis.
Chapman, Jos. F., Brackenridge.
Covell, S. W., Wilkinsburg.
Doyle, J. J., Castle Shannon .
Forsythe, Geo. W., Natrona.
Goldsmith's Pharmacy, Tarentum.
Hanna, Frank H., Springdale.
Haymaker, Milo M. & Co., Pitcairn.
Hollander, Jos. M., Braddock.
Kelley & Havekotte, Sharpsburg.
Itel, Albert I., McKees Rocks.
Johns, John A., Beechview.
McClaren's Pharmacy, Glassport.
Paules, J. L., Homestead.
Shaffer, P. T. B., Elizabeth.
Shaw, C. E., Duquesne.
Southwick, E. P., Clairton.
Sprowl's Pharmacy, Turtle Creek.
Swearingen, W. H., Bellevue.
Thompson, Harry M., Carnegie.
Urben, Harry A., Carrick.
Walker's Prescription Pharmacy, McKeesport.
Wesloski, Andrew C., Crafton.
Whiteley, W. S., Verona.

ARMSTRONG COUNTY.

Hoover, A. M., Parkers Landing.
McClelland Bros., Ford City.
Parks, J. H., Leechburg.
Sharp & Borland, Dayton.
Sturgeon, W. J. Kittanning.
Valley Drug Store, Rural Valley.
White, J. A., Coheenville.
Williams, Jas. E., Freeport.
Wray, Frank T., Apollo.

BEAVER COUNTY.

Aber, O. E., Industry.
Bebout, W. I., Darlington.
Caldwell Drug Co., Aliquippi.
Fitzgerald, Thos., Ambridge.
Hoffman, W. A., Beaver Falls.
Kaye, Walter D., Monaca.
Mayo, Fred H., Beaver.
Neubig, Chas. J., Rochester.
Pugh, Frank S., Hookstown.
Schweppe, H. L., New Brighton.

BEDFORD COUNTY.

Alexander, W. A., Everett.
Grubb & Weimer, Clearville.
Jordan, F. W., Bedford.
Rhodes, C. R., Hyndman.
Saxton Drug Store, Saxton.
Shaffer & Conrad, Osterburg.
Statler, Dr. J. B., New Paris.
Stayer, Irvin C., Woodbury.
Tewell, A. L., Chaneysville.
Zeth, John L., Hopewell.

BERKS COUNTY.

Hoffman, Nicholas J., Birdsboro.
Landis, F. T., Womelsdorf.
Mayer, Irene F., Boyertown.
Raser, Wm. H., Reading.
Schomo, Chas. C., Hamburg.
Sellers, E. J., Kutztown
Werley, Dr. C. D., Topton.

BLAIR COUNTY.

Boecking, G. C., Tyrone.
Boecking & Meredith, Bellwood.
Boecking & Meredith, Altoona.
Butler, John P., Altoona.
Davis, H. I., Hollidaysburg.
Hair, Edward, Roaring Spring.
Hess, I. C., Duncansville.
Ketring, D. T. Williamsburg.
McLanahan, Wm. H., Tyrone.
Sanders, J. C., Martinsburg.

BRADFORD COUNTY.

Allis, I. M., Wyalusing
Billings, F T., LeRaysville.
Carpenter & Pierce, Troy.
Francke, E. O., Athens.
Jump, H. D., Sayre.
Kester, E. P., Towanda.
Laquin Lumber Co., Laquin.
Lomax, F. F., Monroeton.
Passmore, John E., Gillett.
Whitman, W. W., Canton.
Wilcox, Ray S., New Albany.

BUCKS COUNTY.

Fretz,, C. D., Sellersville.
Hellyer, E. F., Newtown.
Hulshizer, Est. of Martin, Doylestown.
Johnson, Dr. H. W., Riegelsville.
Moyer, Howard R., Quakertown.
Pryor, Frank C., Morrisville.
Pryor, W. B. T., Langhorne.
Pursell, Howard, Bristol.
Williams, N. B., Perkasie.
Willard, S. B., Yardley.

BUTLER COUNTY.

Edmonds, A. J., Bruin.
Hall, Amos, Branchton.
Hindman, H. C., West Sunbury.
Maybury & Pizor, Slippery Rock.
Mershon, E. B., Saxonburg.
Redick & Grohman, Butler.
Thomas, J. D., Evans City.
Willetts, Chas. E., Mars.

CAMBRIA COUNTY.

Baird, Mrs. Carrie, Dunlo .
Berry, Chas L., Johnstown.
Davis, Cyrus W., Conemaugh.
Easly, J. J., Hastings.
Gunn, John A., Patton.
James, E. & Son, Ebensburg.
Keffer, W. O., Frugality.
Kress, F. C., Lilly.
Krumbine, Dr. G. W., Ashville.
Markley, Dr. J. P., Blandburg.
Morris, H. A., Barnesboro.
Perley, R. P., Allendale.
Reed, K. A., Gallitzin.
Scalp Drug Co., Scalp Level.
Sible, L. A. & Co., Johnstown.
South Fork Pharmacy, South Fork.

CAMERON COUNTY.

Barclay Bros., Sinnemahoning.
Mitchell, Wm. H., Driftwood.
Taggart, L. T., Emporium.

CARBON COUNTY.

Albert, Howard, Lansford.
Davis, T. E., Summit Hill.
Hess, J. M., East Mauch Chunk.
Hess & Browell, Palmerton.
Latham, Peter H., Weatherly.
Mauch Chunk Pharmacy, Mauch Chunk.
Van Wickle, Est. of A. S., Beaver Meadow.
Watkins, Wm. R., Nesquehoning.
Wagner, Chas. H., Lehighton.

CENTRE COUNTY.

Green, F. Potts, Bellefonte.
Meek, H. D., State College.
Melick, W. M., Philipsburg.
Meyer, Thos. F., Millheim.
Moore, H. A., Howard.
Murray, Jared D., Centre Hall.
Sickel, William A., Snow Shoe.

CHESTER COUNTY.

Aiken, James, Berwyn.
Hudson, Thompson, Hopewell Borough.
Hutchison, David W., E. Downingtown.
McCullough, C. B., Oxford.
Megilligan, Mrs. H. Y., Avondale.
Oberholtzer, Dr. L. Sons & Co., Phoenixville.
Seltzer, Chas J., Parkesburg.
Taylor, W. C., Spring City.
Thatcher, Jesse, West Chester.
Treichler, Galen, Honey Brook.
Walton, Geo. R., Malvern.
Young, W. S., Coatesville.

CLARION COUNTY.

Corbett, W. W., New Bethlehem.
Craig, J. S., St. Petersburg.
Greer, Dr. R. J., East Brady.
Hock, W. H., New Mayville.
Kerr, J. W., Rimersburg.
Kuhns, G. W., Leeper.
McKee, L. R., Sligo.
Mooney, J. A., Curllsville.
Reid's Drug Store, Clarion.
Snyder's Pharmacy, Shippensville.
Whitling, W. H., Knox.

CLEARFIELD COUNTY.

Currier, Dr. J., Grampian.
Davidson, T. M., Mahaffey.
Flegal, Dr. S. J., Karthaus.
Glen Richey Trading Co., Glen Richey.
McCartney, W. C., Coalport.
Miller, Dr. J. S., Madera.
Phoenix Drug Store, Houtzdale.
Quinn, J. S., DuBois.
Read, F. B. & Co., Osceola Mills.
Shugart, H. C., Morrisdale Mines.
Spackman, Dr. J. P., Peale.
Tyler Mercantile Co., Tyler.
Winburne Pharmacy, Winburne.
Woodward & Brenner, Clearfield.
Wrigley, W. K., Curwensville.

CLINTON COUNTY.

Hillton & Heffner, Lock Haven.
McGhee, John, Beach Creek.
Mervine, Dr. Graydon D., Bitumen.
Swain Drug Co., Renovo.
Waitz, Frank, Flemington.
Valley Drug Store, Mill Hall.

COLUMBIA COUNTY.

Clewell & Currin, Berwick.
Ely, Chas. S., Millville.
Fisher, J. F., Catawissa.
Goldsworthy, J. W., Centralia.
Hower, Dr. H. V., Mifflinville.
McHenry, Dr. M., Benton.
Ringler, Geo. P., Bloomsburg.

CRAWFORD COUNTY.

Easterwood, F. K., Meadville.
Fisher & Fisher, Springboro.
Lydell, James, Cambridge Springs.
Stratton, Geo., Linesville.
Wilkins & Kemble, Titusville.

CUMBERLAND COUNTY.

Central Drug Co., Mt. Holly Springs.
Claudy, R. B., Newville.
Eckels Bros., Mechanicsburg.
Emrick, B. F., Carlisle.
Fleming & Fleming, Shippensburg.
Good's Pharmacy, New Cumberland.

DAUPHIN COUNTY.

Coble, A. C., Dauphin.
Davis, T. B., Williamstown.
Felty, Wilson, Linglestown.
Gross, E. Z., Harrisburg.
Hay, Dr. J. W., Harrisburg.
Killough, S. M., Hummelstown.
Kuntz, John H., West Hanover.
Peters, D. A., Steelton.
Rewalt, J. W., Middletown.
Smith, A. M. & Co., Halifax.
Steever, Chas. C., Millersburg.
Stroup, N. W., Elizabethville.
Woods, Arthur R., Gratz.
Zimmerman, H. M., Derry Church.

DELAWARE COUNTY.

Cloud, Harlan, Darby.
Concordville Supply Co., Concordville.
Dalton, D. A., Upland.
Davis, Harry M., Lansdowne.
Ellis, Wardle, Media.
Grafstrom, C. J., Llanerch.
Hadley, H. C., Wayne.
Kershaw, Harry, Chester.
Rea, J. H., Chester.
Shirer, V. C., Swarthmore.

ELK COUNTY.

Amend, John, Wilcox.
Bennet's Branch Supply Co., Dent's Run.
Luhr, F. A., St. Mary's.
Quinn & Smith, Johnsonburg.
Ross Drug Co., Ridgway.
Sharp, W. N., Hallton.

ERIE COUNTY.

Ames, N. F. & Co., Corry.
Andrews, W. C., Erie.
Frantz, G. A., Edinboro.
Gates, William, Union City.
Loop, G. D., Northeast.
Newman, A. C., Albion.
Smith, A. R. & Co., Girard.
Wilkins, R. B., Wattsburg

FAYETTE COUNTY.

Bulger, H. H. & Co., Brownsville.
Dunaway, M. G., Fairchance.
Feather, G. A., Smithfield.
Huston, Frank, Connellsville.
Oglevee, F. E., Vanderbilt.
Rathmell Bros., Cadwallader.
Springer, R. E., Uniontown.
Steele Pharmacy, Fayette City.
Sterling, Jesse A., Masontown.
Stouffer, Jas C., Dawson.

FOREST COUNTY.

Detar, C. Y., Kellettville.
Dunn, J. C., Tionesta.
Fehlman, L. A., West Hickory.
Mayburg Supply Co., Mayburg.
Neill, A. D., Marionville.
Ingersoll, J. E., Lynch.

FRANKLIN COUNTY.

Brinley, J. F., Dry Run.
Carl, Chas. B., Greencastle,
Johnson, Dr. Fred C., Mont Alto.
Krebs, Harry B., Mercersberg.
Miller, D. L., Waynesboro.
Montgomery, J. C., Chambersburg.
Skinner, H. W., Chambersburg.

FULTON COUNTY.

Barton, C. J., Hustontown.
Cunningham, N. G., New Grenada.
Dickson, W. S., McConnellsburg.

GREENE COUNTY.

Gibbons, Dr. A. J., Carmichaels.
Hatfield, G. W., Mt. Morris.
Ullom & Bailey, Waynesburg.

HUNTINGDON COUNTY.

Brumbaugh Co., Marklesburg.
Grove, Harry R., Alexandria.
James, G. W. C., Orbisonia.
Minnick, J. M., Mount Union.
Steel, H. E., Huntingdon.
Wolfe, D. R., Birmingham.
Wright, George W., Mapleton Depot.

INDIANA COUNTY.

Allison, Elmer E., Indiana.
Conner, John B., Glen Campbell.
Fisher, James, Rossiter.
Goodlin, Elmer E., Saltsburg.
McCullough, H. L., Cookport.
Miller, M. G., Blairsville.
Park, L. N. & Son, Marion Center.
Rink, Chas. E., Shelocta.
Stephens, T. D., Penn Run.
Truby, S. H., Brush Valley.

JEFFERSON COUNTY.

Abbott & Blakeslee, Coal Glen.
Anita Supply Co., Anita.
Guthrie, H. F., Summerville.
Hamilton, Dr. S. S., Punxsutawney.
Henderson & Craig, Brookville.
Humphreys, G. H., Brockwayville.
Kunselman, M. J., Coolspring.
Mahoning Supply Co., Eleanor.
Miller, J. A. & Son, Hamilton.
Punxsutawney Drug Co., Punxsutawney.
Stoke & Feicht Drug Co., Reynoldsville.

JUNIATA COUNTY.

Banks, W. H. & Co., Mifflin.
Crawford, M. P., Mifflintown.
Haines, W. H., Thompsontown.
Heckerman's Drug Store, Port Royal.
McMeen, J. B., East Waterford.

LACKAWANNA COUNTY.

Bone, J. G. & Sons, Dunmore.
Davis, Jos., Taylor.
Dennis, F. E., Carbondale.
Foote, M. A., Archbald.
Graves, J. M. & F. M., Jermyn.
Jenkins, Geo. W., Scranton.
Koempel, Carl, Scranton.
Tiffany, F. M. Dalton.
Watkins, C. J., Olyphant.

LANCASTER COUNTY.

Bucher, W. L., Columbia.
Dierolf, Chas. B., Elizabethtown.
Fry, H. P., Lititz.
Barber, Elmer W., Mount Joy.
McCloskey, C. E., Marietta.
Miller, J. A., Lancaster.
Quarryville Drug Co., Quarryville.
Reeder, Dr. M. T., Millersville.
Royer, G. S., Ephrata.
Ruhl, H. F., Manheim.
Weaver, J. G., Strasburg.
Wendle, Samuel S., Christiana.

LAWRENCE COUNTY.

Jewell & Martin, New Wilmington.
McKinley & Frantz, New Castle.
Moorhead, Frank B., Volant.
Palace Drug Store, Ellwood City.
Shields, F. O. New Bedford.

LEBANON COUNTY.

Bender, G. H., Jonestown.
Boger, Chas. E., Lebanon.
Kline, W. C., Myerstown.
Light, D. K., Palmyra.
Seabold, W. S., Annville.

LEHIGH COUNTY.

Backenstoe, M. J., Emaus.
Barndt, Mrs. S. K., Alburtis.
Dundore, Harry W., Emaus.
Horn's Drug Store, Coplay.
Horn, Chas. W., Slatington.
Keiper, H. L., Allentown.
Lawall Bros., Catasauqua.
Mohr, J. J., Fogelsville.

LUZERNE COUNTY.

Briggs, Dr. J. F., Shickshinny.
Colburn, W. T., Ashley.
Durbin's Keystone Pharmacy, Plymouth.
Edwards, E. J., Drifton.
Evans, Wm. E., Maltby.
Farrer & Peck, Pittston.
Grover, M. E., Freeland.
James, Henry H., Parsons.
Mans, H. W., Hazleton.
Meyer, R. H., Nanticoke.
Renniman & Co., Avoca.
White, W. D. & Co., Wilkes-Barre.

LYCOMING COUNTY.

Harter, C. W., Muncy.
Hawk, G. M., Slate Run.
Miller, John L., Montgomery.
Mintzer, Dr. L. H. C., Ralston.
Staples, B. E., Jersey Shore.
Sutliff, Jacob, Hughesville.
Walton, L. L. & Co., Williamsport.

McKEAN COUNTY.

Hogarth, L. K., Smethport.
Kane Drug Co., Kane.
Mills, John C., Duke Center
Nourse, W. J., Mt. Jewett.
Thompson & Wood, Bradford.
Williams, J. H., Port Allegheny.

MERCER COUNTY.

Crawford, C. E. J., Jamestown.
Davis, John V., Clark.
Donaldson, L. W. & Co., Jackson Center.
Farver, R. C., New Lebanon.
Forker, W. J., Grove City.
Good, J. R., Mercer.
Griffin, John L., Fredonia.
Hines, J. P., Stoneboro.
Jackson, T., Hadley.
Lewis, A. E., West Middlesex.
Martin, E. K. & Son, Sheakleyville.
Steele, H. A. G., Sharon.
West, Harry D., Greenville.

MIFFLIN COUNTY.

Bishop, D. K., Milroy.
Fultz, Allen, Wagner.
McDonald, J. A., Reedsville.
Muthersbaugh, J. A., Lewistown.
Roche, William F., McVeytown.
Shaver, Henry B., Newton Hamilton.

MONROE COUNTY.

Chamberlin, Edgar W., Mt. Pocono.
Red Cross Pharmacy, East Stroudsburg.
Rhoads, Dr. Geo. H., Tobyhanna.
Seguine, J. A., Cresco.
Trexler, Dr. J. A., Brodheadville.
Trach, Dr. D. C., Kresgeville.
Wertman, Dr. A. A., Tannersville.

MONTGOMERY COUNTY.

Beshore Drug Co., Pottstown.
Bunting, Frank, Souderton.
Craig, James D., Fort Washington.
Culbert, Jos. W., Collegeville.
Huzzard, Curtis, Norristown.
King, A. J., Ardmore.
King, L. Stanley, Bala.
Kuhns, E. J., Lansdale.
McLaughlin, Harry A., Jenkintown.
Medico Drug & Chemical Co., Royersford.
Mensch, James G., Pennsburg.
Moore, Est. Christian, Bryn Mawr.
Neville, Wm., Conshohocken.
Pennepacker & Bromer, Schwenkville.
Rothwell, Walter, Hatboro.
Tiefenbach, J. T., North Wales.

MONTOUR COUNTY.

Gosh, J. D. & Co., Danville.

NORTHAMPTON COUNTY.

Burkhart, H. A., Bethlehem.
Eisenhart, E. K., Bangor.
Heller, H. D., Hellertown.
Jacoby, Cyrus, South Bethlehem.
Miller, S. R., Bath.
Scheffler, J. S., Pen Argyle.
Weaver's Pharmacy, Easton.
Yale, Elsworth W., Siegfried.
Yeakel, Nelson L. & Co., Nazareth

NORTHUMBERLAND COUNTY.

Armstrong, W. K., Sunbury.
Clarkson, T. R. & Co., Shamokin.
Dunn, John B., Watsontown.
Keiser, E. L., Milton.
Krebs, J. S., Herndon.
Mengel, J. S., Trevorton.
Samuel, Dr. E. W., Mt. Carmel.
Standard Drug Store, Mt. Carmel.
Wenck, S. M. G & Son, Northumberland.

POTTER COUNTY.

Chapman, G. F., Genesee.
Cool, W. F., Roulette.
Gilbert, W. E., Harrison Valley.
Lane, H. K., Ulysses.
Lyon, G. W., Shingle House.
McGee & Miller, Costello.
Meine, Dr. Chas., Germania.
Richardson, L., Cross Fork.
Robertson, J. W., Galeton.
Sanford, W. F., Austin.
Thompson, M. S. & Co., Coudersport.

PIKE COUNTY.

Armstrong, C. O., Milford.
Gilpin, Thos. H., Greentown.
Shannon, W. R., Lackawaxen.

PERRY COUNTY.

Eby, B. M., Newport.
Hench, D. U., Blain.
Johnston, A. R., New Bloomfield.
Lahr, J. B., Millertown.
Lakin, Dr. H. A., New Germantown.
Lehman, S. W., Duncannon.
Shuler, S. M. & Sons, Liverpool.
Zimmerman, Thaddeus, Ickesburg.

SCHUYLKILL COUNTY.

Beck, Chas. F., Cressona.
Bensinger, G. I., Schuylkill Haven.
Bolich, H. C., New Ringgold.
Brown, Geo. L., Minersville.
Brown, Frank L., Auburn.
Coble, Dr. J. W., Tamaqua.
Cowen, Wm. S., Pottsville.
Davis, H. R., Coaldale.
Depew, J. A., Delano.
Driebelbis, G. W., Tower City.
Holt, William P., Frackville.
Houck, Paul W., Shenandoah.
Krebs, H. J., Mahanoy City.
McBride, John, McAdoo.
People's Pharmacy, Tremont.
Sutton, John, Pine Grove.
Monaghan, Dr. W. J., Girardsville.
Williams, R. J., Ashland.

SNYDER COUNTY.

Charles, Jerry, Freeburg.
Spangler, W. H., Middleburg.
Ulsh, Calvin, McClure.
Wagner, J. O., Beaver Springs.
Wagenseller, Geo. D., Selinsgrove.

SOMERSET COUNTY.

Brallier, J. J., Berlin.
Dobson, G. L., Stoyestown.
Gross, Wm. H., Boswell.
Home Drug Co., Windber.
Jacobs, Dr. T. J., Somerfield.
McCormick, Mrs. D. H., Rockwood.
Mountain's Pharmacy, Confluence.
Picking, J. S., Somerset.
Pollard, R. T., Garrett.
Sembower, A. J., Markleton.
Thomas, F. B., Meyersdale.

SULLIVAN COUNTY.

Hoffa, Chas. W., Dushore.
Lancaster, H. D., Forksville.
Lopez Drug Co., Lopez.
Voorhees, C. D., Sonestown.

SUSQUEHANNA COUNTY.

Davis & Allen, Forest City.
French, A. P., Susquehanna.
Morris, F. D., Montrose.
Sands, F. E. & Co., Hallstead.
Taylor, A. J., Hopbottom.

TIOGA COUNTY.

Babcock, W. C., Blossburg.
Bates, John P., Mansfield.
Blatchley & Campbell, Wellsboro.
Darling's Pharmacy, Lawrenceville.
Fessler, T. A., Elkland.
Gilbert, F. L., Knoxville.
Holcomb, Frank B., Westfield.
Wells, J. E., Tioga.

UNION COUNTY.

Baker, Dr. T. D., Lewisburg.
Galloway & Meek, Allenwood.
Glover, O. W. H., Laurelton.
Steans, J., Mifflinburg.

VENANGO COUNTY.

Curtis, L. C., Utica.
Gosser Drug Co., Emlenton.
Griffith, E. J., Oil City.
McClintock Co., The, Kennerdell
Strahl, Henry, Petroleum Center.
Third Ward Pharmacy, Franklin.
Zeamer, H. C., Pleasantville.

WARREN COUNTY.

Clark, A. A., Russell.
Kemble & Son, Tidioute.
McDonald, J. G., Sugar Grove.
Pierce, Wm. S., Warren.
Pryor, G. T., Sheffield.
Simpson Bros., North Clarendon.

WASHINGTON COUNTY.

Coulter & Co., McDonald.
Donaldson, J. B., Canonsburg.
Hogsett Bros., Monongahela.
Horn, H. M., Washington.
McMurray, H. B., Burgettstown.
Piper Bros., Charleroi.
Piper & Dague, Donora.
Retzer, Chas., Hickory.

WAYNE COUNTY.

Jadwin, C. C., Honesdale.
Snyder, M. T., Hawley.
Stevens, W. A., Hamlinton.
Tiffany, J. E., Pleasant Mount.

WESTMORELAND COUNTY.

Broadway Drug Co., Scottdale.
Coldsmith, C. F., Mt. Pleasant.
Cook, J. G., New Alexandria.
Fink, Geo. W., Irwin.
Fox, Chas. E., Vandergrift.
Freeman, J. W., Perry.
Fry, F. L., Manor.
Hunnell, B. S., New Kensington.
Kirk, W. P., Monessen.
Martin, A. E., Greensburg.
Obley, H. A., West Newton.
Smith, Horace L., Jeannette.
Tassall Pharmacy, Latrobe.
Wilson, J. M., New Florence.
Wilt, R. A., Ligonier.
Zimmerman, W. J., Delmont.

WYOMING COUNTY.

Besteder, Chas., Center Moreland.
Reynolds, Oscar J., Nicholson.
Sickler, H., Tunkhannock.
Tibbins, Geo. H., Noxen.

YORK COUNTY.

Britcher, Milton W., Dillsburg.
Emlet & Jenkins, Hanover.
Gable, John W., Hellam.
Seitz, J. E., Glen Rock.
Grove, J. H., New Freedom.
Hoke, Martin, Spring Forge.
Lafean, A. H. & Bro., York.
Meyers, G. A., Dallastown.
Moody, C. W., Red Lion.
Mull, Harry, Stewartstown.
Murphy, J. C., York Haven.
Overmiller, N. Allen, East Prospect.
Stacks, A. H., York.
Stahle, R. S., Emigsville.
Smith, Samuel S., Windsor.
Stewart, T. D., Delta.
Tinsley, G. S., Wrightsville.
Wallace, N. G., Dover.

COMMISSION.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

Division of Distribution of Biological Products.

Know all men by these presents, that .....
residing at ..... in the county of .....
State of Pennsylvania, ha.... this ..... day of ..... 190....
been duly appointed Distributor of Diphtheria Antitoxin, at .....
..... County, Pennsylvania, under the rules of the Department of Health.

(Seal)

.....
Commissioner of Health.

METHOD OF DISTRIBUTION.

After appointment the Distributor is furnished with an initial supply of serum consisting of five packages of 1000 units and five packages of 3000 units, and in about fifteen localities in the State, Distributors are supplied with a stock of five packages of 5000 units of Antitoxin, at the special request of physicians at those points, together with blank forms, stamped envelopes, etc., necessary for its distribution; copies of which forms appear hereafter.

The physician discovering a case of diphtheria anywhere in his locality among the poor has but to go to the nearest druggist who is a Distributor, sign a receipt and secure all the Antitoxin he needs for the treatment of the case or cases he has on hand.

Form P. P. 516.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

Division of Distribution of Biological Products.

INSTRUCTIONS TO DISTRIBUTORS REGARDING THE DISTRIBUTION AND USE OF DIPHTHERIA ANTITOXIN.

In the distribution of Diphtheria Antitoxin there are THREE PRINTED forms which MUST be filled out.

FIRST IN IMPORTANCE, FORM B. P. 517, is known as the Application and Receipt. It is in a small book containing 100 numbered pages—50 white and 50 blue—the white to be signed by the physician

and forwarded to the Department after the amounts of Antitoxin secured by him are properly filled out in the spaces reserved for this purpose; the blue pages, on which the carbon copy is taken, remain in the book for the distributor's own record. A space is especially provided in the lower left hand corner of this FORM B. P. 517 for a statement of Distributor's stock of Antitoxin on hand, the filling out of which space will prevent the distributor from ever allowing his stock of Antitoxin to become ENTIRELY exhausted, as a careful examination is made of each Form B. P. 517 immediately upon its receipt, and if the stock is found to be low, additional supply is at once forwarded. This avoids the expense of telegraph and telephone messages to the Department for additional stock.

A physician having a case of Diphtheria among the poor should immediately APPLY to the nearest Distributor, SIGN a RECEIPT Form B. P. 517, and secure all the Antitoxin he needs for the treatment of the case. He agrees, as you will see by the Application and Receipt, to return to the Distributor all unused Antitoxin WITHIN TEN DAYS after securing the same.

Our experience teaches us that the Distributor should require physicians to sign for the Antitoxin BEFORE securing same, if at all possible, because when they send for it they often fail to come in and receipt for same for several days and sometimes never sign for it at all.

SECOND, FORM B. P. 519, is the little slip found wrapped around the outside of the box of Antitoxin. It is to be filled out by the physician, with the patient's name and address, date of use, physician's signature and address, distributor's signature and address, and MUST, when returned to the Distributor, be forwarded by him to the Department of Health, together with the above mentioned Application and Receipt, Form B. P. 517, in the printed stamped envelopes furnished to the Distributor.

THIRD, FORM B. P. 518, is the Clinical Report, and is found inside the box of Antitoxin. The physician fills this out, signs and returns it to the Department at the termination of the case. The Distributor has NOTHING WHATEVER TO DO WITH THIS FORM.

SPECIAL NOTICE, FORM B. P. 524 (copy of which is enclosed herewith), contains instructions relative to sale of Antitoxin belonging to the State supply ONLY in cases of emergency. It sometimes happens the private supply of the Distributor becomes exhausted at a time when a call may come from a person well able to pay for same. In such cases the Distributor is allowed to take Antitoxin from his State supply with the distinct understanding that it MUST BE IMMEDIATELY REPLACED BY PURCHASE from Messrs. H. M. Alexander & Co. at their market price, and in communicating with them in regard thereto the Distributor should not fail to make it clear the exact number of either 1000, 3000 or 5000 unit packages of

STATE goods being replaced. In this connection I would state that the same record is required by the Department for goods that are sold and taken from the State supply as is made for indigent cases, the only difference being that the word "SOLD" must be written across the face of all these records for identification here.

Our distributing agents, Messrs. H. M. Alexander & Co., Marietta, Pa., have been instructed to forward you an INITIAL supply of 5 packages of 1000 units and 5 packages of 3000 units of Antitoxin, and Distributors should bear in mind that an additional supply will be furnished immediately upon notification that this stock is NEARLY exhausted, which notice can be made by simply filling up the space in the lower left hand corner of FORM B. P. 517, specifically provided for a statement of stock on hand.

Should an epidemic of Diphtheria break out in your locality, when a large quantity of Antitoxin might be needed at once, you are then authorized to telegraph, C. O. D. (using the enclosed code), or to telephone, reversing charges to this office for the necessary additional supply.

SAMUEL G. DIXON, M,. D.
Commissioner of Health.

B. P. 517.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

APPLICATION AND RECEIPT FOR DIPHTHERIA ANTITOIN.

.....190..

I hereby acknowledge the receipt of the following named amounts of Diphtheria Antitoxin; for use in the family of .....
.....packages containing 1,000 units. Laboratory Nos., ...
.....packages containing 3,000 units. Laboratory Nos., ...
.....packages containing 5,000 units. Laboratory Nos., ...
from .....Distributor, Address, ...
in the name of the Department of Health. I hereby certify that the person or persons mentioned for whom this Antitoxin is furnished for the treatment of Diphtheria are indigent in the sense that they cannot procure the necessities of life and at the same time purchase Antitoxin. I agree to make no charge for it directly or indirectly, and if unused, to return to the Distributor within ten days; also to mail to the Department of Health, immediately upon termination, a clinical report for each case, on the blanks furnished for this purpose.

We have in stock at this time:

.....packages of 1,000 units. .....
.....packages of 3,000 units. (Physician's signature.)
.....packages of 5,000 units. .....
(Address.)

.....
(Distributor's signature.)

.....
(Full Address.)

with blue stub for Distributor's record; being Application and Receipt to be signed by the physician upon making application to the Distributor for Antitoxin for use on indigent patients in his locality found stricken with the disease, which gives the exact number of packages of Antitoxin—1000 units (immunizing) and 3000 and 5000 units (curative) taken by him, and which is forwarded to the Department with Form No. 519, mentioned below. The blue stub is for the Distributor's record of Antitoxin issued.

Form B. P. 517.

Blue Stub.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

APPLICATION AND RECEIPT FOR DIPHTHERIA ANTITOXIN.

.....190..

I hereby acknowledge the receipt of the following named amounts of Diphtheria Antitoxin for use in the family of .....
.....packages containing 1,000 units. Laboratory Nos., ...
.....packages containing 3,000 units. Laboratory Nos., ...
.....packages containing 5,000 units. Laboratory Nos., ...
from .....Distributor, Address, ...
in the name of the Department of Health. I hereby certify that the person or persons mentioned for whom this Antitoxin is furnished for the treatment of Diphtheria are indigent in the sense that they cannot procure the necessities of life and at the same time purchase Antitoxin. I agree to make no charge for it directly or indirectly, and if unused, to return to the Distributor within ten days; also to mail to the Department of Health, immediately upon termination, a clinical report for each case, on the blanks furnished for this purpose.

We have in stock at this time:

.....packages of 1,000 units. .....
.....packages of 3,000 units. (Physician's signature.)
.....packages of 5,000 units. .....
(Address.)

.....
(Distributor's signature.)
.....
(Full Address.)

Form B. P. 518.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

CLINICAL REPORT OF DIPHTHERIA TREATED WITH ANTITOXIN.

Use a separate blank for each case and forward immediately upon termination of same to the Department of Health, Harrisburg, Pa.

Patient's name, ...Address, ... County, ...Pa.
Age, ...Sex, ...Color, ... Date of first visit,.....

Was treatment immunizing or curative? .....

If treatment was immunizing answer only the following questions:

Date of treatment, ...No. of units used, ...

How long had patient been exposed to the disease? .....

Did patient subsequently contract the disease? (Yes or No)? .....

If the treatment was curative answer the following questions:.....

Date of onset of the disease, ...

SPECIFY EACH TREATMENT.

.....units used within.....hours of onset.
.....units used within.....hours after first treatment.
.....units used within.....hours after second treatment.
.....units used within.....hours after third treatment.
.....units used within.....hours after fourth treatment.
.....units used within.....hours after fifth treatment.
.....units used within.....hours after sixth treatment.
.....units used within.....hours after seventh treatment.
.....units used within.....hours after eighth treatment.
.....units used within.....hours after ninth treatment.

State whether disease was Post-Nasal, Tonsillar, Pharyngeal, Laryngeal.
(Specify by *crossing out* names of *regions unaffected.)*

State complications, if any, ...

State termination (Recovery or death), ...

Number of persons in household,....Number affected,....Number immunized,....

What was the probable source of infection? .....

Remarks, ...

Distributor's name, ... Signature, ...M. D.

Address, ...

The above is the Clinical report which gives the complete medical history of the case from the beginning of treatment to either recovery or death, and which is to be signed by the physician and forwarded to the Department.

Form B. P. 519.

..... Units.	COMMONWEALTH OF PENN'A. DEPARTMENT OF HEALTH.
Manufacturer.	Diphtheria Antitoxin, ...Units.
.....	Manufacturer, ...Laboratory No.....
Laboratory No.	Patient, ...Address,.....
Date within which the unopened vial or attached slip must be returned to Distributor, ...	Date of use, ...
.....	Physician's signature, ...
	Address, ...
	Distributor's signature, ...
	Address, ...
	This slip when returned to Distributor must be forwarded to the Department of Health, together with the application for the same.
	SAMUEL G. DIXON, Commissioner.

This slip is found placed around the outside of the packages of Antitoxin, and is to be filled out by the physician using same; giving name of patient and address, date of use, physician's name and address, distributor's signature and address, and to be forwarded to the Department with Form B. P. 517, above mentioned.

These slips, Form B. P. 519, are filled out for 1000 units, immunizing, and 3000 and 5000 units, curative treatment, respectively; each slip of Form B. P. No. 519 representing one package of 1000, 3000 or 5000 units strength; having also printed thereon the Laboratory number of the package of Antitoxin produced by the manufacturer.

The three forms above mentioned, B. P. 517, 518 and 519, when properly filled out, make a complete record of each case of the distribution and use of Diphtheria Antitoxin issued by the Department of Health to the indigent throughout the entire State of Pennsylvania.

SUMMARY OF OBSERVATIONS UPON THE USE OF DIPHTHERIA ANTITOXIN IN PENNSYLVANIA FOR THE YEAR 1908.

CURATIVE TREATMENT.

The statistics compiled as taken from the clinical reports received from physicians covering the curative treatment of diphtheria among the indigent for the year 1908, show a slight increase in the death rate over the year 1907, and also show that physicians throughout the State did not as strictly take heed, as they did in the previous year, to the urgent requests of the Commissioner of Health given from time to time, to use Antitoxin as early as possible after onset of the disease and in larger doses.

It will be shown by a comparison of Table No. 1 for the year 1908 with the same Table for 1907, that 6,336 persons were treated for diphtheria with but 542 deaths (an increase in number treated, of 1,065 over the year 1907), and that the deaths have been but slightly increased in the year 1908 over the previous year. It will also be noticed in Table No. 1 for 1908, compared with 1907, in the treatment of cases of diphtheria within the first twenty-four hours of onset, that the death rate, though brought to the very low percentage of 6.53 per cent. is slightly increased over the death rate in the previous year. In each succeeding day of treatment after onset

an increase in the death rate naturally appears until the seventh day is reached, when, contrary to what might be expected, the death rate is found to be only 19.51 per cent., much lower even than the results obtained in the previous, or sixth-day-treatment.

In Table No. 2, "Showing Results of Treatment of Diphtheria with Antitoxin with Relation to Sex and Age," it will be seen that 2,892 males and 3,444 females were treated in 1908 as compared with 2,493 males and 2,778 females in 1907. It also reveals the fact that in both years the greatest number of cases of diphtheria occurred in children of both sexes between the ages of five and nine years; the females predominating in 1908, with 1,261 to 1,070 males.

In Table No. 3, showing result of treatment of diphtheria with Antitoxin according to period of initial treatment after onset and age, it will be found that in addition to the increased number of cases treated in 1908, the number of recoveries amounting to 1,379 treated within the first twenty-four hours also occurred in children between the ages of five and nine years; that the percentage of deaths has been reduced to 6.56 per cent.; and that the early use of Antitoxin in increased dosage is gradually reducing the death rate among the poor.

In Table No. 4, showing treatment of diphtheria Antitoxin according to areas affected and period of initial treatment after onset of disease, it will be shown that again, as in the previous year, the largest number of cases treated were of the type known as Tonsillar diphtheria; there being 2,611 cases with but 46 deaths, or a death rate of only 1.76 per cent. The highest death rate shown in this table appears where the cases developed all the four types, combined "Post-Nasal, Tonsillar, Pharyngeal and Laryngeal," producing a death rate of 42.85 per cent. in a total of 63 cases with 27 deaths.

In Table No. 5, showing results of treatment of diphtheria with Antitoxin in the several counties by the months for 1908, it will be seen that diphtheria was prevalent in all the sixty-six counties in the State where Antitoxin was distributed for the treatment of diphtheria among the poor, except Fulton and Pike counties; that Luzerne county heads the list with the largest number of cases treated, or 844, with 81 deaths; Lackawanna county comes second with 788 cases treated with 72 deaths, and Allegheny county is third with 563 cases treated with 35 deaths. The lowest death rate is found in Mifflin county, where 147 cases were treated among the poor with but 3 deaths, showing the remarkably low mortality of 2.04 per cent. Another interesting feature shown by this table is that the treatment of diphtheria in Beaver county with 6 cases; Butler county with 13 cases; Cameron county with 1 case; Forest county with 4 cases; Green county with 7 cases; Huntingdon county with 8 cases; Mercer county with 32 cases; Perry county with 10 cases; Potter county with

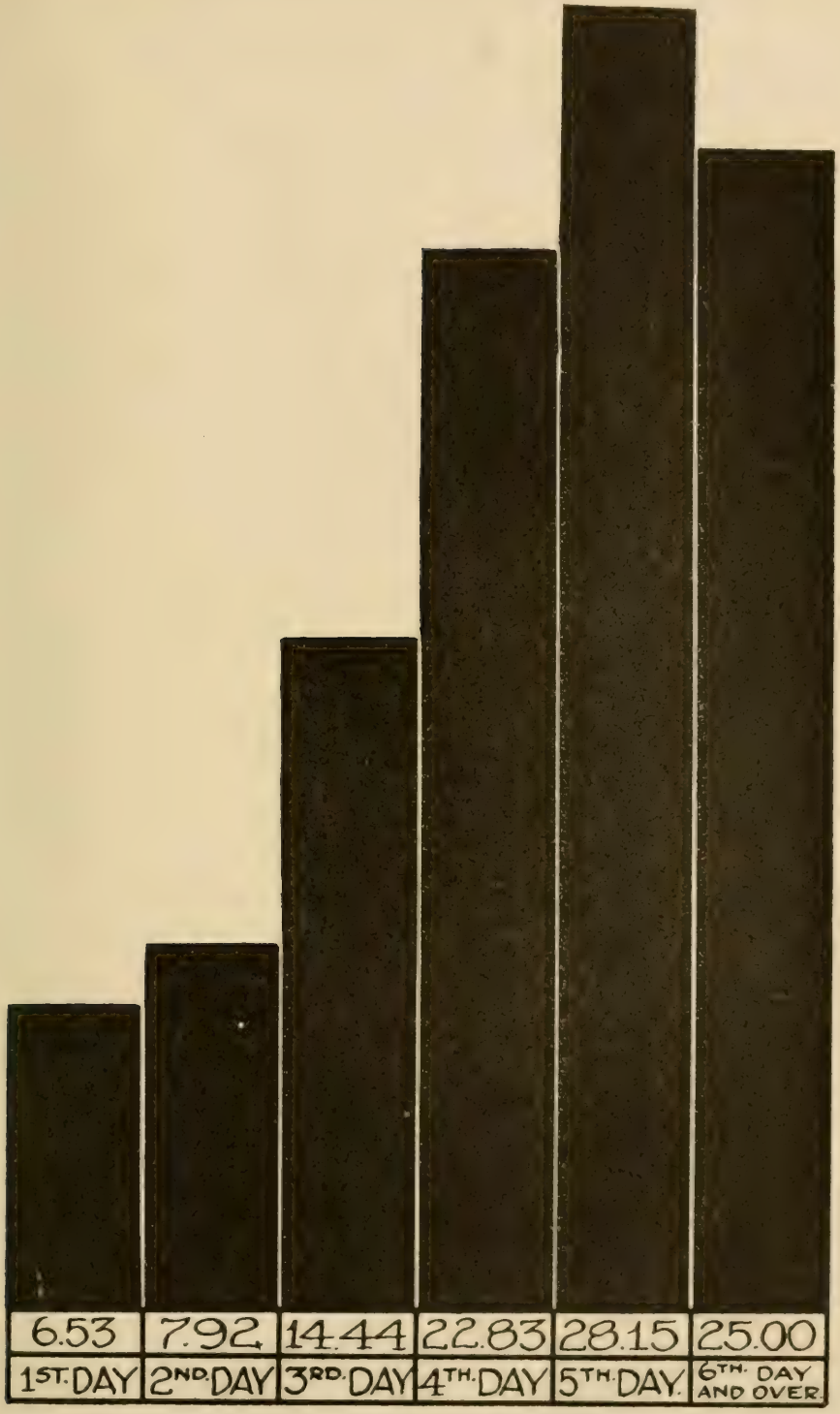


Diagram Showing Percentage of Deaths of Cases Treated With Diphtheria Antitoxin According to Duration of Disease for 1908.

1 case; Snyder county with 14 cases; Union county with 10 cases; Venango county with 7 cases and Wyoming county with 34 cases, resulted in each county in 100 per cent. of recoveries.

Table No. 6, showing result of treatment of diphtheria with Antitoxin according to number of units used and period of treatment after onset, reveals the fact that the initial curative dose, or 3,000 units of Antitoxin, was administered within the first twenty-four hours of onset in 2,019 cases, with only 82 deaths, or a death rate of 4.06 per cent. It also reveals the fact that much more Antitoxin has been used in the entire treatment of any single case, the largest amount of Antitoxin used being 117,000 units to effect the recovery in one case. A careful inspection of this table shows that the number of units used for the entire treatment of any one of the cases will range from 1,000 units by gradual increases until the maximum number of 117,000 is reached. It also shows that double the initial or curative dose of 3,000 units of Antitoxin was used within the first twenty-four hours of onset in 922 cases, with but 60 deaths, or a death rate of 6.50 per cent. A still further examination of this table will show that three times the initial dose, or 9,000 units of Antitoxin, was used within the first twenty-four hours of onset in 264 cases, with only 32 deaths.

Table No. 7, showing the number of cases where subsequent treatments of Antitoxin were administered after the first twenty-four hours, it will be seen that the number of units used in these subsequent treatments range all the way from 1,000 units up to the maximum number of 33,000 units. It will also be seen in this Table that subsequent treatments with only 3,000 units of Antitoxin after the first twenty-four hours were administered in 1,041 cases with 81 deaths, or a mortality of 7.78 per cent. Also that subsequent treatments of *double* the initial curative doses, or *6,000* units of Antitoxin, were administered to 609 persons, with only 84 deaths.

It might be stated just here for the information of the physicians throughout the State of Pennsylvania, that on or about August 26, 1908, 5,000 unit packages of Antitoxin were sent as an experiment to a few distributors for use of physicians living a considerable distance from the nearest distributing station, but not a sufficient number of cases have as yet been treated with this increased dosage to admit of the compilation of statistical data of value at this time. Suffice it to say, however, that the outlook is encouraging from the few clinical reports already received from physicians.

The total number of cases treated has been arranged into one set of Tables, numbered from 1 to 8; No. 1 to 7, inclusive, covering curative treatment, and No. 8, immunization treatment, which give in detail the number of cases treated from January 1, 1908, to December 31, 1908, and show the results as tabulated under the following headings:

1. Period of Initial Treatment After Onset of Disease.
2. Showing Results of Treatment According to Sex and Age.
3. Period of Initial Treatment After Onset and Age.
4. Areas Affected and Period of Initial Treatment After Onset of Disease.
5. Number of Cases Treated in the Several Counties of the State by the Months, with Result.
6. Result of Treatment of Diphtheria with Antitoxin According to Number of Units Used and Period of Treatment After Onset of Disease.
7. Statement Showing Cases Where Subsequent Treatments of Antitoxin were Used After the First Twenty-four Hours.
8. Number Immunized, with Result.

TABLE I.

Antitoxin Treatment of Diphtheria for 1908.
Initial Dose, 3,000 Units.
Relation of Initial Treatment to Time of Onset.

Results.	Period in Which Initial Treatment was Made.								
	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.	Total.
Totals,	3,979	1,464	540	162	103	22	41	25	6,336
Recoveries,	3,719	1,358	462	125	74	15	33	18	5,794
Deaths,	260	116	78	37	29	7	8	7	542
Percentage of deaths,	6.53	7.92	14.44	22.83	28.15	31.81	19.51	28	8.55

TABLE II.

Antitoxin Treatment of Diphtheria, 1908.
Initial Dose, 3,000 Units.
Result of Treatment of Diphtheria with Antitoxin With Relation to Sex and Age.

Results.	Sex.	Age Periods.										
		0-1	1-2	2-3	3-4	4-5	5-9	10-14	15-19	20+	To-tal.	
Totals,	M.,	70	141	260	282	304	1,070	385	148	232	2,892	
	F.,	32	133	256	282	305	1,261	489	236	450	3,444	6,336
Recoveries,	M.,	55	111	215	235	280	982	368	145	221	2,612	
	F.,	25	106	216	258	273	1,170	466	229	439	3,182	5,794
Deaths,	M.,	15	30	45	47	24	88	17	3	11	280	
	F.,	7	27	40	24	32	91	23	7	11	262	542

TABLE III.

Antitoxin Treatment of Diphtheria, 1908.

Initial Dose, 3,000 Units.

Result of Treatment of Diphtheria with Antitoxin According to Period of Initial Treatment After Onset and Age.

Period of Treatment.	Results.	Age Periods.									Total.	Percentage.
		0-1	1-2	2-3	3-4	4-5	5-9	10-14	15-19	20+		
1st day,	Total,	69	146	347	324	396	1,464	532	246	451	3,975	
	Rec.,	54	117	301	298	369	1,379	515	243	438	3,714	
	Deaths,	15	29	46	26	27	85	17	3	13	261	6.56
2d day,	Total,	18	83	97	152	127	538	213	90	149	1,467	
	Rec.,	17	69	81	131	116	499	206	88	145	1,352	
	Deaths,	1	14	16	21	11	39	7	2	4	115	7.83
3d day,	Total,	9	25	43	54	49	197	80	30	53	540	
	Rec.,	7	19	32	41	38	172	75	28	50	462	
	Deaths,	2	6	11	13	11	25	5	2	3	78	14.44
4th day,	Total,	4	8	11	19	19	65	16	4	16	162	
	Rec.,	2	5	5	16	16	48	14	4	15	125	
	Deaths,	2	3	6	3	3	17	2	0	1	37	22.83
5th day,	Total,	2	7	11	6	7	31	22	7	10	103	
	Rec.,	0	5	7	0	5	27	16	5	9	74	
	Deaths,	2	2	4	6	2	4	6	2	1	29	28.15
6th day,	Total,	0	0	2	3	1	12	3	1	0	22	
	Rec.,	0	0	1	2	1	8	2	1	0	15	
	Deaths,	0	0	1	1	0	4	1	0	0	7	31.81
7th day,	Total,	0	3	3	3	5	15	7	3	2	41	
	Rec.,	0	1	3	2	3	14	5	3	2	33	
	Deaths,	0	2	0	1	2	1	2	0	0	8	19.51
8th day and over,	Total,	0	8	2	3	5	9	2	2	1	26	
	Rec.,	0	1	1	3	5	5	1	2	1	19	
	Deaths,	0	1	1	0	0	4	1	0	0	7	26.92
Total rec.,											5,794	
Total deaths,											542	8.55

TABLE IV.

Antitoxin Treatment of Diphtheria, 1908.

Initial Dose, 3,000 Units.

Result of Treatment of Diphtheria with Antitoxin According to Areas Affected and Period of Initial Treatment after Onset of Disease.

Area.	Results.	Period Within Which Initial Treatment was Made.								Total.	Percentage.
		1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.		
Post-nasal,	Total,--	66	22	4	1	1	0	0	0	94	
	Rec., --	62	17	2	1	1	0	0	0	83	
	Deaths,	4	5	2	0	0	0	0	0	11	11.70
Pharyngeal,	Total,--	139	41	19	8	3	1	0	1	212	
	Rec., --	129	38	17	8	2	1	0	1	196	
	Deaths,	10	3	2	0	1	0	0	0	16	7.54
Tonsillar,	Total,--	1,859	536	145	31	22	3	10	5	2,611	
	Rec., --	1,834	528	138	31	19	2	9	4	2,565	
	Deaths,	25	8	7	0	3	1	1	1	46	1.76
Laryngeal,	Total,--	404	165	70	26	16	2	6	5	694	
	Rec., --	308	126	50	17	9	1	4	5	520	
	Deaths,	96	39	20	9	7	1	2	0	174	25.07
All combined,	Total,--	21	20	12	4	3	1	2	0	63	
	Rec., --	13	14	5	1	1	0	2	0	36	
	Deaths,	8	6	7	3	2	1	0	0	27	42.85
Pn. and Phar.,	Total,--	18	19	12	1	3	0	0	3	56	
	Rec., --	16	18	10	1	2	0	0	3	50	
	Deaths,	2	1	2	0	1	0	0	0	6	10.71
Pn., Phar., Ton,	Total,--	232	125	60	23	17	3	2	3	465	
	Rec., --	196	113	50	17	9	1	1	0	387	
	Deaths,	36	12	10	6	8	2	1	3	78	16.77
Pn., Ton., Lar.,	Total,--	20	5	5	1	0	1	1	0	33	
	Rec., --	18	5	3	0	0	1	1	0	28	
	Deaths,	2	0	2	1	0	0	0	0	5	15.15
Pn. and Lar.,	Total,--	29	13	5	4	0	0	1	1	53	
	Rec., --	22	13	3	4	0	0	1	1	44	
	Deaths,	7	0	2	0	0	0	0	0	9	16.98
Ton. and Lar.,	Total,--	55	35	29	8	5	1	3	0	136	
	Rec., --	49	29	24	5	3	1	2	0	113	
	Deaths,	6	6	5	3	2	0	1	0	23	16.91

TABLE IV—Continued.

Area.	Results.	Period Within Which Initial Treatment was Made. 1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.	Total.	Percentage.
Ph., Ton., Lar.,	Total,--	82	45	26	15	8	5	4	1	186	
	Rec., --	66	36	23	7	5	4	3	0	144	
	Deaths,	16	9	3	8	3	1	1	1	42	22.58
Ph. and Ton.,	Total,--	669	305	89	20	16	2	5	3	1,109	
	Rec., --	653	293	84	18	15	1	5	3	1,072	
	Deaths,	16	12	5	2	1	1	0	0	37	3.33
Pn. and Ton.,	Total,--	260	91	47	15	7	2	3	2	427	
	Rec., --	241	83	37	12	6	2	3	1	385	
	Deaths,	19	8	10	3	1	0	0	1	42	9.83
Ph. and Lar.,	Total,--	72	28	12	5	1	0	1	1	120	
	Rec., --	61	23	11	3	1	0	1	0	100	
	Deaths,	11	5	1	2	0	0	0	1	20	16.66
Pn., Ph., Lar.,	Total,--	53	14	5	0	1	1	3	0	77	
	Rec., --	51	12	5	0	1	1	1	0	71	
	Deaths,	2	2	0	0	0	0	2	0	6	7.79
Total,	Rec., --									5,794	
	Deaths,									542	8.55

TABLE V.

Antitoxin Treatment of Diphtheria, 1908.

Initial Dose, 3,000 Units.

Result of Treatment of Diphtheria with Antitoxin in the Several Counties by the Months.

County.	Results.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Percentage.
Adams,	Total,--	2	2	0	0	0	2	1	1	1	2	4	5	20	
	Rec., --	2	2	0	0	0	2	1	1	0	2	4	4	18	
	Deaths,	0	0	0	0	0	0	0	0	1	0	0	1	2	10.
Allegheny,	Total,--	62	56	27	18	16	13	11	30	75	82	84	89	563	
	Rec., --	60	54	23	17	16	12	10	26	71	76	81	82	528	
	Deaths,	2	2	4	1	0	1	1	4	4	6	3	7	35	6.21

TABLE V.—Continued.

County.	Results.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Percentage.
Armstrong,	Total,--	10	2	2	4	2	2	2	7	5	23	18	17	94	
	Rec., --	10	2	1	4	2	2	2	7	5	23	16	15	89	
	Deaths,	0	0	1	0	0	0	0	0	0	0	2	2	5	5.31
Beaver,	Total,--	2	0	1	1	0	0	0	0	0	0	1	1	6	
	Rec., --	2	0	1	1	0	0	0	0	0	0	1	1	6	100
	Deaths.	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bedford,	Total,--	9	4	1	3	2	5	3	5	4	5	3	4	48	
	Rec., --	7	4	0	1	1	5	3	5	4	5	3	2	40	
	Deaths.	2	0	1	2	1	0	0	0	0	0	0	2	8	16.66
Blair,	Total,--	9	3	16	15	1	5	9	2	6	10	9	5	90	
	Rec., --	9	3	14	15	1	4	8	2	6	10	9	5	86	
	Deaths.	0	0	2	0	0	1	1	0	0	0	0	0	4	4.44
Bradford,	Total,--	7	4	5	3	2	3	3	1	1	8	3	3	43	
	Rec., --	7	2	5	3	1	2	3	1	1	8	2	2	37	
	Deaths,	0	2	0	0	1	1	0	0	0	0	1	1	6	13.95
Berks,	Total,--	10	12	12	3	6	2	9	5	20	17	13	9	118	
	Rec., --	9	12	11	3	5	2	7	5	16	15	10	7	102	
	Deaths,	1	0	1	0	1	0	2	0	4	2	3	2	16	13.55
Bucks,	Total,--	5	5	6	3	3	11	5	0	7	6	6	10	67	
	Rec., --	5	4	6	3	2	10	4	0	7	5	5	10	61	
	Deaths,	0	1	0	0	1	1	1	0	0	1	1	0	6	8.95
Butler,	Total,--	7	1	0	0	0	0	1	1	0	1	1	1	13	
	Rec., --	7	1	0	0	0	0	1	1	0	1	1	1	13	100
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cambria,	Total,--	26	11	16	5	6	6	12	11	16	10	13	22	154	
	Rec., --	25	11	13	4	6	6	12	9	15	9	11	21	142	
	Deaths,	1	0	3	1	0	0	0	2	1	1	2	1	12	7.79
Cameron,	Total,--	0	0	1	0	0	0	0	0	0	0	0	0	1	
	Rec., --	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Deaths,	0	0	1	0	0	0	0	0	0	0	0	0	1	100
Carbon,	Total,--	9	5	8	6	3	2	1	1	8	18	13	20	94	
	Rec., --	8	4	6	6	3	2	1	1	8	18	11	18	86	
	Deaths,	1	1	2	0	0	0	0	0	0	0	2	2	8	8.51
Centre,	Total,--	7	2	1	0	1	1	0	3	2	6	2	4	29	
	Rec., --	7	2	1	0	1	0	0	1	2	4	2	4	24	
	Deaths,	0	0	0	0	0	1	0	2	0	2	0	0	5	17.24

TABLE V.—Continued.

County.	Results.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Percentage.
Chester,	Total,--	15	7	5	4	4	2	1	6	9	17	9	11	90	
	Rec., --	15	6	5	3	4	2	0	6	8	17	7	11	84	
	Deaths,	0	1	0	1	0	0	1	0	1	0	2	0	6	6.66
Clarion,	Total,--	3	1	0	0	0	0	1	0	0	1	1	4	11	
	Rec., --	3	1	0	0	0	0	0	0	0	1	1	4	10	
	Deaths,	0	0	0	0	0	0	1	0	0	0	0	0	1	9.09
Clearfield,	Total,--	16	17	10	7	3	5	2	2	2	6	3	4	77	
	Rec., --	15	15	8	6	2	4	2	2	2	6	3	4	69	
	Deaths,	1	2	2	1	1	1	0	0	0	0	0	0	8	10.38
Clinton,	Total,--	8	0	1	8	1	4	0	2	2	2	0	2	30	
	Rec., --	7	0	1	8	1	4	0	2	1	2	0	2	28	
	Deaths,	1	0	0	0	0	0	0	0	1	0	0	0	2	6.66
Columbia,	Total,--	38	26	10	5	20	16	6	10	11	13	19	13	187	
	Rec., --	34	25	9	4	20	15	6	9	10	11	16	13	172	
	Deaths,	4	1	1	1	0	1	0	1	1	2	3	0	15	8.02
Crawford,	Total,--	5	0	0	3	0	3	0	0	0	1	0	4	16	
	Rec., --	5	0	0	3	0	1	0	0	0	0	0	4	13	
	Deaths,	0	0	0	0	0	2	0	0	0	1	0	0	3	18.75
Cumberland,	Total,--	3	2	2	3	1	1	1	0	1	0	0	2	16	
	Rec., --	3	2	2	3	0	0	1	0	1	0	0	2	14	
	Deaths,	0	0	0	0	1	1	0	0	0	0	0	0	2	12.5
Dauphin,	Total,-	36	11	8	4	2	4	1	0	11	12	16	37	142	
	Rec., --	35	11	6	3	2	4	1	0	7	11	14	35	129	
	Deaths,	1	0	2	1	0	0	0	0	4	1	2	2	13	9.15
Delaware,	Total,--	14	15	4	2	2	2	0	1	7	11	7	6	71	
	Rec., --	14	13	2	2	2	1	0	1	7	11	7	4	64	
	Deaths,	0	2	2	0	0	1	0	0	0	0	0	2	7	9.85
Elk,	Total,--	15	9	2	3	4	5	3	1	4	7	7	2	62	
	Rec., --	14	8	2	3	4	5	3	1	3	6	7	2	58	
	Deaths,	1	1	0	0	0	0	0	0	1	1	0	0	4	6.45
Erie,	Total,--	9	7	0	0	5	1	0	2	1	9	5	8	47	
	Rec., --	5	6	0	0	5	1	0	2	1	9	5	8	42	
	Deaths,	4	1	0	0	0	0	0	0	0	0	0	0	5	10.63
Fayette,	Total,--	1	1	6	1	1	0	4	3	4	10	7	10	48	
	Rec., --	1	0	6	1	0	0	2	2	4	10	6	10	42	
	Deaths,	0	1	0	0	1	0	2	1	0	0	1	0	6	12.5

TABLE V.—Continued.

County.	Results.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Percentage.
Forest,	Total,--	0	0	0	0	0	0	0	3	0	0	1	0	4	
	Rec., --	0	0	0	0	0	0	0	3	0	0	1	0	4	100
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
Franklin,	Total,--	8	9	0	2	5	0	2	3	4	9	8	4	54	
	Rec., --	8	9	0	2	5	0	2	3	3	9	7	4	52	
	Deaths,	0	0	0	0	0	0	0	0	1	0	1	0	2	3.70
Fulton,	Total,--	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rec., --	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
Greene,	Total,--	2	1	0	0	0	0	0	1	1	1	1	0	7	
	Rec., --	2	1	0	0	0	0	0	1	1	1	1	0	7	100
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
Huntingdon,	Total,--	1	1	1	0	0	1	0	0	2	1	1	0	8	
	Rec., --	1	1	1	0	0	1	0	0	2	1	1	0	8	100
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
Indiana,	Total,--	4	9	1	3	0	5	2	3	6	7	9	7	56	
	Rec., --	4	7	1	3	0	5	2	3	6	6	9	6	52	
	Deaths,	0	2	0	0	0	0	0	0	0	1	0	1	4	7.14
Jefferson,	Total,--	1	2	1	5	1	0	0	2	6	1	8	9	36	
	Rec., --	1	2	1	3	1	0	0	2	5	1	8	8	32	
	Deaths,	0	0	0	2	0	0	0	0	1	0	0	1	4	11.11
Juniata,	Total,--	0	1	0	0	3	2	3	0	3	3	1	1	17	
	Rec., --	0	1	0	0	2	2	3	0	3	3	1	1	16	
	Deaths,	0	0	0	0	1	0	0	0	0	0	0	0	1	5.88
Lackawanna,	Total,--	117	105	41	51	38	36	32	57	49	92	101	69	788	
	Rec., --	112	97	35	44	33	30	32	52	42	81	93	65	716	
	Deaths,	5	8	6	7	5	6	0	5	7	11	8	4	72	9.13
Lancaster,	Total,--	8	3	2	4	2	5	1	1	1	3	4	6	40	
	Rec., --	7	3	2	3	1	5	1	1	1	3	3	4	34	
	Deaths,	1	0	0	1	1	0	0	0	0	0	1	2	6	15.
Lawrence,	Total,--	6	7	7	3	5	0	1	1	3	10	12	8	63	
	Rec., --	6	7	7	1	5	0	1	1	3	10	12	8	61	
	Deaths,	0	0	0	2	0	0	0	0	0	0	0	0	2	3.17
Lebanon,	Total,--	7	7	5	1	0	3	1	3	2	6	1	1	37	
	Rec., --	6	7	4	1	0	3	1	2	2	5	1	1	33	
	Deaths,	1	0	1	0	0	0	0	1	0	1	0	0	4	10.81

TABLE V.—Continued.

County.	Results.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Percentage.
Lehigh,	Total,.	38	33	18	17	18	16	9	14	24	39	79	37	342	
	Rec.,	37	31	15	17	16	13	8	13	18	34	73	34	309	
	Deaths,	1	2	3	0	2	3	1	1	6	5	6	3	33	9.64
Luzerne,	Total,.	131	60	36	43	32	36	42	47	82	112	111	112	844	
	Rec.,	127	56	34	38	26	30	33	45	69	101	103	101	763	
	Deaths,	4	4	2	5	6	6	9	2	13	11	8	11	81	9.59
Lycoming,	Total,.	16	13	20	8	6	9	8	10	9	33	13	14	159	
	Rec.,	16	13	18	8	6	7	8	9	9	33	11	13	151	
	Deaths,	0	0	2	0	0	2	0	1	0	0	2	1	8	5.03
McKean,	Total,.	1	1	1	1	1	0	1	0	2	3	7	1	19	
	Rec.,	1	1	1	1	1	0	1	0	2	2	5	1	16	
	Deaths,	0	0	0	0	0	0	0	0	0	1	2	0	3	15.78
Mercer,	Total,.	10	9	2	1	0	0	3	2	1	3	0	1	32	
	Rec.,	10	9	2	1	0	0	3	2	1	3	0	1	32	100
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
Mifflin,	Total,.	8	2	0	0	1	1	10	24	36	34	20	11	147	
	Rec.,	8	2	0	0	1	1	10	23	36	34	20	9	144	
	Deaths,	0	0	0	0	0	0	0	1	0	0	0	2	3	2.04
Monroe,	Total,.	3	1	1	1	0	0	1	2	5	1	1	0	16	
	Rec.,	2	1	1	1	0	0	0	0	5	1	1	0	12	
	Deaths,	1	0	0	0	0	0	1	2	0	0	0	0	4	25.
Montgomery,	Total,.	23	23	9	7	15	6	15	9	15	7	11	17	157	
	Rec.,	22	22	9	5	13	6	13	9	12	7	11	16	145	
	Deaths,	1	1	0	2	2	0	2	0	3	0	0	1	12	7.64
Montour,	Total,.	1	0	0	2	2	0	1	2	0	1	3	3	15	
	Rec.,	1	0	0	2	2	0	1	2	0	1	1	3	13	
	Deaths,	0	0	0	0	0	0	0	0	0	0	2	0	2	13.33
Northampton,	Total,.	23	9	16	7	8	3	3	4	6	4	16	20	119	
	Rec.,	23	7	16	6	7	3	1	1	6	3	12	19	104	
	Deaths,	0	2	0	1	1	0	2	3	0	1	4	1	15	12.60
Northumberland,	Total,.	19	20	2	5	8	2	2	4	7	14	13	23	119	
	Rec.,	16	16	2	5	7	2	2	3	7	10	11	19	100	
	Deaths,	3	4	0	0	1	0	0	1	0	4	2	4	19	15.96
Perry,	Total,.	1	3	1	2	1	1	0	0	0	0	0	1	10	
	Rec.,	1	3	1	2	1	1	0	0	0	0	0	1	10	100
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	1	10	

TABLE V.—Continued.

County.	Results.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	Percentage.
Pike,	Total,--	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rec., --	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
Potter,	Total,--	0	0	0	0	0	0	0	1	0	0	0	0	1	
	Rec., --	0	0	0	0	0	0	0	1	0	0	0	0	1	100
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
Schuylkill,	Total,--	54	46	15	4	12	15	11	16	33	72	58	59	395	
	Rec., --	49	43	14	2	11	15	10	15	31	70	53	52	365	
	Deaths,	5	3	1	2	1	0	1	1	2	2	5	7	30	7.59
Snyder,	Total,--	4	2	0	0	1	0	0	0	0	0	1	6	14	
	Rec., --	4	2	0	0	1	0	0	0	0	0	1	6	14	100
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
Somerset,	Total,--	8	13	5	4	3	2	8	2	9	6	16	11	87	
	Rec., --	7	13	4	4	3	2	7	2	8	6	14	11	81	
	Deaths,	1	0	1	0	0	0	1	0	1	0	2	0	6	6.89
Sullivan,	Total,--	8	3	1	3	4	0	1	6	9	1	1	1	38	
	Rec., --	8	3	1	2	3	0	1	5	9	1	1	0	34	
	Deaths,	0	0	0	1	1	0	0	1	0	0	0	1	4	10.52
Susquehanna,	Total,--	1	0	0	0	0	2	0	0	0	8	1	0	12	
	Rec., --	1	0	0	0	0	1	0	0	0	7	1	0	10	
	Deaths,	0	0	0	0	0	1	0	0	0	1	0	0	2	16.66
Tioga,	Total,--	1	2	0	0	0	0	0	0	4	2	2	1	12	
	Rec., --	1	2	0	0	0	0	0	0	2	2	2	1	10	
	Deaths,	0	0	0	0	0	0	0	0	2	0	0	0	2	16.66
Union,	Total,--	1	0	3	0	0	1	0	1	0	2	1	1	10	
	Rec., --	1	0	3	0	0	1	0	1	0	2	1	1	10	100
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
Venango,	Total,--	2	2	1	0	0	0	0	0	1	1	0	0	7	
	Rec., --	2	2	1	0	0	0	0	0	1	1	0	0	7	100
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
Warren,	Total,--	1	1	0	0	0	2	0	0	0	0	0	2	6	
	Rec., --	1	1	0	0	0	1	0	0	0	0	0	1	4	
	Deaths,	0	0	0	0	0	1	0	0	0	0	0	1	2	33.33
Washington,	Total,--	10	7	7	4	1	5	2	1	19	6	10	6	78	
	Rec., --	8	7	7	2	1	5	2	1	14	5	10	5	67	
	Deaths,	2	0	0	2	0	0	0	0	5	1	0	1	11	14.10

TABLE V.—Continued.

County.	Results.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sep.	Oct.	Nov.	Dec.	Total.	Percentage.
Wayne,	Total,--	9	12	6	4	0	7	4	1	4	7	9	1	64	
	Rec., --	9	12	6	4	0	7	4	1	4	7	7	1	62	
	Deaths,	0	0	0	0	0	0	0	0	0	0	2	0	2	3.12
Westmoreland,	Total,--	25	18	15	15	11	11	6	11	29	53	44	33	271	
	Rec., --	24	16	12	14	10	10	5	8	27	51	42	32	251	
	Deaths,	1	2	3	1	1	1	1	3	2	2	2	1	20	7.38
Wyoming,	Total,--	3	4	3	4	0	1	0	0	1	7	7	4	34	
	Rec., --	3	4	3	4	0	1	0	0	1	7	7	4	34	100
	Deaths,	0	0	0	0	0	0	0	0	0	0	0	0	0	
York,	Total,--	11	8	8	8	3	4	2	2	8	5	13	9	81	
	Rec., --	10	7	8	7	1	4	2	1	8	4	13	8	73	
	Deaths,	1	1	0	1	2	0	0	1	0	1	0	1	8	9.87
Total recoveries,--														5,794	
Total deaths,														542	8.55

TABLE VI.

Antitoxin Treatment of Diphtheria, 1908.

Initial Dose, 3,000 Units.

Result of Treatment of Diphtheria with Antitoxin According to Number of Units Used and Period of Treatment after Onset of Disease.

Number of Units Used.	Results.	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.
1,000,	Total,------	87	15	5	1	2	0	2	0
	Rec., ------	83	13	4	1	2	0	2	0
	Deaths, ----	4	2	1	0	0	0	0	0
1,200,	Total,------	0	1	0	0	0	0	0	0
	Rec., ------	0	0	0	0	0	0	0	0
	Deaths, ----	0	1	0	0	0	0	0	0
1,500,	Total,------	3	0	0	0	0	0	0	0
	Rec., ------	3	0	0	0	0	0	0	0
	Deaths, ----	0	0	0	0	0	0	0	0

TABLE VI.—Continued.

Number of Units Used.	Results.	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.
2,000,	Total,	68	15	8	3	2	0	1	0
	Rec.,	65	13	7	2	2	0	0	0
	Deaths,	3	2	1	1	0	0	1	0
3,000,	Total,	2,019	668	215	66	49	7	19	17
	Rec.,	1,937	635	196	55	38	6	17	13
	Deaths,	82	33	19	11	11	1	2	4
4,000,	Total,	116	47	22	5	1	1	2	0
	Rec.,	109	41	18	4	1	0	2	0
	Deaths,	7	6	4	1	0	1	0	0
4,500,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
5,000,	Total,	47	25	14	2	1	0	2	0
	Rec.,	42	21	11	2	0	0	2	0
	Deaths,	5	4	3	0	1	0	0	0
6,000,	Total,	922	394	143	41	15	6	6	4
	Rec.,	862	357	118	29	11	3	4	3
	Deaths,	60	37	25	12	4	3	2	1
7,000,	Total,	48	10	6	1	1	1	0	0
	Rec.,	45	9	4	0	1	1	0	0
	Deaths,	3	1	2	1	0	0	0	0
7,500,	Total,	0	0	1	0	0	0	0	0
	Rec.,	0	0	1	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
8,000,	Total,	27	24	6	1	0	0	0	0
	Rec.,	23	22	3	1	0	0	0	0
	Deaths,	4	2	3	0	0	0	0	0
9,000,	Total,	264	99	47	11	12	3	4	2
	Rec.,	232	91	39	10	8	3	3	1
	Deaths,	32	8	8	1	4	0	1	1
10,000,	Total,	28	13	5	3	1	0	0	0
	Rec.,	25	12	5	3	1	0	0	0
	Deaths,	3	1	0	0	0	0	0	0
10,500,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0

TABLE VI.—Continued.

Number of Units Used.	Results.	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.
11,000,	Total,	11	9	0	2	0	0	0	0
	Rec.,	10	7	0	2	0	0	0	0
	Deaths,	1	2	0	0	0	0	0	0
12,000,	Total,	141	57	33	12	7	3	1	0
	Rec.,	116	52	29	7	3	1	1	0
	Deaths,	25	5	4	5	4	2	0	0
12,500,	Total,	0	0	0	1	0	0	0	0
	Rec.,	0	0	0	1	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
13,000,	Total,	9	6	2	0	0	0	1	0
	Rec.,	8	5	2	0	0	0	0	0
	Deaths,	1	1	0	0	0	0	1	0
14,000,	Total,	13	1	2	0	0	1	0	0
	Rec.,	12	1	1	0	0	1	0	0
	Deaths,	1	0	1	0	0	0	0	0
15,000,	Total,	59	33	9	3	3	0	0	1
	Rec.,	49	31	8	3	1	0	0	0
	Deaths,	10	2	1	0	2	0	0	1
16,000,	Total,	10	1	0	3	0	0	0	0
	Rec.,	9	1	0	1	0	0	0	0
	Deaths,	1	0	0	2	0	0	0	0
17,000,	Total,	5	1	3	2	0	0	0	0
	Rec.,	3	1	2	1	0	0	0	0
	Deaths,	2	0	1	1	0	0	0	0
18,000,	Total,	27	20	4	2	1	0	1	0
	Rec.,	25	17	4	1	1	0	1	0
	Deaths,	2	3	0	1	0	0	0	0
19,000,	Total,	5	1	0	1	0	0	0	0
	Rec.,	4	1	0	1	0	0	0	0
	Deaths,	1	0	0	0	0	0	0	0
20,000,	Total,	4	0	1	0	0	0	0	0
	Rec.,	2	0	1	0	0	0	0	0
	Deaths,	2	0	0	0	0	0	0	0
21,000,	Total,	19	4	4	2	3	0	1	0
	Rec.,	18	3	3	1	2	0	1	0
	Deaths,	1	1	1	1	1	0	0	0

TABLE VI.—Continued.

Number of Units Used.	Results.	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.
22,000,	Total,	5	1	0	0	0	0	0	0
	Rec.,	3	1	0	0	0	0	0	0
	Deaths,	2	0	0	0	0	0	0	0
23,000,	Total,	3	2	0	1	0	0	0	0
	Rec.,	2	2	0	0	0	0	0	0
	Deaths,	1	0	0	1	0	0	0	0
24,000,	Total,	13	3	3	0	3	0	0	0
	Rec.,	9	1	2	0	3	0	0	0
	Deaths,	4	2	1	0	0	0	0	0
25,000,	Total,	1	1	0	0	0	0	0	0
	Rec.,	1	1	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
26,000,	Total,	2	0	0	0	0	0	0	0
	Rec.,	2	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
27,000,	Total,	5	3	1	0	0	0	1	1
	Rec.,	3	1	1	0	0	0	0	1
	Deaths,	2	2	0	0	0	0	1	0
28,000,	Total,	4	0	0	0	0	0	0	0
	Rec.,	3	0	0	0	0	0	0	0
	Deaths,	1	0	0	0	0	0	0	0
29,000,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
30,000,	Total,	1	0	1	0	0	0	0	0
	Rec.,	1	0	1	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
31,500,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
32,000,	Total,	2	3	1	0	0	0	0	0
	Rec.,	2	2	1	0	0	0	0	0
	Deaths,	0	1	0	0	0	0	0	0
33,000,	Total,	2	4	0	0	0	0	0	0
	Rec.,	2	4	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0

TABLE VI.—Continued.

Number of Units Used.	Results.	1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day and over.
34,000,	Total,	0	0	0	0	1	0	0	0
	Rec.,	0	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	1	0	0	0
35,000,	Total,	0	0	1	0	0	0	0	0
	Rec.,	0	0	0	0	0	0	0	0
	Deaths,	0	0	1	0	0	0	0	0
36,000,	Total,	0	2	1	0	0	0	0	0
	Rec.,	0	2	0	0	0	0	0	0
	Deaths,	0	0	1	0	0	0	0	0
42,000,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
43,000,	Total,	0	0	2	0	0	0	0	0
	Rec.,	0	0	1	0	0	0	0	0
	Deaths,	0	0	1	0	0	0	0	0
52,000,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
57,000,	Total,	0	1	0	0	0	0	0	0
	Rec.,	0	1	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
63,000,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
68,000,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0
117,000,	Total,	1	0	0	0	0	0	0	0
	Rec.,	1	0	0	0	0	0	0	0
	Deaths,	0	0	0	0	0	0	0	0

TABLE VII.

Antitoxin Treatment of Diphtheria, 1908.

Initial Dose, 3,000 Units.

Statement Showing Cases Where Subsequent Treatment with Antitoxin were Used After First Twenty-four Hours.

Results.	Number of Cases.	Units Used.	Results.	Number of Cases.	Units Used.
Total,	25		Total,	113	
Rec.,	22	1,000	Rec.,	93	12,000
Deaths,	3		Deaths,	20	
Total,	29		Total,	9	
Rec.,	24	2,000	Rec.,	7	13,000
Deaths,	5		Deaths,	2	
Total,	1,041		Total,	4	
Rec.,	960	3,000	Rec.,	3	14,000
Deaths,	81		Deaths,	1	
Total,	78		Total,	49	
Rec.,	66	4,000	Rec.,	43	15,000
Deaths,	12		Deaths,	6	
Total,	44		Total,	4	
Rec.,	36	5,000	Rec.,	2	16,000
Deaths,	8		Deaths,	2	
Total,	609		Total,	6	
Rec.,	525	6,000	Rec.,	4	17,000
Deaths,	84		Deaths,	2	
Total,	19		Total,	28	
Rec.,	15	7,000	Rec.,	24	18,000
Deaths,	4		Deaths,	4	
Total,	31		Total,	2	
Rec.,	26	8,000	Rec.,	2	19,000
Deaths,	5		Deaths,	0	
Total,	178		Total,	1	
Rec.,	155	9,000	Rec.,	1	20,000
Deaths,	23		Deaths,	0	
Total,	22		Total,	14	
Rec.,	21	10,000	Rec.,	10	21,000
Deaths,	1		Deaths,	4	
Total,	11		Total,	1	
Rec.,	9	11,000	Rec.,	1	22,000
Deaths,	2		Deaths,	0	

TABLE VII.—Continued.

Results.	Number of Cases.	Units Used.	Results.	Number of Cases.	Units Used.
Total,	3		Total,	1	
Rec.,	2	23,000	Rec.,	1	30,000
Deaths,	1		Deaths,	0	
Total,	9		Total,	3	
Rec.,	6	24,000	Rec.,	3	32,000
Deaths,	3		Deaths,	0	
Total,	1		Total,	4	
Rec.,	1	25,000	Rec.,	4	33,000
Deaths,	0		Deaths,	0	
Total,	6				
Rec.,	3	27,000			
Deaths,	3				

IMMUNIZATION TREATMENT FOR THE YEAR 1908.

In addition to the curative treatment of Diphtheria for which Antitoxin is furnished free by the State to the indigent, the Department of Health also furnishes free for use in preventing the spread of diphtheria what is known as an immunizing dose of Antitoxin, 1,000 units in strength, with which physicians are instructed to immunize all those in the household where the true case of diphtheria is found as well as all those outside of the house who may have come in contact with the patient.

Physicians are also requested and they agree when receipting for the Antitoxin from the Distributor, to furnish the Department with a clinical report for all persons immunized as well as for all those treated for cure, and the clinical reports received in which Antitoxin furnished by the State had been used, for the purpose of the immunization of persons who had been exposed to diphtheria from January 1st to December 31, 1908, show that three thousand nine hundred and sixty-five (3,965) persons had been immunized, of which number but 45 were reported as having contracted the disease at some time within twenty-one days after they had been immunized.

If physicians would follow instructions in regard to immunizing all those in the immediate vicinity of the patient at once, it would go far toward stopping the spread of the disease, if not altogether eliminating the chances of an epidemic.

For results in detail of the treatment for immunization during the year 1908, the following Table is presented:

TABLE VIII.

Showing the Results of Treatment for Immunization, 1908.

Number Treated for Immunization.	Units used.	Number not developing diphtheria.	Number developing diphtheria.	Recoveries.	Deaths.
1,	200	1	0	0	0
1,	300	1	0	0	0
126,	500	126	0	0	0
5,	750	5	0	0	0
3,507,	1,000	3,463	44	37	7
67,	1,500	67	0	0	0
60,	2,000	60	0	0	0
170,	3,000	169	1	0	1
16,	4,000	16	0	0	0
5,	5,000	5	0	0	0
5,	6,000	5	0	0	0
1,	7,000	1	0	0	0
1,	10,000	1	0	0	0

The following statement giving the number of syringes of Diphtheria Antitoxin supplied to Distributors during the three months of 1905 and during each month for the years 1906-1907 and 1908 shows a steadily increasing demand for the use of this life-saving agent in the treatment of diphtheria among the poor and also reveals the fact that from October, 1905, to December 31, 1908, there was supplied to Distributors of Antitoxin located in every county in the State, 19,562 packages of 1,000 units, or immunizing doses of Antitoxin; 30,762 packages of 3,000 units and 115 packages of 5,000 units, or curative doses of Antitoxin.

NUMBER OF SYRINGES OF ANTITOXIN SUPPLIED TO DISTRIBUTORS BY MONTHS FROM OCTOBER, 1905, TO DECEMBER, 1908.

	1905.		1906.		1907.		1908.		
	1,000 units.	3,000 units.	1,000 units.	3,000 units.	1,000 units.	3,000 units.	1,000 units.	3,000 units.	5,000 units.
January,	.....	.....	314	503	400	809	467	807	.....
February,	.....	.....	256	394	269	547	401	861	.....
March,	.....	.....	289	455	327	648	380	734	.....
April,	.....	.....	285	476	316	641	503	752	.....
May,	.....	.....	148	295	282	468	437	541	.....
June,	.....	.....	118	243	221	433	515	811	.....
July,	.....	.....	156	314	363	535	448	605	.....
August,	.....	.....	143	336	526	824	590	614	50
September,	.....	.....	564	768	347	702	484	920	5
October,	64	59	1,016	1,408	648	784	917	1,504	20
November,	2,517	2,488	824	1,271	670	1,297	725	1,534	20
December,	377	462	525	1,007	804	1,293	826	1,619	20
Total,	2,958	3,009	4,638	7,470	5,173	8,981	6,793	11,302	115

GRAND TOTAL.

	1,000 units.	3,000 units.	5,000 units.
1905,	2,958	3,009	.....
1906,	4,638	7,470	.....
1907,	5,173	8,981	.....
1908,	6,793	11,302	115
Total,	19,562	30,762	115

The following statements show the number of packages of 1,000, 3,000 and 5,000 units of Diphtheria Antitoxin supplied, as well as dispensed by Distributors, located throughout the entire State of

Pennsylvania, each month during the year 1908 and also reveals the fact that the demand for and use of Antitoxin for the treatment of diphtheria among the poor is steadily increasing every year.

ANTITOXIN SUPPLIED.

1908.

	1,000 units.	3,000 units.	5,000 units.
January,	467	807	
February,	401	861	
March,	380	734	
April,	503	752	
May,	437	541	
June,	515	811	
July,	448	605	
August,	590	614	50
September,	484	920	5
October,	917	1,504	20
November,	725	1,534	20
December,	826	1,619	20
Total,	6,793	11,302	115

ANTITOXIN DISPENSED.

1908.

	1,000 units.	3,000 units.	5,000 units.
January,	427	806	
February,	403	822	
March,	189	439	
April,	127	369	
May,	257	527	
June,	192	488	
July,	230	344	
August,	213	367	
September,	497	847	18
October,	603	1,234	14
November,	579	1,346	17
December,	609	1,251	12
Total,	4,326	8,840	61

The following statements by years give a concise summary of the whole number of cases treated; number of deaths; percentage of deaths; number immunized; number immunized and later contracting the disease; the number of syringes, 1,000 units, 3,000 and 5,000 units of Antitoxin supplied to and dispensed by Distributors and total cost for each year; and the General Summary for the years 1905, 1906, 1907 and 1908 giving the totals of each item since the Depart-

ment of Health began distributing Antitoxin for the treatment of diphtheria among the poor, in October, 1905, until December 31, 1908, just three years and three months, reveals the fact that out of a grand total of 15,429 cases treated for cure, but 1,349 resulted fatally, or a death rate of only 8.74 per cent. and in addition to the number treated for cure 10,253 persons mostly little children who were exposed to the disease were immunized and of the above mentioned number of persons so immunized only 161 contracted Diphtheria, and of those who contracted the disease, only thirteen died.

The total cost of Antitoxin used in the treatment of the 15,429 cases for cure and the 10,253 cases that were immunized or a grand total of 25,682 cases treated from October, 1905, to December 31, 1908, was $54,887.65, or about $2.13 per capita.

SUMMARY.

1905.

Number of cases cured during October, November and December, 1905,	255
Number of deaths,	38
Total number treated,	293
Percentage of deaths,	12.98
Number immunized,	155
Number immunized and later contracting the disease,	5
Number of syringes, 1,000 units, dispensed by distributors,	327
Number of syringes, 3,000 units, dispensed by distributors,	619
Total cost (including "Initial Supply") which cost $6,199.73,	$7,251.80

1906.

Number of cases cured from January 1st to December 31, 1906,	3,136
Number of deaths,	393
Total number treated,	3,529
Percentage of deaths,	11.12
Number immunized,	2,334
Number immunized and later contracting the disease, (total),	77
Number immunized and later contracting the disease (recovered),	74
Number immunized and later contracting the disease (deaths),	3
Number of syringes, 1,000 units, dispensed by distributors,	3,725
Number of syringes, 3,000 units, dispensed by distributors,	6,564
Total cost,	$16,192.32

1907.

Number of cases from January 1 to December 31, 1907,	4,985
Number of deaths,	376
Total number treated,	5,271
Percentage of deaths,	7.13
Number immunized,	3,799
Number immunized and later contracting the disease (total),	34

Number immunized and later contracting the disease (recovered), ...	32
Number immunized and later contracting the disease (deaths), ...	2
Number of syringes, 1,000 units, dispensed by distributors, ...	3,431
Number of syringes, 3,000 units, dispensed by distributors, ...	6,931
Total cost, ...	$17,387.13

1908.

Number of cases cured from January 1 to December 31, 1908, ...	5,794
Number of deaths, ...	542
Total number treated, ...	6,336
Percentage of deaths, ...	8.55
Number immunized, ...	3,965
Number immunized and later contracting the disease (total), ...	45
Number immunized and later contracting the disease (recovered), ...	37
Number immunized and later contracting the disease (deaths), ...	8
Number of syringes, 1,000 units, dispensed by distributors, ...	4,326
Number of syringes, 3,000 units, dispensed by distributors, ...	8,840
Number of syringes, 5,000 units, dispensed by distributors, ...	61
Total cost, ...	$14,056.40

GENERAL SUMMARY.

1905, 1906, 1907, 1908.

Number of cases cured from October, 1905, to December 31, 1908, ..	14,080
Number of deaths, ...	1,349
Total number treated, ...	15,429
Percentage of deaths, ...	8.74
Number immunized, ...	10,253
Number immunized and later contracting the disease (total), ...	161
Number immunized and later contracting the disease (recovered), ...	148
Number immunized and later contracting the disease (deaths), ...	13
Number of syringes, 1,000 units, dispensed by distributors, ...	11,819
Number of syringes, 3,000 units, dispensed by distributors, ...	22,954
Number of syringes, 5,000 units, dispensed by distributors, ...	61
Total cost, ...	$54,887.65

THE DISTRIBUTION OF VACCINE AND VACCINE SUPPLIES.

The free distribution of Vaccine and Vaccine supplies is made by the Department of Health through the Division of Distribution of Biological Products only to second-class townships and only to those people therein who are too poor to purchase the same, where no Boards of Health exist, also to boroughs just organized and to charitable institutions in Pennsylvania not receiving appropriations

from the State, at the request of physicians located in any county in the State—excepting Philadelphia county—upon the recommendation of the County Medical Inspectors.

Under the urgency of a serious epidemic, however, the stringency of this rule may be relaxed; the safety of the people being of vastly more importance than economy in administration.

During the year 1908 smallpox was found in thirty-four different localities throughout the entire State, viz:

Pittsburg, Allegheny Co.; Freedom, Beaver Co.; Sayre, Bradford Co.; Centre township, Keenan, Butler, Eau Claire, Bessemer Coal Mines, Venango township, Butler Co.; Croyl township and South Fork, Cambria Co.; Coatesville, Chester Co.; Meadville, Linesville Boro and Conneaut township, Crawford Co.; Mechanicsburg, Enola, New Kingston, West Fairview, Carlisle, Cumberland Co.; Harrisburg, Halifax, Dauphin Co.; Summit township, Erie Co.; Mt. Union, Huntingdon Co.; McCalmont township, Jefferson Co.; North Annville, Lebanon Co.; New Smithville, Weisenberg township, Lehigh Co.; Gracedale and Mt. Top, Luzerne Co.; Lower Merion, Montgomery Co.; Philadelphia, Philadelphia Co.; Glade township and Sheffield, Warren Co.

Only 770 Glycerinized Vaccine Points and 390 tubes of Vaccine Lymph for use in the vaccination of persons exposed to smallpox were supplied upon requisition through the proper channels in twelve different localities, the entire cost for furnishing same being only $45.23.

The following statement shows the number of cases of Smallpox occurring throughout the State of Pennsylvania during the year 1906, 1907 and 1908, by the months.

	1906.	1907	1908.
January,	10	7	2
February,	9	4	2
March,	4	9	9
April,	12	7	9
May,	19	3	1
June,	7	6	2
July,	7	14	1
August,	3	4	3
September,	0	1	11
October,	0	2	13
November,	9	1	13
December,	0	4	11
Total,	80	62	77

SANATORIA AND DISPENSARIES FOR THE TREATMENT OF TUBERCULOSIS.

South Mountain Sanatorium: FREDERICK C. JOHNSON, M. D., *Medical Director.*

Dispensaries: THOMAS H. A. STITES, M. D., *Medical Inspector of Dispensaries.*

PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM FOR TUBERCULOSIS.

Report for the Year Ending May 31, 1909.

MEDICAL AND NURSING STAFF AND EMPLOYES.

Dr. Fred C. Johnson, Medical Director, McKean County.
Dr. B. S. Putts, Associate Medical Director, Allegheny County.

PHYSICIANS.

Dr. A. M. Rothrock, Chester County.
Dr. J. W. MacMullen, Dauphin County.
Dr. J. Edward Nickel, Dauphin County.
Dr. H. H. Thomsen, Philadelphia County.
Dr. F. C. Hyatt, Philadelphia County.
Dr. H. P. Lynch, Dauphin County.
Dr. J. P. Marshall, Berks County.
Dr. H. C. Lacy, Berks County.
Dr. W. G. Marks, Philadelphia County.
Dr. Benjamin F. Robinson, Philadelphia County.
Dr. Carl Koenig, Allegheny County.
Dr. George H. Fox, Bacteriologist, Dauphin County.

STENOGRAPHERS.

Martha O. Adams, Dauphin County.
Caroline B. Haifleigh, Dauphin County.
L. Walter Garrett, Clerk, Chester County.

MATRONS.

Miss Maud Emery, Clinton County.
Mrs. Annie M. Klee, Franklin County.
Mrs. Annie Yeager, Assistant Matron, Franklin County.

NURSES.

Addah Strouse, Head Nurse, Philadelphia County.
Myra E. Preble, Franklin County.
Catherine Cadden, Luzerne County.
Selina Wilder, Philadelphia County.
Mary E. Lyons, Philadelphia County.
Rachiel Ross, Philadelphia County.
Mary Clark, Sullivan County.
Gertrude Snyder, Northampton County.
Edith Keister, Dauphin County.
Mathielde Bayer, Philadelphia County.
Mary Ekhart, Philadelphia County.
Florence Laskowski, Philadelphia County.
Elenore O. Risso, Philadelphia County.
Agnes Martin, Lackawanna County.
Lottie Reynolds, Franklin County.
Elizabeth McMahon, Lycoming County.
Alice McKernen, Philadelphia County.
Sarah Zimmerman, Philadelphia County.
A. Irene Ramage, Philadelphia County.
Helen Gimmell, Philadelphia County.
Tusanna Walker, Northampton County.
Emma Ibbetson, Philadelphia County.
Alice Pilkington, Philadelphia County.
Carrie Epley, Cumberland County.
Myrtle Cook, Dauphin County.
Eleanore Lehman, Dauphin County.
14 Orderlies.
7 Ward Maids.

DINING ROOM.

Catherine Strine, Cook, Dauphin County.
Mrs. Mary Souder, Assistant Cook, Dauphin County.
3 Waitresses.
3 Chambermaids.

SEAMSTRESSES.

Julia Boyle, Dauphin County.
Josie Garber, Lancaster County.

MAIN DINING ROOM BUILDING.

Charley Hutz, Chef, Franklin County.
Elizabeth Rosenberger, Assistant Chef, Franklin County.
36 Waitresses.
14 Maids and Helpers.

MISCELLANEOUS.

Wilson Reynolds, Superintendent, Franklin County.
Louis Sorg, Steward, Philadelphia County.
J. T. Staley, General Foreman, Franklin County.
George Naugle, General Foreman, Franklin County.
C. R. Forbes, Resident Engineer, Lancaster County.
George C. Metzgar, Storekeeper, Philadelphia County.
George Thompson, Assistant Storekeeper, Philadelphia County.
Arthur Yeager, Master Mechanic, Franklin County.
J. N. Reed, Foreman over Foreigners, Franklin County.
Nelson Anderson, Special Officer, Lancaster County.
Leo Pavlick, Special Officer, Philadelphia County.
Clarence W. Durr, Night Watchman, York County.
J. Wesley Dix, Night Watchman, Philadelphia County.
Charles H. Hill, Fireman-Carpenter, Dauphin County.
George A. Staley, Fireman, Adams County.
James Daywalt, Fireman, Adams County.
Samuel Staley, Fireman, Franklin County.
Maurice Lightner, Fireman, Adams County.
Ben Carbaugh, Caretaker of Filter Plant, Franklin County.
Daniel Staley, Pump Runner, Franklin County.
Harry Baker, Traction Engine Runner, Franklin County.
H. S. Hay, Laundryman, Northampton County.
Levi Wagaman, Poultryman, Franklin County.
Charles Marceline, Chef, Philadelphia County.

INFIRMARY.

William Beitzel, Chef, Philadelphia County.
Daniel Fegler, Assistant Chef, Berks County.
3 Kitchen Helpers.
7 Waitresses.
1 Chambermaid.

REPORT.

At the beginning of the year, June 1, 1908, there were one hundred and thirty-three (133) patients under treatment, of whom eighty (80) were males and fifty-three (53) females.

During the year, seven hundred and twenty (720) males and three hundred and sixty-nine (369) females, a total of one thousand and eighty-nine (1,089) patients were treated, while five hundred and

eighty-nine (589) were discharged, four hundred and seven (407) males and one hundred and eighty-two (182) females, of whom thirty-four (34) died, twenty-six (26) males and eight (8) females.

On June 1, 1909, there were remaining in the Sanatorium five hundred (500) patients, of whom three hundred and thirteen (313) were males and one hundred and eighty-seven (187) females. Of these, three hundred and fifty-six (356) were under treatment in the Incipient Camp and one hundred and forty-four (144) in the Infirmary Wards.

There were one thousand seven hundred and forty-nine (1,749) applications for admission, of whom nine hundred and fifty-six (956) were admitted, one hundred and seventy-five (175) refused to come, four hundred and ninety-two (492) failed to reply to admission notices, forty-one (41) had died, and twenty-five (25) were too ill to travel. Sixty (60) were children under fourteen years of age, whose moral, mental and physical welfare demands more care and surveillance than is possible to give them under the cottage plan of treatment. The completion of the Children's Hospital will, therefore, greatly enhance the usefulness of the Institution.

Over 38 per cent. of cases treated were from Philadelphia and Allegheny Counties.

The exactions with regard to admission have insured a majority of native born patients (78.14 per cent.).

Of the balance, 6.61 per cent. were from Russia; 2.75 per cent. were from Ireland; 2.02 per cent. were from Germany; 1.95 per cent. were from England; 1.74 per cent. were from Italy; 1.65 per cent. were from Austria.

Our statistics bear out the statement that Tuberculosis is a disease of early adult life, as 66.39 per cent. of patients treated during the year were not over thirty years of age. Of these, 62.51 per cent. were males.

The occupations of applicants have been varied, but evidence the fact that Tuberculosis claims more victims among those following indoor occupations.

The completion and equipment of the Infirmary Building early in February added one hundred and forty-four (144) cases to our constantly increasing population. Cases admitted to these wards have not all proven hopeless, as many with the disease active have later improved sufficiently under rest in bed and proper diet to be transferred to the Incipient Camp. Prior to the opening of the Infirmary Wards, cases wearied by a tedious journey were of necessity segregated in cottages near the dining-room and cared for under great disadvantages. At present, all cases are given a preliminary examination at the Infirmary, and, if necessary, retained there until physically able to take up the life and environment of the Incipient Camp.

Of the incipient cases discharged, sixty-seven (67) in number, thirty-four (34) were arrested, twenty-eight (28) improved and five (5) left unimproved.

Our patients generally are unwilling to remain in the Institution after active signs of the disease have disappeared. The majority of them are wage-earners and of necessity compelled to leave the Sanatorium and resume employment as soon as they have regained sufficient strength to do so. It seems a justifiable assertion, therefore, that the majority of these cases, were they able to continue treatment at the Sanatorium, could be discharged as arrested cases and subsequently go on to cure under favorable conditions.

This, in part, is true of the moderately advanced class discharged, two hundred and fifty-two (252) cases, of whom fifty-nine (59) were arrested, one hundred and thirty-nine (139) improved and fifty (50) unimproved, while four (4) died.

Of the far advanced class discharged, two hundred and seventy (270) cases, thirty-two (32) were arrested, and one hundred and fourteen (114) improved, ninety-four (94) unimproved and thirty (30) died.

Of the incipient class discharged, sixty-seven (67) cases, sixty-two (62) gained in weight, two (2) remained stationary and three (3) lost weight.

Of the moderately advanced class discharged, two hundred and fifty-two (252) cases, two hundred and six (206) gained in weight, thirteen (13) remained stationery and thirty-three (33) lost weight.

Of the far advanced class discharged, two hundred and seventy (270) cases, one hundred and sixty-four (164) gained in weight, twenty-two (22) remained stationary and eighty-four (84) lost weight.

The provision of quarters for the treatment of patients with Tuberculin permits of the selection of proper cases, which has not obtained heretofore, its use being limited to those who requested such treatment, and, unfortunately, of this class the disease has made such progress that entirely satisfactory results could hardly be expected. Of the favorable cases, however, the results have been such that our belief in the permanent immunization of tuberculosis subjects with Tuberculin is strongly confirmed. The benefit that will accrue to that class of patients who so frequently suffer from relapses, following the cessation of Sanatorium treatment, is incalculable. This treatment frequently begun at the State Dispensaries is continued following admission of the patient to the Sanatorium and in turn carried on at the Dispensaries after discharge of the patient from the Institution.

Thus far our work has been confined to the use of Emulsion of Dead Tubercle Bacilli (B. E.) and the Water Extract, prepared after the method of Dixon (Medical News, October 19, 1889). With the con-

tinuance of this work and with the results anticipated among selected cases, we feel sure of being able to make material additions to the literature subsequently.

Besides the specific treatment we have endeavored to keep firmly in mind the objects for which our State has provided this Institution, viz:

First: "Benefit to the individual" whereby he not only regains health but again becomes a support to his family.

Second: Increase of the resources of the Commonwealth.

Third: "Segregation," which removes him as a source of infection while he is returning to health, and in addition provides for the proper care and treatment of incurable cases who are often excluded from other Institutions, and become centers of infection.

Fourth: "Educational Features," which do not stop with instructing the patient how to live and protect others from infection, but often start an endless chain by their exemplary habits.

The basis of treatment may be summarized as nourishing food, rest, fresh air and sunlight.

Medicinal agents are used only for the relief of co-incident symptoms and conditions as they appear.

Impaired digestion is undoubtedly the cause of a great number of failures, for in no other branch of medicine is this vicious sequel of nostrums and quackery more apparent than among sufferers from Pulmonary Tuberculosis.

Exercise and light work, carefully graduated, form a part of the treatment of convalescent patients, both being increased as the condition of the patient permits.

The "Daily Routine" observed by our patients is as follows:

DAILY ROUTINE.

6:30 A. M.	Rising Hour.
7:15 A. M.	Breakfast.
7:30 to 9:30 A. M.	Temperatures and cleaning quarters.
9:30 A. M.	Lunch.
10 to 11:30 A. M.	Rest in pavilions (or exercise)
12:00 M	Dinner.
1:00 to 2:30 P. M.	Rest in reclining position on bed.
2:30 P. M.	Lunch.
3:00 to 4.30 P. M.	Rest in pavilions (or exercise).
5:00 P. M.	Supper.
5:30 P. M.	Distribution of mail.
5:45 P. M.	Temperatures.
7:30 P. M.	Lunch.
8:30 P. M.	Retiring Hour.
9:00 P. M.	Lights out

The completion of the Laboratory Building with its added equipment affords opportunity for more extensive and systematic work than has been possible heretofore.

Our aim has been a monthly examination of sputum, following the examination of both the urine and sputum of all patients on admission.

Examination of the sputum each month of the cases treated has been made with a view to eliminating unfavorable cases of mixed infection.

The record of sputum examinations is as follows:

	Total.	Tubercle bacilli present.	Not found.
June,	381	263	118
July,	412	337	75
August,	346	283	63
September,	159	117	42
October,	394	272	122
November,	157	94	63
December,	244	150	94
January,	139	103	36
February,	142	81	61
March,	372	191	181
April,	279	181	98
May,	100	52	48
Grand total,	3,125	2,124	1,001

Re-examination of the sputum of arrested cases has largely contributed to the results of examinations in which tubercle bacilli were not found.

A study has been made of the sputum with regard to its phagocytic content. While the work has proven interesting, no noteworthy deductions have been elicited.

During the year nineteen hundred and seventy-two (1,972) urine examinations were made and detailed reports filed with the patient's records.

The difficulty of obtaining permission for autopsies has handicapped the verification of clinical symptoms by accurate pathological findings at post mortem. However, special efforts have been made to work up exceptional cases, of which the following was most interesting from the diagnostic point of view:

L. M., a typical, far advanced case, thirty-two (32) years of age, was admitted on November 20, 1908. Duration of the disease probably ten (10) years, although active symptoms began only in the last two (2) years. Upon admission, weighed one hundred and thirty-two

and one-half pounds and general condition fairly good. Physical examination was negative except that the lungs showed marked softening at the right upper and lower lobes and left apex, with signs of cavity at right upper lobe.

During his stay of sixty-two (62) days there was a slight gain in weight without active febrile symptoms. He was making fairly satisfactory progress until about four weeks prior to his death when he suffered from a rather sharp attack of Herpes Zoster. This attack subsided slowly but the patient then began to exhibit further symptoms of spinal disturbance, suggesting incipient tabes, such as girdle pains, poor station, exaggerated knee jerks, with sluggish pupillary reactions. Combined with these symptoms was a slight but definite transitory cerebral excitement. About one week prior to death he became mentally dull and apathetic, followed by a mild wandering delirium with slow pulse and sub-normal temperature until his death on January 21, 1909. An autopsy verified the thoracic clinical signs, while the following report made by Dr. Allen J. Smith, Director of the Department of Health Laboratories, cleared up the symptoms referable to the spinal cord:

"Sections of cord taken from dorsal region show the existence of a marked meningo-myelitis, characterized by a marked diffuse infiltration of the surface of the cord, of the perineural sheaths and the membranes by lymphocytes, and attended by oedema and a minor fibrin deposit in the distended lymph spaces. Endothelial proliferation of many of the blood vessels, almost or quite to obliteration, perivascular collection of lymphocytes, and endothelial formations, and injection of the vessels prevails. In a few isolated miliary foci caseation exists; no definite giant cells noted. The vascular thickening is not of the fibrous type commonly expected of a luetic process, is rather cellular in type from proliferation of the lining endothelium and of the endothelial cells of the perivascular lymph spaces. Special staining shows the presence of tubercle bacilli in small numbers.

From the above points the diagnosis of a tuberculous meningo-myelitis is evident. A lymphocytic collection of small grade exists in the commisure about the central canal; and along many of the small vessels of the cord a slight collection of the same type is to be seen. Alteration of the staining quality, discoloration of the nucleus and loss of shape of multipolar cells is noted occasionally. Most of the cells are apparently normal. The process probably extended along the sheaths of the spinal nerves for some distance from the cord, judging from the grade of changes present in the portions attached. Diagnosis: Tuberculous meningo-myelitis."

The responsibility of preserving the purity of a food product so easily contaminated as milk, in the quantity required, is obviously considerable. Despite frequent examinations of milk and inspections

of the dairy farms from which our supply of milk is derived, four (4) cases of Enteric fever occurred during the month of November. The cases were directly traceable to milk supplied from a dairy farm upon which three (3) ambulant cases of Enteric fever were discovered by members of the Department.

A farm hand first showed symptoms of the disease and was sent to a nearby hospital, where he made a satisfactory recovery. After an incubation period of about sixteen days both the farmer and his wife contracted a very mild but unmistakable type of the disease.

The physician attending the cases was arrested and fined for his neglect to report these cases to the Department of Health.

Of the cases stricken with the disease at the Sanatorium, all were males, quartered in a group of cottages, containing one hundred and sixty (160) patients, of whom four (4) were regarded as suspects, but none of these responded to the Widal test, and recovered promptly without developing any pathognomonic signs of the disease. All of the demonstratable cases were of the same cycle of infection, and it appears probable that the duration of exposure was brief, possibly but one milk delivery acting as the vehicle of infection. All of the patients made uneventful recoveries without the development of any secondary cases.

Of three (3) moderately advanced cases the course of the disease did not appear to be materially influenced by the added infection, while in one far advanced case the patient failed progressively afterward with evidence of increased activity of the disease until his discharge on January 4, 1909.

No other cases of communicable disease occurred in the Institution during the year except one case of Varicella and one of Measles. Both were properly isolated and no further extension of the disease resulted.

On the discharge of patients from the Sanatorium the Dispensaries through which they applied for admission are notified. This permits of continued surveillance over them by the Local Dispensary Authorities and thus reduces to a minimum the relapses that have been only too common among discharged Sanatorium cases heretofore.

Cases traveling to and from the Sanatorium are provided with individual drinking cups and the accessories for the care of sputum, thus preventing many opportunities of infection to the traveling public. Outgoing mail, as well as the effects of discharged and deceased patients, are properly disinfected with formaldhyde gas before leaving the Institution.

Amateur theatricals and the weekly assemblage of patients for games and social intercourse have added much to the contentment of the patients. A large phonograph with many excellent records has also furnished them many enjoyable hours.

A monthly publication, bearing the very appropriate name of "Spunk" has been founded by the patients. It has received many flattering press notices and as a monthly message of good cheer to the afflicted serves to encourage and spur on the struggling patient in his search for health.

Through the generosity of Mrs. Samuel G. Dixon a chapel will be erected on the grounds in memory of her father, John Gilbert. The site has been selected and the architect's plans are nearing completion.

The building will be so arranged that it may be used for worship by all denominations.

Through donations received from time to time the nucleus of a library has been established.

Through the Waynesboro, Shippensburg and Lansdowne Branches of the Needlework Guild of America many deserving patients were furnished with wearing apparel.

Several boxes of clothing have also been received from Mrs. Samuel G. Dixon.

Children's shoes and overshoes were received from the Jerauld Shoe Company of Harrisburg; also a box containing clothing from Messrs. Schwartz Brothers, Johnstown.

I am indebted to and wish to make grateful acknowledgment for the co-operation of the Medical and Nursing Staff, whose arduous and untiring efforts have been with a singleness of purpose that has meant much to the success of the Institution.

During the year the following improvements have been made:

Dining room building, seating five hundred and seventy-six (576) patients. The building affords ample storage facilities in the basement and provides quarters for the help on the second floor.

A modern steam laundry, equipped with washer steam sterilizers and other devices of recent construction.

Infirmary Building and Laboratory, as noted elsewhere.

Acetylene plants have been provided for the lighting of the Infirmary and main dining room buildings.

A concrete mortuary with cold storage facilities for the care of the dead and provisions for post mortem examinations.

Three bath houses, each equipped with showers and provided with a room in which the patient may rest after bathing before going into the open air.

Comfortable, well appointed twin houses of colonial design, have been provided for the Medical Director and the officials.

All the buildings on the grounds, together with the Infirmary Building, have been fitted with fly screens.

An ice pond, covering an area of about 25,000 square feet, together with an icehouse, with a storage capacity sufficient for the needs of the Institution for over two years.

Over two miles of pipe have been laid, connecting our springs to a collecting reservoir with a capacity of 45,000 gallons. Engines and pumps have been installed for use in pumping the water from the collecting reservoir into the storage reservoir, which has a capacity of 300,000 gallons.

At the disposal plant two sand filters, each 40 x 100 feet, and an incinerating plant, consuming 1,500 pounds of garbage daily, have been provided.

Over 1,800 feet of 6-inch sewage pipe have been laid in making sewerage connections to the Infirmary, dining room building, twin houses, bath houses and toilets.

Buildings and screened run-ways for five hundred (500) chickens have been erected.

The alterations on the stable have provided more stalls and a spacious wagon shed, together with suitable quarters for the stable man.

A concrete manure pit has been erected at the stable.

The superstructure is screened from flies and the pit constructed to permit of the draining and collecting of fluid contents for use as a fertilizer on lawns.

At the laundry steam and water jets have been provided for cleansing garbage cans.

A road has been built from the township road to the Infirmary, a distance of 2,450 feet. The road is constructed of crushed stone, and although built in the early months of the year, when weather conditions were most unfavorable, the work has proven most satisfactory and doubtless far better than any road in this vicinity.

Over 4,200 feet of roads and 4,000 feet of walks have been built of crushed stone throughout the Institution enclosures.

The grounds have been almost entirely enclosed with a substantial ribbon wire fence and the posts whitewashed by convalescent patients.

A great deal of work has also been done by the patients in the lower camp that has added very much to its appearance.

The following work is contemplated during the ensuing year:

An additional unit to the incinerating plant, and additional septic tanks at the disposal plant.

A road from the Infirmary to the Incipient Camp via the ice pond; a road from the ice dam to the sewage disposal plant.

Sixty-four (64) cottages for patients.

Nine (9) toilet buildings.

One (1) bath house.

Eight (8) pavilions.

One (1) Dispensary Building.

A Children's Hospital.

Staff dining room and nurses' home.

Addition to patients' dining room.

Addition to laboratory building.

Addition to blacksmith shop.

Additional buildings and run-ways for 500 chickens.

A carpenter shop.

Seeding grounds about the cottages, the planting of shrubbery and hedges throughout the grounds.

Planting and fencing about sixty (60) acres of land on the Monaghan field for farm purposes.

TABLE I.

ADMISSIONS AND DISCHARGES.

	Total.	Male.	Female.
Number of patients in Sanatorium June 1, 1908,	133	80	53
Number of patients admitted to Sanatorium from June 1, 1908, to May 31, 1909,	956	640	316
Number of patients discharged from Sanatorium from June 1, 1908, to May 31, 1909,	589	407	182
Number of patients died in Sanatorium from June 1, 1908, to May 31, 1909,	34	26	8
Number of patients remaining in Sanatorium May 31, 1909,	500	313	187
Total number of patients treated during year,	1,089	720	369

TABLE II.

CLASSIFICATION OF PATIENTS TREATED DURING YEAR, BY COUNTIES.

	Total.	Male.	Female.
Adams,	3	1	2
Allegheny,	91	51	40
Armstrong,	12	8	4
Beaver,	3	3	
Berks,	11	10	1
Blair,	17	10	7
Bucks,	2	2	
Butler,	15	10	5
Cambria,	53	26	27
Carbon,	4	2	2
Centre,	4	3	1
Chester,	36	24	12
Clarion,	6	6	
Clearfield,	8	6	2
Clinton,	7	5	2
Columbia,	5	5	
Crawford,	11	10	1
Cumberland,	15	10	5
Dauphin,	100	60	40
Delaware,	46	30	16
Elk,	1	1	
Erie,	11	6	5
Franklin,	17	9	8
Fulton,	1		1

TABLE II.—Continued.

	Total.	Male.	Female.
Greene,	2	1	1
Huntingdon,	5	3	2
Indiana,	5	3	2
Jefferson,	9	5	4
Juniata,	8	6	2
Lackawanna,	9	7	2
Lancaster,	16	9	7
Lawrence,	11	5	6
Lebanon,	8	8	----
Lehigh,	2	1	1
Luzerne,	36	20	16
Lycoming,	9	4	5
McKean,	1	1	----
Mercer,	4	4	----
Mifflin,	5	4	1
Monroe,	2	2	----
Montour,	1	1	----
Montgomery,	20	16	4
Northampton,	16	11	5
Northumberland,	15	9	6
Perry,	14	9	5
Philadelphia,	330	236	94
Potter,	2	2	----
Schuylkill,	4	3	1
Somerset,	9	5	4
Sullivan,	1	1	----
Tioga,	7	4	3
Venango,	5	4	1
Warren,	1	----	1
Washington,	2	1	1
Wayne,	4	4	----
Westmoreland,	11	5	6
Wyoming,	1	1	----
York,	35	27	8
Grand total,	1,089	720	369

TABLE III.

CLASSIFICATION OF PATIENTS TREATED DURING YEAR, BY DISPENSARIES.

1	Wilkes-Barre,	Dr. C. H. Miner,	36
2	York,	Dr. J. S. Miller,	35
3	Erie,	Dr. J. W. Wright,	11
4	Carlisle,	Dr. H. B. Bashore,	12
5	Lebanon,	Dr. A. J. Riegel,	8
6	West Chester,	Dr. Jos. Scattergood,	34
7	Bellefonte,	Dr. G. F. Harris,	1
9	Johnstown,	Dr. W. E. Matthews,	53
10	Lewistown,	Dr. C. H. Brisbin,	5
11	Chambersburg,	Dr. H. X. Bonbrake,	16
12	Chester,	Dr. H. M. Hiller,	46
13	Harrisburg,	Dr. P. A. Hartman,	99
14	Altoona,	Dr. J. D. Findley,	17
15	Butler,	Dr. H. D. Hockenberry,	15
16	Berwick,	Dr. S. B. Arment,	5
17	McConnellsburg,	Dr. J. W. Moser,	1
18	Honesdale,	Dr. H. B. Ely,	4
20	Pittsburg,	Dr. S. M. Rinehart,	87
21	Philadelphia,	Dr. Alfred Stengel,	329

TABLE III.—Continued.

22	Rochester,	Dr. E. S. H. McCaley,	2
23	Doylestown,	Dr. I. S. Plymire,	2
24	Kittanning,	Dr. T. N. McKee,	12
25	New Bloomfield,	Dr. A. R. Johnston,	14
26	Mifflintown,	Dr. W. H. Banks,	8
27	Coudersport,	Dr. E. H. Ashcraft,	2
28	Danville,	Dr. G. A. Stock,	1
30	Meyersdale,	Dr. C. P. Large,	9
31	Norristown,	Dr. H. H. Whitcomb,	19
32	Oil City,	Dr. J. P. Strayer,	4
33	Williamsport,	Dr. C. W. Youngman,	9
35	New Castle,	Dr. J. D. Moore,	11
36	Sharon,	Dr. P. P. Fisher,	4
37	Reading,	Dr. Israel Cleaver,	11
39	Lancaster,	Dr. J. L. Mowery,	15
40	Scranton,	Dr. J. C. Reifsnyder,	9
41	Meadville,	Dr. J. K. Roberts,	11
42	Ridgway,	Dr. J. C. Flynn,	1
43	Clarion,	Dr. J. T. Rimer,	6
45	Mauch Chunk,	Dr. J. K. Henry,	3
46	Lock Haven,	Dr. R. B. Watson,	7
47	Huntingdon,	Dr. H. C. Frontz,	5
48	Indiana,	Dr. W. A. Simpson,	5
51	Allentown,	Dr. H. F. Cawley,	2
52	Easton,	Dr. E. M. Green,	8
53	Shamokin,	Dr. R. H. Simmons,	13
54	Warren,	Dr. M. V. Ball,	1
55	Monongahela,	Dr. C. B. Wood,	..
56	Tunkhannock,	Dr. H. L. McKown,	1
57	Greensburg,	Dr. I. M. Portser,	8
58	Tioga,	Dr. S. P. Hakes,	6
59	Dushore,	Dr. P. G. Biddle,	1
60	Gettysburg,	Dr. J. R. Dickson,	3
62	Clearfield,	Dr. S. C. Stewart,	8
63	Waynesburg,	Dr. J. T. Iams,	2
64	Punxsutawney,	Dr J. E. Grube,	7
65	Stroudsburg,	Dr. W. L. Angle,	2
66	Pottsville,	Dr. L. T. Kennedy,	4
72	Franklin,	Dr. H. F. McDowell,	1
73	Jenkintown,	Dr. W. B. Jameson,	1
74	Columbia,	Dr. J. P. Kennedy,	1
75	Coatesville,	Dr. E. A. Graves,	1
76	Phoenixville,	Dr. C. A. Yocum,	1
77	Mt. Pleasant,	Dr. M. B. Horner,	3
78	Lykens,	Dr. M. D. Lehr,	1
80	Phillipsburg,	Dr. C. E. McGirk,	3
81	McKeesport,	Dr. D. P. Blose,	2
87	Bangor,	Dr. H. S. Sherrer,	1
89	Lansford,	Dr. J. H. Young,	1
91	Tamaqua,	Dr. E. E. Shifferstein,	22
92	Milton,	Dr. R. B. Tule,	2
95	DuBois,	Dr. R. R. Jordan,	1
96	West Fairview,	Dr. H. B. Bashore,	3

TABLE III.—Continued.

98	South Bethlehem,	Dr. W. D. Chase,	5
100	Homestead,	Dr. A. P. Fogleman,,	1
101	Braddock,	Dr. F. K. Whitfield,	1
102	Brookville,	Dr. J. A. Haven,	1
103	Beaver Falls,	Dr. Bruce Snodgrass,	1
104	Wellsboro,	Dr. P. W. Houser,	1
105	Washington,	Dr. E. M. Hazlett,	3
107	Frankford,	Dr. W. G. Turnbull,	1
108	Waynesboro,	Dr. W. C. Schultz,	1
		Grand Total,	1,089

TABLE 4.

CIVIL CONDITION OF PATIENTS TREATED DURING YEAR.

	Total.	Male.	Female.
Married,	400	284	116
Single,	641	413	228
Widowed,	45	20	25
Divorced,	3	3	
Grand total,	1,089	720	369

TABLE 5.

RELIGION OF PATIENTS TREATED DURING YEAR

	Total.	Male.	Female.
Protestant,	637	408	229
Catholic,	300	197	103
Hebrew,	99	73	26
Confucian,	1	1	
Not given,	52	41	11
Grand total,	1,089	720	369

TABLE 6.

NATIVITY OF PATIENTS TREATED DURING YEAR.

	Total.	Male.	Female.
United States,	851	544	307
Ireland,	30	19	11
Roumania,	9	7	2
Russia,	72	52	20
Norway,	3	3	----
England,	21	17	4
Canada,	3	3	----
Italy,	19	14	5
Austria,	18	15	3
Prussia,	2	2	----
France,	1	----	1
Germany,	22	14	8
Sweden,	4	2	2
Poland,	3	2	1
Scotland,	9	8	1
Hungary,	7	6	1
Syria,	1	1	----
China,	1	1	----
Wales,	1	1	----
Australia,	1	1	----
Not given,	11	8	3
Grand total,	1,089	720	369

TABLE 7.

NATIVITY OF PATIENTS TREATED DURING YEAR.

	Total.	Male.	Female.
Father born in			
United States,	609	387	222
England,	46	36	10
Ireland,	115	79	36
Scotland,	17	14	3
France,	2	1	1
Hungary,	6	5	1
Germany,	81	53	28
Russia,	86	64	22
Austria,	19	16	3
Canada,	7	6	1
Norway,	5	3	2
Italy,	22	16	6
Sweden,	5	3	2
Prussia,	5	3	2
Roumania,	6	3	3
Wales,	11	7	4
Poland,	4	1	3
Cuba,	1	1	----
Syria,	1	1	----
Denmark,	3	1	2
Australia,	3	3	----
China,	1	1	----
Spain,	1	1	----
Not given,	33	15	18
Grand total,	1,089	720	369

TABLE 8.

NATIVITY OF PATIENTS TREATED DURING YEAR.

	Total.	Male.	Female.
Mother born in			
United States,	623	395	228
England,	45	32	13
Ireland,	130	87	43
Scotland,	18	14	4
France,	3	1	2
Hungary,	4	4	----
Germany,	59	39	20
Russia,	81	62	19
Austria,	18	15	3
Canada,	4	3	1
Norway,	5	3	2
Italy,	21	16	5
Sweden,	5	3	2
Prussia,	2	2	----
Roumania,	8	7	1
Wales,	4	2	2
Poland,	5	3	2
Cuba,	1	1	----
Syria,	1	1	----
Denmark,	3	2	1
Bohemia,	1	1	----
Australia,	2	2	----
China,	1	1	----
Not given,	45	24	21
Grand total,	1,089	720	369

TABLE 9.

CLASSIFICATION OF PATIENTS TREATED DURING YEAR, SHOWING AGE INCIDENCE AND MORTALITY.

				Mortality.		
	Total.	Male.	Female.	Male.	Female.	
1 to 5 years, inclusive,	3	2	1	----	----	----
6 to 10 years, inclusive,	20	12	8	----	----	----
11 to 15 years, inclusive	65	37	28	----	----	----
16 to 20 years, inclusive,	173	108	65	2	2	----
21 to 30 years, inclusive,	462	293	169	12	3	----
31 to 40 years, inclusive,	227	160	67	9	3	----
41 to 50 years, inclusive,	104	82	22	1	----	----
51 to 60 years, inclusive,	31	23	8	2	----	----
61 to 70 years, inclusive,	4	3	1	----	----	----
71 to 80 years, inclusive,	----	----	----	----	----	----
Grand total,	1,089	720	369	----	----	----

TABLE 10.

OCCUPATION OF PATIENTS TREATED DURING YEAR.

	Total.	Male.	Female.
Agent,	5	5	
Assembler,	1	1	
Auditor,	1	1	
Axe grinder,	1	1	
Baker,	3	3	
Banker,	1	1	
Bank clerk,	1	1	
Bank teller,	1	1	
Barber,	15	15	
Bar tender,	7	7	
Beamer,	1	1	
Blacksmith,	10	10	
Boatman,	1	1	
Boiler maker,	2	2	
Boiler tester,	1	1	
Bookkeeper,	6	6	
Box-maker,	2	2	
Brakeman,	2	2	
Brass finisher,	1	1	
Brick layer,	3	3	
Broom-maker,	1	1	
Butcher,	1	1	
Butler,	3	3	
Cabinet maker,	2	2	
Canvasser,	3	3	
Carriage builder,	2	2	
Carpenter,	8	8	
Cashier,	1	1	
Cash boy,	1	1	
Cement contractor,	1	1	
Chair maker,	1	1	
Chemist,	4	4	
Chef,	1	1	
Civil engineer,	1	1	
Cigar worker,	13	10	3
Clerk,	52	52	
Cloak operator,	1	1	
Cloth cutter,	1	1	
Coachman,	3	3	
Conductor,	3	3	
Cook,	4	2	2
Cooper,	2	2	
Core-maker,	2	2	
Craneman,	2	2	
Cutter,	1	1	
Decorator,	1	1	
Draughtsman,	3	3	
Dye maker,	1		1
Drug clerk,	1	1	
Electrotyper,	1	1	
Electrician,	5	5	
Elevator man,	1	1	
Embroiderer,	2	1	1
Engineer,	4	4	
Engraver,	2	2	
Farmer,	27	27	
Fireman,	3	3	
Florist,	2	2	
Frame-maker,	1	1	
Gardener,	1	1	
Glass worker,	13	13	
Hatter,	3	3	
Harness-maker,	1	1	
Hostler,	2	2	
Hotel keeper,	2	2	
Housework,	190		190
Huckster,	1	1	
Iron worker,	12	12	
Janitor,	1	1	
Jeweler,	2	2	
Laborer,	68	68	
Laundry worker,	10	1	9
Law student,	1	1	
Leather worker,	2	2	
Lineman,	4	4	
Liveryman,	2	2	
Lumberman,	1	1	

TABLE 10.—Continued.

	Total.	Male.	Female.
Machinist,	36	36	
Medical student,	2	2	
Messenger,	4	4	
Merchant,	7	7	
Mender,	1		1
Mill hand,	68	34	34
Miner,	17	17	
Mining engineer,	1	1	
Motorman,	2	2	
Moulder,	2	2	
Mover,	1	1	
Music teacher,	1	1	
Newsboy,	2	2	
Night watchman,	1	1	
Nurse (trained),	8		8
Nurse,	4		4
Office boy,	1	1	
Packer,	2	2	
Painter,	8	8	
Paper bag maker,	1	1	
Pattern-maker,	6	6	
Peddler,	3	3	
Picture framer,	1	1	
Pipe cutter,	1	1	
Pipe fitter,	2	2	
Physician,	1	1	
Plasterer,	1	1	
Plumber,	6	6	
Porter,	2	2	
Postal clerk,	2	2	
Priest,	2	2	
Printer,	14	14	
Puddler,	1	1	
Quartermaster,	1	1	
Salesman,	30	30	
Saleslady,	6		6
Sailor,	2	2	
Saloon keeper,	1	1	
Seamstress,	16		16
Sexton,	1	1	
Shipbuilder,	1	1	
Shoemaker,	2	2	
Secretary Y. W. C. A.,	1		1
Slate worker,	1	1	
Solicitor,	2	2	
Stage hand,	1	1	
Stationary engineer,	4	4	
Stage carpenter,	1	1	
Steel worker,	4	4	
Stable boss,	1	1	
Stenographer,	10	3	7
Steward,	1	1	
Stockboy,	1	1	
Stone carver,	1	1	
Stone cutter,	2	2	
Stove worker,	3	3	
Student,	84	48	36
Railroader,	5	5	
Reporter,	1	1	
Rigger,	2	2	
Railroad conductor,	1	1	
Tailor,	19	18	1
Teamster,	30	30	
Teacher,	12	3	9
Tinsmith,	8	8	
Telephone operator,	1	1	
Theatre manager,	1		1
Tobacco stripper,	3		3
Tool-maker,	1	1	
Trainman,	1	1	
Umbrella-maker,	1	1	
Weaver,	17	10	7
Waiter,	5	5	
Waitress,	2		2
Watchman,	1	1	
Wood carver,	1	1	
Wood worker,	1	1	
Unclassified,	39	10	29

TABLE 11.

CLASSIFICATION OF RESULTS IN ALL CASES DISCHARGED DURING YEAR.

	Total.	White.	Black.	Male.	Female.	Married.	Single.
No. patients discharged during year,	589	577	12	407	182	277	312
No. patients discharged as arrested,	125	123	2	91	34	36	89
No. patients discharged as improved,	281	275	6	199	82	147	134
No. patients discharged as unimproved,	149	147	2	91	58	81	68
No. patients discharged by death,	34	32	2	26	8	13	21

TABLE 12.

SHOWING WEIGHT RECORD OF DISCHARGED CASES.

	Total.	White.	Black.	Male.	Female.	Married.	Single.	Per cent.
Number of patients discharged during year,	589	577	12	407	182	277	312	
Number of patients discharged during year, increased in weight,	432	426	6	299	133	198	234	.73
Number of patients discharged during year, unchanged in weight,	37	36	1	28	9	18	19	.06
Number of patients discharged during year, lost in weight,	120	115	5	80	40	61	69	.21

TABLE 13.

WEIGHT RECORD OF FAR ADVANCED PATIENTS DISCHARGED DURING YEAR.

	Total.	White.	Black.	Male.	Female.	Married.	Single.
Number of patients discharged during year,	270	265	5	201	69	142	128
Number of patients discharged during year, increased in weight,	164	163	1	129	35	87	77
Number of patients discharged during year, unchanged in weight,	22	21	1	15	7	11	11
Number of patients discharged during year, lost in weight,	84	81	3	57	27	44	40

TABLE 14.

CLASSIFCATION OF FAR ADVANCED CASES BY COLOR, SEX, SOCIAL CONDITION AND BY LENGTH OF RESIDENCE IN SANATORIUM.

								Under Three Months.							Over Three and Under Six Months.						
	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.
No. patients June 1, 1908,	28	------	21	7	13	15	28	------	------	------	------	------	------	------	------	------	------	------	------	------	------
No. patients admitted during year,	498	8	338	168	235	271	506	------	------	------	------	------	------	------	------	------	------	------	------	------	------
No. patients remaining to date,	261	3	158	106	106	158	264	------	------	------	------	------	------	------	------	------	------	------	------	------	------
No. patients discharged during year,	265	5	201	69	142	128	270	162	3	123	42	99	66	165	67	1	51	17	28	40	68
No. patients discharged as arrested,	32	------	30	2	8	24	32	13	------	13	------	4	9	13	15	------	14	1	3	12	15
No. patients discharged as improved,	112	2	90	24	68	46	114	54	1	47	8	39	16	55	40	1	30	11	20	21	41
No. patients discharged as unimproved,	93	1	58	36	54	40	94	75	------	45	30	46	29	75	8	------	5	3	4	4	8
No. patients discharged by death,	28	2	23	7	12	18	30	20	2	18	4	10	12	22	4	------	2	2	1	3	4
No. patients increased in weight,	163	1	129	35	87	77	164	81	1	66	16	51	31	82	59	------	46	13	25	34	59
No. patients lost in weight,	81	3	57	27	44	40	84	61	1	43	19	37	25	62	8	1	5	4	3	6	9
No. patients unchanged in weight,	21	1	15	7	11	11	22	20	1	14	7	11	10	21	------	------	------	------	------	------	------

TABLE 14.—Continued.

	Over Six and Under Nine Months.							Over Nine Months and Under One Year.							Over One Year.						
	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.
No. patients discharged during year,	19	1	15	5	10	10	20	13	------	9	4	4	9	13	4	------	3	1	1	3	4
No. patients discharged as arrested,	3	------	2	1	1	2	3	1	------	1	------	------	1	1	------	------	------	------	------	------	------
No. patients discharged as improved,	9	------	6	3	6	3	9	7	------	5	2	2	5	7	2	------	2	------	1	1	2
No. patients discharged as unimproved,	5	1	5	1	3	3	6	3	------	2	1	1	2	3	2	------	1	1	------	2	2
No. patients discharged by death,	2	------	2	------	------	2	2	2	------	1	1	1	1	2	------	------	------	------	------	------	------
No. patients increased in weight,	13	------	9	4	7	6	13	8	------	6	2	3	5	8	2	------	2	------	1	1	2
No. patients lost in weight,	6	1	6	1	3	4	7	5	------	3	2	1	4	5	1	------	------	1	1	1	1
No. patients unchanged in weight,	------	------	------	------	------	------	------	------	------	------	------	------	------	------	1	------	1	------	------	1	1

TABLE 15.

ADMISSIONS AND DISCHARGES IN FAR ADVANCED CASES.

	Total.	White.	Black.	Male.	Female.	Married.	Single.
Number of patients in Sanatorium June 1, 1908,	28	28	----	21	7	13	15
Number of patients admitted from June 1, 1908, to May 31, 1909,	506	498	8	338	168	235	271
Number of patients discharged from June 1, 1908, to May 31, 1909,	270	265	5	201	69	142	128
Number of patients remaining on May 31, 1909,	264	261	3	158	106	106	158

TABLE 16.

CLASSIFICATION OF RESULTS IN FAR ADVANCED PATIENTS DISCHARGED DURING YEAR.

	Total.	White.	Black.	Male.	Female.	Married.	Single.
Number of patients discharged during year,	270	265	5	201	69	142	128
Number of patients discharged during year as arrested,	32	32	----	30	2	8	24
Number of patients discharged during year as improved,	114	112	2	90	24	68	46
Number of patients discharged during year as unimproved,	94	93	1	58	36	54	40
Number of patients discharged during year by death,	30	28	2	23	7	12	18

TABLE 17.

CLASSIFICATION OF MODERATELY ADVANCED CASES BY COLOR, SEX, SOCIAL CONDITION AND BY LENGTH OF RESIDENCE IN SANATORIUM.

								Under Three Months.							Over Three and Under Six Months.						
	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.
No. patients June 1, 1908,	77	------	43	34	30	47	77	------	------	------	------	------	------	------	------	------	------	------	------	------	------
No. patients admitted during year,	365	5	242	128	142	228	370	------	------	------	------	------	------	------	------	------	------	------	------	------	------
No. patients remaining to date,	192	3	126	69	58	137	195	------	------	------	------	------	------	------	------	------	------	------	------	------	------
No. patients discharged during year,	250	2	159	93	114	138	252	109	2	79	32	63	48	111	80	------	46	34	28	52	80
No. patients discharged as arrested,	59	------	39	20	20	39	59	12	------	9	3	7	5	12	29	------	19	10	7	22	29
No. patients discharged as improved,	138	1	88	51	68	71	139	67	1	48	20	39	29	68	41	------	22	19	18	23	41
No. patients discharged as unimproved,	49	1	29	21	25	25	50	29	1	21	9	17	13	30	9	------	4	5	3	6	9
No. patients discharged by death,	4	------	3	1	1	3	4	1	------	1	------	------	1	1	1	------	1	------	------	1	1
No. patients increased in weight,	205	1	127	79	93	113	206	82	1	57	26	49	34	83	74	------	42	32	26	48	74
No. patients lost in weight,	32	1	21	12	15	18	33	15	1	12	4	8	8	16	6	------	4	2	2	4	6
No. patients unchanged in weight,	13	------	11	2	6	7	13	12	------	10	2	6	6	12	------	------	------	------	------	------	------

TABLE 17.—Continued.

	Over Six and Under Nine Months.							Over Nine Months and Under One Year.							Over One Year.						
	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.
No. patients discharged during year,	36	-----	19	17	13	23	36	12	-----	7	5	3	9	12	13	-----	8	5	7	6	13
No. patients discharged as arrested,	10	-----	5	5	3	7	10	7	-----	5	2	2	5	7	1	-----	1	-----	1	-----	1
No. patients discharged as improved,	19	-----	10	9	6	13	19	2	-----	2	-----	1	1	2	9	-----	6	3	4	5	9
No. patients discharged as unimproved,	6	-----	4	2	4	2	6	3	-----	-----	3	-----	3	3	2	-----	-----	2	1	1	2
No. patients discharged by death,	1	-----	-----	1	-----	1	1	-----	-----	-----	-----	-----	-----	-----	1	-----	1	-----	-----	-----	1
No. patients increased in weight,	28	-----	15	13	9	19	28	12	-----	7	5	3	9	12	9	-----	6	3	6	3	9
No. patients lost in weight,	8	-----	4	4	4	4	8	-----	-----	-----	-----	-----	-----	-----	3	-----	1	2	1	2	3
No. patients unchanged in weight,	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1	-----	1	-----	-----	1	1

TABLE NO. 18.

ADMISSIONS AND DISCHARGES OF MODERATELY ADVANCED CASES.

	Total.	White.	Black.	Male.	Female.	Married.	Single.
Number of patients in Sanatorium June 1, 1908,	77	77	.....	43	34	30	47
Number of patients admitted from June 1, 1908 to May 31, 1909,	370	365	5	242	128	142	228
Number of patients discharged from June 1, 1908, to May 31, 1909,	252	250	2	159	93	114	138
Number of patients remaining on May 31, 1909.	195	192	3	126	69	58	137
Number of patients died from June 1, 1908, to May 31, 1909,	4	4	.....	3	1	1	3

TABLE 19.

CLASSIFICATION OF RESULTS IN MODERATELY ADVANCED CASES DISCHARGED DURING YEAR.

	Total.	White.	Black.	Male.	Female.	Married.	Single.
Number of patients discharged during year,	252	250	2	159	93	114	138
Number of patients discharged during year as arrested,	59	59	.....	39	20	20	39
Number of patients discharged during year as improved,	139	138	1	88	51	68	71
Number of patients discharged during year as unimproved,	50	49	1	29	21	25	25
Number of patients discharged during year by death,	4	4	.....	3	1	1	3

TABLE 20.

WEIGHT RECORD OF MODERATELY ADVANCED CASES DISCHARGED DURING YEAR.

	Total.	White.	Black.	Male.	Female.	Married.	Single.
Number of patients discharged during year,	252	250	2	159	93	114	138
Number of patients discharged during year, increased in weight,	206	205	1	127	79	93	113
Number of patients discharged during year, unchanged in weight,	13	13	.....	11	2	6	7
Number of patients discharged during year, lost in weight,	33	32	1	21	12	15	18
Number of patients discharged during year, by death,	4	4	.....	3	1	1	3

TABLE 21.

CLASSIFICATION OF INCIPIENT CASES BY COLOR, SEX, SOCIAL CONDITION AND BY LENGTH OF RESIDENCE IN SANATORIUM.

								Under Three Months.							Over Three and Under Six Months.						
	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.
No. patients June 1, 1908,	26	2	16	12	7	21	28														
No. patients admitted during year,	76	4	60	20	18	62	80														
No. patients remaining to date,	40	1	29	12	4	37	41														
No. patients discharged during year,	62	5	47	20	21	46	67	19	3	19	3	10	12	22	24	2	20	6	6	20	26
No. patients discharged as arrested,	32	2	22	12	8	26	34	6	------	4	2	1	5	6	14	2	12	4	4	12	16
No. patients discharged as improved,	25	3	21	7	11	17	28	10	3	12	1	8	5	13	9	------	8	1	2	7	9
No. patients discharged as unimproved,	5	------	4	1	2	3	5	3	------	3	------	1	2	3	1	------	------	1	------	1	1
No. patients increased in weight,	58	4	43	19	18	44	62	17	2	16	3	8	11	19	23	2	20	5	6	19	25
No. patients lost in weight,	2	1	2	1	2	1	3	------	1	1	------	1	------	1	1	------	------	1	------	1	1
No. patients unchanged in weight,	2	------	2	------	1	1	2	2	------	2	------	1	1	2	------	------	------	------	------	------	------

TABLE 21.—Continued.

	Over Six and Under Nine Months.							Over Nine Months and Under One Year.							Over One Year.						
	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.	White.	Black.	Male.	Female.	Married.	Single.	Total.
No. patients discharged during year,	12	------	6	6	3	9	12	6	------	2	4	2	4	6	1	------	------	1	------	1	1
No. patients discharged as arrested,	9	------	5	4	2	7	9	3	------	1	2	2	1	3	------	------	------	------	------	------	------
No. patients discharged as improved,	2	------	------	2	------	2	2	3	------	1	2	1	2	3	1	------	------	1	------	1	1
No. patients discharged as unimproved,	1	------	1	------	1	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------
No. patients increased in weight,	11	------	5	6	2	9	11	6	------	2	4	2	4	6	1	------	------	1	------	1	1
No. patients lost in weight,	1	------	1	------	1	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------
No. patients unchanged in weight,	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

TABLE 22.

ADMISSIONS AND DISCHARGES OF INCIPIENT CASES.

	Total.	White.	Black.	Male.	Female.	Married.	Single.
Number of patients in Sanatorium June 1, 1908,	28	26	2	16	12	7	21
Number of patients admitted from June 1, 1908, to May 31, 1909,	80	76	4	60	20	18	62
Number of patients discharged from June 1, 1908, to May 31, 1909,	67	62	5	47	20	21	46
Number of patients remaining on May 31, 1909,	41	40	1	29	12	4	37

TABLE 23.

CLASSIFICATION OF RESULTS IN INCIPIENT CASES DISCHARGED DURING YEAR.

	Total.	White.	Black.	Male.	Female.	Married.	Single.	Per cent.
Number of patients discharged during year,	67	62	5	47	20	21	46	.....
Number of patients discharged during year as arrested,	34	32	2	22	12	8	26	.....
Number of patients discharged during year as improved,	28	25	3	21	7	11	17	.....
Number of patients discharged during year as unimproved,	5	5	.....	4	1	2	3	.....

TABLE 24.

WEIGHT RECORD OF INCIPIENT CASES DISCHARGED DURING YEAR.

	Total.	White.	Black.	Male.	Female.	Married.	Single.	Per cent.
Number of patients discharged during year,	67	62	5	47	20	21	46	.....
Number of patients discharged during year, increased in weight,	62	58	4	43	19	18	44	.....
Number of patients discharged during year, unchanged in weight,	2	2	.....	2	.....	1	1	.....
Number of patients discharged during year, lost in weight,	3	2	1	2	1	2	1	.....

MAINTENANCE COST SANITORIA FROM JUNE 1,1908, TO DECEMBER 31, 1908.

Accounts.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.
Administration,	$161 69	$139 57	$153 21	$172 18	$348 93	$38 04	$284 15	$1,297 77
Drugs,	54 62	117 24	30 31	21 55	48 67	13 36	529 99	815 74
Eggs and green stuffs,			1,442 79	1,408 29	1,581 02	1,323 38	2,167 09	7,922 57
Food stuffs,	2,443 96	2,720 51	1,564 53	2,022 37	1,351 78	2,124 87	926 88	13,154 90
Insurance,				23 75			1,086 24	1,109 99
Legal services,					15 00			15 00
Salaries, doctors, nurses, etc.,	1,194 54	1,327 42	1,697 86	1,851 85	1,900 22	1,839 68	3,070 98	12,882 55
Oper. supplies,	1,037 54	1,425 63	440 77	1,508 77	1,334 98	5,805 31	2,330 72	13,883 72
Traveling expense,	133 20	33 27	150 39	108 43	123 69	19 83	18 95	587 76
	$5,025 55	$5,763 64	$5,479 86	$7,117 19	$6,704 29	$11,164 47	$10,415 00	$51,670 00

TUBERCULOSIS DISPENSARIES.

Dr. Thos. H. A. Stites, Medical Inspector of Dispensaries.

OFFICE STAFF.

Miss Olive E. Jamison, Stenographer.
Miss Mary Sandoe, Stenographer.
Miss Nellie Tittle, Stenographer.
Miss Josephine Hill, Stenographer.
Miss Mary Fitzpatrick, Clerk.

DISPENSARY MEDICAL STAFF.

In each dispensary there is a Physician-in-Charge appointed at the head of the work. Where the work is great enough to warrant the same, the Commissioner of Health appoints a first assistant physician and a second assistant physician, thus making the medical staff consist of the Physician-in-Charge, one first assistant and one second assistant physician. Subsequent to August 6, 1908, the Commissioner of Health decided upon the remuneration of the first and second assistant physicians as well as the Physician-in-Charge for their services.

VISITING NURSES.

As soon as possible after application for treatment and examination at the dispensary, each patient is visited in the home by a nurse from the dispensary.

The visiting nurse is expected to investigate the conditions in and and around the patient's home, the habits of the family, and the health of the family, while the financial circumstances are also considered important.

Immediately subsequent to the first visit of the nurse a written report on the conditions found is rendered by her to the physician-in-charge. In addition to investigating the surroundings and circumstances of the patient, it is the duty of the nurse to follow up the advice and instructions already given at the dispensary by pointing out the particular manner in which the advice is to be applied. She is expected, so far as possible, to assist in improving conditions about the patient. No effort is spared towards re-arranging the rooms and furniture in such a way as to materially improve the surroundings.

In many ways the work of the visiting nurse is of prime importance, since by coming into the patient's home she becomes far more intimately acquainted, not only with the patient, but with the whole family, than is the case with one who sees the patient only at the dispensary.

The observations and reports of our visiting nurses are of great assistance in preventing misapplication of the supplies furnished by the Department.

OFFICE WORK.

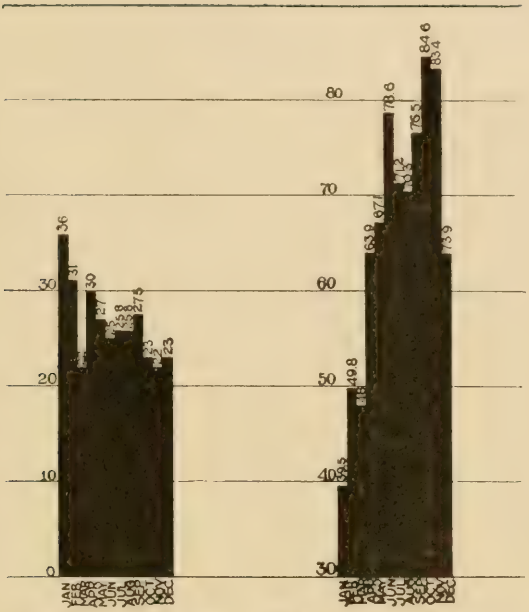
Administrative Work.

The administrative work of the division consists in superintending the distribution of supplies, reviewing reports and vouchers, and personal inspection of the various dispensaries. The Medical Inspector of Dispensaries makes frequent visits to each dispensary, his coming never being known to those in charge of the particular dispensary until his arrival. In this way the Department seeks to assure itself of the maintenace of the dispensaries in proper physical condition, and that the physicians are doing their work as required by the Department.

LOCATION OF DISPENSARIES.

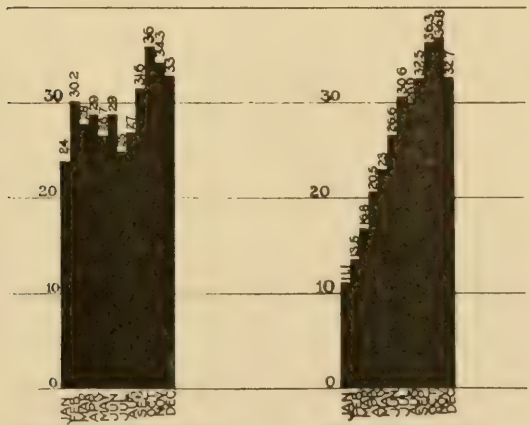
The original plan of distribution of dispensaries was to open one dispensary in each County, This program was completed on June 2, 1908, with the opening of the dispensary at Greensburg, Westmoreland County. Frequent requests and petitions, however, were received by the Commissioner of Health asking him to open other dispensaries. After a careful review of the work of the dispensaries already in operation and of their geographical relations to the various districts of the State, it was decided that the Department should proceed in the extension of the existing system. This extension was begun in October, 1908, and up to December, 18th, thirty-seven (37) additional dispensaries had been opened for the reception of patients. These dispensaries are numbered from 68 to 104. Their locations and names of Physician-in-Charge are shown in the accompanying lists. A further extension of the system is under consideration.

It has been the effort of the Department to place dispensaries at points where they will best serve the needs of the greatest number of people, and to this end careful consideration has been given to lines of communication and centers of population.



PER CENT OF PATIENTS RECEIVING MEDICINE
1908

NO. OF VISITS TO PATIENTS PER NURSE
1908



PER CENT OF PATIENTS SHOWING INCREASED WEIGHT
1908

NO OF PATIENTS PER DOCTOR
1908

DATES OF OPENING OF THE TUBERCULOSIS DISPENSARIES.

Dis. No.	County.	Place.	Date of Opening.
1	Luzerne,	Wilkes-Barre,	7-22-07
2	York,	York,	11-12-07
3	Erie,	Erie,	12-10-07
4	Cumberland,	Carlisle,	10-25-07
5	Lebanon,	Lebanon,	12-21-07
6	Chester,	West Chester,	12- 5-07
7	Centre,	Bellefonte,	11- 5-07
8	Cameron,	Emporium,	10- 5-07
9	Cambria,	Johnstown,	11-26-07
10	Mifflin,	Lewistown,	2-18-08
11	Franklin,	Chambersburg,	11-10-07
12	Delaware,	Chester,	11-12-07
13	Dauphin,	Harrisburg,	3-28-08
14	Blair,	Altoona,	12-10-07
15	Butler,	Butler,	11-15-07
16	Columbia,	Berwick,	11-15-07
17	Fulton,	McConnellsburg,	12-10-07
18	Wayne,	Honesdale,	1- 3-08
19	Pike,	Milford,	12- 6-07
20	Allegheny,	Pittsburg,	1-21-08
21	Philadelphia,	Philadelphia,	1- 7-08
22	Beaver,	Rochester,	1-24-08
23	Bucks,	Doylestown,	6-24-08
24	Armstrong,	Kittanning,	11- 5-07
25	Perry,	New Bloomfield,	1- 9-08
26	Juniata,	Mifflintown,	12-17-07
27	Potter,	Coudersport,	2-24-08
28	Montour,	Danville,	12-14-07
29	Union,	Mifflinburg,	1- 4-08
30	Somerset,	Meyersdale,	12- 4-07
31	Montgomery,	Norristown,	1-13-08
32	Venango,	Oil City,	12-13-07
33	Lycoming,	Williamsport,	2-22-08
34	Forest,	Tionesta,	12-20-07
35	Lawrence,	New Castle,	1-24-08
36	Mercer,	Sharon,	2-18-08
37	Berks,	Reading,	1-15-08
38	McKean,	Bradford,	2-14-08
39	Lancaster,	Lancaster,	1- 3-08
40	Lackawanna,	Scranton,	2-25-08
41	Crawford,	Meadville,	2-13-08
42	Elk,	Ridgway,	1-21-08
43	Clarion,	Clarion,	1-21-08
44	Bradford,	Towanda,	1-23-08
45	Carbon,	Mauch Chunk,	4-20-08
46	Clinton,	Lock Haven,	5-14-08
47	Huntingdon,	Huntingdon,	4- 3-08
48	Indiana,	Indiana,	2-26-08
49	Susquehanna,	Montrose,	3-27-08
50	Snyder,	Selinsgrove,	2- 4-08
51	Lehigh,	Allentown,	2-28-08
52	Northampton,	Easton,	4-28-08
53	Northumberland,	Shamokin,	3-10-08
54	Warren,	Warren,	3-14-08
55	Washington,	Monongahela,	2-20-08
56	Wyoming,	Tunkhannock,	1-24-08
57	Westmoreland,	Greensburg,	6- 2-08
58	Tioga,	Tioga,	2-25-08
59	Sullivan,	Dushore,	4-18-08
60	Adams,	Gettysburg,	5-19-08
61	Bedford,	Everett,	4-14-08
62	Clearfield,	Clearfield,	5- 7-08
63	Greene,	Waynesburg,	3-12-08
64	Jefferson,	Punxsutawney,	5-11-08
65	Monroe,	Stroudsburg,	4-16-08
66	Schuylkill,	Pottsville,	4-28-08
67	Fayette,	Uniontown,	5-30-08
68	Luzerne,	Hazleton,	7-22-08
69	Cambria,	Hastings,	11-24-08
70	Fayette,	Connellsville,	11-23-08
71	Northumberland,	Mt. Carmel,	12- 2-08
72	Venango,	Franklin,	11-11-08
73	Montgomery,	Jenkintown,	11-14-08
74	Lancaster,	Columbia,	11-26-08
75	Chester,	Coatesville,	11-17-08
76	Chester,	Phoenixville,	12- 2-08

DATES OF OPENING OF THE TUBERCULOSIS DISPENSARIES.
Continued.

Dis. No.	County.	Place.	Date of Opening.
77	Westmoreland,	Mt. Pleasant,	11-20-08
78	Dauphin,	Lykens,	11-25-08
79	Blair,	Tyrone,	12- 2-08
80	Centre,	Philipsburg,	12- 1-08
81	Allegheny,	McKeesport,	12- 2-08
82	Bucks,	Bristol,	11-24-08
83	Allegheny,	Carnegie,	12- 3-08
84	Lackawanna,	Carbondale,	12- 3-08
85	Schuylkill,	Shenandoah,	12- 2-08
86	York,	Hanover,	12- 4-08
87	Northampton,	Bangor,	12- 4-08
88	Westmoreland,	Monessen,	12- 7-08
89	Carbon,	Lansford,	12- 2-08
90	Crawford,	Titusville,	12- 4-08
91	Schuylkill,	Tamaqua,	12- 1-08
92	Northumberland,	Milton,	12- 1-08
93	Columbia,	Bloomsburg,	9-30-08
94	Luzerne,	Pittston,	12-10-08
95	Clearfield,	Du Bois,	12- 5-08
96	Cumberland,	West Fairview,	9-30-08
97	Susquehanna,	Susquehanna,	12- 4-08
98	Northampton,	S. Bethlehem,	12- 3-08
99	Erie,	Corry,	12- 4-08
100	Allegheny,	Homestead,	12-12-08
102	Jefferson,	Brookville,	12- 4-08
103	Beaver,	Beaver Falls,	12-18-08
104	Tioga,	Wellsboro,	12- 6-08
106	Montgomery,	Pottstown,	12- 6-08

OFFICE DAYS AND NUMBER NURSES EMPLOYED IN DISPENSARIES.

Dispensary No.	Physician-In-Charge.	Nurses.	Days.	Hours.
1.	Dr. Chas. H. Miner,	6	Daily,	3—5 P. M.
2.	Dr. J. S. Miller,	3	Daily, except Sat.,	3—5 P. M.
3.	Dr. J. W. Wright,	1	Tues & Sat.,	3—5 P. M.
4.	Dr. Harvey Bashore,	1	Tues. & Frid.,	12—2 P. M.
5.	Dr. A. J. Riegel,	1	Wed. & Sat.,	10—12 A. M.
6.	Dr. Jos. Scattergood,	1	Wed. & Frid.,	2—4 P. M.
7.	Dr. Geo. F. Harris,	See note.	Friday,	1:30–3:30.
8.	Dr. H. S. Falk,	1	Tues. & Frid.,	1—4 P. M.
9.	Dr. W. E. Matthews,	1	Tues. & Frid.,	2—4 P. M.
10.	Dr. C. H. Brisbin,	1	Tues. & Frid.,	10 A. M.–1 P. M.
11.	Dr. H. X. Bonebrake,	Health officer.	Friday,	2—4 P. M.
12.	Dr. Robert Maison,	4	Mon., Wed., Thurs., and Fri.	2–4 P. M.
13.	Dr. Paul Hartman,	4	Daily,	3—5 P. M.
14.	Dr. J. D. Findley,	1	Tues. & Frid.,	2—4 P. M.
15.	Dr. H. D. Hockenberry,	1	Tues. & Frid.,	10—12 & 1—4 P. M.
16.	Dr. S. B. Arment,	1	Tues. & Frid.,	10—12 A. M.
17.	Dr. J. W. Mosser,	Health officer.	Tuesday,	1—2 P. M.
18.	Dr. H. B. Ely,	Health officer.	Tuesday,	2—4 P. M.
19.	Dr. Wm. B. Kenworthy,	Health officer.	Monday,	2–4 P. M.
20.	Dr. S. M. Rinehart,	7	Daily,	3—5 P. M.
21.	Dr. Alfred Stengel,	6	Daily,	11—1 P. M.
22.	Dr. E. S. H. McCauley,	1	Tues. & Frid.,	3—4 P. M.

OFFICE DAYS AND NUMBER NURSES EMPLOYED IN DISPENSARIES.

Continued.

Dispensary No.	Physician-in-Charge.	Nurses.	Days.	Hours.
23.	Dr. I. Swartz Plymire,	Health officer.	Wednesday,	2—4 P. M.
24.	Dr. T. N. McKee,	Health officer.	Mon. & Frid.,	2—4 P. M.
25.	Dr. A. R. Johnston,	Health officer.	Thursday,	2 P. M.
26.	Dr. W. H. Banks,	1	Tues. & Frid.,	2—4 P. M.
27.	Dr. E. H. Ashcraft,	Health officer.	Saturday,	1—3 P. M.
28.	Dr. Geo. A. Stock,	1	Tues. & Frid.,	2—4 P. M.
29.	Dr. C. H. Dimm,	See note.	Tues. & Sat.,	12—2 P. M.
30.	Dr. C. P. Large,	Health officer.	Wednesday,	2—4 P. M.
31.	Dr. H. H. Whitcomb,	1	Mon. & Frid.,	2:30—4:30.
32.	Dr. J. P. Strayer,	1	Mon. & Frid.,	12:30—2 P. M.
33.	Dr. C. W. Youngman,	1	Wed. & Sat.,	10—2 P. M.
34.	Dr. F. J. Bovard,	Health officer.	Saturday,	9—11 A. M.
35.	Dr. J. D. Moore,	1	Tues. & Frid.,	10—12 M.
36.	Dr. P. P. Fisher,	1	Tuesday,	10—12 M.
37.	Dr. Israel Cleaver,	1	Wed. & Frid.,	3—4 P. M.
38.	Dr. W. C. Hogan,	Health officer.	Tuesday,	1—3 P. M.
39.	Dr. J. L. Mowery,	1	Tues. & Frid.,	3—5 P. M.
40.	Dr. J. C. Reifsnyder,	2	Tues. & Frid.,	2—4 P. M.
41.	Dr. J. K. Roberts,	1	Mon. & Thurs.,	3—5 P. M.
42.	Dr. J. E. Rutherford,	Health officer.	Tues. & Frid.,	3—4 P. M.
43.	Dr. J. T. Rimer,	1	Tues. & Frid.,	2—4 P. M.
44.	Dr. S. M. Woodburn,	Health officer.	Thursday,	1—3 P. M.
45.	Dr. J. K. Henry,	1	Tues. & Frid.,	11 A. M.—1 P. M.
46.	Dr. R. B. Watson,	2	Thursday,	2—3 P. M.
47.	Dr. H. C. Frontz,	1	Friday,	1:30—3:30.
48.	Dr. W. A. Simpson,	Health officer.	Wednesday,	11—12 M.
49.	Dr. J. G. Wilson,	Health officer.	Friday,	1—2 P. M.
50.	Dr. F. J. Wagenseller,	See note.	Tuesday,	9—11 A. M.
51.	Dr. M. F. Cawley,	1	Mon., Wed., Fri.,	2—4 P. M.
52.	Dr. E. M. Green,	1	Mon., Wed., Fri.,	3—5 P. M.
53.	Dr. R. H. Simmons,	1	Tues & Frid.,	10—12 M.
54.	Dr. M. V. Ball,	Health officer.	Friday,	4—6 P. M.
55.	Dr. C. B. Wood,	Health officer.	Thursday,	2—4 P. M.
56.	Dr. B. E. Bideman,	Health officer.	Saturday,	11—12 P. M.
57.	Dr. I. M. Portser,	Health officer.	Tuesday,	2—4 P. M.
58.	Dr. S. P. Hakes,	Health officer.	Saturday,	12—1 P. M.
59.	Dr. P. G. Biddle,	1	Wednesday,	11—12 M.
60.	Dr. J. R. Dickson,	Health officer.	Tuesday,	10—12 M.
61.	Dr. W. de La. M. Hill,	See note.	Saturday,	1—2 P. M.
62.	Dr. S. C. Stewart,	Health officer.	Thursday,	10:30—12:30.
63.	Dr. J. T. Iams,	Health officer.	Thursday,	1—3 P. M.
64.	Dr. J. E. Grube,	Health officer.	Monday,	11—12 M.
65.	Dr. W. E. Gregory,	1	Thursday,	2—3 P. M.
66.	Dr. L. T. Kennedy,	1	Tues., Thurs., Frid.,	11—12:30.
67.	Dr. O. R. Altman,	1	Tues. & Sat.,	12—2 P. M.
68.	Dr. W. C. Gayley,	1	Tuesday,	1—3 P. M.
69.	Dr. D. S. Rice,	1	Tuesday,	10—12 M.
70.	Dr. T. B. Echard,	See note.	Wednesday,	11—1 P. M.
71.	Dr. W. T. Williams,	See note.	Wednesday,	2—4 P. M.
72.	Dr. H. F. McDowell,	See note.	Wednesday,	1—3 P. M.
73.	Dr. W. B. Jamison,	See note.	Wed. & Sat.,	2—3 P. M.
74.	Dr. J. P. Kennedy,	1	Thursday,	3—5 P. M.
75.	Dr. E. A. Graves,	See note.	Tuesday,	2—4 P. M.
76.	Dr. C. A. Yocum,	See note.	Thursday,	2—4 P. M.
77.	Dr. M. V. Horner,	1	Friday,	3—5 P. M.
78.	Dr. M. D. Lehr,	1	Wednesday,	1—3 P. M.
79.	Dr. W. S. Musser,	1	Wednesday,	3—4 P. M.
80.	Dr. C. E. McGirk,	See note.	Tues. & Thurs.,	2—3 P. M.
81.	Dr. D. P. Blose,	1	Wednesday,	2—4 P. M.
82.	Dr. J. De B. Abbott,	Health officer.	Tuesday,	11—1 P. M.
83.	Dr. F. E. Herriott,	Health officer.	Monday,	3—5 P. M.
84.	Dr. W. J. Lowry,	See note.	Thursday,	2—4 P. M.
85.	Dr. H. M. Wasley,	1	Daily, ex. Monday,	9—11 A. M.
86.	Dr. J. H. Bittinger,	1	Friday,	3—5 P. M.
87.	Dr. H. S. Sherrer,	1	Thursday,	2—4 P. M.
88.	Dr. M. J. Cramer,	Health officer.	Tues. & Frid.,	2—3 P. M.
89.	Dr. J. H. Young,	See note.	Wednesday,	3—5 P. M.
90.	Dr. J. M. Waide,	Health officer.	Friday,	10—12 M.
91.	Dr. E. E. Shifferstine,	1	Tuesday,	11—1 P. M.
92.	Dr. R. B. Tule,	Health officer.	Tuesday,	2—4 P. M.
93.	Dr. S. B. Arment,	See note.	Mon. & Wed.,	10—1 A. M.
94.	Dr. S. L. Underwood,	1	Mon. & Tues.,	3—5 P. M.
95.	Dr. R. R. Jordan,	Health officer.	Saturday,	2—4 P. M.
96.	Dr. H. B. Bashore,	See note.	Wednesday,	2—4 P. M.

OFFICE DAYS AND NUMBER NURSES EMPLOYED IN DISPENSARIES.
Continued.

Dispensary No.	Physician-in-Charge.	Nurses.	Days.	Hours.
97.	Dr. Sam'l Birdsall,	Health officer.	Saturday,	2—4 P. M.
98.	Dr. W. D. Chase,	See note.	Tues. & Thurs.,	2—4 P. M.
99.	Dr. C. B. Kibler,	1	Friday,	1—3 P. M.
100.	Dr. A. P. Fogelman,	See note.	Wednesday,	2—4 P. M.
102.	Dr. J. A. Haven,	Health officer.	Saturday,	3—5 P. M.
103.	Dr. Bruce Snodgrass,	See note.	Mon. & Thurs.,	2—3 P. M.
104.	Dr. P. W. Houser,	Health officer.	Thursday,	3—5 P. M.
106.	Dr. T. E. Wills,	Health officer.	Wednesday,	2—4 P. M.

(Note.) In dispensaries where number of nurses is not given, the work of nurse is done by nurse attached to another dispensary. The instances of these are as follows:

Nos. 7 and 79 and 80, ...one nurse
Nos. 29 and 28 and 50, ...one nurse
Nos. 47 and 61, ...one nurse
Nos. 70 and 67, ...one nurse
Nos. 71 and 53, ...one nurse
Nos. 72 and 32, ...one nurse
Nos. 73 and 31, ...one nurse
Nos. 84 and 40, ...one nurse
Nos. 89 and 91, ...one nurse
Nos. 98 and 52, ...one nurse
Nos. 100 and 20, ...one nurse
Nos. 103 and 22, ...one nurse

DISPENSARY PHYSICIANS BY COUNTIES.

County.	Location.	No.	Attending Physicians.
Adams,	Gettysburg,	60.	Dr. J. R. Dickson—Physician in Charge.
Allegheny,	Pittsburg,	20.	Dr. S. M. Rinehart—Physician in Charge.
			Dr. I. H. Alexander.
			Dr. J. M. Long.
			Dr. J. F. Edwards.
			Dr. Samuel Hamilton.
			Dr. C. J. McKee.
			Dr. F. D. Stozenbach.
			Dr. C. W. Sample.
			Dr. G. H. Boyd.
	McKeesport,	81.	Dr. D. P. Blose—Physician in Charge.
	Carnegie,	83.	Dr. F. E. Herriott—Physician in Charge.
	Homestead,	100.	Dr. A. P. Fogelman—Physician in Charge.
Armstrong,	Kittanning,	24.	Dr. T. N. McKee—Physician in Charge.
			Dr. H. B. Stone.
Beaver,	Rochester,	22.	Dr. E. S. H. McCauley—Physician in Charge.
			Dr. J. B. Armstrong.
	Beaver Falls,	103.	Dr. Bruce Snodgrass—Physician in Charge.
Bedford,	Everett,	61.	Dr. W. de la M. Hill—Physician in Charge.
Berks,	Reading,	37.	Dr. Israel Cleaver—Physician in Charge.
Blair,	Altoona,	14.	Dr. Jos. D. Findley—Physician in Charge.
			Dr. E. B. Miller.
	Tyrone,	79.	Dr. W .S. Musser—Physician in Charge.
Bradford,	Towanda,	44.	Dr. S. M. Woodburn—Physician in Charge.
Bucks,	Doylestown,	23.	Dr. I. S. Plymire—Physician in Charge.
	Bristol,	82.	Dr. J. de B. Abbott—Physician in Charge.
Butler,	Butler,	15.	Dr. H. D. Hockenberry—Physician in Charge.
			Dr. T. M. Maxwell.
Cambria,	Johnstown,	9.	Dr. W. Matthews—Physician in Charge.
			Dr. J. McAneny.
			Dr. Thom.
	Hastings,	69.	Dr. D. S. Rice—Physician in Charge.
Cameron,	Emporium,	8.	Dr. H. S. Falk—Physician in Charge.

DISPENSARY PHYSICIANS BY COUNTIES—Continued.

County.	Location.	No.	Attending Physicians.
Carbon,	Mauch Chunk,	45.	Dr. Jno. K. Henry—Physician in Charge.
	Lansford,	89.	Dr. J. H. Young—Physician in Charge.
Centre,	Bellefonte,	7.	Dr. Geo. F. Harris—Physician in Charge.
	Philipsburg,	80.	Dr. C. E. McGirk—Physician in Charge.
Chester,	West Chester,	6.	Dr. Jos. Scattergood—Physician in Charge.
	Coatesville,	75.	Dr. E. A. Graves—Physician in Charge.
	Phoenixville,	76.	Dr. C. A. Yocum—Physician in Charge.
Clarion,	Clarion,	43.	Dr. Jno. T. Rimer—Physician in Charge.
Clearfield,	Clearfield,	62.	Dr. S. C. Stewart—Physician in Charge.
	Du Bois,	95.	Dr. R. R. Jordan—Physician in Charge.
Clinton,	Lock Haven,	46.	Dr. R. B. Watson—Physician in Charge.
Columbia,	Berwick,	16.	Dr. S. B. Arment—Physician in Charge.
			Dr. Jos. Cohen.
	Bloomsburg,	93.	Dr. S. B. Arment—Physician in Charge.
Crawford,	Meadville,	41.	Dr. J. K. Roberts—Physician in Charge.
			Dr. W. E. Hyskell.
	Titusville,	90.	Dr. J. M. Waide—Physician in Charge.
Cumberland,	Carlisle,	4.	Dr. H. B. Bashore—Physician in Charge.
			Dr. R. Plank.
	West Fairview,	96.	Dr. Harvey B. Bashore—Physician in Charge.
Dauphin,	Harrisburg,	13.	Dr. Paul Hartman—Physician in Charge.
			Dr. J. W. Ellenberger.
			Dr. C. R. Phillips.
	Lykens,	78.	Dr. M. D. Lehr—Physician in Charge.
Delaware,	Chester,	12.	Dr. R. S. Maison—Physician in Charge.
			Dr. E. S. Haines.
		134.	Dr. J. W. Wood.
Elk,	Ridgway,	42.	Dr. J. E. Rutherford—Physician in Charge.
Erie,	Erie,	3.	Dr. J. W. Wright—Physician in Charge.
			Dr. A. H. Roth.
	Corry,	99.	Dr. C. B. Kibler—Physician in Charge.
Fayette,	Uniontown,	67.	Dr. O. R. Altman—Physician in Charge.
	Connellsville,	70.	Dr. T. B. Echard—Physician in Charge.
Forest,	Tionesta,	34.	Dr. F. J. Bovard—Physician in Charge.
Franklin,	Chambersburg,	11.	Dr. H. X. Bonbrake—Physician in Charge.
Fulton,	McConnellsburg,	17.	Dr. J. W. Mosser—Physician in Charge.
Greene,	Waynesburg,	63.	Dr. J. T. Iams—Physician in Charge.
Huntingdon,	Huntingdon,	47.	Dr. H. C. Frontz—Physician in Charge.
Indiana,	Indiana,	48.	Dr. Wm. A. Simpson—Physician in Charge.
Jefferson,	Punxsutawney,	64.	Dr. J. E. Grube—Physician in Charge
	Brookville,	102.	Dr. J. A. Haven—Physician in Charge.
Juniata,	Mifflintown,	26.	Dr. W. H. Banks—Physician in Charge.
Lackawanna,	Scranton,	40.	Dr. J. C. Reifsnyder—Physician in Charge.
			Dr. C. Falkowsky.
			Dr. Jos. Wagner.
	Carbondale,	84.	Dr. W. J. Lowry—Physician in Charge.
Lancaster,	Lancaster,	39.	Dr. J. L. Mowery—Physician in Charge.
			Dr. S. H. Heller.
			Dr. H. F. Myers.
	Columbia,	74.	Dr. J. P. Kennedy—Physician in Charge.
Lawrence,	New Castle,	35.	Dr. J. D. Moore—Physician in Charge.
			Dr. J. D. Tucker.
Lebanon,	Lebanon,	5.	Dr. A. J. Reigel—Physician in Charge.
			Dr. H. E. Maulfair.
Lehigh,	Allentown,	51.	Dr. M. F. Cauley—Physician in Charge.
			W. D. Kline.
			Dr. Fred C. Bausch.
Luzerne,	Wilkes-Barre,	1.	Dr. Chas. H. Miner—Physician in Charge.
			Dr. J. W. Geist.
			Dr. S. Reichard.
			Dr. S. D. Wyckoff.
			Dr. George W. Carr.
			Dr. R. L. Wadhams.
			Dr. Walter Davis.
			Dr. C. R. Grosser.
			Dr. J. A. Hilbert.
			Dr. G. H. McConnon.
			Dr. James. T. Williams.
	Hazleton,	68.	Dr. W. C. Gayley—Physician in Charge.
	Pittston,	94.	Dr. S. L. Underwood—Physician in Charge.
Lycoming,	Williamsport,	33.	Dr. C. W. Youngman—Physician in Charge.
McKean,	Bradford,	88.	Dr. W. Clyde Hogan—Physician in Charge.
Mercer,	Sharon,	36.	Dr. P. P. Fisher—Physician in Charge.
Mifflin,	Lewistown,	10.	Dr. Chas. H. Brisbin—Physician in Charge.
Monroe,	Stroudsburg,	65.	Dr. W. E. Gregory—Physician in Charge.
Montgomery,	Norristown,	31.	Dr. H. H. Whitcomb—Physician in Charge.
			Dr. C. H. Mann.
	Jenkintown,	73.	Dr. W. B. Jameson—Physician in Charge.
	Pottstown,	106.	Dr. T. E. Wills—Physician in Charge.
Montour,	Danville,	28.	Dr. Geo. A. Stock—Physician in Charge.

DISPENSARY PHYSICIANS BY COUNTIES—Continued.

County.	Location.	No.	Attending Physicians.
Northampton,	Easton,	52.	Dr. E. M. Green—Physician in Charge. Dr. T. C. Zulick. Dr. W. P. Thompson. Dr. W. H. McIlhaney. Dr. J. E. Fretz. Dr. Quiney. Dr. Tillman. Dr. Morgenstern.
	Bangor,	87.	Dr. H. S. Sherrer—Physician in Charge.
		98.	Dr. W. L. Estes—Physician in Charge.
	South Bethlehem,		Dr. W. D. Chase.
Northumberland	Shamokin,	53.	Dr. R. H. Simmons—Physician in Charge. Dr. C. M. Malone.
	Mt. Carmel,	71.	Dr. W. T. Williams—Physician in Charge.
	Milton,	92.	Dr. R. B. Tule—Physician in Chage.
Perry,	New Bloomfield,	25.	Dr. A. R. Johnston—Physician in Charge.
Philadelphia,	Philadelphia,	21.	Dr. Alfred Stengel—Physician in Charge. Dr. A. P. Francine. Dr. Turnbull. Dr. George Wood. Dr. S. A. Mumford.
Pike,	Milford,	19.	Dr. Wm. B. Kenworthy—Physician in Charge.
Potter,	Coudersport,	27.	Dr. E. H. Ashcraft—Physician in Charge.
Schuylkill,	Pottsville,	66.	Dr. L. T. Kennedy—Physician in Charge.
	Shenandoah,	85.	Dr. H. M. Wasley—Physician in Charge.
	Tamaqua,	91.	Dr. E. E. Shifferstine—Physician in Charge.
Snyder,	Selinsgrove,	50.	Dr. F. J. Wagonseller—Physician in Charge.
Somerset,	Meyersdale,	30.	Dr. Chas. P. Large—Physician in Charge.
Sullivan,	Dushore,	59.	Dr. P. G. Biddle—Physician in Charge.
Susquehanna,	Montrose,	49.	Dr. J. G. Wilson—Physician in Charge.
	Susquehanna,	97.	Dr. S. Birdsall—Physician in Charge.
Tioga,	Tioga,	58.	Dr. S. P. Hakes—Physician in Charge.
	Wellsboro,	104.	Dr. Penrose W. Houser—Physician in Charge.
Union,	Mifflinburg,	29.	Dr. C. H. Dimm—Physician in Charge.
Venango,	Oil City,	32.	Dr. J. P. Strayer—Physician in Charge. Dr. Fannie Davis.
	Franklin,	72.	Dr. H. F. McDowell—Physician in Charge.
Warren,	Warren,	54.	Dr. M. V. Ball—Physician in Charge.
Washington,	Monongahela,	55.	Dr. C. B. Wood—Physician in Charge.
Wayne,	Honesdale,	18.	Dr. Harry B. Ely—Physician in Charge.
Westmoreland,	Greensburg,	57.	Dr. Idem M. Portser—Physician in Charge.
	Mt. Pleasant,	77.	Dr. M. W. Horner—Physician in Charge.
	Monessen,	88.	Dr. M. J. Cramer—Physician in Charge.
Wyoming,	Tunkhannock,	56.	Dr. B. E. Bidleman—Physician in Charge.
York,	York,	2.	Dr. J. S. Miller—Physician in Charge. Dr. Roland Jossop. Dr. B. F. Parker. Dr. J. H. Bennett. Dr. L. S. Weaver. Dr. H. D. Smyser. Dr. E. Meisenhelder. Dr. B. W. Shirey. Dr. L. M. Hartman. Dr. W. Clarkson Smith.
	Hanover,	86.	Dr. J. H. Bittinger—Physician in Charge. Dr. H. M. Alleman.

SKETCH OF A SCHEME OF TREATMENT.

Circular Addressed to Dispensary Physician.

1. Patient received, personal history, social history, etc., weight, height, pulse, respiration and temperature taken and recorded by assistant or nurse.

2. Careful physical examination by physician in charge of clinic.

3. Obtaining specimens of sputum, forwarding same to State Laboratory; containers supplied by Department.

4. Advice and prescription.

The intention of the Department is to give as little medicine as possible. Principal reliance must be placed upon fresh air, diet, and careful regulation of habits of life of the patient.

An exceedingly important feature of the work of the dispensary is the education of patients and their friends; the forcing upon them of a realization of the contagious nature of the disease and the duty incumbent upon each to do everything necessary to protect themselves and others.

A. Medicines, as little as possible; left to judgment of attending physician in each case.

B. Fresh air and rest. Require each patient to be as much in the open air as possible. Inquire into habit of sleeping; urge open windows; where possible, the swinging of a hammock out of doors; a bed on the porch; a cot in a tent. In daytime as many hours as possible out of doors. Where it can be done this time should be spent in a semirecumbent position and at rest; a steamer chair or hammock with a supply of blankets is an ideal equipment. The hammock is probably the cheaper and is as easily arranged as anything. It will require considerable urging and no little persistence on the part of physicians and nurses to prevail upon patients to take anything like as much fresh air as experience shows to be desirable. Stress must be laid upon the fact that if proper amount of body covering is provided there is no danger of "*catching cold.*" Too many people think that strenuous exercise is desirable; this is a fallacy to be earnestly combatted.

C. Diet. To a certain extent this must be regulated by the digestion of the individual. As a general rule the diet should be liberal and as nourishing as possible. Milk and eggs are important factors. Milk should be taken slowly and often, with a small amount of lime water added in order to prevent gastric disturbances. Eggs should be fresh and are best taken *raw*. Few patients will do this without urging, but seldom is there an instance where it is impossible. Few patients will consume sufficient milk and eggs without continual urging; and it will be found necessary to question each one closely upon each visit to the dispensary. Probably it will be found wisest to have patients take the milk and eggs at regular hours *between meals*.

In this way the amount of food will be most likely to be increased.

D. Habits of life, etc. These should invariably be investigated, and where irregular or erroneous, their correction urged. This must be repeated at frequent intervals. Among the most important features will be found:

1. As much rest and sleep as possible, not only at night but by day.
2. Avoidance of over-exertion at any time.

3. Avoidance of any exertion during presence of fever or exhaustion.

4. Regulation so far as possible of the exercise of the sexual functions. The attending physician is urged to investigate the habits of the unmarried as well as the married, as frequently there will be discovered the existence of habits which are reprehensible, physically as well as morally. The sexual instinct is proverbially excessive among consumptives. This is a delicate subject to handle and must be approached with tact. Experience shows that when properly approached no resentment will be excited.

5. Meals should be taken at regular hours.

6. The bowels should be kept regular.

7. The skin should be kept clean and its function active. Bathing should be regulated and friction with a coarse towel will be found valuable.

8. Clothing. Usually consumptives are too warmly clad; heavy flannel underwear supplemented by thick chest pads is a frequent occurrence in even warm weather. The evil effects of this continual over-clothing are so apparent that great care must be taken to give proper advice in every case. Probably few habits are so universal among consumptives as is this of over-clothing. Clothing should conform to the weather; too much or too little is equally bad. Patients must be warned to avoid *wet* feet.

9. Use of stimulants or narcotics. This should be particularly noted and cut to the lowest possible point. The dispensary cannot afford to waste effort and help upon those who decline to help themselves. Except in extreme cases stimulants are of little or no value, the effects in the long run being bad rather than good.

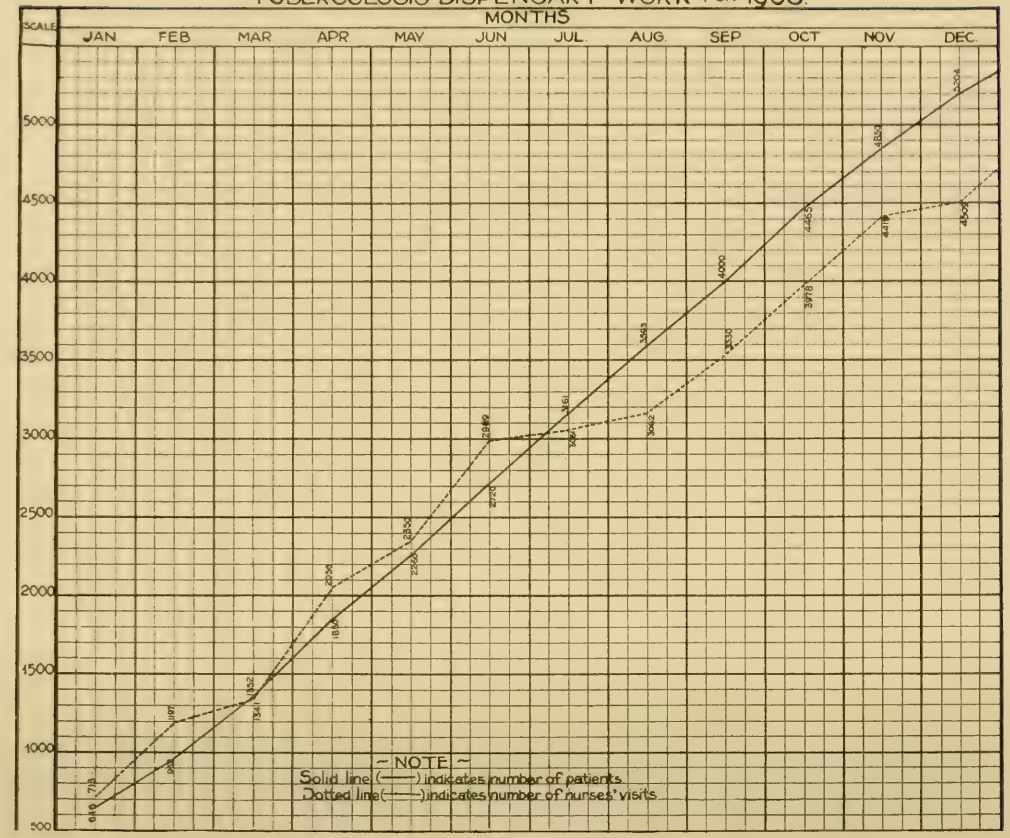
E. Education. Each person must be told that his or her disease is communicable, and that only care on his or her part will stand between those 'round about and the acquiring of the disease.

Close personal contact is dangerous; use of common towels must be avoided; a separate bedroom should be strongly urged, and under no circumstances should a consumptive be allowed to occupy the same bed with any other person. Instruction must be given as to the proper care and disinfection of clothing, bedding, eating utensils and all articles used by the patient. The proper disposal of *sputum* must be carefully explained; burning being the only sure road to safety. Kissing is a habit which is hard to regulate, but we do not do our duty if we fail to warn against it.

Members of the family are very much exposed to infection and any cough or loss of weight must receive attention. The dispensary is open for the examination of all such. In other words, the dispensary is founded as much with the idea of protection to the uninfected as for the curing of the infected.

CHART SHOWING

TUBERCULOSIS DISPENSARY WORK FOR 1908.



The statistical report on dispensary patients appended hereto, includes all patients examined from July 22, 1907, the date of opening of the first dispensary, up to and including December 31, 1908. Seventeen (17) dispensaries were opened during the year 1907. Fifty (50) dispensaries were opened between January 1, 1908, and June 1, 1908. Thirty-seven (37) dispensaries were opened between June 1, 1908, and December 31, 1908.

A few points of interest to which attention may be specially directed are as follows:

Of all applicants examined 71.8 per cent were found tuberculous.
50.2 per cent. patients were males.
49.8 per cent. patients were females.
48.8 per cent. patients married.
95.11 per cent. patients white race.
81.2 per cent. patients native born.
30.8 years average age of patients.

Of the 6,728 tuberculous patients, no less than 1,891 were women engaged in household duties; 701 were laborers, not including those engaged in agricultural pursuits; 199 were bookkeepers and clerks; 139 were textile mill and factory operatives; 299 were miners and quarrymen; 106 were farmers and farm laborers; 97.1 per cent. suffered from tuberculosis of the lungs. The average length of time under treatment was 4.87 months. 48.5 per cent. of the tuberculous patients reported that they had at some time been in direct contact with other tuberculous sufferers. The average family income per month was found to be $24.63. The average family was found to consist of 4.38 members, making the average per capita family income $5.60 per month.

Concerning the seat of the tuberculous lesions of the lungs, the following are the facts found:

The upper right lobe was the most frequent and was found in 5,095 patients. The upper left lobe was found involved in 3,498 cases. The middle right lobe was affected in 1,020 cases. More than one lobe was found involved in 4,756 and in 1,972 but one lobe was involved.

STATISTICAL REPORT ON DISPENSARY PATIENTS.

FROM JULY 22, 1907 (DATE OF OPENING), TO DECEMBER 31, 1908.

TOTAL EXAMINED,	9,363		
TOTAL TUBERCULOUS,	6,728	71.8%	
SEX:			
Male,	3,382	50.2%	
Female,	3,346	49.8	
CIVIL CONDITION:			
Married,	3,284	48.8%	
Single,	3,024	44.94	
Widowed,	283	4.1	
Divorced,	18	.2	
Not stated,	119	2.0	
RACE:			
White,	6,402	95.11%	
Black,	324	4.86	
Other,	2	.03	
NATIVITY:			
Native born,	5,467	81.2%	
*Russia,	220	3.2	(63.1% Hebrews.)
Ireland,	194	2.8	
England,	168	2.3	
Germany,	112	1.6	
Hebrews,	214	3.18	
Others,	379	5.6	
Not stated,	113	7.3	

AGES:		
—1,		
1—2,	6	
2—3,	14	
3—4,	22	
4—5,	36	
5—9,	305	
10—29,	3,215	
30—49,	2,436	
50—65,	524	
66—or over,	62	
Not stated,	108	Average age, 30.8 years.
OCCUPATIONS:		
Under occupational age,	819	
No occupation,	284	
Occupation not stated,	267	
PROFESSIONAL GROUP:		
Architects, artists and art teachers,	4	
Clergymen,	5	
Engineers and surveyors,	7	
Journalists,	1	
Lawyers,	0	
Musicians and music teachers,	3	
Physicians and surgeons,	2	
School teachers,	17	
Nurses and midwives,	16	
Students,	90	
Others,	23	168
CLERICAL AND OFFICIAL GROUP:		
Book-keepers, clerks and copyists,	199	
Collectors, agents and auctioneers,	16	
Stenographers and typewriters,	9	
Telegraph and telephone operators,	34	
Others,	4	262
MERCANTILE AND TRADING GROUP:		
Apothecaries and pharmacists,	3	
Commercial travelers,	30	
Merchants and dealers,	31	
Hucksters and peddlers,	37	
Others,	17	118
PUBLIC ENTERTAINMENT GROUP:		
Hotel and boarding house keepers,	12	
Saloon keepers, liquor dealers and bar tenders,	27	
Others,	27	66

*Russia and Hebrews: Duplication of 139 Hebrews born in Russia.

STATISTICAL REPORT ON DISPENSARY PATIENTS.—Continued.

PERSONAL SERVICE GROUP:			
Barbers and hairdressers,	27		
Janitors and sextons,	23		
Policemen, watchmen and detectives,	11		
Soldiers, sailors and marines,	1		
Others,	5	67	
LABORING AND SERVANT GROUP:			
Laborers (not agricultural),	701		
Servants,	198		
Laundresses,	42		
Housekeepers,	1,891	2,832	
MANUFACTURING AND MECHANICAL GROUP:			
Bakers and confectioners,	15		
Blacksmiths,	26		
Boot and shoe makers,	27		
Brewers, distillers and rectifiers,	2		
Butchers,	13		
Cabinet makers and upholsterers,	15		
Carpenters and joiners,	89		
Cigar makers and tobacco workers,	83		
Clock and watch repairers and jewelers,	3		
Compositors, printers and pressmen,	31		
Coopers,	9		
Engineers and firemen (not railroad),	24		
Glass blowers and glass workers,	19		
Hat and cap makers,	98		
Iron and steel workers,	95		
Leather makers,	49		
Machinists,	64		
Marble and stone cutters,	29		
Masons,	118		
Mill and factory operatives (textile),	139		
Millers (flour and grist),	22		
Painters and glaziers,	29		
Plasterers,	31		
Plumbers. gas and steam fitters,	87		
Tailors,	23		
Tinners and tinware makers,	10		
Artificial flower and paper box makers,	12		
Milliners,	13		
Others,	91	1,267	
AGRICULTURAL AND TRANSPORTATION GROUP:			
Boatmen and canalmen,	1		
Draymen, hackmen and teamsters,	54		
Farmers, planters and farm laborers,	106		
Gardeners, florists and nurserymen,	7		
Livery stable keepers and hostlers,	8		
Lumbermen and raftsmen,	3		
Miners and quarrymen,	249		
Sailors, pilots and fishermen,	7		
Stock raisers, herders and drovers,	2		
Steam railroad employes,	87		
Street railroad employes,	23		
Others,	32	579	
TUBERCULOSIS—FORM OF:			
Pulmonary,	6,534		97.1%
Non pulmonary,	57		
Not determined—under observation,	137		2.9%
CLASSIFICATION:			
Incipient and moderately advanced,	3,132		
Advanced,	2,429		
Far advanced,	990		
Not determined—under observation,	177	6,728	
CONDITION ON DISCHARGE:			
Disease arrested,	180		
Condition improved,	1,534		
Condition not improved,	808		
Deaths,	658		
Referred to sanatoria,	602		
One visit only,	693		
Other causes,	66	4,541	
LENGTH OF TIME UNDER TREATMENT:			
Less than 1 month,	1,036		
1—2 months,	580		
2—3 months,	731		
3—4 months,	850		
4—5 months,	738		
5—6 months,	538		

STATISTICAL REPORT ON DISPENSARY PATIENTS.—Continued.

6—7 months,	533	
7—8 months,	250	
8—9 months,	275	
9—10 months,	206	
10—11 months,	172	
11—12 months,	112	
Over 12 months,	707	Average 4.87 months.
CONDITION OF PATIENTS ON ROLL DECEMBER 31, 1908:		
Improved,	1,389	
Not improved,	436	
Stationary,	334	
Under treatment less than 1 month,	1,036	
Under observation—diagnosis not decided,	1,981	5,176
FAMILY HISTORY OF TUBERCULOSIS:		
None reported,	2,898	
Tuberculosis present,	3,830	
RELATIVES AFFECTED:		
Father,	834	
Brother,	860	
Paternal aunts,	401	
Paternal uncles,	279	
Paternal grand parents,	233	
Consort,	366	
Mother,	1,005	
Sisters,	960	
Maternal aunts,	402	
Maternal uncles,	267	
Maternal grand parents,	381	
Children,	271	
Consort's family,	237	
Relatives not stated,	363	
VARIETIES OF FAMILY TUBERCULOSIS:		
Lungs,	3,314	
Others,	46	
Not stated,	8	
CONTACT AS POSSIBLE SOURCE OF INFECTION:		
None known,	3,462	=51.5%
Family,	2,104	
Friends,	581	3,266=48.5%
Fellow workers,	474	
Others,	107	
DWELLING:		
Private house,	5,554	
Apartment,	314	
Tenement,	507	
Not stated,	353	
LENGTH OF OCCUPANCY:		
1 year or less,	3,463	
1—2 years,	789	
2—3 years,	542	
3—5 years,	348	
Over 5 years,	1,886	
TUBERCULOSIS FORMER OCCUPANTS:		
Yes,	398	
None known,	3,941	
Not stated,	2,399	
Destitute—less than $5,	1,702	
MONTHLY FAMILY INCOME:		
5—20 dollars,	1,170	
20—25 dollars,	444	
25—30 dollars,	497	
30—35 dollars,	371	
35—40 dollars,	825	
40—45 dollars,	189	
45—50 dollars,	501	
50—55 dollars,	111	
55—60 dollars,	259	
60—65 dollars,	56	
65—70 dollars,	63	
Over $70,	234	For 6,472 patients average family income, $24.63
Not stated,	256	

STATISTICAL REPORT ON DISPENSARY PATIENTS.—Continued.

NUMBER PERSONS IN FAMILY:

1,	801	
2,	746	
3,	1,012	
4,	1,066	
5,	947	
6,	724	
7,	483	
8,	341	
9,	211	
10,	83	Average family, 4.38.
More than 10,	96	Average monthly income
Not stated,	218	per capita—$5.60.

PHYSICAL MEASUREMENTS:

Height—			
Under 3 feet,	22	5 ft. 8 in.,	486
3 to 4 feet,	130	5 ft. 9 in.,	324
4 to 4 feet 6 inches,	274	5 ft. 10 in.,	253
4 ft. 6 in. to 5 ft.,	359	5 ft. 11 in.,	148
5 ft.,	247	6 ft.,	56
5 ft. 1 in.,	327	6 ft. 1 in.,	28
5 ft. 2 in.,	481	6 ft. 2 in.,	11
5 ft. 3 in.,	667	6 ft. 3 in.,	2
5 ft. 4 in.,	728	Over 6 ft. 3 in.,	
5 ft. 5 in.,	592	Not stated,	425
5 ft. 6 in.,	502	Average height, 5 ft. 3 1-3 inches.	
5 ft. 7 in.,	596		

SEAT OF LESION IN LUNGS:

Right Lung—		Left lung—	
Upper lobe,	5,095	Upper lobe,	3,498
Middle lobe,	1,020	Lower lobe,	422
Lower lobe,	322	Both lobes,	470
All lobes,	380	Not stated,	377

Note: Right lung, 3 lobes involved, cases are not included elsewhere. Same is true left lung, 2 lobes involved.

COMPLICATIONS:

Tuberculous—		Non Tuberculous—	
None stated,	6,002	None stated,	6,445
Nose and throat,	253	Nose and throat,	48
Other organs,	323	Heart,	152
		Stomach,	58
		Other organs,	396

HISTORY OF ANAL FISSURE:		HISTORY OF ANAL FISTULA:	
Present,	4	Present,	10
Absent or denied,	4,191	Absent or denied,	4,187
Not stated,	2,533	Not stated,	2,531

FORMS IN USE IN THE TUBERCULOSIS DISPENSARIES.

Form 101.

COMMONWEALTH OF PENNSYLVANIA,
DEPARTMENT OF HEALTH.

Application for Treatment Tuberculosis Dispensary No.....

To the Commissioner of Health:

I hereby make application for treatment for Tuberculosis. I am unable to pay for medical attention. I agree to comply with the instructions of the Department.

No. ..... Signed: .....

Date: .....190.. Address: .....

File this card at the Dispensary.

Form 102.

COMMONWEALTH OF PENNSYLVANIA.
DEPARTMENT OF HEALTH.

Dispensary No. .....Report. Month Ending .....20th 19.....

	Totals.	Color.		Sex.		Civil Condition.	
		W.	B.	M.	F.	M.	S.
Patients Admitted,							
From Previous Month,							
Discharged,							
Patients Remaining,							
Dischgd. Disease Arrested,							
Dischgd. Improved,							
Dischgd. Unimproved,							
Dischgd. Ref. to Sanatoria,							
Did not return after 1st Visit,							
Dischgd. Non-tuberculous,							
Dischgd. Ref. to Fam. Phys.,							
Deaths,							

	REMARKS
Return Visits,	
No. Wt. Increased,	
No. Wt. Unchanged,	
No. Wt. Loss,	
No. Taking Medicine,	
No. Nurses Visits,	
No. Exam'd for Sanatoria,	
No. Qts. Milk Ordered,	
No. Pats. Rec. Milk,	
No. Doz. Eggs Ordered,	
No. Pats. Rec. Eggs,	

Dates Disp. was open, _____

Physicians Attending and No. of days each, _____

Signed_____M. D.
Physician-in-Charge.

Reverse of Form 102.

This Space Reserved for Use at Department Headquarters.

Dispensary No._____at_____County of_____

Month ending, _____20th, 190_____

Date received, _____

Form 103.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

NEW PATIENTS.

Dispensary No. _____ Month Ending _____20th, 190..

Name	Address.	Age.	Date.	Classification.	Previous Institution, Date, Condition and Reason for Discharge.

Under classification indicate incipient, advanced, far advanced.

Signed_____Physician in Charge.

Form 104.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

PATIENTS DISCHARGED.

Dispensary No. ..... Month Ending .....20th, 190..

Name.	Address.	Age.	Date.	Condition.	Reason, Complications, etc.

Under condition state whether arrested, improved, unimproved, died.

Signed.....Physician in Charge.

Form No. 6 Dis.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

Tuberculosis Dispensary No. ..... at .....

County of ....

Name, ... Date, ...
Address, ... No. .....
Please call at Tuberculosis Dispensary of the .....
Department of Health, at .....
on ..... at .....to be examined for.....
admission to ..... Sanitorium.

Chief of Clinic.

BRING THIS CARD WITH YOU.

Form 108.

COMMONWEALTH OF PENNSYLVANIA.
DEPARTMENT OF HEALTH.

Rules to be observed by patients, nurses and attendants in the management of
PULMONARY TUBERCULOSIS (CONSUMPTION).

Never forget that Pulmonary Tuberculosis (Consumption) is an infectious disease and can be prevented.

All sputum must be collected and thoroughly disinfected, preferably by burning. If you are careless in this regard, you may reinfect yourself and will become a menace to others who may inhale the dust resulting from the dried sputum.

Do not spit on the floor or the sidewalk.

A pressed paper spit cup, or a paper cup held in a metal frame, should be used, and these cups must be burned after using.

If a china or earthen spit cup is used, keep lye or water in it all the time and scald it out once or twice daily.

Never spit in rags or handkerchiefs. Always carry with you a supply of paper napkins on which to wipe your mouth, or in which to spit in case of emergency. Carry a paper bag in which to place the soiled napkins and burn the bag, with its contents, at the end of the day.

Never swallow your sputum.

You should occupy a well-ventilated, sunny room, from which all unnecessary furniture, such as carpets and hangings, has been removed.

Always sleep with the windows open, but have them well screened so as to prevent the entrance of insects.

Sleep in a room by yourself, if possible. If not, have a separate bed.

Keep clean shaven, especially about the mouth, as the beard is usually infected and may be responsible for your reinfection.

Avoid getting sputum on the bed or body clothing, carpets or furniture, or in fact in any place where it may become dry. The outer covering on your bed should be of material that can be frequently washed and boiled.

Have your own individual towels, handkerchiefs and toilet articles.

Handle the soiled bed and body linen, particularly handkerchiefs, as little as possible. Place such articles in water containing Chlorinated Lime, in the proportion of one quarter pound to eight gallons of water, until ready to be washed.

Never use a broom or dry duster in your room. Cleansing, except for metal fixtures, should be done with a cloth moistened in a solution made by dissolving eight Bichloride of Mercury tablets in every gallon of water used.

Since Bichloride of Mercury is very poisonous when taken internally, bottles containing it should be plainly labeled "Poison," and placed beyond the reach of children.

Never kiss anyone upon the mouth. It would be better to avoid this practice entirely as well as handshaking.

Always wash your hands thoroughly and clean your finger nails before eating.

Remember that rest, fresh air, sunlight, and good food, are essential to your improvement.

Take medicine only upon the advice of a physician. Good digestion is one of the greatest implements in the fight against tuberculosis. It is often destroyed by the use of patent medicines which frequently rob the patient of his last chance of recovery.

Live in the open air during winter and summer as much as possible. Avoid dust and smoke.

Those suffering from tuberculosis should not follow any occupation which requires the handling of food stuffs.

Dress consistently with the season. Avoid chest protectors and tight clothing, particularly corsets. Keep your feet dry and warm at all times.

Take exercise only upon the advice of a physician and then never to the extent of fatigue.

Go to bed early so as to get rest and if possible sleep at least eight hours.

Keep your body clean, take a warm bath at least once a week and be sure to rinse the body thoroughly of soap used in bathing. Never take cold douches or cold baths except by direction of a physician.

Do not eat when physically or mentally tired, or when excited. All meals should be preceded and followed by a period of rest in bed, or in a reclining chair.

Rinse your mouth before meals.

Eat plenty of good wholesome food at meal time, supplementing this with milk and eggs as directed by a physician.

Eat slowly, chew your food well and avoid anything which causes indigestion.

Sweet meats and pastry are especially to be avoided.

The teeth and mouth should be kept in good condition, by the use of a tooth brush, especially at bed time and upon rising in the morning. Always disinfect your toothbrush after using and never keep it where it will come in contact with a brush used by any one else.

The use of wines, liquors and tobacco, is prohibited except by order of a physician.

See that your bowels move regularly every day.

Whenever you have a temperature which is 99.5 degrees, diarrhoea or reddish expectoration, you should remain in bed.

If you should have a hemorrhage, keep as quiet as possible and send for a physician.

At all times endeavor to control your cough as much as possible, but when you are obliged to cough cover your mouth with a paper napkin.

Under all circumstances obey the instructions of your physician minutely, and if there is any doubt in your mind as to what you ought to do, consult him.

In order to prevent others contracting the disease, your room should be disinfected before being used by another person. You are therefore requested to send word to the Township Health Officer upon removal, in order that the work of disinfection may be done by the department.

Sputum cups, paper napkins and bags, are supplied to patients attending State Dispensaries.

If attending the Dispensary, regular visits will be required until discharged by the physician in charge.

SAMUEL G. DIXON, M. D.
Commissioner of Health.

FORM 109.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

HISTORY AND EXAMINATION.

TUBERCULOSIS DISPENSARY NO....

No. ..... Date .....

Name, ...Age.....S. M. W. D. Sep. Race,.....Country Nativity.....

Address .....Occupation (usual) .....

Diagnosis .....Classification ..... Prognosis .....

Form 109 Continued.

Complications: (Tuberculous) .....(Non-tuberculous) .....
Referred by .....Examining Physician .....
Discharged .....Reason .....Condition .....
(Date.)

NOTE:—Leave no blanks, strike out terms which do not apply.

FAMILY HISTORY OF TUBERCULOSIS.

Connect relative with type of disease by line—if suffereing from, place (H. T.) or if died from put date opposite letters.

F.	Lungs	M.
B.	Glands	S.
P. A.	Bones	M. A.
P. U.	Joints	M. U.
P. G-F.	Skin	M. G. F.
P. G-M.	Meninges	M. G-M.
Consort	Marasmus	Children

Consort's family .....How long married .....
Children living, ...Children dead, ...

ENVIRONMENT.

Contact { Friends ..... / Work ..... / Other .....
Dwelling { Private house ..... / Apartment ..... / Tenement .....
No. sleeping rooms, ...No. occupants, ...
Patient occupies separate bed, ...Separate room, ...
How long in present dwelling, ...
History of Tuberculosis in former occupants, ...
Alcohol: (Non. Mod. Exc.) Tobacco: (Non. Mod. Exc.) Drugs: .....
Sputum: how collected .....disposed of .....
Family income per mon. $.....Sick benefits, $.....
Insurance per mo. $.....Rent per month, $.....
No. in family .....No. to support .....
Stopped former work, ...
(Date.)
Present occupation, ...
Place employed, ...
Employer, ...

PREVIOUS HEALTH.

Up to adolescence, ...Since .....
Diphtheria .....Rheumatism .....
(Date.) (Date.)
Pneumonia .....Pertussis, ...
(Date.) (Date.)
Influenza .....Pleurisy .....
(Date.) (Date.)
Measles .....Typhoid fever .....
(Date.) (Date.)

Frequent colds ..... Frequent sore throat .....
Injuries { Nose .....
or { Throat .....
Operations { Chest .....
Mouth breather ..... Miscarriage .....

PRESENT ILLNESS.

Began ..... With .....
Onset probable from history and examination .....
Probable beginning .....
Cough ..... When most severe .....
Sputum: Amount ..... character .....
Blood streaked sputum first .....
Hemorrhage first ..... Amount .....
Recurrences .....
Fever first observed ..... frequency.....
Chills first observed, ... frequency.....
N. Sweats first observed ..... frequency.....
Weight: first observed loss ..... Amount.....
Pain: location ..... character.....
Dyspnoea ..... When most severe.....
Hoarseness ..... Deafness .....
Appetite, ... Digestion .....
Bowels: Movements daily ..... Character .....
Micturition: frequency ..... pain .....
Up at night ..... Menses .....

PHYSICAL EXAMINATION.

Height ..ft. ..in. Weight....lbs. Highest .....lbs.....Lowest.....lbs.....
Development ..... Nourishment ..... Color .....
Eyes: Color .....Pupils .....Reaction to light .....to distance.....
Tongue .....Teeth .....Gums .....Uvula .....
Naso-pharnyx: Septum .....Turbinates .....Tonsils .....
Fingers: Clubbed .....Cyanotic .....Contractures .....
Glands: Hyperotrophy of: Cervical .....Axilary.....Inguinal .. ..
Thorax: Shape ..... Symmetry .....
Diameters: 6th Dorsal Spinous process to midsternum opposite junction of 4:h rib ..... inches
Transverse; at highest points of axilae ..... inches
Circumberence: full expiration .....inches: full inspiration .....inches
Atrophy of scapular muscles R .....L.....R. Handed .....
Depressions above clavicles R .....L.....L Handed.....
Heart: Apex (location) ..... 1st sound .....
2nd Pulmonic .....2nd Aortic .....
Murmurs ..... Transmission .....
Lungs: .....
Abdomen: .....
Stomach: .....
Liver: .....
Spleen, ...
Pulse: Volume .....Tension .....Rythm .....Rate.....
Blood pressure: Systolic .....m. m. Diastolic .....m. m. Arteries .....

Extremities ..... Successfully vaccinated .....
History of evidence of syphillis, ...
History or evidence of anal fissure, ...fistula .....
History or evidence of nervous or mental diseases .....
Formerly treated at .....Sanatorium, Hospital or other Institution.
Date of Dicharge .....190..How long an inmate .....
Condition on Discharge, ...
On Admission T..P..R..On discharge..T..P..R..Weight....Gain....Loss....
Conduct .....

Form 110.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

NURSES REPORT.

TUBERCULOSIS DISPENSARY NO....

No. ..... Date .....
Name .....Age, ...Country Nativity .....
Address .....Occupation (usual) .....
Place of employment .....
Member of family or boarder .....Name of head of household .....
Number of inmates of house .....How long has patient been an inmate of present house? .....
Address of last previous place of residence .....
Means of support: .....
No. of wage earners in family.....Who are they? .....
Usual weekly income $....Present weekly income $....No. of people supported ....
Is patient able to work?....If so, what proportion of usual wages can he earn? ....
If unable to work, give date of last employment.....Place .....
Does patient (or family) receive financial aid from any source? .....
If so, state amount and source .....
Are milk and egg supplies needed? .....If so, which? .....
Any other supplies urgently needed, and what? .....
General cleanliness .....Good.....Indifferent.....Bad.....
Does patient occupy seperate bedroom? .....Separate bed .....If not, with whom does patient share room or bed ....How many rooms in house? .....
Give approximate size of patient's bedroom....Number of windows in patient's bedroom, ...
What, if any, business is carried on from the premises? .....
General condition of family health—Robust. Fair. Poor.
Any invalids in addition to patient .....If so, how many? .....
Any suspicion of tuberculosis in any one in addition to patient .....

Names.	Ages.	Disease.	Duration of Illness.
.....			
.....			
.....			

Remarks: Note any particulars likely to be of interest if not elsewhere brought out.
.....
.....
.....
Date .....
Signature .....
(Health Officer or Nurse.)

Form 115.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

TUBERCULOSIS DISPENSARY NO.....

At ..... County of .....

RECORD OF TREATMENT AND CONDITION.

Name ..... No. .....

Date.	P. R. T.	Wt.	Taken Daily: Milk.	Taken Daily: Eggs.	Digestion.	Bowels.	Medicines prescribed.	Sputum examined.	Physical examination.	Remarks. (Note progress of case.)

Form 116.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

TUBERCULOSIS DISPENSARY NO.....

At ..... County of .....

M ..... No. .....

Examined for admission to Sanatorium

.....he is in { incipient / advanced / far advanced } stage

Report forwarded to .....

..... M. D.

Physician in Charge.

Date.....190 .

Form 117.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

SAMUEL G. DIXON, M. D., Commissioner.

MILK ORDER.

No. ..... Tuberculosis Dispensary No. .....

To ..... At ..... St.

....Town.

Date .....

Please deliver to each person named below One Quart of milk per day for fourteen days only at cents per quart.

Begin 19 , End 19 .

NAME.	ADDRESS.	REMARKS.
		Dealer will specify number of quarts actually delivered in each instance.

This order must accompany bill when rendered. No bill honored for any amount other than called for in above order.

(Signed) .....M. D.

Physician in Charge.

Form 117 B.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

SAMUEL G. DIXON, M. D., Commissioner.

EGG ORDER.

No. ..... Tuberculosis Dispensary No. .....

To ..... At ..... St.

....Town.

Date .....

Please deliver to each person named eggs per day as specified below for fourteen days only at cents per dozen.

Begin 19 , End 19 .

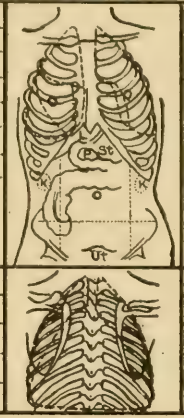
NAME.	ADDRESS.	REMARKS.
		Dealer will specify number of eggs actually delivered in each instance.

This order must accompany bill when rendered. No bill honored for any amount other than called for in above order.

(Signed) .....M. D.

Physician in Charge.

Form 119 NAME No.

INSPECTION	RESONANCE	TAC. FR.		TAC. FR.	RESONANCE	INSPECTION
	Outline Liver, Spleen, Stomach, Colon.				Record here extent of involvement.	

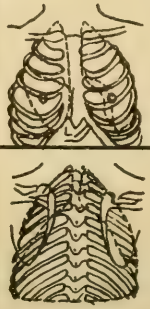
BREATHING	RALES	V.R.	WH. PECT.		WH. PECT.	V.R.	RALES	BREATHING
								

Chart for Recording Physical Signs.

NOSE, THROAT AND EAR.

Prognosis of Local Condition: Name:
Effect on General Health: Date:
Diagnosis: Examined by Dr.

HISTORY.

Chief Complaint:
Nasal Respiration:
Nasal Discharge:
Pain { Head: / Face: / Ears:
Nasal Subjective Symptoms:
Pharyngeal Subjective Symptoms:
Hoarseness:
Odynphagia: Deafness:
Aphonia: Tinnitus:
Dysphonia: Otorrhea:

Epiglottis:
Aryepiglottidean Fold { Left: / Right: Arytenoid Cartilages { Left: / Right:
Interarytenoid Fold: Posterior Commissure:
Ventricular Bands { Left: / Right: Vocal Cords { Left: / Right:
Anterior Commissure: Trachea:
Ulceration { Deep: / Superficial: Infiltration
Congestion:
OEdema:
Left Ear:
Right Ear:

Form 120.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

Identification Card Tuberculosis Dispensary No. .....

Name .....

Address .....

Date ..... No. .....

Days ..... Hours .....

ALWAYS BRING THIS CARD.

31—17—1908

Form 121.

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

Index Card. Tuberculosis Dispensary No. .....

Name, ...No. .....
Address, ... County of .....
M. S. W. D. Sep. Age .....years Color ....
Applied, ...190 . Classification .....
Discharged, ...190 . Condition, ...
Friend or Relative, ...
Address, ...
Examined by Dr. .....
Visited by .....

Form 113.

DAILY REPORT OF HOURS.

CONSUMED IN DISPENSARY WORK.

Dispensary No. .....

Month Ending.....20th, 19.....

Doctors.	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Signed.....
Physician in Charge.

TOTAL WORK OF THE DISPENSARIES FOR THE YEAR ENDING DECEMBER 20, 1908.

1908.	January.			February.			March.			April.			May.			June.			July.		
	M.	F.	T.	M.	F.	T.	M.	F.	T.	M.	F.	T.	M.	F.	T.	M.	F.	T.	M.	F.	T.
Admitted,	249	158	407	285	193	478	325	263	588	395	342	737	356	328	684	405	389	194	370	395	765
Ford from prev. month,	173	180	353	353	293	646	544	418	962	739	613	1,352	976	874	1,850	1,180	1,080	2,260	1,389	1,332	2,721
Discharged,	69	45	114	94	68	162	130	68	198	158	81	239	152	122	274	196	137	333	197	127	324
Remaining,	353	293	646	544	418	962	739	613	1,352	976	874	1,850	1,180	1,080	2,260	1,389	1,332	2,721	1,562	1,600	3,112
Discharged: Case arrested,	1	1	2	1	3	4	1	3	4	10	7	17	11	10	21	6	4	10	14	2	16
Discharged: Improved,	13	10	23	11	17	28	20	12	32	25	10	35	25	23	48	42	28	70	38	28	66
Discharged: Unimproved,	19	6	25	11	12	23	30	20	50	27	22	49	36	29	65	59	60	119	65	40	105
Discharged: Ref. to San.,																1		1			
Discharged: One visit only,	6	9	15	3	5	8	8	1	9	7	3	10	5	3	8	1	1	2	1	1	2
Discharged: Non-tuberculous,	16	14	30	54	21	75	59	27	86	58	27	85	58	43	101	51	31	82	41	42	83
Discharged: Ref. to form. phys.,										1		1				2		2			
Deaths,	14	5	19	14	10	24	12	5	17	30	12	42	17	14	31	34	13	47	38	14	52
Return visits,			726			1,095			1,374			2,170			2,609			3,485			3,143
Weight increased,			155			291			381			534			605			801			802
Weight unchanged,			187			360			287			514			769			704			871
Weight, loss,			64			165			182			305			450			566			643
Taking medicine,			233			305			398			557			595			703			816
Nurses visits,			713			1,197			1,341			2,056			2,350			2,989			3,061
Ex'd for sanatoria,			46			36			54			43			72			73			28
Quarts milk,			6,092			8,367½			9,168½			17,292½			21,577			26,662			33,721
Dozen eggs,			466 1-3			1,197¾			1,761½			3,227			4,226 5-6			5,193 5-6			4,819 11-12
Days open,			241			293			1,312			453			502			553			538

TOTAL WORK OF THE DISPENSARIES FOR THE YEAR ENDING DECEMBER 20, 1908—Continued.

1908.	August.			September.			October.			November.			December.			Total.
	M.	F.	T.	M.	F.	T.	M.	F.	T.	M.	F.	T.	M.	F.	T.	
Admitted,	362	437	799	373	381	754	386	468	854	422	425	847	487	496	983	8,690
Ford from prev. month,	1,562	1,600	3,112	1,730	1,864	3,594	1,911	2,090	4,001	2,098	2,366	4,464	2,263	2,585	4,848	353
Discharged,	194	173	367	192	155	347	199	192	391	257	206	463	327	302	629	3,841
Remaining,	1,730	1,864	3,594	1,911	2,090	4,001	2,098	2,366	4,464	2,263	2,585	4,848	2,423	2,779	5,202	5,202
Discharged: Case arrested,	1	2	3	1	0	1	2	-----	2	13	7	20	4	2	6	106
Discharged: Improved,	39	53	92	64	54	118	54	49	103	98	65	163	132	125	257	1,035
Discharged: Unimproved,	79	31	110	61	46	107	52	42	94	54	44	98	81	56	137	982
Discharged: Ref. to San.,	-----	-----	-----	1	0	1	3	1	4	5	-----	5	5	4	9	20
Discharged: One visit only,	5	14	19	-----	1	1	-----	-----	-----	-----	-----	-----	-----	1	1	75
Discharged: Non-tuberculous,	47	47	94	40	34	74	53	69	122	54	58	112	73	94	167	1,111
Discharged: Ref. to form. phys.,	3	4	7	-----	2	2	2	6	8	-----	1	1	4	1	5	26
Deaths,	20	22	42	25	18	43	33	25	58	33	31	64	28	19	47	486
Return visits,			3,962			4,532			4,788			5,272			5,463	38,619
Weight increased,			983			1,267			1,646			1,666			1,721	--------
Weight unchanged,			883			1,000			1,189			1,129			1,279	--------
Weight, loss,			647			500			507			472			636	--------
Taking medicine,			899			1,102			1,049			1,063			1,199	--------
Nurses visits,			3,162			3,530			3,978			4,419			4,509	33,305
Ex'd for sanatoria,			60			56			91			136			119	814
Quarts milk,			44,236½			40,367			53,770½			62,031			62,533	385,818½
Dozen eggs,			5,546 5-6			6,022 7-12			6,893 1-6			7,548 5-6			7,497½	54,403 1-12
Days open,			593			578			605			617			680	5,965

DESCRIPTIVE CATALOGUE

THE EXHIBIT OF THE

STATE DEPARTMENT OF HEALTH

Of Pennsylvania

AT THE

International Congress on Tuberculosis

WASHINGTON, D. C.

SEPTEMBER 21 TO OCTOBER 12, 1908

By the authority of

HIS EXCELLENCY, EDWIN S. STUART

Governor of the Commonwealth

SAMUEL G. DIXON, M. D., Commissioner of Health

OUTLINE.

The present plan of the State governmental anti-tuberculosis work in Pennsylvania which has been made possible by the liberal appropriation of the Legislature in 1907, with the approval of His Excellency, the Governor, and the details of which are illustrated in this exhibit may be summarized under the following headings:

1. The collection and tabulation of statistics relating to tuberculosis, through official morbidity and mortality reports of each individual case.

2. The establishment of one or more sanatoria for the treatment of incipient cases, including infirmaries for advanced and hopeless cases.

3. The establishment of dispensaries in each county of the State for the care of cases which can not avail themselves of sanatorium treatment, including home visitations and the study of occupational conditions.

4. The maintenance of pathological laboratories for the free examination of sputum and tuberculous lesions, and biological laboratories for the possible development of immunitive and curative products.

5. The restriction of tuberculosis by the disinfection of rooms, buildings (private and public), conveyances and carriers, and by supervision and regulation over the general avenues of infection.

6. The dissemination of knowledge relative to the communicability, care and prevention of tuberculosis.

EXHIBIT NO. 1.

CHART SHOWING THE NUMBER OF DEATHS FROM TUBERCULOSIS AS COMPARED WITH OTHER PRINCIPAL CAUSES OF DEATHS FOR THE YEAR 1907.

The total number of deaths from tuberculosis in all forms was 10,825 and, as shown on the chart, no other single affection contributed so extensively to the death rate.

The registration of vital statistics throughout the entire State of Pennsylvania was commenced January 1, 1906, and therefore, no reliable data for individual years exist prior to that time. The deaths from tuberculosis in 1907, compared with the deaths in 1906, are as follows:

1906	10,780
1907	10,825

The rates per 100,000 of population for the corresponding periods are as follows:

1906	155.5
1907	154.0

The forms of tuberculosis represented in the total and the number of deaths credited to each form are as follows:

Lungs	9,317
Larynx	99
Meninges	525
Abdomen	451
Pott's Disease	82
Abscess	10
White Swelling	41
Other Forms	107
General	193

EXHIBIT NO. 2.

MAP OF PENNSYLVANIA SHOWING THE DEATH RATE FROM TUBERCULOSIS PER 100,000 OF INHABITANTS FOR EACH COUNTY, AND BY SHADED AREAS THE COMPARATIVE RATES ACCORDING TO FOUR PRINCIPAL GROUPS, VIZ:

Under 100, per 100,000.
100 to 125, per 100,000.
125 to 150, per 100,000.
Over 150, per 100,000.

When this exhibit is studied in connection with Exhibit No. 7, which contains the population for each county, it will be noted that with few exceptions the highest death rates correspond to the areas with the greatest density of population. Franklin county with a low density and high death rate contains the State Sanatorium for tuberculosis which necessarily adds to the deaths. Aside from this, however, there is a tendency not only in this but in some other mountainous counties to intermarry, with a consequent physical deterioration which predisposes to tuberculosis. The high rate of Montour, a county small in area, is due to the inclusion of a State Insane Asylum with a high tuberculosis death rate.

The relatively high rates of Pike, Montour and Wayne are due to the large number of tuberculosis persons who seek the mountains of this section for purpose of cure, many of whom come from New York City. Luzerne county is the seat of the "Free Hospital for Consumptives" at White Haven, and Carbon county contains a number of small private sanatoria.

EXHIBIT NO. 3.

CHART SHOWING THE DEATHS FROM TUBERCULOSIS BY AGE PERIODS.

The impressive feature of this chart is the fact that tuberculosis finds the greatest number of its victims in early adult and middle life, the most productive and, therefore, the most valuable period.

EXHIBIT NO. 4.

CHART SHOWING THE ANNUAL COST OF TUBERCULOSIS TO THE STATE AND TO THE PEOPLE THEREOF.

In computing the cost of tuberculosis each life has been estimated at three thousand dollars. The loss of earning power of the living cases has been estimated at seven and one-half dollars per week for one year; the expenditure attendant upon treatment and burial of each dying case at one hundred dollars; and the expenditure for special foods, medicines, medical attendants and nursing of each living case at fifty dollars. To these amounts has been added the actual money appropriated by the State and its municipalities, to be devoted exclusively to tuberculosis work, but no account has been taken of private contributions for such work.

When it is considered, as shown in Exhibit No. 3, that the greatest number of deaths from tuberculosis occur in early adult and middle life, the economic value ($3,000.00) placed upon each death is very conservative. The majority of sociologists are inclined to place this figure higher ($5,000.00).

EXHIBIT NO. 5.

CHART SHOWING THE AMOUNT APPROPRIATED BY THE STATE OF PENNSYLVANIA EXCLUSIVELY FOR TUBERCULOSIS WORK FROM 1893 TO THE PRESENT TIME.

The year 1893 marks the date of the first State appropriation for tuberculosis work. The amounts appropriated at each biennial session of the Legislature since that date and the institutions receiving the same are as follows:

1893—Rush Hospital for the Treatment of Consumption and Allied Diseases, ... $10,000.00

1895—Rush Hospital for the Treatment of Consumption and Allied Diseases, ... $10,000.00

1897—Rush Hospital for the Treatment of Consumption and Allied Diseases, ... $10,000.00

1899—Rush Hospital for the Treatment of Consumption and Allied Diseases, ...$10,000.00
1901—Rush Hospital for the Treatment of Consumption and Allied Diseases, ...$10,000.00
Free Hospital for Consumptives, White Haven, ...$50,000.00
1903—Rush Hospital for the Treatment of Consumption and Allied Diseases, ...$47,000.00
Free Hospital for Consumptives, White Haven, ...$115,000.00
State Forestry Commissioner, ...$8,000.00
1905—Rush Hospital for the Treatment of Consumption and Allied Diseases, ...$50,000.00
Free Hospital for Consumptives, White Haven, ...$70,000.00
State Forestry Commissioner, ...$15,000.00
1907—Rush Hospital for the Treatment of Consumption and Allied Diseases, ...$50,000.00
Free Hospital for Consumptives, White Haven, ...$70,000.00
Pittsburg Sanatorium, ...$15,000.00
Grand View Sanatorium, ...$7,000.00
West Mountain Sanatorium, ...$5,000.00
State Department of Health, ...$1,000,000.00

EXHIBIT NO. 6.

MAP OF PENNSYLVANIA SHOWING THE DIVISIONS OF THE STATE INTO SEVEN HUNDRED AND THIRTY-THREE SANITARY DISTRICTS.

In each sanitary district a Health Officer is maintained by the State to whom cases of communicable disease, including tuberculosis, are reported by physicians. These officials disinfect premises occupied by tuberculosis sufferers or in which patients have died from tuberculosis; also school-rooms and other public places frequented by them.

The care and management of every case of communicable disease occurring outside the limits of incorporated municipalities devolves upon the State Department of Health. A County Medical Inspector is in direct supervision over the work of the Health Officer in each county of the State.

EXHIBIT NO. 7.

MAP OF PENNSYLVANIA SHOWING THE LOCATION OF DISPENSARIES FOR THE FREE TREATMENT OF TUBERCULOSIS IN EACH OF THE SIXTY-SEVEN COUNTIES, EMBRACING AN AREA OF 46,017 SQUARE MILES AND A POPULATION OF 6,928,575.

The first dispensary was opened July 22, 1907, at Wilkes-Barre, and the last at Greensburg, June 2, 1908. As noted, the number of cases under treatment during July 1908, was 3,472. Each dis-

pensary is in charge of a chief physician, from one to thirteen assistants, one to five nurses according to the number of patients under treatment, and is open at convenient hours, day or evening, to accommodate the occupational demands of those who are able, or who are compelled to work. The location has been determined with a view of reaching the most populous centers. The great object of the dispensary is to reach each individual indigent case of tuberculosis, and by competent medical advice, treatment and supervision ameliorate or entirely relieve their physical condition, and at the same time educate them as to the communicable character of their disease to the end that others may not become infected through ignorance or carelessness. The dispensary nurses are required to make visits to the homes of dispensary patients and advise as to the methods of personal hygiene and home sanitation; instruct non-affected persons of the household as to the dangers, and how to avoid infection; to spread the doctrine of fresh air, sunlight, rest, proper foods, temperate habits and obedience to the instructions of the medical advisors; at the same time discover unsuspected cases. 3,006 such visits were made by dispensary nurses during July, 1908. The occupational pursuits of those who are compelled to work are likewise investigated, and visits are paid to factories and workshops where consumptives are employed, in order that unhygienic surroundings may be bettered, and the safety of co-workers as well as the users or consumers of the manufactured products be preserved.

It is from these dispensary patients that the inmates of the State Sanatorium are largely recruited.

The equipment of the dispensary consists of a suite of rooms centrally located, and supplied with only such furniture as is absolutely necessary for the work to be done. The rooms vary in number according to the number of patients under treatment, and their arrangement must conform with modern sanitary ideas, no pains being spared to keep them in such a condition of cleanliness as to furnish an object lesson to all who may visit the dispensary. The furniture consists of a filing cabinet, tables, chairs, examining stools, couch, scales, toilet set and a few instruments for measurements of the chest and simple examinations of the nose and throat. It is of simple, plain design, and was selected with a view to efficiency and economy.

Dispensary records are kept upon blank forms provided by the Department, and frequent inspection by an officer from Department Headquarters insures proper recording of the desired information. The inspecting officer also pays careful attention to the physical and sanitary condition of the dispensary rooms.

In all the larger dispensaries the "Class System" has been inaugurated. Under this system classes are organized among the patients, each of which contains not over twenty-five members. The number of classes varies, being governed by the needs of the individual dispensary. The classes meet at regular intervals, some weekly but usually every two weeks. The members are instructed to take and record their own temperature, pulse and respiration. This they do as frequently as the class leader may direct. Not only do the patients record these particulars but they are also instructed to make careful notes of their condition, feelings and actions. Memorandum books are supplied for this purpose.

At the class meeting patients are encouraged to converse among themselves and compare notes as to their experiences. The note books are submitted to the inspection of the class leader, who carefully reviews each one. Faults are pointed out, and misfortunes discussed, with a view of avoiding their repetition and minimizing unfavorable consequences. Often the ingenuity of one patient will be of great assistance in solving the difficult problem of another. Patients are weighed and the result commented upon.

Indigent dispensary patients are supplied with nitrogenous food stuffs. In addition to food supplies the dispensaries furnish liberal quantities of paper napkins and bags, pressed paper sputum cups for use in tin forms, and pocket cuspidors.

Earnest effort is made through the dispensaries to educate the people in each community to a sense of the value of thorough room disinfection. The Department's Health Officers, of whom there are over seven hundred districted throughout the State, are instructed in the work of disinfection and supplied with the necessary equipment. A postal card sent to any Health Officer will secure his speedy attention. Not only the dispensary physicians, but every practitioner in Pennsylvania is provided with a list of the names and addresses of the Health Officers located in his own and adjoining counties. That the people are becoming aroused to the protection offered them by this procedure is evident from the continually increasing number of requests for disinfection that are pouring in upon the Department of Health and its officers.

In a number of instances the members of the staff, at a particular dispensary, have associated themselves together as a society for the better study of their cases. This action has occurred in no less than nine different counties, and in a number of these the societies meet not only for discussion and study by the members themselves, but other physycians not connected with the dispensary are invited to be present at the meetings and to take part in the work of the society. The spirit of friendship thus fostered among the physicians of a community is of value beyond question, not only to the physicians themselves, but to the community at large.

DIRECTORY OF TUBERCULOSIS DISPENSARIES WITH MEDICAL ATTENDANTS.

County.	Location.	Attending Physician.
Adams,	Gettysburg,	Dr. J. R. Dickson, Chief.
Allegheny,	Pittsburg,	Dr. S. M. Rinehart, Chief.
		Dr. J. F. Edwards.
		Dr. I. H. Alexander.
		Dr. F. D. Stolzenbach.
		Dr. Samuel Hamilton.
		Dr. Geo. J. McKee.
		Dr. G. H. Boyd.
		Dr. J. M. Long.
		Dr. C. W. Sample.
		Dr. Warren Shepard.
		Dr. Nelson Clark.
		Dr. Watson Marshall.
		Dr. G. A. Dillinger.
Armstrong,	Kittanning,	Dr. T. N. McKee, Chief.
Beaver,	Rochester,	Dr. E. S. H. McCauley, Chief.
		Dr. J. D. Armstrong.
Bedford,	Everett,	Dr. W. de la M. Hill, Chief.
Berks,	Reading,	Dr. Israel Cleaver, Chief.
		Dr. Freemont Frankhauser.
Blair,	Altoona,	Dr. J. D. Findley, Chief.
		Dr. E. B. Miller.
Bradford,	Towanda,	Dr. S. M. Woodburn, Chief.
Bucks,	Doylestown,	Dr. I. S. Plymire, Chief.
Butler,	Butler,	Dr. H. D. Hockenberry, Chief.
		Dr. T. N. Maxwell.
Cambria,	Johnstown,	Dr. W. E. Matthews, Chief.
		Dr. J. McAneny.
Cameron,	Emporium,	Dr. H. S. Falk, Chief.
		Dr. W. H. Bush.
Carbon,	Mauch Chunk,	Dr. J. K. Henry, Chief.
Centre,	Bellefonte,	Dr. G. F. Harris, Chief.
Chester,	West Chester,	Dr. Jos. Scattergood, Chief.
Clarion,	Clarion,	Dr. J. T. Rimer, Chief.
Clearfield,	Clearfield,	Dr. S. C. Stewart, Chief.
Clinton,	Lock Haven,	Dr. R. B. Watson, Chief.
Columbia,	Berwick,	Dr. S. B. Arment, Chief.
		Dr. Jos. Cohen.
Crawford,	Meadville,	Dr. J. K. Roberts, Chief.
		Dr. W. E. Hyskell.
Cumberland,	Carlisle,	Dr. H. B. Bashore, Chief.
		Dr. R. Plank.
Dauphin,	Harrisburg,	Dr. Paul A. Hartman, Chief.
		Dr. J. W. Ellenberger.
		Dr. C. R. Phillips.
Delaware,	Chester,	Dr. R. S. Maison, Chief.
		Dr. E. S. Haines.
		Dr. J. Wm. Wood.
Elk,	Ridgway,	Dr. J. E. Rutherford, Chief.
Erie,	Erie,	Dr. J. W. Wright, Chief.
		Dr. W. R. Hunter.
		Dr. G. A. Reed.
		Dr. D. V. Reinoehl.
		Dr. A. H. Roth.
Fayette,	Uniontown,	Dr. O. R. Altman, Chief.
Forest,	Tionesta,	Dr. F. J. Bovard, Chief.
Franklin,	Chambersburg,	Dr. H. X. Bonbrake, Chief.
Fulton,	McConnellsburg,	Dr. J. W. Mosser, Chief.
Greene,	Waynesburg,	Dr. J. T. Iams, Chief.
Huntingdon,	Huntingdon,	Dr. H. C. Frontz, Chief.
Indiana,	Indiana,	Dr. W. A. Simpson, Chief.
Jefferson,	Punxsutawney,	Dr. J. E. Grube, Chief.
Juniata,	Mifflintown,	Dr. W. H. Banks, Chief.
		Dr. L. P. Walley.
Lackawanna,	Scranton,	Dr. J. C. Reifsnyder, Chief.
		Dr. Jos. Wagner.
		Dr. Chas. Falkowsky.
Lancaster,	Lancaster,	Dr. J. L. Mowery, Chief.
		Dr. S. H. Heller.
		Dr. H. F. Myers.
Lawrence,	New Castle,	Dr. J. D. Moore, Chief.
Lebanon,	Lebanon,	Dr. A. J. Riegel, Chief.
		Dr. H. E. Maulfair.
Lehigh,	Allentown,	Dr. Morris Cawley, Chief.
		Dr. W. D. Kline.
		Dr. F. R. Bausch.
		Dr. E. C. Statler.
		Dr. J. T. Butz.

DIRECTORY OF TUBERCULOSIS DISPENSARIES WITH MEDICAL ATTENDANTS.—Continued.

County.	Location.	Attending Physician.
Luzerne,	Wilkes-Barre,	Dr. Chas. Miner, Chief.
		Dr. Walter Davis.
		Dr. J. W. Geist.
		Dr. C. Grosser.
		Dr. Sara Wyckoff.
		Dr. R. L. Wadhams.
		Dr. S. Reichard.
		Dr. G. W. Carr.
Lycoming,	Williamsport,	Dr. F. E. Seely, Chief.
McKean,	Bradford,	Dr. W. C. Hogan, Chief.
Mercer,	Sharon,	Dr. P. P. Fisher, Chief.
		Dr. R. S. Heilman.
Mifflin,	Lewistown,	Dr. C. H. Brisbin, Chief.
		Dr. J. R. Hunter.
		Dr. J. Clarkson.
Monroe,	Stroudsburg,	Dr. W. E. Gregory, Chief.
Montgomery,	Norristown,	Dr. H. H. Whitcomb, Chief.
		Dr. A. H. Mann.
		Dr. Reinoehl Knipe.
		Dr. E. S. Buyers.
		Dr. S. M. Miller.
Montour,	Danville,	Dr. G. A. Stock, Chief.
Northampton,	Easton,	Dr. E. M. Green, Chief.
		Dr. T. C. Zulick.
		Dr. W. Thomason.
		Dr. W. McIlhaney.
		Dr. J. E. Fretz.
Northumberland,	Shamokin,	Dr. R.H. Simmons, Chief.
		Dr. C. M. Malone.
		Dr. A. H. Smink.
Perry,	New Bloomfield,	Dr. A. R. Johnston, Chief.
Philadelphia,	Philadelphia,	Dr. Alfred Stengel, Chief.
		Dr. A. P. Francine.
		Dr. G. W. Norris.
		Dr. R. Lavenson.
		Dr. Annie Turner.
		Dr. W. G. Turnbull.
		Dr. S. A. Mumford.
Pike,	Milford,	Dr. Wm. B. Kenworthy, Chief.
Potter,	Coudersport,	Dr. E. H. Ashcraft, Chief.
Schuylkill,	Pottsville,	Dr. L. T. Kennedy, Chief.
Snyder,	Selinsgrove,	Dr. F. J. Wagenseller, Chief.
Somerset,	Meyersdale,	Dr. O. P. Large, Chief.
Sullivan,	Dushore,	Dr. P. G. Biddle, Chief.
Susquehanna,	Montrose,	Dr. J. G. Wilson, Chief.
Tioga,	Tioga,	Dr. S. P. Hakes, Chief.
Union,	Mifflinburg,	Dr. C. H. Dimm, Chief.
Venango,	Oil City,	Dr. J. P. Strayer, Chief.
		Dr. Fannie Davis.
Warren,	Warren,	Dr. M. V. Ball, Chief.
Washington,	Monongahela,	Dr. C. B. Wood, Chief.
Wayne,	Honesdale,	Dr. H. B. Ely, Chief.
Westmoreland,	Greensburg,	Dr. I. M. Portser, Chief.
Wyoming,	Tunkhannock,	Dr. B. E. Bidleman, Chief.
York,	York,	Dr. J. S. Miller, Chief.
		Dr. R. Jessop.
		Dr. B. F. Parker.
		Dr. J. H. Bennett.
		Dr. L. S. Weaver.
		Dr. H. E. Smyser.
		Dr. E. Melsenhelder.
		Dr. B. W. Shiray.
		Dr. L. M. Hartman.
		Dr. W. C. Smith.

EXHIBIT No. 10.

PHOTOGRAPHS OF SCRANTON AND EASTON DISPENSARIES.

EXHIBIT No. 11.

PHOTOGRAPHS OF WILKES-BARRE AND ALLENTOWN DISPENSARIES.

EXHIBIT No. 12.

RELIEF MODEL OF GROUNDS AND BUILDINGS OF THE PENNSYLVANIA STATE SOUTH MOUNTAIN SANITORIUM.

This reservation comprises 650 acres and is located in Franklin county near Mont Alto on a plateau of the Blue Mountains with an average elevation of about 1,800 feet above the sea level. Its topography and climatic conditions render it particularly well adapted for the treatment of tuberculosis, while its geographical location makes it readily accessible from all parts of the State. This Sanatorium had its inception in an appropriation by the Legislature of Pennsylvania in 1903 of the sum of $8,000.00 to the Commissioner of Forestry, to be used for the treatment of tuberculosis sufferers, and a further appropriation in 1905 of $15,000.00.

The lands devoted to the purpose were a part of a large area (55,000 acres) which had been purchased by the State for a forest reservation. Upon this a number of small shacks were erected, and on June 1st, 1907, at which time its management and control were transferred to the Pennsylvania State Department of Health, 28 patients were under the care of the Forestry Commissioner. The area is sufficiently large to afford a scheme of development which will permit the classification and segregation of patients of different types or degrees of infection, if so desired, and also to supply light open air employment to those physically capable of performing the same, while the large State forest reservation adjacent insures the Sanatorium from all undesirable surroundings. The water supply is collected from mountain springs on the State reservation. The spring heads are all walled over that they may not be exposed to any pollution. The water is then carried in cast-iron pipes to a pumping well and from there it is forced into a large reservoir with sufficient capacity to supply the entire camp with water for two months in case of drought. The height of the reservoir is sufficient to give ample pressure in case of fire. The ice is collected from an ice dam and sufficient storage capacity is provided in an ice house to meet all requirements. The assembly building serves the purpose for general meetings and a chapel for religious services. The barn is constructed of stone and frame with slate roof and affords accom-

modation for 16 head of mules and wagon room for as many vehicles. The ground applicable for farming comprises an area of about 100 acres. The accommodations as shown on this model provide for five hundred patients.

EXHIBIT No. 13.

PANORAMIC VIEW OF SOUTH MOUNTAIN RESERVATION SHOWING THE GROUP OF SANITORIUM BUILDINGS IN THE DISTANCE.

This photograph shows the large area of forest in which the camp is located and the manner in which it is protected by natural conditions.

EXHIBIT No. 14.

PANORAMIC VIEW SHOWING SOME OF THE ORIGINAL SHACKS AND THE CONSTRUCTION OF NEW COTTAGES, PAVILIONS, BATH-HOUSES, ETC.

This photograph taken from the roof of the Administration Building, gives a good view of the general construction work in the camp.

EXHIBIT No. 15.

PANORAMIC VIEW OF THE MOUNTAINS FROM ROCKY POINT NEAR SANATORIUM.

The slightly undulating character of the Reservation affords opportunity for graded exercise of the patients while the beauty of nearby forest and distant mountains is always grateful. "Green battlements that guard the Health Port of the South Mountain Sanatorium." *Leigh Mitchell Hodges.*

EXHIBIT No. 16.

PANORAMIC VIEW OF PART OF THE OLD CAMP.

This shows a view of a part of the old camp site started in 1902. Here was built the first little cabin 8 x 8 feet, constructed out of second-hand lumber. From this cabin, which is still in use, grew the present camp, which is laid out on a scale to ultimately accommodate 4,000 people.

EXHIBIT No. 17.

PANORAMIC VIEW OF SEWAGE DISPOSAL PLANT.

The sewage disposal works comprise settling basins designed to be operated as settling tanks if desired, sprinkling filters, intermittent filters and a chemical sterilizing chamber. The object of the

works is to completely change the sewage into a pure water by the absolute destruction of all organic matter in the sewage. The plant operates by gravity. It is provided with automatic mechanism to simplify the duties of the caretaker. The site has been chosen remote from the camp and all the buildings, and the layout is adapted for additions capable of handling the sewage of a population of 4,000 people.

EXHIBIT No. 18.

MOUNTAIN VIEW NEAR THE CAMP.

"The pine clad mountains as seen from Pennsylvania's 'Hillside City of Hope.'" *Leigh Mitchell Hodges.*

EXHIBIT No. 19.

PHOTOGRAPH OF MODEL COTTAGE FOR INCIPIENT CASES.

(See description under Exhibit No. 26.)

EXHIBIT No. 20.

PHOTOGRAPH SHOWING THE RELATIVE POSITION OF COTTAGES, THE CORNERS OF WHICH CORRESPOND TO THE FOUR POINTS OF THE COMPASS.

This picture shows how the positions of the cottages are arranged so that no two cottages in adjacent rows come directly opposite each other .

This scheme gives more air space than if two adjoining rows were built with the cottages directly opposite, and also prevents them from throwing shadows on each other. By having the corners of the square cottages pointing to the four points of the compass the four sides and windows get the maximum sunshine during the entire year.

EXHIBIT NO. 21.

ADMINISTRATION BUILDING AND STATION TEAM.

This building is used for offices.

The team of mules represents the style of conveyance used to transport passengers from the railroad station to the Sanatorium.

EXHIBIT NO. 22.

PART OF THE MEDICAL AND NURSING STAFF.

This picture shows some of the physicians and nurses of the Pennsylvania State South Mountain Sanatorium in their uniforms.

EXHIBIT NO. 23.

GROUP OF PATIENTS IN WHOM THE DISEASE HAS BEEN ARRESTED.

EXHIBIT NO. 24.

ONE OF THE PRESENT CHICKEN-HOUSES.

The care of poultry has proven an interesting occupation for patients who are physically able to perform light work. A supply of fresh eggs will be provided when the chicken house now under construction, is completed. The house will be 450 feet long with provision for the housing and yarding of chickens in lots of 25. A house for the keeper and one for storing and preparing food will also be provided.

EXHIBIT NO. 25.

WHITE PINE FOREST ADJOINING CAMP.

This beautiful grove of pines is used for park purposes by the patients. With its lofty canopy of evergreen foliage and its underlying carpeting of pine needles upon which the footfalls are noiseless, it had been christened by the patients who enjoy its stately aisles, as the "Cathedral Pines."

EXHIBIT NO. 26.

MODEL OF COTTAGE FOR INCIPIENT CASES.

The cottages are one story in height with a liberal air space between the ceilings and the roofs to guard against the extreme heat of summer and the extreme cold of winter. The floorings are double with water proof material between.

The first floor is divided into four rooms opening into an entryway widened in the centre by adding space from the corners of the rooms. The entryway has a door at each end, which permits a free circulation of air to blow past the four door ways leading into the rooms Each door has a transom over the top which is open at all times in case a door should be closed for any special purpose. In the middle of summer and the extreme cold of winter. The floorings are double larger pipe which opens into the entry at the ceiling, so that the warmer air of the cottage can be freely forced into the colder outside atmosphere, thereby making a gravity ventilation. Each room has two large windows with sash hung on ball bearing rollers, so that they can be pushed back, leaving the entire window space open. The eaves overhang only four inches so as not to throw any shad-

ows on the sides of the buildings. This gives the cottages the maximum of sunlight. This construction would not protect the open windows from rain and snow during heavy storms. To provide against such storms wide shutters are hung with rollers on tracks so that they hang vertically against the walls in fair weather. They can be pulled over the windows with perfect ease during a storm, and fixed at any angle desired by an arrangement of hooks, thereby permitting of a free circulation of air. The floors average about 18 inches above the ground, leaving an open space for the air to circulate under the cottages during fair weather. Solid shutters, however, are arranged which drop over the spaces, entirely closing them during heavy rain or snow storms. This model is constructed on a scale of 1 inch equal to 1 foot, the original cottages being 27 feet square, constructed of wood with foundation piers of concrete, and roofs of fire-proof asbestos and cement shingles.

EXHIBIT NO. 27.

MODEL OF OPEN AIR PAVILION.

The pavilions are constructed of wood with concrete pier foundations. The roofs are built of fire-proof shingles made of asbestos and cement. The buildings are entirely open with the exception of a wall extending three feet above the floor. The eaves overhang only four inches so as to permit of the maximum sunlight. Awnings are arranged so as to drop in time of heavy rain or snow storms. These, however, will only be closed on the stormy side, leaving at least, two sides open during bad weather. The floor is 36 feet by 24 feet, which will permit of two rows of reclining chairs for the patients during the daytime. The width is sufficient to permit of a liberal aisle between the rows of chairs. These pavilions are to take the places of porches around the cottages, which would cut off the sunlight.

EXHIBIT NO. 28.

MODEL OF TENT.

This model, on a scale of 1 inch equal to 1 foot, was made by Mr. John Quicksell, a patient. Tents of this type are used for the stronger patients during the entire year, where they keep perfectly comfortable during the coldest weather in the winter.

EXHIBIT NO. 29.

CHART, FRONT AND SIDE ELEVATION OF DINING HALL.

The kitchen and dining room is constructed of concrete and frame with asbestos roof. It will now accommodate 500 patients, and is so planned as to permit of extensions which will seat 1,000 patients.

EXHIBIT NO. 30.

CHART, FIRST FLOOR, PLAN OF DINING HALL.

There is a half basement which provides cold storage and all other accessories necessary for kitchen and dining room purposes, such as butcher shop, storage and heating plant.

EXHIBIT NO. 31.

CHART, SECOND FLOOR, PLAN OF DINING HALL.

The quarters for help are arranged in the second story over the dining hall, well heated and ventilated, and so situated as to have sunlight in each of the rooms, which accommodate in all 100 people.

EXHIBIT NO. 32.

CHART, FRONT, SIDE AND REAR ELEVATIONS OF INFIRMARY.

The infirmary for the accommodation of the incurable cases is beautifully situated in the pines. It is constructed of concrete and wood, with a fire proof asbestos and cement roof. It has all the necessary modern accommodations of a hospital building, with a wing to accommodate the nurses and help. The elevation of the building represents a long narrow construction two and one-half stories high, so as to permit of plenty of air and sun in all the small wards. It has indirect heating apparatus and ventilation. The present construction will accommodate 110 patients, and is so planned as to permit of extensions for 200 patients.

EXHIBIT NO. 33.

CHART, FIRST FLOOR PLAN OF INFIRMARY.

EXHIBIT NO. 34.

CHART, SECOND FLOOR PLAN OF INFIRMARY.

EXHIBIT NO. 35.

CHART, ELEVATION AND FIRST AND SECOND FLOOR OF LAUNDRY.

The laundry building is constructed of wood, concrete and asbestos shingles. It is provided with sterlizing washers arranged so that the clothing can be placed in the revolving washers from the receiving room, taken out sterilized and washed, into another room where the laundresses receive them to carry them through the drying and ironing machinery. Accommodations for the necessary help are provided on the second floor.

EXHIBIT NO. 36.

CHART, ELEVATION AND FLOOR PLANS OF OPEN AIR PAVILIONS, BATH-HOUSE, TOILET BUILDINGS AND COTTAGES.

(For model of open-air pavilion see Exhibit No. 27.)

The camp is provided with bath houses constructed of wood with concrete foundations and fire-proof roofs. Each house is divided off into twelve little dressing rooms with a hand shower-bath room adjoining. They are all provided with a comfortable waiting room for the use of the patients after bathing. The buildings are well heated with sufficient ventilation and yet not enough to chill the bathers by causing too rapid an evaporation when wet. The toilet houses are substantially built of wood, concrete and fireproof roofs and are conveniently situated for the use of the patients. They are all provided with water closets and connected with the sewage system, the effluent of which is pure enough to drink.

EXHIBIT NO. 37.

PHYSICIAN'S DISPENSARY COAT.

This garment is a sample of the coat supplied for use of physicians in attendance at the dispensaries. It is washable and in each case is long enough to fully cover the other clothing worn by the physician. In this way the physician avoids the danger of carrying infection from the dispensary to outside patients.

EXHIBIT NO. 38.

DISINFECTOR'S SUIT.

This suit is used by the Health Officers when disinfecting houses so that they may not carry the infection from place to place.

EXHIBIT NO. 39.

THE DEPARTMENT'S DISINFECTING APPARATUS.

Each of the State Department of Health's 733 Health Officers is provided with a disinfecting apparatus that is used in fumigating rooms and premises that have been occupied by a case of communicable disease. The apparatus consists of a tin pan measuring 15 inches in diameter at the top, 11 inches at the bottom, and with a depth of five inches, and a large funnel-shaped container measuring 15 inches in diameter at the top, 11 inches at the bottom, the inside depth of the flaring part being 5 inches, and the depth of the lower part 6 inches. The dimensions of the vessel have been fixed by empirical trial as ample for the diffusion of the gas, preventing its

ignition when in contact with a live flame. The pan within which water is placed interlocks with the container proper leaving sufficient space between the vessels for the circulation of water which protects the floor from heat generated by the chemical action. For convenience in carrying the pan is made to rest in the top of the container. Eight ounces, by weight, of commercial potassium permanganate crystals is required for each pint of the officinal (U. S. P.) solution of formaldehyde in disinfecting every thousand cubic feet of air space and 24 ounces of potassium permanganate may be safely used in this vessel without danger of overflow.

EXHIBIT NO. 40.

NURSE'S DISPENSARY GARB.

A sample of the apron or gown provided for the use of nurses and women physicians in attendance at the dispensaries. It is washable and protects the clothing. It is designed to avoid the danger of carrying infection from the dispensary to outside patients.

EXHIBIT NO. 41.

SPUTUM CUPS.

First, tin form and filler for home use. This sputum cup is a combination of a tin form provided with a handle and cover, the cover kept in place with a spring and the paper filler. The latter, properly folded, is put into the form, making a receptacle easily handled and stable enough to be allowed to stand upon the table at the bedside or near the patient's reclining chair. When full or soiled this paper filter can be pushed out of the tin form directly into the fire of a stove or furnace, in this way providing easy and certain disinfection. The tin form can be boiled.

Second—Pocket Sputum Cups. These cuspidors are for use by the patient when away from home. The entire cuspidor is destructible by fire. The paper has undergone a waterproofing process.

EXHIBIT NO. 42.

LABORATORY OUTFIT FOR SPUTUM EXAMINATION.

This outfit is used by the physician to mail sputum, other excretions and tuberculous lesions, to the Pennsylvania State Laboratory for examination.

EXHIBIT NO. 43.

ANTI-SPITTING SIGN.

Adopted by the Department for the Dispensaries and Sanatorium.

EXHIBIT NO. 44.

BIOLOGICAL PRODUCTS.

The possibility of developing a biological product which would have an immunizing and curative influence in tuberculous infection, engaged the attention of Dr. Samuel G. Dixon, the Commissioner of Health, prior to 1889, in which year in an article in the "Medical News," date of October 19, branched forms of tubercle bacilli were noted and two hypotheses presented as to the establishment of tolerance together with results obtained by inoculation. The two products here shown, No. 5, a suspension of dead tubercle bacilli and No. 10, a salt solution extract from living tubercle bacilli are the result of extensive experiments upon the subject, and at the present time are being used in certain types of cases. The results which are apparently favorable are being tabulated for publication as soon as they reach a number sufficiently large to warrant definite conclusions being drawn. The literature presented by Dr. Dixon upon the subject may be found under Exhibit No. 84.

LABORATORY METHODS CONCERNING THE BIOLOGICAL PRODUCTS.

1. Method of Production.
2. Method of Standardization.
3. Method of arriving at dosage.

Action of the two products toward one another.

No. 5.—DEAD TUBERCLE BACILLI.*

1 and 2. Method of Production and Standardization.

After the bacillary mass is removed from the filtrate it is dried of excess moisture, over night, perhaps, in the incubator, and then it is dried in the vacuum desiccator over sulphuric acid until it becomes brown and brittle. The masses are then broken into small fragments and placed in a soxhlet. An equal quantity by weight of human and bovine bacillary mass is used. The first extraction is done with absolute alcohol and is continued until the brown color of the distillate has disappeared. The alcohol is then replaced by ether and the extraction is continued until the cooled ethereal distillate is practically clear. Absolute clearness is impracticable to obtain because it seems impossible to extract all fat and wax from the tubercle bacillus. Vandremer and Martin say that six weeks extraction with petroleum ether will not remove all the fat. The extraction necessary to bring about the above result

*"Possibility of establishing tolerance for the Tubercle Bacillus," Medical News, Oct. 19, 1889.

will last six to eight days of nine hours each, depending upon the size of the clumps. When the ether extraction is complete, the mass is dried twenty-four hours at 45 deg. C. The resulting mass consists of dirty yellow gray granules which break up easily into a slightly greasy powder. This is not soluble in water, salt solution, alcohol or ether and when used must be ground up in definite quantity and the per volume weight is determined. The usual method is to grind up a large quantity, without previous weighing, in a ball mill with a small quantity of salt solution. A definite quantity of this suspension, say 20 cubic centimeters, is evaporated to dryness in a tared watch crystal and the same quantity of the salt solution used to make the suspension is also evaporated. The difference in these weights will equal the weight of the diseased organisms in amount of suspension used. In order that the emulsion shall be homogeneous, the suspension after grinding is centrifuged the supernatant liquid removed and resedimented in the machine. After a third centrifugalization one obtains a homogeneous emulsion which will stand without sedimenting for a long while. Any slight sediment which occurs after three or four weeks will shake up into perfect homogeneity. 8.64 milligrams to the cubic centimeter is the highest strength heretofore obtained in perfect emulsion. The salt solution used is .6 per cent.

The microscopic examination of the mass after extraction shows chiefly unbroken organisms which takes the acid fast staining methods very faintly but clearly. The irregularity of staining characteristic of the tubercle bacillus is more pronounced. Careful observation with high objectives and oblique light shows no irregularity in the contour of the single cell but the edges of the stained portions seem more irregular than the untreated bacillus.

Microscopic examinations of the ground emulsion shows many fragments chiefly single organisms and only occasionally two, never more, clinging together. The staining is apparently the same as before grinding.

3. Method of dosage and toxicity. The difficulty of expressing the value of these products in any unit of toxicity or other property has compelled the adoption of a dose which when repeated every week or ten days causes no loss of weight in healthy or tuberculous guinea pigs of 400 to 600 grams. It is not necessary to give all the details of the primary experiments, but it will be enough to state that weekly injections of .000001 gram of the organisms are withstood without loss of weight. Of the later experiments three pigs received twenty-three injections of the product before injections of the organisms. They still live. They have gained from 350 to 600 grams in nine months and have lost no weight since the injections of the organisms.

No. 10.—TUBERCLE BACILLI EXTRACT.*

1 and 2. Method of Production and Standardization.

This product is made from living organisms removed from fluid media. An equal weight is taken from human and bovine stains, dried of excess water in the incubator and then washed in an excess of ether. This is renewed when it has removed the last remnants of water and glycerin and the second portion allowed to act six hours to soften the wax of the organisms. This fat separates so that it collects at the bottom of the vessel and may be removed by a Pasteur pipette. After removing the second ether, the mass is allowed to dry until no more ether odor is perceptible. Then the separated fat is removed. The mass is weighed, ground thoroughly in a mortar and suspended in ten parts of .6 per cent. salt solution. This suspension is carried in a shaking machine eight hours and allowed to stand sixteen hours at room temperature. It is then filtered several times through porcelain, the filtrate being a light amber or pronounced straw colored fluid, the product No. 10. The standardization of the extract must depend upon its equivalent in tubercle bacilli. One cubic centimeter represents the extract of .1 gram of the organisms. Repeated microscopical examination of the sediment of large quantities fails to reveal any bacteria and injections of a single large or repeated small dose do not produce tuberculosis.

The following is a chemical analysis of the product No. 10:

	Human.	Bovine.
Color,	Deep straw yellow,	Straw yellow.
Reaction,	Faintly acid,	Faintly acid.
Total residue,	1.27 per cent.,	1.23 per cent.
Sodium chloride,	0.74 per cent.,	0.68 per cent.
Organic matter,	0.46 per cent.,	0.44 per cent.
Sulphates,	Slight,	Slight.
Calcium,	Slight,	Slight.
Odor or residue on evaporation,	Slightly ammoniacal,	Slightly ammoniacal.
Color tests of residue with strong acids and alkalies	None,	None.
Tanret's test for albumens,	Positive,	Very faint.
Trichloracetic acid test for albumens,	Positive,	Faint.
Salicysulphonic acid test for albumens,	Negative,	Negative.
Nitric acid and heat test for albumens,	Negative,	Negative.
Mayer's reagent for alkaloids,	Negative,	Negative.
Alphanaphthol test for carbo-hydrates,	Faint,	Negative.
Nessler's test for ammonium compounds,	Strong,	Positive.
Ammonium molybdate test,	Positive,	Positive.
Tannic acid test,	Very faint turbidity,	Very faint turbidity.

Effect of sensitization for one another.

Each of these products will sensitize for itself but the experiments show that one injection of No. 5 will not sensitize for a subsequent dose of No. 10. The reverse is also true.

*Same as "Fluid of Dixon," Medical News, Jan. 17, 1891.

This last observation, viz: Of the effect of the alternate use of Dead Bacilli No. 5, and the Extract of Living Bacilli No. 10, in healthy animals was made by Dr. Herbert Fox.

EXHIBIT NO. 45.

PHOTOGRAPHS OF PATHOLOGICAL LABORATORIES.

These pictures represent the Laboratories of the University of Pennsylvania where the Pennsylvania State Department of Health conducts its bacteriological and chemica work, which consists of original research work, examinations of pathological specimens for diagnostic purposes and examinations of water for purity, largely used by the Sanitary Engineering Division of the Department.

EXHIBIT NO. 46.

PHOTOGRAPHS OF PATHOLOGICAL LABORATORIES.

EXHIBIT NO. 47.

PHOTOGRAPHS OF STATE CAPITOL.

In which the general offices of the State Department of Health are located.

EXHIBIT NO. 48.

FLOOR PLAN OF CAPITOL BUILDING SHOWING THE LOCATION AND SPACE OCCUPIED BY THE DEPARTMENT OF HEALTH.

EXHIBIT NO. 49.

PHOTOGRAPH OF MACHINE USED IN TABULATING STATISTICS OF MORBIDITY AND MORTALITY.

EXHIBIT NO. 50.

CARTO-GRAPHIC DISPLAY IN LEAF CABINET.

Copy of the Act of Assembly creating the Department of Health and empowering it to make rules and regulations concerning communicable diseases. It is under the authority conferred by this Act that tuberculosis is made a reportable affection.

EXHIBIT NO. 51.

(A) A copy of the rules and regulations of the Department of Health making tuberculosis a reportable affection and specifically prescribing the methods of reporting both in municipalities and rural sections.

(B) Report cards supplied to physicians for the purpose of reporting tuberculosis occurring in rural districts to Health Officers. These reports are in turn forwarded to the State Department of Health, with additional reports as to any action taken by the Health Officer. Upon their receipt in the Department of Health they are filed for future reference according to locality and are tabulated for statistical purposes.

EXHIBIT NO. 52.

Copies of blanks supplied to Boards of Health in municipalities and to institutions for making returns of communicable diseases, including tuberculosis, to the Department of Health. Under the regulations as set forth in Exhibit No. 45, Boards of Health in municipalities and institutions are required to report at the end of each week all cases of communicable diseases which have been reported to them by physicians. Upon receipt of these reports in the Department of Health they are filed for reference according to locality and tabulated for statistical purposes.

EXHIBIT NO. 53.

(A) Copies of cards requesting Health Officers to disinfect premises upon the removal or death of the tuberculous occupant. These cards are supplied to physicians for the purpose of making requests for disinfection of premises.

(B) Form 37 is the card upon which the local Health Officer advises the County Medical Inspector of the disinfection of any premises within his jurisdiction.

(C) Form 38 is a certificate of disinfection which is issued by Health Officers to the owner or occupant of the premises which have been disinfected for any purpose.

EXHIBIT NO. 54.

Copy of directions issued by the Department of Health for room disinfection following cases of communicable diseases, including tuberculosis, either by formaldehyde gas or sulphur. A room is taken as the unit of house disinfection.

EXHIBIT NO. 55.

A copy of the Act of Assembly appropriating the sum of $600,000 for the establishment of tuberculosis sanatoria and $400,000 for the establishment of dispensaries.

EXHIBIT NO. 56.

(A) Request cards for supplies for dispensaries.
(B) Card index file of dispensary patients.
(C) Notice to dispensary of change of residence.
(D) Notice to patient to call at dispensary for examination for admission to State Sanatorium.
(E) Result of examination for admission to State Sanatorium.
(F) Health Officer's and nurses's weekly report to dispensary of visits to tuberculosis stations.

EXHIBIT NO. 57.

(A) Application blank for treatment at tuberculosis dispensary.
(B) Tuberculosis dispensary card.
(C) Individual history and examination records of dispensary patients.

EXHIBIT NO. 58.

(A) Dispensary examination blank for throat, nose and ear.
(B) Health Officer's and Nurse's report.
(C) Detailed report of inspections and visitations.

EXHIBIT NO. 59.

(A) Physical diagnosis chart of dispensary patients.
(B) Record of treatment and condition of dispensary patients.

EXHIBIT NO. 60.

(A) Dispensary monthly report of new patients.
(B) Detailed monthly dispensary report.
(C) Order for supplying milk to dispensary patients.
(D) Acknowledgment of supplies received at dispensary.

EXHIBIT NO. 61.

(A) Application for admission to sanatorium.
(B) Index card of waiting list for sanatorium.
(C) Index card for inventory of personal property.
(D) File index card for sanatorium patients, and reverse of same.

EXHIBIT NO. 62.

(A) Individual history and examination record of sanatorium patients.
(B) Sanatorium examination blank for nose, throat and ear.

EXHIBIT NO. 63.

(A) Physical diagnosis chart for sanatorium patients.
(B) Notes, treatment and diet chart for sanatorium patients.

EXHIBIT NO. 64.

(A) Weekly case record of sanatorium patients.
(B) Reverse of same.

EXHIBIT NO. 65.

(A) History chart for sanatorium cases.
(B) Inspection chart for sanatorium cases.

EXHIBIT NO .66.

(A) Monthly report of new patients admitted to sanatorium.
(B) Detailed monthly report of sanatorium.

EXHIBIT NO. 67.

(A) Report of a case of tuberculosis on individual report card.
(B) Punch card for tabulating statistics from card (A).
(C) Certificate of death from tuberculosis of the lungs.
(D) Punch card for tabulating statistics from certificate (C).

AUTOCHROMES.

The development of color photography has afforded an opportunity to perpetuate the colors contained in fresh pathological specimens.

The color plates shown, were made from specimens immediately after autopsy, and are, therefore, free from the bleachings and contractions which take place in preserved specimens. While the entire process may be considered more or less in its infancy, the results forecast that color photography will have an important place in pathological studies.

EXHIBIT NO. 68.

Photograph No. 1.

VIEW OF THE COSTAL SURFACE OF LEFT LUNG OF A CASE OF CHRONIC ULCERATIVE TUBERCULOSIS WITH CAVITY FORMATION.

This photograph shows irregular areas of thickened pleura over the upper lobe, with tabs of torn adhesions especially along the fissure. The anterior inferior portion of the upper lobe is solid with conglomerate tubercules. The upper part shows a few scattered caseous tubercules. The lower lobe shows hypostatic congestion with

diffuse grayish thickening of the pleura, and a few caseous tubercles. The apex is the seat of softening perceptible to the touch, with but little evidence of involvement on the pleural surface, whereas the lower interior portion of the same lobe is solid but does not suggest a cavity within. The yellowish, gray and red mottling of the lower half of the upper lobe is due to cheesy-like degeneration of fused tuberculous areas. The individual caseous tubercles may be noted by the pale yellowish dots beneath the pleura in the upper portion of both lobes. The pleural surface of the tissue is apparently uninvolved, except for a few adhesions.

EXHIBIT NO. 69.

Photograph No. 2.

VIEW OF THE INTERNAL SURFACE OF LEFT LUNG SHOWN IN NO. 1, SHOWING ROOT OF SEVERED BRONCHI AND VESSELS.

To the left center are noticed the two openings of the superior and inferior bronchus about the former of which is a large semilunar shaped anthracotic and caseous bronchial gland. To the left of the bronchi is the opening of the pulmonary artery and below and to the right the opening of the distended pulmonary vein. The internal surface does not show the extent of the tuberculosis portion that the costal surface showed in No. 1. The thickened pleura with its torn shreds is visible over the upper lobe (upper left hand corner). The interior surface of the upper lobe just above the superior bronchus and lymph gland shows some thickness due to conglomerate caseous tubercles. The lower internal surface of the upper lobe is more or less emphysematous and the consequent anemia of that portion accounts for the pearliness and lack of color in that area. The portion below and to the right of the large pulmonary vein shows numerous small caseous tubercles. On the lower lobe the pleura has much the appearance of the pleura on the internal surface overlying the area of hypostatic congestion and also shows some scattered individual caseous tubercles. The bluish color over the area of hypostatic congestion is due to extravasted blood and decomposed hemaglobin.

EXHIBIT NO. 70.

Photograph No. 3.

VIEW OF SECTION SURFACE OF SUPERIOR AND INFERIOR LOBES OF RIGHT LUNG, THE MATE OF NOS. 1 AND 2.

In the center of the picture is the partially opened inferior bronchus, running downward and to the right. To the left and upper center is the opening of the pulmonary vein. The upper lobe is

riddled with cavities of various sizes, the largest of which is at the extreme upper left hand corner. Just above the center of the picture are found bronchiectatic dilatations running toward the areas of greatest involvement. The connective tissue is seen to be increased principally at the extreme top of the picture beside the large cavity and on its lower left hand wall. The portions of the upper lobe not occupied by the cavities contain increased connective tissue or are involved in a chronic caseous tuberculosis in the form of large miliary tubercles. The cavity in the upper right hand corner shows no well defined wall but rapid extension into the areas of caseous tubercles. Especially upward the wall is ulcerated and ragged. The large cavity on the left side is lined with a smooth membrane and shows some definite limitations. All of the cavities and bronchi contained large quantities of thick creamy pus which was emptied by the section. On the lower left portion of the upper lobe the pleural covering shows some caseous tubercles shining through. The lower lobe is uniformly congested. In the upper right corner there are a few well defined masses of caseous tubercles. Following the smaller bronchi downward and to the right, spreading out in branch form are pale areas marking the spread of the infection by means of the bronchi. This is in the form of early consolidation around the bronchioles. The large bronchus mentioned first in the description of this lung is the seat of a purulent bronchitis and indicates the course of infection in the bronchioles.

EXHIBIT NO. 71.

Photograph No. 4.

VIEW OF COSTAL SURFACE OF LEFT LUNG SHOWING A MARKED CONDITION OF ANTHRACOSIS.

The tessellated appearance is due to the presence of minute particles of coal in the lymph spaces separating the group of respiratory cells into which they have been carried from the bronchioles or air cells, by cell carriers with this peculiar function. These deposits when present in moderate quantity have no serious effect. In large quantities they destroy elasticity, obstruct lymph flow and impede venous circulation, creating thereby possible emphysema or in the lymph glands a chronic hyperplasia, and establishing a fertile area for tuberculous infection. Coal workers are almost universally affected with anthracosis. The left margin of the specimen shown in photograph is moderately emphysematous, as indicated by its undulating character. The lung as a whole shows slight passive congestion.

EXHIBIT NO. 72.

Photograph No. 5.

SECTION OF RIGHT LUNG SHOWING CHRONIC ULCERATIVE TUBERCULOSIS WITH CASEOUS MASSES IN THE LOWER LOBE.

Above the center of the section is the superior bronchus. At the center and slightly to the right are two branches of the inferior bronchus. There are many round nodules slightly anthracotic over the entire pleural surface. The upper part of the superior lobe shows several caseous areas with a cavity near the right margin which contains yellow pus. The wall of the cavity is smooth. The configuration of the apex on the left is distorted by dimpling of the surface due to a subjacent conglomerate tubercle. In the lower lobe there are a few conglomerate tubercles below and to the right of the branches of the inferior bronchus. There is marked interalveolar anthracosis. This lies chiefly near the bronchi. There are, however, also many smaller areas extending out to the pleura and beneath it.

EXHIBIT NO. 73.

Photograph No. 6.

VIEW OF THE RIGHT LUNG SHOWING EXTENSIVE CASEOUS PNEUMONIA IN THE LATE STAGE IN THE ANTERIOR INFERIOR HALF OF THE SUPERIOR LOBE.

The upper half of the superior lobe shows some of the configuration of the normal lung with conglomerate caseous tubercles shining through the pleura. Note the eroded pleura covering this area. The lower anterior half is solid and there is no respiratory tissue left. The upper part of the lung shows some of the lines of anthracosis marking the lymph spaces. The contour of the upper lobe is destroyed by the mass of exudate on the lower portion. The upper internal portion relatively less involved is not so prominent as the upper anterior portion which has the caseous masses lying beneath the pleural surface. The lower lobe is moderately congested with a large number of caseous tubercles showing through the pleura. A few areas of anthracosis in annular form may be seen in the lower part of the picture. Their centers are pale and here early tubercles are present. In the upper right corner of the lower lobe the caseous portion is seen extending across the fissure and involving the anterior superior border. Alongside of this a hemorrhage and several emphysematous bullae are noted.

EXHIBIT NO. 74.

Photograph No. 7.

VIEW OF THE COSTAL SURFACE OF RIGHT LUNG, SHOWING A SLIGHTLY CONGESTED CONDITION WITH A MODERATELY HIGH DEGREE OF SUB-PLEURAL ANTHRACOSIS.

The pleura is opaque over a large part and slightly cloudy over all the rest. The fissure between the superior and middle lobe is obscured by a thickened pleura and only part of the fissure between the superior and inferior lobe is visible. The pleura shows the effect of chronic pleuritis with adhesions to the visceral pleura which have not disfigured the contour of the lung. These adhesions have been very dense and represent either a repeated mild infection or a mild chronic infection to which good resistance has been offered.

EXHIBIT NO. 75.

Photograph No. 8.

VIEW OF THE INTERNAL SURFACE OF NO. 7 (RIGHT LUNG).

Above the center may be seen the section of the main bronchus above the pulmonary artery. Below and to the right of this artery is the opening of the pulmonary vein. The tissue spread out to the right is part of the areolar tissue of the mediastinum and the pericardium. This was slightly adherent to the lung, and a portion of the torn surface may be seen near the upper margin. The nodules seen near the center of the section are lymph nodules of normal size. Above the bronchus the large dark blue object is a markedly anthracotic superior bronchus lymph gland. The adhesions described under No. 7 may be seen to the left of the picture, and the thickened pleura is stretched out as a gray veil over the posterior surface to the left. The sub-pleural anthracosis is unusually marked and its profuseness is very apparent on the diaphragmatic surface.

EXHIBIT NO. 76.

Photograph No. 9.

SECTION OF BOTH LOBES OF TUBERCULOUS LUNG (LEFT) ON POSTERO-LATERAL-COSTAL SURFACE.

The upper half of the superior lobe shows irregular caseous infiltration, as indicated by the light colored areas, separated by partly functionating and slightly anthracotic lung tissue. The lower half of this lobe shows complete consolidation by caseous infiltrate, probably a late stage of caseous pneumonia. The process has not extended across the pleural septum to the lower lobe. In the lower

lobe vessels may be seen opened longitudinally, toward the extreme lower end, and on the side of the fewer blood vessels pale areas may be seen. These represents early tuberculosis areas. The varnish applied to this plate has not dried well; therefore, cracks are noticeable on the starched film.

EXHIBIT NO. 77.

Photograph No. 10.

VIEW OF TUBERCULOUS LEFT LUNG, SHOWING SECTION THROUGH BOTH LOBES.

In the center, open blood vessels are noted and around them are enlarged anthracotic glands. These are not opened but appear caseous. In the upper lobe are many areas of disseminated caseous infiltration, and one small cavity is found above but slightly to the left of the middle of the upper lobe. The lower part of the section shows moderate hypostatic congestion. The pleural covering intact is noted below and to the right. The other section shows an opened spleen with caseous masses of various sizes.

EXHIBIT NO. 78.

Photograph No. 11.

ANOTHER VIEW OF PHOTOGRAPH NO. 10.

EXHIBIT NO. 79.

Photograph No. 12.

SECTION OF RIGHT LUNG SHOWING CAVITY AND INFECTED GLANDS AROUND HILUS OF LUNG.

The cavity is to the left and a grape-like arrangement of the caseous nodules is noted in the vicinity of the cavity. The latter shows projecting teats of tissue which originally stretched across it but have been divided by the process of ulceration.

EXHIBIT NO. 80.

CHART SHOWING INFECTION WITH TUBERCULOSIS OF THE SUCCESSIVE OCCUPANTS OF AN ISOLATED FARM HOUSE.

This chart shows graphically the possibilities of house infection where carelessness, indifference or ignorance exists on the part of tuberculosis sufferers, and when neglect of disinfection makes evil results possible to a remote degree. Tuberculosis under such conditions becomes a wide spread menace not confined to the overcrowded tenements of large cities.

The above house is located in Cumberland county. The following is a history of another farm-house in Juniata county.

History Previous to 1898.—No definite history of tuberculosis although there is reported one suspicious case, a negro who underwent amputation of one leg because of "some disease."

1900-1902.—Family of J. E. moved into house 1898. Husband's family history, negative. Wife's history, doubtful. First case Mrs. J. E. died 1902. During 1902 there developed tuberculosis in the husband, one son and two daughters. A short time after moving from the house one other daughter developed tuberculosis and at the present time one additional daughter is under observation, there being strong evidence of early infection.

Of the J. E. family within six years after moving into the house six members died of tuberculosis and two are still living, both infected.

1902-1904.—T. moved into house 1902. Family history both Mr. and Mrs. T. negative. 1903 one son, one daughter and Mrs. T. developed tuberculosis and died. One son and one daughter have developed the disease and are now under treatment.

A Mrs. M. not connected with this family having a good family history was a frequent visitor during the occupancy of the house, and in 1904 contracted tuberculosis.

1904-1906.—Family of R. L. occupied the house. Family history negative. In 1905 one son contracted tuberculosis and died. During the occupancy of the house three other members of the family developed tuberculosis.

Since leaving the house one additional member has been in poor health and is now under observation, numerous signs pointing to infection.

1906-1908.—Since 1906 the house has been occupied by a family of negroes who are all apparently in healthy condition. The father of the present occupant is said to have lived in the house previous to its occupancy by the man whose leg was amputated for the suspicious disease.

Physical Conditions of House—Inspection of the house shows it to be built upon the southwest shore of the Juniata far separated from other buildings, the ground falling away on all sides. In fact the location might be pronounced excellent. The house is built of wood and is well supplied with windows on three sides, the fourth side or northwest side, having but one window.

EXHIBIT NO. 81.

WEIGHING AND MEASURING SCALE USED IN DISPENSARIES.

EXHIBIT NO. 82.

INSTRUMENTS USED IN DIAGNOSIS AND TREATMENT IN DISPENSARIES.

EXHIBIT NO. 83.

COPY OF THE FIRST ANNUAL REPORT OF DR. SAMUEL G. DIXON, COMMISSIONER OF HEALTH, FOR THE YEAR 1906.

EXHIBIT NO. 84.

REPRINTS OF ARTICLES PUBLISHED BY DR. SAMUEL G. DIXON, COMMISSIONER OF HEALTH, RELATING TO CURATIVE AND IMMUNITIVE BIOLOGICAL PRODUCTS.

EXHIBIT NO. 85.

MODEL DISPENSARY.

This room as fitted up is designed to show the general equipment and furnishing of the dispensaries for tuberculosis which the State Department of Health has located in each county.

SUB-DIVISION OF SPECIAL MEDICAL INSPECTION.

John A. Bouse, M. D., Special Medical Inspector.

During the earlier months of the year this sub-division was engaged in the organization of Boards of Health in first class townships of the counties of Allegheny, Beaver, Delaware, Lackawanna, Lebanon, Lehigh, Luzerne, Montgomery and Northumberland. We succeeded in securing organized Boards of Health in all the first class townships in Allegheny county except Harrison and Reserve. These townships are now under way of organization.

North Versailles township of Allegheny county has been recently reported a first class township and now has an organized Board of Health. The whole number of first class townships in the State is 31.

Foster and Hazle townships, two second class townships of Luzerne county, organized their School Boards into Boards of Health under the Act of April 7, 1899, and are now taking charge of the sanitary affairs in these townships.

Special reports from all of the townships above mentioned are on file in this office. The reports received on communicable diseases from the secretaries of the various Boards are usually prompt.

Reports rendered during the year show the following Boards of Health organized, by counties:

ADAMS.
- McSherrystown.
- York Springs.

ALLEGHENY.
- Brackenridge.
- Clairton.
- Glen Osborne.
- Rankin.
- Spring Garden.
- West Elizabeth.
- West View.

ARMSTRONG.
- Applewald.
- Johnetta.
- Manorville.
- Queenstown.
- Rural Valley.

BEAVER.
- Glasgow.
- Darlington.
- East Rochester.
- Georgetown.
- Midland.

BEDFORD.
- Coaldale.
- Hopewell.
- Hyndman.
- Mann's Choice.
- Rainsburg.
- Schellsburg.

BERKS.
- Kutztown.
- Mohnton.
- Shillington.

BLAIR.
- Newry.

BRADFORD
- Alba.
- LeRaysville.
- Troy.

BUCKS.
- Hulmeville.
- Trumbauersville.

BUTLER.
- Callery.
- Eau Claire.
- Harmony.
- Prospect.
- Saxonburg.
- Valencia.
- West Sunbury.

CAMBRIA.
- Ashville.
- Brownstown.
- Ferndale.
- Loretto.
- Scalp Level.
- Summer Hill.

CAMERON.
- Emporium.
- Driftwood.

CARBON.
- Parryville.

CENTRE.
- Howard.
- South Philipsburg.

CHESTER.
- Malvern.

CLARION.
- Callensburg.
- Edenberg.
- Shippenville.

CLEARFIELD.
- Irvona.
- Lumber City.
- Troutville.

CLINTON.
- Avis.
- Flemington.
- Logantown.
- South Renovo.

COLUMBIA.
- Stillwater.

CRAWFORD.
- Blooming Valley.
- Cochranton.
- Linesville.
- Spartansburg.
- Springboro.
- Venango.
- Woodcock.

CUMBERLAND.
- Camp Hill.
- Lemoyne.

ERIE.
- East Springfield.
- Middleboro.

FAYETTE.
- Dunbar.
- Fairchance.
- Masontown.
- Ohiopyle.
- Point Marion.

HUNTINGDON.
- Birmingham.
- Broadtop.
- Mill Creek.
- Orbisonia.
- Shirleysburg.

INDIANA.
- Armagh.
- Clymer.
- Creekside.
- Marion Centre.
- Shelcota.

JEFFERSON.
- Big Run.
- West Reynoldsville.
- Summerville.

JUNIATA.
- Mifflintown.

LACKAWANNA.
- Moosic.
- Vandling.
- Waverly.

LANCASTER.
- Adamstown.
- Akron.
- Mountville.
- Washington Borough.

LAWRENCE.
- Volant.

LEBANON.
- Richland.

LEHIGH.
- Emaus.

LUZERNE.
- Avoca.
- Courtdale.
- Hughestown.
- Laurel Run.
- West Wyoming.

LYCOMING.
- DuBoistown.
- Jersey Shore.
- Montgomery.

MERCER.
- Fredonia.
- Greenville.
- Jackson Center.
- New Lebanon.
- Wheatland.

MIFFLIN.
- Newton Hamilton.

MONTGOMERY.
- East Greenville.
- Pennsburg.
- Trappe.

NORTHAMPTON.
- Freemansburg.
- Northampton Heights.
- Tatamy.

NORTHUMBERLAND.
- Marion Heights.
- Snydertown.
- Riverside.

PERRY.
- Landisburg.

PIKE.
- Matamoras.

POTTER.
- Shinglehouse.

SCHUYLKILL.
- Mt. Carbon.
- New Philadelphia.
- Palo Alto.

SNYDER.
- Middleburg.

SOMERSET.
- Benson.
- Casselman.
- Garrett.
- Hooversville.
- New Bethlehem.
- New Centerville.
- Rockwood.
- Stoyestown.
- Ursina.
- Wellersburg.

SUSQUEHANNA.
- Dundaff.
- Great Bend.
- Hallstead.
- Little Meadows.
- Susquehanna.

TIOGA.
- Knoxville.
- Nelson.
- Osceola.

UNION.
- Hartleton.
- New Berlin.

VENANGO.
- Pleasantville.
- Clintonville.

WASHINGTON.
- Elco.
- Bentleyville.
- Coal Center.
- Deemston.
- Cokeburg.
- North Charleroi.
- Roscoe.

WESTMORELAND.
- Adamsburg.
- Arona.
- Cokeville.
- Delmont.
- Greensburg.
- Seward.
- Smithton.

WAYNE.
- Honesdale.
- Hawley.

In concluding this report I wish to add that our correspondence has been of considerable moment, as we have taken up the various requirements and regulations of this Department regarding the reporting of communicable diseases the proper quarantine period, and also the matter of room and house disinfection. We have found our Circular No. 6 to be an invaluable aid to borough Boards of Health, and to be highly appreciated by the same.

We are still receiving complaints from Boards of Health with regard to physicians who fail to report communicable diseases.

The greatest difficulty encountered is that many Borough Councils refuse adequate financial support to Boards of Health. They are unable to furnish the necessary forms for reporting communicable diseases to the Secretary, as well as the other necessary literature. Councils do not seem to understand the provisions of the Act of May 11, 1893, or carelessly disregard it. With proper financial support many Boards of Health would become active. Regarding this particular feature we would suggest that a circular letter be issued by this Department citing the law to Councils and urging a strict compliance therewith.

The following is a resume of information obtained by correspondence with the authorities of boroughs arranged by counties:

ADAMS COUNTY.

Arendtsville. Population 393. Recent information to the effect that a Board of Health has been appointed but not organized.

Biglerville. Population 200. No response to our letters.

New Oxford. Population 663. Recent advice that organization will be perfected during the present month.

ALLEGHENY COUNTY.

Breckenridge. Advice to the effect that appointments have been made but no organization effected. Have visited this place but could get no satisfactory assurance of prompt organization.

North Braddock. Under process of organization at present.

Osbourne. Population 362. Have visited Osbourne and succeeded in organizing a Board which immediately resigned owing to some apparent pique over sewage disposal plans.

ARMSTRONG COUNTY.

South Bethlehem. Population 183. We have failed to receive any reply to correspondence with reference to organization of a Board of Health.

BEAVER COUNTY.

Darlington. Population 270. More recent advice to the effect that a Board of Health has been appointed but not organized. We have written for the name and address of the Secretary, but no reply.

Frankfort Springs. Population 198. No organization.

Georgetown. Population 271. Advised that Board is appointed but have up to the present date failed to furnish the name of the Secretary.

Hookstown. Population 259. No reply to our communications.

BEDFORD COUNTY.

Mann's Choice. Population 312. Board resigned. Letter from Secretary advising of his resignation. This was followed by letter to President of Council requesting him to furnish the name of the new Secretary. No reply.

New Paris, Population, ... 205
St. Clairsville, Population, ... 102
Pleasantville, Population, ...
Woodbury, Population, ... 226

Recently visited Bedford county and interviewed the various officials who promised to proceed at once with the organization of Board of Health. These towns are so small and are under such poor municipal government that I question very much whether an efficient Board of Health could be organized therein.

BERKS COUNTY.

Bechtlesville. Population 361. Letter from Borough Solicitor stating that they could not obtain any men to serve on a Board of Health.

Centreport. Population 141. No Board yet organized, but letter asking for information concerning manner of organizing received and package was sent.

BLAIR COUNTY.

Newry. Made a recent visit to this Borough and had a very satisfactory interview with the President of the Borough Council who said he would proceed with the appointment at once and that in the early part of this month, would, if possible, complete the organization.

BRADFORD COUNTY.

Wyalusing. Population 525. Report Board appointed and will advise this Department as soon as organized of the name of Secretary.

BUTLER COUNTY.

Connoquenessing, Population,	343
Fairview, Population,	235
Karns City, Population,	265
Petrolia, Population,	350
Portersville, Population,	195
West Liberty, Population,	90

The above mentioned towns have all been notified of their duty regarding the organization of Boards of Health but in every instance we have failed to receive any response.

Zelienople. Population 963. Board has been appointed but name of Secretary is not reported.

CAMBRIA COUNTY.

Chest Springs is the only borough in this county not organized. All the Boroughs in this County except this particular one, have responded to all requests and a number of these boroughs have recently organized. Chest Springs reports Board appointed but we cannot obtain the name of the Secretary.

CARBON COUNTY.

Parryville. Population 723. Reports Board appointed but not organized.

Weissport. Population 445. Find it hard to get any one to serve on the Board of Health.

CENTRE COUNTY.

Centre Hall. Population 537. No reply to our communications.

Snow Shoe. Population 600. This Borough reports a Board appointed, but not yet organized.

CHESTER COUNTY.

Hopewell. Population 182. No reply to communications.

CLARION COUNTY.

Strattonville. Population 602. No reply to communications.

CLEARFIELD COUNTY.

Brisbin. Population 666. Unable to secure the services of any as members of the Board of Health.

Burnside. Population 647. Unable to get any one to serve.

Grampian. Population 606. Visited this Borough recently. Had a conference with a number of the gentlemen of the borough, including the chief burgess and physicians, who will take the matter up immediately and proceed with the appointment of a Board of Health.

Newburg. Population 314. No reply to our communications.

Wallaceton. Population 289. This Department is advised that the Council are acting as a Board of Health. We wrote them that this was illegal.

COLUMBIA COUNTY.

Orangeville. Population 439. Impossible to get men to serve on Board.

CRAWFORD COUNTY.

Centreville. Population 260. Letter from President of Council advising of his inability to procure members to serve on Board.

Hydetown. Population 337. Unable to get men to serve on Board.

Townville. Population 327. Board appointed and this Department wrote to each individual member urging their prompt organization. Up to date no reply.

This process has been observed with reference to a number of boroughs reporting appointments.

Uniontown. Population 359. No answer to our communications. During my early connection with this Department I visited this town and received promise of this organization but nothing has resulted.

ERIE COUNTY.

Platea. Population 250. No reply to our communications.

Waterford. Population 1,457. Reports a Board of Health appointed, giving the names thereof to whom we wrote urging the organization and asking for the name of the Secretary.

FAYETTE COUNTY.

Fayette City. Population 1,995. No reply to our communications.

Smithfield. Population 525. No reply to our communications..

Vanderbilt. Population 1,800. Letter giving names of men appointed to whom we wrote. No reply.

HUNTINGDON COUNTY.

Cassville. Population 168. Have been in recent communication with this borough and awaiting reply.

Markelsburg. Population 260. No reply to our communications.

INDIANA COUNTY.

Mechanicsburg. Population 161. Board appointed but not organized.

JEFFERSON COUNTY.

Worthville. Population 154. Letter from President of Council asking for information and instructions which were immediately furnished with reference to organization of Board of Health.

JUNIATA COUNTY.

Port Royal. Population 546. Visited Port Royal and had a conference with the Burgess, or President of Council, who assured me that they would organize a Board of Health promptly.

Thompsontown. Population 273. Visited this place and had a conference with the President of Council, who promised prompt organization.

LACKAWANNA COUNTY.

Elmhurst. Population 444. No reply to communications.

Glenburn, Population, ... 307

Gouldsboro, Population, ... 93

This Department advised of the impossibility to get men to serve on account of the small population.

LANCASTER COUNTY.

Terre Hill. Population 891. Letter from President of Council stating that he would take this matter up with Council and a latter report to the effect that the organization is under way.

LAWRENCE COUNTY.

Enon Valley. Population 395. Board organized but up to date we have failed to receive name of Secretary .

Volant. Population 120. Board appointed December 15th but not organized.

LEBANON COUNTY.

Jonestown. Population 571. Board not organized.

LUZERNE COUNTY.

Dallas. Population 543. Report Board appointed but we are unable to ascertain the name of the Secretary.

New Columbia. Population 202. No reply to our communications.

Warrior Run. Population 965. Board of Health resigned for the reason that Council refused any appropriation or to support them in any way. We have taken this matter up with the President of Council.

Yates. Population 443. No reply to our communications.

MERCER COUNTY.

Clarksville. Population 220. This Department notified that Board has been appointed, have written for name of Secretary.

Sheakleyville. Population 164. This Department furnished with names of men appointed on Board of Health. Wrote urging a prompt organization, but no reply.

MONROE COUNTY.

Stroudsburg. Population 3,654. Secretary resigned. Have not received name of successor.

MONTGOMERY COUNTY.

East Greenville. Population 894. No reply to our communications.

Green Lane. Population 272. Board appointed but failed to organize. Wrote to President of Council asking him to proceed to appoint a new Board.

MONTOUR COUNTY.

Washingtonville. Population 212. Letter advising the Department of inability to secure men to serve on Board.

PERRY COUNTY.

New Buffalo. Population 171. No reply to our communications.

POTTER COUNTY.

Lewisville. Population 618. Under process of organization.

SCHUYLKILL COUNTY.

Girardville. Population 1,165. This borough persistently refuses to organize, or pay any attention to our communications. We have received complaints concerning communicable diseases.

Middleport. Population 540. Letter from President of Council stating that Board was appointed October 5th. Has not yet reported organization.

Port Clinton. Population 478. No reply to our communications.

SOMERSET COUNTY.

Jennertown. Population 96. No reply to our communications.

Paint.

Somerfield. Population 178. The above boroughs are all of such small population that it seems impossible to obtain the services of any one as members of the Board of Health.

SULLIVAN COUNTY.

LaPorte. Population 442. No reply to our communications.

SUSQUEHANNA COUNTY.

Little Meadows. Population 213. Information to the effect that is is impossible to organize a Board of Health owing to the fact that it is impossible to get men to serve and that the town contains no resident physician.

This is also true of many other small boroughs in the Commonwealth.

TIOGA COUNTY.

Lawrenceville. Population 486. No reply to communications.

VENANGO COUNTY.

Utica. Population 268. No reply to communications.

WASHINGTON COUNTY.

Beallsville. Population 368. Had a personal interview with the President of Council who promised to appoint a Board of Health which I think he endeavored to do. We have received letter to the fact that the Board has refused to organize.

Long Branch, Population, ... 270
Speers, Population, ... 369
Twilight, Population, ... 136

These are very small municipalities with regard to population.

Houston. Reports a Board appointed, advises that they will proceed with organization immediately.

Midway. Population ——. Letter from President of Council stating that they could not organize a Board in this borough because of having no resident physician. We instructed them to proceed with organization leaving the place of physician vacant until such time as they could secure the services of a physician.

West Middletown. Population 244. School directors organized and acting as Board of Health.

WAYNE COUNTY.

Bethany. Population 130. Board appointed but not organized.

Prompton. Population 258. Letter stating that there was not enough people from which to get a Board of Health.

WESTMORELAND COUNTY.

Donegal. Population 157. Too small a population from which to secure a Board of Health.

East Vandergrift. Population 2,076. Visited this borough and secured the promise of organization. Up to this time no reply.

Madison. Population 464. Letter stating inability to secure men to serve.

New Alexandria. Population 364. Board appointed but failed to organize.

New Florence. Population 800. No reply to communications.

Youngstown. Population 771. No reply to communications.

YORK COUNTY.

East Prospect. Population 292. Visited this place. Had conference with borough officials but they have failed to organize.

Fawn Grove. Population 202. No Board.

Franklin. Population 374. Unable to secure a Board.

Jefferson. Town Council illegally acting as Board of Health.

Loganville. Population 343. Visited this place and conferred with the Chief Burgess but cannot effect an organization.

Wellsville. Population 296. Unable to get men to serve on Board.

New Salem. Population 241. Unable to procure proper persons to serve on Board.

THE DIVISION OF SANITARY ENGINEERING.

F. HERBERT SNOW, C. E., *Chief Engineer.*

THE DIVISION OF SANITARY ENGINEERING.

CONTENTS.

DIVISION OF ENGINEERING.

The following is a detailed statement of the operations of the Engineering Division of the State Department of Health to the end of the year 1908, being the third annual report of the Division made since the creation of the Department of Health under Act No. 281, approved April 27, 1905.

I. ORGANIZATION AND ADMINISTRATION.

OFFICE AND OFFICE FORCE.

Mr. F. Herbert Snow has continued throughout the year to discharge the duties of his position as Chief of the Engineering Division of the Department.

The offices of the Division are on the ground floor front, north corridor, and on the fifth floor, south corridor, of the Capitol, and are those occupied by the Division during the preceding year.

Six subdivisions of the organization have been created in the administration of the work put upon the office, namely, that of general office work; that pertaining to water works and sewerage applications that relating to special investigations; that relating to design and construction; that of map making and, finally, that of sanitary regulation.

There have been employed in the office nine stenographers and five clerks.

ASSISTANT ENGINEERS.

Mr. Walter S. Hanna has continued to discharge the duties of Assistant Engineer in direct charge of the general office work. Messrs. Ira L. Miller and Horace P. Rees were appointed in October and November, respectively, and were assigned to aid Mr. Hanna.

Mr. Chester F. Drake was appointed in February to the position of Assistant Engineer in charge of the investigations of water works and sewerage applications. Mr. Drake resigned later to accept the office of Superintendent-in-charge of the municipal water filter plant of the city of Pittsburg.

Mr. William H. Ennis remained at the Mont Alto State Sanatorium as Resident Engineer on construction work until July, when he was transferred to the office at Harrisburg as an Assistant Engineer on water works and sewerage investigations.

Mr. Howard E. Moses was appointed in June and served as an Assistant Engineer on Water works and sewerage investigations. The greater part of his time has been devoted to special sanitary investigations in Allegheny county.

Mr. Paul Hooker received his appointment in September as assistant engineer on water works and sewerage investigations. He has devoted much time to a special study and report on the Allegheny river drainage basin conditions with respect to water supply and sewerage.

Mr. Moylan E. Shaughnessy was transferred from the field inspecting force to the water works and sewerage investigating force. Besides making engineering investigations along these lines, he has made numerous sanitary inspections and compiled maps for the field inspecting force in Allegheny county.

Mr. Charles H. Cummings has continued as principal assistant engineer in charge of special engineering investigations.

Mr. Ralph E. Irwin, who was employed during the summer months of the previous year, received a permanent appointment in June as assistant engineer on special investigations.

Thomas Fleming, Jr., continued as principal assistant engineer in charge of designs and construction.

Under the personal supervision of Mr. Ennis at Mont Alto was a surveying party, composed of Mr. Chester A. Eckbert, transitman; Mr. Frank L. Gardner, engineer and inspector; and Mr. Ivan M. Glace, rodman. In the office, John M. Mahon, Jr., and Mr. Harry A. Otto, engineering draftsmen, were employed on the design of various structures. Mr. Glace was transferred from field work to design work in January, and later was assigned to the drafting force. Mr. Eckbert was transferred to the office force in February, and later to the drafting force. Mr. Charles R. Forbes was transferred from the drafting force to design work in the office, and in April was sent to Mont Alto as a transitman.

Mr. Albert H. Beard was appointed to the position of assistant engineer in July. He at once reported at Mont Alto and assumed the position of resident engineer on construction.

Mr. Coleman B. Mark was transferred in August from the field inspecting force to the construction force at Mont Alto. He had had previous experience as inspector of construction work.

Mr. James L. W. Gibbs has continued as chief draftsman in charge of map making. The following men were employed under him to make maps or tracings: John W. German, Jr., F. Marion Sourbeer, Charles R. Forbes, Edgar R. Barnes, Chester A. Eckbert, Ivan M. Glace, Max H. Matthes and George Williams. Messrs. Eckbert, Glace and Barnes has previously been on the construction work at Mont Alto; Mr. Matthes, of the field inspecting force, and Mr. Williams spent some time in assembling maps and charts for use in the Pennsylvania Exhibit of the International Tuberculosis Congress, held at Washington, D. C. The office force has, therefore, varied from five men, at the commencement of the year, to eight at the end.

Mr. Moses K. Ely, the chief sanitary inspector, has been in charge of bureau work incident to the supervision of all field officer's work.

These assistants have comprised the permanent force, but at intervals during the year eleven other engineers, residents of the State, were called upon to render assistance of a specific character. These names are presented in alphabetical order:

L. E. Chapin,	Pittsburg.
Harvey Linton,	Altoona.
Chas. F. Mebus,	Philadelphia.
Marshall R. Pugh,	Philadelphia.
Mason D. Pratt,	Harrisburg.
F. H. Shaw,	Lancaster.
H. S. Smith,	Wilkes-Barre.
John H. Strauch,	Pottsville.
D. F. A. Wheelock,	Warren.
Elton D. Walker,	State College.
George F. Hodkinson,	Philadelphia.

Mr. Chapin made an examination and report relative to sewerage and sewage disposal of New Wilmington.

Mr. Linton made investigations of the sewerage system at Bellefonte, the sewerage system in Farmaugh township, Juniata county, and the water-works system of Juniata borough. He also made a special investigation of the watershed of the Altoona City water-works.

Mr. Mebus made investigations and reported on the sewerage systems of the city of Chester, city of Wilkes-Barre, borough of Ridley Park and the borough of Upland. Investigations and report on the proposed sewerage disposal plants of the House of Refuge, Girls Department, at Darlington, and of the Pennsylvania School for Feeble-Minded Children at Elwyn. He made a report on the operation of the sewage disposal plant at Wayne and one on the operation of the sewage disposal plant at Dermady Cottage Sanatorium near Morton, Delaware county. He also made an examination and report on the location of a proposed sewage disposal plant at New Castle, and with respect to sanitary conditions near Ambler.

Mr. Pugh examined and reported on sewage pollution and nuisance near Narberth, on plans and proposed locations of a sewage disposal plant for the Williamson Trade School in Delaware county, and on the water-works systems in Emaus borough.

Mr. Pratt made investigations and reported on sewerage and water-works in the borough of Mt. Union, water-works belonging to to the Blossburg Water Company, and on a sewerage system at Eaglesmere.

Mr. Shaw made sewerage investigations at Corry and water-works investigations at Palmyra, Parkesburg, Mountville and Huntingdon.

Mr. Smith reported investigations on sewerage at Winton borough and Shenandoah borough; also on the water-works system at the latter place.

Mr. Strauch made a special investigation of the water-works system at Schuylkill Haven and at the State Hospital at Minersville.

Major Wheelock made water-works investigations at Austin and at Emlenton, of the Winburne Water Company, Trotter Water Company, Beaver Valley Water Company and Anthracite Water Company systems. He made sewerage investigations at the Columbus Tannery, near Corry, of the Erie Improvement Company in Mill Creek township, Erie county, at Clintonville and Tyrone. Both water-works systems and sewerage systems were investigated and reported on by him in the following municipalities: Wellsboro, Beaver Falls, Erie City, Mercer, College Hill, East Vale, Patterson Heights, New Brighton, Rochester, Freedom, Conway, Fairchance, Fallston, West Bridgewater, James City, Union City, Punxsutawney, Reno, Mars, West End and Parker City.

Professor Walker reported on the sewerage systems of Sharpsville, city of McKeesport, Allentown, Danville and State College borough.

See Royersford and Spring City for Mr. Hodkinson's work.

FIELD OFFICERS.

Besides the sanitary inspectors in the employment of the Department at the beginning of the year, thirty-two additional sanitary inspectors have been appointed by the Commissioner of Health. The

name, place of residence and date of appointment of each is given below:

Charles H. Glenn,	Philadelphia,	March, 1908.
Stuart H. Heist,	Harrisburg,	April, 1908.
Timothy Whelan,	Clifton Heights,	April, 1908.
James A. Walker,	Philadelphia,	April, 1908.
Roland B. Styer,	Lancaster,	May, 1908.
J. B. Baumgardner,	Chambersburg,	May, 1908.
John W. Eisenhart,	York,	May, 1908.
Richard Bayard,	Dauphin,	June, 1908.
Moylan E. Shaughnessy,	Lewistown,	June, 1908.
Howard B. Moore,	Harrisburg,	June, 1908.
J. A. McCleary,	Altoona,	August, 1908.
Robt. S. Hansbury,	Philadelphia,	August, 1908.
Harry E. Magee,	Philadelphia,	August, 1908.
J. D. Marshall,	New Castle,	August, 1908.
William Ellis,	Phoenixville,	August, 1908.
Coleman B. Mark,	Harrisburg,	August, 1908.
Frank H. Lanard,	Philadelphia,	August, 1908.
J. F. McElwee,	Bedford,	August, 1908.
Fred Fletcher,	Columbia,	August, 1908.
J. M. Silliman,	Tamaqua,	September, 1908.
D. M. Irwin,	Greensburg,	September, 1908.
Harry A. Miller,	Lebanon,	September, 1908.
William C. Riddle,	Lancaster,	September, 1908.
William H. Bisbing,	Norristown,	October, 1908.
Edward C. Mitchell,	Bethlehem,	October, 1908.
Joseph S. Couch,	Oil City,	October, 1908.
John E. Perry,	Harrisburg,	October, 1908.
Ira L. Miller,	Harrisburg,	October, 1908.
E. H. Everett,	New Haven,	October, 1908.
Jesse E. Dale,	Patton,	November, 1908.
William P. Miller,	Pittsburg,	November, 1908.*
Thos. W. Templeton,	Plymouth,	November, 1908.

Deputy field officers, so called, because while being in the employ of a private corporation, they are deputized to represent the Commissioner of Health in inspecting the sanitary condition of property and to report results to him, were appointed in four instances prior to 1907. During the current year four additional appointments were made. The name, residence of each and date of appointment is given below:

H. N. Blunt,	Palmerton,	June, 1906.
L. E. Agnew,	Alderson, Harveys Lake,	June, 1906.
Wm. G. Edmunds,	Nanticoke,	June, 1906.
Howard Seabold,	Catasauqua,	November, 1906.
E. M. Stack,	Scranton,	April, 1908.
John Brown,	Scranton,	April, 1908.
Emil Amann,	Warren,	May, 1908.
David Decker,	Ridgway,	June, 1908.

REGULAR FORCE.

On December 31, 1908, the regularly employed force under my direction—the names being given alphabetically—was as follows:

CLERKS.

Bayard C. Dickinson,	Chief Clerk—Local Health Officer Work.
Richard F. Einstein,	Clerk of Field Inspection Work.
Howard M. Haines,	Clerk of Field Inspection Work.
Ellen Johnston,	Clerk of Files.
Daniel V. Ness,	Chief Clerk in Charge Nuisance Complaints.

*Reappointed.

STENOGRAPHERS.

M. Irene Cuenot.
M. Louise Eckels.
Elizabeth R. Fleisher.
Jane Gilbert.
Leola R. Hannah.
M. Ethel Hurst.
Clara V. Mahaney.
Mary E. Russell.
Mary K. Sourbeer.

ASSISTANT ENGINEERS.

Albert H. Beard, ... Resident Engineer, Mont Alto.
Charles H. Cummings, ... Principal Assistant in Charge Special Investigations.
William H. Ennis, ... General Investigations.
Thomas Fleming, Jr., ... Principal Assistant in Charge Design and Construction.
Charles R. Forbes, ... Chief—Surveying Party.
Frank L. Gardner, ... Engineer Inspector.
Walter S. Hanna, ... Principal Assistant in Charge General Office Work.
Paul Hooker, ... Principal Assistant in Charge Water and Sewerage Investigations.
Ralph E. Irwin, ... Chemical and Bacteriological Examination.
John M. Mahon, Jr., ... Construction Design.
Coleman B. Mark, ... Construction Inspection.
Ira L. Miller, ... General Office Work.
Howard E. Moses, ... General Investigations.
Harry A. Otto, ... Construction Design.
Horace P. Rees, ... General Office Work.
Moylan E. Shaughnessy, .. General Investigations.

DRAFTSMEN AND TRACERS.

Edgar R. Barnes.
Chester A. Eckbert.
John W. German, Jr.
James L. W. Gibbs—Chief Draftsman.
Ivan M. Glace.
Max H. Matthes.
F. Marion Sourbeer.
George Williams.

SANITARY INSPECTORS.

Henry Andrews, ... Field Officer.
Richard Bayard, ... Field Officer.
John B. Baumgardner, ... Field Officer.
James M. Clark, ... Field Officer-in-Charge.
David M. Coleman, ... Field Officer-in-Charge.
John J. Considine, ... Field Officer-in-Charge.
William K. Claypool, ... Field Officer.
Joseph S. Couch, ... Field Officer.
Jesse E. Dale, ... Field Officer.
John W. Downes, ... Field Officer.
Moses K. Ely, ... Chief Sanitary Inspector and Bureau Officer.
John W. Eisenhart, ... Field Officer.
E. H. Everett, ... Field Officer.
Fred Fletcher, ... Field Officer.
Morris Z. Frederick, ... Field Officer.
Charles H. Glenn, ... Field Officer.
Stuart H. Heist, ... Special Field Officer.
Warren S. Hood, ... Special Field Officer.
Robt. S. Hansbury, ... Field Officer.
D. M. Irwin, ... Field Officer.
Harry S. Kauffman, ... Field Officer.
Frank H. Lanard, ... Field Officer.
Howard B. Moore, ... Field Officer-in-Charge.
Charles T. Maclay, ... Field Officer.
William P. Miller, ... Field Officer.
Ira L. Miller, ... Field Officer.
J. D. Marshall, ... Field Officer.
Edward C. Mitchell, ... Field Officer.
Harry E. Magee, ... Field Officer.
J. A. McCleary, ... Field Officer.
John B. Nightingale, ... Field Officer-in-Charge.
Thomas R. Nicholson, ... Field Officer.

SANITARY INSPECTORS—Continued.

Otto F. Nickel, ... Field Officer.
John W. Pinkham, ... Field Officer.
John E. Perry, ... Field Officer.
Wilson W. Ritter, ... Special Field Officer.
William C. Riddle, ... Field Officer.
W. W. Reno, ... Field Officer.
Charles H. Spelker, ... Field Officer.
J. H. Silliman, ... Field Officer.
Roy Souder, ... Field Officer.
Roland B. Styer, ... Field Officer.
William R. Teats, ... Field Officer-in-Charge.
Thos. W. Templeton, ... Field Officer.
Timothy Whelan, ... Field Officer.
Daniel Zellers, ... Special Field Officer.
Ira F. Zeigler, ... Special Field Officer.

Mr. E. T. Edwards, City Health Officer for Johnstown, has continued to represent the Department as a special sanitary inspector in the immediate territory beyond the jurisdiction of that city.

LOCAL HEALTH OFFICERS.

To better administer the work of the Department throughout the 1,519 second-class townships of the Commonwealth, wherein reside over two and one-third millions of people, entirely without sanitary protection such as is afforded by the Boards of Health of first-class townships and the boroughs of Pennsylvania, the Commissioner of Health had the State—66 counties, excluding Philadelphia—divided into sanitary districts, totalling 733, for each of which he appointed a resident agent.

In so far as possible and practicable, township boundaries were followed. Usually a district comprises two or more townships, including the boroughs and cities therein. For instance, Logan township, Blair county, including within it Altoona City and Juniata borough, comprises a district. The city of Pittsburg proper is a district by itself, and so is Allegheny City.

The resident sanitary agent of the Commissioner of Health, in so far as his duties relate to the Medical Division of the Department, is confined to the territory wholly without the borough, city and first-class township, because these municipalities are required by law to have their own organized boards of health; but everywhere within his district, regardless of the municipal boundaries, the resident sanitary agent is expected to investigate stream pollutions, water-works and sewers, to render assistance to field officers, and to report to the chief of the Engineering Division.

The work performed for the Engineering Division of the Department appears elsewhere herein.

OFFICE WORK.

The general office work necessary to administer the operations of the Division, including general correspondence, recording corporation reports and plans required by law to be filed in the office of the Department, or in compliance with decrees of the Commissioner, attention to petitions and complaints, the issuing of orders for the abatement of nuisances and menaces, and the preparation of plans

of watersheds for the use of sanitary inspectors in the field, comprises the subjects treated of in this part of the report under the head of office work. More or less office work is performed in connection with the sub-divisions of the organization and it is mentioned elsewhere.

CORPORATION REPORTS.

Under provisions of Law No. 182 of the Acts of the Assembly of Pennsylvania, approved April 22, 1905, entitled "An Act to Preserve the Purity of the Waters of the State for the Protection of the Public Health," it is the duty of every municipal corporation, private corporation, company and individual supplying or authorized to supply water to the public within the State to file with the Commissioner of Health a certified copy of the plans and surveys of the water-works, with a description of the source from which the supply of water is derived.

Under the provisions of the same law it is the duty of the public authorities having by law charge of the sewer system of every municipality of the State to file with the Commissioner of Health a report of such sewer systems, which shall comprise such facts and information as the Commissioner of Health may require.

One hundred and sixty-one reports were received. Thirty-three of them were from municipal corporations and 128 were from private corporations.

The municipal returns comprised 6 water supply reports and 27 sewerage reports.

The private corporation reports pertained to 124 water-works systems and 5 sewerage systems.

The Department has now on file information obtained in this formal way relative to water supply in 788 places, and relative to sewerage in 427 places.

RECORDED PLANS.

On December 31, 1908, there were 5,616 official plans registered in the Department, 2,017 having been added during the year, and of the grand total, 2,576 accompanied water-works and sewerage reports, of which 779 were added during the year; 2,358 accompanied water-works and sewerage applications, of which 766 were added during the year; and 472 were of a miscellaneous character, including some of the office working maps and those used in engineering and inspection work.

PETITIONS AND COMPLAINTS.

The Commissioner of Health, in addition to the powers conferred by the new law, has all the powers conferred, and must perform all the duties heretofore imposed by law upon the former State Board of Health, or any member, committee or officer thereof, including the secretary. The work of supervising the general interests of the health and lives of the citizens of the Commonwealth has been done in part in answer to petitions and complaints, and requests for advice. The Commissioner's instructions to give prompt attention to petitions, complaints and requests have been complied with in so far as the Department force made possible.

Hundreds of communications relative to stream pollutions by sewage, or by industrial waste, or with respect to unsanitary conditions, inferior water supply or ice supply, and respecting sewers, sewage disposal, water supply and general sanitation, have received attention.

Four hundred and sixty-one complaints and petitions have been acted upon during the year. Three hundred and eighty of these cases have been satisfactorily settled.

Thirty-one requests for advice relative to water supply, sewerage, garbage disposal, drainage of stagnant water, disposal of creamery and industrial wastes, and location and construction of cesspools have been answered.

Common nuisances located within the territory of a municipality having an organized board of health, and made the subject of complaint to the Commissioner of Health, have been referred by the Department to such local boards. There have been one hundred and seventy-six references of this kind during the year, as follows:

Stream Pollution. Avondale, Ashley, Bath, Chester, Hazleton, Juniata, LaPlume, LeRaysville, Lincoln Place, North East (2 cases), Patton, Tremont, Troy, West Conshohocken and West Newton.

Sewage in Street Gutters. Blairsville, Edenburg, Emporium, Hamburg, Houtzdale, Knoxville, Lebanon, Littlestown, McKeesport, Mt. Penn, Mt. Pleasant (2), New Bethlehem, Penbrook, Petersburg, Rimersburg and Smethport.

Sewer Outlet.. Blossburg, Chartiers township, Allegheny county, and Mt. Carmel.

Defective Sewer. Apollo, Ashley, Carrolltown, Chester, Glenolden, Greensburg, Pittsburg, Punxsutawney, Royersford, Sewickley and Southwest Greensburg.

Open Sewer. Bedford, Bellevue, Benton, Blairsvile, Blakely, Brownsville, Chartiers township, Allegheny county, Danville, East Stroudsburg, Fayette City, Hoboken, Lebanon, Mill Hall, Mt. Joy, New Bethlehem and Pittsburg.

Unsanitary Premises. Apollo, Ardmore, Bethlehem, Chambersburg, Chester, Coatesville, Curwensville (2), Darby (2), Duboistown (2), Dunmore (2), Duquesne, East Mauch Chunk, Ellsworth, Emaus, Ephrata, Everett, Fernwood, Galeton, Greensburg, Harrisburg (2), Hawley, Highspire (2), Hoboken, Houtzdale, Kane, Kingston, Laceyville, Lancaster, Langhorne, Lebanon (3), Lewistown, Lock Haven, Logantown, Malvern (2), Middletown, Milton, Montour, Mt. Union, Narberth, Newburg, North East, Petersburg, Pitcairn, Pottsville, Punxsutawney, Ridley township, Delaware county, Shamokin (2), Shenandoah, Shippensburg, Siverly, South Fork, Susquehanna, Tower City, Tyrone, Uniondale, Verona, Versailles township, Allegheny county, Waynesburg, Wellsboro and Wyomissing.

Dumping Grounds. DuBois, Grove City, Harrisburg, Lancaster, Lower Merion township, Montgomery county, New Philadelphia, Vandergrift and Waterford.

Dead Animals. Mt. Union.

Slaughter Houses. Adamstown, Coalport, Delta, Jamestown, Jeannette, Johnstown, Loganville, Manchester, Red Lion and St. Marys.

Swamp Land and Stagnant Water. Apollo, Avoca, Chambersburg, Cherry Tree, Columbia, Hartstown, Hyndman, Juniata, Latrobe, Mt. Union, Narberth, Orrstown, Pittston and Williamsport.

Impure Water and Ice Supply. Ashley, Barnesboro, Creekside, Harmony, New Galilee, Punxsutawney, Schuylkill Haven and Tamaqua.

Night Soil. DuBois.

Reduction Works. Lancaster.

At the close of the year, of the 176 cases referred to local boards of health, all but 26 have been adjusted to the satisfaction of the complainants. The Department will follow the remaining cases to a conclusion.

Two hundred and fifty-four complaints and petitions were made the subject of special investigations and report by the Engineering Division. The localities were usually outside of boroughs and cities and in territories where the Department of Health has adequate jurisdiction. Fifty-four of these commanded the services of engineers, field inspectors and county medical officers, and two hundred commanded the services of the local health officers. Classified, these subjects were as follows:

Nuisances in streams by sewage and industrial wastes,	54
Impure water and ice supply,	22
Sewerage systems,	11
Defective drainage,	6
Garbage and night soil dumps,	18
Unsanitary premises,	66
Nuisances in street gutters by sewage,	32
Slaughter houses,	7
Reduction, fertilizer and glue works,	5
Dead animals,	17
Mine drainage,	..
Swamp land and stagnant water,	13
Sewage disposal plants,	3
	254

The localities of the cases investigated are shown in the following statement:

Nuisances in streams by sewage and industrial wastes. In Allegheny county, Carnegie; in Bedford county, Sulphur Springs; in Berks county, Boyertown, Spangsville and Perry township; in Bradford county, Stevensville and Wyalusing; in Bucks county, Ben Salem township; in Cambria county, Ebensburg and Laurel Run; in Cameron county, First Fork Creek; in Centre county, Spring Mills; in Clearfield county, DuBois and Sterling; in Clinton county, Grugan township; in Cumberland county, Shippensburg; in Delaware county, Darby Creek, Millbourne and Drexel Hall; in Erie county, Mill Creek; in Fulton county, McConnellsburg; in Indiana county, Glen Campbell; in Jefferson county, Vicksburg; in Lackawanna county, Scranton; in Lehigh county, Coopersburg; in Luzerne county, Trucksville and Sybertsville; in Mercer county, Wilmington township; in Monroe county, Saylorsburg; in Montgomery county, Bryn Mawr and Upper Hanover township; in Philadelphia county, Chestnut Hill; in Pike county, Milford; in Schuylkill county, Tremont and Lost Creek; in Susquehanna county, Heart Lake, Montrose, Springville and Kingsley; in Union county, Vicksburg; in Washington county, Houston and Washington; in Wayne county, Inglehart, Star-

rucca and Texas township; in Westmoreland county, Jeannette, Manor Penn township, Stauffer and West Newton; in Wyoming county, Mill City; in York county, Hanover and York.

Where the above places are not designated as townships, the places named are villages or suburbs of boroughs. Sometimes in the latter instances the inspections involved examinations within the coroprate territory of the municipality.

Impure water and ice supply. In Allegheny county, Pittsburg; in Beaver county, Beaver Falls; in Berks county, Cumru township; in Blair county, Juniata; in Bradford county, Wyalusing; in Butler county, Buffalo township; in Centre county, Boalsburg; in Chester county, Supplee; in Dauphin county, Susquehanna township; in Montgomery county, Limerick and Colmar; in Monroe county, Stroudsburg; in Northampton county, Easton; in Northumberland county, Seven Points; Perry county, Penn township; in Potter county, Austin; in Sullivan county, Bernice; in Tioga county, Mansfield; in Venango county, Cranberry township; in Washington county, Canonsburg and Washington; in Westmoreland county, Latrobe.

Sewerage Systems. In Allegheny county, Ben Avon, Carrick and Ross township; in Berks county, Virginsville; in Cambria county, Brownstone and Spring Hill; in Lycoming county, Vilas; in Montgomery county, Lansdale; in Northumberland county, Mt. Carmel; in Westmoreland county, Mt. Pleasant and New Kingstown.

Defective Drainage. In Armstrong county, Kelly Station; in Dauphin county, Swatara township; in Huntingdon county, Huntingdon; in Jefferson county, Punxsutawney; in Union county, Lewisburg; in Westmoreland county, Pleasant Unity.

Garbage and Night Soil Dumps. In Allegheny county, McKeesport and Pitcairn; in Armstrong county, Georgetown; in Berks county, Muhlenberg township and Reading; in Chester county, Anselma, Berwyn, Devon and Paoli; in Clearfield county, DuBois; in Franklin county, Chambersburg; in Lancaster county, Gap; in Lawrence county, Union township; in Lehigh county, Old Zionsville; in Monroe county, Pocono township; in Montgomery county, McKinley and Upper Gwynedd township; in Perry county, Duncannon.

Unsanitary Premises. In Allegheny county, Bellevue, Sandy Creek, Tarentum and Versailles township (3); in Armstrong county, Kiskiminetas township; in Berks county, Wernersville (2); in Bucks county, Lahaska, Trevose; in Cambria county, Patton and Stony Creek township; in Carbon county, Weissport; in Centre county, Walker township; in Chester county, Berwyn, East Fallowfield township (2), East Marlboro township, Strafford and Warwick; in Clarion county, Phillipston; in Clearfield county, DuBois, Madera and Tylersburg; in Clinton county, Loganton; in Cumberland county, West Fairview; in Dauphin county, Linglestown, Susquehanna township (3), Swatara township (2) and Wiconisco; in Delaware county, Primos and Upper Darby township; in Erie county, Union township and Wesleyville; in Fayette county, Perryopolis and Redstone township; in Huntingdon county, Walker township; in Indiana county, Blairsville; in Lehigh county, New Tripoli; in Luzerne county, Nanticoke; in Lycoming county, Slate Run; in McKean county, Derrick City; in Mifflin county, Milroy; in Monroe county, Saylorsburg; in

Montgomery county, Ardmore, Bryn Athyn and Bryn Mawr; in Northampton county, Mt. Bethel; in Northumberland county, Dewart, Johnson City and Shamokin; in Perry county, Duncannon; in Westmoreland county, Arone, East Vandergrift and Penn Station; in Schuylkill county, Sheppton and Sheridan; in Snyder county, Port Treverton; in Tioga county, Cowanesque; in Wyoming county, North Mehoopany; in York county, Hanover.

Nuisances in street gutters by sewage. In Allegheny county, Ross and Scott townships; in Cambria county, Johnstown; in Cameron county, Emporium; in Chester county, Berwyn (2), Devon, Treddyfrin township; in Clarion county, Clarion township; in Clinton county, Avis and Mill Hall; in Dauphin county, Paxtang, Susquehanna and Swatara townships; in Elk county, Kersey; in Lackawanna county, Elmhurst and Simpson; in Lancaster county, Leola; in Lawrence county, Oakland; in Luzerne county, Ashley; in McKean county, Ludlow; in Mifflin county, Belleville; in Montgomery county, Berwyn, Haverford, Pottstown, Upper Dublin township, Valley Forge and Willow Grove; in Schuylkill county, Sheppton and Wade; in Westmoreland county, Claridge; in York county, York.

Slaughter House. In Allegheny county, Union Station; in Berks county, Stouchburg; in Erie county, North East; in Greene county, Monongahela township; in Montgomery county, Zeiglersville; in Schuylkill county, Valley View; in York county, Springettsbury township.

Reduction, Fertilizer and Glue Works. In Berks county, Cumru township; in Cameron county, Emporium; in Lebanon county, Myerstown; in Montgomery county, Whitpan township; in York county, Penn township.

Dead Animals. In Berks county, Shillington and Wernersville; in Blair county, Isett; in Chester county, Berwyn; in Crawford county, Centerville and Sadsbury township; in Franklin county, Greene township, Mercersburg; in Indiana county, Buffington township; in Lancaster county, Florin; in Mercer county, Springfield township; in Northampton county, Lehigh township; in Northumberland county, Turbotville; in Susquehanna county, Harmony township and Little Meadows; in Westmoreland county, Claridge and Harrison City.

Swamp Land and Stagnant Water. In Berks county, Douglassville and Heidelburg township; in Cambria county, Stony Creek township; in Center county, Rush township; in Dauphin county, Susquehanna township; in Erie county, Edinboro; in Indiana county, Hortons; in Lackawanna county, Coyne (2) and Hanover township; in Luzerne county, Pittston; in Philadelphia county, Manayunk; in Wyoming county, Mill City.

Sewage Disposal and Disposal Plants. In Allegheny county, Etna; in Columbia county, Centralia; in Luzerne county, White Haven.

Some of the petitions came from local Boards of Health and borough authorities, and in these cases the investigations were in the towns.

ORDERS OF ABATEMENT.

To prevent causes of disease and mortality, so far as the same may be caused by public menaces and nuisances, more especially outside of municipalities on the watersheds of the State, the Commissioner

of Health has the power and authority to order such nuisances and menaces to be abated and removed. Upon examination made by any persons duly authorized by the Commissioner of Health so to do, information as to the facts is submitted to this office and subsequently an order to abate or remove may be issued. These orders are signed by the Commissioner and served by the field or local health officers. The abatements listed below were had by formal notification. Many hundred of properties have been put in sanitary condition on inspection and verbal request by the field or local health officer.

Eight thousand three hundred and forty written orders have been prepared for issuance during the year. Six thousand two hundred and thirty-four of them were issued as the direct result of investigations on watersheds by the division field officers, and all but fifty-three of the menaces were found existing on drainage areas feeding public water supplies. They are more fully reported elsewhere herein. The fifty-three written orders were of a miscellaneous character, reported, in a large majority of the cases, by the local health officers who served the notices. Many of the other notices were also served by the local health officers under the supervision of the Department's field officers.

DRAFTING.

The map-making force varied from five men during the fore part of the year to eight men at the latter part, except when assistant engineers and field officers may have temporarily engaged in the preparation of plans in connection with work to which they were specifically assigned.

During the year maps of twenty different counties were made, each showing townships, boroughs, cities, post-offices, villages, railroad, street-car lines and streams. They are to serve as a basis for general reference, and more particularly as a foundation for future map making of districts within the county. The uniform scale of these maps is three miles to one inch. A total of 585 enlarged township maps were made from smaller maps, and blue print copies thereof were supplied to field officers for inspection work.

In connection with and to facilitate the work of a sanitary survey of the sources of minor pollutions on the watersheds of Ithan Creek, Little Darby Creek, Perkiomen Creek, West Creek and the Shenango River, a map of each shed has been prepared and copies thereof have been supplied to officers in charge of field work in these districts.

Special sanitary inspections of the boroughs and townships in Allegheny county necessitated the compiling of the proper maps to assist the inspectors in this work. Two men were sent to Pittsburg to make tracings of townships, borough and village maps from the authorized county atlas in the county court house. Fourteen township maps and thirty-two borough and village maps were prepared in this way.

For the International Tuberculosis Exhibit at Washington the Department prepared elaborate maps and charts to demonstrate the different methods and ways of treating patients afflicted with tuberculosis. Statistical charts were prepared. For this purpose three maps of Pennsylvania were made, one showing the death rate from tuberculosis per 100,000 inhabitants for each county, and other data of a similar nature; another showing the division of the State into

733 sanitary districts, and the last one showing the location of dispensaries for the free treatment of tuberculosis in each of the 67 counties. Ten charts were prepared, which show the following: The infection of tuberculosis of successive occupants of an isolated farm house; deaths from tuberculosis by age periods; the annual cost of tuberculosis to the State and to the people thereof as compared with the annual value of certain agricultural products; the amount appropriated by the State of Pennsylvania exclusively for tuberculosis work from 1893 to the present time; the comparison of deaths and causes for the years 1906-07; the number of deaths from scarlet fever, measles, diphtheria and whooping cough for the year 1907; the deaths from suicide and heart disease for 1907; the treatment for diphtheria by antitoxin during the years 1906-07. In connection with this exhibit a plan of the first floor of the State Capitol building in Harrisburg, showing the rooms and space occupied by the Department of Health, was prepared and the titles of 42 photographs and 60 cartographs were executed.

Special inspection of the watersheds furnishing the supply to Hummelstown and Connellsville have necessitated the making of maps of the village of Hershey and of the boroughs of Ursina, Castleman and Berlin in Somerset county, respectively, the latter boroughs being on the upper head waters of the Youghiogheny River.

Some miscellaneous map making has been done in connection with pollutions at Devon, Girard borough and the northern vicinity of Pittsburg, in connection with a typhoid outbreak at Royersford and Spring City, in connection with the problem of investigating the various water supplies in southeastern Pennsylvania, and in connection with the consideration of sanitary problems in southeastern Pennsylvania.

Besides the preparation of the various maps enumerated, statistical and other sheets were made for compiling nuisance reports, typhoid epidemic statistics and certain medical reports.

Reference to maps made in connection with Mont Alto work appears elsewhere in this report.

III. ENGINEERING.

The review of plans of proposed sewerage and water-works systems, and of extensions to existing systems, and the making of investigations and reports in relation thereto has been an important part of the work performed by the Engineering Division.

There were 306 sewerage and water-works applications received during the year, of which 107 pertained to water works and 199 to sewers. Of the water-works applications, 83 were received from private corporations and individuals, and the remaining 24 were sent in by municipalities. Of the sewerage applications, 26 were received from private corporations and individuals, and the remaining 173 were sent in by municipalities.

The water-works applications may be classified as follows: Thirty-two for ground water sources and 75 for surface sources; in 11 cases of which the plans provided for purification by filtration of

the surface water, and in 26 additional instances, the surface water was being filtered at the time the application for extensions were made, namely, in the following cases:

1 New Chester Water Company to supply water in Chester township, Delaware County, via Edgemont Water Company.
2 Armstrong Water Company of Kittanning.
3 McKeesport.
4 Springfield Water Company, suburban Philadelphia.
5 Bristol Water Company of Bristol.
6 West Side Water Company of West Bridewater.
7 College Hill Borough Water Company, College Hill.
8 Freedom Water Company of Freedom.
9 Union Water Company of Beaver Falls.
10 Fallston Water Company of Fallston.
11 Beaver Valley Water Company of Conway.
12 Patterson Heights Water Company of Patterson Heights.
13 Valley Water Company of Rochester.
14 North Rochester Water Company of North Rochester.
15 New Brighten Water Company of New Brighton.
16 Chambersburg.
17 Steelton.
18 Reading.
19 Pittsburg.
20 Warren Water Company of Warren.
21 Huntingdon Water Company of Huntingdon.
22. New Bethlehem.
23 Danville State Hospital of Danville.
24 Danville State Hospital of Danville (2nd application).
25 Cambridge Springs.
26 Reading (2nd application).

The applications for water filtration plants, arranged in order of date of receipt, are given below:

1 North East, Erie county.
2 Ridgway, Elk county.
3 Pottstown Gas and Water Company, Montgomery county.
4 Ellwood Water Company, Lawrence county .
5 Freeport Water Company, Armstrong county.
6 Mechanicsburg Gas & Water Company, Cumberland county.
7 Natrona, Allegheny county.
8 Riverton Consolidation Water Co., Cumberland county.
9 Shirmanstown Water Company, Cumberland county.
10 Riverton Consolidated Water Co., Cumberland county (2nd application).
11 Morganza, Washington county.

The sewerage applications may be classified as follows: Eighty-one for separate systems for sewage only, 82 for combined systems to receive both sewage and storm water, and 33 for sewage disposal works, and 3 for extension of time.

The application for sewage disposal plants, arranged in order by dates, are given below:

1 Allegheny City Home, Allegheny county.
2 Butler, Butler county.
3 Allentown, Lehigh county.
4 Palmer Land Company, Carbon county.
5 State Homeopathic Hospital for the Insane, Lehigh county.
6 Derry, Westmoreland county.
7 State Hospital for the Insane, Danville, Montour county.
8 Reading, Berks county.
9 Allegheny City Home (2nd application).
10 Pitcairn, Allegheny county.
11 College Hill (Robert A. Whiteside), Beaver county.
12 Devon, Chester county.
13 Haverford College, Montgomery county.
14 Williamson Trade School, Delaware county.
15 Reading (2nd application).
16 Cheswick, Allegheny county.
17 White Haven Sanatorium, Luzerne County.

18 South Canonsburg, Washington county.
19 Canonsburg, Washington county.
20 Bryn Athyn, Montgomery county.
21 Pennsylvania Training School for Feeble Minded Children, Elwyn, Delaware county.
22 J. W. & A. P. Howard Tannery, Erie county.
23 Beechwood Park Amusement Company, Delaware county.
24 Girl's House of Refuge, Delaware county.
25 Ellwood City, Lawrence county.
26 Cheswick (2nd application).
27 Edwardsville, Luzerne county.
28 Milton, Northumberland county.
29 Morganza, Washington county.
30 New Wilmington, Lawrence county.
31 Western Penna. Hospital for Insane, Dixmont, Allegheny county.
32 Meadville, Crawford county.
33 Bryn Athyn (2nd application).

Three applications for extension of time to fullfil the terms of permits issued to the borough of Youngville, Emporium and Oil City were made by these places.

306 applications received during the year, 247 have been examined and reported upon besides two applications left over from 1905, 2 from 1906 and 64 from 1907, making a total of 315 applications investigated and reported upon during the year. In 201 cases conclusions have been reached and a permit or decree duly issued by the Commissioner of Health.

Of the 201 cases, 72 related to water-works and 129 to sewerage and sewage disposal works.

With respect to water-works permits or decrees, 49 embrace surface sources, of which in 22 cases adequate filtration was required, and 23 embrace ground sources. The 22 cases where filtration was required are stated below in order of issuance:

1 Hummelstown Consolidated Water Company, Dauphin county.
2 York Water Company, York county.
3 Dauphin Consolidated Water Supply Company (Enola), Cumberland county.
4 Ridgway, Elk county.
5 Warren Water Company, Warren county.
6 Pottstown Gas and Water Company, Montgomery county.
7 Ellwood Water Company, Lawrence county.
8 North East, Erie county.
9 Danville State Hospital, Montour county.
10 Pittsburg, Allegheny county.
11 Shiremanstown, Cumberland county.
12 Riverton Consolidated Water Company, Cumberland county.
13 Danville State Hospital (2nd application), Montour county.
14 Freeport Water Company, Armstrong county.
15 Mechanicsburg Gas and Water Company, Cumberland county.
16 Fairchance, Fayette county.
17 Shiremanstown Water Company (2nd application), Cumberland county.
18 Riverton Consolidated Water Company (2nd application), Cumberland county.
19 McKeesport, Allegheny county.
20 Riverton Consolidated Water Company (3rd application), Cumberland county.
21 Western Pennsylvania Reform School (Morganza), Washington county.
22 Natrona Water Company, Allegheny county.

All but numbers 1, 2 and 16 are mentioned in the above list of 1908 applications.

With respect to sewerage decrees, 32 involved sewage disposal works and the other 97 related to sewers and ultimate treatment plants, as more fully hereinafter appears. Sewage disposal applications in 6 instances are pending, namely, Nos. 2, 10, 11, 27, 28 and 32.

A brief summary of the applications received and acted upon relative to water-works and sewerage since the inauguration of the Department is given below:

Applications received in 1905 and 1906,	155
Applications received in 1907,	236
Applications received in 1908,	306
Total,	697
Applications acted upon in 1905 and 1906,	74
Applications acted upon in 1907,	159
Applications acted upon in 1908,	266
Total,	499

There were 123 applications pending at the end of 1908. Fifty-six of them were water and 67 sewerage and disposal applications; 34 of the water-works and 19 of the sewerage applications were investigated, leaving 70 to be investigated.

The 697 applications comprise 212 water-works and 485 sewerage systems; 426 of the latter were municipal plants and 58 private works; and of the former, 165 were owned by private and 47 by municipal corporations. It may be interesting to note that 67 of the water applications concerned ground sources, and 146 concerned surface sources in 33 instances of which the water was being filtered, and in 24 cases new filterers were contemplated. Also with respect to the sewerage applications, 188 related to separate sewers, 212 to combined sewers, 9 to separate and combined, and 73 to disposal works, 3 having been for extensions of time.

So it appears that plans for 58 water filters and 73 sewage treatment plants have been considered and passed upon or will engage the attention of the Department at an early date.

WATER WORKS.

Water Works Permits and Decrees Issued by the

COMMISSIONER OF HEALTH

Up to January 1, 1909.

This work has been done under Act 182, approved April 22, 1905. The law is entitled, "An act to preserve the purity of the waters of the State for the protection of the public health." The term "Waters of the State" is defined to include all streams and springs, and all bodies of surface and of ground water, whether natural or artificial, within the boundaries of the State.

Acting under this law, which prescribed that no waterworks for the supply of water to the public shall be constructed or extended, or an additional source of supply be secured, without a written permit, to be obtained from the Commissioner of Health, the scope of inquiry in each case has been strictly confined to whether the supply be prejudicial to public health.

The virgin waters of the State are pure. They gather in their devious courses on or below the surface of the ground foreign matter, oft times of a poisonous character. To preserve the purity absolutely is impossible, but approximations may be achieved. The results frequently concern the removal of impurities injurious to public health under conditions demanding continual supervision by the State.

Precedent to judgment in any particular case, the full information as to the source of supply and capacity, the manner of collection and the means of distribution, is indispensable; with respect to the source, principally as to danger to be guarded against and means necessary for protection; with respect to capacity, because, besides other reasons, where a supply be altogether good and limited, consumers may be compelled by shortage to have frequent recourse to private wells and neighborhood springs in close proximity to and polluted by cesspool or privy drainage, or other sewage contamination, or because recourse may be frequently had to a polluted stream as the supplementary supply, and thus spread disease in the town, conditions which the law does not contemplate the State authorities should overlook or sanction; with respect to details, because, besides other reasons, the interests of the public health require that ample facilities for quick drainage or shutting off of any infection in any part of the system shall be provided, or where a filter may amply purify water in ordinary times, during a fire the speeding up may be at a rate entirely beyond the purifying capacity and thus sewage water may be introduced into town, or direct recourse may be had to raw creek water for emergencies.

In connection with the subject, it may be important to know about the private wells and springs in the town.

For the dissemination of information, the permits set forth quite fully the local situation leading up to the conditions under which an additional source of supply or an extension to existing water-works will not be prejudicial to public health.

The stipulations refer to provisions for removal of sources of pollution, protective measures, such as sanitary patrol of water sheds and reports thereof, efficient operation of purification works, remedial measures to be adopted by approval or advice of the Commissioner of Health in case the supply or any part of the water-works system becomes prejudicial to the public health and other matters, all appearing in the various cases herein set forth in full and arranged alphabetically.

ANNVILLE, LEBANON COUNTY.

Annville Water Company.

This application was made by the Annville Water Company of Annville, Lebanon county, and is for permission to increase its source of supply of water to the public in said village.

Annville, Lebanon county, is a village of twenty-five hundred population, located immediately south of the Lebanon Valley Branch of the Philadelphia and Reading Railway five miles west of Lebanon city. Part of the village is in North Annville township and part of it is in South Annville township. The sources of supply of water to the public are derived wholly from the hillsides immediately north of the village and in North Annville township.

There are two small runs which come down from the hills towards the village. One of them passes under the railroad near the passenger station opposite the central part of the village. Formerly the only supply was taken from the ground

up this ravine. The water flowed from natural springs up through openings in the bottom of a masonry reservoir thirty feet wide, fifty feet long and about ten feet deep. When these springs became insufficient, three wells were driven adjacent to the reservoir and pumps were installed to raise the water. The contributing area above is an uninhabited district. The elevation of the reservoir is sufficient to afford a gravity supply to the village, the water being conducted by an eight-inch pipe about one mile long. This source, while of excellent quality, proved insufficient in quantity, and on November ninth, nineteen hundred and five, the Commissioner of Health issued a written permit for an additional water supply, which has since been installed.

The new source is about one mile distant from the village in the second run whose area adjoins and is immediately east of that of the first source. It comprises a watershed approximately one-third of a square mile in extent, hilly and cultivated, at the outlet of which exist several springs. The water company acquired the right to the waters of these springs, improved and walled them up and conducted the water to a storage reservoir, located just above the ice pond. This reservior was to be built of masonry, and to be fifty feet long, thirty feet wide and about ten feet deep. An eight-inch gravity supply main delivers the water from this reservoir to the village, following the line of the run past the ice pond. The property here belongs to the Meyer estate, whereon is a dwelling, privy and barn near one of the springs. Above the Meyer Estate is the farm of Samuel Kettering.

The terms and conditions of the written approval and permit for this additional supply issued by the Commissioner of Health were as follows

FIRST: That all surface and run water be excluded from the springs, and for this purpose each spring shall be dug out and walled up in masonry to a sufficient height, and the adjacent land where boggy shall be sufficiently drained. The water from said springs shall be piped to the collecting and storage reservoir, and each such pipe leading from each individual spring shall be fitted with a gate permitting each said individual spring, or any or all of them, to be shut off separately or collectively from the said storage reservoir.

SECOND: That the proposed storage reservoir be made tight on the bottom and sides, and the walls thereof be carried up high enough to always exclude surface and run water, and that a drain shall be constructed so that the reservoir may be readily emptied and the waters therein wasted into the run; and a gate shall be placed on the supply main between the reservoir and the village so that the supply from the proposed source may be shut off when occasion may require it.

THIRD: That the present connection between the supply main and the ice pond shall be taken out, and that on no occasion shall the waters from said ice pond or any surface water be introduced into the Annville water supply system.

FOURTH: That the water supply company shall not be required to supply the said ice pond with spring water at any time, except as required by the contract and agreement with the said David H. Meyer, the owner of the said ice pond.

FIFTH: That the spring upon the said David H. Meyer Estate shall not be taken or used by the water company until the small tenement house and the buildings thereon are vacated, and that these buildings shall be removed on or before the first day of July, one thousand nine hundred and six.

SIXTH: That facilities be provided whereby the system of distributing pipes in the village may be easily and completely drained whenever occasion may require it.

SEVENTH: That permission to use the proposed additional source of supply is hereby granted under the above stipulations and provisions, and under the further provision and stipulation:

"That the said Annville Water Company, on or before the first day of December, one thousand nine hundred and five, shall file with the Commissioner of Health a complete plan of the entire water works system, present and proposed. This plan shall show the streets of the village, the location of the water pipes, their sizes, location of gates and hydrants, and the location and profile of the supply mains and any gates upon them, together with plans, sections and elevations of the storage reservoir, their gates and appurtenances, of the pumping station and the driven wells, a plan and section of the ice pond, and a topographical map of the watersheds of the two sources—the old and the new—said topographical map to be drawn to scale, giving elevations and locations of the springs and all the buildings upon the watersheds, highways and runs."

The company has submitted a plan showing the distributing pipe system and the water shed and the location thereon of dwellings, roads, et cetera, and a general plan of the pipe arrangement for the collection of the water supply from the springs and its delivery to the reservoir, but the detail plans of the springs, piping and reservoir have not been submitted.

It appears that during the dry season the present combined sources are inadequate for the need of the district in which the company has laid its pipe lines and to which it is furnishing water. Furthermore, the petitioners know of no available water that can be procured at the present time, except that to be obtained by drilling or boring wells. The petitioners, therefore, purpose to drill a well along the line of the new or east supply pipe line at a point fifty-five feet eastward from the valve immediately below the ice pond. The well is to be bored to such a depth as shall secure a proper and adequate supply of water. Its diameter is to be from eight to twelve inches, to be cased throughout with iron pipe, the outlet

to be of such elevation as to prevent any surface water from flowing into the well. It is proposed to install a pump in connection with the said well or wells, if there be more than one.

It has been determined that the proposed additional source of supply will not be prejudical to the public health under certain conditions, and a permit is hereby and herein issued therefor under the following conditions and stipulations:

FIRST: That an accurate record of the strata encountered in sinking the wells shall be kept and furnished to the State Department of Health, and that before the water is turned into the water district the water company shall notify the Commissioner of Health of its readiness to do so, whereupon the State Department of Health will collect samples of water from the wells and make tests thereof, and if found satisfactory, approve the supply.

SECOND: Before the additional supply is used, the water company shall prepare the detail plans heretofore called for but not yet submitted, of the reservoirs, springs, pond and pumping station and file the same, together with detail plans of the wells herein approved, their piping, the pumping station layout and appurtenances.

THIRD: At the close of each season's work, the water company shall file a plan of the extensions of the pipe lines in the streets laid during the year, with any other information in connection therewith that the Commissioner of Health may require, to the end that the said Commissioner shall always be informed of the extent of the water works and its use by the public.

FOURTH: If, at any time, in the opinion of the Commissioner of Health, the water works system, or any part thereof, of the sources of supply, shall have become prejudicial to public health, then such remedial measures shall be adopted by the water company as the Commissioner of Health may advise or approve.

It is the purpose of the State Department of Health to make regular inspections of the water works system and the water company shall assist in such inspection, and the company shall keep on blank forms satisfactory to the Department weekly reports of the operation of the water works system and file the same in the office of the State Department of Health.

Harrisburg, Pa., May 11, 1908.

ANNVILLE VILLAGE, LEBANON COUNTY.

(Annville Water Company.)

This application was made by the Annville Water Company of the village of Annville, Lebanon county, and is for permission to increase its supply of water to the public in the said village.

The drilled well for which a permit was issued by the Commissioner of Health on May eleventh, one thousand nine hundred and eight, was completed and found to yield at best about forty gallons per minute. This supply was not sufficient in the opinion of the company to warrant the expense of raising the water.

At the close of the extraordinary drouth of the summer and fall of one thousand nine hundred and eight the springs which are the source of gravity supply to the company are now in a very much depleted condition, and there is necessity for an immediate augmenting of the supply.

The petitioners propose to do this by collecting the ground water at and above the main collecting basin on the Meyers Estate, and also on the Kettering Estate, Along the bottom of the ravine it is proposed to lay open-jointed, vitrified pipe, to fill in around with crushed stone and then to cover all over with earth, bringing this up to the general surface of the ground so that the ravine will be entirely obliterated The water in the ground roundabout which flows out at the present time into the ditch from numerable points will thus be collected in the pipes, made available for the supply, to the village. The water will be piped into the main collecting reservoir now in use. Spring number six is right below Kettering's house. It is to be walled up and covered over and the water is to be piped to a two-inch iron pipe into the main feeder to the collecting reservoir. Thus the possibility of any surface contamination will be done away with. A part of the flow from spring number six will be delivered into the water trough at the Kettering farm, and the details of this arrangement are shown on the plans submitted for approval.

From spring number five the ravine or gulley down through the Kettering farm is to be treated in the same manner and for the same purpose as described with respect to the ravine on the Meyers Estate, and this water is to be conducted into the main collecting reservoir.

The Kettering privy is to be rebuilt and a masonry tight vault provided so that no possibility of sub-soil contamination of the water can occur.

The petitioners present at this time detailed plans of existing reservoirs and springs so that there is now on file in the Department all the information which has been called for.

It has been determined that the proposed additional source of supply will not be prejudicial to the public health, and a permit is herein and hereby issued therefor under the following conditions and stipulations:

FIRST: That the company shall pay especial attention to the prevention of any surface water getting into the system of underground collecting pipes herein approved. Such an occurrence is possible and likely if the gullies should be washed out.

SECOND: The Department will make systematic collections of samples of water from the water company's source of supply, and if the examinations of the samples should indicate any contamination whatsoever, then the water company shall adopt such remedial measures as the State Department of Health may advise or approve.

This permit is issued under the conditions and stipulations applicable thereto contained in the former permits issued by the Commissioner of Health to the Annville Water Company.

Harrisburg, Pa., December 23, 1908.

BERWICK, COLUMBIA COUNTY.

Berwick Water Company.

This application was made by the Berwick Water Company of the borough of Berwick, Columbia county, and is for permission to increase its source of supply and to extend water works in its water district.

Berwick borough, eight thousand population, a community composed largely of foreigners, and supported by one great industrial concern, the American Car and Foundry Company, lies on a comparatively level plateau, sixty feet or more higher than the Susquehanna river and on the north bank thereof. The incorporated territory is about one mile square. It is in the extreme eastern part of the county of Columbia, and is bounded on the west by the borough of West Berwick, population, three thousand, and rapidly growing, on the north and east by Briar Creek township, and on the east for a short distance near the river banks by Luzerne county. The settlement in Briar Creek township, where one thousand people reside, is known as North Berwick.

On the opposite or south bank of the river and in Luzerne county is the borough of Nescopeck, connected by a highway bridge to Berwick. In this settlement of about eighteen hundred people there are approximately three hundred and fifty dwellings. Excrement is disposed of in privy vaults, there being no sewer system. Slops are thrown out on the surface of the ground, which is porous. Ten cesspools are reported and five small private sewers. The latter empty into the river at convenient points. The velocity of the stream here is quite rapid. Probably sewage from Nescopeck does not pass across the river to the pumping station in Berwick. The streets are quite thoroughly piped for public water, and these pipes are owned by the Nescopeck Water Supply Company. This company purchases water of the Berwick Water Company, there being a six-inch main under the river, connecting both systems.

West Berwick borough was recently incorporated out of Briar Creek township. The houses are of frame construction and the owners are mostly employed in the mills. There are no sewers, but the streets are piped for public water and the mains are owned by the West Berwick Water Supply Company, which company buys the water of the Berwick Water Company.

The Berwick Water Company was chartered by legislative enactment of January twenty-seventh, one thousand eight hundred and eighteen, on which date the borough of Berwick was erected. Under this act the company was formed, and it was incorporated by the Governor on March thirteenth, one thousand eight hundred and eighteen. The company was bound to introduce water into the borough and to erect hydrants to use for extinguishing fires. It is a matter of history that the works were built in one thousand eight hundred and forty-eight, the supply being taken from a spring on the river bank and pumped into a standpipe.

In contemplation of the increase of stock and extensive improvements to the system, the company accepted the General Corporation Act of eighteen hundred and seventy-four in eighteen hundred and eighty-nine, and proceeded to obtain an additional source of supply, which is still in use.

The West Berwick Water Supply Company was incorporated under the laws of the State in nineteen hundred and two to supply water to the public at the village of West Berwick in the township of Briar Creek, Columbia county.

The Nescopeck Water Supply Company was incorporated under the laws of the State in eighteen hundred and ninety-four to supply water to the public in the township of Nescopeck, Luzerne county. The incorporators of the last two companies were men or officers interested in the Berwick Water Company.

The Nescopeck Water Company was incorporated in eighteen hundred and ninety-one to furnish water for domestic and manufacturing purposes to the public in Nescopeck, Luzerne county. This company was dissolved by decree of the court in July, nineteen hundred and one.

The Briar Creek Water Company was incorporated in May, nineteen hundred and one, to supply water to the public in the township of Briar Creek, Columbia county. So far as the Department is informed, this company has not erected water works or attempted to supply the public with water. The incorporators may not have any interest in the Berwick Water Company. However, the incorporators of the Briar Creek Water Supply Company, approved March twenty-fifth, nineteen hundred and four, for the purpose of supplying water to the public in said township of Briar Creek, appear to have been the officers or men interested in said Berwick Water Company. It is presumed that the water pipes laid in the streets

in the village of North Berwick and the township of Briar Creek are the property of the Briar Creek Water Supply Company, since the Berwick Water Company, so far as the Department is informed, does not have a right to sell water to the public in this district. However this may be, the Briar Creek Water Supply Company has not made a report and filed plans of its water works system in the State Department of Health.

The West Salem Water Supply Company was chartered in nineteen hundred and three for the purpose of supplying water to the public in the township of Salem, Luzerne county, Pennsylvania, the incorporators being men interested in the Berwick Water Company. It is not known to the Department that this concern has laid any water works pipes, or attempted to supply the public with water.

So it appears that the Berwick Water Company supplies water to the West Berwick Water Supply Company, to the Nescopeck Water Supply Company and to the Briar Creek Water Supply Company, a district in which reside about fourteen thousand people.

Berwick borough has a combined sewer system. It practically encircles the town and the sewage is discharged through a five-foot circular drain into the river at the foot of Oak Street near the boundary line between Berwick and West Berwick. There are over fifteen hundred buildings in the town. In nineteen hundred and five less than two hundred of them had sewer connections. Cesspools are common. The soil is light and gravelly.

The lower or main plant of the American Car and Foundry Company is located in the western part of the borough, west of Oak and Vine Streets, and is partly in Berwick and partly in West Berwick. It comprises the rolling mill, steel works, wheel, forge, paint and smith shops and foundry, where the vast majority of workmen are employed. The upper plant, where the frame and wood work is done and the castiron pipe is made, is in the eastern central part of the borough.

The Berwick Water Company has three sources of supply, namely, Glen Brook, Verners Run and two alleged springs at the edge of the Susquehanna River in Berwick borough.

On Glen Brook and Briar Creek township there are two reservoirs situated about two miles north of Berwick. Both of them are artificial. The lower one holds eight million four hundred and twenty thousand gallons, is termed Reservoir Number One and is used for impounding purposes. Reservoir Number Two holds three million five hundred and twenty-eight thousand gallons, and is used largely as a subsidence basin. The watershed comprises two and eighty-two hundredths square miles. It is rugged country. Two streams unite above the upper basin to form the main stream. The source of each branch is a number of springs near the foot of what is known as Lee Mountain. On the east branch there are seven occupied homesteads. On the west branch there are twenty dwellings, one school-house, two churches and a store. All the buildings on this branch, except eight residences, are in the little village of Summerhill, on the extreme western edge of the watershed.

Ordinarily, when there is plenty of flow, the water is taken directly from the stream above reservoir Number Two and piped to the town. The supply main from the lower dam to Berwick is twelve inches in diameter, and a parallel one is twenty inches in diameter, each sixty-two hundred feet long to the borough line, where they connect with the distribution system. On the way they pass through the village of Foundryville and the village of North Berwick. In each place the pipe lines are tapped several times.

The reservoirs are fenced in, and a man who lives in the neighborhood below the dams is constantly employed on patrol duty.

On Verners Run, in Salem township, Luzerne county, distant about a mile and a half due east of the Glen Creek reservoir, is Reservoir Number Three. It is smaller than number one, but sufficiently high to furnish a gravity supply to the borough. The source of this stream is also a number of springs at the foot of Lee Mountain. On the watershed, which is two and fifty-three hundredths square miles in extent, there are eight occupied estates, one church, one creamery and a schoolhouse. This area is also patroled by a man in the employ of the water company. He resides on the watershed about half a mile above the reservoir. From the dam a ten-inch supply main, thirteen thousand four hundred and fifty feet long, extends to and connects with the twelve-inch pipe line from Glen Brook reservoir. The juncture is near North Berwick at a point about five thousand feet below Reservoir Number One. There are a few taps off this ten-inch line.

The patrols are maintained because the water company realizes that pure water infected by nascent fecal matter becomes most dangerous and that, therefore, such poisons accidently put into the streams on the steep slopes of the mountain shed might reach the water district in a short time and cause disaster.

The two springs, so called, at the edge of the Susquehanna River in the central part of the borough, and at or near the low water mark of the river, are covered over with long, narrow, cast-iron, water-tight boxes, about thirty-six feet long and seven feet wide and deep, open on the bottom lengthwise. These boxes were placed in the gravel over the springs and the sides thereof were imbedded several feet in the gravel. The expectation was that only water which passes up through the gravel into the boxes flowing from the alleged springs would enter the boxes. The box nearest the shore is on the edge at low water, and it is about one hundred feet from the bank at high water. In this box about midway thereof is a small box, about three feet square and seven feet long, filled with stone. A perforated sixteen inch pipe extends out through one end of the main box to a three-million gallon

pumping engine in the nearby pump house. This is the pump suction pipe by means of which water is drawn from the alleged spring and forced directly into the water district. Until recently and as occasion required, this water was delivered into the system of street pipes in the town.

The second box, not now in use, is located about seventy feet further out in the stream. It was formerly connected by twenty-four-inch pipe to the first box.

In the fall of nineteen hundred and five, when firteen inches of water stood over the intake, at least one leak in the cast-iron pipe was observed by a Department officer and evidence of downward currents could be seen. As the river rises and the pressure increases, the leaking and the infiltration downward and thence upward through the gravel into the intake chamber correspondingly increases undoubtedly. It is safe to conclude that all of the water which flows into the intake does not come from the supposed underground flow.

The sixteen-inch force main from the pump house reduces to a ten-inch main at the corner of Market and Third Streets, and thence it is a ten-inch pipe all the way to the lower works of the American Car and Foundry Company, with a four-inch branch, to the upper works of said company. There is a connection between the force main and the town system of pipes at the corner of Market and Third Streets, and two others in Third Street near the said lower works. They are provided with valves, kept closed. There is no way to introduce river water into the town system except by opening these valves. There is a check valve at the upper works and also at the lower works of the American Car and Foundry Company, which prevents river water from flowing into the town system, but admits the mountain water to the industrial plant when the pumps stop or the pressure on that side is reduced for any reason.

The river water is now used exclusively for industrial purposes, except at such times as the mountain supply has become depleted and it becomes absolutely necessary to put the river water on the town to obviate a water famine. Then the local authorities and the public are amply warned to boil all water. It is to obviate this necessity that the water company purposes to increase its mountain supply.

At both works of the American Car and Foundry Company there are independent lines of water pipes laid to the different mills and shops, through which the mountain water is supplied for drinking purposes. Warning signs are placed throughout the works calling attention of employes to the danger of drinking the water supplied to and used in the works for industrial purposes.

The supply to West Berwick and to Nescopeck and to North Berwick is taken off the town distributing pipes so that whatever water is supplied generally throughout Berwick is also supplied to these other places. For all purposes the consumption averages two million one hundred thousand gallons daily, of which one million four hundred thousand gallons is for manufacturing purposes, and is largely used at the lower plant. The water company supplies the town and shops exclusively with mountain water as long as this is practicable. This, of course, saves pumping. The next arrangement of operation is to pump river water to the lower industrial plant and possibly the upper plant, keeping the town exclusively on the mountain water. Finally, when the mountain water supply becomes prejudicial for town purposes, recourse is then had to the river source to make up the deficiency.

There is a second pumping engine in the station. It has a capacity of about one million five hundred thousand gallons. It is held in reserve for fire protection.

Thus it appears that there is a domestic system and an industrial system of water works in the district, they being interchangeable. It is also noted that ordinarily the river water is supplied largely to the lower industrial plant.

During August, September and October of nineteen hundred and five, following the outbreak of typhoid fever at the river town of Nanticoke, a few miles up stream, typhoid fever broke out among the men employed at the lower works in Berwick, and it did not disappear until pure water had been furnished at the works and the epidemic had assumed proportions great enough to scare the employes into the observance of rules against drinking river water. Out of ninety-two cases reported, sixty-three were among men employed at the lower works. The other twenty-nine cases included eleven women, six boys and two girls, and ten men variously employed in the town or surrounding country. Had the infection been in the domestic supply, men, women and children everywhere in the district should have been poisoned, which was not the case.

The petitioners purpose to build a new reservoir on Glen Brook, using the present reservoirs there and build an additional supply main from Verners Run dam to the new dam on Glen Brook. The Susquehanna River affords an abundant supply but because its waters are polluted by sewage from many cities along its banks above Berwick and because the cost of purifying this water and pumping it would be prohibitive, the water company prefers to develop the mountain supply to provide for double the present population of the district. On the basis of a per capita consumption for industrial purposes of an amount equal to that now furnished, a supply capable of yielding three million gallons daily is sought.

The proposed plans are intended to afford a sufficient gravity supply from the mountains to meet all domestic consumption throughout the year and as much more as may be possible in order to minimize the use of the river water for industrial purposes.

With the present impounding capacity of fifteen million gallons, in round numbers, it is only possible to store eight days' supply for the domestic consumption of twenty-three thousand people. There are often periods of drought when this amount

of storage plus the minimum yield of the watersheds would be totally inadequate to avoid a water famine. The petitioners estimate that with a daily domestic consumption of one million eight hundred and forty thousand gallons and an extreme low run-off of six hundred and ninety-two thousand four hundred and thirty-four gallons for a period of fifty-four days, a storage of fifty million gallons of available water should be assured to supply the domestic consumers, the pumps being used during this period to meet the industrial consumption.

To accomplish this purpose it is proposed to build a third dam across Glen Brook valley about seven hundred feet below dam number one. It is to be forty-seven feet high to the top of the embankment, have a concrete core wall, reinforced by earth embankment to be two hundred and sixty feet long with a flood channel on one side, spillway in the centre and a gate house at the foot of the embankment in the reservoir, submerged, with screens on the outside, provided with three ports at different depths. From the gate house the supply mains to the town are to extend. A blow-off pipe at the bottom is provided. This structure will impound twenty-three million eight hundred thousand gallons.

Dam Number One is about twenty-one feet high and one hundred and ninety-five feet long. Dam Number Two is fifteen feet high by two hundred and thirty feet long. Both are earthen embankments, Number One having a concrete core wall. As the waters from the brook run directly into the upper reservoir during a rain storm, the bottom is well filled with mud. Provision is made for carrying the flood waters around Number One Reservoir through an open conduit, roughly made in the side of the hill. When this ditch was constructed, gates were built at its entrance to control the floods and turn the waters into either reservoir, but at present there is no arrangement by which flood water can be conserved in periods of drought or whenever desired. So no advantage is taken of summer showers, from which much good water might be impounded to tide over a drought.

It is proposed to clean out reservoirs number one and two to give a minimum depth of water in number one reservoir of ten feet and a maximum of twenty-six feet, and a minimum depth of ten feet in number two reservoir and a maximum of thirteen feet. In the new reservoir, number four, the minimum depth of water is to be twenty-six feet and the maximum forty-two feet. By this arrangement fifty-three million gallons of water is to be impounded as follows: In the present Verners Run reservoir, three million three hundred thousand gallons; in reservoir number one, nineteen million four hundred thousand gallons; in reservoir number two, six million five hundred thousand gallons, and in the proposed reservoir, twenty-three million eight hundred thousand gallons available draft.

At dam number one it is proposed to tear out the old gate house, substituting therefor a new one similar to that proposed at dam number four. At dam number two it is purposed to construct a controlling chamber by means of which, through various pipes, the water from the main stream above may be delivered into any one of the three reservoirs on Glen Brook or into the supply mains in the town. At the head of reservoir number two there is to be a small feed dam with gates on the pipes which pass beneath the dam to the control chamber at dam number two.

In each one of the several dams a spillway mid-length of the dam will be provided. It is proposed to conduct the flood waters around all these structures by an improvement in the existing flood channel and by extensions of the same. It is to be an open channel, graded and lined with concrete sides and on the bottom, to dam number one. From this point to below the lower dam it is to be a sixty-inch reinforced concrete conduit built in the side hill.

From observations made on the ground it is known how much of a precipitation renders the waters yielded from the watershed objectionally turbid. There is to be an automatic flood gate arranged in a chamber in the flood channel at dam number two, whereby all water of such turbidity is diverted from reservoirs number one and four, and wasted.

It appears that ample drainage facilities are provided for the independent drainage and cleansing of each basin.

In order to use or utilize all the dry weather flow from Verners Run watershed, it will be necessary to provide a pipe leading from said reservoir, which is forty-three feet at high-water mark above the high water in the proposed reservoir, into the latter. If there were a constant draft upon the Verners Run dam from the town, the present ten-inch pipe as now arranged and connected to the twelve-inch from the Glen Brook supply might carry all the mean dry weather yield from Verners Run, because the ten-inch pipe has a maximum capacity of nine hundred and forty-two thousand gallons per day. But such is not the case in practice, so that water flows over the spillway of Verners Run dam and is wasted when it is the most valuable. It is proposed to build a twelve-inch main paralleling the ten-inch main and connect the new twelve-inch main with the twelve-inch from Glen Brook. The old ten inch is to continue as now to connect with the twelve-inch to town, but this is to be in the future the only supply to the twelve-inch pipe to the town; therefore, there will be a direct supply main from Verners Run reservoir to Berwick and a direct supply main twenty inches in diameter from the Glen Brook reservoir to Berwick.

The observed yield for dry weather periods from the local watersheds, although high when compared to average watersheds, are still comparable with yields from mountain areas in Pennsylvania. The estimated flow and the contemplated storage are reasonably certain to accomplish an adequate supply of drinking water to a

population of twenty-five thousand people. What the industrial uses of water may be remains to be proven. It is clearly impossible to furnish the demands of both kinds of consumption from the mountain watersheds even now. It is more desirable to conserve the virgin pure waters for general town uses and to use the river water for manufacturing, than to supply all purposes from the river after first filtering such water.

It is easily possible by efficient patrol and the maintenance of sanitary conditions to keep the streams on the mountain pure and wholesome for domestic uses. The individual householder there is responsible for the proper disposition of poisonous waste. The water Company is responsible for the quality of water it furnishes to its consumers, which involves the exercise of due care in protecting its source of supply from pollution. And the State is responsible for the preservation of the purity of the streams for the protection of the public health.

It has been determined that the proposed additional source of supply will not be prejudicial to public health, and the same is hereby and herein approved and a permit issued therefor and for the extensions of water pipes in the borough of Berwick under the following conditions and stipulations:

FIRST: That detail plans of all of the dams, reservoirs, gate houses and chambers, location of piping, gates and appurtenances and detail plans and profiles of the supply mains leading to Berwick, as the same shall be upon the completion of the work herein approved, shall be prepared and filed in the office of the State Department of Health, together with any other inforation in connection therewith that may be required at the close of the seasons work.

SECOND: An accurate plan of the pipe lines, gates, hydrant locations, blow-off and drainage facilities, shall be prepared and filed in the office of the Commissioner of Health at the close of the current year. And, thereafter, annually, plans of all extensions made to the street pipe system and water works during the year shall be prepared and filed in said office, together with any other information in connection therewith that may be required, to the end that the Commissioner of Health may be informed of the extent of the water works system and the number of people supplied with such water.

THIRD: Adequate facilities for the quick drainage of every part of the water works system shall be afforded, and these drainage points shall be adequately designated on the plans to be filed with the State Department of Health.

FOURTH: The water company shall maintain adequate patrols of the watershed, to see that proper receptacles are provided and used and maintained on all occupied estates, and that all reasonable precautions be taken to prevent any contamination whatsoever of the waters to be supplied to the public. Monthly reports of all inspections shall be kept and copies thereof, to the satisfaction of the Commissioner of Health, shall be filed in said Commissioner's office.

FIFTH: If, at any time, in the opinion of the Commissioner of Health, the water supply of the water works or any part thereof has become prejudicial to the public health, then the water company shall adopt such remedial measures as the Commissioner of Health may approve or suggest.

SIXTH: Detail plans of the construction and installation of the check valves shall be prepared and filed with the Commissioner of Health. The water company shall make frequent inspections of these valves to see that they are securely seated, and that no river water can possibly pass by these valves into the town system. The only place where river water may be introduced into the town system of distributing pipes shall be at the three places above mentioned, namely, at the corner of Third and Market Streets and in Third Street near the lower industrial plant. However, the gates on these by-passes shall be securely closed and never used except in the face of a water famine, and not then unless the public, the local health officials and the State Commissioner of Health be notified and amply warned. The consumers shall be advised by the water company at such times to boil the water.

SEVENTH: The water company shall see to it that its consumers who use river water at industrial plants shall keep posted throughout the several mills, shops and places warning signs notifying all the employes of the danger of drinking the water supplied to the plant from the river.

EIGHTH: Regular inspections will be made of the water works system by a Department officer. The State Department of Health may suggest rules and regulations to govern the supply of water to the public in so far as the public health is concerned, and the water company shall co-operate with the Department and furnish facilities for inspections and assist in the examinations if required. The company shall keep a weekly report of the operations of the works on forms satisfactory to the Department of Health and submit copies thereof to the Commissioner of Health when required.

NINTH: It is expressly stipulated that this permit for an additional water supply and an extension of water works, relates only to the supply of water to the public in the borough of Berwick, or the territory defined by the company's charter. The mere ownership of stock in the West Berwick Water Supply Company, the Briar Creek Water Supply Company, the West Salem Water Supply Company and the Nescopeck Water Supply Company, in the absence of a purchase of the franchise and property of these independent corporations, or of a consolidation or merger under the laws of the State, does not entitle the Berwick Water Company to rightfully petition for approval of plans to extend water works for the supply of water to the public in territory outside of the borough of Berwick.

It is suggested that the Berwick Water Company might find it profitable to construct permanent weirs on Glen Brook above the reservoirs and to take daily observations of the yield of the watershed and of the amount of water supplied to the town. This might also be done on the Veners Run water shed. The first cost would be trifling and the daily observations would involve no additional expense to the company. The knowledge thus secured might prove of very great value to the company. The measurements are recommended.

Harrisburg, Pa., March 24th, 1908.

BETHLEHEM, NORTHAMPTON COUNTY.

This application was made by the borough of Bethlehem, Northampton county, Pennsylvania, and is for permission to install the necessary plant and to obtain an additional source of supply of water to the public within said borough.

It appears that on May twenty-seventh, nineteen hundred and seven, a decree was issued to the Board of Water Commissioners of the borough of Bethlehem by the Commissioner of Health, in which decree, after reviewing the circumstances, the Commissioner continued "I have determined that the present source of supply of water to the public in Bethlehem is prejudicial to public health, and, therefore, apprise the Board of Water Commissioners of the danger to the public accompanying the use of the existing source of supply and hereby advise and request the Water Commissioners to prepare and submit to the State Health Department for consideration, a plan or plans for the supplying of pure water to the public."

The Commissioner further determined "that on or before September first, one thousand nine hundred and seven, the borough shall comply with the law requiring the filing with the Department of plans and a report relative to its existing system of water works."

The petitioners report that the present supply has become inadequate since the annexation of West Bethlehem, and that an examination of all the possible sources within a radius of ten miles or more has proved them all to be either insufficient or entirely too expensive. The petitioners therefore determined to buy the Illick Mill property and to obtain thereon a supply of water from deep wells, which supply will supplant that now obtained from the limestone spring in the borough.

The Illick Mill property now in the possession of the borough comprises nineteen and five-tenths acres and stretches along the banks of Monocacy Creek for a distance of about three thousand feet up-stream from a point about a mile above Bethlehem and West Bethlehem, between which the creek is a natural boundary. On the property are Illick's dam and a mill privilege.

Above the site of the wells Monocacy Creek has a drainage area of forty-three square miles, ninety per cent. of which is said to be under cultivation. The upper part of this area is hilly, and here the geological formation is slate, while at the lower part of the area it is limestone and here the topography is gently rolling.

The Lehigh and Lackawanna branch of the Central Railroad of New Jersey follows the course of the creek, crossing and recrossing it. There is on the drainage area a population of forty thousand or more, ninety-four per square mile. There are also along the creek two boroughs, Chapman on the upper part and below it Bath, which latter is about ten miles above the site of the wells. Bath has now an estimated population of nine hundred. Around it, also on the watershed, are several large cement manufactories, and this recently-developed industry promises to considerably increase the population in the vicinity. In nineteen hundred and six there were in Bath several private sewers discharging into Monocacy Creek and a number of privies overhanging its banks.

The deep wells on the Illick Mill property are already drilled or in progress of drilling. They are to be below the dam to the west of Monocacy Creek, between it and the mill race. The creek here and for a mile or so above has moderately steep though not high side hill slopes leading to the comparatively flat territory beyond. The lower cell has been completed, being located about one hundred feet from the race and thirty feet from the creek, and just below an overflow from the former to the latter. It is said to have been drilled eight inches in diameter to a depth of seven hundred and fifty feet, and to have been lined to a depth of two hundred and fifty feet with seven-inch casing. The well is said to extend through limestone rock with layers of silicious rock. It is said that practically no water was found until a depth of two hundred and eighty feet was reached, when the well commenced to overflow, and it continued to do so in increasing quantities as the depth was increased. It is said that the natural flow rises to the height of eight feet above the ground at the rate of two hundred thousand gallons per day, and that the well yields nine hundred thousand gallons per day when the water in the well has been lowered twenty-seven feet below the ground; and further, that a continuous ten-day test with an air compressor yielding one million two hundred and fifty thousand gallons daily with a maximum rate of discharge of one million five hundred thousand gallons per day when the water was thirty-five feet below the surface of the ground, and further that bacteriological and chemical tests made at the University of Pennsylvania and Lehigh University proved entirely satisfactory.

The second well, in process of construction, is about two hundred feet west of the one just described and about sixty feet from the race and one hundred and thirty feet from the creek. It has been drilled twelve inches in diameter and lined with

twelve-inch casing to the depth of two hundred and fifty feet, below which the well is being continued eight inches in diameter. No tests have as yet been reported to the Department.

The elevation of the ground around the wells is, speaking roughly, five feet above the ordinary elevation of the water surface in the adjacent part of Monocacy Creek and five feet below the elevation of the water surface in Illick's dam. The mill is one hundred feet distant from the first mentioned well, and a barn and several dwellings are within two hundred feet of the well and somewhat further from the second well.

It is proposed to pump, presumably at least in part by water power, from the wells to a twenty-inch rising main nineteen hundred and twenty feet long to a proposed standpipe, to be located on an eminence between the wells and the town and having an elevation of approximately ninety feet above the wells and little or not at all above the highest parts of Bethlehem. From the standpipe twenty-two hundred and ten feet of twenty-inch pipe will extend southerly in or near a public road to the borough line, and will there be connected to the present mains. The pump station, force main, standpipe and supply main have not been designed in detail.

A serious conflagration in Bethlehem might, at any time, require water for fire fighting at the rate of two million gallons per twenty-four hours or more, in addition to the ordinary consumption of about one million five hundred thousand gallons per twenty-four hours, a total consumption of three million five hundred thousand gallons per twenty-four hours. The storage provided must, during the continuance of the maximum rate of consumption assumed, furnish water at the rate of one million gallons per twenty-four hours, the excess of this rate of consumption over the rate of the yield of the wells, liberal assumption as two million five hundred thousand gallons per twenty-four hours. It is not known what storage will be provided in the new standpipe in addition to the nine hundred thousand gallons provided in the two existing standpipes, but since these must also take care of the daily fluctuations in the consumption, a million gallons storage might be assumed to be always maintained, and this amount would be exhausted in eight hours by the assumed rate of consumption.

Therefore, it appears that the welfare of the community would demand additional storage and an additional source of supply of pure water, especially in view of the proposed extending of the distributing system into West Bethlehem.

That the pumps and wells might always be ready for service in case of fire, the layout of the proposed puming station should provide against any possible flooding of the machinery or surface pollution of the wells by high water in the creek.

Though the wells are deep and at a considerable distance from thickly built-up communities, it is not at all impossible that their water may, at some time, be polluted by the waters of Monocacy Creek or sewage of Bethlehem, more especially if the water in the wells is maintained at a considerable distance below the surface. Therefore, frequent bacteriological tests of this water should be made.

It is reported that the pressure in parts of the town is at present insufficient for fire fighting. Such information as has been submitted with the application does not indicate that any greater pressure would be obtainable in the proposed system.

It has been determined that the proposed source of supply will not be prejudicial to public health and it is hereby and herein approved that a permit therefor be issued under the following conditions and stipulations:

FIRST: Ample facilities shall be provided by means of blow-offs placed at all low points whereby the rising main, standpipe and supply main may be completely drained.

SECOND: Detailed plans of the layout at the pumping station and of the rising main, standpipe, and supply main showing all valves and connections, shall be filed with and appoved by the Commissioner of Health before work is commenced on these respective parts of the system and before water is supplied to the public from the new source, a description and, if necessary, plans of the construction of the wells shall be filed with the Commissioner of Health.

THIRD: After the proposed works are completed and the supply of water to the public from the proposed source has been commenced, water shall not be furnished to the public from any other source without a permit from the Commissioner of Health.

FOURTH: It is the purpose of the Department to obtain samples of water for analyses from the various parts of the system from time to time, and the petitioners shall render such assistance in carrying out this idea as may be necessary, and shall make such alterations in the system and source of supply as the Commissioner of Health may suggest or approve or demand in the interests of the public health to the end that the water supplied through the water-works of the petitioners shall not be prejudicial to the public health.

FIFTH: Detail records of the operation of the works shall be properly kept on blank forms to be suggested by this Department and copies thereof shall be furnished to the Commissioner of Health.

SIXTH: The permission herein granted is given under the express stipulation that the plans of the present works already called for in the decree of the Commissioner shall be filed with the said Commissioner of Health on or before September first, nineteen hundred and eight.

Harrisburg, Pa., Juy 16th, 1908.

BIGLER TOWNSHIP, CLEARFIELD COUNTY.

Madera Water Company.

This application was made by the Madera Water Company of Madera village, Bigler township, Clearfield county, and is for permission to obtain an additional source of supply of water to the public within its chartered territory and to extend water pipes in the streets of said village.

It appears that Madera is a mining settlement of about one thousand population, located in the center of Bigler township, Clearfield county, on Clearfield Creek.

This stream has its head waters in Cambria county at Cresson and Gallitzin boroughs in the summit of the Allegheny mountains. Thence it flows northerly through the county and through Clearfield county, joining the West Branch of the Susquehanna river near the county-seat, which is Clearfield borough. The territory so drained is mountainous. Madera is on the stream about fourteen miles above the county-seat. The direct means of communication between the two places is a branch of the New York Central and Hudson River Railroad. The village is also on the Moshannon and Madera branches of the Pennsylvania Railroad. The region round about is rich in deposits of bituminous coal and this resource is mined extensively. There are several operations in and about Madera. The principal ones are the Corona Coal and Coke Company, employing about two hundred men; the Morrisdale Coal Company, employing about one hundred men, and the Blyth Coal Company, employing about seventy-five men. There are about one hundred and sixty houses. Fourteen of them have private sewers to the runs. Otherwise, the shallow privy vault method of sewage disposal is in vogue. Sanitary conditions are of a low standard, but the general health of the community is good at the present time. There are three cases of typhoid fever, attributed to the use of contaminated well water.

Large quantities of sulphur water are pumped from the mines and drained into the streams in the region.

The Madera Water Company was chartered in nineteen hundred and four for the purpose of supplying water to the public in the village of Madera. During the year and the one that followed, the water works system was built, comprising springs, a storage and distributing reservoir and the pipe system in the village. The village is located on the east bank of the creek and on the north bank of a tributary called Alexander Run. The town site is on a side hill, whose summit is several hundred feet above the village. Numerous springs outcrop on this hill, and some of them are used as sources of individual supply to the citizens of the village.

Alexander Run rises about a mile and a half to the east and drains a very precipitous, small watershed, on which there are several mine operations. The company's water supply is three small springs. They are located about a mile and a half southeast of the settlement in the valley of a small brook, tributary to Little Muddy Run, which in turn empties into Clearfield Creek before Madera village is reached. These springs are enclosed in masonry, covered over and kept locked. There is no chance for surface drainage to flow into the springs. From two of them the water is piped through a four-inch pipe line, one line for each spring, terminating in a masonry reservoir, fifty-five feet long by thirty-six feet wide by six feet deep. The bottom is natural earth. The structure stores eighty-nine thousand gallons of water, and when full the surface elevation is seventy feet above the village. The reservoir is distant about one thousand feet from the two springs. A six-inch drain pipe is provided to empty the reservoir into the brook. A five-foot board fence closes the basin.

From the reservoir the water is conducted by gravity through a six-inch cast-iron pipe to the village, about a mile and a half distant. This pipe line follows the valley of Muddy Run and Clearfied Creek, and is laid in a highway.

Between the reservoir and the village the third spring is located. It is on the hillside to the east of the road, or main public line, and at elevation about equal to the reservoir elevation. The water is piped from it through a four-inch line into the six-inch gravity main leading to Madera.

There are three and a half miles of cast-iron pipe laid in the streets of the village. The diameters range from six to two inches. One hundred and ten houses are supplied. Probably eight hundred people reside in these dwellings. The remaining inhabitants obtain their drinking water from private wells and springs.

Formerly the water company furnished the Morrisdale Coal Company, but this service had to be discontinued owing to lack of supply.

The flow of the three springs above described does not exceed twenty-five thousand gallons per day during protracted dry periods. The watersheds above the springs are unpopulated. Eight years ago Madera had a population of two hundred. It is confidently expected that the village will rapidly increase in size because of the extensive mining operations now being developed in the territory. To meet the present requirements and increased demands for water consumption, the water company stands in need of an additional source of supply. Prior to the present season the three springs constituting the existing source were ample in flow to supply the people with drinking water, but the drought of the current season has practically dried up the springs. The inhabitants in the western section of the village at present are compelled to seek their drinking water from dug wells.

The three cases of typhoid fever in this locality are believed to be due to the use of this dug well supply. The use of ground or spring water taken from the vicinity of privy vaults and cesspools of the percolating type, where located on a hillside subject to surface flow contamination, is a suspicious practice. The interests of the public health demand that proper receptacles for sewage should be used in order to make impossible the escape of any sewage matter, either from the surface of the ground or underneath it, to the sources of drinking water supply.

The water company has no additional plans of its street pipe system showing the locations of pipes, hydrants, valves, drainage facilities and the sizes of the pipes.

The Madera Water Company purposes to build a collecting reservoir about a mile northeast of the village near the headwaters of a brook tributary to Alexander Run. The source is to be a spring. This spring is on the land of Joseph K. Minds. No plans have been submitted of the details of the reservoir, or of the proposed six-inch cast-iron pipe line from it to connect to the street pipe system in the village.

The petitioners, however, state that the new reservoir will be one hundred and seventy-five feet above the village, and that it will probably include a masonry dam, which will dam up the water to a depth of about six feet, storing about one hundred thousand gallons. At the site chosen it would appear that the watershed will have an area of less than three-quarters of a square mile. The land is heavily wooded and there is one occupied dwelling on the watershed.

It is impossible for the Department to give a fair consideration to a proposition of this kind when the petitioners neglect to submit adequate plans and data.

As the proposition now stands the new reservoir will be one hundred feet higher than the old reservoir. Therefore, the old reservoir must be abandoned, or there must be two services in the village, one a high service and the other a low service. Since there are fire hydrants distributed in the town, no one would desire to be on the low service district, and this would result probably in the entire village being put on the high service so long as the supply was capable of furnishing the water. Then the old service, or low pressure, would have to be resorted to for a part of the village. Or it may be that the water company intends to introduce an auxiliary pumping station or an intermediate collecting reservoir, to be placed at the same elevation as the old reservoir.

It seems that the details have not been thought over; the great haste at the present time being for an immediate supply of water to the village. The Department's representative measured the flow on the day of his inspection and ascertained it to be about fifty thousand gallons per twenty-four hours.

Within one hundred feet of the proposed new spring there is a dwelling and a shallow privy vault. By the construction of this vault and its proper maintenance, and by the walling up and proper protection of the spring there should be no danger of contamination, but the water company should attend to this.

It has been determined that the proposed source of supply will not be prejudicial to public health, and a permit is hereby and herein issued therefor, under the following conditions and stipulations:

FIRST: The water company shall on or before December first, nineteen hundred and eight, prepare and file in the office of the Commissioner of Health complete plans of the existing water works, showing reservoirs, springs, pipe line and watersheds thereabove, the supply mains and distributing pipes in the streets and all gates, hydrants and drainage and blow-off facilities.

SECOND: Provision shall be made at all low points for the drainage and flushing of supply mains and distributing pipes.

THIRD: The water company may extend its street pipe lines on the express condition that at the close of each season's work plans thereof, together with any and all information in relation thereto that may be required, shall be filed in the office of the Commissioner of Health, to the end that the State Department of Health may be kept fully informed of the extent of the water works system and the public use thereof.

FOURTH: The water company shall provide a masonry and water-tight privy vault on the property of Joseph K. Minds, and shall see that this is used and properly maintained, in order that all contamination of the proposed spring and reservoir shall be prevented.

FIFTH: That before the water company builds the reservoir it shall submit a detail plan thereof, which must be approved by the Commissioner of Health. From the area which it is proposed to flood with water all loam, mud and vegetable matter shall be removed. Plans shall include the contour of the high water mark and the configuration of the sides and bottom of the reservoir.

SIXTH: Surface water shall be excluded from the new reservoir. The new spring shall be walled up in masonry and covered over and protected from contamination and the water from it shall be piped into the storage reservoir. In this manner the quality of the water should be equal to that now supplied to the village.

If the company purposes to make a storage reservoir for surface water, then ample provision must be made for conducting all the drainage from around the house and immediate vicinity to below the dam, and detail plans of all this improvement shall be submitted to and approved by the Commissioner of Health before the work is done.

SEVENTH: If at any time the water works system or the source of supply or any part therefor shall in the opinion of the Commissioner of Health have become a menace or prejudicial to the public health, then such remedial measures shall be adopted as the Commissioner of Health may demand, suggest or approve.

EIGHTH: The water company shall cause monthly inspections to be made of the watersheds above its source of supply, and any change thereon from existing conditions, such as the erection of any new buildings or the removal of timber or other operation, shall be reported immediately to the Commissioner of Health. Whenever required, detail reports of the operation of the water works system shall be kept on blank forms satisfactory to the Commissioner of Health and copies of the same shall be filed with the said Commissioner.

Harrisburg, Pa., September 2nd, 1908.

BIGLERVILLE BOROUGH, ADAMS COUNTY.

Biglerville Water Company.

This application was made by the Biglerville Water Company, of Biglerville borough, Adams county, and is for permission to install a system of public water works and to obtain a source of supply therefor.

It appears that the borough of Biglerville, with a population of four hundred, comprises a manufacturing and farming community in Adams county, seven miles north of Gettysburg on the Gettysburg and Harrisburg Branch of the Philadelphia and Reading Railway. The borough was incorporated from Butler township in nineteen hundred and three and has an area of three hundred and seventy-three acres. In nineteen hundred the town had a population of about two hundred and eighty. Besides farming in the vicinity, there are half a dozen small manufacturing plants in the borough, including a canning factory and apple evaporating works.

There is no flowing water in the vicinity other than a small tributary of the Conewago Creek, which rises northwest of Biglerville. There are no sewers in the town. Of the eighty houses in the borough, six are reported to have cesspools and the remainder shallow privy vaults as the only means of sewage disposal. Wash water, garbage, etc., are generally thrown on the ground.

Water for domestic purposes is obtained principally from individual drilled wells, about fifty feet deep. There are also in the borough, six dug wells and six cisterns, so it is reported. In spite of these conditions, typhoid fever has been of rare occurrence.

The Biglerville Water Company was chartered September fifth, nineteen hundred and eight for the purpose of supplying water to the inhabitants of the borough of Biglerville.

The water company has already constructed a reservoir on Yellow Hill, one mile northwest of the borough in Butler township. This reservoir if formed by a concrete breast seventy-eight feet long across a natural ravine. The sides of the reservoir are rip-rapped on a one to one inside slope, and extend above the natural surface of the ground, thus preventing the run-off from the immediate vicinity entering the reservoir. The basin has an elevation above Biglerville of about one hundred and twenty-two feet, a capacity of about two hundred thousand gallons, and when it is full the water has a depth of six feet and a surface area of about forty-seven hundred square feet. Through the concrete breast there are two six-inch cast-iron pipes, flush with the bottom of the reservoir, one for draining it and the other being the six-inch gravity supply main to Biglerville.

A six-inch gravity main has already been constructed from the reservoir southeasterly through private property, a distance of about thirty-nine hundred feet, to the western borough line, whence the six-inch main extends easterly through the main street of the borough, a distance of about one mile. In the western part of the borough a four-inch lateral extends from the main five hundred feet south in Penn Street. A four-inch lateral is also in process of construction in the central part of the town, in Gettysburg Street, about seven hundred feet south and one thousand feet north from the six-inch main. There will thus be four dead ends in the borough.

The source of supply to the reservoir comprises three small springs. One of these is located thirty feet from the reservoir in the western slope of the ravine in which the basin lies. This spring is completely walled and covered by a masonry structure, and its water flows through a three-inch terra cotta pipe directly into the reservoir. The slope above the spring is cultivated and contains no habitation, the buildings of the farm to which this area belongs being located beyond the crest of the hill.

The second spring is located on the land of John Funt in the head of the ravine about one-quarter of a mile north of the reservoir. This spring is in a dilapidated and roofless spring-house, long since abandoned, and the water flows from it through an open and natural channel to the reservoir. About one hundred feet to the north of this spring, on the slope above it, is the residence of John Funt. In the vicinity are the barn and barnyard and an overflowing privy. The slope above the spring and the sides of the ravine above the run are largely under cultivation, although there is some woodland on the eastern slope.

The third spring is located on the land of Edward Lauver at the foot of the western slope of the ravine midway between the Funt spring and the reservoir. The water flows through an open channel to the run from the Funt spring. This third spring is in boggy ground and is not protected in any way. As already indicated, the slope above it is under cultivation.

The total drainage area above the spring is one hundred acres and contains the one farmstead mentioned. The flow of the three springs is reported to have measured sixty thousand gallons per day in July and August, nineteen hundred and eight. On Septembear fourteenth, nineteen hundred and eight, the flow appeared to be somewhat less than this. The flow from the Funt spring is probably more than the combined flow of the other two springs.

It is expected that the water system will have forty house connections to it at once and probably most of the forty remaining houses in the near future. It is also probable that the Reading Railway Company may, before long, obtain water from the water company for its locomotives. The local industries have their own drilled wells and will probably continue to use them. Fire plugs have been installed on the distributing system.

The domestic water supply obtained from shallow wells in the vicinity of loose privy vaults and cesspools and where waste water is allowed to run over the surface of the ground is suspicious. Therefore, the furnishing of a sufficient supply of pure water from outside of the borough is desirable.

The proposed supply will probably be sufficient for some time to come, but it is doubtful whether the two smaller springs, without the Funt spring, would be sufficient to meet the demands of the prospective patrons of the water company. The location of the Funt spring and of the open run from it to the reservoir immediately below the farm buildings mentioned is extremely objectionable. All the springs should be completely enclosed to prevent any possible contamination reaching them, and the water should be piped from them to the reservoir. The run-off from above the reservoir, including the surface wash from around the farmstead, should be conducted around the reservoir by means of an adequate channel, provided for this purpose. Proper means should be provided for sewage disposal at the dwelling, to which end the Department will use its influence. However, it would be much more desirable for the water company to purchase this estate and raze the buildings and strip off the surface soil in the vicinity.

The capacity of the reservoir, about two hundred thousand gallons, should be sufficient to furnish fair fire protection and also to allow for the daily variation in consumption so long as the sources of supply are adequate for the town, provided care is taken in operating the system to see that the reservoir is always as nearly full as is practicable. The six-inch gravity main should furnish two or three moderate fire streams in the central part of the town, so long as the pipes remain clean and free from incrustations. At the extremities of the four-inch laterals the fire service will be less efficient.

It has been determined that the proposed water works and source of supply will not be prejudicial to the public health and a permit is hereby and herein issued therefor under the following conditions and stipulations:

FIRST: Before water is furnished to the public, the water company shall file with the State Department of Health a plan of the watershed, showing the location of all streams, highways, buildings and other possible sources of pollution; also, detailed plans of the reservoir and springs, a plan and profile of the gravity main and a plan of the distributing system, showing the location of all blow-offs, valves and the sizes of pipe. At the end of each season's work a plan showing the extensions made to the distributing system during the year and such other information as may be required, shall be filed with the State Department of Health, in order that the said Department may always be informed of the extend of the system and of its use by the public.

SECOND: Before water is supplied to the public, all the springs shall be adequately protected from surface wash and chance or malicious pollution by means of closed water-tight masonry structures. The water shall be piped from the springs directly into the reservoir. The surface run-off from the area above the reservoir shall at no time be allowed to flow into the reservoir, but shall be conveyed around it in a channel adequate to carry this flow at all times.

THIRD: The reservoir shall be effectively protected by a fence against chance or malicious pollution. A screen shall be provided in the reservoir over the inlet to the supply main and this inlet should preferably be raised somewhat above the bottom of the reservoir.

FOURTH: Since the main spring is near the Funt residence, the water company shall have a sanitary inspection made of this property every month to ascertain whether there be any existing menace to the purity of the waters of the Funt spring, and the reports of the inspection shall be filed with the Department of Health. The water company shall see that a water-tight, masonry privy vault is constructed at the Funt farmstead and that the same is properly maintained, and that other wastes from this property are disposed of in as sanitary way as possible. Any neglect on the part of any individual or owner of property on the watersheds above the springs to comply with sanitary regulations shall be promptly reported by the water company to the Commissioner of Health. The presence of any infectious diseases on the watersheds shall be promptly reported to the said Commissioner of Health.

FIFTH: The water company shall keep monthly reports of the operation of its system on blank forms satisfactory to the State Department of Health and copies thereof shall be filed with the said Department.

SIXTH: If at any time the water supply or water works or any part thereof shall be found prejudicial to the public health, such remedial measures shall be adopted as the Commissioner of Health shall approve or advise.

Harrisburg, Pa., November 23rd, 1908.

BLACKLICK TOWNSHIP, CAMBRIA COUNTY.

Nant-y-Glo Water Company,

This application was made by an association locally known as the Nant-y-Glo Water Company, formed and controlled by Montell Davis and E. C. Davis, and is for permission to install a system of water works and supply water to the citizens of Nant-y-Glo, in Jackson and Blacklick townships, Cambria county.

It appears that Nant-y-Glo, a mining village in a mining district opened within the past ten or fifteen years, is in the western part of Cambria county, ten miles northeast of Johnstown, in Blacklick and Jackson townships. It is on the Blacklick branch of the Cambria and Clearfield Division of the Pennsylvania Railroad, which connects Nant-y-Glo with Cresson on the east (on the main line of the Pennsylvania Railroad) and Indiana borough on the west. Ebensburg, the county seat of Cambria, is on the same branch, seven miles to the east.

The South Fork of Blacklick Creek, one of the branches of the Kiskiminetas River, separates the two townships, and with the railroad on its eastern bank divides Nant-y-Glo, about three-eighth of the town being to the east in Blacklick township and five-eighths to the east in Jackson township.

Nant-y-Glo is strictly a mining village and has a population of about one thousand. A considerable proportion, though by no means the majority of the population, is foreign. The entire town has sprung up since mining operations were started in this vicinity a decade or more ago.

The South Fork of Blacklick Creek winds from its source nine miles to the village of Nant-y-Glo, where it is joined from the south by Schuman Run, a stream about three miles long, and from the north by a small run about two miles long. The village is not built up close to the banks of the main stream on either of the runs. Twenty-four miles below Nant-y-Glo, Blacklick Creek joins with the Conemaugh to form the Kiskiminetas which enters the Allegheny just above Freeport. The country in the vicinity of Nant-y-Glo is sparsely populated, but being a new mining district, nothing definite can be said of the future.

Close to the western bank of Schuman Run on the southern outskirts of the village, is a mine of the Nant-y-Glo Coal Mining Company, of Philadelphia, which, it is said, produces three hundred to four hundred tons daily, and just south of this, Pennsylvania Mine Number fourteen, of the Pennsylvania, Beach Creek and Eastern Coal Company, of New York, from which five hundred or more tons are mined daily. Two miles north of the village, near the small run already mentioned, is the Lincoln mine of the Lincoln Coal Company, of New York, which is at present running with a small shift of men, but it is said will shortly produce three to four hundred tons daily. In the eastern part of the village and northeast of the creek, is the Ivy Hill mine of the Ivy Hill Coal Company (Barker Bros., Ebensburg), producing three hundred tons daily. All of these mines discharge mine drainage into the streams. The Ivy Hill mine drainage is said to average one hundred thousand gallons daily, based on pump rating, although the pumps have a total capacity of six hundred thousand gallons daily. The stream is markedly polluted with mine drainage. About a quarter of a mile east of Nant-y-Glo, the Springfield Coal and Coke Company is opening up a large mine. A mile or so further up the stream is a small chemical works, the output of which is said to be largely the products of the destruction of wood. It is said that this works pollutes the stream to considerable extent.

A single bridge connects the two parts of the village. That part to the northeast is on ground which rises rapidly from the creek to an elevation of about sixty-five feet. To about six houses on the lower ground water is piped in a two and a-half-inch pipe from a spring and small reservoir on the hill to the north. This spring and reservoir are reasonably well protected and are above all habitation. The spring is said to have been recently maliciously opened up to allow cattle to water there, but this dispute will probably be settled. The present applicants for a permit for a new supply are those personally interested in this supply. There are also several wells in this locality.

On the same side of the creek near the Ivy Hill coal mine are twenty-eight houses, owned by Barker Brothers. Four of these are furnished with water piped to the houses from a neighboring spring. The remaining twenty-four carry their water from four running spouts, to which it is piped from a second spring in the vicinity. Both of these springs are said to be above all habitation, and although not protected from surface water, are probably reasonably safe, except from the danger of chance or malicious pollution. The boiler supply for the Ivy Hill Coal Company is taken from a bore hole at the power plant, and is said to be satisfactory.

To the southwest of the creek and west of Schuman Run the ground rises from the valley of the run and creek to an elevation of about eighty-five feet. Here the village is laid out in four blocks, though these are not built up solid, and there are occasional houses outside of them. Forty-six frame houses in pairs, belonging to one of the coal companies, extend for one thousand feet or more south from the principal part of the village. The water supply on this side of the creek is derived from about fifteen wells (several of them dug) and five or more open springs, several of which are subject to surface pollution and drainage from houses above them.

The Pennsylvania, Beech Creek and Eastern Coal Company obtain their boiler supply from Schuman Run at a point in the outskirts of the village. The Nant-y-Glo Coal Company use the less sulphurous mine drainage in their boilers. The Pennsylvania, Beech Creek and Eastern Coal Company have in view a supply of water from one of the tributary runs further up the South Fork of Blacklick Creek. It is said, however, that they are only doing enough work on the proposition to hold their charter, and it is not known locally how extensive a supply is contemplated.

The Springfield Coal and Coke Company in connection with opening their mine will probably develop a considerable village in its vicinity, and may very likely supply the same with water.

The village consists practically entirely of small frame houses, although many of them have stone foundations. There is one hotel and there are several stores. There is neither gas nor electric lighting for either streets or houses. There are no paved streets or gutters. There is said to be only one inside closet. Practically every house has its privy. Almost all the waste water finds its way to the streams through natural water courses. Just below the bridge across the creek a slaughter-house projects over the stream, and is said to discharge its wastes into the latter and at times to be the source of extremely offensive odors.

Twelve cases of typhoid fever are reported in Nant-y-Glo in the fall of nineteen hundred and six, and investigations by Department officials indicate that the infection came from overflowing privies, the drainage of which reached wells and springs. There were ten cases or more in the village during the last half of nineteen hundred and seven.

Montell Davis and E. C. Davis, the applicants, propose to introduce a supply of water from Davis Run, a small tributary of the run entering Nant-y-Glo from the north. It is proposed to install a small intake dam, gravity main to the village, and a distributing system with fire plugs. Nothing is said of the fire service in the application, but in the correspondence this is put as one of the urgent reasons for installing the system at once.

There is no incorporated company, but it is evidently intended that the supply shall be a strictly public one. In the application it is stated that one hundred and fifty acres are to be served at once, subject to applications from citizens. Permits have been obtained from the townships to allow the laying of pipes, and an agreements has been drawn up with those owners whose properties are crossed by the various pipe lines. This agreement reads in part as follows:

> "That we, the undesigned, all parties of the first part, and Montell Davis and Everett C. Davis, parties of the second part, ————
>
> "It being fully understood, however, that the said pipe line is to be used by the said parties of the second part for the purpose of the water main to supply water to the citizens of the village of Nant-y-Glo and the various districts surrounding said village or lying adjacent hereto, and for no other purpose ————————."

Thus it appears that a public supply is contemplated should the source prove adequate, and also that persons not included in the agreement may be refused the right to connect with the public system.

The area of the watershed of the proposed supply above the proposed intake is stated as one hundred and sixty-six acres, or twenty-six hundredths square miles. The territory is said to be entirely uninhabited. It is traversed by perhaps a half mile of road, which leads from Nant-y-Glo to a solitary habitation beyond the watershed, to which place there is access from another direction as well. This road crosses the stream at least once. Practically the entire area is wooded, and it is said that all of it has been timbered within the last fifteen years. A large part of the area is covered with a scrub growth.

Much of the ground is covered entirely with large rocks approaching boulders in size. Clay was also very evident in places.

Assuming a minimum rainfall of five-tenths of an inch per month, the average daily fall would be seventy-five thousand gallons on a quarter square mile and a run-off of fifty per cent. would give an average stream flow of thirty-seven thousand gallons per day. Probably reliable records of rainfall kept at Johnstown show the precipitation for October to have been forty-eight hundredths inches in eighteen hundred and eighty-seven and thirty-hundredths inches in eighteen hundred and eighty-eight, these being the only two months in twenty-six years over a period of thirty-nine years in which the precipitation fell below seven-tenths of an inch. From the character of the watershed, it would seem that there should be a very considerable natural ground storage, but whether this would be sufficient to maintain the assumed minimum stream flow throughout the period affected by a thirty-day

period of minimum rainfall or to maintain a greater daily flow throughout a longer period on which the average rainfall would be considerably greater (over two inches precipitation in sixty days, including October, in either of the two years already mentioned) is a question to be determined only by a series of stream gaugings, such as have not been made on the stream in question.

On September twenty-seventh, previous to which weather conditions had been normal, the watershed seemed rather wet. On the morning of September twenty-eighth, the head of water on an eight-inch weir was about three inches, which reduces to one hundred and sixty-two thousand gallons daily. From all reports, October is usually in the driest part of the year in Cambria county, although the present year has been a wet one. The petitioners claim that they have watched the stream carefully during the past summer and at no time in this period or in some ten years past, during which they have frequently observed it casually, has the flow of this stream been appreciably less than at the time of the Department's investigation. This is, of course, meager data as to the quantity of water when there is considerable doubt as to its being a sufficient supply.

Just below the site of the proposed intake another small run joins the run intended to be used, from the west. This second run has a watershed of, perhaps, one-third the area of the proposed supply. In case of necessity, it might be used to increase the supply, either by placing the intake below the junction or by having an intake on each run and joining the pipes. While but little head would be lost by the first method, every available foot of head will be required for an adequate fire service. A public mountain road traverses the side hill above this run.

According to the application, the intake dam proposed will have a capacity of about twenty thousand gallons. Assuming that the proposed flow of the stream would be sufficient for domestic purposes, it is very evident, however, that for fire service storage must be relied upon entirely, Therefore, unless a distributing reservoir of one hundred and fifty thousand gallons or more capacity be constructed near Nant-y-Glo the dam at the intake should certainly have such a capacity, or greater.

A dam of very much greater capacity, such as might be built to supply the ordinary daily demand during a dry spell of several weeks, could not be built at the proposed intake site without much excavation, or else a large embankment for one side of the dam as well as a breast across the valley. Moreover, were the waters of the stream backed very far above the proposed dam site, property above that owned by the applicants would be flooded, which would be undesirable whether it would cause trouble at the present or not. As already mentioned, to locate the dam even one hundred feet or so further down stream would mean the loss of head in town for fire, and here also the same objections hold as to the practicability of constructing a storage dam.

Judging from the surface, any excavation in the vicinity of the intake site would be almost entirely in rock.

The small concrete reservoir (capacity about ten thousand gallons) on the hill north of the village in Blacklick township and already referred to as furnishing water to the applicants and several parties in the lower part of the village, is fed by a small spring in the vicinity, and the supply is carried to the consumers in a two and a-half-inch pipe. The applicants own the ground around this spring and reservoir and a considerable interest in its development. They state that they intend to run the pipe from the new supply up onto the hill and connect it with the two and a-half-inch pipe near the present reservoir, cutting out the latter entirely. The two and a-half-inch pipe,it is hoped, will have a sufficient capacity for the present. This present reservoir is about thirty-five feet below the hydraulic gradient for a fire service flow in the proposed pipe line.

A distributing reservoir might be built at no great distance up on the hillside about on the steepest hydraulic gradient for the pipe proposed at present. Such a reservoir, if built at some time in the future, would, with an adequate distributing system, insure fire protection and reduce the ordinary pressure on house connections and fixtures.

Probably for the present the stream flow would be sufficient for domestic purposes and a small dam at the intake for a fire service. If the future demand exceed the supply available here, probably other runs in the same valley could be developed instead of providing storage on the present run, or by buying more property such storage could be provided, which would probably be more desirable, since there would be a smaller watershed to be kept free from pollution. Were other streams developed without building storage reservoirs, probably the most satisfaction would result from building a large distributing reservoir near Nant-y-Glo, which would also obviate the necessity of increasing the size of the gravity main in the valley for some time.

The supply main proposed is to consist of about forty-four hundred feet of six-inch pipe. There is to be two thousand feet of existing two and a-half-inch pipe incorporated in the system, merging the supply main into the distributing system. The distributing system is to consist of eleven hundred feet of six-inch pipe from the lower end of the two and a-half-inch pipe crossing the creek and in Roberts Street to corner of Roberts and Caroline Streets, and of twenty-nine hundred feet of four-inch pipe in Lloyd and Caroline Streets and in the central North and South Streets. It is proposed that at some time in the future a six-inch main be laid connecting the six-inch pipe from the intake where it joins the two and a-half-inch pipe, straight

across the valley of the South Fork of Blacklick Creek, with the distributing main in the western part of Roberts Street. Then the two and a-half-inch pipe would remain in service for distribution, but would no longer carry the entire flow.

The applicants are considering seriously using spiral riveted pipe, at least for the gravity main.

The fire protection which would be furnished by six-inch gravity and distributing mains would be poor. Eight-inch pipes would give very much better service. The six-inch pipe has not been definitely decided upon.

In order to connect with the two and a-half-inch pipe at the reservoir, the gravity main would leave the public road and be carried up on the hill. If continued in the future as proposed, to the western part of Roberts Street, this would be about the shortest route to the latter point. This arrangement would have the following advantages: First, the time required for, and the first cost of the installation of the system would be somewhat less owing to the use of the present two and a-half-inch pipe; second, the pipe lines from the point on the hill to different parts of the distributing system would be somewhat of a safeguard against breaks; third, the gravity main would be near a site for a possible future distributing reservoir.

On the other hand, if the gravity main were continued in the public road and connected to the six-inch distributing main where it was proposed to connect the latter to the lower end of the two and a-half-inch pipe, the gravity main would be on a more nearly uniform grade and the full capacity of the system would be realized from the beginning. The lower end of the two and a-half-inch pipe could be connected with such a main as part of the distributing system and, if desirable, the connection with the present reservoir on the hill could be retained in case of emergencies or heavy demand on the system, a check-valve being placed at the reservoir.

From the intake to the reservoir on the hill would take forty-four hundred feet of pipe, and from here to Roberts Street two thousand feet, making sixty-four hundred feet. From the intake to the distributing main (six-inch) in the eastern part of the village, would take sixty-two hundred feet.

The proposed distributing system would probably be considerably improved both with regard to circulation and fire protection, by increasing the four-inch pipe in the principal North and South Streets to six inches, or eight inches from Roberts Street to Davis Street, and connecting it at the latter point by four-inch pipe in Davis Street to the four-inch laterals in Caroline Street and Lloyd Street.

With these suggestions, the distributing system would consist of eighteen hundred feet of six-inch pipe and twenty-nine hundred feet of four-inch pipe. The western three hundred feet in Roberts Street might be reduced to four inches, but this would not be desirable if the proposed six-inch pipe from near the present reservoir on the hill is to intersect Roberts Street at its western end.

To summarize, it appears that it is desirable that a domestic water supply and fire protection system of water works should be installed. The petitioners are willing to build the system proposed for their own particular benefit and for the benefit of others.

A very considerable part of the town consists of houses owned by the different coal companies, many of which are already supplied with water. Moreover, it seems that a considerable part of the future growth will consist of mine employes who will probably live in houses to be built by an additional mining company and some perhaps by the present companies. Therefore, the introduction of water being a private enterprise, naturally for the purpose of earning a profit, it is not to be expected that the applicants will spend more money on the project than reasonably sure profits warrant.

The springs and wells which are the present sources of water supply are evidently unfit for domestic use, and a pure supply of water would be in the interests of public health.

From all available information it seems that the proposed source of supply will be reasonably pure.

While the quantity is small, it will in all probability be adequate for the domestic consumption for a few years and may be for a much longer time. It is also possible to provide a fairly satisfactory fire protection. This, however, and the augmenting of the supply in the future are questions to be considered in detail by the water company. The sizes of pipes have been discussed, but these also must be finally decided upon by the applicants.

It has been determined that the proposed water works system and the source of supply will not be prejudicial to public health, and a permit is hereby and herein granted therefor to the Nant-Y-Glo Water Company, under the following conditions and stipulations:

FIRST: That ample facilities shall be provided for draining both the gravity main and the distributing system and also the intake dam or reservoir.

SECOND: If at any time it is found desirable or necessary to include the present spring or reservoir hereinbefore mentioned in the proposed system, said spring or reservoir shall be adequately protected from surface drainage or chance pollution and facilities shall be provided for draining them. Plans of said spring and reservoir and their connections to the proposed system shall be filed with the Commissioner of Health.

THIRD: Complete plans of the intake arrangement for the proposed supply and complete plans for the proposed distributing system as installed and plans showing the location of all blow-off outlets shall be filed with the Commissioner of Health.

FOURTH: If at any time in the opinion of the Commissioner of Health the water works system or the source of supply or any part thereof shall become prejudicial to the interests of the public health, then such remedial measures shall be adopted as the Commissioner of Health may demand, advise or approve.

FIFTH: No additions to the system or supply shall be made without application to and approval by the Commissioner of Health. At the close of each season's work a plan of the water pipes laid in the streets of the town during the year, showing the sizes, gates and blow-offs, shall be prepared and filed in the office of the Commissioner of Health, together with any other information in connection therewith that may be required, to the end that the Department of Health may always be informed as to the extent of the water works system and its use.

SIXTH: If any lumber operations should be undertaken on the watershed or any habitation or source of pollution be established thereon at any time, the Nant-Y-Glo Water Company, so called, shall immediately notify the Commissioner of Health thereof and co-operate with the Department of Health in the enforcement of sanitary regulations to safeguard the water used by said company as a source of supply to the public.

Harrisburg, Pa., August 15th, 1908.

BLOSSBURG BOROUGH, TIOGA COUNTY.

This application was made by the Blossburg Water Company, of the borough of Blossburg, Tioga County, Pennsylvania, and is for permission to introduce an additional source of supply of water to the public in said borough.

It appears that Blossburg borough is a community of about twenty-eight hundred population, located in the southeastern portion of Tioga County near the headwaters of Tioga River, a stream which flows northerly into the State of New York and empties into the Chemung River, a tributary of the North Branch of the Susquehanna River. The municipal territory, which is about two and a half miles square, is bounded on the north by Covington Township, on the east and and south by Hamilton Township and on the west by Bloss Township. About four miles to the east is the borough of Fallbrook, through part of which Tioga River flows easterly and passing through Hamilton Township enters the southeastern corner of Blossburg borough and thence pursues its course northerly about midway of the incorporated area. The village is built along the east bank of the stream. The houses are well scattered, the streets are unpaved and there is no sewer system, but a few private sewers empty directly into the stream. The principal industry is the tannery plant of the United States Leather Company. A branch of the Erie Railroad, Tioga Division, follows up the east bank of the river to Blossburg and thence it forks, one branch extending westerly up the valley of Johnson's Creek and another branch extending easterly up the river of Fallbrook to Fallbrook borough. There are coal mines in these valleys.

The surrounding territory is hilly. The customary methods of disposal of house sewage prevail in the absence of sewers. There are probably one hundred and fifty domestic wells in use, mostly in the higher portions of the village. According to reports, typhoid fever has not been prevalent.

The original water works plant was installed by the Blossburg Water Company about eighteen years ago. At the present time the Company supplies four hundred and twenty-five out of six hundred dwellings. It also furnishes water to the tannery and to the Erie Railroad Company. Fire protection is afforded by the system and the pressure in the lower part of the town is said to be one hundred pounds. The following description of its source of water supply was submitted by the water company on August twenty-first, nineteen hundred and five:

"The supply of water to the Blossburg Water Company is derived from Taylor Run, a mountain stream, emptying into the Tioga River two miles south of Blossburg borough.

"The reservoir which has a capacity of 3,000,000 gallons is located three-fourths miles from the mouth of the stream, one thousand five hundred and seventy-six feet above tide water or two hundred and twenty-eight feet above the borough. The water is delivered to the said borough through a ten and eight inch main. The line has two intakes one in the stream above storage and the other in the storage, the stream however furnishes a supply adequate to meet the demands of the consumers and the storage is drawn upon only during a very short period each year.

"The said stream runs through a sandstone formation two and one-fourth miles to the reservoir and fed entirely by springs. The entire watershed is covered by hard wood mostly Beach, Birch and Maple. The Water Company are the owners of a large portion of the watershed. The water is entirely free from any contamination, there being no residences, barns or other buildings of any description in the territory drained by the stream."

From the Department's inspection it appears that the Taylor Run reservoir has a capacity of about three million gallons, is timber cribbed, rock filled breast with planked face. The reservoir is apparently in good condition with dry rubble

wall around about two-thirds of the circumference. The water is clear and in the deep part has the dark color of water from a timbered watershed. The reservoir has a sluice gate for emptying, with sluice trough through the center for cleaning, which operation is carried out once in three years.

The watershed is approximately three square miles in extent. It is uninhabited and covered entirely with second growth timber about ten years old. Sub-soil is sandstone, rock and gravel. One or two mountain roads pass through the shed but have very light travel. The supply main from old reservoir on Taylor Run is about twelve thousand feet in length, is eight inch iron pipe provided with blow-offs for cleaning.

There is no growth in the water of the reservoir and nothing could be noted in either taste or odor.

The water pipe system in the village comprises about one-quarter of a mile of ten inch cast iron pipe, three and one-half miles of eight inch, two and one-half miles of six inch, two miles of four inch and about three-quarters of a mile of two inch pipe.

Taylor Run is a tributary of Tioga River and it enters the same near Hamilton Township near the borough line. The stream rises in Liberty Township to the south and the source is not always sufficient.

In order to make up for lack of water in dry seasons, a horizontal duplex Buffalo pump, five inch suction, four inch discharge, operated by steam, was installed on Tioga Creek at the junction with Taylor Run. This pump has been operated about one month in each year, but the water supplied by it from Tioga Creek is open to suspicion as it includes drainage from an old mine workings, now abandoned containing more or less sulphur. Tioga River here also receives drainage from bark extract works and from Fallbrook habitations. The water company, appreciating that this condition is not all that it should be, purposes to move the pump about one-half mile up stream on Taylor Run where it will catch the overflow and leakage from the old reservoir. It is expected, however, that with the supply from the new reservoir, this pump will not be used for some time to come. When the pump is operated, it pumps directly into the supply lines.

In making an application for approval of the new source, the Blossburg Water Company submits the following statement:

"The Company files herewith a map showing the plans, surveys and water works of the Company as existing at the present time, together with a description showing the sources of water supply.

"The supply of water from Taylor Run was not sufficient for the requirements of the Company. In order to provide a sufficient supply of water it became necessary for the Company to use the water of Bellman Run.

"The Company began the construction of the reservoir and pipe line required for the use of water from Bellman Run on July 7, 1907. The work was completed about June 1st, 1908. The water has been turned into the line for the purpose of testing the pipe. It has not been used for domestic purposes.

"The omission of the Company to apply for a permit was not due to any intention to evade the law, but was due solely to the fact that the officers of the Company overlooked the Act of April 22nd, 1905."

Bellman Run is a tributary of Johnson Creek. It has several branches and its watershed of about six square miles lies partly in Bloss Township and partly in Hamilton Township, south of Johnson Creek and the Erie Railroad.

An additional statement by the Company in reference to the source of supply is as follows:

"I herewith submit for filing in your department a Blue Print of a complete map of the pipe lines and watershed of the Blossburg Water Company. The watershed from which the supply is derived is about 1,800 feet above tide, well timbered with Beech, Birch, Maple and some soft woods. There are no dwellings or any other thing to contaminate the supply. In fact the watershed is timber lands uninhabited. The land formation is of sandstone and the points where the supply is taken are well above the coal measures.

"The reservoir on Taylor Run and Bellman Run are located on the respective streams. Taylor Run reservoir has a capacity of two million eight hundred and thirty thousand gallons and Bellman Run reservoir a capacity of one hundred and twenty-four thousand gallons with overflows. The subsoil has been removed from both reservoirs, leaving a gravel bottom, the sides are protected with stone walls. The intake at both reservoirs are protected by a screen three feet square perforated with three sixteenth of an inch holes and thoroughly covered with three feet of gravel and broken stone. The Taylor Run reservoir is located about two hundred and twenty-seven feet above the Borough, the delivery is made with an eight inch line. Bellman Run reservoir is located two hundred and forty-five feet above the Borough, the delivery is made with a six inch line. Bellman Run line joins the Taylor Run line at the intersection of Tabor Street and Williamson Road near the tannery shown on the map.

Respectfully yours,

THE BLOSSBURG WATER COMPANY,

F. H. Stratton, Supt."

The Department has ascertained by investigation that the additional water supply is required and has been provided for, as stated, in the reservoir on Bellman Run, whose construction is similar to the Taylor reservoir and whose elevation is about twenty feet higher than the Taylor reservoir. The six inch cast iron supply main about fourteen hundred and fifty feet long extending down the valley in Williamson Road, paralleling the Erie Railroad, is completed, and ready for use. The same general conditions obtain and the same statements may be made with regard to the new supply that have been herein made relative to the old supply. Negotiations are on foot for complete ownership and control by the water company of the new watershed.

It has been determined that the water works and proposed additional source of supply will not be prejudicial to public health and a permit is hereby and herein granted therefor, under the following conditions and stipulations:

FIRST: The water company shall not pump any water from the Tioga River in to the water district. Before any change of location of the pump house or plan is made, complete plans thereof shall be submitted to the Commissioner of Health for approval.

SECOND: Detail plans of the reservoirs and dams, gates, drains and pipes and valves location shall be prepared and filed with the Commissioner of Health on or before January first, nineteen hundred and nine. At the close of each season's work the water company shall make a plan of the water pipes laid in the streets of the borough during the year and file the same in the office of the Commissioner of Health, together with any other information that may be required in the operation thereof, in order that the State Department of Health may always be informed of the extent of the water works system and the public use thereof.

THIRD: If at any time, in the opinion of the Commissioner of Health, the water works system or the source of supply has become prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

FOURTH: It is the intention of the Commissioner of Health to make tests of the source of supply from time to time and the water company shall assist in such examinations, if required. Records of the operation of the system shall be kept on blank forms from the State Department of Health and copies thereof submitted, if asked for.

FIFTH: The company shall designate on a map to be prepared of the water pipes in the streets of the borough and filed in the office of the Commissioner of Health on or before January first, nineteen hundred and nine, the size of all water pipes, the location of gates and drainage facilities. And, if it shall appear that such drainage facilities are not adequate, then the water company on request of the Commissioner of Health shall improve such facilities to the Commissioner of Health's satisfaction.

SIXTH: It is especially stipulated that this permit is issued with the understanding that the watershed is uninhabited. If at any time any dwellings or occupations or permanent sources of pollution should be established on these areas tributary to these reservoirs, then the Commissioner of Health shall be amply notified beforehand and he will issue and put in force such regulation as shall safeguard the sources of supply from sewage pollution.

Harrisburg, Pa., July 21st, 1908.

BRADFORD TOWNSHIP, McKEAN COUNTY.

South Bradford Water Company.

This application was made by the South Bradford Water Company, of Bradford Township, McKean County, and is for permission to extend water works for the supply of water to the public in the village of South Bradford, Bradford Township, McKean County.

It appears that the South Bradford Water Company was chartered September twenty-third, nineteen hundred and one, for the purpose of supplying with water for domestic and manufacturing purposes the inhabitants of that portion of Bradford Township, McKean County, lying south of the south line of Bradford City west of the public highway leading from Bradford City south to Misard Run Road on the east side of the Tunungawant Creek, north of the road leading from the village of DeGolia up Misard Run and east of the dividing range of hills lying between the east and west branch of Tunungawant Creek, comprising an area of about two square miles.

At the time of the incorporation of the water company the principal stockholder, James W. Leasure, had arranged to supply running water to the green houses and caretaker's residence of his farm to these places only, but on request of adjoining property owners in the neighborhood he decided to form a company and he has since been furnishing four other properties besides his own with water.

The source is a spring located on the side of the hill west of the water district about two thousand feet west of the east branch of the Tunungawant Creek and elevated about two hundred and fifty feet above the valley. The ground west of the spring continues to rise to the summit of the range which divides the east and west branches of Tunungawant Creek.

About midway on the slope from this range to the east branch is the main highway leading south from the city of Bradford. The water works and source of supply are west and above this thoroughfare. The elevation of the spring is in the neighborhood of one hundred and fifty feet above the road. The land around the spring is wooded and there are no buildings of any kind on the slope above. The land is all owned by Mr. Leasure to the summit.

The spring at present is uncovered, but is surrounded by a loose stone wall which retains the excavation, which is about two feet square, from which the water flows out from the shale rock and passes away down the mountain brook. The measured flow is stated to be three hundred thousand gallons each twenty-four hours. A one and a half inch wrought iron pipe leads from the spring a distance of six hundred feet to an uncovered wooden tank ten feet in diameter and ten feet high. A two inch supply main leads from this storage tank to the green-houses which are distant about two hundred feet and about fifty feet lower than the tank. A one inch supply pipe is taken off the two inch main and extends to the caretaker's residence. This one inch pipe also extends across the highway to four other dwellings in the neighborhood. The total population being supplied at the time of the Department's inspection in nineteen hundred and seven was twenty people. There are about one hundred families residing in the charter territory of the South Bradford Water Company. It is evident, therefore, that the quality of water available is ample based on the above measurement.

The petitioners' purpose to replace the loose stone retaining wall about the spring by a tight concrete wall so as to make it a receiving basin four feet square. This is to be roofed over and securely guarded.

Two hundred and fifty feet away from the spring has been constructed a new storage reservoir thirty-eight feet long and thirty-two feet wide and four feet deep. Its sides are of stone masonry and the foundations are concrete. A double line of one and a half inch pipe connects the spring with the storage basin.

A new four inch supply main extends from the reservoir to the green-houses from whence a three inch distributing pipe leads to the highway and a two inch pipe has been laid along the road.

At the date of the Department's inspection the changes had been practically completed.

Should it be desirable to further increase the source of supply in order to admit of the extension of the water pipes to other parts of the water district and to furnish all of the inhabitants with drinking water, it is reported that there are other springs on the farm owned by Mr. Leasure which may be easily incorporated into the system.

It has been determined that the proposed source of supply is not prejudicial to public health and the same is hereby and herein approved, as well as the water works extension, under the following conditions and stipulations:

FIRST: That the walls surrounding the spring and source of supply be constructed and the roof be put on and kept securely locked as proposed and that the water company shall provide a drainage ditch around the upper sides of the spring to carry away all surface water, that over the ends of the supply pipes leading from the spring shall be placed screens and that gates or valves shall be placed on these pipes to admit of the water being shut off if necessary. There shall be an overflow pipe placed in the upper portion of the wall at the spring, provided with an elbow and a screen over the vertical pipe.

SECOND: Ample overflow and drainage pipes and screens at inlet and outlet pipes shall be provided at the storage reservoir. Also valves on pipes to admit of the shutting off of the water or drainage of the basin. A high tight board fence shall be constructed around the reservoir to prevent accidental or malicious pollution of the water. The water company shall properly intercept all surface water so as to absolutely prevent any of it reaching the reservoir.

THIRD: That before any additional spring supply be made plans shall be prepared thereof and submitted to the Commissioner of Health for approval, and that if at any time the water supply or the water works system or any part thereof shall become prejudicial to public health in the opinion of the Commissioner of Health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

Harrisburg, Pa., May 5th, 1908.

CATASAUQUA, LEHIGH COUNTY.

This application was made by the borough of Catasauqua, Lehigh County, and is for permission to drill wells, and install a system of public water works, and for investigation by the State Health Department and approval of sites for a proposed drilled well supply and water works system.

The borough of Catasauqua is a long established manufacturing town, located in the eastern part of Lehigh County, on the eastern bank of the Lehigh River, two miles north of Allentown. It is on the suburban outskirts of the district

recently occupied, as a result of the adaptability of the natural rock, by numerous large cement manufactories. This industry together with iron works and silk mills furnishes employment to most of the inhabitants of Catasauqua, and the community of which it is a part and which stretches up both banks of the river for a distance of six miles from Allentown. Catasaqua had a population of thirty-seven hundred and four in eighteen hundred and ninety; thirty-nine hundred and sixty-three in nineteen hundred and four thousand or more in nineteen hundred and eight.

The borough has an area of about a half square mile, triangular in shape, and is bounded on the north by North Catasauqua borough, Northampton County, on the west by the Lehigh River and on the east by Hanover Township, Lehigh County and Catasauqua Creek, which flows southerly to its confluence with the river at the southern end of Catasauqua. The canal of the Lehigh Coal and Navigation Company follows the bank of the Lehigh River through the borough, the tracks of the Central Railroad of New Jersey lying between the two water ways. The canal branches from the river at a dam across the latter about two thousand feet above the borough. The Crane Iron Works of the Empire Steel and Iron Company are located on the east bank of the canal near the central part of the borough and to a very considerable extent make use of the waters of the canal for power purposes, the level of the canal being lowered five or six feet in a lock at the site of the Crane Iron Works.

Between the river and Catasauqua Creek the ground of the borough rises rapidly to an elevation above Front Street, along the canal, of about ninety feet at the northern borough line. The surface drainage, including considerable domestic waste water drained to the gutters, is conveyed, in some cases by storm drains and culverts, to the canal and the creek. Privies are very generally in use throughout the borough and the custom prevails of disposing of much of the domestic sewage into crevices in the limestone formation underlying the borough. There are springs in the limestone rock both along the canal and the creek, particularly in the southern part of the borough. Some of these have been condemned by the local authorities as sources of supply for drinking water. The dug wells at one time very generally in use, are said to have become polluted and been abandoned almost without exception. On perhaps half the properties within the borough rain water cisterns are in use.

Catasauqua, incorporated as a borough in eighteen hundred and fifty-three, was, it is reported, supplied for a time by a Crane Water Company; and later, about eighteen hundred and fifty-seven, by the Lehigh Crane Iron Company. The Crane Water Company, incorporated in eighteen hundred and ninety-five, and the Clear Springs Water Company, incorporated in eighteen hundred and ninety-nine under the laws of the Commonwealth, supplied water to the public in Catasauqua until about the end of nineteen hundred and two. Seven water companies supplying water in the vicinity, including the Crane Water Company and the Clear Springs Water Company, were merged under the laws of the Commonwealth into the Clear Springs Water Company, to which letters patent were issued April tenth, nineteen hundred and two, for the purpose of supplying water to the public within the charter territories of the original companies, which include all of Lehigh and Northampton counties. This water company since nineteen hundred and two has furnished water for the public and fire protection in Catasauqua.

The Clear Springs Water Company pumping station number two is located in the borough in the southern part of the Crane Iron Works near the canal. There is a drilled well adjacent to the pumping station which is said to be about two hundred and fifty feet deep and is one hundred feet or more from the canal. Water is forced from this well by means of compressed air into a small pump well. There is also about a ten inch intake pipe leading from the head race of the Crane Iron Works to the pumping station. This head race branches from the canal immediately above the lock and passes through the Crane Iron Works furnishing water for power purposes. The two pumps of the water company are connected so that by the operation of valves either pump may be made to take its supply either from the intake furnishing canal water or from the pump well supplied with well water. The discharge pipes unite in a twelve inch rising main in which the water passed to a standpipe near the pumping station, about five feet in diameter, installed for the purpose of relieving the distributing system of the jar from the pumps. From this standpipe the water passes through the distributing system and overflows into about a five hundred thousand gallon standpipe located on the high ground in the extreme northern part of the borough. On July eighteenth, the pumps were operating at about equal speeds, the western one pumping canal water, the eastern one well water, so that apparently about half the supply furnished directly to the consumers was being obtained from the Lehigh canal. Above the head race intake from the canal the latter receives considerable surface drainage from Catasauqua and North Catasauqua. Within a mile above the intake on the low lying canal banks are the privies of a number of dilapidated frame dwellings and vaults in the limestone rock receiving the sewage of the employes of a planing mill in Catasauqua and the sewage of the employes of the Bryden Horse Shoe Company in North Catasauqua, the vault of the latter being about two hundred feet from the canal, that of the former about one hundred feet. The Lehigh River above the entrance of the canal at the dam receives drainage and sewage from White Haven borough and from Mauch Chunk

and East Mauch Chunk, twenty-two miles above Catasauqua, and below Mauch Chunk, from Lehighton, Parryville, Slatington, Alliance, Coplay and other places. The river also receives large quantities of mine drainage in Sandy Run and Black Creek from the anthracite coal fields near Hazleton.

The distributing system of the water company in Catasauqua comprises more than six miles of pipes ranging from four to ten inches in diameter. Plugs are rented by the borough for fire protection. It is said that only about half of the inhabitants use the water, the remainder being dependent principally upon rain water cisterns. The methods of the water company are said to be generally unsatisfactory to the citizens.

At several points along the northern borough line the distributing system is connected with that of the same water company in North Catasauqua. It is said that ordinarily valves on these connctions are kept closed, but that during the trouble at the Catasauqua pumping station these valves may be and have been opened so that Catasauqua at times receives its supply from the other source of the Clear Springs Water Company.

This other source of supply is obtained from Spring Creek, also called Mill Creek. There is an impounding dam of about one hundred million gallons capacity on this creek in the extreme northern part of Whitehall Township, Lehigh County, and about a quarter of a mile from the river. Spring Creek, above the dam, has a largely cultivated watershed of about three square miles in Whitehall and North Whitehall Townships, containing a population of two hundred and ninety. An inspection of this watershed has been made by officers of the Department and there have been served upon persons owning property on the watershed for the abatement of nuisances or menaces to the purity of the water twenty-three written notices.

The water company maintains a pumping station below the dam near the river. There is a twelve inch suction pipe from the dam and an auxiliary twelve inch suction from the river. A Jeansville duplex compound condensing pumping engine forces the water through a ten inch force main about four thousand feet to a three million gallon distributing reservoir on Lincoln Heights west of the village of Cementon. From this reservoir the distributing system of the Clear Springs Water Company extends down stream along both banks of the Lehigh River for a distance of four miles or more, furnishing water on the eastern side of the river to the boroughs of Alliance and North Catasauqua in Northampton County and Catasauqua borough and East Catasauqua village in Lehigh County, and west of the river to the village of Cementon, Coplay borough, and the villages of Kokendauqua, West Catasauqua and Ferndale, all in Lehigh County. The impounding dam on Spring Creek is supplied principally, during dry weather, by a large spring in its upper end. On July seventeenth, nineteen hundred and eight, the flow of the surface stream from the valley, known as Drum Hole, was almost inconsiderable. On the same date the water in the distributing reservoir was turbid and there were numerous small dead fish floating on the surface. During October and November, nineteen hundred, a typhoid epidemic at Cementon was investigated by officers of the State Board of Health. There were reported to be at least one hundred and sixty-five cases and thirteen deaths in and around Cementon, although the cases outside of the village were but few and scattered. The evidence collected seems to indicate as the source of infection Leisenring Spring, from which the water company furnishes water to the district in Cementon where typhoid was most markedly present. The cases in the districts supplied with Spring Creek water from the distributing reservoir were attributed to the patients having visited in Cementon. However, colon bacilli were found in samples both of the Spring Creek water and of the Leisenring spring water and the existence on the Spring Creek watershed of earlier cases of typhoid to which some of the cases of the epidemic might be attributed was discovered.

Since October, nineteen hundred and five, there have been twenty-two cases of typhoid in Catasauqua borough, according to the reports made to this Department.

The Clear Springs Water Company has filed plans showing the Spring Creek impounding dam, the layouts of the two pumping stations and the lines of the distributing system. Plans are not on file in the Department showing the watershed of Spring Creek, the Lincoln Heights reservoir and the distributing system indicating the sizes of pipes and the location of blow-offs.

The borough having become dissatisfied with the quality of the water furnished by and the methods of the Clear Springs Water Company has resolved upon acquiring or installing public water works. On December twenty-eighth, nineteen hundred and seven, the borough filed a petition in the Court of Common Pleas asking the appointment of three appraisers to set a value upon the company's water works in Catasauqua as provided for in the Act of Assembly approved May thirty-first, nineteen hundred and seven. Thereupon, the water company filed with the court a disclaimer refusing to sell its plant at any price and forfeiting any exclusive privileges which it might have in the borough, as provided for in the said Act. On April twenty-seventh, nineteen hundred and eight, the court declined the petition of the borough in view of the filing of this disclaimer which has been recorded in the office of the Recorder of Deeds of the proper county and expressed the opinion that the borough was free to install its own water works and supply water to the public.

Therefore, the borough contemplates installing its own water works and a public vote will shortly be taken upon the issuing of bonds to raise money to cover the expense.

It is intended to install a drilled well or wells, pumping machinery, a standpipe and distributing system. The entire plant as proposed will be within the borough, except that the distributing system may be extended to outside consumers.

Two alternate sites are considered for the location of the proposed well. One is in the northeastern corner of the borough, just south of Walnut Street and about two hundred feet west of and twenty-five feet higher than Catasauqua Creek at this point. If this site is selected, the fuel will, for the present at least, be carted to the pumping station and the water will be pumped through a force main directly to the standpipe to be located on the high ground near the northern borough line either within the borough or in North Catasaqua borough. The other site is in the eastern part of the borough just north of Wood Street and between American Street and Catasauqua Creek. The site is within one hundred feet of the creek and about twenty feet above it and the well would extend through filled ground in the mouth of an old limestone quarry. Both well sites are considerably above the highest freshet elevation of the creek. It is said that arrangements can be made with a factory having a railroad siding across the creek from the lower well site, that last mentioned, whereby the borough will be allowed to install a mechanical conveyor to carry the coal, if this fuel is determined upon, from cars on the siding to the pumping station. In the case of the selection of this site the water will be pumped directly into the distributing system and overflow into the standpipe near the northern borough line and a standpipe of small diameter will probably be placed at the pumping station with the pumps. Whichever site is selected, it is intended to carry the well or wells if it seems advisable to build more than one to obtain the needed supply, to a depth of perhaps seven hundred feet, at which depth it is expected that water can be obtained from strata beneath the limestone.

The standpipe is to be thirty feet in diameter by seventy-five feet high, so as to have a capacity of about four hundred thousand gallons. It is intended that the pumps and well or wells shall have a capacity to furnish water at the rate of one and a half million gallons per twenty-four hours. Therefore, it seems that, with the exercise of reasonable care in the operation of the plant, a fairly satisfactory fire protection will be assured, especially as the borough has steam fire engine service. The fire service furnished by the water company is to be discontinued. No auxiliary source is to be provided. The Catasauqua Creek, having a watershed above the town of twelve square miles, would hardly furnish a source of fire supply without the installation of an impounding dam.

The distributing system as designed consists of thirty-eight thousand feet of pipe, consisting of forty-eight hundred feet of six inch pipe, twenty-seven thousand four hundred feet of six inch pipe and sixty-one hundred feet of four inch pipe. The system is well supplied with valves and is so designed as to have but few dead ends. The location of blow-offs is not indicated.

There is no reason to suppose that a satisfactory and wholesome supply may not be obtained from the proposed drilled wells. However, even though the wells are to be deep and if possible to draw from strata below the surface limestone and even though every precaution to guard the wells from surface pollution be taken, nevertheless, the underground supply from which the well or wells are to draw may at any time be polluted by the sewage of the borough disposed of in the crevices of the limestone rock or even by the sewage of neighboring communities and the borough must shoulder the responsibility for endeavoring to obtain a pure supply from the proposed source. The buildings of the town are within a few hundred feet of either well site. The general dip of the surface limestone in the neighborhood is to the south as indicated in the old quarry near the Wood Street well site and at other outcrops in the vicinity, probably, therefore, there is a little more likelihood of obtaining contaminated water from the Wood Street site than from the Walnut Street site. Moreover, the elevation of the latter is somewhat above that of the former and the distance for the water to be pumped to the standpipe will be considerably less if the well is located at the Walnut Street site.

The borough purposes to expend sixty thousand dollars for the installation of this system and it is understood that the municipality can borrow at least ninety thousand dollars

The water of the Lehigh River, polluted as it is with sulphurous mine drainage, is said to furnish an extremely unsatisfactory boiler water supply. For this purpose almost all the factories in and around Catasauqua use well or spring water. If the borough can obtain a first class domestic supply and also one suitable for boiler purposes and can supply the same at sufficiently reasonable rates, the water works may prove a good investment.

It has been determined that the proposed water works and source of supply will not be prejudicial to public health and a permit is hereby and herein issued therefor under the following conditions and stipulations:

FIRST: Ample facilities shall be provided by means of blow-offs placed at all points whereby the rising main, standpipe and supply main and distributing system may be completely drained.

SECOND: Detail plans of the lay-out at the pumping station, and of the rising main, standpipe and distributing system, showing the location of all valves, blow-offs and sizes of pipe as finally decided upon, shall be filed with and approved by the Commissioner of Health before the work is commenced on these respective parts of the system. Before water is supplied to the public from the proposed source a description and plans of the construction of the well or wells shall be filed with the Commissioner of Health.

THIRD: It is the purpose of the Department to obtain samples of water for analysis from the various parts of the system from time to time and the petioners shall render such assistance in carrying out this idea as may be necessary and shall make such alterations in the system and source of supply as the Commissioner of Health may demand, suggest or approve in the interests of public health to the end that the water supplied by the water works shall not be prejudicial to the public health.

FOURTH: Detail records of the operation of the water works shall be properly kept on blank forms to be suggested by this Department and copies thereof shall be furnished to the Commissioner of Health.

FIFTH: At the close of each season's work plans shall be prepared and filed with the Commissioner of Health showing extensions to the distributing system made during the year, so that the Commissioner of Health may always be informed of the extent of the water works and the district supplied thereby.

SIXTH: The permission herein granted is given under the express stipulation that if the distributing system is extended beyond the borough limits for the supply of water to the public the conditions of all laws pertaining to such extensions shall be complied with.

SEVENTH: It is expressly stipulated that before the water shall be introduced into the public system of the town, satisfactory chemical and bacteriological tests of the waters shall be made of enough samples taken over a period of days to thoroughly and satisfactorily prove the water to be free from all contamination.

That attention of the local authorities is called to the fact that drilling for a ground water supply, especially in limestone formation, is always more or less of a gamble. The very gist of this whole enterprise proposed is expressed in the requirements as to a test of the waters before they be used by the public.

Harrisburg, Pa., August 14th, 1908.

CHAPMAN TOWNSHIP, CLINTON COUNTY.

(Absalom Farwell).

This application was made by Absalom Farwell of Chapman township, Clinton count, Pennsylvania, and is for permission to install a system of water works for the supply of water to the public in the village of Farwell, said township.

The village of Farwell is the result of a real estate development scheme of the petitioner. Mr. Farwell was an owner of a tract of land comprising several hundred acres, located along the northern side or bank of the West Branch of the Susquehanna River about one and a half miles below the borough of Renovo and extending back to the top of the mountains which parallels the river in the region. A portion of this tract was laid out in town lots by the owner. These lots have nearly all passed to the ownership of separate individuals, some of whom have erected dwellings on the lots. The development lies between the Philadelphia and Erie Railroad and the river and thereon are eighty plots, equivalent to an approximate population of four hundred were every plot occupied by a house. It is expected that even a larger settlement may eventually result.

The crest of the mountain is six hundred and fifty feet above the river bank and back therefrom a distance of about three-fifths of a mile. The flats along the stream are about eight hundred feet wide and terminate about at the railroad. From here northerly the mountain slopes begin and at an elevation of about fifty feet above the village there is a public highway on the mountain side which is the main thoroughfare for public conveyances from Renovo to Lock Haven. The mountain side is well wooded and unoccupied.

For the convenience of the prospective villagers and to aid in the sale of house lots, Mr. Farwell constructed a system of water works during the season of nineteen hundred and six. The source of supply is five springs.

Four of the springs now supplying the plant are located along the upper side of the public highway. Each spring has been walled up with cement and stone and covered over with flagstone, the entire structure being water tight so that no pollution may be introduced to the water from the outside. None of the masonry work appears above the ground. The location of three of the springs, however, may be seen from the highway by reason of the excavation into the mountain side. The fourth place is obliterated by a landslide.

From the collecting well at each spring a one and a half inch pipe has been laid underneath the highway and finally terminating in a small collecting masonry wall at a spring below the public road and distant therefrom about one hundred and fifty feet. Adjacent to this spring which is walled up and covered similar to the others, the water is conveyed by a pipe to an adjacent storage reservoir

fifteen feet square and five feet deep. The construction of this basin is stone masonry lined with cement and made water tight. Over it is a wooden building with a door under lock and key or more properly speaking a wooden roof, there being no floor or platform provided under the roof. There is a three inch overflow pipe at the reservoir. The water is conveyed to the village by a four inch cast-iron pipe, the outlet end being raised six inches above the bottom of the reservoir. There is a valve on the line outside of the building. There is also a drain pipe.

The supply main is about one thousand feet long. It terminates in Prospect Street in the eastern part of the village. Connecting with it at the present time is a pipe line in McCloskey Alley thirteen hundred feet long, the diameter ranging from two inches to one and a half inches. Off the four inch line other street pipes are to be taken when required. One branch now leads to the farm house near the village. The object of the works is to supply drinking water only. The static head from the reservoir is not over thirty-three feet.

The minimum capacity of the springs is reported to be forty-five hundred gallons per day, which is an insufficient amount for the domestic uses of four hundred people.

There are two other springs further up the mountain side on the Farwell estate which are available from which the flow is estimated to be greater than the combined capacity of the five springs now in use. The applicant purposes to attach these new springs to the present supply and also to drill a well, or more than one if necessary, near the present reservoir, and to increase the source of supply sufficiently for the needs of all consumers.

The borough of Renovo is located on a table land hemmed in between the mountains and the river. All the available land there has been taken up, so that the increased population must seek places of residence outside of that borough. This they are doing.

There is another plot of ground adjoining Farwell village to the west upon which a settlement exists and from which a demand for water may come. It is the intention of the petitioner to extend water pipes for the supply of water to the public into this other settlement if such extension should prove advisable.

Detail plans of the reservoir have not been filed. The Department's inspection makes it evident that the water should be of excellent quality and satisfactory for domestic purposes. The situation and surroundings at the springs are such that the probability of any pollution is most remote and, in fact, seems to be almost impossible. The springs come from the shale rock, are continuous in flow, but during times of extreme drought the quantity is limited.

Additions to the supply must be made if the village grows and the demand for the water increases proportionately. The supply is preferable to that of individual wells sunk on properties and in proximity to privies and cesspools. The interests of the public health should be subserved by the extension of proper water works and the furnishing of a pure mountain water to the inhabitants of the district. The works, however, should be extensive enough to afford ample supply and proper pressure at the dwellings of the consumers. And undoubtedly fire protection will be demanded ultimately. In the extension of the works and in obtaining an additional supply of water, these things should be taken into consideration.

It has been determined that the existing sources of supply are not prejudicial to public health, and the supply and the water works system as it now exists is hereby approved and a permit granted for an additional supply and for an extension of the water works system, under the following conditions and stipulations:

FIRST: That a ditch be constructed around the existing reservoir, of sufficient depth to carry away all surface drainage, and that if at any time, in the opinion of the Commissioner of Health, the source of supply or the water works system or any part thereof is prejudicial to public health, then such remedial measures shall be immediately adopted as the Commissioner of Health may approve or advise.

SECOND: No additional springs or wells or other sources of supply, and no extension of water pipes, shall be obtained or laid until complete plans showing such sources and the means by which the water is to be collected and until plans of the water pipe extensions proposed shall have been prepared and submitted to the Commissioner of Health for aproval. The Commissioner of Health may modify or amend such plans and fix the conditions under which such additional sources and water works extensions may be obtained and made in order that public health may be safeguarded.

In the case wells should be drilled for an additional source of supply, careful data must be recorded relative to the strata through which the wells have been driven.

Harrisburg, Pa., April 30th, 1908.

CHESTER, DELAWARE COUNTY.

New Chester Water Company.

This application was made by the New Chester Water Company, of the City of Chester, Delaware County, and is for permission to extend its water works system into the borough of Marcus Hook, Delaware county, and to supply water to the public in said borough.

The Commissioner of Health at first determined that the New Chester Water Company appeared to have no right to supply water to the public in the borough of Marcus Hook and the said water company was notified accordingly. Whereupon, its officers formed the Chichester Water Company, which was duly incorporated on December nineteenth, one thousand nine hundred and seven, to supply water to the public in the borough of Marcus Hook, its source of supply to be the Delaware River, the water to be taken therefrom at the present pumping station of the New Chester Water Company in the city of Chester.

The Chichester Water Company has made an application for approval of its system of water works and source of supply, which application is now under consideration by the Commissioner of Health.

It appears that the New Chester Water Company was incorporated under the laws of the State in eighteen hundred and eighty-five for the purchase, erection and maintenance of works for supplying water and furnishing the same for public and domestic use to the city and citizens of Chester, Delaware county, and the suburbs thereof.

At the same time the Penn Water Company, Upland Water Company and South Chester Water Company were incorporated for the same purpose within their respective districts that the New Chester Water Company was incorporated.

The charter territory of the Penn Water Company was confined to the borough of North Chester, that of the Upland Water Company to the borough of Upland and that of the South Chester Water Company to the borough of South Chester, all in Delaware county.

The records in the office of the Secretary of the Commonwealth show that on April sixteenth, eighteen hundred and eighty-seven, the South Chester Water Company had purchased the franchise and all the property of the said Upland Water Company, and of the said Penn Water Company. In turn the South Chester Water Company sold and transferred its franchises and all its property to the New Chester Water Company, the sale being duly recorded in the office of the Secretary of the Commonwealth on November twentieth, Nineteen hundred and six.

On said November twentieth, nineteen hundred and six, the New Chester Water Company had also purchased the franchise and property of the Eddystone Water Company and the Linwood Water Company.

The Linwood Water Company was chartered in December, eighteen hundred and ninety-five, for the purpose of supplying water to the public in the township of Lower Chichester, Delaware county.

The Eddystone Water Company was chartered April nineteenth, eighteen hundred and eighty-seven, for the purpose of furnishing water to the public in all that certain portion of Ridley township in Delaware county, lying south and west of Crum Creek and bordered by said Crum Creek and by Ridley, and the Delaware River. The control of this company was effected by the New Chester Water Company in eighteen hundred and ninety-one, and the latter company immediately laid eight lengths of eight inch pipe on Ninth Street in Eddystone, but no connections with the New Chester Water Company's mains were made or water furnished. Since that time no further work has been done, so the charter lapsed. However, on November nineteenth, nineteen hundred and six, the Eddystone Water Company sold and transferred its franchise and property to the New Chester Water Company. The said defunct Eddystone Water Company should not be confounded with the Eddystone Water Company chartered on December twenty-second, eighteen hundred and ninety-two, for the purpose of supplying water to the public in the borough of Eddystone, Delaware county. The latter company immediately constructed water works and is now furnishing water to the inhabitants of the borough, being operated by the Springfield Water Company.

The act of eighteen hundred and seventy-four and amendments thereto authorize a corporation to sell, assign, dispose and convey to any corporation, created under or accepting the provisions of this act, its franchises and all its property, real, personal and mixed, and thereafter such corporation shall cease to exist and said property and franchises not inconsistent with this act, shall thereafter be vested in the corporation so purchased aforesaid. The doubt as to whether the purchase by one company of the property and franchises of another authorized to furnish water in an adjacent township vested any right in the purchasing company, was generally entertained until the opinion of the Supreme Court in the Hay versus Springfield Water Company case was handed down. This doubt was reasonable because it is a well established fact that a company for the supply of water to the public must confine its operations to a single municipality.

Under this opinion the operations of a water company in several districts by virtue of the purchase of the property and franchises of other companies is not inconsistent with the act which confines the incorporation of such a company to a single district. Said decision was in part as follows:

"Under the act of April seventeenth, eighteen hundred and seventy-six, water companies may sell, assign and convey their franchises and property to other water companies and such properties and franchies will upon such sale and assignment become vested in the purchasing company."

So it appears that today the New Chester Water Company has the right to supply water to the public in the city of Chester, which now includes what was formerly North Chester and South Chester boroughs, in Upland borough and Lower Chichester township, by reason of its having purchased the franchises and property of the above mentioned water companies.

Prior to the rights vested in the Chichester Water Company to supply the inhabitants of Marcus Hook borough the Marcus Hook Water Company was, in eighteen hundred and ninety-two, given a charter covering this territory, but this charter lapsed because the company failed to take any active steps towards furnishing the public with water. The Linwood Water Company territory comprised Lower Chichester township, but at this time (eighteen hundred and ninety-five) Marcus Hook borough had been organized out of Lower Chichester township. It was under the Linwood Water Company's franchise, as previously stated, that the New Chester Water Company thought it had the right to supply the borough of Marcus Hook and so it proceeded to extend its mains in the borough and had laid in the highways therein about three and a half miles of ten, eight and six inch pipes under a borough franchise, whereby a contract exists between the borough and the New Chester Water Company for the maintenance of fire hydrants, it may be presumed that the Chichester Water Company will become possessed of the water pipes and appurtenances and will assume the obligations of the contract under which the New Chester Water Company laid the pipes in Marcus Hook, if it should supply the public there.

The petitioners claim that the Marcus Hook borough franchise is valid and to substantiate this claim call attention to a supplement to an Act entitled, "An Act to enable the south ward of the city of Chester to procure a supply of water, approved the second day of March, eighteen hundred and sixty-seven and the supplement thereto, approved March 24th, 1869," which final supplement was approved March twenty-fifth, eighteen hundred and seventy, and provides as follows:

"Section 1.—That the corporators named in the said act or majority of them, or their successors, or majority of said successors, shall have full power and authority to extend their pipes into any road, street, lane or alley of any township, district and borough in the said county of Delaware, adjacent to the said city of Chester, and shall have full power and authority to supply the inhabitants of the said township, district and borough, or either or any of them with water, and to use all necessary means therefor, as fully as if such township, district or borough had been named in the said original act and its supplements."

"Section 2.—That the proper authorities of any such township, district or borough, or either or any of them, are hereby authorized and empowered to enter into and fulfill all and every such contract and agreement on behalf of such township, district or borough, as may be necessary to fully carry out the purposes of this Act, etc."

It appears that in eighteen hundred and sixty-six a large majority of property owners in the South Ward of the city of Chester voted for a domestic and a fire protection supply of water, and that in the following year a law was passed authorizing the members of the city council of the said South Ward, or a majority of them or their successors, to contract for the erection of works to supply the said South Ward and the inhabitants thereof with an adequate supply of water, and for the purpose power was given to use and occupy the roads of Delaware county, the streets of the city, the streets of said South Ward and other property in the said county, city and ward, with the same rights and privileges, and subject to the same restrictions as are now by law given to and imposed upon water companies in this Commonwealth, et cetera.

The water works, privileges, revenues and franchises were the property of the South Ward and its inhabitants. The security for the payment of the loan contracted for the erection of the water works was all the property in said South Ward, real, personal and mixed.

In eighteen hundred and eighty-seven, the New Chester Water Company bought out the South Ward water works, paying for the system, as it is reported, three hundred and thirteen thousand dollars, and under this purchase and the franchises accompaning it, the petitioners claim the right to extend the pipes of the New Chester Water Company into the borough of Marcus Hook.

This permit is based on the assumption that the said law of eighteen hundred and seventy can be rightfully construed as authorizing the petitioners to supply water in Marcus Hook, although it does not appear that in eighteen hundred and seventy any township or borough in Delaware county was adjacent to the city of Chester except Chester township, Ridley township, and the boroughs of Upland, North Chester and South Chester.

The city of Chester is a manufacturing community and historical town located on the north bank of the Delaware River in Delaware county a short distance above the Delaware-Pennsylvania boundary line and about nine miles down stream from the mouth of the Schuylkill River in Philadelphia. The municipal territory is very irregular in shape and is bounded on the east by Ridley Creek which separates the city from the townships of Nether Providence, Ridley and the borough of Eddystone, the latter being opposite the city along the Delaware River, at the mouth of the creek, on the south by the Delaware River, on the west by Lower Chichester and a part of Upper Chichester township, and on the north by Chester township and Upland borough.

Within this territory which is quite flat and extends along the river bank for a distance of three miles, there is a population of forty thousand people, or thereabouts.

Coming down from the north through the city to the river are numerous streams, the principal one being Chester Creek. It and Ridley Creek and Crum Creek to the east are parallel streams, heading in the hills back in the county and draining farming territory. Their courses are such that numerous mill privileges are afforded. The head waters of Crum Creek furnish a water supply and the head waters of the two other creeks might be available for this purpose, were it not for the excessive damages to mill owners which would have to be paid by any one attempting to divert the water from the streams for public supply. The city is in a thriving condition, its industries, which are varied, among which are the manufacture of textile fabrics, ship building, steel works and tubing mills, et cetera, are located principally along the river front where wharfage is had and also where railroad freight facilities are afforded.

The Delaware River at this point is over a mile wide, the waters are tidal, the normal stage being about six feet and the velocity during the strength of the ebb and flow is very strong. The main channel follows the shores along Chester City.

The main line of the Philadelphia, Baltimore and Washington Division of the Pennsylvania Railroad passes through the city, paralleling the river, and so does the Baltimore and Ohio Railroad.

The highway along the river front is called Front Street and back therefrom parallel streets are designated by numbers. Fulton Street which is at right angles to the river is in the upper or eastern half of the city territory and at the foot of it on the river front the New Chester Water Company's pumping station is located. Chester Creek empties into the river about fifteen hundred feet up stream from the pumping station and Ridley Creek is about one mile still further up stream. While the city has not filed the plans of its existing sewer system, from information now in the Department it is known that there are large public sewers emptying into Ridley Creek in the city of Chester at the foot of Fourteenth, Ninth, and Fourth Streets, which serve an estimated population of three thousand people. Into the main river between Ridley and Chester Creeks there are large public sewers which empty their flow at the foot of Morton, Upland and Welsh Streets. Into Chester Creek there are city sewers discharging at Fourteenth, Seventh, Fourth, Third and Second Streets, serving a combined population of about sixteen thousand people. Below Chester Creek there are large city sewers discharging into the river at the foot of seven streets, if not more. The public sewers are on the combined plan and comprise, all told, a length of about thirty miles, and connected therewith are buildings in which reside thirty-seven thousand people, estimated. The remaining inhabitants occupy properties on which the customary disposal of excrement in privy vaults is in vogue.

There are numerous private sewers from the industrial plants and other places which empty into the streams. Along Ridley Creek in Eddystone borough there are nine boat houses, and Chester Creek there are six boat houses, and along the river in the city there are sixteen boat houses, all of which are much in use during the season. There are overhanging privies at many of these places.

Owing to the method of disposal of sewage both Ridley Creek and Chester Creek are polluted and entirely unsuitable waters to bathe in. Typhoid fever among boys who have bathed therein has been attributed to this custom.

The water company's intake is at such a place that the sewage from the city sewers may be taken by the tide back and forth by said intake, causing in consequence a continual menace of a greater or less degree to public health.

Several years ago the courts were appealed to to compel the water company (prior to its present ownership) to furnish pure water, and this appeal resulted in the installation of the filter plant and the turning on of filtered water for the first time on December third, nineteen hundred and three. No effort has been made by the city to minimize the gross pollution of the river at this point, so that now more sewage than ever of a local origin is discharged into the water supply of Chester City.

The pumping station is a substantial brick structure and therein are housed two Holly-Gaskel crank and fly-wheel compound-condensing pumping engines, each with a rated capacity of five million gallons per twenty-four hours. The machines are old but have recently been thoroughly overhauled and appear to be in good condition. They draw the water through a thirty-inch section main five hundred and fifty feet long, laid on the bed of the river and extending out beyond the Port Warden line a short distance into the main channel. On the end is affixed a strainer. The water here at low tide is twenty-five feet deep.

The water is pumped through about three and a half miles of force main, twenty and twenty-four inches in diameter, a vertical height of two hundred and eight feet, to the reservoir located at Harrison's Hill. The pipe terminates in a gate house at the reservoirs where the water may be delivered into either one of the basins as desired. Each basin is two hundred and twenty feet long by one hundred and fifty feet wide on the bottom, with sloping slides lined with dry rubble masonry to a height of twenty feet or more, and each has a capacity of eight million gallons.

For some years it was the custom to settle the water in one reservoir while supplying the city from the other. To improve the quality of the supply, the company in the year eighteen hundred and ninety-seven, installed a third reservoir of three million gallons capacity, locating same in close proximity to the two reservoirs but at an elevation nine feet lower. With the third reservoir completed, water from the pumps was delivered into reservoir number one and made

to travel the entire length thereof to promote sedimentation, and when it attained a depth of sixteen feet the surface water flowed to reservoir number two through an open spill-way. After additional sedimentation in reservoir number two, the water flowed to reservoir number three, from which it was delivered to the city through the gravity supply mains.

To still further improve the quality of the supply, in the year nineteen hundred and one, the company equipped reservoir number one with wooden baffle boards, to cause a more complete displacement of its contents and to increase its subsidence efficiency. At this time a coagulant feed pump was installed at the pumping station. A solution of sulphate of alumina of uniform density was prepared and applied in known quantities to the water in the force main by means of a small steam pump. In traveling through the three and a half miles of force main between the pumping station and the reservoirs, ample opportunity was given for a thorough admixture of coagulent and water. This method was continued up to the time of installing the filter plant and effected material improvement in the quality of the water delivered to the city, but it did not sufficiently clarify and purify the water.

The filter plant was placed on the hill between reservoirs numbers one and two and the third reservoir. The pumps are operated from twelve to eighteen hours each day to deliver into the two reservoirs the water consumed by the district during twenty-four hours. The maximum daily consumption is reported to be three and a half million gallons and the average one million gallons less.

The filter house is a brick building and it contains twelve mechanical filters, each rated at one-half a million gallons capacity daily. They are operated continuously. The two reservoirs having been pumped full during the day deliver water by gravity to the surface of the filters day and night. In turn, the filtered water goes to the filtered water basin number three. This is an open structure, lined with concrete, two hundred feet long by one hundred and fifty feet wide on top, twenty feet deep, with sides sloped one and a half to one. When full this basin holds three million gallons, but on account of the vertical head room required between the waters in the two reservoirs and that in the third reservoir, the depth of water in the latter is reduced to a maximum of fourteen and a half feet, which is equivalent to a storage of two million gallons only in the filtered water basin.

The arrangement of piping is such that in the case of a large fire, or for any reason, and at will, the water company can turn the water from the sedimentation basins into the filtered water basin, thus by-passing the filter plant. The water in the two sedimentation reservoirs stands at the same level and may be lowered about four feet, equal to about one and a half million gallons, before the filters cease to be operated by gravity. The remaining water is available by pumping. A centrifugal pump, capacity not stated, has been set up in the gate house located between the two sedimentation basins, which when necessary lifts water from basin number one into basin number two.

The wooden baffle boards in basin number one, were in the Fall of nineteen hundred and seven partly broken down, so that the water instead of traveling around them passed through.

The coagulant solution which is mixed or prepared in two tanks in the filter house, and is dissolved sulphate of alumina, is added to the water as it enters the sedimentation basin at the gate house. The amount of solution used is regulated by floats and the strength is said to be about one-quarter grain per gallon. Tests are not made at regular intervals to ascertain whether this amount be sufficient to purify the water at all times.

The drainage facilities for the wastes from the plant are not stated by the applicants. In fact, the company has failed to file plans of the reservoirs and purification plant sufficiently in detail to enable the Department to judge accurately as to the suitability of the apparatus as a safeguard to public health.

Each of the twelve filter units is a cypress tank, fifteen feet inside diameter. They are arranged in parallel rows of six units each with the operating gallery and piping and accessories on and underneath this gallery. The influent pipe of each filter is provided with a balance valve and float for maintaining the desired water level within the filter and to prevent its overflowing. The effluent valve is also provided with a valve and float to shut off the filters when the level of water in the filtered water collecting flume reaches an established maximum elevation. No rate controllers are provided, however, so there is nothing to prevent the operation of a filter unit at a speed far beyond its capacity to purify the water.

It is understood that across the centre of each filter on the bottom is laid a cast-iron main collector, and extending laterally from this to within three inches of the inside periphery of the tank, on six inch centres, are one and one-quarter inch diameter extra heavy wrought-iron pipes which receive the screens or strainers. The bottom is filled with concrete three and one half inches deep to the top of the screen, on top of which is placed six inches of gravel varying in size from one-eighth to one-half inch diameter, and on top of the gravel is placed about three feet of sand, having an effective size of about four-tenths milimeters and average uniformity coefficient of one and a half.

The floor of the filter house is concrete throughout. The operating platform is built of wood and is located about three feet below the top of the filters, and on this are mounted the stands of the operating gates. Below it in the concrete foundation is constructed the filtered water flume, which is six feet wide by four feet

deep and one hundred feet long. The water in it is the same height usually as the water in the filtered water basin, there being a twenty inch pipe connection between the two. The basin adjoins the filter house. The flume not being covered receives the dirt which falls through the cracks of the platform over it. At the time of the Department's inspection, there was considerable sediment on the bottom of the flume.

The filters are cleansed with a reverse or upward current of filtered water, supplied by centrifugal pump, rated at twelve hundred gallons per minute, which takes its suction from the filtered water collecting flume. A mechanical agitator or rake for stirring up the sand layer to its extreme depth, or on the surface only, is provided. This method of surface agitation for the removal of intercepted matters from the surface of the sand layer is stated to have been installed for the first time at the Chester plant. Instead of being provided with one waste located twelve inches above the sand layer, the filters have two waste openings, one immediately at the level of the sand layer, and the other twelve inches higher, both connected with a steel trough. The filter undergoing cleaning is first drained off until not over twelve inches of water remain over the sand layer. The surface accumulations are then broken up by the agitator and form with the remaining water a thick mass which is drained off completely to the level of the sand bed through the lower opening. The bulk of the intercepted matters thus removed, washing with a reverse current, proceeds, the water overflowing through the upper opening, the agitator being used or not as necessity may require. The advantage claimed for this particular method is that by it the surface accumulations only may be removed and filtration resumed without disturbing the lower strata of the sand level or interfering with its filtering functions. Whether or not the plan is operated in a manner to make this process advantageous is not proven by the data now in possession of the Department. The storing up of impurities in the lower layers of the filter might be a disadvantage.

It is reported that after the unit is put in operation again the filtered water for the first fifteen or twenty minutes is turned into the waste water flume, and that after this the filter is ran at one-third of its rate for several hours. Six filters are cleansed this way each day. An attendant is constantly on duty. The waste water from the filters is collected in an open flume in a concrete floor of the house (one flume in front of each row of filters), which delivers the waste to a well adjoining the filter house. The water after subsidence is pumped from this well into sedimentation basin number one. What disposition is made of the sediment is not stated. The waste flume is not covered and it is possible for the dirty water to splash over or by accident to reach the filtered water in the larger flume paralleling the two smaller ones and immediately adjacent thereto.

Bacteriological tests of the efficiency of the purification plant have shown ninety-nine per cent removal of bacteria from the raw water as reported by the petitioners.

It is reported that there are about thirty-six hundred consumers in the water district, of which in the city of Chester, out of a total population of forty thousand, there are thirty-four thousand one hundred and ten consumers; in the borough of Upland, out of a total population of twenty-three hundred, there are seventeen hundred and fifty consumers, and in Lower Chichester township, out of a population of fifteen hundred, there are one hundred and forty consumers. The system of distributing pipes comprises about fifty-eight miles, ranging in diameters from twenty-four inches to two inches. Owing to the growth of population and developments the petitioners wish to extend the mains.

There are about twelve hundred private wells in the city, fifty in Upland borough, and two hundred or more in Lower Chichester township, so it is reported.

The records of the local health officials do not show that diminution in typhoid fever rates which might be expected to follow the installation of a water purification plant. In nineteen hundred and six, there were sixty-two cases and twenty-four deaths reported to the State Department. In all probability the records are not accurate. More cases may have occurred than were recorded. The ratio of deaths to cases seems to warrant this conclusion. At least ten of the deaths in nineteen hundred and six occurred at the City Hospital. Up to October, nineteen hundred and seven, there were fourteen cases of typhoid fever for the year in Lower Chichester township, in ten instances of which the sufferers used well water. Whether the prevalence of this disease in the water district is due to polluted milk, well or public water of local origin is entirely debatable. A special study would have to be made to settle the question. One conclusion, however, is warranted, which is that well water drawn from the ground in proximity to privy vaults or cesspools or from ground that may have been saturated with sewage in the past, or from ground from the surface of which pollution may reach the wells, is dangerous and should be stopped.

Besides building new mains in the present district the petitioners ask approval of the extensions into Marcus Hook, as aforesaid.

This borough is a small manufacturing community located on the north bank of the Delaware River immediately below the city of Chester. There is a small strip of land in Lower Chichester township between said city and the borough. Said township also bounds the borough on the north. The State line between Delaware and Pennsylvania bounds the borough on the west. Within this incorporated territory, which comprises about four hundred acres and lies low and flat, there are at

present about fifteen hundred residents mostly employed in the oil refineries, but some of them are engaged in shad fishery. The Pennsylvania Railroad lines pass along the northern boundary and a branch of the Reading Railroad terminating in the town, extends along the river bank up stream to Philadelphia. The town has attained some note as the location of the State Quarantine Station. It is also the terminasi of the petroleum oil pipe lines from the productive fields of western Pennsylvania to the seaboard. It is from here that oil is exported to foreign countries.

At present the citizens obtain drinking water from individual wells mostly dug through hard-pan into underlying gravel. Kitchen slops and garbage are deposited on the ground and surface and shallow privies abound. Opportunities are many for surface and sub-soil pollution of the drinking supply. Cases of typhoid fever occurring in the borough have been attributed to polluted well water. The town is in need of sewerage and the question is now being considered. The local authorities hope by an aggregate policy of public improvement involving water and sewerage works, to promote the industrial growth and material prosperity of the community. Provided the petitioners have a charter right to furnish water in this district, there apepars to be no reason why permission therefor should not be granted.

The State Department of Health is endeavoring to stop the discharge of sewage into the creeks which pass through Chester City, and some progress has been made in the territory outside of the city. While the sewage of Philadelphia and of other cities in the Delaware River basin goes into the streams there, there are opportunities for dilution and destruction by natural processes of much of the poisonous matter, so that when the waters originally freighted with such sewage pass by the intake of the New Chester Water Company's system, it is not likely to be so dangerous as the virulent sewage poisons which are discharged into the river in the immediate vicinity of said intake and passing thereby. The latter sewage being the most dangerous should be the first sewage to be diverted from the city's water supply. Even then the Delaware River water will be dangerous. These facts should constantly be borne in mind by those upon whom rests the responsibility for supplying the people of Chester and vicinity with pure and wholesome water. Too great care cannot be exercised in operating and maintaining the purification plant. Its normal capacity would seem to be sufficient for the additional demands which may be made upon it soon, but it is evident that to maintain a high state of efficiency other units must be added at no distant date, provided the water district be materially increased.

In view of the foregoing considerations, it has been determined that the proposed source of supply to Marcus Hook borough will not be prejudicial to the public health, and a permit is hereby and herein granted therefor and for the extension of the water works in the streets as proposed, under the express stipulations that the right to do the things proposed is within the rights of the New Chester Water Company's charter and the laws of the State, and under the further conditions and stipulations as follows:

FIRST. The water company shall within six months from the date of this permit file in the office of the State Department of Health complete and full detail plans of the reservoirs, filter plant, grounds, piping, gates and appurtenances thereof, together with a plan of all water pipe owned by it and laid in the borough of Marcus Hook and Lower Chichester township. And thereafter, at the close of each season's work, the company shall file a plan of the pipes laid during the year in said office, together with such other information in connection therewith as may be required.

SECOND. Weekly reports of the operation of the water works system, particularly the purification plant, shall be kept on blank forms satisfactory to the State Department of Health, and copies thereof shall be filed in said Department. The water company shall assist the State Department of Health in making such tests of the plant from time to time as may be found desirable. If necessary, the Commissioner of Health may prescribe standards of efficiency and make regulations for the operation and maintenance of the plant. If at any time in his opinion the water works, or any part thereof, or the water furnished thereby, has become defective, or insufficient or prejudicial to the public health, then such remedial measures shall be adopted by the said company as the Commissioner of Health may advise or approve.

THIRD. The introduction of raw river water into the street main system or anywhere except into the subsidence basin is absolutely prohibited. Duplicate pumps or ample pumping capacity shall be provided at the gate house or subsidence basins to render as much of the eight million gallons stored in reservoir number one as may be practicable available for use. With the large storage now available on the hill, ample insurance against the necessity of by-passing the filter plant should be afforded. There being facilities for storing two million gallons of filtered water, the necessity does not exist for an emergency connection between the pumps and the street mains. To the contrary, the interests of the public health demand that all connections with the force main between the pumps and the purification plant shall be absolutely cut off or discontinued if there be any such. So this is made a special stipulation.

FOURTH. The filtered water flume and the wash water flumes shall be covered by a water-tight concrete floor to obviate any possible contamination of the filtered water.

FIFTH. Rate controllers of approved design shall be installed on the filters and no unit shall be operated beyond its normal capacity, except it be in an emergency.

SIXTH. The water company shall have bacteriological tests made of the raw water and of the water in its various stages of progress through the purification plant, and this shall be done in a most thorough manner every six months. Every two weeks bacteriological tests of the filtered water shall be made in sufficient numbers to show whether the plant is efficiently performing its work. Copies of these tests shall be promptly submitted and filed in the office of the State Department of Health.

The Commissioner of Health will request local authorities to have a systematic test made of well water in the water district and will do other things also in an attempt to bring about a dimunition of typhoid fever there. He will also, in conjunction with the Governor and Attorney General, take some action with respect to the sewage pollution of the Delaware River and tributaries by Chester City sewage as may be determined to be proper and necessary. The city Board of Health will be requested to stop all bathing in the sewage polluted streams of the vicinity, also said Board will be advised that all wells in the city used as sources of drinking water should be tested and, if found polluted, the same should be abandoned.

Harrisburg, Pa., March 23, 1908.

CHESTER TOWNSHIP, DELAWARE COUNTY.

Edgemont Water Company.

This application was made by the Edgemont Water Company of Chester Township, Delaware county, and is for permission to establish a system of water works and supply water to the public within said township.

The Edgemont Water Company's charter was approved on March fourth, one thousand nine hundred and eight, and authorized said company to supply water to the public in the township of Chester, Delaware county, its source of supply to be the Delaware River, the point on said river at which said water is to be taken or used, to be at the present pumping station of the New Chester Water Company in the city of Chester.

The incorporators are men who are interested in the New Chester Water Company and the latter will sell water to the Edgemont Water Company.

The township of Chester, which it is proposed to supply, lies directly north of the city of Chester, being bounded on the east by Ridley Creek and on the west by Chester Creek. The only settlement of any magnitude in the township is the village of Brookhaven. It is in the north central part of the township and has a population of possibly seventy-five people. The entire population of Chester township in nineteen hundred was five hundred and forty-three. The filter plant and distributing reservoir belonging to the New Chester Water Company are located at the extreme northern limits of this township and the twenty-four inch supply main returning to the city from the distributing reservoir on the hill, is laid in the turnpike which passes through Brookhaven village. Along the one and a half miles of turnpike in the township are located a number of houses, several of which are connected with the said supply main. These dwellings have been so supplied with water for a number of years.

The present owners of the New Chester Water Company recently discovered that these properties supplied with water in Chester township were being furnished with water without legal authorization, and, therefore, the Edgemont Water Company was incorporated to legalize this supply and the furnishing of water to anybody who might want it within said township.

No plans have been submitted by the petitioners except a sketch of the supply main above mentioned and it is not known that the new company purposes to immediately lay any pipes in the ground.

The New Chester Water Company pumps water from the Delaware River, taking it at a point opposite the central part of the city in the main channel where the sewage from the city sewers and that from Philadelphia nine miles distant has opportunity to pass and repass the intake. The water is pumped through a rising main whose diameter ranges from twenty to twenty-four inches a distance of about three and a half miles to two sedimentation basins, each holding eight million gallons. Adjacent thereto, there is a mechanical filter plant, the water flowing from these basins after treatment with a chemical solution, onto the filters. They have a normal capacity of six million gallons daily. The filtered water flows to a filtered water basin holding two million gallons. This plant is on Harrison's Hill in the northern part of Chester township. The distributing system extends through the city of Chester, Upland borough and in a part of Lower Chichester township. The daily consumtion averages less than three million gallons. The population supplied approximates thirty-six thousand. The purchase of the franchise and property of the Linwood Water Company and of the Upland Water Company in a manner prescribed by law is the authority under which the New Chester Water Company has the right and is exercising it to furnish water to Lower Chichester township and Upland borough; also possibly under a supplement, approved May twenty-fifth, eighteen hundred and seventy, to an act of eighteen hundred and sixty-seven,

enabling the South Ward of the city of Chester to produce a supply of water, and the supplement thereto of eighteen hundred and sixty-nine. Under this law it is claimed by the New Chester Water Company that it has full power and authority to extend water pipes into any road, street, etcetera, of any township, district and borough adjacent to the city of Chester in the county of Delaware. If this construction of the law be correct, then the New Chester Water Company already has authority to supply the public with water in Chester township.

It is, of course, understood and presumed that the Edgemont Water Company will not purchase water of the New Chester Water Company at any point where the New Chester Water Company is not under its charter and franchise empowered to sell water to the public.

The petitioners should not sell water to the public unless it be pure and wholesome, but the Edgemont Water Company now has no control or means known to the Department of regulating this matter. The petitioners do not purpose to build a filter plant of their own. They intend to sell the water of the same quality as it is purchased. In this arrangement the Edgemont Water Company does not seem to have afforded sufficient safeguard to their consumers. The Commissioner of Health must, under the law, determine whether the proposed supply be prejudicial to the public health. There is no doubt if the Edgemont Water Company should enter into an agreement compelling the New Chester Water Company to furnish a pure and wholesome supply at all times to it under forfeiture of a sufficient amount, that this could be taken as one reasonable evidence of the intention of the Edgemont Water Company to actively interest itself in the potability of the water which it is authorized to supply to the public.

The fact cannot be emphasized too much that the original source, the Delaware River, is dangerous. There are always poisons therein inimical to life and health. An accident might occur, but under such circumstances carelessness and negligence more often do occur, whereby a greater or less amount of these poisons are admitted through the water pipe into the homes of the consumers. Constant vigilance should be exercised in the operation of the purification plant, else the water to be purchased by the Edgemont Water Company would be unsuitable to supply to the public.

It has been determined that the proposed water works system and the supply therefor for the township of Chester by the Edgemont Water Company will not be prejudicial to public health, and a permit is hereby and herein granted therefor, under the following conditions and stipulations:

FIRST. This permit shall not be operative until the Edgemont Water Company shall have entered into an agreement with the New Chester Water Company, whereby the latter shall guarantee to furnish the former with a sufficient quantity of water, the purity of which shall be satisfactory to the State Commissioner of Health. Tests of this water shall be made by the Edgemont Water Company every two weeks and copies thereof shall be filed in the office of the State Department of Health. A copy of said agreement shall also be filed in said office.

SECOND. Before the Edgemont Water Company shall lay any water pipes and use the same, plans thereof shall be filed in the office of the State Department of Health and be approved. At the close of each season's work a plan of the water mains laid during the year shall be prepared and sent to the Commissioner of Health, to the end that there shall be a complete record in said office of the extent of the works belonging to the Edgemont Water Company and the number of people in said township dependent upon such supply.

THIRD. If at any time, in the opinion of the Commissioner of Health, the water supply, or the water works, or any part thereof, has become prejudicial to public health, then the Edgemont Water Company shall adopt such remedial measures to protect the public health as the Commissioner of Health may approve or suggest.

FOURTH. Regular inspections will be made of the Edgemont Water Company's system and supply by a Department officer. The Commissioner of Health may suggest rules and regulations to govern the supply of water to the public in so far as public health is concerned. Said water company shall conform to any such orders, rules or regulations in so far as they may relate to the supply of water to the public in Chester township.

FIFTH. This permit is issued on the express stipulation that the operations of the Edgemont Water Company shall be wholly within its charter rights.

Harrisburg, Pa., March 23, 1908.

CHESTER, DELAWARE COUNTY.

New Chester Water Company.

This application was made by the New Chester Water Company of Chester, Delaware county, and is for a modification of a permit issued to the said company by the Commissioner of Health under date of March twenty-third, one thousand nine hundred and eight.

It appears that in said permit, Section Five, it was stipulated as follows:

> "Rate controllers of approved design shall be installed on the filters and no unit shall be operated beyond its normal capacity except it be in an emergency."

The applicants beg to be excused from this provision because the outlay involved is large and because in the bottom of each filter there is a six inch manifold in which all of the clear water passing through the filter bed is collected before passing to the clear water flume outside. Since the diameter of this manifold is six inches and the diameter of the pipe and connection into the clear water flume is five inches, and since a six inch pipe under a ten foot head will deliver about five hundred thousand gallons daily, whereas a five inch pipe can only deliver four hundred and twenty-five thousand gallons daily when there is a full height of water on the filter, this provision, especially installed to obviate the cost of putting in rate controllers, successfully regulates the flow of effluent from the filter and serves the purpose as thoroughly as would some other kind of rate controller. It is urged by the applicants that of the many different patterns of controllers none is an absolute success and none is to be preferred to the simple arrangement above described. Therefore, since it would cost several thousand dollars to install other rate controllers on the twelve filter units at the plant, the New Chester Water Company deems these facts a sufficient warranty for the Commissioner of Health to relieve the petitioners from the provision of Section Five of said permit.

It has been determined that the request can be complied with without prejudice to the public health and, therefore, the said permit of March twenty-third, one thousand nine hundred and eight, is hereby and herein modified by striking out the fifth clause or stipulation thereof.

Harrisburg, Pa., April 20, 1908.

DANVILLE, MONTOUR COUNTY.

Danville State Hospital for the Insane.

This application was made by the Board of Trustees of the Danville State Hospital for the Insane of Danville, Montour county, and is for approval of plans for additions to the present water purification plant submitted in pursuance of recent legislation and an appropriation made therefor, said permit and approval being given under the following conditions and stipulations:

It appears that the present plant consists of a gravity intake, pump well, feed water pump, sedimentation basin, two filter units, filtered water basin and high service pumping machinery. The works were established in one thousand nine hundred and three, having been laid out and constructed under plans furnished by the New York Continental Jewell Filtration Company. The tank and filters, the pump well and filtered water basin comprises one structure, about fifty-five feet long by nineteen feet wide. It is located adjacent to the high service pumping station for the hospital. The water from the river first enters the pump well outside on the flats and then by pipe to the raw water pump located in a pit extending clear across the end of the building below ground and having a width of ten feet and a depth of nine and one half feet below the floor line. This floor line is about level with the surface of the ground outside. From here the water is lifted into the sedimentation tank which is a wooden structure, fourteen feet in diameter and ten feet high, provided with customary baffles, inlets and outlets, such as are used in plants of this type. The drainage from this tank is discharged into the sewers of the plant whose outlet is ultimately into the river below the intake.

From the subsidence basin the water flows by gravity to two filter units, each twelve feet in diameter, of the low type standard double tank, reversible rake bar Jewell filter, each having a rated capacity of three hundred thousand gallons per twenty-four hours and designed to be operated in excess of this rate for short periods. Each filter is of double tank construction. The inner tank, or filter receptacle is twelve feet inside diameter and the over-all height of the double tank is eight feet. The water is introduced between the inner and outer tanks and rising up passes over the edge and into the filter. The level of the surface of the sand is twelve inches below top of the filter tank and the depth of sand and gravel is three feet eight inches. This material rests on the strainer system, which consists of a central eliptical cast-iron header constructed in flanged sections securely bolted together. The header is tapped on opposite ends of its long diameter for the lateral pipes. The laterals are spaced six inches on centers and are one and one-fourth inch wrought-iron pipes, inner end screwed into the cast-iron headers and the free end capped. These laterals are drilled and tapped on the top six inches apart with three-eight inch pipe, upon which the brass strainers are fitted. These strainers are provided, four per square foot of filtering area. The screen system is imbedded in concrete up to a level with the upper portion of the strainers. From the collecting system the filtered water is delivered into a down draft pipe five inches in diameter extending down six feet into the clear water well, the end being about two feet above the bottom of said well.

In each filter there is provided a rotary reversible swivel rake bar agitator, mounted on heavy yellow pine cross timbers and supported in suitable cast-iron brackets attached to the sides of the filter tank. The agitator consists of a system of spur and bevel gear and pinion with tight and loose pulleys, shaft and belt shifting device, so that the agitator may be revolved with the rakes traveling in a vertical position or reversed and the rakes made to trail over the surface of the filter beds.

The function of the down draft pipe is to act as a controller when the clear water well is full. Excessive use, however, from the clear water well tending to uncover the down draft pipe exerts a suction or down draft on it, thereby increasing the flow from the filters, and might tend to exceed their proper capacity.

The influent pipe to each filter is six inches in diameter controlled by a flanged gate valve.

The filter is washed by reversing the current and the waste water is drained into the eight inch sewer above mentioned. There is a re-wash arrangement whereby the first filtered water may be wasted to the sewers, all provided with and controlled by proper valve arrangements. The waste pipe from each tank is four inches in diameter. The pressure from the service system of the institution is used for washing.

On each influent pipe to the filter there is a butterfly valve controlled by means of a float encased in cast-iron float tank attached to the side of the filter unit, whereby the supply of water to the filter is regulated.

The chemical feed box is located in the room over the pump pit and there are two storage tanks. The feed is through a regulation orifice box into the section pipe of the raw water feed pump. This pump has a capacity of six hundred thousand gallons, so it is reported. It is of the direct acting type.

The pit or well in which this pump is located is constructed water tight. The water flows to the pump by gravity.

The consumption of water at the institution is equal to about the rated capacity of the filter plant. On the hill back of the main building there is a storage reservoir. In the operation of the water works during the hours of greatest consumption the pumps are speeded up in the adjacent station to a rate in excess of the normal capacity of the filters with the result that the water is lowered in the clear water basin beneath the filters to the minimum and, as above explained, the rates of the filters are accelerated and at times, especially during high turbidities in the river, the evidence of over crowding of the filters may be seen in the coloring in filtrate. To obviate the possibility of overcrowding of the plant, the Trustees propose to add one filter unit and additional filtered water storage.

The filtered water basin is underneath the subsidence tank and the present filter units and its dimensions are nineteen feet in width by forty-five feet six inches in length and a depth of ten feet. Probably eight feet of this depth is effective capacity. Into this basin the suction pipes of the service pumps are extended. These pumping engines are ample in capacity to serve the institution. The raw water feed pump, however, is of insufficient capacity. The present installation should be taken out and duplicate machinery provided, centrifugal pumps installed each having a capacity ample to deliver all the water that may be required during any interval of time to the plant.

The plans submitted for a new filter unit provide for construction similar in all respects to the filter units now in existence. The end wall of the superstructure enclosing the filters is to be torn out and the filtered water basin and superstructure is to be extended about fourteen feet. Thus the storage capacity for filtered water will be increased and the full capacity will be equivalent to nine hundred thousand gallons of filtered water per twenty-four hours. The filtered water basin is to be constructed of concrete and the superstructure is to be built of brick.

The filter company proposes to give a guarantee of efficiency to extend over one year from the completion of the new filter unit. The guarantees are made subject to the conditions that the plant shall be operated in accordance with the instructions of the filter company and that a suitable quantity and quality of coagulants or reagents shall be used. When operated in this manner the new filter unit is to deliver three hundred thousand gallons of clear bright water, practically free from color and matters in suspension.

It has been determined that the proposed filter unit and additional storage capacity for filtered water will not be prejudicial to public health, and the plans are hereby approved therefor under the following conditions and stipulations:

FIRST: The improvements shall be made in conformity with these plans and thereafter the plant shall be operated in an efficient manner, satisfactory to the Commissioner of Health. Daily reports of the operation of the water works system shall be kept on blank forms satisfactory to the State Department of Health and copies thereof shall be filed in the office of the Commissioner of Health.

SECOND: It is the purpose of the State Department of Health to collect samples of the raw water and the filtered water and to watch the operation of the system, and if at any time, in the opinion of the Commissioner of Health, the plant or any part of the water works system is prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may suggest or approve.

THIRD: The Board of Trustees shall provide adequate and duplicate pumping machinery for the raising of raw river water into the filter plant and attention is called to the suggestions hereinbefore made relative to this point.

FOURTH: The Trustees shall prepare an accurate detail plan of the existing pumping station and layout, including the intake pipe, the run nearby, the railroads, adjacent buildings, location of valves and force main and file the same in the office of the Commissioner of Health on or before the completion of the filter unit herein approved.

It would appear from evidence at hand that an examination of the intake pipe at the river and leading therefrom to the receiving well on the flats should be carefully made by some qualified expert in the employ of the Trustees. Probably

defects in this line may be found and remedies applied, whereby an ample quantity of water may be assured at all times at the pump well and raw water feed pumps.

Harrisburg, Pa., August 14th, 1908.

DANVILLE, MONTOUR COUNTY.

This permit is issued to the Board of Trustees of the State Hospital for the Insane at Danville, Montour county, and is for the construction of additional filter units to the present water filtration plant of the institution, according to plans therefor filed by Mr. William Field Shay, President of said Board of Trustees.

It appears that the present plant consists of a gravity intake, pump well, feed water pump, sedimentation basin, two filter units, filtered water basin and high service pumping machinery. The works were established in nineteen hundred and three, having been laid out and constructed by the New York Continental Jewell Filtration Company. On August eleventh, nineteen hundred and eight, said filtration company submitted plans for improvements to the works; the plans were approved and a permit issued therefor by the Commissioner of Health, said permit being dated August fourteenth, nineteen hundred and eight. This permit was issued with the understanding that the plans had been authorized by the Board of Trustees. It now appears that this was a mistake. After advertisement and the receiving of bids, the trustees, represented by the President, Mr. Shay, are prepared to enter into a contract with the American Water Softener Company, provided the plans submitted by this company are satisfactory and receive the approval of the Commissioner of Health as required by law.

The present tank and filters, pump pit and filtered water basin are all housed in one structure, fifty-five feet long and nineteen feet wide. This building is located adjacent to the high service pumping station for the hospital.

There is a receiving well on the flats between the station and the river into which the raw river water flows by gravity and from which it flows by gravity to the feed water pump located in the pit under one end of the building. However, this gravity flow to the pumps is only during a period of high water in the river. There are weeks at a time when there is a suction lift of twenty feet or thereabouts. The pump pit is ten feet wide with a depth of about nine and a half feet below the floor. In it there is a horizontal simple duplex pumping engine of a rated capacity of about eight hundred thousand gallons per twenty-four hours. This engine lifts the water into the sedimentation tank located on the floor of the building above. This structure is fourteen feet in diameter and ten feet high and provided with customary baffles, inlets and outlets, such as are used in plants of this type. The drainage from this tank is discharged into the sewer outlet of the plant, whose outlet is ultimately into the river below the intake.

From the subsidence basin the water flows by gravity to two filter units, each twelve feet in diameter, of the low type, standard double tank, reversible rake bar, Jewell filter, each having a rated capacity of three hundred thousand gallons per twenty-four hours and designed to be operated in excess of this rate for short periods. Each filter is of double tank construction. The inner tank, or filter receptacle, is twelve feet inside diameter and the over-all height of the double tank is eight feet. The water is introduced between the inner and outer tanks and rising up passes over the edge and into the filter. The level of the surface of the sand is twelve inches below the top of the filter tank and the depth of sand and gravel is four feet eight inches. This material rests on the strainer system, which consists of a central eliptical cast-iron header constructed in flanged sections securely bolted together. The header is tapped on opposite ends of its long diameter for the lateral pipes. The laterals are spaced six inches on centres and are one and one-quarter inch wrought-iron pipes, inner end screwed into the cast-iron header and the free end capped. These laterals are drilled and capped on the top six inches apart with three-eighths inch pipe, upon which the brass strainers are fitted. These strainers are provided four per square foot of filtering area. The screen system is imbedded in concrete up to a level with the upper portion of the strainers. From the collecting system the filtered water is delivered into a down draft pipe five inches in diameter extending down six feet into the clear water well, the end being about two feet above the bottom of said well.

In each filter there is provided a rotary, reversible, swivel rake bar agitator, mounted on heavy yellow pine cross timbers and supported in suitable cast-iron brackets attached to the sides of the filter tank. The agitator consists of a system of spur and bevel gear and pinion with tight and loose pulleys, shaft and belt shifting device, so that the agitator may be revolved with the rakes traveling in a vertical position or reversed and the rakes made to trail over the surface of the filter bed.

The function of the down draft pipe is to act as a controller when the clear water well is full. Excessive use, however, from the clear water well tending to uncover the down draft pipe exerts a suction or down draft on it, thereby increasing the flow from the filters, and might tend to exceed their proper capacity.

The influent pipe to each filter is six inches in diameter controlled by a flanged valve gate.

The filter is washed by reversing the current and the waste water is drained into the eight inch sewer above mentioned. There is a re-wash arrangement whereby the first filtered water may be wasted to the sewer, all provided with and controlled by proper valve arrangements. The waste pipe from each tank is four inches in diameter. The pressure from the service system of the institution is used for washing.

On each influent pipe to the filter there is a butterfly valve controlled by means of a float encased in a cast-iron float tank attached to the side of the filter unit, whereby the supply of water to the filter is regulated.

The chemical feed box is located in the room over the pump pit and there are two storage tanks. The feed is through a regulation orifice box into the suction pipe of the raw water feed pump.

The consumption of water at the institution is equal to about the rated capacity of the filter plant. On the hill back of the main buildings there is a storage reservoir. In the operation of the water works during the hours of greatest consumption the pumps are speeded up in the adjacent station to a rate in excess of the normal capacity of the filters, with the result that the water is lowered in the clear water basin beneath the filters to the minimum and, as above explained, the rates of the filters are accelerated and at times, especially during high turbidities in the river, the evidence of overcrowding of the filters may be seen in the coloring in the filtrate. To obviate the possiblity of over-crowding of the plant, the Trustees purpose to add one filter unit and additional filtered water storage.

The filtered water basin is beneath the subsidence tank and the present filter units, and its dimensions are nineteen feet wide by forty-five feet six inches long and ten feet deep. Probably eight feet of this depth is effective capacity. Into this basin the suction pipes of the service pumps are extended. The high service pumping engine which is used to serve the institution has a capacity of nine hundred gallons per minute. There is an emergency high service engine of about the same capacity.

The raw water feed pump is of sufficient capacity to deliver all the water that may be required during intervals of excessive demand at the plant.

There are five proposals made by the bidders whose plans are under consideration.

Proposal "A" comprises the extensions of the existing filter building and clear water basin a distance of fifteen feet and the installation of one additional twelve foot diameter double tank gravity filter, identical in all respects with the existing filters, excepting that the filter offered herein is to be equipped with the Hodkinson improved, reversible, power agitator, which is claimed to possess the additional advantage of throwing the wash water into the wash or waste gutter and expediting the washing process, and the filter is also to be equipped with the Hodkinson improved strainer or sand valve.

Under this proposal the filter house shall be extended in a neat and substantial manner, all walls to be of same thickness as walls of the existing buildings; all materials to be of the same quality, the filtered water basin to be of the same depth, breadth and construction; the "I" beams for supporting the filter to be of same weight and depth; the roofing and covering to be the same; the operating platform to be the same; all window frames, sash and lights to be the same, and the whole completed in a thorough and workmanlike manner and the equal in every particular of the existing building as regards finish, workmanship and quality of materials. This proposal contemplates removing the existing end wall of the filter house, but with the understanding that the brick, window frames and sash may be used in the proposed extension.

The proposal also contemplates extending the operating platform. It also includes all hangers, shafting, pulleys and belting for driving the agitator on the new filter.

As the present eight inch diameter pipe leading from the subsidence tank is too small to supply an additional filter, the proposal contemplates removing the present eight inch supply and substituting therefor a ten inch diameter wrought-iron supply main, properly valved, with a branch therefrom to each of the existing filters, and to the filter offered in the proposal, the free end of this pipe to be capped or plugged to admit of extending it to future filters.

Under this proposal it is agreed to extend the existing wash water supply, steam sterilizing and drain pipes to the new filter, carrying the effluent from the filter down into the filtered water basin, and the doing of all other pipe work incident to the proper installation of the filter herein proposed and necessary to make it complete and identical in all respects with piping arrangements on the existing filters.

This proposal also contemplates the furnishing and installation of all materials, although not herein specifically referred to, necessary to extend the filter building and the existing filtered water basin, to install the additional filter and make everything complete and first class and in running order, everything to be equal in every respect to the existing plant and to harmonize therewith.

Proposal "B" provides for the extension of the existing filter building and filtered water basin a distance of twenty-nine feet six inches and the installation of two twelve foot diameter filters, all as set forth in Proposal "A."

Proposal "C" is on the assumption that the filtered water basin is to be omitted and concrete footing courses furnished for new walls, and on this basis a deduction is to be made from Proposal "A" and also from Proposal "B" of two hundred and fifty-three dollars and five hundred and six dollars respectively. Under this proposal the new portion of the building would be covered with a substantial and well finished concrete floor laid off in squares and the filter effluents would be carried down into the existing filtered water basin.

Proposal "D" is the same as proposal "A" practically, with the exception that instead of a twelve foot filter, it is proposed to establish a standard thirteen foot filter, the same to be constructed in all substantial respects as the standard fifteen foot filter of the bidders. Each of the existing filters at the institution is twelve feet in diameter and there is an area of one hundred and thirteen square feet. The thirteen foot filter proposed has an area of one hundred and thirty-two square feet, or nearly seventeen per cent. more area and capacity than each of the existing filters. The bidders offer to give this additional filter capacity without extra cost. The unit would not look unlike the existing filters and the present existing appearance of the plant would be maintained. But under this proposal the company would install its own style apparatus instead of a double tank filter like those now in use at the plant.

Proposal "E" is substantially the same as Proposal "B", with the exception that each of the two additional filters is to be of the bidder's own make and each thirteen feet in diameter. The two filters offered in this proposal would give nearly thirty-four per cent. greater filter capacity than two filters like those already in use.

The bidders guarantee the filters herein offered by them to be capable of delivery under like conditions, a quantity and quality of water equal in every respect to that produced per square foot of area by the existing filters at the institution; and that the filters proposed will consume no more time or wash water in cleaning and that no more power will be required to drive the agitator.

The filters proposed and all parts thereof are guaranteed free from infringement of patents.

Proposal "A" is for the sum of Three thousand two hundred and ninety-two dollars. Proposal "B" is for the sum of five thousand nine hundred and eighty-nine dollars.

The bidders are prepared to extend the filter house and install two additional filter units within one hundred days or one additional filter unit within seventy days.

The method now in use at the plant for applying the coagulant solution is not accurate, or it does not receive the personal attention necessary to make it accurate. As above stated, this is a gravity feed device and feeds a constant stream at all times regardless of the quantity of water flowing to and through the filters. This would be all right if the strength of the solution added varied in conformity with the quality and quantity of water delivered. As it is now, if the device is adjusted to feed a given amount when the filters are clean, it will supply too much coagulant as the filters become dirty, because more water is furnished to the filters when they are clean than when they are dirty, and the rate of filtration is much reduced. If the device is adjusted when the filters are dirty, it will, therefore, feed too little coagulant when they are clean for the same reason. Under these conditions, unless an expert be in attendance the filters are not liable to develop their best and most uniform bacterial efficiency, and, besides, the use of coagulent cannot be economical. Furthermore, if the attendant should fail to close off the alum feed when the plant is shut down for the night, the solution would be emptied out of the tank during the night time into the suction well and a half dose of this chemical would be received into the institution. To counteract this possible occurrence the bidders propose, for the net sum of one hundred dollars, to install a coagulant feed pump and all appurtenances belonging thereto. This pump is to be actuated by the steam pump supplying water to the filters. Every stroke of the steam pump, whether running fast or slow, would cause the alum feed pump to also make a stroke and feed the required dose of coagulant—if the pump supplying the filters stops, so will the alum feed pump, and there will be no waste of coagulent. This apparatus will feed the coagulent solution uniformly at all times and in direct proportion to the volume of water supplied to the filters, and as the pump has a variable stroke it can be quickly and easily adjusted to feed varying quantities of the coagulent solution according to the condition of the river. Tables and scales, comprehensible by the most ignorant, showing how to mix and feed the coagulent in definite proportions, accompany the outfit.

The present subsidence capacity is in the neighborhood of one and a half hours and with two additional filter units it will be about three-quarters of an hour.

The plant is unfortunately located right on the bank and adjacent to the pump house, so that there is a limited area. One subsidence tank of the present capacity is too little to give efficiency where the filter unit is to be run up at a high rate, and, therefore, it argues in favor of more filter units in which to distribute the work of water purification at reduced rates of filtration.

Furthermore, with a high service pumping engine of nine hundred gallons per minute, it stands to reason that the filter plant should have at least this capacity under all conditions and at all times where the filtered water basin has a limited

capacity as in this instance. If the high service pump be operated at its full capacity of nine hundred gallons per minute, which is the economical rate to operate it, the filtering area should be sufficient to deliver a purified water at this rate.

The present filter units should not be operated in excess of five hundred and fifty-two gallons per minute. The three filter units like the present ones would deliver seven hundred and seventy-eight gallons per minute and four filters would deliver nine hundred and four gallons per minute. If two filters of the make proposed by the bidders, each thirteen feet in diameter, were installed in connection with the existing filters, the plant would have a total filtering capacity of one thousand and eighty gallons per minute, or more than enough to keep the large pump supplied.

This is the best proposal submitted, which is Proposal "E." With this capacity of filtration it is not necessary, to extend the filtered water well.

The improved method for applying the coagulant solution should be adapted.

The filtered water well or pump well for the high service pump is not covered with a floor. Water from leaky stuffing boxes or valves or leakage of water, through staves of the filter tank, or raw river water slopping over from the filter can fall into the filtered water below and contaminate it, thus spoiling all results of filtration. In a modern well designed plant this danger is eliminated by the construction of a water-tight floor underneath the filters forming an impervious roof to the filtered water well. This improvement should be made without fail over the existing filtered water basin and a pitch should be given to the surface of the floor and the drainage be conducted to the sewer.

The design submitted is an advancement over the plan approved under the permit of August fourteenth, nineteen hundred and eight, in that it provides for two filter units instead of one and in that it affords an automatic arrangement of improved design for the feeding of the coagulant solution to the raw water.

It has been determined that the proposal for two additional thirteen foot filter units, without additional storage of filtered water, and that the proposal for the improved coagulant feed, in conformity with the plan submitted, will not be prejudicial to the public health if adopted by the Board of Trustees, and the plans therefor are hereby and herein approved and a permit issued, under the following conditions and stipulations:

FIRST: The improvements shall be made in conformity with these plans and thereafter the plant shall be operated in an efficient manner, satisfactory to the Commissioner of Health. Daily reports of the operation of the water works system shall be kept on blank forms satisfactory to the State Department of Health and copies thereof shall be filed in the office of the Commissioner of Health.

SECOND: It is the purpose of the State Department of Health to collect samples of the raw water and the filtered water and to watch the operation of the system, and if at any time, in the opinion of the Commissioner of Health, the plant or any part of the water works system is prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may suggest or approve.

THIRD: The Board of Trustees shall provide adequate and duplicate pumping machinery for the raising of raw river water into the filter plant and attention is called to the suggestions hereinbefore made relative to this point.

FOURTH: The Trustees shall prepare an accurate detail plan of the existing pumping station and lay-out, including the intake pipe, the run nearby, the railroads, adjacent buildings, location of valves and force main, and file the same in the office of the Commissioner of Health on or before the completion of the filter unit herein approved.

FIFTH: The Board of Trustees shall build a concrete water tight floor over the present filtered water well and this shall be done and completed at the time that the two additional filters herein approved shall be completed.

SIXTH: This permit is issued under the express stipulation that the work herein authorized and approved shall be done during the current season.

It would appear from the evidence at hand that an examination of the intake pipe at the river and leading therefrom to the receiving well on the flats should be carefully made by some qualified expert in the employ of the Trustees. Probably defects in this line may be found and remedies applied, whereby an ample quantity of water may be assured at all times at the pump well and raw water feed pumps.

Harrisburg, Pa., August 24th, 1908.

DANVILLE, MONTOUR COUNTY.

Danville State Hospital for the Insane.

This permit was issued to the Board of Trustees of the State Hospital for the Insane at Danville, Montour county, relative to certain proposed improvements to the water works system of the institution as provided for by law. The approval of the plans and the permit herein are under certain conditions and stipulations hereinafter appearing.

Mr. R. Scott Ammerman, solicitor for the Board, on September twenty-ninth, nineteen hundred and eight, submitted a proposition from the water filter company whose plans were approved by the Commisioner of Health in due form in a permit issued August twenty-fourth, nineteen hundred and eight. The letter of the water filter company to the Superintendent of the institution is given in full below:

"September 22, 1908.

"Dr. H. B. Meredith,

"Supt. State Hospital for the Insane,

"Danville, Pa.

"Dear Sir:—Agreeable to the understanding had at the last meeting of your Executive Committee, we are handing you herewith, in duplicate, our proposal, as originally submitted under date of August 11th, 1908, but omitting therefrom our several other proposals which are not now to be considered, and including only such portions as relate to the work actually to be done in accordance with the permit issued by the State Department of Health and the decision of your Executive Committee.

"The enclosed redraft of proposal, you will find, is copied almost verbatim ad literatum from our original proposal, excepting that we have included therein the additional items of installing a new low service pump, putting in a new coagulant feed pump, covering your existing filtered water basin with a concrete floor, and covering the strainer on river end of intake pipe. In our new specifications we have also covered a description of the extra work which we are now asked to perform.

"The price named in our redraft of proposal is made up as follows:

"Our price for two filters 13 feet diameter per our proposal "E" of Aug. 11, 1908, ...	$5,889 00
"Less deduction allowed for omission of filtered water basin beneath filter house extension, per our proposal "C" of Aug. 11, 1908, ...	506 00
	$5,383 00
"New coagulant feed pump, per letter accompanying our proposal of Aug. 11, 1908, ...	100 00
"New Worthington low service pump, per our letter of Aug. 14, 1908,	1,050 00
"Covering the existing filtered water basin with a concrete floor, ...	450 00
"Stone covering for strainer on river end of intake pipe, ...	200 00
	$7,183 00

"The trouble with your intake pipe is that the aggregate cross sectional area of the perforations in the strainer on the river end is too limited, being equal to about 44 square inches, whereas the area of the 16 inch intake pipe is 201 square inches. As nearly as the writer could determine, the strainer on the river end of intake contained about 400 holes about 3-8 inch diameter. During high stages of the river it is more than likely that these perforations become obstructed with gravel or particles of coal. This condition can be relieved by covering the existing strainer with broken stone, as shown on our drawing No. 15-F-1, and as described in our proposal and specifications, as the stone would prevent access of coal and gravel to the perforations while the voids would be ample to allow free ingress of water. As your low service pump suction pipe is 8 inch diameter and has a cross sectional area of 50 square inches, you will see that the 44 square inches of perforations in strainer on river end of intake are not equal to the area of the suction pipe to low service pumps.

"A better and more permanent method of correcting trouble with the intake pipe would be to cut off the end of present strainer and slip over this pipe a cast iron strainer substantially as shown on our drawing No. 14-F-1. Our redraft of proposal, as enclosed herewith, contemplates our covering the existing strainer on river intake with broken stone only. If you should conclude to have us put on the new cast-iron strainer shown on our drawing No. 14-F-1, $200.00 must be added to our price of $7,183.00.

"If we are to do the work on the intake pipe it is important that the contract be signed up without delay so that we can take advanage of the present low stage of the river, as our estimates are based on our being able to do this work while the river is low. If you should conclude to have us supply the new strainer casting shown on our drawing No. 14-F-1, we would thank you to wire us as soon as this decision is reached so that we can order the patterns and castings immediately and get the work in with the least possible delay and while the river is low. If this new strainer casting is used we could cut off the blank end of your present strainer and leave end of pipe open. The perforations in our strainer, which are on the side walls only, would have area equal to area of the 16 inch pipe. We would anchor this new strainer in place so that it could not be disturbed.

"Covering the existing filtered water basin with a concrete floor, and making alterations to intake, are not easy tasks, and as costs will depend largely upon conditions existing at the time the work is done. If the river should be high when

we do work on the intake the extra precautions to be taken would soon eat up the little profit included in our figures. In covering your filtered water basin we would have to do the work so as not to interfere with the operation of the plant.

"We hope the matter is now in such shape that contract can be drawn up and duly executed with little delay. If matters can be expedited in any way by another meeting of your Executive Committee with the writer, the undersigned will be glad to be in Danville any day and hour you may name. We are particularly anxious to get at the intake at once if we are to do this work.

"Awaiting your further commands, and hoping you will find the enclosed redraft of proposal and specifications satisfactory, and that you will notify us promptly if they are not, we remain,

"Very truly yours,

"AMERICAN WATER SOFTENER CO.,

By Geo. F. Hodkinson,

Mgr. Filter Dept."

"GFH—MP.

The plans for the improvements to the intake have been submitted and filed in the office of the Commissioner of Health. Their execution involves a total expenditure of two hundred dollars in addition to the total bid of seven thousand one hundred and eighty-three dollars.

It has been determined that the proposed plans are not prejudicial to public health and the same are hereby and herein approved and a permit issued therefor.

The improvements to the intake are called for by the following clause of the said permit of August twenty-fourth, nineteen hundred and eight:

"It would appear from the evidence at hand that an examination of the intake pipe at the river and leading therefrom to the receiving well on the flats should be carefully made by some qualified expert in the employ of the Trustees. Probably defects in this line may be found and remedies applied whereby an ample quantity of water may be assured at all times at the pump well and raw water feed pumps."

The item for the concrete water-tight floor is required by the Fifth Condition of the said permit of August twenty-fourth, nineteen hundred and eight, as follows:

"The Board of Trustees shall build a concrete water-tight floor from the present filtered water well and this should be done and completed at the time that the two additional filters herein approved shall be completed."

The items for additional pumping machinery were called for in the Third Condition of said permit, as follows:

"The Board of Trustees shall provide adequate and duplicate pumping machinery for the raising of raw river water into the filter plant and attention is called to the suggestions hereinbefore made relative to this point."

Harrisburg, Pa., October 20th, 1908.

DERRY TOWNSHIP, DAUPHIN COUNTY.

Hershey Village, M. S. Hershey.

This application was made by Mr. M. S. Hershey, of Hershey Village, Derry township, Dauphin county, and is for permission to extend his water works system for the supply of water to the public in the village of Hershey and to obtain an additional source of supply therefor.

Act One hundred and eighty-two, approved April twenty-second, nineteen hundred and five, provides that an individual supplying water to the public shall not extend the water works or obtain an additional source of supply without a written permit to be obtained from the Commissioner of Health.

It is represented by the petitioner that he is the individual owner of the water works now supplying water in the village of Hershey and vicinity. This village is in Derry township on the Philadelphia and Reading Railway, fourteen miles east of Harrisburg. A large area of ground about three-quarters of a mile square was purchased about four years ago by Mr. M. S. Hershey and he at once laid it out into streets and established a plant for the manufacture of chocolate, which is operated under the name of M. S. Hershey Chocolate Company. He also built a number of houses for employes and a bank and a school house and fire house and a water works system to supply water to the factory and to anyone who might care to buy the water. The factory and all the other main buildings are substantial stone structures. In addition to these improvements Mr. Hershey built a trolley line and an amusement park for the accommodation of the villagers. The inhabitants depend exclusively on the chocolate factory for their support, there being no other industry in the vicinity. Hummelstown is about three and one-half miles to the west and the village of Palmyra is about three miles to the east. The country round-about is open rolling farming land. In the village there is a population of about eight hundred.

It is reported that there are cesspools in use at fifty dwellings and that at other estates not connected with the sewers privy vaults are provided. The geological formation is limestone.

Through the central part of the village in a westerly direction flows Spring Creek, a stream which rises about three miles easterly and empties into the Swatara Creek nearly two miles westerly opposite the village of Union Deposit. The railroad, factory and major portion of Hershey lies south of the creek, but there is in the north-eastern corner of the village a short stretch of the railroad north of the creek and it is in this part along a main tributary of the creek east of the railroad that the new supply of water is to be obtained. On the hill east of this tributary is Mr. Hershey's mansion, and there is a private sewer from it southerly to the main creek. It is a pipe sixteen inches in diameter.

Down stream eight hundred feet at the railroad culvert there is a twenty-four inch sewer into the creek. It is six hundred feet long and conveys all the factory sewage and waste to the stream. The waste is principally rinsing water from milk cans. This sewer is less than one hundred feet down stream from the water works pumping station.

The next sewer is ten inches in diameter, it conveys the drainage from the school house, hotel, bank, fire house and railroad station, northerly under the railroad embankment to an open ditch which extends northerly through the field passing within sixty feet of two dwellings a distance of two hundred feet to the creek. The point of discharge is eight hundred feet below the railroad culvert.

The last two sewers mentioned appear to have been established when the buildings were erected. The sewer from the Hershey mansion is of recent construction and has not yet been used since the dwelling has not yet been occupied.

There are upwards of ninety dwellings in the village and about two-thirds of them are furnished with water supplied from Mr. Hershey's pipe lines. The other houses obtain their drinking water from private wells drilled on the premises. The waste water from these buildings is disposed of principally into cesspools from which the water percolates through the soil or passes off in crevices through the limestone rock. In a number of instances sewage is emptied into these cesspools. Earth privy vaults boarded up or lined with loose stone work are generally used for the reception of excrement.

The source of supply of Mr. Hershey's water works is a spring at the foot of the hill on which the factory is located. Before the railroad embankment was built there the water flowed out over the fields northerly about one hundred feet to Spring Creek. Now the said embankment is over the spring and the water is piped through a twenty inch pipe to the northerly edge of the embankment where there is constructed a concrete receiving well seven feet square and ten feet high roofed over with a hinged cover on top kept locked. Seven feet of this structure is above ground and two feet from the top there is a six inch overflow pipe. Near the bottom there are also two six inch overflow pipes one of which is kept plugged. The other extends out a few feet from the well and is brought to the surface of the ground or thereabouts and its end is approximately three feet above he bottom of the well. Therefore, the spring water will overflow from the well when the depth in the well exceeds about three feet. On the day of the Department's inspection, February twenty-eighth, nineteen hundred and eight, when Spring Creek was in flood, the lower overflow was submerged several inches by the flow so that if the draft upon the spring water had been greater than the flow, through the twenty inch pipe into the well, Stony Creek water would have entered through the overflow pipe into the well and been introduced into the water works system. In fact, however, on said date the water was sufficiently high in the well to overcome the head over the overflow pipe and so it passed out into Spring Creek.

Into the well there is inserted a six inch suction pipe. This line is laid northerly along the bottom of the railroad embankment to the railroad culvert and thence in the bed of the creek up stream through the culvert, a total length of about three hundred feet to the pumping station which is located near the south bank of the creek east of the railroad. This suction pipe is directly connected to two pumping engines electrically driven, each being a triplex, vertical, single-action pump rated at one hundred and fifty thousand gallons capacity daily. The water may be forced through either one of two pipes six inches in diameter, four hundred feet long to an iron tank located on the hill, back of the factory having a diameter of eighteen feet and a depth of twenty-seven feet. The high level in this tank is reported to be one hundred feet above the pump house floor and about fifty feet above the centre of the town. The storage capacity of the tank is fifty thousand gallons. It is reported that the pumping engines by an arrangement of valves can force water directly into the street mains. These pipes comprise about one half mile of six inch and about one and a half miles of four inch mains. Fire hydrants are attached to the distributing system at convenient points.

The average daily consumption is one hundred and forty thousand gallons, so stated, of which twenty-five thousand gallons are estimated to be used for domestic purposes. This consumption plus the increased demand which might be made upon the water system at any moment in case of fire would tax the present source and pumping machinery beyond their capacity. The petitioner purposes to obtain an adequate supply and to install additional machinery capable of meeting all demands.

At the foot of the hill where the Hershey mansion is located, out of a crevice in limestone rock, gushes forth a large volume of ground water measured to be at the rate of two million gallons per twenty-four hours minimum flow. This large quantity evidently is not of local origin. Probably it is collected from an extended area of sparsely settled farming territory.

The spring discharges into a storage basin irregular in shape and in the neighborhood of five hundred feet long built between the bottom of the hill and the run, whose water level is to be three and one half feet above the bank of the run. Details of this reservoir have not been submitted, neither have plans of the proposed supply main and improvements at the pumping station. A concrete dam about five feet high and one hundred and fifty feet long at the lower end of the basin and an earth embankment lined on the inner side with a dry rubble masonry wall five feet in height extending up stream near the run and finally terminating at the hillside, together with said hillside excavated at the bottom and walled up to a height of five feet forms the enclosure for the impounding of the spring water. On February twenty-seventh, nineteen hundred and eight, evidences were seen of the overflow of the creek or run into the basin over the embankment at the upper end of the basin.

From this reservoir an eighteen inch pipe extends down the run valley crossing a public highway and spring creek, a distance of about five hundred feet to the new pump well built at the pumping station.

This well is nine feet in diameter, fourteen feet deep, is made of concrete, is covered with boards and the top is about six feet above the surface of the ground. The height of water at the reservoir is nine feet above the bottom of this new pump well so that an abundant supply of water is always assured at the well. It would appear that there is no means of contaminating the water in this well, provided the entrance of the eighteen inch pipe through the walls into the well be thoroughly protected and secured against leakage at times when for any cause the well should be emptied.

The pumping station has been enlarged, a steam boiler plant has been erected and a horizontal duplex steam pumping engine installed. The rated capacity of the latter is one million five hundred thousand gallons per twenty-four hours. A twelve inch suction pipe extends from the pump to the new pump well.

So it appears that the new water works improvements will give good manufacturing, domestic and fire service to the town.

Chemical analysis of the water show it to be of medium hardness, as will be expected from a limestone region. The topography of the country would indicate that the contributing area to the supply lies between Spring Creek and its main tributary above mentioned, which is sparsely populated. With due care, exercised at the farm houses on this area and at the Hershey mansion, respecting sewage disposal there should be no organic pollution of the spring water. But this conclusion does not follow with respect to the spring at the foot of the railroad embankment and now used as a source of supply to the village. It might be possible for cesspool drainage from the village houses to contaminate this source or the private well supplies. A systematic test of the quality of these private supplies should be made and if found to be polluted they should be abandoned.

The existing source of supply of the water works should also be abandoned when the new supply is ready for use. It is apparent that if on February 27th, both pumping engines had drawn down the water in the old pump well that the creek water would have flowed into the well so that the sewage from the factory, in this event, might have been supplied to the water consumers in the borough. This, of course, is on the assumption that the flow of the spring at the time was less than the combined capacity of the two pumping engines. But apart from the possibility of sewage pollution of the well water from the surface sources, is the ever present menace of underground pollution of the spring itself which, in the interests of public health, warrants the abandonment of the supply.

Unless the petitioner can show good reasons for the continued use of said old supply, it should be entirely disconnected from the water works system.

At least monthly bacteriological tests of the proposed new supply should be taken.

At Hummelstown borough the Swatara Creek furnishes the water supplied to the citizens of that town for domestic uses. The discharge of sewage into Spring Creek, is therefore, a great menace to the health of the public in Hummelstown. This fact has evidently been overlooked by those in Hershey village who now discharge sewage into Spring Creek.

In view of these considerations, it has been determined that the proposed source of supply will not be prejudicial to the public health and a permit is hereby and herein granted therefor and for the extension of the water works system in the village of Hershey, under the following conditions and stipulations:

FIRST. That upon the introduction of the water from the new source of supply into the distributing pipe system of the village, the owner thereof shall disconnect the old existing source of supply and abandon its use, provided, however, that it may be maintained as an emergency supply if the said owner can show reasons therefor satisfactory to the Commissioner of Health.

SECOND. The owner shall cause to be made monthly bacteriological tests of the new source of supply and shall file copies thereof with the Commissioner of Health. If at any time in the opinion of the Commissioner of Health the said

source of supply or the water works system or any part thereof, has become prejudicial to the public health, then such remedial measures shall be forthwith adopted as the Commissioner of Health may approve or advise.

THIRD. This permit is granted under the express stipulation that on or before June first, nineteen hundred and eight, detail plans and elevations of the storage basin, pump well and station, standpipe and water works, showing all pipes, valves, and so forth, shall be prepared and filed in the office of the Commissioner of Health. And at the close of each season's work, a plan of all additional street mains laid during the year, together with any other information in connection therewith that may be required, shall be filed in the office of the Commissioner of Health, to the end that the State may have complete information of the extent of the water works system and its use by the public.

FOURTH. The owner shall raise the embankment above the storage reservoir at the upper end to a sufficient height to prevent the overflow of surface waters into the basin and all surface water shall be excluded from the basin. Precaution shall be taken to keep all animals out of the basin.

FIFTH. On the land immediately adjacent to and higher than the neighborhood of the storage basin and the spring emptying into it, there shall be no discharge of sewage into or onto the surface of the ground or into any receptacle from which the sewage may overflow or percolate. The sewer from the Hershey mansion now discharging into the creek shall be discontinued or the same shall not be used and sewage discharged therefrom into the waters of the State. The art of treating sewage to destroy all pathogenic matter therein has sufficiently developed to render feasible the installation of disposal works to accomplish this purpose before the liquids flow into any stream.

The owners of the several sewers now discharging directly or indirectly into the stream in Hershey village, will be ordered by the Commissioner of Health to discontinue such discharge. Probably the devising of an intercepting sewer and a common sewage disposal plant for the treatment of the sewage from the sewers and from those which may be built in the village in the future would be the most economical and satisfactory solution of the problem. The Department will be glad to advise further with respect to this matter.

The Department will also cause an examination of individual well waters to be made.

Harrisburg, Pa., March 10, 1908.

EDDYSTONE, DELAWARE COUNTY.

Ridley Water Company.

This application was made by the Ridley Water Company of Eddystone borough, Delaware county, and is for permission to install a system of water works for the supply of water to the public in said borough.

The Ridley Water Company is a corporation duly organized under the laws of the State. Its charter was approved June seventh, one thousand nine hundred and seven, having been recommended by the State Water Supply Commission with the understanding that the source of supply was to be the Delaware River, the water to be furnished at the boundary line between the city of Chester and the borough of Eddystone by the New Chester Water Company.

The borough of Eddystone is located on the north bank of the Delaware River and adjoins the city of Chester on the up stream side, the two municipalities being separated by Ridley Creek. The eastern boundary of the borough is Crum Creek, a stream which rises back in the hilly portions of the county and drains a rather sparsely populated territory, more especially in its upper parts.

Until recently, Eddystone was unprogressive. Since the establishment of several large manufacturing plants in the borough a boom has occurred. Among the important industries may be mentioned the Eddystone Print Works, employing about fifteen hundred hands, the Baldwin Locomotive Works, employing about the same number, the Belmont Iron Works and the Tindel, Morris & Company Saw Works.

Besides having a tide water river front (the main channel of the river being near the borough shores), the main line of the Pennsylvania Railroad between Philadelphia and Washington, the Baltimore and Ohio, and a local branch of the Philadelphia and Reading Railway pass through the town. The land is flat and low but drains naturally towards the two creeks and the river, there are extensive and favorable manufacturing sites unused, local taxes are low and prospects appear bright for a future community of considerable size. In nineteen hundred the population was seven hundred and seventy-six. Now it is estimated to be fifteen hundred.

There are a number of dug wells at the existing residences, but the majority of the inhabitants are supplied with public water furnished by the Eddystone Water Company.

The Eddystone Water Company was chartered on December twenty-second, eighteen hundred and ninety-two, for the purpose of supplying water to the public in the borough of Eddystone, Delaware county. It immediately proceeded to construct water works and to supply filtered water to all the residents in the borough

who care to purchase the same. This water comes from Crum Creek, is filtered and is furnished by the Springfield Water Company to the Eddystone Water Company, which Springfield Water Company operates the Eddystone Water Company's works.

On the creek in Springfield township about five miles above Eddystone, there is a dam and pump house. Above this point there are about twenty-eight square miles of water shed rural in character. The pumps lift the water to a nearby sedimentation basin from whence it is forced through pressure filters to Marple Hill reservoir. From this reservoir the water flows by gravity to the consumers. The water in the reservoir is about two hundred and fifty feet above Eddystone borough. The pressure in the mains at the latter place is said to average about eighty pounds. A twelve inch main reduces to eight inches at the borough line and this pipe connects with six inch and four inch laterals laid in most of the streets of the borough. Fire hydrants are placed at important street corners.

The water company supplies about one-half of the residences and it furnishes some water to each industrial plant.

A defunct company having the name of Eddystone Water Company was chartered April nineteenth, eighteen hundred and eighty-seven, for the purpose of furnishing water to the public in all that certain portion of Ridley township, in Delaware county, lying south and west of Crum Creek and bordered by said Crum Creek and by Ridley Creek and the Delaware River. The control of this company was effected by the New Chester Water Company in eighteen hundred and ninety-one. The latter company immediately laid eight lengths of eight inch pipe on Ninth street in Eddystone, but no connections with the New Chester Water Company's mains were made or water furnished. Since that time no further work has been done, so the charter lapsed. On the record books in the Secretary of State's office appears a transaction between the New Chester Water Company and the Eddystone Water Company in nineteen hundred and six, whereby the latter is represented as having sold and transferred its franchise and property to the former. Since such franchise long since lapsed, the New Chester Water Company does not thereby possess territorial rights in Eddystone borough.

The New Chester Water Company draws its supply from the Delaware River opposite the city of Chester at a point where the sewage from said city and from Philadelphia has an opportunity to pollute the water. Pumps raise the supply to reservoirs and a purification plant located back on the hills north of the city. Here by sedimentation, coagulation and filtration, the raw water is supposed to be sufficiently purified to render it safe for drinking purposes. It is then returned and supplied to the inhabitants of Chester city, Upland borough and Lower Chichester township. There are a few water takers in Chester township.

The petitioners purpose to connect a twelve inch pipe at the Ninth Street bridge over Ridley Creek with a twelve inch connection in said street in the city of Chester leading to the twenty-four inch supply main from the purification plant.

The petitioners state that it is proposed to lay between two and three miles of street mains in Eddystone, that there will probably be between two and three hundred taps, but are unable to say what the classification of the takers will be. However, a minimum consumption of one million gallons daily and a maximum of double this amount is estimated and stated in the application.

At the Baldwin Locomotive Works there is an artesian well forty feet deep which supplies water for boiler purposes. In addition to this possibly five million gallons per month is purchased of the Eddystone Water Company for drinking purposes. It appears that the Eddystone Water Company's supply to said works is ample in amount, satisfactory in quality and the rates are reasonable. So unless special inducements are offered by a new company the existing water company may continue to furnish water here.

The Eddystone Print Works pump water from the Delaware River, using, so it is reported, nearly four million gallons per day.

The Belmont Iron Works, recently completed, may buy its water from the company which offers the lowest rate.

Whether the Ridley Water Company purposes to afford fire protection is not known to the Department. The plans submitted do not indicate whether there are to be facilities for the ready drainage of the water pipe system. The sizes of the water pipes are not shown, so that the Department cannot tell whether reasonable and customary safeguards to public health are intended or have been provided for.

If it be true that the Ridley Water Company is to make a demand of the New Chester Water Company for a maximum of two million gallons daily, when the New Chester Water Company's filter plant is in danger of proving inadequate in capacity to meet the total demand. So additions would have to be made.

Furthermore, because the raw water is dangerous and in case of carelessness or negligence at the filter plant, poisonous matter in the supply at its source might be transmitted to and delivered into the water pipes and thence to the consumers in the Ridley Water Company's district, the latter company should have some agreement whereby it can hold the New Chester Water Company responsible, and assure to itself and its consumers a constantly pure and wholesome supply of water.

If the New Chester Water Company will operate its purification plant in a manner and purify the water to the satisfaction of the Commissioner of Health and the Ridley Water Company can secure an agreement to such a stipulation, then the Commissioner of Health would be warranted in determining that the proposed supply would not be prejudicial to public health.

In view of these circumstances, it has been determined that the proposed water works system and the supply therefor for the borough of Eddystone by the Ridley Water Company will not be prejudicial to public health, and a permit is hereby and herein granted therefor, under the following conditions and stipulations:

FIRST. This permit shall not be operated until the Ridley Water Company shall have entered into an agreement with the New Chester Water Company, whereby the latter shall guarantee to furnish the former with a sufficient quantity of water, the purity of which shall be satisfactory to the State Commissioner of Health. Tests of this water shall be made by the Ridley Water Company every two weeks and copies thereof shall be filed in the office of the State Department of Health. A copy of said agreement shall also be filed in said office.

SECOND. Before the Ridley Water Company shall lay any water pipes and use the same, plans thereof showing the location of pipes, valves, hydrants, blow-offs and drainage facilities, shall be filed in the office of the State Department of Health and be approved. Adequate facilities for quick drainage of the pipe system shall be afforded and be clearly designated on the plans. At the close of each season's work a plan of the water mains laid during the year shall be prepared and filed in the office of the Commissioner of Health, together with any other information in connection therewith that may be required, to the end that there shall be a complete record in said office of the extent of the works belonging to the Ridley Water Company and the number of people in said township dependent upon such supply.

THIRD. If at any time in the opinion of the Commissioner of Health the water supply or the water works, or any part thereof, has become prejudicial to public health, then the Ridley Water Company shall adopt such remedial measures to protect the public health as the Commissioner of Health may approve or suggest.

FOURTH. Regular inspection will be made of the Ridley Water Company system and supply by a Department officer. The Commissioner of Health may suggest rules and regulations to govern the supply of water to the public in so far as the public health is concerned. Said water company shall conform to orders, rules or regulations of the Department in so far as they may relate to the supply of water to the public in Eddystone borough.

FIFTH. This permit is issued under the express stipulation that the operations of the Ridley Water Company shall be wholly within its charter rights.

Harrisburg, Pa., March 24, 1908.

ELLWOOD CITY, LAWRENCE COUNTY.

Ellwood City Water Company.

This application was made by the Ellwood Water Company of the borough of Ellwood City, Lawrence county, and is for approval of plans for the enlargement of its plant and for an increase in the source of supply to the public in said borough.

On April twenty-ninth, nineteen hundred and seven, the Commissioner of Health issued a decree to the Ellwood Water Company withholding approval of the plans for a proposed extension of the water works system by the enlargement of the reservoir or storage basin to a capacity of four million gallons. The important clause in the decree was as follows:

"In view of the circumstances, I therefore withhold approval to the plans of the proposed extension of the water works system until plans for the purification of the sources of supply, or some other project for the furnishing of a pure and wholesome supply to the public in Ellwood City borough and vicinity be submitted to the Commissioner of Health for approval."

On June eighteenth, nineteen hundred and seven, the Ellwood City Board of Health inquired if it were necessary for the company to have a permit for locating the reservoir, and if so, whether the Ellwood Water Company had obtained such permit, with especial reference to the location of the structure near the cemetery; and on June twenty-seventh, the said local board requested the Commissioner of Health to have an inspection made of the reservoir being built by the water company, and to explain the stipulations of the decree issued by the said Commissioner to the said water company. Whereupon, the Department made such inspection of the complete plant.

The water works system is now operated by two pumping stations: One is in the power house of the Pennsylvania Power Company, taking its supply from the Connoquenessing Creek at the dam and delivering such water mainly to the Shelby Tube Company. The other station is on the bank of Slippery Rock Creek just above its junction with the Connoquenessing Creek. There is a one and one-half million gallon capacity pumping plant here delivering the Slippery Rock Creek supply to private consumers and to manufacturing plants in the town, through a ten inch force main and branches. The surplus daily pumpage had formerly gone to the smaller reservoir, whose enlargement was in progress at the time of the Department's inspection.

In the recent petition of the Elwood Water Company, the one now under consideration, it is stated that "the surplus daily pumpage is stored in a six million gallon storage reservoir."

The Connoquenessing Creek on the south bank of which Ellwood City borough is located, drains a water shed of about four hundred and twenty-five square miles and on it are the boroughs of Butler, Harmony and Zelienople, besides smaller places and hamlets.

The Slippery Rock Creek which discharges into the Connoquenessing about one mile above Ellwood City borough, has a drainage area of about four hundred and thirty-seven square miles. This area is much less populated than the Connoquenessing but nevertheless, sewage is discharged into it, particularly at Grove City borough and Slippery Rock borough. The Commissioner of Health has taken action with respect to compulsory sewage purification works at Butler and Zelienople and Grove City, and the work of preserving the purity of the waters of this shed for the protection of public health will continue to be prosecuted with due diligence.

The Slippery Rock pumping station is on the south bank of the creek at the forks of this stream and the Connoquenessing. Power is furnished by an electric motor of one hundred and eighty-five horse power which operates an electric centrifugal pump of one and one-half million gallons per twenty-four hours. The intake is a ten inch pipe extending twenty feet into Slippery Rock Creek, the outer end being closed and pipes perforated.

The ten inch rising main from the pump house extends westerly across private property a distance of over eight thousand feet to the junction of a twelve inch rising main which receives the water from the Connoquenessing Creek pump house at the dam.

At this time it is a considerable structure built to furnish power to run an electric power plant. There is a turbine water wheel operating a Gould pumping engine which forces the water through the said twelve inch main into the pipe system of the town at the point where it meets the ten inch main from the Slippery Rock pumping house. This rising twelve inch main passes by and through the plant of the Shelby Tube Company and supplies most of the water to said company.

There is also a four inch rising main from the Connoquenessing pumping station which supplies the central district of the town between the Connoquenessing Creek and the Baltimore and Ohio Railroad according to plans, which are not sufficient in detail to show location of valves and gates.

From the junction of the ten inch and twelve inch mains, water is taken through a ten inch line paralleling the Baltimore and Ohio Railroad to Fourth Street and its branches radiate through the town.

The reservoir as originally constructed was very small and consisted of an excavation in the hillside back of the borough. There was a dirt dam constructed below the earth excavation to hold the water. The new reservoir of six million gallons capacity as reported, and constructed by the water company without approval of the Commissioner of Health, is located about one hundred and ninety feet, vertical height, above Fourth and Spring Streets in the borough. A large excavation was made in the side of the hill sufficient to form the embankment on the lower side to complete the basin, the said embankments or dam being provided with a core wall of concrete masonry, so it is reported.

Furthermore, it is reported that the interior sides and bottom of the reservoir were to be lined with concrete varying from four to six inches but this has not been done.

About two hundred feet back of the reservoir and between fifty and one hundred feet higher there is a cemetery containing thirty-five graves along that portion of the ground where it slopes directly to the reservoir. The geological formation to a depth equal with the bottom of the reservoir, is first, ordinary soil; second, clay; third, loose shale; fourth, a thirty inch outcrop of coal, and below this coal, fire clay.

The citizens of the borough and the local board of health have been considerably exercised as to the possibility of the drainage from the cemetery and from the graves located therein reaching the water in the reservoir, and it would seem as though these fears had some foundation unless the reservoir is thorough lined with some water proof substance material and further protected by a drainage ditch around its upper sides and between it and the cemetery.

The waters of the two sources are extremely turbid quite frequently. The quality of the Slippery Rock Supply is said to be preferable on this account, to the other stream at nearly all times of the year, but even the water from the better supply is often roily and turbid and has a bad odor and taste. The Department is reliably informed that the officers of the Ellwood Water Company and those citizens of the borough who can afford to do so, purchase water for drinking purposes from persons engaged in business of bottling spring water and selling it.

The water company supplies about thirty-six hundred people in the borough and one thousand outside of the borough. There are about fifty driven wells in the town which are used by the private owners of the property. The average consumption of public water for manufacturing purposes is about four hundred and fifty thousand gallons daily and for domestic purposes about five hundred and fifty thousand gallons, making a total average consumption of one million gallons daily. There are a few dead ends in the water line.

With respect to the public health it has been ascertained that much of the sickness is charged up against the public supply of water. At the time of the Butler typhoid epidemic, it is reported that there were a higher number of typhoid cases in Ellwood City than at any time before or since.

On September thirteenth, nineteen hundred and seven, the borough board of health requested the State Board of Health to see that the water company's reservoir was cemented on the sides and bottom.

The following communication was sent by the Commissioner of Health to the water company on September thirteenth, nineteen hundred and seven:

"I beg to call your attention to the fact that the security of your investments in the water works of Ellwood City depends to quite a degree, upon your compliance with State laws, and that the terms of the decree issued to you in April of this year have not yet been complied with. I call your attention to this, and urge you to be prompt and not further delay compliance with the request of the State."

On November twenty-third, nineteen hundred and seven, the water company notified the Commissioner of Health that on account of the unsettled financial condition, it was forced to abandon for the present the carrying out of the plans for a filtration plant. In the letter was the following statement: "The matter was fairly well under way when the condition of the money market became such that we were obliged to postpone for the present any future work." In answer to this the Commissioner of Health sent the following letter on November twenty-nine, nineteen hundred and seven:

"Samuel A. Roelofs, President,
Ellwood Water Company,
"Ellwood City, Pennsylvania.

"Dear Sir:

"In reply to your esteemed favor of November twenty-third, saying that you have abandoned, for the present, carrying out plans for filtration plant, I beg to say that such an abandonment does not relieve you from the responsibility of supplying a pure water to the people of Ellwood City. You know your sources of supply to be impure and dangerous. At any time it may poison the water consumers of Ellwood City. I have warned you and I do hereby and herein warn you, that your sources of supply are prejudicial to the public health, and if you do not take all reasonable precautions to warn the public of the danger and to safeguard public health so far as your water supply is concerned, you are rendering yourself financially and criminally responsible, to an extent possibly much greater than you have any idea of.

"What would you do in the event of an outbreak of typhoid fever in Ellwood City, and what ground would you have for defense?

"Your attention is again called to the subject of the requirements set forth in former communications from this Department to your water company.

"Yours very truly,"

On March twenty-eighth, nineteen hundred and eight, the company's experts communicated with the Commissioner of Health and among other things made the following statement:

"I desire to say that these plans for the new pumping station and filter plant are substantially completed and as soon as the same may be checked over, estimates and specifications prepared, and a report made to the water company, they will be ready for submission to your department which will probably be in about thirty days from this date.

"We originally expected to have these plans completed at an earlier date, but owing to the difficulty of securing funds, the destruction of the power company's plant on March first, which plant furnished the power to operate our present pumping machinery, we have been obliged to concentrate all our efforts toward temporary expedients to maintain the water supply in this district."

The said application of June first, nineteen hundred and eight, states, "owing to the probable increase in demands for waters and betterment of its supply, the company desires to extend its capacity and works by the construction of a new plant of six million gallons ultimate capacity, located on north side of Slippery Rock Creek with intakes into said creek."

The proposed plan is to comprise a new boiler and pump house, intakes, settling basins, filter plant, filtered water reservoir under the filter plant and all necessary appliances and appurtenances for modern water purification works of six million gallons capacity.

Plans in detail of construction are submitted but specifications and description of the intended operation of the plant have not been submitted presumably on account of the intention of the company not to erect the works at this time. The petition states as follows:

"The water company cannot raise funds until its existing bonds mature in August nineteen hundred and nine, and desires to have plans approved, that it may make estimates to finance cost so as to have plant completed by January first, nineteen hundred and eleven."

Owing to the fact that Slippery Rock Creek passes through an agricultural territory on which there are sources of sewage pollution, there is no time of the year when this source is not subject to accidental or direct pollution, and, therefore, until such time as the Ellwood Water Company shall filter the water from this source before it is delivered to the consumers in its district, the present complaints from citizens and physicians about the danger to public health will be well founded and

continued cases of sickness from water borne diseases may be expected. Because the Connoquenessing Creek supply is much more polluted by sewage, it should be absolutely prohibited as a source of public water supply without filtration, provided that it be possible to get water from any other source. It seems remarkable that there has not been more sickness among consumers when this supply was being used than has been reported. In fact it would not be surprising if at any time an epidemic of water borne disease should break out effecting a large portion of the inhabitants of the borough who use the public supply. The situation demands that the water purification plant shall be installed at the Slippery Rock source at once. The reason for delay offered by the company cannot be considered by the Commissioner of Health, the interests of public health are paramount. Human life cannot be placed in jeopardy because a private corporation is unable to fulfil its charter obligation to furnish to the public a pure and wholesome water.

There must be means found to provide the remedy.

Not only should the purification plant be constructed, but the reservoir on the hill should be lined with concrete masonry as originally planned, especially on the sides next to the cemetery and on the bottom.

Since the Ellwood Water Company have proceeded in defiance of law to extend its water works system by making additions thereto and has thus increased its source of supply to the public illegally and to the menace of public health to a greater or less degree, it has been determined that the said company shall and said company is hereby and herein notified that it shall on or before ninety days from the date of this decree, begin construction of the proposed purification plant according to detail specifications of the construction and operation of the same, to be submitted by said company to the Department of Health and approved by said Department, which approvals shall be accompanied by stipulated conditions under which approval of the source of supply and water works system may be given, and failure on the part of the Ellwood Water Company so to do shall be understood and deemed to be an admission of its inability to fulfil its charter obligations, and the Department of Health will so understand it and proceed accordingly in the interests of the public welfare; provided, however, that if satisfactory evidence shall be forthcoming that ninety days is too short a time in which to make such beginning in construction, then the Department of Health may extend the time but not for any longer period of time and then only when specified that the company will be able to carry out the terms of the decree in the immediate future.

The water company is hereby notified that the plans submitted for the new purification plant are in the main satisfactory and that when the specifications for the construction thereof and the description of the intended operation of the plant shall have been submitted, it is probable that entire approval of the plant may be given.

Harrisburg, Pa., August 5, 1908.

EMLENTON, VENANGO COUNTY.

Emlenton Water Company.

This application was made by the Emlenton Water Company, of Emlenton borough, Venango county, and is for permission to obtain an additional source of supply and to extend street mains.

Emlenton borough is a small residential community estimated to contain thirteen hundred inhabitants located in the oil fields on the north bank of the Allegheny River at the extreme southeast corner of Venango county. The size of the place has been nearly stationary for the last three decades.

The town site is partly on the slope of a mountain and partly on the flats or shelf of ground between the bottom of the mountain and the river. This low lying section is from twenty to fifty feet above the low stage in the river.

There is a municipal sewerage system to which is admitted both sewerage and storm water. The discharge is into the Allegheny River at a point in the lower part of the town. A very general use of this sewer system is made. However, there are numerous privies and shallow earth vaults in use. These are often in proximity to springs and dug wells from which water is drawn and used for domestic purposes.

The sewers were built in nineteen hundred and one and nineteen hundred and two. During the construction and immediately following it there was a marked increase in typhoid fever cases which was attributed by local physicians to the exposing on the streets of the excavations from the sewer trenches. These piles of earth contained, so it was thought, poisonous matter which had accumulated in the ground by percolations from privy vaults and household drainage. During the warm weather flies swarmed on the polluted soil thus excavated and may have carried infection into the homes and onto the foods consumed by the people residing in the vicinity. The outbreaks of the disease were in the localities where the excavations were being made.

In the fall of nineteen hundred and four, there were some thirty cases of typhoid fever and, according to meagre reports, an epidemic of diarrhoea and stomach troubles prevailed, extending into the following spring, during which fully one-third of the population in the borough was affected. It appears that sickness pre-

vailed among users of private and the public water supply. From such records as the Department has been able to obtain thus far it appears that there were seven cases of typhoid fever in nineteen hundred and five, nine in nineteen hundred and six, seven in nineteen hundred and seven and six cases during the first two months of nineteen hundred and eight. The evidence presented is that the disease has appeared in the homes of those using the private sources as well as those using the public sources.

Without doubt the contamination of the ground with sewage renders the waters of wells and springs located in the built-up part of the town extremely suspicious, to say the least, as a suitable supply for domestic purposes.

The Haggerty Spring is located under an old house. The water is collected in a stone-lined pool, covered over with plank and located under the house. This dwelling is not now occupied but was sometime since by a number of Italians. At that time it is said the conditions on the property were filthy. A number of years ago a perpetual lease was given for the use of the waters from this spring by certain neighbors. Pipes lead from it to several dwellings. Two samples of water were recently collected and analyzed by the Department. No sewage pollution was indicated by the tests.

The Gosser spring is in the centre of the town. There are neighborhood rights to its waters. Above the spring are several residences and privies. Two tests recently made of these waters did not indicate sewage pollution.

The public water supply is owned by the Emlenton Water Company. By an application for letters patent filed in the office of the Secretary of the Commonwealth, April fourteenth, eighteen hundred and seventy-nine, it appears that this company was incorporated by the court of common pleas of Venango county in April eighteen hundred and seventy-four. The company accepted the constitution and act of April twenty-ninth, eighteen hundred and seventy-four and its charter was approved by the Governor on April fourteenth, eighteen hundred and seventy-nine. There is no limit mentioned in the letters patent to the territory which this company is authorized to supply with water.

Works were constructed in eighteen hundred and seventy-seven. The original source of supply was the Allegheny River. Some years afterwards the supply was changed to various springs located on the mountain side in the borough but above the dwellings. Owing to the inadequacy of the spring supply it was abandoned. This was prior to the period of typhoid outbreak above mentioned.

The present works comprise a river intake, pumping station, distributing reservoir and the pipe system in the town.

The pumping station is located on the river bank at the foot of Eighth street immediately above the central portion of the borough. The water is taken from the river through an eight inch suction pipe, the outer end being in the centre of the river and having a free opening. It is about two hundred and fifty feet from the pumping station.

The pump house is a brick structure enclosing a pit of water tight masonry construction, eighteen feet in diameter and twenty-eight feet deep. In this pit is located the pumping machinery. There is an old horizontal steam pumping engine, now maintained for emergencies and a sixty horse power gas engine, belt connected to a triple Stillwell Bierce pump having a rated capacity of four hundred and thirty-two thousand gallons per day of twenty-four hours.

The water is raised vertically three hundred and eighty-feet through an eight inch and six inch line two thousand six hundred and ninety feet long to the distributing reservoir on the hill above the town. There is a six inch return supply main to the town, but the water may be pumped directly into the street mains by the manipulation of valves at the pump house. It is reported that the pumps are operated to fill the reservoir and that then they are shut down until the reservoir supply is depleted sufficiently to call for refilling of the basin.

This structure is stone masonry, open, circular, ninety feet in diameter on top and sixty-three feet in diameter on the bottom. When full to a depth of about ten feet, it holds three hundred and forty-six thousand gallons, or practically two days' supply for the town, the average daily draught being one hundred and eighty thousand gallons. The maximum is reported to be two hundred and fifteen thousand gallons and the minimum about one hundred and fifty thousand gallons per twenty-four hours. It is represented that a six inch drain pipe is provided to empty the reservoir for cleaning purposes. There is a six inch overflow at the top. There is no enclosure to prevent the malicious or accidental pollution of the water in the basin. The surface of the ground slopes away from the reservoir in all directions, so there is no possibility of any surface drainage contamination of the supply after it is introduced into the water works system.

The system of distributing mains in the streets totals a length of four and seven tenths miles. Over one mile is six inches in diameter, there are nearly two miles of four inch pipe, about one mile of three inch pipe and some two inch and one inch pipe. At convenient points in the village fire hydrants are installed. Along the river front there are several blow-offs which admit of the ready drainage of the water pipe system.

On the banks of the river a few hundred feet above the pump house is the woolen mill of Flinn Brothers, where wool is received in the fleece and manufactured into blankets. The peculiar wastes from this process are discharged directly into the river. Trade wastes from the Emlenton Refining Company's plant also go into the river above the water works intake.

The water company purposes to entirely abandon the river supply, if the new source be found adapted to its needs. Six wells have been drilled at the reservoir on the company's land. These wells vary in depth from two hundred and twenty-nine to three hundred and eleven feet. Each is cased off with six inch pipe to a depth of about one hundred feet from the surface of the ground where there is solid rock. It is purposed to place in each six inch pipe a three inch tube through which the water is to be raised into the reservoir with such appliances as are in customary use in the oil regions. The power is to be furnished by a gas engine.

The water bearing stratum into which the wells are drilled is a white sand rock, quite porous and having its general slope towards the Allegheny River. The location of this water bearing rock is about one hundred feet above said river. The springs in the borough along the side of the mountain are thought to be outlets of this same strata.

The country to the northward is rolling, generally cleared agricultural land, ascending gradually to the mountain summits several miles distant.

Eight hundred feet distant from the wells and on the hill is a cemetery of considerable area. Additions to it are contemplated. It is reported by those who are familiar with the local geological formation that below the top soil there is a hard rock difficult to drill and quite impervious to water. If this be true and the casing off of all surface waters has been effectually accomplished at the wells, there may be no danger whatsoever of any contamination of the remotest kind from the cemetery.

The petitioner prefers to secure a pure supply rather than to filter an impure water, and the proposed plans are offered for acceptance on this score.

The Allegheny River is known to be polluted by the sewage from the cities and towns along its banks. The city of Franklin is on the river twenty-eight miles above. The citizens of Emlenton fear the pollutions which are discharged into the stream at Franklin city and at other places. Tests of the raw river water, of the water in the reservoir and of the water taken from a tap in the town recently made by the Department revealed the presence of sewage organisms at these places. If this source is to be used, even for emergencies, the Emlenton Water Company should install a filter plant for the purification of the water. Such installation for temporary purposes or emergency uses would be as expensive as an installation for constant use. If the company is successful in its search for a new supply, then the Allegheny River should be entirely abandoned and the pumping machinery at the pump house should be disconnected with the river intake.

By trial only can it be demonstrated whether the driven well supply is a safe and abundant one. After the company shall have put its machinery in operation and have drawn water from the wells for a period of several weeks, a series of tests should be made to determine the quality of the water.

It has been determined that the proposed source of supply will not be prejudicial to public health and a permit is hereby issued therefor and for the extension of the water pipes in the streets, under the following conditions and stipulations:

FIRST. That before the proposed supply from the wells be used, the reservoir shall be emptied and thoroughly cleaned out and then shall be filled with water from the new source. A series of bacteriological tests of the well waters shall have been made prior to said filling of the reservoir and copies of these tests shall have been submitted to the Commissioner of Health.

On approval by the Commissioner of Health of the well water the reservoir shall be filled as above stipulated, and the water pipes in the streets shall be thoroughly flushed and cleaned out by the well water from the reservoir. If the supply be found insufficient in quantity, added wells shall be put down in order that all of the supply may be obtained from the ground.

SECOND. As soon as it shall have been demonstrated that the ground supply proposed is abundant in quantity and satisfactory in quality, the water company shall install adequate machinery, in duplicate if necessary, in order that the ground supply only shall be supplied to the public and then all connection between the river intake and the machinery in the pump house on the river bank shall be severed. If an adequate ground water supply be not found the water company shall thereupon install a water filter plant for the purification of the river water before it be supplied to the public and plans therefor shall be submitted to the Commissioner of Health for approval.

THIRD. Plans of the lands owned by the water company at the reservoir and showing the precise location of the wells shall be submitted to the Commissioner of Health. Also the results of the tests as to quantity of water yielded by these wells shall be submitted to said Commissioner. At the close of each season's work plans of water mains laid during the year shall be filed in the office of the State Department of Health, together with any other information in connection therewith that may be required in order that the Commissioner of Health may always be informed as to the extent of the water works and the number of people using the same.

FOURTH. If at any time in the opinion of the Commissioner of Health the water supply or the water works or any part thereof has become prejudicial to the public health, then the water company shall adopt such remedial measures as the Commissioner of Health may approve or suggest.

Since the existing supply is subject to pollution, the water company shall notify its consumers that absolute safety in the use of this water for domestic purposes can only be assured by the boiling of the water and shall advise its consumers to

boil the water for thirty minutes until such time as the Allegheny River supply shall have been discontinued or substituted by the proposed ground water supply.

FIFTH. The company shall keep a weekly report of the operation of the water works satisfactory to the Department of Health and submit copies thereof to the Commissioner of Health when required. If the company will notify the Department when it is ready to have tests made of the quality of the new supply, sample bottles will be sent for filling with proper directions how to collect the samples and how to ship them to the State Health Laboratories, and the Department will make the tests for quality. This is made optional with the company.

SIXTH. The water company shall provide an ample enclosure at the reservoir to obviate accidental or malicious contamination of the reservoir water.

The Department of Health will advise the local authorities to institute a careful examination and series of tests of the private well waters in the town for the purpose of ascertaining that wells or springs are contaminated and causing the abandonment of all such sources which are polluted.

Harrisburg, Pa., April 21, 1908.

VILLAGE OF ENOLA, EAST PENNSBORO TOWNSHIP, CUMBERLAND COUNTY.

Dauphin Consolidated Water Supply Company.

This application was made by the Dauphin Consolidated Water Supply Company and is for permission to extend its water works for the supply of water to the public in the village of Enola, East Pennsboro township, Cumberland county, Pennsylvania, and to obtain an additional source of supply therefor.

It appears that the Dauphin Consolidated Water Supply Company was formed by a merger and consolidation on May twenty-first, one thousand nine hundred and three, of three independent water companies, namely, the Citizens Water Company of Middle Paxton township, the Citizens Water Company of Dauphin borough and the Citizens Water Company of Susquehanna township, all of Dauphin county.

The said Citizens Water Company of Middle Paxton township was chartered in January, one thousand nine hundred and one, for the purpose of supplying water to the public in said township. The said Citizens Water Company of Dauphin borough was chartered on the same date for the purpose of supplying water to the public within the borough. The Citizens Water Company of Susquehanna township was also chartered on the same date and its district was limited to said township.

The new company has all the privileges and restrictions formerly obtaining with each of the three smaller companies.

Since said merger and consolidation, the Dauphin Consolidated Water Supply Company has purchased the franchise and property of two other water companies, one being the Progress Water Supply Company, chartered in nineteen hundred and five and authorized to supply storage or transportation of water and water power for commercial and manufacturing purposes in Susquehanna township, Dauphin county, and the other company being that of the Enola Water Company, chartered in nineteen hundred and three and authorized to supply water to the public in the township of East Pennsboro, Cumberland county.

The records in the office of the Secretary of the State show that said purchase and sale were made under provisions of the General Corporation Act of April twenty-ninth, eighteen hundred and seventy-four and the supplement of April seventeen, eighteen hundred and seventy-six, for it is so stated on the records. If a franchise be sold under the act of eighteen hundred and seventy-four, then, by the express provisions of said act, the vendor company ceases to exist. So it would appear for the purpose of this discussion that there is no longer such a corporation as the Enola Water Company and that the Dauphin Consolidated Water Company is the proper one to submit the application to the Commissioner of Health.

The former Enola Water Company's plant is independent of the other system of the water works owned by the Dauphin Consolidated Water Company. The source is ground water obtained from driven wells and pumped into a standpipe from which the village is supplied by gravity to the inhabitants of Enola village.

This village is of recent origin and comprises about two hundred dwellings erected for the accommodation of railroad men in the employ of the Pennsylvania Railroad. The classification freight yards of the Philadelphia Division of said railroad are in the village or between it and the west bank of the Susquehanna River opposite the northern part of the city of Harrisburg. The Realty Company which laid out the town built the streets and brought about the establishment of water works and sewerage systems does not have any control or say in the management of the water works system.

In the northern part of the town in a small ravine there are six driven wells between one hundred and two hundred feet deep from which water is pumped through a six inch main a distance of twelve hundred feet to a standpipe twenty feet in diameter and forty feet high and located on a hill the highest point in the village.

The driven wells are connected by a horizontal pipe to the small masonry covered basin which serves as the receiving gallery for the water from said driven wells. This water is ordinarily at an elevation of twenty feet or more below the surface of the ground, so it has to be raised and up to the present time the means employed has been compressed air. A horizontal duplex steam pumping engine of four hundred thousand gallons capacity is employed to lift the water from the collecting chamber into the sandpipe.

It is reported that the ordinary consumption of water in the town averages thirty-five thousand gallons daily. About seven hundred and fifty people are so supplied and the water is used exclusively for domestic purposes. There are times, however, during the summer months when the demand for supply of water is as great as the capacity of the driven wells. It is for the purpose of securing an auxiliary source and never failing supply which shall be available at any moment, that the petitioners ask approval of a plan to install an auxiliary pumping station and emergency intake to the Susquehanna River. In this connection it should be noted that the water works afford fire protection. There are fire hydrants conveniently located in the town.

The other district of the Dauphin Consolidated Water Supply Company's system is across the river from Enola and east and north of the city of Harrisburg. Here there are other villages and also an extensive freight yard or yards and shops of the Pennsylvania Railroad Company, all of which obtain their source of supply from the said water company. The supply is derived from Stony Creek a stream rising in the mountains north of Harrisburg and emptying into the Susquehanna River at the borough of Dauphin. A dam is built across this stream at an elevation sufficiently high to develop water power by means of which the supply is pumped to a masonry distributing reservoir holding about one hundred and seventy-five thousand gallons and located on the hill back of Dauphin borough. From here, the water is furnished by gravity to the district.

At the Enola yards water is supplied for locomotive and other purposes from a system of water works owned and maintained by the Railroad Company. There is an open earth reservoir on the hill near the water company's standpipe into which river water is pumped and stored for supply to the freight yards exclusively. The petitioners purpose to tap the pumping main leading from the river station to the open reservoir on the hill and to conduct the raw river water through a four inch pipe to a pressure filter to be located at the present pumping station of the water company.

One filter unit, a frame structure approximately six feet high and twelve feet square with a filtering area of approximately seventy square feet, is to be built. In the bottom of the filter there is to be a series of two and one-half inch brass strainer pipes, eighteen inches apart, which will serve as underdrains. A sand bed about thirty inches in depth is to be placed over the underdrain. The water will come on to the filter from a partition on the raw water inlet to the tank. High water level will be about eighteen inches above the top of the sand, and the top of the filter will be six inches above high water line. Alum will be fed in by gravity to the raw water just before it reaches the filter. No arrangement has been made for a re-wash valve to allow first filtered water to go to a sewer.

The filtered water will go to the main section well. There is to be no regulator to control the rate of filtration. A filter with an area of seventy square feet should take care of about two hundred thousand gallons per day of good coagulated water reasonably free from suspended matter but probably would have great trouble in satisfactorily purifying muddy river water. It is evident that unless some improvements be made to the design that the filter will be unable to purify river water, even if clear and then not at a rate in excess of one hundred million gallons per acre, or approximately one hundred and fifty thousand gallons per day for the filter unit proposed.

In so far as the Department is now informed, it appears that with a full standpipe and with the proposed filter the water works system would be capable of furnishing two good fire streams during adverse conditions, provided the river water were clear and only satisfactorily filtered water were admitted to the system. The danger to public health, where there is an installation between a polluted source of supply and the water consumer, of apparatus designed to purify the water lies in the possibility that in an emergency, the necessities of the case may be considered great enough to warrant the discarding temporarily of the safe guard and the admittance to the water works system of unpurified river water.

This danger should be minimized to a reasonable degree which in this instance suggests the installation of a second filter unit coupled with a sedimentation basin having a capacity of at least two hours' supply in which thorough coagulation of the raw river water should be accomplished.

Furthermore rate controllers should be provided to obviate any excessive rate of filtration.

Because the filtered water is to be discharged at once into the pump well, some attention should be paid to a modification of the plans whereby the first filtered water after cleaning may be wasted to the sewer.

The fact is not overlooked that the proposed improvements are in anticipation of shortage of water which shortage has not actually been experienced. So the use will be occasionally which renders all the more important that the plant be equipped with appliances to insure a proper purification of the river water.

The washing of the filter is to be accomplished by pressure from the supply main. The overflow weir for dirty water is twelve inches only above the sand surface which is too little to admit of proper washing. Much sand is bound to be wasted. It would be well to provide a gravel underdrain. The design as now submitted does not warrant approval if it be the intention of the petitioners to use the filter during muddy stages of the river, because in all probability the plant would be totally unable to handle this kind of water without a sedimentation tank.

It is understood that the proposed auxiliary supply is a temporary expedient only, and that finally an adequate and permanent supply is to be obtained from some source not now determined upon. This is urged as a reason why the filter plans on the small scale have been offered for approval. The water company wishes to avoid any unnecessary expenditure at this time. It is probable that a two hydrant stream service of six hours' duration will meet the immediate demands of the village and that the extreme conditions above mentioned will not obtain. It would be much better and safer if the water company would add a filter unit but this may be left for the future. However, since it is necessary in the opinion of the water company to install the filter, it is necessary that the apparatus accomplish in fact what its existence at the pumping station will warrant the water consumers in believing is being accomplished, namely, the purification of the water. Therefore, a sedimentation tank should be installed in conjunction with the filter, the plant provided with the equipments above mentioned in connection with regulation of rate of operation and cleaning, appliances which are inexpensive and yet important. Observations throughout the season of nineteen hundred and eight should then demonstrate whether the adding of a filter unit to the plant is necessary.

It has been determined that the proposed additional supply will not be prejudicial to public health, and a permit is hereby and herein granted therefor provided it be within the charter right of said water company to obtain its source of supply temporarily from the Pennsylvania Railroad Company's system of water works. This permit is granted under the express stipulation that if the Dauphin Consolidated Water Supply Company does not have the right to obtain this source of supply from the Pennsylvania Railroad Company's system of water works, then said water supply company shall first acquire the intake pumping station and rising main or whatever apparatus may be necessary to introduce the river water to the proposed filter. And this permit is issued under the further conditions and stipulations as follows:

FIRST. That plans of the water purification plant as built shall be filed in the office of the Commissioner of Health together with any other information in connection therewith that may be required and that at the close of each year's work a plan of the entire water works system of the said water company showing all additions to the street mains laid during the year shall be prepared and filed in said Commissioner's office to the end that there shall always be a complete map of the existing water works in said Commissioner's office.

SECOND. The water company shall provide sedimentation of the coagulated water and shall use a coagulant whenever the filter be operated. The modern equipments hereinbefore mentioned shall also be provided for the filter and a record of the operation thereof shall be kept on forms satisfactory to the Department of Health whenever required.

THIRD. If at any time in the opinion of the Commissioner of Health the water supply has become prejudicial to public health, then the water company shall adopt such remedial measures as the Commissioner of Health may approve or suggest.

FOURTH. Regular inspections will be made of the system by a Department officer and the State Department of Health may suggest rules and regulations to govern the supplying of water to the public in so far as the public health is concerned. The water company shall co-operate with the Department, furnish facilities for inspection and assist in the examination if this be required.

Harrisburg, Pa., April 2, 1908.

FAIRCHANCE BOROUGH, FAYETTE COUNTY.

This application was made by the borough of Fairchance, Fayette county, Pennsylvania, and is for permission to establish a system of water works, in the town and to obtain a source of supply from the Trotter Water Company, under the following conditions and stipulations:

It appears that Fairchance borough is a manufacturing community of about twenty-one hundred population, located in the southwestern part of Fayette county on the western slopes of Chestnut ridge, a mountain whose summits are fifteen hundred feet or more above the borough. This ridge is about three miles east of the borough and it extends through the county from the Monongahela River on the southwest to the Youghiougheny River on the northeast. Connellsville borough is on the latter at the foot of the west slope of the mountain, and Uniontown borough is also west of the mountain between Fairchance and Connellsville. The main line of the Baltimore and Ohio Railroad passes northerly along this mountain slope throughout the borough of Fairchance, Uniontown and Connellsville. A branch of the Pennsylvania Railroad system from Greensburg extending southerly and passing through Uniontown terminates at Fairchance. There is also an electric railroad line leading from Fairchance northward to Uniontown and Connellsville.

Fairchance borough is at the headwaters of Georges Creek about seven miles north of the State line between Pennsylvania and West Virginia. Georges Creek rises in several mountain runs immediately west of the borough, these runs coming down in parallel lines through deep ravines and forming the main creek in the borough. A tributary, Muddy Run, rises north of the borough, perhaps three miles distant, and on it there are several coal mines and coke operations. This stream follows closely the western boundary of Fairchance and joins Georges Creek a few hundred feet below the southwestern corner of the town. Thence Georges Creek flows in a general southwestern direction to the Monongahela River, nine miles distant. The borough of New Geneva is on the river at the mouth of the creek. The distance traversed by the stream is an unpopulated, mountainous, wild region.

The principal industry which supports the inhabitants of Fairchance borough is the mining of coal. However, the coke interests are large. The Frick Coke Company operates the Kyle Mine, which is located partly in the western section of the borough and partly in George township, which surrounds the borough. This plant is in Muddy Run Valley. The company employ about three hundred people and use water supplied by the Trotter Water Company. In the borough there is also the Kanawha Glass Company, makers of window glass. This concern employs about two hundred and twenty-five hands. The United Fire Brick Company, located adjacent to the glass plant, employs about thirty hands. There are no public sewers in the community, but there are three private sewer lines discharging into Muddy Run and two private sewers discharging into Georges Creek. The largest part of the built up section of the borough drains into the creek. This stream is clear, pure, mountain water, but Muddy Run is aptly named. It receives large quantities of mine drainage and the color of its waters is characteristic of sulphur pollution. The acidity of the run renders the stream unsuitable for domestic and industrial uses. There are coal mines which drain into Georges Creek below Fairchance borough so that this natural water course is practically preempted for mine drainage purposes.

At the present time the people of Fairchance borough derive their drinking water from dug wells and a few drilled wells. These are usually sunk to a depth of about twenty feet below the surface of the ground. Some of these sources are polluted by surface drainage from street gutters. As they are in proximity, in many instances, to loose earth privy vaults and cesspools there is reason to believe that contamination of the drinking waters result from this proximity and the disposal of sewage into loose privy vaults and cesspools. The discharge of sink water and wash water on to the ground in street gutters is also a menace. Typhoid fever has been prevalent in the borough. During nineteen hundred and seven, two physicians treated at least sixty cases. They were not reported to the State Department of Health. The towns people realize that there should be better methods of sewage disposal, and there is an application at this time pending before the Commissioner of Health relative to the building of a public sewer line in Church street, the main thoroughfare of the village.

The headwaters of Georges Creek are about three miles distant east of Fairchance in a wooded, mountainous territory which is uninhabited. If this drainage area were secured by the borough and maintained in its present condition, it could be developed to supply an abundance of water of excellent quality. Owing, however, to the cost of constructing adequate impounding reservoirs on the mountain slopes and the fact that the streams, during dry weather, practically run dry, it has been determined that it would not be practical for the borough to undertake to seek water supply from these sources. The borrowing capacity of the borough of Fairchance is insufficient to defray the cost of such a municipal improvement. However, the local authorities have decided that the public health demands that there shall be a public supply of pure water and purpose to bring this about. The plan is to purchase the water from the Trotter Water Company, the borough to lay the mains in the streets only. The municipal authorities have entered into a contract with the Trotter Water Company to furnish water to the borough for a period of ten years, from May, nineteen hundred and eight, the supply to be two hundred thousand gallons per day, and the contract to be cancelled by either party on sixty days written notice. The contract also provides a renewal privilege at the end of the ten year term. The borough has, in consequence of this contract, made application for permission to lay the water mains in the various streets of the borough and to connect them with the Trotter Water Company's eight inch main at the coke ovens.

The borough has also executed a contract for the construction of the water mains in the streets and the contractor is engaged at the present time in building the system.

The Trotter Water Company was incorporated under the act of eighteen hundred and seventy-four. The charter was granted on October twenty-ninth, eighteen hundred and eighty-eight, the place of business being Scottdale. The object of the company was the supplying of water to the public in Dunbar township, Fayette county. The notice of the merger and consolidation of the Trotter Water Company, the Youghiogahela Water Company and the Youghiogheny Water Company under the name of the Trotter Water Company was filed in the office of the Secretary of the Commonwealth on August twenty-eighth, nineteen hundred and five.

Youghgahela Water Company was formed by the merger and consolidation for four water companies, the papers being filed July eleventh, nineteen hundred and five. These four companies were given the name of the Youghgahela Water Company. They were the Lemont, Huron, Redstone and Fairchance Water Companies.

The Lemont Water Company was chartered February sixteenth, nineteen hundred and four for the supplying of water to the public in the township of North Union, Fayette county surrounding Uniontown borough.

The Huron Water Company was chartered February sixteenth, eighteen hundred and ninety-nine for the supplying, storage and transportation of water and water power for commercial and manufacturing purposes in the township of German, Fayette county. This township extends easterly from the Monongahela river.

The Redstone Water Company was chartered October seventeenth, eighteen hundred and eighty-seven for the supplying of water to the public in the township of South Union, Fayette county. This township lies south of Uniontown borough and south of North Uniontown township. In it are the villages of Hutchinson and Brownfield.

The Fairchance Water Company was chartered October twenty-seventh, eighteen hundred and eighty-seven for the purpose of supplying water to the public in George township, Fayette county. Fairchance borough is in this township. This township lies between South Union and German townships.

So the four said water companies form a tier of townships which, with the original Trotter Water Company territory, extends from the Youghiogheny River along the western slope of Chestnut Ridge to the Monongahela River.

The Youghiogheny Water Company was chartered on October twenty-seventh, eighteen hundred and eighty-one for the storing and transportating of water for the public use from the Youghiogheny River at or near Broadford, Fayette county through Lynn and Connellsville townships in Fayette county to a point at or near Mount Pleasant. The place of business of the company was Scottdale. Mount Pleasant and Scottdale are in Westmoreland county.

Thus the present Trotter Water Company has a large charter territory along the western slope of Chestnut Ridge from Mount Pleasant in Westmoreland county, to the Monongahela River, a total distance of thirty miles.

The Trotter Water Company, at the present time, has two main sources of supply, namely, the Youghiogheny River and the Monongahela River.

The main pumping station is located in Dunbar township on the west bank of the Youghiogheny River at a point opposite South Connellsville. Connellsville borough is below. The river is reasonably free from sewage and mine drainage pollution above Connellsville. It is known that tanneries and lumber camps and small settlements abound on the banks of the streams. As far as the Department is aware, the borough of Somerset in Somerset county is the only municipality within Pennsylvania having a sewer system from which sewage is discharged into the river or a tributary. This borough's sewage goes into Coxes Creek, which in turn flows into Casselman River. The point of discharge of sewage is fifty miles above Connellsville.

The Yougiogheny River rises in West Virginia. Above Connellsville the drainage area is at least one thousand square miles. It is generally wooded, rugged, mountainous territory. The principal tributary is the Casselman River. This stream and Laurel Creek and the Upper Youghiogheny River unite and form the main stream at Confluence borough. Casselman River receives the drainage of quite a number of coal mines and it appears that the sulphur waters are largely diluted before Connellsville is reached. At and below this point, sewage, mine drainage and industrial refuse is discharged into the stream all along its course. The Trotter Pumping station is about one and five-tenths miles above Connellsville borough. The water is taken from the river through an intake tunnel five feet wide and eight feet deep leading to a pump well fifteen feet by forty feet in plan and twenty-five feet deep. A wire screen of three-eighths inch mesh is placed at the entrance of the tunnel. There are two sixteen inch suction pipes inserted into the well. They connect to two duplex, horizontal pumps installed in the station, each pump having a capacity of five million gallons per twenty-four hours. There are also two Wilson-Snyder pumps at the plant. The water is raised through a twenty-four inch force main to a reservoir of three and one-half million gallons capacity, located on top of the mountain, distant one-quarter of a mile back from the pump house. This reservoir is excavated out of rock and is built of cement masonry. It is elevated four hundred and forty-two feet above the pumping station. There is an overflow pipe from it sixteen inches in diameter and a twelve inch drain pipe. From this reservoir a twenty-four inch gravity main is laid southwesterly through Dunbar and North Union townships, passing through the villages of Pechin, Mount Braddock, Youngstown and Lemont Furnace to coke ovens about two and one-half miles east of Youngstown borough where the storage reservoir of seventeen million gallons capacity is located. This point is seven miles distant from the Dunbar reservoir. The Uniontown reservoir is on an eminence and higher than the surrounding country. From this reservoir, continuing in a southwesterly direction one mile, there is a twenty inch water main reducing to a sixteen inch main which continues in the same general direction for a distance of four and one-half miles, passing Leith village where a six inch line branches off supplying this settlement in South Union township. A short distance beyond the Leith branch is an eight inch

branch extending northerly to a protected reservoir known as Continental Number One, having a capacity of five hundred thousand gallons. This is situated on high ground above Uniontown about one-half mile west therefrom. Beyond Leith, off of the sixteen inch there is a six inch branch southerly leading to the ten million gallon reservoir on the highland above Brownfield village in South Union township. This reservoir supplies the Brownfield coke ovens. Thence continuing southwesterly, the sixteen inch main reduces to a fourteen inch, at this point there being a six inch branch southerly which supplies Oliphant Furnace, which is one and one-half miles beyond Brownfield. About one mile further southwest off of the fourteen inch main is a four inch branch leading to coke ovens about three-quarters of a mile west of Oliphant Furnace. One-half mile beyond this branch the fourteen inch main terminates in a twelve inch and an eight inch. The eight inch extends southerly to the coke ovens of the Frick Coke Company at Fairchance borough to a reservoir having a capacity of one and one-half million gallons. The twelve inch pipe continues southwesterly to a ten million gallon reservoir in George township about two miles northwest of Fairchance borough. This reservoir is formed by a dam constructed across the valley of Yorks Run. There is a pumping station located near this reservoir which is used to increase the pressure to the consumers. This force main is twelve inches in diameter and extends westerly to the small village of Shoaf on the Smithfield and Masontown Branch of the Baltimore and Ohio Railroad. There is a six inch branch off the twelve inch pipe to the village of York Run. From the seventeen million gallon reservoir called Uniontown reservoir, which is near Cool Spring village and the Cool Spring coke ovens, there is an eight inch branch extending northwesterly for a distance of about four miles, passing through the village of Oliver to Phillips in North Union township. The line of this water main passes about one mile northeast of Uniontown and terminates at a point two miles north of the borough.

From the said Continental reservoir number one, an eight inch line extends southwesterly a distance of two miles to a protected reservoir of five hundred thousand gallons capacity known as Continental number two.

Three-quarters of a mile south of this reservoir is another reservoir, capacity nine million gallons. One-half mile west of it there are two reservoirs having a combined capacity of twenty-one million gallons. These three basins are impounding reservoirs at the headwaters of small runs. From Continental number two, a six inch main extends westerly to Continental reservoir number three. Detail plans of the reservoirs have not been filed in the Department, and so the capacity of number three is not known. Between the last two reservoirs is Thro Mine, which is supplied by the said six inch pipe. From Continental number three there is an eight inch pipe line extending westerly down the valley of the North Branch of Browns Run, a distance of about four miles to Leckrone village at the junction of the north and south forks of Brown's Run. This point is about two and one-half miles easterly of the mouth of the run at the Monongahela River.

The Trotter Water Company's Huron pumping station is located in German township on the east bank of the Monongahela River at the mouth of Brown's Run. Information about the pumping capacity and details of the intake are not in the possession of the Department. The raw river water is raised through a twenty-four inch force main to a standpipe about one mile distant from which there is an eighteen inch main reducing to ten inches and finally eight inches in diameter, which supplies the villages of New Salem and Buffington in German township. Eight inch branches reach the villages of Lambert and Edenborn in the same township. Off this main line there is a twelve inch branch to McClellandtown and thence southerly the pipe is ten inches in diameter connecting to the eight inch main at the village of Leckrone. The latter pipe as hereinbefore described comes from Continental reservoir number three. Thus the raw Monongahela River water may be forced into the pipe system leading to the Trotter pumping station on the Youghiogheny River. The Monongahela River water is polluted with sewage and mine drainage also by refuse matter from steamboats which pass by the intake. The supply is unsuitable for drinking purposes without purification. Ordinarily, Youghiogheny water is supplied to Fairchance coke ovens and to Continental reservoir number one. It is understood that it is seldom if ever that the Monongahela River water is forced into the water mains beyond Continental number one. It is used principally for the coal mines and coke ovens in the southwestern part of Fayette county.

The Connellsville Water Company which furnishes drinking water to the borough of Connellsville takes its supply from the Youghiogheny River more than a mile upstream above the Trotter Water Company. However, the Connellsville Water Company filter the supply before furnishing it to its consumers. The Trotter Water Company, however, supplies its consumers with raw Youghiogheny River water.

The Trotter Water Company has a third pumping station. It is located at Broadford on the north bank of the Youghiogheny River about one and one-half miles below Connellsville borough. The stream here is subject to great pollution from mine drainage, industrial wastes and the sewage of the boroughs of Connellsville and New Haven and is totally unfit, without purification, to be used as a source of drinking water. The Department does not have a plan of the pumping station and intake or information as to the capacity of the outfit. It is understood, however, that the Broadford pumps are used only in a case of an emergency. From this point a force main twelve inches in diameter extends up Jacob's Creek, a distance of about two and one-quarter miles to Summit Heights, where is located a reservoir

having a capacity of eleven million gallons. From this point a gravity main twelve inches in diameter extends about one and one-half miles northerly to Scottdale borough. There are coke ovens here which are supplied by the Trotter Water Company. There is a six inch pipe under the river to the south side connecting with the pipe system which receives its supply from the Dunbar reservoir, so it is reported. The main from the Dunbar reservoir is eight inches in diameter and extends northerly for about two miles and branches into two twelve inch pipes. One twelve inch pipe extends southwesterly supplying the village of Leisenring and the Monarch coke ovens, whence the pipe reduces to eight inches in diameter and extends southwesterly to the village of Bute and West Leisenring. This point is six miles from the eighteen inch pipe. From the Monarch coke ovens there is a ten inch pipe reducing to an eight inch line which extends northerly one and one-half miles to Juniataville about one mile north.

The other twelve inch branch extends northerly about one mile to New Haven borough with an eight inch branch at Trotter village extending northerly to Adelaide village on the south bank of the Youghiougheny River, and off from this eight inch pipe is a six inch line above mentioned as passing along the river to the Broadford station. A submain four inches in diameter off from the six inch pipe extends under the river to Davidson mine adjacent to Connellsville borough.

Thus it is seen that the Trotter Water Company has three different pumping stations connected by a system of water mains so that it is possible that any one of the stations can furnish water to the entire system.

The blueprint submitted by Fairchance borough of its proposed water works shows that the local authorities purpose to lay one and fifteen one-hundredths miles of eight inch pipe, one and nine one-hundredths miles of six inch pipe, and one and nineteen one-hundredths miles of four inch pipe. Fire protection is to be afforded as well as drinking water. The citizens believe that the quality of the water to be furnished by the Trotter Water Company is preferable to that of the polluted wells in use in the borough.

The feed main is to be eight inches in diameter and is to be laid a distance of twenty-nine hundred feet to a standpipe in George township belonging to the Trotter Water Company and already described. The water is to be purchased by meter rate.

It is purposed to secure flushing of the water mains in the streets through fire hydrants, some of the hydrants to be located at low points in the borough. It is not expected that the citizens will very generally use the supply for drinking purposes at the beginning, but that ultimately the majority of them will be consumers.

It is reported that the borough intends to use the Trotter Water Company's supply until such time as the finances of the municipality will permit the development of the Georges Creek source.

At present, there is no Board of Health in Fairchance borough, and consequently sanitary rules and regulations are not enforced. The interests of the public health demand the introduction of a pure water supply and also the protection of the existing well waters. An application for public sewerage is now pending before the Commissioner of Health, but the plan submitted does not comprise a complete sewerage system. Attention should be paid to the present method of sewage disposal into cesspools and privy vaults in proximity to wells. The citizens should be informed that the drawing of water from the ground near privies and cesspools is dangerous and that so long as the present method of sewage disposal prevails, the borough is threatened with a widespread epidemic of a water borne disease. Garbage disposal is a menace and improved methods should receive the attention of the local authorities.

Probably the Youghiogheny River water will be less prejudicial to public health than the present domestic wells in Fairchance borough and hence the introduction of this water in the town should be a benefit to the community. However, the Monongahela River is totally unsuited to be used as a source of public supply in Fairchance borough. Even the Youghiogheny River is subject to accidental pollution and the water should be filtered.

It has been determined that the proposed water works system and source of supply will not be prejudicial to public health under certain conditions and a permit is hereby and herein granted under the following conditions and stipulations:

FIRST. Before the proposed source of supply is introduced into the borough of Fairchance the borough shall prepare plans for the installation of a water filter plant for the purification of the water supplied and shall submit said plans to the Commissioner of Health for approval and after the plans are modified, amended or approved the borough shall erect a filter plant and put the same in operation and maintain a filter therefor so long as the Trotter Water Company's source of supply be used by the borough. The cost of such water filter installation need not be expensive and as a safeguard, should provide the cheapest kind of insurance to public health health in the borough.

SECOND. The borough shall provide adequate drainage facilities for the speedy drainage of the water works system and shall show location on a plan and submit a written description of such facility. At the close of each season's work the borough shall submit a plan of the water pipes laid during the year together with any other information in connection therewith that the Commissioner of Health may require in order that the Department shall always be informed of the full extent of the water works system and the public use thereof.

The local authorities' attention is especially called to the suggestions hereinbefore offered relative to the changes in the existing methods of sewage and garbage dispesal. The borough council should notify the citizens to boil the water taken from domestic wells and springs of the borough and used for domestic purposes.

A local board of health should be established forthwith and sanitary rules and regulations should be promulgated and enforced in the interests of the public welfare.

Harrisburg, Pa., October 5, 1908.

FREEPORT, ARMSTRONG COUNTY.

Freeport Water Works Company.

This application was made by the Freeport Water Works Company of the borough of Freeport, Armstrong county, Pennsylvania, and is for approval of plans for the installation of a mechanical filtration plant for the purification of the water to be supplied, and for the extension of water pipes in the streets of the borough.

The borough of Freeport is located in Armstrong county, Western Pennsylvania, on the Allegheny River thirty miles northeast of Pittsburg. It is in the extreme southwestern corner of Armstrong county, where said county abuts Westmoreland, Allegheny and Butler counties. The borough is bounded on the north by South Buffalo township in Armstrong county, on the east by said township and the Allegheny River; on the south by the Allegheny River which separates it from Westmoreland county; and on the west by Buffalo Creek which lies a few hundred feet east of the Butler county line.

One mile above the borough the Kiskiminetas River joins the Allegheny. Buffalo Creek, which enters the Allegheny River at the western edge of the borough, is a small tributary which drains approximately one hundred and fifty square miles of territory in Armstrong and Butler counties.

The incorporated area of the borough, consisting of two hundred and fifty acres, is located on land which rises gradually from the Allegheny River and Buffalo Creek to a ridge located parallel to the river and approximately a half mile therefrom. The land immediately along the bank of the river and Buffalo Creek is about fifteen feet above the normal stage of the river and is subject to floods during high water. The land at the extreme northeastern edge of the borough at the summit of the ridge is two hundred feet higher.

Freeport is mainly a railroad center. Across Buffalo Creek on the western boundary of the borough is Butler Junction, a terminal of the Butler Branch of the West Penn Railroad. One mile east of Freeport, across the Allegheny River, is Kiskiminetas Junction, where the Allegheny Valley Railroad joins the West Penn Division. The West Penn Division of the Pennsylvania Railroad passes through the center of the borough, furnishing easy access from Butler Junction and Kiskiminetas Junction. Most of the railroad employes at these two places live in Freeport, comprising about thirty per cent. of the total population.

The present population within the incorporated limits of the borough is estimated to be two thousand. The borough is one of the oldest in the western part of the State of Pennsylvania and the growth has been slow. The population in eighteen hundred and eighty was fifteen hundred and in nineteen hundred was seventeen hundred and eighty, so it is probable that the population twenty years from now will not be more than twenty-five hundred. In addition to the population within the borough limits, there is a settlement at Butler Junction and also a suburban district in South Buffalo township immediately east of the borough limits which are supplied with water by the water works company. With these additions, it is estimated that the total population within the territory of the water works company is twenty-five hundred, with a probable future population of three thousand.

In addition to being a railroad center, Freeport has one large industry, the Guckenheimer Distillery, located on what was formerly known as Todd's Island on the Allegheny River at the southeast end of the borough. This island was purchased by the distillery company and a part of the narrow eddy separating it from the mainland has been filled in. The island, which is two thousand feet long and five hundred feet wide, has been laid out in lots and streets and the houses of the employes are located thereon, in addition to the distillery ware houses and buildings. The distillery employs one hundred and sixty-five men. It is supplied with a private water supply for domestic purposes, but uses the water from the Freeport Water Works Company for fire purposes. The private supply consists of the raw river water for the boilers and a driven well supply for the distillery. A pumping station is located on the bank of the river, equipped with two vertical triplex pumps, each with a capacity of two hundred and fifty gallons per minute and both directly connected to a gas engine. One pump draws the water directly from a crib located in the bottom of the river about twenty feet from shore and pumps this water through a five inch wrought-iron main to the boiler house. The second pump is connected with five wells driven along the bank of the river to a depth of forty feet and lined with six inch casing. This water appears to be in good condition and is forced through a five inch wrought iron main to the distillery.

West of the borough at Butler Junction across Buffalo Creek, there is another distillery known as the Montrose Distillery, belonging to the Pennsylvania Distilling Company. This distillery is supplied with water by the water company.

At Butler Junction are located the watering tanks for supplying the engines and round house on this division of the railroad. The railroad company has no independent supply, but is furnished with water by the water company.

The borough is equipped with a combined system of sewers which drain half the area of the borough. These sewers range in size from twenty inches to eight inches and discharge into the Allegheny River and Buffalo Creek through five independent outlets. Sewers were first installed in eighteen hundred and ninety-six, when the Singer Sewer Company constructed three thousand feet of sewer in the central portion of the borough. The system has been developed more recently to its present size and the borough officials are planning extensions in the immediate future which will drain the remaining built-up section of the borough not sewered at present. It is estimated that thirteen hundred people are using sewers at present with a total of two hundred and fifty connections to sewers. The remaining population use dry earth vault privies, of which there are over three hundred in the borough.

In addition to the public sewer system, there are many private sewers emptying directly into the river from the houses located along the river front. The distilleries also have independent sewerage systems which discharge directly into the river.

The Freeport Water Works Company was incorporated on June twelfth, eighteen hundred and eighty-three, for the purpose of supplying water to the public and persons and corporations in and adjacent to Freeport borough, Armstrong county, Pennsylvania. It is generally held that the charter territory of a water company must be confined within definite limits, and if this should apply to the Freeport Water Works Company's charter, it would limit the company strictly to the borough of Freeport. However, the company has presumably the belief of charter security to supply the public in territory adjacent to Freeport borough, namely, Butler Junction and properties in South Buffalo township. It might be better for the company to make an application for and secure an extension of its territorial rights to these places. Such a course would effectually settle any question of authority.

The company supplies five hundred thousand gallons of water per day, of which three hundred thousand gallons are used for industrial purposes. The railroad company at Freeport Junction is the largest consumer.

Practically every house in the borough is connected to the water mains and in addition the settlement at Freeport Junction and also that in South Buffalo township immediately east of the borough are generally supplied by the company.

The water furnished by the company is, however, not used generally for drinking purposes. There is a prejudice against the use of this water due to its being taken directly from the Allegheny River, which is highly polluted, and also to the muddy condition of the water during the flood stages of the river. The people in the borough use several springs which outcrop at various points in the borough between the ridge and the river, and probably a dozen dug wells. These wells range from four to six feet in diameter and go to a depth of thirty feet where the bottom is about on a level with the river bed. The wells are lined with dry rubble field stone.

The existing water works system consists of a pumping station located on the Allegheny River about three-quarters of a mile above the borough proper and one thousand feet from the borough line, in South Buffalo township; three storage tanks with a total capacity of two hundred and fifty thousand gallons located on the ridge at the eastern edge of the borough immediately on the borough line; and six miles of supply mains ranging in size from three inches to ten inches.

When the water works were first constructed in eighteen hundred and eighty-three, water was taken from the river at a pump station located on the main land near the eastern end of Todds Island. In eighteen hundred and ninety-two this pump house was abandoned and the existing pump house was constructed.

Water is taken from the Allegheny river at this pumping station through two wooden cribs located six feet below the river bed and covered with sand and gravel. These cribs are located fifty and one hundred and fifty feet from the river bank, respectively. The crib nearer the bank of the river is fifteen feet by thirty feet by five feet deep and is connected with the pumps by a twelve inch suction line of flanged pipe. The other crib is sixty-five feet by fifteen feet by four and a half feet deep and is connected by an eight inch wrought iron pipe line. During low water periods the crib nearer the bank is out of service.

The pumps are located in a circular pit twenty-one-feet in diameter and twenty-eight feet deep, with the floor line ten feet above low water mark. The top of the pit is several feet above the highest flood. The walls of the pit are constructed of brick laid in cement and are two feet four inches thick. The bottom consists of a nine foot thickness of concrete. In the bottom of the pit are located the two pumps, consisting of a Gould single-acting vertical triplex pump of one million gallons capacity and a Wilson Snyder horizontal duplex steam pump of one-half million gallons capacity. The plunger rods of the Gould pump are carried vertically up to the shafting located above the top of the pump pit and directly connected to an eighty horse power gas engine. The top of the pump pit is covered by a brick pump house twenty feet by forty feet interior dimensions, which also covers the engine room in which the gas engine is located. Adjacent to this pump house is a brick structure

fifteen feet by thirty feet interior dimensions, containing one steam boiler of fifty horse power capacity This boiler develops steam at eighty pounds pressure which is used for driving the steam pump.

Forty feet northeast of the pumping station there is a piggery and slaughter house belonging to Philip Steislinger, butcher, located on top of the bank of the river and draining directly therein. The run-off from this piggery is a menace to the water supply of the borough.

The discharge line from the pumping station consists of a ten inch cast-iron force main extending west from the station along the main public road for a distance of twelve hundred feet to a point at the foot of the slope immediately below the storage tanks. At this point there are two pipe lines, five hundred feet long each, extending at right angles to the road up the hill to the tanks, six inches and ten inches in diameter, respectively. Water can be pumped through either of these lines to the storage tanks, or it can be pumped directly into the town mains through a six inch line extending from this junction point along the public road into the built-up section of the borough. The usual method of operation is to pump through the ten inch line to the storage reservoirs and to use the six inch line to supply the six inch mains leading from this junction point to the town.

There are eight houses located between this junction point and the pump house. These houses are supplied directly from the force main with raw water. The officials of the water company, however, state that it is their intention during the coming year to lay a supply main from the present distributing system to these houses so that they can be supplied with filtered water.

The storage reservoirs are located two hundred and twenty-five feet above the floor in the pump house pit and sufficiently high to furnish a pressure of eighty-five pounds on the hydrants in the main sections of the borough. The tanks are near the top of the ridge at the eastern edge of the borough and the borough line passes through the location. North of the tanks the land rises thirty-six feet higher where the crest of the hill is reached. The tanks consists of wood stave structures banded horizontally with circular steel bands and with a total capacity of two hundred and fifty thousand gallons. The two larger tanks are thirty feet each in diameter and twenty feet high. The smaller tank is twenty-four feet in diameter and sixteen feet high. These tanks are directly connected at present, so that the flow line in the larger tanks is governed by the depth in the smaller tank which is fifteen feet.

The ten inch force main enters the two larger tanks through ten inch connections located at the top of the tanks. At a point one foot above the bottom of the tanks there are six inch valved connections to the six inch supply main. The smaller tank connected at the bottom with the six inch line from the force main at the foot of the hill.

The borough is supplied from the tanks through this six inch main which is now used as a supply line and also through a six inch main extending from the tanks along High street and through a four inch main extending along Franklin street. These supply mains are so arranged with valving that one or more can be placed out of commission without cutting off the supply to the town.

The two six inch mains extend through the entire length of the borough along Market street and High street and are four hundred feet apart. The other streets are supplied with four inch and three inch lines. A four inch extension from the six inch main on Market street supplies the Butler Junction district. The pipe system is well equipped with valves. The dead ends are supplied with blow-off connections discharging directly into the river, or with hydrant connections. Fire hydrants are located at street corners at distances ranging from four hundred to eight hundred feet. Many of these hydrants are connected with three inch and four inch supply lines.

There has always been considerable typhoid fever in the borough of Freeport. The statistics of the number of the cases and deaths are not complete. The records of the cases are unreliable. The records of the State Department of Health are very incomplete relative to typhoid fever cases, showing that the physicians are lax in submitting reports. For the last ten years from three to twenty-two deaths per annum are reported. The twenty-two deaths occurred in nineteen hundred and seven. For that year only twenty-seven cases were reported. There is more likelihood that two hundred and seventy cases of typhoid occurred during that year.

The epidemic in the fall of nineteen hundred and five, when sixteen cases occurred in two weeks was attributed to a polluted milk supply, as all those stricken with the disease were supplied by one milk dealer at whose farm there was a case of typhoid fever, so it is reported.

The proposed filtration plant is to be located immediately above the existing storage tanks near the crest of the hill. It is proposed to install these filters in two units each with a capacity of five hundred thousand gallons and also to construct on top of the crest a settling tank having a capacity of one hundred thousand gallons. A coagulant pump and chemical mixing apparatus are to be located at the existing pumping station for introducing a coagulant into the force main.

The coagulant plant will supply sulphate of alumina to the water in definite proportions. Two cedar tanks, each three feet in diameter, and three feet deep, will be used for dissolving the coagulant. The alum will be placed in a small dissolving box located at one side of each tank and will be slowly dissolved by allowing a stream of water to trickle over it. One tank will be in commission while the solution is being dissolved in the other. A bronze pump, bolted to the side of the high pressure

pump and directly connected there to, will force the solution into the discharge compartment of the pump. This bronze pump is so arranged that the length of the stroke can be increased or diminished in proportion to the amount of coagulant desired and the rate of pumpage is in proportion to the rate of the main pump.

The water will be delivered through the existing ten inch main to a settling tank located on the crest of the hill. It is proposed to leave the existing connections from this ten inch main to the two storage tanks and also to the six inch supply main at the foot of the hill in position, so that they can be used to by-pass the water around the filters, or around both filters and storage reservoir in case of emergency.

The settling tank will consist of a circular white cedar structure, covered with a wooden roof, thirty feet inside diameter and nineteen feet deep. The bottom of the tank will be thirty-six feet above the top and one hundred and fifty feet north of the existing storage reservoirs and will rest upon concrete foundations, twelve inches wide, five feet ten inches center to center and extending the full width of the tank. The capacity of the tank, one hundred thousand gallons, allows two and a half hours settling.

Raw water will be introduced above the bottom of the tank at one side and will pass around a wooden baffle extending across the tank almost to the opposite side. The water will be taken off from the tank on the other side of this baffle through a floating outlet spout arranged to travel through a depth of ten feet from the top of the tank and connected to the eight inch supply line leading to the filters. A four inch blow-off valve and piping connection is located in the bottom of the tank for draining the tank to a tile sewer which will extend to a ravine east of the filter plant location.

The filter plant will be of a gravity type, located on the side of the hill half way between the settling tank and the storage tanks, with its base level with the top of the storage tanks. It will be equipped with two circular wooden filters, each fifteen feet in diameter and seven feet deep. Each will have an effective area of one hundred and seventy-six square feet, or a capacity of five hundred thousand gallons when operated at a rate of one hundred and twenty-five million gallons per acre per day. The filters will be covered with a frame building, twenty-four feet by thirty-eight feet interior dimensions, constructed upon a concrete foundation. The filters will rest upon four by six oak strips, spaced eighteen inches center to center and laid directly upon a six inch concrete floor which will cover the entire interior of the filter building.

The raw water will enter the filter through a six inch valve connection to the eight inch supply line from the settling basin and will be distributed over the surface from an overflow trough extending partly around the circumference of the filter at a height of eighteen inches above the surface. Water will be taken off from the filter through a manifold system consisting of a six inch header with one and one-fourth inch lateral pipes radiating therefrom and spaced six inches center to center on the bottom of the filter. In to this grid of pipes there will be seven hundred and twenty bronze strainer connections spaced six inches center to center. The filtering material will consist of ten inches of gravel and thirty-six inches of selected filter sand. The outlet pipe from each filter will be controlled by a rate controller which will limit the rate of operation of the filter to a one hundred and twenty-five million gallon rate. From the rate controllers the water passes through an eight inch filtered water main to one of the largest storage tanks nearest the filter plant and thence through the storage tanks into the existing supply main connections.

In cleaning the filters, water from the settling basin will be introduced into the strainer system by means of a six inch wash water connection and will be forced up through the filtering material to the wash trough located at the top and thence through an eight inch connection to the sewer line. No agiation is proposed, but it is intended to wash at a high rate, probably eight or ten gallons per square feet per minute. After washing the filter, the water first filtered will be wasted through a four inch connection to the sewer. A loss of head gage is to be provided for each filter to read the loss of head directly, so that the operator will know immediately when it is necessary to clean.

A by-pass line is provided around the filters, so that the water from the settling basin can be introduced directly into the storage reservoir without passing through the filters. The Greer Filter Company, who have prepared the plans for the filter plant and propose to install same, have guaranteed a bacterial reduction of not less than ninety-eight per cent when the bacteria in the unfiltered water is three thousand or more per c. c., and that when the number is less than three thousand, the average number in the filtered water shall not exceed one hundred per c. c., and shall meet the requirements of the State Board of Health. They propose to furnish with the filter plant a field equipment of testing apparatus and chemicals for making tests of the raw and filtered water and to instruct the operator how to make the necessary tests.

In order to obtain the full capacity of the storage tanks, a float and valve are to be provided on the smaller tank which will automatically close the inlet when it is full and allow the other two tanks to fill to their full capacity.

The continued prevalence of typhoid fever in Freeport demands the installation of a proper water purification plant. While there is at present some reduction in the number of bacteria due to infiltration through the cribs at the intake and through subsidence in the storage reservoirs, yet it is absolutely necessary to safeguard the public health of this community that an efficient filter plant should be installed which

will be operated in an intelligent and careful manner. It is to be noted that the water works company realizes that this will be a profitable investment, as it will increase the domestic consumption and will probably eliminate the use of the wells and springs which are now in constant use for drinking purposes and are not above suspicion. The water company has voluntarily submitted this application for the approval of a filtration plant and should receive the support of the borough officials in its efforts to furnish a pure supply.

The facilities for fire protection in a large portion of the borough appear to be inadequate. Through the center of the borough the hydrants are connected to the six inch supply mains and are sufficiently close together to furnish ample protection in times of fire. In other sections of the borough there are many hydrants connected with three and four inch mains and spaced eight hundred feet apart, so that during a severe fire it would be difficult to supply a sufficient amount of water. It would be advisable to increase the fire protection, either by constructing larger mains in these districts or by installing hydrants at more frequent intervals.

The plans submitted contemplate the by-passing of raw river water around the filter plant at intervals. As stated above there are three methods of by-passing water around the filters and by one of these it goes directly into the mains without any sedimentation or storage. Such by-passes are a menace to a water supply when the source of supply is contaminated and should be used only in the case of a great emergency. When so used all consumers should be notified in advance and advised to boil their drinking water.

The plans of the filters as submitted should furnish a plant of the highest type of efficiency, if intelligently operated. It is advisable in the installation of a filtration plant that the expert who installs it shall be entrusted with the general supervision of the plant for at least one year after installation or some one equally competent, in order that he may be fully responsible for the efficiency. It is impossible to allow a plant to be operated by one who is entirely ignorant of filtration without impairing the efficiency. It will probably be necessary to cover the storage reservoirs to prevent growths of algae.

It has been determined that the proposed water purification plant will not be prejudicial to public health, and a permit is hereby and herein granted therefor and for the extension of water pipes in the streets of the borough, under the following conditions and stipulations:

FIRST. That at the close of each season's work the water company shall file a plan of the water pipes laid during the year together with any other information in connection therewith that may be required, in the office of the State Department of Health, in order that the Commissioner of Health may be always informed of the extent of the water works system and the public use therof.

SECOND. That the filter plant shall be operated one year after installation under the direction of the expert who designed it, or some other competent expert. A full report of the initial test of the filter plant shall be submitted to the Commissioner of Health and thereafter the water company shall assist the State Department of Health in making such tests of the plant from time to time as may be desired.

THIRD. Weekly reports of the operation of the water works system and purification plant shall be kept on blank forms satisfactory to the Department of Health and copies thereof shall be filed with said Department. If at any time in the opinion of the Commissioner of Health, the water works system or any part thereof, or any water furnished thereby, has become prejudicial to the public health, or inefficient or defective, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

FOURTH. The by-pass provided for passing water around the filters directly into the mains must be kept closed and sealed under an arrangement satisfactory to the Commissioner of Health and only in some great emergency shall these valves be opened and used. If this is done the public must be immediately warned of the fact and the local and State health authorities notified.

FIFTH. At the completion of the work a complete set of plans of the new structures and all changes to existing structures shall be prepared and placed on file with the Commissioner of Health.

SIXTH. The Water Works Company shall notify the consumers of water who take the water from the supply pipe between the filter plant proposed and the pumping station, which consumers now get raw water, that all such water used for drinking and domestic purposes, shall be boiled, and the company shall construct, during the year nineteen hundred and nine, a connection from the filtered water supply and shall furnish the said consumers with filtered water.

SEVENTH. This permit carries with it the specific condition that the Freeport Water Works Company is authorized by its charter to do the things which it proposes to do as hereinbefore described. However, it is suggested, that the said company should find it advisable to have the undisputed limits of its water district defined by the Pennsylvania Water Supply Commission and that for this purpose an application should be made, as provided by law.

Harrisburg, Pa., September 2, 1908.

HOPEWELL TOWNSHIP, BEAVER COUNTY.

Jones and Laughlin Steel Company.

This application was made by the Jones and Laughlin Steel Company, of Pittsburg, and is for permission to construct a system of water works for the supply of water to the public on its own property, consisting of the village of Woodlawn, in Hopewell township, Beaver county, Pennsylvania.

The Jones & Laughlin Steel Company is constructing a new manufacturing plant, which will ultimately consist of coke ovens, blast furnaces, steel works, rolling mills and finishing departments.

This plant is being built at Woodlawn, a village in Hopewell township, Beaver county, Pennsylvania, along the Ohio River, about twenty miles down stream from Pittsburg.

In order to provide adequate habitations for the employes engaged in the construction and operation of this plant it has become necessary for the company to build houses to care for at least twenty-five hundred people. It is represented that this number of people will undoubtedly be increased to ten thousand or more by the time all departments of the plant are constructed and in operation. Before the Jones & Laughlin Steel Company began work at Woodlawn the village consisted of possibly one hundred inhabitants within the district immediately affected by the construction of this plant. The population now consists of nearly sixteen hundred persons, and in order to provide these people with convenient and sanitary habitations, the company has already constructed sixty-three blocks of double houses—one hundred and twenty-six dwellings in all—and fifty-one single and double modern houses—fifty-six dwellings in all.

To provide these houses with the necessary water supply, the company purposes to erect a pumping station, storage system and supply distribution.

The proposed pumping station is to be located two hundred and twenty-five feet up stream from the Ohio River dam number four on property belonging to the company and at the river harbor line. The sewer outlet into the river, temporary approval of which has been given by the Commissioner of Health, is at the mouth of Logstown Run below the dam. The said pumping station is laid out to provide for a population of ten thousand inhabitants and ample provision is made for additional pumps if this population should be exceeded.

The pump house is a circular structure fifty feet in diameter and its walls rest on solid rock foundation seventy-five feet below the surface of the ground and the floor of the motor room. The basement is to be the pump well and ports in the outer walls will provide an entrance for river water to the large pumping engines designed to furnish supply to the industrial plant. The pumps will rest on the floor twenty-four feet above the bottom of the well. This will be made water tight. Twenty-seven feet above this floor will be the operating floor of the pump house.

The pumps for the domestic supply are to be electric driven, vertical, triplex, deep well pumps, two in number, each of two hundred and fifty thousand gallons capacity in twenty-four hours, and they are to have a four inch suction into a twelve inch collecting main which is to extend up stream, reducing to ten inch, eight inch and six inch diameters, off of each size of which are to be two four inch branches, each branch terminating in an eight inch vertical pipe driven to solid rock from forty to fifty feet deep below the shores of the river. These driven wells have their tops slightly above the low or permanent level of the Government Dam. This structure, however, is collapsible—that is, it is provided with wooden sections which may be raised to a height of nine feet, so that the highest level of the dam will for the present submerge the driven wells nearly nine feet, if the information now in possession of the Department be accurate. However, the line of wells is back of the harbor river line and it is the purpose of the company to fill in the land many feet deep to this line. All piping in connection with the wells is flanged, but in case the joints should leak there would be a possibility of the sewage polluted water of the river flowing into the wells and contaminating them. Plans of the piping have not been submitted. The depth to which it is proposed to cover the wells is not known. The burying of the apparatus under the conditions obtaining is a doubtful expedient. The piping should be where it may be easily reached and inspected and repaired.

A test well showed a very copious flow of water in the sand layer on top of the rock and bacteriological and sanitary analyses of this water showed it to be satisfactory in quality.

The pumps are to discharge into an eight inch main and where the pipe crosses the railroad tracks a sixteen inch cast iron pipe is to be laid. At each end of this sixteen inch line under the tracks of the Pittsburgh and Lake Erie Railroad special fittings are to be provided in contemplation of additional branch lines, both from the supply and the distribution.

The rising main will feed the pipe system, overflowing into two closed top steel standpipes. Only a portion of the entire water supply will pass through these tanks. The elevation at the bottom of these tanks is to be one thousand and fifty-six. The elevation of the motor floor of the engine house is to be seven hundred and twenty-five. The highest flood line was at seven hundred and eleven and

one half. The dam when up is at elevation six hundred and eighty-four. It will thus be seen that a very good pressure will be maintained in the distributing system. Each tank is to be thirty feet in diameter and thirty-six feet high.

It has been determined that the proposed water works system and source of supply will not be prejudicial to public health and a permit is hereby and herein granted therefor, under the following conditions and stipulations:

FIRST: That at the conclusion of each season's work plans of the water pipe laid during the year shall be filed by the owner of the system in the office of the Commissioner of Health, together with such other information in connection therewith as may be required, to the end that the Department may always be informed of the extent of the water works and use of the system.

SECOND: The driven well piping and connections shall be provided with suitable means of access for inspection and repairs if this be found feasible, otherwise, upon monthly tests of the waters which shall be made by the company which shall file copies of such tests with the Commissioner of Health, revealing the presence of any sewage organisms, the company shall filter the water by apparatus to be approved by said Commissioner. It is the purpose of the State Department of Health to also make tests of the water and if at any time in the opinion of the Commissioner of Health, the water supplied by the company for drinking purposes is prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health shall approve or advise.

THIRD: If called for, weekly reports of the operation of the water works system shall be made on blank forms satisfactory to the State Department of Health and copies thereof furnished to the said Department.

FOURTH: Satisfactory record plans of the piping in connection with the driven well system shall be filed with the Commissioner of Health.

Harrisburg, Pa., June 29, 1908.

HOUTZDALE, CLEARFIELD COUNTY.

Houtzdale Water Company.

This application was made by the Houtzdale Water Company of the borough of Houtzdale, Clearfield County, Pennsylvania, and is for permission to obtain a new source of supply of water to the public in the borough of Houtzdale.

It appears that Houtzdale borough is a small mining community located in the south central part of Woodward Township on Beaver Run which flows easterly through about the center of the borough. Beaver Run is made up of numerous mountain streams which have their source in the southwest of Houtzdale about three miles. It takes a northerly and easterly course passing through numerous small mining settlements and at a point about four miles to the east of Houtzdale it empties into Moshannon Creek, which is a tributary of the West Branch of the Susquehanna River.

Houtzdale is about fifteen miles south of Clearfield borough, the county seat of Clearfield County, and has direct railroad connections with same, a branch of the Cambria and Clearfield Division of the Pennsylvania Railroad passing through the center of Houtzdale, as does the New York and Pittsburg Central Railroad.

The borough is divided into two sections. The northern or principal section is built on the side of the hill, the summit of which is about the northerly boundary of the borough. The natural drainage of this section is to Beaver Run. The southern section is also built on the slope, but not so severe as the other section. The natural drainage is also to Beaver Run.

The chief industry is the mining of coal. There are a few small mines scattered in the outskirts of the borough. The larger mines are scattered about the surrounding township. Within the borough limits the upper coal measures have been pretty generally worked out. It is probable, however, in the future, the lower measures will be worked, as the authorities are holding out inducements to operators.

The principal mining company is the Berwind, White Company. This concern employs probably six hundred men in various mines throughout the township. There are no manufacturing plants within the borough limits.

The population has been decreasing. In eighteen hundred and ninety it was twenty-two hundred and thirty-one, in nineteen hundred it was fourteen hundred and eighty-two and at the present time it is estimated to be about fifteen hundred.

There are three hundred and twenty houses in the borough of which eight have percolating cesspools, eight have private sewers and the remaining number have shallow privy vaults for the reception of sewage. The sanitary conditions are generally poor.

The water company serves two hundred and seventy-two houses, the remaining forty-eight obtain their water supply from wells or private springs. There are twenty-five wells in use at the present time. They are dug and are subject to surface contamination to a greater or less degree.

The Houtzdale Water Company was chartered August sixteenth, eighteen hundred and eighty-seven for the purpose of supplying water to the public at Houtzdale and in the vicinity. In eighteen hundred and eighty-seven, the Houtzdale Water Company drilled a well, built a frame pumping station, constructed a reservoir and laid pipes throughout the borough, and water has been served to the community from this source to the present date.

A remarkable circumstance is the fact that the pumping station, well and reservoir are located to the north of the borough in Woodward township on a summit which overlooks the borough.

The well which is within the pumping station, is drilled six hundred and fifty feet deep and consists of an eight inch pipe driven to a depth of four feet. In this casing there is a five inch suction pipe about three hundred feet long. The elevation of water is two hundred feet below the surface. In the pumping station there is a thirty-five horse power and one forty horse power tubular boiler and two forty horse power horizontal steam engines.

From the drilled well, water is pumped by an old type, Jericho suction pump which is operated by a beam connected with the steam engines through a series of cog wheels. This pump has a four and three-quarer inch plunger and a thirty-two inch stroke, makes twenty-eight strokes per minute, discharges four gallons per stroke or one hundred and sixty-one thousand, two hundred and eighty gallons per day and is operated continuously. From this pump the water enters the eight inch supply main and flows through the piping system to consumers, the surplus backing into the reservoir. In all, there are about four and one-half miles of eight inch pipe reducing to three inch cast iron pipe laid through the borough. The reservoir is of masonry construction and is located about fifty feet to the north of the pumping station, is fifty feet in diameter by eight feet deep, capacity ninety thousand gallons. The elevation is about one hundred and seventy-five feet above the business section of the borough.

There are a number of dead ends in the piping system but fire hydrants are placed on them for flushing as well as for fire protection. The maximum daily consumption is about ninety thousand gallons per day.

The water company proposed to build an intake dam on a small mountain stream distant about four and one-half miles south of the borough. The site is in Center County on Mountain Branch, so called, of Moshannon Creek, which forms the boundary line between Center and Clearfield Counties. From the proposed dam the water will flow by gravity through an eight inch wooden pipe and connect to the present eight inch supply main at Hanna and Charles Streets in the central part of the town. Water will then pass through the present piping system and the sulplus will enter the existing reservoir.

The proposed reservoir will be built in a natural ravine, the sides will be given a uniform slope of one to one, the bottom will be excavated with a gradual, descending grade to the breast. The breast is to be of masonry construction, two and one-half feet thick, and while not shown on the plan, is to have wing walls and also a spillway. A twenty-four inch pipe through the bottom will provide means for drainage. The depth of water at the breast will be five feet. The surface area of the reservoir will be about thirty-seven hundred and fifty square feet, the average depth about four and one-half feet, the capacity ninety-seven thousand five hundred gallons, and the elevation about two hundred and twenty-three feet above the business section of the borough and fifty feet above the present reservoir.

The present reservoir will be provided with float and check valves to prevent overflowing of the same from the new reservoir.

On August the twenty-fifth nineteen hundred and eight, on the day of the Department's inspection it was estimated that the flow in Mountain Branch was approximately two hundred thousand gallons per twenty-four hours. The watershed above the reservoir site has an area of about three square miles, is not populated, and is mostly barren, due to numerous forest fires.

It appears that the present deep well supply is strongly impregnated with sulphur and at times is not fit to drink, so the consumers report. The water is discolored and even has an offensive odor as well as taste. The company wishes to discontinue the well for this reason and also to save the cost of pumping. If the new supply is approved, the Pennsylvania Railroad Company will make use of the pure mountain supply, which will be an additional source of revenue.

Because Houtzdale borough is more or less honeycombed with old mine workings, there is a possibility that sewage from the borough may reach the underground waters so that an abandonment of the driven well supply would remove any suspicions of the possibility of sewage pollution.

It has been determined that the proposed new supply will not be prejudicial to public health and a permit is hereby and herein granted therefor under the following conditions and stipulations:

FIRST: That on or before December first, nineteen hundred and eight, the water company shall submit a plan of the watershed to the Commissioner of Health showing all the streams and public roads on the watershed.

SECOND. Gates shall be placed on the new supply main to the town to prevent the shutting off of the water at any time and facilities for flushing the pipe line at the low points shall be put in. All provisions shall be made on all dead ends and at low points in the town system to drain the pipes.

THIRD. If at any time the water works system or any part thereof or the source of supply, in the opinion of the Commissioner of Health has beome a menace or prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

FOURTH. The Water Company may extend its pipe lines from time to time as necessity may require, but at the close of each season's work plans of such extensions shall be made by the company and filed in the office of the Department of Health so that the Commissioner of Health may always be informed of the extent of the water works system and public use thereof.

FIFTH. Detail reports of the operation of the water works system may be required at any time by the Commissioner of Health and this permit is issued with the understanding and stipulation that such report shall be made whenever required by the Commissioner of Health.

The attention of the Water company is called to the fact that this permit relates only to its charter territory. If the company wishes to supply water beyond its charter territory, an application for right to do so should be made to the proper State authority. The Commissioner of Health is not empowered to extend charter privileges.

Harrisburg, September 25th, 1908.

HUMMELSTOWN, DAUPHIN COUNTY.

Hummelstown Consolidated Water Company.

This application was made by the Hummelstown Consolidated Water Company of Hummelstown, Dauphin County, and is for permission to extend its water works in the borough of Hummelstown to obtain an additional source of supply and for approval of plans for the filtration of the water so to be supplied.

It appears that on August sixteenth, nineteen hundred and seven, the Commissioner of Health issued a decree to the Hummelstown Consolidated Water Company relative to plans for the improvement of its source of supply of water to the public in the borough of Hummelstown, in response to an application duly made and bearing date of June thirteenth, nineteen hundred and seven. The conclusions of the decree were as follows:

"In view of all the circumstances, I have determined that the proposed improvements would be prejudicial to the public health, and I do hereby and herein withhold approval thereof.

"I beg to suggest and advise the said water company that it employ a competent engineer and work up the details of that water purification plant best adapted to the economies and necessities of the case, bearing in mind the various matters set forth in the above discussion."

In response to this advice the company has engaged an engineer, detail plans have been perfected and they are the ones which have been submitted and are now under consideration.

The charter of the Hummelstown Consolidated Water Company limits the territory in which the company can supply water to the public and corporations to the borough of Hummelstown so it appears. Hence that part of the company's application relative to the extension of water works into Derry and Swatara townships cannot be considered. Relative to this matter, however, it is to be noted that on August sixteenth, nineteen hundred and seven, the Commissioner of Health issued a decree to the Rutherford Heights Water Supply Company of Swatara Township, Dauphin County, relative to a plan for obtaining a source of supply from the Eastmere Water Company. It appears that on July twenty-second, nineteen hundred and seven, the Commissioner of Health had issued a permit to said Rutherford Heights Water Supply Company, which, among other things, specified, "that before the proposed water works system be constructed and used, detail plans thereof shall be prepared and submitted to and approved by the Commissioner of Health as provided by law, and among other things, said plan shall include designs for a water purification plant." But the Rutherford Heights Water Supply Company could not install a filter and get water to the public in the village of Rutherford Heights quick enough to supply the people living there and hence it asked temporary permission to take water from the Eastmere Water Company. The latter corporation was chartered in eighteen hundred and ninety-nine to supply water to the public in the village of Eastmere, Swatara Township, and the water is purchased of the city of Harrisburg at the city line. The conclusions of the said decree of August sixteenth, nineteen hundred and seven, were as follows:

"The Rutherford Heights Water Supply Company wishes to furnish a pure supply to Rutherford Heights at the earliest practicable moment and desires to do this under permission of the Commissioner of Health, but said Commissioner of Health is not empowered to grant a permit which will operate to extend the powers conferred by the charter of said water company. The Rutherford Heights Water Supply Company's charter provides that the company shall confine its source to the Swatara Creek at the place shown on the plan submitted by said Company and on file in the office of the State Water Supply Commission, March thirteenth, nineteen hundred and seven. Therefore, unless the

petitioners obtain a modification of the Company's charter, the Commissioner of Health cannot approve of any source except the Swatara Creek. However, the Commissioner of Health could entertain a petition for an extension by Eastmere Water Company of its pipe line to Rutherford Heights and this extension could be granted under the condition that it be within the charter rights of the Eastmere Water Company.

"Therefore, I hereby and herein decline to approve the plans of the Rutherford Heights Water Supply Company for the obtaining of a source of supply from the Eastmere Water Company.

"The petitioners have two courses open to accomplish the end desired. First, for the Rutherford Heights Water Supply Company to obtain a modified charter; second, for the Eastmere Water Company to apply for permission to extend its pipe lines to Rutherford Heights."

On October twenty-seventh, nineteen hundred and seven, the Rutherford Heights Water Supply Company secured an amendment to its charter and it now has a right to take water from the Swatara Creek at the same point and use the same intake which is in use by the Hummelstown Consolidated Water Company. Therefore, the said Rutherford Heights Water Supply Company, like any other corporation within the borough of Hummelstown, may purchase its water of the Hummelstown Consolidated Water Company, and this is the way in which it is intended to introduce filtered Swatara Creek Water into the territory covered by the charter of the Rutherford Heights Water Supply Company.

In a like manner the Eastmere Water Company of Swatara Township may, if it chooses, purchase water of the Rutherford Heights Water Supply Company of said township.

On December third, nineteen hundred and seven, the Progress Water Company was granted a charter for the purpose of supplying water to the public in the Township of Susquehanna, Dauphin County, more particularly in the villages of Progress and Pleasant View which lie in the east and are suburbs of Harrisburg, the source of supply to be from Swatara Creek, at the same point at which the Hummelstown Consolidated Water Company obtains its water, and at which the Rutherford Heights Water Supply Company proposes to obtain its supply.

Thus it is seen that the territory to which the water filtered by the Hummelstown Consolidated Water Company is to be supplied (by the proposed plant herein under consideration) practically comprises all of Susquehanna and Swatara Townships besides the borough of Hummelstown.

At the present time the Hummelstown Consolidated Water Company takes its water supply from Swatara Creek at a point just below the built up part of the borough. The water is pumped to a standpipe near the pumping station, distant about six hundred feet. There is a dam across the creek just above the highway bridge and this dam diverts the water into a penstock leading to a mill which is owned by the water company and used as a water power house and electric light plant. Water wheels, two in number, have a total capacity of about three hundred horse power. An auxiliary steam plant for electric lighting purposes has been provided. The tail race extends down stream about a quarter of a mile to the creek. The company owns the land between the tail race and the creek and also other land in the vicinity. On it near the bank of the creek the standpipe is located.

There are two pumps, one is driven by water power and one is an auxiliary steam pump used when water power is not available. The capacity of each pumping engine is about five hundred thousand gallons daily. The eight inch force main terminates in a stand pipe which is one hundred feet high and sixteen feet in diameter. The base of this stand pipe is about forty feet above the creek and level or slightly below the village. The stand pipe when full gives a pressure of approximately forty pounds in the village. It has a capacity of one hundred and fifty thousand gallons.

The borough water consumption is about two hundred and fifty thousand gallons ranging from two hundred thousand to three hundred thousand gallons daily. During a fire the pumps must be speeded up to meet the extra service. Thus the fire protection service is very poor.

About all of the citizens of the town use the public supply. There are a few private wells.

The Swatara Creek is a muddy and turbid stream and at times contains considerable culm or coal dirt. It is also subject to sewage pollution. The city of Lebanon is on the watershed.

The proposed improvements comprise a water purification plant, new pumping machinery, a storage reservoir and a new pipe line.

The purification plant is to consist of a sedimentation basin, mechanical filters, filtered water basin and accessories.

New pumping machinery is to consist of two triplex pumps, water power driven, each of a million gallons capacity when working against a pressure of one hundred and eighty pounds. These engines are to lift the filtered water into the new storage reservoir. A two million gallon low lift pump is to be provided to raise the creek water into the sedimentation basin. A wash pump of a capacity of two and three quarter million gallons per day against a twenty-five foot head is to be installed.

These pumps will be operated by water power. To provide against break downs or low water there is to be erected a two million gallon steam pump for auxiliary purposes.

The storage reservoir is to be located on a hill in Swatara township near Rutherford Heights. Its elevation will be about three hundred and seventy feet above the pumping station and its distance approximately three miles. The rising main is to be twelve inches in diameter. After this reservoir is constructed the present stand pipe in Hummelstown will be abandoned. The reason for going out in Swatara Township for the site of the new reservoir is that this is the most available site at a sufficient elevation to give ample pressure for improved fire service in Hummelstown borough.

The plans show a re-inforced concrete storage reservoir, circular, one hundred and eighteen feet in diameter, twelve feet deep to the flow line and divided into two compartments of equal size. Approximately this reservoir will hold one million gallons. It is to have a concrete roof. The side walls are so designed that in the future, if necessary, the walls may be nearly doubled in height.

The water is to be introduced at one end and taken out at the opposite end of each compartment, both being at the bottom of the reservoir. At the outlet end there is to a vertical pipe whose top will be the top of the high water mark in the reservoir. It will connect with the drain and thus serve as a safety valve to prevent the overflowing of the reservoir.

The raw creek water is to be lifted from the pool in a quiet place above the dam to a vertical height of about sixteen feet into the sedimentation basin at pump house but outside of it. This structure is to be built of re-inforced concrete open on top and is to comprise two compartments, each twenty feet wide and forty feet long at the bottom and slightly more at the top. The depth to the top of the walls is to be sixteen and five-tenths feet. The water level is to be six inches below the top. The approximate capacity of each compartment is one hundred thousand gallons. Thus when both compartments are in use a subsidence of two hours is provided when the plant is being operated at its normal capacity of two million gallons per twenty-four hours. There is opportunity for the addition of two other compartments in the future.

The chemicals, alum ordinarily and soda ash when the river is acid are to be introduced at the pump and will be fed by gravity from tanks in the boiler room. There are to be two solution tanks for the alum and one for the soda ash. The solutions are to be fed into an orifice box in which a constant level is to be maintained by means of a float and butterfly valve. The outflow is to be made by a graduated orifice arranged to be easily adjusted by the operator.

The chemically treated water is to be admitted to the subsidence basins at the top. The water will rise through a vertical pipe six inches in diameter to a height of three feet above the high level mark in the reservoir and flowing over the top of the pipe will fall upon a wooden platform and thus be sprayed and aerated. The top of the vertical pipe is to be fitted with a flange twenty inches in diameter provided to spray the water out. Three such aerators are provided at the inlet end of each compartment. The splash board will float on the water. Twenty feet from each inlet end is to be a baffle board across the compartment sunk to about mid-depth. The water is to be drawn from the outlet end at the surface through a fixed skimming pan eight feet long, fifteen inches deep and one to three feet wide. Water will flow over the edges of this pan, weir fashion, and thence through a twelve inch pipe to the main feed pipe to the filter, the latter to be sixteen inches in diameter. The head on the filter will be about four and one-half feet, measured from the high water level of the subsidence basin to the high water level on the filters. There is a pump in the centre of each compartment to the subsidence basin and the drainage is to be into the tail race by means of a twelve inch drain.

The filters are four in number, each fourteen feet long by thirteen feet wide with a rated capacity of five hundred thousand gallons daily. They are arranged in pairs on either side of the pipe gallery, the floor of which is covered with concrete on which the valve stands will be placed. Below in the gallery the influent, wash and drain pipe are to be placed and the regulating apparatus. The filters are to be partly roofed over by re-inforced concrete cover. The gallery and inner ends of the filters are to be enclosed within the building. Below the filters is to be a clear water basin made of concrete masonry twenty feet wide and thirty feet long with longitudinal partition walls supporting the inner ends of the filters and the pipe gallery. These walls will have openings through them. The capacity of this clear water basin is forty thousand gallons. This will be the pump well and thus a half hour pumpage will be on hand when the plant is operated at the two million gallon rate.

The sand in each filter is to be sharp fracture spherical grain, pure quarts sand, effective size about four-tenths millimeters with a uniformity of co-efficient of one and five-tenths. It is to have a depth of about thirty inches and rest on ten inches of gravel, ranging from a quarter to an eighth of an inch in diameter. This is to rest on the manifold system which is embedded in the concrete on the bottom of the filter and consists of an inch by twelve inch casting and two inch lateral pipes six inches apart and fitted with improved conical strainers six inches on centres.

There will be four feet of water on the sand at high water. The water is to be introduced on the filter through two parallel troughs, the head being maintained by a float and butterfly valve on the inlet pipe. The troughs are twelve inches wide, fifteen inches deep and semi-circular on the bottom and extend across the entire length of the filter and the lip of these troughs will be two feet above the sand line. The effluent from each filter will pass directly to the filtered water basin below, but there is to be a Norwood controller on each effluent pipe which will work under water and will be capable of regulation by means of which the speed at which the filter is operated may be regulated uniformly within certain limits.

The cleaning of the filter unit is to be accomplished by pumping filtered water back through the strainer system at a very high rate, probably six times the rate of filtration. It is expected that this high rate will prove as efficient as the combined air and water in common practice. The first filtered water after washing will be drained to the sewer which drain will also take the overflow pipe placed at the high water mark on each filter to obviate accident. The sewer will empty into the tail race which is to be directly below the clear water basin.

This tail waste is a new construction and is to be excavated from the present mill northerly a short distance to the creek in order to obtain the full benefit of the head to provide drainage facilities and to increase the head on the turbines. The walls of the clear water basin will be extensions of the walls of the new tail race and the space below the concrete bottom of the clear water basin which is to form the top of the new tail race underneath the filter plant will ordinarily be about two feet above the water line in the race. However, during flood and freshets the back water will rise nearly if not quite to the top of the clear water basin. Hence care must be taken that the filtered water well be constructed so as to make it water tight.

The layout is of modern design and well adapted to purify the Swatara Creek water provided chemicals are used and the plant be operated intelligently. However, the works should be constructed under the supervising direction of the expert who designed them or some one equally skilled in this branch of engineering.

The plant also to be operated for a period of twelve months under the supervising direction of the designer during which time the officers of the company or the attendants at the plant should be thoroughly schooled in the methods of operation and the adjustment of chemicals to the requisite treatment of the water in its varying quality.

The Hummelstown Consolidated Water Company purposes to sell filtered water to the three other water companies whose charters give them the right to take water from the same point in Swatara Creek. Approval of the plan would be withheld if these said three companies intended to take this water from the rising main or reservoir of the Hummelstown Consolidated Water Company in Swatara Township because the charter of said water company does not permit it to sell water in this territory. However, within the charter rights the proposed plans furnish a practicable scheme for the supplying of a pure and wholesome water to all of the villages and towns along the Philadelphia and Reading Railway between Hummelstown and Harrisburg.

It has been determined that the proposed improvement will not be prejudicial to public health and a permit is hereby and herein granted therefor and for the extension of the water works system in the borough of Hummelstown within the chartered rights of the Hummelstown Consolidated Water Company under the following conditions and stipulations:

FIRST: On completion of the proposed purification plant reservoir and other improvements the water company shall file with the State Department of Health complete and full detail plans of the same as built, showing all valves, pipes and appurtenances, together with any other information in connection therewith required by the Commissioner of Health.

SECOND: At the close of each season's work the company shall file a plan of the pipes laid during the year in the office of the State Department of Health, together with such other information in connection therewith as may be required by said Commissioner.

THIRD: The filter plant shall be operated under the responsible direction of the expert who shall erect the same for a period of twelve months in order that the water company's attendants may be afforded a reasonable time in which to become thoroughly schooled in the responsible duties of efficiently operating the water purification works. A full report of the intitial test of the plant shall be submitted to the Commissioner of Health and thereafter the water company shall assist the State Department of Health in making such tests of the plant from time to time as may be found desirable. If necessary, the Commissioner of Health may prescribe standards of efficiency and make regulations for the operations and maintenance of the plant and the entire water works system.

FOURTH: Weekly reports of the operation of the water works shall be kept on blank forms satisfactory to the State Department of Health and copies thereof shall be filed with said Department. If at any time in the opinion of the Commissioner of Health, the water works system, or any part thereof, or any water furnished thereby, has become defective, or inefficient, or prejudicial to public health, then such remedial measures shall be adopted by the water company as the Commissioner of Health may advise or approve.

FIFTH: The introduction of raw creek water into the street main system or anywhere, except into the filter plant, is absolutely prohibited. The plant being operated continuously and the storage on the hill being one million gallons, necessity does not exist for an emergency connection between the pumps and the street main, more especially since there is duplicate pumping machinery. The interests of the public health demand that all connections now in existence by means of which raw creek water is delivered to the water works system shall be absolutely cut off and put out of commission, when the improvements herein approved have been installed.

SIXTH: There shall be an attendant at the filter plant whenever the same is in operation.

SEVENTH: The drainage from the filter plant shall, if ever required by the Commissioner of Health, be otherwise disposed of than into the creek.

Harrisburg, Pennsylvania, January 16th, 1908.

JOHNSTOWN, CAMBRIA COUNTY.

Mr. Jerry Alwine.

This application was made by Jerry Alwine of Johnstown city, Cambria county, Pennsylvania, to construct water works and supply water to the public in that part of the Eighth Ward of Johnstown City formerly comprising the Borough of Roxbury.

It appears that that part of the Eighth Ward of Johnstown City which was previously the borough of Roxbury and which contains the straggling residential settlement still known by that name on the outskirts of Johnstown, is in the extreme southwestern part of the city in the valley of Stony Creek, which rises to the south in the Allegheny Mountains in Somerset county and follows a general northerly course to a point about two miles below and north of the Eighth Ward, where it joins the Little Conemaugh River in the heart of Johnstown forming the Big Conemaugh River. North of Roxbury is Grubtown, also in the Eighth Ward, while to the south is Ferndale borough and to the west Upper Yoder township.

It is the general practice in Roxbury to dispose of sewage in common privies and perhaps in a few cesspools and by discharging waste water into the street gutters. Previous to the installation of the water works under consideration, the entire domestic water supply was obtained from wells, most of which were dug. Many of these wells, it is reported, dry up during hot weather.

During the summer of nineteen hundred and eight the Johnstown Water Company installed in Roxbury a pumping station, distributing tank and about two miles of distributing pipes, in order that it might commence in the fall of nineteen hundred and eight to furnish water pumped from its low service mains for the use of the inhabitants of Roxbury.

Cherry Run rises about a mile west of Roxbury in Upper Yoder township and flows easterly in a deep ravine to the settlement, through which it follows a northerly course parallel to Stony Creek but separated therefrom by a distant hill. The run finally enters Stony Creek through Grubtown.

The water works for which a permit is asked have already been installed and water was supplied to the public thereby during the summer of nineteen hundred and eight, the applicant at that time being ignorant of the necessity of obtaining a permit. The principal supply is obtained from a spring which is located high on the southern slope of the ravine of Cherry Run and just southwest of the settlement of Roxbury, two hundred feet south of Joseph street, in Upper Yoder township. The spring is within a few hundred feet of the crest of the hill and less than one hundred feet below it. A field on the summit may be either cultivated or used as a pasture, but there are no buildings of any description above the spring, which is in a grove and surrounded by an acre of ground owned by the petitioner. The surface formation is sandstone. The water from the hillside above is to be diverted from the spring by means of a ditch.

A slight excavation has been made in the hillside around the spring and the face of this excavation has been walled up. Immediately in front of this wall is a water-tight masonry tank about nine feet square by three and one-half feet deep, with a frame roof. Adjacent to this tank is a water-tight masonry reservoir, twenty feet wide, fifty feet long and five and one-half feet deep, also covered with a frame roof. In the bottom of the tanks are two two inch flush pipes and there is also a two inch flush pipe leading from the bottom of the reservoir at the southeastern corner. At present the water from the spring is piped directly into the reservoir, but when the arrangements are completed a pipe will convey the water from the spring to the small tank provided to catch any sediment and from the tank the water will overflow into the southwestern corner of the reservoir. From a point in the southeastern corner of the bottom of the reservoir close to the drain pipe a two inch supply pipe protected by a sieve extends northeasterly through private property and across the city line about five hundred feet, into Derby street of Roxbury. This system includes about three thousand feet of two inch and one and a quarter inch galvanized iron pipe. There is a

valve at the reservoir, so that the supply may be shut off. Although no blow-offs for the draining of the pipe system have been installed, it is understood that the applicant intends to place such blow-offs in the pipe lines at low points. Water is furnished to, about thirty dwellings, perhaps a population of one hundred and fifty, less than half the total population in this little district. A one inch pipe is to lead from the northeastern corner of the reservoir and furnish water to several dwellings on Joseph street within three hundred feet of the reservoir.

The applicant reports having obtained from the Mayor of the City of Johnstown such permits as were necessary for laying the pipes in the streets. He has no franchise from the city for supplying water to the public.

The petitioner has a second spring eight hundred feet southwest of the Joseph Street Spring and just south of Berkley Street, also in Upper Yoder township and in the head of a small ravine which opens northeasterly into the valley of Cherry Run. During the summer of nineteen hundred and eight water was furnished from this spring through a one and a half inch pipe about fourteen hundred feet long to Roxbury Park, a summer amusement resort immediately south of Roxbury in Upper Yoder township.

The land above the spring is under cultivation. There is one dwelling owned by a Mr. Harry Berkley, on the summit of the divide between this valley and the next valley to the south. From this dwelling domestic waste water is discharged on to the surface of the field about four hundred feet above the spring. However, the surface wash will carry this sewage and the drainage from the public road past the spring which is south of the bottom of the ravine.

At present the spring flows from the steep hillside into an open water-tight masonry reservoir, twenty-seven feet by thirty-one feet in plan and seven feet deep. The one and a half inch supply pipe to the park leads from the bottom of the reservoir being protected by a sieve. A two inch drain pipe also leads from the bottom of the reservoir. It is proposed to wall up the spring and put a roof on the reservoir and protect both of them from surface wash. It is further proposed to lay a suction pipe from this reservoir to a pump to be located in a slaughter house owned by the petitioner just below the spring and to lay a one and a half inch force main from this pump to the Joseph Street reservoir, so that both springs may be used to furnish water to this latter reservoir and the distributing system supplied thereby. This Berkley Street spring is located in the upper end of a ten acre tract owned by the petitioner.

The water to be obtained from these springs after the completion of the arrangements for their protection from surface wash should almost unquestionably be pure and of a good quality. Although up to the time of the Department's investigation on September tenth, nineteen hundred and eight, the Joseph Street Spring had furnished and adequate supply to all the consumers dependent upon this source while many other sources in the vicinity had failed, it does not seem that a much greater population could be safely dependent upon this source, even when augmented by pumping water from the Berkley Street Spring. Probably the water works will not be greatly extended. It appears that the local wells furnish an inadequate supply of water and are also suspicious sources in view of the practice of disposing of sewage in privies and on the surface of the ground. It does not appear that the Johnstown Water Company's having extended its mains into Roxbury is any reason for denying a permit for the construction of the water works herein considered.

It has been determined that the water works and the sources of supply will not be prejudicial to public health, and a permit is hereby and herein granted therefor under the following conditions and stipulations:

FIRST: No more water shall be furnished to the public from the Berkley Street reservoir until it has been roofed over, the spring walled up and protected from chance or malicious pollution and both the spring and the reservoir adequately protected from surface wash.

SECOND: The petitioner shall cause inspections to be made of the areas on the hillsides above the two reservoirs as often as necessary and shall immediately inform the Department of the erection and occurrence of any possible source of pollution on either of these water sheds, and of the disposal of the sewage at the house above the Berkley Street reservoir becoming a menace to this source of supply, if such should ever be the case.

THIRD: When it is desired to install the pipes and pump, to force the Berkley Street water into the Joseph Street reservoir, complete plans of the pipe lines, pumping station and connections shall be filed with the Commissioner of Health. At the end of each season's work plans and such other information as may be required showing the extensions of the distributing system made during the year shall be filed with the Commissioner of Health in order that the said Commissioner may be always fully informed of the extent of the water works and its use.

FOURTH: On or before January first, nineteen hundred and nine, blow-offs shall be installed at low points in the pipe system, by means of which, if necessary, all the water may be drained from the pipes, and a plan showing the locations and sizes of these blow-offs shall be filed with the Commissioner of Health

FIFTH: It is the intention of the Department to collect samples of water for analysis from time to time from the various parts of the water works and the petitioner shall render such assistance in this work as may be necessary.

SIXTH: Detail reports of the operation of the water works shall be kept on blank forms satisfactory to the Commissioner of Health and copies thereof shall be filed with the said Commissioner of Health.

SEVENTH: If at any time the water works or any part thereof or the water supplied thereby shall become prejudicial to the public health. then such remedial measures shall be adopted and enforced as the Commissioner of Health may approve, suggest or advise.

EIGHTH: It is expressly stipulated that the petitioner in conducting his business and extending his water works shall comply with the provisions of all laws pertaining thereto.

Harrisburg, Pa., October 15th, 1908.

JOHNSTOWN, CAMBRIA COUNTY.

Johnstown Water Company.

This application was made by the Johnstown Water Company of the City of Johnstown, Cambria County, and is for permission to extend its water-works system and to obtain an additional source of supply.

It appears that the city of Johnstown is located on the main line of the Pennsylvania Railroad, twenty-five miles west of the great divide between the Susquehanna River and the Ohio River basins at the junction of the Little Conemaugh River and Stony Creek. These streams form the Big Conemaugh River which flows westerly from Johnstown into the Kiskiminetas River, the latter emptying into the Allegheny River at Freeport borough, Westmoreland county.

Johnstown is a thriving manufacturing community, the home of the Cambria Steel Company. While there are numerous other manufacturing plants in the locality, the manufacture of iron and steel and the mining of coal, principally of the Cambria Steel Company, constitute the most important enterprise. The city is on the western edge of the Cambria-Somerset district of the upper bituminous coal measures. Johnstown had a population of twenty-one thousand, eight hundred and five in eighteen hundred and ninety; thirty-five thousand, nine hundred and thirty-six in nineteen hundred and has about sixty thousand at present. The community centering around Johnstown comprises a considerably larger area than the city itself. In the surrounding boroughs and townships there are probably twenty thousand people, considerably scattered, due to the peculiar topography.

The Big and Little Conemaugh and Stony Creek are in deep, steep sided valleys. The Little Conemaugh enters the city from the northeast, having its source near the summit of the Allegheny Mountains and draining a very rugged, mountainous area. Stony Creek rises in the Allegheny Mountains to the south in Somerset county and flows northerly to its junction with the Little Conemaugh in Johnstown. The valley of the creek in the city and for a short distance above has a comparatively wide, flat and low lying bottom. The Big Conemaugh River flows out of the city to the northwest in a rugged valley similar to that of the Little Conemaugh. It is in this valley along the banks of these two streams that the main line of the Pennsylvania Railroad winds from the east westerly toward Pittsburgh. The works of the Cambria Steel Company extend throughout the city from east to west, also in the valley of the Big and Little Conemaugh Rivers, in places on one bank and elsewhere on the other. A private railroad of the company connects the various parts of the works and its neighboring coal mining operations.

The old town, now the business section, comprising the first, second, third and fourth wards of Johnstown, is located on the flat ground in the fork between Stony Creek and the Little Conemaugh. To the south across Stony Creek, are the fifth and sixth wards known as Greenville. West of these districts on a high bluff, is Westmont borough, a residential district reached by an incline plane. Further up Stony Creek on its eastern bank, is the seventh ward of Johnstown, known as Hornerstown. East of this, on the hillside and the summit above are the small boroughs of Dale and Daisytown. Further up-stream, west of Stony Creek, is the eighth ward of Johnstown, consisting of Grubtown, adjacent to the stream, and further to the south Roxbury, originally a borough by that name. Beyond Roxbury along Stony Creek is the borough of Ferndale. Opposite these places on the east bank, is the seventeenth ward of Johnstown known as Moxam. Stony Creek follows a tortuous course between these wards and boroughs. Upper Yoder township lies to the west of this district and Stony Creek township to the east.

In the valley of the Little Conemaugh on the south bank of the stream and east of the business district are the Ninth and Tenth Wards of Johnstown, originally Conemaugh borough and still known as such. Northeast of this district across the stream is the eleventh ward, known as Woodvale, and still further upstream

are the boroughs of East Conemaugh and Franklin respectively on the north and south banks of the Little Conemaugh River. These wards and boroughs in the valley of the Little Conemaugh are bounded on the north and south respectively by East Taylor and Conemaugh townships. The twelfth and thirteenth wards known as Prospect are on the north bank of the Little Conemaugh opposite the business district and junction of the streams and extend up the hillside. To the north of Prospect is the small borough of Rosedale in the valley of Hinckston Run.

Below Prospect in the valley of the Big Conemaugh on its southern bank are the fifteenth and sixteenth wards of Johnstown, known as Cambria City and across from them on the north bank is the fourteenth ward Minersville. Further up stream are the eighteenth, nineteenth and twentieth wards, known as Morrellville on the southwestern bank of the river and in the valley of St. Clair Run, and the twenty-first ward, Coopersdale on the northeastern bank. The wards in the valley of the Big Conemaugh are bordered on the north by West Taylor township and on the south by Lower Yoder township.

The city is more or less completely sewered by public, combined sewers receiving both sewage and storm water and discharging into the various streams. Above the city these streams are contaminated by mine drainage and are yellow in appearance. The river below the city is foul and blackish because of the sewage and industrial wastes discharging into it.

The Johnstown Water Company was incorporated by an Act of the General Assembly entitled "An Act to Incorporate the Johnstown Water Company" approved April eleventh, eighteen hundred and sixty-six (P. L. seven hundred and twenty-three) and letters patent of the Commonwealth were issued to it June fourteenth, eighteen hundred and sixty-seven and July thirty-first, eighteen hundred and eighty-eight upon the Water Company accepting the constitution of the Commonwealth and the Corporation Act of eighteen hundred and seventy-four. The purpose for which the company was chartered is the introducing from some convenient source a sufficient supply of pure, wholesome water into the boroughs of Johnstown, Conemaugh, Millville, Prospect, Cambria and vicinity in Cambria county, Pennsylvania. All these boroughs are now parts of the city of Johnstown. The Johnstown Water Company, upon its organization, took over the water works of the older Johnstown Water and Gas Company.

The Stony Creek Water Company was incorporated September seventh, eighteen hundred and eighty-eight to supply water for the public at Moxam in Stony Creek township and to persons, partnerships and associations residing therein and adjacent thereto as may desire the same. The Johnstown Water Company is reported to have purchased all the property, stock and franchises of the Stony Creek Water Company about eighteen hundred and ninety.

The Manufacturers Water Company was incorporated February nineteenth, nineteen hundred for the supplying of water for commercial and manufacturing purposes. This is still an independent company.

The Morrellville and Cambria Borough Water Company was incorporated October eleventh, eighteen hundred and eighty-eight for supplying water to the public at the borough of Cambria and surrounding township of Lower Yoder and to persons, partnerships and associations residing therein or adjacent thereto as may desire the same. This company furnishes water to about three thousand consumers among the seventeen thousand inhabitants of the fifteenth, sixteenth, eighteenth, nineteenth and twentieth wards of Johnstown and to several industrial establishments. The sources of supply are Struyer Run, a tributary of St. Clair Run, and a drilled well near the intersection of Chandler Avenue and F Street in the district known as Morrellville. This is also an independent company.

The Eighth Ward Water Company of Johnstown, Pennsylvania, was incorporated April seventeenth, nineteen hundred and six for the supply of water to the public in that part of the eighth ward of the city of Johnstown formerly constituting the borough of Roxbury. This company has as yet, installed no works and is reported to have no prospective supply or intention of becoming active.

A private individual, Jerry Alwine, is supplying water for domestic purposes to about one hundred and fifty consumers in that part of the eighth ward known as Roxbury, and his system has been approved by the Commissioner of Health. The sources of supply are neighboring springs.

Quite a number of drilled wells in the heart of the city are used as sources of water supply by industrial establishments, hotels and stores, and there are many individual wells both dug and drilled still in use in the outlying districts, particularly in the higher parts, to many of which the mains of the Johnstown Water Company do not extend.

The Johnstown Water Company obtains its supply from six tributary surface streams widely separated in the three valleys radiating from Johnstown, one of these sources, Salt Lick Run, being the subject of one of the applications herein considered. The dams from which the waters of these various streams are taken vary from mere intakes to an impounding dam of one hundred and thirty million gallons capacity. The various sources are Mill Creek, Dalton Run, St. Clair Run, Wild Cat Run and Salt Lick Run, and the intakes are at an average distance of five miles from the center of Johnstown. An auxiliary supply may be and has been obtained from the Manufacturers Water Company both from Hinckston Run and Stony Creek.

Mill Creek a tributary of Stony Creek furnishes one of the principal and oldest supplies. On it, southwest of Johnstown, are two impounding dams in Upper Yoder township, the lower with a capacity of thirty-two million gallons, the upper ninety-seven million gallons. The lower dam is used only as a last resort, being too low to furnish water at a satisfactory pressure. The watershed above the upper dam is about four square miles, perhaps five square miles above the lower dam, all in Upper and Lower Yoder townships. The country is very hilly and largely wooded, and on the drainage area there are eight or more farmsteads with a population of perhaps sixty persons.

The twenty-four inch pipe from the lower reservoir is reduced after a short distance to a twenty inch pipe which extends in the valleys of Mill Creek and Bens Creek and Stony Creek, of which the former are tributaries, about three miles to the city line. In the southern part of the city this main is divided into a twelve inch and a sixteen inch main which extend to the central part of the city respectively on the west and east sides of Stony Creek. A thirty-six inch pipe line half a mile long connects the upper Mill Creek Reservoir with the twenty inch main from the lower.

Dalton Run, appropriated subsequently to the Mill Creek supply, now furnishes much of the city's water. On it, southwest of Johnstown and beyond Mill Creek, is a one hundred and thirty million gallon impounding reservoir in Conemaugh township, above which reservoir is a hilly, largely wooded watershed of four or five square miles in Conemaugh and Upper Yoder townships. In this drainage area there are said to be at least eight farmsteads and a population of perhaps sixty persons. From this reservoir a twenty inch pipe line extends in the valleys of Dalton Run and Bens Creek of which Dalton Run is a tributary, about three miles to its point of connection with the pipe from Mill Creek where said pipe emerges from the valley of Mill Creek into the valley of Ben's Creek.

St. Clair Run a tributary of Big Conemaugh furnishes a considerable supply to the western part of Johnstown. On it, west of the northern part of the city, is a dam with a capacity of fifteen million gallons in Lower Yoder township, above which dam there is in Lower and Upper Yoder townships, a largely wooded, hilly watershed of about five square miles very similar to the sheds of Dalton Run and Mill Creek. A twelve inch pipe line extends from this dam about a mile in the valley of St. Clair Run to the city line, and thence two miles or more along the south side of the Conemaugh River through Johnstown to the heart of the city, the system being intimately connected with that fed by Mill Creek and Dalton.

Laurel Run and Wild Cat Run tributaries of Big Conemaugh furnish the remainder of the supply to the western part of the city. On Laurel Run north of the western part of the city and in West Taylor township, is a nine million gallon reservoir above which, in West Taylor and Jackson townships, is a largely wooded, hilly watershed of about eighteen square miles, upon which there are reported to be thirty farmsteads and dwellings, about ten within one-half mile of the reservoir. Three or four dwellings particularly menace the supply, being less than one-fourth of a mile above the reservoir and, with their outbuildings, line both banks of a small tributary.

A sixteen inch pipe line extends from this dam about eighteen thousand feet in the valleys of Laurel Run and the Conemaugh River to Coopersdale, the twenty-first ward. The sixteen inch pipe continues up the northern bank of the Conemaugh River through the twenty-first ward and West Taylor township into Minersville, the fourteenth ward. Here a twelve inch pipe was laid across in the bed of the Conemaugh connecting the Laurel system with the St. Clair Run system at the foot of Third Avenue in the fifteenth ward. The connection was made in nineteen hundred and seven.

On Wild Cat Run, a tributary of Laurel Run, there is in West Taylor township, a small intake dam from which a pipe line connects with the one from Laurel Run and above which in West Taylor and Jackson township, is a wooded watershed of about two square miles, on which there are reported to be but one or two habitations.

Salt Lick Run was used as a source of supply by the Johnstown Water Company in the fall of nineteen hundred and seven. There is a small intake dam on the run about one-fourth of a mile north of its junction with the Little Conemaugh River. A six mile, twenty inch pipe line in the valley of the Little Conemaugh conveys the water into Johnstown.

The distributing system in the valley of Stony Creek, fed principally from Mill Creek and Dalton Run, covers pretty completely this part of Johnstown and also extends eastward from that part known as Hornerstown into Dale borough and Walnut Grove village in Stony Creek township. There are also a few distributing pipes in Ferndale borough. At the foot of the bluff west of that part of the city known as Greenville is a pumping station which takes water from the distributing system in the said Greenville district through a six inch suction pipe and forces it through an eight inch force main eighteen hundred feet long to a distributing reservoir on the bluff in the southeastern part of Westmont Borough, which is supplied with water from this reservoir. The Water Company also maintains a pumping station in the district known as Prospect, at the foot of the hill north of the Little Conemaugh and opposite the business section. The suction is a four inch pipe connected with a twelve inch main laid across the

Little Conemaugh in its bed from the central part of the city. This pumping station forces water from the low service distributing system through a force main of four inch, six inch and ten inch pipes twelve hundred feet long, to a small distributing reservoir known as the Lower Prospect Reservoir. There is also a force main from this pumping station composed of nineteen hundred feet of six inch to eight inch pipe leading to the Upper Prospect reservoir. From these two reservoirs water is furnished to Prospect. During the summer of nineteen hundred and eight a pumping station was erected by the Johnstown Water Company at the foot of the hillside in the western part and that part of the eighth ward, previously Roxbury. The pumping station is reported to have a capacity of two hundred and sixty thousand gallons per twenty-four hours. It is intended to put the pumping station in operation in the fall of nineteen hundred and eight. Water will be taken from the low service distribution system and forced into a seventy-seven thousand gallon tank on the hill west of the pumping station from which tank it will be distributed through about two miles of four inch, six inch and eight pipe laid during nineteen hundred and eight in the built-up part of Roxbury in the eighth ward of Johnstown.

The distributing system in the valley of the Big Conemaugh, fed principally by St. Clair Run, Laurel Run and Wild Cat Run, is reported to be restricted practically exclusively to the territory within the city.

The distributing system in the valley of the Little Conemaugh is not so extensive as those in the other valleys, and is reported to be restricted within the city limits. Therefore, a considerable part of the supply brought through this valley by the twenty inch pipe from Salt Lick Run is probably furnished to the distributing systems supplied more directly from the other sources.

There are fire plugs throughout the distributing system and also quite a number of blow-offs by means of which the pipes may be more or less completely flushed out. Facilities are also provided for more or less effectively flushing the reservoirs.

Stony Creek furnishes a supply to the Manufacturers Water Company. From the intake dam on the creek at Border Station of the Rockwood and Johnstown Branch of the Baltimore and Ohio Railroad in the valley of Stony Creek, a thirty-six inch pipe line extends seven miles down stream to the heart of Johnstown, the lower part of this pipe line paralleling the pipe line from Dalton Run and Mill Creek. There is a cross connection and controlling valve between this thirty-six line and the twenty inch Mill Creek line in Ferndale just south of Johnstown and a similar connection and valve between the Stony Creek pipe and the sixteen inch branch of the Mill Creek pipe line in Hornerstown at the corner of Cherry and Horner Streets. One or both of these connections may be and have been used to furnish Johnstown with Stony Creek water upon the other sources failing because of drouth. The watershed of Stony Creek above the dam at Border Station has an area of three hundred and thirty square miles supporting a population of about thirteen thousand, two hundred and twenty-five, in parts of ten townships and two boroughs, all in Somerset county. There are also thirty mining operations along the streams, and the creek above the intake has the appearance of being polluted with mine drainage.

During the summer of nineteen hundred and eight Johnstown and its vicinity experienced a drought unprecedented in the history of the water company. During July, the storage of the Water Company was seriously depleted, due to lack of rainfall. On July thirty-first what water remained in the Dalton Run reservoir was flushed out and wasted and on August second the flow of the stream was turned into the pipe line. It became apparent that the resources of the Johnstown Water Company would be exhausted.

Instead of resorting to Stony Creek water, as in previous droughts, the Water Company made an agreement with the Cambria Steel Company for the use of the water of Hinckston Run. Northeast of the city on this run, which is here the boundary line between West Taylor and East Taylor townships, is a one billion gallon reservoir above which the run has a drainage area of ten and nine-tenths square miles supporting a population of about seven hundred. Although there are considerable wooded areas, the greater part of the territory is under cultivation. The reservoir is reported to have a depth of seventy-five feet and on September eleventh at the time of the Department's investigation, the depth of the water remaining in the reservoir was about fifty-three feet, at which depth it is reported to hold about five hundred million gallons. The Cambria Steel Works was reported to be drawing but a small quantity from the reservoir at the time, and it was estimated that the water stored would last the city for a period of six weeks at least, if rainfall did not bring relief from the drought. A twenty-four inch pipe line extends from the dam down the valley of the run through Rosedale Borough and enters the city in Minersville. Here there is a sixteen inch connection with a valve between this pipe line and a sixteen inch pipe line of the Cambria Steel Company which is in reality an extension of the sixteen inch pipe line from Laurel Run and which extends from Minersville upstream along the northern bank at least to a point opposite the ninth and tenth wards, the district known as Conemaugh Borough where there is a connection across the river into these wards. On September second, nineteen hundred and eight, under the agreement between the Water Company and the Steel Company, the water from Hinckston Run was turned into the Water Company's mains. This was done by opening the valve in the sixteen inch connection between the twenty-four inch

pipe from Hinckston Run and the sixteen inch pipe along the northern bank of the river, which is part of the system supplying the Steel Company. The ninth and tenth wards distributing system was connected by a ten inch temporary pipe with the pipe of the Steel Company which, as already mentioned, here crosses the Little Conemaugh from the sixteen inch main on the north bank. By means of a twelve inch temporary connection, this same sixteen inch main was connected with the twelve inch pipe which crosses the Little Conemaugh from the central part of the city and furnishes the supply to the four inch suction of the Prospect Pumping Station and also to a small settlement called Millville on the north river bank at the foot of the hill on which Prospect is located. Moreover, the sixteen inch main of the Steel Company being a continuation of the sixteen inch main from Laurel Run, the water from Hinckston Run was for a time turned into the distributing systems of the western part of the city both north of the river and also south of the river, by means of the twelve inch connection crossing the Big Conemaugh at Third Avenue, Cambria City. However, it was found that the water from Hinckston Run was supplied at such a pressure that it backed up and filled the Laurel Run reservoir so that on September fifth the Hinckston Run supply was shut off from the entire western part of the city except in so far as it might find its way into these districts through the central part.

On September third, nineteen hundred and eight the water remaining in the Upper Mill Creek reservoir was flushed out and wasted and on September fifth the stream flow was turned into the pipe line. At night-fall the upper Mill Creek reservoir was shut off and the stream in the lower Mill Creek reservoir which was empty but had not been flushed out, was turned into the pipe line.

It was reported at the time of the Department's investigation in September, that practically only the streams flow was being obtained from St. Clair Run but the reservoir had not been flushed out.

On September eleventh, nineteen hundred and eight, it was reported that the daily supply furnished by the Johnstown Water Company consisted of about four million, five hundred thousand gallons from Hinckston Run, about one million gallons from Dalton and Mill Creek together and about one million five hundred thousand gallons from Salt Lick Run, and that Laurel Run, Wild Cat Run and St. Clair Run together were furnishing a fairly plentiful supply to the western part of the city.

The application of July first nineteen hundred and five states in part as follows:

"By reason of the growth in population and the largely increased consumption of water in the district which it was incorporated to supply, the said Water Company has found it necessary from time to time to enlarge its works and increase its source of supply, and for the same reasons it is now necessary to further increase its works and sources of supply—the population now supplied by said Water Company aggregating approximately sixty thousand.

"Said Water Company has not at the present time a sufficient supply of pure and wholesome water, and for the purpose of meeting the increased demands upon it for supply of water, it duly and legally appropriated the waters of Salt Lick Run in East Taylor and Jackson townships, Cambria county, Pennsylvania, on the fourteenth day of September, 1904, and located its reservoir on said run in East Taylor Township. On the nineteenth day of September, 1904, said water Company filed its bonds in the Court of Common Pleas of Cambria county in condemnation proceedings of said stream of water and the riparian owners affected thereby, which bonds were duly approved by the Court and certain work in the way of surveys and the sinking of test pits on said stream at the site of the proposed reservoir has been prosecuted by said Water Company, and the said Water Company now wishes to actively begin the construction of said reservoir and its works on Salt Lick Run.

"Salt Lick Run is a mountain stream whose watershed is quite sparsely populated and whose waters are exceptionally pure, wholesome and palatable."

On Salt Lick Run, one quarter of a mile above its junction with the Little Conemaugh River, about six miles northeast of Johnstown, is a small intake dam in East Taylor township just above the village of Mineral Point. Above the intake the run has a drainage area of eleven and four-tenths square miles in East Taylor, Jackson, Cambria and Croyle townships. From a detailed sanitary inspection made by the Department in nineteen hundred and seven, it appears that there are in this drainage area thirty-six farmsteads and a population of one hundred and ninety-eight, and about four hundred domestic animals. Many verbal orders were given and four written orders, issued by the Commissioner of Health, were served for the abatement of menaces to the purity of the streams. About half the drainage area is under cultivation, the upper half near the sources of the streams, and here are located practically all of the habitations for the most part close to the sources. At least the lower two miles of the course of the run is through uninhabited, wooded ravines. The surface formation is sandstone and shale and very hilly.

Lumbering operations will probably be carried on on the drainage area for several years to come, although the saw mill to which most of the lumber is taken is below the intake. One of the Argyle Mines of Coulter and Huff, Greensburg, Pennsylvania, has four openings on the shed near the head of Custer Run. Drainage flowing from three of these and pumped from the fourth is

conducted in a cemented, terra cotta pipe line about two miles in length and discharged several hundred feet below the intake of the water company. This arrangement was brought about through a provisional clause in the deed or lease by which the mine operators acquired their rights from the Cambria Steel Company. Under date of February fifth, nineteen hundred and seven, the President of the Johnstown Water Company petitioned the Department to investigate and take such action as the interests of the public health might demand relative to the proposed opening of a mine and building of a village on the watershed by the Pennsylvania Coal and Coke Company. These proposed operations have not proceeded further than the digging of test pits about two miles above the intake and it is not known that it is intended to proceed further in the near future. Practically the whole shed is underlain by coal. The Cambria Steel Company is reported to to own about one-third of the mineral, the Pennsylvania Coal and Coke Company probably the majority of the mineral and about one square mile of surface area.

A twenty inch pipe extends from the intake on Salt Lick to the valley of the Little Conemaugh and in this valley about six miles to the eastern part of Johnstown where it is connected with the distributing system of the eleventh ward. The Manufacturers Water Company originally used the lower part of this line to convey water from a dam on the Little Conemaugh River, but this dam has been abandoned and the connection to it is reported to have been removed.

A large impounding dam is proposed to be erected near the site of the present intake on Salt Lick Run in the near future, just when has not been determined. It is intended to extend the main from the eastern part into the heart of the city.

The application of June twenty-second, nineteen hundred and seven, stated in part as follows:

"By reason of the growth in population and the largely increased consumption of water in the district which it was incorporated to supply, the said Water Company has found it necessary from time to time to enlarge its works and increase its source of supply, and for the same reasons it is now necessary to further increase its works and sources of supply—the population now supplied by said Water Company aggregating approximately 70,000.

"Said Water Company has not, at the present time, a sufficient supply of pure and wholesome water to meet the demands of the public furnished with water by its system, and for the purpose of meeting such increased demands upon it, it did on the fifth day of November, nineteen hundred and two, duly and legally appropriate by survey and resolution seven million gallons of the water of North Fork of Ben's Creek in Conemaugh township, Somerset county, Pennsylvania, and located a reservoir on said North Fork in Conemaugh township at a point nine hundred and ninety-five feet below the entrance of Alwine's Run into said North Fork: and the said Water Company since its said appropriation has legally acquired the tract of land upon which said reservoir was located and is to be constructed; that the said Water Company has in the meantime done certain work in connection with said reservoir such as the sinking of test pits, etc., and it now wishes to actively begin the construction of said reservoir and the laying of its pipe leading from said reservoir to the City of Johnstown. (A certified copy of the resolution adopted by said Water Company November 5, 1902 and the map accompanying said resolution is hereto attached and made part hereof).

"The said North Fork of Ben's Creek is a mountain stream whose water shed is sparsely populated and whose waters are pure, wholesome and palatable."

The resolution of the Board of Directors of the Johnstown Water Company providing for appropriating seven million gallons daily of the water of said north fork of Ben's Creek estimates the quantities to be contributed by the three main branches of the stream above the intake as follows:

North Fork of Ben's Creek three million, five hundred thousand gallons daily.
Alwine Run, two million, four hundred and fifty thousand gallons daily.
Lick Run, one million and fifty thousand gallons daily.

These figures probably represent pretty closely the proportions of the total stream flow contributed by the branches.

The North Fork of Ben's Creek is in Somerset county southwest of Johnstown and beyond Mill Creek and Dalton Run. Above the site of the proposed intake which is in Conemaugh township, Somerset county, the stream has a drainage area of nine and seven-tenths square miles in Conemaugh and Jenner townships, Somerset county and Upper Yoder township, Cambria county. The surface formation is sandstone and shale. The Johnstown Water Company owns between one hundred and two hundred acres at the site of the proposed intake which is about seven thousand feet above and west of the junction of the north and south forks of Ben's Creek. Laurel Hill, a high, well defined ridge dividing Somerset and Westmoreland counties, is the northwestern boundary of the watershed.

Alwine Run, the most northern of the three branches of the streams above the intake, rises from two sources on the slope of this ridge, whence the streams flow through deep valleys, mostly wooded. On this drainage area there are six or eight farms, some on the cultivated plateaus above the valleys and some along the streams.

North Fork, the central and principal branch of the stream, rises from two sources, also in the wooded mountain side, and from these sources streams flow through the wooded valleys similar to those of Alwine Run although the area drained is considerably larger. There are six or eight farms in the drainage area.

Lick Run, the most southern of the three branches, has one source in the wooded mountain side but by far the greater part of its waters come from a cultivated area comprising the southern part of the drainage area. The course of the stream almost to the site of the proposed intake is through open, cultivated country. There are about sixteen farmsteads in this area and almost all of them are located close to small tributary runs.

The whole drainage area has a population of perhaps two hundred people. Lumbering operations will probably be continued on the shed for several years to come. A large part of the underlying mineral is said to have been bought up by mining companies. At present there are no openings and mining operations on or under the shed other than small drifts used by local residents.

The Water Company is now constructing a thirty inch main to extend from the heart of the city to the junction of the mains from the Mill Creek and Dalton Run reservoirs. It is proposed next year, to extend this thirty inch main up the valley of Ben's Creek and the North Fork of Ben's Creek to the site of the proposed intake on the latter and to erect at this site a small intake dam in order that water may be furnished during the summer of nineteen hundred and nine. Later it is proposed to erect a large impounding dam at the site of the intake.

The experience of recent years, and particularly of the summer and fall of nineteen hundred and eight has shown the necessity for augmenting Johnstown's water supply. The addition of the two proposed sources will increase the total drainage area of the streams from which the city is supplied, by sixty-five per cent., and should when the impounding dams and pipe lines have been constructed, make the total supply adequate to meet the demands of the consumption.

The drainage areas of the two proposed sources being sparsely populated, should, if properly patrolled, yield reasonably safe domestic water supplies, particularly when opportunity for sedimentation is provided by large impounding reservoirs. Until these reservoirs are in use, the patrol of these sheds should be frequent and vigilant, because if the streams should become polluted, the supply could rarely be shut off before some of the infected water had been furnished to the consumers. It is, therefore, desirable that the impounding reservoirs be constructed as soon as practicable.

The watersheds of the new sources are but little more densely populated than those of the older sources and the quality of the water furnished by the company in the past has seemingly been generally satisfactory. The city's typhoid rate has been high, but it cannot be said that this is due to the public water supply, since the disease has never developed more extensively in a district supplied from any one source than in the others. The presence, in the city, of a large, uneducated, foreign element has probably raised the typhoid rate.

JOHNSTOWN TYPHOID CASES. FROM STATE DEPARTMENT RECORDS.

Month,	1906	1907	1908
January,	11	6	1
February,	2	4	5
March,	0	1	1
April,	2	2	13
May,	6	1	0
June,	1	3	7
July,	5	1	20
August,	26	25	60
September,	39	37	30
October,	30	35	..
November,	28	13	..
December,	11	32	..
Total,	161	160	137

In September nineteen hundred and five, the Department at the request of the water company, advised with the said company concerning the operation of the water works subsequent to the discovery of the pollution of the Mill Creek source of supply by typhoid infected sewage, and took charge of cleaning up the premises where the cases of typhoid had occurred. Subsequently the Department has had sanitary inspections made of the various drainage areas from which the water company obtains its supplies and has caused the abatement of numerous nuisances along these streams. The Department intends to continue such inspections of the watersheds. The water company should continue the various stream patrols in order that permanent menaces to the quality of the water may be reported to the Department as soon as possible after their discovery.

Under date of August thirty-first, nineteen hundred and eight, a large number of citizens of the seventeenth ward of the city of Johnstown—the district known as Moxam—petitioned the Attorney General to take the necessary steps to compel the Johnstown Water Company to carry out the purposes for which it was chartered and supply the said petitioners and others with the necessary water for domestic and other purposes, stating that the said Water Company had hitherto failed, neglected and refused to furnish water to the said petitioners after having accepted pay for the same and was continuing to do so, and that although frequent promises had been made by the said company to remedy the evils complained of during the

past eight or ten years, the conditions remained the same; and stating further that the existing conditions amounted to a nuisance, due to the lack of water in toilet rooms; and stating further that the said water company had an ample supply of water in its reservoir to supply the said petitioners and all others with the necessary water at all times, but that the supply was cut off from the petitioners early in the morning of each day and remained off during the entire day.

The water company reports having recently connected the northern part of the distributing system in the seventeenth ward with one of the supply mains in the Stony Creek valley. It is expected that this arrangement and the thirty inch main being constructed in the valley and the addition of the North Fork of Ben's Creek as a source of supply will make more efficient the services furnished in the seventeenth ward and better the conditions complained of in the petition already cited. It is reported that the poor service in the past has been due entirely to the high elevation of this district and the water company does not consider itself blameworthy since the company in its contracts with individual consumers does not hold itself liable for deficiencies or failure in the supply of water, whether occasioned by shutting off water to make repairs and connections, or by any cause whatever beyond its control.

It has been determined that the proposed water works and sources of supply will not be prejudicial to the interest of the public health, and a permit is hereby issued therefor and for the supply of water to the public therefrom under the following conditions and stipulations:

FIRST. Before the proposed dams are built, detail plans thereof and of the reservoirs shall be submitted to the Commissioner of Health for approval and the same information shall be submitted with respect to the existing dams and reservoirs.

SECOND. Plans of the watersheds above each dam and reservoir of the company, showing the highways, streams and occupied estates shall be prepared and filed by the company in the office of the State Department of Health on or before March first, nineteen hundred and nine.

THIRD. The supply mains from the new sources shall be provided with adequate drainage facilities. Plans and profiles of these supply mains shall be filed in the office of the State Department of Health on or before March first, nineteen hundred and nine. Also on or before said date the water company shall file plans of its pumping station, layouts, force mains and distributing reservoirs or tanks. And at the close of each season's work the company shall file a plan in the office of the said Department of Health showing the water pipes laid during the year, together with any other information in connection therewith that may be required in order that the Commissioner of Health may be always informed of the extent of the water works system and the public use thereof.

FOURTH. The Water Company shall maintain a sanitary patrol of the water sheds and inspections at each occupied estate and at every lumber camp or other occupied property shall be made by the company at least monthly and a report made thereof and filed with the State Department of Health. The water company shall see that the proper receptacles for sewage are provided at all such occupied camps and estates and that these receptacles shall be used and properly maintained to prevent any contamination whatsoever of surface waters on the watershed. Any neglect on the part of any owner or individual to comply with sanitary regulations shall be promptly reported by the water company to the Commissioner of Health. Presence of any infectious diseases on the watershed shall also be promptly noted and reported to said Commissioner.

FIFTH. The company shall keep weekly reports of the operation of its system or systems on blank forms satisfactory to the State Department of Health and submit copies thereof for filing in said office whenever this is required.

SIXTH. If at any time, in the opinion of the Commissioner of Health, the water supply or the water works, or any part thereof, is found prejudicial to public health, then the water company shall adopt such remedial measures as the Commissioner of Health may approve or advise.

SEVENTH. The Johnstown Water Company shall not supply water from any other source other than these hereinbefore designated as its own and herein approved, except in cases of emergency fully warranting such use whereupon the company shall immediately give notice to the State Department of Health.

EIGHTH. This permit shall not be construed as approving the supply of water to the public in any territory beyond that authorized by the company's charter. If there be any question as to the right of the company under its charter to supply the public in Dale, Ferndale and Westmont boroughs, or Walnut Grove village, the Commissioner of Health will be glad to act favorably on an application for approval, after an extension of the charter rights of these territories is granted by the State Water Supply Commission.

With respect to the Morrellville and Cambria Borough Water Company, said company will be required to submit detail plans of its dam and reservoir, watershed and pumping station and that it be required to make the customary sanitary inspections monthly of watersheds, similar to recommendations hereinbefore offered to the Johnstown Water Company.

With respect to the Manufacturers Water Company, since it supplies water to the Johnstown Water Company for drinking purposes sometimes, the company will be required to submit plans of its intakes, dam and supply main.

With respect to the Cambria Steel Company's Hinckston Run supply, since this is used in emergencies as a source of supply to the Johnstown Water Company, this company will be required to file in the office of the State Department of Health plans of the dam, reservoir, watershed and supply pipe, and the company will be further required to conform to any regulations about sanitary patrol of the watershed which the State Department of Health may establish.

The city and the surrounding borough authorities will be notified that the prevalence of typhoid fever in the community is attributable to quite an extent to polluted surface springs and wells from private estates and that there is a great necessity of a vigilant inspection of these private sources of drinking water and the discontinuance of all such as are subject to contamination.

Harrisburg, Pa., November 20, 1908.

LOWER ALLEN TOWNSHIP, CUMBERLAND COUNTY.

Riverton Consolidated Water Company, Riverton Village.

This application was made by the Riverton Consolidated Water Company of the village of Riverton, Lower Allen township, Cumberland county, and is for approval of extensions of water works and for permission to increase its source of supply.

It appears that opposite the city of Harrisburg on the west bank of the Susquehanna river there was formerly a settlement in the township of Lower Allen known as Riverton. Now there are three boroughs in the district.

Recently Wormleysburg borough has been incorporated out of the township of East Pennsboro. It has a population of about six hundred and its territory extends along the river from just north of the People's Bridge approach, northerly about a half mile and back from the river to the low grade freight line of the Pennsylvania Railroad. Some distance beyond this borough and north of it is the village of West Fairview in East Pennsboro township, and north of West Fairview is the village of Enola in the same township. The latter place has its own independent system of water works.

Crossing the Susquehanna river a few hundred feet below the People's Bridge are the tracks of the Cumberland Valley Railroad and down stream about a quarter of a mile the tracks of the Philadelphia and Reading Railway are carried over the river Between these parallel lines from the west bank of the river westerly for a distance of about a mile is the village formerly called Riverton but now incorporated into the borough of Lemoyne and containing one thousand inhabitants.

Northwest of Lemoyne on the rising ground is the borough of Camp Hill, rapidly growing and containing a present population of about seven hundred. It was incorporated out of East Pennsboro township. Lemoyne was incorporated out of Lower Allen township.

It appears that the Riverton Consolidated Water Company was formed by merger and consolidation, by and between the Riverton Water Company, the Susquehanna Water Supply Company, the Allen Spring Water Company, the East Pennsboro Water Company, the Fairview Township Water Company and the Mountain Water Company, of New Cumberland, notice of which agreement was filed in the office of the Secretary of the Commonwealth on February seventeenth, nineteen hundred and four.

The Riverton Water Company was incorporated under the laws of the State on June second, eighteen hundred and ninety-two, for the purpose of supplying water to the public at Riverton, Cumberland county. It was sold, under the Act of April eighth, eighteen hundred and sixty-one, and the supplement thereto, (which Act concerns the sale of railroads, canals, turnpikes, bridges and plank roads) on account of a mortgage by deed dated November nineteenth, nineteen hundred and three. Later the Riverton Water Company filed a certificate of re-organization in accordance with the law, said certificate being filed in the office of the Secretary of the Commonwealth under date of December twenty-ninth, nineteen hundred and three.

The Susquehanna Water Supply Company was chartered on December sixth, eighteen hundred and ninety-seven, for the purpose of supplying water to the borough of Camp Hill, Cumberland county, Pennsylvania.

The Allen Spring Water Company received its charter under date of December eleventh, nineteen hundred and one, for the purpose of supplying water to the public in the township of Lower Allen, Cumberland county, Pennsylvania, except all such portions of said township as may be covered by the Riverton Water Company.

The East Pennsboro Water Company was chartered December ninth, nineteen hundred and one, for the purpose of supplying water to the public in the township of East Pennsboro, Cumberland county, Pennsylvania, except all such portions of said township as may be covered by the Riverton Water Company.

The Fairview Township Water Company has a charter dated December thirty-first, nineteen hundred and three, for the purpose of supplying and furnishing water to the public in the township of Fairview, York county, Pennsylvania.

All of these companies had the same treasurer when they were incorporated and it is evident that the project was to ultimately effect a consolidation.

The Mountain Water Company of New Cumberland was chartered February twentieth, eighteen hundred and ninety-six for the purpose of supplying water to the public in New Cumberland.

It further appears that there is a concern known as the Shiremanstown Water Company. Shiremanstown is a borough of about seven hundred population, located on the line of the Cumberland Valley Railroad about two miles beyond Camp Hill. It lies partly within Lower Allen township. The Shiremanstown Water Company was chartered on August thirty-first, nineteen hundred and three, for the purpose of supplying water to the public in the borough of Shiremanstown. This corporation is identified with the Riverton Consolidated Water Company and has made application for permission to obtain its source of supply from the Riverton Consolidated Water Company.

There are a number of other companies which have been chartered at different times to supply some of the districts, now being supplied by the Riverton Consolidated Water Company, whose rights have lapsed because of non-use. These companies were the New Cumberland Water Company, chartered on April fifteenth, eighteen hundred and ninety-five, to supply water to the public in the borough of New Cumberland; the Camp Hill Spring Water Company, chartered on October nineteenth, eighteen hundred and ninety-seven, to supply water to the borough of Camp Hill in East Pennsboro township, Cumberland county; the Camp Hill Water Company, chartered April fifteenth, eighteen hundred and ninety-five to supply water to the public at the borough of Camp Hill, in the township of East Pennsboro, Cumberland county, and the Riverside Water Company, chartered February sixth, nineteen hundred and three, for the purpose of supplying water to the public in and throughout the township of East Pennsboro, Cumberland county.

On October twenty-third, eighteen hundred and ninety-five, an ordinance was passed by the council of Camp Hill granting a franchise to the Cumberland Water Company, which company was chartered April fifteenth, eighteen hundred and ninety-five, for the purpose of supplying water to the public at the village of Boiling Springs and the township of South Middleton, Cumberland county. This company was afterwards sold to the Carlisle Water Company, the notice of sale appearing on the books of the office of the Secretary of the Commonwealth, under date of August thirty-first, eighteen hundred and ninety-six. This company never did any work in the borough, probably for the reason that their charter rights would not permit them to enter said borough.

The Riverton Water Company was then granted a franchise, on October twenty-second, eighteen hundred and ninety-seven, to lay pipes in the borough of Camp Hill. It would appear from an inspection of their charter rights that they could not legally supply water to said borough. Camp Hill, however, was a borough in eighteen hundred and eighty-five, prior to the incorporation of the Riverton Water Company. Therefore, the latter's charter territory does not include Camp Hill borough. Less than two months after October twenty-second, nineteen hundred and seven, when the Camp Hill authorities undertook to give rights beyond the charter to the Riverton Water Company, a charter was obtained by the Susquehanna Water Supply Company, before mentioned, to supply Camp Hill borough.

Thus it may be seen that the Riverton Consolidated Water Company has a right by virtue of the merger and consolidation above described to supply water to the public in Wormleysburg, Lemoyne, Camp Hill and New Cumberland boroughs, in East Pennsboro and Lower Allen townships, Cumberland county, and also in Fairview township, York county.

New Cumberland is a borough of about eighteen hundred population and including the suburbs of Elkwood and Rosemont, there are about twenty-five hundred people living in the community. The town is on the river at the mouth of the Yellow Breeches Creek, on the opposite side of which is Fairview township in York county.

The charter territory of the water company thus extends from Perry county on the north into York county on the south and along the Susquehanna river opposite Harrisburg. It contains a population of about twelve thousand people. Most of the citizens are employed in Harrisburg and at the mills at Steelton and also by the railroad companies. There is also considerable farming population in the district.

In the northern part the geological formation is shale, in the central limestone and in the southern part Huronian Rocks. The country is rolling in the north, flat through the centre and there are high hills in the south.

There are two large streams which pass through the district into the Susquehanna river. They are the Conodoguinet and Yellow Breeches Creeks. The former rises in Franklin county and flows easterly passing north of and near the borough of Carlisle and empties into the Susquehanna river, opposite the city of Harrisburg. This stream has many tributaries; those coming from the south rising in springs in the limestone formation and those from the north draining slate and sandstone formation. It has a water shed area of four hundred and forty square miles and drains six boroughs, having a total population of about nineteen thousand. The territory through which this stream passes is agricultural and most of it is low, undulating land, thereby causing the course of the stream to be winding and the flow sluggish.

Yellow Breeches Creek is the dividing line between Upper and Lower Allen townships in Cumberland county and Fairview and Monaghan townships in York county. The stream rises in South Mountain in the southwestern part of Cumberland county and flows in a general northeasterly direction for a distance of some thirty-two miles in a straight line to the river at New Cumberland. The area so drained comprises about two hundred and thirty-eight square miles, about one-third of it being mountainous. The northern portion of the water shed is in the limestone formation, while the southern part is underlaid with sandstone and Huronian rocks. About one-half of the watershed is in limestone and the other half in sandstone formation, the creek bed being entirely on the limestone side. The water therefore, is fairly hard in summer when about half the flow is ground water from the limestone country.

Distributed for a distance of fifty miles along the banks of the Yellow Breeches Creek there are two boroughs and eighteen villages and settlements, comprising a total population of about sixty-five hundred, which is fifty-three per cent. of the entire population of the water shed. The balance of the people living thereon are widely distributed over a drainage area averaging twenty-five individuals per square mile.

There are two pleasure resorts along this stream, namely: Mt. Holly and Williams' Grove, seventeen and twenty-seven miles above the mouth, respectively. The former receives thousands of visitors during the summer months by way of the trolley system, while the latter is a camping ground where people pitch tents and where, during the week of the annual convention of the State Grange Association, from five to fifteen thousand people congregate in one day.

There are two sources of supply used by the Riverton Consolidated Water Company, the first being from the hills in Fairview township, York county and the second from the Susquehanna river. The hill water is furnished to some of the houses along the pipe line in Fairview township to New Cumberland borough and vicinity and to Lemoyne and vicinity. The river water is furnished to Wormleysburg, Camp Hill and villages in the vicinity in East Pennsboro.

The supply from the hills in Fairview township comes from a small run on the old Haldeman estate and from a run distant about a mile south. Each stream has a reservoir on it, the first being known as the old reservoir and the latter being known as the new reservoir. They were both built by the Mountain Water Company.

The old reservoir, built in eighteen hundred and ninety-six, consists of an earth embankment thrown across a gulley. The dam is one hundred and twenty-five feet long and it backs the water up to an average depth of about ten feet, the reservoir being about three hundred feet long. There is a small spillway four feet wide and eighteen inches deep in one corner of the dam. There is a twelve inch blow-off pipe and a six inch blow-off pipe extending through the embankment and having gate valves on them in the reservoir. The gulley on the sides was excavated and retaining walls built and these extend back for about one third of the distance on the sides, the remaining portions being earth slopes. On the east side there is an old unused road along the retaining wall. On the west side there is a ditch designed to carry the run-off from the water shed to below the dam.

The drainage area of the reservoir is about one-quarter of a square mile. It is mostly wooded, but there are a few pasturage fields on it and one residence. A small proportion of the land only is owned by the water company. No plans of the company's holdings have been submitted.

After a heavy rain the water in the reservoir becomes turbid. A man living at the foot of the hill is employed by the company to divert from the reservoir the first run-off after a heavy rain. The run is dyked above the basin to the by-pass around the reservoir and the man cuts the water off by means of a box sluice way and plants provided in the run for by-pass purposes.

The reservoir holds one million gallons, so it is reported. It is elevated about one hundred and eighty feet above New Cumberland borough and is enclosed in a fence to keep out the public. The flow of the run into the reservoir has been measured as two hundred and fifty thousand gallons per twenty-four hours in the spring of the year.

From the reservoir there is a six inch gravity supply main extending northerly across private property and under Yellow Breeches Creek to New Cumberland borough, two miles distant.

The new reservoir was built in nineteen hundred and two. The dam is of earth construction, one hundred and fifty feet long, and the water is back-flooded one hundred feet and its maximum depth is fifteen feet. This small basin operates as not much more than an intake. The water company owns and controls the land adjacent to the reservoir and the greater part of the headwaters of the stream. The watershed comprises thirty-five hundredths of a square mile, about two-thirds of it being open field and the remainder wooded land.

There are four habitations above the reservoir. Three of them are on the land owned by the water company. The properties are rented and under conditions precluding the cultivation of land near the run and requiring precautions to be taken to obviate sewage pollutions. Intervening between the company's property on the watershed and the reservoir there is a strip of land about a half mile wide owned by private individuals, on which there is one farm. The public road passes at right angles to the stream across the watershed through this portion. Above the road there is a swampy ground and ducks from the barnyard nearby paddle in the

waters of the stream. The barn is not over two hundred feet distant. Below the road the private land is pasturage, but the water company owns the stream rights and has laid an eight inch terra cotta pipe from the upper side of the road to near the reservoir. The object of this improvement was to collect the water where it was not subject to much pollution and convey the water from the pipe into the reservoir. For some reason, however, this improvement has not been completed, so that now all the drainage from the road and the barnyard and the entire watershed gets into the reservoir except during extraordinary floods, when, by an arrangement built for the purpose at the uper end of the basin, the water is diverted and sent around below the dam. So ordinary storms and muddy waters all get into this basin and, the capacity being small, much sediment is carried on into the gravity supply main. The reservoir is elevated eight feet above reservoir number one. It is fenced in and the supply pipe from it to the town is six inches in diameter. No plans of the dam or reservoir have been submitted to the Department and the means of collecting water through the intake are not known in detail.

The six inch pipe follows down the valley of the run, largely across private property and paralleling the public road, crossing the line of the six inch pipe from reservoir number one and extending under the Yellow Breeches Creek into New Cumberland borough via Rosemont, joining, or supposed to join, at the crossing of Gerry and Third streets. There is a blow-off on the pipe line from number two reservoir.

From New Cumberland an eight inch supply main extends northerly in the public road a distance of about two miles to Lemoyne borough, supplying on its way Riverton in Upper Allen township and also the Philadelphia & Reading Railway tank in said township. Off this line there are branches in Lemoyne borough. One special branch is six inches in diameter and extends up Hummel avenue, reducing to four inches where it extends out into the township to White Hill village. At the crossing of Cumberland street it connects with a pipe in Camp Hill borough. This point is five and one-third miles from the reservoirs.

The Susquehanna River supply is taken from the river at Wormsleysburg less than two hundred feet above the People's bridge across the river from the end of Walnut street in the city of Harrisburg. At this point there is an old pumping station, about thirty-five feet square, one story and constructed of brick, having in it two eighty horse-power boilers and a Worthington compound double acting pump, fourteen by twenty by twelve by fifteen inches. It is reported by the pump man that the pump is operated every day and then only for a period of about five hours.

A twelve inch intake extending about one hundred and fifty feet out into the low water in the river and having on its end a cone-shaped copper screen delivers the water to a pump well about eight feet square, which is divided into two compartments by a half inch mesh screen vertical and extending eight feet from the bottom, the total depth being fifteen feet. From the pump well there is a twelve inch suction line to the pump. During floods the pump is submerged and cannot be operated and during excessive freshets the fires in the boilers are put out.

The pumping engine is a horizontal duplex compound one, having a rated capacity of about one and a half million gallons, but it is old and out of repair, leaks badly and its efficiency is cut down to about one million gallons per twenty-four hours and, so far as can be ascertained, this is the rate at which it is operated. At present the pump is run (as stated above) five hours out of every twenty-four and it raises between two hundred thousand and two hundred and twenty-five thousand gallons of water into a cement lined reservoir on Fort Washington hill nearby in East Pennsboro township. The rising main is ten inches in diameter.

The distributing reservoir is about eighty feet square at the top, the sides sloping so that the flow line is about seventy-five feet square. The water has a depth of nine feet, equal to a capacity of two hundred and forty thousand gallons. The force main enters the reservoir in a vertical position, the water flowing over the top and falling three feet to the level in the basin. There is an overflow through to a gulley on the side hill and also a drainage pipe, but this is plugged tight. The reservoir is made by excavation with a heavy earth embankment and surrounded by a fence seven feet high. The water level is two hundred and fifteen feet above the pumping station and eight feet above the new reservoir in Fairview township, York county, and distant therefrom four and four-tenths miles.

The river water is all pumped into the Fort Washington reservoir. From it an eight inch gravity supply main is laid to Lemoyne and a four inch pipe line is laid to Wormleysburg. The former line extends into Lemoyne and connects with the mountain water line from New Cumberland and by means of an arrangement of valves on either side of Lemoyne this river water can be supplied to New Cumberland, Lemoyne and White Hill and to Camp Hill, districts which nominally should get the hill water.

A pipe is taken off of the the eight inch line from Fort Washington reservoir and extends up the Mechanicsburg pike to Camp Hill borough. This line is six inches in diameter and it has a connection with the four inch pipe from the mountain water supply at Cumberland street hereinbefore mentioned. From this point a four inch line carries the water to the western part of Camp Hill borough, two and six-tenths miles from Fort Washington reservoir and one hundred and six feet below it.

The four inch line which comes down from the reservoir to Wormleysburg cannot receive mountain water.

The pumping station, Fort Washington reservoir and connecting pipes were the original works of the Riverton Water Company.

In the districts supplied by the Riverton Consolidated Water Company there has been much complaint about the quality of the water and the inefficiency of the service. Formerly New Cumberland had ample water supplied by the Mountain Water Company, but since the consolidation and the extension of the district furnished by this mountain water complaints about scarcity of the supply have arisen.

On January seventh, nineteen hundred and seven, during the typhoid fever epidemic at Scranton, the Commissioner of Health advised the Riverton Consolidated Water Company as follows:

"Gentlemen:

"I fear that there is an unusual amount of typhoid fever infection in the Susquehanna river by reason of the epidemic of the disease now prevalent in the city of Scranton. While I have issued instructions to the mayor of that city to disinfect all discharges from typhoid fever patients before said discharges leave the premises, yet I have grave doubts that said instructions are generally observed with reference to convalescents, and consequently conclude that the Susquehanna river water, into which the sewers of the city of Scranton empty, is an unusually dangerous source of supply of water to the public at this time. It becomes my duty to warn you not to furnish this supply to your consumers unless it be first adequately filtered, otherwise you are to notify the public to boil the water for a period of thirty (30) minutes before the same is used for drinking or culinary purposes.

"Yours very truly,

"SAMUEL G. DIXON.

It apepars that no action was taken by the company in reference to this matter, so far as the Department is informed.

On January nineteenth, nineteen hundred and seven, the Commissioner of Health notified the president of the water company that the river source contained sewage and that pure water must be furnished the consumers. The communication was as follows:

"Mr. Patricio Russ,
"Pres. Riverton Consolidated Water Company,
"Harrisburg, Pa.

"Dear Sir:

"Two samples of water taken from the well at your pumping station, at Wormleysburg, reveal the presence of the b. coli communnis. The presence of these organisms is taken as an evidence of sewage pollution, and I beg to inform you that some action will be necessary on the part of your company to furnish water free from sewage pollution.

"Yours very truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

No action was taken concerning this communication.

Still further, as showing the derelictness of the company in discharging the obligations of its charter, it appears that on December eleventh, nineteen hundred and six, the State Department of Health sent the following communication to the secretary of the Riverton Consolidated Water Company:

"This is to call your attention to the matter of filing report and plans of your water works system, with respect to which a correspondence passed between us a number of weeks ago, at which time you promised to file the said report and plans in the immediate future."

On July sixth, nineteen hundred and seven, the Commissioner of Health placed in the hands of an attorney the matter of proceeding against the Riverton Consolidated Water Company. The communication of Frank M. Eastman, Department counsel, to the water company is given in full below:

"Harrisburg, Pa., July 25th, 1907.

"A Grant Richwine, Esq.,
"Secy. Riverton Consolidated Water Company,
"Lemoyne, Pa.

"Dear Sir:

"I am in receipt of your letter of July 24th and note its contents.

"Section 3 of the Act of April 22, 1905, provides that no private corporation shall construct water works for the supply of water to the public within the State, *or extend* the same, without a written permit to be obtained from the Commissioner of Health. That a permit is necessary for an extension not necessarily involving an additional source of supply appears from the penalty clause of said section;

"'The penalty for failure to file copies of plans, surveys and descriptions of existing water works within the time hereinbefore fixed, and for the construction of extension of water-works, *or the use of an additional source of supply* without a permit from the Commissioner of Health shall be $500.00, etc.'

"In this clause, as you will notice, the construction or extension of water works is contradistinguished from the use of an additional source of supply.

"The report of your system of water works filed with the Department in April, 1906, was incomplete in many respects, but it was tentatively accepted with the understanding that the Department would call upon your company for such further data as might be required. Considering the status of the company as established as of the data of said filing, you have since made numerous extensions for which you should have had permits from the Department, and failing to apply and receive the same your company has incurred the penalty provided for in the Act of 1905.

"I send you in the same mail with this blank on which to make application for a permit to make the extensions which you have already made, and such further ones as you may now have in contemplation. If you will promptly fill this up and return it to me forthwith, and otherwise comply with the requirements of the Department in this regard, I shall not proceed against the company for the penalty already incurred; otherwise I shall.

"Your attention is called to the fact that some time last fall the Department advised you that typhoid germs existed in the water supplied by you to the public, and you were instructed to take such action as might be necessary to supply the public with pure water. Nothing appears to have been done by you in this regard, and the fact that your water supply is impure is evidenced by the fact that typhoid is or has recently been epidemic in the borough of Camp Hill which you supply with water.

Unless immediate steps are taken by your company to purify its water supply, I shall on behalf of the Commissioner of Health institute such legal proceedings against your company as may seem advisable. I wish to be advised what your intentions are in this regard at your earliest convenience.

Very truly yours,

(Signed) FRANK M. EASTMAN,

"Counsel, Health Department."

In response to this letter the application of August twelfth, nineteen hundred and seven, was made for approval of the extensions to pipe lines already made.

Also in response to this communication the water company did, on May twentieth, nineteen hundred and eight, submit the application herein under consideration for increased source of supply. However, the plans accompanying this application, which plans were absolutely necessary to consider the proposition were not submitted in the Department until June twenty-ninth, nineteen hundred and eight.

During the summer of nineteen hundred and seven the Department made a series of tests of waters at various places in the districts of the Riverton Consolidated Water Company. The results of the tests of samples taken from the Philadelphia and Reading Railway tank at Lemoyne, the water coming from the mountain supply, showed no pollution. The water collected from the tank at the Cumberland Valley Railroad, west of Lemoyne, which tank was being supplied from the river pumping station when the samples were taken, this being accomplished by opening the valve at Cumberland street in Camp Hill borough and closing the one at the Cumberland Valley tracks, showed some pollution. About twenty families at White Hill were being furnished with this supply. At some other times these families received mountain water. No notice of change in the water supply was given by the company.

The samples of water collected at the well at the pumping station and also samples of water collected at the Fort Washington reservoir showed sewage pollution.

In the water company's district the prevailing methods of sewage disposal in connection with private sources of drinking water has a bearing on sickness from water borne diseases.

In New Cumberland borough, incorporated in eighteen hundred and eighty-three there are several public sewers leading to the river and to the Yellow Breeches Creek, but most of the inhabitants use the old time privy vault. There are a number of dug wells and a few drilled wells located on private properties and about twenty-five roof water cisterns. The town has been contemplating a sewer system. The sub-soil is mostly shale.

In Camp Hill borough, incorporated in eighteen hundred and eighty-five, there are no public sewers. The structure is limestone and sewage is disposed of into holes sunk therein. The method is not entirely satisfactory and some discussion has been had about establishing a sewer system. There are fourteen drilled wells reported as being used as sources of domestic supply on private properties. There was an outbreak of typhoid in Camp Hill in nineteen hundred and seven and the disease was prevalent in years prior thereto. The infection was traced by a Department officer to the Straub well, near the corner of Main street and Park avenue. It was thoroughly cleaned out and disinfected.

In Lemoyne incorporated three years ago, the method of disposal of household wastes is into sink holes drilled in limestone rock. There are a few private drilled wells in the village. Some typhoid fever occurs annually, but it has not been traced to any specific infection.

In Wormleysburg, which was incorporated into a borough during the current year, there are about one hundred and fifty houses, many of which have roof cisterns. The majority of the properties have dug wells sunk into the sand and gravel formation, from which water is drawn for domestic purposes; there are some drilled wells also. There are a few percolating cesspools and some of the old dug wells

are used as receptacles for household wastes. There has been typhoid fever in the settlement, but records thereof were not kept. Well water pollution has been suspected. From some of the dwellings located along the river front there are individual sewers leading to the river and from dwellings back from the river there are also sewers to the stream. Twenty-three sewers of this kind were found on inspection on August fourteenth, to be discharging into the river immediately above the water company's intake and connected therewith are fifty houses. Two of these sewers were laid by the township of East Pennsboro, so it is reported. To one of these sewers fourteen houses are said to be connected, for which connection no permission was issued. To the other public sewer there are seven dwellings connected, the owners of which in each instance paid a tappage fee. These pipes take storm water as well as sewage. The former public sewer is ten inches in diameter and empties near the top of the river bank. The latter is twenty inches in diameter and empties about two-thirds of the way down the river bank. The private sewers discharge at the water's edge or part way up the bank. Complaint has been registered in the State Department of Health about a nuisance arising from the depositing of sewage anywhere along the shores of the river. Local garbage from the settlement is thrown over the embankment and the conditions in this respect are filthy all along the shores above the water intake. One of the nearest sewers to the intake is from Hotel Navarre, two hundred feet distant; the furthest private sewer in the borough is about a mile distant; the majority of them are within a half mile. Named in order up stream, the owners of the sewers are as follows:

No.	Location.	Size.	Ownership.
1.	50 ft. above intake,	8 inch,	Amos Snyder.
2.	75 ft. above intake,	8 inch,	Amos Snyder.
3.	150 ft. above intake,	4 inch,	A. B. Potts,
4.	200 ft. above intake,	Several outlets.	Hotel Navarre (Shamokin Brewing Co.)
5.	250 ft. above intake,	12 inch,	P. M. Heiser.
6.	Near Poplar St.,	10 inch,	Unknown.
7.	Poplar St.,	10 inch,	D. S. Brown (7 houses).
8.	250 ft. above Poplar St.,	6 inch,	Abner Yetter.
9.	300 ft. above Poplar St.,	10 inch,	A. J. Wright (3 houses and slaughter house).
10.	350 ft. above Poplar St.,	?	Willard Black.
11.	375 ft. above Poplar St.,	?	George Chambers.
12.	Market Street,	20 inch,	Township sewer.
13.	50 ft. above Market St.,	6 inch,	John Bixler.
14.	100 ft. above Market St.,	4 inch,	John Bixler.
15.	200 ft. above Market St.,	6 inch,	P. C. Coble.
16.	Locust Street,	10 inch,	Township sewer (11 houses).
17.	250 ft. above Locust St.,	?	A. J. Wright.
18.	275 ft. above Locust St.,	?	J. D. Hipple.
19.	3,000 ft. (or over) above intake,	?	Mr. Reichert.
20.	3,000 ft. (or over) above intake,	?	Mr. Fairbright.
21.	3,000 ft. (or over) above intake,	?	Mr. Wambaugh.
22.	3,000 ft. (or over) above intake,	8 inch,	Mr. Baum.
23.	3,000 ft. (or over) above intake,	8 inch,	Samuel Weidman.

The inhabitants of West Fairview village, located above Wormleysburg, use individual wells and cisterns for water supply. There are no public drains in the town.

In the village of Enola the water is supplied by the Dauphin Consolidated Water Supply Company. There is a system of public sewers and sewage disposal works owned by the Enola Sewerage Company.

Besides asking approval of the lines already laid since nineteen hundred and five, the petitioners ask approval of plans to build a new reservoir immediately above the old reservoir in Fairview township. The said new reservoir is to hold about thirty million gallons of water. It is proposed to lay a sixteen inch pipe line from this basin to the pipe in front of the Valley Traction office in Lower Allen township, near Lemoyne station, and to run an eight inch line from the square in Lemoyne to connect with this sixteen inch main. The new eight inch line is to pass directly west on Hummel avenue, Lemoyne, out through White Hill and connect with the pipe line of the Shiremanstown Water Company at Shiremanstown borough line.

The proposed reservoir will consist of an earthen dam built across a natural valley wherein the water will be impounded. It will have a rubble concrete core wall backed by stones and other heavy material and have a base of puddle material laid in six inch layers. The dam will be fifteen feet across the top and about fifty-two feet high. Its length across the top will be somewhere in the neighborhood of four hundred feet. There will be a waste weir twenty-five feet wide cut out of rock, which will reduce to ten feet in width before it discharges into the present reser-

voir. There will be a twenty inch cast iron pipe laid under the dam and it will have a screen over the inlet. At the end of the pipe at the top of the outer embankment of the dam will be a valve house in which will be located the valve of this pipe. This outlet pipe from the reservoir will discharge either into the present reservoir or will be by-passed around it to the sixteen inch pipe leading to town.

The water shed above the proposed reservoir is about one quarter of a square mile in area. At the present time the run is nearly dry. The yield from a water shed like the one in question, with the highest development of storage facilities feasible, does not average, in America, five hundred thousand gallons per square mile daily, taking into account a series of dry years. In extremely springy water sheds, where the yield is far above the normal and the springs never run dry, sometimes with adequate storage the development is equivalent to a yield of seven hundred and fifty thousand gallons per square mile during a series of dry years. The Department has not enough local information for the basis of a reliable conclusion as to what may be expected from the Haldeman reservoir proposed, other than general deductions. The engineer who designed the new reservoir estimates that the available yield when developed will not be more than three hundred thousand gallons, nor less than one hundred and fifty thousand gallons per square mile per twenty-four hours throughout a series of dry years. Said engineer, in recommending that a source equivalent to one million gallons capacity per twenty-four hours be ultimately planned for, suggested the obtaining of the additional supply from the Yellow Breeches creek at New Cumberland. Six hundred thousand gallons of the million gallon supply, he estimates, will be needed for the Lemoyne, Camp Hill and Wormleysburg districts and vicinity. Shiremanstown will need one hundred and twenty-five gallons daily, so it is reported.

The Fort Washington reservoir is to be retained as a storage and into it water will be fed from the Haldeman reservoir at night-time. It is understood that the Company's intention is to abandon the river pumping station.

The Haldeman reservoir watershed is too small to warrant expenditures for the new dam as proposed. The quantity and quality of water would not have a comparative value sufficient to render the source a desirable one for the extensive district of the Riverton Consolidated Water Company.

With a limited district, possibly for New Cumberland borough for the present, Haldeman reservoir source as it is contemplated might prove feasible from every standpoint. The territory opposite the city of Harrisburg is bound, in all probability, to witness a very large and rapid growth. One of the conditions precedent to the sustaining of an increased population is an adequate supply of pure water. Should a Greater Harrisburg ultimately take in the settlements on the west bank, filtered river water would undoubtedly be supplied to the inhabitants there. The best expert advice which the city of Harrisburg and the borough of Steelton could command reported adversely on any other source of public supply than the Susquehanna River, filtered. The Yellow Breeches Creek water is unsuitable to use without filtration. The Commissioner of Health has already stipulated that the Mechanicsburg Gas and Water Company, whose proposed new intake is to be at the Yellow Breeches Creek, shall filter the water. The Creek water is not only subject to sewage pollution, but it is extremely hard in quality and not as desirable for domestic purposes as the river water. The latter is also to be preferred over the waters of the Conedoguinet Creek. The Riverton Consolidated Water Company's expert has concluded in his report that if the company must resort to steam pumping in place of water power to raise the Yellow Breeches Creek water into the district, then it would be much better for the Riverton Consolidated Water Company, in his opinion, to do such pumping from the river and filter the water.

The Fort Washington reservoir is well located centrally for a distributing point. It is possible to place the filter on the hill and to have the filtrate flow by gravity into this reservoir.

The plans as they now stand, with the present river pumping station abandoned, would not in the opinion of the State Department of Health afford an abundant supply of pure water, and, therefore, this would be prejudicial to public health because it would force the inhabitants to resort to polluted springs and wells in the territory.

Furthermore, the river water cannot be used without prejudice to the public health unless the water is filtered. Nevertheless, this source of supply must continue, as it is now, to be the major one for the district of the Riverton Consolidated Water Company, unless the company obtain some other source of adequate supply.

It has been determined that the proposed Haldeman reservoir and a system of distributing pipes to deliver the water therefrom to New Cumberland, Lemoyne, Camp Hill and vicinity will not be prejudicial to public health under certain conditions and the same is herein and hereby approved under the following conditions and stipulations:

FIRST: That this source of supply shall be preserved and conserved and used primarily for the borough of New Cumberland and adjacent settlements, provided that when the Haldeman reservoir is full and overflowing the surplus water may be delivered into the distributing districts of the Riverton Consolidated Water Company lying beyond New Cumberland and its immediate vicinity.

SECOND: The Boyer reservoir, or reservoir number two, shall be cleaned out within two weeks from the date of this permit, the company shall complete its contemplated improvement of diverting the polluted water from the farm house, barn and property near the public highway and from the pasturage fields immediately above the reservoir to the by-pass leading around the reservoir below the dam on or before the said two weeks, and it shall provide, or cause to be provided, at all occupied properties on the watershed sufficient and suitable receptacles for all sewage and shall see to it that these receptacles are used and that the content is removed at stated periods and deposited off the watershed in some sanitary manner, and it shall forthwith remove every source of pollution on the entire watershed above the reservoir, or report promptly its inabillity to remove such pollutions to the Commissioner of Health, who will thereupon without delay take action in the premises. This work shall not be delayed. Now that the stream is dry, the time is opportune for the improvements.

THIRD: On or before November first, nineteen hundred and eight, the company shall, from actual survey, furnish a plan and elevation of the existing reservoirs, dams and appurtenances and a plan of the water sheds of the Boyer and Haldeman reservoirs showing thereon all occupied estates and highways and sources of pollution, and thereafter, so long as these watersheds shall be used as a source of supply by said company, the company shall have a monthly inspection made of every occupied estate and report the sanitary condition thereof and the existence of any menace on the watershed forthwith to the Commissioner of Health.

FOURTH: The Boyer reservoir shall be used primarily, together with the Haldeman reservoir water, for the supply of the borough of New Cumberland and immediate vicinity. Any surplus water therefrom may, as in the case of the Haldeman reservoir, be delivered into the distributing pipe system of the districts beyond New Cumberland and immediate vicinity.

FIFTH: The pipe system in New Cumberland and vicinity shall be so arranged or re-arranged that water from the Haldeman and Boyer reservoirs cannot be furnished to Lemoyne and other districts of the water company beyond New Cumberland and immediate vicinity, except at one point and here on this pipe there shall be placed a valve and the company shall keep an accurate record of this valve's operation and file sworn copies of said record in the office of the Commissioner of Health monthly. Within ten weeks from the date of this permit a certified plan of the location of this valve and the pipe arrangement in connection therewith shall be filed in the office of the Commissioner of Health.

SIXTH: On or before November first, nineteen hundred and eight, the company shall have improved its distributing system of pipes in New Cumberland borough by eliminating certain dead ends in pipe lines where the quality of water has been inferior. These dead ends shall be connected up so that the water may have a circulation in the street pipes and the entire system shall be very thoroughly flushed and cleaned out to the satisfaction of the Commissioner of Health.

SEVENTH: The company shall provide ample blow-offs and facilities whereby the reservoirs and the pipe system may be completely and readily drained and flushed and this shall be done during the current season, and a report of these improvements shall be made to the Commissioner of Health on or before the close of the year. The drainage facilities of the proposed dam are not now ample and shall be increased in capacity, provided the dam be built.

EIGHTH: The Department of Health does not advise at this time the construction of the new reservoir. In its opinion, by far the best plan would be to obtain the entire water supply for all but New Cumberland from some approved point in the Susquehanna River and to filter the water and supply it from the Fort Washington reservoir to the entire water works district. Improvements in the distributing system of pipes according to this plan would be permanently made. The main supply pipes could be laid down with the assurance of their being able to meet the demands of the present and future consumption for the territory along the west bank of the river in Cumberland County and now comprised within the charter territory of the Riverton Consolidated Water Company.

NINTH: Since the Riverton Consolidated Water Company is now supplying and must continue for some time to supply raw water to a part of its water district, it is expressly stipulated that the company shall forthwith notify its consumers and the public by several publications in the daily newspapers that the source of supply taken from the river is subject to sewage pollution and that safety to public health requires that all such water so supplied and used for domestic purposes shall be boiled for thirty minutes.

TENTH: The Riverton Consolidated Water Company shall, on or before November first, nineteen hundred and eight, submit plans and specifications to the Commissioner of Health for approval for a water purification plant for the treatment and purification of all river water supplied by the company to its consumers. These plans shall comprise the adaptation of modern methods of water treatment, and they will be approved, modified or amended by the Commissioner of Health and as so modified, amended or approved they shall be built. The company shall begin construction of the works according to the plans approved by the said Commissioner on or before November first, nineteen hundred and eight, and failure on the part of the Riverton Consolidated Water Company so to do shall be understood and deemed to be an admission on the part of said company of its inability to fulfil its charter obligations, and the Commissioner of Health will so un-

derstand it and proceed accordingly in the interests of public welfare: provided, however, that if satisfactory evidence shall be forthcoming that November first, nineteen hundred and eight, is too short a time in which to make such beginning in construction then the Commissioner of Health may extend the time, but not for any long period, and then only when specified by the company that it will be able to carry out the terms of this decree in the immediate future.

ELEVENTH: The water company shall at the close of each season's work file a plan of lateral street extensions of its pipe system, together with any other information in connection therewith that may be required, in the office of the Commissioner of Health, to the end that the State Department of Health may always be informed as to the extent of the water works system and the public use thereof.

Permission to supply the Shiremanstown Water Company with water at any point in Lower Allen township is hereby denied. The application now under consideration of the Shiremanstown Water Company, for permission to obtain its supply from the Riverton Consolidated Water Company, must be granted, if granted at all, in the face of ample evidence that the Riverton Consolidated Water Company will be capable of furnishing an ample and pure supply to Shiremanstown Water Company, at all times and under all conditions.

TWELFTH: The water company shall forthwith keep a daily record of the operation of its entire water works system, including the present river pumping station, on forms satisfactory to the Commissioner of Health, and copies thereof shall be filed in the office of the Commissioner of Health. If at any time it becomes apparent that the water works system or any part thereof, or the water supplied thereby, is prejudicial to public health, then the Riverton Consolidated Water Company shall adopt such remedial measures forthwith as the Commissioner of Health may advise or approve.

The Commissioner of Health will notify the owners of sewers hereinbefore mentioned that within thirty days the discharge of sewage into the waters of the State shall cease, also the garbage disposal into the waters of the State and on the banks of the river shall be discontinued forthwith.

The Commissioner of Health will also notify the local authorities of each borough of the danger of the use of abandoned wells or receptacles for sewage and advise that the matter of the disposal of sewage should receive the careful attention that it deserves in each municipality.

Harrisburg, Pa., August 18, 1908.

LOWER ALLEN TOWNSHIP, CUMBERLAND COUNTY.

Riverton Consolidated Water Company.

This application was made by the Riverton Consolidated Water Company of the village of Riverton, Lower Allen Township, Cumberland County, for approval of plans for a water filtration plant and for improvements to the Company's distributing system.

It appears that these plans were submitted in compliance with the terms of a decree issued by the Commissioner of Health on August eighteenth, one thousand nine hundred and eight, to the said Water Company.

The proposed improvements contemplate the following:

FIRST: The securing of an additional supply of water from the Yellow Breeches Creek, the supply to be taken at a point south of New Cumberland, at a mill dam now owned by the Riverton Consolidated Water Company.

SECOND: The construction of a pumping station and purification works at the mill site above mentioned.

THIRD: The laying of a new force main from the purification works and pumping station above mentioned to a new elevated reservoir to be constructed on top of the high ground north of White Hill and about half a mile west of the present Fort Washington Reservoir.

FOURTH: The laying of additional street mains in White Hill, Lemoyne and New Cumberland, and the making of connections between the new high pressure systems, the present Fort Washington reservoir, and the street mains, to increase the pressure throughout the district, and give a more copious supply of water, and provide satisfactory fire protection.

FIFTH: The abandonment of the pumping station on the west bank of the Susquehanna River above the Walnut Street Bridge.

The proposed new works near New Cumberland will consist of purification works and pumping machinery, the capacity of the works to be built immediately being five hundred thousand gallons per day from this source.

The purification works contemplate the preparatory treatment of the water by:

(a) Subsidence to remove the coarse suspended and floating matter and:

(b) Rapid filtration through coarse grained filters, with or without the use of a coagulant, as may be proper.

The water will be taken from the race of the mill by a centrifugal pump, and discharged directly upon the roughing filters, or upon them after passage through a coagulating and deposit chamber. When the turbidity of the raw water is less than one hundred parts per million, no coagulant will be used; when less than

about fifty, the water will usually be passed directly upon the roughing filters and when more than one hundred coagulation must be resorted to, using sufficient aluminum sulphate to reduce an effluent from the roughing filters with a turbidity of not over twenty-five parts per million.

The effluent from the rapid, or roughing filters is to be further purified by slow sand filtration, the filters being operated at a relatively high rate. This plant is, in general, similar in style to that installed recently, (and now in successful operation) for the purification of the water supplied to the Borough of Steelton, Pennsylvania.

The capacity of the different parts of the purification works will be as follows:

The deposit chambers are ten feet wide, thirty-one feet long and nine feet deep with a capacity of twenty-seven hundred and ninety cubic feet, or twenty-one thousand gallons or one hour's supply when the plant is operated at the rate of five hundred thousand gallons daily.

There will be three filters nine feet by twelve feet in plan and nine and five-tenths feet deep, each having a surface area of one hundred and eight square feet, two hundred and forty-nine hundred thousandths of an acre. Two filters in use will yield five hundred thousand gallons daily when operating at a rate of one hundred million gallons per acre per day the third filter being out of service for washing. These filters can safely be depended upon to yield fifty per cent. more water than the nominal capacity of five hundred thousand gallons daily.

There will be four filters each twenty-seven and five-tenths feet square, arranged in the form of a square, with a sand washing plant located in the center of the group. The net area of each filter will be seven hundred and sixteen square feet, one hundred and sixty-five ten thousandths of an acre. When three of the four filters are in service there will be five hundredths of an acre in use, which will, at a rate of ten million gallons per acre daily, yield five hundred thousand gallons of filtered water.

The immediate demands upon this plant will not exceed the furnishing of about two hundred and fifty thousand to three hundred thousand gallons of water a day.

The filtered water will flow to a small pure water reservoir on top of which will stand a triplex power pump belt driven from the line shaft of the mill, the pump having a capacity of five hundred thousand gallons daily, at maximum speed, but having three speeds at which it can be driven from the line shaft.

The force main to the stand pipe will be twelve inches in diameter from the pumping station to Market Street in Camp Hill, and thence sixteen inches in diameter to the elevated reservoir, which will be located twenty-one hundred and fifty feet west of the Fort Washington reservoir, on the highest part of the ridge. The elevation of the ground at this point is five hundred and twenty-nine feet above sea level, and the surface of the water in the stand pipe, when full, will be five hundred and eighty feet above sea level.

The static lift on the pumps will thus be two hundred and eighty feet, and the friction head for the delivery of five hundred thousand gallons of water daily to the elevated reservoir eleven feet making a total of two hundred and ninety-one feet. For the delivery of one million gallons daily the total lift would be increased to three hundred and twenty-four feet.

The elevated reservoir, to be located on the high ridge west of the Fort Washington reservoir, will be of reinforced concrete lined with a riveted sheet steel shell protected from corrosion by a reinforced cement lining.

The diameter of the reservoir is to be forty feet, inside with a shaft, six feet in diameter, passing centrally downward through it, to the foundations, and forming one of the supports.

The capacity of the reservoir, when full, will be two hundred thousand gallons.

The reservoir will be supported on arched piers and reinforced columns and will be covered with a domed roof having a ventilator on top, with screened openings, and a cast iron manhole head and cover.

The filtered water from the pumps will be delivered to the stand pipe through a twelve inch flanged pipe rising up through the central well and discharging over the top of the same into the reservoir.

The outlet from the reservoir to the high service district will be at the bottom of the reservoir through a twelve inch check valve on a branch pipe connected with the twelve inch vertical force main. This arrangement will insure circulation in the reservoir.

A second twelve inch pipe will rise up through the central well passing the reservoir at the bottom and having a twelve inch valve thereon, and, also, a vertical branch, open at the top forming an overflow to the reservoir. This overflow pipe will lead to the Fort Washington reservoir, and will be the supply pipe through which this reservoir will be filled with filtered water.

A blow-off connection on this pipe will permit it to be used for cleaning the reservoir, if necessary.

In order to secure better pressures in Lemoyne and Riverton a new ten inch main will be laid from the Fort Washington Reservoir to Lemoyne, being connected with the main on Herman, Hummel and Bossler Streets, proper circulation in the street mains in Lemoyne being secured by laying six inch connecting mains in Bucher, Clinton and Lorne Streets, from Herman to Bossler, connecting at each intersection, control valves being supplied where necessary.

In New Cumberland it is proposed to provide six inch connections between the new twelve inch force main and the six inch mains on Third and Sixth Streets,

install new fire hydrants on the high pressure line and provide new four inch circulation mains in Second and Sixth Streets, with control valves, to give an additional supply and better pressure.

At White Hill Station it is proposed to place in the new eight inch main leading to Shiremanstown a valve each side of the connection between this eight inch main and the new twelve inch force main, by this means the high service pressure can be turned into the Lemoyne mains, if necessary, and can be used customarily to give sufficient pressure for satisfactory service in Shiremanstown, where about sixty pounds pressure would be expected during the day time, rising to seventy pounds in the night.

Between White Hill Station and the new elevated reservoir the twelve inch main would follow westwardly along this street north of the Cumberland Valley Railroad to Heyd Street being connected with the four inch main in Main Street; thence northerly on Heyd Street to Market Street, where a connection would be made with the existing four inch main; thence easterly along the turnpike and following the alignment shewn on sheet thirteen of the plans, to the elevated reservoir, with proper connections and valves to control the supply.

On the abandonment of the pumping station on the Susquehanna River the present eight inch force main to the Fort Washington reservoir will be converted into a supply main to Wormleysburg, proper connections being made therefor.

It is also the intention, in the near future, to take up the four inch main in the turnpike, from Heyd Street westwardly for about three thousand feet, replacing the same with ten inch cast iron pipe to give better pressure.

It has been determined that the plans hereinbefore described provide for improvements which will not be prejudicial to public health, and the same is herein and hereby approved and a permit is issued therefor, under the condition that all of the conditions applicable thereto and specified in said decree of August eighteenth, one thousand nine hundred and eight, are applied and put in full force with respect to the plans herein approved and subject to the additional conditions as follows:

FIRST: The filter plant shall be constructed only under the immediate and responsible supervision of the engineer who designed the plant or some other expert equally competent to perform the services, and after the works are built they shall be operated for one year under the responsible supervision of some expert in order that the attendants at the filter plant shall be given ample opporunity to become thoroughly schooled in the operation of the filter plant.

SECOND: Daily record of the operations of the filter plant shall be kept on blank forms satisfactory to the Department of Health and whenever required copies thereof shall be filed in said Department's office.

It is the intention of the Department of Health to make regular inspections of the filter plant and if necessary, in the interests of the public health, to establish rules and regulations for the operation thereof in so far only as the public health would be concerned. The Water Company shall adopt such requirements and put them in force, and at all times render assistance to State officials in making investigations. If at any time, it becomes necessary, in the opinion of the State Department of Health, that enlargements, additions or alterations shall be made in the works or any part thereof, then the water company shall make such extensions, alterations or improvements as the Department of Health may advise or approve.

Harrisburg, Pa., November 12th, 1908.

McKEESPORT, ALLEGHENY COUNTY.

This application was made by the City of McKeesport, Allegheny County, Pennsylvania, and is to extend and enlarge the municipal water main system.

It appears that on March seventh, nineteen hundred and seven, the Commissioner of Health approved plans for a water softening and filtration plant for the city and issued a permit therefor under certain conditions among which were the following:

FIRST: That a complete set of plans of the driven well system, pumping station plant, intake well and piping, force main, distributing reservoir, high service pumping station and plans of the pipes in the high and in the low service districts of the existing water works system shall be prepared without delay and filed with the Commissioner of Health, together with a satisfactory report of said works.

SECOND: That the proposed mechanical filtration plant is hereby approved with the provision that the clear water basin capacity shall be increased to not less than two hundred thousand gallons, and that a new pump well of ample dimensions shall be built at the pumping station to which all filtered water shall be delivered and from which it shall be taken by the pumping engines. Plans for the enlarged clear water basin and the new pump well shall be submitted to the Commissioner of Health for approval.

THIRD: That in the event of the substitution of bidder's plans for the mechanical filter plant herein approved, then such plans shall be submitted to the Commissioner of Health for approval before the said works are constructed.

FOURTH: The admission of the raw river water to the water pipe system of the town or to any part of the works except the water softening or filtration plant is prohibited except in extraordinary emergencies. This obtains also with respect to

the ground water. To safeguard the public interests there should be an emergency intake from the river to the new pump well. The valves on this intake shall be closed under seal. Whenever used the Commissioner of Health should be notified. Plans for the quick introduction of raw river water into the filtered water pump well, which introduction may be by gravity or pumping, shall be submitted to the Commissioner of Health for approval.

FIFTH: Plans of the works when built as herein provided for shall be submitted in detail and filed with the Commissioner of Health, together with such other information in connection therewith as he may require.

SIXTH: A chemist and skilled attendant shall be placed in charge of the operation of the water softening and filter plant. Weekly reports of said operation shall be submitted to the Commissioner of Health on blanks to be furnished by the State Department of Health.

The city has complied with the conditions in stipulation Number One.

The city has also increased the capacity of the clear water basin to over two hundred thousand gallons and a new pump well of ample dimension has been built at the pumping station to which all filtered water is to be delivered and from which it is to be taken by the pumping engines on the town service. Plans for these structures are now before the Commissioner of Health.

The clear water basins are located as previously described, in the said permit of March seventh, nineteen hundred and seven, in the filter house under the filters. However, the depth of the basin has been increased to about twelve feet, giving an effective capacity of about two hundred and seventy thousand gallons.

The new filtered water pump well is located between the raw water intake well and the pumping station. Because of lack of space between the two, the filtered water pump well is made narrow and long. Its length is fifty feet, eleven and five-tenths feet wide and about twenty feet deep. A thirty inch pipe line is to deliver the filtered water to the well. This well is open on top, the opening being four feet eight inches wide and extending the entire length. The part roofed over is adjacent to the pump house. To prevent ordinary freshet water from flowing into the well, there is built around the opening a concrete wall four feet high, the top of the well being even with the surface of the ground. The top of the wall is one foot nine inches lower than the flood level of February twenty-third, eighteen hundred and ninety-seven and five feet four inches lower than the flood level of March fourteenth, Nineteen hundred and seven. Both of these floods put the pumping machinery out of commission. As the plant now exists flood water would enter the pumping station and the filter house and the softening plant before it reached the level of the wall about the filtered water pump well.

It is understood that the city contemplates the erection of walls to protect the water works at the pumping plant from damage or flooding. It is important that such plans should be perfected and executed without delay. The small storage afforded by the reservoir on the hill—twenty-four hours' supply—in connection with the possibility of the purification and pumping plant being out of commission for more than twenty-four hours emphasizes the point. An extended conflagration coincident with the high freshet flow of the river would prove most disastrous to the city were there no flood protection works at the plant.

The mechanical filters being built in accordance with the plans now before the Commissioner of Health differ from the filter plant described in the said permit of March seventh, nineteen hundred and seven, in the following particulars:

The delivery main from the water softening plant to the adjacent filters is by means of a rectangular re-inforced concrete conduit in place of the thirty inch pipe. Each of the six filters is twenty-four feet by eighteen feet with a capacity of one million gallons daily. There is thirty-four inches of sand supported by eight inches of gravel over a manifold system bedded in a concrete floor of the filter and connected to a ten inch outlet. The air system consists of one-half inch transversed piping six inches on centres, perforated on the underside and placed two inches above the collecting manifold. The collecting and distributing troughs are three in number for each filter unit. They extend on each side of a central channel built the full length of the filter. They are parallel, eight feet apart on centres and their tops are sixteen inches above the level of the sand in the filter.

The project for the quick introduction of raw river water by the purification plant into the filtered water pump well which the city has introduced and for which approval is requested is as follows: From the raw river receiving well adjacent to the filtered water pump well there are three pipe lines leading to the three main pumping engines in the pump house and in use on the town service. Two of these pipes are twenty inches in diameter and each pipe leads to a three million gallon Blake pump. The other pipe is twenty-four inches in diameter and leads to a five million gallon Wilson-Snyder pump. These three pipe lines pass through the filtered water pump well and by an arrangement of valves and branches, either filtered water may be drawn from the filtered water well which will be the ordinary use of the pipes, or in extreme emergencies, and by the use of the valves, the filtered water may be shut off and the raw river water may be drawn.

The city's auxiliary supply from drilled wells on the premises has been abandoned. The circular well in which was installed the pumping machinery for drawing the water from the ground is now used to house the centrifugal pumps direct connected to Delaval steam turbine engine. There are two of these pumping engines, each

rated at seven million gallons per twenty-four hours. They will supply the raw river water from the intake well to the water softening plant. These engines need protection from floods as well as those in the old pump house of the main station.

The twenty-four inch intake which it is the intention of the city to build from the raw water intake well out into the river far enough to avoid contamination from the sewers discharging above this point will not be built for the present. The old sixteen inch intake is to be used until it shall have proved inadequate or unsafe.

The distributing reservoir is located about one-half a mile from the pumping station. It is on a hillside, three sides of the reservoir being an embankment. The structure is masonry lined and about two hundred feet square with a depth of twenty-six feet and has a capacity of five million gallons.

There is a sixteen inch force main which delivers the water from the pumping station into the reservoir. It is reported that the city intends to substitute this by a twenty inch pipe. A new twenty-four inch force main has recently been constructed by the city from the pumping station towards the centre of the city where it connects with the distributing mains. Both of these force mains are by-passed to permit of the pumping of water either directly to the reservoir or directly to the city mains with the surplus overflowing into the reservoir.

The high service pumping plant occupies a small portion of a plot of ground owned by the city. It is adjacent to the reservoir and the land is available and could be used for a new reservoir. It is reported that an additional storage capacity of about five million gallons could thus be secured. It is understood that this addition is contemplated. Plans should be prepared and submitted to the Commissioner of Health for approval.

There are in service about fifty-eight and five-tenths miles of main pipes in the streets, ranging in size from four inches to thirty inches in diameter. This system fairly well covers up the built-up portion of the city. However, many of the mains are too small to meet the increasing demand put upon them, especially in case of a large fire. It is the intention of the Water Board to replace many of these small mains by larger ones, to extend the service into the outlying districts, to provide by-pass connections to meet emergencies and local fluctuations in consumption. Permission to do these things is requested.

While the present sixteen inch intake may prove adequate, its short length makes the danger of excessive pollution by sewage from the city sewers above it very great. The new twenty-four inch intake shown on the plans which were approved by the Commissioner of Health, should be constructed without delay.

It has been determined that the plans for the improvements at the purification plant and pumping station will not be prejudicial to the public health and it is hereby and herein approved and a permit issued therefor and for the extension of the street main system in the city under the following conditions and stipulations:

FIRST: Complete plans of the intakes, water softening and purification plant and the pumping stations, together with the arrangements of pipes and valves, shall be filed with the Commissioner of Health, showing said works as built and this filing shall be done not later than six months from the completion of the improvements. At the close of each season's work plans of the water pipes laid during the year shall be prepared and filed in the office of the State Department of Health, together with any other information in connection therewith that may be required, to the end that the Commissioner of Health shall always be adequately informed of the extent of the water works system and the public use thereof. Weekly reports of the operation of the water works system shall be kept on blank forms satisfactory to the Commissioner of Health and copies thereof shall be filed in the office of the State Department of Health.

SECOND: The emergency intake between the river or the receiving well and the new filtered water pump well shall not be used except in extraordinary emergencies. Whenever used the Commissioner of Health shall be notified and all due precautions taken by the city to protect the public health in so far as this may be done.

THIRD: The city shall devise a method to reduce and if possible, eliminate the danger from floods at the purification and pumping plant. Plans for such protective work shall be prepared without delay and submitted to the Commissioner of Health for approval.

FOURTH: Before any enlargement of the existing storage reservoir is made plans therefor shall be submitted to and be approved by the Commissioner of Health.

FIFTH: The new twenty-four inch intake shall be constructed without delay in accordance with the plans for the purification works approved by the Commissioner of Health on March seventh, nineteen hundred and seven.

SIXTH: A suitable cover shall be placed over the clear water pump well at the main pumping station to obviate any possible accidental contamination of the filtered water at that point.

SEVENTH: It is the intention of the State Department of Health to make frequent examinations of the water works system. If at any time in the opinion of the Commissioner of Health, the water supply system is not performing its work efficiently, or the water being supplied by the city is or may be injurious to public health, then the city of McKeesport shall adopt such remedial measures as the Commissioner of Health may approve or suggest.

Harrisburg, Pa., October 15th, 1908.

41—17—1908

MARCUS HOOK, DELAWARE COUNTY.

Chichester Water Company.

This application was made by the Chichester Water Company of the borough of Marcus Hook, Delaware County, and is for permission to install a system of water works for the supply of water to the public in said borough.

It appears that on October first, one thousand nine hundred and seven, the New Chester Water Company made an application for permission to extend its water works system and supply water to the public within the borough of Marcus Hook, Delaware County, Pennsylvania. It was determined at that time by the Commissioner of Health that the New Chester Water Company appeared to have no right to supply water to the public in the borough of Marcus Hook. Accordingly the said water company was notified that the Commissioner of Health could not entertain an application made by it for permission to supply water in Marcus Hook until such time as the Company was authorized to supply water to said borough.

In the meantime, the New Chester Water Company had proceeded to extend its mains to the borough and had laid in the highways therein about three and a half miles of ten, eight and six inch pipes. Following the receipt of the notification from the Commissioner of Health that the New Chester Water Company had no rights in Marcus Hook borough, application by persons interested in the New Chester Water Company was immediately made for the incorporation of the Chichester Water Company. The application was made for the purpose of legalizing the supply of water by the New Chester Water Company in Marcus Hook.

On December nineteenth, one thousand nine hundred and seven, the Chichester Water Company was duly authorized to supply water to the public in the borough of Marcus Hook, its source of supply to be the Delaware River, the water to be taken therefrom at the present pumping station of the New Chester Water Company in the city of Chester.

On December thirty-first, the secretary of the new company notified the Department about its new charter and requested that a permit be granted for the use of the water pipes laid in the streets of Marcus Hook borough and for the supply of water to the public as provided by charter, and on March seventh, One thousand nine hundred and eight, a formal application therefor was made by the Chichester Water Company.

Marcus Hook borough lies on the shore of the Delaware River about three miles southwest of the city of Chester, all in Delaware County. The borough is adjacent to and north of the Pennsylvania-Delaware State line. It is a very old settlement dating back to about seventeen hundred. First incorporated into a borough about eighteen hundred and seventy, it subsequently gave up its incorporation but was again re-organized into a borough in eighteen hundred and ninety-two. Its population then was less than a thousand. In nineteen hundred the census gave the population as twelve hundred and nine. Within the last five years, following the construction of oil refineries and other industrial works, its growth has been more rapid. There are at least fifteen hundred residents in the community now. A number of the employes live in Philadelphia and Chester.

The local authorities hope by promoting public improvement, such as water works and sewerage works, to build up the town. Previous to the installation of the present water system no general system had been built. In eighteen hundred and ninety-two the Marcus Hook Water Company was incorporated but the charter lapsed because the company failed to take any active steps toward furnishing the public with water. Prior to the rights vested in the Chichester Water Company now under consideration, the Marcus Hook Water Company's charter was the only one ever granted covering this territory. The Linwood Water Company, incorporated in eighteen hundred and ninety-five for the supply of water to Lower Chichester Township from which the borough of Marcus Hook had been previously organized, sold its franchise and all its property in nineteen hundred and six to the New Chester Water Company and it was under this Linwood Water Company's franchise that the New Chester Water Company thought it had the right to supply the borough of Marcus Hook.

Investigations by the Department indicate that the citizens of Marcus Hook stand in need of a supply of water for domestic, municipal and fire purposes. Heretofore, the population has been dependent upon wells, shallow, located on private properties throughout the town, and in numerous instances in close proximity to cesspools or shallow earth privy vaults which menace the purity of the well water. Some typhoid fever has been attributed to the contamination of these private sources of drinking water.

Nothing smaller than a six inch pipe line has been laid in the streets. Fire hydrants have been installed. It is understood that a pressure of seventy-two pounds will be available at Marcus Hook. A franchise has been obtained from the borough. It was granted to the New Chester Water Company, under which said company laid the mains during the summer of nineteen hundred and seven. It is presumed that the Chichester Water Company has become possessed of the water pipes and appurtenances, and will assume the obligations under which the New Chester Water Company laid the pipes in Marcus Hook.

The New Chester Water Company's plant consists of a Delaware River intake, two pumping engines of five million gallons capacity each, a twenty and twenty-four inch rising main about three and a half miles long, terminating in subsiding reser-

voirs located on Harrison Hill back of Chester, each reservoir holding eight million gallons, a mechanical filter plant of a daily capacity of six million gallons, a filtered water reservoir of two million gallons capacity and a system of gravity distribution in Chester City, Upland borough and Lower Chichester township. The daily consumption averages less than three million gallons and the population supplied approximates thirty-six thousand people. The source of supply is polluted by Philadelphia sewage. The filter plant was installed in nineteen hundred and two and nineteen hundred and three. The water which the Chichester Water Company is authorized by its charter to obtain from the New Chester Water Company will be delivered at the boundary line between Lower Chichester township and Marcus Hook borough, and the supply should be as potable for domestic uses as any supply which could be economically obtained in the vicinity.

To quite a degree the health and even life of the water consumers in the district furnished with drinking water by the New Chester Water Company depends upon the efficiency of the aparatus which said company operates and maintains to remove the sewage poisons known to exist in its source of supply, the Delaware river, and render the water potable. Any accident occurring to the plant whereby raw river water might be introduced into the homes of the district would be likely to imperil public health and might be followed by a fatal epidemic. It is the duty of the Commissioner of Health to preserve the purity of the waters of the State for the protection of the public health. However, the discharge of Philadelphia's sewage into the Delaware river and its tributaries cannot be discontinued except it be most gradually and under some plan necessarily requiring several decades for its consummation. Therefore, the New Chester Water Company must exercise constant vigilance in the operation of its purification plant. The extension of this water supply to Marcus Hook might easily become a public calamity to that borough. State sanction of the supply must provide safe guards against an inferior quality of water. The petitioners should not engage in the business of selling water, the quality of which is a matter beyond its control. There should be an agreement in writing between the Chichester Water Company and the New Chester Water Company, whereby the latter shall guarantee under a suitable and sufficient bond to furnish water to the Chichester Water Company under conditions and tests satisfactory to the State Commissioner of Health. It would not do to deprive Marcus Hook of its supply for manufacturing and supply purposes and therefore there appears to be no other practicable means of guaranteeing a constantly pure water or one approaching nearest to constant purity than by such an agreement as proposed.

The petitioners have not submitted a plan of the existing water pipes in Marcus Hook borough or of extensions that may be made thereto from time to time.

It has been determined that the proposed water works system and the supply therefor in the borough of Marcus Hook will not be prejudicial to the public health, and a permit is hereby and herein granted therefor under the following conditions and stipulations.

FIRST. This permit shall not be operative until the Chichester Water Company shall have entered into an agreement with the New Chester Water Company, whereby the latter shall guarantee to furnish the former with a sufficient quantity of water, the purity of which shall be satisfactory to the State Commissioner of Health. Tests of this water shall be made by the Chichester Water Company every two weeks and copies thereof filed in the office of the State Department of Health. A copy of said agreement shall also be filed in said office.

SECOND. On or before June first, one thousand nine hundred and eight, the Chichester Water Company shall prepare a plan showing the boundaries of the borough of Marcus Hook and the streets and the water pipes laid therein, and file said plan in the office of the State Department of Health. At the close of each season's work a plan of the water mains laid during the year shall be made and sent to the Commissioner of Health, to the end that there shall be a complete record in said office of the extent of the Chichester Water Company's water works and the number of people in the borough dependent upon such supply.

THIRD. Ample facilities for the complete drainage of the water pipe system or of parts thereof shall be provided and the location of the facilities and of all gates and blow-offs shall be indicated on the plan to be filed in the State Department of Health on or before June first, one thousand nine hundred and eight.

FOURTH. If at any time in the opinion of the Commissioner of Health the water supply, or the water works, or any part thereof, has become prejudicial to the public health, then the Chichester Water Company shall adopt such remedial measures to protect the public health as the Commissioner of Health may approve or suggest.

FIFTH. Regular inspections will be made by the New Chester Water Company's system and supply by a Department officer. The Commissioner of Health may suggest rules and regulations to govern the supply of water to the public in so far as the public health is concerned. The Chichester Water Company shall conform to any such orders, rules or regulations in so far as they may relate to the supply of water to the public in Marcus Hook borough.

SIXTH. This permit is issued on the express stipulation that the proposed operations of the Chichester Water Company are wholly within its charter rights.

Harrisburg, Pa., March 30, 1908.

MATAMORAS, PIKE COUNTY.

Matamoras Citizens Water Company.

This application was made by the borough of Matamoras, Pike county, and is for permission to install a water works system and to supply to the public in said borough.

It appears that the borough of Matamoras, of fifteen hundred population, is located in the extreme eastern corner of Pike county, on the banks of the Delaware, opposite the city of Port Jervis, New York (population, ten thousand), which, together with Matamoras, constitutes a railroad community. Matamoras is strictly a residential town. The Erie Railroad extends from New York to Port Jervis and on up the valley of the Delaware. Port Jervis is the terminus for many of the passenger trains from New York, and is also the site of extensive yards for the re-making of through freight trains and of large repair shops, so that the railroad furnishes employment for the support of the greater part of the population of Port Jervis and Matamoras. There are also in Port Jervis half a dozen manufactories each employing about a hundred hands. A highway toll bridge connects Port Jervis with Matamoras, and from the latter town there extends down the valley of the Delaware, connecting with the Pennsylvania Railroad and the Delaware, Lackawanna and Western Railroad at Stroudsburg, a much traveled highway, which is the only means of communication through the valley.

For many miles above Matamoras the Delaware follows a southeasterly course while immediately below it turns sharply and follows a southwesterly course for twenty-five miles along the foot of a well-defined mountain ridge in Pennsylvania parallel to the river. Matamoras is located entirely on a flat strip of land in this angle of the river between it and the foot of these hills. The hills are of shale formation and the flat is of fine sand underlain by gravel. The flat is at an average levation of about twenty feet above the river, which has never reached this height except when jammed with ice. These ice jams have done much damage to both banks of the river, as a result of which a dyke faced with riprap has been constructed along the Port Jervis shore, and it is said a State appropriation has been secured for a similar structure along the Matamoras bank.

Matamoras has grown from a few houses at the time of the building of the first highway bridge, in eighteen hundred and seventy-two, until now it has a population of fifteen hundred or more, during which time the highway bridge has been twice destroyed by floods and rebuilt. The town was incorporated as a borough on January eighteenth, nineteen hundred and five.

Delaware Drive extends southeasterly along the river front from Diller's Brook at the northwestern limit of the borough to Pennsylvania Avenue and the highway bridge. The streets parallel to Delaware Drive are named in order from First Street to Tenth Street, which is the southwestern borough limit. The cross streets are named in order from Avenue "A," at the northwestern end of the borough, to Avenue "T," at the southeastern end, with the exception of Pennsylvania Avenue, which runs between Avenues "K" and "L." The streets thus planned extend over the entire borough, which has an area of about four hundred acres and is nearly square in shape. The area laid out in streets and built up includes only about one-third of the borough in the northern part. The general surface slope in the borough is to the south away from the river front of the town to a depression in the flat extending easterly to the river below Matamoras. Few or no storm drains have been built, and the natural grades are light, and yet it is said that storm water seldom creates a nuisance in the town owing largely to the porosity of the soil.

Perhaps a half dozen houses along the river front have sewer pipes leading to the river, while a few others (although the number of these is said to be increasing) are sewered to percolating cesspools. A very few houses have inside flush closets and practically every house has an outside privy, which are almost exclusively of the loose vault type. Waste water is for the most part disposed of on the surface of the ground, where it is said not to create a nuisance owing to the porosity of the soil and the houses not being built closely together.

The water supply is at present obtained from private wells, of which there are estimated to be two hundred and forty in the town, one for nearly every house. These wells are, almost without exception, either driven or dug, there probably being rather more of the latter type.

The Matamoras Citizens' Water Company was incorporated with a capitalization of seven thousand dollars on June seventeenth, nineteen hundred and three, to exist for a term of ninety-nine years, for the purpose of supplying water within the township of Westfall, from which township the borough of Matamoras has since been organized. No contract has been made between the water company and the borough, although one has been drawn up providing for the proper laying of the pipes and for taking of water by the borough for fire protection and the furnishing of the same by the water company, which agreement it is said both parties are ready to sign whenever the water company is in position to carry out its part.

The water supply is to be obtained from one or two drilled wells, or from both of them, depending upon future investigations and the demands upon the system.

West of Matamoras is a bowl-shaped valley in the hills. This basin is two hundred feet or more higher than Matamoras, has an area of three-quarters of a square mile, and opens to the river valley at the northeast. It is sparsely populated, partly cultivated and partly in scrub timber, and is drained by Driller's brook,

which enters the river just above Matamoras. Just northwest of the borough, in line with Third Street and about one hundred feet west of Driller's brook, below the well-defined basin, the water company drilled a well about two years ago. The ground at the site of this well is at an average of fifteen feet above the town and above the bed of Driller's brook. The well is said to be eight inches in diameter and two hundred and two feet deep, and to be cased in sand and gravel for a depth of eighteen feet, and to extend the remainder of its depth through shale rock, in which are the water-bearing strata, principally at a depth of one hundred feet and more. The well is said to have been tested after being completed and to have yielded continuously for twenty-four hours one hundred and twenty-five to one hundred and thirty gallons per minute, which was the maximum capacity of the testing pump used. During the greater part of the year water flows from the well at the surface, though not in any great quantity. During the test the water fell in a short time to a depth of one hundred and fifteen feet, from which it varied little or not at all during the remainder of the twenty-four-hour test. The nearest building to this well is a dwelling about one hundred and fifty feet distant up the hillsides.

It is stated that it is thought that further investigations may indicate that the possibility of drilling further up the hillside in the mouth of the valley already described an artesian well, which will yield without pumping a flow sufficient to meet the demands of the water consumption, at least during the greater part of the year. The exact location of this proposed well was not known by the water company officials.

A concrete reservoir was constructed by the water company a year or so ago on the hillside about half way between the sites of the two wells. This reservoir is about forty-five feet in diameter, being octagonal in shape and ten feet deep. It is provided with a six-inch overflow pipe and with a single inlet and outlet pipe ten inches in diameter, so it is said. A small pipe has also been placed in the wall a couple of feet from the bottom as a means of connecting the reservoir with any other one which it may be desirable to build in the future. The reservoir is a massive, apparently substantial, concreate structure, with a frame roof. The elevation of the bottom of the reservoir is about five hundred and eighty feet above tide; the average elevation of the town, four hundred and forty feet.

The method of connecting the proposed upper well with the reservoir has not been decided upon. The water from the lower well, if this is needed, is to be pumped into the ten-inch gravity supply pipe to the town, which pipe is to pass near the well. However, the water may be raised from the well to the reservoir in two lifts, in which case a rectangular concrete basin of ten thousand gallons more capacity, already constructed near the well, may be used as an intermediate receiving basin and pump well. The details of the pumping station have not been designed.

From the connection at the proposed pumping station the main ten-inch pipe (or possibly eight inch) is to extend southeasterly across Driller's brook and in Third Street, a total length of one thousand seven hundred and twenty-five feet to Avenue "F," being connected with several cross pipes of the distributing system. At Avenue "F" the main reduces to eight inches in diameter and continues in Third Street about thirteen hundred feet to an eight-inch cross main in Pennsylvania Avenue, a six-inch pipe continuing about five hundred feet farther in Third Street. The distributing system is to have no dead ends. It is to include in all, below the connection of the pumping station to the main, about seventeen hundred and twenty-five feet of ten-inch pipe, twenty-seven hundred and fifty feet of eight-inch, seven thousand feet of six-inch and seventeen thousand eight hundred feet of four inch.

No plans have been filed with the application showing the location of the wells, the construction of the existing well, the arrangement at the pumping station, the reservoir, the connections between the wells and the reservoir, and the gravity main and distributing system, with the location thereon of valves, low points, blowoffs for draining and fire plugs, all of which plans should have been filed with the application and should, under any condition, be approved by the Commissioner of Health before the water works are constructed. The only plan submitted is a layout of the distributing system, showing the sizes of pipes to be used, but without other details.

Very many of the buildings of the town being located within fifty feet of each other, the practice of disposing of sewage in loose privy vaults and on the surface of the ground or in percolating cesspools, and the method of obtaining water for domestic purposes by means of dug or driven wells from the thirty foot surface stratum of porous sand and gravel render the quality of these various water supplies doubtful. The report of a local physician, in agreement with the report of a member of the local Board of Health, is to the effect that typhoid is of rare occurrence in Matamoras and that the majority of the patients have been railroad men, who probably contracted the disease away from home. This, however, is no assurance of the continuance of the purity of the well waters in view of the increasing number of cesspools, nor indeed that many of the wells are not at present contaminated with sewage. The bringing in of a supply of pure water from a distance would certainly be in the interests of public health, and if it were generally

used and the local wells abandoned, the sandy soil should for some time afford a way of satisfactory disposing of sewage in cesspools at small intial costs for sewerage.

There is every indication that the proposed water supply to be obtained from deep drilled wells in shale rock will be satisfactory and healthful if proper care is taken in protecting the wells from surface pollution.

Another urgent reason for the proposed introduction of a public water supply in pipes is that fire protection may be afforded and the fire insurance rates reduced, which rates are now considerably above the rates for Port Jervis. Although the efficiency of the water works for fire protection is but indirectly related to the function of the works to furnish water for domestic purposes, the Department feels called upon to direct the attention of the water company and the borough officials to the following features of the water system as a means of fire protection:

The average elevation of water in the reservoir above the surface of the ground in Matamoras of from one hundred and forty feet to one hundred and forty-five feet, respectively, with the reservoir about empty to half full, would afford a static pressure in the town of from sixty-one to sixty-three pounds per square inch. If not more than twenty plugs are distributed uniformly over the built-up part of the town, many points in Matamoras could be reached from the nearest plug only by five hundred feet or more of hose. Even if the static pressure of from sixty-one to sixty-three pounds, or sixty-five pounds for a full reservoir (the greatest pressure the reservoir could ever produce) were obtainable at the plugs, allowing for no loss of head in friction during the flow of the water in the pipes, this pressure would be insufficient to furnish through three hundred feet or more of two and a-half-inch hose a fire stream such as fire underwriters assume as a standard. It is, therefore, apparent that the pipes of the system should be designed so that as little head as possible may be lost in friction, and that there is no doubt but that at least a ten-inch pipe should be used for the gravity main and the principal main of the distributing system, instead of an eight-inch pipe, the use of which is said to have been considered and in which the loss in friction would be materially greater, thus reducing the efficiency of the fire protection. Although even a ten-inch gravity and distributing main would not afford in connection with the present reservoir a standard fire stream, this sized pipe even after it has been in service several years should furnish from three to five fairly efficient fire streams for a small town of low buildings.

It should also be mentioned that the capacity of the present reservoir, about one hundred thousand gallons, would be insufficient to provide storage for fire protection and for the inequalities of consumption for domestic purposes during the day, for even half a day, so that this fact should lead the water company to provide pumping facilities or means of obtaining water from the proposed upper well.

A satisfactory means of obtaining a thoroughly efficient system for fire protection would be to construct another reservoir at a greater elevation or to install a pumping outfit of sufficient capacity to furnish water for fire purposes under direct pressure from the pumps.

A pipe system adequate to furnish fire protection would, of course, meet the ordinary demands upon the system for some time to come, but it must be remembered that the fire protection will continually grow less efficient, not only because of the aging of the pipes, but because the water for domestic purposes, which must be furnished to some extent even during fires, will, with the growth of the town, become a greater and greater portion of the entire flow in the pipe system, thus reducing the flow available for fire protection.

As to the quantity of water available at the proposed sources nothing can be said definitely from the information before the Department. The report of the test of the lower well would apparently indicate that this would furnish, with proper storage, sufficient water for both domestic purposes and fire purposes, for some time to come. Nothing is known as to what the projected well may yield.

It has been determined that the proposed water works system and source of supply will not be prejudicial to public health and a permit is hereby and herein granted to the Matamoras Citizens' Water Company for the installation of water works and the supply of water to the public, as projected, under the following conditions and stipulations:

FIRST: Ample facilities shall be provided by means of blow-offs placed at all low points whereby the reservoir, gravity main, distributing system and the basin at the lower well may be completely drained.

SECOND: Detail plans of the lay-out at the pumping station and of the gravity main, force main, reservoir and distributing system, showing all valves and connections, shall be filed with and approved by the Commissioner of Health before work is commenced on these respective parts of the system.

THIRD: Before the works are completed and water is furnished therefrom, a plan shall be filed with the Commissioner of Health showing the drainage area tributary to the sites of the wells and the location thereon of the wells and of all buildings and other possible sources of pollution, which plan shall be drawn to scale.

FOURTH: Before any well other than the existing one is connected with the system, there shall be filed with and approved by the Commissioner of Health, a report, and if required, a plan of such additional well or wells indicating the construction of the same and the strata pierced thereby.

FIFTH: It is the purpose of the Department to obtain samples of water for analysis from the various parts of the system from time to time, and the water company shall render such assistance in carrying out this idea as may be necesssary, and shall make such alterations in the system and source of supply as the Commissioner of Health may suggest or approve or demand in the interests of the public health, to the end that the water supplied by said company through its system of water works shall not be prejudicial to public health.

SIXTH: Daily records of the operation of the work shall be properly kept on blank forms to be suggested by this Department, and copies thereof shall be furnished to the Commissioner of Health. Monthly inspections of occupied estates on the areas tributary to the valley above the sources of supply herein approved shall be made by the water company, the sanitary conditions noted and the results reported to the Commissioner of Health.

SEVENTH: It is stipulated that this permit is issued under the condition that all laws governing or regulating the business in which the company purposes to engage shall be complied with.

Harrisburg, Pa., June 12, 1908.

MECHANICSBURG, CUMBERLAND COUNTY.

Mechanicsburg Gas and Water Company.

This application was made by the Mechanicsburg Gas and Water Company, and is for approval of plans for a water purification plant and for certain other improvements in connection with the obtaining of a new source of supply for the public in the charter territory of said company, under certain conditions and stipulations, which are hereinafter set forth.

It appears that on April tenth, one thousand nine hundred and six, the Commissioner of Health issued a permit to the Mechanicsburg Gas and Water Company, of the borough of Mechanicsburg, Cumberland county, Pennsylvania, to extend the water supply to the public in said borough and to obtain a new source of supply from Yellow Breeches Creek at Millers Mill. The water company did not submit detail plans of the proposed improvements at that time, the preparation of these plans being deferred pending the decision of the Commissioner of Health with respect to the new source. Among other conditions the said permit contained the following:

"That the Yellow Breeches Creek water shall be purified by a modern water filtration plant before the water or any of it shall be supplied to the inhabitants of Mechanicsburg.

"That before said plant is constructed or used detail plans of the plant and its appurtenances shall be submitted to the Commissioner of Health for his approval, and he may modify or amend said plans and approve them.

"Before construction thereof, plans of the proposed force main and reservoir, standpipe or other means or facilities for storing water shall be prepared and submitted to the Commissioner of Health for his approval, and until so approved, the same shall not be constructed.

"That detail plans of the existing reservoirs, pipes gates, drain tiles, watershed, supply main and distributing mains in Mechanicsburg shall be prepared and placed on file with the Commissioner of Health."

In compliance with the terms of this permit, the water company has prepared the plans, and they are now on file in the office of the Commissioner of Health.

The plans comprise the rebuilding of the dam across Yellow Breeches Creek at Millers Mill, the installation of pumping machinery to be driven by water power developed at the mill, the erection of a mechanical filtration plant, the building of a cast iron pumping main and the construction of a reinforced concrete distributing reservoir.

It is understood that the company is not to abandon its existing source of supply.

The new dam is to be of concrete construction and is to be built immediately below the existing wooden dam across the creek. The water will be diverted by the new dam through the existing race to the fore bay at the mill. Within the present building is to be installed one turbine water wheel which is to operate a triplex pump of the ordinary type, belt driven. This pump is to be used to raise the filtered water to the distributing reservoir on the hill toward the town. Its capacity is said to be five hundred thousand gallons per twenty-four hours.

The same turbine wheel will also operate the low service centrifugal pump, capacity four hundred gallons per minute, which is to be used to supply raw water to the subsidence tanks.

This tank is to be of reinforced concrete, circular, twenty-eight feet in diameter and twenty feet deep, provided with baffles and customary inlet and outlet weirs. The normal rate of the filter plant is five hundred thousand gallons per twenty-four hours, so that a subsidence period of four and one-half hours is afforded by the tanks proposed. This structure is to be placed outside of the

building and to rest on a foundation about level with the ground. The coagulated water will feed by gravity to the filter unit which is to be set up in one end of the present mill building. Underneath this filter is to be the clear water well.

The Water Company has contracted with the Pittsburg Filter Manufacturing Company for the construction of the filter and its appurtenances, not including the subsidence tank. The filter unit is to be fifteen feet inside diameter and eight feet in height. To be constructed of cypress and to set on I beam foundation to be furnished by the Water Company as shown on plans submitted. On these beams are to rest a tongue and grooved wooden flooring. The height of the top of the filter tank is to be on a level with the top of the concrete subsidence tank outside the building. The water is to be delivered from one to the other through a ten inch pipe. This pipe will terminate at the filter in the distributing trough extending around the inner circumference of the unit, being fourteen inches above the top of the sand layer. Here the water will stand about six inches from the top of the tank, equivalent to a depth of three feet above.

Across the floor of the filter is to be laid a heavy cast iron manifold. Laterals of heavy wrought iron pipe will be screwed into the cast iron manifold six inches on centers and extend in parallel lines to the inner circumference of the filter tank. They will be capped on the outer end. The waste and collecting screens are to be of the contractor's latest design, made of the best quality of valve metal and they are to be screwed into the laterals on six inch centers. This manifold system to the base of the screens is to be imbedded in concrete.

Across the floor of the filter, which is above the waste and collecting system above described and at right angles to the central manifold, a casting is to be laid of heavy manifold air pipe. The brass pipes are to be of the best quality of brass tubing screwed into the manifold pipe six inches on centers, and extending in parallel lines to the sides of the filter. Air is to be admitted to the filter through drilled holes one sixteenth of an inch in diameter on six inch centers on the sides of the lateral tubes. Over this system of piping is to be placed a filter of gravel to a depth of eight inches and then filter sand to a depth of thirty inches. Gravel is to be of such size that it will pass a screen having a clear mesh of five-eights of an inch and be retained on a screen having a clear mesh of three-sixteenths of an inch.

Filter sand is to be specially selected and shall contain not more than five per cent. of flat or laminated particles. It shall be of hard, silicous material that will not disintegrate and shall be practically free from loam, clay and perishable matter. Sand shall have an effective size of not less than thirty-five hundredths M.M. or more than thirty-six hundredths M.M. and shall have a uniformity coefficient of not more than one and seven-tenths. Filtered water is to be delivered from the manifold system through a six inch pipe into the filtered water basin below. No regular regulator or control is provided except that it is reported that when the clear water basin is full, a float will automatically shut off the supply of raw water to the subsidence basin. Under this arrangement it is readily apparent that the filter could be easily operated in excess of its rated capacity and since the Yellow Breeches Creek is subject to sewage pollution, a repetition of the Royersford and Spring City typhoid fever epidemic of the current year could easily occur at Mechanicsburg, owing to lack of regulation of filter rates.

For washing purposes, the filtered water from the pumping main appears to be used. The connection to the manifold system is a ten inch pipe and under the pressure available, an ample supply may be had for washing purposes. The dirty water is to be wasted to the sewer which will empty into the creek below the dam. Piping connections are so designed that the first filtered water may also be wasted if desired.

There is to be provided a rotary pressure blower, driven by water power of ample capacity for properly cleaning the filter with air.

The chemical tanks are to be set up on the second floor of the present mill. Each is to be forty-eight inches in diameter and forty-two inches high, built of wood, equipped with dissolving boxes with suitable connection and spraying devices. The flow of the chemical, which under ordinary circumstances is to be sulphate of alumina, is to be regulated by means of an orifice box consisting of a small tank constructed of wood and equipped with a float for maintaining a consistent head and a finely graduated distributing orifice for feeding the solution at the proper rate to the raw water. The water supplied to the solution tank is to be taken off from the pumping main. The solutions are to be admitted to the raw water at the inlet to the sedimentation tank.

The contractor agrees from one year from the date of the completion of the filter plant, that the same, (subject to the condition that the plan shall be operated in accordance with the company's instructions, and that a suitable quanity and quality of coagulant will be used) shall be capable of filtering an average of not less than five hundred thousand gallons of water in twenty-four hours and that the filtered water shall be bright, clear and practically free from turbidity, discoloration and matter in suspension. It shall show a removal of ninety-seven per cent. of bacteria when the raw water contains three thousand or more p r c.c.

The filtered water basin is to be built by the Water Company. Underneath the end of the present mill, excavations are to be made and a reinforced concrete basin eleven feet deep, twenty-four feet nine inches wide and thirty-three feet long to be built. This length is provided in order to admit of the installation of an additional filter unit over the basin in the future. The piping is all arranged with this in view. At a little more cost, the flooring and covering of this clear water basin could be made water tight. As before stated, a wooden floor is now contemplated. Concrete flooring should be provided. This would obviate any possible danger of pollution of the filtered water in the basin.

The storage of filtered water in this basin is for purposes of pumping only. The suction pipe of the pump is to extend into this basin. The real storage of filtered water is to be obtained in the distributing reservoir on the hill.

The plan submitted by the petitioners shows the location of the proposed distributing reservoirs to the south of Mechanicsburg near one of the present reservoirs of the company. The elevation of high water is to be five hundred and fifty in this basin or one hundred feet above ninety-four per cent. of the area of Mechanicsburg borough.

This storage reservoir is to be built in circular form, two hundred and eleven feet in diameter at the top and one hundred and sixty feet in diameter at the bottom, seventeen feet deep and holding, when full, three million gallons. The sides and bottom of the dividing wall through the center are to be built of reinforced concrete. The water is to be delivered into and taken out at the bottom of each half of the reservoir. From the same point that the water is admitted and taken out, there is also provided an eight inch wash-out pipe, by means of which either section of the basin can be drained.

It should be observed that there will be no circulation whatsoever by this method of introduction and taking out of the water from the reservoir except that which may occur from natural causes in the basin. It has been found that circulation of filtered water in open basins such as the one provided for in the plans, exerts a marked influence in preventing the growth of organisms which deteriorate the quality of stored filtered water. It will be to the advantage of the water company to modify the plans of the inlet so as to produce the maximum current in each section of the distributing reservoir.

The Water Company purposes to lay a ten inch force main from the pumping station to the distributing reservoir. A profile of this line has not been submitted and the Department is not informed whether blow-outs and drainage facilities are afforded or not.

It has been determined that the proposed improvements will not be prejudicial to the public health and a permit is hereby and herein granted therefor under the following conditions and stipulations:

FIRST: That on or before January first, nineteen hundred and nine, the Water Company shall file detail plans of the existing reservoirs, pipes, gates, drain tiles and watershed and supply main of the existing water works system now used to supply water to the public in Mechanicsburg, in the office of the Commissioner of Health. At the close of each season's work the water company shall file in the office of the State Department of Health, a plan of the water pipes laid in the streets of the borough during that year together with any other information in connection therewith that may be required, in order that the Commissioner of Health may always be in formed of the extent of the water works system and the public use thereof.

SECOND: The filter plant shall be operated for one year after installation under the direction of the expert who designed it or some other competent expert. A full report of the initial test of the filter plant shall be submitted to the Commissioner of Health and thereafter the Water Company shall assist the State Department of Health in making such tests of the plant from time to time as may be desirable.

THIRD: Weekly reports of the operation of the water works system and purification plant shall be kept on blank forms satisfactory to the Department of Health and copies thereof shall be filed with the said Department. If at any time in the opinion of the Commissioner of Health, the water works system or any part thereof of any water furnished thereby has become prejudicial to public health or insufficient or defective, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

FOURTH: The Water Company shall provide for the installation of a rate control at the filter plant and such a device of approved pattern shall be installed and ready for use at the time that the filter unit is put in commission.

FIFTH: The Water Company shall construct a reinforced concrete, water-tight floor and roof over the clear water basin.

When the improvements herein approved are completed, the Water Company shall file a complete set of plans of the structures and changes in the office of the Commissioner of Health. Ample facilities for draining the force main shall be provided, and the company's attention is specially called to the desirability of carrying out the suggestions hereinbefore made with respect to circulation of water in the distributing reservoirs. It will be cheaper for the company to do this now than at a later date.

Harrisburg, Pa., September 25th, 1908.

MINERSVILLE, SCHUYLKILL COUNTY.

Minersville Water Company.

This application was made by the Minersville Water Company of Minersville Borough, Schuylkill County, Pennsylvania, and is for permission to construct a reservoir for impounding an additional water supply to the public in said borough.

It appears that Minersville had in nineteen hundred a population of forty-eight hundred and fifteen and the present population is reported to be approximately six thousand. This borough is situated about four miles west of Pottsville, the seat of Schuylkill County. The men and boys are generally employed in and about the collieries in the vicinity. A number of the girls are employed in factories and the laundry in the town. The people are mostly of foreign birth.

The borough is situated in the midst of the coal measures on the west bank of the West Branch of the Schuylkill River. A small stream called Wolf Creek rising in Mine Hill to the north, flows down through the center of the town and is used as a drain for two collieries and for the village itself. On either side of this creek in the borough there are high hills upon which and in the valley between is located the built-up part of Minersville. A part of Wolf's Creek is arched over and into it the combined sewers of the municipality empty and also private sewers. Wolf Creek drains a very narrow and steep watershed and during storms the flow has a scouring effect which washes out all accumulations in the culvert onto the flats in the lower part of the borough. There is no reliable data at hand now in the office of the Department, showing the extent of public use of the sewer system but it is known that sewers are very generally laid throughout the streets of the town. There are a number of cesspools and many privies in the borough and a dozen or more private wells, so it is reported. People very generally take water from the Minersville Water Company.

The Minersville Water Company was chartered by Act of Assembly, April thirteenth, eighteen hundred and fifty-five; Letters Patent being granted on March twenty-eighth, eighteen hundred and fifty-seven, for the object of conveying water to the borough of Minersville. This is the only corporation authorized to supply the borough of Minersville.

It is reported that the first works were built about eighteen hundred and fifty-eight and that parts were reconstructed in eighteen hundred and ninety. At present the borough and parts of the townships of Cass and New Castle are supplied by the Minersville Water Company. By what authority the supply of water to the public outside of the borough is undertaken by the Minersville Water Company, is not known to the State Department of Health. The Company reports that the poulation supplied with water outside of Minersville borough is in the neighborhood of three thousand.

The system is a high service gravity supply, affording a pressure reaching from sixty-five to one hundred and fifty pounds per square inch.

The company has not submitted any plans of its water pipe system in the borough showing the sizes, location of valves and draining facilities.

The source is obtained from three streams located in Schuylkill County in Cass Township and north of Mine Hill, namely Dyers, Wagners and Wheelers Creek. These streams are all typical fresh water mountain brooks with no habitation whatever on their watersheds above the reservoir from which the supply is taken.

Dyers Run is the largest of the three brooks. It has a watershed of five square miles. This stream heads in springs on the top of Broad Mountain four miles from its mouth. The growth on its watershed of four square miles consists of shrubs, bushes and some second growth timber. The soil is mostly the disintegrated conglomerate, together with some clay and loam. At one time the Mine Hill and Schuylkill Haven Railroad (Philadelphia and Reading Railway) between Minersville and Gordon Plane passed over this shed, but the road is now abandoned and the tracks torn up. The road bed is not used for purposes of traffic. The largest reservoir of the system is located on this stream about three and three-tenth miles from the borough and at an elevation of eleven hundred and forty feet mean sea level. It consists of a dam thrown across a gully and is said to have a capacity of about nine million gallons. The dam is a dry stone masonry dam with a clay puddle cord and a puddle face, from it leads a fourteen inch supply main. The vegetation and organic growth was cleaned off the site before water was allowed to impound. There are no present indications that such growth exists. There is a caretaker at this reservoir.

The second reservoir in size is situated at Wagners Creek, a small stream having a watershed above the dam of seven-tenth square miles. This stream is directly east of Dyers Run, but in a small valley of Broad Mountain and the general conditions relative to it are the same as those on Dyers Run. The impounding reservoir is of same kind and constructed like the others and is distant about two and nine-tenths miles from Minersville. It has a capacity of approximately six hundred thousand gallons. The water discharges into an eight inch pipe line laid for about a half mile parallel to the stream and there connects to the fourteen inch line from the Dyers Run reservoir to Minersville.

Wheelers Creek parallels and is immediately east of Wagner's Creek. It is a small stream and upon it the third reservoir of the system is located. This structure is of the same class as the others and has a storage capacity of three hundred thousand gallons. The watershed above is estimated to be three tenths of a square mile in area. An eight inch supply main is laid down the valley about one-half mile to the fourteen inch supply main to the Dyers Run reservoir.

The last two named reservoirs are at a higher elevation than the larger one. They are held as an auxiliary supply of minor importance.

The west branch of the Schuylkill River above Minersville passing up stream follows the course nearly northerly for a distance of about two miles and thence it turns at right angles around the end of Mine Hill and its course is due west into the Broad Mountains, a distance of about four miles, where are its headwaters. Dyers Run and Wagners and Wheelers Creeks flow southerly and empty into the west branch. The main fourteen inch supply pipe from Dyers Run reservoir is laid down the valley of the west branch of the Schuylkill to Oak Hill colliery near Minersville borough line. Here the fourteen inch main branches into two eight inch lines, both of which are extended to the borough of Minersville and parts of Cass and New Castle Townships. New Castle Township lies east of Cass Township and east of the west branch of the Schuylkill River. Norwegia Township is east of the river opposite Minersville and for some distance north of it. The said fourteen inch gravity supply main in following down the valley passes out of Cass Township through a small portion of New Castle Township, but it is not known to pass through any of the Norwegian Township territory. Off of this line in Cass Township and New Castle Township there are branch pipes used to supply water to the public and to Lytle, Pine Hill, Oak Hill and West Pine Knob coal collieries. From the information submitted by the Minersville Water Company, it is not known whether such company owns these branch supply pipes.

On July second, eighteen hundred and ninety, the Crystal Water Company was incorporated to supply water to the public in Cass Township, Schuylkill County. It appears that this corporation, which is controlled by the Philadelphia and Reading Coal and Iron Company, has an impounding reservoir of considerable size on a stream in the western part of Cass Township, from which it supplies water to the public and to collieries in that portion of said township and to the Otto Water Company in Reilly Township to the west and to Deep Water Company in Branch Township, to the south, said county. In the Crystal Water Company's chartered territory is located the Lytle colliery of the Susquehanna Coal Company and the plans filed by said water company in the office of the Commissioner of Health show a pipe line laid to said colliery. However, the Minersville Water Company and also the officers of the said Lytle colliery both state that water is furnished and sold by the Minersville Water Company to the Lytle Coal Company at its said colliery which is in Cass Township, north of and about one and one-half miles distant from Minersville borough. It also appears, as above stated, that the Minersville Water Company furnishes water to the Pine Hill colliery, located in the same neighborhood and operated by Sturgis and company. Furthermore, the said water company supplies water to the Oak Hill colliery of Leisenring, Writer and Company, located in Cass Township, at the end of the fourteen inch supply pipe above mentioned. It also furnishes water to the West Pine Knob colliery of the Philadelphia and Reading Coal and Iron Company, located in Cass Township, near the mouth of Dyers Run.

On December seventeenth, eighteen hundred and ninety, the Forestville Water Company of Minersville was chartered to exist for twenty years to supply water to the public in Cass Township, Schuylkill County. The pipe lines of this corporation was laid to supply the said Lytle colliery and miners' houses in the neighborhood. Water is furnished by the said Minersville Water Company and by the said Crystal Water Company. It is estimated that about seven hundred and fifty people rely upon the Forestville Water Company for their drinking water.

The water works of the Forestville Water Company comprise only the pipe lines, pump and tanks at the colliery and the settlement in the vicinity. No detail plans have been submitted.

The petitioner proposes to build a new dam and reservoir. The following is a copy of the application:

"On behalf of the Minersville Water Company, a company incorporated under the Act of the General Assembly of the Commonwealth of Pennsylvania, P. L. six hundred and thirty-nine, approved the thirteenth day of April, eighteen hundred and fifty-five, I make application for a permit authorizing the said company to construct a reservoir for the purpose of impounding an additional water supply from the waters of Dyers Run in Cass Township, Schuylkill County, Pennsylvania, about nine thousand feet on said stream, above the location of the company's present impounding reservoir thereon, and also to do whatever is necessary to protect the water of the said stream from pollution and diminution.

"I enclose you herewith a certified blue print copy of the preliminary plan of the breast of the proposed dam, and also a certified blue print copy of a preliminary plan of the proposed reservoir, the location of which will be found upon the plans and surveys of the said company's water works, etc., already on file in your office, in compliance with the Act of April twenty-second, nineteen hundred and five."

The object of the dam is to store water to be used during droughts only. It will be an earth and rock filled structure, having a concrete core wall four feet thick with puddle on the inner slope. The design will provide for a forty-five foot structure in the future but for the present the dam is to be erected twenty feet only to the crest. This will give a storage for the present of about twenty-eight million gallons increased to fifty million gallons for the higher elevation. The watershed above the site of the dam has an area of about one and one-half square miles. The fall in the stream between the proposed reservoir and the old one is three hundred and forty feet and the intervening territory is a narrow, rock valley a few hundred feet wide and uninhabited. The plan is to open the valves in the new reservoir and permit the impounded water to flow down the run to the lower reservoir.

The watersheds of the Minersville Water Company's supply being uninhabited are free from permanent sources of pollution. The only danger, therefore, to contamination of the supply, is that of accidental pollution. The water gives satisfaction to the consumers and there seems to be no reason why the desired permit should not be granted to the Minersville Water Company. On the day of the Department's inspection at the site of the new dam, trees and stumps were being cleared and the organic matter on the land to be flooded was being removed to some extent. The total area to be flooded is not known nor the extent of shallow flowage, except that the preliminary sketch shows a fairly good depth of flowage for the higher dam. In case of deterioration of the quality of water by vegetable organisms, such remedies as are customary would have to be applied by the water company to remove tastes and odors from the water. The aeration of the water in the mile and three-quarters course between the two dams would operate naturally to benefit the water, and it would seem reasonable to wait until the deterioration of water occurs, if ever, before determining the best remedies; but the water company should expect to be advised and required to apply remedies whenever needed.

The supply of water to the public outside of its chartered territory is a matter which cannot receive the approval of the Commissioner of Health until the rights so to supply water beyond the limits of Minersville borough shall have been acquired by said company.

It has been determined that the water works system and source of supply and the proposed new source of supply and extension of water pipes within the limits of Minersville borough will not be prejudicial to public health and the same is hereby and herein approved and a permit granted therefor under the following conditions and stipulations:

FIRST: On or before the first day of January, nineteen hundred and nine, the water company shall prepare a detail plan of the water pipes in the borough showing their sizes, location of gates, blow-offs and drainage facilities and the same with respect to the pipes belonging to the company outside of the borough limits, also detail plans and elevations of the reservoirs, dams, gates and drainage facilities thereof belonging to the company and file the same in the office of the Commissioner of Health. Thereafter at the close of each season's work, plans shall be filed by the said company of the water pipes laid during the year, in the office of the Commissioner of Health, together with any other information in connection therewith that may be required, to the end that the State Department of Health may always be informed of the extent of the water works and the use thereof.

SECOND: On or before January first, nineteen hundred and nine, the water company shall file with the Commissioner of Health, detail plans of the new reservoir and dam.

THIRD: If at any time in the opinion of the Commissioner of Health, the water works system or any part thereof or the source of supply shall have become prejudicial to the public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

FOURTH: If any lumber operations should be undertaken on the watershed or any habitation or source of pollution be established on the watershed at any time, the water company shall immediately notify the Commissioner of Health thereof and co-operate with the State Department of Health in enforcement of sanitary regulations to safeguard the purity of the waters used by said company as a source of supply to the public.

FIFTH: If the public health shall require it, the State Board of Health shall establish rules and regulations for the operation of the waters works system and the water company shall be bound in accepting this permit to abide by and observe such rules and regulations in so far as they shall relate to public health matters.

SIXTH: Approval by the Commissioner of Health of the supply by the Minersville Water Company to the public in any other territory except that prescribed by its charter, is herein withheld and denied. However, if the company shall first obtain a legal right to supply water in the townships through which its main supply pipes are located, the Commissioner of Health may thereupon grant an approval for such supply to the public.

Harrisburg, Pa., July 23rd, 1908.

MORGANZA, WASHINGTON COUNTY.

Pennsylvania Reform School.

This application was made by the Board of Managers of the Pennsylvania Reform School, located at Morganza, Cecil Township, Washington County, and is for approval of plans for water filters, improvements to the water works system and for a new impounding reservoir.

It appears that the Pennsylvania Reform School is a State Institution for the care and education of incorrigible children up to the age of twenty-one years. The school was established in eighteen hundred and fifty-two on the site of the present penitentiary in Pittsburg. In eighteen hundred and seventy-two, it was moved in its entirety to the present site at Morganza. The institution to-day comprises a main building, four cottages for boys and a large building for the care of the girl pupils, a public school building for boys, three shop buildings in which trades are taught to the boys, a hospital and farm buildings. There are in process of erection two cottages, one for boys and one for girls, and a large gymnasium and a power house. They are all situated on a five hundred and twelve acre tract of land located in Cecil Township, Washington County, north and west of Chartiers Creek, which flows in a general south-easterly direction by the property. This creek makes a large bend in its course so that it forms the western boundary of the southerly portion of the property and through this part the Chartiers Valley Division of the Pittsburgh, Cincinnati, Chicago and St. Louis Railroad extends. Morganza Station is on the land occupied by the state buildings.

The Administration Building and four cottages are directly back from the station on a bluff which is one hundred feet or so above the creek valley and the other buildings are situated back from this bluff on rising ground which is laid out in regular plots and drives for the prospective cottage development of the institution.

Near the northern boundary of the land reserved for future cottages is a water course locally known as Morganza Run which rises north in the township near the village of Bishop and pursues a generally southerly direction, a distance of about two and a half miles, to Chartiers Creek. The latter seventeen hundred feet of the course follows closely the northern boundary of the State property.

The valley of this run and the entire watershed is under cultivation.

The population of the institution, including officers, numbers about five hundred and fifty. It is estimated that the average daily water consumption approximates one hundred and twenty-five thousand gallons.

On the institution grounds in the northern part, a small intake dam on Morganza Run was erected to divert the water of the stream into the water pipe system of the institution and this source was the first supply. Later, owing to the inadequacy of the supply, an intake dam and pumping station was erected near the banks of Chartiers Creek and the major portion of the supply was drawn from the creek. Subsequently, owing to coal mine operations and the pollution of the waters by mine drainage and sewage, the creek supply was abandoned, except for emergency uses, and Morganza Run was again resorted to. A small intake dam of timber construction was built on the run five hundred feet below the site of the original dam and the water was conveyed by a pipe to an artificial pond on the bank of the stream about five hundred feet distant. This basin was an earth structure, partly excavated and partly held in embankment, being about one hundred and forty feet long by eighty wide, affording a three foot depth of water. Its use was that of a pump well and ice pond. From this basin the water was pumped into a distributing reservoir on the hill in the northern part of the institution grounds elevated about one hundred and eighty feet above the main building.

At the present time the institution's water supply is derived from three sources; first, raw water from Morganza Run for general inferior uses; second, from springs for drinking purposes; and third, from Chartiers Creek and a drilled well at the creek pump house for inferior uses.

The main supply is derived from the run and is diverted by means of a dam and the ten inch tile pipe to the open basin and pump well above described. The water is raised by means of a horizontal, duplex pumping engine of five hundred gallons capacity per minute through about a half mile of six inch cast iron force main to the distributing reservoir located on the hill north of the institution.

The distributing reservoirs are two in number, each seventeen feet deep and thirty-six feet by fifty-one feet in plan, vertical walls brick lined, cement bottom, having a combined capacity, at a depth of fifteen feet of water, of four hundred and thirteen thousand gallons. There are facilities afforded at the bottom of these reservoirs for drainage. The pumping engine is operated daily for a few hours until the high water mark is reached.

From these reservoirs the water is supplied by gravity to all the buildings, including the barns, stables and farm house, and is used for flushing, sprinkling, bathing, stock, and other general purposes, except for drinking. One of the rules of the institution forbids the use for drinking of the faucet supply; but it has been found difficult to entirely prevent the use for this purpose.

There is no plan in existence of the distributing pipe system. There appears to be a six inch and eight inch supply line from the hill reservoir. About the grounds at convenient points fire hydrants have been erected. It is reported that most of

the distributing pipe is four inches in diameter. The value of the state buildings and the necessity for adequate fire protection warrants the obtaining of accurate knowledge of the exact diameters of the water pipe.

It is possible, by means of valves and connections, to pump Morganza Run Water directly into the distributing system, by-passing the reservoirs, so it is reported. The facts as to this by-passing should also be ascertained and accurately indicated on the plans.

For drinking purposes, water is obtained from two or three springs located on the ground. The principal spring is on the hillside in front of the administration building and about half way distant between said building and the railroad station. The formation is limestone and originally there was a small ravine in which the spring gushed forth from the limestone. Rocks were thrown in here and carefully piled together and then the ravine was filled with earth up to the general level of the lawn as it may be seen to-day. A two inch pipe extends from the underground spring down hill towards the railroad and terminates in a galvanized iron tank about eighteen inches in diameter and three feet high, resting on a brick foundation slightly above the surface of the ground. There is a faucet near the bottom of this tank from which water is drawn for use. Formerly a water wagon hauled all the drinking water to the main buildings, supplemented by family bucket brigades for fresh water supply to the cottages for table use. This system is maintained in part at the present time, but generally speaking the girls' buildings are now supplied by a pumping system. The overflow from the iron tank is piped to a brick, cement lined, storage basin of about fifty barrels capacity, located near the railroad and the old power house, where there is a small pumping engine which raises the water through a two inch force main to a second brick, cement lined reservoir of the same size, located in the ground back of the Administration Building and near the group of shops. This structure is elevated sufficiently high to furnish a gravity flow under low pressure to the ground floor or basement of the Administration Building and four cottages adjacent thereto.

Another important spring is in the grove on the slope towards Chartiers Creek northeast of the shops. The water flows from limestone rock through an inch pipe and falls free into an artificial stone basin in which there is no storage. The water is obtained here by putting receptacles under the end of the pipe.

The next spring of importance is in the immediate vicinity of one of the new cottages being erected and within seventy-five feet of the main fifteen inch sewer of the institution. It is reported that this spring which comes from the limestone is in what was formerly a ravine, which has been filled in a manner similar to that described with respect to the first spring herein mentioned. A six inch pipe about two hundred and fifty feet long conveys this water to an open, brick lined basin about three feet in diameter and flush with the surface of the ground. Surface water contamination is possible here. It is always full of water. The overflow is into a nearby lily pond. Water has been occasionally taken from this well for drinking purposes, more especially by the families in the three nearest cottages.

During the latter part of the current season, a spring at the farm house has been drawn upon. It is in a spring house, the water flowing from the bank out of the limestone.

At the Chartiers Creek pump house there is a drilled well, deep and connected up to the pump. The machinery is old. The water raised from this well has an odor and disagreeable taste and the supply is limited. At the pump house there is a seventy-five thousand gallon, circular, brick pump well, into which the deep-seated water is delivered and from whence, by a second pumping engine, the water is forced into the distributing system of the institution. This latter pump may also draw water directly from the creek and deliver it into the system. Whenever the Morganza Run supply is insufficient, the driven well is resorted to and finally raw water is used. Any surplus pumpage overflows from the pipes into the distributing reservoirs on the hill.

On the hill adjacent to the twin distributing reservoirs is a large reservoir approximately one hundred feet square, with sloping sides and thirteen and a half feet deep. It is brick-lined. This structure is not water tight and hence is not in use. The capacity on a twelve foot basis is slightly in excess of five hundred thousand gallons.

The watershed of Morganza Run above the intake dam has an area of about two square miles and on it there are twelve dwellings, all occupied but one. Nine of the estates are farms. There are quite a number of oil producing wells on the watershed and new wells are being drilled from time to time. A detailed map of the drainage area and occupation thereof is now being prepared by the Board of Managers and will be filed in the office of the State Department of Health.

The institution has witnessed considerable typhoid fever during its thirty-two years' existence at Morganza. Three times it has shown in epidemic form. The attending physician reports seventy cases for eighteen hundred and ninety-eight, sixty cases for nineteen hundred and three, nine cases for nineteen hundred and seven and forty cases for the current year. With a few cases occurring in other years, the total has been nearly two hundred cases during the last ten years, the cause of which has never been determined.

On July twelfth, eighteen hundred and ninety-eight, the first case appeared in Cottage D, where the boys average fifteen years of age. In the following table the date of onset of each case and the location of cottage in which the patient resided are shown:

LOCATION OF COTTAGES.

1908. Date of Onset,	No. of Cases.	Cottages.	D	F	C	B	A	E
		Average age of boys.	15	18½	14	13½	11	17½
July 12,	1		1					
Aug. 1,	2					1	1	1
Aug. 2,	2						1	1
Aug. 3,	3						1	2
Aug. 6,	1						1	
Aug. 7,	2					1		1
Aug. 8,	4						3	1
Aug. 9,	4				1	1	1	1
Aug. 10,	3					2		1
Aug. 11,	2					2		
Aug. 12,	2						1	1
Aug. 13,	2							2
Aug. 14,	2					1	1	
Aug. 15,	1							1
Aug. 17,	1						1	
Aug. 18,	1					1		
Aug. 19,	1					1		
Aug. 20,	1						1	
Aug. 21,	1					1		
Aug. 23,	2						2	
Aug. 26,	1				1			
Aug. 29,	1							1
			1		2	11	13	13

During the time covered by the table and the outbreak, Morganza Run water was generally supplied to the buildings and the two principal springs were in general use for drinking purposes. It will be noticed that no cases occurred in the girls' cottages or among adults, so the infection was not likely to have come from any food or water supply in general use. The milk supply was run down and found to be pure. If the conclusion be correct, the Morganza Run and the two principal springs are relieved from suspicion and there remains Lily Spring to examine.

It will be noted that the cases occurred in the cottages supplied by drinking water partly from Lily Spring. Cottage E is nearest the spring and in it there were thirteen cases and there were thirteen cases in Cottage A, the next nearest building. There were eleven cases in Cottage B, which is the third from Lily Spring. The other three cases were in the buildings further removed. It appears that the epidemic was confined to the users of Lily Spring, because in Cottages E, A and B the boys had daily access and drew water from Lily Spring as previously described. The dates of onset indicate a weakened infection and a continual recurrence to the poison. It is such an outbreak as would be expected where a number of families use infected water from a spring week in and week out. The type of the disease was the mildest form. There was one death only. The investigator would naturally look for a constantly polluted source of non-virulent kind and it is believed that the Department has discovered such source of infection in the sewer previously mentioned and distant seventy-five feet from the spring.

Every occupied estate on the watershed was visited. No typhoid fever was discovered. During the previous year there was one case on the shed.

The first case, on July twelfth, was located in Cottage D at the end of the main sewer line. During the first week of the August outbreak the main sewer was opened near Lily Spring by the superintendent and the structure was found to be in a leaky condition and immediately Lily Spring was put out of commission permanently by cementing up the well. Its use had been prohibited on August second, on suspicion. During the middle of the month, while excavations were being made for the basement of one of the new cottages over the main sewer, distant about two hundred and fifty feet from the spring, it was discovered that every joint was broken in a distance of about eighty feet, indicating that a similar condition may obtain throughout the entire sewer line. Closer inspection revealed that the joints on the bottom had never been properly cemented. When it is recalled that such a main sewer passes fifteen feet above and seventy-five feet distant from Lily Spring and that the structure is porous and partly filled earth,

the connection between the infection discharged into the sewer line from Cottage D on and prior to July twelfth and the subsequent infection of Lily Spring followed by the daily onset as reported can be understood.

A hole was dug in the porous soil near the sewer and a salt test was applied, showing that twelve hours' time would permit the passage of the salt water into the spring. Hence sewage from the sewer pipe could pass through in this time.

It was concluded by the institution and State authorities that an improved sewerage system and water works system was demanded at the institution.

The plans now submitted provide for the construction of a dam to be located a few hundred feet above the present intake on Morganza Run, entirely on the property of the Institution. This dam is to be an earthen enbankment, concrete core wall structure, twenty-five feet above the bed of the stream and length over all three hundred feet. Across the top of the dam is to be a roadway twelve feet wide. The top of the core wall will be flush with the surface of the roadway. Normal high water in the reservoir will be four feet below. The sides of the dam will slope uniformly on either side two feet horizontal to every vertical foot and the slope on the reservoir side is to be riprapped from the top of the dam to an elevation fourteen feet lower to prevent erosion by wind and ice action. Flood run-offs, and waste water are to be carried around the dam through a spillway channel excavated in the hillside. The entrance to this spillway is a semi-circular, concrete weir, elevation nine hundred and fifty-five, which fixes the height of normal water in the reservoir. The channel is thirty-one feet wide on the top and fifteen feet on the bottom. The bed and the vertical side two feet high are to be built of concrete and from these vertical sides the slopes are to be stone paved. The total vertical height from the bed of the spillway is six feet. The flood discharge capacity is based on a run-off of eight hundred cubic feet per second.

A line of perforated pipe along or near the bottom of the core wall inside and a few feet above the toe of the down stream slope of the dam is connected up to a well for the collection of seepage water. The core wall is to be imbedded in rock six feet below the channel of the run and along the extreme toe of the outer slope is a layer to a depth of about two feet of broken stone.

This dam will impound over twenty million gallons, equivalent to five months' supply to the institution at the present rate of consumption. The area flooded will cover about eight acres and the greatest depth of the water will be twenty feet. At the upper end of the basin, which is about twelve hundred feet long and an average of about three hundred feet wide, there is some shallow flowage, but not much. The site is grass land. It is proposed to strip the shores of the reservoir comprising that portion submerged at high water to a depth of four feet. Loam and sub-soil will be partly used in facing the lower slope of the dam. Outside of this stripping the flooded area is to remain as it now is; but at the site of the dam, of course, all material is to be removed to solid earth. In fact, this has been done and the structure has been partly built. An appropriation of twenty-five hundred dollars was made by the Legislature of nineteen hundred and seven for the land. The work is being performed by the pupils and it is intended to complete the work with this labor. An added appropriation will be needed for material.

Provision for draining the reservoir consists of a small concrete intake on the bottom above the dam, ten inch cast iron pipe protected by a screen extending through the bottom of the dam to an outlet concrete chamber down stream. The gate on this pipe line is near the outlet. If the water in the lower layer of the reservoir should be used at any time, this blow-off arrangement by means of a connection can deliver the water to the main supply pipe to the institution.

The eight inch cast iron main supply pipe begins at a circular concrete basin called the aerator, located nearly below the dam. This structure is twenty feet in diameter, four feet deep and in the centre there is a vertical pipe, at the top of which there is affixed a nozzle to spray the water. This riser pipe is connected by two six inch feed pipes leading to the reservoir, one of these pipes has its end submerged two and a half feet below the normal surface of the reservoir water and the other pipe is submerged five feet lower. The gates on this feed pipe are near the aerator.

Owing to the extensive demands on institutional labor, it is not practicable to build the proposed filter plant except by contract, therefore, an appropriation must be secured.

The State Department of Health has made inspections of the estates on the watershed and will assist the management of the Reform School in maintaining a patrol and sanitary regulations. Even then the supply would not be absolutely safe. Filtration is necessary. Usually the stream is a clear one. Its turbid periods are of short duration.

The proposed filtration plant is to receive the water by gravity from the new impounding reservoir. It is to be located near the existing pump house on the banks of the run. It is designed to purify three hundred thousand gallons of water daily, at a net rate of between one and a half and two million gallons per acre per day. This conservative rate has been adopted because of the turbidities of the water. The slow sand method is proposed because it is peculiarly adapted for this institution. The reason is that the operations may be entrusted to selected pupils, because of simplicity. The operations of mechanical filters would, it is thought,

involve skilled attention, necessitating an additional permanent expense which may be avoided. Filters are to be in duplicate, each seventy feet by sixty feet interior dimensions of filtering area on either side of a central gallery housed over, which gallery is fifteen feet. The water is to be delivered by gravity into a control chamber in the forward part of the building. Into and out of this chamber lead the pipes carrying the influent, effluent and waste water. The regulating valves and indicating apparatus are located here. Beyond this chamber the gallery is divided by longitudinal walls, which walls form the main wall of each filter. There is an extension of the filtering surface to this wall so that from the platform above may be seen the surface of the water on the filters. Adjacent to the control chamber is a plat form in each filter unit level with the surface of the sand from which an incline rises. The further end of the gallery is to be utilized as the sand washing room. This floor is concrete. Here will be set up the ordinary machinery for sand washing with jet from reservoir pressure. The waste water will be delivered to the drain, an eight inch cast iron pipe, leading to and terminating in the main drain at the control chamber. This main drain is to take the overflow, if any, from the surface of the filters and also for draining the filters, there being a by-pass connection between the drain and the main effluent pipe. This main drain has its outlet into the run near the pump house.

The concrete floor of each filter unit slopes to the middle where there is a ten inch vitrified pipe laid below the floor into which half channel six inch tile pipe, laid in parallel rows ten feet on centers, will deliver the filtered water. These underdrains are to be surrounded in the customary manner by coarse filtering material graded and over all is to be placed four feet ten inches, average depth, of filter sand. This material is to be water washed and graded to a uniform size suitable for the purpose. The high water mark is to be four feet above the sand level or at elevation nine thousand three hundred and fifty-five, nineteen and a half feet below the normal level in the impounding reservoir. Hence it may be seen that there is sufficient fall for the delivery by gravity to the filter plant of run water, even if the reservoir supply were depleted or drained for any purpose.

The scraping of the filters is to be done by hand by institutional labor. The sedimentation is so great in the impounding reservoir that precipitants may be avoided. Furthermore, the storage of filtered water is so great that the filter operations may be suspended during times of great turbidities.

The filters are to be covered with a concrete roof supporting two feet of soil.

A clear water basin, fifty by forty feet in plan, of concrete construction, bottom, sides and roof, ten feet deep to flow line, holding one hundred and fifty thousand gallons or twelve hours' flow, based on the normal capacity of the filters, is to be located adjacent to the pump house. Connected with the present pumping engine there is to be an eight inch suction pipe terminating in the clear water basin at a point diagonally opposite the inlet.

It is purposed to make the large distributing reservoir on the hill watertight and to cover it and the adjacent twin reservoirs with a concrete roof. Proper drainage facilities and overflow arrangements are to be provided. The combined storage capacities of these three basins will be slightly under one million gallons, or a week's supply to the institution.

It is also proposed to make some changes in the distributing pipes through the ground. The plan is to provide a direct connection from the pump to the pipes leading to some of the main buildings, in order that the distributing reservoir may be cut out temporarily, if necessary, or, in case of accident, to admit of direct pumpage. The present reported by-pass is not considered suitable or sufficient.

With the proposed improvements carried out, and the watershed placed under sanitary control and the filter plant operated in a proper manner, the water supply at the Reform School should be equal to the best obtainable, provided the existing sources be absolutely abandoned.

The drilled well and Chartiers Creek supply is prejudicial to health as a water supply. Immediately on the installation of the filter plant and the successful inauguration of it, the pumping machinery at the Chartiers Creek pump house should be removed.

The Lily Spring has been abandoned. This should be followed, as soon as filtered water be introduced at the institution by the abandonment of the principal spring in front of the main building, and, meantime, the Department will make monthly bacteriological examination of the spring water on receipt of samples sent by the management of the school. This is necessary because the geological formation and relative positions of the main sewer and the spring and the probable faulty condition of the sewer introduce an element of risk involving the security of human life, which the State Department of Health and the institution management should not assume in the face of the facts. While it appears that this water has been pure, so far as is known, and it may continue on test to be found pure, nevertheless, this does not alter the proposition as stated above. Finally, it is not necessary to continue this spring in use after the filtered water shall have been introduced.

The completion of the dam should be hastened and the erection of the filter plant also. At the close of the season of nineteen hundred and nine, both improvements should be completed.

A duplicate pumping engine and steam plant should be installed at the pump house and necessary enlargements and additions in connection therewith.

It has been determined that the proposed improvements will not be prejudicial to public health and a permit is hereby and herein granted therefor, subject to the following conditions and stipulations:

FIRST: The Board of Managers shall endeavor to obtain an adequate appropriation for the erection and completion of the impounding reservoir, filtration plant, proposed changes and improvements to the distributing system, including an additional pumping outfit, in order that these improvements shall be completed by the close of the season of nineteen hundred and nine.

SECOND: The water filters shall be built under the responsible supervision of the experts who designed them, or some other expert equally competent to render the service. And the plant shall be operated for a reasonable length of time after being put in commission under the responsible direction of such an expert, in order that the efficiency of the entire plant as designed shall be obtained.

THIRD: The Board of Managers shall notify the State Department of Health when the filter plant is ready for the final test and after it shall have been determined to the satisfaction of the Commissioner of Health that the filter plant is efficient, it shall be put into commission and nothing but filtered water shall be delivered to the institution. All existing and present sources of water supply, except the filtered Morganza Run water, shall be discontinued and the pumping engines in connection therewith shall be dismantled.

FOURTH: Daily reports of the operation of the water works and filter system shall be kept on blank forms satisfactory to the State Department of Health and copies thereof shall be filed with the said Department whenever required.

FIFTH: If at any time in the opinion of the State Department of Health the water works system or any part thereof, or the water supplied thereby, shall become prejudicial to public health, then such remedial measures shall be adopted and enforced as the Department may approve or advise.

SIXTH: The Board of Managers shall maintain a sanitary patrol on the watersheds. Every occupied estate in operation shall be inspected at least once monthly, all nuisances and menaces shall be noted and promptly reported to the State Department of Health, together with prompt information as to the outbreak of any case of any infectious disease.

The suggestions relative to revision of the system of distributing pipes are especially called to the attention of the Managers, more particularly in relation to adequate fire protection.

It is, of course, understood that the distributing reservoirs and pipes will be thoroughly flushed and cleaned before the introduction of filtered water.

Plans of any alterations or extensions of the water works system as herein approved shall be filed in the office of the State Department of Health, in order that the Commissioner of Health may always be informed of the extent of the system at the institution.

Harrisburg, Pa., November 17, 1908.

MOUNT UNION, HUNTINGDON COUNTY.

Mount Union Water Company.

This application was made by the Mount Union Water Company of Mount Union, Huntingdon County, and is for permission to obtain an additional source of supply.

Mount Union Borough is a community of about three thousand, two hundred population located on the main line of the Pennsylvania Railroad along the south bank of the Juniata River and on the mountain side about twelve miles down stream from the county seat and the borough of Huntingdon. It is a thriving industrial town. The principal manufacture is silica and fire brick. There are two large concerns engaged in this business employing possibly six hundred men which have been located in the borough since nineteen hundred. Their advent has more than doubled the population. There is also a tannery. The Broad Top Railroad which comes down the valley of Aughwick Creek has its terminal station in the borough and a connection with the Pennsylvania system. A number of the railroad hands live in the village. On the flats north of the Pennsylvania Railroad and the canal (now abandoned) there are numerous dwellings where possibly a third of the inhabitants reside. The principal part of the town, however, is on the mountain side south of the railroad. Here the grades are steep and the ground is a broken, shaley, clayey structure. Dug wells are used on some of the properties for the household water supply. Some of the wells have been abandoned for this purpose and are now used as a repository for sewage. There are over five hundred old time privy vaults, many of them being shallow earth pits full to overflowing. Rain water can wash this material over the surface of the ground into the wells. There is also danger of sub-soil contamination. The risk run in drinking the water drawn from the ground in proximity to the sources of pollution is evidenced

by the typhoid fever records. It appears that during nineteen hundred and seven there were seventeen cases; during nineteen hundred and six there were forty-six cases; and in nineteen hundred and five there were at least seventy-five cases. Prior to this time if unauthenticated reports be true there were even more cases annually. The town is contemplating the installation of a public sewer system to remove the poisons away from the vicinity of the dwellings.

The Mount Union Water Company was chartered in June, eighteen hundred and ninety-nine for the purpose of supplying water to the public in the borough. It entered into contract with the local authorities during the following year and built the works at that time.

The existing water works system comprises a collecting reservoir for ground water, a gravity supply main to the town and a distributing pipe system in the village.

The source is a number of springs on the southern end of Jacks Mountain north of the Juniata River. Part way down the mountain side, there is a cemented wall across a gully filled up with broken gannister rock. The wall impounds possibly fifty thousand gallons of water which flows down through the rock spaces from the springs above. The flow line at the dam is about level with the highest occupied ground in the borough or approximately two hundred feet above the business section of the borough. The watershed is uninhabited and thickly wooded. There is no source of pollution on it. From the dam a six inch cast iron main extends easterly down the mountain side and across the river channel and along the railroad a distance of about two miles to town. The village streets are quite thoroughly piped and fire hydrants have been erected throughout the town. It is estimated that five-sixths of the population use the supply. The Broad Top Railroad Company, the tannery and the Harbison-Walker Refractories Company are liberal consumers of water. The average daily consumption is reported to be two hundred thousand gallons and the maximum three hundred thousand gallons. During wet weather Jacks Spring, the main source, furnishes an ample supply but in dry weather the company is forced to economize in the supply of water.

The community is in a thriving condition and its principal industries being quite stable assure some future growth. An ample supply of water for all seasons of the year and for increased consumption is demanded. The company purposes to obtain the new supply in addition to the present source from two tributaries of Furnace Run. There are two mountain brooks each having their source in a spring on the eastern slope in Jacks Mountain opposite the borough across which, above the old Lewistown Huntingdon Turnpike, now little used, on which it is proposed to build a small masonry intake dam at an elevation to be definitely fixed by the engineer on the level with the Jacks Spring reservoir. It may be three miles above these proposed dams to the mountain summit, an extent of barren rock and occasional forested area. There is no source of pollution on it.

From these intakes it is proposed to lay a six inch main down the run and across the river to the town. Where the pipe crosses the river it is to be eight inches in diameter.

The water company is not in possession of a plan of its water works system and this information should be filed in the Department's office. It would appear that the present and the additional source of supply are exceptionally good ones. Undoubtedly storage of water in the borough would be a marked improvement more especially since the service is supposed to furnish fire protection. The next six inch main will have an approximate length of one mile north of the river.

It has been determined that the water-works system and the proposed source of supply will not be prejudicial to the public health and the same are hereby and herein approved and a permit granted therefor under the following conditions and stipulations:

FIRST: If at any time the sources of supply or the water works system or any part thereof shall have become prejudicial to the public health, in the opinion of the Commissioner of Health, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

SECOND: On or before the first day of January, nineteen hundred and nine, the Mount Union Water Company shall prepare plans of its entire water works system, showing the area of the watershed and the general topography drawn to scale, the dams and reservoirs, supply mains and profiles thereof, the borough limits and the streets and water pipes therein, with sizes and elevations, gates and hydrants, and file the same in the office of the Commissioner of Health to the satisfaction of said Commissioner, and thereafter at the close of each season's work, a plan of the water pipes laid during the year shall be made and filed in said office, together with any other information in connection therewith that may be required.

THIRD: The water company shall render such assistance to the State Department of Health in making examinations of the water works system and for the supply from time to time as may be required. Should any quarrying operation be undertaken on the watershed, the water company shall immediately notify the Commissioner of Health and adopt such precautionary measures as the Commissioner of Health may prescribe for the sanitary protection of the source of supply of said company.

Harrisburg, Pa., June 30th, 1908.

MOUNTVILLE, LANCASTER COUNTY.

This application was made by the Borough of Mountville, Lancaster County, and is for permission to install a system of water-works for the supply of water to the public in said borough.

Mountville is an old settlement located on the Columbia and Lancaster turnpike, three and a half miles east of Columbia and six and a half miles west of Lancaster, was recently incorporated as a borough and its present population is reported to be about seven hundred and fifty. The citizens derive their chief employment from cigar and tobacco factories, of which there are several. There is also a plow manufacturing company and a brick works.

The village is located on a ridge between the watershed of the west branch of the Little Conestoga Creek which flows southerly and Stricklers Run which flows westerly and discharges into the Susquehanna River at or near the southerly boundary of Columbia borough. It is up the valley of this run that a branch of the Pennsylvania Railroad passes from Columbia to Lancaster. The easterly portion of the borough drains into the Little Conestoga and the westerly portion drains into tributaries of Stricklers Run. The slopes in the borough are sufficient to afford satisfactory surface drainage. The soil is clayey and the underlying rock is limestone. Privy vaults are used in connection with nearly all of the dwellings in the town. There are reported to be very few cesspools.

At the present time the inhabitants derive their drinking water from domestic wells and from cisterns.

There is a demand for fire protection and pressure service and the people desire running water for dwellings. During the latter part of the year nineteen hundred and seven the borough authorities were authorized to incur an indebtedness of twenty-two thousand eight hundred dollars for a municipal water-works plant. A preliminary plan of the source of supply and of the water works system was prepared and publicly discussed before the bond issue was voted upon and it is this project which the petitioners submit for approval.

The proposed source of supply is to be taken from springs located about one mile north of the west end of the borough at a place, or settlement called Chestnut Hill, in West Hempfield township. The springs, three in number, are located in the lower portion of the valley about half a mile long and one-eighth of a mile wide at the head of the main branch of Stricklers Run.

Spring Number One is the most copious one and it is located higher up the valley than the others. In fact, it is, during dry weather the living source of Stricklers Run. Above this spring there is an area of twenty-five acres from which storm water passes in a gully to the run at the spring. Where the water rushes out through the shale rock, a loose stone wall enclosing a space four feet in diameter and backed up with earth two feet in height has been provided as a kind of protection to the spring. The water in this enclosure finds its way out through the stones in the side nearest the run which is two feet distant. It is possible for the surface drainage from the twenty-five acres to backflood into the spring under some conditions. On this area there are four occupied dwellings, three barns in use. The privy vaults on these properties are full to above the surface of the ground and in wet weather the drainage from these vaults and from the kitchens, barnyards and pig-pens goes into the run at the spring. The nearest dwelling to Spring Number One is three hundred feet distant. There is a house, barn, shed and pig-pen here and the privy vault, which is full and overflowing, is located about twenty feet from the dry water course.

The petitioners purpose to deepen Spring Number One, wall it in with tight masonry and cover it over. The water is to be conducted by a three inch cast iron pipe down stream about four hundred feet, where a three inch cast iron pipe from Spring Number Two is to be joined with it into a four inch cast iron pipe, which is to extend down stream a distance of about three hundred feet, across Hill Street, to the proposed collecting reservoir.

Spring Number Two is second in importance with respect to size. It is enclosed in a space four feet square, having brick walls carried to a level with the surface of the ground. The water stands within two feet of the top of the wall. This furnishes living water to the main run which is about thirty feet distant. South of the spring seventy feet distant and sixteen feet higher there is a highway, from which surface drainage at the present time passes onto the side slope leading towards the spring. The nearest residence is on the same side of the highway as the spring. The privy on this property is on rising ground sloping directly towards the spring and not over two hundred and fifty feet away. The vault was overflowing at the time of the Department's inspection.

Spring Number Three is an abandoned well located ten feet west of Hill Street and about one hundred and fifty feet distant from the collecting reservoir proposed. The water level in the well is about twelve feet below the surface of the ground, and above it on a side hill and one hundred and fifty feet away and fourteen feet higher there is a privy with no pit, on occupied property. If it be found necessary and feasible, the flowing water from this well is to be conducted by a three inch cast iron pipe to the four inch pipe above mentioned.

Spring Number Four is located in a barnyard about one hundred and seventy-five feet northeast of the proposed collecting reservoir. It is in the side of a hill, is walled up with loose stone and covered over with plank, the space enclosed being about eight feet long and six feet wide. The walls are two and a half feet high and the water twelve inches deep.

The petitioners purpose to deepen and wall up and enclose and securely protect each spring from surface pollution. Spring number four is to be piped by a three inch cast iron pipe to the collecting basin. The maximum flow, excluding the well, from the springs was measured in October last past to be one hundred and thirteen thousand gallons per twenty-four hours. The minimum flow was measured to be sixty-eight thousand gallons for the same period.

In the forks of the highways, where at present there is a small pond, there is to be erected an open circular reinforced concrete collecting basin, ninety feet in diameter, and eight feet high. In this structure the water from the several springs is to be piped. By means of a receiving chamber and valves the water from any particular spring may be shut off, or it may be delivered directly to the eight inch supply main to town, or it may be delivered to the receiving chamber and thence to the collecting basin. Blow-outs and overflow pipes are provided. The gravity main to the town will draw the water from near the bottom of the reservoir. The overflow pipe will maintain a depth of six and a half feet of water, thus assuring a storage of three hundred thousand gallons.

The top of the wall will be about two feet above the general surface of the surrounding ground. A fence is to be provided about the structure, but no roof will be erected over it.

From the reservoir an eight inch main, thirty-six hundred feet long, will extend to the borough limits. The distributing pipes in the streets of the borough are to range in diameter between four and eight inches. The eight inch pipe is to be thirteen hundred feet long, the six inch pipe three thousand feet long and the four inch pipe fifteen thousand feet long. The highest point of the distributing system is at College Avenue and Main Street, where the ground is eighty-four feet below the level of the water in the reservoir as now planned. This head is equivalent to about thirty-six pounds pressure, with no loss of head due to friction. In the business section of the town the pressure will be about twenty pounds greater.

The original plans, so it is reported, called for a larger reservoir and distributing pipes, the reduction in sizes having been necessary, in order to keep the cost of construction within the amount appropriated by the borough, which said amount represents nearly the full borrowing capacity of Mountville. Bids have been received and the contracts let for the building of the system as now planned. The provision has been made that the plans shall first be approved by the State Department of Health.

There is no reason, known to the Department, why by careful attention to the disposition of sewage on the occupied estates at and in the vicinity of the proposed sources of supply and by careful protection at each spring to keep surface water out, the public health should not be safe-guarded by the proposed plans. The system, however, will not give first class fire service.

It may be necessary in the future to place a roof over the storage reservoir, in order to prevent the abundant growth of certain vegetable organisms, which may thrive in ground water exposed to light.

The capacity of the plant is placed at sixty-five thousand gallons daily and the total estimated consumption should be well within this amount for a number of years.

The plans accompanying the application have not been drawn to scale and they do not show the facilities for drainage of the street pipes.

It has been determined that the proposed source of supply will not be prejudicial to the public health under certain conditions and permission is hereby and herein granted therefor and for the installation of the proposed water works system, under the following conditions and stipulations:

FIRST: That each spring and the well shall be fully protected from surface drainage by means of walls, embankments and ditches and each shall be covered by a roof properly ventilated.

SECOND: The supply pipes from the springs to the collecting reservoir shall be made water-tight and be provided with a valve at each spring to admit of the shutting off of the water.

THIRD: The borough shall make a monthly inspection of every occupied estate on the watersheds of the sources of supply herein approved and shall report any improper disposition of sewage thereon. Receptacles for sewage shall be provided at each such property and be used in a manner to obviate any pollution whatsoever of any waters, which may reach the borough springs by surface or under-ground sources. The borough shall arrange for the prompt reporting to it of the case of any infectious or contagious disease, which may occur at any time on any such occupied estate and said borough shall forthwith file and transmit such notice to the Commissioner of Health and the borough shall file monthly a copy of a report of inspection of sanitary conditions at each such occupied estate, in the office of said Commissioner.

FOURTH: Ample blow-off and drainage facilities shall be provided at low points in the system, accurate plans drawn to scale shall be prepared of each spring and the collecting system and storage reservoir showing all valves and appurtenances, together with accurate plans drawn to scale of the distributing system in the town. Records shall be kept of the operation of the water works on such blank forms as shall be satisfactory to the State Department of Health, and at the close of each season's work a plan of the water pipes laid during the year shall be made and filed with the State Department of Health.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the source of supply or the water works or any part thereof shall become prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

Harrisburg, Pa., May 1, 1908.

MUHLENBERG TOWNSHIP, BERKS COUNTY.

(Reading Suburban Water Company)

This application was made by the Reading Suburban Water Company of Muhlenberg Township, Berks County and is for permission to obtain a new source of supply and for permission to furnish water thereform to its consumers in Muhlenberg township.

The community supplied by the Reading Suburban Water Company is primarily a residential suburban district, comprising the village of Hyde Park or Muhlenberg which stretches north from the Reading city line in Muhlenberg township for about a mile and a half along the Kutztown road, extending also for considerable distances on several branch roads. The track of an electric inter-urban car line between Reading and Allentown occupies the Kutztown road throughout the greater part of the village. Hyde Park is at an average distance of two miles east of the Schuylkill river and is located on comparatively flat ground, while east of it the hills rise rapidly.

There are perhaps two thousand inhabitants in this community at the present time. Building operations have progressed rapidly in recent years and bid fair to continue. About one-third of the properties are furnished with water by the Reading Suburban Water Company, while the remainder are said to obtain domestic supplies from individual wells, most of which are dug. There is said to be no public sewerage. Privies are in common use and cesspools also have been constructed, especially for the more modern houses.

The Reading Suburban Water Company was incorporated under the laws of Pennsylvania in one thousand nine hundred and two and first constructed works in one thousand nine hundred and four. It obtains its supply of water at present from the Reading City Water Works in Adams avenue at the city line, through a ten inch pipe supplied through the Reading City distributing system by pumping main from Maiden creek. The ten inch pipe of the Water Company extends north from the city line about one hundred feet and is then reduced to a smaller size pipe. The company's pipes extend north in the Kutztown road about a mile and a half and there are lateral pipes in several of the branch streets, some of them a half mile in length. There is a four inch blow-off in the main in the Kutztown road where the latter crosses Spring Valley creek about one thousand feet north of the city line. It is said this blow-off will drain practically the whole system. About seven thousand feet of pipe are said to have been laid in nineteen hundred and seven, making a total of about nineteen thousand feet of pipe owned by the Reading Suburban Water Company, ranging in size from four to ten inches. Some ten inch pipe has been laid at the northern end of the main at which point it is proposed to introduce the supply from the new source.

There are on the pipe lines about one hundred and twenty-five taps including one for a brewery and one for a dye works. These two factories consume on an average twenty-one thousand gallons per day. The domestic supply is said to average sixteen thousand gallons per day, making a total of thirty-seven thousand gallons. There are no fire plugs connected with the system, though it is said that these could be arranged for should the patrons of the company wish them.

There are no plans of the present system on file in the Department and it is said that complete plans have never been made.

The getting of water from some other source has been made necessary. So it is said, by the action of the city of Reading in refusing to furnish water to the water company after September first, one thousand nine hundred and nine, claiming that such furnishing of water by a third class city is illegal.

The petitioners propose to construct an intake and reservoir on Frush Valley Run at a point about two hundred feet higher than and one and a half miles northeast of Hyde Park and also in Muhlenberg township and to lay pipes and furnish water from said reservoir to their consumers.

Frush Valley Run above the proposed intake has a sandstone drainage area of perhaps two hundred acres on the western slope of the mountain east of the flat ground on which Hyde Park is located. The small run follows a southwesterly course from the upper edge of the watershed to the reservoir site where the company owns about thirteen acres. The distance of the proposed intake below the

summit of the drainage area at the head of the water course is about three thousand feet. Northwest of Frush Valley Run, parallel thereto and at an average distance of two hundred feet, is a public road leading northward into the valley of Laurel Run. The bottom lands along Frush Valley Run are cultivated, while the mountain slopes above are covered with second growth timber.

On the narrow strip of land between the run and the public road are located the dwellings, barns and barn-yards, pig-styes, chicken yards and privies of five farmsteads, having a combined population of about twenty-five persons. For many of these properties the run is the source of water supply for wash water and wash tubs may be seen set up to dry on the banks of the run, so that pollution of the stream seems almost inevitable. Dug wells are the usual source of water supply for other purposes. On the upper side of the road away from the run are five other farmsteads, having also a population of about twenty-five people. The surface run-off from these places collects in the upper road gutter from which a culvert under the road carries the water to the lower side, whence it may reach the run. The township will, it is said, abolish this culvert and provide for carrying the run-off in the upper gutter to below the reservoir site. Inspections made by officers of the Department show that Frush Valley Run may be polluted by privy drainage, barn-yard drainage and by wash water from the properties on the drainage area above the proposed intake. The principal dry weather flow of the run is from springs located at the foot of the steep upper slope of the eastern side of the valley farthest from the habitations.

The Water Company proposes to construct a two hundred thousand gallon concrete or masonry reservoir on flat ground adjacent to the run but well above its flood height and just above this a small intake, whence a six inch pipe provided with a blow-off, will lead to the reservoir. It is desired to use water from this reservoir as soon as possible and as soon as practicable thereafter to replace the intake by a million gallon intake dam, around which the stormy weather flow of the run will be by-passed. When the consumption demands it a nine million gallon impounding dam will be constructed and around this also the wet weather flow will be by-passed. The two hundred thousand gallon reservoir will continue to be used in connection with the impounding dam. The two hundred thousand gallon reservoir will be sixty-six by fifty feet by eight feet deep to the flow line. The masonry walls will be carried one foot above high water level and the basin will be divided transversely by a wall four feet high. The bottom will be of concrete. The six inch inlet pipe will have a connection to each basin, on each of which connections will be a gate valve. Each basin will also have a six inch cast iron drain pipe controlled by a valve to be used for cleansing purposes and to be connected with the ten inch over-flow pipe. An outlet pipe about one and one-half feet above the bottom and protected by a copper screen and controlled by a valve will be installed in each side of the reservoir, the two uniting beyond the valves to form the ten inch supply main. Thus either basin may be cleansed while the water in the other is maintained at a depth of four feet. This supply main will furnish water to the distributing system of the water company at its northern end.

Complete plans have not been submitted of the water-shed, intake, impounding dam, supply main and distributing system, showing the means to be afforded for draining these various parts of the works.

As a future supply, when the consumption shall have outgrown the supply obtainable from Frush Valley Run, the water company has in view large springs flowing from the limestone formation along the banks of Laurel Run at a point about fifteen hundred feet above the mouth of this run in the Schuylkill river. These springs are located about two miles directly west of Hyde Park and when they are resorted to it will be necessary to pump the water taken from them. It would therefore be out of the question to consider the use of this source until the consumption and revenues of the water company have been considerably increased.

Unquestionably from time to time considerable pollution reaches Frush Valley Run above the proposed intake. Even though every precaution be taken, it will be practically impossible to prevent all pollution of this stream during rainy weather. Therefore, the provision of the water company to by-pass the storm flow is a most necessary precaution. Even during dry weather every precaution will be necessary to prevent the pollution of the run. With a daily consumption as reported of forty thousand gallons, the two hundred thousand gallons reservoir will provide for several days settlement, or if necessary will allow of the run-off being by-passed for four or five days. The intake dam when constructed and afterwards when enlarged will provide increased sedimentation. Nevertheless, this would be only a partial safe-guard and in addition all sewage and waste water should be kept out of the stream at all times, to which end it might be advantageous and in the end the cheapest method to construct a collecting sewer up the valley and thereby to convey all the wastes of the inhabitants on the watershed to below the proposed intake and there to purify them in a sewage disposal plant. The Department will cause formal notices to be served upon residents on the watershed from whose properties pollution is reaching the stream and will take subsequent action to the end that the said pollution shall be discontinued and this should make the inhabitants be more willing, for economical reasons, to co-operate with the water company in any scheme for the sewerage of the valley. Only by means of a sewer or cesspools of adequate size and at considerable distance from the run or by providing some other

means for the definite removal of all wastes from the watershed can the run be safeguarded against chance pollution incident to the population residing along the stream. The privy vaults may be reconstructed of water tight cement masonry to be properly cleaned out when necessary, or might be connected to such a sewer system. Even with all these precautions, there will be chance for considerable pollution from barnyards and pig-styes and experience and bacteriological tests of the water furnished from the proposed source may indicate the necessity for other improvements, perhaps for the filteration of the water.

The minimum flow of Frush Valley Run at the site of the proposed intake is thought at times to be less than one hundred thousand gallons per day, perhaps as low as fifty thousand gallons. For this reason it is said to be undesirable to extend collecting pipes to the springs on the eastern hillside away from the habitations and to prevent other water from reaching the reservoir. Such a scheme would incur expensive damages for depriving the people on the water shed of the water of the run in addition to the damages already partially settled for between the water company and riparian owners below the proposed intake.

There is said to be no other available surface supply in the vicinity. Drilled wells have not been considered as a source of supply. It would seem that this idea might be worthy of consideration, especially as it would probably obviate the necessity of paying damages to the owners below the proposed intake. However, the water company officials do not look favorably upon the idea of obtaining a supply from drilled wells and it was represented that the water company would be willing to construct suitable privy vaults wherever necessary on the water shed and to bear some further expense for the improvement of the local conditions.

In view of the method of disposing of sewage in Hyde Park in loose vault privies and cesspools, it would appear to be unfavorable to the interests of public health to necessitate the use of dug wells in the vicinity of these privies and cesspools as the only means of obtaining water for domestic purposes even though the wells are largely used at present, provided a reasonably safe supply can be procured from the proposed source. The condemning of this source might for financial reasons result in the abandoning of the public water works in Hyde Park.

It has been determined that the proposed additional source of supply will not be prejudicial to public health under certain conditions, and a permit is hereby issued therefor under the following conditions and stipulations:

FIRST. Plans for a sewerage system or some other scheme for the definite disposal of the sewage and household wastes of all the properties on the water shed other than into the natural water course shall be filed with and approved by the Commissioner of Health and the works called for in the plans shall have been installed and in operation before the proposed source of supply is used by the Water Company. The Commissioner of Health will use his influence to bring about the co-operation of the inhabitants to a reasonable degree in such a plan.

SECOND. Adequate facilities shall be provided for draining the dam, reservoir, supply main and distributing system of the water works and for by-passing the storm run-off from the water-shed around the intake dam.

THIRD. Detailed plans of the proposed dam, reservoir, supply pipe and of the means of draining these parts of the works shall be filed with the Commissioner of Health and approved by him respectively before these various works are installed, and a detailed plan of the distributing system shall be filed with the Commissioner of Health before water from the proposed source is furnished to the public and thereafter at the close of each season's work plans of the distributing pipes laid during the year shall be filed with the Commissioner of Health.

FOURTH. A plan of the watershed above the proposed intake drawn to scale and showing the location of the water sources, public roads and all buildings and habitations and all other possible sources of pollution shall be filed with and approved by the Commissioner of Health before the water from the proposed source is furnished to the public, and the Water Company shall cause to be made every month, or oftener if necessary, sanitary inspections of the watershed, with a view of discovering any existing pollution of, or menace to, the water supply and reports of such inspections shall be filed with the Commissioner of Health.

FIFTH. Monthly reports of the operation of the water works shall be kept on forms to be suggested by the Commissioner and copies thereof shall be filed with said Commissioner. If the water works or any part thereof, or the water supplied thereby, shall at any time, in the opinion of the Commissioner of Health, have become detrimental to the interests of the public health, then such remedial measures shall be adopted and enforced as the Commissioner of Health shall demand, suggest or approve.

Harrisburg, Pa., August 14th, 1908.

NATRONA VILLAGE, HARRISON TOWNSHIP, ALLEGHENY COUNTY.

Natrona Water Company.

This application was made by the Natrona Water Company of the village of Natrona, Harrison township, Allegheny county, and is for permission to construct a filter plant to be used in filtering water obtained from the Allegheny river and supplied to consumers for general domestic use.

The Natrona Water Company was incorporated under the laws of the Commonwealth of Pennsylvania in April, nineteen hundred and eight, for the purpose of supplying water to the public in the township of Harrison, Allegheny county. The source of supply was stated to be springs situated along the hillsides lying to the north of the Allegheny river and the town of Natrona and near the eastern boundary line of the Pennsylvania Salt Manufacturing Company's farm at Birdvillle and to the north of the Pennsylvania Salt Manufacturing Company's works in Harrison township.

Harrison is a township of the first class, located on the west bank of the Allegheny river in the extreme northeastern corner of Allegheny county and has a population in the neighborhood of fifty-five hundred, of which about forty-five hundred people live in the village of Natrona. This village was established by the Pennsylvania Salt Manufacturing Company when it located its large plant in the township.

The township stretches along the river for a distance of about four and a half miles and back therefrom a little over one mile. To the west is the township of Fawn and to the south the borough of Brackenridge.

Midway of the township there is a ridge elevated about two hundred and fifty feet above the river and extending southerly into Brackenridge borough and northerly into Butler county. Northerly of the village the slopes are precipitous to the river, so that no opportunity affords for extensive building operations; but at the site of Natrona there is a plateau about twenty-five feet above the river and from a third to a half mile wide, extending southerly, so that the area of future growth for the village is naturally confined to the territory beween its present limits and Brackenridge borough.

The hillsides abound in copious springs which form the beginnings of the runs which come down across the flats to the river and these waters afford sources of supply to the public and to the industrial plants for drinking purposes.

The West Penn branch of the Pennsylvania Railroad skirts the foot of the slope. The principal part of the village and the industrial plants are located between the river and the railroad.

There are five important industrial concerns in the township. Their employes reside either in Brackenridge borough or in Natrona. There is about three-quarters of a mile distance between these two places. The land there is either occupied by the industrial plants or is under cultivation.

Of these industrial concerns, the Pennsylvania Salt Manufacturing Company is the most prominent in the village of Natrona. When it located its plant in this locality it laid out streets, water works, drainage pipes, and erected dwellings for its employes. The land developed by said company includes practically everything north of Pond street, which street lies east and west through the central part of Natrona. Here reside fifteen hundred people, whose drinking water is obtained from a spring on the hillside west of the railroad and supplied by gravity. Paralleling this system there is an independent line supplying water from the river for fire protection and domestic purposes. These lines were installed originally by the Pennsylvania Salt Manufacturing Company, but recently the water works company has been organized to control the supply of water to these people under the name of the Natrona Water Company. A similar system of pipes supplies the small settlement of Birdville, located two miles north of the village of Natrona and inhabited by employes of the Pennsylvania Salt Manufacturing Company. This settlement contains about three hundred people.

The village south of Pond street is supplied with drinking water by the Tarentum Water Company of Tarentum borough. The source is the Allegheny river and the water is taken from an intake crib and filtered before being supplied to the consumers.

The other industrial concerns are the Solid Steel Tube and Forge Company, the Inter-State Steel Company, the Allegheny Steel Company and the Reliance Tube Company. These works are located along the river south of the salt company's works. Spring water and drilled well water is used in these works for drinking purposes and river water for industrial purposes.

The existing sewer system of the village of Natrona consists of a combined system of sewers discharging through six outlets into the Allegheny River. These sewers range in size from a sewer four feet square owned by the salt company and used to carry mainly wastes from the plant to twelve inch terra-cotta sewers carrying sewage and storm water from the Walnut street and Pine street district. It is estimated that one-third of the village population permanently and over half that number during the working hours of the day contribute to the pollution of the Allegheny river.

During the early part of nineteen hundred and seven, the township of Harrison made application for permission to extend this sewer system in the village of Natrona and upon reviewing the conditions the Commissioner of Health withheld a permit for these extensions and advised the Commissioners of the township that it would be necessary for them to prepare plans for the collection of the sewage of the village and its conveyance to some point for treatment and purification.

The water works system of the Natrona Water Company, as previously stated, consists of two independent supplies which are used for drinking purposes and for domestic and fire purposes respectively.

The spring water supply is obtained from springs located on the hillside immediately west of Natrona village. The main supply consists of springs located in Potts Hollow, Gagers Hollow and on the slope immediately west of the settled portion of the village. These spring supplies are conducted by gravity to a circular, brick reservoir of one hundred thousand gallons capacity, located on the hill immediately west of the village, and thence the supply is delivered by gravity to the consumers through a system of wrought-iron pipes ranging in size from three inches to one inch.

There are four springs in Potts Hollow which is one-half mile north of the main storage reservoir. These springs are collected by a two inch pipe line and the supply is delivered by gravity into the main reservoir. The other two spring supplies are collected in small reservoirs and thence the supply is delivered to the main reservoir. Each individual spring is walled up and covered to protect it from any contamination.

In Gagers Hollow the reservoir consists of a circular brick tank fourteen feet in diameter and thirteen feet deep with a capacity of thirteen thousand gallons. This tank is covered with a wooden roof.

The tank which collects the water from the group of springs immediately west of the village is similar in design to the Gagers Hollow tank. It is twenty-eight feet in diameter and thirteen feet deep and has a capacity of fifty thousand gallons. From these two tanks the water flows by gravity to the main storage reservoir, which is also a circular tank forty-one feet interior diameter and eleven feet deep. The bottom of this tank is sunk in the ground about six feet in front and the full depth behind. The bottom is composed of an eleven inch concrete floor and the walls are constructed of brick twenty-nine inches thick. Capacity of the tank, as previously stated, is one hundred thousand gallons. From this tank a three inch supply line extends to a two inch main at the outskirts of the village. This two inch main connects with a system of two inch and one inch laterals extending through the streets of the village and connecting with the various houses.

It is estimated that the total flow from these springs is eighty-six thousand gallons per day, of which thirty-two thousand gallons is supplied by the Gagers Hollow springs and fifteen thousand gallons by the Potts Hollow springs. It is proposed to connect eight hundred houses to this supply and it is estimated that the average consumption per house will be fifty gallons per day, so that this would amount to only forty thousand gallons consumption and the supply would be ample. However, great difficulty has been experienced in keeping down the consumption to this amount and already the spring supply is overtaxed.

The Birdville Spring supply is independent from the Natrona supply. The water is procured from springs located on the range of hills along the north side of the Allegheny river east of Birdville. The water is conducted through a two inch wrought-iron pipe system to a collecting tank distant about two thousand feet from the springs and having a capacity of ten thousand gallons. From this tank the water is pumped through a two and a half inch wrought-iron pipe line to a wooden distributing tank mounted on a wooden support and located fifty feet above the ground. This tank has a capacity of ten thousand gallons and from it the water gravitates through the two inch wrought-iron pipe system to the houses in Birdville.

It is estimated that the supply from these springs will average twelve thousand gallons per day. Sixty houses are to be supplied from this system and with an average supply of fifty gallons per house there will be a total consumption of three thousand gallons.

The water works system used for domestic and fire supply consists of a system of pipes ranging in size from six inches to four inches and extends through the streets of the village of Natrona north of Pond street. These pipe lines parallel the spring water supply lines and are supplied with water by the Pennsylvania Salt Manufacturing Company, which obtains water directly from the Allegheny river for industrial purposes.

The six inch main of the Natrona Water Company connects with a ten inch main belonging to the Pennsylvania Salt Manufacturing Company on Center street three hundred feet north of Federal street at the northern boundary line of the built-up section of the village. The water is obtained by the Pennsylvania Salt Manufacturing Company from the river at a point on the northern boundary of the company's works. At this point there are two main pumping stations each located in circular wells twenty-five feet in diameter and thirty feet deep. In the bottom of one of these wells there is a three million gallon Wilson-Snyder pump and in the other well there are two one and a half million gallon Wilson-Snyder compound, duplex pumps. These pumps take the water partly from the river direct and partly through a pipe connected with a crib located about thirty feet from shore in the bottom of the river. Both pump pits are covered with brick superstructures.

For supplying steam for these pumps there is a boiler house equipped with four boilers of six hundred and ten horse power capacity.

The pumps supply water through a ten inch force main to various parts of the works under normal pressure of sixty pounds. For fire purposes there are several large storage reservoirs scattered through the works and these are connected with a fire pump station equipped with Underwriter's Fire pumps of large capacity and capable of giving one hundred pounds fire pressure.

There is also an auxiliary pumping station arranged similar to the two main pumping stations and located in the center of the works. This station is equipped with two one million gallon pumps and is used only in case of emergency. The water for this supply is also taken directly from the river.

It is proposed to close off the direct supply of the water from the Pennsylvania Salt Manufacturing Company's mains at the north end of Center street and to extend the supply pipe from said manufacturing company's mains to a point in the vicinity of the main storage reservoir belonging to the spring supply. At this point it is proposed to install a mechanical filter plant of a gravity type and with a capacity of five hundred thousand gallons per day and to allow the water to gravitate from this filter plant into the existing domestic and fire supply mains in the village of Natrona. A check value will be installed on this supply main immediately outside of the filter plant and during periods of fire the existing connection to the manufacturing company's main at the north end of Center street will be opened and raw water will be admitted to the system for fire protection. This is necessary as the filter plant will be located at an elevation of only one hundred feet above the village and very little storage of clear water is provided.

The filter plant will consist of a settling tank, two gravity filters and a small concrete clear water well.

The settling tank will be located immediately outside of the filter plant and will consist of a circular wooden tank, twenty-four feet in diameter and thirteen feet four inches deep, built of three inch first quality white cedar or Washington fir, and fitted with round iron hoops with draw lugs. It will be located on a concrete foundation extending below frost line. Across the top of this concrete foundation bed there will be laid four by sixes, spaced two feet center to center and on top of those will rest the wooden floor of the settling tank. Above this floor there will be a conical shaped bottom extending on the sides for a distance of three feet above the floor line, to assist in drawing the sludge from the tank. Above the conical bottom there will be three baffles extending vertically across the tank with a four foot opening at alternate ends on each baffle. This will permit of a horizontal circulation of the water and will insure that all water admitted will have the full settling period.

Raw water will be admitted to the settling tank through a weir box located on top of the tank at the end of the baffle furthest away from the filters. This weir box is equipped with a small vertical, distributing weir which is directly connected by means of a small pipe to the alum feed box also located on top of this tank. The full flow of raw water passes this distributing weir and it is arranged so that the proportionate amount of water is admitted through it and into the alum box in accordance with the quantity of solution desired. The water admitted into the alum feed box displaces a proportionate amount of concentrated alum solution and this passes through an effluent pipe located at the opposite end of the feed box at the flow line to a connection in the raw water inlet pipe. The inlet pipe will be controlled by means of a balance valve so as to regulate the inflow in proportion to the consumption of the filters. The water will be taken off from the sedimentation tank at the opposite end from the inlet after it has passed slowly around the three baffles. The sedimentation tank will not be housed, but the alum feed apparatus will be properly protected.

Immediately outside of the settling tank the filter building will be located. It will consist of a substatial brick building covering the two filter units and connecting piping. The filters will consist of two rapid sand filters each eleven feet in diameter and seven feet four inches deep, inside dimensions, built of three inch first quality Washington fir or white cedar and fitted with round iron hoops with draw lugs. Each filter will have a capacity of two hundred and fifty thousand gallons per day when operated at a rate of one hundred and twenty-five million gallons per acre per day. Water will be admitted to the filters through an inlet pipe connection, connecting directly with the outlet pipe from the settling tank and controlled by means of a balance valve equipped with a copper float. The inlet water will flow around two troughs arranged in the top of the filter for washing purposes and thence will be distributed over the surface of the filter. The filtering material will be thirty inches in depth and will be composed of a lower layer of twelve inches of gravel covered with a six inch layer of medium sand, an eight inch layer of fine sand and topped with a four inch layer of a very fine sand. There will be a total water depth in the filter of seven feet, giving a depth of four and one-quarter feet above the surface of the sand.

Water will be drawn off from each filter through a system of strainers arranged in a manifold covering the entire bottom of the filter. The manifold will consist of a steel central section extending across the diameter of the filter from the outlet connection and fed by a system of one and one-half inch galvanized iron pipe spaced six inches center to center and extending crossways on both sides of the filter from the central section. Into these pipes will be screwed special brass strainers patented by W. B. Scaife and Sons, manufacturers of the filters. The whole manifold will be imbedded in concrete which will be carried up to the bottom of the strainers.

The filters will be cleaned by reversing the flow of water in the filter and for the purpose raw water under pressure will be used. The water will be admitted into the manifold through a connection with the raw water main at the outlet end of the filter and this water will pass up through the sand and thence over the wash troughs located eight inches above the surface of the filters. One of these wash troughs extends entirely around the circumference of the filter and there are two cross

troughs extending directly across the filter and connecting with the main trough. These troughs will be formed by bolting a galvanized iron strip to the wooden walls of the filter. The wash water from the filter will be drawn off from these troughs through a connection to the sewer at the inlet end of the filter.

Upon completing the washing operation, a re-wash connection is made with the outlet from the filter so that the water can be wasted after each washing until the filter is running under normal conditions. The outlet from each filter will be controlled by a weir rate controller which will be adjustable and will have a maximum capacity equal to that of the filter.

Immediately under the two filters there will be constructed a clear water well of concrete eight feet wide by eighteen feet long by six feet deep, interior dimensions, and having a capacity of sixty-four hundred gallons. This well will extend under both filters and the filters will be supported above it by means of "I" beams extending across the eight foot width of the wall and carrying four by six struts on which the filter will directly rest. The clear water well will be connected with the supply line to the village.

The Natrona Water Company is chartered to supply spring water to the public in the township of Harrison and has no right, under its existing charter, to furnish an additional supply of filtered river water. Steps should be taken immediately to obtain an extension of its charter rights which will permit it to use this additional supply and the Water Supply Commission should be consulted in regard to this matter.

In using the river supply of water for domestic purposes, which is rendered necessary on account of the limited quantity of spring water, there is a danger of spreading typhoid and other water-borne diseases due to carelessness in the use of this auxiliary supply. The Natrona Water Company appreciates this condition of affairs and on that account has voluntarily submitted the plans for the filter plant to be installed for purifying this supply and eliminating this danger to its employes.

The filter plant as submitted is equipped with all modern appliances, and, if carefully operated, should prove efficient. There are some details in connection with it which have not been provided for in the plans submitted, but which will be neccessary to completely equip the plant. The outlets from the filters are provided with orifice controls which will limit the rate of filtration below the maximum allowable rate, but no provision is made for cutting off the supply from the filter when the small clear water well is full. This can easily be arranged by supplying a control float valve to the outlets. The troughs in the filters are located at an elevation of only eight inches above the top of the sand in the filters. It is the general practice to make the minimum height over the top of the sand to the trough fifteen inches and in many cases where wash water alone is depended upon for agitation and cleaning the filter this distance is increased to a greater depth. The William B. Scaife and Sons Company, who have submitted plans for these filters, claim that this is unnecessary in their filters due to the special arrangement in their nozzles whereby the washing water is forced out horizontally through the gravel and there is a uniform distribution over the whole filter area. However, it appears that it would be more advisable to raise these troughs to a minimum height of fifteen inches above the filter surface.

The plans do not show in what manner the wash water and other waste water from a filter plant will be disposed of. In constructing the plant, special attention should be paid to protecting adjacent property from this waste water. The valve provided between the water company's mains and the pressure lines belonging to the Pennsylvania Salt Manufacturing Company for fire protection should only be opened in extreme emergencies when the fire is sufficiently developed to require this additional supply. The mains, after being filled with raw water from this source, should be thoroughly flushed.

The spring water supply furnished for drinking purposes appears to be satisfactory and the springs appear to be well protected from pollution. It is stated that in typhoid fever epidemics in this locality very few cases have been traced to the water supply from this company.

It has been determined that the proposed source of supply under certain circumstances, will not be prejudicial to the public health, and the plans for the filters are hereby and herein approved and a permit issued therefor under the following conditions and stipulations:

FIRST: That upon the completion of the filter plant the final plans showing the location and piping connections be filed with the Commissioner of Health and that revised plans of the water works showing additions be filed yearly.

SECOND: That the filter plant shall be operated at the rate and under the conditions as set forth in this permit and that modifications in the details of the filter troughs and control valves be made as previously suggested.

THIRD: That accurate records of the operation of the filter plant shall be kept on blanks to be suggested by the Commissioner of Health and reports thereon shall be filed in the State Health Department.

FOURTH: If at any time in the opinion of the State Department of Health the water works system or any part, or the water supplied to the public by the Natrona Water Company is prejudicial to the public health, upon due notice of this fact the water company shall adopt such remedial measures as the Commissioner of Health may advise or approve.

And finally, it is expressly stipulated that permission to do these things is contingent upon the right of the company under its charter to obtain its source of supply from the Allegheny river. If this right is not now a charter right, doubtless the company can secure the privilege by petition to the State Water Supply Commission.

Harrisburg, Pa., December 16th, 1908.

NORTHEAST BOROUGH, ERIE COUNTY.

This application was made by the borough of Northeast, Erie county, and is for the permission to extend its water-works system and to obtain an additional source of supply.

It appears that on February seventh, nineteen hundred and eight, the borough of Northeast, Erie county, made application for approval of plans for a water filter.

It further appears that on June seventh, nineteen hundred and six, the Commissioner of Health issued a permit to the said borough to extend its water-works system and to obtain an additional source of supply. The following were named among the conditions to be fulfilled:

"FIRST: That the borough shall prepare and present detailed plans of the proposed reservoir and dam, overflow, outlet and drainage pipes, gates and appliances and the supply main to the present distributing reservoir, and submit the same to the Commissioner of Health, who may modify or amend them, and the borough shall not begin construction of the reservoir until the plans so approved or amended have been returned by the Commissioner of Health to said borough.

"SECOND: That the filter shall be provided and installed on the line of the supply main between the proposed reservoir and the existing distributing reservoir of the said borough's water-works system according to detail plans to be submitted to and approved by the Commissioner of Health, and no water shall be supplied from the proposed reservoir unless it shall have been adequately purified by said filtration.

"THIRD: That the loam and top soil shall be removed, together with all vegetable matter from the bottom and sides of the proposed reservoir unless in the opinion of the Commissioner of Health such removal shall be deemed unnecessary after further investigation of the subject.

"FOURTH: After the installation of the proposed additional works the borough shall abandon the present pumping station and force mains and also the supply from Baker's creek and thereafter no water shall be delivered from these sources into the present distributing reservoir of the water-works system, either directly or indirectly."

The Department declined to act on the application for the approval of the filter plans until the borough should submit the other information called for in the above quoted permit. In accordance with these conditions the borough on May twenty-third, nineteen hundred and eight, submitted plans for the reservoir and various connections and the supply main.

The present supply of public water comes from a system of springs located in the hills about a mile east of the borough. The flow is piped by gravity to a four-million gallon reservoir, open, located on top of one of the hills southeast and at an elevation of two hundred and thirty-eight feet above the borough. During the dry season this supply is inadequate and it has been necessary to pump from Sixteen Mile creek and to tap Baker creek.

To obviate this pumping and the danger of polluted water from these sources, it was decided to construct a storage reservoir on a branch of Sixteen Mile creek. This reservoir was planned to hold twenty-five million gallons, to have a drainage area of nine-tenths of a square mile and to supply the existing reservoir by gravity through an eight-inch pipe.

This structure has been built as originally planned with respect to location only. It covers an area of sixteen acres and has a capacity of ninety million gallons. The reservoir in shape is approximately trapezoidal. It is formed by an earth dam twenty feet high, constructed across the valley of this creek at a point where it is narrow. The width of the valley at this point is two hundred and thirty feet, the width of the reservoir at the opposite end is eight hundred feet. The length of the reservoir from the dam to the opposite end is twelve hundred feet. The dam extends across the eastern end of the reservoir and is built almost due north and south. It is constructed of earth and is fifteen feet wide at the top with a slope of three to one on the upper side and two to one on the lower side. In constructing this dam a puddle core wall was built across the bottom to a depth of from six to ten feet below the natural surface of the ground into the solid rock underlying this site. This core wall is eighteen feet thick and above the surface of the ground is carried up for a height of four feet in order to tie it into the main body of the dam. A series of ditches were also excavated on the site of this dam parallel to this core wall and were filled with puddle. The main body

of the dam is composed of selected clay, thoroughly rolled and compacted. The slopes are composed of a selected mixture of clay and gravel. The top of the dam is at an elevation of about two feet above the flow line.

On the south side of the reservoir a waste way has been cut into the solid rock. This waste way extends from a point in the creek four hundred feet below the dam, around the south end of the dam, along the entire southern side of the reservoir and thence along the eastern side parallel to the public road. This waste way is ten feet wide at the bottom, thirty feet wide at the top and ranging from four to ten feet in depth. It intercepts all surface flow on these sides of the dam. The spillway for the reservoir is located one hundred and fifty feet east of the south end of the dam and empties into the waste way. It is thirty feet wide and passes over the rock at the point where it enters the waste way. This rock consists of a shale which is liable to disintegrate and it is probable that it will have to be replaced at some time in the future with a concrete lining.

Two twelve-inch cast iron pipe lines are laid under the bottom of the dam surrounded by concrete and connect with a gate house located at the outer toe of the dam. These pipe lines serve as supply and drain lines to the dam. The supply line is connected by a six-inch valve to the six-inch supply main. There is also a twelve-inch bypass on it connecting to the creek and controlled by a twelve-inch valve. The supply is taken from the dam at a point six feet above the bottom through the end of this supply line. The drain pipe connects directly with the bottom of the dam and empties into the creek below the toe of the dam, being controlled by a twelve-inch valve. The inlet ends of both pipes are properly protected by means of screens of one-eighth inch copper mesh. The valve house consists of a re-inforced concrete structure, eight by ten feet, built up sufficiently high above the natural surface of the ground to prevent any wash from the creek and covered with reinforced concrete top.

The reservoir will be supplied by numerous springs located within it and about seventy per cent. of the drainage area through the office of two creeks which cross the waste way in reinforced concrete troughs three feet deep and four feet wide and so arranged that they can be by-passed into the waste way when the quality of water discharged unfits it for use in the reservoir. The drainage from the west of the watershed will be eliminated from the reservoir by means of the waste way so that approximately two-thirds of the drainage area will drain to the reservoir. This will eliminate the drainage from the road, school house and swamp at the east of the reservoir. On the creek which drains in at the southeast end of the reservoir there is a group of houses located very close to the bank which are apt to contaminate the supply. The borough officials have, however, made arrangements with these people to remove all outhouses which are adjacent to the creek and to throw the drainage from this group of buildings into a smaller creek to the north of the buildings, which will drain directly into the waste way.

There is considerably shallow flowage in this reservoir. The depth over the main central part averages twenty feet, but the depth over the bank on the north and south sides ranges from one to four feet for a distance of forty feet from the bank. A part of the bottom and nearly all of the sides were stripped of top soil and other material for a depth of a foot when the reservoir was constructed. There is, however, at present, a great deal of growth in this shallow water and a considerable amount of top soil. At the northeastern end of the reservoir there is swamp from which no material has been stripped and which is very injurious to the quality of water. It is, however, the intention of the borough officials to extend the dyke around the eastern end of the reservoir across this northeastern end and to thoroughly drain the swamp into the waste way. A bank will be constructed between the waste way and the reservoir so as to completly separate the reservoir from the swamp. This has already been done successfully along the eastern edge of the reservoir where a swamp existed before the work was begun.

A six-inch supply main has been constructed from the gate house at this reservoir westerly to the existing reservoir. This main is composed of six-inch cast iron pipes and is seventy-seven hundred feet long. There is a drop of thirteen feet from the outflow pipe in the reservoir for the first thirty-six hundred feet of this main. This gives a controlling gradient of thirty-six ten-thousandths, allowing a flow of two hundred and fifty thousand gallons per day when the level in the reservoir is at the outlet opening of this pipe. The main is supplied with two four-inch blow-off connections controlled by gate valves and located at the two low points on the main between the reservoir and the old reservoir. These blow-offs discharge directly into the nearby creeks.

The proposed filter plant will be located immediately east of the existing reservoir on the force main leading from the impounding reservoir to the distributing reservoir. It will be a pressure type plant. It is proposed to construct immediately one unit of two hundred and thirty thousand gallons capacity, and provision will be made for an additional unit of this size to be constructed in the future. The filter will be located in a reinforced concrete structure sixteen feet long by twenty feet wide by ten feet six inches high, placed below the surface of the ground and entered by an areaway at one end.

The filter unit will be constructed of one-half-inch steel plates, it will be eight inches in diameter and ten feet long.

The drainage system for the filter will be located at a distance of one foot ten inches above the bottom of the cylinder and will be composed of a gridiron of wrought iron pipe varying in size from five inches to one and one-half inches and fifteen inches center to center. The grid will be built in concrete, which will extend from the bottom of the filter to a point immediately above the grid at the face of the strainers. The strainers will be located at the intersection points of the members of the grid and will be of the Hungerford type of strainers. This type of strainer is rectangular in shape and is six inches square by one-half inch deep. It is composed of sheet metal one and one-half inches thick. These strainers take in the effluent from the filter on the four sides and are arranged so as to allow a variation in the openings, due to the difference in pressure. Surrounding the strainers and extending four inches above is a layer of two-inch gravel. On top of this layer there is a four-inch layer of one-half inch gravel and immediately on top of this is a third layer four inches thick of shot gravel varying in size from one-half to one-eighth inch. The sand layer will extend from the top of the gravel and will be four feet deep will be composed of a pure quartz sand of effective size thirty-six and thirty-six hundredths milometer uniformity coefficient of one and two-tenths. It is estimated that the total area of the surface of this filter will be seventy-eight square feet. The inlet pipe of this filter enters through the top of this cylinder and extends longitudinally at a distance of eight inches above the surface. It is composed of a five-inch wrought iron pipe perforated on top with one-inch holes of sufficient number to give an area of ninety per cent. of the area of the five-inch inlet connection. There is a distance of one foot five inches from the center line of this inlet pipe to the top of the filter.

In operating the filter the main from the new dam enters the filter house and is directly connected with an alum chamber for dosing the raw water with alum before it enters the filter. This alum device consists of a cast iron chamber twelve inches in diameter and two feet deep which will hold eighty pounds of alum. It is connected at the top by a three-eighths inch inlet pipe, which also connects with the inlet main extending to the center of same and faces against the velocity direction. The outlet pipe is of the same size connected with the bottom of the alum compartment and with the main at a point below the inlet pipe connection and facing in the direction of the current. By this arrangement a difference in pressure is obtained between the inlet and outlet connections which is directly proportional to the quantity of water being filtered. The quantity of alum admitted to the raw water is further controlled by a needle valve placed on the three-eighths inch inlet connection. After passing the alum connection on the raw water main there will be a device for regulating the loss of head in the filter to a maximum of five pounds. This device will consist of a diaphragm connection with a hydraulic pulley operated valve. The sides of the diaphragm will be directly connected with the raw water and filtered water pipes of this filter. As soon as the loss of head has reached five pounds, the diaphragm will close the hydraulically operated valve and shut off the supply of filter and will remain so until turned on by hand. The outlet pipe from this filter will extend to the existing reservoir and will be controlled by means of an orifice in a steel plate, which will be set to give a maximum discharge of two hundred and thirty thousand gallons under the initial operating pressure on the filter. The flow is further controlled by means of a float valve in the reservoir, which will close off the supply from the filter when the reservoir is full.

In washing the filter the outlet connection with the reservoir will be valved off and wash water will be admitted into the pipe connecting system in the bottom of the filter through a connection with the raw water inlet main. This connection will be made of sufficiently small pipe to limit the initial pressure to twenty-five pounds, which will give approximately eleven gallons per square foot per minute. The wash water is drawn from the filters through the inlet pipe in the top, which has a five-inch connection with the vitrified sewer line leading to Sixteen Mile Creek. After washing the filter the outlet pipe is further connected by means of a three-inch pipe with the sewer drain, so as to allow the water which is first filtered to be wasted.

The filter will rest on a concrete foundation, will be equipped with a manhole in front above the sand line and will have pressure gauges on the raw water and filtered water connections to show directly the loss of head in the filter at any time.

The piping connections at the filter are so arranged that the line from the new dam passes directly into the filter plant through the filter and along the north side of the old reservoir to the existing supply main from the springs. There is also a six-inch by-pass around the filter which will permit the water from the new dam to be directly passed into the existing supply. A ten-inch sewer drains from the bottom of the filter plant southerly to Sixteen Mile creek located three hundred and fifty feet distant.

The Baker creek line is also supplied by two springs located above Baker creek near the end of this line. These springs are connected by a four-inch wrought iron pipe connected under Baker creek to a manhole located on the opposite side. There is also a connection in this manhole to Baker creek. The two springs are above the flow line of the creek and there is no contamination in the direct vicinity which would affect the purity of the water from these springs.

In constructing the reservoir and supply line before the plans for same had been submitted, the borough violated the conditions of the permit and the State law.

The reservoir as constructed has a capacity of three times that contemplated in the original plan. Whether this was good judgment or not remains to be demonstrated, but one thing is sure that the large percentage of shallow flowage is a menace to the quality of the water.

On July seventeenth, nineteen hundred and eight, there was absolutely no flow into this reservoir from the surface streams and there was no overflow from the spillway and no water was being drawn out through the pipes. In the absence of any evidence of leakage, it appears that in drouths the yield of the watershed for short periods is nothing. However, the average flow from the drainage area during the wet months and for the year should be ample to fill the reservoir annually. The storage thus available is intended to be used and drawn upon only during the dry season. The problem is to keep this stored water in a good and satisfactory condition for domestic purposes.

As there is considerable shallow flowage, special attention should be paid to stripping all shallow areas. This should be completed around the entire edge. The swamp at the upper end shoud be eliminated before the supply is used. A dyke or earthen embankment should be built to effectually isolate the swamp water from the reservoir. The water in the reservoir at the present time is much discolored, due, in a great measure, to the swamp and other shallow flowage.

A six-inch suppiy main has been constructed from this reservoir to the old reservoir in place of the eight-inch as originally planned. As stated above, the supply from this main is limited to two hundred and fifty thousand gallons per day, and if a greater quantity than this be needed in the future it will be necessary to lay another six-inch supply line. As this supply is merely an auxiliary to the spring supply, and as the growth of the borough has been very slow in the past, it is probable that the six-inch line will furnish an auxilliary supply to the borough for many years to come.

In a filter plant of the pressure type there is always a disadvantage due to the difficulty experienced in inspecting the surface of the filter. It is necessary to remove a manhole located in the end of the filter and above the sand line, and after removing it to illuminate the inside of the filter and sometimes crawl in. There is a tendency for the operator to neglect to do this after every cleaning. With the automatic devices proposed for controlling the filter, there should be no trouble in furnishing the correct proportions of alum and in properly controlling the rate and loss of head. Hungerford and Terry, the contractors for the filter, have promised to guarantee its successful operation for one year after the date of installation and will make bacteriological and chemical analyses at sufficient intervals to intelligently operate the plant.

The by-pass from the new supply around the filter plant should be eliminated. This will remove any temptation for the operator to supply the town with raw water from the new reservoir.

It has been determined that the proposed auxiliary water supply will not be prejudicial to public health, and a permit is herein and hereby granted therefor and for the proposed filteration plant as hereinbefore described under the following conditions and stipulations:

FIRST: That before using the supply the borough complete the waste way around the dam so as to completely drain the swamp at the northeastern end of the dam. The parts of the reservoir where there is a shallow flowage of six feet or less in depth are to be stripped thoroughly of all loam and top soil.

SECOND: That weekly sanitary inspections of the condition of the watershed above the new reservoir shall be made by the borough, and all things be done by the borough to eliminate contamination by sewage of the waters from the watershed to be used as a source of supply to the public in the borough, and copies of such sanitary weekly inspections shall be filed in the office of the Commissioner of Health.

THIRD: That the filter plant shall be operated at the rate and under the conditions described in this permit. The by-pass around the filter is to be eliminated and the inspection manhole is to be removed after every washing when the filter is in operation.

FOURTH: That in abandoning the Baker creek supply the borough is permitted to use the two springs connected to their line at present and located immediately above Baker creek at the end of this line. Especial care is to be taken in sealing off the connection with Baker creek and in arranging the manholes at this end so as to allow no seepage from Baker creek.

FIFTH: That if at any time the Commissioner of Health determines that said supply is unsuitable for drinking purposes, the borough shall adopt such precautions and apply such remedies as the Commissioner of Health may prescribe.

SIXTH: Accurate records of the operation of the filter plant shall be kept on blanks to be suggested by the Commissioner of Health and reports thereof shall be filed in the State Health Department.

SEVENTH: At the close of each season's work accurate plans of the water pipes laid during the year in the streets of the borough shall be made and filed in the office of the Commissioner of Health, together with any other information in

connection with the water works system that may be required, to the end that the Commissioner of Health shall always be informed of the extent of the water works system and the use thereof.

Harrisburg, Pa., August 10, 1908.

ORBISONIA, HUNTINGDON COUNTY.

(Orbisonia Water Company).

This application was made by the Orbisonia Water Company, of Orbisonia, Huntingdon county, and is for permission to install a system of water works for the supply of water to the public in said borough and the adjoining borough of Rockhill.

The Orbisonia Water Company is not an organization incorporated under the laws of this State. It is an association of three men, citizens of the borough of Orbisonio, namely, S. O. Fraker, C. B. Bush and W. K. Shaffner. Since the filing of the above application these gentlemen have requested further permission to supply the adjacent borough of Rockhill.

It appears that on October first, nineteen hundred and seven, the Orbisonia council passed an ordinance authorizing the proper officers of said borough to enter into a contract with the said Fraker, Bush and Shaffner and other persons who may be hereinafter incorporated or associated with them in the water company to be known as the "Orbisonia Water Company," for the erection, construction and maintenance in the borough of a complete water works system for the furnishing at all seasons of the year of a sufficient quantity of pure water for domestic, sanitary and manufacturing purposes, and for the further supply of water to provide protection against fire to buildings and property within said borough, at such time and upon such terms as may be agreed upon in the future.

It also appears that on January first, nineteen hundred and eight, the council of the borough of Rockhill granted a similar franchise to the said Fracker, Bush and Shaffner, styled the "Orbisonia Water Company." In both appears the stipulation, "that the franchise, property, stocks, bonds and capital of the said Orbisonia Water Company shall be exempt from all borough taxation." So far as the Department is informed no attempt to issue bonds or stocks has been made. The obligations assumed by the gentlemen above named are individual obligations.

The boroughs of Orbisonia and Rockhill constitute a single community of about fourteen hundred inhabitants dependent principally upon an iron ore furnace in Rockhill and also to a considerable extent on farming and coal mining in the vicinity. The boroughs are located on opposite banks of Black Log creek, one mile above its junction with the Great Aughwick creek, which eleven miles below and north of Rockhill joins the Juniata river four miles below Mount Union. The boroughs are entirely within Cromwell township in the southeastern part of Huntingdon county. The East Broadtop Railroad, a narrow gauge line runs from Mount Union through Shirley borough to Rockhill and Orbisonia, and thence westerly twelve miles to two bituminous coal mines at Robertsdale, a five-mile branch extending southeast from Orbisonia to Shade Gap. About thirteen hundred tons of coal are hauled daily from Robertsdale.

The valley of the great Aughwick, extending in a general direction east of north, is here from three to five miles wide, and is bounded on the east by a belt of high mountain ridges about fifteen miles wide, beyond which is the Cumberland Valley, and on the west by Jacks mountain, and beyond it by Broadtop mountain, in which are the coal mines. Fertile farms cover the bottom land of the valley and of the valleys in the mountains to the east.

The furnace in Rockhill is owned by the same people as the railroad company, but is leased to and is operated by the Rockhill Furnace Company. It was shut down, occasioning hard times in the community, about ten years ago, and has again been shut down since the investigation by the Department, so it is reported. All the coal is obtained from Robertsdale, being but a small part of the product of these mines, and is coked in Rockhill. The ore is principally lake ore, although a small proportion is mined locally in the mountains in the east.

A small pin factory is located in Rockhill, and in Orbisonia there are a grist mill and small planing mill.

Orbisonia marks the site of some of the oldest charcoal iron furnaces in the country. The village became a borough in about eighteen hundred and fifty. The town of Rockhill was laid out in eighteen hundred and seventy-four and became a borough in about eighteen hundred and eighty-six. The growth has been irregular. At present the population is less than it was in eighteen hundred and ninety; for Orbisonia borough and for Rockhill borough it is about stationary.

The assessed real estate valuation for Orbisonia is said to be about one hundred thousand dollars and the debt about two hundred dollars, all for school purposes. There are no paved streets, other than macadam, public water works, nor is there public lighting. Two short combined sewers run from Ridgley Street to Black Log creek, one in Elliott Street and one between Elliott and Ashman

Streets. The assessed valuation of Rockhill is about one hundred thousand dollars. There are no paved streets, public water works nor is there sewerage or public lighting.

The present water supply for domestic purposes is obtained almost exclusively from dug wells and rain water cisterns, both in Rockhill and Orbisonia. The residential districts in both boroughs are comparatively closely built up. There is a loose-lined privy vault for practically every house, although there are few if any cesspools. Limestone, sandstone and shale underlie the town, the former outcropping in Orbisonia. The formation and the close proximity of privies and dug wells render extremely dangerous the present domestic water supply. Moreover, the supply obtained from the wells is too hard for domestic purposes, as indicated by the storage of rain water which is, however, palatable.

A pumping station, reservoir and auxiliary fire pumps are maintained by the furnace company for its own use, the source of supply being Black Log creek, at a point near the furnace.

The local authorities do not report their contagious diseases to this Department. Dr. Taylor, President of the Council of Orbisonia, reported having had three cases of typhoid in Orbisonia this fall, from foreign infection, he thought. Several years ago he had twenty-seven cases in the vicinity, but does not consider the local wells suspicious or dangerous.

Dr. C. B. Bush, one of the principal local physicians, a member of the Council of Orbisinia, and one of the petitioners in the application under consideration, reported having attended within the past twenty years fifty-four cases of typhoid in Orbisonia and sixty-six in Rockhill, a fair proportion having been serious, several resulting in death. He blames the local wells, giving as one reason the usual persistency of the disease on any property once visited.

Owing to the seemingly dangerous conditions of the wells and to the desires of several of the inhabitants for modern sanitary improvements the question of the borough introducing a water supply was recently brought to public notice and voted down in June, nineteen hundred and seven. The people remembered vividly the hard times following the shutting down of the furnace a decade ago and, in view of the possibility of the recurrence of these conditions, feared to incur an increase in taxation. The introduction of a purely private supply by those persons wishing it was considered, but this idea was dropped and finally the ordinance already sited was passed by the Council of Orbisonia.

The water works design, approval of which has been applied for in the formal application under consideration, and altered as set forth in letters to the Department subsequent to the application, contemplates an intake to collect the flow of a mountain spring incidentally developed in an iron ore drift, a gravity pipe line thence to a storage or equalizing reservoir and thence a gravity pipe line to Orbisonia and distributing pipes in Orbisonia and Rockhill boroughs.

Black Log creek has its principal sources in the second valley east of the Great Aughwick creek, draining the valley both to the north and to the south, and then turning to the west at right angles it flows through gaps in the intervening ridges and joins the great Aughwick. Rockhill borough is in the fork of the creeks, the town being on the banks of Black Log creek one mile above the fork, while Orbisonia is on the opposite bank east of Rockhill. There intervenes between the two towns on the western or Rockhill side of the creek a flat about one thousand feet wide and occasionally inundated. The furnace is located on this flat and the railroad traverses it at the foot of the rising ground on which slope is located Rockhill. The Orbisonia bank rises abruptly and the town is close to the stream at an average elevation of twenty feet or more above it.

Sandy run rises in the valley west of that in which Black Log rises and flows south and then west just north of Orbisonia, entering Black Log below that town. A public road from Orbisonia extends up the valley of Sandy run.

The proposed source of supply is a spring in "Old Williams Drift," located about a mile and a half northeast of Orbisonia in the western slope of Black Log mountain, which drains to Sandy run. The drift was opened several yeare ago as an iron ore mine and abandoned owing to the difficulty of handling the water. It is said to extend two thousand feet or more into the hillside and to slope sufficiently to drain it. It is at an elevation of about nine hundred and fifty feet above tide and three hundred feet above the average elevation of Orbisonia. The drift is about one-third way from the bottom of the valley to the mountain top. The general dip of the strata in Black Log mountain is about seventy degrees to the west. It is said that there is an "S" shaped fold in the strata in the mountain in this locality, east stratum below the fold being west of its continuation above, making a narrow bench in the side slope on which numerous springs crop out at or above the elevation of the old drift. The drift and several of these springs which are considered possible additional sources are on the property of the Rockhill Iron and Coal Company, more or less intimately connected with the railroad and furnace companies, and it is said that the right to the water has been acquired under condition that a supply be furnished to the office of the furnace company.

Besides the ore vein and several strata of shale and slate, the drift extends through one of limestone which, however, is said not to make the water hard. The flow from the mine is said to vary but slightly, to be little affected or not at all by rainfall, and to have measured in August, nineteen hundred and seven, a little more than two gallons in five seconds, or about thirty-five thousand gallons per day.

The mountain side above the drift is wooded and apparently uninhabited, which is said to be the case and as well on the eastern slope at a greater elevation than that of the drift.

Plans of the intake and of the possible tributary drainage area have not been submitted.

A three-inch pipe is to lead southwesterly from the drift five thousand six hundred and thirty-eight feet to a proposed reservoir at an elevation of about one hundred and eighty-five feet below the drift, said pipe line to extend entirely through private property. A plan and profile of the location of the pipe line have been submitted, and although facilities for draining it are not indicated on said plans, a letter subsequent to the application states, "The low points on line from drift to reservoir will have flush outs."

Plans of the proposed reservoir have not been submitted, nor any information as to its size, character, material of construction, whether it is to be covered or open, or the facilities for draining it.

From the reservoir site a four-inch pipe is to lead to Orbisonia, the length of pipe from the reservoir to the borough line being about two thousand four hundred feet. The line will run in a general southwesterly direction eight hundred and sixty-eight feet in private property and about fifteen hundred feet in the public road in the valley of Sandy run. A plan and profile of the location of the pipe line have been submitted, and although facilities for draining it are not indicated on said plans, a letter subsequent to the application states that there will be flush outs at the low points on line from reservoir to borough line.

The distributing system is to consist of about sixteen hundred feet of four-inch mains and about thirty-five hundred feet of smaller pipes in Orbisonia and fifteen hundred feet of four-inch pipe in Rockhill, extending across the flat to the town and the office of the furnace company.

The elevation of the reservoir above the area to be served averages about one hundred and twenty-five feet for Orbisonia and one hundred and forty-five feet from Rockhill, although the part of Rockhill on the hillside extends to perhaps fifty feet above the locality to be served at present.

There is to be a valve on the supply main where it enters Orbisonia and a valve in Orbisonia on the main leading to Rockhill. There are also to be valves on the smaller distributing pipes where they lead from the four-inch mains. There will be six or more dead ends in the system. The pipe may be carried across the Black Log creek, either in the bed of the stream or on the public highway bridge connecting the towns. There is to be a blow off in Rockhill at the bank of the creek. The approximate locations of this blow off and of four or five fire plugs to be installed in Orbisonia and also of the distributing pipes were indicated by one of the applicants at the time of the Department's inspection. It was not then definitely known what might be the most desirable location of the pipes of the distributing system.

Not a great number of consumers are expected in the near future in Orbisonia and but very few in Rockhill. It will be noted that the ordinance of neither borough requires that the system now to be installed shall provide fire protection.

With the elevations as given of the mine drift and reservoir a three-inch wrought or cast iron pipe would be more than ample to carry the entire flow of the spring in the drift, reported to be thirty-five thousand gallons daily.

The intake arrangements should provide reasonable protection against chance or malicious pollution and facilities for being drained.

The size of the reservoir required depends upon whether storage is to be provided against a protracted drought and incidental fires or whether the storage is to provide for a fire supply and the inequality in the rate of consumption during the day or merely the latter inequality without attempting to provide fire service. The design of the reservoir should anticipate the possible necessity of its having to be covered to obviate trouble from algae growths and ample facilities should be provided for draining said reservoir and for shutting it off from the pipe below so that the latter may be drained.

With the elevations given for the reservoir and Orbisonia and Rockhill the four-inch main from the reservoir to and in the boroughs would not have the capacity to provide a single standard fire stream, such as required by fire underwriters. A six-inch pipe would be better, but it would require an eight-inch pipe to insure two or more fire streams after the pipes have been but a short time in use. The four-inch pipes proposed would be ample to carry the entire flow of the spring and an additional flow such as might be conducted to the reservoir from some of the other springs already mentioned as being in the neighborhood of the drift.

The distributing system would with advantage be altered in design so as to provide facilities for its more complete draining and so as to eliminate dead ends as far as possible.

Even if the ordinary demands to be made of the system are solely those of domestic consumption the supply may prove insufficient during protracted droughts unless considerable storage is provided; but since such a failure would not necessarily imperil the public health the possibility of its occurrence need not necessitate the withholding of approval of the system.

The borough authorities and all persons interested should know that the State Health Department approves the proposed design simply as one for system to obtain a safe domestic water supply and not to provide fire service, and further that the future use of any part of this system to supply for purposes water which from a

sanitary or public health standpoint may be less satisfactory than the supply proposed at the present may appear to be prejudicial to the interests of public health.

It has been determined that the proposed source of supply and the proposed system of water works will not be prejudicial to public health under certain conditions, and a permit is hereby issued therefore under the following conditions and stipulations:

FIRST: That a plan of the tributary watershed above the proposed intake be prepared by the applicants, named the Orbisonia Water Company, on which plan shall be plotted the lines of all lands purchased or leased or in which the said water company may have an easement, and all highways and occupied estates, should there be any, and such plan shall be filed with the Commissioner of Health on or before the completion of the construction of the proposed intake.

SECOND: The said water company shall cause to be made every three months a sanitary inspection of the tributary watershed above the intake, and reports thereof shall be made to the Commissioner of Health.

THIRD: All natural ground surface to be flooded by the proposed intake or to be made part of the sides or bottom of the proposed reservoir shall be thoroughly grubbed and cleaned, and all organic matter and mud shall be removed therefrom.

FOURTH: Ample facilities shall be provided for the proper and complete draining of any basin formed at the intake and of the reservoir and for the protection of the intake and of the reservoir from chance or malicious pollution and also for the shutting off of the supply from the town if need be. Detailed plans of the intake and reservoir and of these facilities for drainage, and all pipe connections and valves shall be submitted to the Commissioner of Health for approval before the works are constructed, and no additional source shall be used or new reservoir constructed thereafter unless approved by the Commissioner of Health.

FIFTH: Ample facilities for ready draining of the upper and lower supply mains at low points shall be provided. A plan of the boroughs showing the streets and showing definitely the location and sizes of the proposed water pipes and blow-offs and the location of all gates, hydrants and the drainage facilities shall be prepared and filed with the Commissioner of Health. At the close of each season's work a plan of the extensions to the street mains laid during the season shall be prepared and filed with the Commissioner of Health.

SIXTH: Because the small sizes of proposed pipes might involve public health, it is expressly stipulated that approval of them is herein given on the condition that the borough councils shall also approve the sizes after having been acquainted with the discussion of the subject already presented; reserving the right, however, to immediately modify this stipulation if it should appear to be for the interest of public health to do so.

SEVENTH: If at any time in the opinion of the Commissioner of Health the said source of supply or the water works or any part thereof have become prejudicial to public health, then such remedial measures shall be adopted as said Commissioner may advise or approve, and such reports of the monthly operation of the system shall be made to the Department of Health as may be required.

It is the intention of the State Department of Health to occasionally collect samples of water from the proposed supply and to make tests thereof, and in accepting this permit the water company obligates itself to co-operate with the State officials.

It is expressly stipulated that this permit is issued under the further condition and provision that the water company shall have complied with all laws applicable to the case relative to the business in which it proposes to engage.

Harrisburg, Pa., April 2, 1909.

PARKESBURG, CHESTER COUNTY.

Parkesburg Water Company.

This application was made by the Parkesburg Water Company, of Parkesburg borough, Chester county, and is for permission to obtain an additional source of supply of water to the public within its charter territory.

It appears that the borough of Parkesburg is located in the northwestern part of Chester county, on the main line of the Pennsylvania Railroad. It has an area of about five hundred and seventy acres and a present population of about two thousand; in nineteen hundred it was seventeen hundred and eighty-eight, and in eighteen hundred and ninety, fifteen hundred and fourteen.

The borough is drained by the west branch of Buck run, which empties into the Brandywine about five miles below Coatesville. This stream receives surface drainage and sewage from borough sewers built in the two principal streets of the town, to which many houses are connected. There are also several private sewers emptying into this stream.

There are from twenty-five to fifty individual wells in use in the borough.

The soil is clay and gravel underlaid by sandstone. The principal industry in the town is the Parkesburg Iron Company. Judging by present conditions there would appear to be no indications of a rapid growth of the borough in the immediate future.

The Parkesburg Water Company was incorporated in eighteen hundred and ninety-nine, to supply water to the public in the borough of Parkesburg. An ordinance of borough council, passed in eighteen hundred and ninety gave the borough the right to lay pipes in the streets and contracts for fire service were entered into. The works were built in that year and have been extended from time to time as necessity demanded. At present the territory furnished with water comprises about one hundred and forty acres. The works are reported to have a capacity of seventy-thousand gallons daily. The supply is taken from driven wells, eleven of which are located at the lower reservoir just north of Main Street, and two at the upper reservoir, about twelve hundred feet further north.

Main Streets parallels the railroad tracks and lies immediately north of them.

The wells at the lower reservoir are six inches and eight inches in diameter and from thirty-six to one hundred and fifty feet deep. These wells empty into a settling reservoir near Main Street, thirty-two feet by seventy-six feet by six feet deep to overflow, having a capacity of about one hundred and ten thousand gallons.

From this reservoir water is pumped by a gasoline and oil engine pumping plant through about three hundred feet of six-inch pipe to the eight-inch main connecting the upper reservoir with the distribution system, which is about thirteen hundred feet in length. The wells at the lower reservoir are located at the foot of the valley, in which there are about thirty houses, all of which are reported to be provided with privies. The wells and lower reservoir are protected from surface drainage, but there is a possibility of pollution from some of the above mentioned houses.

The upper reservoir is one hundred and fifty feet long and one hundred feet wide and eleven feet deep to the overflow line, with vertical masonry walls. It is divided into two parts, one one hundred feet by fifty, and the other one hundred feet by one hundred, but they are operated as one reservoir. They have a capacity of about one million, two hundred and thirty-eight thousand gallons. They are provided with blow-off and overflow pipes, and receive the surplus from the pumps.

At this reservoir are located two wells about three hundred feet deep, the water level of which stands about ninety feet below the surface and can be utilized only by pumping. All of the wells are driven into mica sandstone, the top of which lies about twenty feet below the surface.

The distribution system consists of eight hundred and fifty feet of eight-inch, forty-five hundred and fifty feet of six-inch, eleven thousand eight hundred feet of four-inch, and two thousand feet of two-inch, or a total of twenty thousand four hundred feet, or about four miles.

The estimated supply of ground water is about sixty-five thousand gallons per day minimum and seventy-five thousand gallons per day maximum. The total consumption is given at seventy-five thousand gallons daily, which is the full amount of the supply, or about fifty gallons per capita based on fifteen hundred consumers.

The proposed supply is located at the headwaters of Glen run in Highland township, about two miles southwest of the town.

The supply consists of sixteen springs located in a piece of swampy ground covering about six acres. These springs have been excavated from two or three feet to sandstone rock, walled up and covered with flat stones.

They have been connected with a receiving reservoir by means of three-inch, five-inch, six-inch and eight-inch terra cotta pipe, laid with loose joints in trenches excavated to rock. There are about four hundred and forty feet of three-inch, four hundred and forty feet of five-inch, three hundred and eighty feet of six-inch and one hundred and seventy feet of eight-inch pipe in these ditches besides about two hundred and fifty feet of French drain, making a total of one thousand six hundred and eighty feet of loosely laid pipe with open joints which collect more or less ground water.

The total yield has been estimated at three hundred thousand gallons per day.

The flow from these pipe lines is collected in a concrete reservoir nine feet by five feet by four feet deep, having a capacity of thirteen hundred and fifty gallons. This reservoir will be covered with a wooden roof.

From this reservoir an eight-inch cast-iron main is laid for about one hundred and forty-four feet, from which about two and a half miles of six-inch pipe conducts the water to the lower reservoir near main street.

The swamp in which the springs are located is situated near the head of Glen run, there being about one hundred and twenty-five acres of farming country above the swamp.

Within about two hundred feet of the French drain, at the head of the swamp, is a tobacco shed. A water course spreads its flow over this swamp and on this water course is located the large farm buildings of W. A. Griest.

On this farm are kept about ten or twelve horses, thirty or forty cattle and fifty hogs. The hog-pen is about five hundred and fifty feet long and the water course traverses about two-thirds of its length and also receives drainage from barnyard, kitchen and from privy vaults, the contents of which are above the

ground. The farm buildings are probably five hundred feet above the swamp. There is also another property owned by the same party where a few pigs are kept, but no stock, about one thousand feet above the swamp, the drainage from which follows the road to the swamp.

The supply will be ground water in dry weather and during storms it will be polluted surface water, filtered through from two to three feet of clay and gravel.

Evidently an additional source is needed. The improvements had been practically completed at the time of the Department's inspection. Aside from the pollution mentioned, it is evidently a good supply.

The course of the stream discharging into the swamp can be led around it, thus greatly decreasing the danger of pollution.

There has been no satisfactory plan of the proposed supply filed with the Department and no reference is made to any possible pollution in the application; in fact, the application states that it will be free from pollution.

It has been determined that the water works and the proposed source of supply is not prejudicial to public health and a permit is hereby and herein granted for the additional supply and for extension of water pipes in the borough, under the following conditions and stipulations:

FIRST: That the water company shall prepare a map of each watershed, showing its limits and all streets and ways, occupations and sources of pollution thereon, and file the same with a satisfactory report thereof in the office of the Commissioner of Health within ninety days from the date of this permit, and thereafter the water company shall co-operate with the Commissioner of Health in enforcing all such regulations with respect to the disposal of sewage on said watershed as may be deemed advisable.

The attention of the water company is called to the fact that the law prohibits the disposal of any sewage from private estates into any waters either on the surface of the ground or under the surface of the ground.

The information herein called for is to be a basis for the determination of whether there be any such sewage discharged in any way on the watershed to the menace of the source of supply of the water company and to the public health within the water district of said company.

SECOND: Within ninety days from the date of this permit the water company shall prepare and file maps showing the location of the various springs and a plan for diverting the flow of water courses from the vicinity of springs, and when such plan shall have been modified, amended or approved by the Commissioner of Health, the water company shall execute the same forthwith in order that the source of supply may be safeguarded against possible pollution.

And on or before said ninety days shall have expired, the water company shall also have filed in the office of the Commissioner of Health a plan of the pumping station, piping and wells of existing supply and of the reservoirs and of the distributing pipes from the source of supply and the pipes in the streets, showing their size, elevations, location of gates, hydrants, blow-offs and drainage facilities. If, in the opinion of the Commissioner of Health, such drainage facilities are inadequate, then improvements shall forthwith be made to the satisfaction of said Commissioner.

THIRD: If at any time, in the opinion of the Commissioner of Health, the water works or any part thereof, or the source of supply shall have become prejudicial to the public health, then such remedial measures shall be adopted by the water company as the Commissioner of Health may advise or approve. The water company shall keep a record on blank forms satisfactory to the Commissioner of Health of the operation of its system and file copies thereof with the said Commissioner. Examinations and investigations of the system will be made from time to to time by the State Department of Health and the water company shall assist if required to do so in such examinations and investigations.

The State Department of Health may make rules and regulations for the operation of the system in so far as the interests of the public health are concerned and such requirements shall be observed by the water company.

Harrisburg, Pa., July 21, 1908.

PITTSBURG, ALLEGHENY.

Approval is hereby given of plans for the construction of ten additional water filters at the city's filtration works near Aspinwall, and general approval to the entire water works system for the enlarged city of Pittsburg, and a permit issued for such additional water filters and for general extensions to the water works system in response to plans duly filed by said city of Pittsburg and a written statement supplementary thereto.

GENERAL CONDITIONS.

The territory comprising the greater Pittsburg district as incorporated in one municipality, now includes "Old Pittsburg" or all the land laying east of the confluence of the Allegheny and Monogahela rivers between the former on the north and the latter on the south, for a distance of about seven miles in which reside approximately three hundred thousand people; also the "South Side" or the land

along the south bank of the Monongahela river opposite Pittsburg proper, a stretch of four miles and westerly along the south bank of the Ohio river for two and a half miles in which reside approximately one hundred thousand people; and also the "North Side" or all the land on the north bank of the Allegheny opposite old Pittsburg, a stretch of about three miles and westerly along the north branch of the Ohio for about three miles, formerly the city of Allegheny, in which reside approximately one hundred and fifty thousand people.

Beyond the site as described, there are in the immediate vicinity many municipalites which are closely allied with Pittsburg. Numerous territorial accessions by annexation have been made to Pittsburg in the past. It was under the provisions of Act number one hundred and sixty-one, approved April twentieth, nineteen hundred and five, providing "that where two cities are contiguous and in the same county, the smaller may be annexed to the larger,," that Allegheny City was absorbed.

The annexation idea is predominant and this tendency is of more than passing import.

Ranking fifth among the cities of the United States in commercial and industrial importance—because it is the port of entry and transfer between the east and west and because it is the largest shipping point for bituminous coal and because it has the natural fuel supply of coal, coke and gas and the climate to foster enterprise—no period of its expansion has been more promising than the present. Local problems pertaining to public water supply may with peculiar reason be contemplated in relation to probable consolidation.

The past conditions of growth offer a partial explanation of the different independent water works systems found existing within the municipal territory of Pittsburg to-day.

In old Pittsburg, comprising Wards one to twenty-three, inclusive, Brushton borough, now Thirty-seventh ward and Sterrett township, now Forty-first ward, there are two systems, one owned by the municipality and the other owned by a private corporation, named the Pennsylvania Water Company, authorized to supply water to the public in said borough and township prior to their annexation to the city.

In the "South Side" the water is furnished by two private corporations; one being the Monongahela Water Company, supplying wards twenty-three to thirty-six, inclusive, and the Thirty-ninth and Fortieth wards—formerly Elliott and Esplen boroughs—and the other being the South Pittsburg Water Company, supplying Wards Thirty-eight, Forty-two, Forty-three and Forty-four, formerly Beltzhoover, Montooth, Sheraden and West Liberty boroughs, respectively.

The old city of Allegheny, now the "North Side," has its own system.

OLD PITTSBURG WATER SUPPLY.

Taking up each system in the order stated, with respect to the old Pittsburg water supply, it is noted that the topography in the city proper is so uneven, elevations ranging over five hundred feet, that distinct systems of distribution have resulted. However, all water is primarily lifted into the Highland Park reservoir from the Brilliant Pumping Station. This plant is located on the south bank of the Allegheny about six miles above the mouth of the river. Formerly the water was drawn directly from the river at this point; now it arrives at the station through pipes connected to the water purification plant located on the opposite bank in O'Hara township.

No emergency intakes is provided at the Brilliant station, whereby raw water may be admitted to the system.

The engines comprise four fifteen million gallon pumps, four twelve million gallon pumps and two ten million gallon pumps, equivalent to a combined capacity of one hundred and twenty-eight million gallons per twenty-four hours. Since the maximum daily pumpage is eighty-three million gallons, the reserve of forty-five million gallons is an apparent large margin. The effective margin, taking into account contemplated improvements and additions to the system, is nearer thirty million gallons. The engine room floor is above freshet line, but the boilers are in danger of being put out of commission by an extraordinary flood. Some corrective measures are planned and they are to be applied at an early date.

Highland reservoir number one has a storage capacity of one hundred and eighteen million gallons. Reservoir number two has a capacity of one hundred and twenty million gallons. The latter is ninety-one feet lower in elevation. Both are on the hill back from and near the pump house. Both are interchangeable, and both may be cut off and the supply be pumped directly into town.

River mud at times excessive. A large proportion of the heavier sediment has in the past been deposited in the reservoir. Some of the fine material found its way on into the street mains. Now that filtered water is being furnished, the city is engaged in cleaning out the service pipes and the reservoir preparatory to keeping them in such condition.

The distribution districts are divided into a low, high and extra high service.

The low service is a gravity supply from reservoir number two, but in emergencies or at choice it may be connected to reservoir number one. This territory comprises all the lower portion of the city bordering on the Allegheny and Monongahela

rivers—a strip not over one-half mile wide at any place. It includes the manufacturing, mercantile and down-town shopping districts. Probably one hundred and ten thousand people are served.

The high service comprising an extensive area with a resident population of ninety thousand people, is supplied by gravity from Highland reservoir number one. The district includes the lands too elevated to be properly reached by the low service.

The extra high service is furnished by water pumped from the high service mains into reservoirs and tanks located at such points and elevations as to serve districts above the reach of the high service system. There are four such services, named in order of importance, Herron, Bedford, Garfield and Lincoln.

A thirty-inch main from reservoir number one feeds the Herron pump station at the corner of Central Avenue and Craig Street in the central part of the city near Shenley Park. From this point the supply is pumped into the reservoir on Herron Hill, not far distant, and also by a separate main into the reservoir on Bedford Hill, near the down-town district. The latter basin holds two and a quarter million gallons and supplies a mercantile district of about twenty-seven thousand population. The former holds eight million gallons and supplies a large residential area of about forty-seven thousand population.

The Garfield tanks are of steel construction, hold five hundred thousand gallons and supply about ten thousand people resident near Highland Park. The pumping station is at the corner of Dearborn and Pacific Streets.

The Lincoln tanks hold two hundred and fifty thousand gallons, they are on the hillside near the east city line. The pump house is located on the corner of Park Avenue and Dean Street. There are resident in the district ten thousand people.

About seventy million gallons is the present average daily pumpage at the Brilliant Station.

PENNSYLVANIA WATER COMPANY.

The population within the city supplied by the Pennsylvania Water Company is about eleven thousand. All service connections are metered and the estimated consumption is about forty gallons per capita. On the municipal system it is between two hundred and thirty and two hundred and sixty gallons.

The company was chartered in eighteen hundred and eighty-seven to supply water in the township of Sterrett, out of which the Thirty-seventh Ward, formerly Brushton borough, and the Forty-first Ward, were made. The plant supplies Wilkensburg and other places as far south as North Braddock. In eighteen hundred and ninety-nine the Pennsylvania Water Company purchased the works of the Turtle Creek Valley Water Company, built to supply the boroughs in the Turtle Creek Valley, and then known as the East Pittsburg Water Company. The whole territory is now supplied from the pumping station of the Pennsylvania Water Company on the Allegheny river at Nadine. This point is about two miles above the Brilliant pumping station.

The water is taken from three filter cribs built three feet below the bottom of the river bed.

Crib number one is three hundred and eight feet long by thirty-three feet wide by five feet deep. It is covered with gravel and sand.

Cribs number two and three are each four hundred and eight feet long by forty-eight feet wide by five feet deep, built in the same way, cornerib fashion.

From number one crib a twenty-four-inch cast-iron pipe is laid below the bed of the river to a manhole on south bank of river. From cribs number two and three a forty-two-inch cast-iron pipe is laid below the bed of the river to same manhole; thence to the pump there is a six-foot tunnel. The bottom of the river over the cribs is not allowed to silt up. This is prevented by dragging over it a rake made of the pipe from which water is discharged in small jets under pressure of one hundred pounds per square inch. The observed reduction of bacteria in water pumped compared to the raw water is between ninety and ninety-nine per cent. when the cribs are in working order. Occasionally the cribs fall off in efficiency.

One ten-million gallon and one six-million gallon pumping engine raises the water to a reservoir of six million gallons capacity, located on high ground back of the station and distant therefrom five thousand feet. About twenty-three thousand feet from reservoir number one is reservoir number two, which holds twelve million gallons. They are connected by a forty-two-inch pipe. The portion of the city noted is supplied principally from reservoir number one, but Ward Thirty-seven may be supplied directly from reservoir number two.

The water furnished by the Pennsylvania Water Company is usually clear. It was generally superior in quality to that furnished by the city prior to the starting up of the Aspinwall filters.

MONONGAHELA WATER COMPANY.

As stated above, the "South Side," excepting Wards Thirty-eight, Forty-two, Forty-three and Forty-four, is supplied by the Monongahela Water Company. To meet the conditions imposed by broken topography, three services with reservoirs and tanks at different elevations have been installed by the company. They comprise the low district, the Allentown high district and the Esplen district.

The larger part of the supply is pumped from the Monongahela river at the main pumping station, situated on the river front at the foot of Twenty-ninth Street. The water is raised into the Birmingham settling basins, open brick-lined structures, built in the nearby hillside at the head of Thirty-first Street at the elevation of about two hundred feet above the river. These basins have a total capacity of three million gallons and from them the water flows by gravity to the low service area lying between the foothills and the river.

The intake is a thirty-six-inch pipe run out to the middle of the stream. There is a screen on the end of it. The power plant is subject to inundation. The pumps are not in first class order. There are five of them, one being four million, two being ten million and two being five million gallons capacity. The latter raise water five hundred and ninety-eight feet high through a twenty-inch line into three settling basins, each sixty feet in diameter by forty feet high, located in the Twenty-seventh Ward on the highest ground available in the Allentown district. Thirty-eight thousand people reside in the hill area—Wards Twenty-seven, Thirty-one, thirty-two and thirty-five—served by these tanks.

A sub-station, of not much account, at the Birmingham basins is maintained in reserve to pump water through a ten-inch pipe and by a cross connection into the twenty-inch line to the tanks.

The Allentown and the low service area comprising Wards Twenty-four to Thirty-five, inclusive, and Ward Thirty-six in the Esplen territory, constitute the "Old district" of the "South Side." Eighty-three thousand people are now resident therein. The daily consumption, excepting the Thirty-sixth Ward, approximates twelve millions gallons and the water is delivered through ninety miles of street mains. These mains are known to be clogged with mud deposit.

The new Esplen plant was built by the Monongahela Water Company and put in service in eighteen hundred and ninety-five. It is now operated in conjunction with the "Old district" works. Besides Ward Thirty-six, it includes the Thirty-ninth and Fortieth Wards (formerly Elliott and Esplen boroughs), and outside of the city, part of the borough of McKees Rocks and parts of Chartiers and Stowe townships.

The water is pumped from the Ohio river at a point opposite Brunot's Island. There are two filter cribs here sunk in the river bed from each of which a twenty-four-inch supply pipe leads to wells in the station. There are also fourteen twelve-inch drilled wells, each about fifty feet deep, from which water is drawn. The supply is lifted by two pumping engines, each three million gallons capacity, a vertical height of four hundred and twenty-five feet to two steel tanks, each fifty feet in diameter and seventy feet high, located on Sheraden Hill, from whence the discharge is by gravity to the district. Ward Thirty-six contains about four thousand people.

The superiority of the plans under municipal control in Pittsburg proper as compared with private ownership on the "South Side," above described, is partially conspicuous in every detail of design, management and maintenance, and is one reason for popular sentiment favorable to city ownership.

In December, nineteen hundred and six, the city petitioned for appraisement of the value of the plant and property of the Monongahela Water Company lying in Wards Twenty-four to Thirty-six, inclusive, since these were the city limits in eighteen hundred and eighty-five, when an agreement was entered into between the city and the water company, whereby the latter obtained an exclusive franchise for twenty-one years to the said territory of thirteen wards.

The company does not now own any pipes outside of the Twenty-fourth and Thirty-sixth wards, inclusive, excepting the pipe system connected with the Esplen plant, which lies largely outside the limits of the city. All others were purchased by the Chartiers Valley Water Company in eighteen hundred and ninety-six.

So the Monongahela Water Company will continue to exercise its franchises outside the "Old District," but still within Pittsburg's limits subsequent to any purchase of the "Old District" plant by the city.

In fixing upon a fair value for the plant to be purchased, the water company's experts have frankly admitted that improvements are advisable and necessary and would be made by any private individual accustomed to successful management of water works property. The quality of the water must be improved by filtration. The company's plans proposed as a basis for estimation of cost of giving good advice, is to locate a fifteen-million gallon filter plant at the Birmingham reservoir, build settling basins of approved type out of one of the existing basins and use the other to store filtered water; erect two new vertical pumps at the Twenty-ninth Street station to pump all the water needed from the river to the settling basins; provide a return pipe to remodeled high district pumps for delivery of filtered water to the Allentown tanks; build a new pump house and plant at the reservoir; raise up and alter the main station; clean out all street pipes; rebuild intakes, and, in fact, revamp the entire system to secure an up-to-date service.

At the present time there is no competition whatever in the supply of water in the district. There is a contract existing between the Monongahela Water Company and the South Pittsburg Water Company, the only other concern supplying water to adjacent territory, whereby these two companies refrain from entering into com-

petition. This should operate to the benefit of the service at once in the Esplen district and also in the thirteen wards in event of failure of the city to acquire the latter works.

It is the city's plan to supply filtered water should the "South Side" plant come under municipal control. The obligation of the water company is equally as great at all times to supply pure water at reasonable rates, subject to the regulation of the court.

SOUTH PITTSBURG WATER COMPANY.

The South Pittsburg Water plant comprises a pumping station on the Monongahela river at Beck's run, about one mile up stream from the Twenty-ninth Street station of the Monongahela Water Company, buried filter crib in the river bed and two auxiliary pipe lines leading directly from the stream into the pump well, a mechanical filter plant, including settling tanks, filters, clear water basin, chemical laboratories and all appurtenances of latest and most approved pattern, three five-million gallon service pumps at the filter plant to raise the water into a steel tank on the hill in Mt. Oliver borough and a system of distributing mains reaching a large population in the municipalities bordering the Pittsburg boundary and in the townships beyond. It is also serves the four hill wards of the city above mentioned. The works are managed with exemplary care under skilled direction. The water is clear and pure and the service is eminently satisfactory. This feature has materially aided in the building up of the district. A contract exists between the city and the company for fire hydrant service. All the territory covered by this water company and by the Pennsylvania Water Company will in likelihood, be annexed to Pittsburg, and following there is likely to be agitation for municipal control of the water works. Naturally city ownership would effect alterations in methods of distribution. Such possibility need only be thought of in considering the present question of supplying filtered water to the north and south sides of Pittsburg at present incorporated.

ALLEGHENY CITY.

The "North Side," formerly Allegheny City, is supplied entirely from water works owned and operated by the municipality, and like the other parts of Pittsburg, the topography is irregular, ranging six hundred feet or more in elevation, so that there are several systems of distribution.

The supply is taken from the Allegheny river at two points. At Montrose village in O'Hara township, opposite Verona, nine and a half miles up stream, is the principal pumping station. An auxiliary plant called River Avenue Station, is in the eastern part of the North Side at the site of the original pump house built in eighteen hundred and forty-nine.

Montrose intake has a timber crib twenty-five hundred feet long by thirty-two feet wide by seven feet deep, placed in a ten-inch excavation in the river bottom. It is planked on top and covered with gravel to original surface of the channel and its sides are riprapped filling. Difficulty has been experienced in keeping the structure open to admit of the passage of water. The sides have been dredged out for this purpose, but they fill up again. So far as keeping out silt from the pump chambers or clarifying the river water goes, the crib may as well be out of commission.

There are two fifteen million gallon triple expansion pumping engines and three twelve million gallon cross compound pumping engines in the station. They raise about forty million gallons of water daily a vertical height of two hundred and forty-seven feet through a sixty-inch steel force main nine and a half miles long to Troy Hill reservoir, where the water is delivered directly into the low service district without going into the reservoir. The surplus overflows into duplicate basins at said reservoir. The two large pumps are new. They were put in final commission early in the current year. Now all the supply is pumped at the Montrose station; but prior to nineteen hundred and seven for ten years or so about one-third of the water supply was drawn from the river at the River Avenue Station. Steam in one battery of boilers is still kept up at this old station in readiness for use during emergencies.

Here the intakes are two twenty-four inch and one thirty-six-inch pipes. They extend down stream for fifty-six feet and are perforated with one-inch holes. The plant is subject to possible interrruption of service at times of extreme high water. A combined rated capacity of thirty-three million gallons is afforded by the five pumps. They are in poor condition. The water is raised into Troy Hill reservoir nearby.

The Troy Hill reservoir holds seven million five hundred thousand gallons. It is of earth embankment construction, concrete lined and paved with brick. A wall divided the reservoir into two basins of about equal capacity. Each is in poor condition, especially at the frost line.

From Troy Hill reservoir the water was formerly furnished by gravity of the low service district, comprising a belt of varying width, extending nearly the whole length of the river front. The section includes all the manufacturing and commercial districts and covers an area of about two and a half square miles. The popu-

lation served approximates ninety-five thousand people. But not only the several distinct high services draw water from the basins. A thirty-inch and a sixteen-inch gravity main extends northeast about a mile to the Howard Street pumping station, which is located at the corner of Howard and Rising Main Streets. Here five pumping engines raise the water into tanks in districts B. C. and D. Each tank is forty feet in diameter and twenty-two feet high.

There is one eight million and one five million triple expansion pumping engine and one three million and two two million five hundred thousand gallon pumping engines of the combined duplex type in the station.

A twenty-four-inch main leads to two tanks on Nunnery Hill nearby. They are elevated two hundred and eighty-eight feet above the Troy reservoir. From them a residential area of one square mile, lying directly north of the low service district and comprising twenty-thousand people, is supplied by a gravity flow. This is high service district B.

A separate twenty-four-inch main also leads to two tanks, located eighty-five feet higher on Nunnery Hill, which feed district C, an area of two and seven-tenths square miles, extending to the northerly city boundary and containing an approximate population of twenty thousand people.

An irregular shaped area of one and two-tenths square miles adjacent to the eastern boundary of the city, containing a population of about ten thousand people, comprises high service district D. It is fed from two tanks on Spring Hill. A sixteen-inch force main from the Howard Street station delivers the water into these tanks. They are elevated about three hundred and sixty-nine feet above the Troy reservoir.

In district C at the city line is Green Tree Hill, the highest land in Allegheny county. On this eminence are two tanks supplied with water from an auxiliary pumping station on Broadway. The tanks feed a local extra high area of about two-tenths square miles. The pumps are electrically driven and have a capacity of one million gallons each. The consumption is small.

At the Troy Hill reservoir is a pumping station containing two pumps, rated capacity one million gallons each, which supply by direct pressure a district of about three-tenths square miles on the hill land in the vicinity.

The investigator must be struck with the lack in the water works of opportunity for sedimentation. Troy Hill reservoir has too little capacity to assure the removal of silt. Water of the quality of the Allegheny river, if delivered into the system without sedimentation or purification, is bound to clog up the pipes and house connections and reduce the efficiency of the works and hence increase the cost of operation and maintenance. These matters are indirectly prejudicial to public health.

WATER PURIFICATION PLANT.

Plans for a complete water purification plant large enough to furnish all of the city of Pittsburg, including the South Side, with pure water were adopted and construction work begun in nineteen hundred and five.

Opposite the Brilliant pumping station and just above it on the north bank of the river is a level plateau over a mile long and about half a mile wide whose elevation is higher than the highest freshet ever recorded. Here a slow sand filtration plant has been recorded, consisting of a pumping station, sedimentation basins, forty-six acres of covered filter beds, each an acre in area, covered filtered water basin and gravity supply mains under the river to the pump wells in the Brilliant station. The net daily capacity of the filters is one hundred million gallons based on a maximum rate of filtration of three million gallons per acre per twenty-four hours, making allowance for cleaning and other operations. The works were designed for future additions, space having been reserved therefor in the eastern portion of the tract owned by the city.

The site is in O'Hara township, bounded on the west by Aspinwall borough. At the upper end of the said tract are the new intakes and pumping station called Ross station. The capacity is between one hundred and forty million and one hundred and eighty million gallons per twenty-four hours, dependent on the height of river water. These engines raise the raw river water into the central receiving basin, capacity twenty million gallons, on either side of which are larger sedimentation basins, capacity sixty million gallons each, from which the water passes to the filters.

The heavier suspended matters deposit in the primary receiving basin. All three basins are designed to drain pumps leading to the drainage system of the plant.

The conduits carrying settled water from the basins lead to the central gate chamber at the primary receiving basin. The operation of the entire plant is controlled and directed at the administration building, erected over the central gate chamber. Here are the offices, rooms, operating mechanism and bacterological and chemical laboratories.

The sedimentation basins are at the foot of the hill. The filters lie between them and Freeport road and the tracks of the West Penn division of the Pennsylvania Railroad near the river bank.

Passing through the site of the filters is a right-of-way in which the sixty-inch Montrose station force main to the Troy Hill reservoir extends. This strip, sixteen feet wide, is laid out as a driveway and divided the filter layout into north

and south parts, three rows of filters being in each part. The distribution and collection system of pipes run at right angles to this driveway. The pipes are housed in covered galleries thirty-one feet wide in the clear, placed between alternate rows of filters. There are four of them, each about one thousand feet long, including the north and south part, and they contain all auxiliary apparatus and machinery for scraping, washing and restoring sand.

There is a fan-heating and ventilating system in each gallery to maintain a uniform temperature, also an attendant's room. A toilet room and locker and lunch room are provided in each half gallery. The floors of all of these places are made tight and arranged for ready cleaning.

Two sand washing tanks of concrete are placed in each half gallery. The flow of dirty water from the outlet weir of these washers passes directly into the drain. All the drainage is intercepted by a large main trunk drain along Freeport road, which empties into the river opposite gallery number one.

Adequate facilities for the treatment and disposal of the sewage created at the water filtration plant have been provided. Approval, according to law, was given in a permit issued by the Commissioner of Health under date of April, twenty-ninth, nineteen hundred and seven.

The filter beds have groined arched concrete floors and covers. The latter are carried on concrete piers fourteen feet on centers. The gravel underdrains total one foot in thickness, the sizes ranging from five to one and a half inches in diameter. The sand layer is between two and four feet deep. The underdrainage system consists of a concrete main collector extending the length of the filter in the longitudinal center bay and a lateral drain six to eighteen inches in diameter, in each transverse bay connects to this main collector. The latter has pipe connection to its corresponding regulating chamber, located in the gallery.

An automatic recording gauge, indicating the rate of filtration, loss of head and the depth of water over the sand, is supplied for each filter. The facilities for back-flooding the beds and for draining them and for the ordinary feed, are ample. Sand scraping and sand restoring machinery are used. However, the design permits of this work being done by hand were it necessary for any reason.

The filtered water conduit in each gallery connects with the main conduit ten feet four inches in diameter, extending to the filtered water reservoir. This structure is built of concrete, groin arched, width at one and two hundred and ninety-four feet, with a total length between the ends of eleven hundred and ninety-four feet, and holding forty-two million gallons. The roof is supported by piers twenty-one and five-tenths feet high, spaced eighteen feet apart on centers. The up-stream end is in line with the down-stream gallery of the filters.

The river side of the reservoir is nearly parallel and one hundred and twenty-five feet from the harbor line. Here an embankment has been filled in on a slope of two to one. The slope is protected up to the elevation of extreme floods with a heavy concrete revetment. A level berm twenty to forty feet in width is carried back from the top of the revetment to a second slope, rising to the level of the filling over the reservoir roof. Tile drainage and puddle cover have been provided to prevent percolation of surface waters into the filtered water basin.

There is an inlet and outlet chamber at the reservoir. An eighty-four-inch by-pass, laid on the reservoir floor, connects the two. The inflow may be measured by weir apparatus. The outflow is through two seventy-two-inch pipes, laid under the river to the pumping station at Brilliant. A place for a third seventy-two-inch pipe has been left. A ventrul meter is set up in each seventy-two-inch pipe. This is the last of four measuring stations by which the quality of water flowing from various parts of the plant may be observed and loss located.

In connection with distributing the filtered water a fifty-inch pipe line has been laid from Highland reservoir to a point on the north side of the Monongahela river, a distance of about five miles, and thence under the river by a thirty-six-inch pipe, to supply the "South Side." The thirty-six-inch main connects at Twenty-ninth Street with the system of the Monongahela Water Company, but water is not furnished, but might be in an emergency.

The general idea of the landscape treatment of the entire water filter layout is to isolate the site from surroundings by hedges and seed down the entire enclosure, lay out drives around and by the sedimentation basins, pump house and filters and reduce the formality of the view by shrubbery and small trees along the drives.

Three filters were put in commission in December last, seven in January, eight in March, six in April and three in May, and now there are altogether thirty-nine units operated. They are distributed along each of the four galleries. All of the water delivered through the Brilliant pumping station, as previously stated, comes from the purification plant; but not all is filtered. Only forty-one million gallons daily pass through the sand beds. The balance to make up the seventy million gallons daily consumption, more or less in Pittsburg, is water settled in the sedimentation basins. The two waters are mixed, since there is no way of keeping them separated.

If the thirty-nine filters were operated at their normal capacity, all of the seventy million gallons would be filtered. This result is to be accomplished as soon as possible. Fifteen men are now engaged in the operating galleries; they are distributed as follows: Two filter attendants for four galleries; two laborers for four galleries; one filter foreman; this makes a force of five men for four galleries for each shift of eight hours or fifteen men for each twenty-four hours. An additional

filter attendant and an additional filter laborer for each shift is to be put on. This will make twenty-seven men for each twenty-four hours instead of fifteen men. With this force the higher rates are to be attained as soon as possible without jeopardizing the entire plant.

In the cleaning operations there are now employed four machine operators, four filter laborers, two washer attendants and one machinist. This force is to be doubled. It has been found necesssary to do this to successfully work all the filters. Without adequate cleaning force, if the beds were run to their full capacity, it would tie up the entire plant. The unusually high turbidity of the Allegheny river this summer has retarded the development of the filters to their maximum efficiency.

In the laboratory work, whose results give the important index of necessary corrective measures in daily and hourly operation, there are now employed one analysist in charge, one assistant chemist, two laboratory assistants, two sample collectors and one laborer. Other help will be employed as required.

PROPOSED ADDITIONS.

The city asks approval of plans for the erection of ten additional filter units of the same size and form of construction as the existing filters, to be located up stream on the land belonging to the city and reserved for this purpose.

The annexation of Allegheny City has extended the territory and usefulness of the filtration works. The present plant has a maximum capacity of one hundred million gallons. The greatest consumption in Pittsburg as recorded is eighty-three million gallons. The Monongahela Water Company's district, if supplied by the city, will call for twelve million additional gallons of filtered water, making a total of ninety-five million gallons needed.

The "North Side" consumption is now forty thousand gallons daily; so it is evident that ten additional units are none too many. It is understood, however, that experiments with preliminary treatment are now in progress as a basis of design for materially increasing the capacity of the existing sand beds. This study of preliminary treatment is heartily recommended. The State Department of Health will be glad to favorably consider any well conceived method, thoroughly tested, with special reference to adaptability to local conditions.

The exigencies of the case, however, warrant no delay in providing for additional capacity, and the plans proposed for ten filters should be executed at once.

The city also proposes, as soon as money therefor shall have been provided, to add low service pumping machinery to the Ross pumping station and to build and equip a new high service pumping station at Aspinwall, for the purpose of delivering filtered water into the Allegheny mains; and when this has been done, to abandon the old River Avenue pumping station and also the Montrose pumping station.

Further, it is contemplated to build a reservoir of about one hundred million gallons capacity somewhere along the pipe line route to Allegheny.

Still further, in connection with the furnishing of filtered water to the "South Side" when the city takes over the works of the Monongahela Water Company, it proposes to abandon the use of the low service pumps at the Twenty-ninth Street station at once, and to deliver filtered water into the district mains. The filtered water supply will be lifted by the high service pumps at this station to the Allentown tanks, pending the building and equipment of new high service pumps and their installation in a new house to be erected at a site free from inundations or floods. Upon completion of this work the Twenty-ninth Street station will be entirely abandoned.

DISCUSSION.

The policy of the State in subserving the interests of public health bears a peculiar relationship to the endeavors of the authorities of Pittsburg along the same lines. The sewages of the municipalities situated on the banks of the Allegheny and Monongahela rivers above Pittsburg pollute to a very considerable and dangerous degree the waters which are the source of supply to all the districts hereinbefore described. Even the city's own sewage pollutes the water which passes over or by the intakes of the River Avenue, Twenty-ninth Street and Esplen pumping stations. To these facts have been attributed rightfully a considerable proportion of the typhoid fever cases and deaths of Allegheny county.

A circuit between the city, its environment and the country beyond its existency, no doubt, whereby infection is transmitted back and forth through the medium of water, milk and food stuffs. This circuit can only be cut when all of the drinking water in the city is pure water.

A compulsory proper disposal of household wastes of a poisonous nature at the farms and in the village is going along apace under State direction; but the compulsory discontinuance of the discharge of municipal sewage into the city's drinking water must necessarily require a long term of years for accomplishment. Meantime, the people must have pure water, and there is one law for all water works whether owned and operated by private or municipal corporation. The Pennsylvania Water

Company now has pending before the State Department of Health for approval, plans for improving its water supply which have a relation to the future development of the municipal system. The Monongahela Water Company, held up for the time being in making improvements, by the probability of having its plant partly taken away, must also provide adequate works to purify the water supply to its consumers and a decree to this effect will be issued.

It has been determined that the existing city water works will not be prejudicial to public health under certain conditions, and the same are hereby and herein approved and a permit granted for the proposed extensions, alterations and improvements, under the following conditions and stipulations:

FIRST: That this permit shall relate only to the water works now owned and operated or that may be owned and operated by the city between the territory now comprised within the boundaries of the city of Pittsburg as incorporated August first, nineteen hundred and eight. The acquirement of water works or extensions of water works by the city into any area beyond the said municipal territory of August first, nineteen hundred and eight, shall be made under the provisions of law requiring a written permit by the Commissioner of Health.

SECOND: That the city shall immediately upon its acquirement of the Monongahela Water Company's plant in the thirteen wards, fully inform the Commissioner of Health of the fact of the nature and terms of the agreement between the city and the water company, and the extent of the plant as acquired, more particularly in its bearing to any remaining property or works of the said water company within the city limits and similar information shall be given with regards to any acquirement of the Pennsylvania Water Company's plant in part by the city.

THIRD: That monthly reports of the operation of the water purification plant and of the water works system shall be filed in the office of the Commissioner of Health on forms satisfactory to said Commissioner. At the close of each season's work the city shall file satisfactory plans showing all additions, extensions and changes in the water works system made during the year, together with any other information in connection therewith that may be required.

FOURTH: That the city shall not later than December first, nineteen hundred and eleven, supply the "North Side" and the "South Side" and the old city proper, with filtered water and filtered water only. Provided, however, that if the Monongahela Water Company should not be acquired by the city then, in that event, the State Board of Health will require the said water company to filter the water supplied to all its consumers. And on or before December first, nineteen hundred and eleven, the abandonment of the Montrose and River Avenue pumping stations shall have been accomplished and also the Twenty-ninth Street station, if this latter property shall have been acquired by the city in time to admit of the changes in plans herein approved relative thereto being made, otherwise, a reasonable extension of time will be granted by the Commissioner of Health. It is the intent of this permit to bring about at the earliest practicable moment the elimination from the water works system of all emergency and other intakes whereby raw river water may be introduced into the distributing system.

FIFTH: That since greater filter capacity than that now possessed at the Aspinwall plant, together with the ten additional filter units is requisite to the furnishing of the entire city with filtered water. It is stipulated that tests of the preliminary treatment of the Allegheny river water shall be conducted by the city preparatory to the adoption of the best treatment, and that prior to installation of any permanent method, the plans therefor, together with the tests showing the adaptability of the process, shall be submitted to the Commissioner of Health for approval.

SIXTH: If at any time it shall appear that the water works system or any part thereof, or the water supplied to the public thereby is prejudicial to public health, then such remedial measures shall be adopted forthwith as the Commissioner of Health may approve or advise.

Harrisburg, Pa., August 17, 1908.

POTTSTOWN, MONTGOMERY COUNTY.

This application was made by the Pottstown Gas and Water Company, Pottstown, Montgomery county, and is for permission to extend its distributing main within its chartered territory and to install a water purification plant.

It appears that the borough of Pottstown, having a population of sixteen thousand, is a thriving manufacturing community on the north bank of the Schuylkill river in the southwest corner of Montgomery county.

The municipal territory is bounded on the west by West Pottsgrove township, on the north by said township and Upper and Lower Pottsgrove townships, on the east by the last named township, and on the south by the Schulykill river. Opposite the borough south of the river is North Coventry township in Chester county. Two highway bridges span the Schuylkill, connecting the scattered settlement along the south river bank on the flats called South Pottstown, where five hundred people reside, with the borough of Pottstown.

The incorporated area of about four square miles extends for three miles along the river. The topography is rolling, the surface drainage is fairly good, more especially since there are numerous natural water courses flowing to the river.

Manatawny creek is the principal stream. It enters the Schulykill in the western part of the borough. Its watershed is about seventy square square miles. A considerable number of the inhabitants live in dwellings connected by private sewers to the runs, which the borough has arched over to obviate a nuisance.

The principal industry is the manufacture of iron and steel. The plants are located along the lines of the Pennsylvania Railroad and the Philadelphia and Reading Railway, within fifteen hundred feet of the river. Two of them employ over a thousand or more hands and two others employ half as many. Twelve more concerns employ an average of about one hundred hands each. And among these are included hosiery mills, shirt factories and dye mills.

The Pottstown Gas and Water Company furnishes more water to the manufactories than to the citizens of the town. There are some private domestic wells, shallow dug. Their location is unknown to the Department.

The Pottstown Gas and Water Company was incorporated by special act of Assembly, April second, one thousand eight hundred and sixty-nine, for the purpose of making, raising and introducing into the borough of Pottstown a sufficient supply of gas and pure water. A subsequent act of May sixteenth, eighteen hundred and seventy-one, provided for the protection of the water company's mains and reservoirs. The company is now operated under the General Corporation Act.

The plant as first installed in eighteen hundred and sixty-nine had its intake to the Schuylkill river at the foot of Washington Street in the lower part of the borough, below the outlets of numerous sewers. In eighteen hundred and ninety a new pumping station and river intake were built up stream about one mile beyond the borough line at the village of Bramcote in West Pottsgrove township. The old station and intake were abandoned. The new intake is the one at present in use.

Said intake consists of a thirty-inch cast-iron pipe, extending into the river sixty feet from low water line, the river here being about three hundred feet wide. At low water the outer end of the intake is in a pool four feet deep. The shore end of the pipe terminates in a screen well five feet in diameter, located on the bank of the river. The water thence flows by gravity through a brick tunnel four or five feet into a pump well, which is said to be twelve feet in diameter and twenty feet deep. It is two hundred feet back from the river bank adjacent to the pump house.

The pumping machinery consists of two horizontal compound condensing engines, one a Barr pump, rated capacity, three million gallons, and the other a Worthington pump, capacity, one and a half million gallons per twenty-four hours. By these engines water is raised to a twenty-four-inch cast-iron force main, one and a half miles, to a five million gallon reservoir on Stowe Hill, north of the borough in West Pottsgrove township. It is reported that the average vertical lift is one hundred and sixty-three and five-tenths feet, not including friction.

The storage reservoir on Stowe Hill is approximately two hundred by three hundred feet in plan and thirteen feet deep. The side walls are of stone masonry, plumb on the inside. The bottom is concrete. A partition wall six feet high divides the reservoir transversly into north and south basins. Ordinarily the water is pumped into the northwest corner of the reservoir and taken out at the southeastern corner, both inlet and outlet pipes being flush with the bottom. However, the piping will admit of water being supplied and drawn from either basin independently, so that six feet of water may be maintained on one side of the partition wall while the basin on the other side is being cleaned. There are no plans filed in the Department of the details of any part of the water works system. How the reservoir is drained the Commissioner of Health does not know. There is a by-pass by means of which water may be forced directly into the town street pipe system without first passing through the reservoir.

From the Stowe Hill reservoir there is a twenty-inch gravity main to town which furnishes the distribution system. It extends easterly through the borough in Berks and King Streets, a total distance from Stowe Hill of about two miles to Washington Street. In this highway there is a ten-inch pipe extending northerly about half a mile to a one and a half million gallon reservoir on Washington Hill. It is in the borough and is elevated about one hundred and fifty feet above the river. This small reservoir was a part of the plant as first installed in eighteen hundred and sixty-nine when the intake was at the foot of Washington Street.

This reservoir takes the overflow from the system. It is irregular in shape and seventeen feet deep. The inner slopes are paved with brick and the bottom is concrete. A float valve regulates the inflow, shutting it off at a predetermined elevation.

The average consumption is said to be one million six hundred thousand gallons daily of which one million are furnished for industrial purposes. In summer the consumption is two million gallons per twenty-four hours. Thus the storage capacity of both reservoirs at six and one-half million gallons permits the pumps to be shut down for three or four days without a curtailment of use of water in the district. The company selects the most suitable time for pumping from the river. The first waters of a flood being most turbid are permitted to pass. The pumping station was under six feet of water and out of commission for a period of three days in February, nineteen hundred and two, and this may occur again at any time. The company reports that about four thousand people living in the borough do not take public water but derive their supply from shallow wells. There are said to be many hundred loose vault privies in the town.

The records filed in the State Department by the local authorities show that there were in Pottstown the following number of typhoid fever cases: for nineteen hundred and six, thirty-five; for nineteen hundred and seven, forty-eight, and for nineteen hundred and eight, up to and including April, thirty-three cases.

At the Hill School in December, nineteen hundred and three, and the following month, there was an epidemic of typhoid fever, which is said to have been due to infiltration from a cesspool into the well which supplied the drinking water. This well has since been closed up and the school now receives its supply from the water company.

The water company also furnishes water to the public in the townships of West Pottsgrove and North Coventry.

The supply main to North Coventry is carried across the river at Hanover Street and furnishes a supply to about one hundred inhabitants. The West Pottsgrove township district comprises the outskirts of the borough and there are about four hundred individuals here to take the water, so it is reported. The charter right granted the company is for the borough of Pottstown only. There is no record in the office of the Secretary of the Commonwealth of the water company having secured the franchise or right to extend its water pipes beyond the limits of Pottstown borough.

Under act number one hundred and seventy-seven, approved May twenty-first, nineteen hundred and one, the company might have legally supplied water to the settlement surrounding Pottstown, but if water is being furnished there by the Pottstown Gas and Water Company in compliance with a petition from the owners of a majority of the land in these districts, the records in the office of the Secretary of the Commonwealth do not show it. Hence it would appear that the said company has no legal right to furnish water beyond the limits of Pottstown.

The application of July twenty-seventh, nineteen hundred and seven, to extend distributing pipes in North Coventry township and West Pottsgrove township cannot be acted upon by the Commissioner of Health until the water company shall have obtained a charter right to supply water to the public in these townships. consequently, a withholding of approval of the pipes already laid in these townships and used to supply water to the public therein by the Pottstown Gas and Water Company on the date of its application of July twenty-seventh, nineteen hundred and seven, must be decreed by the Commissioner of Health.

The extension of distributing pipes in the borough may be approved, but until the company shall have submitted a plan of the piping system showing dead ends and drained facilities among other things, the Commissioner of Health cannot be in a postion to act most intelligently with respect to particular stipulations in relation thereto.

Rapid sand filtration preceded by coagulation and sedimentation is contemplated in the plans for the proposed water purification plant submitted for approval. The plant is to be equipped under a guarantee by the New York Continental Jewell Filtration Company. The concrete work is to be constructed by the water company.

The filter plant is to have a capacity of four million gallons per twenty-four hours. However, it is the intention not to operate it more than twelve hours or so daily. It is to be located immediately north of the present pumping station. The filters will be housed in a reinforced concrete building one hundred and forty feet long by fifty-two feet wide. In the end nearest the pump house will be the sedimentation basins and in the other ends the filters, and below them the clear water basin.

Two centrifugal pumps, each five million gallons capacity, are to be set up in the pump house and used to raise raw water from the pump well into the inlet chamber of the sedimentation basin, extending from the bottom seventeen feet eight inches high. The water will rise in this chamber which will be about four square feet and pass out through two ports controlled by gates, one on either side to the inlet weir trough extending across the entire end of each basin at the top. A longitudinal wall will divide the entire tank into equal halves. Adjacent to the inlet chamber is to be an overflow chamber extending from top to bottom in the line of the division wall. It will connect with the sewer and will be provided with ports to drain out each basin when necessary. The top of the overflow chamber will be five inches above the inlet weir. Passing over this weir the water will flow in either chamber under a baffle board extending from the roof nearly to the bottom. Both basins together to a depth of sixteen feet ten inches will afford a period of sedimentation of about three and one-half hours when the plant is being operated at the rate of four million gallons per twenty-four hours.

The outflow from the basin is to be over weirs into collecting troughs extending the full width of the basins at the end nearest the filters. This weir or dam will be eight inches lower than the top of the overflow chamber at the opposite end of the basin.

Over the outlet end is to be the chemical room and coagulant solution tank. Sulphate of alumina is to be used and the solution will be applied in the pump well. The amount of solution to be used will be regulated by an orifice box to be placed at a convenient point at the pump station.

The elevation of the bottom of the sedimentation basin is to be on a level with the engine room floor.

The last forty-two feet of the purification plant is to be devoted to clear water basins and the filters. This basin will be four feet deeper than the sedimentation basins. A twenty-four inch influent pipe from the collecting trough at the outlet end of the sedimentation basin is to extend in the adjacent operating gallery of the filter house. This pipe will reduce to twenty inches and fourteen inches in diameter and from it will lead ten inch pipes on either side to the filtering units of which there are to be three in each row. Each filter unit is to have a surface thirteen feet by seventeen feet ten inches and its capacity is to be two-thirds of a million gallons per twenty-four hours when operated at the normal rate of the plant. The ten inch inlet pipe is to discharge into a chamber at the head of the filter out of which at the top are to extend three iron gutters across the full length of the filter. Their tops are to be twelve inches above the sand surface.

The mainfold system on the bottom of each filter unit is to consist of a six inch cast iron pipe off of which is to be taken in parallel rows, six inches on centers one and a half inch wrought iron pipes fitted with strainers six inches on centers. Over this collecting system, which is to be imbedded in the concrete floor of the unit flush with the bottom of the strainers is to be laid nine inches of gravel supporting twenty-seven inches of sand. An eight inch effluent pipe will conduct the filtered water to the central pipe gallery and rate controller, whence the water will go to the clear basin below. The arrangement of valves and piping is such that the wash water will be wasted to the sewer and also the first filtered water. The wash water will be taken from the pressure main.

The aim in the design is to maintain practically the same level on the filters as that of the water in the sedimentation basin. The overflow weir in the latter structures will prevent overflowing of the filters. Besides a device operated by floats influenced by the level in the sedimentation basin will operate to reduce the speed of the pumping engines. This will obviate the wasting of any water. the air wash is to be accompanied through the water manifold system. Each filter unit is to be provided with the regulation loss of head gage. The effluent controllers are to be of the Weston type. A free air discharge of filtered water in the clear water basin below is to be maintained.

At the bottom of the inlet chamber of each filter is to be a ten inch connection with a twelve inch sewer in the central gallery. This sewer will extend through said gallery and thence longitudinally through one of the sedimentation basins near the central wall to the overflow chamber where it will discharge in the bottom of said chamber.

The material excavated from the hillside where the purification plant is to be erected is being used to form a dyke about the pumping station to keep out floods. The water will rise in the overflow chamber, backing up through the sewer from the river and will attain a level possibly seven feet above the chamber during some extraordinary freshet. At such times it will still be possible to wash the filter and drain the dirty water to the river.

The entire form of construction of the basins and filters is to be reinforced concrete. The sedimentation basins are to have flat roofs of concrete construction. The operating gallery and inlet ends of the filters are to be housed over in the customary manner by a concrete or brick superstructure and the chemical store house will be of the same type.

The operating gallery will be covered by a platform of concrete made water tight.

Beneath the filters and the gallery is to be the clear water basin. It will occupy the entire space, being thirty-nine feet eight inches by forty-nine feet four inches in plan and having a depth below the under side of the floor of the pipe gallery of seven feet five inches. Its capacity will be about one hundred thousand gallons.

The existing pumping engines of the town service are to have their suctions connected to a twenty-four inch pipe terminating in the clear water basin, but the old suction pipes to the raw river pump well are not to be disconnected. Valves are to be placed on them and they are to be kept for emergency uses.

In view of the foregoing considerations it has been determined that a permit be withheld and it is hereby and herein withheld from the Pottstown Gas and Water Company to supply water to the public in the townships of North Coventry and West Pottsgrove until said company shall have obtained legal right so to do.

It has also been determined that the water works system and the source of supply and the extension of water pipes in the borough of Pottstown will not be prejudicial to public health and the plans therefor are hereby and herein approved, also the plans for the water purification plant hereinbefore described and a permit is issued therefor and for the extension of the mains in the streets of the borough under the following conditions and stipulations:

FIRST: That complete plans of the intake, pump well, pumping station, purification plant, showing the plant as it is constructed with all appliances and appurtenances, valves, etc.; and that complete plans and elevations of the force main, distributing pipes, gates, hydrants, blow-offs and drainage facilities, shall be prepared; and that plans and elevations of the distributing reservoirs shall be prepared by said company, and all of said plans shall be filed in the office

of the Commissioner of Health on or before the first day of January, nineteen hundred and nine. At the close of each season's work the company shall file a plan of the pipe laid during the year in the office of the Commissioner of Health, together with such other information that may be required to the end that the Department shall always be fully informed of the extent of the water works system and its use.

SECOND: The filter plant shall be operated for one year under the responsible direction of the experts who have designed it or by some other expert equally competent to render this service. A full report of the intial test of the proposed filters shall be submitted to the Commissioner of Health and thereafter the water company shall assist the State Department of Health in making such tests of the plant from time to time as may be found desirable. If necessary the Commissioner of Health may prescribe the standard of efficiency and make regulations for the operation and maintenance of the plant and the water works system, so far as the interests of the public health may be concerned.

THIRD. Weekly reports of the operation of the water works system and purification plant shall be kept on blank forms satisfactory to the Department of Health and copies thereof shall be filed with said State Department. If at any time, in the opinion of the Commissioner of Health, the water works system or any part thereof, or any water furnished thereby has become prejudicial to public health, or inefficient or defective, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve. The introduction of raw river water into the street system is absolutely prohibited with this exception. The gates on the river suction pipe shall be kept closed and sealed under arrangement satisfactory to the Commissioner of Health and only in some great emergency fully justifying the use shall these valves be opened and the raw river water be pumped into the system. In such an event the public shall be immediately warned of the fact and the local and State Health authorities shall be notified.

FOURTH: The drainage from the purification works shall, if ever required by the Commissioner, be otherwise disposed of than into the river.

Harrisburg, Pa., July 15, 1908.

RETREAT, LUZERNE COUNTY.

Central Poor District.

This application was made by the Board of Directors of the Central Poor District of Luzerne County, Pennsylvania, and is for approval of preliminary plans for an additional source of supply to the institutional buildings.

Under the Act of the General Assembly, number two hundred and eighty-eight, approved June sixth, nineteen hundred and seven, entitled "An Act to authorize all State Hospitals for Injured Persons, and all hospitals for the care and treatment of the insane, in whole or in part maintained by State aid, to acquire land for hospital purposes; and to take waters, streams, lands, properties and materials for the purpose of supplying said hospitals with pure water for hospital purposes; prescribing the manner in which said lands, streams, property and materials may be taken and the manner of compensating the owners thereof for such taking," the Directors of the Central Poor District of Luzerne County have given notice to the Commissioner of Health of their intention to obtain a new source of supply of water to said Institution. The said Act requires a compliance with the Purity Water Bill, so called, approved April twenty-second, nineteen hundred and five, and still further provides,

"That no waters shall be condemned and appropriated under the provisions of this Act, nor any water system, reservoir, pipe or conduit be constructed or maintained, until a permit for the condemnation and appropriation of such waters, or the construction or maintenance of such water system, reservoir, pipe or conduit, shall have been procured from the Department of Health and the Water Supply Commission of Pennsylvania."

It appears that the Hospital for the Insane and also the almshouse for the Central Poor District of Luzerne County are located at Retreat, a railroad station on the Sunbury Division of the Pennsylvania Railroad, twelve miles southwest of Wilkes-Barre. The grounds comprise about one hundred and fifty-five acres, which extend along the south bank of the North Branch of the Susquehanna River for about one and six-tenths miles and back therefrom about one-quarter of a mile. This tract is located at the foot of the mountains and contains about fifty-five acres of land under cultivation, which stretches along the flats and is from twenty to twenty-five feet above the river level, ordinary stage. The railroad tracks are built along one side of the flats and south of them the land rises to the foothills. The immediate site of the buildings is on a shelf of ground elevated about one hundred feet above the river.

The almshouse buildings comprise two poor houses, one for male and one for females, the superintendent's home and barn and out structures. They were erected about eighteen hundred and seventy and occupy the westerly portion of the ground.

The insane hospital buildings were constructed about nineteen hundred and additions have since been made. At present there is the four-story administration building with three-story wings on either side for the male and female wards and in the rear is the power house, the cold storage building and the morgue.

The administration building is heated by direct steam but the other buildings are provided with the hot air introduced by means of blowers operated at the power house.

Patients from Schuylkill, Carbon and Luzerne County are received at the Institution. The insane department, accommodates about five hundred patients and requires sixty employes. The almshouse accommodates about three hundred patients and employes, making a total of about nine hundred people at the institution

Sewers were first installed in eighteen hundred and ninety-eight, they take both sewage and storm water. The main sewer is twenty-four inches in diameter, serves the almshouse buildings and some of the hospital buildings. It passes under the railroad tracks west of the depot and receives a connection from the depot. The point of discharge is into the river about opposite and slightly up stream from the pump well from which the Institution's water supply is drawn. There is an eighteen inch sewer pipe extending from the north wing of the insane hospital northerly under the railroad tracks and thence along the flats about nine hundred feet westerly to the twenty-four inch sewer into which it discharges.

With the exception of the depot, the buildings of the institution are elevated sufficiently to admit of a gravity discharge of sewage to works which might be provided for the purification of the sewage.

The well from which the Institution's water supply is taken is located in the porous ground on the flats between the railroad and the river. It is three hundred feet back from the river bank and about one hundred and fifty feet from the railroad. The well is thirteen feet in diameter, twenty-seven and five-tenths feet deep, lined with brick and covered with a concrete roof provided with a manhole for inspection.

On July sixteenth, nineteen hundred and seven, the date of the Department's inspection, there was four and one-half feet of water in the well, the surface of the water standing two feet below the level of the river water level.

During the summer months the water is frequently drawn down to within one foot of the bottom of the well, making it necessary to run the pumps very slowly during the entire twenty-four hours to avoid uncovering the suction pipe.

Originally the pump house was located over the well, but in the spring of nineteen hundred and three, it was carried away by ice. This was the year of the noted ice gorge, when many structures went down all along the entire length of the Susquehanna River. That water at the time stood thirteen feet above the top of the present roof of the well. A new pump house was constructed on the river side of the railroad opposite the boiler house.

It is a one-story brick building, built over the concrete pump well in the bottom of which well are the two duplex pumping engines, having each a maximum capacity of two hundred thousand gallons per twenty-four hours. The top of this well is three and one-half feet above the high water mark of the freshet of nineteen hundred and three. The floor of the well is twenty-five feet below the top of the sides. From the bottom there is a concrete gallery four feet high and two feet wide extending to the well, in which gallery is laid the eight inch suction pipe. The pumps are so arranged that one may be used to keep the pump well dry during high water stages of the river.

The steam is supplied from the boiler house on the opposite of the railroad.

There is a tank reservoir located on the mountain side about eight hundred feet in the rear of the administration building. It is twenty feet high and is reported to have a storage capacity of one hundred thousand gallons. It is not in a good state of repair. The top of the tank is two hundred and seventy feet deep above the pumps and one hundred and twenty feet above the roof of the highest building at the in stitution. There is a six inch force main extending from the pumps to the tank. It is possible to pump directly into the distributing pipe system whenever this may be desired. It is estimated that there are about three thousand feet of six inch pipe in the ground including the force main. Nine fire hydrants are connected to the six inch fire supply line in the grounds and there are various small pipes attached to standpipes in the buildings, making a grand total, so it is reported, of thirty-three hose connections on the ground.

The main well water is said to be acid to an extent sufficient to require constant repairs to the hot water heating system. Large amounts of iron are precipitated and water drawn from hot water spigots is always red in color. It is further reported that when ever the river water overflows the well there follows an epidemic of enteric diseases at the Institution.

Besides having an effect on the hot water flushing and boiler tubes, which makes a pure supply desirable, the quantity is inadequate during the summer months. The directors wish to secure an abundant supply ample for all fire protection as well as domestic consumption.

When the river well is flooded recourse is had for drinking water to a supply from a bore hole extending seven hundred feet horizontally into the mountain. This source is unreliable and sometimes disappears completely. There is also a spring house at the foot of the mountain beyond the female pauper building. The quantity of water here is small and it is used only at the piggery.

Daily consumption of water at the Institution is about one hundred and fifty thousand gallons.

The petitioners purpose to obtain the new source of supply from the surface streams located on the opposite side of the river and forming tributaries of the east branch of Hunlocks Creek. The main stream by this name empties into the Sus-

quehanna River about one mile and a half above Retreat. The east branch affords the site of the proposed reservoir. It is just below the forks of the two tributaries. The stream to the east being known as Peg Hunter Creek and the one to the west being known as Hughes Creek.

Peg Hunter Creek has a watershed of three square miles rather precipitous and about three-quarters wooded. There are nine farm houses on the area. Its easterly branch rises in springs and is in woodland excepting one farm. The water has excellent appearances. Its northern branch rises in Mud Pond, so called, lying at the head of the valley, surrounded by hills and formed by a low sand-stone ridge. The pond has an area of about twenty-four acres, an average depth of ten feet of water and soundings failed to reveal the depth of the mud. The latter is known to be twenty-five feet deep. Evidently this body of water is fed by springs, the water is cloudy in appearance, has a fishy taste and the shores are surrounded with a strip of luxuriant water plants. There is no economical way of draining this pond or of reclaiming it.

Hughes Creek has a watershed of two and seven-tenths square miles, three-fourths of which is farm land, the balance being wooded. There are sixteen farm houses on it drainage area.

Above where it is proposed to construct a dam below the forks of the two creeks, the watershed has an area of about five and seven-tenths square miles. The average dry weather flow is estimated at three hundred and forty thousand gallons per day. The twenty-six farm dwellings with accompanying outbuildings, together with the mud pond, form the only sources of pollution.

The new reservoir proposed is to be formed at the site of an abandoned dam. The petitioners have two plans under consideration. One is for the erection of a dam twenty feet high with the crest five feet above water level and a length of three hundred feet. This structure would flood six and four-tenths acres and give a storage of about eleven million gallons. The other plan calls for a dam ten feet higher by which nineteen acres would be flooded and a storage capacity obtained of about forty-six million gallons.

Either reservoir would extend back a short distance up each tributary. The reservoir site is composed of bottom land with some swamp. There is also a group of farm buildings near the flow line. It is reported that solid rock foundations may be secured upon which to rest the dam. An earth dam with concrete core wall and spillway has been suggested and that the lower dam be built first in conformity with plans by which the ten additional feet may be put on without endangering the structure in the future. However, detail plans have not yet been prepared. It is proposed to conduct the water from this reservoir by means of a six inch or eight inch pipe line which will follow the course of the creek to the Susquehanna River, thence diagonally across the river to a point about opposite the northerly end of the Institution grounds, thence parallel with the railroad to the present pumping plant where it is to connect with the present system.

The elevation of flow line of the reservoir, lower level is two hundred and fifty-seven feet above the pumps.

It is proposed to construct a reinforced concrete reservoir on the hill in the rear of the Institution Its capacity is to be about five hundred thousand gallons. The water from the storage reservoir at the source will flow by gravity to the distributing reservoir in the rear of the Institution.

The Department is unable to say, without going into an examination of local territory more thoroughly than it seems to be the province of an advisory power, whether the site selected for the dam is the very best one possible. The watershed, however, is sparsely populated and the purity of the waters can be safeguarded as easily as the waters from any territory available for the Institution.

The directors should consider this possible necessity of cutting out Mud Pond water. This would be done by digging open trenches following the contours about the pond by means of which the upland waters would be intercepted and delivered into the stream below the pond. Such a remedy might be resorted to in case the entire creek supply became impregnated with objectionable odors and impurities, imparting a disagreeable taste to the waters which could not otherwise and at less expense be eradicated.

A sanitary patrol should of course be maintained to secure the proper disposition of sewage on the contributing area above the dam.

The directors should also take into account the probable deterioration in water stored in the reservoir and attributable to shallow flowage. It is good practice where filtration of the surface waters is not to be accomplished to remove from the bottom of a reservoir all soil and mud and organic matter, especially in that portion to be flooded to a shallow depth. And it is also good practice where money can be secured therefor to eliminate shallow flowage by the excavation of earth around the edges and the depositing of it at the shore line, equalizing the cut and fill in such a way as to secure the greatest benefits for the outlay and effect as great a depth of water at the shore line as may be practicable. However, there should be a reasonable limitation of this kind of work.

The surest remedy of all is the filtration of a surface water supply and probably the time will come when all such supplies derived from inhabited areas will be filtered.

The minimum yield of the five and seven-tenths square miles of watershed without storage, based on measurements of a neighboring stream is estimated at one hundred and eighty thousand gallons per twenty-four hours. The maximum con-

sumption for the future at the Institution is taken at three hundred thousand gallons daily, or one hundred and twenty thousand gallons in excess of the daily minimum flow of the stream. So the proposed storage reservoir at the low level would, together with the minimum flow of the stream provide an hundred day's supply to the Institution at the expiration of which the storage would be depleted. This is believed to be a sufficient storage. But having in mind the possibility of an Institutional growth, not now anticipated, and an even greater consumption of water than estimated, it would be prudent for the directors to plan the dam and the reservoir to admit of its safe enlargement should this ever become necessary or desirable.

A six inch supply main from the dam to the pump house is impracticable. The friction in this length would limit a pipe of this diameter to a total discharging capacity in twenty-four hours of about five hundred thousand gallons. The demand for fire service at any time might be greater than this. It should be possible to easily obtain through the supply main enough water to furnish three good fire streams of three hundred gallons per minute each. The elevation of the proposed dam is seven hundred and sixty-five feet. When the water is drained off for cleaning purposes, the flow of the stream would be taken into the gate house at an elevation of fifteen feet below this point. From this lower elevation an eight inch pipe could not deliver nine hundred gallons per minute to the pump house, and neither could it do so if the reservoir were full, but a ten inch pipe would be ample in size.

The advantage of a ten inch supply main still further appears when it is made clear that the loss of head through it in delivering the average daily consumption to the Institution of three hundred thousand gallons would be but six feet, while if an eight inch pipe it would be at least twenty feet. In other words the high water mark in the proposed distributing reservoir to be erected on the hillside back of the Institution cannot be placed higher than elevation seven hundred and forty-four if the ten inch pipe be used, while it would be fourteen feet lower if the eight inch pipe were used. The difference in cost of about five thousand dollars would seem to be wholly in favor of the ten inch line.

Elevation seven hundred and forty-four is eighty-four feet only above the highest roof at the Institution. The present tank is one hundred and twenty feet above such roof. It is desirable that the reservoir should be as high as possible and permit water to reach it by gravity from the dam. While elevation seven hundred and forty-four will give a good domestic pressure, in case of fire, pumping engines must be relied upon for service.

In view of the foregoing consideration, approval is given to the general plan under the conditions that the directors prepare their detail plans along the lines herein suggested and submit the same to the Department of Health for final approval. Also that ample provision should be made at the dam for the complete drainage of the reservoir, and adequate drainage facilities along the line of the gravity main and of the entire water works system shall be provided. The possibility of an ultimate filtration plant on the hill in the rear of the Institution shall be taken into account in laying out the distributing reservoir.

The directors should anticipate the construction of a sewage purification plant at no distant date and prepare plans therefor, and submit the same to the Department of Health for approval at as early a date as convenient.

Harrisburg, Pa., February 27th, 1908.

RICHLAND TOWNSHIP, CLARION COUNTY.

Foxburg Water Works Company.

This application was made by the Foxburg Water Works Company, Richland Township, Clarion County, and is for permission to install an additional source of supply to the public in its charter district.

Foxburg village is located in the western part of Clarion County in the southwestern part of Richland Township, and is on the eastern bank of the Allegheny River, just above the mouth of the Clarion River. There are no industries and but a few citizens. The population to-day is not as great as it was twenty years ago. In nineteen hundred it was six hundred and forty. The land in the village is all owned by the Fox Estate and the dwellings have been erected on lots leased of the Fox Estate. The region round about is productive of oil and the people who live in the village are principally dependent upon the oil industry. The branch of the Baltimore and Ohio Railroad which extends from Kane to Pittsburg, passes over the Allegheny at this point. The Pennsylvania Railroad extends along the river bank in the borough. The particular reason why individuals have been willing to erect houses on leased land in preference to taking up residence at other places in the oil region is because the Fox Estate has been willing, at its own cost and expense, to make public improvements, which has somewhat lessened the cost of living in the village. For instance the sewers have been provided by said estate and the water works system was established and is being maintained by said estate without profit.

The ground ascends rapidly from the river to the crest of the mountain, distant a quarter of a mile and elevated several hundred feet and the village is located on the hillside and on the narrow flats at the foot of the slope. On the other side of the mountain crest the land descends as rapidly to the Clarion River. The highways follow generally the contour.

The Foxburg Water Works Company was incorporated and the plant installed in eighteen hundred and seventy-seven and it has furnished water to the inhabitants of the village, drawing the supply from the Allegheny River until recently. Above the railroad bridge across the river there is an intake crib in the bed of the stream near the east bank, covered over with sand and gravel to a depth of about four feet. The river water was drawn through this filter and raised by two steam pumps to two wooden tanks located on the hill two hundred and eleven feet above the river, each tank holding about fifty thousand gallons. From the tanks the water was conveyed by four inch and three inch branches laid in the streets of the village to the various points for consumption and for fire protection.

The wooden tanks were found to be in such a state of decay and the river water, being contaminated by the sewage of places above on the Allegheny River, being considered dangerous, the owners of the water works determined it to be in the interests of public health to entirely abandon the river source and to seek a new supply of drinking water and this was done.

On the day of the Department's inspection in October, nineteen hundred and seven, the old water works plant was being maintained for fire protection only. A new water works system and new source of supply was found to be in use. The approval of this new plant is the subject of the application herein considered.

On the crest of the mountain immediately back of the village four six inch wells have been sunk to a depth of one hundred and fifty feet. There is a level tract of ground which may be considered the surface watershed in which the wells are located. Possibly it comprises one hundred acres, all owned by the Fox Estate and unoccupied. The geological structure encountered in drilling the wells was sand rock and shale. The water is obtained from the sand rock at a depth of about one hundred and forty feet below the mountain crest and at a height of about one hundred and forty feet above the river. A very satisfactory quality of water is yielded from this strata.

Each well is cased off in the customary manner and the water is raised therefrom by a natural gas engine. The pumping arrangement is similar to the ordinary method employed at oil wells. Each well is tubed and near the bottom is placed a working barrel from which rods extend to the surface and there connected with horizontal "sucker" rods extending to the power house located in the middle of the space on the circumference of which are the wells. In this way one engine is adapted to the working of lifting the water from each well.

The water is delivered into an open concrete and masonry storage reservoir built near the wells. This structure is retangular, one hundred and five feet long and seventy-three feet wide on top, with sloping sides, with a depth of fourteen feet. Its capacity is about three hundred and ninety thousand gallons. The reservoir is provided with an overflow pipe and a drainage pipe. The top of the wall extends several feet above the surrounding ground and iron posts imbedded therein support a wire screen fence.

The water is conducted from the reservoir to the village in a four inch cast iron pipe and the lateral mains have diameters ranging from two inches to four inches. Blow-offs are located at dead-ends.

It has been ascertained that each well can deliver twenty thousand gallons of water per twenty-four hours or a total daily capacity of eight thousand gallons. There are a very few domestic wells or springs in the village. There are at least five hundred water consumers and the maximum consumption is forty thousand gallons. It would appear, therefore, that the company has secured an ample and pure supply of drinking water.

The fire service water mains are entirely separate from the domestic water lines. There are the old pipes used formerly in connection with the river supply. It is the purpose of the petitioners to continue the maintenance of the old pumping station for the fire service. By means of a valve the two systems may be connected and hence in case of accident or emergency the reservoir water may used for fire protection or the river water may be used for domestic consumption. The systems are interchangeable. However, the water works are not conducted by the Fox Estate as an investment for profit and the likelihood of the river water being introduced into the drinking water pipes is extremely remote. Nevertheless, Foxburg is one of the places along the Allegheny River where public health is menaced by the discharge into the river of sewage from municipalities higher up on the watershed.

Should there be any material increase in the village population, requiring the obtaining of a large supply of water, it is probable that the Allegheny River might be the ultimate source and this is one of the many reasons why the purity of upland waters should be preserved as a public asset.

It has been determined that the proposed water works system and source of supply is not prejudicial to the public health and the same is herein and hereby approved and a permit granted therefor under the following conditions and stipulations:

FIRST: That at the end of each season a plan of water pipes laid during the year shall be prepared and filed in the office of the State Department of Health, together with any other information in connection with the water works that may be required, in order that the Commissioner of Health may at all times be fully advised of the extent of the water works system and the number of people who are supplied with such water.

SECOND: If at any time in the opinion of the Commissioner of Health the source of supply or the water works or any part thereof shall have become prejudicial to the public health then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

THIRD: Allegheny River water shall not be introduced through the fire protection pumping plant and street mains or by any other means into the domestic water works sytem except under some great emergency and not then unless the water consumers shall have been fully forewarned. And the water company shall immediately notify the Commissioner of Health of such introduction of river water into the water works system.

Harrisburg, Pa., May 4th, 1908.

RIDGWAY, ELK COUNTY.

This application was made by the borough of Ridgway, Elk County, and is for approval of plans for an additional source of supply of water to the public and for the purification of said supply and extension of water works in the town.

It appears that on September fifth, nineteen hundred and seven, the Commissioner of Health issued a permit to the borough of Ridgway, Elk County, Pennsylvania, to extend its water works and to obtain an additional source of supply from Big Mill Creek, under certain conditions and stipulations, among which were the following:

"First. That the intake dam shall be located where it may be advantageously and economically enlarged to a storage dam and equipped to meet future borough demands; and a topographical plan of the basin thus to be formed, and details of the present intake dam, together with the pumping station, well, piping valves and engine layout, shall be prepared and submitted to the Commissioner of Health for approval before construction of this work be undertaken.

"Second. Detail plans of the new storage reservoir on the hill and of the filter plant shall be submitted to the Commissioner of Health, and these structures shall not be built until the plans thereof have been approved by the Commissioner of Health. Particular attention must be paid to the design of the filter plant. It must be operated whenever the pumps are operated and obtain a high degree of efficiency. The borough should employ some qualified expert to select the best point for the erection of the filter plant and to design the details. This will prove true economy."

On October fifteenth, nineteen hundred and seven the borough closed negotiations with a filter company for the erection of a water purifying plant and submitted plans, the details of which were subsequently changed. On October twenty-fourth plans for the dam were submitted and these were subsequently changed. On December seventh, nineteen hundred and seven, plans of the force main and the final filter layout were submitted and on May twenty-eight, nineteen hundred and eight, a formal application for approval of these plans was handed in.

Reference may be had to the permit of September fifth, Nineteen hundred and seven, for a full description of local conditions and the existing water works of the borough.

Big Mill Creek is a mountain stream rising in Jones Township and flowing directly south, a distance of about fourteen miles to the Clarion River, which it enters about two miles below Ridgway. The watershed lies to the west of the borough and it is narrow and long and deep with percipitous sides. The bed of the stream is stony and rather porous and the territory is unoccupied except by a lumbering camp and two farm houses.

In approving this source the Commissioner of Health required that a patrol should be established, that proper sanitary facilities should be maintained at camps and lumber operations, and further, as follows:

"The borough shall immediately disconnect the distributing system with the existing wells at the pumping station and at the Eagle Valley works and at the Dynamo Company's works, and anywhere else, if there be any such connections, and thereafter, upon the introduction of the new supply into town, this and the Gallagher Run supply shall be the only sources used in the public system, and the latter shall be discontinued as soon as practicable."

Gallagher Run rises in the hills southeast of the borough and flows down a steep channel through the borough. Its watershed above the intake dam (a small dilapidated affair) is a little over one mile in area, occupied by two farm houses and yields water enough in wet weather for the town's purposes, but the run goes dry in summer. On the hill is a concrete storage reservoir, circular in form, seventy feet in diameter, twelve feet deep to flow line and is elevated about two hundred and fifty feet above the lower land in the village near the river. This structure was built in nineteen hundred and two at the time the pumping station and drilled

well supply was introduced. The typhoid fever epidemic of nineteen hundred and seven brought about the adoption of the new source and now the borough is prepared to abandon all old sources of supply.

The site of the proposed intake dam and pump house is opposite Ridgway and distant about two miles therefrom. The area of the watershed near where the pipe line of the Ridgway Light and Heat Company crosses the creek and near where the dam is to be erected is thirty square miles and the flow therefrom is about one and a half million gallons per twenty-four hours.

Two hundred feet up stream from the gas pipe line is being erected a substantial masonry spillway dam eight feet high and seventy-six feet along between wing walls and the creek banks, beyond which on either side is being constructed earth embankments with core wall. The dykes being carried up five feet above the crest of the spillway. It is the intention at this time to confine the pool within the banks of the creek. Said banks are ten feet high. The slope of the creek bed is about fourteen feet per mile, so that the dam will back water over half a mile and the pool will be confined wholly within the channel. In the future, if large storage should be wanted, no better site for a dam in the valley is afforded than at the point where the present structure is located. A dam fifty feet high would be about four hundred feet long from hill to hill. Because the structure now planned is not for storage but for intake purposes only, the petitioner asks to be relieved from preparing and filing plans for a reservoir on the creek. This is to be done later should storage ever be required.

On the east end and built into the dam at the wing wall is an intake chamber about five feet square, having a port three by four feet provided with a screen. Instead of a valve there is a stop plank arrangement in front of the screens in the chamber. A sixteen inch cast iron pipe extends from said chamber along the east bank of the creek down stream for a distance of about two hundred feet to the pump house.

Through the bottom of the dam just outside of the intake chamber is a drainage outlet three feet square. It is provided with a plank sluice gate.

The pump house is a concrete building seventy-five feet long and thirty feet wide and its floor is two feet higher than the crest of the dam. Here have been set up the two old pumping engines, gas driven direct connected, each three hundred and seventy-five thousand gallons capacity per twenty-four hours. There is also room for two other engines, one of which is now being installed. It is a Rumsey horizontal tri-plex pump, belt driven, having a capacity of eight hundred and twenty-five gallons per minute against a head of one hundred and fifty pounds. The engine house is a projection thirty by thirty-eight feet of concrete construction, affording accommodations for two gas engines, one only being provided at the present time. Its rated capacity is one hundred and twenty-five horse power. The gas is to be obtained from the adjacent pipe line above mentioned. The power is to be transmitted by belt to shafting in the pump house.

The sixteen inch supply main is connected up to the three pumping engines above described. There will always be at least two feet head of water in it at the pumps. However, it slopes towards the intake chamber and may be drained into the same whenever the chamber is emptied. A large drain opening is provided at the bottom of the intake for this purpose.

The force main is twelve inches in diameter. It has been laid over the hill to the town in a right of way purchased in fee by the borough. The summit is two hundred and twenty-nine feet above the pump house floor and two hundred and seventy-five feet above Main Street in the town. Air valves and blow-offs are provided at proper points along the line. The site for the distributing reservoir on the hill base been selected but not purchased because the borough is without sufficient funds. Later, details of a distributing reservoir will be prepared and submitted for approval as ordered by the Commissioner of Health. Mill Creek water is to be furnished to the town direct. The surplus pumpage will overflow into the present Gallagher Run distributing reservoir.

The plans for the water purification plant call for feed and wash pumps, chemical and subsidence tanks, mechanical feed and wash pumps, chemical sand filters, filtered water basin with accessories capable of adequately purifying Mill Creek water at the rate of one million gallons per twenty-four hours. Outside and in the corner adjacent to the pump and engine house has been built into the ground below the foundation of said pump and engine house are re-inforced concrete water tight structures fifty-eight feet long and twenty-one feet wide interior dimensions, carried up eight feet above the surface of the ground and backed by earth slopes on two sides and one end. In the corner abutting the pump and engine house the concrete walls support a superstructure whose roof is contiguous with that of the adjacent buildings. Elsewhere the walls support a flat concrete roof, level with top of earth embankments.

The inner half of the structure next to the buildings comprise the filtered water basin. The outer half is designed for subsidence purposes.

The centrifugal feed pump and the centrifugal wash water pump are located in the pump house in the corner near the filter plant. The former has a capacity of one million gallons daily and the latter two thousand gallons per minute. Both are so arranged as to be available for feeding raw water to the subsidence tank or washing the filters either with filtered water or with raw water.

The coagulent feed apparatus is to consist of two solution tanks, each four feet in diameter and four feet high. Two variable stroke coagulent solution pumps to be actuated by the high service pump so that each revolution will cause a stroke or displacement of the coagulent feed pump are to be provided. The application of the coagulent to the raw water is to be into the eight inch feed pipe beyond the centrifugal feed pump between it and the subsidence basin. The amount of solution applied will be in direct proportion to the amount of water being drawn from the filtered water basin. It is intended to use sulphate of alumina as a coagulent. Should the raw or applied water be low in alkalinity, one solution tank and pump may be used for applying lime water or soda solution, while the other solution tank and pump supplies the coagulent.

The sedimentation basin is twenty-eight feet long by twenty-one feet wide and will contain water to a depth of sixteen and one-half feet, giving a storage capacity, deducting partition walls, of sixty-nine thousand gallons, equivalent at the nominal rate of the entire plan to about one and a half hours' sedimentation, which should be ample for Mill Creek water. This stream does not become very turbid and the suspended matter during freshet periods is coarse and easily settled.

The raw water is to be delivered through an eighteen inch pipe into the stilling chamber of the subsidence basin, this chamber being about two and a half feet wide and ten feet long in the clear, the inner wall being perforated with one and three-quarter inch holes, twelve inches on centres, arranged in parallel rows eighteen inches apart. In the bottom of this wall there is provided an equalizing valve The end of the delivery pipe within the stilling chamber is to be provided with a butterfly valve actuated by a proper float, for controlling delivery of water into the basin and to prevent its overflow. An overflow pipe and also drain connection will lead to the main ten inch drain which extends to the creek opposite the station. The drain will receive all waste water from the plant but no sewage. A cement vault with privy superstructure is provided outside of the buildings in the yard. Water will enter the main basin through the perforated stilling wall, travel full length of basin, pass round end of centrally located baffle wall and finally over the weir of skimming wall whence it will be conveyed by a six inch gravity to the filter unit.

There are to be two rectangular concrete gravity filters each eighteen feet long and ten feet wide, built side by side over the filtered water basin below. One-half of their length will be enclosed in the filter house where the sand surface will be open to view. The pipe gallery and operating floor above in front of the filters will be in the filter house, all resting on substantial concrete construction, forming the roof of the filtered water basin.

Across the floor of each filter a heavy cast-iron main collector, made in sections, elliptical inform and having flanged and faced joints is to be laid. This collector will have an area equal to twenty-eight square inches. It will have bosses on either side and the bosses will be tapped six inches apart to receive lateral or strainer pipes, which will be one and a quarter inches in diameter. These small pipes will be tapped six inches centre to centre to receive the level of the strainers and so cover all the pipes with a layer of concrete. There will be about seven hundred strainers in each filter and they will be distributed as nearly as possible on six inch centres. The aggregate strainer area will be less than the cross section of the main collector, so that the washing effect will be uniform and regular. A tested effluent controller will be placed at the outlet of each filter so that the rate of filtration can be controlled between four and six hundred thousand gallons per day, and these controllers will have valves so that the rate can be controlled within two per cent. of any desired amount. Each filter will be provided with good loss of head gauges. The filter piping will consist of settled water inlet pipes, wash water inlet pipes, wash water outlet pipes, filtered water to the filtered water basin pipes, and filtered water to waste pipes. These pipes will vary from six inches to ten inches and will be adequate for the purpose. Equalizing or balance valves will be placed on the stilling wall and weir wall of the coagulating basin, so that the water level in the filters and the subsidence basin will be kept reasonably constant.

Over the strainer system of each filter is to be sprayed an eight inch layer of screened gravel and upon it thirty inches in thickness of selected filtering sand. Each filter unit is to be equipped with a heavy sheet iron wash trough set eighteen inches above the top of the sand to admit of the washing of the filter at a rate of about ten gallons per square foot per minute.

Filtered water basin beneath the filters is to be twenty-eight feet in length and twenty-one feet in width and with a depth of seven feet of water the capacity will be thirty thousand gallons.

Each filter contains one hundred and eighty square feet of effective filtering area and as each is guaranteed to deliver five hundred thousand gallons per twenty-four hours, the rate of filtration will be less than one hundred and twenty-five million gallons per acre per diem. When delivering water at the five hundred gallon rate, if the filter companies guarantee shall be obtained, the water will be bright and clear and when the number of bacteria in the raw or unfiltered water is three thousand or more per cubic centimeter, the bacterial reduction is to be not less than ninety-seven per cent. as determined by an examination of not less than thirty samples collected within a period of not less than fifteen days; and when

the number of water bacteria in the raw water is less than three thousand, the filtered water shall not contain more than an average of one hundred bacteria. This guarantee is subject to the conditions that the filter plant be operated in accordance with the instruction of the filter company.

A sixteen inch suction pipe is inserted into the clear water basin to within eighteen inches of the bottom by means of which the water is to be supplied to the town. The consumption is now about five hundred thousand gallons daily, so there is over an hour's storage in the filtered water basin.

The emergency intakes at the industrial works now connected with the town pipe system have been placed under seal, the type of seal being that in ordinary use on freight cars.

The purification works as herein described and the entire layout is of good design, economically arranged and should afford to Ridgway borough a valuable asset. The dam and different parts of the works have been under construction for several months and it is expected that filtered water may be delivered to the town within a few weeks. Details of the original plans have been altered to increase the efficiency and the economy of the plant, all of which reflect credit upon the prudence and ability of the local authorities.

It has been determined that the interests of the public health will be subserved by approving the plans and issuing a permit therefor and a permit is hereby and herein granted under the following conditions and stipulations:

FIRST: That a plan of the water pipe system in the borough showing the sizes and location of pipes, location of gates, blow-offs and drainage facilities shall be prepared forthwith and filed in the office of the Commissioner of Health. And thereafter, at the close of each season's work a plan of the water pipes laid during the year shall be prepared and filed in the office of the State Department of Health, together with any other information in connection therewith that the Commissioner of Health may require.

SECOND: Weekly reports of the operation of the water works system, particularly the purification plant, shall be kept on blank forms satisfactory to the State Department of Health, copies thereof shall be filed in said Department. The borough shall assist the Commissioner of Health in making such tests of the plant from time to time as may be found desirable. If necessary, the Commissoner of Health may prescribe standards of efficiency and make regulations for the operation and maintenance of the plant. If at any time, in his opinion, the water works system, or any part thereof, or the water furnished thereby has become defective or insufficient or prejudicial to the public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may advise or approve.

THIRD. The borough shall filter all of the water supplied to the town. Only in some great emergency shall raw creek or river water be introduced into the system At such time the public shall be amply warned to boil the water and as soon as practicable the water pipe system shall be drained and thoroughly flushed.

Harrisburg, Pa., June 18, 1908.

RIVERTON, CUMBERLAND COUNTY.

This application was made by the Riverton Consolidated Water Company of Riverton Village, Lower Allen Township, Cumberland County, Pennsylvania, and is for permission to obtain a temporary supply of filtered water from the city of Harrisburg.

It appears that in pursuance of the terms of a permit and decree bearing date of August eighteenth, nineteen hundred and eight, and issued to said water company by the Commissioner of Health, the water company is now engaged in the preparation of plans for the construction of its own water purification plant, which plans will be submitted to the Commissioner of Health for approval. The works, however, cannot be constructed and put in operation at an earlier date than the summer of nineteen hundred and nine. Meantime, the public must continue to be furnished with the Susquehanna River water, the safeguard to public health in such use being the boiling of the water. As evidence of good faith and to meet the public demand in its charter territory the Riverton Consolidated Water Company now seeks to supply the people with filtered water at once.

The city councils of Harrisburg have enacted an ordinance which has been approved by the Mayor, providing for the sale within the city limits to the Riverton Consolidated Water Company of filtered water, the water so purchased to be used for a public supply in the chartered territory of the water company for an indefinite term but with the understanding that the expiration of the term will be at the date when the water company shall have installed its own water purification plant in pursuance of the said decree of the Commissioner of Health of August eighteenth, nineteen hundred and eight.

A permit is hereby and herein granted to the Riverton Consolidated Water Company to obtain its source of supply from the city of Harrisburg as proposed, pending the carrying out of the stipulation in the decree of August eighteenth, nineteen hundred and eight.

Harrisburg, Pa., October 15th, 1908.

ROULETTE, ROULETTE TOWNSHIP, POTTER COUNTY.

Roulette Water Company.

This application was made by the Roulette Water Company, Roulette, Roulette Township, Potter County, and is for permission to obtain an additional source of supply.

It appears that the village of Roulette, a manufacturing and farming community of about eight hundred inhabitants, is situated in Roulette Township, in the western part of Potter County and along the Allegheny River ten miles below and west of Coudersport, the county seat of Potter County. The Coudersport and Port Allegheny Railroad passes through Roulette to its junction with the Buffalo Division of the Pennsylvania Railroad at Port Allegheny, seven miles west of Roulette.

The inhabitants of Roulette are dependent for employment upon a small chemical works and stave factory and to a certain extent to farming and lumbering in the vicinity. The latter industry is becoming rapidly less important as a large part of the timber in the locality is exhausted. Although the village is in the gas fields, this industry furnishes employment to but few of the inhabitants. A glass works, at one time the mainstay of the community, was burned down during the current year and it has not resumed and, it is reported, will not resume operations. As a result the population of the town has been diminished from twelve hundred in nineteen hundred and seven to eight hundred.

The Allegheny River pursues a westerly course through the village and divides it into a north and south section. The principal or business section is to the north.

Fishing Creek has its source in the mountains, six miles northeast of Roulette, and follows a southwesterly course to its junction with the Allegheny River in the western end of the village.

Lanegar or Lanning Creek, a small mountain stream, has its source about three miles south of Roulette and flows northerly to its junction with the river in the eastern end of the village.

A public sewerage system does not exist in Roulette. Three residences and one hotel are accommodated by three private sewers, two in the southern section of the town and one in the northern section. These sewers discharge into the river. There are fifteen cesspools and two hundred and twenty-one earth privy vaults in the village.

The Roulette Water Company supplies one factory and one hundred and three of the two hundred and forty houses in the town, the remaining inhabitants obtain their supply of water from dug wells and a few drilled wells and springs.

The Roulette Water Company was chartered February third, nineteen hundred and four, for the purpose of supplying water to the public in the township of Roulette, Potter County.

In nineteen hundred and four, the water company laid about two miles of two inch and three inch cast-iron and wrought iron distributing pipes in the village and about a mile of four inch cast-iron gravity main, extending southward from the town in and near Lanegar Creek Road to a point where the pipe line branches, a short branch extending to each of the two reservoirs. These reservoirs were constructed by the water in nineteen hundred and four and are located in Roulette Township about five hundred feet from Lanegar Creek, one on the western and one on the eastern slope.

Reservoir Number One on the western slope was excavated in the side hill and has a masonry breast forty-five feet long on the one side. A spring in the bank at the upper side of the reservoir is its only source of supply. On October eighth, nineteen hundred and eight, this spring was dried up and the reservoir was empty, due to the general drought and to the drilling of numerous gas wells on the summit, one-quarter of a mile to the west. A gutter was dug around the upper side of the reservoir to keep out surface drainage. The reservoir has a capacity of twenty thousand gallons and at elevation of about one hundred and ten feet above the village and when it is full the water has a surface area of one thousand square feet and a depth of five feet at the breast. There is a valve on the supply pipe at the reservoir so that the water may be shut off and there is a separate pipe by means of which the reservoir may be drained. There is no fence around the reservoir and it is not otherwise protected and is only about fifty feet from the public road.

Reservoir Number Two on the eastern slope immediately opposite Reservoir Number One was excavated in the hillside and has a masonry front and ends. It is fed by a small spring in the bank at its upper side. This reservoir has a capacity of two hundred thousand gallons and an elevation of about one hundred and ten feet above the village and when it is full the water has a surface area of four thousand feet and an average depth of seven feet. There is a shut-off valve in the supply main at the reservoir and there is a separate pipe by means of which the basin may be drained. The reservoir is entirely enclosed by a wire fence and a ditch has been dug around its upper side to keep out surface drainage. The slope above this basin is uninhabited second growth timber land.

A well was drilled and a pump installed in the eastern end of Roulette, north of the Allegheny River about one hundred and fifty feet from the water's edge and immediately west of the highway bridge across the stream and water from the well

was pumped into the distributing system at this point. This was one of the principal sources of supply from the beginning of the operation of the water works, but the arrangement was found unsatisfactory and was abandoned in nineteen hundred and seven, and the pumping machinery has been removed.

In nineteen hundred and seven the water company, having abandoned the well, and without having made application to the Department of Health, constructed an intake dam on Lonegar Creek at a point directly between the two reservoirs. A wooden breast about twenty feet long forms a basin with a capacity of five thousand gallons. A three inch cast-iron pipe, in which there is a shut-off valve, leads from the dam to the gravity main from the two springs. The dam is at an elevation little lower than the springs, about one hundred feet above the village.

The watershed of Lonegar Creek above the intake has an area of two and a half square miles, and is for the most part heavily wooded with second-growth timber; but contains some farmland. Immediately above the dam and along the public road are a school house and four dwellings and the accompanying outbuildings, all built close to the creek, which receives surface drainage from the barn yards, pig pens, privies and dwellings. There are approximately thirty persons living in the watershed, exclusive of the school children, a large number of whom come from the village of Roulette.

The one hundred and three houses supplied by the water company are scattered throughout the village, which covers about one square mile. There are numerous dead ends throughout the distributing system, but it is reported that all these and also all low points are provided with blow-offs. The consumers number about six hundred and the average consumption is reported to be thirty thousand gallons per day. Of this amount one thousand gallons are used for manufacturing purposes. The chemical works in the southeastern corner of the village has a private drilled well and pump.

The application of the water company states:

"That the Roulette Water Company is not intending to extend its service nor to use additional source of supply, but merely to take water from the stream now in use at a point higher in its course. As your Department has already been informed, the springs which have furnished the Company's supply have been so impaired by the drilling of gas wells in the vicinity that in dry times their flow is not sufficient. The Company has operated a pumping plant drawing water from a deep well. Whenever this pump is out of order it has been necessary to use water from Lanegar Creek. Complaint has been made to your Department in this regard. To place its plant above any criticism the company desires to lay four hundred and twenty rods of line up Lanegar Creek to a point above all buildings where the stream comes from the forest and to take water from that point. And further sets forth there is no source of pollution above the point where the Company proposed to take water."

The Water Company purposes to construct an intake dam across Lanegar Creek in Roulette Township at a point about two and three-quarter miles south of the village, and about one and one-quarter miles above the present intake and above all habitations; the nearest dwelling is one thousand feet below. The principal sources of Lanegar Creek are three springs about three-quarters of a mile above the site of the proposed dam. The drainage area above this site is uninhabited and entirely covered with second growth timber and contains about one square mile of Roulette and Keating townships.

The depth of water at the masonry breast is to be about four feet six inches and a six inch drain pipe is to be provided in the bottom of the dam. This proposed intake site is about one hundred feet higher than Reservoir Number One. A three inch pipe draining from above the bottom of the dam is to carry water from the proposed intake to Reservoir Number One, whence the supply will be furnished through the existing pipe system.

Lanegar Creek is now the principal source of supply for Roulette and it is a dangerous source at the point of the existing intake. The spring in the bank of reservoir Number Two furnishes perhaps five per cent. of the town's consumption and the spring in the bank of Reservoir Number One at times dries up completely. Therefore the abandoning of the present intake in Lanegar Creek and the obtaining of an unpolluted source of supply is desirable in the interests of public health.

Apparently Lanegar Creek at the site of the proposed intake would furnish a satisfactory and uncontaminated supply of water sufficient in quantity to meet the demands of the consumption upon the system. The flow of the stream at this point on October eighth, nineteen hundred and eight, was estimated at seventy-five thousand gallons per day. Proper precautions should be taken to protect the proposed sources from chance contamination and the watershed should be occasionally patroled with the same object in view.

It would be well to arrange the piping so that the water from the proposed source may be allowed to flow into either of the existing reservoirs at the springs without interrupting the continuous flow of water to the village in order to make it possible to keep a supply in storage in case it should be desirable to temporarily discontinue furnishing water from any one of the sources. It would thus also be possible to provide several days of settling for the supply, if desirable. The present intake in Lanegar Creek should be abandoned and the piping connection removed. Reservoir Number One should be efficiently fenced to prevent chance or malicious pollution.

Conditions are such that an outbreak of typhoid fever in Roulette among the users of the public water supply might occur at any time.

It has been determined that the proposed additional supply will not be prejudicial to the public health under certain conditions, and a permit is hereby and herein issued therefor, under the following conditions and stipulations:

FIRST: The water company shall immediately and so long as water is furnished from the present intake in Lanegar Creek, notify and continue to notify its consumers by means of placards posted in conspicuous places, of the danger of using the public water supply for drinking and culinary purposes without the water being previously boiled.

SECOND: On or before April first, nineteen hundred and nine, the water company shall prepare and file in the office of the State Department of Health a plan of its distributing system, showing valves, blow-offs and sizes of pipe and plan and profile of the supply main of the town, showing all valves, blow-offs and connections and detail plans of the two reservoirs, showing all connections and drainage facilities. At the end of each season's work a plan shall be prepared and filed in the office of the State Department of Health showing the additions made to the distributing system of pipes in the streets during the year and such other information as may be required, in order that the Department may always be fully informed of the extent of the water works system and the public use thereof.

THIRD: If necessary to keep cattle away from the banks of the intake reservoir, a fence shall be constructed around it and ditches shall be built, if necessary, to prevent surface drainage from adjacent farm and pasture lands entering the reservoir, and adequate facilities shall be provided by means of which the proposed reservoir may be flushed out and cleaned, and adequate drainage facilities shall be provided at low points on the proposed pipe line, and a valve shall be provided in the supply pipe at the reservoir, so that the supply may be shut off from the town if desirable.

FOURTH: Before the proposed works are built, detail plans of the dam and of the reservoir to be formed above it and a plan and profile of the location of the supply pipe and plans showing the connection of the supply pipe to the existing system shall be submitted to the Commissioner of Health for approval. Before the proposed source of supply is used by the water company, a plan of the watershed above the proposed intake, showing wagon roads and streams and any possible source of pollution, shall be prepared and filed by the company in the office of the State Department of Health.

FIFTH: The water company shall maintain a monthly sanitary patrol of the watershed and reports thereof shall be filed with the State Department of Health. Should a lumber camp or any habitation be established on the watershed, the water company shall see that proper receptacles for sewage are provided at all such occupied camps or estates and that these receptacles shall be used and properly maintained to prevent any contamination whatsoever of surface waters on the watershed. Any neglect on the part of any owner or individual to comply with sanitary regulations shall be promptly reported by the water company to the Commissioner of Health.

SIXTH. The company shall keep monthly reports of the operation of its system on blank forms satisfactory to the Commissioner of Health and submit copies thereof for filing with the State Department of Health whenever this is required.

SEVENTH: If at any time in the opinion of the Commissioner of Health, the water supply or water works, or any part thereof, is found prejudicial to the public health, then the water company shall adopt such remedial measures as the Commissioner of Health may advise or approve.

EIGHTH: When the proposed extension has been made and water is being supplied thereby, the pipe connection from the present intake in Lanegar Creek to the supply main shall be taken out and thereafter no water shall be supplied to the public taken from Lanegar Creek below the site of the intake for which a permit is herein granted.

NINTH: On or before January first, nineteen hundred and nine, a substantial fence shall be constructed around the reservoir Number One to effectually prevent chance or malicious contamination of its waters.

Harrisburg, Pa., November 23rd, 1908.

ST. MARYS, ELK COUNTY.

St. Marys Water Company.

This application was made by the St. Marys Water Company of the borough of St. Marys, Elk County, and is for permission to secure an additional source of supply.

St. Marys is a manufacturing community of about sixty-four hundred population, located on Elk Creek in Benzinger Township, Elk County. Elk Creek is a tributary of the Clarion River which empties into the Allegheny River. The creek has its head waters in the hills in the township surrounding the borough, these hills being the summit of that part of the Allegheny Mountains which form the divide between the Susquehanna River and the Ohio River basins.

The town is located in the creek valley and it extends up on the hillside where many of the dwellings are located.

The St. Marys Water Company was chartered in eighteen hundred and eighty-nine and works were built in that year and the year following and the public in the borough has since been supplied with water for domestic and fire protection purposes. A number of the manufactories use the water.

There are two sources of supply besides the additional source which has been introduced and for which approval is asked.

One of the two supplies is Silver Creek. This stream rises in the township north of the borough and flows southerly, joining Elks Creek a short distance below and west of the borough.

The other source is obtained from Laurel Run. This stream rises in the hills five miles south of the borough in Fox Township, and flows northerly, emptying into Elk Creek a mile or more down stream below the mouth of Silver Creek.

The Silver Creek supply is drawn from an intake dam made of timber and earth and pumped through a six inch rising main to reservoirs elevated one hundred and thirty-five feet above the pumping station and one hundred and eighty-four feet above the borough in the valley. The dam is about ten feet high and stores approximately four million gallons. The watershed above this reservoir comprises about one hundred acres. There is one dwelling on this watershed and it is in the vicinity of the living springs which form the head waters of Silver Creek. On a little tributary brook has been erected a small dam and reservoir which is utilized to store some spring water and discharge it through an eight inch pipe into the reservoir at the pump house. There are three drilled wells at the pump house, each three hundred and fifty-five feet deep, being cased off with eight inch and six inch pipe to the rock which lies eighty feet below the surface. Water flows from these wells into a well at the pump house. The pumping machinery comprises two pumps each half a million gallons capacity per twenty-four hours, one being operated by a gas engine and the other by a steam engine.

The distributing reservoirs are located in the extreme northwestern corner of the borough on the hill and adjacent to St. Michael Street. They are both of the same size, thirty feet wide by eight feet long and eight feet deep, being practically excavations in the ground whose sides are held in place by two inch plank and timber work. Over all is an A roof, designed to afford protection from pollution. A six inch distributing main leads from the reservoirs down St. Michael Street to the town.

The water from the wells at the pump house is abundant, clear, colorless and appears to be of good quality.

The water from the various springs is also of excellent quality where it gushes forth from the ground, but the conditions existing on the Kerner farm, whereon the springs are located, are unsanitary. The two large springs back of his dwelling flow into a duck pond. Kitchen slops and wastes are thrown out from the house onto the ground within a few feet of the largest spring immediately back of the house. A hen house is immediately over another small spring. A pig pen and yard crosses the stream below the duck pond. The house privy vaults on the slope one hundred feet away, where surface drainage can reach the run. The large manure pile at the barn stands in a pool when it rains or it would do so if there were not a drain under the road which carries the water away to the run. These unsanitary conditions are represented by the water company to be the result of wilful intention of the owner of the property in order to compel the water company to purchase the farm at an exorbitant price. It is reported that the water company has offered to put the premises in a sanitary condition and maintain them, but that the owner has refused to enter into any negotiations with the company for the abatement of the menaces.

The source of the Laurel Run supply is an intake dam built of concrete which impounds about five million gallons and has a contributing area of three hundred and seventy-five acres, owned almost entirely by the water company. There are numerous springs of clear, cool and sparkling water which gush forth from the mountain side and furnish a never failing flow into the reservoir. The watershed is principally wooded and is reported to be uninhabited. The sides and bottom of the flooded area of the dam were stripped of all organic matter. A suction pipe leads from the reservoir to the pump house. There are two eight inch pipes, one leading to each pump. The pumping engines are driven by a gas engine and each is capable of raising from five hundred thousand to eight hundred thousand gallons in twenty-four hours. At the pump house there are three driven wells, having a depth of about three hundred feet and cased off to rock in the usual manner. They do not flow. Water has to be raised from them by the pumping engines.

There is a six inch rising main through which the Laurel Run water is forced to a reservoir known as Laurel Run Reservoir and located on the hill in the township immediately south of the borough. This structure is the same construction and size and has the same elevation above the borough as the two distributing reservoirs above described and located on St. Michael Street. A six inch gravity main delivers the water into the town.

During dry weather the above sources of supply are insufficient to supply enough water for all the demands. The maximum daily consumption is one and a half million gallons and it would be more if the company could supply the water.

The tanneries in the town use considerable water and so do the other industrial plants. Certain outlying districts in the town have not yet been furnished with public water and in these districts the springs and ground water now used by the people for drinking purposes are very liable any moment to become polluted by surface drainage. The borough is now undertaking the construction of a public sewer system to do away with these conditions, but even then the use of domestic well water anywhere in town is bound to be accompanied by danger to a greater or less degree. An active demand for extension of the street water pipes resulted in the water companies making additions to the source.

Wolf Lick Run rises in the mountains on the south side of the ridge from whose north slope flow the springs which are the headwaters of Laurel Run. The course of Wolf Lick Run is southeasterly into Spring Run which empties into the Sinnemahoning Creek, one of the main feeders of the West Branch of the Susquehanna River. On this run at a point above which the drainage area is twenty-five hundred acres, all of which are owned by the company with the exception of a forty-three acre tract on which resides the only inhabitant of the watershed, the company has constructed a new storage reservoir with a capacity of about ten million gallons. The dam is a substantial concrete structure about two hundred feet long and twenty feet high. All organic matter was stripped from the area flooded by this dam. A pump house and gas driven pumping engine of a million gallons capacity daily have been erected and water during the summer of nineteen hundred and seven was pumped through an eight inch force main to a new distributing reservoir of the same size and construction and elevation as the other distributing reservoir hereinbefore described. The Wolf Lick reservoir is on the hill immediately south of the borough in the general neighborhood of the Laurel Run distributing reservoir. A six inch connecting pipe has been laid between the two supplies at the reservoir.

At the farm house on the watershed which is near the source of one of the tributaries there is a duck pond immediately below the house and one side of the pond is a pig pen and yard. The barn yard and manure pile are nearby, the ground sloping quite rapidly from them towards the stream and pond, so that whenever it rains the wash is directly to the run. A spring gushes out a short distance to one side of the house and flows into the run below the duck pond. Immediately over the banks of the brook is a privy. The water company has failed in its attempt to negotiate with the owner of the property for the purchase of the land or for the abatement of the menaces.

The water company has a contract with the borough to supply all its inhabitants at all seasons of the year with an abundance of water. The additional source of supply is thought to be equivalent to eight hundred thousand gallons per day. The company asks approval of this and the original supplies and for permission to make extensions to the water works system in the town.

It is clearly apparent that the waters from the three mountainous watersheds, supplied as they are by springs and coming from practically uninhabited areas, should furnish to the inhabitants of St. Marys borough as desirable a quality of water as it is possible to obtain, provided the menaces at the two dwellings above mentioned be removed, and conditions be established and maintained whereby danger from these sources shall be eliminated. The State Department of Health can cause an abatement of the menaces and the water company can maintain a patrol and make sanitary inspections at frequent intervals and keep the Commissioner of Health informed of any improper disposition of sewage at the occupied property or of the existence of any unsanitary conditions. The law of nineteen hundred and five to preserve the purity of the waters of the State for the protection of the public health has for its object the prevention of just such pollutions as now exist on the Silver Creek and Wolf Lick Run watersheds.

The water company has failed to submit sufficient detail plans of its dams, pumping stations, force mains, reservoirs and distributing pipes to enable the State Department of Health to become thoroughly informed of the system and to direct the supply of water to the public in the case of the outbreak of an epidemic in the town. Such plans should be submitted.

It has been determined that the proposed additional source of supply will not be prejudicial to the interests of the public health and the same is hereby and herein approved and a permit granted therefor and for the extension of water pipes in the borough of St. Marys, under the following conditions and stipulations:

FIRST: That detail plans of all dams, reservoirs, pumping plants, force mains, distributing reservoir and pipes shall be prepared and filed in the office of the State Department of Health, together with accurate plans of the watersheds of the supplies. At the close of each season's work a plan of all extensions made to the street pipe system during the year shall be prepared and filed in said office, together with any other information in connection therewith that may be required, to the end that the Commissioner of Health may be always informed of the extent of the water works system and the number of people supplied with such water.

SECOND: Adequate facilities for the quick drainage of every part of the water works system shall be afforded, and these drainage points shall be adequately designated on the plans to be filed with the State Department of Health.

THIRD: The water company shall maintain adequate patrol of the watersheds to see that proper receptacles are provided and used and maintained on all occupied estates and that all reasonable precautions be taken to prevent any contamina- whatsoever of the waters to be supplied to the public. Monthly reports of all inspections shall be sent to the Commissioner of Health.

FOURTH: If at any time, in the opinion of the Commissioner of Health, the water supply or the water works, or any part thereof, has become prejudicial to the public health, then the water company shall adopt such remedial measures as the Commissioner of Health may approve or suggest. In this connection the Commissioner will cause a sanitary inspection of the occupied properties on the watershed and will forthwith issue orders for abatement of menaces. In this work and subsequent proceedings the water company shall assist the State Department of Health.

FIFTH: The Company shall keep a weekly report of the operations of the works on forms satisfactory to the Department of Health and submit copies thereof to the Commissioner of Health when required.

Harrisburg, Pa., May 4th, 1908.

SHEFFIELD TOWNSHIP, WARREN COUNTY.

Sheffield Water Company.

This application was made by the Sheffield Water Company, of Sheffield Township, Warren County, and is for permission to extend its water works for the supplying of water to the public in the village of Sheffield, said township.

In eighteen hundred and eighty-seven, a partnership by the name of Horton, Crary and Company, locally known as Deer Lick Water Company, constructed a small dam, impounding about one and a half million gallons of water on Deer Lick Run in Sheffield Township and piped the water to the village of Sheffield, situated at the confluence of Two Mile Run and Tionesta Creek, principally to supply water to the tanneries located there. Subsequently the tanneries passed to the Penn Tannery Company and finally to the Elk Tanning Company, but the water works system was retained by the original owners.

At joint expense the water company and the Penn Tanning Company from time to time made some improvements and operated and maintained the plant and to increase the supply drilled a well at the Sheffield Tannery and installed a pump there and made connections with the street pipe lines.

Some time after May first, nineteen hundred and five, on which date the Elk Tanning Company acquired the Penn Tanning Company's properties, it became apparent that the water works system had been reserved. The Sheffield Water Company, still an association unincorporated, made demands for water rates of the Elk Tanning Company. The latter concern refused to pay them rates on the ground that the water works plant was a joint property. The question was litigated, the trial court decided in favor of the water company and an appeal to the Supreme Court is now pending.

Meantime, in the fall of nineteen hundred and seven, the Elk Tanning Company, having made other provisions for water, entirely abandoned the use of the water company's supply, with the exception, however, of the well and pumps on the Elk Tanning Company's property at the Sheffield Tannery.

The village is an important lumbering centre for the district. It is located in a mountainous well timbered region in the southeastern corner of Warren County on the main line of the Pittsburgh and Erie Railroad, about thirteen miles east of Warren.

The railroad comes down the valley of Two Mile Run from the east and passes up the valley of Tionesta Creek westerly. At the forks of the streams is the Sheffield Tannery, a half mile up Two Mile Run is the Tionesta Tannery and about five hundred feet northwest of the confluence of the banks of the main stream is the Horton Tannery. Three-quarters of mile above this point is the Sheffield Saw Mill of the Central Pennsylvania Lumber Company, a corporation allied with the interests of the Elk Tanning Company, which latter concern owns and operates the tanneries. The saw mill is a new plant and will give employment to a large number of men. In between the works above mentioned the territory is well built up and comprises the village. The population is said to have doubled since nineteen hundred and at present is about two thousand. Conditions are prosperous and a moderate growth may be anticipated. The terminal of the Sheffield and Tionesta Railroad and the main offices and shops of the narrow gauge road called the Tionesta Valley Railroad are here.

The policy of the Elk Tanning and Lumber Company is to erect dwellings for its employes and to equip the dwellings with running water and modern plumbing facilities. It is reported that during the last year thirty-two such houses were constructed. The tanneries and these houses are now supplied with water taken from various sources, partly from springs on the hillside and from individual wells, and partly from the driven well at the Sheffield Tannery. This well water is salty and not desirable. Some water is taken from Two Mile Run at the Tionesta Tannery and supplied to the works and the houses in the vicinity belonging to the

Elk Tanning Company. It is in this manner that the said tanning company at present obtains the water used by it for manufacturing and domestic purposes. A plan has been prepared for a new water works system to adequately furnish a pure mountain water to the tanneries and the properties of the Elk Tanning Company and its allied interests. An application for a charter has been filed in the office of the Secretary of State and approval of the plan by the Commissioner of Health has been requested by the incorporators under the name of the Citizens Water Company of Sheffield.

On April seventeenth, nineteen hundred and six, the Sheffield Water Company was duly chartered under the laws of the State for the supply of water to the public at the village of Sheffield, Warren County.

The intake dam at Deer Lick Run is distant from the village about one and a half miles. Since the incorporation, the water company has rebuilt the dam, raised the surface of the water about five feet and removed all vegetable matter and soft mud from the bottom of the reservoir, excepting a small portion of the upper end thereof. As it now exists there is a log dam about fifteen feet high impounding about four and one-half million gallons of water area between one and five-tenths and two acres in extent, the elevation being sufficient to maintain a pressure of about seventy pounds in the village. Details of this structure and of the reservoir have not been filed in the Department's office. It is understood, however, that the supply main is eight inches in diameter and that on its line to the town there are opportunities for blow-off and drainage.

The area contributing to this reservoir is reported to be two and a half square miles of mountainous, well timbered land. The Central Pennsylvania Lumber Company owns most of this territory and lumbering operations of more or less extent may occur there. At the present time there is a small camp on the area and hardwood is being removed.

The population in the village now using the public supply is said to approximate sixty-five per cent. of the entire community. Demands for extension of the water works pipes made from time to time in the past by residents of the Northwestern section were denied on the ground of an insufficient supply. This was before the enlargement of the storage capacity of the reservoir and the discontinuance of the supply to the tanneries. During nineteen hundred and seven, or since the incorporation in nineteen hundred and six, extensions of street mains were made at various points in the town and it is understood that at the present time there are about four miles of street pipes whose diameters range from three to eight inches. The system seems to be well designed and the pressure under ordinary circumstances good. Dead ends are few and usually a fire hydrant is placed at such ends. There are about forty fire hydrants. The company is not under contract to maintain the hydrants. The insufficiency of the pressure and the supply during fires was one reason for the making of connections to the streams for use in an emergency at two of the tanneries. These connections, however, had been cut off prior to the stopping at the tanneries of the use of the water company's supply.

The petitioners purpose to make improvements from time to time in the village as necessity may require and to increase the source of supply, if need be, by adding to the storage in the reservoir and by intercepting the flow from certain copious springs there whose discharge is now into the run below the dam. Details of these extensions and additions have not been submitted because the improvements are not contemplated for the present.

The extensions made by the petitioners since Act one hundred and eighty-two of nineteen hundred and five became a law were made not with the intention of defying the provision of the law; but as soon as the water company became aware of the necessity of filing plans of existing water works and of receiving approval for extensions thereof, it prepared and submitted the plans and applications now before the Department.

It is represented that the shortage of water during the summer of nineteen hundred and seven was prior to the discontinuance by the tanneries of the use of the Sheffield Water Company's supply, and that had the tanneries not made a wasteful use of the supply there would have been an ample quantity of water on hand in the reservoir during the drought to have furnished the entire village with water without deficiency. The petitioners further represent that for some time in the future the system of water works as now operated will be ample for the supply of water for domestic uses in the village.

It was during the drought of nineteen hundred and seven that citizens of Sheffield made a formal protest to the Commissioner of Health relative to the shortage of water and asked that the water company be ordered to have recourse to the driven well supply as a temporary expedient. The Department has not determined the question of proprietorship in this well and the matter seems immaterial because the petitioners do not ask approval of this source of supply nor do they contemplate the use of it.

The danger of contamination of Deer Lick Run waters lies in possible pollution at camps or from lumbering operations. It should not be a difficult matter for the company to patrol the watershed sufficiently to keep informed of the sanitary condition at all buildings, camps and operations and to enable it in conjunction with the State Department of Health to enforce sanitary regulations to preserve the purity of the waters.

Provided the quality of the reservoir water should deteriorate because of lack of adequate removal of mud, soil and vegetable matter or other deleterious substances from the site of the reservoir, a remedy should be easily at hand.

In view of the above circumstances, it has been determined that the proposed extensions will not be prejudicial to the public health, and approval is hereby and herein given to the improvements made to the water works system subsequent to April twenty-second, nineteen hundred and five, all under the following conditions and stipulations:

FIRST: That the water company shall prepare a plan of its existing water works system in the village showing thereon the location of hydrants, gates, blow-offs and the sizes of the pipes The company shall also submit a similar plan and profile of the supply main to town, together with plans and elevations of the dam and reservoir. At the close of each season's work, a plan of the water pipes laid during the year shall be prepared and filed in the office of the Commissioner of Health, together with any other information in connection therewith which may be required.

SECOND: Before any additional source or extensions to the existing supply be made the water company shall prepare plans of the same and submit them to the Commissioner of Health for approval.

THIRD: The water company shall maintain a patrol of the watershed at all times to preserve the purity of the waters, more especially when any camp or lumber operation is located on the watershed. The patrolmen shall submit a regular report of the sanitary condition at the camps and lumber operations and any and all dwellings or buildings on the watershed, and the water company shall provide or see that proper sanitary or portable privies be provided and that these receptacles for sewage shall be used and properly maintained to prevent any contamination whatsoever of the surface waters supplied by the Sheffield Water Company to its customers.

FOURTH: If at any time in the opinion of the Commissioner of Health, the water supply of the water works or any part thereof has become prejudicial to the public health, then the water company shall adopt such remedial measures as the Commissioner of Health may approve or suggest.

FIFTH: The water company shall keep records of the operation of the system on blank forms satisfactory to the Department of Health and submit copies thereof whenever required to the Department of Health.

SIXTH: Regular inspections will be made of the system by a Department officer and the State Department of Health may suggest rules and regulations to govern the supply of water to the public in so far as the public health is concerned. The water company shall co-operate with the Department, furnish facilities for inspection and assist in the examination, if this be required.

Harrisburg, Pa., February 11th, 1908.

SHIREMANSTOWN, CUMBERLAND COUNTY.

Shiremanstown Water Company.

This application was made by the Shiremanstown Water Company of Shiremanstown borough, Cumberland county and is for permission to install a system of water works for the supply of water to the public in said borough and to obtain its source of supply from the Riverton Consolidated Water Company at the eastern borough line.

It appears that the Shiremanstown Water Company was chartered on August thirty-first, nineteen hundred and three, for the purpose of furnishing water to the public in the borough of Shiremanstown.

Shiremanstown borough is a small place territorally containing a resident population of about seven hundred, located on the line of the Cumberland Valley Railroad and also along the old turnpike between Harrisburg and Mechanicsburg, and distant about two and a half miles from Camp Hill and Lemoyne boroughs. The latter borough borders on the west bank of the Susquehanna river; intervening is the township of Lower Allen. The Riverton Consolidated Water Company has charter rights to supply water to the public in Camp Hill and Lemoyne and also in Lower Allen township.

Shiremanstown has been a borough since eighteen hundred and seventy-four. It is underlaid by a limestone formation. Dug wells, roof water cisterns and drilled wells furnish the source of domestic water supply at the present time to the inhabitants. Drilled wells are from sixty to two hundred feet deep so it is reported. There are a few of them only, the people paying for the privilege of drawing water from some neighboring well. Sewage is deposited into sink holes drilled into the limestone. Conditions are not altogether assuring. The people are desirous of having running water under pressure in their homes.

During nineteen hundred and seven, so it is reported, the borough council entered into a contract with the Shiremanstown Water Company for pure water to be furnished from the Mechanicsburg Gas and Water Company's plant, a corporation doing business in Mechanicsburg, located several miles to the west. However, it was found that there was no charter authority for the Mechanicsburg cor-

poration to supply water to the public in Shiremanstown, hence during the present season the borough council considered an amendment to the original ordinance whereby permission to the Shiremanstown Water Company to supply water to the borough of Shiremanstown from the Riverton Consolidated Water Company's plant was to be given.

On March nineteenth, nineteen hundred and eight the borough council requested the Commissioner of Health to inform the borough whether the Riverton Consolidated Water Company would supply water to Shiremanstown from the river or from the mountain supply.

The Shiremanstown Water Company has not submitted a plan of its proposed lines of water pipes. The Riverton Consolidated Water Company has filed a plan of a portion of the streets in Shiremanstown, showing size of pipes to be laid therein. According to this plan it appears that the main pipe is to be six inches in diameter and this pipe will be in the main street of the borough and branching off from it are to be lines of four inch pipe in the lateral streets.

The Riverton Consolidated Water Company has two sources of supply, one being from the Susquehanna river opposite the city of Harrisburg and the other from small streams located in the hills in Fairview township, York county, near New Cumberland borough. The former source is subject to sewage pollution. The water is supplied directly to Wormleysburg, Lemoyne and Camp Hill boroughs, and during the summer months, without doubt, a considerable portion, if not all of the water which would be furnished to the Shiremanstown Water Company, would come from the Susquehanna river.

The mountain supply is stored in two reservoirs, the larger of which is known as the Haldeman reservoir. The dam is a small one and it holds about one million gallons. The stream in the spring has a flow of about two hundred and fifty thousand gallons daily, but in the summer time it goes nearly dry.

The Boyer reservoir is not much more than an intake dam. It has a watershed of three-tenths of a square mile while the Haldeman reservoir watershed is slightly less in extent. On it there is only one residence but on the Boyer reservoir watershed there are four residences occupied. The water from the latter is subject to some pollution, especially from a highway and a farm house not owned by the water company. Cattle are pastured in a field abutting the stream. Some attempt has been made by the water company to waste the drainage from the highway and pasture lands and barnyard of the house adjacent thereto, but the improvement has not been perfected and the water in the reservoir is now subject to contamination. These menaces are all subject to correction and the water from both sheds should be preserved in its purity and to a limited extent would furnish a suitable and wholesome supply during all seasons of the year. These reservoirs were first built by the Mountain Water Company with the intention of supplying New Cumberland borough and by an agreement between that borough and the water company, the town has the first right to the reservoir waters. During rainy seasons any surplus may be delivered to the rest of the distributing system and supplied ultimately to Shiremanstown borough, if a connection were made to the system.

The Riverton Consolidated Water Company has asked permission to supply the Shiremanstown Water Company, but this has been withheld because evidence is lacking that said company is capable of furnishing Shiremanstown with an abundance of pure water at all times and under all conditions.

The river water is not suitable in its raw condition to be furnished to any place for domestic use. The Commissioner of Health has ordered the latter company to install a water purification plant.

Provided the Riverton Consolidated Water Company build approved water purification works of a capacity sufficient to furnish the public in its charter territory with water, then it would appear that the plan of the Shiremanstown Water Company to obtain its source of supply from the Riverton Consolidated Water Company would not be prejudicial to public health.

It has been determined that it would be prejudicial to public health to do otherwise than withhold a permit for the present, and the same is hereby and herein withheld to the Shiremanstown Water Company to obtain its supply of water from the Riverton Consolidated Water Company until such time as the Riverton Consolidated Water Company can produce suitable evidence that it can and will and is equipped to supply a pure and wholesome water to the public within its charter territory.

When the water filter plant shall have been constructed by the Riverton Consolidated Water Company under plans approved by the Commissioner of Health, then the Commissioner of Heath will favorably consider the petition of the Shiremanstown Water Company and issue a permit under reasonble conditions and stipulations for said company to obtain its source of supply from the Riverton Consolidated Water Company, provided, however, that if the latter company will submit evidence that it is equipped and will supply the Shiremanstown Water Company with some other suitable supply of pure water other than the filtered Susquehanna River water, then, in that event, the Commissioner of Health will favorably consider such proposition and issue a permit to the Shiremanstown Water Company under reasonable conditions and stipulations.

Harrisburg, Pa., August 18th, 1908.

SHIREMANSTOWN BOROUGH, CUMBERLAND COUNTY.

Shiremanstown Water Company.

This application was made by the Shiremanstown Water Company of Shiremanstown, Cumberland county, and is for permission to obtain a source of supply of filtered water from the Riverton Consolidated Water Company, said filtered supply to come primarily from the city of Harrisburg's water works system.

The Shiremanstown Water Company proposes to use the said filtered water to be supplied to it by the Riverton Consolidated Water Company until the latter can furnish some other pure and wholesome water satisfactory to the Commissioner of Health.

It appears that in a decree issued by the Commissioner of Health on August eighteenth, one thousand nine hundred and eight, the following stipulations were made:

"In view of the foregoing considerations, I have determined that it will be prejudicial to public health to do otherwise than to withhold a permit for the present and I do hereby and herein withhold a permit to the Shiremanstown Water Company to obtain its source of supply of water from the Riverton Consolidated Water Company until such time as the Riverton Consolidated Water Company can produce suitable evidence that it can and will and is equipped to supply a pure and wholesome water to the public within its charter territory."

"When the water filter plant shall have been constructed by the Riverton Consolidated Water Company under plans approved by the Commissioner of Health, then the Commissioner of Health will favorably consider the petition of the Shiremanstown Water Company and issue a permit under reasonable conditions and stipulations for said company to obtain its source of supply from the Riverton Consolidated Water Company, provided however, that if the latter company will submit evidence that it is equipped and will supply the Shiremanstown Water Company with some other suitable supply of pure water other than the filtered Susquehanna river water, then, in that event, the Commissioner of Health will favorably consider such proposition and issue a permit to the Shiremanstown Water Company under reasonable conditions and stipulations."

It further appears on examination by the Department, that the city councils of Harrisburg have in due form enacted an ordinance providing for the sale within the city limits of filtered water by the city to the Riverton Consolidated Water Company for distribution among the company's consumers in its charter territory. This ordinance has been approved by the Mayor.

The Riverton Consolidated Water Company is now engaged in the preparation of detail plans to be submitted to the Commissioner of Health for approval for the construction of its own water purification plant. But meantime, it is the wish of the water company to supply its consumers with pure water.

It has been determined that the proposed source of supply will not be prejudicial to public health, and a permit is hereby and herein issued to the Shiremanstown Water Company to install a system of water works and to obtain its source of supply from the Riverton Consolidated Water Company under the following conditions and stipulations:

FIRST. Detail plans of the water pipes, location of gates, hydrants and drainage facilities shall be filed in the office of the Commissioner of Health showing the system as built at the end of the first year's construction. And thereafter at the close of each season's work plans of the water pipes laid during the year shall be filed in said Commissioner's office, to the end that the State Department of Health shall be always informed of the extent of the water works system and the public use thereof.

SECOND. If at any time, in the opinion of the Commissioner of Health, the source of supply is prejudicial to the public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

THIRD. It is expressly stipulated that this permit shall not authorize the use as a source of supply by the Shiremanstown Water Company of any other than the filtered water to be primarily obtained from the city of Harrisburg by the Riverton Consolidated Water Company until the latter company shall have installed its own water purification plant and until it is in a position to furnish a filtered water supply of its own satisfactory to and approved by the Commissioner of Health and the Shiremanstown Water Company shall enter into a contract with the Riverton Consolidated Water Company under terms whereby the latter shall agree to furnish water to the former of a quality satisfactory to the Commissioner of Health.

Harrisburg, Pa., October 15, 1908.

DIRECTORS OF THE POOR, SOMERSET COUNTY.

This application was made by the Directors of the Poor and of the House of Employment of Somerset county, Pennsylvania and is for the approval of plans for an additional source of supply and a permit is issued therefore under the following conditions and stipulations:

It appears that the county home is located on a tract of three hundred and forty-seven acres situate due east of Somerset borough on the Somerset turnpike about two miles from the county seat. The tract is at the summit of the watershed of Coxe Creek, a tributary of the Casselman river.

The main buildings comprise the Administration Hall and Home, the Asylum, the power house and accompanying farm buildings. The first named structure is within one hundred feet of the turnpike and the power house and asylum are grouped about it. The inmates and employees total one hundred and seventy-five.

At the present time the water supply to the three buildings is obtained from two principal sources. One is from a spring on the hill to the east and distant twenty-two hundred and thirty-six feet from the power house. This spring is known as spring number one. The water is collected in a masonry reservoir roofed over and protected from surface wash. This structure is about thirty feet square in plan. The water gushes out from the spring in one corner of the reservoir. The walls are roofed over. The land back from the spring house continues to rise to the summit of the hill. The slope is partly cultivated and partly used for pasturage and at the summit there are woods. The supply is reported to have been satisfactory in quality. A four inch pipe line conveys the water from the reservoir to the power house and to tanks in the upper stories of all three buildings.

The second main supply is located immediately north and about one thousand feet distant from the power house. Spring number two, as it is called, flows out from a porous formation, said to be sandy, about which spring masonry walls have been erected and covered over with stone flagging. In plan these walls form a well about nine feet wide and twelve feet long. They are carried up above the surface of the ground. To the north side there is an opening in the side wall to admit of inspection of the spring water. Two hundred feet to the south is spring number three. It is fourteen feet higher than spring number two. It has been walled up and enclosed and the water is piped to the well at Spring number two. Into this well is inserted the suction pipe of a gas pumping engine, said to have a capacity of twenty-five gallons per minute. This engine raises the water to a three inch force main to the power house and to the tanks above mentioned.

Springs number two and three are about fifty feet lower in elevation than the ground at the power house. They are in a field which slopes quite uniformly northerly. The field is used for pasturage. At times it has been under cultivation. Precaution taken at the springs were afforded to prevent any contamination of the spring water

At the power house there is a deep driven well encased down to rock which has been used as the main supply for the institution until recently. This well was drilled in nineteen hundred and two thereabouts and was put in because of the inadequacy of the other supply. The quantity of water yielded by the deep well has for some unknown cause diminished, so that this supply cannot longer be relied upon, in fact it has failed altogether, so the institution authorities report.

The said authorities now purpose to improve and develop the old spring supply. The four inch pipe line from spring number one to the power house has been laid during the current season to take the place of a pipe of one and one half inches in diameter. Approval of this new line and the supply is asked. Spring number one has a storm flow in wet weather. It was dry during the summer.

The walling up and improvements at springs number two and three and the installation of the pump and the three inch pipe line is about completed. The directors request approval of the said improvements and the source of supply. Formerly the waters used from these springs were carried by hand or hauled to the buildings.

Each of the three main buildings has its own sewer. From the Administration Hall and from the power house there are independent lines of sewers laid southerly under the turnpike over the field about three hundred feet beyond the pike so it is reported and the main building sewer discharges onto a field several hundred feet further from the pike.

The asylum sewer is laid in the opposite direction. It extends northerly and empties into a ravine which forms the head waters of a run which passes north of and below springs number two and three and thence extends westerly into Somerset borough, two miles distant.

There are privies near the asylum on the ground sloping towards springs number two and three The vaults are simply holes dug in the ground.

It has been determined that the proposed sources of supply will not be prejudicial to public health and the same is hereby and herein approved.

FIRST. Every reasonable precaution shall be taken by the Directors to prevent sewage from reaching the proposed sources of water supply. Special attention shall be devoted to the keeping out of the springs of all surface water: If necessary, ditches around the other sides of the springs shall be built to divert surface drainage away from the springs.

SECOND. As a double security all privy vaults on the property shall be laid in masonry and carried up above the surface of the ground to prevent flooding or overflowing. Whenever the contents is removed, it shall be disposed of in a sanitary manner and off of the ground sloping towards the spring.

THIRD. The Directors shall collect monthly samples of water from the springs under written instructions by the State Department of Health and ship these samples of water to the laboratories of the Department for analyses. If at any time, in

the opinion of the Department of Health the water supply of the institution be found prejudicial to the public health, then such remedial measures shall be adopted as the Commissioner of Health may approve or suggest.

The attention of the Directors is called to the probability of improvements being required relative to the distribution of the sewage at the three sewer outlets hereinbefore described. An inspection of the existing methods will be made by a Department officer at an early date.

Harrisburg, Pa., October 29, 1908.

SOMERSET TOWNSHIP, SOMERSET COUNTY.

Gladhurst Water Company.

This application was made by the Gladhurst Water Company of Somerset township, Somerset county, and is for permission to install a system of water works and to supply water to the public.

It appears that the village to be supplied with water by this water company is adjacent to and directly east of the borough of Somerset situated in the central part of Somerset township. It is a community consisting of some twenty-three or more dwellings and having no industrial establishments. The headwaters of Coxes Creek divide this village from Somerset borough. The old Bedford pike passing from Somerset to Bedford passes through the village and it is along this pike on both sides that most of the houses are built and distributed at some distance from each other. There are no railroads in the immediate vicinity, but in Somerset, a branch of the Baltimore and Ohio railroad between Johnstown and the main line passes through and a branch of the Pennsylvania Railroad terminates at this point. There are no coal mines in this vicinity.

The people both in the village and in Somerset obtain a livelihood by means of farming and various commercial pursuits. Somerset being the county seat of Somerset county attracts a great deal of custom and trade.

The whole section is on a high plateau some twenty-two hundred feet above the sea level between the Chestnut Ridge on the west and the Negro Mountains on the east, making a broad expanse of rolling country, some thirty miles wide.

There are no public sewers in the village; the people dispose of their sewage in privies and cesspools. There is one private sewer reported to discharge from one of the dwellings into a tributary of Coxes Creek.

The existing water works consists of springs, the water from which is pumped by means of windmills to a reservoir on the hill from which the water is permitted to run by gravity to the village.

The springs are two in number, one of which is walled up and covered over and completely hidden from view and from which a small pipe carries the water by gravity to the second spring. This spring is also walled up and is covered over with loose boards but is protected from surface wash. Both of the springs are located in a field in the valley between several hills and this field and adjacent fields are under cultivation. They are so protected that cattle cannot get to them and interfere with the purity of the water.

From the second spring two pipes are laid to a well close by over which is built a small pump house and the whole is covered over and the door kept locked. The pipes are three inches and one and one-half inches in diameter respectively, the smaller pipe being in the bottom of the spring and the larger one near the surface. The well is twenty feet in diameter and six feet deep with a six inch blow-out valve and a six inch overflow pipe four and one-half feet from the bottom. The capacity of the well is eleven thousand gallons.

The water is pumped from the well by means of a wind mill and at times when there is no wind a five horse power gasoline engine is put in operation and used as an auxiliary pump. From here the water is pumped through a three inch pipe for a distance of sixteen hundred feet to a small reservoir on the hill one hundred and fifty feet higher than the springs. The reservoir is thirty-five feet in diameter and ten feet deep, built of masonry and covered over with a wooden roof, having two dormer windows opposite each other. These windows are covered with fine mesh copper screens which protects the water from insects and at the same time ventilates it. The capacity is twenty-three thousand gallons. The reservoir is so located on the apex of the hill that surface water drains away from it.

A four inch iron pipe distributes the water to the consumers. This distributing main is about a mile long and at the present time there are nineteen taps on it out of a total number of twenty-three houses in the community. There are fifteen private wells in the village, used either alone or in conjunction with the existing water works.

Besides the existing system and the wells there is a private supply from the second spring to the house of one of the officers of the water company, which supply is pumped from the spring by means of a wind mill to a small reservoir five feet in diameter and ten feet deep constructed of masonry and located on a hill in the rear of this man's lot. This reservoir is covered over and protected from surface drainage. This supply was the original water works and afterwards others became interested and started the new company.

The object of the incorporation of this water company is mainly to supply the immediate vicinity in the village and not to expand into other districts in the township. The fact is that the people who have built houses there pooled their interests to form this company for their own supply and it is not a money making scheme. They have taken great pains to protect the water and to keep it free from contamination.

The method of taking water from the private wells where cesspools and privies are located close by is a menace to public health and it is a dangerous practice.

It appears that the water company was chartered in nineteen hundred and six and built the works the same year so that the application to install water works is for the approval of the existing water works.

It has been determined that the proposed water works system will not be prejudicial to public health and a permit is hereby and herein granted for the installation of such water works under the following conditions and stipulations:

FIRST. That the water company submit a detail map of the springs, wells, pump house, reservoir, distributing main with sizes, location and valves and blow-off forthwith.

SECOND. At the close of each season's work the water company shall make a plan of the water pipes laid in the streets of the village during the year and file the same in the office of the Commissioner of Health, together with any other information that may be required in the operation thereof, in order that the State Department of Health may always be informed of the extent of the water works system and the public use thereof.

THIRD. If at any time in the opinion of the Commissioner of Health, the water works system or source of supply has become prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

Harrisburg, Pa., July 23, 1908.

SPRINGDALE, ALLEGHENY COUNTY.

Springdale Water Company.

This application was made by the Springdale Water Company of the borough of Springdale, Allegheny county, and is for permission to make extensions to its water pipe system in the streets of the borough.

It appears that Springdale is a new borough having been incorporated during nineteen hundred and six. It is a manufacturing community and residential place, situated on the north bank of the Allegheny river about sixteen miles up stream above Pittsburg. The greater part of the borough is located on a somewhat flat, slightly rolling, tableland or plateau which extends along the entire river front and back to the Pittsburg—Freeport road, which is distant from the river about a quarter of a mile. The West Penn Division of the Pennsylvania Railroad passes through the town along the bank of the river and within three hundred feet of it. Beyond the Freeport road the land rises at a steeper grade, but nowhere precipitous, to an elevation of between two hundred and three hundred feet above the river at the western boundary. Thus the surface of the ground has an easy slope and drainage is good and towards the river. Most of the residences are located along the Freeport road and between it and the railroad. In fact, the dwellings are grouped along either the Pennsylvania Railroad and Colfax road adjacent to it, or along the Freeport road. The land between these two thoroughfares is partly built up.

The present population is estimated to be about two thousand. Many of the property owners do business in Pittsburg, riding to and fro daily. There are three industries in the town.

The Heidenkamp Plate Glass and Mirror Company employ about three hundred hands. The plant is located in the central part of the borough on the river bank near Colfax street. Drinking water for the shop is obtained from neighborhood wells and is carried as needed by persons employed for that purpose. Water for industrial purposes is secured from the river. The sewage from the property is deposited in the Allegheny.

The Pennsylvania Glue Company employs about one hundred and fifty hands. The plant is located on the river bank, immediately above the government dam, which is in the upper central part of the borough. Drinking water is obtained from drilled wells located on the premises. The industrial wastes are treated in a sedimentation tank and the sewage is discharged into the river.

The Pennsylvania Swedish Iron Company's works are small and are located along the Freeport road in the extreme western part of the borough.

The people quite generally obtain their drinking water from wells drilled on the premises. There are a few dug wells. Most of the drilled wells are cased to a depth of from sixty to eighty feet. There are a number of springs in the borough, several of these being of a considerable size. One of these is owned by R. L. Elliott. It is the source of supply to the Elliott Nursery Company and to the Neff Green Houses and also to forty-seven families. The spring is located in a ravine about fifteen hundred feet north of the Pittsburg-Freeport road near Maple street

in the western part of the borough. The spring is bricked in, covered and the water is piped to a brick tank and from there to an iron tank of about seventy-five barrels capacity, and thence to the consumers. The brick tank is located about one hundred feet from the upper end of the ravine and the iron tank about fifty feet below this and also in the ravine. Above the spring on higher ground are located several dwelling houses. At present none is nearer than six hundred feet. The houses are situated on the ground which slopes in the opposite direction from the spring. Should the land in the immediate vicinity of the ravine be settled, there would be possibility of contamination of the waters of the spring. Most of the forty-seven dwellings mentioned are comprised in the Heidenkamp group of tenements located near Colfax spring adjacent to the glass works. There are also a few families in the immediate vicinity of the spring using this water. The green houses and the nursery are below the Pittsburg-Freeport road.

The Springdale Water Company was chartered on April twenty-seventh, nineteen hundred and five, for the purpose of supplying water to the public for commercial and domestic purposes in Springdale township, Allegheny county, out of which township Springdale borough has since been incorporated. Prior to this charter the works were constructed by individuals, so it appears. As it now exists, the system comprises a pumping plant, a drilled well, a storage tank and the distributing system of pipes.

The pumping plant is located about one thousand feet north of the Pittsburg-Freeport road on Murtland avenue, on land owned by the water company. This place is on a terrace at the top of a steep slope. Northerly the slope continues, but at a more gradual ascent, for about a quarter of a mile, to the borough line. The pump house is a wooden structure fifteen feet wide, twenty feet long, and in it is located a two hundred and fifty barrel wooden tank, into which the water is pumped and stored for distributing purposes. There is a small gas engine used to lift the water from the well. This well is located in one corner of the building. It is drilled seventy feet deep and is encased in iron tubing. The water is pumped about four hours daily. This amount serves to meet all present requirements.

To the west of the pump house there is a ravine in which there is a small run about thirty-five feet from the house and about thirty feet lower in elevation. About one hundred yards to the east of the pump house there is another ravine not so deep. Both ravines have a general north and south direction. In the section formed by these ravines there is at present only one building, an old barn. It is located about a quarter of a mile above the pump house. Near the barn there is a small pumping station used by the Moyer Sand and Gravel Company to supply water to a sand quarry near the top of the hill which drains into the ravine. On the slope of the west ravine there is a farm house.

There are two private dwellings in the vicinity of the water company's pumping station. These face on North street. There are out-houses on the property.

The distributing system comprises thirty-eight hundred and fifty feet of two inch iron pipe.

The company proposes to lay a four inch pipe line the whole length of the Pittsburg-Freeport road in the borough and also to make extensions to the street pipe system from time to time as necessity may require. At present there are reported to be thirty consumers on the company's system.

While it is at once evident that the water works system is limited and is not adapted to supply the entire borough with any considerable amount of water, and while it is also apparent that if the water company should purpose at any time to supply the industrial plants or to afford fire protection it would be necessary to lay entirely new lines of pipe of larger diameters in the streets, nevertheless, it cannot be determined from the evidence now before the Department that the existing supply for drinking purposes is prejudicial to public health. Undoubtedly, the company will in the proper time and when there is a prospect of adequate revenue, introduce material changes in the water works system.

It has been determined that the existing supply of water to the public and the water works system is not prejudicial to the public health, and that the proposed extensions thereof will not be prejudicial to the public health and the same are hereby and herein approved and a permit granted therefor, under the following conditions and stipulations:

FIRST. That at the close of each season's work plans of the pipes laid during the year shall be prepared and filed in the office of the Commissioner of Health, together with any other information in connection therewith that may be required, to the end that the Department of Health shall always be informed of the full extent of the water works system and the public use thereof.

SECOND. The water company shall not increase its existing source of supply, drill new wells, build new reservoirs and pumping facilities, or otherwise make extensions to the water works other than those hereby and herein approved, without first submitting detail plans thereof and making application for approval as provided by law.

THIRD. If at any time in the opinion of the Commissioner of Health the water works system or the source of supply shall become prejudicial to the public health, then such remedial measures shall be adopted and provided as the Commissioner of Health may approve or advise.

Harrisburg, Pa., October 5, 1908.

STATE COLLEGE BOROUGH, CENTRE COUNTY.

University Water Company.

This application was made by the University Water Company of State College borough, Centre county, Pennsylvania, and is for permission to obtain a source of supply and to build water works to supply water to the public in the township of Ferguson and the township of College, said townships being in Centre county.

It appears that the University Water Company is the present name given by authority of law on July third, nineteen hundred and eight, to a corporation organized under the laws of the State and approved by the Governor on the fifth day of February, nineteen hundred and seven, under the name and title of the "Farmers Rural Water Company of Ferguson Township."

The purpose of the company is to supply pure water to the public in all that portion of Ferguson township, to wit: "Beginning at a stone on the division line between Harris and Ferguson townships, at the foot of Tussey Mountain; thence west along the foot of said mountain four hundred and fifty rods to stone; thence north one hundred rods to the Matternville road; thence following said road north five hundred and fifty rods to junction of said road with the Gatesburg road; thence along the Gatesburg road east five hundred and forty-eight rods to the division line between College and Ferguson townships; thence by said line and the line between Harris and Ferguson townships south twenty-four degrees east, six hundred and eight rods to the place of beginning."

Ferguson township lies west and southwest of State College borough and it concludes a portion of the State College farm property. The Gatesburg road, called College avenue in the borough, extends southwesterly in the township and the Matternville road is laid out at right angles to the Gatesburg road and is parallel with the boundary line between the borough, Harris and College townships to the east and Ferguson township to the west. Within this district is a territory occupied by farms, the owners of which desire to obtain a public supply of water. Since the territory is sparsely populated, the conditions for the organization of the water company for this purpose are exceptional. The country is a high plateau underdrained by a stratum of exceedingly fissured limestone. Considerable difficulty is experienced in obtaining water from wells, owing to the depth, and so the citizens have to rely largely on cisterns for their drinking water. This supply has the additional advantage of no small importance of being soft in quality. Some of the farmers have had to haul water considerable distances during dry seasons and there is need, therefore, for a reliable water supply in this scattered rural community.

The source of supply selected is a small stream rising in what is known as "Tussey Mountain," said mountain being the boundary line between Centre county and Huntingdon county. The geological structure is sandstone formation and the waters delivered from the mountain are correspondingly soft and pure. The stream flows in a northerly direction to meet a small tributary of Spring Creek, which eventually is joined by Logan Branch at Bellefonte borough and empties into Bald Eagle Creek. The latter joins the west branch of the Susquehanna river just below Lock Haven borough. These streams, with the exception of the Tussey Mountain Brook, are supplied by wonderful springs in the valleys flowing from subterranean passages. The waters are naturally hard.

It is the purpose of the water company to erect a dam and storage reservoir on the brook at what is known as Musser's Gap. This dam is to be a concrete structure and when completed its entirety will store one million, two hundred and fifty thousand gallons, approximately, and have an area of about one-quarter of an acre. The watershed above the dam is steep and covered by heavy forests. There are no habitations upon it. The area is approximately four-tenths of a square mile. The chief owner has for himself and heirs agreed not to denude the watershed. Records of the yield of the brook of Musser's Gap taken during drought show a flow of about seventy-four thousand gallons per day as the minimum.

The maximum depth of water with full reservoir will be twenty feet. Soil or organic matter is to be stripped from the bottom of the area to be flooded.

A twenty-four inch drain with valve is to be provided in the dam for drainage. The structure is to be constructed in a substantial way and is to be a spill-way dam, approximately ninety feet in length. From it an eight inch gravity supply main is to be laid across country in the charter territory above described and branch lines are to be laid from it to farm buildings on the various farms through which the main line is to pass.

The height of the water in the reservoir will be three hundred and eighty-eight feet above the campus grounds of the college in the borough about four miles distant.

It appears that the authorities of the State College were not satisfied with the present supply which is obtained from the State College Water Company, a corporation also supplying the borough. Not only is this company's supply the subject of some complaint, both as to quality and quantity in the summer time, but the pressure is not always sufficient and satisfactory. The college authorities, therefore, in looking about for a suitable supply in addition to its own supply from a driven well on the premises, the waters of which are exceedingly hard, concluded the Tussey Brook source contemplated by the said Farmers Rural Water Company

was the only available and suitable source of supply for the college. And so the water company designed its works with the understanding that water would also be furnished to the college, the intention being to supply this water at the Ferguson township line within the charter territory of the water company.

It further appears that some of the officers of the college and prominent citizens interested in the welfare of the institution acquired the controlling interest in the said Farmers Rural Water Company and changed the name thereof to that of the University Water Company. The works have not been built, but it is the intention of the company so to do as soon as the approval of the plans shall have been given by the Commissioner of Health.

It has been determined that the proposed water works and source of supply will not be prejudicial to public health and a permit is hereby and herein granted therefor under the following conditions and stipulations:

FIRST. Detail plans of the dam, pipe line and branches shall be filed in the office of the Commissioner of Health upon completion of the system, showing how said works have been constructed.

SECOND. Ample drainage facilities along the line of the supply main shall be provided to admit of the ready emptying of such line in case of necessity.

THIRD. If at any time, in the opinion of the Commissioner of Health, the source of supply or the water works system or any part thereof is prejudicial to public health, then such remedial measures shall be adopted as said Commissioner may approve or advise. If any lumber operatons should be undertaken on the watershed, or if any habitation or other source of pollution is established on the watershed at any time, the water company shall immediately notify the Commissioner of Health and co-operate with the State Department in the enforcement of sanitary regulations to safeguard the purity of the waters used as the source of supply to the public by said company.

FOURTH. If public health shall require it, the State Board of Health may establish rules and regulations for the operation of the water works system and the water company shall be bound in accepting this permit to abide and observe such rules and regulations in so far as they shall relate to public health matters. If any additional pipe line in the charter territory should be laid, at the close of each season plans of such additional pipe line laid during the year shall be filed in the office of the Commissioner of Health, together with any other information in connection therewith that may be required, to the end that the Commissioner of Health shall always be informed about the extent of the water works and the use thereof.

Harrisburg, Pa., July 23, 1908.

STEELTON BOROUGH, DAUPHIN COUNTY.

Board of Water Commissioners.

This application was made by the borough of Steelton, Dauphin county, and is for permission to make an emergency connection between the low and the high lift pumping engines at the borough's water works pumping station.

It appears that the application was made on behalf of the Water Board by its Consulting Engineer, and said application reads as follows:

"The Water Commissioners of the Borough of Steelton wish, in arranging the piping in the borough pumping station in accordance with the plans for the filter plant, which were approved by your Department in the early part of last summer, to add an emergency connection between the discharge pipe from the low lift pumps which pump the raw water to the filters, and the suction pipe of the high lift pumps which pump the filtered water to the city. The desirability of this connection, from the point of view of the Water Commissioners, is that the river bank at Steelton is not as high as the highest flood level, and consequently the pit in which the centrifugal pumps will stand is likely to be flooded so that the pumps might be completely submerged at times. Under these conditions these pumps could not be run, and a shortage of water might occur if a severe conflagration should visit the city.

"The high lift pumps, which pump water to the reservoir in the city, stand at a sufficiently high elevation not to be interfered with by floods in the river, and if there were a cross connection between the discharge pipe from the centrifugal pumps and the suction pipe to the high lift pumps, river water could be drawn through the centrifugal pumps by the high lift pumps if necessary.

"The manner of making the connection, as suggested by the President of the Board of Water Commissioners, is to place a "T" in the discharge pipe from the centrifugal pumps and also one in the suction pipe from the high lift pumps, and provide a special elbow, which could be bolted to the flanges of these two T's, in case of necessity; ordinarily this special connecting piece will not be in position, but the opening of the T's will be closed tight with blank flanges bolted on.

"There is very little likelihood that this emergency connection will ever be required, as the city reservoir holds a sufficient supply of water to tide over any flood, providing no unusual draught of water were made, such as might occur during a very extensive conflagration, or as the result of a serious break in some of the street mains during a flood.

"I am enclosing a blue print which shows the proposed method of connection, as suggested by the Water Commissioners, having notified them that I cannot put in this connection without permission from the Commissioner of Health, in as much as the original plans had been approved and I had no authority to change them.

"It is desired to place the order for all the piping in connection with the low lift pumps as soon as possible, and your early consideration of this connection is respectfully requested, so that the plans may be completed and the pipe ordered."

The making of this connection is herein approved under the condition that it shall in no way effect the stipulations in the permit issued by the Commissioner of Health to the borough of Steelton dated September eleventh, one thousand nine hundred and seven, and that the proposed connection shall not be used except in some great emergency like a great conflagration.

Harrisburg, Pa., February 26, 1908.

STEELTON, DAUPHIN COUNTY.

This application was made by the borough of Steelton, Dauphin county, Pennsylvania, and is for approval of detail plans for a new water works intake.

On September eleventh, one thousand nine hundred and seven, the Commissioner of Health issued a permit to the borough of Steelton to increase its source of public supply and to make extensions and improvements to its water works system under certain conditions and stipulations among which was the following:

"If practicable, the borough shall during the present low stage of the river forthwith proceed to caulk and render tight all joints on the existing intake pipe and plans for a completed intake well and pipe shall be made and submitted to the Commissioner of Health for approval during the current year."

In conformity with this requirement the borough endeavored to make the pipe line tight but failed. It therefore, during the current season replaced the old pipe with a new one thirty inches in diameter.

The new intake was built partly as an emergency work because the extreme low water of the summer made it impossible for the securing of any supply from the river through the old intake.

As now constructed the new thirty inch cast iron pipe begins at the point near the bank of the river where the old twenty-four inch pipe laid in place in anticipation of extension across the river terminated. This old pipe is fully described in the said permit of September eleventh, nineteen hundred and seven.

From this point the new thirty inch cast iron pipe is laid in a trench slightly beneath the present rock bottom of the river a total length of eleven hundred and thirty feet to the new intake located near the bank at the island opposite the pumping station. In this total length the thirty inch pipe has an ascending grade towards the inlet of six inches. At the shore line, near the pumping station there is a twenty-four inch gate valve on the pipe.

The intake at the end of the thirty inch pipe is similar in construction to the new intake on the end of the river pipe at the Harrisburg filtration plant. The top of the intake opening is seventeen inches below the low water mark of this season and there is no record of a lower water mark than this in the life time of any living person.

It has been determined that the interests of the public health are amply safeguarded by the new intake and the plans are hereby and herein approved and a permit issued therefor.

Harrisburg, Pa., October 15, 1908.

SWATARA TOWNSHIP, DAUPHIN COUNTY.

Rutherford Heights Water Supply Company.

This application was made by the Rutherford Heights Water Supply Company of Swatara township, Dauphin county and is for permission to obtain an additional source of supply from a spring known as Paxtang in the said Swatara township.

The Rutherford Heights Water Supply Company is duly chartered under the laws of the State to supply water to the public in Swatara township. Its source of supply was at first confined to the Swatara Creek at a place shown on the plan submitted by said company and filed in the office of the State Water Supply Commission, March thirteenth, nineteen hundred and seven. Subsequently, on October twenty-seventh, nineteen hundred and seven, the said company secured an amendment to its charter whereby its source of supply may be taken from the Swatara Creek at Hummelstown, at the same point from which the Hummelstown Consolidated Water Company draws its supply. It is the intention of this latter company to filter the creek water and sell it to the former company and it was with this understanding that the modified charter was granted.

It appears that on August sixteenth, nineteen hundred and seven, the Rutherford Heights Water Supply Company asked permission to obtain a temporary supply of water from the Eastmere Water Company, a duly incorporated company supplying water to the inhabitants of the village of Eastmere, a suburb of Harrisburg within Swatara township. This request was denied by the Commissioner of Health on the ground that the charter confined the Rutherford Heights Water Supply Company to the Swatara Creek as a source.

It now appears that pending the erection of filtration works and machinery for the treatment and supply of Swatara Creek water through the said company's mains, yet to be built in compliance with the terms of a permit issued by the Commissioner of Health on July twenty-second, nineteen hundred and seven to the Rutherford Heights Water Supply Company in which it is specified "that before the proposed water works system be constructed and used, detail plans thereof shall be prepared and submitted to and approved by the Commissioner of Health as provided by law," the inhabitants of the village of Rutherford Heights are insistent upon an immediate supply of pure water, and therefore, the said Company request permission to utilize the said "Paxtang Spring" as a temporary source of supply.

Paxtang Spring otherwise known as Rutherford Spring, is located on the farm of the heirs of S. S. Rutherford at the point about two hundred feet south of the right of way of the Philadelphia and Reading Railway and perhaps twenty-five feet west of the road entrance to Paxtang Park. Within a radius of a quarter of a mile is located the village of Paxtang, of perhaps twenty-five houses and one hundred and twenty-five residents. The dwellings are provided with modern plumbing and the drainage is mostly to cess-pools. At various places an outcrop of limestone shows that there is a pitch in the strata towards the southeast, and if this be the regular formation, it indicates the possibility of the underground drainage of from possibly twenty properties towards the Paxtang Spring.

The spring itself issues from the rock beneath a small stone spring house. The house has two floors. On the ground floor are the appointments of a small dairy. The platform is almost on a level with the water of the spring, and there is danger of pollution brought in by the shoes and left on the platform. Milk cans are rinsed out into the waters of the spring or the overflow thereof.

The flow is very copious and it is reported that it has never ceased even in a protracted dry period. On the day of the Department's inspection the outflow was measured to be two million gallons. This is proof that the contributing area is of a large extent and the geological formation being limestone leads to the conclusion that were the surface area from which these ground waters are gathered thickly populated, a very pronounced evidence of contamination would follow.

On the second floor of the spring house one of the farm attendants lives. The nearest building is the farm house two hundred feet north of the spring.

From the west where there is a cart road surface, drainage can reach the spring so that if the spring water be used temporarily, a source of supply, it should be walled up and every precaution taken to exclude surface water or any other surface pollution.

A part of the overflow of the spring is used to operate a hydraulic ram by means of which water is raised to the Rutherford farm buildings and mansion.

The spring also furnished a three inch pipe line which conveys water to Paxtang Park.

A test of the spring water made by the Philadelphia Clinical Laboratory on October fourteenth, nineteen hundred and seven, showed it to be potable. It would appear possible to adopt precautions to preserve the purity of this spring from surface contamination, but whether the waters be subject to under ground pollution is a question which needs extended investigation and possibly constant examination. The topographical conditions are suspicious. A temporary right to use this water might be approved by the Commissioner of Health on presentation of satisfactory plans for the collection and distribution of the water. No such plans have been submitted by the Rutherford Heights Water Supply Company. Furthermore, the charter limitations of this company as to this source at present preclude it as a possibility. A still further modification of the company's charter would appear to be necessary.

It has been determined that the application of the Rutherford Heights Water Supply Company to use Paxtang Spring is not properly before the Department of Health, since this source is precluded by the company's charter. If a modified charter be obtained, then the Commissioner of Health may favorably entertain such an application. However, the supply would not be favorably recommended as a permanent source for any water company because of the uncertainty as to the quality of the water. The district is rapidly increasing in population and the time cannot be far distant when sewage pollution will be likely to manifest itself at the Spring. If observations relative to the pollution of underground waters coming from populated areas in limestone districts elsewhere are a criterion by which to judge.

Harrisburg, Pa., January 16, 1908.

SWATARA TOWNSHIP, DAUPHIN COUNTY.

Paxtang Consolidated Water Company.

This application was made by the Paxtang Consolidated Water Company of Swatara township, Dauphin county, and is for permission to obtain an additional source of supply from the spring known as Paxtang Spring in said township.

The Paxtang Consolidated Water Company was originally called the Paxtang Water Company, which company was chartered in eighteen hundred and ninety-five for the purpose of supplying water to the village of Paxtang and adjacent thereto in Swatara township. In nineteen hundred and six the name of this company was officially changed to its present name. The water company's original supply came from a drilled well on the hill to the north of the village of Paxtang, but later this source proving inadequate the company purchased a supply from the Eastmere Water Company, a duly incorporated company supplying water to the inhabitants of the village of Eastmere, a suburb of Harrisburg, in Swatara township, the Eastmere Water Company purchasing its water in turn from the city of Harrisburg at the city limits. Recently the Harrisburg supply was refused to the Eastmere Water Company and hence to the Paxtang Consolidated Water Supply Company; consequently, the latter company had to resort to the original well supply and the former was obliged to purchase of the latter. The well is inadequate for these purposes.

In nineteen hundred and seven the Rutherford Heights Water Supply Company was chartered under the laws of the State to supply water to the public in Swatara township. The charter rights limited the company to the Swatara Creek as the source of supply. Later this was modified so as to enable the company to obtain water from said creek at Hummelstown.

This company applied to the Commissioner of Health for permission to install a system of water works for the supply of water to the public in the township of Swatara, Dauphin county, and represented that it purposed to supply the public in the villages of Rutherford Heights, Oberlin, Enhaut and New Benton, all situated in said township, and also to supply the public in other parts of said township through which the company's pipe lines pass in reaching these villages or from which sufficient revenue might be secured to warrant the laying of additional pipe lines. The permit was granted by the Commissioner of Health under certain conditions and stipulations, one of which was substantially that before the proposed water works system be constructed and used, detailed plans thereof should be prepared and submitted to and be approved by the Commissioner of Health as provided by law, and among other things that the plans shall include designs for a water purification plant. Plans for the purification of the Swatara Creek water at Hummelstown have been approved by the Commissioner of Health and the work on the construction is underway. This plant is owned by the Hummelstown Consolidated Water Company, which proposes to furnish filtered water to the Rutherford Heights Water Supply Company for distribution throughout Swatara township.

Pending the construction of this filtration plant the Rutherford Heights Water Supply Company on August sixteenth, nineteen hundred and seven, asked permission of the Commissioner of Health to obtain a temporary supply from the Eastmere Water Company but the request was denied because the charter of the Rutherford Heights Water Supply Company confined it to the Swatara Creek source.

After this refusal by the Commissioner of Health, and on October nineteenth, nineteen hundred and seven, the Rutherford Heights Water Supply Company applied for permission to use the stream known as Paxtang Spring as an additional source of supply, but their request was again denied by the Commissioner of Health on the ground of limited charter rights. In the decree of refusal it was specifically stated, however, that if a modified charter were to be obtained, the Commissioner of Health would favorably entertain such an application, but the supply would not be favorably recommended for a permanent source.

Paxtang village and vicinity consists of about forty dwellings and is located in the northwestern part of Swatara township on the Philadelphia and Reading Railway (Lebanon Valley Branch) about two miles east of the passenger station in Harrisburg. It is purely a residential section accessible to Harrisburg by railroad and trolley. The region surrounding the village is farming district and the whole underlaid by a limestone formation. The dwellings in the village are mostly provided with modern plumbing and discharge their sewage and waste in cesspools, there being no sewers to the waters of the State. Outcrops of the limestone formation show the shale pitching toward the southeast; and hence the drainage of the village and of the eastern suburbs of Harrisburg is in the same direction and presumably towards the Paxtang Spring.

The present drilled well supply is obtained on the hill back of Paxtang village near the cemetery and is collected by means of a small gas pumping engine. A two inch wrought iron force main discharges from the pump to a wooden storage tank twelve feet in diameter and seven feet high which rests on a masonry foundation which is about six feet from the ground and is roofed over. A supply main leads from the tank to the village. The company has not submitted plans of the pump house and well and tank lay-out. The report states that there are about twelve

hundred feet of six inch wooden pipe supply main from the tank to the village and connected with it about one thousand feet of six inch cast-iron pipe about four thousand feet of four inch cast iron pipe and that about two hundred inhabitants are furnished with water. It is reported that the well is one hundred and seventy feet deep.

The proposed supply is to be taken from Paxtang Spring, sometimes known as Rutherford Spring, which is located on the farm of the heirs of H. S. Rutherford at a point about two hundred feet south of the right of way of the Philadelphia and Reading Railway and about twenty-five feet west of the trolley road entrance to Paxtang Park. It issues from the limestone rocks from beneath a small spring house, which has two floors. On the ground floor which is on a level with the water in the spring are the appointments of a dairy. It is here where milk is cooled and the cans are rinsed out into the waters of the stream or its overflow. A platform almost on the level with the stream extends two-thirds of the way across the water and is used to stand on while manipulating the milk cans. There is danger of polluting material being brought in by the shoes and left on the platform, from whence it might be washed into the water. The second floor of the spring house was formerly occupied by a man employed in the vicinity. Adjacent to this floor, but on the outside, is a small chicken coop in use. About two hundred feet to the north is the farm house.

There is a cart road from the farm buildings to the west of the spring which drains directly into the water of said spring.

The flow of the spring was estimated on the day of the Department inspection to be about one million gallons per twenty-four hours, and it is reported that this flow has never ceased even in times of drought, showing that the water comes from a much larger area than the immediate surroundings. A part of the overflow of the spring is used to operate a hydraulic ram by means of which water is raised from said spring to the mansion and other farm buildings. Immediately below the spring is Paxtang Park, a pleasure resort for picknickers and day visitors. This park is shut off from the spring by means of a fence. A three inch pipe line conveys water from the spring to the resort.

The topographic features connected with the Paxtang spring are such as to cause suspicion. The close proximity of the village one quarter of a mile to the north, the dip of the limestone from the populated district toward the spring together with the large body of water issuing therefrom would be just cause for such suspicion.

The petitioners have not submitted any plans showing the details of how the water is to be taken from the Paxtang spring and furnished to the public. But it is understood that the suction pipe of the pump is to be inserted in the spring, the object being to draw the water from a point above where it may be subject to any possible contamination from the immediate vicinity. From the pumps a temporary main will be laid to the turnpike and connected with the supply main there. Said main in this thoroughfare is a twelve inch water pipe extending westerly to Eastmere and easterly beyond Paxtang village in Swatara township.

It has been determined that the proposed additional source of supply will not be prejudicial to the public health, and plans therefor are hereby and herein approved under the following conditions and stipulations:

FIRST: That the company shall prepare a plan of Paxtang village and its surroundings, showing the streets, general location of buildings, water pipes, sizes, gates and hydrants, the location and details of the drilled well supply and the details of the additional source herein approved, and the pump and supply main layout in connection therewith as built, and shall file the same with the Commissioner of Health within two months from the date of this permit.

SECOND: The State Department of Health will make bacteriological tests of the water of the spring and if at any time in the opinion of the Commissioner of Health the water supplied by the Company has become suspicious and prejudicial to public health, thereupon the water company shall adopt such remedial measures as the Commissioner of Health may advise or approve.

THIRD: This permit shall cease at the end of the current year. If at that time the filtered Swatara Creek water supply is not ready for introduction into Swatara township territory as contemplated, then the Commissioner of Health may extend the time in which Paxtang Spring may be used by the Paxtang consolidated Water Company, but it is the intention of the State to cause the abandonment of both the present drilled well supply and the additional Paxtang spring supply upon the introduction of the filtered Swatara Creek water into the district:

FOURTH: It is stipulated that this permit is contingent upon the water company having acquired full right to enter upon and appropriate the waters of the Paxtang Spring as proposed.

FIFTH: It is also specially stipulated that the intake shall be located in the spring at a point where there shall be no danger of pollution. Also the occupancy of the spring house by man or beast is prohibited. The hen coop shall be removed and the spring placed in the best of condition.

Harrisburg, Pa., June 16, 1908.

TOWANDA, BRADFORD COUNTY.

Towanda Water Works Company.

This application was made by the Towanda Water Works Company of Towanda borough, Bradford county, and is for permission to extend its water works system to supply water within its charter territory.

It appears that the Towanda Water Works is a duly incorporated company chartered by the State in eighteen hundred and seventy-nine for the purpose of building and managing a system of water works for supplying the public general to Towanda and vicinity.

Towanda is the seat of Bradford county and is located near the centre of the said county. It is bounded on the east by the North Branch of the Susquehanna river and on the other sides by Towanda and North Towanda townships. In eighteen hundred and ninety the borough had a population of four thousand one hundred and sixty-nine, and in nineteen hundred it was four thousand six hundred and sixty-three, while at the present time it is estimated to be about five thousand. The municipality is built on a hillside, sloping toward the river and has excellent natural drainage toward the river. It is somewhat of a manufacturing place, and the people find a means of livelihood at the toy factory, employing one hundred and twenty-five hands, the silk mill, employing twenty-five hands, besides numerous other smaller industries and local pursuits. There are three railroads entering the borough which also give employment to a number of the residents of this town, especially the Lehigh Valley, whose main line between New York and Buffalo passes through Towanda. This railroad has large car shops at Sayre eighteen miles north where many of the Towanda men are employed, a special train carrying them to and from their work. The other two roads are the New York and Susquehanna and the Bowmans Creek Branch of the Lehigh Valley Railroad. The surrounding territory is hilly and mountainous and of a glacial deposit, the valleys and tops of the hills being given to agricultural pursuits. In the immediate vicinity of the borough there are large tracts of flat land which are devoted to tobacco raising. The farmers in the rural districts thereabout make a specialty of dairy produce and send it to the New York markets. At one time lumbering was the chief industry but the dissipation of the timber has made this means of livelihood of minor importance.

A short distance below the borough the Towanda Creek discharges into the river. This stream has a watershed area of two hundred and eighty-four square miles and drains the greater part of the southwest section of Bradford county. It is made up of the main stream proper and three branches; named in order, these are the North Branch, Shrader Branch and the South Branch, the former entering the main stream from the north and the latter two from the south. On this water-shed there are four boroughs having a total population of twenty-five hundred and a township population in the neighborhood of fourteen thousand. The stream is twenty-seven miles long, it flows through an agricultural district eastwardly to the river.

The South Branch heads in the divide between Bradford county and Sullivan county and flows almost due north for a distance of fourteen miles to the main stream at the borough of Monroe. The stream is paralleled throughout its course by the Bowmans Creek Branch of the Lehigh Valley Railroad. The borough of New Albany, having a population of about five hundred, is located on this stream, eight and a half miles from its mouth. For a greater part of the distance of its course, the stream flows through a narrow valley and it has the appearance of a mountain stream.

The present supply of water is obtained by gravity from Eilenberger springs located seventeen miles south of Towanda, adjacent to the South Branch near its source and from a tributary of said stream about midway between the borough and these springs. From these springs the water flows through a small reservoir close by thence through ten inch cast-iron pipe for seventeen miles to Towanda. It receives the auxiliary supply through an eight inch line at the mouth of Satterlee Run. At Towanda a part of the water is received in two storage reservoirs, the remainder being distributed throughout the town.

The Eilenberger Springs, from whence the greater part of the water supply is received, are located at the base of a ridge and about a mile south of the village of Laddsburg in Albany township. They are several hundred feet east of the South Branch. Immediately to the east of the springs and up the side of the ridge there is a farm land used principally for pasture. The springs are enclosed on all sides by cemented stone walls about four feet high, the tops of which are slightly above the level of the ground. This structure is thirty feet long, three and a half feet wide, four feet deep and is covered over with flag stones having cemented joints. An air pipe extending about five feet above the stone covering affords means of ventilation while a trap door with an iron cover, kept securely locked provides means of entrance. This basin is well protected from any surface drainage or malicious pollution. From the lower end a twelve inch terra cotta pipe emerges along the bottom and conveys the water through about two hundred feet of open jointed terra cotta pipe, thence through about three hundred feet of jointed pipe to a small reservoir in the ground, six feet wide by seven feet long and at least eight feet deep from the surface of the ground. This box is built of stone and cement and covered over by

a cement roof extending to a ridge, the ridge running the whole length of the box. This sloping roof is about four feet or so higher than the surface of the ground and has an iron door in one side of it large enough for a person to crawl through. All parts of this receptacle are closed and the doors kept locked. A twelve inch terra cotta pipe discharges into this reservoir from the spring and a ten inch cast-iron pipe having several feet of fine mesh strainer pipe and a gate valve located in the reservoir, conveys this water to Towanda.

There is an emergency intake consisting of an eight inch iron pipe extending from the east bank of the South Branch to the twelve inch line at the upper end and outside of the reservoir. The length of this intake is about thirty feet. At its upper end there is a wooden plug attached to a chain, the plug being inserted in the end of the pipe or taken out at will, thereby permitting the South Branch water to enter the system by gravity. There is a valve inserted in the ground at a point where the emergency intake might join the supply line which is reported to control the amount of water taken in through this intake.

At a point a short distance above the intake to the creek there appears to be some form of communication between the creek and the pipe line from the springs above the reservoir. This is in a form of a ditch which is said to have been filled in with stones and gravel so as to form a natural filter, the water being received from the edge of the creek bank, thence through the natural filter to the supply line. It is reported by an officer of the water company that this means of supply has been abandoned.

Another means of helping the main supply line was to underdrain some of the low land adjacent to the creek by perforated open joint tile drains and conduct this water to the main line.

The vicinity of the springs, the reservoir and entrance thereto has been purchased to the extent of about twenty-seven acres by the water company. The house on the property is vacated. This is reported by an officer of the water company to have been at the suggestion of the old State Board of Health.

The South Branch Creek at this place has the appearance of a small meadow stream and has pasture land on either side, so that cattle and other livestock can wade or wallow in the stream at will. The stream rises in hills, forms into rivulets, then unites to form the main stream. The area of the watershed above the Eilenberger Springs is in the neighborhood of ten square miles and contains a number of farm houses having their pig pens, barnyards and some privies draining into the stream, thereby causing the stream to be dangerous as a means of water supply for domestic purposes. A railroad having several local passenger trains a day, parallels the stream for a short distance and crosses a small tributary flowing into the stream above the emergency intake.

The stream from which the auxiliary supply is taken, is from Satterlee Run, a tributary of the South Branch. An eight inch pipe extends up the valley of this run from the ten inch supply line to Towanda a distance of about one mile and terminates in the run with a perforated tee pipe having three eight inch holes. The intake consists of a number of loose stones thrown across the run forming a crude dam and a second series of stone extends from the middle of the first, blocking up the stream, and across to the north bank a distance of some twenty-five feet. The enclosure between the bank and the blocking being somewhat lower than the bed of the stream forms a natural pool through which the water is received into the pipe line. The flow of the water into the line is greatly impeded at times on account of leaves blocking the openings in the screen intake and being held in place through suction.

The watershed of the run is a narrow valley with high ridges on either side and having an area of about five square miles the greater part of which is densely wooded with second growth timber. There is a privy not over forty feet from the banks of the stream, one quarter of a mile above the intake. This belongs to a small farm in the valley, the occupant of which at the time of the Department's inspection reported that the water company had purchased this farm and he contemplated moving away at once. Further up the valley there is another farm on a tributary to the main run, the owner of which stated that at one time they had a privy on the premises but it toppled over and since has not been replaced. The deposits and excrement are placed on surrounding ground. This man reports also that there are at least three other habitations on the water-shed. This method of disposing of excrement is dangerous at any time and especially so on a water-shed with steep sides draining directly into the stream such as this one is. The stream is flashy and during time of heavy rain becomes exceedingly rapid.

A pumping station belonging to the water company is located on South Branch a short distance below the mouth of Satterlee Run. In it there is a Dean pump and a boiler, also a well about fourteen feet in diameter and some thirty-seven feet deep from the top. The well is about forty feet from the South Branch and the water in the well stands about four feet above the water in the creek, although the bottom of the well is below the bed of the creek. The pump has its intake connected to the well but the outlet has been disconnected. This station has an appearance of not having been used for years and it is the reported purpose of the water company to dismantle the plant and use it elsewhere.

At Monroe borough the water company supplies about ten families with water and also furnishes water to other people living along the pipe line through whose property it was necessary to obtain right of way in constructing the line.

Just south of the borough line in the district known as South Towanda a ten inch lateral leads from the main pipe line up the adjacent hill side to a small storage reservoir having a capacity of approximately one hundred and fifty thousand gallons. This reservoir is merely an overflow from the city main; a twelve inch line extends from here into the borough and again connects with the main line.

In the borough an eight inch pipe leads from the main ten inch line up the hill through the middle of the town to a reservoir located about three-quarters of a mile west of the borough. This reservoir consists of concrete wall having been thrown across a slight ravine for a distance of about one hundred and fifty feet and an embankment perpendicular to it up one of the sides of the ravine for a distance of nine hundred feet thence an embankment at the upper end terminating at the opposite hillside. The upper part of the ravine is flat thus necessitating the long embankments and the embankment at the upper end. At one time a small stream flowed through the natural bed of this small valley, but it has been diverted to one side where a ditch paralleling the long embankment was dug to by-pass it around the reservoir. Paralleling the ditch on the opposite side is a public road. There is a small spillway at the upper end of this reservoir. Besides the main inlet pipe numerous springs on the hillside contribute to the supply. It is stated that the capacity is some fourteen million gallons. The water surface covers an area of five and three-eights acres. The hillside from which the springs emerge is well wooded and about two hundred feet away from the water's edge is the bed of an old State road which is now abandoned. There is a ditch paralleling this road between it and the water to carry off any surface pollutions which might enter the reservoir on this side. The whole area is enclosed by a wire fence excepting the side toward the public road which is protected by the embankment ranging from five feet to nine feet in height. The elevation of this reservoir above the lowest point is two hundred and fifty feet.

The water company reports that this reservoir has been used but once since it was finished in nineteen hundred and five, the time being August of that year. It appears that water was turned onto the borough on account of a break in the main pipe line but the muddy condition of the water received such condemnation from the citizens that it was decided not to use it and has not been supplied since. The company reports also that this location received the sanction of the old State Board of Health after a personal visit of the secretary.

The water company supplies most all of the population, there being one thousand and sixty-six taps. The section known as North Towanda also receives this water.

There has been little typhoid fever in Towanda. In nineteen hundred and five there were two cases and no deaths, in nineteen hundred and six there were six cases reported and three deaths, four of the six cases were found to have been brought into the borough from elsewhere. In nineteen hundred and seven, up to the middle of October, two cases and one death were reported.

The water company has submitted an application for permission to extend its water works and has submitted a plan of the reservoir last described situated on the Watkins farm in Towanda Township and desires the approval of the Commissioner of Health of this reservoir. It was finished in nineteen hundred and five and used for the first time in August of that year, but it was immediately shut off from the town supply and has not been used since.

The question of the purity of the water supplied to Towanda has been under discussion between the people and the water company for a number of years. As far back as nineteen hundred a report was made to the old State Board of Health in which it appears that at that time the water company stated it had in operation a seventy foot sand filter along the South Branch at the Eilenberger Springs, but evidence of its location or of its ever having been renewed or cleaned could not be obtained. This report also states that the water in the creek near the emergency intake was simply a shallow stagnant pool of water, its banks covered with decaying foliage, the surface of the water covered by an oily brick-red scum, floating debris and about one-half mile farther up the stream cattle were found feeding along its banks and wading in at will. The droppings from the cattle were to be seen not only on the banks but in the stream itself.

In nineteen hundred and one a representative of the old State Board of Health made an inspection of this water supply and reported the existence of the sand filter but believed that the water filtered through this medium would be objectionable. A considerable collection of black vegetable matter was seen under the intake of the spring basin which raised the question as to whether a small amount of water might not find its way into the pure supply from the creek through the plug emergency intake. The use of the waters of South Branch were condemned unless filtered consequently the emergency intake was condemned and its removal ordered. The report also stated that there would be no risk in supplementing the water received from other sources by the water furnished by the well located along South Branch, a short distance below Satterlee Run and suggested to the company the importance of having a chemical examination of each of its sources by thoroughly competent chemists approved by the State Board of Health at least twice every year and a bacteriological examination by a bacteriologist approved by the State Board at least once annually.

The Department is aware of the fact that during the fall of nineteen hundred and six a committee of the local Board of Health of the town council of Towanda went to the source of the water supply and found at the Eilenberger springs, a pipe carrying water from South Branch Creek into the pipe from Eilenberger springs so that almost as much water was being taken from the creek as from the spring. This committee found some farmhouses with their privy vaults and pig pens on the bank of the stream and smaller tributaries draining other farms and buildings. They also found a railroad paralleling this creek for a short distance above the intake from the creek. The local Board of Health at once disapproved of this condition and pointed out the fact to the water company that if a case of typhoid fever should occur at any of these farm houses above the intake, the water would be in great danger of contamination from the stools of the patients, and advised the people to use boiled water. The council refused to pay any more water rent until the creek water was eliminated from the supply. The water company paid no attention to the communication sent to them so that the matter was called to the attention of the Commissioner of Health, whereupon he called the attention of the water company to the existing conditions and advised that the creek source of supply be abandoned in order to obviate any possibility of a typhoid epidemic. In reply the water company forwarded a copy of a letter purported to have been written by the old State Board of Health approving the proposed supply from the South Branch and Satterlee Run and calling attention to the expediency of obtaining control of these watersheds to such an extent as to prevent the location thereon of dwellings or factories so situated as to pollute the water. This letter also states that the State Board of Health reserved the right to condemn this supply if at any time it finds it to have become polluted.

It appears that the contract between the water company and the borough states that if the Eilenberger springs should fail to afford an ample and constant supply of water to the public at all seasons, the supply of good water shall be made ample by taking the same from a source approved by the State Board of Health. It was this contract requirement which called for investigation in eighteen hundred and ninety-four of the proposed new supplies above mentioned.

In the report of this investigation it is stated that the watershed of the South Branch above the proposed intake was found to be almost totally uninhabited and free from contamination. The same being true of the proposed supply of Satterlee Run. In view of these sanitary conditions approval was probably given, but the present conditions are such as to cause the South Branch waters to be dangerous as a water supply.

In response to the information received complaining of the breach of the contract in supplying South Branch water, the Commissioner of Health on July third, nineteen hundred and seven, ordered an investigation made of the facts in connection with the water supply at that time.

The result of this investigation brought forth information that the reservoir covering at the Eilenberger springs was fastened with a lock, but was unlocked so that it could be opened at will by any one, and of the existence of an eight inch iron pipe leading from the creek bank to the main supply line. At this intake a small dam had been made by hoeing up part of the creek bed, so that the water above the dam was about eighteen inches deep. A piece of wire screen eighteen inches by twenty-four inches, having thirty meshes to the square inch, was held in place over the mouth of the intake by stones laid on the corners of the screen. The water was flowing into the pipe to the depth of five inches, it being laid on an easy grade. The creek was low and the water stood in pools covered with a greenish yellow scum. Cattle stood in these pools and defiled the water. It was reported that some twenty-one head of cattle stood in the creek just above the intake at one time.

In October, nineteen hundred and seven, one of the Department's engineers made an investigation of the existing conditions of this water supply and found among other things that this water company had built a new reservoir without a permit.

On the day of the Department's inspection in October, nineteen hundred and seven, the ground along the open jointed pipes leading directly from the Eilenberger springs was found to contain deposits of excreta. Although the land is within the enclosure hereinbefore described, it appears that some one had wilfully entered and committed a nuisance.

The water company contends that the quantity of water flowing from the Eilenberger springs is not sufficient for the supply to the borough, and that the combined supply from these springs and Satterlee Run is not sufficient in time of drought.

The auxiliary supply from Satterlee Run, if properly conserved, ought to be sufficient to go a long way towards supplying the extra demands of a dry season. A substantial intake dam should be constructed across the land whereby a greater amount of water, in fact the entire flow, could be taken into the pipe line. Much of this water is now allowed to run into waste. There is an ideal spot here for the erection of an impounding reservoir.

The South Branch water at the pumping station or at any point above or below the Eilenberger springs should not be used in its raw state for drinking purposes. The water company should properly filter the waters of this stream or abandon it as a source altogether.

The Department does not have a plan of the street mains in the town or a plan of the supply mains, intakes, watershed, etc., outlined for supply of water which the company furnishes to the public. Mere sketches have been submitted, but they are not reliable. A plan of the new reservoir has been submitted, but details are lacking.

There appears to be no good reason why the new reservoir water should be prejudicial to public health.

It has been determined that the use of a new reservoir will not be prejudicial to public health, and a permit is hereby and herein granted for its use and for the extension of the water pipes in the borough of Towanda, under the following conditions and stipulations:

FIRST: That the Eilenberger springs and the Satterlee Run supply shall be the the only sources with the exception of the waters naturally flowing into the new reservoir that the water company shall use. The South Branch waters are absolutely prohibited unless the water company shall install a modern water purification plant for the treatment and adequate purification of said South Branch Creek waters, plans to be first submitted to the Commissioner of Health and approved by him.

SECOND: The facilities by which the South Branch Creek waters are now directly or indirectly introduced into the water works system shall be entirely discontinued and cut off from the water works system.

THIRD: Satterlee Run watershed tributary to the point where the water company takes the flow of its system for its purpose shall be mapped showing the existence of all roads, and occupied estates thereon and the company shall file such map in the office of the Commissioner of Health. The Department of Health will co-operate with the water company in removing all menaces from the watershed and in maintaining sanitary conditions thereon, but the company shall visit every occupied estate monthly and report to the Commissioner of Health the sanitary condition. The company shall make arrangements to have reported to it promptly the existence of any infectious disease of water-borne character on the said watershed and such intelligence shall be communicated to the Commissioner of Health without delay.

FOURTH: The water company shall improve the intake dam across Satterlee Run and submit plans thereof to the Commissioner of Health for approval. The suggestions relative to the development of this source are commended to the careful consideration of the company.

On or before the first day of January, nineteen hundred and nine, the water company shall have prepared and have drawn to scale of sufficient size to be useful to the Deparment of Health a map of the borough showing the precise location of all water pipes, gates and drainage facilities. Also a map of the supply mains to the town with their grades and location of all valves, blow-offs and drainage facilities. Also cross sections and detail plans of the springs, collecting pipes, gates and valves and also the same relative to the new reservoir whose use is herein approved.

FIFTH: If at the time the water company submits these details herein called for, it will make a general application for permission to extend its distributing system, the Commissioner of Health will consider such proposition and may issue a permit therefor permitting the water company to make such extensions from time to time as the necessity may call for.

SIXTH: If at any time in the opinion of the Commissioner of Health the water works system or any part thereof has become a nuisance or menace or prejudicial to public health, then such remedial measures shall be adopted as he may advise or approve.

Harrisburg, Pa., October 6th, 1908.

WARREN, WARREN COUNTY.

Warren Water Company.

This application was made by the Warren Water Company, Warren Borough, Warren County, Pennsylvania, and is for permission to obtain an additional source of supply and to construct a filtration plant to purify said source and the water of the Morrison Run supply.

On March fifteenth one thousand nine hundred and seven the Commissioner of Health issued a permit to the said Warren Water Company to obtain an additional source of supply from wells to be driven on land owned by the company in the vicinity of the company's pumping station and among other conditions it was stipulated:

"The Morrison Run supply shall be either filtered or abandoned; but it may be kept as an emergency source and be used without filtration only in extreme cases. At such times, the local and State Department of Health shall be notified. Sanitary inspection of the watershed shall be made monthly by the company, who shall file reports thereof with the State Department of Health and take such precautionary measures as may be necessary to safeguard public health.

"Because, in case of great conflagration, it might be necessary to have resources to the Allegheny River water, the company may maintain an intake thereto, subject to conditions to be agreed upon by the borough council and the Water Company subject to the approval of the Commissoner of Health. Detailed plans of this intake and its connection shall be filed with the State Department.

"If at any time, in the opinion of the Commissioner of Health, the water supplied by the Warren Water Company to the borough is not suitable for drinking and culinary purposes, then such remedial measures shall be adopted as the Commissioner of Health may advise or suggest or approve, and weekly analyses of the water shall be made by the said company and reports thereof filed with the Department of Health, together with such other information relative to the operation of the plant as the State Department of Health may require."

These conditions have been complied with.

Soon after the introduction of the new well water into the system a marked deterioration in the quality of the ground water supply of the company was noticed. The water became harder and quantities of iron were found to be present. The company endeavored to ascertain the cause and to find a remedy. During this period frequent complaints were lodged with the Commissioner of Health by the public authorities and an entire new source of supply was demanded. The company early represented that it would abandon the ground water supply or install a purification plant to render the water and the Morrison Run supply satisfactory to the consumers. The question of appraisement and purchase by the municipality of the water works plant was taken up by the citizens and the borough council, and upon inquiry by the Commissioner of Health it was ascertained that the company would defer submitting plans for an improved water supply until it was determined whether the borough would purchase the plant. It appears the company is now prepared to proceed immediately with the erection of the purification plant and plans are submitted therefor.

The company purposes to entirely abandon its present pumping plant and driven wells system as soon as the new supply is installed.

It is proposed to erect a new filter plant and puming station on the north bank of the Allegheny River in Glade Township at the bend in the river immediately below the Glade Run bridge over the river. The ten inch gravity supply main from Morrison Run reservoir is laid across the bed of the river at this point and thence extends in and along Pennsylvania Avenue to Warren. The borough line may be two thousand feet down stream from the river bridge. Here in the township is a small village called Glade Run and the tannery said to be owned by the Elk Tanning Company located on the banks of the run. Below in the borough there are several industrial plants including refineries, acid and chemical works. At the bridge there is a hotel and easterly along a highway, there are a few dwellings. The land becomes rapidly precipitous from the river bank up stream from the bridge and the slopes are unoccupied. A branch of the Pennsylvania Railroad is laid along the river bank and between this railroad and Pennsylvania avenue immediately below the said bridge, is a triangular tract of land less than one acre in area, upon which the company plans to build the filters and pump house. There is a strip of land between the railroad and the river about fifty feet wide, on which there are three dwellings and a barn. These properties are not included in the company's contemplated purchase. Between the tannery and the said triangular tract, there is a plot of ground about two hundred feet wide now occupied by a private residence.

This site has been selected by the company for three principal reasons: first, it is adjacent to the Morrison Run supply main which supply it to be filtered: second, the ground is elevated with the exception of one corner, above the highest flood ever recorded; and third, it is opposite deep water in the river.

The Allegheny river above Warren is sparsely populated. The stream and its tributaries are subjected to a minimum pollution. The waters are soft and easily purified and afford a never failing source. It is believed that under the law providing for the preservation of the purity of the waters of the State for the protection of the public health, that the Allegheny river will never be more polluted than at the present time, and that the few scattered sources of contamination now existing on the watershed both in Pennsylvania and in the state of New York, will in the near future be entirely eliminated, and consequently the company represent that its plans for a permanent source of pure and wholesome supply for Warren are worthy of approval.

It appears that north of the Glade Run bridge there are two islands of considerable size in the river. One of them next the north shore is long and narrow and at low water this channel is said to go dry or nearly so. The main channel between the two islands during low water which may cover a protracted period, is about eighteen inches deep, so it is reported. The current is rapid over these shoals. The bed of the river is gravel and small boulders and rather stable.

Between the southerly island called Rogers Island, and the river bank is the mouth of Dutchman Run, into which nearby, Morrison Run empties. The main line of the Philadelphia and Erie Railroad extends up the valley of Dutchman Run and about two miles from the river in Mead township there is a station and village on the railroad and the run called Stoneham, where there are tanneries, the drainage of which in a pronounced degree pollutes the stream. The dark color imparted to the water peculiar to tannery wastes, is discernible at the mouth of the run and

it follows the south bank of the river diminishing in color but visible at the Glade Run bridge. The bend in the river at this point to the north down stream produces a current towards the south bank so that under existing conditions, it is physically impossible for the Dutchman Run water to reach the north bank at the bridge and it is at this point one hundred and forty feet below the bridge and about one hundred feet out from the shore in a natural depression assuring a depth of five feet at extreme low water that the company purposes to establish its intake. The river at this point is said to be fully seven hundred feet wide.

The power plant is to be installed in a brick building comprising a boiler room in which is to be erected two water tube boilers each two hundred horse power, an engine house, a coagulating room, laboratory and shop. The main floor is to be laid two feet above the highest recorded flood level of eighteen and fifty-eight hundredths above low water.

The eighteen inch suction pipe from the river is to be connected directly to duplicate pumping engines each three million gallons capacity per twenty-four hours. The raw water is to be raised to the settling tank, a steel structure fifty feet in diameter and twenty feet high, set in the ground, its flow line designed to be five feet above the surface of the filters or thirty-two feet above low water. The coagulant solution is to be introduced into the raw water pipe between the pumps and the settling tank by approved apparatus. There is room for an additional tank when it becomes necessary. One tank will give a subsidence of between two and three hours under present rates of consumption and this is thought to be sufficient for local conditions. Morrison Run water is to be discharged into the sixteen inch force main leading from the raw water pumps to the settling tank. During rainy seasons, and for a number of months of the year the flow of Morrison Run will be sufficient to furnish all of the water to the plant. It will be only at such times as this supply is insufficient that the river water is to be used.

The raw water will be delivered into the tank at the top over an inlet trough and passing under a submerged baffle board across the middle of the tank it will leave by means of a skimming trough at the opposite side and thence flow to the filters. By an arrangement of piping the raw water will be by-passed directly to the filters whenever the settling tank is cleaned out. A twelve inch sewer pipe, cast iron, will take the drainage to the river bank and this sewer will also drain all wash water from the filters.

The filters and filtered water basins beneath are to be housed in a separate structure. The basins are to be laid wholly in excavation but the filters will be above ground. The construction is to be reinforced concrete and over all exposed to sight the filters will occupy a space about fifty feet square. They will support a roof, the walls of which will come to within about five feet of the sides of the filter. This outside space is to be utilized for the depositing of sand from the filters.

There are to be six filter units arranged in parallel rows of three with the operating platform and pipe gallery between. Each filter unit is to have an area of one hundred and seventy-six square feet and to be capable of filtering five hundred thousand gallons of water per twenty-four hours.

There is a twenty inch raw water pipe from the settling tank to the filter off of which an eight inch pipe is taken to each filter unit terminating in an inlet chamber extending across the entire width of the end of the unit. The heighth of water over the surface of the sand is regulated by butterfly valves and there is a four inch overflow pipe set two inches above the water line which is three feet four inches above the sand surface. The depth of sand is to be thirty inches supported by ten inches of gravel resting on a steel false bottom into which the strainers are screwed and under which there is a free passage way for the filtered water of about twenty-four inches in depth. From this horizontal collecting chamber, the filtered water is piped at the rate controller in the operating gallery and thence it goes to the filtered water basin below. The total capacity of the basin is one hundred thousand gallons.

A centrifugal pump, capacity two thousand gallons per minute is provided for washing. It will deliver filtered water through a twelve inch pipe with eight branch into the bottom of each unit and upward to two steel collecting troughs whose edges are to be set twenty-one inches above the sand surface. They will discharge into the vertical inlet chamber and thence to the sewer. Pipe arrangements are provided for the wasting of the first filtered water.

All valves have stems extending to above the operating platform. This platform is made of concrete construction water tight so that no possibility of contamination of the filtered water below is afforded.

A connection with the supply main to the town will be made so that wash water can be used under pressure in case the wash water pump should be out of repair.

The filtered water is to be raised into the pipe system of the town by three pumping engines. One of them is to be a three million Worthington horizontal triple expansion engine. The second a two million Worthington compound, and the third, is to be a one million, five hundred thousand triple expansion engine. The latter is to be used principally to pump water into the reservoir on the hill. The other pumps will be placed on the town service and pump water directly into the distribution system. Paralleling the present ten inch main to the borough is to be laid a new twelve inch force main part way and a ten inch main the balance of the distance to the center of the town and the pipe to the reservoir. By this

arrangement it will be possible to pump filtered water directly into the distributing reservoir on the hill without passing it through the distributing system and this is the plan of operation intended.

In submitting these plans for approval the company represent that the expense involved in the erection of the plant will be large and more than should be incurred, but the investment is considered a permanent one and so the best design is submitted. The establishment of a laboratory is made a part of the plan because of the intention of operating the filters in the most efficient manner possible. While the plant is to be operated continuously and the supply from Morrison Run or from the river is much more suitable in its raw state to be furnished to the public than many of the domestic supplies in Pennsylvania, nevertheless the petitioners request that the Commissioner of Health remove from the watershed of the Allegheny river above the intake, all sources of sewage pollution at as early a date as may be found practicable.

There is a saw mill on Rogers Island. There is a club house on an island further up stream besides the hotel and adjacent dwellings which require to be inspected and looked after. This is clearly within the province of the State Department of Health and will be attended to.

Should conditions change before the tannery wastes now discharged into Dutchman Run are required to be treated whereby the wastes might reach the north bank of the river passing over the proposed new intake and interfere to any appreciable extent with the efficiency of the filter plant, it does not appear that a remedy would not be at hand as easy of adoption then as it would be at this time. The expense of providing an intake further up stream will be very considerable and it need not be undertaken until there is sufficient warrant for the expenditures.

It has been determined that the new source of supply and the plans therefor are not prejudicial to public health and the same is hereby and herein approved and a permit granted therefor under the following conditions and stipulations:

FIRST. That when the new works shall have been established the old pump house and driven well supply shall be absolutely abandoned.

SECOND: Weekly reports of the operation of the water works system, particularly of the purification plant shall be made to the State Department of Health on blank forms satisfactory to the Commissioner of Health. If at any time, in said Commissioner's opinion the water works system or any part thereof, has become defective or outgrown or insufficient, or the water furnished thereby prejudicial to public health, then such remedial measures shall be adopted by the Company as the Commissioner of Health may approve or advise.

THIRD: Because Morrison Run is now the major supply and in view of the stipulation in the decree of the Commissioner of Health of the Warren Water Company relative to Morrison Run supply under date of March fifteenth, one thousand nine hundred and seven, wherein it is stipulated that such supply shall either be filtered or abandoned, it is herein specially stipulated that the purification plant herein approved shall be erected and put into commission on or before eighteen months from the date of this permit. The water company will notify the Commissioner of Health when the new plant is put into commission. The company shall make a sanitary inspection of the Morrison Run watershed in the spring and the fall of each year and file reports thereof with the State Department of Health and take such precautionary measures on the watershed as may be necessary to safeguard public health.

FOURTH: This permit is issued with the understanding and stipulation that the filter plant is to be operated under skilled management and that the laboratory is to be used regularly in connection with such operation.

FIFTH: No sewage from the pump house or filter plant shall be discharged either directly or indirectly into the river. The company shall make monthly inspections of the three properties on the river bank opposite the purification plant and of the hotel and dwellings in the vicinity and of the saw mill on Rogers Island and dwellings in that vicinity and make reports thereof to the Commissioner of Health. It is the purpose of the State Department of Health to require a proper disposal of sewage at all occupied estates above the proposed water works intake.

Harrisburg, Pa., June 29, 1908.

WATERFORD BOROUGH, ERIE COUNTY.

Waterford Water Company.

This application was made by the Waterford Water Company of Waterford borough, Erie county, and is for permission to obtain an additional source of supply and to extend water works to supply water to the public in said borough.

Waterford borough is in Waterford township in the central part of Erie county, fifteen miles south of Erie city. The municipal territory is rectangular and contains a little less than one square mile. At the southwest corner are the shores of the LeBoeuf Lake, a body of water of considerable size, containing approximately over half as much land as lies within the borough. Leading into this lake is Beaver Run which passes by and through the western part of the village, having its source in the western portion of Waterford township about five miles above the lake.

The main feeder, however, is LeBoeuf Creek which heads in Summit township near Erie city and with its tributaries drain about fifty square miles. Below the lake this creek has a length of about two miles to the point where it empties into French Creek. Above the lake its course is due eastward away from the borough for a mile, whence it turns to the north. The Philadelphia and Erie Railroad from Erie city passes down the valley of this creek, Waterford station on the railroad being in the township one mile east of the borough.

Waterford borough was incorporated in eighteen hundred and thirty-three. Its population at that time was about four hundred. Now it is about eight hundred. The country round about is wholly agricultural and the village is residential. Besides the stores, there is a carriage shop and blacksmith and a grist mill. In provincial times Fort LeBoeuf was located in this vicinity and the site was early selected for a town. There are no immediate prospects of any great change in the size or character of the present borough.

There are no public sewers and but one private sewer. This leads from the Park Hotel to a swamp in the northwest part of the borough where it empties. Such disposal has not caused any complaint so far as is known.

Domestic wastes from dwellings is discharged into cesspools and privies. It is reported that the number of cesspools does not exceed a half dozen. The sub-soil and underlying earth is of a clayey, retentive nature. The water supply is generally obtained from dug wells walled up with loose stone and located on individual property. The surface of the ground within the borough is generally quite even, ascending gradually from the lake and the creek to the northern part of the borough where it has an elevation of about sixty feet above the lands along the creek. The danger from surface contamination, therefore, is minimized as is that from sub-soil pollution. The health of the inhabitants generally is excellent. The surroundings of private estates are kept in a sanitary condition.

The borough council by ordinance passed May twenty-second, nineteen hundred and six, granted to Charles Himrod and his assigns the right to construct and maintain and operate a system of water works for the purpose of furnishing fire protection and for other purposes.

It appears that Mr. Himrod originated a scheme to obtain a gravity spring water supply for his private residence in Waterford. The spring was so situated that the pipe from it would necessarily pass through several of the village streets on the way to the Himrod mansion. Owners of abutting estates along this line desired the privilege of tapping the pipe and, Mr. Himrod consenting, the ordinance above cited was enacted by the borough council. The system was installed in nineteen hundred and six and water was furnished for the first time in September of that year. It is represented that the applicant did not then know of the law requiring State approval of plans and sources of public water supply.

The Waterford Water Company of Erie county was chartered on September thirteenth, nineteen hundred and seven to supply water to the public in said borough, such supply to be obtained from springs on outlets fifty-six, fifty-seven and fifty-eight in the borough, leased from D. W. Hunt, and from the "Woods" spring and other springs purchased from William Taylor and wife, located on the Taylor farm, being part of tract "E" in Waterford township.

The plant as it now exists comprises a collecting and storage reservoir at the springs on the hill in the northeastern part of the borough and the gravity pipe lines in the borough streets.

A spring formerly gushed forth from a gravel strata underlying several feet of clay in a slight depression. The petitioners excavated the surface earth here, exposing several other springs, and enclosed them all in an earth and clay embankment ninety feet long, seventy feet wide and six feet high. The capacity of this reservoir to a depth of four feet is two hundred thousand gallons. The territory from which the water is yielded is to the north beyond the borough. It is rolling farm land. Around the reservoir has been erected a tight board fence about six feet high and guarded on top by a barbed wire. A pipe leads from the bottom of the basin for drainage purposes. The measured flow of the springs in the reservoir is stated to be twenty-four thousand gallons per twenty-four hours. There are several small springs about six hundred feet north of this reservoir and on higher ground which may be utilized when required.

The water in the reservoir is about twenty-six feet above the square in the village half a mile distant. There is a six inch supply main leading to the town and connected with it are four inch pipes. The total length of these pipes is sixty-one hundred feet, of which forty-five hundred feet is four inch pipe. Forty families, including the Himrod residence, now use the supply. Ten fire hydrants have been installed at convenient points in the borough and connected to the street mains. The service is of course valueless for fire protection except pumping be resorted to.

It is represented that other property owners wish to use the public supply, but that owing to the slight elevation of the reservoir above the borough, which in some instances is lower than the residences in the north and east portion of the village, it is not practicable to grant this request. Therefore it is proposed to obtain an additional supply from several large springs located slightly more than a mile distant west of the borough on the Taylor farm. The elevation here is said to be ample to give the requisite head to furnish water to every point in the borough.

The proposed additional supply is sought and will be furnished for domestic purposes only. Either fire engines must be provided by the borough to insure fire protection or a pumping plant must be installed and the water raised to a tank or stand pipe. The expense of this improvement on the part of the borough is not warranted in the opinion of the local authorities, so it is said, and the expense would not be assumed by the petitioner until a guaranteed revenue sufficient to make the investment a profitable one were assured.

The water company contemplates the erection of a million gallon storage reservoir at or near the springs on the Taylor farm. The elevation of this structure would be somewhere between fifty and seventy-five feet above the borough. Plans of it and of the supply main have not been prepared or submitted neither have plans of the existing reservoir.

It is estimated that the new source, together with the existing source, will furnish one hundred thousand gallons of water daily. The present water consumers purchase water by meter and the consumption is thus known to be an average of thirty-five gallons per capita per diem. An estimate for future consumption of fifty gallons for the entire population would give a total daily demand of forty thousand gallons only. Hence on this basis the proposed storage and the present storage would give a month's supply of water to the town provided the springs cease to yield water.

It has been determined that the proposed source of supply will not be prejudicial to the public health and a permit is hereby and herein granted therefor and for the extension of the water pipes in the streets, under the following conditions and stipulations:

FIRST: Before the proposed reservoir is constructed detail plans of it and cross sections showing the manner in which the water is to be collected from the several springs and stored, together with the plan and profile of the supply main to town, shall be prepared and submitted to the Commissioner of Health for approval.

SECOND: A plan of the borough and the streets thereof showing existing water pipes and pipes which it is proposed to lay in all of the streets of the borough shall be prepared and submitted to the Commissioner of Health for approval at the time that the plans of the reservoir shall be submitted.

THIRD: Detail plans of the existing reservoir shall also be prepared and filed. The Commissioner of Health will consider these various plans, make such modifications thereof as may be deemed necessary and may issue a permit therefor. The Department of Health may from time to time investigate the water supply and the system of water works and make rules and regulations for the operation and maintenance thereof in so far as the interests of the public health are concerned. The water company shall conform to these requirements and if at any time in the opinion of the Commissioner of Health the source of supply or the water works or any part thereof shall have become prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

The attention of the petitioners is called to the desirability of the establishment of ample drainage facilities at the reservoirs and at suitable points in the distribution system.

Harrisburg, Pa., April 30, 1908.

WELLSBORO, TIOGA COUNTY.

Wellsboro Water Company.

This application was made by the Wellsboro Water Company of Wellsboro, Tioga county, and is for permission to extend its water works and to obtain an additional source of supply of water to the public within the said borough of Wellsboro.

The Wellsboro Water Company was chartered on August fourth, eighteen hundred and eighty-five, to supply water to the public in Wellsboro borough Tioga county, and the works were constructed in the following year and extensions have been made from time to time since to meet the demand for water. At that time the town's population was in the neighborhood of twenty-four hundred. At the present time it is estimated that the borough's population is thirty-two hundred. Wellsboro is the county seat and a very substantial resident town and trading centre for the surrounding country which is rolling farm land. It is the largest place in the county and the most important one. The village is situated in a hollow surrounded by hills through which three natural water courses in their northward courses pass to a junction, this point of confluence being in the north central part of the municipal territory at the lower edge of the village. The main stream thus formed is known as Marsh Creek. It flows northerly out of the borough into Dedmar township to Stokesdale Junction, whence its course is westerly about seven miles to Pine Creek, a tributary of the west branch of Susquehanna river.

The main branch of Marsh Creek is the easterly one. It goes by the name of Charleston Creek. The head waters are seven miles distant to the southeast, in Duncan township, and the course of the run is generally southwesterly through

Duncan and Charleston townships to the borough. The other branches are short local streams, the middle one being named Morris Run and the westerly stream being known as Kelsey Run.

The New York Central and Hudson River Railroad passing from Williamsport on the Susquehanna to Corning, New York, connecting with the Erie Railroad there, extends up Pine Creek and Marsh Creek valleys and thence northeasterly. A branch line starts at Stokesdale Junction and follows up Marsh Creek to Wellsboro and thence along Charleston Creek for its entire length, terminating at the village of Antrim in Duncan township.

At the headwaters of Charleston Creek and nearby on the rising ground to the east, there are two streams named Rock Run and Nickle Run which rise here and flow southerly in another watershed. The springs and surface waters of these two runs furnish the principal supply to Wellsboro. It is reported that the wells are walled up and housed over and kept under lock and key. On the runs there are intakes from which surface waters are taken when the waters are clear. At the township line between Duncan and Charleston townships there is a gate house and from the meagre information now in possession of the Department it would appear that at times Charleston Creek water is taken into the main at this point. Morgan Spring which is the source of the dry weather flow of Charleston Creek, is located along the roadside and the railroad and its flow is diverted into the gravity main. The entire territory is elevated four hundred feet or more above the storage reservoir in Wellsboro and hence there is ample fall for a gravity supply to the town.

Details of the springs, collecting pipes, intakes and gate houses and the gravity main have not been submitted and filed in the office of the Department of Health.

In the borough on the hill between Charleston Creek and Morris Run and elevated about one hundred and eighty feet above the principal part of the village are the storage reservoirs, two in number, located together, the larger one having an area of four and a half acres, a maximum depth of twenty feet and a capacity of seventeen million gallons, and the small one having an area of one and eighty-one hundredths acres, a maximum depth of twelve feet and a storage capacity of five hundred gallons. Their shapes are irregular, having been excavated and conforming to the natural topography of the contours.

The water thus stored has been treated chemically every year since nineteen hundred and four to destroy algae. Copper sulphate was used with success. The fishy odor and offensive taste noticeable in former years has been obviated, so it is reported.

Detail plans of the reservoirs and of the distributing system have not been submitted. It is understood, however, that the streets of the borough are quite thoroughly piped and that two-thirds of the inhabitants use the public supply.

The water company has each year extended the distributing pipe system without being aware that an application of a general character for permission to extend the water works system from time to time as it became necessary or desirable should have been made to the State health authorities. As the case now stands, the Commissioner of Health does not know in what parts of the borough public water is available and where the citizens must rely wholly on private sources for drinking water. The law contemplates that the records on file in the Commissioner of Health's office shall always be sufficient to enable said Commissioner to know the extent of the existing water works system and its public use.

There are a number of individual wells in commission in the borough. There is a public sewer system and over fifty per cent. of the population live in dwellings which have a sewer connection. Nevertheless, the ordinary privy abounds and sink drainage is disposed of in a more or less promiscuous manner. During the past five years cases of typhoid fever occurred in the Sears street neighborhood in the northwestern part of the borough. The district goes by the name of Frogtown, owing to its swampy character. The cases of typhoid were attributed to the pollution of the private dug wells which were located in proximity to privy vaults, pig-pens and stables. Since then the water company has extended its pipes to this district, so it is reported.

In Duncan township, in the centre of Warrant Number Fifteen hundred and seventy-nine, on a fifty acre tract of ground owned by the water company, there is a spring whose capacity is forty thousand gallons a day, known as McConnells Spring, whose water it is the intention of the company to add to their existing supply. No details or explanations of how this water is to be taken into the system is given, but the petitioner states that the spring is distant about eight thousand feet southwesterly from the present gate house on the supply main at the Charleston-Duncan township line.

It appears, however, that the said spring is really a spring run and that it is the purpose of the company to erect an intake and divert the flow to the collecting pipe. It is represented that there is no habitation, barn or other structure on the drainage area, and that the waters will be free from contamination.

It is evident, from the meagre information which the water company has thus far given to the State Department, that it is not aware of the purpose of the law and the responsibility thereunder which the Commissioner of Health assumes in approving existing water works and pronouncing an additional source of supply to be not prejudicial to public health. If there be a single permanent source of sewage pollution on any of the drainage areas to the springs or runs used as a source of supply to Wellsboro, it should be watched. Its existence should be clearly made

known by the company to the State Department of Health and rules and regulations can then be framed and executed in relation thereto as a public safeguard. It is quite possible that the Scranton typhoid fever epidemic of nineteen hundred and seven was caused by infection from a passenger coach on the railroad. The proximity of the road bed to a stream supplying the public with water is a menace.

In spite of all precaution any surface supply may be poisoned and when infection once gets into a public water works system, its prompt eradication is a vital necessity. The Commissioner of Health must have detailed information on file relative to all parts of the water works system in order to be able to promptly do his part in safeguarding the public health if occasion requires. A water company is promoting its own interests and rendering its investments more stable by cooperating with the State Department of Health.

In view of these circumstances and the lack of adequate information now at hand relative to the Wellsboro water works system, it has been determined that the interests of the public health require that approval of the water works system and a permit to extend the same and to take the additional supply be withheld, and such approval and permit are hereby and herein withheld, until the said company shall have submitted the maps and detailed information of the watersheds and sources of the present and proposed supply and the other parts of the system hereinbefore mentioned.

Upon the receipt of this information, the State Department of Health will institute tests of the various waters and if they be found satisfactory the permit will be issued under such conditions and stipulations as usually obtain in permits of like character.

Harrisburg, Pa., May 11, 1908.

WELLSBORO, TIOGA COUNTY.

Wellsboro Water Company.

This application was made by the Wellsboro Water Company of Wellsboro, Tioga county, Pennsylvania, and is for permission to obtain an additional source of supply and to extend water pipes in certain streets of the borough.

It appears that on May eleventh, nineteen hundred and eight, the Commissioner of Health issued a decree to the Wellsboro Water Company of Wellsboro, Tioga county, Pennsylvania, in response to an application for permission to extend its water works and to obtain an additional source of supply of water to the public within the said borough of Wellsboro. The said decree, among other things, contained the following statements:

"It is evident from the meagre information which the water company has thus far given to the State Department, that it is not aware of the purpose of the law and the responsibiity thereunder which the Commissioner of Health assumes in approving existing water works and pronouncing an additional source of supply to be not prejudicial to public health. If there be a single permanent source of sewage pollution on any of the drainage areas to the springs or runs used as a source of supply to Wellsboro, it should be watched. Its existence should be clearly made known by the company to the State Department and rules and regulations can then be framed and executed in relation thereto as a public safeguard. It is quite possible that the Scranton typhoid fever epidemic of nineteen hundred and eight, was caused by infection from a passenger coach on the railroad. The proximity of the road bed to a stream supplying the public with water is a menace. In spite of all precaution a surface supply may be poisonous and when infection once gets into a public water works system, its prompt eradication is a vital necessity. The Commissioner of Health must have detail information on file relative to all parts of the water works system in order to be able to promptly do his part in safeguarding the public health if occasion requires. A water company is promoting its own interests and rendering its investments more stable by co-operating with the State Department of Health.

"In view of these considerations and the lack of adequate information, now at hand relative to the Wellsboro Water Works System, I have determined that the interests of the public health require that approval of the water works system and a permit to extend the same and to take the additional supply be withheld, and I do hereby withhold such approval and permit until the said company shall have submitted the maps and detail information of the watersheds and sources of the present and proposed supply and the other parts of the system hereinbefore mentioned."

The water company has neglected and refused thus far to furnish the information called for with the exception of a detailed topographical map of one of the storage reservoirs on Bacon Hill and a map of the borough on paper of such poor quality as to be unsuitable for filing. This map does not show the sizes of the pipes or the location of valves and drainage facilities.

A letter has been received giving a detailed description of springs, intake at Mickle Run and Rock Run, gate house and intake on Charleston Creek, reservoirs and intake at them and a description of the sizes and lengths of distributing pipes in the village. Also a description of McConnell Spring to be used as the additional supply.

The McConnell Spring is located about eight thousand feet south of the present gate house on Charleston Creek. The spring is the head water of a small run. The company has purchased about fifty acres and there are no buildings of any description on it. The company purposes to build a small masonry dam across the run and to place a filter box filled with wash gravel in the reservoir formed by the dam and from this intake box lay a six inch pipe twenty feet long through the dam and thence for about a mile down the run, the line is to be a six inch vitrified pipe and thence for about three thousand feet the grade will be steeper and a four inch vitrified pipe is to be used. A valve twelve inch blow-off pipe will afford drainage facilities of the small reservoir at the dam. Near the main conduit line is to be a collecting chamber. The spring run water may be overflowed at this point or it may be delivered to the main line leading to the town. The spring run is to be fenced on both sides.

It has been determined that a permit be granted for this additional source and for the extension of water pipe lines but only under the following condition; namely, that on or before December first, nineteen hundred and eight, the Wellsboro Water Company shall prepare all of the maps and plans called for in the said decree of May eleventh, nineteen hundred and eight and submit the same to the Commissioner of Health; whereupon, if the information be satisfactory, the said Commissioner of Health will issue a final permit under the customary conditions and stipulations.

It is expressly stipulated that the approval herein given to the additional source of supply and for the extension of a pipe line in Nichols, Sears and Ellis streets, is of a temporary character only. The permanent permit, when the information called for has been filed in the Department, will relate to the permanent conditions under which the water works system and the source of supply will be pronounced not prejudicial to public health.

Harrisburg, Pa., July 7, 1908.

WINDBER, SOMERSET COUNTY.

Windber Water and Power Company.

This application was made by the Windber Water and Power Company and is for extension of water works and for an additional source of supply of water to the public within its chartered territory.

On said date, November twentieth, nineteen hundred and seven, the Windber Water and Power Company made an application for an extension of water-works and for an additional source of supply of water in the boroughs of Windber and Paint, Somerset county, and to the borough of Scalp Level and the township of Richland in Cambria county.

The great divide in the Allegheny mountains between the Susquehanna and the Ohio river basins has made the boundary between Bedford county on the east and Cambria and Somerset counties on the west. The waters of the western slope are gathered by numerous lesser streams and emptied into Stony Creek which flows northerly through the central part of Somerset county and Cambria county to the Conemaugh river at Johnstown. In the latter county Richland township extends from the creek part way up the western slope and the other part is comprised in Adams township. In Somerset county adjoining Richland township is Paint township, the upper slopes to the summit lying within Ogle township and next southerly and extending from Stony Creek to the divide is Shade township. Paint and Windber boroughs have been recently incorporated out of Paint township. Scalp Level borough was incorporated out of Richland township. This place and Paint borough are separated only by the county line between Cambria to the north and Somerset to the south. Before Paint borough was organized it was known as Scalp Level. In fact these two municipalities and Windber are practically all one community. The latter has a population of about five thousand and the other boroughs about one thousand each. They owe their existence and support to the extensive coal mine operations of the Berwind-White Coal Mining Company which operates eleven coal mines in the district. The extensive mining tracts are held by a subsidiary concern known as the Wilmore Coal Company.

The boroughs and nine of the operations are in Paint Creek valley, a stream which drains Richland, Adams and a part of Paint township. The other operations are in Shade Creek valley next south which drains Ogle, Shade and the other part of Paint townships.

The Windber Water and Power Company was incorporated in April, nineteen hundred to supply water to the public and for commercial and manufacturing purposes. Paint and Shade townships in Somerset county, which now included the two boroughs since incorporated out of the former township. Hence its chartered territory does not include Scalp Level borough and Richland township.

Prior to the existence of this Water and Power Company, the Paint Township Water Company had been incorporated to supply water to the public in Scalp Level, Paint township, Somerset county.

A charter was granted to the Richland Township Water Company in eighteen hundred and ninety-seven to supply water to the public in Richland township, Cambria county, out of which township Scalp Level borough has since been organized.

Each of these companies has built water works besides furnishing water to the public in the boroughs and mining villages, a very important part of their work is to supply water for steaming purposes to the various plants of the Berwind-White Company. In fact the water companies are subsidiary to the said Berwind-White Company.

The Richland Township Water Company obtains its supply from a dam on Little Paint Creek, located about two miles above Scalp Level borough. The watershed contains about seven miles of very rugged territory. The village of Elton, Adams township, is on the stream about a mile above the dam. The population of this place is approximately two hundred and fifty. Two sanitary inspections have been made of the occupied estates in the village and a number of formal notifications for abatement of menaces have been issued by the Commissioner of Health. The Scalp Level Branch of the Pennsylvania Railroad comes into Windber and the local coal fields down and along Little Paint Creek, and this is also a possible menace to those who drink the water supplied from this source. Regular inspections and the maintenance of sanitary conditions at all occupied estates on this watershed are essential. The toilets on the passenger coaches should not be used in Little Paint Creek Valley.

The water from this dam is furnished by gravity through an eight inch pipe to mine number forty and a settlement of one hundred frame houses (double tenements), to the borough and to mine number thirty-seven in Richland township and a settlement of about one hundred double houses.

The Water Company has not filed in the State Department of Health a detailed plan of the dam and of the watershed above it or of the supply main to the town.

The Paint Township Water Company obtains its supply from two dams located on Paint Creek, two or more miles above Windber. The watershed is a wild region almost entirely wooded and is said to be free from permanent sources of pollution. No plans of the reservoirs and of the watershed and of the supply main have been submitted.

There are two supply mains, one an eight inch and one a ten inch pipe which follow down Paint Creek Valley from the reservoirs, passing through Windber and supplying water to it and to mines number thirty-six, thirty-five, thirty-two and thirty-one. A branch line extends southerly into the township to mines number thirty-three and thirty-four and the tenement houses in the vicinity the water being delivered by pumps. A six inch main extends into Paint borough and supplies the inhabitants there and mine number thirty and the tenement houses in the vicinity.

Evidently the village of Scalp Level in Somerset county, now Paint borough originally comprised not only that settlement but the mines and tenement houses in the vicinity thereof.

The Windber Water and Power Company built its first works (comprising an intake on Shade Creek, pumping station, tanks and distributing pipes), in Paint township at mines number thirty-eight and number thirty-nine and the neighborhood houses. This district is near the mouth of Shade Creek four miles southwest of Windber. The watershed contains about eighty square miles and on it there are eight villages. The water consumption is said to be ninety thousand gallons daily, of which sixty-six thousand gallons are used for industrial purposes.

There is a connection at the county and borough line between the water pipes of Paint Township Water Company and the Richland Township Water Company so that either one may furnish water to the other if desired. It is stated that the valve is left open. The combined daily consumption in the districts of these two companies is reported to be one million eight hundred thousand gallons, of which one million gallons are used for industrial purposes.

The following representation is made by the Windber Water Power Company:

"That the present course of supply to the inhabitants of the boroughs of Windber and Paint and mines thirty-six, thirty-three, thirty-four, in Paint township, Somerset county, Pennsylvania, and the borough of Scalp Level and Richland township in Cambria county, Pennsylvania, at present supplied by the Paint and Richland Township Water Companies is wholly inadequate and insufficient for industrial and domestic purposes by the increased demand and the decrease in supply each year, so we are compelled to ask for a permit to take water from Dark Shade Creek. Our object in going to the point indicated on blue print is to get as far up on the watershed as possible and thus avoid the chances of the water being polluted and preserve the public health."

The new source of supply is to be derived from the head waters of Shade Creek. About eight miles south of Windber borough and higher up the mountain slope in Shade township there is a mill privilege known as McGregors on Dark Shade Creek. It consists of a dam flooding an area of about fifty acres to a shallow depth. Into this mill pond empty three streams of about equal size and area, named Beaver Dam Run, Dark Shade Creek and Little Dark Shade Creek. All told they drain an area of twenty-eight square miles of mountainous wooded country on which resides an estimated population of two hundred people. Lumber operations are still in progress. Public roads cross the streams on the area and there are three villages at cross roads, two of them four thousand feet above the reservoir and the other at the head of Beaver Dam Run.

The petitioners intend to reconstruct the old dam to a higher elevation and to build it out of concrete with an overflow weir one hundred and fifty feet in length. The depth of the water at the dam will be about twelve and one-half feet and the storage capacity of the reservoir is reported as sixty-seven million gallons but this seems to be too small for the area flooded. Detail plans of the storage basin have not been received.

The intake chamber of masonry is to be on the inside of the dam near its centre at the end of the spillway weir. Its diameter is to be twelve feet. The ports are twenty-four inch openings respectively two and five and five-tenths feet above the bottom of the chamber. Each opening is provided with a gate and double perforated plate screen. A thirty-six inch pipe blow-off affords means of draining the reservoir through said chamber.

The gravity supply main to the town is to be twenty-four inches. It is to begin at the bottom of the intake chamber and to extend down the valley of Shade Creek for a distance of about three miles and thence it is to pass northerly part of the way through a tunnel to the divide between Shade and Paint Creek watersheds, a total length of twenty-seven thousand, one hundred feet where the main is to reduce to eighteen inches in diameter for thirty-three hundred feet and thence to sixteen inches for twenty-two hundred feet, terminating in a relief basin, details of which have not been submitted. The elevation of high water in this basin is to be nineteen hundred and fifty which is two hundred and fifty feet above the termination of the proposed new main at twenty-second street in Windber. This last section of main will be nine thousand feet long and have a diameter of twenty-two inches.

Along the entire line from McGregors to Windber drainage facilities are to be afforded at every low point and air valves are to be placed on all summits. On the Paint Creek slope the line is to pass down Seese Run and Eureka mine number thirty-three and number thirty-four in Paint township.

Examination of the records in the office of the Secretary of State fail to show any sale or purchase or consolidation or merger of the franchises and property of the three water companies herein mentioned. They are independent corporations, controlled by one dominant interest. Therefore, the Windber Water and Power Company would appear to have no right to sell water to the public in Cambria county, its charter territory being confined to Paint and Shade townships in Somerset county wherein it can supply water to everybody, the Paint Township Water Company not excepted. Hence so much of the application now under consideration, as obtains to the supply of water to the Richland Township Water Company is irrelevant and beyond the present power of the Commissioner of Health to grant. But the Richland Township Water Company, can, with approval, buy water of the petitioners at the Paint Township line as it now, presumably, buys water of the Paint Township Water Company at said line and it may be presumed that this is the way the petitioners intend to carry out their purpose expressed in the application.

The mining settlement at number thirty-eight known as Berwindino in Paint township, contains two hundred tenement houses. They are located along the hillside on the south side of Shade Creek. About two thousand feet further down stream is the post office Seanor. Midway of these hamlets in the fall of nineteen hundred and five the water company maintained its intake and pumping station. The privy vaults at Berwindino were of the ordinary kind and in the usual overflowing condition, surface drainage from them being directly to the creek and all at points from six hundred to three thousand feet above the said intake. The pumps raise the water to tanks on the hill in the vicinity from hence the water was distributed through pipes laid in the streets of both hamlets. In November and December about thirty cases of typhoid fever occurred among the water consumers. In October at the lumbering camp of Arrow in Paint township on Sandy Run a tributary of Roaring Fork, a branch of Shade Creek, there had been an outbreak of typhoid fever totalling about thirty cases. The houses there were located on either side of the Saw Mill Pond. Sanitary directions were disregarded and it was quite probable that the poison reached the stream and that the infection was transmitted therein to the water consumers at Berwindino. The Arrow outbreak was not traced to any definite origin. The ice used at the camp was obtained from Ashtola, another lumber town one and a half miles distant, also on Roaring Fork. The ice had been harvested two years previous at which time there were several cases of typhoid fever in the dwellings adjacent to and draining into the pond from which the ice was cut. The Arrow water supply was derived from five springs connected by pipes with the hamlet. The Windber Water and Power Company immediately extended the water works intake up stream to a point above where it thought pollution from the mining settlement would occur. This was a temporary expedient, and now the petitioners represent that the pumping station is to be done away with and that a gravity water supply from the twenty-four inch main leading from McGregor's dam is to be introduced into Berwindino, thus obviating the danger incident to the use of Shade Creek water from the eighty mile watershed. Until the new supply be introduced the water consumers should be notified and requested to boil the water used for domestic purposes.

While the McGregor's dam watershed is sparsely populated, nevertheless the existence of a lumbering camp on it or other villages makes it imperative in the interests of public health that proper receptacles for sewage should be provided and used. The water company can easily maintain a sanitary patrol. Negligence could bring

about an epidemic in Windber. Rules should be adopted and put in force governing the disposal of sewage at all occupied estates and at lumber camps and everywhere on the watershed. The State Department of Health can co-operate and secure an abatement of any menace and this it will do, but the responsibility for furnishing a pure and wholesome water to the public primarily rests with the water company. Mountain streams are more dangerous as carriers of infection than are the rivers into which much sewage may be discharged, because the former are rapid flowing and may carry a virulent poison immediately to the water consumer while in the latter opportunities for natural destructive agencies may abound and thus minimize the danger. It is upon the efficiency of a mountain watershed patrol that the safety of such supply depends where the area is inhabited. The alternative is filtration. It should not be necessary to filter the McGregor dam supply or those of the other two companies.

Since the water works system of Scalp Level, Paint and Windber boroughs are connected and the source of one may be the source for all at any time and since the Little Paint Creek supply has sources of menace on its watershed and so has McGregor's dam, and in the event of the poisoning of one source demanding the attention of the State Department of Health to prevent or limit an epidemic, it would be necessary to know the extent of the use of the different sources in the water works district and to be in possession of facts as to the operation of valves, blow-offs and the system in general, it is essential that the water company should keep a record of such operation.

The Richland Township Water Company is required by law to obtain a written permit from the Commissioner of Health before using any additional source of supply such as the purchasing of water from the Windber Water and Power Company would be. The Paint Township Water Company is also obliged to make an application for an additional source of supply and receive a permit therefor before it can legally purchase water of the Windber Water and Power Company. The water pipes in Windber and Paint boroughs now belong to the Paint Township Water Company and the source of supply has been a definite one. While the company maintains its independent existence, the law is plain relative to the obtaining of an additional source of supply. The Paint Township Water Company has not signified its intention of securing another source. Such an application would be favorably received, so would a similar one from the Richland Township Water Company.

The petitioners do not show any contemplated distributing pipes for Windber and so far as the Department of Health is informed, the company does not intend to do more than supply to the public, within the borough territory through the street mains of the existing water company, such water as may be needed to make up the deficiency of the existing sources.

It has been determined that the plans for the additional source of supply and for the extension of water works will not be prejudicial to public health and a permit is hereby and herein granted therefor under the following conditions and stipulations:

FIRST: That the company shall prepare a map of the watershed above McGregors dam showing its area and all roads, lumber camps and occupied estates thereon and file the same in the office of the State Department of Health on or before the date when water from the new supply herein approved shall be used by the company for the purposes hereinbefore described.

SECOND: The water company shall maintain a sanitary patrol of the watershed and inspections at every lumber camp and at all occupied properties shall be made at least monthly and a report thereof made and filed with the Commissioner of Health. The water company shall see that proper receptacles for sewage are provided at all such camps and occupied estates and that these receptacles shall be used and properly maintained to prevent any contamination whatsoever of surface waters on the watershed. Any neglect on the part of any owner or individual to comply with sanitary regulations shall be promptly reported by the water company to the Commissioner of Health. The presence of any infectious disease on the watershed shall also be promptly noted and recorded.

THIRD: On or before the time when the works herein approved shall have been construced and put in operation, detail plans of elevation of McGregors dam and reservoir, of the gravity main and relief basin and delivery pipe to town of Berwindino and Windber or elsewhere in the charter territory shall be prepared and filed in the office of the Commissioner of Health, together with any other information in connection therewith that may be required, and thereafter, at the close of each season's work plans of all extensions of distributing mains laid during the season, shall be prepared and filed in the office of the Department of Health to the end that there shall always be in said office a complete plan of the water works system as it exists.

FOURTH: The present source of supply, Shade Creek, at Berwindino is condemned as unsuitable to use in its raw state for a domestic supply. Either the company must carry out its contemplated plans for the introduction of the new source herein approved or the water must be filtered. Meantime, the company shall not fail to notify the water consumers to take the health precaution of boiling all water to be used for domestic purposes.

FIFTH: The Windber Water and Power Company shall not sell or furnish an additional supply of water to any other water company more especially the Paint Township Water Company and the Richland Township Water Company unless said

companies can show and do show to the Windber Water and Power Company a written permit by the Commissioner of Health issued for such an additional source of supply. The approval herein given to the plans of the Windber Water and Power Company should be taken as an indication that the Commissioner of Health will favorably consider applications duly made for the use by the other companies of the McGregor dam supply.

SIXTH: If at any time in the opinion of the Commissioner of Health, the water supply, or the water works, or any part thereof has become prejudicial to public health, then the water company shall adopt such remedial measures as the Commissioner of Health may approve or suggest.

SEVENTH: The water company shall keep a weekly report of the operation of the system on blank forms satisfactory to the Department of Health and submit copies thereof to the Commissioner of Health whenever required.

EIGHTH: Regular inspections will be made of the system by a Department officer, and the State Department of Health may suggest rules and regulations to govern the supply of water to the public in so far as the public health is concerned. The water company shall co-operate with the Department and furnish facilities for inspection and assist in the examinations if required.

NINTH: This permit is issued under the express stipulation that the Windber Water and Power Company has the power under its charter to do the things mentioned and proposed and hereinbefore described and approved for Shade and Paint township. The approval of plans to sell water to the public in Richland township is denied.

Harrisburg, Pa., May 19, 1908.

WINDBER, SOMERSET COUNTY.

Windber Water and Power Company.

This application was made by the Windber Water and Power Company of Windber borough, Somerset county, and is for permission to obtain an additional source of supply from Clear Shade Creek.

On May nineteenth, nineteen hundred and eight, the Commissioner of Health granted a permit to the Windber Water and Power Company of Windber borough, Somerset county, to extend its water works and to obtain an additional source of supply from Dark Shade Creek: The company proceeded to negotiate for land and rights of way and meeting with obstacles, it has decided that the better course to pursue would be to obtain the first additional supply from Clear Shade Creek and it purposes so to do if a permit can be obtained. It is deemed advisable by the Windber Water and Power Company to have a choice of additional sources and to be empowered to use either or both as necessity may require.

The general situation with respect to topography, location and drainage of Shade Creek and its tributaries is fully set forth in the said permit of May nineteenth, nineteen hundred and eight.

Dark Shade Creek and Clear Shade Creek unite to form the main stream of Shade Creek. The company purposes to erect an intake dam on Clear Shade Creek above the coal measures. The general form of construction is to be similar to that approved for the Dark Shade Creek supply. Details, however, have not been prepared. They will be admitted later. The watershed will be approximately twenty-nine square miles and on it there are three lumber camps, whose operations will continue for possibly two years. There is also the settlement of Ogletown where eighty people reside and above on farms as many more citizens permanently abide. The supply main is to extend down the valley of the creek to Dark Shade Creek and thence the main will follow the line to Windber borough hereinbefore approved with the exception that the tunnel between Shade Creek and Roaring Fork will be obviated. The new reservoir is to be at a sufficiently high elevation to deliver the water by gravity over the hill between these two streams.

It has been determined that the proposed Clear Shade Creek supply will not be prejudicial to public health and a permit is hereby and herein granted therefor under the following conditions and stipulations:

FIRST: That the Dark Shade Creek supply shall not be used without a further permit by the Commissioner of Health in the event that the Windber Water and Power Company should decide to use Clear Shade Creek supply at once, or if the company should select the Dark Creek supply as originally intended, then it shall not use the Clear Shade Creek supply herein approved until after a further permit be obtained from the Commissioner of Health. It is not the intention to grant in this permit the right to use both sources of supply unless said sources are to be used immediately.

SECOND: The water company shall prepare a map of the Clear Shade Creek watersheds above the proposed dam, showing its area and all roads, lumber camps and occupied estates thereon, and file the same in the office of the State Department of Health on or before the date when water from the new supply herein approved shall be used by the company for the purposes hereinbefore described.

THIRD: The water company shall maintain a sanitary patrol of the watershed and inspections of every lumber camp and at all occupied properties shall be made at least monthly and a report thereof made and filed with the Commissioner of Health. The water company shall see that the proper receptacles for sewage are provided at all such camps and occupied estates and that these receptacles shall be used and properly maintained to prevent any contamination whatsoever of surface waters on the watershed. Any neglect on the part of any owner or individual to comply with sanitary regulations, shall be promptly reported by the water company to the Commissioner of Health.The presence of any infectious disease on the watershed shall also be promptly noted and recorded.

FOURTH: On or before the time when the work herein approved shall have been constructed and put in operation, detail plans and elevations of the dam and reservoir, of the gravity main and relief basin and delivery pipe to the town of Berwindino and Windber or elsewhere in the charter territory shall be prepared and filed in the office of the Commissioner of Health, together with any other information in connection therewith that may be required, and thereafter, at the close of each season's work, plans of all extensions of distributing mains laid during the season, shall be prepared and filed in the office of the Department of Health to the end that there shall always be in said office a complete plan of the water works system as it exists.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the water supply or the water works, or parts thereof has become prejudicial to public health, then the water company shall adopt such remedial measures as the Commissioner of Health may approve or suggest.

SIXTH: The water company shall keep a weekly report of the operation of the system on blank forms satisfactory to the Department of Health and submit copies thereof to the Commissioner of Health whenever required.

SEVENTH: Regular inspections will be made of the system by a Department officer, and the State Department of Health may suggest rules and regulations to govern the supply of water to the public in so far as the public health is concerned. The water company shall co-operate with the Department and furnish facilities for inspection and assist in the examination, if required.

Harrisburg, Pa., June 30, 1908.

YORK, YORK COUNTY.

York Water Company.

This application was made by the York Water Company of the city of York, York county, and is for an extension of its water purification plant and for permission to extend its street main system from time to time as necessity may require.

It appears that the York Water Company was created under the provisions of an act approved February eighth, eighteen hundred and sixteen, for the purpose of supplying water for domestic and manufacturing purposes in York.

On July twentieth, eighteen hundred and ninety-six, the water company of Manchester township, was duly incorporated for the purpose of supplying water to the public in the township of Manchester, York county, and the following year said company sold and conveyed its franchise and all its real and personal property to the York Water Company. On the said July twentieth, eighteen hundred and ninety-six, the water company of Manchester township was duly incorporated to supply water to the public in the township of West Manchester and the following year sold its franchises and all property to the said York Water Company.

Also on said July twentieth, eighteen hundred and ninety-six, the water company of Springgarden township was duly incorporated to supply water to the public in Springgarden township, York county, and the following year it also sold out to the said York Water Company.

The Mayersville Water Company was duly incorporated to supply water to the township of Manchester, York county, on October thirteenth, eighteen hundred and ninety, and on the twenty-third day of April, eighteen hundred and ninety-eight, said company sold its franchise and property to the York Water Company, including a pumping station, engines and supply well near the village of Mayersville in said Manchester township and a force main and reservoir. The station machinery was removed and the reservoir abandoned. The site of the latter is now under cultivation.

Thus it appears that the York Water Company absorbed the other water companies hereinbefore mentioned under provisions of law and hence extended its charter territory to include, besides York, the townships of Manchester, West Manchester, and Springgarden, which entirely surround the city of York.

It further appears that the York Water Company had, prior to nineteen hundred and six, extended its water mains beyond its charter territory easterly of Springgarden township into Springetsbury township, either through ignorance or with the direct intent of neglecting such limit. Considerable money was expended in such extension. To protect these expenditures and to legalize the distribution of the water in Springetsbury township, the directors of the York Water Company formed

two independent associations and applied for charters therefor under the names of the Water Company of Springetsbury township and the Kreutz Creek Water Company, the purpose of the former company being to supply water to Springetsbury township and of the latter company to supply water to Hellam township. The latter application was denied, but on November twenty-seventh, nineteen hundred and six, a charter for the water company of Springetsbury township was approved. This approval was with the understanding that the source of supply was to be filtered water purchased of the York Water Company.

The city of York is the county seat and a thriving municipality located in the central part of the county on Codorus Creek at a point about nine miles above the mouth of the stream into the Susquehanna river. Its industries are varied and have contributed to the remarkably rapid yet substantial growth of the city and its environs during the last two decades. In nineteen hundred the population of the city and the surrounding boroughs and townships was forty-two thousand. At the beginning of the previous decade it was thirty thousand. At the present time it is sixty-three thousand, distributed as follows: City of York, fifty-one thousand five hundred; North York borough, two thousand; West York borough, one thousand; West Manchester township, two thousand; Manchester township, one thousand five hundred; Springgarden township, two thousand, and Springetsbury township, two thousand, total, sixty-three thousand.

The York Water Company supplies all of York City and North and West York boroughs, or all of the built-up portion thereof, and populations of sixty in Manchester, eight hundred and forty in West Manchester, eleven hundred and eighty in Spring Garden and forty in Springetsbury townships. The remaining inhabitants obtain their water supply from individual sources, thus the said York Water Company supplies fifty-seven thousand six hundred and twenty people, out of a total population of sixty-three thousand. These figures are approximations.

The original supply in eighteen hundred and sixteen was obtained from springs and furnished through wooden pipes. The source was supplemented in eighteen hundred and forty-nine by pumping water from infiltration galleries along the banks of Codorus Creek in the upper part of the town. The South Queen Street distributing reservoirs, built about eighteen hundred and fifty-two, were abandoned in the latter part of eighteen hundred and ninety-seven, together with the said distributing reservoirs and the original supply at which time the present source was first put in use.

The new supply was necessary because of the inadequacy of the infiltration galleries to furnish satisfactory water to the rapidly growing community. The new sedimentation basins were entirely completed during eighteen hundred and ninety-eight, on March third, eighteen hundred and ninety-seven a filtration plant was put in operation and in nineteen hundred and two a filtered water basin was completed and thus the works exist to-day.

So it appears that for fifty years the York Water Company pumped water from the Codorus Creek and supplied it for public uses in the town. About three miles above York the main stream forks in two branches, called the South and West Branches.

The new pumping station was built on the banks of the South Branch immediately above the confluence. In appropriating the waters of the South Branch for public purposes it does not appear that the water company exercised its right of eminent domain and hence its rights were not superior to those of other riparian owners along the stream.

Water was first served to York from the new pumping station late in December, eighteen hundred and ninety-seven. The large sedimentation reservoirs were in an incomplete stage, so raw or possibly partially subsided creek water was delivered directly to the consumers in the district. This delivery was followed almost immediately by a serious outbreak of typhoid fever in York, totalling four hundred and fifty-three cases before the epidemic subsided. On investigation it was ascertained that there were eighteen cases of typhoid fever in the borough of Glen Rock during the month of January. This place is twelve miles above the water company's intake and on the same stream. The dejecta, in a number of cases, was permitted to reach the stream and thus poison the supply of water to the public in York. To meet the situation and to adequately protect the public health, the York Water Company at once began the installation of a filter plant and it also instigated proceedings in the courts or co-operated with the State Board of Health to secure abatement of nuisances in Glen Rock.

George P. Yost was indicted for maintaining a nuisance by reason of the discharge of sewage from a privy into the south branch of the Codorus Creek at Glen Rock, from which at a point below, numerous citizens of the Commonwealth obtained and were supplied with water for drinking and domestic purposes. The case was prosecuted by the Commonwealth. The second and third counts were for refusing to obey an order of the State Board of Health to abate and remove a nuisance under the Act of June third, eighteen hundred and eighty-five. Defendant was acquitted in the court of Quarter Sessions, and decision reversed on appeal to Superior Court. Mr. Justice Brown, of the Supreme Court, on July eleventh, nineteen hundred, handed down an opinion. The main question appears to have been on the question of the maintenance of a public nuisance by Yost. Among other things, His Honor declared as follows:

"If the public, having a right to take from this stream pure and unpolluted water, found in it germs of disease, coming from the cesspool of the defendant, which he maintained on a tributary of the stream, his offense would be a public one, for which he would be properly indicted. The wrong would be against the whole community, as a community—not simply against an individual or certain individuals, however numerous—and ought to be punished as a crime.

"If the public have a right to receive pure water through the agency of a corporation legally authorized to take it from a stream, he who pollutes it offends against the public.

"If, on the other hand, the waters of a stream, in which riparian owners alone have an interest, be polluted, the wrong or injury is a private one, for which the individual or individuals injured may have redress; and this is true whether the riparian owner be a private person or a water company which does not take the water from the stream under the right of eminent domain. The rights of such owners are the same.

"The defendant was in a criminal court and nothing was to be presumed against him. Before he could be convicted of any offense against the public, it was the duty of the Commonwealth to show that he had offended against the rights of the public. No such offense was proved; no right of the public to use the water pumped by the York Water Company was shown. If anything was proven on the trial, it was that a riparian owner, the York Water Company, had undertaken to divert and sell the water, alleged to have been polluted by the defendant, from the South Branch of the Codorus Creek, which was not even shown to have been a public stream.

"In the absence of any proof that it had a right to do so, such right, in a prosecution of this kind, we repeat cannot be presumed. The case, as presented to us for review, is one in which the waters of a stream may have been polluted by the defendant and were pumped out by a riparian owner for general use, but without any right on its part to so take and dispose of it. The wrong done by the defendant, if any, was to such riparian owner, the York Water Company, in depriving it of the use of pure water for ordinary domestic purposes, and any wrong committed was a private one, for which the remedy was purely civil.

"Without formal action by the State Board of Health directing a nuisance of the cause of any special disease or mortality to be abated and removed, its Secretary can neither speak or act for it in ordering the abatement and removal of the nuisance; and the disregard of an order so given is not indictable."

Under the law, Act One Hundred and eighty-two of nineteen hundred and five, all streams and springs and all bodies of surface and of ground water, whether natural or artificial, within the boundaries of the State are "waters of the State."

Section Eight of said Act reads as follows:

"All individuals, private corporations and companies that, at the time of the passage of this act, are discharing sewage into any of the waters of the State, may continue to discharge such sewage, unless, in the opinion of the Commissioner of Health, the discharge of such sewage may become injurious to the public health. If, at any time, the Commissioner of Health, considers that the discharge of such sewage into any of the waters of the State may become injurious to the public health, he may order the discharge of such sewage discontinued.

"Section Nine. Every individual, private corporation or company, shall discontinue the discharge of sewage into any of the waters of the State, within ten days after having been so ordered by the Commissioner of Health."

The York Water Company has represented that its source of supply to fifty-seven thousand people in its water district is subject to sewage pollution and has asked the Commissioner of Health to abate nuisances and remove menaces on the water shed.

It is a fact that the waters of the South Branch of the Codorus are subject to sewage pollution.

The South Branch and its tributaries above the pumping station of the York Water Company have a drainage area of about one hundred and ten square miles, on which are resident in the neighborhood of twelve thousand people, averaging one hundred and nine inhabitans per square mile. Of this population, about four thousand are situated in nine boroughs, the largest of which is Glen Rock having a population of about twelve hundred. The other boroughs average about three hundred and fifty inhabitants each. There are seven townships or parts of townships in the watershed occupied largely by farming lands and quite thickly populated, for a country district. The South Branch rises in the hills near New Freedom borough, which is located on the Baltimore Division of the Northern Central Railroad near the Maryland State line, and thence flows northerly through Railroad borough, Glen Rock and Seven Valleys boroughs, a distance of about fifteen miles, to the water works intake which is on the stream at a point immediately above the confluence of the South and West Branches. The principal tributary of this stream is the east branch, whose mouth is about two miles above the pumping station. Its watershed is wholly rural.

The said railroad follows down the valley of the South Branch, crossing and recrossing the stream many times. It is the main line between Baltimore and Harrisburg. And this is one source of pollution or menace to the purity of the stream. Investigations by the Department have shown the existence of many overhanging

privies and private sewers from which sewage is deposited directly into the water courses which yield the waters used subsequently by the inhabitants of York and vicinity for drinking and general domestic purposes.

The watershed is a sprasely wooded and decidedly agricultural one and the creek is subject to sudden rises after heavy rains. The geological formation is principally limestone and it yields waters normally turbid, which after heavy rains become muddy The minimum flow at the pumping station has been estimated at seven million gallons daily, but this has not been verified.

Besides many individual sources of sewage pollution there are numerous trade waste pollutions. There is a tannery at Railroad borough, also a wood extract factory. Two miles below is a distillery and at Glen Rock there are the woolen mills and various private sewers, all of which deposit sewage or polluting material into the creek. Pathogenic poison discharged anywhere into a natural water course, because of the limited size of the watershed, could be readily transmitted to the water works intake of the York Water Company, and thence be introduced in a sufficiently virulent state into the dwellings of the water consumers to produce sickness and consequent death. Experience of the State Department of Health with respect to the origin of typhoid fever epidemics in Pennsylvania, proves conclusively that the interests of the public health demand that sewage should cease to be discharged into the waters of the State used subsequently as a source of public water supply.

It is a fact that fifty-seven thousand people or more obtain their drinking water from the South Branch of Codorus Creek. It is also a fact that the same community or district has been supplied with Codorus Creek water for fifty years or more; still, further, it is a fact that water is as essential to life and health as is food supply, and that to suddenly deprive the consumers of the York Water Company of water from the water works system would be a public calamity which would likely incite riot and bloodshed, and this is true whether the source of supply be taken in a legal or illegal manner. It does not appear that the York Water Company has been criminal in the obtaining, conveying and selling the waters of the South Branch of the Codorus to the public. If damages to other rights in the stream have been caused by any act of the York Water Company, there would appear to be a civil remedy, but, pending any action at law, the public in the city of York and vicinity must be supplied with water and hence the Commissioner of Health is warranted in considering an application for such additions and improvements to the water works system as may be necessary to enable the York Water Company to supply a pure and wholesome and sufficient quantity of water to its consumers. He is also warranted in preserving the purity of the waters of the State thus used by the inhabitants of the city of York and vicinity. A party of the Department field inspectors are now engaged in making a sanitary survey of the entire watershed.

The plant of the York Water Company consists of an intake dam, pumping station and rising main, sedimentation of distributing reservoirs, a filtration plant and the street main system.

The latter comprises seventy-two miles of pipes whose diameters range from twenty-four inches to three inches.

The filters, reservoirs, pumping station and intake are in Springgarden Township.

A dam about six feet high extends across the creek by means of which water is diverted through an open channel eight feet wide on the bottom with sloping sides, paved with rubble masonry, to a pump well twenty-two feet in diameter, brick-lined and twenty-six feet deep. The open channel is about one hundred feet long. At its end there are screens. The water is admitted to the pump well through an opening provided with a gate. Water is ordinarily eleven feet deep in the well and leading from it four feet from the bottom are two thirty inch suction pipes, each connected up to a Worthington horizontal triple expansion, high-duty, duplex pumping engine.

A twenty-four inch force main, ten thousand feet long delivers the water raised by the pumps to the storage reservoirs on the hill overlooking the city. They are surrounded by a beautiful park, affording a magnificent view. The embankments are clay puddled and brick lined and the entire structure appears substantial.

The company has not submitted a profile of the force main, but it is understood that there is a high point on it from which the water flows by gravity to the aerator at the reservoir. This aerator is a fountain with a circular base enclosure about forty feet in diameter, from whence the water flows to the distributing reservoirs. There are two basins, each about four hundred feet long and two hundred feet wide and thirty-five feet deep. Detail plans of these structures have not been submitted by the water company. It is understood that they have a combined storage capacity of forty million gallons. So, since the average daily consumption is not over four million gallons, there is from ten days to two weeks supply on hand.

The western basin or reservoir was put in service December twenty-sixth,, eighteen hundred and ninety-seven. With both basins now in use, undoubtedly some of the water passes through in much less than a week's period. At times of muddy creek water, the pumping operations are suspended and the supply is drawn from the water stored in the basin. However, a material clarification is always effected by subsidence and during periods of fairly turbid water the removal of suspended matter and bacteria has averaged upwards of eighty per cent., as appears from

a review of tests made by water company experts. The water company installed a laboratory at the filters and, beginning in the autumn of nineteen hundred, daily analyses were made of unfiltered and filtered water. The colon bacilli have been found present almost constantly in the creek water and also in the water at the fountain and usually in the effluent of the storage reservoirs after subsidence, which effluent is the water supplied to the filter. Reviewing the entire analytical evidence, the conclusion from a strict hygienic point of view is that the subsided water from the large storage basins cannot be regarded as safe for drinking purposes. Hence the danger of its use without filtration, coupled with the possibility of this water being supplied to the water consumers of the district, make doubly necessary that not only should the filter plant be adequate and properly operated, but that the disposal of sewage on the watershed should be regulated, so that the water-borne diseases there should not menace the public health in York city.

The arrangement of pipes is such that the subsidence basins can be used separately or jointly, or water may be delivered directly to the filter plant from the force main without having been passed through the aerator or subsidence reservoir. Immediately below the reservoirs towards the town is the filter house and purification plant through which the water, after leaving the reservoirs, passes by gravity on its way to the consumers.

The fitler house is a brick structure about eighty by fifty feet, two stories, the operating floor being thirteen and a half feet above the lower one. There is an ell containing a boiler, engine and wash water pump and also a gate house in the upper story of which is the laboratory.

Beneath the floor of the filter house is a clear water basin having a nominal capacity of about two hundred and fifty thousand gallons. The average depth of the water is ten feet.

The water can be delivered by gravity from the reservoirs on to the filters until the height in the reservoir has been lowered to within five feet of the bottom thereof. A twenty-four inch pipe leads from each to the gate-house, from which a twenty inch feed main extends to the filters. Before admittance to the filter house, the water is first treated with a small quantity of sulphate of alumina solution. The chemical solution tanks also are in the gate house and the solution is fed by gravity to the chemical pump. The automatic coagulant feeding device consists of a propeller located in the twenty inch main in the gate house and connected to a shaft and gearing which in turn operate the pump. The velocity of the water in the main increases the speed of the pump and hence the proper amount of chemical applied. It has been ascertained over a series of years, that the unfiltered water contains sufficient alkalinity to decompose more sulphate of alumnia than is required to produce proper results.

The filter plant was contracted for in October, eighteen hundred and ninety-eight, was built by the New York Filter Manufacturing Company, and first placed in operation March third, eighteen hundred and ninety-nine.

The filters comprise eight wooden tanks, arranged in parallel rows of four each, with the main feed pipe and accessories placed between. Each tank is sixteen feet in diameter and fourteen feet high and within each is an inner tank fifteen feet in diameter and six feet deep containing the filter proper and occupying the upper part of the outside tank.

Below the filter the main tank is a water-tight compartment sixteen feet in diameter and seven and three-quarters feet high, the roof of the compartment being the floor of the filter above. The chemically treated water is admitted here and in the chamber a considerable proportion of the suspended matters in the water settles. The remaining particles in suspension are coagulated and pass up in the water through a central stand-pipe onto the surface of the filter above. Each settling chamber has a capacity of eleven thousand four hundred gallons, equivalent to about thirty-three minutes flow when the filter is being operated at its guaranteed normal capacity of five hundred thousand gallons per day of twenty-four hours.

The filtering medium is sand, sixty-two hundredths millimeters in size, uniformity one and twelve-hundredths, having a depth of thirty inches and resting on gravel and the collecting or strainer system of the conventional arrangement at the bottom of the filter. The filtered water passes out through the strainer system into the clear water basin underneath the entire filter house.

Each filter unit is equipped with a loss of head gauge and a rate controller and approved devices to insure proper operation. On the inlet pipe to each settling chamber is a butterfly valve operated by float, which maintains a uniform head of water in the filter. A similar arrangement which automatically shut off the filter when the clear water basin is full is used.

Ordinarily in ten hours or so the sand becomes clogged and requires cleaning. The sand is then washed by pumping filtered water up through the strainer system for about eight minutes, accompanied by agitation by revolving rakes of the Jewell type. The dirty water overflows at the top of the inner tank and goes to the sewer which reaches down the hill to a small water course. Detail plans of this sewer and its connections and general location have not been submitted by the water company.

The system is so arranged that creek water may be pumped directly into the distributing mains or directly into the filters, instead of first going to the sedimentation reservoir; also the waters from the said reservoirs may be passed directly to the street mains instead of first being delivered to the filters. However, it is reported that since the installation of the reservoirs and filter plant, no water has ever been turned into the distributing mains by any of these methods. In fact, they are intended to be used only in the event of some great conflagration or extraordinary emergency.

The filters are operated continuously under constant attention of men thoroughly familiar with the operations of all of the mechanical appliances and having an intelligent understanding of the object of definite instruction. Careful records of turbidity, strength and volume of chemical solutions used and amount of water filtered, and so forth, are kept.

The filtered water basin holds about one hour's supply at the maximum and four hours' supply at the minimum rate of consumption. This storage is too small in case of a large fire or serious breakdown. So the water company in nineteen hundred and two provided a safeguard against the necessity of having to turn unfiltered water into the town during any emergency or probable occurrence, by the construction of a large filtered water basin just below the filter house to which the filtered water flows from the small basins beneath the filters as it passes to the consumers.

This basin is a masonry structure roofed over,. about one hundred and twenty feet square and holding about two million gallons.

The efficient operation of these works has effected a marked reduction in water borne diseases, as appears by the reports on file in the State Department. The data, although not precise, is substantial enough to conclusively show the very great safeguard to public health afforded by said filter plant.

There are times when the daily consumption is at a rate in excess of the normal capacity of the present filter plant and it is for the purpose of providing adequate filter capacity that the petitioners intend to install four additional units, each of five hundred thousand gallons capacity.

A contract has been entered into between the water company and the New York Continental Jewell Filtration Company for the installation and equipment of four standard high type Jewell filters, similar to the filters now installed, and to have the plant ready for operation within ninety days from commencement of work, under the condition that the four units shall deliver two million additional gallons per twenty-four hours of clear bright filtered water, and when there are three thousand or more bacteria in the influent water there shall be removal in the filtered water equal to an average of ninety-seven per cent., and when there are less than three thousand in the effluent there shall not remain in the filtered water more than an average of one hundred bacteria per cubic centimeter. The guarantee is made subject to the condition that the plant shall be operated in accordance with instructions.

The city of York has been favored by the aggressive policy of the management of the water company. While it does not appear that said company has done more than has been necessary to protect the public, nevertheless, it has done this voluntarily. It is to be regretted that a like policy has not prevailed everywhere in the management of private water works. In placing the seal of approbation on the voluntary extension of the existing filter plant, it is not amiss to call attention to the prospects of a continual increase in water consumption leading up to the time when the entire minimum flow of Codorus Creek may be utilized to supply the inhabitants of York with water. No higher use could be made of this water. The Legislature of nineteen hundred and five, in its wisdom, saw fit to enact a beneficent law to preserve the purity of the waters of the State for the protection of the public health and the Codorus watershed is one which demands attention.

The compulsory discontinuance of the discharge of sewage into any stream directly or indirectly on this water shed contemplated by the State, and the prompt reporting of infectious diseases there and enforcement of measures for the killing of the poison of specific diseases before it leaves the household, should very largely minimize the danger, so that, should an accident occur necessitating the admittance of raw water to the town, there would not be much liability of infection resulting.

The situation warrants the careful attention on which it is understood to receive by the York Water Company.

The records of its observations should be copied and the copies placed on file in the State Department of Health. Detail plans of the force main and reservoirs, piping and sewers leading from or connecting with the reservoirs, filter house and filtered water basins and detail plans of the filtered water basins should be filed in the State Department of Health. And thereafter, as the works are further enlarged, other plans should be filed in order to keep the records up to date in the State office.

There should be a duplicate chemical pump in order that chemical solutions may always be used.

It has been determined that the proposed extension to the water works and the additional filters will not be prejudicial to the public health, and the same are hereby and herein approved and a permit granted therefor, under the following conditions and stipulations:

FIRST: That complete plans of the force main and its appurtenances, of the sedimentation reservoir, filtered water reservoir, and pipes, gates and sewer arrange-

ment at purification plant, be prepared and filed in the State Department of Health within six months from the date of this permit; and that thereafter at the close of each season's work the company shall file a plan of the pipes laid during the year, in the office of the State Department of Health, together with such other information in connection therewith as may be required by the Commissioner.

SECOND: The filter plant shall be operated as if now is, under the responsible direction of an expert chemist. A full report of the initial test of the proposed added filters shall be submitted to the Commissioner of Health and thereafter the water company shall assist the State Department of Health in making such tests of the plant from time to time as may be found desirable. If necessary, the Commissioner of Health may prescribe standards of efficiency and make regulations for the operation and maintenance of the plant and the water works system, so far as the interests of the public health may be concerned.

THIRD: Weekly reports of the operation of the water works shall be kept on blank forms satisfactory to the Department of Health and copies thereof shall be filed with said Department. If at any time, in the opinion of the Commissioner of Health, the water works system, or any part thereof, or any water furnished thereby has become defective, or inefficient or prejudicial to the public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

FOURTH: The introduction of raw creek water into the street main system is absolutely prohibited with this exception. Water after having subsided in the large storage reservoirs may be by-passed around the filters and be delivered into the street main system in some great emergency fully warranting and justifying this course, in which event the public shall be immediately warned of the fact and the local and State health authorities shall be notified.

FIFTH: The drainage from the purification works shall, if ever required by the Commissioner of Health, be otherwise disposed of than into the creek.

Harrisburg, Pa., January 24, 1908.

ZERBE TOWNSHIP, NORTHUMBERLAND COUNTY.

Treverton Water Supply Company.

This application was made by the Treverton Water Supply Company of Zerbe township, Northumberland county, and is for permission to extend water works in the borough of Treverton in said township.

Treverton is a mining village of about three thousand population, located in the valley of Zerbe Run between Little Mountain and Big Mountain, most of the streets being along the foot of the northern slope of Big Mountain. The run has its rise about three miles east of Treverton and its course is westerly through the valley which is narrow and deep, to Mahanoy Creek, a tributary of the Susquehanna river. Its watershed above the village is limited by summits of the mountains which are about one mile apart and seven hundred feet or more above the bed of the stream. The territory is almost wholly unpopulated and is largely a second growth of pine and scrub oak. Shamokin, about seven miles to the east and in the valley of Shamokin Creek, is connected by trolley to Treverton. A branch of the Philadelphia and Reading Railroad extends westerly along the run terminating at Herndon, on the river and the Pennsylvania Railroad, Northern Central line. The occasion for the growth of the community has been coal mining operations. In the town there is a silk mill, powder works and a sawmill, but the majority of the population are dependent upon the coal mines.

The main street is about fifty feet higher than the run, it parallels the same and continues easterly and westerly through the valley, being the main highway, in fact the only thoroughfare of common communication. It is in this road that the trolley line is built in the village and for most part in the township.

The cross streets in the village are very steep. The hotels, business blocks and principal residences are along the main street, which is thickly built up. There are no sewers in the town. Sewage is deposited in vaults which are usually holes dug in the earth. At every house there is reported to be a well, dug, walled up with rubble masonry and subjected to the danger of surface contamination. Slop water disposal is largely to the street gutters. In spite of these methods of sewage disposal and water supply, there has been comparatively little typhoid fever in the town, if reports may be relied on.

It is said that possibly eight hundred people live in the valley or on the south slope of Little Mountain in the village. In this north hillside district numerous springs outcrop which are used as the neighborhood source of drinking water, the inhabitants going there with buckets to obtain the supply. Some of these springs are located at a higher elevation than the dwellings, some of them are in the midst of dwellings.

There are dug wells in this district also which are used when the springs run dry.

The coal operation of the Zerby Run Valley are entirely to the west of Treverton so that the waters of the run above the village should be pure and free from pollution.

The Treverton Water Supply Company was chartered March the thirtieth, one thousand nine hundred and six, to supply water to the public in Zerbe township and the works were built that year without application to or approval by the Commissioner of Health.

The works comprise springs, a collecting basin, pumping plant, distributing reservoir and pipe system.

There is a group of three springs near the foot of the mountain slope north of the creek above all habitations. They are open. The water is piped from them in six inch tiles laid practically on the surface of the ground and terminating in the stone enclosure six feet square cemented and built up above the surface of the ground and topped with a plank platform. In this enclosure there is also a spring. A six inch tile leads from this spring chamber to a collecting basin twenty feet in diameter and sixteen feet deep cemented on the bottom and sides, the stone being laid up one foot above the ground to prevent the entrance of surface water. These walls support a conical roof. The last mentioned six inch pipe is laid below frost line and it is about two hundred and fifty feet in length. In the bottom of this basin there has been drilled a six inch well sixty-five feet deep which is said to flow at the rate of about thirty thousand gallons per day. This basin is located on the banks of Zerbe Run a little above the village. Adjacent to the basin is the pump house. In it there is a twelve foot overshot water wheel which furnishes the power to operate the pumping engine.

Two hundred feet up stream across Zerbe Run is a stone dam about five feet high. A fifteen inch terra cotta pipe conveys water from the breast of the dam to the pump house and there connects with a fifteen inch riveted iron pipe which takes the water to a tank from which it is discharged over the wheel. The wheel is connected by a chain and sprocket to a Dean vertical tri-plex doubling acting pump, capacity two hundred and fifty thousand gallons per twenty-four hours. The pump has a six inch suction pipe into the collecting basin. There is a fifteen horse power gasoline engine, belt connected to the pump, which is held in reserve for any emergency. The water is raised through a six inch force main into the pipe system of the town. These pipes are wholly in the streets south of the run. The surplus is forced to a storage reservoir on the mountain just back of the village and about two hundred feet above the pump house, vertical height. It is a masonry structure water tight seventy-five feet long by fifty feet wide and sixteen feet deep, the flow line being twelve feet above the bottom, maintained by a six inch overflow. The inlet is at the bottom. Both the inlet and outlet pipes are free of gates. No provision for drainage of the reservoir is made except it be through the inlet pipe.

The street system is laid out so that there is only one dead end. At the lowest point in the system there is a valve which is said to be opened twice yearly to blow off and drain the pipes.

Twenty-five hydrants are now being erected on the system throughout the village.

There seems to be a prejudice by many people in the town against the purchasing of water so long as the well supply holds out. Although the streets are quite thoroughly piped comprising about two and a half miles, the number of water consumers are few.

The petitioners hope by extending the system and affording fire protection and opportunities for running water in the dwellings, to gradually increase the use of the public supply and thereby to eventually receive a fair return on the investment.

The three open springs should be walled up, and covered over. The pipes leading from them to the spring chamber should be protected. The reservoir on the hill, which now has a wire fence about it to keep animals out should be enclosed in a tight board fence as precaution against malicious or accidental pollution.

It has been determined that the water works system and source of supply will not be prejudicial to public health and a permit is hereby and herein granted for the extension of the water pipes in the streets and district, under the following conditions and stipulations:

FIRST: That accurate and complete plans satisfactory to the Commissioner of Health, of the dam and pumping plant, springs, piping, collecting basins and of the pipe system in the town present and proposed and of the distributing reservoir on the hill shall be prepared by the water company and filed in the office of the State Department of Health on or before three months from the date of this permit.

SECOND: That at the close of each season's work plans of the pipe laid during the year shall be prepared and filed in the Commissioner of Health's office, together with any other information in connection with the water works system that may be required.

THIRD: The springs forming the source of supply shall be walled up and covered over, the pipes leading from them shall be amply protected. A tight board fence shall be constructed about the distributing reservoir. A weekly report of the operation of the plant shall be kept on blank forms satisfactory to the Commissioner of Health and copies thereof shall be filed in said Commissioner's office.

FOURTH: If at any time the water works system or any part thereof, or the source of supply has become prejudicial to public health in the opinion of the Commissioner of Health, then such remedial measures shall be adopted by the Water Company as said Commissioner may approve or advise. The State Department of

Health purposes to make tests of the water from time to time and it may make rules and regulations with respect to the water works system and its operation in so far as the interests of the public health may be concerned.

The water company shall assist the State Department of Health making all tests and examinations, if this assistance be required.

Harrisburg, Pa., June 29, 1908.

SEWERAGE.

Sewerage and Sewage Disposal Permits and Decrees

issued by the

COMMISSIONER OF HEALTH

Up to January 1, 1909.

This work has also been done under Act 182 of 1905. This law is a distinct departure in Pennsylvania State Medicine, in that it provided for State preservation of water borne diseases. Formerly the powers committed by statute to the State Board of Health relative to regulations tending to limit the spread of infection by water carriage were advisory only. It was within the Board's sphere and duty at all times to recommend to local authorities having the usual powers in matters relating to the preservation of public health, the adoption of effective sanitary and preventive regulations and measures in anticipation of future or possible epidemics.

The policy of limiting the State Department to powers of an advisory character only, until the actual presence of an epidemic threatens everybody in the community, so vividly shown to be suicidal in the extreme at Butler, in the memorable epidemic of 1903-04, ceased with the enactment of the law of 1905. Therefore, in the prosecution of the work thereunder, precedents have had to be established. It has been pioneer effort.

Sewage in the Act is defined as "any substance that contains any of the waste products or excrementitious or other discharge from the bodies of human beings or animals." Slops, sink and wash water come within the meaning of the term. The prevailing idea that laundry water and drainage from bath tubs is not sewage is gradually being dispelled; but not without some educational effort in making clear that such wastes very frequently contain pathogenic poison, and that they are often discharged onto the surface of the ground near the springs and wells, or into street gutters, and thence to streams used below as sources of public water supply. Also that some manufacturing wastes are not sewage as above defined, but if a menace to public health, they are subject to regulation at the discretion of the Commissioner of Health.

The law stipulates that no person, corporation or municipality shall place or permit to be placed, or discharged or permit to flow into any of the waters of the State any sewage except as specially provided; but the Act does not apply to waters pumped or flowing from coal mines or tanneries. Neither does it prevent the dis-

charge of sewage from any public sewer system owned and maintained by a municipality, provided such sewer system was in operation and was discharging sewage into any State waters at the time of the passage of the Act. A copy of the law has been sent to every municipality.

The exception noted, however, does not permit the discharge of sewage from a sewer system which shall be extended subsequent to the passage of the Act. Therefore, it is understood that so long as a municipal sewer system in use before April 22nd, 1905, be not extended, the law is not applicable and the sewage therefrom may continue to defile the public water supply. What constitutes an extension has been the subject of considerable contention by local officials. A sewer system must, in the course of events, be extended. Department officers and agents have been instructed that evidently the intent of the law is to bring, as soon as possible, all municipal sewer systems under State regulation and control, to the end that the purity of the waters of the State for the protection of the public shall be accomplished.

Unapproved sewer extensions to an existing sewer outlet whereby the volume of filth discharged into a stream was quadrupled would defeat the object of the law and be contrary to the letter thereof. It is understood that the State officials have determined that it is the principle involved which shall control and not the length of the sewer extension.

The law further provides that upon the application duly made to the Commissioner of Health by public authorities having by law charge of a sewer system of any municipality, the Governor, Attorney General and the Commissioner of Health, shall consider the case and whenever it is their unanimous opinion that the general interests of the public health would be subserved thereby, the Commissioner of Health may issue a permit for the discharge of sewage from such public sewer system into any of the waters of the State and may stipulate in the permit the conditions on which such discharge may be permitted. The permit before being operative must be recorded in the office of the Recorder of Deeds for the county wherein the outlet for the sewer system is located.

As understood, the policy inaugurated is to bring about the abandonment of streams as carriers of sewage. All sewage must finally cease to be discharged, untreated, into any waters used subsequently for drinking purposes.

In a municipality whose borrowing capacity has been about reached, the erection of sewage purification works for the present is thus prevented. However, it is the policy of the State, set forth in the permit, to require this municipality, or any other, in extending its sewers, to make such extensions in compliance with plans contemplating treatment works in the future.

It also appears by what follows that a town should obviate the making of a petition every time a petty sewer extension is contemplated, by the submission in the first instance of a general application for sewer extension, involving the question once for all of State policy for that particular municipality. State approval under these circumstances implies careful consideration of the problems involved. The principal one relates to the disposition of sewage.

The student of the permits may note that one feature is based on the proposition that it is not practicable to treat large volumes of mingled sewage and storm water, owing to the prohibitive cost. Usually it is cheaper and better to build separate sewers for sanitary household drainage and to provide other channels for the removal of rain water.

Also that another feature is based on the proposition that efficiency and economy in preserving the purity of streams for the public protection dictate that sewers shall be built to conform to a comprehensive plan. Municipalities are learning that patch-work methods are bound to cause trouble, expensive alterations and repairs, and that those towns which have employed competent consulting engineers to lay out comprehensive systems and have thereafter conformed to the plan in construction, have usually found such a course to be profitable.

Temporary permission to discharge sewage untreated into a stream has been granted in sixty-nine cases. Thirteen formal rejections of sewer plans have been issued, and two rejections of sewage plans. Fourteen municipalities and one sewerage company have been required to prepare sewage disposal plans at once. Two municipalities have been required to submit plans for sewage disposal works when called for by the Commissioner of Health, and one in three years' time. Twenty-six sewage treatment works have been designed and plans thereof approved by the Department and in fifteen cases immediate construction was ordered. In four instances the construction was ordered within one year, one instance construction was ordered in two years, and in five instances construction was ordered when called for by the Commissioner of Health. A supplementary permit was issued to the city of Reading.

Of the sixty-nine cases to temporarily discharge sewage into the waters of the State, one stipulated the preparation of plans for sewage disposal works at once, namely, Cheswick; two for sewage disposal plans in six months, namely, Parnassus and Verona; four for disposal plans in one year, namely, Barnesboro, Sharpsville, Sharon and South Sharon; one for disposal plans in two years, namely, A. P. Dysart, Scott Township, Allegheny County. Two instances at the order of the Commissioner of Health, namely, Columbia and Swarthmore.

Fifteen of the sixty-nine permits expire in one year, namely, Yeadon, Lansdowne, Colwyn, Darby, Sharon Hill, Stroudsburg, Edwardsville, Youngwood, Connellsville, Corry, Freeport, Glassport, McKeesport, Union City and Scottdale, all of which are required to submit plans for sewage disposal works on or before expiration of the year, with the exception of Scottdale, which must submit plans at the order of the Commissioner of Health. Eleven of the said permits cease at the expiration of two years, namely, Franklin, Fair Oaks Land Company, Dickson City, Olyphant, Emlenton, Wickboro, Winton, Kittanning, Danville, Carrick and Forest City. The first eight being required to submit plans for sewage disposal on or before the expiration of two years. The next two submit sewage disposal plans at the end of one year.

Twenty-five of the permits expire at the end of three years, namely, Huntingdon, Cambridge Springs, Middletown Drainage Company, Hughesville, Bradford, Reynoldsville, Exeter, Beaver, Jones and

Loughlin Company (Woodlawn), California, Scalp Level, Watsontown, Scalp Level (second application), Mercer, Lancaster, Eagles Mere, Mount Union, Ridgway, Kane, Dorranceton, Ben Avon, Monaca, Erie Improvement Company, Summit Hill, and Coaldale. The first being required to submit plans for sewage disposal at once. The second before the expiration of one year. The next five before the expiration of two years. The following eleven before the expiration of three years and the next three on the order of the Commissioner of Health.

Eight permits refer to Philadelphia, for five years has been stipulated in which to prepare plans to abate existing nuisances caused by sewage pollution of State waters.

The rejected sewer plans were for the following places: East Stroudsburg, West Reynoldsville, Wellsboro, McKeesport (two applications), Chester, Bellefonte, New Kensington, Samuel Castner (Devon), Cambridge Springs, St. Clair, Brackenridge and Zelienople. The first three requiring sewage disposal plans before the sewers are built, the next four permits before the expiration of one year, and New Kensington before the expiration of two years.

The rejected sewage disposal plans were from the Beechwood Park Amusement Company and New Wilmington.

The fourteen municipalities and one sewerage company where plans were called for at once are as follows: Derry, Upland, South Canonsburg, Brackenridge, Tarentum, Grove City, Treverton Sewerage Company, White Haven, Minersville, Montgomery, Houtzdale, Clintonville, Shenandoah, Ridley Park and Sewickley.

The municipalities required to submit sewage disposal plans when called for are Pottsville and Lancaster, while North East is required to do so in three years.

The twenty-five sewage disposal plans approved were for the following places: Reading, Palmerton village, Derry, Allegheny City Home, Hospital for the Insane (Hanover township, Lehigh County), New Wilmington, Ellwood City, Danville Hospital for the Insane, Williamson School (near Philadelphia), Cheswick (after modification), Bryn Athyn Village Association, near Philadelphia, (after modification), Haverford College, J. W. & A. P. Howard Company, of Corry (after modification), Cheswick, Girls' House of Refuge (near Philadelphia), Bryn Athyn (second application), New Castle, (after modification), Reading, Allentown, Pennsylvania Reform School (Morganza), Indiana, South Canonsburg, Canonsburg, Fairchance, Mount Carmel, Training School for Feeble Minded Children at Elwyn (after modification), the first sixteen are required to build at once, the next four within one year, the next one within two years and the remainder when ordered by the Commissioner of Health.

A private corporation duly chartered by the State and to whom local authorities have granted a franchise for the construction, operation and maintenance of a public sewer system, is considered to be classed with the municipal corporation to the extent that plans must be filed and extensions approved. All other private corporations and companies and individuals that at the time of the passage of the Act, were discharging sewage into any of the waters of the State, may continue such discharge unless otherwise ordered. In a borough the remedy for these sources of pollution may be connection with a public sewerage system. All of the above matters more fully appear in the various permits herein arranged in alphabetical order.

ALLENTOWN, LEHIGH COUNTY.

This application was made by the city of Allentown, Lehigh County, and is for permission to install a system of sanitary sewers and sewage disposal works.

It appears that the city of Allentown is essentially a manufacturing community of diversified interests covering a large variety of manufactures, substantial and rapid growing, having an estimated population of about fifty thousand (since the recent annexation of South Allentown) and being located on the west bank of the Lehigh river about sixteen miles above the junction of this stream with the Delaware river at Easton, Pennsylvania. It is bounded on the north by Whitehall township, on the south by Salisbury township and on the west and for a short length on the north by South Whitehall township.

Most of the city is on the hilly land rising about one hundred and sixty-five feet above the river. The natural drainage is to the north and the east into Jordan creek and south into Little Lehigh creek and into its tributary Cedar creek.

Jordan creek has its source in the Blue Ridge mountain in the northern part of the county and it flows southerly nine miles, thence easterly about the same distance to the boundary of Allentown and thence its course is southerly through the city paralleling the Lehigh river and distant therefrom about half a mile to the confluence with the Little Lehigh creek at a point in the southeast corner of the city a thousand feet from the river. The land between the creek and the river is mostly low and flat and subject to inundation. It is thickly built upon, is traversed by the railroads and upon it are many industrial plants. The land west of the creek is precipitous to the higher plane which is broad and gentle in slope and upon which the principal portion of the business and resident section of the city is located.

Little Lehigh creek rises in the South Mountains in Berks county. It flows northeasterly through an agricultural district and along what was formerly the southerly line of Allentown to Jordan creek. A tributary, Cedar creek, empties into the Little Lehigh at the southwestern corner of the city territory. The slopes north of these two streams are generally quite steep. South of the Little Lehigh creek on the hillsides is a settlement known as South Allentown above referred to as having been annexed to the city.

There is a highway bridge over the river just above Klines (Jeter) Island at the foot of Hamilton street. This thoroughfare extended across the flats through the entire length of the city east and west and the other highways are laid out parallel or at right angles to it. Seventh street, extending from Jordan creek to Little Lehigh creek intersects Hamilton at the public square. Front street, Ridge avenue, Second and Third streets are on the flats named in order from the river to Jordan Creek.

The topography divided the city territory into three natural drainage systems, viz., the Lehigh, the Jordan creek and the Little Lehigh drainage districts.

Most of the existing sewers empty into Jordan creek.

Beginning at Little Lehigh creek and named in order up-stream there are seventeen public sewer outlets and twelve private sewer outlets into Jordan creek within the city limits as will appear by the following table:

Location.	Ownership	Size.
Union Street,	City,	36 inch.
Union Street,	Grape Capsule Company,	4 inch.
North of Union Street,	Electrical Specialty Manufacturing Company,	4 inch.
Near Union Street,	City,	20 inch.
Near Walnut Street,	Private,	6 inch.
Walnut Street,	City,	30 inch. by 48 inch.
Walnut Street,	Allentown Mill Supply Company,	6 inch.
Walnut Street,	City,	2 ft. by 4 ft. culvert.
Hamilton Street,	Lehigh Railroad Station,	Several small pipes.
Hamilton Street,	City,	24 inch.
South of Linden,	Phoenix Silk Mills,	
Linden Street,	City,	54 inch.
Between Linden and Turner,	Woman's College,	3 inch.
Turner Street,	City,	24 inch (west).
Turner Street,	City,	30 inch (east).
Chew Street,	City,	30 inch.
Gordon Street (east),	City,	36 inch.
Gordon Street (west),	City,	40 inch by 60 inch.
Liberty Street,	City,	34 inch by 51 inch.

Location.	Ownership	Size.
Allen Street,	City,	20 inch.
Near Tilgham Street,	Southdown Knitting Co.,	18 inch.
Tilgham Street (east),	City,	12 inch.
Green Street,	City,	30 inch.
Green Street,	Excelsior Knitting Machine Mfg. Company,	20 inch.
Fourth Street,	Allentown Silk Dye Works,	
Fourth Street,	Pickup & Kean,	
Fifth Street,	City,	2 ft. by 4 ft.
Twelfth Street,	City,	46 inch by 69 inch.
Sixteenth Street,	Allentown Flint Bottle Company,	

The Union Street outlet discharges sewage from houses which have been connected presumably by city sanction. There is also a brewery on the system and also a laundry. There is a twenty inch branch on Fifth Street which reduces to fifteen inch in the alley. All told, the outlet serves about a half mile of sewers. Kitchen drainage is discharged into the street gutters.

The Grape Capsule Company and the Electrical Specialty Manufacturing Company discharge all their sewage and waste into the run. There are small concerns, the former employing about eighteen hands.

The twenty inch combined sewer near Union Street comes from the flats to the east and empties at a point a short distance above the Union Street bridge. The entire line is about eleven hundred feet long, the upper end being sixteen inches in diameter. There is a hotel and also the Allentown Terminal Station connected to the line.

The Walnut Street combined sewer comes from the hill, is twenty-nine hundred and fifty feet long, including a short lateral fifteen inches in diameter, empties into Jordon Creek at the retaining wall along the west bank of the creek and discharges sewage and laundry water. There are no dwellings near the outlet.

The Allentown Reed Harness and Mill Supply Company, employing about fifty hands, and one of the branches of the Phoenix Silk Manufacturing Company, employing about sixty hands, occupy a single building on the west bank of the creek just below the Walnut Street bridge. All of the sewage is discharged through a six inch pipe to the stream. In the vicinity kitchen drainage goes to street gutters and it is finally led directly to Jordan Creek by a two foot by four foot culvert.

At Hamilton Street the Lehigh Valley Railroad Station is built directly over Jordan Creek, into which is discharged the sewage from said station. The twenty four inch city sewer into the creek at this point comes from the hill and is fifteen hundred feet long.

Right above this point, but in the bed of the stream, there is a catch basin built of stone masonry, into which all the sewage from the Phoenix Silk Manufacturing Company's plant, employing fourteen hundred hands, is discharged. At high water the tank is submerged.

The fifty-four inch city sewer at Linden Street serves the central part of the city on the hill. Connected with it are seven thousand five hundred and fifty feet of sewers, the smallest diameter being eighteen inches. These sewers were laid primarily for cellar drainage and surface water. They now discharge quite a volume of sewage proper, but the Department has not ascertained how many properties contribute to the sewage flow. The County Jail is connected. The outlet is under the bridge at the foot of Linden Street.

Between Linden and Turner Streets there is a three inch pipe overflow from a cesspool on the property of the Allentown College for Women. The pipe terminates at the creek at the top of the high bank.

A twenty-four inch pipe line in Turner street is sixteen hundred and fifty feet long, including some fifteen inch pipe. It was laid primarily for surface drainage. It was built during nineteen hundred and seven and one house has been permitted to put sewage into the line. The thirty inch sewer from the flats on the east empties into Jordan creek a short distance up stream from the Lehigh Railroad bridge. This line is possibly six hundred feet long. It terminates in a settlement on the flats at Turner street.

The thirty inch Chew street sewer line reducing to twenty-four inches is eight hundred feet long only, but in this length it receives the sewage from one of the mills of the Phoenix Silk Manufacturing Company, where are employed five hundred hands.

The large sewer outlet at the foot of Gordon street, west bank, serves a district on the hill, comprising nine thousand, one hundred and fifty feet of sewers, the smallest of which is eighteen inches in diameter. The Allentown Spinning Mill, where are employed four hundred and ninety hands, and the small establishment of the Acme Bleaching and Dyeing works discharge all their sewage and industrial wastes into the sewer system. The thirty-six inch sewer from the east, which reduces finally to twenty inches in diameter at the upper end of the line, serves all told one thousand, nine hundred feet, to which is connected a hotel and a brewery, besides other properties.

The Liberty street outlet serves over a mile of sewers the smallest size of which is sixteen inches in diameter. They are located on the hill. The Allentown Silk Company, employing five hundred hands have a sewer connection which empties both domestic and manufacturing refuse into the system.

The twenty inch Allen street sewer is about seven hundred and fifty feet long. Its upper end is eight inches in diameter. It carries both sewage and storm water. It serves a territory between the creek and the river and the point of discharge is over a bluff into a pool below along the Allentown Terminal Railroad from whence it flows through culverts and an open ditch under the railroads to the creek. Near Tilgham street west of the creek is the plant of the Southdown Knitting Company where are employed two hundred and fifty hands. Dye wastes are discharged through an eight inch sewer into the creek.

The twelve inch Tilgham street sewer from the east is about two hundred feet long. Here over the creek is a highway bridge and it would appear that the sewer outlet is temporary and that the intention is to extend the pipe to the creek. It now discharges into a little ditch which flows down into the pool at the foot of Allen street.

The thirty inch Green street sewer serves about half a mile of combined sewers. Possibly there may be no house connections for sewage only. But at this street end is the plant of the Excelsior Knitting Machine Manufacturing Company employing about fifty hands from which there extends a twenty inch pipe to the creek. It takes sewage and manufactural wastes from the Novelty Hosiery Company and the Givernaud Silk Mill employing two hundred and seventy-five and eight hundred hands respectively.

Green street is one mile up stream from the mouth af Gordan's creek and Tilgham, Allen, Liberty, Gordan, Chew, Turner, Linden, Hamilton, Walnut and Union street are respectively five hundred feet apart, Union street being near the mouth of said creek. Thus it is seen that sewage and manufactural wastes are emptied into the stream throughout this mile length of the creek at a point about equally distant.

A short distance above Green street the creek turns abruptly towards the west. In this course at the foot of Fourth street is the Allentown Silk Works employing ten hands. The plant is built on the bank of the creek and from it is discharged much spent dye liquors. There is a privy overhanging the stream here. Also at the foot of this street is the plant of Pickup and Keene engaged in dyeing cotton yarns. The conditions with respect to sewage and trade wastes is identical with the other dye works just mentioned.

The two foot by four foot storm drain at the foot of Fifth street is not known to take anything but storm water. It empties into the mill race. It is about here that Gordan creek makes a right angle turn and the course is up stream northerly opposite the township.

There is a valley at the foot of the streets in the north part of the city traversed by Sumner avenue in which is a branch railroad track by which an ascent is made to the plateau on which the city is partly located. At the terminus of the track large lumber yards are located and in the vicinity a box factory, planing mill, shoe shop and silk mill and bobbin works. This district is served by the Twelfth street sewer and its branches comprising a total length of four thousand feet, the smallest sewer being eighteen inches in diameter. There is no appearance at the outlet of sewage being discharged therefrom. The end of the sewer is in a ditch which extends northerly in Twelfth street to Sumner avenue and thence this ditch follows along the railroad and in the avenue to Sixth street whence it is a concrete box culvert twelve feet wide and six and one-half feet high to a mill race about three hundred feet distant. Near the upper end of Sumner avenue is the plant of the Allentown Flint Bottle Company giving employment to one hundred and fifty men. Sewage from this place is discharged into the ditch or dry run near Sixteenth street. This is about a mile away from the mill race. The avenue is not a traveled highway.

Outside of the city limits in the country in Whitehall township, perhaps a mile from the city line, there is a fertilizer plant and a city garbage crematory. Wastes from the fertilizer works in liquid form are emptied into a pool near the creek. When the water in the creek is two feet higher than normal flow it floods out the pool. Between this point and the city line the creek is used as a swimming place by the youth of the city.

Beginning at the river, and named in order up stream there are nine public sewer outlets and seventeen private sewer outlets into Little Lehigh creek within the city limits as will appear by the following table:

Location.	Ownership	Size
Trout Run, ...		
Jordan Creek, ...		
Penn Street, ...	City, ...	20 inch.
Between Penn and Lehigh Street, ...	American Steel and Wire Company, ...	8 inch.
Lehigh Street, ...	City, ...	36 inch.
Lehigh Street (south), ...	Allentown Bottling Works,	4 inch.
Lehigh Street (north), ...	Private residences, ...	4 inch.
Between Lehigh and Water Street (south), ...	Yeager Furniture Company,	8 inch.
Lehigh and Water, ...	Stable, ...	4 inch.
Lehigh and Water, ...	Butchery, ...	
Water Street, ...	City, ...	20 inch.
Near Water Street (north),	Gabriel Dye Works, ...	
Near Water Street, ...	Liberty Silk Mill, ...	12 inch.
Near Water Street, ...	Private Resident, ...	4 inch and 6 inch.
Near Mill Race, ...	Unity Silk Company, ...	
	Lacha Silk Company, ...	4 inch.
Opposite Fountain Street, .	Private, ...	4 inch and 3 inch.
Opposite Tenth Street (south), ...	Mack Brothers Motor Car Company, ...	8 inch.
Near Tenth Street (south),	Trayor Engineering Company, ...	16 inch.
Near Tenth Street (north),	Deifer and Brother, ...	6 inch.
Eleventh Street, ...	City, ...	24 inch.
Twelfth Street (north), ...	Dauffer Brewery, ...	8 inch.
Jefferson, ...	City, ...	24 inch by 72 inch.
Fourteenth Street, ...	H. M. Gangeweir, Butcher,	4 inch and 6 inch.
Franklin Street, ...	Gangeweir Brothers Butchers, ...	
Sixteenth Street, ...	City, ...	20 inch.
Eighteenth Street, ...	City, ...	30 inch.

Trout Run enters Little Lehigh creek from the south at a point about two hundred feet above the mouth of the creek at the river. The run here is in Salisbury township for a short distance and thence for a distance of a half a mile it is in the South Allentown district of the city. Beyond it, it is in the township again.

At the mouth there is a small soap works and also several private dwellings with privies overhanging the run. Between the two below the dwellings is the pumping station and intake of the water works owned by the Philadelphia and Reading Railway Company and used to supply the yards and locomotive tanks in South Allentown.

A quarter of a mile up stream is the plant of the Palace Ribbon Manufacturing Company employing three hundred and seventy-five hands and discharging all sewage to the run through three six inch pipes and adjacent to this plant is that of the East Penn Milling Company where there is a privy overhanging the mill race. Both plants are in the city. A quarter of a mile further up stream in the meadow beside Trout Run is the two hundred feet deep well cased to rock and the pump house and the spring formerly owned by the South Allentown Water Company and recently acquired, by the Bethlehem Consolidated Water Company. A part of South Allentown is supplied by water from this system. The spring is protected by concrete masonry covered with plank. The water flows by gravity to a cistern and is pumped to a standpipe on high land when the supply from the well is insufficient. The spring is apparently a shallow one and may become polluted if the neighborhood should be built up. In high water everything is flooded out almost to the floor of the pump house. Above, the run watershed is rural, under cultivation with a part of it very mountainous. The population is sparse. However, below the sewage going into the run poisons the water and is a menace to the employes of the railroad, who in spite of warning may at times drink water drawn from the locomotive tenders filled in the yard.

Jordan creek as has been shown, pours into the Little Lehigh creek a filthy stream of sewage and manufactural wastes, and while this open sewer has not been made the subject of formal complaint to the State Department of Health by citizens of Allentown, for obvious reasons, it has been complained about by users of the Lehigh river water below Allentown.

The twenty inch Penn street sewer outlet is one thousand feet up stream from Jordan creek. It serves a district at the foot of the hill between Penn and Lehigh streets in which there are twenty-one hundred feet of sewer, more than half of the length being pipe eight inches in diameter. The cellars of the dwellings are wet and the sewers were built primarily for cellar drainage. They are used as combined sewers.

Between Penn and Lehigh streets is the American Steel and Wire Company's plant employing over one thousand hands and having many pipes leading to the creek. One eight inches in diameter empties all of the sewage into the stream. A considerable volume of acid water is also discharged from the plant into the creek. The drinking water at this plant comes from the city but for industrial uses it is taken from the creek at a point immediately below the Lehigh street sewer. The company purifies the water by mechanical filteration but the purification is not to the degree which renders the water safe for drinking, in all probability. The habit of employes to drink the water which is handiest has been proven to be the cause of much sickness throughout Pennsylvania and is accepted as one good reason for the discontinuance of the discharge of sewage into the waters of the State. This policy is peculiarly applicable to the Little Lehigh creek above the American Steel and Wire Company's plant.

The thirty-six inch Lehigh street sewer outlet serves a total length of sewers of a half a mile the smallest being fifteen inches in diameter. The system takes sewage and waste from a brewery, and cellar drainage from the houses at the foot of the hill. Most of the district is on high land.

Between Lehigh and Water street sewage is discharged into the creek from the Allentown Bottling Works, a private residence and stable, a small slaughtering house and from the Yeager Furniture Company plant where two hundred and twenty hands are employed, all within four hundred feet of the wire and steel company's intake.

The twenty inch Water street sewer outlet is about seventeen hundred feet up stream from the Penn street outlet and four hundred feet up stream from the water intake at the steel and wire works. The pipe is five hundred feet long, was put in to drain cellars and possibly it does not carry sewage. Fifteen hundred feet up stream above Water street there is a masonry dam in the creek to furnish water power. The mill race from the dam is south of the creek. Into this race is discharged sewage from the Unity and Lacha Silk Mill Companies, each employing ninety-five and thirty-three hands respectively. At and immediately above Water street there is the remnants of an old dam. Spent liquors from the Babriel Dye Works goes to the stream here. Sewage from the Liberty Silk Mill where four hundred hands are employed when the plant was in operation, was discharged through an eight inch pipe to the creek and the trade wastes went through a two foot by three foot stone drain to the stream. Creek water is taken for boiler purposes at these works and drilled wells supply for other purposes. Two residences in the vicinity have pipe connection to the creek.

Immediately below the dam which is a masonry spillway and an earthen embankment, possibly three hundred feet long, is a small area surrounded by a dyke which can be flooded by water from the creek. Ice is harvested here and distributed to consumers in Allentown. And into the mill pond the sewage from two private residences, from the Mack Brother Motor Car Company plant, employing one hundred and twenty-five hands, from the Taylor Engineering Company works employing five hundred hands and from the Deifer building, is discharged.

The twenty-four inch Eleventh street sewer serves a small district on the hill and empties into an open ditch part way down the hillside in the vicinity of Lawrence street. Naturally it would find its way eventually into the mill pond opposite beyond Lawrence street, which is the valley road.

Near Jefferson street the Dauffer Brewery has an eight inch pipe connection to the creek. At the foot of Jefferson street, which is eighteen hundred feet above the dam, the large city sewer serving about thirty-four hundred feet of sewers, the smallest comprising three hundred feet of thirty inch and two hundred and fifty feet of twenty-four inch empties into the creek. West of this street is the water works pumping station belonging to the city. These structures are built largely for surface drainage. The sewage from one hotel is emptied into the main sewer and there may be other similar uses of the system. The pumping station closets are connected.

Two thousand feet up stream the sewage from two slaughter houses located within the city goes to the creek.

Both the Sixteenth and Eighteenth street city sewers are primarily surface drains and they empty on the hillsides into open water courses or ditches. The latter may take kitchen drainage or bath room water. The former was dry on the day of the Department's inspection.

The Sixteenth street drain is tributary to Little Lehigh creek, but the Eighteenth street drain terminates in Hamilton street and the flow is westerly to Cedar creek.

Outside of the city in Salisbury township is the rendering plant of Reichard and Leidy on Cedar creek. All waste matters are drained into the stream and three thousand feet further up stream near the city line in the township are some duck farms. About four miles west of the city the sewage from the county almshouse is discharged into and pollutes Cedar creek.

Just above the Hamilton street bridge over the river to the settlement of East Allentown in Hanover township there is a dam maintained in connection with the canal which extends along the east bank of the river. Into the pool half a mile above the dam at the foot of Liberty street extended is a forty inch city drain under construction. Into the canal basin near Hamilton street is discharged the sewage from a power plant of the Lehigh Valley Transit Company. Immediately below the dam there is a slaughter and packing house from which all wastes go to the river through a box culvert. The plant is said to be owned by Arbogast and Bastian. There is a thirty-six inch city sewer in Hamilton street serving nearly half a mile of street sewers. Sewage appears to be flowing from the mouth of it. In the vicinity there is a twenty-four inch pipe two hundred and fifty feet long which takes kitchen drainage from the street gutter from the foot of Walnut street to the river. Immediately below this on the banks is a slaughter house from which the drainage goes directly to the river.

In East Allentown there is an extensive dyeing establishment employing five hundred hands from which sewage and trade waste got to the river.

There is a city ordinance regulating the use of drains making it unlawful to drain kitchen water or waste or sewage matter whatsoever or any other injurious substance into the public sewer. No private estate upon which is produced any material injurious to the sewer can be lawfully discharged into a public sewer except through a catch basin to be approved by the city engineer and except such material be rendered harmless to the sewer. It appears that this regulation has not been inforced. Many sewer connections for the discharge of sewage have been made and the storm drains are with few exceptions being used as sewers to-day under city sanction.

The pollution of the Lehigh river at Allentown within four miles of the point in the river from which the water is drawn to supply the public in South Bethlehem and Bethlehem and vicinity totalling twenty-five thousand population possibly, has been a matter for protest to the Commissioner of Health, the complaints specifying trade wastes as well as domestic sewage.

By far the greater percentage of sewage produced in Allentown is deposited through holes drilled in the limestone formation into crevices in the underlying rock. They are called "sinks" and there are many hundred of them in the city. Some of the crevices approach the size of caverns and never require attention or cause stoppages, while other sinks fill up in time and make necessary the drilling of a new hole. The underlying structure on the hill is literally a subterranean receptacle for the filth of the community. Processes of putrefaction go on there and in the total large volumes of gases are produced. Within a few months an explosion extensive enough and powerful enough to be mistaken for an earthquake occured in Allentown. It is reported that people were thrown off their feet and their pictures and bric-a-brac and other property was injured. Furthermore, that this was not the only violent explosion from an unknown cause recorded in the city. The occurrence has been attributed to the accumulation of gases in the subterranean passages there produced by decomposed sewage.

The city water supply is derived from two springs, Crystal spring within the city limit at the pump house at the foot of the hill, and Schantz's spring located in the valley of Cedar creek four miles west of the city. The latter source is the principal one. The water is piped by gravity to the pump house and is thence raised to the city. The average daily consumption is seven million gallons. Schantz's spring is said to be good for nine million gallons daily.

Crystal spring is reputed to have a capacity of five hundred thousand gallons per twenty-four hours. The quality of this water has long been under suspicion. As a result of the examination and report on the spring water the use of it has been practically discontinued since early in nineteen hundred and seven except at times, when the pumps connected to the Schantz's Spring supply have been out of commission. Then it has been necessary to pump water from Crystal Spring. It is reported to be the intention of the city to re-arrange the piping so as to make it possible for any pump at the house to draw water either from Schantz's Spring or Crystal Spring. There is reported to be an intake to Little Lehigh Creek by means of which should both spring sources prove sufficient or have to be temporarily cut out, Little Lehigh Creek water may be pumped directly to the city.

There are a number of private water supplies in use in Allentown and vicinity. Many of the industrial plants have driven wells.

Up to nineteen hundred and three Crystal Spring was the only source of public supply. During the fall months of nineteen hundred and two there was a typhoid fever epidemic numbering five hundred and four cases and forty-seven deaths.

A note of warning had been previously sounded of the danger of the Crystal Spring supply because of its proximity to the built up portion of the city and the method of disposal of sewage into the ground on the hill above the spring. The following table will show the prior visitations of typhoid fever. For years a modern method of sewage collection and disposal has been urged.

TYPHOID FEVER IN ALLENTOWN.

Year.	Cases.	Deaths.
1894,	70	9
1895,	337	40
1896,	128	15
1897,	46	10
1898,	91	19
1899,	130	32
1900,	141	9
1901,	82	17
1902,	619	75
1903,	65	12
1904,	77	17
1905,	139	15
1906,	102	19
1907,	144	23

The proposed plans for remedying the various evils of present methods of sewage disposal in the city comprises a complete system of sanitary sewers in the city streets and the necessary intercepting sewers, pumping stations, force main, outfall sewer and sewage disposal plant.

The projected sewers are designed to remove sewage only, storm or street water is to be excluded and cared for in the existing drains. The system is to serve an aggregate population of about one hundred and twenty-five thousand people. It is proposed to build at first sewers in the built-up portion of the city. They will total a length of about sixty-two miles, exclusive of the branch connections from the street sewer to the curb line. The design provides for extensions into areas now outside of the city limits, but which in the future will undoubtedly become a part of Allentown. The basis of capacity is two hundred and fifty gallons per capita daily when the sewer runs three-quarters full. This is supposed to be sufficient for industrial wastes. A detailed study has not been made of the question of trade wastes to the sewers, except to make reasonable allowances in capacity. The minimum size street sewer is eight inches in diameter increased only where sewage from a comparatively large area will reach a volume requiring a larger pipe. The slopes of the sewers will assure self-cleansing velocities. Special care has been taken to lay the sewers deep enough in the plan to provide for cellar laundries and closets and give a slope to house connections of about one-quarter inch per foot. Automatic flush tanks are to be provided at dead ends and man-holes for inspection and cleaning are to be placed at changes in line and grade. The sewers are to be quite generally built in alleys and in other cases where streets are now permanently paved two sewers are designed, one on either side near the curb line. This method is cheaper and better.

A high level intercepter is planned to collect as much of the sewage as possible, to deliver it by gravity to the disposal works. This area in general follows the ridges in the vicinity of Hamilton Street on the south and in general lies west of Fourth Street.

The various street sewers in the lower areas are to discharge into low level intercepters leading to the pumping station. There are to be three of them.

One of these is to follow down the Summer Avenue ravine to Jordan Creek and thence down the valley of this creek on the east side of the flats to the pumping station to be located near the mouth of Jordan Creek a short way up the valley of Little Lehigh Creek, at the foot of Fourth Street. The sewer will range in diameter from eight to thirty inches. Another low level intercepter will follow along in the vicinity of the Lehigh River, close to the railroad track, at the upper end on the flats and uniting with the Jordan Creek intercepter at or near the pumping station. Its diameter will range from eight to eighteen inches. The third intercepter is to collect the sewage tributary to the valley of the Little Lehigh Creek and it is to extend down the full length of the valley to the pumping station. Its diameter will range from twenty to thirty inches.

The rising main from the pumping station is to extend along Fourth Street and to terminate at the high level intercepter at Liberty Street. It is to be thirty inches in diameter and to be constructed of reinforced concrete. Several pressure pipes will discharge by gravity into this force main. For the present considerably less than half of the sewage of the city will be delivered to the pump house. The total lift will be seventy feet.

Two four million gallon and one eight million gallon centrifugal pumps are to be installed. They are to be direct connected engines and the power is to be steam, three one hundred horse power, water tube boilers being provided. The pump well will be under the boiler room floor and under one-half of the engine room. The pump pit will contain the suction pipes. The entire station is to be thirty feet by sixty feet, interior dimensions. The sewers will terminate in a screen chamber. No overflow to the creek is planned and no storage of sewage, except that necessary to facilitate the continuous operation of the pumping engines. The well has a capacity of between thirty thousand and sixty thousand gallons; the flow line will be dependent on the rate of pumping. Ventilation will be effected through the boiler stack. The town sewers are to be ventilated through perforated manhole covers and

through untraped house connections to the main soil pipe at each building, the latest and most approved method of securing a constant flow of fresh air through sanitary sewers.

The disposal works are to be located in the valley of Jordan Creek, about three-quarters of a mile up stream north of the city limits and opposite the garbage crematory. The site is remote.

The plant is to comprise settling tanks, a sprinkling filter, a re-settling basin, sludge disposal outfit and laboratory. Its nominal capacity is to be between six and seven million gallons daily, capable of working at such greater rates for short periods. The lay-out admits of additions.

A fifty-two inch gravity outfall sewer from the city is to terminate in a settling tank, two compartments. They are to be built of reinforced concrete, open on top, two hundred and twenty-five feet long, one hundred feet wide, divided into two compartments, one sixty and the other forty feet wide. The average depth of the sewage will be twelve and one-half feet. It is expected that between sixty and seventy per cent. of the total suspended particles will deposit on the bottom of these tanks. This deposit may be removed every month or so, if desired, or it may be allowed to undergo septic treatment whereby the volume of the sludge may be reduced fifty per cent. Should it appear desirable to remove fibrous suspended matter which comes from certain trade wastes, before the sewage reaches the septic tanks, this may be done at the pumping station and arrangements for the installation of a fine-mesh, self-cleansing device are provided as to space. This would handle the low level sewage only.

The sewage is to be admitted into the tank through a concrete chamber on the outside, connected by port-holes submerged two feet and through the end wall. A sluice-gate to shut off the in-flow is provided. The sewage will pass down the full length of the tank and around the partition wall and back to the inlet end, where in the second half of the tank there is an overflow weir and scum board two feet deep delivering the flow to a collecting trough. This collecting trough also extends across the outlet end of the outlet compartment of the second tank into and out of which the sewage is conducted in a similar manner. It will be understood that the down and back passage-ways in the first tank are twenty feet wide each and in the second tank they are thirty feet wide each. In the main wall, between the first and second tanks, there is an overflow weir, set three inches above the main weir, and mid-length of the outside wall of the second main tank there is an overflow weir with scum board provided for emergency and over which the sewage would pass directly to the sprinkling filter.

The bottom of the septic tanks is to slope towards the opposite end from the inlet. The depth of the flow line at the inlet will be about eight feet and at the opposite end it is to be about sixteen feet. For draining out the deposits there is to be a twelve inch pipe from each tank leading to a fifteen inch pipe extending to the sludge area between the tanks and the creek. The plans of the sludge areas have not been prepared and submitted.

The flow line of the tank is to be at elevation fifty-four. There is a dam across the creek immediately below the disposal site. Its elevation is thirty-three and five tenths. Elevation thirty-four may be taken as the normal creek level. This figure refers to an assumed datum. The highest flood recorded here was elevation forty-one in nineteen hundred and two. In the spring of the current year the freshet level was thirty-nine and six tenths. Thus it may be seem that the lowest point in the septic tanks is below the highest freshet line, but four feet above the normal creek level, and it is within this vertical height of four feet that the liquid sludge must be disposed of if pumping be not resorted to.

The sprinkling filters are to be laid out adjacent to the septic tanks. Their surface area is to be elevation forty-six, or eight feet lower than the flow line in the tanks. The concrete floor will afford an average depth of filtering material of about six feet. This material will be crushed stone obtained from local quarries and will have an average diameter ranging from one to two and one-half inches.

In plan the entire filter will cover an area between the concrete side walls of three hundred and fifty-four feet long by two hundred and ninety-seven feet wide. Deducting partition walls, comprising the operating gallery which is five feet four inches wide and three hundred and fifty-four feet long, dividing the filter into two equal units, there is an actual filtering surface of two and thirty-eight one-hundredths acres.

The septic effluent is to flow into a small dosing chamber containing about ten minutes average flow and by an arrangement of floats and valves the dose will be intermittently delivered through a set of six hundred and fifteen nozzles set about thirteen feet apart at the surface of the filter, by means of which the liquid will be sprayed over the entire surface. Over the chamber is to be an office and laboratory. A by-pass is provided to admit, if necessary, a direct flow from the septic tanks to the filter. The forty-two inch concrete main will terminate in the operating gallery, where will be placed the main distributing pipes and the water pipes for washing and all valves. Off of the lateral thirty inch distributing mains will be taken eight inch laterals laid in parallel rows eleven and twenty-five one-hundredths feet apart and extending across each filter unit. The three inch vertical risers capped with the nozzles are to branch from the eight inch laterals. In the operating gallery will be placed a valve on each one of these laterals.

The filtering material will rest upon a false bottom made of half round tile, six inches in diameter, nine inches centre to centre, and the concrete from underneath the tile will slope from the operating gallery walls nine inches to the opposite end, where in the concrete floor is to be built a channel topped by a concrete slab, into which the flow from the tiles will discharge and pass to a manhole in the centre of the unit. The collecting main between these two manholes of the two filters is to be twenty-two inches in diameter and it is to terminate in the re-settling basin just beyond the filters. The flow line of these basins will determine the height of the water in the two manholes and the main collector. Its invert is to be elevation thirty-three. The weir outlet is to be thirty-seven and four tenths, so that the pipe will always be back-flooded. The bottom of the filters is to be one and six-tenths feet higher, or elevation thirty-nine. So it appears that during freshets the settling basins will be flooded, and not the filter floor, except during an extraordinary flood.

The basins are to be constructed of concrete bottom and sides one hundred and twenty feet long and one hundred and three feet wide, with an average depth of six feet. By a division wall, the basin will be in two units, each fifty feet wide. The filtrate is to be discharged into an open trough of concrete construction, extending across the entire length of the unit end and through the sides of it numerous ports, operated by shear gates, will admit the liquid to the basins. Each unit is to have a conical shaped bottom. Parallel cones, ten feet centre to centre for the first half length of the unit and thence for the other half the ridge and valley arrangement is to be, at right angles or lengthwise of the tank with the slope towards the cones. Into each cone is to be inserted a six inch cast-iron suction pipe five feet long, connected to an eight inch suction pipe feeding into a main suction line in the partition wall twelve inches in diameter and connected up to an electrically operated pump, capacity eighteen hundred gallons per minute to be installed in a sludge pump house at the end of the basins.

The effluent is to flow out over a weir full width of the outlet end of each unit into a collecting trough leading to an open outlet channel sloping sides lined with concrete terminating at the creek. The bottom of this channel will be on a level with the top of the dam in the creek.

The total capacity of these basins, both units, is five hundred and fifty thousand gallons. The upper layers to a depth of four feet may be drained through pipes provided for the purpose into the outlet channel. The sludge is to be pumped on to land in the vicinity. The grounds have been arranged with the idea of building a low dyke or levee along the bank of Jordan Creek and to have the sludge pumped on to the land between the levee and the purification works. The entire plant is so arranged that no by-passes or unpurified sewage to the creek can occur. All of the sewage must be purified with the exception that wind shields are not planned for the filter sides.

The fact is worthy of emphasis that it is absolutely necessary that the greatest care should be exercised in the construction of the proposed sewers to make them tight. The expense of so doing is that for first class engineering and inspection. The cost if the sewers should leak considerably would be a permanent one for operating expenses at the disposal works and pumping station besides a much increased first cost for additional capacities. The proposed filter units may, if efficiently operated successfully treat and purify the city sewage during the early years of the system to a degree satisfactory to the State Department of Health, but this is dependent to quite an extent upon the flow in the sewer. Because in some sections of Allentown cellars are wet and the ground water level is above the line of the proposed sewers, it should be apparent that anything but tight joints in the sewer pipe or of other form of construction might easily total for the entire system a leakage of several million gallons. If any large infiltration should occur, this would require the immediate addition of another unit or so at the purification works. The Commissioner of Health purposes to keep a careful record of the operation of the plant. Its success will call for extensions as the city grows.

Another point should be emphasized; the public health will not be safeguarded if the system be not used after it is constructed. Compulsory sewer connections should be the rule. The waters of the State which include all ground waters as well as waters flowing in the stream at the surface are being polluted by individuals. This is contrary to the interests of public health and the practice should cease before a greater epidemic be visited upon the community. A practice which may cause loss of property and even life by explosion of gases which might start a conflagration of wide extent ought surely to be subject to regulation and control by city ordinances. And the menace (which should not be considered speculative but a certainty) to the Crystal Spring and private supplies of water in the city and vicinity is by State law subject to removal. It would be a cumbersome undertaking for the State Department of Health to close up every percolating cess-pool or sink in the city and an expensive procedure for the property owners; but even after this shall have been accomplished by common consent of the citizens and by city ordinance through the sewer system and compulsory connection, the Crystal Spring water should not be used as a source of supply unfiltered except daily bacteriological tests of the waters were made, proving them to be free from sewage pollution of a pathogenic character.

The State Department of Health will institute a sanitary survey of the water sheds of Trout Run, the Little Lehigh and Cedar Creek and have removed and abated every source of sewage pollution thereon since these waters are used as sources of

public and private supply. The pollutions in the city above the emergency water works intake must be removed at the earliest moment. The city should build this valley sewer without fail and notify all estates and manufactural draining to the creek to dispose of their sewage into the city sewer.

The city must also stop all discharge of sewage and manufacturing wastes into the waters of the State within the municipal boundary or the State Department of Health must do so. The proposed sewer system will afford the remedy. Industrial plants whose sewers are below the proposed intercepters should provide pumping apparatus to raise the sewage to the sewer. However, there are certain kinds of trade wastes which are known to be inimical to the proper functions of a sewer and sewage disposal plant. Such wastes should be subjected to preliminary treatment on the individual estate. There can be no question about the necessity for the discontinuance of the discharge of trade wastes into State Waters at Allentown. The water works intake of the Bethlehems within four miles down stream dictates the necessity. A water filter is not a germ proof device and it may get out of order or break down. Sewage emptied into the Lehigh River or its tributaries at Allentown may, within three or four hours, be introduced through the water works system into the homes of the citizens of South Bethlehem. Judging from the city policy prevalent throughout the country, it will be a prudent move for Allentown to foster its industrial interests by defraying the cost of a careful study of the trade wastes disposal question and of affording drainage facilities for such wastes.

It has been determined that the interests of the public health will be subserved by granting a permit for the installation of the proposed sanitary sewer system and sewage purification works and a permit is herein and hereby granted therefor under the following conditions and stipulations:

FIRST: That all storm and roof water shall be excluded from the sewer system and special care shall be taken to obtain water tight sewer lines. At the close of each season's work a plan shall be submitted and filed in the office of the Commissioner of Health, showing all sewers laid during the year, together with any other information in connection therewith that may be required, in order that there shall be on file in said office an accurate plan of the existing sewer system of the city with reliable information in reference to its use.

SECOND: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

THIRD: The city shall enforce such reasonable measure as may be necessary to bring about at the earliest practicable moment the discontinuance of the discharge of all sewage and trade wastes into storm drains or natural water courses or into the waters of the State on or below the surface of the ground within the limits of the city. The sewer system and sewage disposal works herein approved shall be built or construction work thereon shall be started on or before the close of the season of nineteen hundred and nine. It would be wise for the city to have its experts examine into and report upon the trade wastes drainage problem.

FOURTH: Detail plans for the proper and sanitary disposal of the septic tank and settling basin sludge and drainage shall be prepared and submitted to the Commissioner of Health for approval before the disposal works shall be put in operation.

FIFTH: Detail plans of the entire sewage disposal plant and the low level pumping station as built when the works herein approved is completed, shall be prepared by the city and filed in the office of the Commissioner of Health without delay.

SIXTH: Within three months from the date of any request which the Commissioner of Health may make therefor, the city shall prepare and submit plans and a report on additional units to the sewage purification works of a sufficient total capacity to accomplish the purification of all of the city sewage discharged into the sewer system, together with that which may be reasonably expected to be discharged by said system in the near future.

SEVENTH: The city shall expedite the work of intercepting the sewage now going into the Little Lehigh Creek within the city limits above the emergency water works intake and the private intake at the steel and wire plant and is hereby permitted, if it be necessary, to make a temporary outlet for said sewage into the creek below these points, pending the construction of the sewage pumping station and outfit.

EIGHTH: Daily records of the operation of the entire sewage disposal works, beginning at the pumping station shall be kept by the city in form satisfactory to the Commisssioner of Health, and copies thereof shall be filed in said Commissioner's office. The city shall cause to have made frequent analyses of the crude sewage and of effluents at various stages of the process of treatment, sufficient to show the efficiency of the plant and to enable deductions to be made therefrom as to management and operation. The plant shall be operated for one year under the responsible supervision of the experts who designed it, beginning at the start of the operation, or if not by these experts, then by others equally competent to perform such ser-

vice. The results of all tests shall be given to the Commissioner of Health who may make rules and regulations governing the operation of the plant in so far as these may effect the quality of the effluent discharged into the water of the creek.

NINTH: If at any time in the opinion of the Commissioner of Health, the sewer system or sewage disposal works or any part thereof has become a menace to public health, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

Harrisburg, Pa., July 27th, 1908.

BARNESBORO, CAMBRIA COUNTY.

This application was made by the borough of Barnesboro, Cambria County, and is for permission to extend its sewer system and discharge the sewage therefrom untreated into the West Branch of the Susquehanna River within the limits of the borough.

It appears that the borough of Barnesboro and the borough of Spangler, adjacent to the former on the south, are primarily mining towns in a recently developed soft coal country on the east side of the Alleghenies and in the valley of the West Branch of the Susquehanna. They are in the northwest part of Cambria County and are almost surrounded by Susquehanna Township, Barr and Carroll Townships bordering Spangler on the south. The boroughs are on the Cambria and Clearfield Division of the Pennsylvania Railroad, about twenty-two miles north of Cresson. From this latter station, on the main line just west of the Allegheny Divide, this division of the Pennsylvania extends to the north—three branches running—the western one through Ebensburg, the county seat of Cambria, to Indiana, the central one through Barnesboro and Spangler to Cherrytree and Dixonville, Indiana County, and the eastern one through Cambria County to Punxsutawney, Jefferson County. About seven mines southeast of Spangler are served by the New York Central Railroad which has its outlet to the north over the Pennsylvania tracks and further on over its own right of way to Clearfield.

The West Branch of the Susquehanna rises seven miles southeast of Barnesboro. Above the lower or northern borough line the river has a watershed of twenty-seven square miles all in Cambria County. A small part of the borough of Carrolltown extends over the extreme upper end of the watershed. About three miles above Barnesboro on the banks of the stream is the village of Bakerton, noted in these parts for its unsanitary condition, it being simply a mining village. The mining village of Saint Benedict is located close to one of the branches of the river about three miles southeast of Barnesboro. There are several other small mining villages on the watershed above Barnesboro.

Forty mines are located within the twenty-seven square miles water-shed of the West Branch of the Susquehanna above the lower boundary of Barnesboro and from the majority of these mines considerable quantities of mine drainage are pumped or allowed to run to the streams where the sulphur water is very noticeable in the peculiar yellow translucent appearance of the water both above and below Barnesboro. Half of these mines are located in terrritory tributary to the river within Barnesboro and Spangler, and the other half in territory drained by the river above these boroughs. There are five mines within the borough of Barnesboro, four owned by Barnes and Tucker of Barnesboro, and one owned by the Empire Coal Mining Company of Philadelphia. The water shed above Barnesboro and Spangler is hilly, almost rugged, although the greater part is under cultivation.

Five miles below Barnesboro is Cherrytree borough in Indiana County, eleven miles below is Burnside Borough in Clearfield County, twenty miles below Mahaffey Borough, twenty-eight miles below Lumber City Borough, forty-three miles below Clearfield borough, all in Clearfield County, ninety-six miles below Barnesboro is the junction of the West Branch with the Sinnemahoning Branch at Keating and one hundred and ninety-five miles below is the confluence of the West and North Branches of the Susquehanna River. The first use of the river water for domestic purposes is at Muncy, one hundred and sixty-eight miles below Barnesboro.

The borough of Barnesboro was incorporated March fifth, eighteen hundred and ninety-four. Its population in nineteen hundred was one thousand six hundred and sixteen. The estimated population at present is two thousand five hundred and fifty. The present population of Spangler is about twenty-five hundred. There is also a population of about one thousand outside of but in the immediate vicinity of these boroughs.

There are no industries in Barnesboro worth mentioning other than mining. A large part of the population consists of the poorer class of foreigners.

The incorporated area is about one and a half miles in extent. The West Branch of the Susquehanna enters the borough from the south and following a general northwesterly direction leaves the borough at the extreme northwest corner, about one-fifth of the total area being west of the river. Walnut Run, entering the river from the east, is just within the southern boundary of the borough. Porter Run, coming from the east, enters the river at about the centre of its course through the borough. The hills rise rapidly from the streams reaching an elevation above them of several hundred feet within the borough.

The business district and most thickly built up residential district is the southern part of the borough joining Spangler and in the mouth of the valley of Walnut Run on its northern slope. From this district, at an elevation well above the river, Chestnut Street extends northwesterly along the eastern river slope across the mouth of Porter Run valley and then becomes Shepard Street, the principal street in North Barnesboro (a settlement in Barnesboro borough). The two settlements are about a thousand feet apart, although connected by straggling houses along Chestnut Street. About half the borough population is in Barnesboro proper at the mouth of Walnut Run. Almost all the remaining population is concentrated in North Barnesboro. There are also about five hundred people living in a mining village extending from North Barnesboro up the valley of Porter Run, (within the borough), and a small scattered population in the valley of Walnut Run above the principal part of the town. There are but few houses west of the river within the borough, although just beyond its boundary to the southwest is a considerable little village known as West Branch. Within the borough the river winds through flat meadow lands several hundred feet wide, which it annually overflows. The railroad follows the east bank of the river through Barnesboro on these meadow lands at the foot of the side slopes.

The public water supply is furnished by the Barnesboro Water Company which is a subsidiary company of the Spangler Water Company and water is furnished by the latter to the former.

The Spangler Water Company has an impounding dam on the twenty-seven mile water shed hereinbefore mentioned, situated two miles east of Spangler, on a branch of the river joining the latter from the east, just above Spangler. There is a drainage area above the intake of about three square miles. This area is hilly, cultivated lands supporting a population of about one thousand people, including the villages of Saint Benedict and Foxburg. There are four mine openings on the shed above the intake from which mine drainage reaches the streams, in fact, at times it probably forms the greater part of the stream flow. The intake dam has a capacity of about four million gallons. It is provided with a twenty-four inch drain pipe.

From this dam an eight inch supply main leads through Spangler to Barnesboro. There are several branches from the main in Spangler and a restricted distributing system in Barnesboro. In the whole system there are only three blow-offs aside from the twenty-four inch drain pipe at the reservoir. From the reservoir into the heart of Barnesboro the total length of the eight inch main is about twenty-thousand feet. It is estimated that nine hundred and fifty persons are supplied with water in Spangler and seven hundred in Barnesboro.

In Spangler borough below at least one sewer outlet there is a pumping station on the bank of the river from which water is supplied to locomotive tanks of the Pennsylvania Railroad. During the summer months when the impounding reservoir supply becomes low, it has been necessry for the water company in avoiding a water famine, to use this pumping station at the river, by means of which this river water has been obtained as an auxiliary supply to the public. The river is frequently turbid and the quality of the water is very unsatisfactory to the public, but in this respect there seems to be little choice between the auxiliary source and the water from the impounding reservoir, from the standpoint of the consumer.

Barnesboro originally owned its water works but sold out the system to private individuals about eighteen hundred and ninety-nine.

It is reported that both the borough of Barnesboro and the Spangler Water Company have given consideration recently to the obtaining of a more satisfactory source of water supply.

Owing to the inadequacy of the supply and the inferior quality of the water, there are still quite a few private wells in use in Barnesboro, particularly in the higher parts. In North Barnesboro village there are not more than ten per cent of the people who use the public water supply, so it is reported. About ninety per cent of the properties in the borough are provided with loose vaulted privies. A few cesspools of the percolating type are in use. The common practice is to discharge wash water and sink drainage to street gutters and the surface of the ground.

There are some public sewers but it appears that not over approximately twenty buildings are connected therewith. The existing method of sewage disposal, the steep slopes of the ground and the general use of dug and drilled wells, establishes a standard menace to public health. The danger is from surface and underground pollution of the well waters. There have been several typhoid fever epidemics in Barnesboro and Spangler within a few years. Records are unreliable. In no instance has the origin been definitely traced to the public water supply, so it is reported. The pollution of the private wells and springs, has been the accepted cause. The State Department of Health made a thorough inspection and caused menaces to be removed from the Spangler Water Company's water-shed, during the year nineteen hundred and seven. However, accidental pollution of the waters of the reservoir may occur at any time and the probability is very great, owing to the population and proximity of dwellings to the streams feeding the reservoir.

The borough sewer system is largely for surface drainage. The pipes are laid in the streets in the closely built-up district in Walnut Run Valley. The trunk sewer is twenty-four inches in diameter and fifteen hundred feet long in Maple Street and empties into the river at the foot of this street extended; off of it there are two lateral sewers, one twenty inches in diameter in Caroline Street and one fifteen inches in

diameter in Martha Street. Maple Street parallels and is north of Walnut Run. The two lateral sewers were built during nineteen hundred and five. Street inlets for the admission of surface water are provided on the sewers.

The borough purposes to build a twelve inch lateral extension in Mary Street northerly from Maple Street six hundred feet and a twelve inch lateral in Ann Street northerly a distance of eight hundred feet. These streets are not paved, their gutters are badly gullied, and because of the steepness of the slopes, it is to save the wear of the highways that the proposed sewers are to be laid. In the gutters of these steep streets, deep holes have been washed out, wherein stagnant pools of kitchen drainage remain and cause a nuisance. The proposed sewer will remedy this evil provided the borough authorities make abutting properties connect with the sewers. This has not been done in Martha Street, and, therefore, these stagnant pools are still in existence in Martha Street. Caroline Street is paved and the conditions therein are, therefore, fairly good. One object of the urgency of the Ann Street sewer is to have sanitary connection of the public school house at the corner of Ann and Chestnut Streets on the hill.

The general sanitary condition of the whole borough is not up to the standard.

One of the first things to be done in improving the health conditions in Barnesboro is the proper disposal of household wastes. This should be accomplished by a proper sewer system. The borough council and local board of health seem to be in favor of the establishment of such a sanitary system. Under a proper plan the cost of such improvements ought not to be very great. Smaller pipes, designed for house drainage only, would be sufficient. The surface water drainage facilities are good. Storm water may be permitted to flow off in improved street gutters to the nearest natural water courses. The admission of storm water to sewers renders the cost of the sewer system excessive and the cost of treating the sewage and storm water prohibitive.

Barnesboro is near the head waters of the West Branch of the Susquehanna River. It is desirable that these waters should be kept free from sewage pollution and the sewer system, therefore, should be designed in connection with a sewage purification plant. So long as mine drainage continues in its present volume the amount of sewage going into the stream is small, and it may not be necessary for the borough to erect a sewage treatment plant, but the improvement in its entirety should be laid out; the site of the works selected and when, if ever, the necessity shall arise for the erection of the purification plant, it can be done without rendering useless any part of the sewer system or without requiring expensive alterations to the sewer system. Barnesboro and Spangler boroughs should jointly consider the sewerage problem because it is all one community. Spangler has public sewers emptying into the river, some of which have been laid without State approval. The interests of public health would seem to demand that notification be given to both municipalities that they must, either independently or jointly, give immediate consideration to plans for improved sewerage and submit the same to the State Department of Health, for approval. After such plans have been modified, amended, approved and adopted, then the local municipal authorities can build a sewer in any particular street from time to time in conformity with this general plan. In this way only can efficiency and economy be secured.

Owing to the unsatisfactory condition of the public water supply and the very general use of private wells, it is deemed to be for the interests of the public health that sewers should be extended, with the right temporarily to empty the flow therefrom into the river. The large flow of mine drainage into the Susquehanna River above Barnesboro renders this stream a natural disinfector of sewage to some extent and undoubtedly it mitigates against any nuisance. No complaints about the existing sewer outlets have come to the attention of the Department, but there is a limit to the amount of sewage which can be discharged into the river without causing a nuisance under existing conditions.

It has been determined that the interests of the public health will be subserved by granting a permit to the borough of Barnesboro to discharge sewage into the West Branch of the Susquehanna River from the sewer in Maple Street and in Martha and Caroline Streets and from the sewers mentioned in the application, namely, in Mary and Ann Streets, under the following conditions and stipulations:

That on or before July first, nineteen hundred and nine, Barnesboro shall either independently or in conjunction with Spangler borough, prepare plans for a comprehensive sewerage system and select a site for disposal works and submit outlines of a plan for delivering the sewage ultimately to this site for purification, to the Commissioner of Health for approval. In doing this it would be well for the municipality to employ the services of a sanitary engineer of recognized experience.

A notification will be issued by the Commissioner of Health to the borough of Spangler to the effect that on or before July first, nineteen hundred and nine, it shall either independently or in conjunction with Barnesboro prepare a plan for a comprehensive system of sewerage and select a site for disposal works and submit outlines of a plan for delivering the sewage ultimately to this site for purification, to the Commissioner of Health for approval. In doing this it would be well for the municipality to employ the services of a sanitary engineer of recognized experience.

The Commissioner of Health will notify the Spangler Water Company and the Barnesboro Water Company each, that their present sources of supply are prejudicial to public health and that plans for supplying a pure and wholesome water

to the public within their charter territories shall be submitted to the Commissioner of Health for approval on or before January first, nineteen hundred and nine. Failure on the part of these companies so to do shall be understood by the Commissioner of Health to be an admission that the said water companies are unable to fulfill their charter obligations, and the Commissioner of Health will be guided accordingly.

The local Board of Health of Barnesboro will be requested to make inspections of all privies and cesspools and to enforce the sanitary maintenance of the same and the proper disposal of contents removed therefrom. This measure is essential to prevent surface contamination of wells and springs located on private properties.

Harrisburg, Pa., September 14th, 1908.

BEAVER, BEAVER COUNTY.

This appliction was made by the borough of Beaver, Beaver County, and is for permission to extend its sewerage system and to discharge the sewage therefrom untreated into the Ohio River, within the limits of said borough.

The borough of Beaver is the county seat of Beaver County, has a population of about four thousand, and is growing steadily. The town is situated on the north bank of the Ohio River and on the west bank of the Beaver River where it enters the Ohio and is about twenty-five miles below Pittsburg. It is a residential community entirely. In fact, Beaver borough does not extend to the Beaver River; there is a narrow strip of land intervening which comprises the borough of Bridgewater and extends from the mouth of the Beaver River northward a mile and a half to the borough of Fallston.

Bridgewater lies on a low flat shelf, about thirty feet above the normal level of the Beaver River. During freshets the area is flooded. Beaver borough lies on a high plateau about sixty feet above Bridgewater. This higher plateau is of gravel deposit quite level to the edge of the bluff which is an abrupt slope both to the Bridgewater borough and the Ohio River. The Pittsburg and Lake Erie Railroad, which extends up the Beaver River valley, lies on the top of the slope at the boundary line between Bridgewater and Beaver and passes southerly over the Ohio River to the borough of Monaca on the opposite side. The Pittsburg and Cleveland Division of the Pennsylvania Railroad follow the banks of the Ohio River through Beaver at an elevation of about freshet line and crosses Beaver River at its mouth to the borough of Rochester and thence on to Pittsburg. There is a highway bridge connecting Bridgewater with Rochester and another spanning the Ohio River between Rochester and Monaca, both of which are owned by the county and free to the public. The manufactories of this district are in Rochester and Monaca and comprise glass houses, brick works, iron and steel mills and pottery manufactories.

The lines of communication between Beaver Borough and the municipalities in the Beaver and Ohio River valleys have been recently developed by the Beaver Valley Traction Company and are now exceptionally good, in fact every thing points to a material growth of the district.

Beaver was laid out by the Commonwealth of Pennsylvania in the year seventeen hundred and ninety-three as a town site with streets paralleling and at right angles to the river and one hundred feet wide. The municipal territory is rectangular about three quarters of a mile along the river and about three quarters of a mile back. At each corner there is a public square and in the centre of the town four blocks are devoted to park purposes and the court house is situated in one of them. Extending back from the river through the centre of the town and the park is Market Street and at right angles to it, through the park and the centre of the town, paralleling the Ohio River, is Third Street. This is the main thoroughfare and its surface is paved with brick.

Owng to the gravel formation, which is from one hundred to one hundred and fifty feet deep, the level of the ground water is reported to be at least one hundred feet below the upper terrace on which the town is built. Immediately north of the borough is an abrupt hill whose summit is over two hundred feet above the borough. It is on this hill that the reservoir for storage water supplied to the public is built.

Formerly the springs on this hillside were the source of supply to the village. About ten years ago, so it is reported, the borough built the new reservoir and extended the distributing pipes in the borough and obtained a new source of supply from the Ohio River by driven wells in the gravel bed thereof. The wells and pumping station are located near the foot of Beaver Street in the up-stream part of the borough. No plans or report of this municipal system of water works has been filed in the State Department of Health office, as required by law. It is reported that all of the citizens take the public supply.

Owing to the porosity of the ground, percolating cesspools are utilized as the method of disposal of sewage. The dwellings are almost universally provided with modern plumbing facilities and while the liquid household wastes have been quite successfully cared for by soil absorption, it is now represented that the ground has become thoroughly saturated in places and that the accumulated organic matter therein, especially during warm weather, in decomposing produces more or less of a nuisance. Complaints have been made to the Department relative to this condition.

There are two public sewer outlets in Beaver, one of them is a twenty-four inch pipe which enters the river eight hundred feet below the water pump house. It extends the full length in Beaver Street and connecting with it is an eight inch sewer in Corporation Street, taking the sewage from the buildings on Third Street, and a short twenty-four inch branch in Fifth Street which receives the surface water from a small run near Beaver Street. The twenty-four inch pipe was laid for surface water, but it is used as a combined sewer. The Corporation Street sewer is sanitary only. Connecting with this system are sixty-seven dwellings and buildings serving about five hundred people.

The other public sewer is in the extreme western part of the borough. It is twenty-four inches in diameter in Buffalo Street from Third Street to the edge of the bluff. It is said to be used only for surface water. It discharges into the public square into an open ditch, which ditch is paved in its course down slope and under the railroad to the river.

In the extreme northwestern corner of the town in the Hindman Addition there is a private six inch sewer about one thousand feet long in Sixth Street, which has not been connected up with dwellings, but is to be in the near future. It will discharge into cesspools to be built in Mill Street at the edge of a small water course called Two Mile Run. The overflow from these cesspools, if any, will be directly into the run.

The petitioners represent that the present practice of disposing of bath-room and inside closet drainage into cesspools is becoming a source of danger to public health and that, therefore, it is the purpose of the town council to submit to the voters a proposition to increase the public debt in the sum of Fifty Thousand Dollars, for the purpose of installing a public sewer system for the entire borough territory.

The proposed sewers are to be strictly for sanitary drainage, all storm water is to be excluded. A conduit is to be provided in every highway, inspection manholes are to be placed at dead ends, street intersections and changes in line of grade, ventilation is to be effected through manhole covers, flush tanks of accepted design are to be installed where needed and the minimum grade with one exception, namely, on Second Street, for a few hundred feet, is to be five-tenths per cent.

For the present two sewer outlets into the river are proposed. Ultimately the sewage is all to be collected on the lower river bank in the southwestern corner of the borough.

The outlet for the eastern portion of the borough is to be twelve inches in diameter and the system is to comprise twenty-two thousand feet of eight inch pipe, thirteen hundred feet of ten inch pipe and fifty-seven hundred feet of twelve inch pipe. The twelve inch outlet is to connect with the present twenty-four inch storm sewer to the river at the foot of Beaver Street. Ultimately the twenty-four inch pipe is to be adandoned as a sewer. This is to be accomplished at once if the appropriation is authorized. A new sanitary sewer will be laid in Beaver Street and all laterals connected to it.

The outlet for the western portion of the borough is to be fifteen inches in diameter. It is to extend down Buffalo Street from Third Street to the river and discharge here until such times as sewage treatment works may be required. Then inconformity with the plan disposal works are to be erected on land owned by the borough and comprised within the "Broadhead Square" and on the river bank near the railroad at the foot of Buffalo Street.

Connected with this western outlet is to be twenty-five thousand feet of eight inch pipe, fourteen hundred of twelve inch, sixteen hundred feet of fifteen inch and in the Hindman Addition twenty-one hundred feet of six inch.

It is not an exaggeration to state that Beaver has one of the most exceptionally favorable sites for a town in the United States. Its conditions naturally are ideally healthful. With a pure water supply amply protected and adequate sewerage facilities, it will be an easy matter for the local authorities to maintain a high degree of sanitation. The class of residences averages above that of most of the municipalities in Pennsylvania. Eighty new dwellings were built during nineteen hundred and seven, every one being provided with latest sanitary conveniences. It is represented that public sentiment is strongly in favor of the proposed sewerage system and this would be expected in a town of this class. The assessed valuation is reported to be slightly above two and a half millions of dollars. If it is true that the present debt is seventy-five thousand dollars only, then the borrowing capacity of Beaver is in the neighborhood of one hundred thousand dollars.

The petitioners do not want to expend all of their resources on the sewerage improvement. The sewers will cost at least the amount of money estimated and this cost is to be defrayed by general taxation.

Since every municipality in the valley of the Beaver and Ohio Rivers discharges sewage into the stream and will continue to do so at least for some time, the authorities of Beaver request permission to put Beaver sewage into the river temporarily.

An examination of the borough's water supply has not been made by the Department. Even if it is true that the water flows into the wells from a much higher head than that attributed to the water level in the river, experience has demonstrated over and over again that ground water drawn from points always accessible by sewage polluted waters, is dangerous and a menace to public health, since it is never known when an accident may occur by which admittance of the poisonous waters into the water works system may be possible. It is clearly a duty of the State

to aid the preservation of the purity of Beaver's water supply by bringing about the ultimate discontinuance of the discharge of sewage into the river and tributaries above said borough.

Beaver is the last place of any size on the Ohio River in Pennsylvania. The municipalities on the river outside of Pennsylvania obtaining their supply of drinking water from the river comprises within a distance of four hundred and fifty miles, a total population of eight hundred and seventy-six thousand people.

In cities using pure water supplies the typhoid fever death rate is usually maintained at between five and ten per hundred thousand population. The rates in the municipalities above mentioned, below Beaver, are --in most of them—ranged from thirty-two to one hundred and one per hundred thousand population, for typhoid fever. To what extent Pennsylvania sewage contributes to these high rates must be purely conjectural, but there can be no doubt that it is possible for sewage from Pennsylvania towns to be transported to these lower municipalities and infect the public water supply thereof.

However, the small amount of sewage which Beaver borough will put into the river from the proposed system of sewers might not necessarily increase the pollution of the river until the sewage of Pittsburg and of all the other towns in the district above Beaver has ceased to be discharged untreated into the river.

Because the States of Ohio and West Virginia are not conducting an active campaign against the pollution by sewage of the Ohio River, it would seem that all a conservatively progressive policy would require at Beaver would be the anticipation in the sewerage plans of the ultimate treatment of the borough sewage at a date not earlier than other towns in Pennsylvania in the district are required to treat their sewage.

The plans offered comprise a site for treatment works, and the sewers are to be separate sewers in anticipation of treatment of the sewage. Details as to the precise kind of disposal works are left for future consideration.

The borough of Baden, a few miles above Beaver, has been granted permission to discharge sewage into the river until July first, nineteen hundred and ten, because the finances do not warrant an earlier installation of sewage purification works. Should the borough of Beaver perfect plans for treatment works and submit them for approval on or before this date, it is believed by the petitioners that this is the earliest time at which the subject should be taken up in a preliminary way.

In view of the fact that Rochester and Monaca in the immediate vicinity and above Beaver put their sewage into the river and will continue to do so until they come within the jurisdiction of the State authorities, and in view of the other considerations hereinbefore mentioned, it has been unanimously agreed that the proposed plans for the installation of the new sewerage system be approved, and such approval is hereby and herein granted and a permit issued therefor, under the following conditions and stipulations:

FIRST: That permission to discharge sewage into the waters of the State herein granted shall cease on the first day of July, one thousand nine hundred and eleven. On or before said date the borough shall prepare detail plans of sewage disposal works for the treatment of the borough sewage and submit the same to the Commissioner of Health for approval. If this be done and the other conditions of this permit shall have been complied with, then the Commissioner of Health may extend the time if the interests of the public health demand it in which the borough sewage may continue to be discharged, untreated, into the Ohio River.

SECOND: All storm water shall be excluded from the sewers, and at the close of each season's work plans and profiles of the sewers laid during the year shall be prepared and filed with the Commissioner of Health, together with any other information which may be required in relation thereto.

THIRD: No pathological material from any laboratory shall be discharged into the system. The proper authorities shall cause these wastes to be destroyed on the premises.

FOURTH: The local authorities shall keep a record of all connections with the sewer and copies of the same shall be submitted to the State Department of Health when called for.

FIFTH: This permit to discharge sewage into the Ohio River shall be null and void unless within three months from the date thereof the borough shall have filed with the Commissioner of Health a complete and satisfactory report and plans of its water works system.

SIXTH: It is expressly stipulated that this permit is granted under the condition that, if, upon receipt by the Commissioner of Health of full information regarding the borough's water works system, it shall appear that the source of supply is rendered prejudicial to public health to some extent through negligence or by acts of the borough itself, then such remedies shall be adopted to protect the purity of said supply, in so far as the borough may be held responsible, as the Commissioner of Health may advise or approve. The special reason for this stipulation is that it may later appear that the borough's sewage from the easterly outlet may endanger the purity of the driven well supply to some extent, since Federal Government Dam Number Six, across the river two miles below Beaver, is utilized to maintain a pool through the borough for navigation purposes during dry weather, and an extended examination may show it to be desirable to have this easterly sewer outlet extended much further down stream.

SEVENTH: If at any time the sewerage system, or any part thereof, shall become a nuisance or menace to public health, then such remedies shall be adopted as the Commissioner of Health may advise or approve.

The borough council is advised that the best practice in separate sewer system is to have an untrapped main soil pipe from the sewer through to the top of the roof of the building, all plumbing fixtures on each floor of course being trapped to this main soil pipe. Thus a free ventilation of the sewer is affected and no accumulation of gases rendered possible. It would also be advisable for the borough to adopt an ordinance regulating the connection of all dwellings with the sewer system and the abandonment of existing cesspools.

Harrisburg, January 24th, 1908.

BELLEFONTE, CENTER COUNTY.

This application was made by the borough of Bellefonte, Center County, and is for permission to extend its sewers and to discharge the sewage therefrom into the waters of the State within the borough.

Bellefonte, county seat of Center County, is a manufacturing community of upwards of five thousand people located in the midst of the Allegheny Mountains on the watershed of the West Branch of the Susquehanna River. The incorporated territory is rectangular being a little over one mile long east and west and less than a mile long north and south. Northward through the western part of this area flows Spring Creek, a stream having its head waters on the mountains twelve miles or more southerly and flowing northerly to Bald Eagle Creek, entering the latter in the borough of Milesburg two miles below or north of Bellefonte. Between these two boroughs lies the Muncy Mountain Range. It is through a deep narrow gap (McCoys) in this mountain that Spring Creek passes into the Bald Eagle Creek Valley beyond. Above Bellefonte the watershed comprises twenty-seven square miles up which the Lewisburg and Tyrone Branch of the Pennsylvania Railroad extends. At the summit is State College borough. This is the only place of importance on the area.

In Bellefonte near the southwest corner there is a small branch of the creek called Logan Branch which rises four miles southerly and pursues its course northerly east of and parallel with Spring Creek and joins the latter in the borough. It drains an area of two and seven tenths square miles of farm land.

In the northwest corner of Bellefonte, Spring Creek is joined by Buffalo Run, a stream rising in Patton Township and flowing northeasterly along the south slope of Muncy Mountain range a distance of twelve miles to Spring Creek. The water shed comprises nine square miles. It is up Buffalo Run Valley that the Bellefonte Central Railroad extends.

The valleys of these three streams are underlaid with limestone rock, except a small area near State College where the rock is sandstone. The soil is fertile and generally under high cultivation.

In the borough there is a dam across Spring Creek below Logan Branch. It is above High Street, the principal highway of the town. The dam was erected to create a water power and the head race extends below the dam west of the creek a quarter of a mile to Lamb Street where there is a flour mill operated by water power. The land between this head race and the creek is not over two hundred feet wide at any given point, and on it near the south end abutting High Street is a large hotel and the McLean Block and the Pennsylvania Passenger Station. The latter, however, is immediately west of the head race. This line follows the race and the west bank of Spring Creek and back from it the land rises into a hill. There is one street paralleling the railroad on the hillside called Smith Street. Along it are dwellings. A branch of the railroad crosses the creek above the dam and extends up Logan Branch valley through the borough. It is along these lines that the industrial plants in the borough are located. Besides the Flour Mill at Lamb Street there is the plant of the Lingle Foundry and Forge Company west of the creek. The other industries in the town are east of the creek. The principal plant is the Pennsylvania Match Company, employing one hundred and ten hands. There are also lumber yards and a planing mill and a toy factory.

At and beyond the northern boundary line of the borough on either side of Spring Creek the American Lime and Stone Company operates large stone crushing plants, kilns and quarries. The limestone is of pure quality and there are vast deposits of it in the region. It is one of the natural resources of the territory. Up Buffalo Run four miles the Chemical Lime Company has a plant. In the opposite direction in the township a half mile east of the borough is the plant of the Empire Lime Company.

Another natural resource is red hematite ore, mined in the region. It is used in mixture with Lake Superior ore in two blast furnaces. The Nippany Iron Company furnace is on Logan Branch just outside of the borough. The Bellefonte Iron Company furnace is on Buffalo Run, immediately beyond the borough limits.

The town proper is built on the hillside west of Spring Creek. High and Lamb Streets bridge the creek and then ascend easterly to an elevation between one hundred and fifty and two hundred and fifty feet higher at the easterly borough line. The main street at right angles to these highways is Allegheny Avenue. The public

square begins at the intersection of this avenue and High Street and thence it extends easterly two blocks in High Street. Here are erected the county buildings, including the jail.

The water works system is owned by the municipality. The source of supply is from "Big Spring," a wonderful stream of ground water measured to flow at the rate of twenty million gallons per twenty-four hours year in and year out. These measurements have not been verified by the Department, but certain it is that the volume of flow is great and constant, comparatively speaking. This spring is located at the foot of the hill south of Spring Creek and above the dam, east of Logan Branch, the match works and the railroad and west of South Water Street. It has been dammed up and improved and confined in a pool about a half acre in area. The pool is enclosed by a fence. The fall of water is utilized to create power to operate a pumping engine located in the power house immediately below the spring. The pump has a capacity of one hundred and twenty gallons per minute under ninety pounds pressure. It delivers the spring water into the twelve inch distributing main of the water pipe system. This capacity is insufficient for the town's demands.

On Logan Branch south of Water Street just within the borough limits there is a dam belonging to the water works system, at which an available head of eighteen feet is utilized to operate a pump having a capacity of seven hundred and fifty to twelve hundred gallons per minute. The suction of this engine is into a pump well supplied with water from the Big Spring. Besides two turbine driven pumping engines, there are auxiliary steam engines provided for emergency. Surface water pumped into the town's distributing system overflows into a reservoir on the hill on Allegheny Avenue at the southern borough line. It is a stone masonry structure sixty-three feet by forty-five feet in plan and twenty-two feet deep to flow line. When full it holds four hundred and eighty thousand gallons.

Blue Spring on Logan Branch four and a half miles from Bellefonte flows over ten million gallons daily, so it is reported, and numerous other springs add their quota so that Spring Creek is a large flowing stream of naturally pure water even in the dry season. However, during times of lowest water the flour and planing mills in the borough utilize nearly all of the flow of the stream for water power, consequently there is little water to be found in the creek bed below the dam and above the tail race.

About everybody takes public water. Individual wells on properties are reported to be a minus quantity. The prevalent method of sewage disposal is by privies and cesspools. There are many hundreds of them. Frequently a hole is dug through the surface clay to the underlaying limestone rock twelve to eighteen feet below the surface. If the rock be open, the hole is walled up and the liquid wastes disappear in the fissure. If the rock be compact, which is not often, a hole is drilled two or three feet deep in the rock and a blast fired. In some cases the hole is drilled to greater depth and the rock is shattered at the bottom by a dynamite cartridge. The limestone rock dips about forty-five degrees or thereabouts to the northwest. This is in the direction of the Big Spring in the southern part of the town, but the subterranean passages may extend in any direction and no one knows the channels of communication. It is an extremely dangerous expedient to deposit sewage to the rocks of this region, especially in proximity to a drinking water supply. It may take years for the field of contamination to spread to the Big Spring. Prudence dictates the safe course rather than the one of risk. Chemical and bacteriological examinations of the water show a pure supply.

There are six public sewer outlets, all into Spring Creek in the borough. All but one are below the dam. This exception is a six inch pipe two hundred and ninety feet long emptying into the stream in the north bank at the foot of Thomas Street.

In order down stream the sewer outlets below the dam are as follows:

Water Street outlet.
High Street outlet.
Lamb Street culvert.
Lamb Street six inch pipe.
West Side outlet.

Water Street sewer is ten inches in diameter. It begins at the Bellefonte Academy on the hill and passes westerly through private property to South Water Street and thence in said street northerly, emptying into the creek ten feet below the dam. The entire length of this sewer line is seven hundred and eighty feet.

High Street outlet is twenty-four inches in diameter. It serves the territory in the public square and south thereof in which there are about forty-two hundred feet of sewer, five feet being four inches in diameter, eight hundred feet six inches in diameter, seven hundred and twenty feet eight inches in diameter and the balance being twenty-four inches in diameter. This system takes both roof and surface water and sewage into the eighteen inch and twenty-four inch pipe.

Lamb Street culvert is a stone structure very old and said to be two by three feet in dimensions. It extends up Lamb Street across private property to Burrows Alley. During nineteen hundred and seven, the borough extended this culvert which took the place of an old natural water course by laying a thirty inch pipe in the alley to Allegheny Avenue. Thence the borough laid two hundred and eighty feet of twenty-four inch pipe in the avenue to Howard Street and eight hundred and twenty

feet of eighteen inch pipe up Howard Street. This work was in progress at the time of the Department's inspection. There is also a six inch pipe seven hundred and forty feet long laid in the avenue from the public square northerly to the thirty inch pipe sewer. This system is also a combined one.

The Lamb Street six inch outlet begins on the hill at Armor Street and is laid in Linn Street across the public school lot and down Lamb Street a total length of twenty-seven hundred and twenty feet. It is reported to take sewage only. The west outlet is eighteen inches in diameter. It extends along the railroad west of it thirteen hundred and ninety-two feet to High Street. There is a short ten inch branch up the hillside in said street and a short six inch branch in Lamb Street and Smith Street. A six inch private sewer serving one house only on Smith Street is connected to the outlet. All told sewers comprise a total length of thirteen thousand, eight hundred and thirty feet or about two and one half miles. There are no inspection manholes provided on the sewers. It is reported that the pipes are not laid to established lines or grades and that there are no records of the precise location of the sewers and the branches on file in the public office.

No nuisance or complaint of a nuisance at the sewer outlets is reported. Besides the public sewers there are numerous private sewers to the streams along Water Street and on the island. These private pipes extend through the retaining wall and along High Street they are submerged.

In the neck of the land between Logan Branch and Spring Creek there are dwellings and overhanging privies on the banks of the stream and the race. At the Phoenix pump house is such a privy. The sewage from the match factory goes to the race so it is reported.

In the fall of nineteen hundred and six, a six inch sewer was constructed from the Bellefonte Hospital to Logans Branch at Willow Bank Street. Objection to such use of the stream brought about a discontinuance of sewer, The hospital sewer is now emptied into a hole drilled into the limestone rock.

The additions to the existing sewers for which approval was asked, were under constructon, all arrangements having been made therefor by the local authorities prior to the time of asking approval of the plan. These extensions were made because the flood waters on the streets were a nuisance. They comprise the following additions:

The enlargement of the sewer in Allegheny Street from Burrows Alley to Howard Street to twenty-four inches.

The addition of a sewer on Howard Street from Allegheny Street to Decatur Alley to twenty-four inches and from said Decatur Alley to Ridge Street of eighteen inches.

The addition of sewer on Bishop Street from Penn Street to Ridge Street of eighteen inches.

It appears that the assessed valuation of Bellefonte is one million, six hundred and twenty-six thousand, four hundred and thirty-six dollars. Seven per cent. of this amount is one hundred and thirteen thousand, eight hundred and fifty dollars. The net indebtedness of the borough is reported to be one hundred and seven thousand, six hundred and seventy-eight dollars and if these figures be correct the municipal borrowing capacity is about six thousand dollars only. So the authorities cannot do anything about changing the present method of disposal of sewage at least for the present. If the water works indebtedness were to be placed outside of the seven per cent limitation, the debt being guaranteed by the revenues of the plant, then Bellefonte might be in a position to take up improved sewage and the sewage disposal problem.

Furthermore, it does not appear that the creek and the stream into which it empties and the river is used as a source of public water supply until after the sewage of numerous other municipalities besides that of Bellefonte has been discharged into such waters.

At a low stage of water in Spring Creek about ten years ago, the owner of the flour mill on Lamb Street put two foot flash boards on the dam which diverted all of the water through this mill race. This caused a slight nuisance for a few days because there was not sufficient water in the stream below the dam to dilute the sewage emptied therein. The court being appealed to decided that the dam should never be raised above its present level.

It does not follow because a nuisance is obviated in Spring Creek that sewage should be emptied into the stream. In fact if care had been exercised in the past to keep sewage out many thousands of human lives and millions of dollars expense would have been saved and there would be no necessity now for the campaign to preserve the purity of the waters of the State for the protection of the public health. A district is favored wherein its stream and waters are now comparatively pure and every effort should be made to keep them so.

The borough of Bellefonte may, with prudence, do two things at once: First, prepare a comprehensive plan for a sanitary sewer system for the entire borough with one outlet down stream near a site adapted for the ultimate erection of a sewage purification plant. When this plan has been submitted to the Commissioner of Health and approved the sewers may be built from time to time as local necessity may require with the assurance that economy and efficiency is being secured. There is no reason why a sewer should not be laid down for a century. It is extravagance which permits the building of a sewer one year and its digging up soon after. The policy of

Pennsylvania and of other States to keep sewage out of the streams has been of slow maturity but is here to stay. Bellefonte can ill afford to go on with a combined system The cost of treating sewage and storm water is prohibitive. Every advantage will accrue by the adoption of a comprehensive sanitary system. Besides the economies of the situation, the present household disposal into lime rock on the "out of sight, out of mind" plan is hazardous. There are changes going on in under ground courses. It is safer to confine the poisons ejected from the body to structures wherein the harmful qualities may be handled and destroyed and the sewage after sterilized may then be discharged into the stream with full knowledge of the degree of security afforded to public health by the method.

In other states in the Union modern methods of living have demanded ample legislation to permit of the financing of needed municipal improvements. It is not beyond reason to anticipate some relief for towns situated as is Bellefonte.

It has been determined that a decree be issued, and the same is hereby and herein ordered and decreed that the borough of Bellefonte shall within one year from July twenty-ninth, nineteen hundred and eight, prepare a plan for a comprehensive sanitary sewerage system and for a sewage disposal plant for the collecting and disposing of all the sewage of the borough and submit such plan together with reliable estimates of the cost of building this sewerage system and submit same to the Commissioner of Health for approval.

Harrisburg, Pa., July 29th, 1908.

BEN AVON, ALLEGHENY COUNTY.

These applications were made by the borough of Ben Avon, Allegheny County, and are for permission to extend its sewer system and to discharge the sewage therefrom into the waters of the State.

On July sixteenth, nineteen hundred and seven, the borough of Ben Avon, Allegheny County, Pennsylvania, made application for permission to build a storm sewer with an outlet into the Allegheny River. At the time of the Department's inspection it was ascertained that this sewer was already under construction and that it would be used for surface drainage only.

On July ninth, nineteen hundred and eight, a plan of existing sewers and of future extensions to said sewers for the entire borough, was submitted with an application for approval of the same. This plan also showed existing and proposed storm water drains.

On August nineteenth, nineteen hundred and eight, the borough made application for the immediate approval of sanitary sewers to be laid in Walnut Road and Virginia Avenue, a total distance of about twelve hundred feet.

It appears that the borough of Ben Avon is situated on the north side of the Ohio River, about six miles below the junction of the Allegheny and Monongahela Rivers and about one mile below Davis Island Dam. Dams Number Two and Three are four and six miles respectively below Ben Avon. The borough is bounded on the north by Kilbuck Township, on the east by Avalon Borough, on the south by the Ohio River and on the west by Emsworth Borough. It is reached by the Pittsburg, Fort Wayne and Chicago Division of the Pennsylvania Railroad, Ben Avon station being about six and a half miles from the Pittsburg Union Station. Emsworth station is also situated within the limits of this borough. There is a trolley line connecting the borough with the city of Pittsburg and intermediate points. The railroad tracks occupy the narrow strip of land along the edge of the river and just north of the right of way is a nearly vertical cliff of shaley rock extending about one hundred feet above the river. This cliff is cut by Lowrie's Run at the west end of the borough and by Spruce Run near the easterly end of the borough. These runs occupy deep, narrow ravines and there are other runs, usually dry or nearly so, which are tributary to them. There is a third run in a shallow ravine near the middle of the borough, which also empties into the river. This last named run has a comparatively small drainage area and is generally dry except for a short time after rains.

From the top of the cliffs there is a gradual ascent with grades averaging about five per cent as far as Church Street, this street being at about two-thirds of the width of the borough back from the cliffs. Beyond Church Street the slopes are much steeper, averaging about ten per cent and in some cases reaching fifteen or sixten per cent. This steep slope continues north of the borough a few hundred feet, where the top of the hills are reached. On account of these steep slopes in the upper part of the borough the velocity of surface water is considerable and, where adequate provision has not been made for it, it does more or less damage, washing out street surfaces and in some cases damaging private property. Nearly all of the borough being located on top of the cliffs, it is free from inundation, except for two small portions where there are areas of flat land near the mouths of Lowrie's Run and Spruce Run.

The borough is a residential suburb of Pittsburg and presents an attractive appearance. Most of the houses occupy spacious grounds and there is an abundance of shade trees. Part of the streets are paved with brick and others are being macadamized at present. Most of the streets have permanent sidewalks. A number of houses have been erected in a recently improved portion of the borough.

About four and a half miles below Ben Avon the borough of Coroapolis takes its water supply from filter cribs on the opposite side of the channel. Approximately six miles below Ben Avon is an intake crib of the Sewickley water works, from which water is furnished to the borough of Sewickley and to parts of the boroughs of Osborne and Edgeworth and Sewickley Heights Township. Fifteen miles and a half below, at Aliquippa, driven wells in the Ohio River are used as a source of supply and the borough of Baden proposes to install a similar plant. The borough of Freedom, eighteen miles below, uses water from the Ohio as a part of its supply and the borough of Beaver, twenty-two miles below, also takes its supply from the river.

The population of the borough is at present estimated to be about two thousand and the United States Census report gives the population for nineteen hundred as eight hundred and fifty-nine. The borough is growing rapidly and its attractive appearance and proximity to Pittsburg should give it a continued and rapid growth.

There are no manufacturing plants in the borough and the only industry of any importance is that of the Ben Avon Lumber Company.

Water is supplied to the public by the Ohio Valley Water Company, the supply being taken from a number of wells sunk in the easterly or upper end of Neville Island and in the Ohio River adjacent thereto. The water is said to be of uniformly good quality and no sickness has been attributed to its use.

The wells vary in size from six inches to twenty-two inches in diameter and there is a minimum depth of twenty feet of sand and gravel between the bed of the river and the point where the water enters the wells.

There are a few private wells and springs in Ben Avon. Whenever cases of typhoid fever occur in the borough, samples of the public water and of any private water used, have been subjected to analysis by the local health authorities, who are very active in the maintenance of the sanitary conditions of the borough.

The private wells are bored or driven and cased with tubing to cut off surface and sub-surface drainage.

The existing sewers are on the separate system, with additional storm water drains. The sanitary sewers empty at three points along the river; one outlet is near the Emsworth station at Forest Avenue; the second between Irwin and Dixon Avenues; and the third is near the Ben Avon station at the mouth of Spruce Run. All of the outlets, at the time of the inspection, were submerged and were reported to be so at all stages of the river.

The system emptying through the Forest Avenue outlet comprises about fourteen thousand seven hundred and seven feet of pipe, ranging from eight to thirty inches in size. The latter is cast-iron where it extends into the river. That lying between Irwin and Dixon Avenues consists of about one thousand two hundred and seventy feet of pipe, ranging from eight to ten inches. The pipe near the outlet was partially exposed, the earth having been washed away.

The system discharging at Spruce Run consists of fifteen thousand and ninety feet of pipe, ranging from eight to thirty inches in diameter.

The middle outlet at the foot of Dixon Avenue is twenty inches in diameter. On the short length of sewers it serves there are three houses.

Many of the ravines which form natural channels for storm drainage are being gradually filled in by the owners of the property so as to obtain additional room for building. As this filling progresses, storm drains are laid in the bottom of the ravines or in the adjacent streets. A number of such drains have already been constructed. The borough engineer estimates that at present about half of the roof water finds its way to the sanitary sewers, the balance running off by natural channels or entering the storm drains.

It is reported that there are no private sewers in use in the borough and that only two or three houses that are reached by sewers have privies or cesspools in use, and that proceedings have already been taken to compel the owners of these properties to comply with the ordinance requiring sewer connections. There are a number of privies in use in a negro settlement on the flats east of Spruce Run and none of these appeared to be a direct source of pollution.

The borough seems to be in good condition as regards private sources of pollution, the only case noted being a privy draining to Spruce Run near the wagon shop of the lumber company. If this structure has not already been removed it should be and this property should be connected with the sewer.

The first application was for permission to construct a storm sewer from a point near the corner of Ridge Avenue and Brighton Road to Spruce Run. On the day of the Department's inspection this sewer had already been constructed in order to avoid damage to the roads and complaints from owners of abutting property. It is reported that this drain receives nothing but surface water, and as it is paralleled throughout all its length by a sanitary sewer, except for a short portion down the bank to the run, the report would appear to be correct.

The second application is for permission to make general extensions to the entire sanitary sewer system as now laid out and also for approval of the surface water drainage system.

The third application is for permission to build specific sanitary sewers, the same having been made with the idea of procuring an immediate permit.

The borough's sanitary sewer system aggregates about six miles in length and reaches nearly all parts of the municipality and empties as above described into the Ohio River, at three points. The grades are good but the pipes are in most

cases unnecessarily large for the service they are called upon to perform. It also appears that the borough has a fairly extensive system of storm water drains to which extensions are likely to be made from time to time as circumstances may require. With this system the State Department of Health has nothing to do, provided sewage be kept out of the drains.

The policy of the State with respect to the ultimate discontinuance of the discharge of sewage into the Ohio River and its trubutaries above points where water is drawn from the river for drinking purposes has been proclaimed in sewerage permits to the boroughs of Emsworth, Osborne and numerous other municipalities in Allegheny County and it has come to the attention of the local authorities of Ben Avon that ultimately this borough's sewage must be purified before the effluent is discharged into the Ohio River. It is fortunate for the borough that it has a separate system. Roof water which is now admitted to the sanitary sewers may, if found necessary, be eliminated in the future. It is not economical to attempt to handle both sewage and storm water in purification works.

There is no land in Ben Avon suitable for a sewage disposal plant and there is reported to be none in the adjacent boroughs, with the possible exception of a small plot in Emsworth which is liable to inundation and which is reported to be valued at seven thousand dollars per acre. On Neville Island there is an abundance of land which appears to be suitable for a sewage disposal site.

This site, however, is an expensive one, and if it is ever to be used, the economies of the situation would seem to dictate that there should be established a sanitary district comprising several municipalities among which Ben Avon should be one whose sewage would be collected in a metropolitan system of intercepting sewers and conveyed to some common point for treatment.

Under these circumstances, extensions to the Ben Avon sewer system from time to time on lateral streets is in the interests of public health and the borough will be in a position at any time to take up the problem of its sewage disposal, either independently or in conjunction with other municipalities.

It has been determined that the interests of the public health will be subserved by approving the sewer system and extensions thereto and that a permit be issued, which permit is hereby and herein issued, therefor, under the following conditions and stipulations:

FIRST: That storm water shall be excluded from the new sewers and that it shall also be excluded from the existing sewers at such times as the treatment of the borough's sewage is required, provided, the exclusion of this storm water at that time shall be found necessary. At the close of each season's work, plans of the sewers built during the year, together with any other information in relation thereto that may be called for, shall be filed in the office of the Commissioner of Health, to the end that the Department may be always informed of the extent of the sewer system and the use thereof.

SECOND: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

THIRD: If at any time, in the opinion of the Commissioner of Health, the sewer system or any part thereof shall become a nuisance or menace or prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

FOURTH: This permit to discharge sewage into the waters of the State shall cease on September first, nineteen hundred and eleven. If at that time the other conditions of the permit have been complied with and all interests demand it, the Commissioner of Health may extend the time in which sewage shall continue to be discharged into the waters of the State from the borough sewer system. However, it is expressly stipulated that this permit to put sewage into the Ohio River is contingent that within six months from date and on request of the Commissioner of Health to the borough of Ben Avon to prepare plans, either independently or in conjunction with some other municipality or municipalities, Ben Avon borough shall prepare such plans in such manner and submit them to the Commissioner of Health for approval or shall submit evidence that the plans are in process of preparation and will be submitted to the Commissioner of Health at an early date.

Harrisburg, Pa., September 14th, 1908.

BRACKENRIDGE, ALLEGHENY COUNTY.

This application was made by the borough of Brackenridge and is for permission to extend the sewers and to discharge the sewage therefrom into the Allegheny River within the limits of the borough.

The borough of Brackenridge is a new and rapidly growing manufacturing community of upwards of twenty-five hundred population, located on the west bank of the Allegheny River immediately above Tarentum borough and below the village of Natrona, in Harrison Township, about twenty miles above the city of Pittsburg.

The incorporated territory extends from the high ridge which parallels the river and is distant therefrom about four thousand feet to the river bank along which Water Street extends. The river frontage is about thirty-eight hundred feet. On the sum-

mit running along the ridge north and south is Kittanning Street. While the hillsides are steep, they are laid out into streets and lots and the strictly residential district of the borough is thereon. At the foot of the slopes are the tracks of the West Penn Division of the Pennsylvania Railroad system. Lying between the river and the railroad is a stretch of comparatively level land about twelve hundred feet wide and twenty feet higher than the river. Here is the business section and principal part of the town. The main highway, Brackenridge Avenue, and Walnut Street, parallel the railroad and traverse the densely populated portion of the flats.

The industries within the borough territory are the Tarentum Glass Company, employing two hundred hands, and the Fidelity Glass Company, employing three hundred and fifty hands, and the Anchor Brewing Company. The Flaccus Glass Company, employing three hundred hands, is located on the borough line in Tarentum. It maintains a pumping station for river water, the intake being a few hundred feet below the outfall of the main Brackenridge sewer, and it maintains a driven well supply for drinking purposes. At the first two mentioned glass plants spring water from the hillsides is furnished the men for drinking, the water being piped into the works. Public water is used for the industrial demands. The Brewing Company also has a pipe line to a spring on the hill.

Public water is furnished by the Tarentum Water Company, operated by the Allegheny Valley Water Company, and the district comprises the boroughs of Tarentum, Brackenridge, Harrison Township and adjacent territory in which typhoid fever has been endemic. The pumping station is in Brackenridge at the foot of Morgan Street, in the central part of the borough. Formerly the water was drawn from an intake crib or directly from the river off shore and raised into a reservoir located near the corner of Kittanning and Prospect Streets, the highest point in Brackenridge. The Commissioner of Health condemned the supply and ordered the submission of plans for purifying apparatus. On September sixth, one thousand nine hundred and seven, plans for a mechanical filtering plant were approved and the same ordered executed.

From January, nineteen hundred and five, to August first, nineteen hundred and seven, there were known to have occurred five hundred and seventy-eight cases of typhoid fever in the water district, of which one hundred and seventy-five were located in Brackenridge. Fifty of these cases were attended during nineteen hundred and seven, up to August first, although for the same period the records in the State Department of Health's office show but two cases. The failure on the part of local physicians and authorities to report this infectious disease is significant.

All of the typhoid may not have been due to infection in the public water. Private wells and backyard pumps are common and in quite general use throughout the town and will continue to be in all probability owing to the water rates. The population is largely made up of the laboring class whose members will choose to use well water as long as it is cool and appears to be pure.

The customary outdoor privy and the presence of sink water flowing along street gutters is noticeable everywhere except on Brackenridge Avenue. Along Water Street, both above and below the Water Company's intake, nearly all of the dwellings have small tile drains for kitchen sinks and backyard privies or for closet drainage, which empty directly into the river. The result of a well developed case of typhoid fever in one of the houses above Morgan Street might be the poisoning of the water supply of the entire district.

All of the surface drainage from the hillside which is not collected by the sewers of the streets there is intercepted at the foot of the slopes by the public sewer paralleling the railroad and adjoining it in North Canal Street. This structure conveys all the sewage and storm water gathered from the hillside, under the railroad by means of sewers in Cherry Street and Morgan Street.

The Morgan Street sewer is a part of the Walnut Street drainage system, whose outlet, a thiry-six inch sewer, is into the three foot sewer in Cherry Street. This thirty-six inch main extends the whole length of Walnut Street with branches under the railroad in Morgan Street and in Mile Lock Lane. The latter is at the northern borough line and takes the flow of a stream from the hillside at the foot of Fairmount Avenue. The drain is thirty-six inches in diameter at its ends. The Walnut Street drainage system comprises the following lengths and sizes of combined sewers; thirty-six hundred feet of thirty-six inch, five hundred feet of twenty-four inch, seven hundred feet of eighteen inch, seven hundred feet of fifteen inch, nine hundred feet of twelve inch, eleven hundred feet of ten inch, and eight hundred feet of nine inch. These dimensions are approximate only.

The outlet of the Cherry Street drainage district is the outlet for the entire borough system. It empties into the river at or near the Tarentum borough line, is thirty-six inches in diameter and extends up Cherry Street under the railroad and thence north and south in Canal Street. During the season of nineteen hundred and six, a twenty-four inch storm drain was built up the hill in Wellinger, Horner and Roup Streets and Laurel Alley to Kittanning Street. At the end the pipe is fifteen inches in diameter. It was built principally for surface drainage, but a few houses have been permitted to connect. The borough did not petition for the right to make this extension to the sewer system.

Into Cherry Street sewer an eighteen inch sewer in Brackenridge Avenue empties. It is a combined sewer and is said to receive the sewage of a thousand inhabitants.

In the Cherry Street district (including Brackenridge Avenue) are the following lengths and sizes of sewer; sixteen hundred feet of thirty-six inch, fourteen hundred and fifty feet of twenty-four inch, four hundred feet of twenty inch, thirteen hundred feet of eighteen inch, one thousand feet of fifteen inch, three hundred and fifty feet of twelve inch, one hundred and fifty feet of ten inch.

With the exception of the Brackenridge Avenue sewer very little sewage is put into the system directly from the houses. Surface waters would accumulate on the flats to the inconvenience and injury of public travel were they not removed underground. From the sizes above given it appears that a very small percentage of the sewers now built would be adapted to a strictly sanitary sewer system. Furthermore, if reports be true, less than one hundred dwellings or buildings are connected with the sewers, Brackenridge Avenue and its connected laterals excepted.

The local authorities propose to extend the sewer in the streets all over the town.

A new twenty-four inch main reducing to fifteen inch at its upper end is proposed in Cherry Alley, Morgan and Stieren Street to the north borough line. This will serve the district between Brackenridge Avenue and river front. The houses along its route, sixty-four in all, including those above and below the water works intake along the river might be connected to the sewer. The streets are flat, the soil is heavy and kitchen drainage remains on the streets where at certain times of the year it creates a nuisance. It is intended to admit both surface water and sewage to the sewer, and to connect the outlet with the thirty-six inch Cherry Street sewer at Water Street.

In the Walnut Street district the proposed extensions are largely on the hillsides. However, at the foot of the slope on Henry Street northerly to Fairmount Avenue is to be laid a twelve inch pipe. At present there are no houses there.

There is a picturesque ravine up the hill from the railroad opposite Morgan Street and to the north of it is Cornelia Street in which is an eighteen inch sewer which receives surface water from the hill and also house drainage between Third and Cleveland Street. It is proposed to extend the eighteen inch sewer westerly and thence northerly in Fourth Street through undeveloped territory to Fairmount Avenue. The tract bordering this street has been laid out and lots are being sold. The proposed sewer is intended to hasten building operations.

The surface waters which run down Prospect street from the hill have gouged out hugh gulleys five feet or more in depth in places and public travel has become unsafe along this main thoroughfare. Building operations are contemplated, and the representations of the petitioners—that the sewers are needed to protect streets and property from destruction by storm water and to save the borough from making a continual outlay for street repairs—are peculiarly applicable to Prospect Street. The main sewer is to be twenty-four inches in diameter; twelve inch laterals are to be provided in the streets extending northerly. The district has already been piped for water, it is said, and sewer connections will immediately follow the laying of sewers.

The petitioners also purpose to extend a fifteen inch sewer up Grant Street from the railroad and to lay spurs to it twelve inches in diameter.

Undoubtedly the future growth of the borough will be on the hillside. Along the line of the Horner Street sewer and in cross streets there are fully sixty dwellings which will connect with the lateral sewer proposed in these streets as soon as they are built.

The contemplated extensions aggregate two and forty-two hundredths miles which is within one-third of a mile of the length of the sewers now built. The extensions are to be divided as follows: Twenty-two hundred and seventy feet of twenty-four inch, three hundred and twenty feet of eighteen inch; twenty-eight hundred and seventy feet of fifteen inch and seventy-three hundred feet of twelve inch.

With the exception of Brackenridge Avenue no highway in the town has its surface permanently paved. The petitioners are seriously considering the paving question. It should, however, not be given precedence over the higher duty of disposing of the sewage in a safe and sanitary manner. Not only do the interests of the public health in Brackenridge demand that sewage from Natrona and other up-stream municipalities and places shall be purified and rendered harmless before reaching the river, but they demand, together with the same interests elsewhere in the valley, that Brackenridge sewage shall be purified. It is reported that the municipal assessed valuation is in the neighborhood of one million dollars and that its borrowing capacity, taking into account its present bonded indebtedness, is in excess of fifty thousand dollars, which if true, enables the municipality to give serious consideration to the means by which sewage treatment shall be accomplished.

Natrona has been denied the right to extend its sewer and discharge sewage into the river. The State Department of Health has called for plans for a purification plant. There is no well defined line between Brackenridge and Tarentum, in fact all these places form one continuous settlement and it is probable that a competent expert could develop sewage disposal works for those settlements under some joint co-operative plan which would prove financially advantageous to each. One thing is certain, the treatment of sewage mingled with storm water would prove prohibitive in cost. There must be a separation.

At the present time most of Brackenridge sewers as shown above take the place of natural water courses and are essential for storm drainage. It would be inconsistent for the State to approve of a sewerage plan whose consummation did not bring about the collection of the entire borough's sewage and its deliverance to some point for purification. It is not made plain to the Department why the proposed sewer on the flat should not be for sanitary purposes only and why all of the lateral sewers proposed should not be strictly for sanitary purposes. It is an extravagant and improvident thing for the borough to jump hastily to the conclusion that economy and efficiency will be achieved by the laying of combined sewers from now on. It is a natural conclusion, however, since the main storm drains have been laid and they are at this moment convenient outlets for the sewage; but in view of the fact that the Allegheny River and the Ohio are now and must continue to be the source of public water supply to the inhabitants along their banks, and in view of the fact that it has become a State policy to preserve the purity of the waters of the State for the protection of the public health, the borough should very carefully study how best to collect the sewage from all parts of its territory and convey it to a place for treatment. In this study existing sewers may be incorporated to some degree if found practicable, but the lateral and new sewers should exclude surface water. Finally when the plans shall have been worked out and adopted and made official by the approval of the State Department of Health, the borough can build a sewer in any particular street whenever it may see fit to do so, with the assurance that the plan is a permanent one, and that it will be economical and efficient and best protect and subserve the interests of all concerned.

In view of the fact that the borough of Brackenridge has extended its sewer system contrary to the provision of law and in view of the fact that it did not take advantage of the exemption clause of Act Number One Hundred and Eighty-two of nineteen hundred and five, its sewage is being illegally discharged into the waters of the State; and in view of the further fact that the speedy removal of sewage from the vicinity of dwellings in a system of underground pipes should be a means of promoting public health in the borough and elsewhere if the sewage be properly disposed of, therefore it has been unanimously agreed that the interests of the public health demand that a permit be withheld and that the borough of Brackenridge be notified that it must on or before August first, nineteen hundred and eight, prepare a comprehensive plan for the collection and purification of the sewage of the borough, to include not only those districts which are now sewered into the river, but all of the municipal territory having its natural drainage into the river, which plans shall be submitted to the Commissioner of Health for approval, on or before that date; such permit is hereby and herein withheld and said notification given.

The attention of the local authorities is especially called to the advisability and advantages of co-operating with the proper local authorities of Natrona and Tarentum in the study of plans for the treatment of the sewage.

A hearing should be given to the authorities of these places in order that there shall be a better understanding relative to the requirements of the Department of Health.

Harrisburg, Pa., May 25th, 1908.

BRACKENRIDGE BOROUGH, ALLEGHENY COUNTY.

This application was made by the borough of Brackenridge, Allegheny County, and is in response to the filing of plans by the borough for sewerage and for a lay out for septic tank and sprinkling filters for the treatment of the borough's sewage.

It appears that on May twenty-fifth, nineteen hundred and eight, the Commissioner of Health issued a decree to the borough of Brackenridge, Allegheny County, relative to sewerage in response to an application for permission to extend the borough sewers and to discharge the sewage therefrom into the Allegheny River within the limits of the borough.

Among other things the said decree contained the following:

"It has been unanimously agreed by the Governor, Attorney General and Commissioner of Health that the interests of the public health demand that a permit be withheld and that the borough of Brackenridge be notified that it must on or before August first, nineteen hundred and eight, prepare comprehensive plans for the collection and purification of the sewage of the borough, to include not only those districts which are now sewered into the river, but all the municipal territory having its natural drainage into the river, which plans shall be submitted to the Commissioner of Health for approval on or before said date.

"The attention of the local authorities is especially called to the advisability and advantages of co-operating with the proper local authorities of Natrona and Tarentum in the study of plans for the treatment of the sewage."

On October thirteenth of the current year the solicitor of Tarentum borough informed the Department that he was advised that the township of Harrison, in which is located the village of Natrona, has declined to enter into ajoint sewerage plan, but that the borough of Tarentum has directed its engineer to prepare

a plan of sewerage and sewage disposal, and further, that Tarentum borough will be willing to co-operate with Brackenridge and Harrison Township if the State Department of Health deems it wise so to do and can arrange such co-operation.

The site of the proposed disposal works is on the river front near the Tarentum borough line and within one thousand feet of Morgan Street and South Canal Street and the railroad. In this territory there are a large number of dwellings and some business blocks. Also Brackenridge Avenue, a main thoroughfare.

Leading to the site two main sanitary sewers are proposed each twenty-four inches in diameter. One of them is to extend easterly in the alley back of Brackenridge Avenue and it will serve the greater part of the flats and a considerable portion of the hill side district north of the railroad. A new sanitary sewer is to be provided for every street or for alleys back of the streets, and all of the sewage in the district is to be ultimately collected in the district and discharged into the sewage disposal works.

Similarly the narrow district in the western portion of the borough on the flats and hillsides is to be collected in a new sanitary sewer system and be served by a twenty-four inch outlet in Cherry Street leading to the sewage plant.

The sewers are to range in diameter from nine inches upwards to twenty-four inches. Some fourteen inch pipe is proposed. Elevations of the proposed sewers are shown at Main Street intersections as evidence that the design is adapted to the topography. The elevations of street surfaces are shown at the intersections of streets. Profiles of the lines of the sewers have not been submitted, and the location of manholes has not been definitely fixed. It is understood that the plan submitted is preliminary only.

The borough purposes to build some of the sanitary sewers at once, more particularly in Stieren Street and vicinity near the river front and in North Canal Street. Apart from sewerage the borough also wishes to build a storm drain in Prospect Street. All of these will empty temporarily into the existing sewer but ultimately the latter are to be used as storm drains only.

The site of the disposal works cannot be approved. The odor from it would be sure to create a nuisance to the injury of public health on the flats. A more remote site must be found. It is not prudent to build sewage works nearer than one thousand feet from a dwelling or from property likely to be used for residential purposes.

Since the sewers are designed to flow by gravity to the disposal works, this necessitates the filling in of Stieren Street to a depth of six feet.

The sewer grades should be adjusted to the official grades of the highways of the borough in order that abutting properties may obtain adequate benefits from the sewer. If grades are not established, they should be. It would be folly to undertake the laying of permanent sewers without this precaution. There is no place in the borough where a sewage disposal plant can be erected and maintained satisfactorily and from information now at hand in the Department, it seems evident that a proper site for purification works for Brackenridge sewage would be at some distance beyond the borough. Pumping of the sewage at this site must be resorted to for at least that portion of Brackenridge sewage produced on the flats. The hillside sewage may be delivered by gravity. The grades of the proposed sewers should be determined with a view of delivering the sewage in an economical manner to such satisfactory site and purification works.

It may be emphasized that Brackenridge borough's financial interests are centered very materially about the proposition of a joint sewerage intercepting project and disposal works involving Tarentum borough. If a joint project cannot be consummated, then each municipality must proceed independently, but certain it is that efforts should be made by the municipalities concerned to come together on the subject.

It has been determined that the Commissioner of Health notify the borough of Brackenridge and the same is hereby and herein notified of the foregoing matters and the conclusion reached by the State authorities that a revision of the plant along the lines herein suggested shall be made and that these revised plans shall be submitted without undue delay to the State Department of Health for approval.

Harrisburg, Pa., November 19th, 1908.

BRADFORD, McKEAN COUNTY.

This application was made by the City of Bradford, McKean County, and is for permission to extend a part of its sewer system and to discharge the sewage therefrom into Tunungawant Creek within the limits of said city.

It appears that the City of Bradford, an enterprising and rapid growing manufacturing community, is located in the north central part of McKean County at the forks of the east and west branches of Tunungawant Creek, at a point about three miles south of the boundary line between the states of New York and Pennsylvania.

Neither one of the tributaries is an important stream. The east branch rises in the mountains twelve miles south of the city and takes a direct northerly course. It is down this valley that the Buffalo, Rochester and Pittsburg Railroad and

the Erie Railroad come into Bradford City from the south. The region is an oil producing one and along the stream there are numerous small settlements and four wood alcohol manufacturing establishments.

The west branch has its source about seven miles southwest of the city. On it, a mile above Bradford, are two chemical works where wood alcohol is manufactured. The trade wastes which go into the two branches from the chemical works interfere to some extent with fish life. Where the waters of the tributaries enter the city they present a clear appearance, excepting the evidence of some oil waste which prevails to a small degree all along the east branch.

The municipal territory of Bradford City is extremely irregular in shape owing to the topography and the fact that the development of the town has been along the streams in the valleys and adjacent hill slopes. The shopping and business section is on the broad flats at the forks. The valley of the main stream extends northeasterly and it is one and a third miles northerly to the city lines. The ground along Tunungawant Creek is from five to ten feet above the ordinary water level of the stream and is subject to inundation. The highlands beyond the flats in the main valley, more especially on the south side of the valley, have been developed and are occupied by residences. Along the flats are many of the principal industries. But it is opposite the business section and in the narrower valleys of each tributary that the larger part of the citizens reside. The west branch is nearly a mile long within the city territory and the east branch is over a mile in length.

About two thousand feet below the confluence, at Mill Street, there was formerly a dam and mill privilege. The city recently purchased the dam and demolished it. There is now no obstruction to the flow of the streams in Bradford. Before this change floods in the business section of the city were of frequent occurrence.

The proposed sewerage extensions are in no way connected with the water supply. Bradford owns and operates the public water works and the citizens have largely availed themselves of the benefits. The supply is of mountain origin and is brought in by gravity from one of the tributaries of the west branch. The system has received the approval of the State Department of Health. The citizens take just pride in the plant

The local industries bear the stamp of the former days of great oil production, when wealth was amassed and the citizens generally acquired fortunes of moderate amounts which gave to the place the reputation of being one of the most substantial communities in Pennsylvania. Today many of the residents continue to make their homes in the city of Bradford, though actively engaged in oil operations in distant fields of the country. As the local industry waned, investments were made in manufacturing. There are now besides five important establishments engaged in the oil well supply business, and two oil refineries and the repair shops of the Erie and the Buffalo, Rochester and Pittsburg Railroad Companies, silk mills, two cutlery works, one extensive foundry, a machine shop, large gas plant, one terra cotta works and five miscellaneous concerns. About all of these plants take city water. Six of them have a drilled well supply. The sewage from nine works goes to the creek. The industrial wells are so inconsiderable, or of such quality, as to require no consideration in connection with the general sewerage problem of the town, but this is not true of the sewage proper.

Natural gas is obtained in abundance in and about Bradford. The city is lighted and heated by this natural product and most of the industrial works use power generated by gas engines. The natural resources of the place, coupled with the enterprise of its inhabitants, vouchsafe a future for the municipality and it should be expected that the local authorities will promptly take up a thorough consideration of the local application of the State's policy with respect to interior sewerage improvements in relation to stream pollution.

The main sewer of the public system empties into Tunungawant Creek several hundred feet below Mill Street, where the Buffalo, Rochester and Pittsburg Railroad bridge over said stream is located. This outlet comprises two parallel lines of twenty inch pipe which follow down the valley from the business section. The plans filed by the city and now in the office of the State Department of Health are indefinite and incomplete. Judging from them, one of the parallel outlet mains passes up the valley of the west branch and the other passes up the valley of the east branch and into these sub-mains is collected the sewage of the respective districts. It is reported that the records of the borough were destroyed by fire several years ago and in consequence many details are lacking in the plans of the sewers. The system was originally partly combined and partly separate. For several years past the local authorities have been gradually eliminating surface water from the sewers, providing other channels and storm drains to the streams. Hence at the present time a comparatively small amount of surface water is taken into the sewers. Roof water, however, is admitted quite generally throughout the entire city. The sewers were poorly constructed and they are known to be in a leaky condition. The infiltration through broken or defective joints is very considerable. There is an overflow from the sanitary system into the west branch at the foot of Davis Street which comes from the Fourth Ward to the north from which during dry times the sewage is drained into the main outfall at Mill Street, or into the west branch intercepter at Ann Street. There is another storm overflow in the West Branch Valley. It is into the creek at the foot of Mechanic Street and it leads from the sewers on the north side—the Third Ward—whose flow during dry times is delivered to the west branch intercepter. From the plans it would appear that

there is a storm overflow into the east branch at the foot of Main Street. How much of the sewer system in the district east of the stream in the Fifth Ward is contributary to this point cannot be ascertained from the plan.

Immediately below Mill Street and above the main sewer there is an eight inch sewer which seems to serve a small district and empties into the main stream at this point.

Nineteen hundred feet below the main sewer outlet there are two sewers which empty into the Tunungawant Creek at Kendall Avenue. The one serving the district to the north is twelve inches in diameter. This is in the Sixth ward. The one to the south is ten inches in diameter. Eight hundred feet further down stream there is a fifteen inch sewer outlet into the creek just above the mouth of Kendall Creek. It serves a local district to the south known as East Bradford and nine hundred feet further down stream is the last sewer outlet into the creek within the city. It is fifteen inches in diameter and serves the extreme eastern portion of the town.

Along the flats adjacent to the upper portion of the west branch in the city in the vicinity of Washington, Barbour and Corydan Streets there are no public sewers, or where such a sewer may exist it is so shallow that the buildings cannot be accommodated thereby and hence nearly all the sewage is discharged through private sewers into the creek. In the locality there are also privies along the stream.

The same conditions exist along the north side of East Main Street below Main Street.

The petitioners wish to establish a new sewer outlet ten inches in diameter into the creek at a point opposite the existing main sewer of the city. It is to serve a main line in Fisher Avenue with branches in Homestead Avenue. It is here that the Bresser Manufacturing plant has been constructed. A permanent pavement is to be laid down in Fisher Avenue and the authorities desire to lay the sewer in the street before the paving is done. The dwellings along the highway are in need of sewerage facilities also.

To the ten inch Kendall Avenue outlet system it is proposed to build a lateral sewer extension eight inches in diameter having a length of two thousand feet. To the twelve inch Kendall Avenue outlet a lateral sewer extension is to be made in Jackson Avenue and Clark Street, a total length of twenty-five hundred feet.

At the present time there are about twenty-three miles of sewers in the entire system and if the plans now submitted afford any reliable means of judgment, at least eighteen miles of the entire system contribute to the flow of the main sewer outlet. In the mile length of valley lying in the city territory below this point, the territory is being gradually built up and there are available sites for manufacturing plants along the low lands and back on the higher ground are the desirable locations for dwellings.

Immediately over the state line in New York at the village of Limestone there is a tannery which pollutes Tunungawant Creek. At Salamanca on the Allegheny River in New York, sixteen miles below Bradford, municipal sewage is discharged into the river. Recently the authorities of that place were required by the State Health Department of New York to re-devise the sewerage system and to build extensions thereto in contemplation of the purification of the sewage. Other municipalities along the Allegheny River, into which the Tunungawant Creek flows, are being required by the New York State authorities to prepare to dispose of their sewage otherwise than by discharging it into the stream. This policy is a co-operative one, adopted by New York and Pennsylvania to bring about the preservation of the purity of public waters for the protection of the public health.

The City of Bradford has an assessed valuation of upwards of five million dollars. Its present bonded indebtedness is reported to be one hundred and sixty thousand, three hundred dollars. If these figures be correct, the municipal borrowing capacity is in the neighborhood of two hundred thousand dollars, so that the city is in a position, financially, to undertake a change in its method of disposing of sewage. Fortunately the sewer system is near enough to a sanitary system to admit of its adaptation to purification works without any expensive modification, so it would appear. The cost of erecting a plant will necessarily be greater than if the sewers were strictly used for domestic sewage. The introduction of surface water and roof water also ought to be reduced to a fair minimum amount in the interests of efficiency and economy. How much of further separation is required is a subject for observation and study.

The local authorities should engage the services of some one skilled in the art of sewage purification to initiate wise plans. The site of the disposal works should be selected and the means of conveying the sewage and delivering it to the plant should be determined upon. Furthermore, a sewer system for the entire city should be devised and accurately planned and then these plans should be submitted to the State Department of Health for approval. When approved lateral sewers and other extensions to the system can then be made from time to time as necessity may require in the development of the city with a surety that no reconstruction will ever be required, but that all will ultimately be the part of a comprehensive system of sewerage and sewage disposal works.

The sewers should contemplate the interception of the entire sewage of the city. Ultimately all private sewers discharging into any stream must be discontinued and so must all sources of stream pollution.

The city has proceeded, since the Act of nineteen hundred and five, regulating sewer extensions, to build sewers without application to or approval by the State authorities. It is fortunate that such extensions have been separate sewers, else the money might have been wasted.

Undoubtedly the city of Bradford may not be required to purify its sewage sooner than some of the towns along the Allegheny River in New York State. However, it is sound business policy for said city to contemplate this ultimate requirement and make the reasonable provisions therefor above outlined.

It has been determined that the proposed sewers will subserve the interests of the public health and that a permit be issued therefor, which permit is hereby and herein issued under the following conditions and stipulations:

FIRST: That storm water shall be excluded from the sewers and that this permit to discharge sewage into the waters of the State shall cease on the first day of May, nineteen hundred and eleven. If on said date the terms of this permit shall have been complied with, then the Commissioner of Health may extend the time in which sewage may continue to be discharged into the waters of the State.

SECOND: That on or before May first, nineteen hundred and nine, the city shall prepare a comprehensive plan for a sanitary sewer system for the entire developed territory and for a sewage disposal plant for the treatment of all the sewage of the city and shall submit the same to the Commissioner of Health for approval, who may modify, amend or approve such plans and, together with the Governor and Attorney General of the State, fix the time in which such purification works, as so approved, shall be erected, which in no event shall be on or before May first, nineteen hundred and eleven.

THIRD: The sewer extension here approved shall be built with the idea of its being incorporated into the improved sewerage system of the city.

Harrisburg, Pa., May 7th, 1908.

BRYN ATHYN VILLAGE ASSOCIATION.

Moreland Township, Montgomery County.

This application was made by the Bryn Athyn Village Association of Moreland Township, Montgomery County, and is with respect to sewerage, in response to plans submitted.

It appears that on August twenty-fifth, nineteen hundred and eight, the Commissioner of Health issued a decree to the said Bryn Athyn Village Association in which decree the plans submitted for the approval of the Commissioner of Health were reviewed and in which it was stated: "These works as modified or amended or some other works which must be approved by the Commissioner of Health before construction shall be built on or before December first, 1908, and they shall receive and purify the sewage on said date and thereafter."

On October thirtieth, nineteen hundred and eight, through a proper representative, the Bryn Athyn Village Association, in accordance with the terms of this decree, submitted to the Commissioner of Health for his approval, plans for a sewage disposal plant for the purification of sewage of Bryn Athyn Village before its discharge into Pennypack Creek in Moreland Township, Montgomery County.

It appears that the proposed sewage disposal plant has been relocated and instead of at the site of the existing plant it will be constructed at a point about five hundred feet further up Pennypack Creek than the present plant and about midway of the stretch of back water above the old dam which is below the present plant, the proposed site is well adapted for a sewage disposal plant, being on sloping ground, almost completely screened by shrubbery and trees and being in a slight depression or ravine opening onto the east bank of the creek. The proposed disposal plant is to be about five hundred feet from the nearest dwellings, which are part of the village of Bryn Athyn.

A six inch terra cotta pipe sewer is to be constructed from the two branches in the principal avenues of Bryn Athyn, which join just east of the Bryn Athyn station, up-stream following the contour of the bank, passing the existing disposal plant at a one per cent. grade. The present outfall sewer is to be abandoned.

The estimated quantity of sewage to be handled is reported to be eighteen thousand gallons per day, for which volume the disposal plant has been designed. The works are to provide for treatment in septic tanks, first and second contact beds, and intermittent sand filters.

The sewage is to enter a narrow inlet chamber across the ends of the septic tanks. These are to be of concrete, twenty feet long and to have an average depth of seven feet to the flow line. The tanks are to be separated by a longitudinal dividing wall. One tank will be six feet wide and the other one three feet. The sewage is to enter the tanks from an inlet chamber by means of submerged elbows six inches in diameter. Each septic tank is to have nine baffle boards transverse to the direction of the flow, five extending down from the top and between these four extending up from the bottom. An outlet chamber is to extend across the

lower ends of the septic tanks. The sewage will flow into this from brass, knife edge wiers, the one in the larger tank being eight inches long and that in the smaller tank four inches long. An eight inch cast iron sludge drain will lead from an eight inch gate valve in the lower and inlet end of each septic tank to the sludge bed to be located about one hundred feet further down the slope. The sludge bed is to consist of a sand area twenty feet square and three feet deep in an excavation surrounded by an earthen embankment three feet high with inside and outside slopes of one on two. The bed is not to be underdrained.

From the outlet chamber of the septic tanks a six inch cast iron pipe, supported on boards on the tops of stakes where it extends through filled ground, is to lead to the dosing tank above the contact beds, which are close to the sludge bed. The walls and floors of the dosing tank and contact beds are to be of concrete construction. The dosing tank is to be approximately fourteen feet by seven feet by four feet deep to the flow line. Upon entering, the sewage will flow over a crib filled with broken stone extending along one side of the tank to act as a screen. The tank will deliver a dose of three hundred cubic feet and will be discharged successively by each of three five inch Aerlock Sequence syphons. Each syphon will discharge onto one of the three primary contact beds to be constructed side by side below the dosing tank. Each contact bed will be approximately twenty feet by fourteen feet and will be filled with broken stone, to a depth of three and a half feet. The sewage will be delivered from a small inlet chamber in each bed by means of a cast iron pipe into the lower part of the broken stone. It is estimated that a dose from the syphon tank will fill one of the beds to a depth of about three feet. Each bed will be underdrained by a longitudinal line of five inch horse shoe tile and three inch horse shoe tile laterals to a sump from which an Aerlock Syphon with a six inch inlet and five inch outlet and timing device for holding the sewage in contact any desired length of time in the primary beds will discharge the sewage to the one of the three secondary contact beds below the primary bed in question. These secondary contact beds below the primary beds are to be similar to the latter in size and construction and will also be discharged by syphons with timing devices. It is intended at the start, to retain the sewage in each contact bed about one and a half hours. The dosing tank having a capacity of three hundred cubic feet will discharge on an average of once in three hours, and once in nine hours onto each of the three primary beds which will discharge at similar intervals onto the secondary beds. Thus, each contact bed will have a resting period of about seven and half hours.

Three sand filter beds are to be installed just below the contact beds. A gate chamber is to be located between the contact beds and filter beds, to which gate chamber the outlet pipes from the three contact beds will lead and from which will lead the supply pipes to the three filters which will be provided with gates in the gate chamber. Moreover, by-passes will be provided so that each of the two outside contact beds may be discharged respectively and directly onto the two outside filter beds. Thus all three of the secondary contact beds may be discharged onto any one or two or all three of the sand filters or the contact beds may be discharged individually and respectively onto the three sand filters. A six inch terra cotta by-pass is to be constructed from the outlet chamber of the septic tanks to the three way gate chambers above the sand filters, so that treatment of the sewage in the contact beds may be entirely eliminated.

The sand filters are to be installed in excavations in the side slope. The uphill sides will be protected from surface wash by ditches and elsewhere the filters will be surrounded by an earth embankment with outside slopes of one on two. The inside slopes of the excavation for the filters and of the embankments will be one on one. The sand surface will be one foot below the top of the embankments. The three filters will be ranged side by side and each will have a surface area twenty-four feet by thirty feet or seven hundred and twenty square feet and a depth of sand of about three feet above the bottoms of the underdrains. The sewage will be spread upon the surface of each filter by means of an open distributor constructed of cypress boards.. Each filter will have seven lines of four inch horse shoe tile underdrains extending longitudinally the length of the filter and ten feet beyond the lower ends to a six inch terra cotta effluent pipe. This effluent pipe leads across the lower ends of the three filters to a manhole and thence to the banks of the creek.

The three filters having a combined area of twenty-one hundred and sixty square feet, will provide for a filtration of sewage at the rate of three hundred and sixty thousand gallons per acre per day. If the dose from one of the secondary contact beds is turned onto all three filters it will flood them to a depth of one and a half inches, or if the entire dose is turned onto one filter it will flood it to a depth of five inches.

The underdrains are to be extended ten feet beyond the lower ends of the sand filters in order that, if desirable, the filter areas may be extended this distance, increasing their size by about one-third. There is space available for increasing the filter area to several times the size proposed for the present, and for increasing the other parts of the works.

The course of the Association in selecting a more secluded site for the new disposal plant is commendable, although this proposed site is only about five hundred feet from the nearest dwellings. However, the location is quite secluded. It is believed that all parts of the plant are to be above the elevation of the highest flood stages of the stream.

The septic tanks, having a combined capacity of twelve hundred and sixty cubic feet, will allow a retention of the sewage in them an average period of about twelve hours. By using the different sized tanks separately or in combination, proper septic treatment may be given to varying flow of sewage which results from part of the sewage of the Academy of the New Church being discharged into the system during only that part of the year in which the school is open.

Even with the preliminary treatment provided in the contact beds, it may be found difficult to maintain the high rate of filtration in the sand filters and obtain a satisfactory effluent, so that it may be found necessary after the plant is in operation to increase the filter areas by adding additional units, or to provide for the chemical sterilization of the effluent before it is discharged into the creek.

It has been determined that the Commissioner of Health should notify the authorities and the same are hereby and herein notified, that the plans herein considered embody a design comparable with modern sewage disposal practice and such a plant as the decree of the Commissioner of Health of August twenty-fifth, one thousand nine hundred and eight, intended should be constructed on or before December first, one thousand nine hundred and eight.

Furthermore, the Association is hereby notified that it may be found difficult to obtain good results with the high rate of filtration provided in the sand filters. However well a plant may be designed and built, it is only by careful attention and intelligent operation that it can be made permanently satisfactory in use. The Commissioner of Health will have tests made of the effluents from the proposed works at regular intervals and if at any time sewage is discharged from the plant or institution into the waters of the State to the prejudice of public health, then the Association shall be liable to the penalties imposed by law for the discharge of sewage into the stream and further remedies will be required by the State Department of Health and the Association shall adopt such remedial measures as the State Department of Health or the Governor, Attorney General and Commissioner of Health may advise or approve.

When the works are built complete plans of them as so built shall be filed in the office of the Commissioner of Health.

If the suggestions herein contained be followed out it must be understood that this will in no wise relieve the owners of the responsibility of maintaining the sewers and sewage disposal works free of all nuisances and menaces to the public health and of keeping the sewage at all times out of the waters of the State.

Harrisburg, Pa., November 17th, 1908.

CALIFORNIA, WASHINGTON COUNTY.

This application was made by the borough of California, Washington county and is for permission to extend its sewers and to build a new sewer outlet and to discharge the sewage therefrom into the Monongahela river within the limits of the borough.

It appears that the borough of California is a residential community of about three thousand population, located on the southwest bank of the Monongahela river in East Pike Run township, Washington county. It was incorporated as a borough over fifty years ago when the slack water navigation of the Monongahela river terminated at Brownsville, four miles up stream.

The site is ideal for a town. The streets are laid out paralleling the river and at right angles thereto and are broad. The bank of the river is high, and the land slopes gently back therefrom, forming a plateau to Third avenue. South of this thoroughfare the ground rises rapidly and the public square which is at the intersection of Liberty street extending from the river and Fourth Avenue, is on the hillside. In the eastern part of the borough there is a natural water course which rises a half mile or more back in the hills above the village, and comes down through a steep and deep gorge to Third avenue in the borough. This gully is dry most of the time, or would be were it not for mine drainage discharged therein from the Vigilant Mine of the Monongahela River Consolidated Coal and Coke Company. The mine drainage is pumped into the run. At and below Third avenue this water is conducted through a thirty inch pipe to the river. For convenience this natural water course is termed East Alley Run.

The western boundary of the borough is marked by Pike Run which separates California borough from Coal Centre borough. The latter is distinctly a place of residence for miners engaged in the operations of the region. Tenement houses predominate and the population is estimated to be eight hundred. The available territory is so hemmed in between the river and a precipitous hillside that Coal Centre will never have a much greater population.

In nineteen hundred the census population of California borough was two thousand and nine. The additional population since attained has been due largely to a new mine operation of the Vesta Coal Company whose tipple is in the borough at the mouth of Pike Run near the railroad.

The Monongahela Division of the Pennsylvania Railroad follows the bank of the river through both boroughs and continues on up and down the valley. At the foot of Union street which is next west of Liberty street, there is a public wharf maintained by the borough where passenger and freight steam boat landings are afforded.

The Southwestern State Normal School buildings occupy a tract of land extending back from the river to the foot of the hillside in the extreme eastern part of the town. Not including the local scholars who are given general public instruction here, there is an enrollment of approximately three hundred and fifty students.

The citizens of California are almost entirely dependent upon the coal mining industry. The region round about is rich in coal deposit, but the topography is such that operations at any great distance from California will be likely to cause the building up of new villages or accessions to boroughs now in existence. In forecasting probabilities it seems reasonable to limit the size of California which is now quite thoroughly developed within its present territory limits to a maximum growth of six thousand population, which growth would involve the annexation of the village along the river to the west and the higher ground to the south.

The citizens rely largely upon domestic wells and cisterns for their drinking water. The wells are usually drilled to a depth of about one hundred feet. The California Water Company owns the public water works system and supplies about one thousand consumers in the borough. The source of supply is the Monongahela river, and the water is taken at a point immediately above the village and distant at least half a mile. An eight inch perforated suction line sunk several feet in the bed of the river and covered with gravel extends, approximately fifty feet, into the stream from the pumping station. In the pump house is a fifty horse power gas engine which operates the pumps that lift the water in a twelve inch force main an approximate vertical height of three hundred feet to a sheet iron tank having a capacity of about two hundred and twenty-five thousand gallons located on the hill back and west of the borough. From this tank a ten inch distributing main leads down to the village. There is no attempt made to purify the river water.

Public sewers were first installed in eighten hundred and ninety-six. At present there are three outlets; the down stream one is a twenty inch pipe and it empties into the river at the foot of Union street at the wharf. This sewer extends up the street to Fifth avenue and connecting with it are lateral sewers ten inches and eight inches in diameter. All told the outlet and its connections comprise a total length of three thousand feet.

The next sewer outlet is up stream about six hundred feet at the foot of Peach alley. It is a thirty inch pipe and connected therewith are sewers comprising four thousand feet, the lateral sewers having diameters of ten inches and eight inches.

These sewers were designed primarily to remove the surface waters from the streets and street gutter inlets are provided at convenient places. Less than fifty per cent. of the inhabitants live in the dwellings which have connections to the sewers. The majority of the dwellings are not of the pretentious kind and do not have running water in them. Hence kitchen drainage is usually deposited on the ground or into the back alleys. Tile drains from the kitchen to the alleys are numerous and in the summer time this deposit of wash water is cause for complaint in certain parts of the borough. Probably as the public water is introduced into the houses and modern plumbing facilities are installed, house connections with the sewers will follow. The local authorities have not deemed it expedient to enact any ordinances requiring compulsory sewer connections for the above reasons.

The Normal School has a private sewer of its own to the river.

The petitioners purpose to make an extension by a lateral sewer in each of the three districts; in Union street district three hundred feet of ten inch pipe are to be laid, in the Peach alley district three hundred feet of ten inch pipe are to be laid and in the East alley district one hundred and forty feet of ten inch pipe are to be laid. Also the open portion of the run is to be abandoned and a thirty inch pipe substituted therefor.

Also it is proposed to establish an entire new sewer outlet in the lower end of the borough. It is to extend down Ash street and to empty into the river about one hundred and fifty feet below the Union street outlet. Connected with this stream are to be ten inch and twelve inch laterals and all are to take storm water as well as house drainage.

It is reported that the assessed valuation of the borough is seven hundred and twenty-six thousand nine hundred and thirty dollars and that the bonded indebtedness authorized or incurred and the floating debt together make a sum of thirty-six thousand eight hundred dollars. On this basis the municipal borrowing capacity is in the vicinity of fourteen thousand dollars. At a recent election the voters authorized a bond issue of thirty thousand dollars, of which five thousand dollars shall be expended for sewers and the balance for permanent street pavements. Bids have been received and contracts are about to be awarded for the paving work.

The petitioners wish to lay down the sewers in advance of the street paving. The new sewer outlet, however, and its connections are on streets that will not be paved this year with the exception of the laterals.

If the proposed sewers be approved and built, this will practically complete the construction of the sewer system within the present limits of the borough, excepting a few petty laterals for which there is no demand at the present time.

The borough of California is about fifty-one miles above the city of Pittsburg and along the banks of the Monongahela river. In this district there are a number of important and growing municipalities which derive their source of water from said river.

It is an observed fact that water borne diseases are exceptionally high in rates in these places. This may be attributed partly to the food supplies and to the low standard of municipal sanitation enforced in these towns. The river traverses a very active coal field and receives in the total an enormous quantity of sulphur mine water. New operations will be established from time to time and it is not probable that the acidity of the stream will diminish for many decades. The river by reason of the improved navigation works on it above Pittsburg is a succession of pools in which the velocity of flow is low during the greater portion of the year. The first dam below California is designated lock number four and it is opposite the borough of North Charleroi about nine miles distant. This dam back flows water more than a mile above Brownsville. This pool acts as a sedimentation basin for sewage and the heavier suspended matters which are brought into the river. Besides, the acid in the water have a germicidal and disinfecting effect, and no doubt materially reduce the number of bacteria in the river. But at times of freshet flow these natural destructive agencies are materially lessened and pathogenic poison discharged into the river anywhere along its course, is liable to be transmitted in an active state to the water works intakes of the municipalities along the banks which draw upon this source for the public supply, and at such times public health is particularly menaced. Any reasonable effort to diminish the menace to public health from sewage pollution of the river should meet with the approbation of the inhabitants of the valley.

Such a project for its consummation requires a careful study of the question and the preparation of comprehensive plans and the adoption of a uniform policy for the entire valley whereby sewers may be built from year to year in the several municipalities in conformity to this general policy whose ultimate object is to eliminate the grosser pollutions from the river. It is perfectly feasible for the local authorities of California to contemplate such an ultimate sewerage system and sewage disposal works and to plan for it and adopt a plan subject to the approval of the State, and thereafter conform to the plan thus wisely approaching the time when not only its sewage shall be subject to such treatment as the interests of the public health may require, but when the sewage from all the other municipalities in the valley shall be likewise treated.

It is evident that the borough is not financially able to erect purification works now even if this were at once necessary. When the time shall have arrived for such erection then a separation to some practicable degree of the sewage from storm drainage would be necessary, since it is prohibitive in cost to attempt to purify mingled sewage and storm water, and since it is during the storm period that the greatest menace to public health occurs in the Monongahela river valley from sewage pollution. This condition is peculiar to this valley. In many other streams the greatest danger occurs when the flow of the stream is the least. Therefore, it becomes evident that no time should be wasted by the local authorities in devising a perfect plan for the ultimate collection of the entire sewage of the borough and for its conveyance to and treatment at a sewage disposal plant.

It has been determined that the proposed extension will subserve the public health and that a permit be granted therefor and said permit is hereby and herein granted, under the following conditions and stipulations:

FIRST: That all sewer connections with the proposed sewers shall be under such terms and conditions that if necessary the borough authorities may eliminate the sewage from the pipes and substitute therefor other conduits designed to remove sewage, or if it be found advisable in the future to incorporate a portion of the existing sewers into the improved sewerage plan, then such roof water as may be admitted to the sewer system herein approved, shall be excluded from the system as may then appear to be desirable.

SECOND: That at the end of each year a plan of the sewers built shall be prepared and submitted to the Commissioner of Health to the end that the Department shall be always fully informed of the extent of the existing sewers. And together with these plans such other information shall be submitted as may be required in relation thereto.

THIRD: This permit to discharge sewage into the waters of the State shall cease on the first day of May, nineteen hundred and eleven. If on said date the other terms of this permit shall have been complied with, then the Commissioner of Health may extend the time in which sewage may continue to discharge into State waters. And on or before the first day of May, nineteen hundred and eleven, the borough shall prepare and submit to the Commissioner of Health for consideration and approval a comprehensive plan for the collection of all of the sewage of the borough and its conveyance to and treatment in a purification plant. These plans may be modified, amended or approved by the Commissioner of Health and the time fixed in which the disposal works shall be erected, this time to be named consistent with the policy of the State with respect to the disposal of sewage at the other municipalities in the Monongahela river valley.

Harrisburg, Pa., May 7, 1908.

CAMBRIDGE SPRINGS, CRAWFORD COUNTY.

This application was made by the borough of Cambridge Springs, Crawford county, and is for permission to extend its sewer system and to discharge the sewage therefrom into the waters of the State.

It appears that on June fifth, nineteen hundred and six, the borough of Cambridge Springs, Crawford county, Pennsylvania, applied for permission to extend its sewerage system and to discharge sewage therefrom into the waters of the State. On April twenty-ninth, nineteen hundred and seven, the Commissioner of Health issued a decree withholding permission to extend the sewers in the borough until the borough is prepared to intercept and convey the sewage to some point below the water works intake and there purify it before the liquid is discharged into French Creek, according to plans to be approved by the State Department of Health. Provided, however, that sewage may be temporarily permitted to discharge into French Creek at some point below the water works intake, to be approved by the Commissioner of Health, if the borough is, during this time, filtering French Creek water supplied by it to the consumers in the borough. It was further stated that the use of French Creek water as a source of public supply, unless the water be filtered, is prejudicial to the public health. Furthermore, the Commissioner requested the said authorities at that time to adopt ways and means to bring about at the earliest practicable moment the construction of a water filtration plant according to plans to be approved by the State Department of Health. The plans for filtration works were approved by the Commissioner of Health on August fifteenth, nineteen hundred and seven, a slight modification of the approval of said plans concerning the pump well was made under date of October second, nineteen hundred and seven. On June third, nineteen hundred and eight, the borough represented, among other things, that it is now constructing, and will have completed within about four weeks, a filter plant in accordance with the plans and specifications approved by the Commissioner of Health and that as soon as the filter plant is completed all water used in the borough water system will be taken from French Creek and filtered before being discharged in the water mains belonging to the inhabitants of the borough, and applied for permission to extend the public sewer system, in accordance with profiles submitted. Plans of the purification works, as called for in the decree, have not been submitted.

The borough of Cambridge Springs is located in the northern part of Crawford county on French Creek and has a normal population of about eighteen hundred. During the summer months people resort to the hills and springs in the vicinity and the population increases to forty-five hundred, or thereabouts. As above mentioned the municipality owns it own water works, but this water has not been used throughout the borough generally for drinking purposes, owing to its being polluted. Numerous private driven wells are scattered over the town, from which the people take most of their drinking water.

French Creek is extremely sluggish in flow for a distance of about three miles above and about three miles below the borough and has the appearance of a pond more than of a flowing creek. This affords good boating and canoeing for the summer visitors and for the picnickers who frequent the picnic grounds along the banks of the stream. The watershed area above Cambridge Springs is about five hundred and seventy square miles. It discharges into the Allegheny river at Franklin City, forty miles below. Plans for the use of the creek waters at the latter place have been approved by the Commissioner of Health.

The present sewerage system of Cambridge Springs comprises three sewer outlets into French Creek. There is a total length of three and one-tenth miles of sewers tributary to them. Approximately two-thirds of the normal population live in dwellings connected to the sewerage system, while the remaining third have privies. The summer visitors as a rule seek quarters in the hotels and buildings having sewer connection. Of this population over fifty per cent. discharge their sewage into French Creek about four hundred feet above the water works intake. The other two outlets discharge into the creek about three hundred and eight hundred feet, respectively, below said water works intake. These outlets named in order are the South Main street outlet, the North Side district outlet and the Grant street outlet.

The petitioners represent that they wish to continue the South Main street sewer by extending its outlet along the bank of French Creek to the Grant street outlet, where it will intercept said outlet and discharge into French Creek at this point. The pipe is to be twenty-four inches in diameter and eleven hundred and forty feet long, laid to a three-tenths per cent. grade. Its object is to carry the sewage now being discharged into the creek above the water works intake to below the same. The petitioners also wish to extend the Church street sewer from the end of the present sewer eastwardly a distance of about seven hundred feet to Thomas street, size to be twelve inches in diameter, thence up Thomas street by an eight inch pipe fourteen hundred feet to Fullerton avenue; to connect with the Thomas street sewer, proposed, an eight inch sewer in Spring street westwardly four hundred feet; to connect with the proposed Thomas street sewer an eight inch sewer in Beech avenue westwardly five hundred feet; to construct an eight inch sewer in Elder street, from Root avenue to the Venango avenue sewer, a distance of about nine hundred feet; to extend the Cummings street sewer to Spring street with an eight inch pipe, a distance of two hundred feet, thence eastwardly on Spring street to Ross avenue, thence south on said Ross avenue, a total distance of six hundred and fifty feet. The total extensions of sewers exclusive of the extensions to the South Main street outlet will be slightly over four-fifths of a mile.

The borough officials represent that the conditions existing in the borough in the districts to be reached by the proposed sewers are extremely unsanitary in as much as sewage is being discharged into street gutters. The borough has complied with the terms of the decree issued by the Commissioner of Health in so far as it has forwarded plans for approval to extend the outlet above the water works intake to a point below. It appears that the borough will shortly have a water filtration plant in operation, but it has not complied with the provision of the sewerage decree which called for plans for a disposal works.

If permission be granted to extend the outlet below the water works intake it will diminish the danger of sewage pollution of the borough public water supply and to this extent the interests of the public health will be subserved. But because French Creek is a source of emergency supply to Franklin City and probably to Meadville, it is essential that the waters of the stream be preserved in their purity. Cambridge Springs does not have sufficient funds to pay for a sewage disposal plant. The municipal borrowing capacity has been practically reached, but the local authorities should prepare plans for sewage disposal works and submit them to the Commissioner of Health with estimates of cost, and after adoption, means for the erection of such works should be sought. Owing to the great degree of sedimentation and natural purification which takes place in the sluggish flow of French Creek between the borough of Franklin City, the danger to public health will not be greatly increased over and above the present danger by the discharge of the existing sewers into the stream, if the proposed sewers be built.

It has been determined that the interests of the public health will be subserved by granting a permit and permission is hereby and herein granted to extend the sewers as outlined herein, under the following conditions and stipulations:

FIRST: All roof and storm water shall be excluded from the proposed sewers. At the close of each season's work a plan of the sewer extensions made during the year shall be prepared and filed with the Commissioner of Health to the end that the State Department may be always informed of the extent of the sewer system and its use, but this permission shall not apply to any other than the particular sewers hereinbefore mentioned. The existing sewers receive both sewage and storm water and before sewage purification works can be erected and operated at a reasonable cost, it will be necessary in all probability that sewage be separated from storm water. The borough shall prepare a complete sewerage plan for the collection of all the sewage of the borough and its conveyance to some point for treatment, and this plan shall be submitted to the Commissioner of Health for approval on or before the first day of July, nineteen hundred and nine.

SECOND: This permit to discharge sewage into the waters of the State shall cease on July first, nineteen hundred and eleven, contingent, however, on the other terms of this permit having been complied with. If at that time the terms of this permit shall have been complied with, then the Commissioner of Health may extend the time in which sewage may continue to be discharged into the waters of the State.

THIRD: On or before July first, nineteen hundred and nine, the borough shall prepare plans and estimates of cost for sewage disposal works and submit the same to the Commissioner of Health for approval. This shall be done in connection with the plans for improved sewerage in the borough hereinbefore called for. In the event of a State appropriation being made to assist municipalities in taking sewage out of streams, prior adoption of plans for sewage disposal works might prove of great assistance in expediting the erection of such works at the earliest practicable moment.

FOURTH: No pathological material from any laboratory shall be permitted to enter the sewers. The proper authorities shall cause these wastes to be destroyed on the premises.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the sewerage system or any part thereof, or the discharge therefrom, shall have become a nuisance or menace to public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may approve and suggest.

Harrisburg, Pa., July 1, 1908.

CAMBRIDGE SPRINGS, CRAWFORD COUNTY.

This application was made by the borough of Cambridge Springs, Crawford county, and is for permission to extend its sewer system.

It appears that on July first, nineteen hundred and eight, the Commissioner of Health issued a permit to the borough of Cambridge Springs, Crawford county, Pennsylvania, to extend certain of its sewers mentioned in said permit under the following conditions and stipulations:

"FIRST: All roof and storm water shall be excluded from the proposed sewers. At the close of each season's work a plan of the sewer extensions made during the year shall be prepared and filed with the Commissioner of Health to the end that the State Department may be always informed of the extent of the sewer system and its use, but this permission shall not apply to any other than the particular sewers hereinbefore mentioned. The existing sewers receive both sewage and storm water

and before sewage purification works can be erected and operated at a reasonable cost, it will be necessary in all probability that sewage be separated from storm water. The borough shall prepare a complete sewerage plan for the collection of all of the sewage of the borough and its conveyance to some point for treatment, and this plan shall be submitted to the Commissioner of Health for approval on or before the first day of July, nineteen hundred and nine.

"SECOND: This permit to discharge sewage into the waters of the State shall cease on July first, nineteen hundred and eleven, contingent, however, on the other terms of this permit having been complied with. If at that time the terms of this permit shall have been complied with, then the Commissioner of Health may extend the time in which sewage may continue to be discharged into the waters of the State.

"THIRD: On or before July first, nineteen hundred and nine, the borough shall prepare plans and estimates of cost for sewage disposal works and submit the same to the Commissioner of Health for approval. This shall be done in connection with the plans for improved sewage in the borough hereinbefore called for. In the event of a State appropriation being made to assist municipalities in taking sewage out of streams, prior adoption of plans for sewage disposal works might prove of great assistance in expediting the erection of such works at the earliest practicable moment.

"FOURTH: No pathological material from any laboratory shall be permitted to enter the sewers. The proper authorities shall cause these wastes to be destroyed on the premises.

"FIFTH: If at any time, in the opinion of the Commissioner of Health, the sewerage system or any part thereof, or the discharge therefrom, shall have become a nuisance or menace to public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may approve and suggest."

Since receiving the permit, the borough on September first, nineteen hundred and eight, applied for permission to extend other of its sewers as stated in the following letter to the Commissioner of Health:

"The borough of Cambridge Springs, Crawford county, Pennsylvania, respectfully represents:

"That on the third day of June, nineteen hundred and eight, said borough filed with your Department a petition requesting permit to extend its sewer system, on which said petition your Department granted to petitioners the right to make certain extensions to its sewer system.

"That by an oversight in the preparation of said petition two small extensions to the system which were contemplated and are necessary at the present time were omitted, to wit: An eight inch pipe sewer in Kearney avenue, commencing at a manhole at the intersection of said street with McClellan street and extending thence northwardly along the centre of Kearney avenue for a distance of seven hundred feet; also an eight inch pipe sewer in Cummings street, commencing at a manhole at the intersection in the centre of Spring street and extending thence southwardly along the centre of Cummings street for a distance of four hundred feet.

"Your petitioners now, therefore, respectfully petition your Honorable Department to grant to the borough of Cambridge Springs the right to make the above mentioned additions to its sewer system and will ever so pray.

"Respectfully submitted this first day of September, nineteen hundred and eight, by borough of Cambridge Springs.

"By E. E. HUMES, Chairman of Council.
"By J. F. HIMEBAUGH, Burgess."

This application was a mistake. Leave to withdraw it and to subtitute another application was asked of the Commissioner of Health on September twenty-fifth, nineteen hundred and eight. The last petition is given in full below.

"FOR SEWER EXTENSIONS AND CHANGES.

"To the Hon. Samuel G. Dixon, Commissioner of Health, Harrisburg, Pennsylvania.

"The borough of Cambridge Springs, county of Crawford, respectfully represent:

"That on the first day of this month an application was made by petitioners to your Department requesting permission to make additional sewer extensions of four hundred feet in Cummings street and seven hundred feet in Kearney avenue.

"That it has now come to the knowledge of your petitioners that the McLellan street sewer does not extend to the intersection with Kearney avenue and that the seven hundred feet of sewer on Kearney avenue to connect with McLellan street sewer, as shown by engineers map, on file with your department, is an error and is impossible of construction.

"That we have now made surveys, maps of which we are now forwarding to you, showing a sewer on Kearney avenue from French Creek northwardly to the center of McLellan street and the map now on file with you shows this sewer extended northwardly about seven hundred feet, to the borough limits. The maps we are now

forwarding you shows an extension of the present eighteen inch outlet sewer on the north side of the creek by which it will be carried westwardly to a connection with the Kearney avenue sewer.

"Whereupon petitioners ask leave to withdraw or annul the request by them made, dated September first, nineteen hundred and eight, and in place thereof to request of your department a permit to make the following extensions and change to its sewer system, to wit:

"To construct an eighteen inch pipe sewer in Kearney avenue, commencing at the north bank of French creek west of the iron bridge extending thence northwardly along said avenue for a distance of two hundred and seventy and five-tenths feet to a manhole, and thence by an eight inch pipe sewer northwardly along said avenue to the borough limits, a distance of about one thousand and thirty feet.

"To construct an eight inch pipe sewer in Cummings street, commencing at a manhole at the centre of the intersection with Spring street, and extending southwardly along the centre of Cummings street for a distance of four hundred feet.

"To take up the eighteen inch outlet sewer on north side of the creek from the creek back to the manhole in Poplar street and in the place thereof to construct an eighteen inch sewer from said manhole westwardly for a distance of about nine hundred feet to a manhole in Kearney avenue two hundred and seventy and five-tenths feet from the creek.

"Respectfully submitted this twenty-fifth day of September, nineteen hundred and eight.

"BOROUGH OF CAMBRIDGE SPRINGS.
"By E. E. HUMES, Chairman of Council.
"By J. F. HIMEBAUGH, Burgess."

Cambridge Springs borough is pursuing a desultory policy in coming before the Commissioner of Health continuously for approval of petty sewer extensions. The permit of July first, nineteen hundred and eight, clearly sets forth the necessity of plans for a comprehensive sewerage system being prepared. There is nothing to prevent the borough from preparing the complete plans, which must, in any event, be submitted to the Commissioner of Health for approval on July first, nineteen hundred and nine.

It has been determined that the interests of the public health will be subserved by withholding the permission for the additional sewer extensions, and a permission is hereby and herein withheld of the last two named applications until the borough shall have complied with Sections One and Three of the permit of July first, nineteen hundred and eight.

Harrisburg, Pa., October 9, 1908.

CANONSBURG, WASHINGTON COUNTY.

This permit is issued to the borough of Canonsburg, Washington county, and is for the construction of sewage purification works for the treatment of the sewage of Canonsburg and South Canonsburg boroughs, in conformity with plans therefor submitted by the borough of Canonsburg.

On February eleventh, nineteen hundred and eight, the Commissioner of Health sent the following communication to the President of the Borough Council of Canonsburg, Washington county:

"Dear Sir:

"In compliance with the unanimous agreement reached by the Governor, Attorney General and the Commissioner of Health, I beg to herein notify you that your borough failed to comply with Section six of Act one hundred and eighty-two, approved April twenty-second, one thousand nine hundred and five, and that, therefore, its sewer system is not exempt from the provisions of this Act against the discharge of sewage into the waters of the State.

"It is further agreed that the Commissioner of Health request the borough of Canonsburg, and I do hereby and herein request you to prepare plans, either independently or in conjunction with the borough of South Canonsburg for the treatment of the sewage before it be discharged into the creek and submit these plans to the Commissioner of Health for approval on or before July first, nineteen hundred and eight. If this be done, then the Commissioner of Health may fix the time in which such treatment works shall be constructed, which date shall not be in advance of the date upon which the sewage from the State Reform School at Morganza is ceased to be discharged into Chartiers Creek.

"Yours very truly."

In compliance with this order the borough of Canonsburg jointly with South Canonsburg, employed an expert to prepare plans for a joint purification works, which plans were submitted to the Commissioner of Health for approval on August fifteenth, nineteen hundred and eight.

The borough of Canonsburg has at the present time a fairly complete system of sewers built on the separate plan. These discharge through a twelve inch main sewer into Chartiers Creek just below Bridge street.

The South Canonsburg main sewer, also twelve inches in diameter, recently completed, discharges into Chartiers Creek at a point fifteen hundred feet above Bridge street.

The description of the sewerage systems of both municipalities is contained in the said permit of February eleventh, nineteen hundred and eight.

It is estimated that Canonsburg has a present population of about four thousand at least one half of which make use of the sewers; and that South Canonsburg has a population of about fifteen hundred. Few, if any, connections have yet been made with the sewers at South Canonsburg, although it is expected, now that the system is about completed, that they will be generally used in the future.

The sewage flow in the Canonsburg main sewer was roughly gaged during dry weather and found to be about two hundred thousand gallons per day. The system is intended for domestic wastes only and although there may be a greater or less number of down spout connections it is believed that the flow will never be excessively increased during wet weather. The size and grade of the main sewer is such as to make it impossible for a very large volume of sewage to reach the present outlet or the future purification works. No gagings have been made of the South Canonsburg output, as the system was not completed at the time of the investigation.

The proposed sewage purification plant is designed to purify sewage from approximately seven thousand people. On a basis of seventy-five thousand gallons per capita, this would be five hundred and twenty-five thousand gallons per day. This provides not only for a combined increase in both boroughs of fifteen hundred people, but also allows for the total population, when the above figure is reached, being connected with the sewers. In other words, the plant should purify about twice as much sewage as will be discharged from both boroughs during the present year. The works can be operated at excessive rates for short periods; and the pumping equipment is of sufficient capacity to handle one million six hundred thousand gallons per day, which is probably as much as the main sewer could convey to the pump well. The purification works proposed are designed to be readily extended or duplicated.

The site chosen for the sewage works is located about half a mile below the corporate limits of Canonsburg on land lying south of the creek between the creek and the highway. The nearest houses are those at East Canonsburg (a small unincorporated community), six hundred feet distant from the center of the proposed filters and at an elevation some thirty feet higher than the filters. The prevailing summer winds are from a westerly direction. This would tend to drive any odors originating from the purification works in a direction away from the above mentioned houses or any other houses. In support of this statement the petition mentioned that the ground near the proposed site has been and is being used for dumping night soil; and that this practice is continued without complaint on the part of the people of East Canonsburg. The site has not yet been purchased and no definite boundaries have been fixed; but a tract of eight or ten acres is contemplated as ample room for the plant and future extension.

Before choosing this site, other sites farther down stream were investigated. One of these was on low land in the rear of the "Tin Plate Mill;" and the other was one half mile east of the proposed site on land south of the steam railroad tracks and across the creek from the Pennsylvania Reform School at Morganza. Neither of these last mentioned sites has marked advantages, as regards distance from habitation, over the site chosen. Giving weight to the matter of prevailing winds these sites are less favorably located, so the borough considers. These facts, taken together with the matter of increased cost of extending the force main and the increased cost of pumping, afford sufficient ground for rejecting both of these sites, in the opinion of the municipal experts.

When the purification works are built, it is proposed to tap the South Canonsburg main sewer with an eight inch inverted syphon, at a point seven hundred feet above the present outlet and to divert the sewage into the Canonsburg main sewer.

Just above the present Canonsburg outlet it is proposed to construct a manhole from which an eight inch syphon is to extend, beneath the creek, to the screen chamber at the pumping station. A weir with crest at elevation nine hundred and seventeen will be constructed in this manhole and will form an emergency overflow through the present outlet. The pumping machinery will force the sewage, through two thousand feet of cast iron main, to purification works consisting of screen chamber, settling tank, sprinkling filters, final treatment basins and sludge beds. The final effluent may be readily disinfected if desired in the future.

At the pumping station the sewage, after being roughly screened, will enter a pump well ten feet by twelve in plan, with a maximum capacity of seven thousand gallons, or from ten to twenty minutes flow. The pumping machinery will consist of a four inch centrifugal pump and a five inch centrifugal pump driven by fifteen and twenty horse power motor, respectively. The motors will be started automatically by means of float switches when the sewage in the well has reached any desired level. The rate of emptying the pump well can be made to vary from several times the rate of inflow to approximately the same rate as the inflow.

The ten inch force main discharges into a screen chamber, provided with two sets of screens, each set comprising a half and three-eights inch screen. From this chamber the sewage passes into one or both of the two settling basins. Each of

these is seventy-five feet long, twenty feet wide, divided longitudinally by a baffle wall upon which the roof rests. The minimum depth in the tank is eleven feet, thus giving a capacity of one hundred and twenty-five thousand gallons each. With both in use, there will be provided, based on the nominal capacity of the tanks, a twelve hour period of retention. It is possible that one settling tank may be used for a month at a time, while the other is allowed to stand idle and the decomposition of the sludge allowed to take place.

It will be noted that the general dimensions of the tanks are such as to provide a relatively high velocity of travel with the idea of more thoroughly distributing the sludge. At a point near the centre of each tank is provided a by-pass through which the sewage can be drawn, if it is desired to decrease the period of retention. The tanks are arranged so that they may be readily cleaned.

Located between the two settling tanks is a syphon chamber which receives the flow from these tanks. When the sewage has reached a predetermined level, it will be discharged through an automatic syphon into the equalizing chamber and thence into the distributing system of the filters. At the outlet of the settling tank brass weir plates are provided, by the use of which the quantity in each dose may be increased by including therein a portion of the contents of the settling tanks themselves.

The filters are two in number and they are to be composed of broken stone having an average depth of five and one half feet. The area of each is one hundred and thirteen feet by eighty feet, or a total area of forty-four one-hundredths acres. These were provided for treating the sewage, when the plant has reached a capacity at a rate of sixteen thousand people per acre, or one million two hundred thousand gallons per day. It will be some years before the filters are called upon to perform this work.

The sewage is to be distributed onto each filter through six lines of cast iron pipe resting on concrete piers and placed about two feet below the surface of the filters. The lines are six inches and four inches in diameter. Each line connects directly with the sixteen inch supply pipe extending through the central gallery. Each line can be cut out of service independently, and a flange at the upper end permits the cleaning out of any deposits, if necessary. Spaced seven feet six inches apart on each of the lateral distributors are cast iron risers extending to the top of the filtering material. Every other riser will be provided with a sprinkler nozzle and the remaining risers will be capped. The nozzles and caps may be changed when desired in order to more thoroughly distribute the sewage.

The underdrains are formed of six inch channel pipe placed in an inverted position on the concrete floors of the filters. The lines of underdrains are eighteen inches centre to centre. They discharge into an open channel in the bottom of the central gallery.

The bottom of the filters has been placed above the level of high water in the creek. The elevation of the sewage in the settling basins is to be nine hundred and thirty-six and one-half. The elevation of the invert of the sewer at the pump well is nine hundred and fourteen. Hence the plans show a vertical height of twenty-two and one-half feet for the lifting of the sewage into the purification works. The surface of the filters will be at elevation nine hundred and twenty-eight or eight and one half feet below the water level in the settling tanks.

Just below the filters are two final treatment basins, either one or both of which can be used. The combined capacity of these basins is about sixty-eight thousand gallons, or three hours' flow, based on the normal capacity of the plant. The basins are large enough to permit, if desired in the future, the application of a disinfectant to the effluent after it has received some two hours of plain sedimentation.

The sludge beds are two in number, each twenty-five by fifty feet and have a combined area of two thousand square feet. Although placed on opposite sides of the final treatment basins, they are connected by an iron pipe so that they can be used as one filter. They will receive sludge from the settling tank through the ten inch cast iron pipes, shown on the plans, and from the final treatment basins by means of sluice gates.

Around the final treatment basins and sludge beds an embankment or protecting dyke is to be built, carried up to elevation nine hundred and twenty-four. The sludge basins are to have underdrains laid on earth and covered to a depth of two feet with sand. The underdrains will empty into the outlet pipe from the final treatment basins from which a fifteen inch terra cotta drain will lead under the embankment to the edge of the creek. This pipe will have a flap-valve on it, so the invert will be at elevation nine hundred and fourteen.

No by-pass for untreated sewage to the creek is afforded. The shortest passage of sewage through the works would be through the settling tanks and sludge beds. The filters will not be put out of commission during freshet stages of Chartiers Creek.

The entire layout is a careful design based on modern practice and should afford to the municipality an efficient and economical system. It is adapted to additions in the future. The only objection there can be to the site is its proximity to buildings. In compliance with the previous terms of the permit hereinbefore mentioned, the boroughs now expect a formal approval of the plans, carrying with it permission to discharge sewage temporarily into Chartiers Creek until the sewage from the State Reform School at Morganza shall have ceased to be discharged into Chartiers Creek.

On general principles it is better to concentrate the care and attention necessary at a sewage disposal works to one plant if this be feasible. In the preparation of plans for the treatment of the Morganza Institution sewage, the State may bestow some thought on the advisability of one plant being erected in Chartiers valley to take the sewage from the State institution and from the Canonsburg and South Canonsburg boroughs. However, this may not be practicable of ultimate accomplishment, and the possibility of the project need not interfere with the approval of the plan now under consideration.

It has been determined that the interests of the public health will be subserved by approving the proposed sewage disposal plant for the boroughs of Canonsburg and South Canonsburg and the same is hereby and herein approved and a permit issued for the temporary discharge of sewage into Chartiers Creek from the sewer system of Canonsburg until plans for sewage disposal works for the State Institution at Morganza shall have been prepared and approved and an appropriation made therefor and the construction of the work begun. At that time the borough of Canonsburg shall be notified that within one year from the date of such notification it shall either independently or in conjunction with South Canonsburg borough construct the sewage disposal works herein approved, or such part thereof as shall be deemed necessary by the State Department of Health, or in substitution for this plant or any portion thereof, shall construct such other sewage disposal works as the State Department of Health may approve, all under conditions and stipulations to be made by said Department.

Harrisburg, Pa., August 25, 1908.

CARRICK, ALLEGHENY COUNTY.

This application is made by the borough of Carrick, Allegheny county, and is for an extension of time in which to prepare plans for the treatment of sewage.

It appears that on April seventeenth, nineteen hundred and six, the Commissioner of Health issued a permit to the borough of Carrick to install a sanitary sewer system, under certain conditions and stipulations, among which was the following:

"That before the said system of sewers or any part thereof is put in use, plans for the treatment of the sewage of said system shall be prepared and submitted to the Commissioner of Health, who shall modify or amend or adopt them and specify the time within which the purification of the sewage shall be brought about."

The borough has proceeded to construct the sewer system and has submitted plans of the sewers built. It appears that Carrick sewer outlet, which is to discharge into Saw Mill Run, will be one only of many sewer outlets now existing in said run. The boroughs of Mt. Oliver and Knoxville have sewer outlets into it and so do a number of wards of the city of Pittsburg, which are drained by this valley stream. The Commissioner of Health is now considering an application made by the city of Pittsburg for permission to extend some of the sewers tributary to the run. The city territory adjoins Carrick. What was formerly West Liberty and Montooth boroughs is now city territory, having been recently annexed. The run is subject to considerable sewage pollution and there are nuisances existing along its course. The district it drains is a growing one and some general sewerage plant is a foregone necessity. Whatever project is adopted by Pittsburg would prove the most economical and efficient outlet for the disposal of Carrick borough sewage. Therefore, the authorities of the latter place wish for ample extension of time during which it is believed the city of Pittsburg will afford an outlet. The cost of the planning and the erection of an independent sewage purification works for Carrick would be large and it might be an entirely unnecessary expenditure in event of the consumation of a trunk sewer line down the valley.

The ridge running lengthwise through Carrick, separates the borough into two distinct watersheds and the sewers in the streets on the eastern slope of the ridge are planned to drain to Becks Run which flows northeasterly a distance of about two miles to the Monongahela river. The boroughs of Mt. Oliver and St. Clair (formerly Lower St. Clair township) discharge sewage into Becks Run. The petitioners represent that the engineer of Carrick borough has been engaged by the adjoining boroughs of Mt. Oliver and St. Clair and that he is preparing a joint sewerage project for all three places. Under these circumstances the authorities of Carrick borough request that sewage be permitted to be discharged into Saw Mill Run and into Becks Run for a period of two years, on or before which plans for the treatment of the sewage or for some other disposal of it than into streams shall be prepared and submitted to the Commissioner of Health for approval.

It has been determined that the interests of the public health will be subserved by granting a permit, and it is hereby and herein granted to the borough of Carrick to discharge sewage from its sewer system up to July first, nineteen hundred and ten, on the following conditions and stipulations:

FIRST: That on or before July first, nineteen hundred and nine, the borough of Carrick shall, either alone or in conjunction with the boroughs of Mt. Oliver and St. Clair, prepare plans for a sewage purification plant for the treatment of the sewage of Becks Run drainage district and submit the same to the Commissioner of Health for approval. It is understood that, if Carrick borough proceeds independently, the proposed plant will be designed to treat only that sewage in the Becks Run dainage district lying within Carrick borough.

SECOND: That on or before July first, nineteen hundred and nine, the borough of Carrick, either alone or in conjunction with Mt. Oliver, Knoxville and the city of Pittsburg, shall prepare a plan for some other disposal of the sewage than into Saw Mill Run or its tributaries and submit the same to the Commissioner of Health for approval.

Harrisburg, Pa., July 24, 1908.

CHESTER, DELAWARE COUNTY.

This application is made by the city of Chester, Delaware county, Pennsylvania, and is for permission to construct sewers and to extend existing sewer system and to discharge the sewage therefrom, untreated, into waters of the State within the said city.

The city of Chester is a manufacturing community and historical town located on the north bank of the Delaware river in Delaware county a short distance above the Delaware-Pennsylvania boundary line and about nine miles down stream from the mouth of the Schuylkill river in Philadelphia.

The municipal territory is very irregular in shape and is bounded on the east by Ridley Creek which separates the city from the townships of Nether Providence, Ridley and the borough of Eddystone, the latter being opposite the city along the Delaware river at the mouth of the creek. The city is bounded on the south by the Delaware river, on the west by Lower Chichester township and a part of Upper Chichester township and on the north by Chester township and Upland borough.

Within this territory which is quite flat and extends along the river bank for a distance of three miles, there is a population of forty thousand people or thereabouts.

Coming down from the north through the city to the river are numerous streams, the principal one being Chester Creek. It and Ridley Creek and Crum Creek to the east are parallel streams heading in the hills back in the county and draining farm territory. The courses are such that numerous mill privileges are afforded. The head waters of Crum Creek furnish a public water supply and the head waters of the two other creeks might be available for this purpose were it not for the excessive damages to mill rights which would have to be paid by any one attempting to divert the water from the streams.

The city is in a thriving condition. Its industries which are varied, among which are the manufacture of textile fabrics, dye works, leather manufacture, ship building, steel works and tubing, are located principally along the river from where wharfage is had and also where railroad freight facilities are afforded.

The Delaware river at this point is over a mile wide the waters are tidal, the normal stage being about six feet and the velocity during the strength of the ebb and flow is very strong. The ship canal follows the shores along Chester City.

The main line of the Philadelphia, Baltimore and Washington Division of the Pennsylvania Railroad passes through the city paralleling the river, the Reading Railroad has a branch and the main line of the Baltimore and Ohio Railroad also traverses the town.

The highway along the river front is called Front street and back therefrom and parallel thereto the streets are designated by numbers. Fulton street which is at right angles to the river is in the upper or eastern half of the city territory and at the foot of it on the river front, the New Chester Water Company's pumping station is located. Chester Creek empties into the river about fifteen hundred feet up stream from the pumping station and Ridley Creek is about one mile still further up stream. There are public and private sewers emptying into the creeks and the river. They are described hereinafter.

The water company's intake is at such a place that the sewage from the city sewers may be taken by the tide back and forth over said intake to the continual menace of public health.

The supply is drawn through a thirty inch suction main five hundred and fifty feet long laid on the bed of the river and extending out beyond the Port Warden line a short distance into the main channel where the water is twenty-five feet deep. On the end is affixed a strainer. The water is pumped through a rising main about three and one half miles long to storage reservoirs on Harrison's Hill back of the city where it is subjected to mechanical filtration and thence supplied by gravity to the water district. The water works system has been approved by the Commissioner of Health and is now operated under State supervision. The Company also furnishes the water to Upland borough and Lower Chichester township.

There are reported to be numerous private wells in the city, a few in Upland borough and two hundred or more in Lower Chichester township.

Several years ago the courts were appealed to and the water company was compelled to furnish pure water. Consequently a filter plant was installed and filtered water was turned on for the first time on December third, nineteen hundred and three. While an immediate diminution in typhoid fever followed and the death rates from the disease have ever since been lower, yet the diminution has not been as great as it should have been. This fact, coupled with the existence of numerous domestic wells, directs suspicion towards the quality of the private sources. The

Department has compiled a table from the best information at hand, which shows that more cases have occurred undoubtedly than have been recorded. Prior to nineteen hundred and four, the death rate of typhoid fever for Chester City was higher than the rate of Philadelphia. For one decade it averaged seventy-four per one hundred thousand people living, but since nineteen hundred and four it has averaged thirty-six.

Until faithful reports of diseases are made and recorded and the study of the subject be further pursued, it will be impossible to determine where all of the typhoid fever comes from; but on general principles three things should be done immediately to safeguard the public. The public filter plant should be maintained at its highest degree of efficiency, and this the Commissioner of Health is looking out for; all possible pollutions of the private supplies should be removed and such supplies should be abandoned if upon investigation they be found contaminated. The Department is not informed of the location of private wells, cesspools and privies. The facts should be ascertained by the local health authorities. There are seventy miles of opened streets and thirty miles of public sewers. Property connection to existing sewers has been made compulsory and the city officials report that this regulation has been actively enforced during the last few years. Nevertheless there is a considerable population living in the districts and along the streets where sewers have not been laid and here the old time cesspool and privy vault may be found and the disposal of kitchen drainage into street gutters or on the ground prevails.

The public sewers are built on a combined plan. They discharge at convenient points into State waters usually at an elevation of meantide so that high water back floods many of them.

The Ridley Creek drainage area contains two public sewer outlets, one into the creek between the Pennsylvania Railroad and the Reading Railway and the other into the creek at Ninth street.

The first mentioned outlet may be called the Fourth street sewer. It is a four foot brick structure five hundred and fifty feet long across the marsh. Connected with it is about four thousand feet of sewer, diameters ranging from eighteen to thirty-six inches. In this district of twenty acres, there are four industrial plants, whose wastes are emptied into the sewer. Some of the streets are paved with asphalt and others with cobble stone. There are eight solid blocks of dwellings for the mill hands. The Aberfoile Manufacturing Company has an extensive plant and employs several hundred hands engaged in the manufacture of cotton and silk cloth. The Chester Worsted Mills, employing about one hundred and twenty-five hands, manufacture yarns. The Huston Manufacturing Company make quilts. The plant is extensive. The fourth plant is a small yarn mill. The dry weather output of sewage and manufactural wastes from this dstrict daily discharged by the sewer into Ridley Creek is unknown to the Department, but the volume is considerable. However, a small pipe would be sufficient to carry it.

The Ninth street sewer outlet is a three foot brick sewer discharging into the creek under the bridge about fourteen hundred feet up stream above the Fourth street outlet. It serves a well built up area of about one hundred acres, in which there are about two and a half miles of sewers, mostly two feet or over in diameter. There are some eighteen inch and four hundred feet of twelve inch sewer in the district. The industrial plants are all connected to the system. There is the Argo Leather Company, tanners of upper leather, employing about fifty hands and consuming from three to seven million gallons of water per month which is discharged to the sewer with the other wastes; also the Lincoln Manufacturing Company, employing about one hundred hands in the manufacturing of white cotton yarns, also the Arasapha Manufacturing Company, employing from two hundred to four hundred hands. This concern weaves various kinds of cloth and uses dyes extensively. The Grove Worsted Mills employ about seventy-five hands in the manufacture of worsted yarn. Wool scourings and spent dye liquids are emptied into the sewers. The J. E. Fricke Company make cotton cordage; about fifty five hands are employed. Domestic sewage is the only output of this plant.

Ridley Creek also receives sewage directly from private sources. With one exception they are in the borough of Eddystone.

Beginning at the mouth of the stream there is in the borough the very extensive plant of the Eddystone Print Works, engaged in the manufacture of calico prints. Spent chemicals and dye stuffs and sewage are discharged from this plant into an open ditch and thence to the creek. Two thousand feet up stream from the river is the Fourth street sewer outlet in Chester City and below this point, within five hundred feet, on the banks of the creek in the borough are fifteen boat houses. They are cheap affairs. North of the Pennsylvania Railroad bridge, about four hundred feet up stream from the said city sewer, is the Eddystone borough storm drain, which is said to receive some sewage. A thousand feet up stream above the city sewer at Ninth street there is a borough sewer, cast iron, ten inches in diameter, which serves a neighborhood on Eleventh street .

In the city at Twenty-fifth street about two miles from the river is the plant of James Irving and Son, manufacturers of cashmere and woolen cloth, where are employed one hundred and twenty-five men. These works are located on the banks of the stream, water is taken from the creek for industrial uses and wastes from dyeing and scouring operations are put into the creek. The domestic sewage is collected in a cess pool, so it is reported. The stream is tidal at this point and the banks are

steep and high, until, passing down the valley, about Eleventh street is reached. From here on marsh lands appear in the city and a very little in Eddystone borough No nuisance exists in the creek because perhaps habitations are remote.

The Chester Creek drainage area contains eleven public sewer outlets, beginning at Second street and ending at Kerlin street two miles above the Delaware river.

Mentioning these outlets in order up stream, first is the Second street two foot sewer on the east. It and an eighteen inch pipe have a total length of sixteen hundred feet. They serve one block about eight acres in area.

The next outlet is three feet in diameter on the east at Third street. It serves less than six acres of territory in the heart of the city. It and two twenty-four inch branches total twenty-six hundred feet.

From the West at Third Street there is a four foot outlet serving twenty-three acres extending to Front Street. There are forty-four hundred feet of sewers in the district whose diameters range from four feet to eighteen inches.

The fourth outlet is a three foot sewer at Fifth Street. It serves a well built-up territory of twenty-two acres and the system comprises a total length of forty-seven hundred feet, the smallest diameter being fifteen inches. In this district and the one previously mentioned several lateral sewers remain to be built, but in the two districts preceding them all of the sewers have been built. In all four districts the streets are permanently surfaced, either with stone or asphalt.

The next sewer outlet is at Sixth Street from the east. It is three feet in diameter, serves an area of about seventeen acres, thickly built up and occupied by dwellings and stores and the main is two thousand feet long. It has a two foot branch and eighteen inch branch, eight hundred and five feet long, respectively. A few laterals remain to be built. This district is along Edgemont Avenue between the Pennsylvania and Baltimore and Ohio Railroads.

The next outlet is two feet in diameter, seven hundred feet long, in Seventh Street east.

The seventh public sewer outlet into the creek is in Penn Street and comes from the south. It serves an area of about twenty acres west of the creek and north of the Pennsylvania Railroad and is occupied by dwellings. Most of the streets have been sewered. The system comprises a total length of about one mile, the smallest size being twelve inches. The next sewer outlet comprises nine hundred feet of eighteen inch pipe in Eighth Street from the east. It serves a row of houses on this highway.

The next outlet comprises twelve hundred feet of twelve inch pipe in Market Street with a branch in Eighth Street. The area drained is about seven acres. North from this point which is about a mile from the river, the land along the creek is unoccupied.

The tenth sewer outlet is into Ship Creek at Fourteenth Street. This stream is a small tributary of Chester Creek which forms the boundary between the city and Upland borough for a short distance. The continuation of Fourteenth Street westerly in the borough bears the name of Upland Avenue. Fourteenth Street sewer is four feet in diameter and it serves an area of highland in the northern part of this city containing about two hundred and seventy-five acres, in which the sewers have not been laid in every street. However, there are four miles in the system as it exists, there being nine thousand feet of eighteen inch pipe, seven thousand feet of three foot sewer, thirty-eight hundred feet of two foot sewer, fourteen hundred feet of four foot sewer and the balance is twelve inch pipe.

The last sewer outlet has no branches. It is a three foot sewer one half mile long, laid in Kerlin Street northerly to Chester Creek. This highway is surfaced with asphalt and it is the main road to Upland borough for this section of the city. To the west of the street is Crozer Park, abutting the creek and to the east the land falls off rapidly so that future sewer extensions to this sewer will be few. Either an additional sewer outlet for the district will be sought or an intercepting sewer will be provided.

Besides these public sources of pollution to Chester Creek, there are numerous private sources, among which are the following:

Between Second and Third Streets on the east side of Chester Creek are a number of outlets from the rest of a block of buildings fronting on Edgemont Avenue. These buildings are used principally for produce and fish markets. From a block of stores fronting on both sides of Third Street east of the creek there are private sewers emptying into the stream.

Opposite these buildings on the west bank of the creek between Second and Third Streets are a series of boat houses and boat landings for pleasure craft. They ply up and down the river principally, but they may be seen on the creek also, even as far up as Crozer Park, and it is quite possible the sewage poisons in the waters may be conveyed by hand from the creek to fruits or other edibles consumed on the boats In fact, boys bathe more or less in Chester Creek and fever among them has been attributed to the pollution of the waters by sewage.

The principal contamination of the stream from private sources is at Ship Creek. Here, besides the Fourteenth Street sewer, there are three industrial plants whose waste go into the natural water course. The Merion Mills of Murphy and Brother, located at Fourteenth Street, and employing about one hundred hands in the manufacture of cotton and woolen worsteds, discharge sewage and manufactural wastes into a short tributary of Ship Creek. Opposite this plant on the same street is the Keystone Fiber Company plant, where large quantities of water are used and delivered to the creek and immediately above the works of the Chester

Enameling Company. Upper leather is manufactured here and the waste peculiar to this process, together with sewage, goes to the stream.

Immediately below Kerlin Street in Upland borough there are a few boat houses and in its vicinity there are dwellings which sewer to the creek and also a slaughter house. And in the borough there are six public sewer outlets, three of which are into the creek, two are into Walworth Mills Run and the other into a smaller tributary of Chester Creek. The first sewer is twenty-four inches in diameter and its outlet is about three hundred feet down stream from Kerlin Street bridge. The other public sewers from the borough empty directly or indirectly into Chester Creek above Kerlin Street. Some spent dye stuffs from the Crozer Mills go to the creek.

The Delaware River drainage district in the city up stream from the city water works intake at Fulton Street comprises a water front of one and twenty-hundredths miles. The public and private sewer outlets named in order up stream from said intake are as follows:

Eight hundred feet above the water works intake, the Pennsylvania Steel Casting Company's sewer (three of them) twelve inches in diameter; sixteen hundred feet above said intake, is Chester Creek; twenty-two hundred feet above said intake the Market Street city sewer, thirty-six inches in diameter; twenty-six hundred and fifty feet above the said intake the Welsch Street city sewer, thirty-six inches in diameter; twenty-six hundred and fifty feet the boat club sewer; four thousand feet above said intake the Upland Street city sewer, forty-eight inches in diameter, and sixty-three hundred feet above said intake, Ridley Creek.

When in full operation the Penn Steel Casting Company employs about six hundred and fifty hands. Wastes from the laboratories and domestic sewage is emptied into the river.

The thirty-six inch sewer outlet in Market Street serves a thoroughly built up and paved area in the heart of the city, extending to the public square and comprising thirteen acres in which there are twenty-six hundred feet of sewers, including four hundred feet of fifteen inch pipe and eight hundred feet of eighteen inch pipe.

The thirty-six inch Welsch Street sewer outlet serves a long narrow area extending north to Baltimore and Ohio Railroad, comprising fifty acres of thoroughly built-up principally residential territory in which all of the streets are sewered and paved. There are two miles of sewers, of which twenty-eight hundred feet are three feet in diameter; twenty-four hundred feet two and one half feet in diameter, forty-one hundred feet are two feet in diameter and the balance is eighteen and fifteen inch pipe. Above this outlet along the river front the land is undeveloped and unoccupied south of the Reading Railway. North of it, however, there is a large residential district which is served by the Upland Street sewer.

The four foot Upland Street outlet terminates in a box culvert on the marsh south of the Reading Railway. The built-up territory it serves comprises one hundred acres, occupied by residences, where the streets are all paved and sewered. The four foot sewer is seventeen hundred feet long and connected therewith are fifty-two hundred feet of three foot sewer, seven thousand feet of two foot sewer and the balance of eighteen inch pipe, making a total of three and a half miles in the system.

The Delaware River drainage district in the city down the stream from the city water works intake at Fulton Street comprises a water front of one and eight-tenths miles. The public and private sewer outlets named in order down stream from said intake are as follows:

Five hundred feet below the city's water works intake, the Parker Street sewer, forty-eight inches in diameter; eighteen hundred feet below said intake Lloyd Run; two thousand feet below said intake the Philadelphia Quartz Company's sewer, used for sewage; twenty-six hundred feet below said intake the American Dyewood Company's sewer used for sewage and trade wastes; thirty-two hundred feet below said intake the Norris Street city sewer, forty-eight inches in diameter; thirty-seven hundred feet below said intake, the Keystone Drop Forge Company's sewer, used for sewage; forty-six hundred feet below said intake the S. & L. Rubber Company's sewer, used for sewage; five thousand feet below said intake the Reaney Street city sewer, thirty-six inches in diameter; fifty-two hundred feet below said intake, the Federal Steel Works sewer used for sewage; fifty-six hundred feet below said intake, the Keystone Plaster Company's sewer, used for sewage; fifty-six hundred feet below the Jeffrey Street city sewer, thirty-six inches in diameter; sixty-four hundred feet below said intake the Townsend Street city sewer, forty-eight inches in diameter; seventy-eight hundred feet below said intake the Hayes Street city sewer, thirty-six inches in diameter; eighty-two hundred feet below said intake the Highland Avenue city sewer, thirty-six inches in diameter; nine thousand feet below said intake Morton Run and nine thousand feet below said intake the South Chester Tube Company's sewer, used for sewage.

The Parker Street outlet serves an eighty acre district occupied wholly by residences and extending both sides of the Pennsylvania Railroad. In this territory nearly all the streets are sewered and paved. The four foot sewer is nineteen hundred feet long, the three foot and the egg-shaped sewer is four thousand feet long, the two and one-half foot sewer is eight hundred and fifty feet long and the

balance to make up a total of two miles in the system is two feet and eighteen inches in diameter. The point of discharge is about two hundred feet from the low water mark. During the ebb tide, last stages, the solid matters are deposited over the shores exposed to view and on the return tide these matters are raised and carried up stream.

The Lloyd Run outlet is a four foot brick sewer discharging into a box culvert which empties into a ditch near Front Street. The ditch is very foul. The odors at the office of the Duplex Metal Company nearby are extremely offensive in summer time. The four foot sewer is eighteen hundred feet long and it takes the place of a former open water course. All told in the system there are two and one-half miles, the district comprising about ninety acres of quite well built up and paved territory in which all of the sewers have not been built. The outflow in dry weather is wholly domestic sewage. There are nine hundred feet of fifteen inch sewer and forty-four hundred feet of eighteen inch sewer, the balance being of larger sizes.

Domestic sewage is discharged from the Philadelphia Quartz Company's works into the river. About thirty men are employed on the premises. Domestic sewage and trade wastes are discharged from the American Dyewood Company's plant into the river. Between one hundred and fifty and two hundred men are employed on the premises. The river water is markedly discolored at times of discharge of the trade wastes.

The four foot Norris Street outlet serves a one hundred and thirty acre district of partly built-up territory, in which there are several manufacturing plants. There are about two and one-half miles of sewers of which four-fifths of a mile are eighteen inches or less in diameter. The main sewer takes the place of a former open water course known as Lamokin Run. The sewer discharges about two hundred feet from the low water line at the mouth of the run and the solid matters spread out. The sewage is dark colored and of high temperature, due to a considerable degree of waste from a large worsted mill owned by G. C. Hetzell and Company. Between three hundred and four hundred men are employed at the mill. The manufacturing process includes both scouring and dyeing. The wastes are turned into the sewer.

The Suburban Gas Company operations are on the river front at the run. There is a private sewer from the property to the public sewer in the street.

Domestic sewage from the Keystone Drop Forge Works is emptied into the river. Fifty-five men are employed here. This is also the case at the S. & L. Rubber Company plant, where fifty hands are employed. The Reaney Street sewer is a three foot structure draining thirty acres, wholly residential and not thickly built up.

Domestic sewage is discharged into the river from the Federal Steel Works. Three hundred and fifty men are employed. At the Keystone Plaster Company's plant, where one hundred and fifty men work, there are privies overhanging at the wharf.

Jeffrey Street sewer is a three foot structure nineteen hundred feet long, serving thirteen acres partly built up. The Townsend Street sewer is a four foot structure twenty-two hundred feet long. It takes the place of a former natural water course known as Harwick Run.

Into this are branch sewers about one and a half miles long all told. The smallest size is eighteen inches, but there are seven hundred feet only of this size. The sewered district shows an area of about fifty acres, partly paved and built up. On the north side of the Pennsylvania Railroad embankment westerly from Morton Street, there is an open ditch to the run which receives trade wastes from the Emmott Worsted Spinning Company's works. A pronounced pollution results.

The three foot Hayes Street outlet drains fifty acres of well built up and paved territory wholly occupied by residences and stores. Sanitary conditions are most wretched in some parts of the district where buildings are not connected to the sewer, more especially along Front Street. The lower end of the sewer passes under the Wydewater Steel Company's works and empties into an open ditch. The Highland Avenue three foot sewer is twenty-two hundred feet long. It drains ten acres. Very few house connections have been made to it.

Domestic sewage from the plant of the South Chester Tube Company is discharged into the river. Four to six hundred men are employed on the premises.

Moulton Run is a little stream draining a small area near Front Street and the city line. There are several private houses sewered to the run and the works of Birkin and Company on Second and Clayton Streets, where are employed three hundred and twenty-five hands in the manufacture of lace curtains, produce trade wastes in the form of bleaching liquors and sulphuric acid, which are discharged into the run. The above mentioned areas and lengths of sewers and sizes and number of factory hands are approximate only and are given to indicate in a general way the scope of the sewers and their use and the volume of pollutions discharged into the streams.

Thus it is seen that the city has over thirty miles of sewers whose diameters are principally two feet and over into which storm water and runs discharge, as well as household drainage and trade wastes, and from which the filth pours into the streams and the river above and below the water works intake.

With seventy miles of open streets and with thirty miles sewered, it is evident that the extensions to the sewer system must, as the city grows, total more

miles than that of the existing sewer. The plans for additions submitted by the city and now under consideration do not call for any sewer mains or laterals of less diameter than eighteen inches and the sewers are to be used for the removal of sewage and storm water.

The petitioners make special mention of appropriations having been made by councils for the immediate construction of a sewer in Central Avenue from River to Seventh Street, in Morton Street from Second to Third, Jeffrey Street from Seventh to Ninth and in Twenty-fourth Street from Edgemont Avenue to Madison Street.

The Central Avenue sewer proposed is a new outlet to the river, three feet in diameter.

The contemplated additions for the future call for three new sewer outlets into Ridley Creek, namely at Morton Avenue, Seventeenth Street and Twenty-second Street; and in Chester Creek at Eleventh Street; and into the Delaware River at Melrose Avenue and at Booth Street.

The Court of Common Pleas of Delaware County, sitting in equity, found, in nineteen hundred, that the New Chester Water Company was furnishing water to the inhabitants of Chester City and had been furnishing the same since eighteen hundred and eighty-seven prior to which time said inhabitants were furnished with water by a corporation known as the South Ward Water Works, whose plant and franchise was purchased by the New Chester Water Company and that this company, through its pumping station, reservoirs and distributing pipes, was furnishing raw river water to the consumers. The Delaware River, before the latter company became possessed of the plant, was polluted by sewage, the pollution increasing year by year, and the water furnished was very turbid at certain seasons of the year, particularly in the winter and spring, but that it was slightly turbid at all other times. It also at times had a bad odor and was unpleasant and objectionable and repulsive to the senses of sight, smell and taste and was not reasonably pure and wholesome, and so the court ordered and decreed that the water company forthwith secure and provide and furnish to its patrons a sufficient supply of water so free from sewage and organic matter and water-borne germs and turbidity and odor as to make said water reasonably pure and wholesome.

It is a fact that the New Chester Water Company did install a water purification plant and that it has since filtered the water with the result relative to diminution of water borne diseases as hereinbefore more fully set forth. Said company, in making extensions to its system, has proceeded according to law to make an application for and it has received approval of its water works system under certain conditions and stipulations with which the company is in strict compliance.

It is a fact that today more sewage is being put into the local waters about Chester by the public sewers than ever before, and by reason of the action of the tides which may carry the sewage forward and back over the water works intake where some of it is bound constantly to be drawn into the water works system, because these local poisons are more dangerous than sewage discharged into the streams at long distances from Chester City, the public authorities in charge of the city sewer system cannot escape a certain amount of responsibility for the menace to public health which impends.

A water filter is not absolutely germ proof and in case of an accident which may happen to any apparatus or duplicated apparatus, whereby the necessity should arise for the passage of raw water or partially purified water into the homes of the inhabitants of the city, it is not clear that the sickness and death resulting could be charged up to the water company. It is against public policy to grossly pollute drinking waters even where such waters be first filtered, and it is the duty of the Commissioner of Health charged with the preservation of the purity of the waters of the State for the protection of the public health to bring about a diminution and not an increase of poison in drinking waters.

The city has not shown how the interests of public health will be subserved by the granting of its request whereby consequent doubling of the volume of filth poured into the town's drinking water within fifteen or twenty minutes distance of the water works intake, would ensue, but to the contrary, every practical consideration from the health standpoint dictates that not only shall no more sewage be put into the river and its tributaries in Chester, but that the sewage which is now going in there shall cease to be so discharged. Since in equity the court adjudged and decreed that the Delaware river water was not fit to be used for domestic purposes without filtration, it necessarily follows that the river is not a suitable place to put the sewage without its first being filtered.

It is absolutely prohibitive in cost to undertake the purification of mingled sewage and storm water and there is another element in the Chester sewers which mitigates against a dry weather flow interception of the existing sewers, and that is, mitigates against a dry weather flow interception of the existing sewers, and that is, the tides which back flood the sewers twice daily for several hours.

The present sewers are better adapted to carry storm water than house drainage. They are altogether too large for sewage proper. In any event the new sewers should be built on the separate plan.

This will cost very much less for the first construction and very much less for maintenance thereafter when the sewage should have been delivered to a purification plant. In this period of its growth with good future prospects, it is very essential that the city should consider a re-design of its sewer system and plan out a comprehensive system adapted to present and prospective needs, and after this

plan shall have been adopted then the city should from time to time in the laying down of sewers conform to it. No great corporation conducts its affairs along any other than thoroughly devised plans and there is no reason why a municipal corporation should not pursue similar methods.

The borough of Eddystone and the borough of Upland has each a concern in the sewerage and sewage disposal problem. It would seem to be a foregone conclusion that it would be cheaper and better for Chester City and these boroughs to work jointly in the consideration of a project rather than independently.

The borough of Upland has been denied permission to extend its existing sewers until it shall have prepared a plan for a comprehensive sanitary sewerage system and sewage disposal works and submitted the same to the Commissioner of Health for approval and until the same are modified, amended or approved by said Commissioner and the local authorities of that borough were advised to consider the feasibility of co-operating with the city of Chester in this movement. A similar notification to this effect will be sent to the borough of Eddystone.

If reports be true, the city of Chester can borrow in the neighborhood of five hundred and seventy-five thousand dollars without exceeding the constitutional limit of indebtedness. So it appears that the municipality is fully able, if it so elects, to undertake an improved sewerage and disposal project. This cost would be a cheap health insurance, but, it should be remembered that the pollution of domestic wells in the city should cease also. All wells in proximity to cesspools and privies should be examined and condemned if found contaminated.

In view of the foregoing considerations, it has been determined that the interests of the public health will be subserved by withholding a permit to the city of Chester and such permit is hereby and herein withheld from the said city to extend its sewer system until the said city shall have prepared a plan for a comprehensive sewerage system and sewage disposal works for the collection of all the sewage of the city and its disposal and treatment in a sanitary and harmless manner and until the city shall have submitted such plan or plans to the Department of Health and they have been approved, modified or amended in compliance with State law.

The city council is hereby notified that since it has extended its sewer system without application to or approval by the Department of Health, and since the city did not take advantage of the exemption clause in Act one hundred and eighty-two of nineteen hundred and five, that it has been determined that the city of Chester be ordered, and said city is hereby and herein ordered and directed to forthwith prepare improved sewerage plans and plans for sewage disposal works and to submit them to the Commissioner of Health for approval on or before the first day of July nineteen hundred and nine.

The local authorities are requested to stop all bathing in the creeks, and, furthermore, to make the examination of the wells as hereinbefore suggested.

The State Department of Health will be very glad to advise and co-operate with the local officials in the preparation of the sewerage plans.

The borough of Eddystone will be notified to discontinue the discharge of sewage into the waters of the State in general conformity with the conditions and suggestions hereinbefore given.

Harrisburg, Pa., July 6, 1908.

CHESWICK BOROUGH, ALLEGHENY COUNTY.

This application was made by the borough of Cheswick, Allegheny county and is for approval of plans for a sewage disposal plant for the borough of Cheswick, Allegheny county. These plans were filed by said borough in accordance with the suggestions of a permit issued by the Commissioner of Health to said borough.

On August twenty-fifth, nineteen hundred and eight the Commissioner of Health issued a permit to the borough of Cheswich in which, after a discussion of the conditions of the plans submitted, permission was denied for the temporary discharge of crude sewage from the borough into the Allegheny river, and in which permissiou was granted for the installation of a new system of sewers and the discharge of sewage therefrom after treatment, into the Allegheny river within the limits of the borough under the condition that—

"the plans for sewage disposal works shall be modified and amended as hereinbefore suggested, and as so modified and amended said plans shall be filed with the Commissioner of Health before the works are constructed, and provided the works are to be erected as temporary works which may be ultimately abandoned in preference to some more remote and permanent site."

and under the additional conditions and stipulations in part as follows:

"If at any time the sewer system or the sewage disposal works or any part thereof shall have become a nuisance or menace or prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may require, suggest or approve.

"No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

"Complete plans and profiles of the sewer system as built shall be forthwith filed in the office of the Commissioner of Health, and thereafter, at the close of each season's work satisfactory plans of the sewers built during the year shall be filed in said Commissioner's office, together with any other information in connection therewith as may be desired, in order that the Department may be always informed of the full extent of the system and the use thereof.

No sewage shall be discharged from the sewer system or disposal plant into the river, except possibly during a short period of extreme freshet. Reports of the operation of the disposal works and system shall be kept on blank forms satisfactory to the Commissioner of Health and copies thereof shall be filed in the office of the State Department of Health. The permit concludes as follows:

"It is possible for the borough during the early years of the existence of the sewer system and disposal works, to dispose of all of the sewage at the plant without creating a nuisance but it is a good judgment to forecast the time when the site for the plant will have been outgrown and some other permanent location for treatment works, remote from all habitation, must be adopted. It would be better were the borough to thoroughly consider this subject at the outset and erect works at the permanent locality. The municipality has a borrowing capacity sufficient to defray this expense, provided a majority of the citizens want a system of sewerage and sewage disposal works."

The plans for the disposal plant as finally adopted and to be built, call for the location of the works at the site previously selected and discussed in the permit of August twenty-fifth, nineteen hundred and eight, namely, a strip of land owned by the heirs of R. H. Stewart. This strip of land is about fifty feet in width and stretches along the bank of the Allegheny river about four hundred feet on both sides of the mouth of Pillow's Run between the river and the tracks of the Conemaugh Division of the Pennsylvania Railroad in the extreme southwestern and down stream end of the borough territory. The disposal plant is to be located on the western end of this area. The ten inch outfall sewer from the town is to extend southward from the Pittsburg and Freeport highway in an alley, a ten inch wrought iron pipe being laid under the railroad tracks. The wrought iron pipe will be continued seventy feet up stream in made ground to the upper end of the disposal works.

The plans submitted provide for the installation of septic tanks, a dosing chamber and sand filters, designed to treat an average daily flow of sewage estimated at three thousand, two hundred gallons, the average daily water consumption of that portion of the borough from which it is proposed to collect the sewage.

Through the ten inch outfall sewer the sewage will enter a small concrete inlet chamber, whence it will enter two similar concrete septic tanks by means of two six inch pipes. These will be flush with the bottom of the inlet chamber and will have down turned, submerged ends in the septic tanks. The threads of these elbow joints are to be kept lubricated so that the vertical lengths of pipe may be revolved around the axis of the horizontal lengths in order to shut off the flow of sewage into either one of the tanks when it is desired to clean it. The sewage will leave the septic tanks by means of two submerged outlets similar to the inlets and at the opposite ends. Each septic tank will be twelve feet long, four feet wide and have an average depth of seven feet to the flow line so that the tanks will have a combined capacity of about five thousand gallons. The concrete floors will slope down toward the inlet ends.

The septic effluent will be discharged into a concrete dosing chamber adjacent to the outlet ends of the two tanks. The dosing chamber is to be twelve feet six inches by nine feet three inches and an automatic five inch siphon will draw from it a depth of three feet of sewage. Thus the dosing tank will have a capacity of twenty-six hundred gallons, sufficient to hold twenty hours flow of sewage on the average. The inlet chamber septic tanks and dosing chamber are all to have oak plank covers.

There are to be two sand filters, each having a sand area of forty-six feet by fifteen feet. These filters, side by side, are to extend down stream from the dosing tank and septic tanks and perpendicular to the direction of flow in the latter. They are to have concrete outside walls and a longitudinal, concrete dividing wall. A six inch discharge pipe from the dosing siphon is to branch into two six inch galvanized iron pipes, each leading to one of the filters where it will discharge into a wooden distributing trough extending longitudinally along the centre of the filter on the surface of the sand and having openings in its sides to provide for a uniform distribution of sewage. An overflow pipe in the dosing chamber will discharge the sewage into this distributing system should the siphon fail to act. The discharge of the accumulated sewage from the dosing chamber onto both filters about once in twenty hours will flood them to a depth of three inches. It is intended to dose the filters simultaneously except when one of them is being cleaned. The surface area of both filters being thirteen hundred and eighty square feet, will provide for a filtration of the sewage at the rate of one hundred thousand gallons per day. The filtering medium is to be coarse sand having an average depth of four feet and a minimum depth of three feet. The floors of the filters are to be paved with brick laid on their sides on the original clay bottom and are to slope toward central, longitudinal gutters, one in each filter. The gutters will slope toward the down stream ends of the filters and in them will be laid six inch sewer pipe with loose joints over which will be a depth of several inches of broken stone. These underdrains will

be vented at the upper ends by means of vertical pipes with cemented joints extending above the filter surface and the two underdrains will discharge through a single six inch sewer pipe at the top of the river bank.

When one of the septic tanks require cleaning, it is purposed to pump the liquid from it on to one of the filter beds by means of a diaphragm pump and then remove the sludge from it by means of buckets. The sludge will be deposited in a convenient excavation to be dug above ordinary high water and at about the greatest elevation obtainable on the property, which excavation is then to be refilled.

The disposal plant is to be constructed for the most part above the natural surface elevation, although all the foundations are to be below this elevation. The outside longitudinal filter walls are to be re-inforced and buttressed, the one furthest from the river on the inside and the one nearest the river on the outside. An embankment with an outside slope of one on one and one-half is to be constructed around the entire plant.

The invert elevation of the inlet is to be seven hundred and forty-seven feet and the elevation of the lower ends of the filter underdrains is to be about seven hundred and thirty eight feet. The average annual spring freshet elevation at Cheswick is reported to be seven hundred and forty feet which will interfere with the purification of the sewage during a short period each year. The lowest parts of the filter walls and the surrounding embankment are to rise to an elevation of seven hundred and forty-six feet, one foot above the elevation of the flood of nineteen hundred and seven.

The septic tanks have a capacity sufficient to allow for a considerable increase in the amount of sewage to be treated and the dosing tank also could be used to handle a considerably larger quantity of sewage by providing for discharge alternately on the filter units proposed to be built at once and on additional filters which it may be found desirable to build in order to increase the capacity of the plant. Such additional filters could probably be constructed, extending up stream from the dosing tanks as those now proposed extend down stream. It would be well to make arrangements so that the dosing tanks may be discharged by causing the siphon to act when the tank is only half full at times when one of the filters is being cleaned in order that too large a dose may not be delivered upon the other filter at one time.

It has been determined that the interests of the public health will be subserved by approving the plans herein considered. If this plant is constructed and operated properly and according to the conditions of the permit already issued to the borough, it should yield an effluent the discharge of which into the Allegheny river should not be prejudicial to the interests of the public health.

Harrisburg, Pa., October 20, 1908.

CHESWICK, ALLEGHENY COUNTY.

This application was made by the borough of Cheswick, Allegheny county, and is for permission to install a new system of sewers and to discharge the sewage therefrom after treatment into the Allegheny river within the limits of the borough.

It appears that the borough of Cheswick is located on the north bank of the Allegheny river about fifteen miles north of the city of Pittsburg. It is attractively situated and is devoted to resident purposes. Most of the householders are engaged in business in Pittsburg and travel back and forth on the railroad daily. The Conemaugh Division of the Pennsylvania Railroad follows along the bank of the river where formerly was located the Pennsylvania State canal. It is elevated above the highest freshet flow known by living man. From this point back a distance of about one-third of a mile the surface of the ground is comparatively flat. At the foot of the hillside is the main thoroughfare known as the Pittsburg and Freeport State road. Northerly from this highway the land ascends rapidly on grades which reach at points fourteen per cent., terminating at the summit of the plat over two hundred feet above the river. This is in the northern part of Cheswick. The incorporated territory is rectangular.

The western half of the borough consists of several comparatively large tracts of land upon which the houses are few and widely scattered, except on the narrow strip occupied by the Elias Block and Company's distillery and its appurtenant dwelling adjacent thereto along the river bank below the railroad. Here also along Pillow Run and on the Freeport road is located the plant of the Pittsburg Tool and Drop Forge Company, where are employed possibly fifty hands.

The eastern half of the borough consists of three lot plans, two of which are being gradually built up and on the third one, recently opened, but one building has been erected. This part of Cheswick is supplied with water by a private water company known as the Cheswick Water Company, which owns a drilled well on the top of the hill. Nearly all the houses in this district, probably thirty-two, are fitted with bath rooms and inside water closets. These dwellings and others contemplated for the neighborhood are of modern type and require the latest sanitary facilities for the comfort of the owners thereof. The character of the ground is such that except in a few locations on the flat underlaid by beds of alluvial gravel, successful house drainage by means of cesspools is practically impossible. Most of the hilltop and slope property is underlaid by several veins of clay practically impervious to water, from which flow numerous springs. This fact is said to have given

rise to the name of the township from which Cheswick borough was recently incorporated, namely, Springdale township. Cheswick borough is bounded on the north by said Springdale township, on the east by Springdale borough, recently incorporated out of said township, and on the west by Harmer township. The population of the borough is less than three hundred at this time. Both to the east and west in Springdale borough and in Harmer township the contiguous territory is rural and is under a high class of cultivation. Truck gardening is an extensive industry and it is quite extensively carried on within the limits of Cheswick borough. At these farm houses and elsewhere the said spring affords a copious supply of drinking water to the individual property owners.

The present method of sewage disposal of most of the houses is into cesspools or privy vaults. Those located on the flats are purposely made of the percolating type and have given reasonable satisfaction for a short period, from two to seven years, when they become clogged up. There are no springs on the flats. There is at least one well in this district and on the slopes in the eastern district, where are the water pipes, there remains one spring in use. The reason for abandonment of the numerous springs formerly used for drinking water was the overflowing of the cesspools on the hillsides and the danger of underground contamination of the sources of water supply.

During the last two years there has been an increasing amount of trouble caused by the overflowing of cesspools and the consequent nuisance. The petitioners wish to be relieved of this condition and hence the borough has designed a system of sewers for the eastern portion of the town.

In the western district sewerage is not contemplated. The occupied estates along the river may have individual sewer pipes to the stream for wash water and waste liquids. It is known, however, that the principal disposal of excrement is into privy vaults.

In the eastern district at the foot of Allegheny avenue there is a private sewer whose outlet is into the river. It is fifteen inches in diameter and begins at the Pittsburg-Freeport road. It is reported to be owned by Caroline Jacoby and others residing along Allegheny avenue. There are eight connections.

There is a private sewer from the Penwick distillery to the river and there are also privies on the bank of the river on this property. On the distillery property or adjacent thereto there are also eight tenements, seven of which have bath, closet and kitchen connections, with two six inch sewers discharging into the river.

The Pittsburg Tool and Drop Forge Company have a sewer pipe from a closet in the company's office to Pillow Run.

George A. Koehler has a private sewer six inches in diameter from his residence to the river.

The local authorities propose to take up the present fifteen inch private sewer in Allegheny avenue from the railroad northerly and relay it at a lower elevation and make it the trunk sewer of the sewer system for the eastern district. A lateral is provided in every street now laid out with facilities for extensions in the other districts which remain inplatted at the present time. If negotiations cannot be closed with Caroline Jacoby and others for the taking over by the borough of the private sewer, then the petitioners purpose to lay an independent main in Allegheny avenue.

The outlet of the pipe is now on the river bank above the ordinary stage of river water.

Two miles below Cheswick on the opposite side of the Allegheny river is the borough of Oakmont and adjacent thereto is Verona borough, both of which are supplied with water by the Suburban Water Supply Company. This company's water works intake is at a point in the river near the easterly borough line of Oakmont. Some complaint has been made by the citizens of the district of the quality of the water and the Suburban Water Company has been requested by the Commissioner of Health to prepare plans for a more efficient purification of the river water than that accomplished by the present intake cribs located in the bed of the stream. The two boroughs of the district have also been required to prepare plans for some other method of sewage disposal than into the Allegheny river, because of the proximity of their present sewer outlets to the water supply intakes of the city of Pittsburg and district.

Below Cheswick, on the north bank of the river, at the hamlet of Montrose in O'Hara township, is the pumping station and intake of the Allegheny city water works system. Seven miles above Cheswick on the same side of the river is the borough of Tarentum. The Commissioner of Health has issued a decree to the authorities of Tarentum and also to the borough of Brackenridge, immediately above, and to the village of Natrona in Harrison township to prepare plans for some other method of disposal of sewage than into the river. In all of these places the problem is rendered quite difficult because of the topography and the fact that many of the sewers receive storm water whose elmination must be effected before the erection and operation of purification works can be conducted on any other than a prohibitive basis from the standpoint of cost. Nevertheless, it is the purpose of the State to bring about at as early a date as practicable the discontinuance of all sewage disposal into the Allegheny river or its tributaries, and consistent with this policy, all municipal authorities should conform their sewer plans.

The petitioners for Cheswick borough contemplate using the proposed sewer for house sewage only.

The assessed valuation of the borough is reported to be five hundred and twenty thousand dollars which gives a borrowing capacity of about thirty-six thousand dollars. The present bonded indebtedness is five thousand dollars. The cost of the proposed sewers is estimated at five thousand dollars, so it is seen that the borough will have, on this basis, the ability to borrow twenty-five thousand dollars after the proposed sewers shall have been built.

Undoubtedly when the times demand sewerage for all of the municipal territory, some other point for a sewage disposal plant will be secured than that at the outlet of the Allegheny avenue sewer proposed. The natural slope of the ground is more towards the mouth of Pillow Run for the western district and towards the mouth of Tawney Hill Run, or Shoop Run, which is to the east in Springdale borough.

If the borough should make a comprehensive study of this subject and be able to select a definite site for the ultimate disposal works where all of the sewage of the borough should be delivered and treated, and find that the cost of conducting the sewage to this point at this time would be prohibitive, then the erection of a temporary sewage purification plant at the foot of Allegheny avenue would appeal more strongly to the citizens and taxpayers of the borough as a practical expedient and the economies of the temporary plant would be thus proven.

In any event, because of the close proximity of Cheswick to the intake of the Allegheny city water works, and the great menace to public health which would be constituted by the discharge of the public sewer into the Allegheny river in Cheswick, it does not follow that local conditions prescribe or admitting that the present method of sewage disposal by cesspool and privy is a menace and nuisance of a local character, that there is not some other remedy than the proposed sewer for this condition and so it would appear that the interests of the public health would demand that the borough of Cheswick should prepare plans for the treatment of the sewage from the proposed sewer outlet, if it persists in building the sewer, and submit the same to the Commissioner of Health for approval.

It has been determined that the interests of the public health would not be subserved by granting a permit for the construction of the proposed sewers, except under certain conditions, and a permit is hereby and herein issued therefor under the following conditions and stipulations:

FIRST: That all roof and storm water be excluded from the sewers and that before the sewers are built and used plans for at least a temporary sewage purification plant capable of receiving and purifying the sewage of the eastern district as now occupied and developed, be prepared and submitted to the Commissioner of Health for approval and that after said plans shall have been modified, amended or approved the borough shall erect the works.

That the owners of all existing sewers hereinbefore mentioned be notified that they must cease to discharge sewage into the waters of the State and that in this connection it would be advisable to have co-operation between the borough and the owners of all private sewers to the end that a good sewerage plan and sewage disposal works shall be adopted.

Harrisburg, Pa., June 23, 1908.

CHESWICK, ALLEGHENY COUNTY.

This application was made by the borough of Cheswick, Allegheny county, and is for permission to install a new system of sewers and to discharge the sewage therefrom, after treatment into the Allegheny river.

It appears that on June twenty-third, nineteen hundred and eight, the Commissioner of Health issued a permit to the borough of Cheswick, Allegheny county, to install a new sewer system and to discharge sewage therefrom, after treatment, into the Allegheny river, within the limits of the borough, under the following conditions and stipulations:

"FIRST: That all roof and storm water be excluded from the sewers and that before the sewers are built and used plans for at least a temporary sewage purification plant capable of receiving and purifying the sewage of the eastern district as now occupied and developed, be prepared and submitted to the Commissioner of Health for approval and that after said plans shall have been modified, amended or approved, the borough shall erect the works.

"That the owners of all existing sewers hereinbefore mentioned be notified that they must cease to discharge sewage into the waters of the State, and that in this connection it would be advisable to have co-operation between the borough and the owners of all private sewers to the end that a good sewerage plan and sewage disposal works shall be adopted."

This permit has not been recorded and further, no part of the works provided for in the permit has been constructed.

As a site for a sewage purification plant, the borough has resolved upon that part of the R. H. Stewart heirs' property lying between the right of way of the Conemaugh Division of the Pennsylvania Railroad and the Allegheny river, and extending along the river bank two hundred feet on either side of Pillow's Run, which drains about two-thirds of the area of the borough. This site comprises about one-half of an acre in the extreme southwestern corner of Cheswick. Plans for the disposal plant for the purification of the borough's sewage were filed in the office of the Commissioner of Health for modification and approval on August fourth.

It is represented by the borough that the project to provide for the installation of sewers for the entire built up portion of the borough and the purification plant as designed, would, if brought before the townspeople, which would be necessary to procure the requisite funds, probably be defeated through the influence of large property owners and others in that part of the borough not so closely built up and not so urgently in need of sewerage. Whereas, if the sewers alone are installed at the present time, the valuation of the properties benefitted will be proportionately increased, so that these properties will bear more nearly their just share of the expense for the purification plant.

Moreover, at Tarentum and the surrounding towns above and at Oakmont and Verona, which are below Cheswick, the sewage from much larger communities than the latter town is discharged into the Allegheny river, although steps are being taken towards the discontinuance of these discharges.

The borough, through its attorney, asks for permission to discharge crude sewage temporarily into the Allegheny river at the foot of Allegheny avenue within the borough through an existing fifteen inch sewer owned by Caroline Jacoby and others. When the interests of the public health demand it, in the opinion of the Commissioner of Health, the borough will build the sewage purification plant proposed as modified or amended by the Commissioner of Health.

The sewage from the built up section in the eastern part of the borough is to be conveyed by a ten inch pipe line about two thousand feet long down stream to the disposal plant. The line of this sewer is to be either through private property immediately north of the right of way of the railroad or several hundred feet further north in the Pittsburg and Freeport highway.

At the disposal plant the pipe will be carried under the railroad tracks. In either case, part of the sewage from the lower ground in the immediate vicinity of the source of Pillow Run may be carried westward in Spruce street and conducted to the same disposal site.

The design for the disposal plant contemplates the treatment of the sewage in a septic tank and intermittent sand filters. Through a ten inch down-turned elbow the sewage will enter, at one side, a circular, brick, septic tank eleven feet in diameter and seven feet deep to the flow line. At the opposite side of the tank it will pass out through a six inch down turned elbow to a syphon dosing chamber. Two wooden baffle boards extending the full depth of the sewage will be so placed in the tank as to cause the sewage to follow a tortuous course of about twenty-four feet through a channel averaging about three feet in width. The concrete bottom of the tank will slope to the centre, from which point there will be a six inch cast iron sludge drain provided with a valve. Final disposal of the sludge has not been provided for. The estimated quantity of sewage to be handled at the present time being thirty-two hundred gallons, the septic tank having a capacity of about five thousand gallons would allow for an amply long period of flow and for a considerable increase in the daily quantity of sewage. In order to obviate a considerable increase in the quantity of sewage by ground water, it will be necessary to have the sewers in the marshy ground and the long outfall sewer laid with carefully formed cement joints under skilled supervision and inspection.

The siphon chamber will be of brick with concrete bottom, circular in shape, nine feet in diameter and two feet three inches deep to the flow line and will be discharged by an automatic six inch syphon to within three inches of the bottom.

The sewage will reach the filter beds from the dosing tank through an eight inch cast or wrought iron pipe. There will be three filter beds arranged side by side and having brick outside and dividing walls and a brick or concrete bottom. Each filter will be twelve by fourteen feet in plan. The filtering material will consist of sand to a depth of four feet below which there will be three inches of gravel over a six inch underdrain. Such a drain will be laid in the centre of each filter in the floor, which will slope slightly towards the drain. The three drains will discharge on the river bank. The eight inch pipe from the syphon chamber will be connected at the centre of the filtering area to a six inch perforated pipe, which will extend centrally across the three filters supported three inches above the surface of the sand. No arrangement has been made for readily distributing the sewage on one or two of the filters alone during the cleaning of the other. It is understood that a by-pass is to be constructed around the septic tank whereby the sewage may be conducted on to the filters while the septic tank is being cleaned, when this is necessary.

The three filters having a combined area of five hundred and four square feet will provide for the filtration of the thirty-two hundred gallons of sewage estimated at the rate of about two hundred and seventy-five thousand gallons per acre per day. The location of the filters is such that additional beds may be added from time to time as they become necessary.

It is reported that the normal elevation of the surface of the river opposite Cheswick is between seven hundred and twenty and seven hundred and twenty-five feet, and that the average annual spring freshet height is seven hundred and forty feet, one foot below the bottom of the sand in the filters, while unusual freshets, such as are said to have occurred twice in the past five years, may reach an elevation of seven hundred and forty-five feet, within two feet of the top of the filter walls and level with the surface of the filters. Thus during such freshets which may remain at their maximum height for perhaps forty-eight hours it will be impossible for the effluent from the filter to flow away by gravity.

The site selected for the disposal works is about the lowest point in the borough. There are a few houses in the neighborhood, one within about two hundred feet of the site. It should be borne in mind that there is more or less odor in connection with any sewage disposal works, and that it is desirable to locate the plant as far away from the dwellings as possible and feasible. Where the plant is located near buildings, greater care and high class maintenance is necessary to obviate a nuisance. It would be better to establish a pumping station at this point and to raise the sewage to some remote point.

Definite arrangements should be made for some other disposal of the sludge from the septic tank than into the river. Plans should be prepared for a suitable sludge drying bed to be constructed so that the sludge may be allowed to run on to it by gravity, but so protected that the highest floods may not reach it or if necessary the plans should provide for a sludge bed to which the sludge may be pumped.

The septic tank should be divided into two parts, so that while ordinarily both parts would be used, when it should become necessary to clean the tank, either half could be used separately while the other half is being cleaned.

The rate of filtration is too high. The syphon chamber will discharge about three times in twenty-four hours, a volume sufficient to cover the three filters to a depth of three inches. This will give a rate of filtration estimated at two hundred and seventy-five thousand gallons per acre daily. The rate should be reduced to about one hundred thousand gallons daily.

The petitioners do not show good reason why more sewage should be put into the river immediately above the municipal water works intakes below. The borough does not show reason why the stipulations hereinbefore quoted of the permit of June twenty-third, nineteen hundred and eight should not obtain. Even a temporary permission to put more sewage into the river might result in loss of life in the municipalities below whose people are reliant on the river water for their domestic supply.

It is evident that the borough has means at its disposal to defray the cost of the preparation of complete detail plans of a comprehensive sewerage system and permanent sewage disposal works. Such plans have not been submitted. The plan now before the Department, if modified as herein proposed, might answer for temporary works, and possibly, a permanent plant, if proximity to dwellings be eliminated from consideration.

The effort in the design has been to secure sewerage facilities at the minimum cost. While the site for treatment works may be ultimately used, yet the borough purposes to temporarily utilize an existing sewer. There is no knowing how much sewage may be added to that now being emptied through the existing pipe into the Allegheny river, and it is clearly in the interests of the public health that all of the sewage should be treated. Either an adequate plant must be installed or each individual estate must care for its own sewage independently of others. The drinking water of municipalities below must not be contaminated.

It has been determined that a permit be denied the borough, and the same is hereby and herein denied to the borough of Cheswick to temporarily use the Caroline Jacoby sewer outlet or any other outlet into the Allegheny river or tributary thereof for the discharge of crude sewage.

It has also been determined that provided the plans for sewage disposal works shall be modified and amended as hereinbefore suggested, and as so modified and amended said plans shall be filed with the Commissioner of Health before the works are constructed, and provided the works are to be erected as temporary works which may be ultimately abandoned in preference to some more remote and permanent site, then approval of the entire system shall be given, and approval is hereby and herein given and a permit issued under these conditions and under the following conditions and stipulations:

FIRST: It is expressly stipulated that the sewerage permit of June twenty-third, nineteen hundred and eight, shall have been first recorded in the office of the Recorder of Deeds for Allegheny county.

SECOND: If at any time the sewer system or the sewage disposal works or any part thereof shall have become a nuisance or menace or prejudicial to public health, then such remedial measures shall be adopted as the Commissioner of Health may require, suggest or approve.

THIRD: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

FOURTH: Complete plans and profiles of the sewer system as built shall be forthwith filed in the office of the Commissioner of Health, and thereafter, at the close of each season's work, satisfactory plans of the sewers built during the year shall be filed in said Commissioner's office, together with any other information in connection therewith as may be desired, in order that the Department may be always informed of the full extent of the system and the use thereof.

FIFTH: No sewage shall be discharged from the sewer system or disposal plant into the river, except possibly during a short period of extreme freshet. Reports of the operation of the disposal works and system shall be kept on blank forms satisfactory to the Commissioner of Health and copies thereof shall be filed in the office of the State Department of Health.

It is possible for the borough during the early years of the existence of the sewer system and disposal works, to dispose of all of the sewage at the plant without creating a nuisance but it is good judgment to forecast the time when the site for the

plant will have been out-grown and some other permanent location for treatment works, remote from all habitation, must be adopted. It would be better were the borough to thoroughly consider this subject at the outset and erect works at the permanent locality. The municipality has a borrowing capacity sufficient to defray this expense, provided a majority of the citizens want a system of sewerage and sewage disposal works.

Harrisburg, Pa., August 25, 1908.

CLINTONVILLE, VENANGO COUNTY.

This application was made by the borough of Clintonville, Venango county, Pennsylvania, and is for permission to establish a system of sewers and sewage disposal works.

It appears that Clintonville borough has a population of three hundred and twenty-five at the present time. In nineteen hundred it was two hundred and sixty-two. Thirty years ago there were more people living in the community than at any time since.

The site of the town is in Clinton township, in the south central part of Venango county. It is an inland town, travel to and from it being over public highways. Dwellings are located along two main thoroughfares namely, Mercer street and Main street, at the intersection and in the vicinity. This part is on a hill from which the ground slopes in all directions. The drainage is entirely into Scrubgrass Creek, a branch which flows northerly through the eastern part of the borough. This branch is called Surrena Run. The valley of this stream is about one hundred feet lower than the main part of the village. There is a water course which begins near the intersection of the two main streets and flows northerly to the Surrena Run.

There is another stream known as Dry Run, which rises near Main street in the southern part of the borough and flows westerly along the southern boundary line to Scrubgrass Creek which it enters near Mercer street in the borough.

Scrubgrass Creek rises two or three miles south of Clintonville and flowing northerly passes along or near the western boundary of the borough and discharges into the Allegheny river, about four and one-half miles north of Clintonville. The mouth of the creek is about fourteen miles below the city of Franklin and ten miles above Emlenton borough.

The country round about it is a rich oil field recently discovered and developed. Several oil wells have been recently drilled in Clintonville. It is expected that further drilling will develop quite a large increase in the production of oil. However, owing to the poor transportation facilities, it is not expected that the growth of the community will be materially increased, except so far as it may be desirable for people employed in the immediate vicinity in operating oil wells to reside in the village. The general practice in oil fields is for the pumpers and other people engaged in the operations to reside near or on the territory being operated. Therefore, some growth in Clintonville may be reasonably anticipated. At the present time there are no manufacturing plants of any description in the town. There is a bank and several stores which handle a general line of commodities.

The inhabitants of this borough obtain their water supply for domestic and other purposes from dug and drilled wells. The dug wells range in depth from twenty to thirty and sometimes forty feet, while some of the drilled wells have a depth of seventy-five to eighty feet. Underneath the soil stratum is a limestone rock which produces a voluminous amount of water which is generally the source of supply for the dug wells, but the drilled wells which are considerably deeper to through this limestone rock into a gravel formation from which the water is taken. The quality of the water from both sources seems to be excellent.

The town is absolutely without any fire protection on account of not having a public water system. But the municipal authorities and the citizens are contemplating the installation of a public water system in the near future which may be carried out next year and if so it is proposed to obtain the water supply from artesian wells and to locate a water tank on the highest point of land in the town, which is a short distance south of Mercer street and east of Main street, and to locate the tank about one hundred feet higher than the general elevation of the town, so as to furnish sufficient pressure to deliver the water for domestic purposes and to make a somewhat efficient fire protection system.

At present there are no sewers in the borough. The drainage from the kitchen is being thrown onto the surface of the ground or goes into drains that discharge in the streets or highways adjacent to the different buildings. Fecal matters are disposed of in the privies and it is reported that one cesspool is in use in the borough. Therefore it may be expected, if this practice is continued, that the water supply taken from the dug wells will sooner or later become polluted and the citizens desire, through the agency of the municipal officials, to correct these insanitary conditions by the installation of a system of sewers. It is proposed, as represented on the blueprint accompanying the application, to construct a sewer eight inches in diameter along Main street for a distance of about three hundred and seventy feet north of Mercer street to an alley which passes easterly from Main street; thence the sewer is to be laid along this alley and across private property for the distance of about

This main sewer from Main street to the small run is to be fifteen inches in diameter. The borough also purposes to extend the fifteen inch sewer northerly from this intersection along Main street for a distance of three hundred and fifty feet and then continue it by an eight inch sewer still northerly along Main street for a distance of six hundred feet. It is proposed also to build an eight inch sewer along an alley east of and parallel to Main street and connect it from the north and from the south into the fifteen inch sewer leading from Main street to the small run before mentioned. Also it is designed to construct an eight inch sewer along an alley north of Mercer street and connect it by means of an eight inch pipe to be laid northerly to the fifteen inch sewer.

Plans for a sewer on Main street south of Mercer street, along Mercer west of Main street have not been submitted. This territory drains to Dry Run. It is understood that if the borough should ever build a sewer in this district the outlet would be planned to terminate in Dry Run. The local authorities are reported to hold to the view that the necessity of an extensive sewer system is very remote and probably will never be required, unless the town should meet with an unexpected and surprising growth. It is proposed by the borough to construct the sewers with manholes and necessary appurtenances, and to use the sewers to take sewage and storm water. The minimum grade of the sewers is to be one per cent.

The borough has secured subscriptions for the proposed sewers from several citizens owning property along the line of the sewers. The subscriptions have been given with the understanding and on the condition that the sewers shall be built on or before January first, nineteen hundred and nine. Therefore, the borough council is especially desirous that the Commissioner of Health should act on the application and grant a permit at the earliest possible date.

The borough's assessed valuation is in the neighborhood of one hundred thousand dollars, so it is reported, and its bonded indebtedness five hundred dollars. If these figures are correct, then it is apparent that the town is unable to build a system of sewers and sewage disposal works and defray the cost of such construction.

It does not appear that Scrubgrass Creek between the borough and the Allegheny river is used as a source of drinking water by man or beast. With the exception of a slaughter house and stock yard, and pigpen connected with the same, located on Dry Run in the borough, from which sewage is discharged into the stream, there does not appear that there is any source of pollution on the entire line of the creek. However, the whole length of this stream has not been traversed by an officer of this Department and it may be that there are other sources of pollution.

It is essential where a water course is now pure that it should be kept so. It is inexpedient for the State to wage a campaign against stream pollution in one section of the State and to permit the pollution of the waters of some other part of the State. The law of nineteen hundred and five, enacted to preserve the purity of the waters of the State for the protection of the public health, does not make it legal for an individual to discharge sewage into any stream. A municipal corporation may, when the Governor, Attorney General and Commissioner of Health are of a unanimous opinion that the interests of the public health will be subserved, be given a permit to discharge sewage into a stream.

The local authorities of Clintonville do not show that it is necessary in the interests of the public health to pollute the waters of the State by the borough sewage. It is no good reason, because a few property owners wish to get sewage away from their dwellings, why this sewage should be drained into a natural water course to the possible danger to other individuals.

Furthermore, the borough of Clintonville is without public water works system and is likely to remain so. Running water is essential to the operation of the sewers. From all the evidence at hand, the case in question is one where the individual should take care of the sewage produced on his property, unless the borough is sufficiently strong financially to properly take care of the sewage of all of the estates in the borough.

It has been determined that the interests of the public health demand that a permit be granted to the borough of Clintonville to build a sewer system and a permit is hereby and herein granted therefor, under the following conditions and under these conditions only.

FIRST: That all storm water shall be excluded from the sewers since the introduction of storm water would interfere with the efficiency and economy in purifying the sewage.

SECOND: That before the sewers are built and used, plans for a sewage purification plant shall be prepared by the borough and submitted to the Commissioner of Health for approval and when the plans are approved, modified or amended the borough shall build works in conformity therewith and deliver the sewage from the said sewers to this plant and purify it there.

Harrisburg, Pa., October 15, 1908.

COALDALE, SCHUYLKILL COUNTY.

This application was made by the borough of Coaldale, Schuylkill county, and is for permission to install a sewerage system and to discharge the sewage therefrom into Panther Creek within the limits of the borough, in accordance with revised plans submitted in due form on December thirty-first, one thousand nine hundred

and seven. It appears that on June seventh, one thousand nine hundred and seven, the borough of Coaldale made an application for permission to install a sewerage system and that on August sixteenth, one thousand nine hundred and seven, the Commissioner of Health issued a decree in which were the following stipulations:

"That the proposed plans be ordered changed, the changes to include the reduction in sizes of the sewers, to such diameters as may be necessary for the removal of house drainage only, and that when so changed the plans shall be submitted to the Commissioner of Health for approval and no sewers shall be constructed and used until this be done.

"This permit to discharge sewage into the waters of Panther Creek shall cease on the first day of November, one thousand nine hundred and eight, but if the borough shall have complied with the other conditions of this permit, then the Commissioner of Health may extend the time in which sewage may be discharged into Panther Creek from said borough's sewerage system."

Coaldale is a coal mining settlement recently incorporated with a population of about thirty-seven hundred, located in the valley of Panther Creek, Schuylkill county, the eastern boundary of the borough being the line between Schuylkill county and Carbon county.

Panther Creek heads in Carbon county and flows in a southwesterly direction through a deep narrow valley between parallel mountain ranges, distant one and a half miles, traversing a distance of seven and a half miles and emptying into the Little Schuylkill river at Tamauqua. In consequence of the extensive coal operations and the small watershed of the valley, most of the dry weather flow of Panther Creek is acid mine drainage. Coaldale borough extends two miles along the creek and in width about one half mile on either side. It is situated about four miles above the Little Schuylkill river. Coaldale village proper, where the public buildings and most of the private dwellings are, comprises about fifty acres only. This tract is on the southerly side of the creek on the Pisgah mountain slope. The grades in the village are moderately steep, the highways are chiefly dirt roads, in consequence of which there is a marked erosion of street surfaces which makes desirable to some extent sub-surface removal of water.

The local authorities proposed to construct a combined sewer system in the village and submitted plans for approval. The area of the proposed district was about thirty acres and the length of streets therein about four and a half miles. The plan called for three and a half miles of sewers all of which were to drain to the main intercepting sewer at the base of the slope and paralleling Panther Creek. This sewer was to start up stream at the foot of Second street and terminate at Fifth street and empty into the Fifth street district outlet, fifty-four inches in diameter. The latter was to be the outfall from the entire village and to discharge the sewage into the creek below the culm dam in the vicinity of Fifth street.

When storms occurred the First street sewer district system (to comprise twenty-three hundred feet of sewers ranging in sizes from ten inches to eighteen inches in diameter), was to overflow and discharge into Panther Creek through an eighteen inch pipe; the Second street sewer district system (comprising forty-eight hundred feet of sewers ranging from ten to thirty inches in diameter), was to overflow and to discharge into the creek through a thirty inch conduit. Ordinarily the First street system would, as planned, have emptied its flow into the Second street sewer at Water street and the flow of both was to have been conveyed by an intercepting sewer seventeen hundred feet long, twelve inches to fifteen inches in diameter, terminating in the fifty-four inch outfall sewer proposed at Fifth street.

The Fifth street system was to have comprised eighty-four hundred feet of sewers with diameters ranging from ten inches to thirty inches.

The plan contemplated the removal underground of all street drainage.

It was ascertained that in the Fifth street sewer district there existed a natural water course, dry most of the time, which by widening, straightening and deepening could be permanently used as the natural course through which street gutter water would flow and that such an improvement would be cheaper and better than the plan then proposed for the district.

The mine drainage is now exempted by law from these pollutions which must cease to be discharged into the waters of the State, it is by no means sure that these pollutions may not some time be subject to regulation. Although the acidity of Panther Creek no doubt renders its waters a disinfectant to a considerable degree, so that under ordinary conditions and during dry weather particularly, the sewage discharged therein at Lansford, a borough immediately above Coaldale, is deodorized and partially sterilized. Yet it is not known that these effects are always assured throughout the year. If it be true that little or no harm can come from the discharge into Panther Creek of sewage from Coaldale during dry weather, and hence whatever danger to down stream population there may be must arise during storms, then it is apparent that sewage disposal works to treat the dry weather flow and to by-pass the sewage during storms into the creek, would entirely miss the point. On this score, if the sewage is to be regulated and treated, it should be during storms, and hence house drainage should be collected in pipes separate from those carrying street drainage.

Because it is possible for sewage from Coaldale together with deposits along Panther Creek to be brought down the Schuylkill during a freshet to the city of Philadelphia in twenty-four hours or less, where said city draws upon said river for part of its source of supply, Coaldale sewage may be a menace to public health

if drained untreated into Panther Creek or its tributaries. Therefore, it was decided that the proposed sewers were much too large to remove house sewage only, and the sanitary sewer system being requisite plans were returned for revision.

The modified plans now before the Department for approval comprise sewers in the streets as formerly, laid out with diameters six inches on grades apparently four per cent. or greater, with eight inch mains for the districts hereinabove described and a ten inch intercepter and outfall sewer along the foot of the slope into the creek below the culm bank. The design seems to have been carefully planned, inspection manholes are provided at street intersections, modern flush tanks are to be installed at summit elevations, the grades are such as to insure self-cleansing velocities and the sizes are ample to receive a much larger volume of flow than should ever be delivered to the sewers from the district they are designed to serve. Care in the construction of the sewers to make their joints tight will insure the town, by the carrying out of this plan, an efficient sewer system and an economical one.

It has been determined that the interests of the public health will be subserved by approving the modified plans and the same are hereby and herein approved, under the following conditions and stipulations:

FIRST: That all street and surface water shall be excluded from the sewerage system and at the close of each season's work plans of the sewers built during the year under the system hereby approved, shall be prepared and filed with the Commissioner of Health, together with any other information in connection therewith which may be required.

SECOND: That no pathological material from any laboratory shall be discharged into the system. The proper authorities shall cause these wastes to be destroyed on the premises.

THIRD: That if at any time the sewerage system or any part thereof, in the opinion of the Commissioner of Health, be a nuisance or menace to public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may advise or approve.

FOURTH: This permit to discharge sewage into the waters of the State shall cease on the first day of May, nineteen hundred and eleven. If the borough shall have complied with the conditions of this permit, then on said date the Commissioner of Health may extend the time in which sewage may be discharged from said sewer system into the waters of the State.

FIFTH: In anticipation of the ultimate treatment of the borough sewage, the Commissioner of Health may institute tests in the borough to determine the most economical and efficient means of disposal of said sewage. If these tests be undertaken the borough officials shall assist the Department of Health in this undertaking by temporarily providing any land for the purpose.

Harrisburg, Pa., April 24, 1908.

COLUMBIA, LANCASTER COUNTY.

This application was made by the borough of Columbia, Lancaster county, and is for permission to build a system of sewers and to discharge the sewage therefrom untreated, into the Susquehanna river in conformity to plans submitted.

It appears that on March eighth, nineteen hundred and seven, the Commissioner of Health issued a permit to the borough of Columbia, Lancaster county, Pennsylvania, to build a system of sewers and to discharge the sewage thereform, untreated, into the Susquehanna river, under the following conditions and stipulations:

"FIRST: That the plans now proposed by the borough shall be so modified that all roof and surface water shall be excluded from the sewers, and that all sewage shall be excluded from the drains.

"SECOND: That the sewer plans modified as herein required, shall provide for the ultimate conveyance of all the sewage of the borough to some common point from whence the sewage can be advantageously delivered to sewage disposal works when the time shall arrive for the discontinuance of the discharge into the river of the borough's sewage; the sewer plans as so modified shall be submitted to the Commissioner of Health for his approval, who may modify or amend the same and fix rules and regulations with respect to the operation and maintenance of said system.

"This permit before being operative shall be recorded in the office of the Recorder of Deeds for the county wherein the outlet for the said sewer system is located."

However, this permit was not recorded as required by law, but it was returned to the Commissioner of Health. On October twenty-fourth, nineteen hundred and seven, the borough engineer submitted a report on plans revised in accordance with the suggestions of the said permit, but the plans themselves were not submitted Further, on said October twenty-fourth, an application was made for a permit to construct that part of the sanitary sewer system in the densely built-up portion of the borough. On July twenty-first, nineteen hundred and eight, on request by the Department, the borough engineer submitted the revised sewer plans.

It appears that Columbia borough is a manufacturing railroad town of about thirteen thousand population, located on the east bank of the Susquehanna river in Lancaster county. Branches of the Pennsylvania railroad and the Philadelphia

and Reading systems pass through the town and materially add to its support. A combined railway and highway bridge spans the river and further adds to Columbia's advantages. The town has had an interesting history during the periods of river navigation and it is extremely probable that the future utilization of water power from the Susquehanna river and its canalization will materially add to the growth and importance of the borough. Therefore, in considering municipal improvements, it is clearly within the bounds of reason to contemplate these possibilities.

There are two hills in the borough, one being east of Shawnee Run and the other west of it. This stream flows down from the northeast and joins the river about the central part of the borough. It is in the valley of this stream that the Philadelphia and Reading Railway is built and the Pennsylvania Railroad and connecting branches follow along the river. The older section or business part of the town is on the rising ground north of the run.

The public highway nearest the river and paralleling it is named Front street. Other highways extending in about the same direction back to the borough limits are designated respectively Second to Sixteenth streets, inclusive. Streets at right angles to them and the river are alternately paralleled by alleys. The most important of these streets in West Columbia are, Walnut, Locust, Union and Mill streets, and in East Columbia, Manor street. The hills, back into which they extend, have elevations of about one hundred and fifty feet above Front street. Rain water comes down rapidly from the height, principally in the streets, whose surfaces are thus scoured, and would flood out the railroads on its way to Shawnee Run or the river were not storm drains provided at various places to conduct the torrents underground beneath the railroads to the streams.

There are about two thousand eight hundred houses in the town, possibly three hundred of them are provided with modern water closets and dispose of house sewage into cesspools, sometimes called sinks, dug to the underlying limestone rock through whose crevices the liquid may pass away to a greater or less degree. The greater majority of dwellings have the ordinary privy arrangement for the disposal of excrement, kitchen and laundry waste being disposed of in these instances chiefly into the street gutters, where it may ultimately find its way into the storm drain at the foot of the street. This method of slop water disposal is sometimes productive during hot weather of objectionable odors, so it is reported.

The street gutters on the hillsides are from two to four feet wide and from six inches to two feet deep. They furnish principal means of drainage for the built-up portions of the town.

Relative to water supply, a few springs at the foot of the hills in Shawnee Valley furnish drinking water for a large number of employes at the plants along the run. The springs are at the base of the hills upon which cesspools in the limestone rock abound. The use of these waters, coupled with the persistence of typhoid in the town since the installation of the public filter plant, is significant. The Pennsylvania Railroad has its own systems and several of the manufactories use stream water for industrial purposes.

The Commissioner of Health has requested the local Board of Health to make an examination of the springs and wells in the borough whose waters are used for drinking purposes and if said waters be found to be polluted, that same shall be abandoned by order of the local authorities.

The major part of the water is furnished by the Columbia Water Company, which takes its supply from the river at the foot of Walnut street just above the central part of the borough. The water is mechanically filtered and then pumped into the pipe systems of the town, overflowing into a four million gallon storage reservoir located in Lockhart's Hollow outside of the borough near the township line at a sufficient elevation to supply the town by gravity at night when pumping ceases. About every house in the borough is supplied with this water. It is reported that not over eight private wells are in use in the district.

The Pennsylvania Railroad Company supplies raw river water to its shops and locomotives. The pumping station and intake is at the foot of Bridge street, which is about eight hundred feet further up stream than the water company's intake. The water is forced into a reservoir. It is located nearby at the west yards of the company immediately back of the round house. Formerly there was another reservoir in the east yards about a mile distant, but this reservoir is not reported to be abandoned. The west yards are supplied with filtered public water for drinking purposes.

Lockhart's Hollow Run is a small open stream in the northern part of the borough and comes down from the hills in an open ditch to North Second street and from whence it passes through two thirty-six inch pipes extending under the railroad yards and old canal bed and eventually to the river near Bridge street above the town's water works intake. Some private sewage from a silk mill is discharged into the run at Second street, so it is reported.

The next water course receiving some sewage enters the river on the down stream side of the bridge about seven hundred and fifty feet above said water works intake. It is known as Heise's Run. It is an open ditch receiving storm water from the streets in the borough to a point about two hundred feet north of Fourth street. The remainder of its courses is walled up and covered over. Where it enters the river, it is four feet by ten feet in diameter. This course receives more or less kitchen drainage and sewage is discharged into the covered portion.

Next in order down stream are two surface drain pipes twenty-four inches and thirty inches in diameter each. They pass under the railroad tracks to the river at the foot of Walnut street. The sewage from the Pennsylvania Passenger station goes into the river through a separate pipe below Walnut street. The water works intake is at this point about two hundred and sixty feet out into the stream.

Next are two stone culverts, each three feet square, extending to the river from the foot of Locust street.

A three foot by four storm drain passes along the railroad to the river from the foot of Alley I. Some sewage goes into this drain from the Reading Passenger station.

Below Alley I. comes the sewer in Alley J. It begins at Fourth street and extends to the river, a distance of about sixteen hundred feet. It is a twenty-four inch pipe where it empties into the river. It carries off rain water and kitchen drainage and possibly sewage from six house connections.

Union Street drain begins at Fourth Street and is a thirty inch pipe passing under the Pennsylvania tracks to the railroad.

Next comes the Perry Street sewer, twenty-four inches in diameter. It extends from Front Street to the river and takes storm water only.

Next comes Shawnee Run. It first shows signs of polluton at the Hollinger Tannery in the borough, and below this several mills add to the pollution. About eight years ago a concern known as the East Columbia Land Company developed a tract of land on the hill in and without the borough south of Shawnee Run and laid out streets and house lots and erected some houses thereon and constructed a stone drain. From the end of this drain near Twelfth and Manor Streets, there is an open channel called Wolfe's Run which extends to the railroad at the foot of Plane Street. Across the railroad tracks it is a thirty-six inch pipe down to the river. Laundry water is discharged into this stream near the end of the stone culvert.

At or near the south boundary line of the borough is Strickler's Run.

Certain alleys and streets in the town are at present almost impassable during and after heavy rains. Deep gutters have been worn out by the scouring force of the rainfalls and street surfaces have been badly washed. These deep gutters are dangerous as well as inconvenient to the public. Moreover, it is desirable, from an economic, as well as a sanitary standpoint, to provide sewers for the removal of household wastes from dwellings provided with modern sanitary facilities. Furthermore the permanent paving of the streets in the business part of the town is contemplated and this renders imperative the closing up of the deep gutters. In fact, whatever permanent drainage improvements are called for in this district should be made prior to the paving improvement. The proposed plans are intended to obviate the existing nuisances and to afford facilities for the removal of surface water and sewage not only in the center of the borough but for the entire municipality in the end.

As now designed, the storm water drains and the house sewers are to be kept entirely distinct. Storm water is to be carried generally in the most direct line to the river and discharged through outlets at the foot of Walnut and Locust, Union and Perry Streets. These main lines will receive branches at intervals which will connect water at the low points in the cross streets, generally at the alleys. The outlets are designed of sufficient size to remove storm water from the entire system after all streets are paved. The storm drains proposed in the new plan are in general of the same size as those of the original plan; but in some cases the grade has been raised, which is permitted by the fact that they are not to receive house drainage. The large intercepting sewer on Front Street, originally planned, is also rendered unnecessary, which reduces the cost of the system.

The sewers for house sewage comprises a considerable percentage of eight inch pipe. The Front Street intercepting sewer will range in size from eight inches to twenty-four inches in diameter. The plan shows a temporary outlet at the foot of Perry Street. However, this intercepting sewer may continue along Front Street to the foot of Plane Street in the future where it will receive the sewage from most of the district south of Shawnee Run. When required, this stretch of intercepting sewer can be built as a continuation of that proposed for immediate construction with no change in the plans except the abandonment of the outlet at Perry Street from Front Street to the river.

No attempt has been made to locate grounds for a disposal plant, but there is nothing in the plan which interferes with the location at any point on either side of Front Street south of Mill Street. It appears that pumping the sewage will be necessary wherever the disposal plant be placed, and its exact location is a matter therefore which must be decided by the conditions of cost available and other concerns.

The roof and storm water is to be excluded from the sanitary sewers. The design contemplates that ultimately a population of thirty thousand uniformly distributed over the limits of the municipality will contribute to the sewers. The sewers are to be provided with flush tanks on dead ends, are to be laid to a minimum depth of seven feet to eight feet no traps are to be laid on house connections and it has been recommended that the main trap be prohibited on the house soil pipe and instead that these pipes be extended full diameter above the roof and a vented trap be placed on each fixture in the house.

It appears that the proposed system comprises, in the territory embraced in the district where sewers are to be built at once, namely from Front Street to Fifth and from Walnut to Perry Street, a total length of four and seventeen-hundredths miles.

In a considerable proportion of the streets where both storm and house sewers are to be laid, it is suggested that these structures be placed in the same trench. Furthermore, it is suggested that the borough engineer may be able to work out a detail plan whereby such consideration will be entirely practicable and economical. The Department of Health will be glad to co-operate with the borough engineer in working out the details of such a plan should the borough engineer desire any assistance from the State.

The necessity has been herein shown for the conveyance of sewage below the water works intake, and the necessity for improved surface drainage being apparent and the laying of sewers in streets prior to their being paved being commendable, it would seem desirable that favorable consideration should be given to the plans as they now stand, more especially since the permit to construct a system of sewerage and to discharge the sewage therefrom untreated into the Susquehanna River within the limits of said borough has been granted in due form on March eighth, nineteen hundred and seven, and the conditions with respect to the use of the waters of the Susquehanna River below the borough of Columbia have not since changed.

In view of the fact that the borough of Columbia has complied with the stipulations and conditions in the sewerage permit on March eighth, nineteen hundred and seven, and in view of the other considerations herein set forth, it has been determined that the proposed plans now under consideration be approved and that a permit therefor and for the discharge of sewage into the waters of the State be issued and such approval is hereby and herein granted and a permit issued therefor under the following conditions and stipulations:

FIRST: This permit to discharge sewage into the waters of the State shall cease on the first day of January, nineteen hundred and twelve, contingent that the other terms of this permit shall have been complied with. If on that date the borough has fulfilled the other terms and conditions of this permit, then the Commissioner of Health may extend the time in which sewage from said sewer system shall continue to discharge into the waters of the State, having in mind the policy of the State Department of Health with respect to the discharge of sewage into said river from other municipalities in the vicinity.

SECOND: At the close of each season's work the borough shall prepare a plan of the sewers built during the year and file the same, together with any other information in connection therewith, in the office of the State Commissioner of Health and the borough council shall keep an accurate record of each house connection with the system and copies thereof shall be given to the Commissioner of Health whenever he may require this to be done, to the end that the extension of the sewer system and its use shall always be known to the Commissioner of Health.

THIRD: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these waters to be destroyed on the premises.

FOURTH: If at any time in the opinion of the Commissioner of Health the sewer system or any part thereof has become prejudicial to public health or a menace, then such remedial measures shall be adopted as the Commissioner of Health shall approve or advise.

Harrisburg, Pa., July 29th, 1908.

COLWYN, DELAWARE COUNTY.

This order and decree was issued to the borough authorities of the borough of Colwyn, Delaware County, Pennsylvania, relative to the discontinuance of the discharge of sewage into the waters of the State within the said borough, in response to a complaint made to the Commissioner of Health by the Board of Health of the borough of Colwyn, Delaware County, Pennsylvania, about a nuisance created by the discharge of sewage into Darby Creek in the vicinity of Fifth Street in Colwyn, said discharge being from a sewer ditch coming down through Darby borough under the Philadelphia, Baltimore and Washington Railroad and emptying into the creek a short distance below the railroad.

It was represented that the residents on Fifth Street in Colwyn had petitioned the Borough Council for redress and that the Board of Health had brought the matter to the attention of the Darby Board of Health without results; therefore, the Commissioner of Health was asked to take the matter under advisement and stop the nuisance.

On September twenty-fourth nineteen hundred and six, the Board of Health again complained about the insanitary condition of numerous privy vaults and the futile effort of the Board to close up the vaults and bring about connections with the sewers. A request that some officer of the State Department make an inspection was made, and this was referred by the Commissioner to the Chief Engineer of the Department, with instruction to visit the town at some future time.

On September twenty-sixth, the Commissioner of Health notified the President of the borough council that an engineer representing the State Department would confer with the borough engineer, Mr. Damon, and make an inspection of the borough at some time in the near future.

These inspections were made in the fall of nineteen hundred and six and again in the spring of nineteen hundred and seven.

Darby Creek rises in Easttown Township, Chester County, about fifteen miles above Colwyn, and six miles below the borough it empties into the Delaware River at a point about two and one-half miles above the city of Chester. This city takes its supply of water from the river. Most of the stream's course, which is winding, is in Delaware County. Above Colwyn it flows in a general southeasterly direction. Below Colwyn its course is southwesterly through meadow marsh and the stream is tidal.

The creek forms the westerly boundary of Colwyn borough, and Cobbs Creek, a tributary of Darby Creek, which rises in Delaware County near Lower Merion Township and comes down through a rolling country to the Philadelphia line whence it is the boundary between Philadelphia and Delaware Counties to its confluence with Darby Creek at the lower end of Colwyn, forms the easterly boundary of the borough.

Darby Borough, Delaware County, lies immediately north of Colwyn and again north of Darby is Yeadon borough, these municipalities also abutting both streams.

Cobb's Creek receives the sewage of a portion of Darby and Yeadon and from the rapidly growing part of the city of Philadelphia known as "Parshallville." The district is served by a combined sewer, five and five-tenths feet in diameter which empties into Cobb's Creek at Woodland Avenue. In the vicinity in Greenway Avenue there is a combined sewer four and five-tenths feet in diameter. About a mile and a half up stream there is another outlet eleven feet in diameter, known as the Thomas Run sewer, which serves quite an extensive area as far north as Market Street. In the vicinity there is also a sewer outlet four and five-tenths feet in diameter at the foot of Chester Avenue. At Market Street the Robinson Street system outlet is located, six and five-tenths feet in diameter, and just below it in Spruce Street there is a combined sewer outlet, three and twenty-five hundredths feet in diameter.

Cobb's Creek is located in a narrow winding and in portions well wooded gorge, upon whose banks in Delaware County outside of the boroughs mentioned there are extensive cemeteries and upon whose banks and adjoining tableland in Philadelphia building operations are intensely active, and in the near future a well built-up residential district is there assured.

Cobb's Creek is now badly polluted and during summer times, when the flow from its limited area of drainage (twenty-two square miles) must be naturally small, a considerable portion of its volume is undoubtedly discharged from the city sewers. Above Market Street there is an important tributary called Indian Run, whose east and west branches drain Narberth borough, Ardmore and Wynnewood villages in Lower Merion Township, and come down through Overbrook and Haddington villages in Philadelphia to the main creek. This run receives the flow of two sewers in Philadelphia, and some pollution from Narberth borough. One of the sewers in Sixty-fifth Street is connected with the Lower Merion Township outfall sewer which is twenty-four inches in diameter and takes house sewage only. The city sewer into which it discharges is six feet in diameter; it empties into the east branch of Indian Run. The other sewer is at the foot of Lebanon Avenue. The run also receives industrial wastes, and altogether they render the water extremely foul, and a menace to public health.

The State Department of Health has approved plans for a four and five-tenths foot sewer called the Cobb's Creek intercepter, and it is now being constructed along the east bank of Cobb's Creek from a point just above Darby Creek a distance of about eight thousand feet. It will intercept the Woodland Avenue and Greenway Avenue city outlets and also all new main sewers laid in the district within the limits of the city of Philadelhpia.

It is contemplated by the city that this intercepter shall be extended up the valley and up Indian Run to the city line. All dry weather flow is to be diverted into this structure and the first flush of storm water.

The approval of this intercepter by the Commissioner of Health was given with the following stipulation:

"That the city shall on or before the year 1912 prepare and submit to the State Department of Health for approval a comprehensive sewerage plan for the collection and disposal of the sewage of the entire Cobb's drainage district within the limits of the city of Philadelphia and elsewhere, if this be found desirable, and that the city shall, in conjunction with the State Department of Health, consider the feasibility of so laying out such comprehensive system that it may be adapted to receive and dispose of the sewage of the municipalities in the drainage district outside of the city limits."

Colwyn borough is a purely residential community of about fifteen hundred population, small in area and really a part of Darby. It was incorporated out of Darby. The dwellings are substantial brick structures, the streets are improved and well kept and the water supply is brought in from a distance by the Springfield Water Company. The railroad above mentioned passes east and west

through the town and north of it to the east is an important district thoroughly developed and bounded on the north by Woodland Avenue at Darby and on the west by Fourth Street, the easterly side of this thoroughfare being in Colwyn and the westerly side being in Darby borough.

In this district, which to all appearances is a part of Darby borough, the streets are thoroughly sewered and the sewers have two outlets into Cobb's Creek. Both of them are at the foot of Chestnut Street extension at the railroad embankment about thirty-seven hundred feet above Darby Creek. One is a twelve inch pipe and connected with it there are forty-seven hundred feet of pipe, said to be principally six inches in diameter and designed to receive house sewage only. The other is reported to be a six inch pipe and serves two hundred and fifty feet of sewer.

In the district south of the railroad there is a sewer outlet into Cobb's Creek at the foot of Front Street and Ellis Avenue twelve hundred feet above Darby Creek. It serves seventeen hundred feet of sewer, all said to be six inch pipe.

The fourth borough sewer empties into Darby Creek at the foot of Fifth Street at a point one thousand feet above the confluence of Darby and Cobb's Creeks. It is reported to be six inches in diameter and to serve eighteen hundred feet of sewer.

Connected to these four sewer lines are about two-thirds of the dwellings. Probably one hundred properties still retain cesspools or privy vaults. In the outskirts some sink water reaches the street gutters.

There are two soap factories in the town. One of them is an extensive establishment located on both sides of Cobb's Creek at Woodland Avenue. Sewage is reported to be discharged from the works direct into the creek. The other soap factory is in the extreme western part of the borough just south of the railroad on the flats.

The borough of Sharon Hill is on the western bank of Darby Creek opposite Colwyn. Sharon Hill has the much larger incorporated territory and in the year nineteen hundred and five, when its new sanitary sewer system was approved by the Commissioner of Health, the borough comprised upwards of two hundred dwellings and a population of about fifteen hundred people. The system has two outlets, both within three hundred feet of each other and into Darby Creek below the Philadelphia, Baltimore and Washington Railroad and at points six hundred and nine hundred feet respectively above the Fifth street sewer outlet into Darby Creek in Colwyn borough. The nearest outlet is twenty-four inches in diameter. The other twelve inches in diameter.

Temporary permission to discharge the sewage from these sewers into Darby Creek was given under the condition that storm water be excluded from the system and also that the treatment of sewage shall be undertaken by Sharon Hill at any time when so ordered by the Commissioner of Health and according to plans to be submitted to and approved by him.

Permission was given as a temporary expedient. The creek here has a watershed of about thirty-six square miles and there is an estimated population on the watershed above Sharon Hill and Colwyn of about fifteen thousand. The sewage from the boroughs of Darby, Yeadon and Lansdowne is now and has been for many years disharged into the creek.

Flow of this stream is comparatively small in summer, the population on the watershed is steadily increasing and consequently the creek pollution must also increase unless something be done to prevent it. It was thought until the sewage disposal problem of the entire Darby Creek valley be carefully considered and a general policy of improvement of stream conditions determined upon, that it would do no measurable harm to permit the small amount of sewage output from Sharon Hill to be added to the already sewage polluted creek.

Opposite the twelve inch sewer of Sharon Hill is a twenty-four inch pipe on the Colwyn side of the creek bank. This pipe extends up the valley along the bank under the railroad, leaving Colwyn borough six hundred feet north of the railroad and continuing up the valley through Darby borough to the present terminus of the pipe about six hundred feet within Darby borough. This stretch of sewer of about fifteen hundred feet in length belongs to and was built by the borough of Yeadon. It was intended that it should be extended up to Yeadon borough, but litigation as to the right of way has thus far prevented a continuation of the work. However, the Yeadon sewer now extends down the valley about three-quarters of a mile through Darby borough and empties into the creek in the central part of Darby borough, at a point about eight hundred feet above the upper end of the twenty-four inch sewer.

There is a dam across Cobb's Creek just above Woodland Avenue and there is a dam across Darby Creek near Twelfth Street, which points mark the head water high tide. So the sewer outlets above mentioned are into tidal water.

The flood tides, especially in summer, accelerate the nuisance caused by sewage in the creeks. The inhabitants of Colwyn borough, more especially those living along the streams, are subject to the annoyance of the sewage from the above places. The convergence of the sewers of those places to the vicinity of the confluence of Darby and Cobb's Creeks where a nuisance now exists, points to one common solution of the difficulty, namely, a common outlet for the reception and disposal of the sewage other than into the stream.

On the day of the Department's inspection, the tide was coming in and sewage was being carried upstream thereby. It was very apparent on the surface of the water. Deposits on the bottom of sewage mud was evidenced by the rising of gas to the surface of the creeks. There was little or no difference in appearance in either stream.

The assessed valuation of real and personal property in Colwyn is not known to the Department. The valuation of real estate in June of nineteen hundred and seven, was reported to be five hundred and twenty-one thousand, nine hundred and ninety-five dollars, and the bonded indebtedness of twenty-six thousand, six hundred dollars. Probably the municipality would be able to contribute a pro-rata share of the cost of joint disposal works, while it might not be able to assume the expense of independent works.

The borough has failed to file satisfactory plans of its existing sewer system as required by law, and, therefore, it does not come under the exemption which permits the borough to continue to discharge sewage into the waters of the State. If continued, to be legal the discharge must be unanimously approved by the Governor, Attorney General and Commissioner of Health.

At and below the confluence of the two streams Darby Creek is very sluggish, its banks are low, and land on either side is flooded at high water, and there is a large stretch of marshes to the Delaware River.

The permanent discharge of sewage into this stream below Colwyn is more a question of suitability. From the standpoint of a nuisance it does not appear, at present, that there are any complaints made by those who make any kind of use of the stream below Colwyn. At various points numerous boat houses dot the banks of the creek and considerable fishing is indulged in. The waters are highly polluted and undoubtedly this may interfere to some degree with the sport, and in a sense menace the lives of those who may boat upon its waters; but it is at and above Colwyn, in the populous districts, where a demand for the cessation of the discharge of sewage into the stream exists. The prevention of pollution of inland streams whose banks are polluted is to provide intercepting sewers to divert sewage therefrom and to convey it to larger bodies of flowing water or to sewage disposal works.

The city has a plan on foot to include Cobb's Creek in the Parkway system. The embellishment of this gorge would be an asset to the district and the city at large. A Parkway system commensurate with the importance of the city of Philadelphia, may well include Cobb's Creek in its scope. Since the creek is in two counties and the area in Delaware County is likely to be occupied by residences, there will be no good sites for purification works anywhere except in the valley of the creek itself and here the Parkway may be located, which would render infeasible the building of any disposal works for the treatment of the sewage along this creek.

It would seem, in the event of the pre-emption of this valley by the city, that the intercepting sewer to be built there should, as a substitute for a site for sewage disposal works, provide for the conveyance of at least house drainage from the territory tributary to Cobb's Creek in Delaware County, otherwise a second intercepting sewer must be built down the valley, so it would appear.

The project of constructing the Cobb's Creek intercepter across the country to the Schuylkill River is now being studied and surveys are under way by the city engineer. If this plan be carried out, at least the city sewage would be diverted from Cobb's Creek and Darby Creek valleys and leave for consideration only the sewage of the various boroughs on the watershed in Delaware County.

It has been determined that the interests of the public health require that the discharge of sewage into the creeks from the borough of Colwyn's sewers should be discontinued and that the borough be given until October first, nineteen hundred and eight, in which to prepare, either independently or in conjunction with other municipalities, a plan for some other disposal of its sewage than into the two creeks and submit the plans to the Commissioner of Health for approval, and it is hereby and herein ordered that plans be prepared by the Borough of Colwyn and submitted to the Commissioner of Health on or before said date, October first, nineteen hundred and eight.

Harrisburg, Pa., January 29th, 1908.

CONNELLSVILLE, FAYETTE COUNTY.

This permit is issued to the borough of Connellsville, Fayette County, and is for permission to extend its sewer system and to discharge the sewage therefrom untreated into the Youghiogheny River and tributaries.

It appears that Connellsville is a borough of about ten thousand population located on the east bank of the Youghiogheny River opposite the borough of New Haven on the west bank of the river, in the north central part of Fayette County, in what is known as the Connellsville coke district.

Within a radius of ten miles of the borough there is a district population of ninety thousand, principally engaged in coal and coke operations.

In the borough besides coking there are other industries, among which is the Sligo Iron and Steel Company, employing three hundred and fifty men; Connellsville Machine and Car Company, employing one hundred men, and the Balti-

more and Ohio Classification yards, buildings and offices; and several smaller works. Adjacent to the borough to the south, in Connellsville Township, is the plant of the American Sheet and Tin Plate Company, where are employed several hundred hands when the works are in operation.

The borough is built on two hills, one in the north and the other in the south part and between them is Connells Run.

North of the north hill, but still in the borough, is Mounts Creek and south of the south hill and within the borough limits is Trump Hill. The northern hill is elevated about three hundred feet above the river and the southern hill about one hundred and fifty feet above the river at its highest point in the borough.

Connells Run has a watershed of about four square miles. It rises to the east in Chestnut Ridge Mountains, and flows in a westerly direction through the borough into the river. Its upper waters are used as a source of supply of water to a part of the borough.

Mounts Creek is a considerable stream. It has an area of about twenty-seven square miles. Its numerous tributaries rise in the Chestnut Ridge Mountains and on one of its tributary streams there is a small intake which impounds water for public use in the borough of Scottdale, and another tributary, Breakneck Run, supplies water to part of Connellsville. Below these dams on the watershed are a few coal mines and numerous coke ovens from which acid wastes go to the streams.

Trump Run rises in Chestnut Ridge Mountains and flows in a northwesterly direction through the borough to the river. It has an area of four square miles and the stream is a fresh water one.

There is in Connellsville an extensive system of public sewers, largely combined, and there are important private sewers. The compulsory connection with the sewers has not been enforced, so it is reported. There are in the neighborhood of five hundred privies of the shallow earth type in use. However, there are but a few individual wells on private property. Most of the individuals derive their drinking water from the public system which is owned by the Connellsville Water Company.

The sources are three in number, namely, Connells Run reservoir, Breakneck Run reservoir and the Youghiogheny River.

The first basin is formed by an earth dam which stores five millon gallons, has a tributary area of two square miles; there are two habitations on it, if reports be true.

The water is used to supply the low surface section of the town.

Breakneck Run reservoir is an earth structure impounding fifteen million gallons on a watershed of three and one-half square miles area upon which reside a number of people. This reservoir is used to supply the high service district in Connellsville. The principal supply comes from the Youghiogheny River and the water is filtered.

The intake and pumping station built in eighteen hundred and ninety-eight are located about two miles south of the city on the east bank of the river. Before that time the station was below the borough and the water was contaminated by sewage from the town.

The water is pumped into a sedimentation basin and thence it flows by gravity to mechanical filters and thence to a filtered water basin, all in the vicinity of the pumping station, from whence the purified water is raised into the distributing system in the town. The capacity of the filter plant is rated at seven hundred and fifty thousand gallons per twenty-four hours.

An additional supply is sometimes taken from Laurel Run, a stream locally known by this name, which flows into the river at the pumping station and has a watershed of about two square miles, upon which there are some inhabitants. A dam has been constructed across the river and water is conveyed by gravity from it into the clear water basin. The dam is at the pumping station.

The river is reasonably free from sewage and main drainage pollution above Connellsville. It is known that tanneries, lumber camps and small settlements abound on the banks of the stream. As far as the Department is aware, the borough of Somerset in Somerset County, is the only municipality within Pennsylvania having a sewer system from which sewage is discharged into the river or a tributary. This borough's sewage goes into Coxes Creek, which in turn flows into Casselman River. The point of the discharge of sewage is fifty miles above Connellsville.

The Youghiogheny River heads in Preston County, West Virginia, some thirty miles or more south of the Pennsylvania State line, and discharges into the Monongahela River at McKeesport. It has a general northerly flow to as far as Confluence borough, Pennsylvania, when it turns northwest and continues in that direction to its mouth. From its source in the Great Savage Mountains, the drainage area is sprasely settled and a generally wooded, mountain territory until near Connellsville. The head waters are rapid and it is a typical mountain stream with its beds having numerous falls and rapids. After the stream reaches the Pennsylvania State line, the flow becomes more uniform and continues as such to the mouth, but the flow is broken in this distance by various rapids, the largest one being at Ohiopyle borough. The total territory drained by the river is about

eighteen hundred square miles, of which some thirteen hundred are in Pennsylvania. Above Connellsville the drainage area is at least one thousand square miles. The population on the whole shed below Connellsville increases rapidly.

The principal tributary, Casselman River, Laurel Creek and the upper Youghiogheny River unite to form the main stream at Confluence borough, which in provincial times was known as Turkeyfoot settlement. The Casselman River receives the drainage from quite a number of coal mines, but it appears that the sulphur waters are largely diluted before Connellsville is reached.

Below Connellsville, Jacobs Creek, a highly acid polluted stream and the Big Sewickley Creek, which is also impregnated with acid mine waste, are the principal tributaries. The part of the Youghiogheny River to its mouth is reported to be more polluted than any other stream in Pennsylvania. The amounts of suspended and dissolved matters carried in the waters are excessive. The gross pollutions begin in Connellsville borough.

Between the intake of the Connellsville Water Company and the borough of Connellsville, but on the west bank of the Youghiogheny River, there are intakes of two other companies. They are, in order, the Trotter Water Company and the Southwest Water Company. The Trotter Water Company has two pumping houses on the river, but the other one is below Connellsville. The water is pumped to various coal mines in the region.

The Southwest Water Company takes crude river water and furnishes it to the various plants operated by the Oliver and Snyder coal and coke interests, including the settlements at the mines.

The sewer outlets in the borough discharge into the river and the creeks. The outlets into the river named in order up stream from the mouth of Mounts Creek are as follows:

Mounts Creek intercepter, twenty-four inches in diameter.
Peach Street, twenty-four inch outlet.
Grape Alley, twenty-four inch outlet.
Apple Street, twelve inch outlet.
Main Street, twenty-four inch outlet.
Church Place, fifteen inch outlet.
Connell Run intercepting sewer thirty inches in diameter.
Trump Run intercepter, eighteen inches in diameter.
The above sewers are all public outlets.

The twenty-four inch intercepting sewer which extends up Mounts Creek valley has an outlet into the river at a point about four hundred feet down stream from the mouth of Mounts Creek. The pipe is imbedded in a stone protective work. During high water the sewer is submerged and the water backs up some distance. The district served is largely a residential one. It includes a stretch about half a mile in length along the river. As far up as Peach Street in which there are about seven and one half miles of sewers, forty per cent. are eight inches in diameter and sixty-six per cent. are fifteen inch pipes or less, the balance comprising sizes ranging from eighteen inches to twenty-seven inches in diameter. The only public sewer outlet into Mounts Creek is an overflow on the Mounts Creek sewer line, located at the foot of Francis Avenue, over half a mile inland. At time of high water when the sewer is surcharged, the sewage from the greater part of the district tributary to this line overflows at this point.

The twenty-four inch Peach Street sewer outlet emerges from the retaining wall or cribbing adjacent to the Baltimore and Ohio Railroad tracks and just above the passenger station. This sewer is the river outlet for District Number One above described. How much of the seven and one-half miles of sewers in the system empty through the Peach Street outlet and how many of them discharge into the Mounts Creek intercepter, is unknown to the Department. At low water sewage sediment collects in pools along the retaining wall and produces disagreeable odors. There territory is densely populated.

The Peach Street, Grape Alley, Apple, Main and Church Street outlets all serve District Number Two, which is in the heart of the city and has a river frontage of about a quarter of a mile immediately opposite the borough of New Haven. Main Street is the principal thoroughfare of the town back from the river, and there is a highway bridge to New Haven borough at the foot of this street. The four sewer outlets mentioned all discharge from the retaining wall and at low water accumulations of sewage matter at the outlets cause a nuisance along Water Street.

In District Number Two there are two and a half miles of sewers tributary to the four outlets of which eighty-two per cent. are fifteen inches in diameter or under.

The thirty inch Connells Run intercepter discharges into the river near the mouth of Connells Run which is at a point about four hundred feet above Main Street bridge. For two miles up stream along the river bank above Main Street the land is occupied by the Baltimore and Ohio Railroad yards. The thirty inch sewer has an overflow pipe near the river bank, the main outlet being located farther out into the river. The overflow is to permit the sewage to discharge free at high water. The intercepter takes the sewage from the eastern part of the borough

through the entire length of the run valley. The district is known as Sewer District Number Three and in it are four miles of sewers, of which fifty per cent. is eight inch pipe and seventy-three per cent. is fifteen inch pipe or less. At places the sewer is built in the run. Reasonable high water covers the entire structure and there are known to be leaks into the sewer.

The next and last outlet, the eighteen inch Trump Run intercepter, discharges into the river twenty-two hundred feet above the Connel Run sewer. It serves District Number Four, in which there are two miles of sewers of which thirty per cent is eight inch pipe and seventy-five per cent. is fifteen inch pipe or less.

The balance of the sewers range in diameters from eighteen inches to twenty-two inches. The outlet, under the tracks in the railroad yard, is in the form of an inverted syphon.

All along the river front in the town there are private sewers emptying into the stream in the borough.

There are six private sewer outlets discharging into Mounts Creek within the borough limits and there are a number of privies built over the stream.

The first of these private sewers is an eight inch pipe which serves one building. The next is an eighteen inch surface drain, taking sewage from several residences. The next is an eight inch sewer from a dwelling on Fourth Street and there is a smaller sewer in Highland Avenue. There is a large combined sewer serving the property of the Sligo Iron and Steel Company works and the Munson Heater Company. The outlet is thirty inches in diameter by sixty-six inches. The last sewer is thirty inches in diameter and belongs to the Pennsylvania Railroad and intercepts street drainage which during dry weather is waste water from dwellings to quite an extent. There is also a brewery connection.

Connells Run does not receive sewage from any public outlet, but there are overhanging privies along the banks. A system of private sewers on the Hogg estate, comprising a total length of thirty-three hundred feet of pipe whose diameters range from ten to fifteen inches, empties into the run, near a manhole on the line of the borough sewer in the valley. It is reported that the owners have failed to obtain satisfactory arrangements whereby this outlet can be connected into the borough intercepter. Negotiations with this object in view have been had. It is understood that the question is one of price.

Trump Run receives sewage from overhanging privies, from the brewery and several private drains, the latter in the Davidson and Newmyer Addition inside the the borough limits. It is here that the public authorities desire to build sewers.

Outside of the borough limits in the district known as the South Side, there are several private sewers which discharge into small runs, and one of them discharges into the river at the foot of Gibson Avenue. It is reported that the population in this settlement in the township is at least two thousand. The water supply is the same as that of the borough, and undoubtedly the territory will be ultimateiy annexed.

These several sewer outlets are all above the water works intake of the Baltimore and Ohio Railroad. The large stone culvert known as the Gibson Avenue sewer is four hundred feet distant only from said intake. Here the water is pumped from the river and supplied to the works and yards and also to the employes in the shops. The company filters the drinking supply by pressure filters.

The borough of New Haven has a system of sewers on the combined plan with outlets into the river.

On the peninsula in Connellsville formed by the river and Mounts Creek, in the extreme northwestern corner of the borough, there is a public dump where refuse and garbage from the borough is hauled and discharged either onto the ground or directly into the river. The land is subject to inundation at high water. It is reported that the accumulations of weeks are carried down stream during freshet periods.

The borough requests permission to extend sewers in several streets in sewer district number four or the Newmyer Addition. The sewers will range in diameter from eight inches to fifteen inches and will have a total length of fifteen hundred and eighty feet. The private individuals developing land in the vicinity wish to connect with this proposed borough line sewers aggregating four thousand feet, the diameter of these private sewers will not exceed twelve inches.

The local authorities also ask permission to extend the borough system from time to time as necessity may require.

Connellsville has permitted, by ordinance, the laying of private sewers on some of the streets since nineteen hundred and five. No application for permission to build these extensions was made, as provided by law.

Dunbar Creek, entering the river on the west bank just above New Haven and Opossum Run which flows into the river from the same direction just below the borough, receives large quantities of mine pollution and markedly discolors the Youghiogheny River. Above Dunbar Creek and the intake of the Baltimore and Ohio, which is in the vicinity, the river has a clear appearance.

There is a place a short distance below the Connellsville Water Company's intake, used as a swimming pool by the youth of the borough. There is also another pool on the east bank of the river in the lower part of the borough which is used for swimming purposes. It is below all of the sewer outlets of Connellsville excepting Mounts Creek outlets, and below some of the sewers in New Haven.

Two miles below Connellsville and New Haven is the village of Broadford in Upper Tyrone Township. Here the Trotter Water Company has a pumping station and supplies river water unfiltered to various coking operations in the vicinity.

The city of McKeesport, which is forty-one miles below, derives its drinking water from the Youghiogheny River.

During the current year the dumping of garbage and refuse into the river at Connellsville was the cause for complaint to the State Department of Health from citizens in McKeesport Orders were issued to the various municipalities along the river and the practice has been temporarily stopped. There is an ordinance in Connellsville prohibiting the dumping of all offensive and obnoxious matter of any kind upon the banks or margin of the river or into the waters thereof.

Owing to the acidity of the Youghiogheny, it is only during freshets that such sewage pollution of a pathogenic character reaches the city of McKeesport. It is expected by persons who should know, that the coking operations will, within several decades, have become less extensive in the Youghiogheny valley and in consequence the stream will be much less acid. So the sewage pollution, and hence menace to public health will increase unless some plan be devised to obviate such increase. Under the laws of the State to preserve the purity of streams, it is clearly evident that Connellsville should anticipate the time when its sewage must be purified before being emptied into the Youghiogheny.

It is prohibitive in cost to treat both sewage and storm water. Fortunately the existing sewers, while used as carriers of storm water, are of such small size that with few exceptions they can be utilized for a sanitary sewer system with a moderate amount of storm water admitted. The problem of separation of sewage and storm water is not necessarily a difficult or expensive one for Connellsville, if handled by an expert, competent by successful experience, to deal with the situation.

The local authorities should at this time study the situation, cause plans to be prepared for a comprehensive intercepting, sanitary sewer system and sewage purification works. The latter need not be built now, but the plans as a whole should be devised and adopted, and then as the years go by sewer extensions may be made in conformity therewith, until finally, when the interests of the public health shall demand it, the disposal works shall be built and all will fit into a perfect whole.

The town is so situated that surface water can be conducted in street gutters to nearby natural water courses in many instances. It is not economical to try to convey surface water long distances under ground when it would run off to some nearby surface channel.

It has been determined that the interests of the public health will be subserved by issuing a permit, and a permit is hereby and herein issued to the borough to build sewers in the Newmyer Addition and there only. Permission to make general extensions to the sewer system throughout the borough is herewith withheld. The permit is issued under the following conditions and stipulations:

FIRST: That no storm water be permitted to enter the extensions in the Newmyer Addition.

SECOND: That on or before September first, nineteen hundred and nine, the borough shall prepare a plan for a comprehensive sanitary sewerage system for the entire municipal territory, which shall include the interception of all of the sewage of the borough and its conveyance to some common point. Also on or before said date the borough shall select a site for sewage disposal works and prepare plans for such works and submit them, together with the said sewerage plans to the Commissioner of Health for approval. After the plans shall have been modified, amended or approved, a permit will be issued by the Commissioner of Health for extensions to the sewer system in conformity with such plans from time to time.

THIRD: This permit to discharge sewage into the waters of the State shall cease on September first, nineteen hundred and nine. But if on said date the borough shall have submitted plans herein called for, and shall have complied with the other conditions of this permit, the Commissioner of Health may extend the time in which sewage may continue to be discharged into the waters of the State, having in mind the time when other municipalities in the Youghiogheny valley shall be required to treat their respective sewages.

FOURTH: The borough authorities shall not grant any privileges or permit the construction of private sewers with outlets into any public storm or sanitary sewers or into any natural water courses within the municipal territory. The Commissioner of Health will notify the owners of existing private sewers of the requirements of the State Department of Health respecting a comprehensive sewerage system and the discharge of sewage into the waters of the State. It is the intent of this stipulation that all sewers, whether public or private, shall be built and maintained in conformity with said comprehensive sewerage plan.

The attention of the local authorities is called to the desirability of prohibiting bathing in the river below the borough sewer outlets.

The State Department will take measures to stop the discharge of sewage into the river above the water works intake at the Baltimore and Ohio Railroad shops. These menaces are in the township in the South Side district, which may be annexed to the village. It would be a prudent thing for the borough authorities to include this district to be covered by the comprehensive sewerage system.

Harrisburg, Pa., August 25th, 1908.

CORRY, ERIE COUNTY.

This application was made by the city of Corry, Erie County, and is for permission to extend its sewer system and to discharge the sewage therefrom into Hare Creek within the limits of the city.

It appears that the city of Corry is located in the centre of the extreme eastern portion of Erie County, the line between Warren and Erie counties being the eastern city boundary. The city is bounded on the north by Wayne township, on the east by Columbus and Spring Creek townships in Warren County, on the south by Concord Township and on the west by Concord and Wayne Townships. It is about thirty-seven miles east of Erie and about twenty-eight miles west of Warren and about fourteen hundred feet above sea level.

The territory so incorporated is two and a quarter miles square and within it there is a resident population of seventy-five hundred people. In nineteen hundred the population was five thousand three hundred and sixty-nine and in eighteen hundred and ninety it was five thousand six hundred and seventy-seven.

The city is a railroad centre; the main line of the Erie Railroad and the Philadelphia and Erie Division of the Pennsylvania Railroad enter from the east, these roads being about one mile apart at the eastern city boundary, intersecting at the centre of the town and passing out of the city near the centre of the western boundary. The Buffalo and Allegheny Division of the Pennsylvania Railroad enters the city near the centre of the northern boundary, crosses the other roads in the centre of the town and passes out at the southwestern corner.

The industries are numerous and varied, amounting to about thirty in all, the most important being the Climax Manufacturing Company, manufacturing locomotives; the United States Radiator and Boiler Company; Ajax Iron Works, Manufacturing steam and gas engines; Corry Condensed Milk Company; Corry Chair Company, MacInnes Steel Company and the United States Chair Company.

The town is not growing very rapidly, but the industrial depression extending throughout the country has not been felt particularly at Corry.

The principal business thoroughfare is Center Street, which extends north and south. At right angles to it is Main Street. The larger manufacturing plants are located along the railroads.

Corry is situated in the Allegheny River watershed on the divide between the headwaters of French Creek and Broken Straw Creek in a broad, level valley drained by a tributary of Broken Straw Creek called Hare Creek. The built-up portion lies principally on the level ground at the head of a valley which extends in a general easterly and westerly direction, the ground rising gradually to the foot hills near the northern boundary. At the south and west the hills come nearly to the centre of the town. The extreme southwest corner of the city is drained by the headwaters of the south branch of French Creek; the main branch of the stream rises in Chautauqua County, New York State, and enters the Allegheny River at Franklin City, about seventy-one miles below Corry.

The said Branch of French Creek in Corry City receives surface drainage from the railroad freight yards and a small portion of the southwestern corner of the built-up part of the city. No sewers are found emptying into this stream here, but considerable kitchen drainage enters the stream from street gutters. There is also a privy over the run near the corner of Pleasant and Union Streets.

The larger portion of the town is situated in the watershed of Hare Creek, which rises in the southern part of Chautauqua County, New York, flows in a general southeasterly direction, crossing the northern boundary line of the city of Corry at the Buffalo and Allegheny Division of the Pennsylvania Railroad, and empties into Broken Straw Creek about six miles below the city limits. It drains a total area of about twenty-five square miles, of which four square miles are in New York State and a little over four square miles in the city of Corry. The creek has a length of about ten and a half miles.

Broken Straw Creek empties into the Allegheny River at Irvington about five miles below Warren and twenty-one miles below Corry. It has a drainage area of about three hundred and six square miles, fifty of which are in New York State. Its total length is thirty-three miles.

Just north of the city line, on Hare Creek, is the pumping station of the Corry Water Company. The creek passes obliquely across the northeastern corner of the city, the built-up portion of the town lying to the southwest. On it, just inside the city limits at the northern boundary, is Parkers Pond, containing about five acres, used for furnishing ice to the residents of the city. The entire course of the stream through the city is in very flat farming and pasture land. The creek is not over twenty feet in width, very crooked, with banks from three to five feet above the water level.

Bear Creek, the principal tributary of Hare Creek, rises in the northwestern corner of the city and flows southeasterly and easterly, entering Hare Creek between East Wayne and Scioto Streets. This stream lies almost wholly within the city limits, has a length of seven thousand feet and a drainage area of about three hundred and twenty-five acres. It flows through farm and pasture land excepting where it crosses Center Avenue. At this point is located the power plant of the Corry and Columbus Street Railway Company. At Center Street and for five hundred feet below the stream, it receives sewage and kitchen drainage from the residences,

located on Center Street near the stream, also street drainage. From Center Street this stream has a width of about five feet and banks from one to two feet in height.

Along Hare Creek, between it and the Erie Railroad, westerly from where the stream crosses under the railroad, there is a city tract used as a dump for garbage. Here there are shanties and pig pens. The garbage is collected by private individuals, sorted and fed to hogs or used as a fertilizer. The place is in a filthy condition and the odor is very noticeable from the railroad.

Beyond this point, out into the township, there is considerable swampy land. At a point on Hare Creek thirty-five hundred feet below the easterly city limits, at a cross roads leading northerly from Howard's tannery to Columbus borough, is the mouth of Winton Run. This run rises about a mile south of Corry city and flows northerly to the Philadelphia and Erie Railroad, thence westerly along this railroad about fifteen hundred feet to near the easterly city limits, where it crosses under the railroad and by the plant of the Howard tannery to Hare Creek. A small stream known as Colgrove Run enters Winton Run at the railroad from the west, draining the southeast section of the city. Winton Run has a total length of about two and two-tenths miles and a drainage area of about three square miles. The Howard tannery works are located on the extreme western corner of Columbus township, adjoining the eastern limits of the city of Corry, on Winton Run twenty-eight hundred feet from its mouth. The property of the tanning company is on both sides of Main street, which is the highway leading down Broken Straw valley.

Below Winton Run the course of Hare Creek is very crooked and the current slow, the stream passing through swamp, pasture and meadow lands, for about two and four-tenths miles, where it strikes the embankment of the Philadelphia and Erie Railroad at a road crossing. From this point the stream follows the north bank of the railroad in straight and ditch for about nine-tenths miles. The original course of the creek was apparently on the south side of the railroad as there are evidences of an old water course now abandoned and grown up to swamp. Upon leaving the railroad, the creek flows in a southeasterly direction for about one-half mile entering the Broken Straw about one-third of a mile above the Philadelphia and Erie Railroad bridge.

Immediately below the mouth of Hare Creek in Broken Straw Creek there is a marked line between the flow of the two streams, that of the Broken Straw being fairly clear, while that of Hare Creek is very dark. By the time the flow reaches the railroad bridge the two waters have become thoroughly mixed, giving the waters of the Broken Straw a very dark color and covering the bottom with a dark brown deposit. From the railroad bridge to Spring Creek village, seven miles below Corry, the stream flows through pasture and meadow lands, a distance of about three miles.

At Spring Creek is located a tannery operated by the Howard Tanning Company. This plant is located on the northern bank of the creek and discharges drainage into it.

The city has a public sewer system and the general sanitary conditions in the town are good. A rule of the local Board of Health makes it compulsory for the property owner to connect his estate with the abutting sewer, but this rule is not enforced unless the sanitary conditions on the property make it necessary. There is very little kitchen drainage emptied into street gutters. The worst conditions found were along Brook street.

Public water is supplied by the Corry Water Supply Company. The original source was from a dam on Hare Creek located about one thousand feet northerly from the northern city boundary. Water was pumped through a twelve inch main to the distributing system in the city, the surplus going into a four and a half million gallon reservoir situated on a hill south of the city. The dam was destroyed by flood. A new supply was then obtained from driven wells sunk to a layer of white sand, which has ever since furnished a sufficient supply of water which is clear at all times. There are four of these wells about fifty feet in depth. They range from three to six inches in diameter. They are connected with the pumps by a sixteen inch suction main. This suction main is extended into the creek, closed by a valve which may be opened in case of emergency. Exclusive of the consumption by the residents, the per capita use of public water in the city is sixty gallons per diem.

There are no good records of typhoid fever available. The few cases which have occurred have, in nearly all instances been traced to sources other than the public water supply, so it is reported.

The public sewer system is built on the combined plan, excepting in one or two streets. The first sewers were connected in eighteen hundred and ninety-three. At the present time there are twelve miles in the system, of which one-half mile is eight inches in diameter, one and a half miles ten inches in diameter, three and a third miles twelve inches in diameter, three miles fifteen inches in diameter and the balance have diameters ranging eighteen to forty-eight inches, of which the forty-eight inch has a length of one and six-tenths miles. About six tenths of a mile of sewers have been constructed without application to or permission by the Commissioner of Health since April twenty-second, nineteen hundred and five.

There are two sewer districts, that drained by the forty-eight inch sewer, known as the main sewer district, and that drained by the thirty-six inch sewer, known as the First Ward outlet sewer, which is connected to the Summer street district. These two outlets empty into Hare Creek within about two hundred feet of each other at the Erie Railroad bridge.

The main sewer distict has a drainage area of eight hundred and seventy-five acres including all of the built up portion of the town, excepting the south-eastern part. The forty-eight inch structure begins at the corner of Church and Spring streets in the south-central part of the city, where it receives the flow of a small run rising near the southern boundary of the city near Centre street. Thence the sewer extends northerly under the railroad tracks and easterly to the outlet.

The open run is about three thousand feet in length and receives considerable kitchen drainage from gutters and private sewers and overflow from privies located along its banks.

There are deposits of sand in the forty-eight inch sewer and a large sand bar at the mouth. The invert is about eighteen inches below the normal level of Hare Creek. This sewer receives drainage from nearly all of the important manufacturing plants and a large portion of the residences. It is reported that during heavy rains the manholes on Smith street frequently overflow. This is due to the back flow from the creek.

A small water course is taken into the system at Church street. This run is about twenty-three hundred feet in length, but was dry at the time of the Department's inspection. The twenty-two inch pipe into which it empties is not large enough to carry the storm water at all times.

There are numerous pipe sewers in this district which could be utilized as sanitary sewers by removing inlets and roof connections. In fact, it might do to utilize the entire system eventually as a sanitary system, in view of the fact that it would not be large enough to carry off all storm water when the streets are paved. However, the question is one for careful study.

The first ward or Summer street district includes the south-eastern section of the built up part of the town and in it there is considerable farming territory. The entire area contains three hundred acres. The thirty-six inch outlet extends northerly from Main street through a swamp for a distance of about three-quarters of a mile to Hare Creek. It empties immediately below the Erie Railroad bridge and about two hundred feet below the forty-eight inch outlet. The masonry head wall has been undermined and has fallen into the stream and partly obstructs the outlet. Connected to this sewer are street sewers whose diameters range from eight to thirty inches.

It may be said, speaking of the entire sewer system of the city, that in general the present sewers are not large enough for all future storm water and some of them are too large for sanitary sewers.

The difference in size between the required sanitary sewers and the existing combined sewers is not so great but that it might be advisable to incorporate many of them into a sanitary system, but this can be accomplished best after a complete topographical map, showing the existing sewers and drainage districts, shall have been prepared and an intelligent study of the entire situation made.

The city proposes to build what is known as the East Church street sewer system with a twenty-two inch outlet, into the existing twenty-two inch pipe previously described as taking the flow of a natural water course in the main sewer district. Sewers whose diameters will range from eight to twelve inches are to be built in Church, Grove, Fifth, Concord and King streets, and will drain into the said intercepting sewer. This twenty-two inch pipe is to be laid as an extension of the present twenty-two inch sewer outlet up the valley of the run through private grounds to a low point in Concord street at Fifth street and thence across Concord and Fifth streets to a new inlet on the same water course. In this system there are to be four hundred and ninety feet of twenty-two inch pipe, three hundred and sixty feet of twelve inch, thirteen hundred and fifty feet of ten inch, ten hundred and ten feet of eight inch, making a total of thirty-two hundred and ten feet. They will drain a district of about twenty acres having a present population of one hundred and fifty persons. There are two cesspools and thirty-two privies in the district, also about twenty-one private sewers, some of which are cellar drains and some of which discharge kitchen drainage into street gutters. It is proposed to connect all these drains with the new sewers. There has been some complaint in regard to kitchen drainage in the gutters in this district. Surface water is to be admitted to the proposed sewers at convenient points. Bids have been advertised and received and the city is prepared to begin work at once.

There is no apparent need for combined sewers as proposed. The street gutters and present water courses are amply able to take care of the water if the streets were crowned, the gutters cleaned out and the eight, ten and twelve inch pipes removed at street crossings and larger ones substituted.

The twenty-two inch main sewer proposed is to take the place of an open water course which will cease to be a cause for complaint as soon as sanitary sewers are built and the various private sewers conected with them. The twenty-two inch sewer in private land can be abandoned, all the sewers made eight inch, all inlets, catch basins, intakes, etc., done away with and a saving of possibly two thousand dollars made by converting the system into a sanitary system. This would require

about one hundred and fifty feet of additional eight inch sewer in Concord street between Church and Fifth street, reversing the flow from Church street and deepening the cut to some extent.

The city also proposes to build a lateral sewer ten and eight inches in diameter, four hundred and seventy-five feet long in Gould street and an eight inch sewer three hundred and fifteen feet long in Sixth avenue. Both of these petty extensions are in the main sewer district. The Gould street sewer is to be used as a combined sewer. The street grade is very flat and one reason for the sewer is to get rid of surface water which lies in the gutters. If the gutters were cleaned out and paved the inlets could be omitted and the sewer built as a sanitary sewer. There are nine houses on the street.

The Sixth avenue sewer will be for sanitary purposes only. There are five houses on the road. Some roof water may be admitted.

Into Bear Creek there are several private sewers discharging at the present time. They take kitchen drainage chiefly. A tract of land is being developed for building purposes on the east side of Centre avenue between Oakley and Irvin streets. Sewers are to be built here and the plan is to empty them into Bear Creek.

It is said that the proprietor of the said real estate development scheme proposed to extend sewerage facilities to the grounds of the Corry Fair and Driving Park Association nearby. A trunk sewer to carry the sewage from this locality to a point in Hare Creek where the other sewers empty would have to be about a mile in length. Private sewers should not be constructed unless in conformity with a general plan for improved sewerage for the entire city, because ultimately such sewers must be taken into the public system, or their use abandoned and the money expended therefor wasted.

When the location of the thirty-six inch trunk sewer was under consideration by the borough authorities, it was deemed advisable to discharge the sewage from it as near as possible to the forty-eight inch outlet. The surrounding ground is from one to two feet higher than the tops of the outlet. During improvements made by the Erie Railroad Company at the point the city acquired about twenty-two acres of land immediately below the sewer outlets. This tract is meadow land from four to five feet above the normal level level of the creek. Adjoining this tract there are twenty-five acres of similar land available for a sewage disposal plant. The entire valley of Hare Creek in this vicinity is subject to frequent floods, the land often being several feet under water, so the site of a sewage disposal plant would have to be dyked off.

The Howard tannery above mentioned is engaged in the manufacture of sole leather. At the works about three hundred and fifty hides are used per day. A portion of the waste water is pumped to a settling tank and there treated with lime and the sludge is used as a fertilizer on the adjoining fields. Some attempt to filter the effluent from the tanks through gravel has been made. The effluent is now discharged directly into the run from about five hundred feet of ten inch pipe. Overflow from the vats in the easterly building next to the road frequently runs down the bank to the road gutter. Recently the settling tanks have been rebuilt and are enclosed in a wooden building to protect them from the weather. Winton Run, from the tannery to Hare Creek is now enclosed by a wire fence. The Company submitted plans for an improved sewage disposal plant to the Department of Health.

Immediately above the entrance of Winton Run into the creek there is a farm formerly owned by H. S. Ayers. It is reported that this property now belongs to to the Howard Tannery Company. This farm is operated as a dairy, there being about forty cows kept here. The milk is sold to a creamery in Columbus borough. The cows are pastured along the banks of Hare Creek below the entrance of Winton Run and access to the water is always possible. Four cows have died on the farm during the current year, one about July fifteenth, one about June twentieth and two in the spring, so it is reported. In the summer of nineteen hundred and seven an outbreak of anthrax among cattle on the farm of H. S. Ayers was attributed to the tannery waste pollution of the waters of Hare Creek. As a result of special investigations conducted by the Department, on October twenty-fourth, nineteen hundred and seven, the following communications was sent by the Commissioner of Health to the tannery company:

"Gentlemen:—

"As you have been made aware, this Department has been investigating the matter of the pollution of the streams in and about Corry in relation to the prevalence of disease among cattle pastured along the banks of the streams. This is to notify you that the wastes of your tanneries at Columbus township and Spring Creek township, Warren county, which wastes are being discharged into the waters of the State, have been found by us to contain sewage organisms in large numbers and B. Anthracis, a virulent and deadly infection fatal to both man and beast. Furthermore, that the evidence collected supports the contention that the cattle pastured along the streams into which the tannery sewage flows directly or indirectly are menaced in life and health thereby, and that such cattle as have suddenly sickened and died from the diseases diagnosed as anthrax probably contracted said disease by reason of the discharge of tannery wastes into the waters of the State.

"I have determined that it is necessary in the interests of public health that all tannery refuse shall cease to be discharged either directly or indirectly into Broken Straw Creek or any tributary thereof, and I hereby notify you of the importance

of submitting for approval not later than December 1, 1907, plans for the purification of the tannery sewage and the sanitary disposition of all deleterious wastes from the works. An early reply will be greatly appreciated.

"Yours very truly,

"(Signed) SAMUEL G. DIXON,

"Commissioner of Health."

"S. C.

The following letter was sent on the same day to Mr. H. S. Ayers:

"Dear Sir:

"This is to inform you that I this day notified the tannery and the city to submit plans for some other disposal of sewage than into the waters of the State and meantime, I am notifying the public through the press to prevent domestic animals from drinking the waters of these streams and I shall post notices along the streams, individually communicate with each farm owner or occupant and do all those things demanded in the interests of public health that I have authority to do in such matters. I trust the time will come when public sentiment will acclaim so loudly against the defiling of the waters that man and beast must use, that the practice of putting sewage into streams will cease. This Department is doing all it can in this work.

"I am,

"Yours truly,

"(Signed) SAMUEL G. DIXON,

"Commissioner of Health."

"S. C.

The following warning notice was advertised in the newspapers:

COMMONWEALTH OF PENNSYLVANIA.

DEPARTMENT OF HEALTH.

"*Warning.*

"The waters of Broken Straw Creek and its tributaries below Corry city, which receive the present sewages are a menace to the lives and health not only of man but of beast who drink the waters or bathe therein. It has become apparent from particular investigations in the valley of said creek that the interests of public health demand that pending the adoption of some other means of sewage disposal, the streams mentioned should not be used for domestic purposes and that cattle should not be permitted to wade in or drink such waters. The public, therefore, will take notice and be governed accordingly.

"SAMUEL G. DIXON,

"Commissioner of Health.

"Harrisburg, Pa., October 24, 1907."

Notices were sent to the Board of Supervision of townships along Broken Straw Creek, urging prompt action in the placing of guard or fences at crossings of public highways and the streams into which tannery refuse was being discharged at points above. Every owner of a farm in the valley was also personally corresponded with, advising the keeping of domestic animals away from such polluted streams. On October twenty-fourth, the following letter was sent to the Mayor of Corry City:

"My Dear Sir:

"This Department will be glad to consider for approval plans for the treatment of the city sewage, more especially since the pollution of the stream into which it is discharged is a menace to health not only of the beasts who graze in the pastures abutting the streams and drink of its waters but man himself who uses the milk, cream and butter and the flesh of such animals for food.

"The prevalence of anthrax among cattle owned by the farmers whose properties are along the stream below Corry city complicates the danger and in taking cognizance of the circumstances and moving to bring about a cessation of the pollution by tannery sewage, the State must consistently require the municipal corporation to do likewise.

"I am about to notify the public in Broken Straw Creek valley to desist from using for domestic purposes and to prevent animals from drinking the waters of this stream or tributaries into which municipal and tannery sewage is discharged.

"Yours truly,

"(Signed) SAMUEL G. DIXON,

"Commissioner of Health."

"S. C.

Plans have been prepared and submitted by the tannery company and are now under consideration by the Commissioner of Health for an improved method of treating the tannery refuse.

The city does not represent that the interests of public health are subserved by the discharge of sewage or tannery wastes into the waters of the State, and all the facts hereinbefore recited are proof positive to the contrary. However, Corry city has nearly reached its borrowing capacity. If reports be true, there is a margin of a few thousand dollars only. Hence the municipality is not able to take up the construction of a sewage purification plant, but it is able to take up a study of the improved sewerage problem and to devise a plan which will lead up eventually to the treatment of the sewage. After such a plan has been approved by the State Department of Health, the city can build, or change over, its sewerage system and lay down new sewers in other parts of the town where sewerage improvements are needed, and do this work by the most economical and efficient plan, so that no part of the work so done need ever be reconstructed.

One thing must be accomplished at the earliest practicable moment, and that is the collection of all the sewage in the city at one point and the plan for future sewerage of the city must have this object in mind. No sewage shall be discharged into the valley of French Creek. If sewers are built in that portion of Corry city, the flow from them should be pumped over into the main district sewers. If sewers must be built in the valley of Bear Creek with a temporary outlet into the stream, this work must be done as a part of the comprehensive sewerage plan of the city. The city councils should not authorize the construction of or permit the laying of private sewers unless it be done in conformity with a general plan for the ultimate collection and treatment of all of the sewage in the city.

Furthermore, the existence of overhanging privies on the banks of streams in the city should be discontinued. The State Department of Health will cause an investigation to be made of all occupied estates on the watershed of Hare Creek above the city and the water company's pumping station, in order to render the waters of said stream which may be used for emergency purposes for the supply of water to the public in Corry as pure as it is possible to make them in their natural condition of flow in the creek.

It has been determined that the interests of the public health will be subserved by granting a permit and a permit is hereby and herein granted to the city of Corry to build the sewers in the streets specifically mentioned and in these streets only and to discharge the sewage therefrom through existing sewers into Hare Creek, under the following conditions and stipulations.

FIRST: That said sewers shall be built as sanitary sewers and that all storm water shall be excluded therefrom. Said sewers shall be so designed as to become a part of a general system of sanitary sewers for the entire city. The sizes of the proposed sewers can be reduced materially with safety and economy and the special attention of the city authorities is called to the discussion hereinbefore made relative to this point.

SECOND: The city shall, on or before December first, nineteen hundred and eight, prepare a complete and accurate plan of its existing sewer system and file the same in the office of the Commissioner of Health, and on or before July first, nineteen hundred and nine, the city shall prepare a comprehensive plan of sewerage for the entire city and for the collection of sewage proper and its treatment in purification works, and this plan shall be submitted on or before said date to the Commissioner of Health for approval. When it shall be modified, amended or approved and a permit issued therefor, the city shall then conform in the laying down of sewers to this plan.

THIRD: This permission to discharge sewage into the waters of the State shall cease on July first, nineteen hundred and nine. If on that date the terms of this permit shall have been complied with, then the Commissioner of Health may extend the time in which sewage may continue to be discharged into the waters of the State.

The co-operation of the Department will be gladly given, should the city desire it, in the study of the improved sewerage problem.

Harrisburg, Pa., September 15, 1908.

CORRY CITY, ERIE COUNTY.

J. W. & A. P. Howard & Co. Ltd.

This decree was issued to the K. W. & A. P. Howard and Company, Limited, tanners of sole leather, of Corry city, Erie county, Pennsylvania, relative to the discharge of sewage from the tanneries of said company into the waters of the State.

It appears that on October twenty-fourth, one thousand nine hundred and seven, the Commissioner of Health sent the following communication to J. W. & A. P. Howard and Company, Limited, tanners of sole leather, Corry city, Erie county, Pennsylvania:

"Gentlemen:—As you have been aware, this Department has been investigating the matter of the pollution of the streams in and about Corry in relation to the prevalence of disease among cattle pastured along the banks of the streams. This is to notify you that the wastes from your tanneries at Columbus township and Spring Creek township, Warren county, which wastes are being discharged into the waters

of the State, have been found by us to contain sewage organisms in large numbers and B. Anthracis, a virulent and deadly infection fatal to both man and beast. Further more that the evidence collected supports the contention that the cattle pastured along the streams into which the tannery sewage flows directly and indirectly, are menaced in life and health thereby, and that such cattle as have suddenly sickened and died from the disease diagnosed as anthrax, probably contracted said disease by reason of the discharge of tannery waste into the waters of the State.

"I have determined that it is necessary in the interests of public health that all tannery refuse and sewage cease to be discharged either directly or indirectly into Broken Straw Creek or any tributary thereof, and I hereby notify you of the importance of submitting for approval, not later than December first, nineteen hundred and seven, plans for the purification of the tannery sewage and the sanitary disposition of all deleterious wastes from the works. An early reply will be greatly appreciated."

On February twenty-ninth one thousand nine hundred and eight, the said company made written request for approval of plans and represented as follows:

"That complaints having been made by property owners along Hare Creek that the sewage from our tannery being discharged into Winton Run a tributary of Hare Creek pollutes the waters and thereby injures the same for grazing purposes and otherwise, and that in consequence of such complaints in order to avoid future allegations of this character, we desire to construct in connection with our present sewer system a filtration plant to treat the sewage from our plant prior to its being discharged into the stream."

The J. W. & A. P. Howard and Company, Limited, does not by any statement herein, or in the annexed statement admit, but expressly denies that any sewage or other matters are being, or have been, discharged from the within premises which are deleterious or which pollute any of the waters or above streams, and saving and reserving all legal rights which the J. W. & A. P. Howard and Company, Limited may now have in the premises."

The J. W. & A. P. Howard Brothers' tannery is located in the extreme western part of Columbus township, Warren county, on land adjacent to the eastern line of the city of Corry, Erie county, Pennsylvania. Said line is also the boundary between Erie and Warren counties.

The main line of the Philadelphia and Erie Railroad and also the main public highway leading from Corry city easterly pass by or through the tannery property and down Broken Straw Creek Valley. For most of the distance to where the stream discharges into the Allegheny river at Irvineton station, some twenty miles from Corry, it may be observed from the passenger coach window.

Hare Creek rises in Chautauqua county, New York state about six miles above Corry, passes through the city and thence by and a short distance north of the tannery, and immediately below the tannery through the farm of H. S. Ayers, finally emptying into Broken Straw Creek about two and a half miles southeast of the tannery property.

Broken Straw Creek also rises in New York state and takes a generally southeasterly course coming down through Columbus borough three miles east of Corry city, in Warren county, and thence passing through Spring Creek village in Spring Creek township and Garland and Pittsfield in Pittsfield township and through Youngsville borough and Irvine, all in Warren county, to the Allegheny river which it enters at a point about four and a half miles below the borough of Warren. The stream traverses a total distance of about thirty miles and drains a watershed of over three hundred square miles of wooded hills and cultivated valleys with nothing markedly characteristic with respect to run-off.

Hare Creek in the vicinity of Corry and the tannery has an average width of about thirty feet. The banks are in the neighborhood of six feet in height. The adjacent lands on either side is low, flat and swampy and subject to inundation during floods. The channel is extremely crooked and the flow sluggish and the volume small during the summer. The large amount of sediment on the bottom and sides is noticeable, even to a casual passerby.

A small branch called Winton Run heads in the township about a mile south and flows northerly through the tannery property, emptying into Hare Creek about twenty-eight hundred feet north of the tannery. It has a total length of two and two tenths miles and a drainage area of about three square miles. This run which naturally contains but little water, except during heavy rains receives the drainage from the tannery and its channel operates as a settling basin for the solid wastes discharged into it. The color of the water is dark red and the odors from this run and from the creek to where it discharges into Broken Straw Creek are strong and noticeable to travelers on the public highways and to the people living in the vicinity.

Above Winton Run in Hare Creek fish are observed to live and here the water is comparatively clear except so far as it is polluted by Corry city sewage. The main sewer outlet is into the creek about four thousand feet above Winton Run. Below said run in the creek, large numbers of dead fish are found. The fact is charged by residents to the sewage and tannery pollution, particularly to the latter. There is no marked contamination of the creek above the city, for there are no villages there, the territory being agricultural with usual conditions found about farm buildings.

The general condition of Broken Straw Creek from the mouth of Hare Creek to Youngsville borough, a distance of about eighteen miles, is bad, the water in the stream being dark colored and the evidences of tannery pollution are plainly seen along the banks and in the bed, the sides of the channel being covered with a black deposit which increases in amount from Youngsville up stream fourteen miles to Spring Creek village where there is a tannery. Here the water in Broken Straw Creek is very black, so that the bed of the stream is entirely obscured. Above the spring creek tannery the distance is about six miles to the said Howard Brothers tannery and in this stretch of the water course the evidences of pollution become intensified as one approaches the latter tannery.

The Howard Tanning Company is an independent concern engaged in the manufacture of sole leather. The capacity of the plant is about three hundred and fifty hides per day. The greater bulk of the hides comes from Chicago, Kansas City and Dallas, Texas. Some are obtained from Cleveland, Buffalo and Pittsburg, one or two bales from China have been received; the latest one in nineteen hundred and six. It is reported that South American hides have not been used at the works during the past eight years.

The raw stock is first placed in a store house and drawn upon as wanted and put in soak and kept there for two or three days for the purpose of cleaning. These tanks are called wash tanks. Next it is placed in lime water and kept there until the hair is loosened so that it may be readily removed. After the hides are cleaned of hair, they are placed in vats containing, so it is said, one part of sulphuric acid and one thousand parts of water to receive what is called the plumping process by means of which the pores of the hides are opened so that they will take the tanning liquids. After this the hides are placed in vats containing solutions of tanning liquor of increasing strength and moved forward until the tanning process is completed. Washing in pure water is then accomplished and afterwards, if a hide is not light enough in color, it is bleached in water and sal soda and then given an application of coal oil to secure a gloss or polish. After another washing with water and a little cod or mineral oil treatment the hide is rolled and ready for market.

All hair is washed in pure water and then dried by steam and sold for commercial purposes. The bulk of the lime is also saved, as it is valuable for fertilizer.

The flesh which is removed from the hides, known as fleshings, is mixed with lime and exported principally to glue manufactories.

The liquid wastes from the different vats is conducted outside to the run and to settling tanks from which the sludge and deposits are removed and disposed of commercially, if possible. Generally the sludge is used for fertilizer on adjoining lands. The portion of the sediment that is of no value is spread on the fields owned by the tannery company and adjoining the works near Hare Creek. The liquids overflow from the basins into the tannery run.

The consumption of water at the works is about one hundred and fifty thousand gallons per day taken from wells located west of the plant. The Corry Water Company has a main into the tannery.

There are several pipes discharging wastes directly into the run. The overflow from the vats in the easterly building next to the road frequently runs down the bank to the road gutter. The run from the tannery to Hare Creek is enclosed by a wire fence.

Spring Creek Tannery, previously mentioned, is located on the north side of Broken Straw Creek in the lower part of the village of Spring Creek and about two hundred feet from the stream. The plant is owned and operated by the said Howard Brothers, has a capacity of about one hundred hides daily and the same process of tanning is used as at the works on Hare Creek.

A settling basin receives the liquid refuse from the plant, the overflow therefrom being to the swampy bottom lands along Broken Straw Creek and eventually finding its way into the creek. A privy is also located over this settling basin.

It was ascertained at the time of the Department's inspection at these works during the summer of nineteen hundred and seven, that there was considerable sickness among the stock of farmers whose property abuts the streams below the two tanneries. The common testimony of the farmers along the stream was that the waters thereof are grossly contaminated at intervals and that many fish die in the waters, and that the odors are a nuisance.

The existing refuse disposal works at the tannery near Corry comprise a twelve inch vitrified sewer passing underneath the bed of Winton Run to a pump well, pumping machinery and four sedimentation tanks, and an outlet pipe to Winton Run. The tanks have been improved and a roof built over them during the present season.

There is a screen chamber adjacent to the tannery building and from it a twelve inch pipe on a grade of eighteen inches per one hundred feet passes under the bed of the creek to the pump well. Here the lift is about ten feet. It is understood that at present one hundred and fifty thousand gallons are raised by the pump in twelve hours and that during the other portion of the day the pump is not operated.

There are four tanks built of wood set side by side each forty-eight feet long twelve inches wide and six feet deep to flow line. The liquid passes in at one end of the compartment and at the opposite end into a second compartment and thence into and out of the other two tanks in a similar manner and through a ten inch pipe about eight hundred feet long to Winton Run. Heretofore the tanks

were open, now they are being enclosed with a wooden roof. Possibly seventy per cent. of the suspended matter is deposited into the first one of the tanks and at least five per cent. of the remaining suspended matter is deposited into the other three tanks. In the effluent the matter in suspension consists of small particles of gass. Lime is used as a precipitant but the extent of the use of this precipitant is not known to the Department.

The total capacity of the four tanks is one hundred thousand gallons. The rate of pumpage during the twelve hour period is three hundred thousand gallons per twenty-four hours, hence during this period the rate of discharge of the liquid as they fill up this rate is accelerated. These figures are on the assumption that the flow from the tannery works is uniform during the twelve hours at the rate stated.

The Tanning Company proposed to continue the use of the four settling tanks and to treat the effluent by filtration. Adjacent to the tanks and at about two feet lower, two filter units are to be constructed. They are to be set side by side and each to be seventy-two feet long, eight feet wide and eighteen inches deep, bottom and sides of concrete construction. In these compartments, cinders screened from boiler ashes are to be placed. The tank effluent is to be introduced under these filters at one end over a weir. The liquid is to pass laterally through the center and out over a weir at the top of the opposite end into a trough leading to a pipe extending to the run. Two units are provided so that when one is being cleaned out the other may be in commission. It is proposed to use these beds continuously and an automatic arrangement is to be provided to secure an even and continuous flow from the settling tanks. Evidently, therefore, the settling tank liquid is to be drawn down, but the plans submitted do not show this to be possible of accomplishment by gravity.

Each bed filled with filtering material will have a total space of voids equivalent in volume to thirty-two hundred gallons. If the one hundred and fifty thousand gallon output be distributed evenly over the twenty-four acres then the thirty-two gallons would pass from the tanks in about a half hour. So the liquid in passing through the filter would not be subjected to more than a straining process, and after the strainer has become filled up with suspended matters, then the liquid would pass bodily from the surface of the filter, and even before this clogging up of the strainer, the liquid would, in taking the line of least resistance, pass over the surface of the bed to the outlet weir.

No plans have been submitted by the proprietors for the treatment of the refuse from the Spring Creek township plant.

Relative to the Corry works proposed, ninety per cent. of the suspended matter should be thrown down into the settling tanks if properly regulated doses of lime as a precipitent be mixed with the influent. The sludge should be removed at regular and frequent intervals onto drying out beds, from which the liquid drainage is conducted back to the pump well.

A strainer such as is proposed would not accomplish the removal of suspended matters in an economical manner. The tank effluent should be distributed onto the surface of the strainers and the filtrate should be collected at the bottom by underdrains. The dimensions of the proposed filters therefore, are not best adapted to this subject. Units half as long and twice as wide with a distributing trough down the center with short laterals at intervals on either side would be a better arrangement. Such a strainer would accomplish nothing more than a further removal of suspended matters.

A far better arrangement would be to raise the tank effluent by the pumps into a tank to be erected above the pump well from which the liquid would flow by gravity to and be distributed through nozzles into a sprinkling filter to a depth of several feet. Any organic suspended matters brought over in the effluent from the tanks would be collected in this filter and undergo a change in form.

Furthermore, some further destruction of bacterial life should be accomplished by the sprinkling process.

The effluent from this structure should then be conducted to a concrete collecting vessel where chloride of lime or some other germicide should be introduced to sterilize the filtrate, and where, when the sprinkling filter unloads these accumulated suspended matters, such material may settle out.

The cost of a lay-out of this kind ought to be moderate and its operation should effect a satisfactory effluent.

All of the liquid output of the plant and domestic sewage should be collected and delivered to and treated in the disposal works.

There are many ways of adapting modern methods of handling trade wastes at the tannery under consideration.

It has been determined that the Commissioner of Health should notify the said Howard Tannery Company and said company is herein and hereby notified that the plans submitted and herein under consideration, if modified as suggested and if built and operated in a careful manner, should prove satisfactory, provided all of the sewage and trade wastes at the plant be collected and treated in such works.

Furthermore, it has been determined that the Commissioner shall notify and said company is herein and hereby notified that it must on or before December first, one thousand nine hundred and eight, satisfactorily treat its trade waste output and sewage output from its plant situated in Columbus township, Warren County, and its trade waste output and sewage output from its plant situate in Spring Creek

township, Warren County, so that all sediment from such plant shall be kept out of the waters of the State and all pathogenic organisms in the trade wastes and sewage from said plants shall be kept out of the waters of the State.

Harrisburg, Pa., September 16th, 1908.

DANVILLE, MONTOUR COUNTY.

This application was made by the borough of Danville, Montour County, and is for permission to extend its sewer system and to discharge the sewage therefrom untreated into the Susquehanna River.

It appears that Danville is a manufacturing borough situated on the north bank of the North Branch of the Susquehanna River in Montour County about eleven and one-half miles above the boroughs of Sunbury and Northumberland, where the North and West Branches of this river unite. It is bounded on the north by Valley Township and on the east and on the west by Mahoning Township. Through the central part and paralleling the river and the abandoned State canal and distant from the latter about five hundred feet and from the former about eighteen hundred feet are the tracks of the Delaware, Lackawanna and Western Railroad. Between these tracks and the canal in the village is Sechler Run flowing westerly to Mahoning Creek, a stream rising several miles northerly and coursing the river through the western part of Danville. The Catawissa Branch of the Philadelphia and Reading Railway passes through the northern part of the borough. A highway bridge over the river at the foot of Mill Street to the borough of Riverside on the south bank affords a bus connection with the Pennsylvania Railroad at a station in the latter borough.

The present population is estimated to be nine thousand. In nineteen hundred it was eight thousand and forty-two and in eighteen hundred and seventy it was eight thousand, four hundred and thirty-six. There may be some increase in population in the near future, attributable to the location in the borough of the Pennsylvania Brake Beam Company. The local Board of Trade is making efforts to induce other industries to locate in Danville. At the present time there are Iron, Tubing, Stove Foundry and Machine Works, Silk and Knitting Mills, and Clothing factories among others.

In the northeastern part of the built-up portion of the borough is on the hillside at an elevation rising one hundred and fifty to two hundred feet above the river. Throughout the town the surface slopes are generally good and the numerous runs and creeks afford natural channels for surface drainage. In the immediate vicinity of the river and Mahoning Creek, the elevations are such as to bring the surface above flood level, and even in the lower parts of the borough the inundation is not serious except at times of unusual freshets. Mill Street, the principal highway of the town, is paved with brick, but the other streets have not been permanently surfaced.

The water works are owned by the municipality, the supply being taken from the river through a filter crib located just below the bridge to Riverside. The water is raised to a mechanical filter plant installed in eighteen hundred and ninety-five and it is reported that all of the supply furnished to the public is filtered. The average consumption is one and one-half million gallons per twenty-four hours.

There are a few private water supplies in use in the borough aside from domestic wells. There are also a few springs to which the public have access.

The Danville Structural Tubing Company, employing about four hundred and fifty hands, located along the south of the canal several blocks above Mill Street, uses water from Sechler Run on the opposite side of the canal.

The Pennsylvania Brake Beam Company, whose plant is located along and north of the canal east of the built-up part of the town, purposes to obtain water for manufacturing purposes from the canal.

The Hanover Brewing Company's plant is near the north borough line, east of the village in the valley of Blizzard Run, which passes under the two railroads and empties into Sechler Run opposite the Danville Structural Tubing Company's Plant. The brewery uses city water for brewing and spring water for boiler purposes, washing kegs, etc. This spring is planked over the town but is liable to receive surface drainage at times of heavy rains. When Blizzard Run is under freshet conditions, the water backs up over the spring.

The Reading Iron Company, employing between five hundred and six hundred hands, has its works between the canal and the railroad west of Mahoning Creek, opposite the mouth of Sechler Run. Here the creek water is used for manufacturing purposes and city water for drinking.

The Danville Knitting Mill Company, employing two hundred hands, have works between the canal and Sechler Run on Church Street. City water is used for drinking purposes during the winter, but during the summer water from a spring near the Delaware, Lackawanna and Western Station. It is about ten feet beneath the present surface of the ground. It originally outcropped north of the tracks, but after the land was filled up the water came out south of the tracks nearer the run. At that time a pipe was laid from the new spring to a small pump well on the side of the run from which water is raised for use by the said Knitting Mill Company. There is also a branch pipe out of which this spring

water flows into the air where people in the vicinity are accustomed to get their supply of water. It is said that analyses of the water have never revealed contamination and that no sickness has ever been attributed to the use of the spring.

The Danville Stove and Manufacturing Company employing about two hundred and twenty-five hands, obtains its water from a well lined with concrete masonry for a distance of fourteen feet down, and is banked up around the top to protect it from surface drainage. There is another well on the premises from which water is obtained for manufacturing purposes. The plant is located in the eastern part of the borough on the Delaware, Lackawanna and Western Railroad near Sechler Run.

The F. Q. Hartman Silk Mills, employing about two hundred and eighty-five hands, located on the banks of the river several blocks north of Mill Street, obtain water for condensing purposes from the river. City water is used for all other purposes.

There is a spring near the corner of lower Mulberry Street and Pearl Street near Blizzard Run on property of the Reading Iron Company which has been used to some extent by people living in the vicinity. The spring is not well protected against surface drainage and might therefore become polluted. It is not very extensively used at the present.

There is a spring on Mill Street near the northerly end of the borough known as "The Iron Mine Spring." It is reported that water from this spring is piped to the tank on the grounds of the Reading Iron Company at the plant first mentioned. The supply was formerly furnished to the employes of the company and it is said that some of them still resort to this tank for their drinking water.

A great majority of the inhabitants permanently use the public water, but there are in the neighborhood of twenty individual wells reported besides the private supplies hereinbefore enumerated. The presence of typhoid fever in the community therefore, more particularly since the infection has not been traced to the private sources, directs suspicion to the river water, which is known to be polluted by sewage. A few cases of typhoid fever exist in the town at the present time, the origin of which is not known. Recourse to records, which are not wholly reliable, give the following cases and deaths from typhoid in Danville since eighteen hundred and ninety: In eighteen hundred and ninety-two, eight cases and three deaths; in eighteen hundred and ninety-three, seven cases and one death; in eighteen hundred and ninety-four, four cases and no deaths; in eighteen hundred and ninety-six, five cases and no deaths; in eighteen hundred and ninety-seven, nine cases and one death; in eighteen hundred and ninety-eight, eight cases and three deaths; in nineteen hundred, three cases and no deaths; in nineteen hundred and one, three cases and no deaths; in nineteen hundred and two, four cases and one death; in nineteen hundred and four, twenty-six cases and one death; in nineteen hundred and five, thirteen cases and one death; in nineteen hundred and six, thirty-eight cases and four deaths; in nineteen hundred and seven, seventy-one cases and seven deaths; in nineteen hundred and eight, thirty cases and one death to date.

Probably the greatest number of cases have been reported beginning in nineteen hundred and four. Prior to that time the records are extremely unsatisfactory and not worthy of acceptance. In November and December of nineteen hundred and seven there were twenty-two and thirty-one cases of typhoid fever respectively, under circumstances indicating sudden infection widely distributed. The most common medium of transmission of the disease being water and the fever being persistent and apparently on the increase year by year dictates that there should be a careful examination of all sources of water supply both public and private in Danville, that where possible, sources of pollution should be obviated, and in some instances possibly the use of the water should be discontinued.

The existing sewers comprise about four miles of pipe ranging in size from eight to twenty-four inches in diameter. The sewers are on the separate system with one exception, mentioned later, and discharge into the river at two outlets; one just below the water works pumping station, the other several hundred feet further down stream and Below Chestnut street. The system emptying through Chestnut street outlet which is twenty-four inches in diameter, comprises about three and four tenths miles of pipe. They are laid in the streets of the district lying north of Mahoning Creek and Sechler Run but laterals south of said run in Mill and Penn streets and vicinity serve a small but important district tributary to Mahoning Creek.

The main sewer extends northerly from the Susquehanna river to and under Mahoning Creek and thence it passes along the north bank of said stream easterly to near the canal aqueduct where it passes under said creek to a manhole whence a sub-main of size not stated extends southerly to Penn street, and whence an eighteen inch main extends northerly under the canal to Sechler Run whence it continues easterly up and along the bed of said run to east of Church street where it cuts across private land and under the Delaware, Lackawanna and Western Railroad to Blizzard Run at Mulberry street and thence up along the bed of this stream to between A. and B. streets. There is a sub-main connecting to the eighteen inch pipe at the foot of A. street. It serves the district north of the Philadelphia and Reading Railway. The district between the latter and Sechler Run is secured by another sub-main which joins the eighteen inch pipe near Mill street.

The district abutting Mahoning Creek is served by a sub-main and follows along the alley near the creek to the eighteen inch pipe near the aqueduct. No definite information as to size and grade and condition of these various sewers has been submitted by the borough, excepting the sub-main district of A. street. It is reported that the information is lacking.

The sewers emptying into the other outlet just below the water works comprise about sixty-one one hundredths of a mile of pipe, the size of which the borough is unable to state with positiveness. The district served, though small, is important. There is a catch basin at the corner of Mill and Front streets, from which surface drainage is conveyed into the main sewer. This is reported to be the only connection for surface water anywhere in the borough.

There are a number of houses having roof water connections to the sewers. The main sewer laid under the bed of the two runs, receives considerable water by seepage through the joints, so it is reported. With the exceptions noted, rain water is discharged upon the surface of the ground and finds its way to the nearby stream by means of street gutters.

The State hospital for the insane occupies the tract of land in Mahoning township for a mile along the river immediately east of the borough. The buildings are adjacent to the town and sewage therefrom when not used for road irrigation is discharged into Hospital Run which at the present time empties into the canal. The water in the canal consists of a series of stagnant shallow pools. The pollution from the hospital makes the canal offensive and has been the cause of numerous complaints by citizens and the borough authorities.

A State appropriation has been made to extend Hospital Run to the river and the work is about to be undertaken. The State has also made an appropriation for an adequate sewage purification plant on the premises. When these two things are done the nuisance in the canal will be abated so far as the State contributes to the nuisance, and the drainage after treatment will go into the river.

However, there are a number of other places within the village from which private properties contribute to the canal nuisance. The Pennsylvania Brake Beam Company turn water closet drainage into the canal, the water from the scrubbers at the Standard Gas and Electric Light plant finds it way to the canal and so does condensing water from the Danville Foundry and Machine Works. The Danville Steam Laundry is reported to discharge all waste water into the canal, and privies in the rear of dwellings along the banks are liable to cause some pollution of canal water.

It is generally admitted that consideration for public health demands that the canal shall be properly drained and be kept free from stagnant water. When the canal was built the borough's natural drainage was somewhat changed and now storm water reaches the canal and thence to the creek. The present owner of the artificial waterway, the Delaware, Lackawanna and Western Railroad, sometime since made a proposition to Danville to build a drain in the bed to take away storm water, provided the borough would fill up the canal; but the size of the pipe proposed was too small. However, an agreement was reached that the railroad would contribute six thousand dollars towards a drain and this money is now available, so it is reported. The local authorities desired the building of a joint combined sewer two feet in diameter at the creek reducing to twenty inches at the upper end of the State Hospital. By this plan the State, the railroad and the borough would contribute to the cost of the sewer to the canal and ultimately these interests would join in the erection of sewage purification works; but the plan was disapproved by the Commissioner of Health because the State should not be a party to a project for the discharge of sewage into a stream, more especially since the immediate erection of sewage purification works at the State Hospital is assured, while a plant capable of treating the large volume of sewage and storm water which the canal sewer would carry would be prohibitive in cost.

Besides the canal nuisance there are private sewers emptying into the streams in the village. Below Chestnut street from four premises there is a private sewer pipe discharging into the creek, one only takes closet drainage. Above Chestnut street eight private sewers discharge into Mahoning Creek. There are eight residences belonging to one estate on the north side of Church street from which water closet drainage is discharged into Sechler Run.

It is reported that at the Hartman Mills on the banks of the river a quarter of a mile above the water works intake the drainage from lavatories goes to the river.

On Blizzard Run just outside of the borough is a drain from a slaughter house and at the Reading Iron Company's Northumberland street plant there is direct sewage pollution of the creek by an overhanging privy.

Besides the methods of sewage disposal about fifty cesspools and fifteen hundred privies are in use and according to the statement of the petitioners the residents in the unsewered districts in the borough are greatly inconvenienced by the present methods of cesspool and privy vault disposal and hence the proposed sewerage system.

It is intended to build an eighteen inch sewer from the twenty-four inch main near the aqueduct along and in the bed of the canal through the village easterly a distance of about a mile and a half and connect with it sewers in the lateral streets in the unsewered district between the canal and the river, most of the pipe being eight inches in diameter. The sub-main in Market street will be ten inches and twelve inches in diameter. Lateral extensions to existing sewers should also be

made from time to time in the other districts, of the borough, more particularly for a length of four hundred and fifty feet in Mahoning street west of Mill street to collect the drainage from the houses from which sewage is now being discharged into Mahoning Creek.

The proposed extensions will amount to possibly seventy per cent. increase of the length of sewer system now owned by the borough. At Sunbury the river is used as a source of public water supply, also at Marysville and at Enola to meet deficiencies and at Harrisburg and other places further down stream.

In view of the term of life of certain pathogenic organisms and the short space of time required for water to pass from Danville to Sunbury and to Harrisburg, specially during freshets, it is clearly evident that the discharge into the river at Danville constitutes a menace to the health of those people below who rely upon the river as a source of public water supply. Therefore, the borough of Danville should make preparation to purify the borough sewage at as early a date as practicable. The State has made appropriation and its officers have devised plans for modern sewerage and sewage disposal works for the Danville State Hospital which plans will be executed as approved immediately.

The assessed valuation of the borough is reported to be two million, four hundred and twenty-five thousand dollars and the bonded indebtedness one hundred and twenty-nine thousand, eight hundred dollars. If these figures be correct the municipal borrowing capacity is in the neighborhood of forty thousand dollars, so it would appear. Existing bonds partly cover the loans for the proposed sewer extension but additional bonds will be required to complete the construction. Entrance fees for sewer connection is levied upon the property owner. These are calculated to reimburse the borough for the cost of the sewers when the properties have all been connected to the system; but there is no compulsory ordinance relative to connection. The borough owns its own electric plant which is operated in connection with the pumping station of the water works. Under these circumstances, while the town is possessed of its public utilities which are valuable assets, its inability to undertake the immediate construction of a sewage purification plant is evident because even forty thousand dollars would be an insufficient sum to pay for sewage works.

Before a plant can be installed to treat all of the sewage of the borough, all storm water and large leakage and most roof water must be excluded from the sewers. Studies must be made to determine the best plan of gathering the sewage of the entire borough at one point and its delivery thence to the disposal works. A site should be selected for the latter and a detail plan shall be prepared, together with estimates of cost and all of these as a complete design should be submitted to the Commissioner of Health for approval. The plan as finally adopted should then control all sewer work.

The borough is amply able to assume this small cost of preparation of plans and it should be done at once.

It has been determined that the interests of public health will be subserved by granting a permit and it is hereby and herein granted for the proposed sewer extensions under the following conditions and stipulations:

FIRST: That all storm and roof water be excluded from the proposed sewers, that particular pains be taken in the construction of the sewers and in making the pipe joints tight.

SECOND: On or before July first, nineteen hundred and nine, the borough shall prepare and submit to the Commissioner of Health for consideration a complete plan for sewering the whole borough and conveying all of the sewage to one outlet and for the purifying of the sewage before discharging it into the river.

THIRD: At the close of each season's work the borough shall file a satisfactory plan with the Commissioner of Health of the sewers laid during the year, together with any other information in connection therewith that may be required in order that the State Department of Health may always be advised of the extent of the public sewer system and the use thereof.

FOURTH: No pathogenic material from any laboratory shall be discharged into the sewer system, the proper authorities shall cause these wastes to be incinerated on the premises.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the sewer system, or any part thereof, has become a nuisance to public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

SIXTH: This permit to discharge sewage into the waters of the State shall cease on July first, nineteen hundred and ten, contingent, however, on the other terms of this permit having been complied with. If the other terms of this permit be complyed with then on said date the Commissioner of Health may extend the time in which sewage may continue to be discharged into the waters of the State provided the interest of the public health require it.

The Commissioner of Health will notify the owner of the mill from which sewage now goes into the Susquehanna river above the borough water works intake that this practice shall cease immediately. The Commissioner will also notify other property owners in the borough who are now discharging sewage into the waters of the State that this must be discontinued.

The State Department of Health will compel owners of property to act as aforesaid if within a reasonable time the borough were to fail to provide adequate sewerage facilities.

The State Department will make a series of tests of public and private drinking water in the borough and communicate the result to the local Board of Health. Wells and springs found contaminated should be forthwith abandoned or their use discontinued. The co-operation of the borough authorities is solicited.

The borough council is advised to consider the compelling of sewer connections on every estate more especially where the methods of sewage disposal are unsanitary. This matter in connection with the drinking water question cannot be too strongly urged as a practical health precaution. Typhoid fever is altogether too prevalent in Danville.

Harrisburg, Pa., July 6th, 1908.

DANVILLE, MONTOUR COUNTY.

Danville State Hospital for the Insane.

This application was made by the Board of Trustees of the State Hospital for the Insane, Danville, Montour county and is for permission to construct a sewage purification plant.

Prior to the session of the General Asembly of nineteen hundred and seven the Board of Trustees for the State Hospital for the Insane near Danville, Montour county, Pennsylvania, through its attorney made request for advice relative to the abatement of a nuisance existing in the old canal bed on State property at said institution, whereupon the Commissioner of Health made an investigation and the Governor, Attorney General and the Commissioner of Health reached the unanimous agreement as follows:

"That the present disposal of sewage at the hospital is a menace to public health because of its discharge into the pools into the canal in front of the hospital and also along the canal bed in the borough of Danville and because of its discharge into the river above the water works intake in Danville and also, possibly, above the intake of the institution's water works. Therefore, to obviate this menace, it is unanimously agreed that the Commissioner of Health shall order the discontinuance of the discharge of all of the institution's sewage into the waters of the State, and that to enable the Board of Trustees to accomplish this object, the Commissioner of Health should recommend an appropriation of eighteen thousand dollars to be made for improved sewerage, drainage and sewage disposal works, to be laid out, constructed and maintained on the State property according to plans and specifications to be prepared by the State Department of Health. The Commissioner of Health shall have general direction and supervision over the operation and maintenance of said improved sewerage and sewage disposal works.

"It is further unanimously agreed that the hospital trustees be notified of the danger of drinking the water now supplied to the institution and be advised and requested by the Commissioner of Health to secure an adequate appropriation for an enlargement and improvement of the existing water works to the end that the institution's water supply shall be adequately purified at all times."

Act number one hundred and five, entitled, an Act making an appropriation to the Trustees for the State Hospital for the Insane, at Danville, Pennsylvania, approved May first, nineteen hundred and seven, among other things provided as follows:

"For the purpose of providing additional means for the disposal of sewage, the sum of eighteen thousand dollars; system and plan to be approved by the State Board of Health before this item becomes available.

"For additions and extensions to water filtration system, the sum of ten thousand dollars, or so much thereof as may be necessary; the system and plans to be approved by the State Board of Health before this item becomes available.

"For the purpose of extending and changing the course of a natural stream in, through and upon the grounds of said Hospital, the sum of five thousand dollars, or so much thereof as may be necessary; the plans and character of the work to be approved by the State Board of Health before this item becomes available.

"For the purpose of filling in bed of old canal, in, upon and through the grounds of said hospital, the sum of twenty-five thousand dollars, or so much thereof as may be necessary. The said sum shall not become available until a deed conveying title in fee simple in the land so occupied by said canal, shall be delivered to the trustees of said hospital by the owners thereof, the Delaware, Lackawanna and Western Railroad Company: And provided further, that the proposition relating to the item of twenty-five thousand dollars, for filling in bed of old canal, shall not become available until approved by the Governor and Attorney General."

At a conference at Harrisburg on February fourth, nineteen hundred and eight, between the local authorities of the borough of Danville, the Trustees of the Danville State Hospital and the Commissioner of Health it was ascertained that a special committee of borough council had made a proposition to the hospital trustees on January eighth, nineteen hundred and eight, the same being as follows:

"The undersigned Committee respectfully submit herewith the following proposition subject to your acceptance:

"First. We agree to allow the State Hospital to connect an eighteen inch terra cotta sanitary sewer pipe to our municipal sewer at the aqueduct, and extend same in an easterly direction in the bed of the canal, under the various streets, alleys, etc., in the borough.

"Second. We agree to examine, flush and to stand one-half the cost to repair and maintain that certain portion of said sewer that shall be within the borough limits, for which consideration, and the privilege of connecting to our main sewer, we reserve the right to make the several connections necessary for the sewering of the adjacent territory.

"Third. We agree, at such time that the Commissioner of Health compels all sewage to be purified, to pay our proportionate share toward the construction and maintenance of such plant.

"Fourth. We agree to allow the Trustees of the said hospital to contract for the laying of a cement or terra cotta surface sewer of sufficient size to properly drain the stream known as Gulicks Run down the canal bed to Mahoning Creek under our several streets and alleys, as the council objects to the emptying of this stream into the river.

"We to permit the use of the six thousand dollars appropriated by the Delaware, Lackawanna and Western Railroad Company for this purpose, reserving the right for connections at the various streets and alleys, in the borough, necessary for the surface drainage of the adjacent territory.

"Fifth. We agree to fill up the old canal bed within the borough limits, in five years time as is necessary to secure the Delaware, Lackawanna and Western Railroad Company's appropriation."

The trustees presented to the Commissioner of Health a copy of a resolution adopting a plan to connect the hospital with the municipal sewer of the borough of Danville, under certain conditions which appear in the resolution as follows:

"Whereas, a proposition relative to the construction of a system of sewage has been submitted by the borough of Danville, granting permission to this institution to connect its proposed sewer with the main sewer of the said borough, at a point near the intersection of the old Pennsylvania canal and Mahoning Creek, at or near a point commonly known as the 'Aqueduct.'

"And whereas, the said borough of Danville, through its proper officers, have complained that the discharge of the sewage from this Institution into the Susquehanna river at a point in said stream above the intake of its water supply is prejudicial to the health of the inhabitants thereof.

"And whereas, it is the desire of this Board to dispose of the sewage of this institution in the most feasible and sanitary manner.

"Whereas, be it resolved that if in the opinion of the Department of Health of the State of Pennsylvania, the proposition submitted to the borough of Danville as to manner and means of disposal of sewage is the most feasible and sanitary one, then and in that event the plan of connecting with the municipal sewer of the borough of Danville, as recommended, be and is hereby approved and adopted, subject to such reasonable regulations as may be agreed upon by and between all the parties hereto."

After the proposition had been discussed and accepted, that the hospital sewage must be purified before being discharged into any stream or sewer or drain, it became apparent that there was no advantage to the State to connect with the proposed borough sewer, more especially since the borough's finances would not permit of the entailing of the expense which a sewage disposal plant, large enough to care for the municipal sewage and the hospital sewage would incur. Therefore, the hospital trustees agreed to engage an engineer to prepare detail plans for sewage disposal works to be erected on the grounds of the institution and the plans and application for approval were submitted on May twenty-sixth, nineteen hundred and eight.

The State Hospital for the Insane at Danville, Montour county is located in a three hundred and ninety-four acre tract in Mahoning township on the north bank of the North Branch of the Susquehanna river immediately east of the borough of Danville.

In the main building comprising the Administration Hall and Officer's Quarters and the Male and Female Wards which are on either side, these wards in the main building being three stories in height, and in the Nurses' Home, and Infirmary, there are housed about fifteen hundred inmates and officers. These buildings are grouped together on an eminence facing the river and distant about one-quarter of a mile therefrom, and elevated possibly one hundred feet above the ordinary stage of the water. Between the buildings and the river are the tracks of the Northumberland branch of the Delaware, Lackawanna and Western Railroad which extends along the bottom of the slope where the lowlands begin and beyond, towards the river, is the abandoned canal now owned by said railroad company and beyond it towards the river a public highway. These lowlands to the railroad are flooded during freshets.

The State property fronts on the river for a distance of nearly one mile and extends back therefrom over half a mile. Coming down through this property to the river are two natural water courses, one to the west, known as the Hospital Run, rising in the hills on or near the hospital grounds, and the other known as Toby

Run, rising in the hills to the east about two miles distant from the river. The latter course divides the State tract into about equal parts. The eastern portion is largely wooded. It is in the western portion where the hospital buildings are located that most of the farm buildings and cultivated fields are located.

The main hospital building was erected in eighteen hundred and seventy-two. The Nurses' Home and Infirmary are recent additions. The new power plant was erected in nineteen hundred and six.

The Institution's water supply is obtained from the Susquehanna River, is subjected to mechanical filtration and is then pumped to a distributing reservoir on the hill, from whence it flows by gravity into the pipe system. The pumping station and filter plant are located in a building on the flats between the railroad and the canal. The old gas plant, still in use, is also located at this place. The water is drawn from a receiving reservoir in the flats between the canal and the river and delivered onto the mechanical filters, and the filtrate is returned without storage to either one of the two pumping engines by means of which the purified water is forced to the reservoir on the hill. Each pump has a capacity of about one million gallons daily.

The gravity pipe from the river to the receiving or pump well is sixteen inches in diameter and extends out to deep water in the river at a point about five hundred feet from the shore. Here at low water the pipe end is submerged three feet. During freshets the mouth is frequently clogged, threatening the supply of the Institution. Attempts to obviate this clogging have been made by providing for the flushing out of the pipe through the turning on of the pressure from the reservoir on the hill. Toby Run may be diverted into the pump either to flush the sixteen inch gravity pipe or to supply the institution in case the said sixteen inch pipe were out of commission.

The force main to the reservoir on the hill is eight inches in diameter and is so arranged that in case of fire the reservoir may be cut off and the full pressure of the pumps put upon the system. The nominal capacity of the filters, of which there are two of the Jewell type, is four hundred thousand gallons daily each. During a fire, if three or more streams were used, the demand upon the pump would be considerably in excess of the normal rate of the sewers and hence because there is no storage of filtered water between the filters and the pump, the filters would necessarly be speeded up for the emergency, thereby admitting to the system an inferior quality of water. Prior to nineteen hundred and three, when the first filter was installed, the Institution was supplied with raw water. Now during freshets the water used in the Institution for drinking and culinary purposes should be boiled. This precaution was taken following the outbreak of the Scranton epidemic.

The distributing reservoir is built in two parts, each one hundred and five feet square and twelve feet deep, excavated in earth and partly in embankment. They are brick lined with sloping sides and have a combined capacity of one million two hundred and fifty thousand gallons. Since the daily consumption is about three hundred and fifty thousand gallons, said storage capacity is equivalent to four days' supply. The gravity main from the reservoir to the buildings is reported to be six inches in diameter.

Plans for additional filter units have not been submitted. It is understood that no movement has been made in this direction.

When the main building was erected, the removal of sewage, roof water and some surface drainage was provided for by the laying of a brick conduit eighteen inches by twenty-four inches in diameter from the front of the building to the canal, thence an eighteen inch pipe under the canal and across the flats to the river bank, thence a sixteen inch cast iron pipe delivered the sewage into deep water about eight hundred feet out in the stream. This point of discharge was about one mile above the intake of the water works system supplying the borough of Danville, so in the year eighteen hundred and ninety-one the State discontinued the discharge of the Institution's sewage into the river above Danville by extending the sixteen inch cast iron main along the river bank down stream to below the Danville water works intake, where the sewage was emptied into the river. Owing to the faulty construction as well as design, so it is reportd, within a year after the laying of this sewer it was undermined and failed at several points, because filled with silt and was abandoned. Subsequently the pipe was taken up and sold, and the old original outlet into the river was put into use again and was in use until the spring of nineteen hundred and five, when a new system of sewerage was constructed at a cost of fifteen thousand dollars and upwards. In the spring of this year there were also three other sewers at the Institution, one of them from the laundry building emptying into Hospital Run, and the other two, one from the new Infirmary building and from the Nurses' Home emptying into the eighteen inch sewer on the hillside near the railroad. Besides these there were sewers emptying into the Hospital Run from the coachman's residence and the farmer's residence and from the slaughter house, these buildings being some distance from the Hospital.

The system of sewerage and sewage disposal installed during nineteen hundred and five now in use comprises a collection basin for the old sewers, compressed air pumping plant and broad irrigation for the disposal of the sewage.

No attempt was made to separate storm water from sewage. The old sewer main from the building, and the Infirmary sewer were intercepted by a fifteen

inch pipe, into which also the sewage from the old laundry sewer and coachman's house was discharged. The sewage from the slaughter house and that from the Nurses' Home continues to discharge as formerly. At present Hospital Run receives the flow of the sewage from the laundry house, farmer's house, slaughtering establishment and the coachman's house, and the overflow from cesspool in the recreation ground.

The new intercepting sewer terminates in a pump well located immediately west of the hospital buildings on the banks of Hospital Run. An overflow is provided to the run for an emergency, but it appears for one cause and another the overflow has been in use much of the time. When the pumps have been out of repair, which is reported to have been often, the run receives the sewage from the institution. When the pumps are operating and the storm water flow overtaxes their capacity, the run also receives the sewage. The capacity of the airlifts, of which there were two, is two hundred thousand gallons daily each. During heavy precipitations the amount of storm water delivered to the filters would exceed this quantity. Both pumps are submerged in the sewage and in case of need of repairs to either of them, the entire plant must necessarily be put out of commission. For the last year very little attempt has been made to operate the pumps. During this time the sewage has flowed bodily from the main building into the river.

When the plant is operated, the sewage is raised through a six inch force main, a distance of eighteen hundred feet to the summit of the hill elevated one hundred and twenty-five feet above the pumps where there is a small distributing reservoir about fourteen feet in diameter and twelve feet deep, provided with several valved openings by means of which the sewage is distributed into wrought iron screwed joint pipes, whose diameters range from three inches to six inches and which radiate from the distributing reservoir in all directions aggregating a total of ten thousand, nine hundred feet, or practically two miles. These pipes are laid below the surface of the ground and at regular intervals vertical pipes extend therefrom about two feet above the ground to the end of which are attached disc valves by means of which the sewage under pressure is discharged in jet form out onto the surface of the ground. In the neighborhood of one hundred acres may be thus irrigated by the Institution sewage. Fodder corn, wheat, grass and alfalfa are fertilized in this manner but no garden truck or food eaten by human beings, excepting wheat, is grown on the irrigation field, so it is reported.

While the largest part of the sewage field is tributary to Hospital Run, some of it drains toward Toby Run. No attempt has been made to prepare the ground for winter treatment of sewage. During the growing season when saturated, and also in the winter when the ground is frozen, because of lack of means to prevent it, the sewage is applied onto the ground and must necessarily find its way over the surface into the run and the river. In case Toby Run water were introduced into the pump well at the filter house, the institution's sewage would be contributed to the pollution of the water supply. Otherwise the instituion sewage would conribute only to the pollution of the water supply of Danville and other places further down stream. The canal through the State property is practically level. It has been abandoned for about seven years, and the eastern part of it from the gas house is empty because of a dyke built across it at the gas house to prevent the tar wastes, incident to the manufacture of gas, from reaching Toby Run and ultimately the Danville water supply. However, Toby Run, and the water from the hillsides reaches the canal bed and remains there to a depth of about one foot. A part of this water, which is stagnant, and very offensive in summer time, is liable to be sewage from the irrigation field.

West of the gas house, the water stands about five feet deep in the canal as far west as Hospital Run. The run with its sewage empties into the pool and keeps it full. The overflow is into the canal bed towards Danville, where there are a succession of standing pools all along through the borough, which give offense in summer time. By removing the dams across the canal, either at the gas house or the Hospital Run, most of the water would drain out through Toby Run to the River, or down the canal bed through Danville borough, where it now goes and to the discomfort of a large number of people owning property abutting the canal. It is evident that the State cannot in justice remove the canal bed nuisance on its own property by transmitting the nuisance to the citizens of Danville.

It is apparent that three things should be done: First, no institution sewage should be discharged into a natural water course at any time or under any conditions; second, under the Act the stagnant water in the canal bed should be prevented as a health precaution, the best way to deal with this nuisance would be to fill up the canal bed and restore the land to its original contour; third, to prevent sewage pollution of the waters of the State and the Institution and to assure a pure water supply to the Hospital, a complete overhauling of the existing water works and sewerage systems must be made.

The proposed improvements to the sewerage system and disposal works submitted for approval and now under consideration comprises a separate system of sanitary sewers, adequate pumping machinery installation, and apparatus of approved design for the purification of all of the sewage of the institution.

Upon weiring the flow of the Hospital sewers, excluding that from the Nurses' Home, the quantity of sewage was found to be three hundred and thirty thousand

gallons for twenty-four hours. Making allowance for the new buildings in progress of erection, a plant with a nominal capacity of three hundred and sixty thousand gallons per day of twenty-four hours has been designed.

A main intercepting sewer is provided to begin in the rear of the female ward and to be laid around in front of the main buildings and up the valley of Hospital Run to the present pumping station. Its elevation is sufficiently low to intercept all of the proposed lateral sewers which are to extend from the fifteen inch main sewer to the old and new buildings at convenient points for collection of all sewage. The sewer joints are to be made tight, inspection manholes are to be built at all changes in line and grade.

A sub-main will be laid down the valley of Hospital Run to deliver the sewage from the farm, coachman's house and slaughter house and from the other farm buildings to the pump well. All told there will be about five thousand feet of new sewer. The old sewers will be continued in use for the removal of storm water only.

The present pump well is a concrete structure hexagonal in plan, seventeen feet in diameter and sixteen feet deep, having an inlet chamber on the outside, shallow, ten feet by six feet, where the sewer terminates and where the sewage is screened. No changes will be made in this screen, which is a parallel bar affair.

The pumping plant is to consist of three vertical, submerged, centrifugal, electric driven sewage pumps automatically controlled by the rise and fall of sewage in the collecting basin. There are to be three pumps specially designed for sewage, each capable of pumping twenty-five thousand gallons of sewage per hour from the collecting basin through a line of twelve inch pipe approximately fifteen hundred feet long against a total elevation of seventy feet. Each pump is to be submerged and properly suspended from the floor above so that the suction shall be within six inches of the bottom of the well. On this floor is to be attached a motor to the vertical driving shaft of the pump. Each motor is to be equipped with an automatic controlling apparatus for starting and stopping. The arrangement is such that the pumps will be thrown into operation not simiultaneously, but consecutively as the flow of sewage increases or diminishes and the level rises or falls in the collecting basin. Pump Number three will operate only after the sewage level shall have reached seven feet above the bottom of the well. This method of control not only assures a pumping capacity of seventy-five thousand gallons per hour, in three successive steps, but it also assures a three-fold guarantee as to the liability of operation, as a second pump will start should the fire fail to operate for any cause, and the third pump will start should the other two fail to operate.

The electrical generating plant of the institution may not be great enough to furnish the power in which event an additional dynamo will be provided.

A by-pass from the screen chamber to the run and an overflow connection to it from the pump well now in existence are to be continued in use for emergency purposes only. There is a valve on the end of the by-pass in the screen chamber but none on the overflow from the well.

The superstructure is to be erected over the well to properly house the motors. In case of repairs the motor, shafting and pump may be raised bodily from the well to the floor.

The disposal plant is to be located away from the buildings of the Institution and distant eight hundred feet from the farm house along Hospital Run west of it in the irrigation field. It is the purpose of the trustees to continue to irrigate when the crops should need the water and at other times the new plant will receive the sewage. The new force main will terminate in a grit chamber at the inlet end of the proposed primary sedimentation basin, of which there are to be three. The water in the said grit chamber will be fifty-four feet higher than the pump house floor. The end of the force main to the irrigation field is seventy feet higher, approximately, so the new plan will save the cost of lifting the sewage to the higher elevation.

The sedimentation tanks are to be concrete open structure, having a combined capacity of one hundred and seventy-six thousand gallons when flooded seven and one-half feet deep and one hundred and ninety-nine thousand gallons when flooded to a depth of eight and one-half feet. The added depth may be obtained by inserting planks in the discharge weir, slots in the masonry sides of the weir being provided for the purpose.

Each tank is sixty-five feet long by fifteen feet wide on the bottom and seventeen feet wide on top, interior dimensions. They are to be built side by side and at their inlet ends in each compartment at the centre is to be built a concrete inlet submerged to mid-depth, having an opening at the bottom six inches wide and three feet long through which the sewage must enter. A non-distributing entrance of the sewage is thus sought. Outside of the end wall of the tanks there is a concrete trough which delivers sewage from the said grit chamber to the submerged inlets. The grit chamber is outside of these troughs opposite the central sedimentation tank. It is sixteen feet long, three feet wide and forty-five inches deep. Near where the force main terminates in the chamber is to be built movable screens, three-quarters inch mesh, but these will not be used unless found desirable. The three ports connecting this chamber to the distributing troughs

will be provided with gates by means of which sewage may be delivered to any one or all three of the tanks. The grit chamber is to be covered by a plank platform with hinged doors at the gates and screens.

It is proposed to give the sewage ample time for sedimentation by passing it into one of the outer tanks, thence down the length of that tank back through the central tank and forward through the other outer tank and thence to the automatic dosing chamber. Twelve inch pipes through the partition walls are provided to effect this circuitous route of the sewage, one pipe through a wall at either end of each compartment placed at mid-depth and provided with a sluice valve. This arrangement of operation may be varied to suit conditions. Undoubtedly one compartment only at times will be used.

The bottom of each compartment will slope laterally three inches to a gutter built in the concrete floor and draining to a ten inch pipe drain, controlled by gate valves set in the ground outside near the grit chamber. This drain terminates in a sludge basin located nearby. Its area is to be about thirty feet square, surrounded on three sides by an earth embankment. If more than eighteen inches of sludge is deposited in this area an overflow to the creek would be liable to occur. It is intended that the operator shall draw off the tank compartment to be drained to within about eighteen inches of the bottom. These upper layers of sewage to be sent to the sprinkling filter. The remaining suldge will then be deposited on the sludge bed where no other preparation for its reception is proposed except the embankment above mentioned.

It is proposed to clean the tank at the rate of one each week. The emptying is to be done at night. Vertical wooden chambers, fitted with valved ports, are to be provided in each tank compartment for the drawing off of the upper layers of the sewage to the filters whenever a tank is to be drained. Ordinarily the sewage will pass out over a weir wall in a collecting trough extending outside and along the opposite wall of the compartment from the inlet. A weir is provided for each tank. It will be eight feet long and the sewage will pass up to it by a concrete submerged outlet similar to the inlet above described. The collecting channel outside will be two feet wide and three feet deep, open to view.

This channel will deliver the settled sewage from any one or all of the tanks to the dosing chamber, which is opposite the middle tank and adjacent thereto. It is designed to discharge about twenty-five hundred gallons each dose. The chamber is of concrete, including roof, twelve feet square in plan with sloping sides at the bottom and is provided with a ten inch syphon and an autmatic apparatus for shutting off the incoming flow at the beginning of the syphon discharge. A float arrangement operates to raise the end of a moveable inlet trough, thus cutting off the flow until the sewage in all the tanks rises one inch, when the sewage again flows into the dosing chamber and as soon as the float releases the trough it falls and a sudden rush of sewage fills the chamber and again discharges the syphon and the water is drawn down far enough for the float to raise the trough and so on. In case one compartment of the sedimentation tank were in use only, the trough would have to be elevated three times as high as when three compartments were in use in order to make the dose uniform. A provision for this is made in one of the arms of the levers actuated by the float whereby changing its length will regulate the inflow. The discharge of the tank will be at the rate of twenty-five hundred gallons in two and one-half minutes, but as the flow is not cut off as soon as the syphon starts, the amount discharged will be a little more than twenty-five hundred gallons and the time of discharge will be proportionately longer.

The surface of the filters is five feet below the high water mark in the dosing chamber and a foot and a half below the low watermark in the chamber. The bottom of the sedimentation tank is eighteen inches above the filters.

The sprinkling filters are to be laid on a concrete floor one hundred and eighteen feet long and ninety-one feet wide. Midway of the length is a ridge for the whole width of the floor from which the slopes are on either side to the sides where are the open effluent carriers built in the concrete and extending down the sides and along the front to the secondary sedimentation basin. The back of the filter is in excavation and a retaining wall is provided there about six feet high. It is near the primary tanks and between them and the run. On the other three sides there will be no walls. On the floor of the filters are to be placed ten inch channel pipe laid in parallel rows and contiguous in diagonal lines, each terminating in the collecting channels above mentioned. The pitch of the entire floor will be away from the back wall toward the front, having a slope of nine inches in the ninety-one feet, hence about one-quarter of the filter effluent will be discharged into the collecting trough in front of the filter.

The main delivery pipe from the dosing tank is to be a twenty inch terra cotta pipe laid in the ground back of the wall and covered over to a depth of two and one-half feet. From it through the wall at intervals of twelve feet are to be eight inch cast iron pipes connected with the twenty inch pipe by terra cotta reducers. Each cast iron pipe is to be carried across the width of the filter and supported on concrete piers and from it at intervals of fourteen feet are to be vertical four inch risers at the top of which at the surface of the filter will be adjusted a sprinkling nozzle of the Reading type. In all there will be fifty-four nozzles. This distribution system will drain back to the twenty inch pipe and down into one of the side channels leading to the secondary subsidence basins.

The filtering material is to be crushed stone of size from one and one-half inches to three inches in diameter. The top surface is to be made level and uniformly three inches below the nozzle. The sides are to be laid up by hand in form of a dry wall with steep slopes.

Under the corner of the filter near the secondary sedimentation tanks is a dry run down which rain water passes. This is to be filled in and a twenty inch drain pipe provided to take the surface water from the hillside above.

The surface area of the filter is about one-quarter of an acre, so it appears that the rate of filtration will be between one and five-tenths and two million gallons per acre daily.

The effluent is to be delivered to the secondary sedimentation tanks. They are twin structures sixty-two feet long by seventeen feet, interior dimensions, built of concrete and left open. They will be four feet deep to the flow line. A trough extends across the inlet ends of the tanks at the top and ports through the dividing wall and will admit the influent. The outlet ends are weirs across the width of each tank, discharging into a collecting trough, which for the present will empty into Hospital Run. The layout admits of the building of sand beds below in the future. For the present the settled material in these tanks is to be removed by hand and deposited elsewhere on the farm, together with cleanings from the sludge pit.

It is estimated that the proposed disposal plant will cost eighteen thousand dollars. If the expenditure should be a less sum, in this event the balance left could not be sufficiently large to build new sewers. The original intention was to abandon the sewage farm and to sell the air compressor, pumping outfit and system of iron piping at auction and to use the proceeds to defray the cost of the new sewers. Now that an effort is to be made to continue the irrigation system in use the moneys to defray the sewer construction cost must be obtained in some other way. It is suggested that any unexpended money appropriated for improvements and additions to existing buildings and for the erection of new buildings might be used to afford sewerage facilities and to build the proposed new sewers.

A purification plant to be reached by gravity would force the selection of a site too near the institution building or on the flats where it would be subjected to damage from freshets and ice gorges. To construct the works here and provide adequate protection would involve an expenditure, so it is reported by the expert, in a sum very much in excess of the appropriation.

To continue the irrigation fields as such demands the installation of an entire new pumping outfit, if all the sewage is to be delivered onto the ground. So the old air compressor lift is to be continued in service and at such times the balance of the sewage will be pumped by the new machiney to the new works in the irrigation fields. In fact, the site selected, is the best adapted for the disposal of sewage. However, the sludge pit should be materially enlarged. The experiment as to whether this pit, properly enlarged, will have a sufficient absorptive capacity to readily dry out the sludge and permit of its being gathered and removed and disposed of in a sanitary manner without being a nuisance or causing a pollution of the run may prove a failure, in which event a specially prepared drying area will have to be constructed.

Some form of shield should be devised to be set up on either side of the sprinkling filter whenever needed to catch the spray carried by the wind over the sides of the filter and return it to the filter.

Detail plans for the final treatment of the sewage in sand filters or by chemicals should be prepared, estimates of cost made and said plans be submitted to the Commissioner of Health for approval, in order that an ample appropriation therefor may be obtained, if this should be found advisable.

The overflow and by-pass from the screen chamber and pump well should be fitted with valves and these should be closed, except it be in an emergency when its use should be noted and recorded.

The detailed plans of the drain or channel improvement from the channel to the river should be prepared and submitted for approval without delay and this work should be constructed during the current year.

All water used for domestic purposes at the Institution should be boiled. The importance of the immediate installation of additional filter units cannot be too strongly emphasized. An outbreak of typhoid fever or of intestinal disorders is liable to occur at any time. The plans for the filters and for a clear water basin of moderate capacity at the water pump house should be forthwith prepared and submitted to the Commissioner of Health for approval.

The disposal works should be erected at once and the new pumping machinery installed and the plant be put into commission at the earliest possible moment. The effluent should be taken out of the canal and conveyed by a new drain to the river. The intercepting of the sewage from all of the buildings in pipes specially designed for the purpose, effecting a separation of the sewage and storm water should be accomplished at the earliest practicable moment.

It has been determined that the interests of the public health will be subserved by approving of the proposed plans for improved sewerage and sewage disposal and the same are hereby and herein approved and a permit issued therefor under the following conditions and stipulations:

FIRST: The storm water and roof water shall be excluded from the sewers

and that all of the sewage from all of the buildings of the Institution shall be intercepted and be kept out of the waters of the State and conveyed to the pump well and from thence to the purification works.

SECOND: The irrigation fields shall be used, if at all, so that no sewage whatsoever shall pass from them, either directly or indirectly into any natural water course. Sewage shall be adequately purified either on the irrigation fields or at the sewage purification plant. If at any time, in the opinion of the Commissioner of Health, the sewer system or the sewage disposal works, or any part thereof has become a nuisance or menace or prejudicial to public health, then the Hospital Trustees shall adopt such remedial measures as the Commissioner of Health may approve or advise. Additional units to the plant shall be made under State approval whenever this becomes necessary.

THIRD: A competent man shall be assigned the duty of caretaker and operator of the sewage treatment plant. Daily records of the operation thereof shall be kept on blank forms to be approved by the Department of Health and copies thereof shall be filed with the said Department. It is the purpose of the Commissioner of Health to collect samples and have tests made as to the efficiency of the operation and the Department may make rules and regulations for the operation of the works in so far as the interests of the public health are concerned, which shall be put in force by the Hospital Trustees.

Harrisburg, Pa., July 29th, 1908.

DARBY, DELAWARE COUNTY.

This order and decree was issued to the borough authorities of the borough of Darby, Delaware County, Pennsylvania, relative to the discontinuance of the discharge of sewage into the waters of the State within the said borough and elsewhere in response to a communication to the State Department of Health, a copy of which is the following:

"At a regular meeting of Colwyn Borough Council, I was instructed to inform you that we have received numerous complaints from residents of Colwyn borough in regard to the unsanitary condition of the vicinity of their homes arising from the emptying of a sewer located in Darby borough. This sewer runs under the property of Adam J. Gottshall, of Darby, at Fifth and Pine Streets, but the outlet is within the precincts of Colwyn or near the dividing line and is very annoying to those residing in the locality. There has been a great deal of controversy between the two boroughs on this queston but without any satisfactory results as yet. So council decided to call your attention to same."

The Colwyn authorities were immediately informed that the State Department has under consideration the question of sewage disposal into Darby Creek and will formally communicate with council in due time in reference to the matter.

During the first part of April, nineteen hundred and seven, the Department representative made an inspection of Darby borough and vicinity and submitted a report thereof.

Darby borough is a rapidly growing municipality having a population of seventy-five hundred at the present time. The nineteen hundred census reported three thousand four hundred and twenty-nine.

The incorporated territory lies between Cobb's Creek on the east, which is also the westerly boundary line of the city of Philadelphia and the boroughs of Sharon Hill, and Collingdale on the west, Colwyn on the south and Yeadon on the north and east. A small portion only of the borough abutts on Cobb's Creek.

Darby Creek flows southeasterly through the entire length of the borough near the westerly line, the course of the stream being about a mile in length here.

The Philadelphia, Baltimore and Washington Railroad touches the borough at one point in the extreme southerly corner. The Baltimore and Ohio Railroad passes westerly through the borough in the southern central part of the town. The business section is principally north of this railroad at the corner of Main and Ninth Streets near Darby Creek. Here the street car lines converge and thoroughfares radiate in all directions. Here also the borough of Collingsdale touches the creek at an acute angle, the lines of which are important highways, the one leading to the southwest being Chester Pike and the one to the northwest being Springfield Avenue. Main Street in Darby extends southeasterly under the B. & O. Railroad to Cobb's Creek where Woodland Avenue in Philadelphia begins. The last eight hundred feet of Main Street is the boundary between Darby and Colwyn boroughs.

At Woodland Avenue, or immediately north of it is a dam across Cobb's Creek which marks the limit of tide water. Below the dam and above the street is a twenty-four inch pipe outlet. This is the eastern sewer main of the borough of Yeadon sewerage system. Obviously the reason of extending this main nine hundred feet into Darby borough territory was to obtain an outlet below the dam.

Into this twenty-four inch main Darby borough sewers have been admitted at two points. The first is just below the B. & O. Railroad in Yeadon borough, comprising a total length of thirty-one hundred feet, and the second is at the foot of Greenway Avenue in Darby borough comprising twelve hundred feet of sewer.

There is an eight inch sewer fourteen hundred feet long in Main Street which empties into Cobb's Creek at Woodland Avenue. Just below said Avenue the Philadelphia sewer, five and twenty-five hundredths feet in diameter empties into Cobb's Creek.

Below this point sewers of Colwyn borough, and above this point many sewers of Philadelphia and of other municipalities empty and much manufacturing waste is discharged into the creek or its tributaries.

There are five borough sewers into Darby Creek and there are three woolen mills and a large gas plant which also contributes to the pollution of the creek. The Verlenden Mill has a connection with the borough sewer. Further pollution of the creek is contributed by overhanging privies and by cesspools built close to the banks of the stream.

The Suburban Gas Company's plant and the Graysons Mill are on Pine Street immediately west of the creek. On the day of the Department's inspection sewage was observed in the creek here. Under the bridge a public sewer from either direction empties into the stream. The easterly outlet is twelve inches in diameter and serves seventy-seven hundred feet of sewer. The westerly outlet is probably eight inches in diameter and serves eleven hundred feet only. These two outlets are about four hundred feet above Sharon Hill and Colwyn boroughs.

Six hundred feet further up stream there is a fifteen inch sewer outlet serving thirty-six hundred feet of sewer.

The sewerage facilities afforded by these three outlets is intended to comprise all the territory in the borough south of the Baltimore and Ohio Railroad within the Darby Creek watershed.

Immediately north of the Baltimore and Ohio Railroad, on the east bank of Darby Creek is the Griswold Mill. This property extends from Main Street to the railroad and possibly further, because the connection with it there is a mill privilege, the head race of which begins at a dam at Twelfth Street, a half mile above the mill and follows down the valley passing under Main Street to the Mill. This canal is polluted with sewage from overhanging privies above Main Street. On the day of the Department's inspection the waters in the canal were stagnant and offensive and easily noticeable to the senses of thousands of people passing daily.

Under the bridge over the creek at Main Street or Chester Pike there is a twelve inch borough sewer discharing into the creek. It serves ninety-five hundred feet of sewer.

The last public sewer outlet is into the creek at the foot of Twelfth Street just above the dam. It is a small pipe connected with fifteen hundred feet of lateral sewers.

The dam marks the utmost limits of tide water. By reason of the tidal action suspended sewage matters are more thoroughly spread out and stranded along the shores, and the menace and nuisance to public health increased, more especially in summer time when the normal flow of upland waters is small. The danger of food infection through the agency of flies exists all along this creek in Darby borough.

But the above five sewer outlets are not the only sewers in the borough which pollute the stream. Just north of the Main Street bridge on the bank of the creek is a sewage fountain in plain sight of the public, out of which the sewage from the boroughs of Yeadon and Lansdowne overflows into the creek. The odors from the gases liberated here are noticeable in the stores and office buildings in the vicinity. The reason for this overflow is explained by the fact that some time since the boroughs of Yeadon and Lansdowne undertook to build a twenty-four inch trunk sewer down the east bank of Darby Creek and to dispose of their sewage into the stream in the borough of Colwyn and the sewer was constructed through Yeadon and Darby boroughs as far as Griswold Mill and up through Colwyn and Darby boroughs from the proposed outlet to within about eight hundred feet of Griswold's Mill. Litigation between Yeadon and Darby boroughs relative to this sewer or the use thereof, and with the owners of the Mill property and possibly others, respecting rights of way, resulted in cessation of constructing and the eight hundred foot connection has not yet been built. Therefore, since an outlet into the creek near Griswold's Mill is maintained through an eight inch pipe which is too small to deliver the flow, it backfloods the sewer and causes the overflow at the manhole provided at the bridge. Into this intercepting sewer extending for practically a mile through Darby borough is connected six hundred feet of Darby sewer at the foot of Eleventh Street.

It is reported that the population living in the dwellings on the line of the sewers is six thousand, of which five thousand reside in dwellings connected to the sewers.

The borough failed to file a plan of its sewer system or report within the time specified by the law and it has not yet submitted a satisfactory plan of its sewer system. So far as is known the system is separate but receives some storm water.

Below Darby borough the sewers of Sharon Hill and one sewer from Colwyn borough empty into Darby Creek. Above Darby borough the creek is in a deep narrow ravine with high banks. Above Lansdowne the stream is subject to considerable pollution by industrial wastes.

Collingsdale has no sewer but it wishes to install a system with an outlet into the creek at Chester Pike.

The city of Philadelphia is building an intercepting sewer down the east bank of Cobb's Creek which will intercept all of the city sewage proper during dry weather and deliver it into Darby Creek below Colwyn until a plan be perfected for the diverting of this sewage easterly into the Schuylkill River drainage district sewers. The main stream below Colwyn passes through a six mile stretch of unoccupied salt marsh, much of which is overflow at high water. Numerous boat houses dot the banks and fishing is extensively indulged in. Two and a half miles below the mouth of the creek into the Delaware River the city of Chester takes its water supply out of the river.

In order to avoid a public nuisance it is necessary that sewage should cease to be discharged into the streams above mentioned. It is much more practicable to devise ways and means to prevent the nuisance now than to permit it to be continued to the detriment of human life.

The borough of Darby is reported to have an assessed valuation of real estate of two million, one hundred and thirty-one thousand dollars and a bonded indebtedness of fifty thousand one hundred dollars. If these figures are correct, the municipality is amply able to undertake some other method of sewage disposal than into State waters. It would have been cheaper for the boroughs of Yeadon, Lansdowne and Darby to have joined together in one common sewer, and it is not too late for each one of the above mentioned boroughs in Darby Creek and in Cobb's Creek valley to unite on a plan for joint works. Undoubtedly this scheme would prove much more efficient and economical than for each municipality to undertake to handle its problem independently.

For instance if the city of Philadelphia will not permit the towns in Delaware County to discharge their sewage into the Cobb's Creek intercepter, then the next best plan would seem to be for these towns to join together and build their own intercepter instead of constructing three independent pipe lines, and when a point were reached below Colwyn where sewage might be delivered into the creek, it does not appear that the interests of the public health demand that sewage should be put in here to the menace of the fisheries and the health of those who may boat upon the waters, and, therefore, one sewage disposal plant should be requisite to receive and treat the sewage of these plants. And since Colwyn, Darby and Yeadon have other sewer outlets into Darby Creek which are a nuisance and menace and which require to be connected up to an intercepting sewer leading to some point below Colwyn, it follows that one sewage disposal plant and one intercepter for each of these two valleys is the most economical and satisfactory solution of the entire problem.

The industrial wastes within Darby borough should be kept out of the stream. After these liquids be freed of any matters injurious to the public sewer, facilities should be afforded by the borough for reception of such liquids and their conveyance in the public sewer system. If this policy is not promulgated by the local authorities, then the State Department of Health must consistently require these private companies to treat their own sewage.

It has been determined that the interests of the public health require that the discharge of sewage into Cobb's Creek and Darby Creek by the citizens of Darby borough, should cease and that said borough be notified that it must, and it is herein and hereby notified that it must on or before October first, nineteen hundred and eight, prepare plans, either independently or in conjunction with other municipalities, for some other disposal of its sewage than into said streams and submit the same to the Commissioner of Health for approval. Such plans shall contemplate the collection of sewage and industrial wastes.

Harrisburg, Pa., January 29th, 1908.

DERRY, WESTMORELAND COUNTY.

This application was made by the borough of Derry, Westmoreland County, and is for permission to install a sewer system in conformity with plans submitted therefor.

It appears that the permit of October eighteenth, nineteen hundred and seven, stipulated as follows:

"FIRST: The present plans be modified to exclude all roof and surface water.

"SECOND: That before approval of the sewer system is given by the State Department of Health, detail plans and profiles of the sewer taking house drainage only shall be prepared by a competent engineer; also plans for an efficient, up-to-date, sewage disposal plant for the purification of the sewage of said sewer system, which plans shall be submitted to the State Department of Health for approval.

"THIRD: That after the plans for the disposal plant shall have been modified, amended or approved by the State Department of Health, the date on or before which they shall be constructed shall be fixed by the Commissioner of Health, which date shall not be less than two years, or more than five years from the date when the borough sewer system or any part thereof shall have been put in use."

The proposed sewer system calls for sanitary sewers in practically every street in the borough. The main sewer is to be fifteen inches in diameter and is to extend beyond the limits of the borough down the valley of McGee Run in a public highway and is to have a temporary outlet into the stream at a point about seven hundred feet below the borough line. Ultimately the outlet sewer is to be extended down the public road about eight hundred feet further and terminate in a sewage disposal plant to be located in the field between the road and the run.

No detail plans of the sewage disposal plant have been submitted. A profile of the proposed outfall sewer shows a fifteen inch cast-iron pipe from a manhole in Fourth Street at McFarland Street, a total length of two thousand three hundred and fifty-seven feet to the septic tank. The elevation of the sewer at the manhole is given as one thousand one hundred and fourteen and fifty-seven-hundredths feet and the elevation of the flow line in the septic tank as one thousand one hundred and eight and six-tenths feet. Contact filters are proposed with a surface at one thousand one hundred and five feet, filtering material six feet in depth. A note on the plan says, "effluent piped and emptied at point where high water cannot back into contact beds." Another note on the plan shows the high water mark two feet below the proposed surface of the contact bed.

The petitioners have not attempted to work out the design of the purification works. The construction of such works will be put off to the latest date possible. The local authorities desire to construct the sewers and to temporarly discharge the sewage into the run at the point above mentioned. The plans of the site and of the location of the works thereon as submitted are tentatively only.

From the information they impart it would be extremely hazardous for the State to approve the site. The vertical head room of nine and one-half feet as shown on the plans is too little to admit of successful and economical purification of the sewage if the operation is to be by gravity. It would seem unnecessary for the town to ever have to resort to pumping in the purification of its sewage. The State ought not to be called upon to approve a site and to commit the borough to a project whose detail development might require pumping in order to accomplish the efficient and economical treatment of the town's sewage. Now is the time before the sewer system is put in use for definite plans for the disposal of the borough sewage to be worked up, approved and adopted.

The local authorities in spite of the filing of the tentative plans above mentioned did not adopt the provisions of the said sewerage permit of April twenty-ninth, one thousand nine hundred and seven until February fourteenth, one thousand nine hundred and eight, on which date, in compliance with law, said permit was received for record at the office of the Recorder of Deeds for Westmoreland county.

Since it has already been determined to be for the interest of the public health that a sewer system be constructed in Derry, it has been determined that approval be granted and the plans are hereby and herein approved for the proposed sewerage system and a permit issued therefor under the following conditions and stipulations:

FIRST: That all roof and surface water be excluded from the sewer system, that records of all properties connected to the sewer system shall be kept and at the expiration of each season's work, plans of the sewers laid during the year, together with any other information in connection therewith that may be desired, shall be filed in the office of the Commissioner of Health, to the end that the Department shall always be informed as to the extent of the borough's sewer system.

SECOND: That before the sewer system or any part thereof shall be put in use, the borough shall employ some recognized expert, experienced in the art of sewage purification, to design plans for disposal works for the borough, and these plans shall be submitted to the Commissioner of Health for approval. If this be done, then the borough may discharge sewage from the proposed sewer system into the waters of the State until such time as the Governor, Attorney General and Commissioner of Health shall determine, but in no event shall said date be more than five years from April twenty-ninth, one thousand nine hundred and seven. The exact time may be given when the sewage disposal plans herein called for shall have been submitted and approved.

THIRD: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

FOURTH: If at any time in the opinion of the Commissioner of Health the sewer system or any part thereof has become a nuisance or menace to the public health, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

This permit before being operative shall be recorded in the office of the Recorder of Deeds for Westmoreland county.

The attention of the borough authorities is called to the many unsanitary conditions in the borough and to the desirability of the adoption and reasonable enforcement of an ordinance requiring a general connection of all occupied estate with the sewer system. But roof and storm water must be excluded from the sewers. The borough councils's attention is also called to the discharge of sewage by private parties into the streams above Derry borough. It might be a source of revenue to the town to permit certain interests there to connect their sewers after all roof and storm water be excluded therefrom with the borough sewer system.

Harrisburg, Pa., March 2, 1908.

DERRY, WESTMORELAND COUNTY.

This application was made by the borough of Derry, Westmoreland county, and is for permission to install a system of sewerage purification works for the treatment of the borough sewage.

It appears that on March second, nineteen hundred and eight, the Commissioner of Health issued a permit to the borough of Derry to install a system of sewers and among other conditions were the following:

"FIRST: That all roof and surface water be excluded from the sewer system, records of all properties connected to the sewer system shall be kept and at the expiration of each season's work plans of the sewers laid during the year, together with any other information in connection therewith that may be desired, shall be filed in the office of the Commissioner of Health, to the end that the Department shall always be informed as to the extent of the borough sewer system.

"SECOND: That before the sewer system or any part thereof shall be put in use, the borough shall employ some recognized expert, experienced in the art of sewage purification, to design plans for disposal works for the borough, and these plans shall be submitted to the Commissioner of Health for approval. If this be done, then the borough may discharge sewage from the proposed sewer system into the waters of the State until such time as the Governor, Attorney General and Commissioner of Health shall determine, but in no event shall said date be more than five years from April twenty-ninth, one thousand nine hundred and seven. The exact time may be given when the sewage disposal plans herein called for shall have been submitted and approved."

It appears that the local authorities, have upon further consideration of sewerage improvements, decided it to be for the best interests of all concerned that a purification plant should be adopted and built at the time that the sewers are constructed. For this purpose an expert has been employed, a site for disposal works selected and necessary detail plans prepared. Work on the sewers will be postponed until these plans shall have been modified, amended or approved by the Commissioner of Health.

The site selected for the works is along the public road leading northerly from the borough through Derry township and is distant from the borough line about one thousand feet. At this point west of the said highway and south of the cross-road, at right angles to the former, there is a tract of land adapted to the erection of the purification plant, so it is reported.

McGee Run, paralleling the public highway and distant therefrom not over one hundred and fifty feet, passes northerly through the tract and between it and the highway there are trees which exclude the land west of the run from view. It is on this western part, at the foot of the hillside, that the works are to be erected. They will consist of sedimentation tanks and contact beds. The site, tentatively selected and indicated on a plan previously submitted, was located several hundred feet further down stream.

In the design under consideration the effort has been to secure the treatment of the sewage in gravity works and this has made necessary the type of plant proposed.

The main outfall sewer of the borough is fifteen inches in diameter. It will terminate in a manhole in the said public highway at the borough line. From thence an eighteen inch outfall sewer, to be laid on a one-tenths per cent. grade, is to extend northerly across the run and thence along the hillside, terminating in a sedimentation tank at the disposal works.

There are to be two of these tanks laid side by side built of reinforced concrete with roof, each thirty-nine feet long by twenty-four feet wide, interior dimensions, with an effective depth of seven and five-tenths feet and a total depth of ten feet.

Into each unit sewage is to be admitted at one end into a compartment seven and one half feet wide and extending to within seven and one half feet of the opposite end. There is to be a concrete baffle board two feet from the inlet end extending across the compartment and submerged three feet below the flow line whose object is to distribute the inflow uniformly throughout the compartment. The course of the sewage will be down the first compartment and thence back through a parallel compartment of equal size and thence forward through a third compartment seven and one half feet wide and under a submerged baffle two feet from the end to the outlet pipe twelve inches in diameter whose invert elevation is to be the same as the inlet pipe. In the roof over the inlet and also over the outlet pipes and also at the opposite end of each longitudinal compartment are to be placed inspection manholes with perforated covers. The depth of the tank at the inlet is to be seven feet, which is to be the depth of the three compartments across the inlet end of the tank. The depth across the opposite end of the tank in each compartment is to be eight feet, this twelve inch slope being provided to facilitate the drainage and removal of sludge. A sludge drain eight inches in diameter is provided at the bottom of the outlet compartment and also halfway between the first and second compartment; each drain to be fitted with approved sludge valves with stems extending through the roof of the tank. Sedimentation tank number two is a duplication of the tank above described.

The effluent from each tank is to be collected in an open manhole chamber adjacent to the tank, one chamber for each tank. Sluice valves are provided for each inlet and outlet pipe to the tanks and in the main wall between the two is to be built a baffled weir by means of which both tanks may be used in tandem.

Adjoining the settling basins are the filters consisting of four beds of equal size, each fifty-four feet square arranged in the form of a rectangle with a control chamber in the centre into which the septic tank effluent flows and is thence diverted onto the surface of the contact beds.

The filters are to be confined within concrete structures, the surface of the filtertering material being nine inches below the minimum flow line of the sedimentation tank.

The control chamber is a concrete masonry structure eight feet square, inside dimensions, housed over on top to protect the mechanism from the weather and extending below the concrete floors of the filter beds. The septic effluent is confined to the upper floor of this chamber in a bowl arranged with four outlets, one for each bed, and provided with valves automatically operated by the height of flowing sewage. These ports connect with sluice ways, concrete bottom and wooden sides, eighteen inches wide at the inlet end and six inches at the smaller end, being graduated down and provided with side gates for the distribution of the sewage at convenient points onto the surface of the filter. One distributing sluice is afforded for each bed. It is to extend diagonally across about three-quarters of the distance from the control chamber.

On the floor of each contact bed which is sloped a maximum of three inches towards the said control chamber is to be laid five inch tile underdrains with slots on the sides, laid in parallel rows eleven inches on centers, terminating in a channel built on the concrete floor along the division wall and twelve inches in diameter covered over with a concrete slab. This main underdrain terminates in the control chamber at the bottom thereof, but on it near the end in the filter bed is a lift valve carried up by stem and connected with a float and balancing apparatus in a cylinder located on the opposite side of the wall in the adjoining filter bed. Into this cylinder the liquid rises as the contact bed is filled, carrying up the float and at some predetermined height this mechanism will operate to close or open the said lift valve in the adjoining bed. Similar arrangements are provided for in each of the contact beds. The outlet pipe into the control chamber is to be free. Leading out from said chamber there is to be a main drain fifteen inches in diameter. Its invert is to be one and one half feet below the lowest point in each filter bed floor or seven and three-quarters feet below the surface of the filtering material. Thus it will be seen that a vertical height of eight and one-half feet is available between the minimum flow line in the septic tank and the bottom of the main effluent drain from the filters.

The filter bed material is to consist of broken stone. The floors are to be covered to a depth of eight inches over the tops of the underdrains with stones from two and one-half to four inches in diameter. The remainder of the bed material is to be of stone having diameters from one to two and one half inches and the total depth of such material is to be six feet from the surface to the underdrains.

The sewage will flow to the filters at the rate it is discharged from the main borough sewer, which rate will fluctuate hourly during the twenty-four hours of the day and it will be greater some days than others. The alternating apparatus proposed is intended to automatically control the quantity and flow of sewage delivered to any one of the contact beds and to cause successive doses to be turned onto successive beds in continuous cycle. The sewage is to flow onto contact bed number one until that bed has filled to the desired height, when the flow is to be automatically changed into bed number two, and so on in continuous cycle. The loss of head through the controlling device necessary to operate the same is eight inches or less. The height to which the sewage shall rise in the beds and the length of time the beds shall stand full is by the arrangement contemplated capable of adjustment, but the time for the completion of a cycle is not capable of adjustment but depends upon the rate of flow from the town sewer. The apparatus is so arranged as to admit of the cutting out of any one of the beds and the union of the other three beds to form a cycle in the operation of the plant.

As previously stated, each bed is to be furnished with an emptying device. The controlling device and the emptying device working in conjunction will give the following cycle of operations. First, bed number one is to be filled with sewage to the desired height when the flow will be automatically changed to bed number two, while bed number one stands full. After bed number one has stood full as long as necessary for the proper action in the bed, or as long as it is possible, then it is to be automatically emptied and allowed to remain at rest until the flow of sewage is again turned onto it from bed number four. After bed number two has filled to the proper height, the flow is to be changed onto bed number three, and so on. It is intended that these shall be two complete cycles of filling and emptying of the contact beds every twenty-four hours.

The elevation of the bottom of the controlling chamber which is the drainage pit, is to be eleven hundred and four and one-half and it is reported that this is the level of the highest freshet ever noted in the valley at this point. It is proposed to carry the fifteen inch outlet pipe to the creek below the cross roads, the exact point of discharge to be determined on the ground later. Between the contact beds and the creek there is a space fifty feet in width, where it is proposed to lay out the sludge drying area. Details have not been submitted. The general scheme is to throw up an embankment of earth around the area and to a sufficient height to exclude storm water. The surface is to be graded off with no part higher than elevation eleven hundred and two and a half feet, which is two and a half feet below the bottom of the settling tank.

It is proposed to drain the accumulation of solids and also the liquid contents of each sedimentation tank onto the sludge area whenever this shall be necessary. A small pumping outfit may be installed at the tanks to facilitate drainage and also the operation and handling of the sludge. The petitioners purpose to work the details out and submit them later. The object will be to prevent the discharge of sewage into the run at any time.

The layout of the plant is such that extensions may be made in the future to double the present capacty.

The present population of the borough and its environs is about four thousand. It is estimated that the total outflow from the sewers when the system shall have been built and put in universal use will be three hundred thousand gallons, excluding ground water and cellar drainage. The town being located on a hill abounding in numerous springs and having a wet soil is in need of sub-soil drainage to render many of the homes of its citizens healthful. The sentiment in favor of sewerage may be attributed equally to the desire for cellar drainage and sewage removal. The careless construction of the sewers whereby pipe joints were imperfectly made would be likely, under the local conditions, to total for the entire sewer system an excessive amount of leakage into the sewers. Such an amount might be greater than the total output of sewage proper. If cellar drainage be also admitted to the sewers a calculation as to the daily discharge into the disposal plant must be a mere conjecture.

The settling tanks have a combined capacity of one hundred thousand gallons, which is an eight hour retention when the flow is at a rate of three hundred thousand gallons per day, or a four hour retention when one tank is in use.

The total area of the filter bed is eleven thousand six hundred square feet, which is practically equivalent, if the flow from the town sewers be not over three hundred thousand gallons per day, to one million two hundred thousand gallons per acre per twenty-four hours. This rate is double that found desirable and necessary in practice. If the sewers were not built tight and if the infiltration from faulty joints should also be added a large cellar drainage flow, the petitioners would be under the expense and necessity of providing works whose capacity should be several times that contemplated by the present plans. It is, therefore, very necessary that all ground water should be excluded from the sewers for economy's sake and that cellar drainage should be excluded from the sewers, provided a more economical way of draining the cellars be found. In the eastern states the project of laying small open joint tile drains beneath the sanitary sewers for sub-soil and cellar dainage has proven economical and satisfactory. This method should be very carefully considered by the loal authorities of Derry borough. It appears from information now at hand that this would be a satisfactory solution of the disposal of ground water in the town. These underdrains are made to discharge at convenient points into the natural water courses. The danger in their use is that through careless construction of the sewers sewage will flow out of the sewers into the underdrains and thus pollute the stream, in which event the underdrains would either have to be stopped or their flow diverted into the sewer and the object of their construction would be lost. It is clearly evident that the economies of the improved sewerage project in Derry dictate that extreme care should be taken in the building of the sewer.

If this be done, then the flow to the disposal works may not be three thousand gallons daily for a number of years, so that the plans proposed would afford works ample in capacity to treat the sewage. However, the doubling of the capacity of the plant will be required at no distant date in any event. There is land in the vicinity adapted to further extensions of the disposal works. These considerations should govern the borough council in its determination of the amount of land necessary to be acquired at this time. The nearest dwelling to the tract is about eight hundred feet distant. The preempting of the site proposed will commit the borough to a permanent policy and, therefore, enough land should be purchased from the main highway westerly to enable the works to be excluded from the view along the traveled highway.

The tanks proposed may easily be operated to infringe the patented process now controlled by the Cameron Septic Tank Company and the borough should understand that a royalty may be due if said process were to be infringed.

The success of any sewage purification plant depends in a measure upon the attention which it receives in operation. The State Department of Health not only carefully scrutinizes the design in the first instance, but it purposes to carefully supervise the operation of the plant thereafter, to the end that sewage shall not be discharged into the waters of the State. In the plant under consideration, whether or not sewage may be liable to enter the stream depends upon the flow from the town sewers. The works if built as designed should effect a reduction of eighty per cent. of the bacterial impurities in the sewage and a greater percentage of reduction of the organic matter and the effluent should be reasonably clear and nonputrescible. The time may come when this degree of purification will not be sufficient to protect the interests of the public health, and when such time shall arrive the local authorities must provide means to accomplish a greater purification.

Sewage effluents may be sterilized to-day, but the cost is high. Some agency may be discovered or introduced later which will render feasible the sterilization of effluents and bearing this in mind the local authorities should understand that the

question of efficiency of the plant is one that must be left open. The necessity of careful attention to the construction of the sewers and the ground water problem cannot be too strongly emphasized.

It has been determined that the interests of the public health will be subserved by approving the proposed sewage disposal plans and a permit is hereby and herein issued therefor under the following conditions and stipulations:

FIRST: Detail plans for the sludge disposal area shall be prepared and submitted for approval and shall be modified, amended or approved before construction.

SECOND: Detail plans of the plant herein approved as the same shall be erected shall be prepared of the works when built and filed in the office of the Commissioner of Health, together with any other information in connection therewith that may be required.

THIRD: Daily reports of the operation of the works shall be kept on blank forms satisfactory to the State Department of Health and copies thereof shall be filed in said Department's office, and to the end that efficiency and economy shall be obtained the borough shall employ the designer of the works, or some equally competent expert to have responsible supervision and direction of the construction of the purification plant and of the operation for one year thereafter, during which time the attendant to be employed by the borough may have an opportunity to become thoroughly schooled and skilled in the manipulation of the apparatus and the sewage disposal plant.

FOURTH: The automatic controlling apparatus shall be purchased and installed under a guarantee that it shall do the work and tests for this purpose of sufficient duration shall be made to determine the efficiency of the apparatus, because the successful operation of the plant will depend in a large measure upon the apparatus. Facilities shall be afforded for the manipulation of the valves by hand, so that the plant need not be shut down in case the apparatus were to get out of order.

FIFTH: The plans herein approved are for disposal works whose capacity to properly purify sewage may be largely exceeded before the sewer system is completed. Therefore, the works now planned for shall be erected at the time the sewer system is built and additions thereto shall be made when, in the opinion of the Commissioner of Health, the disposal plant herein approved fails to accomplish the proper purification of the sewage and such remedial measures shall be adopted in the event of the purification plant becoming a nuisance or menace as the Commissioner of Health may suggest or approve.

Harrisburg, Pa., May 28, 1908.

DICKSON CITY, LACKAWANNA COUNTY.

This application was made by the borough of Dickson City, Lackawanna County, and is for permission to install a sewer system and to discharge the sewage therefrom into Price Creek and the Lackawanna River within the limits of the borough.

It appears that the borough of Dickson City is located in the central part of Lackawanna County on the west bank of the Lackawanna Diver. It is bounded on the north by Scott Township and Blakely borough, on the east by said borough and the Lackawanna River and on the southeast by said river along which opposite Dickson City are the boroughs of Olyphant and Throop, on the south and southeast by the City of Scranton and on the west by South Abington Township.

The area so incorporated is very rugged except along the valley of the river where are the streets and the residences. The major part of the town is steep hillside cut laterally by numerous ravines which are creeks tributary to the river. The summits of the hills are in or near the borough and their elevations are twelve hundred feet or more above the river.

The Delaware and Hudson Railroad follows along the river on the flats and just west of it are the tracks of the Ontario and Western Railroad and also the New York, Susquehanna and Western Railroad.

Between the first two railroads in the upper part of Dickson City are a few streets laid out on the flats where there are residences and this tract is subject to freshet inundation. In the lower part of the borough west of the railroad between it and the river on the flats is another settlement occupied by residences and also subject to flood.

The principal part of the town lies on the higher ground along the west of the railroads. Here there are also located the two collieres in the borough. The principal one is the Johnson Colliery of the Scranton Coal Company. The shaft and pumping outfit are located at the foot of Jackson street and by Price Creek at the railroads in the upper part of the borough and the breaker is located in the vicinity, west of the dwellings in this part of the town.

The Storrs Colliery of the Delaware, Lackawanna and Western Coal Company is located west of the main street in the lower part of the town.

The citizens are engaged principally in coal mining.

The total population at present is about six thousand two hundred. The public water supply is furnished by the Dickson City Water Company absorbed by the Providence Gas and Water Company and operated by the Scranton Gas and Water Company. There are no sewers in the borough, few cesspools and no private wells.

The main street of the town is the old Providence and Carbondale turnpike, a highway extending from the city of Scranton northeasterly up the valley and along the west bank of the river through the boroughs of Dickson City, Blakely, Archbald, Jermyn, Mayfield, Carbondale Township, the city of Carbondale, Fell Township and the Vandling Borough to the Susquehanna County line and Forest City borough in the county of Susquehanna, a total distance of about twenty miles from the Scranton city line.

By the joint co-operation of these municipalities and of the boroughs of Taylor and Old Forge below the city of Scranton and the unanimous approval by the Scranton Board of Trade, the County Commissioners pursuant of Act number two hundred and fifty-one of eighteen hundred and ninety-five and a supplement thereto Act number three hundred and eighteen of nineteen hundred and one, proceeded to perfect plans for the permanent improvement and paving of this highway throughout the entire length of the county, excepting the territory within the two cities Scranton and Carbondale, which have been approved by the grand jury and by the Court of Quarter Sessions as provided by law.

Within the respective jurisdiction of each municipality the highway will be graded by each and the curbing set by the abutting property owners. The county will then enter and surface the roadbed with brick laid on concrete foundation and thereafter the county will maintain the road. It is the purpose of the local authorities to build whatever sewers may be needed for the borough, so far as any part of the sewer system may ever require to be built in Main Street, prior to the permanent surfacing of the highway as aforesaid.

The borough is naturally divided by the topography into three main drainage districts. The first district is in the northern part through which flows Price's Creek. Here now reside about three thousand people. The pumpage from the Johnson Colliery is delivered into this creek at the stone culvert under the railroads. The daily volume of such pumpage is reported to be over one million gallons. It constitutes by far the greater portion of the flow in the streams except during wet periods. If the pumps should cease operating the stream flow would at once become soft, mountain spring water.

The second district includes the central part of the borough and is drained by a small run which empties into the river near and below the boulevard bridge. It receives the waste water from the washery located near shaft number one of the Storrs Colliery. In this district there are about fifteen hundred people.

The third district is in the southern part of the borough, receives the pumpage from at least one of the two shafts and empties into the river near the Scranton Railway Company's washery of the Richmond culm dump.

The proposed sewage system for district number one comprises twenty-one thousand feet of pipe sewer whose diameters range from eight to thirty inches, designed to carry off both sewage and storm water. The outlet is to be into the railroad culvert at the point where the pumpage from the Johnson shaft is now emptied. The plan calls for a sewer for the entire length of Main street in this district.

The proposed sewers for the second district are to be built on the separate plan and to be ten and twelve inches in diamater in Main street for a distance of two thousand feet and in Bowman Street which extends at right angles across the railroads to the river, two thousand feet also. All but about four hundred feet of this outlet is in the flats.

The sewers for the third district are to be on the separate system and to have an outlet into the river where the creek draining this district discharges. These sewers are not to be built at this time excepting about twenty-three hundred feet of ten-inch pipe in Main Street and five hundred feet of outlet.

The plan does not contemplate the sewering of the streets on the flats. If this be ever done, the sewers would probably be planned to drain to a pump well from which the sewage would have to be lifted to a convenient gravity outfall to the river or intercepting sewer or disposal works. The borough now owns its electric light plant. Should pumping of any sewage ever prove desirable and necessary, the pumps might be operated by electric power generated by suitable machinery at the borough's lighting plant.

The river bed through the borough is tortuous, generally shallow, and well filled in with culm and other deposits. The banks on the west side in the borough are generally from three to five feet above the channel bottom. On the east bank there is a twenty-five foot bluff in Olyphant and Throop boroughs.

The sewers of Olyphant and Blakely and the other boroughs and towns in the valley as well as the sewers of the city of Scranton now discharge into the Lackawanna River. Beyond the imediate vicinity of these outlets no nuisance from odors is reported to exist or has been observed by Department officers. This is attributable undoubtedly, to the precipitating and purifying influence of the acids together with mineral water in the flowing current of the stream. There are many million gallons of sulphur mine water daily deposited into the Lackawanna. Undoubtedly the obstructions along the channel of the river cause greater local annoyance than the discharge of sewage therein. The water shed of this stream is precipitous and

sudden and intense precipitations over any extended area thereof, is attended by a rapid rise and freshet flow in the stream. At such time, the accumulated deposits and sewage refuse is stirred up and carried down stream many miles, even as far as the city of Harrisburg. At such time fresh sewage and pathogenic poison may be transmitted from the Lackawanna valley to the down stream municipalities along the Susquehanna river who use the waters for drinking purposes. In this way the public health may be menaced.

While the small proportion of sewage which Dickson City borough might contribute to the already heavily polluted stream channel might not measurably increase the menace, it would not reduce the menace, and it is the policy of the Commonwealth to bring about in a reasonable manner the diminution of the sewage pollution of the waters of the State for the protection of public health.

The fact must not be lost sight of that there is a limit to the amount of sewage which may be put into a stream beyond which limit a nuisance is bound to occur. In the event of the cessation of the pumpage of mine water into the streams at the numerous points where it is now emptied and the delivery of the volume at some one point, such as is said to be contemplated in the upper valley (by means of a tunnel which is to drain several mines from which water is now pumped) the conditions which now obtain would be likely to be so changed as to cause nuisances in the stream at existing sewer outlets in some instances.

It is very prudent in preparing sewerage plans and essential to anticipate a general sewerage project for the interception of the sewage of the numerous municipalities in the Lackawanna River valley. The sewers should be built on the separate plan, first, because this is the cheapest plan and makes possible the laying of sewers in the largest number of streets for a given sum of money; second, because such sewers are most efficient in serving sanitary purposes and the flow discharged from them being house drainage only, calls for a reasonable expense in the building of such apparatus as may be necessary to clarify or treat the sewage before the liquid is discharged into the stream; and, third, it separates the problem of surface drainage, which is always the more expensive one and prohibitive in cost to the smaller municipalities which stand in need of house drainage systems as much as the larger places. The petitioners intend to improve their natural water courses and to get the surface water into them by means of their own choice from time to time as necessity may require.

There is a community of interest relative to the sewerage problem which may be well considered jointly by the State and municipalities along the Lackawanna River. The construction of a score or more of sewage disposal plants with the attending problem of how to dispose of the sludge might be solved to the greatest economy for each place by the construction of the fewest number of plants and the conveyance to them of the sewage from the tributary municipalities.

Should any such project be finally contemplated or the different boroughs and cities be required to independently make other arrangements for sewage disposal than now in use, some separation at that time of sewage from surface drainage would be absolutely necessary. Therefore, the plans for the new sewer system should exclude surface water.

Owing to the excessive damages sustained by abutting property owners by reason of the overflowing of the Lackawanna River banks, the question of widening and straightening and walling and deepening of the channel is now being considered by the Board of Trade of the city of Scranton. No definite plans have been recommended but there is a co-operative movement on foot, so it is reported. If this improvement should be finally inaugurated it would be sensible at least for the promoters to consider the expediency, economy and utility of the building into these walls or laying in connection with the improvement, sewage intercepters. It should be at once obvious that the installation of one garbage crematory for the incineration of the settled solids from sewage, and its operation thereafter for all the places, would be much cheaper to each than an independent installation and operation. Since the various towns in this valley have one general water supply system and have united on a joint highway project, it ought to be possible for the same places after due deliberation, to determine whether there be anything to gain by a co-operative plan of sewerage, sewage disposal and stream improvement.

It has been determined that the interests of the public health demand that approval be given and it is hereby and herein given for the installation of a sanitary system of sewers in the borough of Dickson City, under the following conditions and stipulations:

FIRST: That all street drainage shall be excluded from the proposed sewers and that only such roof water shall be admitted as may be necessary or desirable to flush the sewers to a reasonable degree and that no roof connection be permitted unless it be under the condition by borough ordinance that a disconnection shall be made at any time deemed necessary.

SECOND: Inspection manholes shall be placed on the sewers at all street intersections and at changes of line and grade. A careful record shall be kept of all connections with the sewer system. At the close of each season's work, a plan of the sewers built during the year, together with any other information in connection therewith that may be required, shall be filed in the office of the State Department of Health, to the end that the Commissioner of Health may be informed of the extent of the sewer system and the public use thereof.

Third: This permit to discharge sewage into the waters of the State shall cease on the first day of January, nineteen hundred and ten, provided the other conditions of the permit shall have been complied with. If on said January first, nineteen hundred and ten, all of the conditions of this permit shall have been complied with, then the Commissioner of Health may extend the time in which the borough sewage may be discharged into the waters of the State, having in mind always the general policy of the State with respect to the disposal of sewage from the various municipalities in the Lackawanna River valley above Old Forge borough.

FOURTH: In view of the fact that the joint problem of sewerage and sewage disposal, either alone or associated with the stream improvement as hereinbefore outlined, is a comprehensive one and if brought about, must necessarily require considerable time, therefore, it is specially stipulated that the borough of Dickson City shall on or before January first, nineteen hundred and ten, either alone or in conjunction with one or more other municipalities in the Lackawanna Valley consider and perfect some other plan for the disposal of the sewage than into the Lackawanna River, and submit the same to the Commissioner of Health for approval. Especial attention of the local authorities is called to the various suggestions hereinbefore made and to the fact that the Department will be glad to advise and assist the borough in its study of said problem.

FIFTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

SIXTH: If at any time, in the opinion of the Commissioner of Health, the sewer system or any part thereof, or the method of disposal, has become prejudicial to public health, or a public menace, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

Harrisburg, Pa., April 15th, 1908.

DORRANCETON, LUZERNE COUNTY.

This application was made by the borough of Dorranceton, Luzerne County, and is for permission to build a new sanitary sewerage system and to discharge the sewage therefrom, untreated, into the North branch of the Susquehanna River within the limits of the borough.

It appears that Dorranceton borough is a purely residential community of about twenty-five hundred population, located on the north bank of the North branch of the Susquehanna River, in Luzerne County, directly opposite the city of Wilkes-Barre. It is bounded on the north by Kingston and Luzerne boroughs, on the east by Forty Fort borough, on the south by said river and on the west by Edwardsville borough and also by Kingston borough.

Through the northern part of Dorranceton territory is Wyoming Avenue, the principal highway, paralleling the river and extending up and down the valley. It is along this thoroughfare and in the northern district that most of the residences of the borough are located.

The Dorranceton branch of Toby's Creek rises in the mountains to the northeast of Dorranceton and comes down through Forty Fort borough to Dorranceton, and crossing Wyoming Avenue it flows toward the river and thence takes a parallel course westerly and forms the boundary line between Kingston and Dorranceton in the extereme northwestern part of the latter municipality. All of the territory traversed by this run south of Wyoming Avenue is extremely flat, at time of freshet is subject to inundation.

Wyoming Avenue, after passing westerly from the northern portion of Dorranceton borough, lies within Kingston borough so that there are no physical evidences on the ground of the boundaries between Kingston and Dorranceton boroughs.

The territory is in the anthracite coal fields and many operations are being extensively carried on, both in Kingston and Dorranceton boroughs. The Pettibone shaft of the Delaware, Lackawanna and Western Railroad Company is located on the flats in the northern part of Dorranceton. This is the only shaft in the borough. A large quantity of mine water is pumped from the ground here and discharged into the above mentioned run. Outside of the borough, in Forty Fort, the stream receives the mine drainage from two other collieries, so it is reported, namely, from the Forty Fort and the Harry E. Collieries of the Temple Coal and Iron Company.

Separating Dorranceton from Luzerne borough are the tracks of the Delaware, Lackawanna and Western Railroad, and the passenger station known as Bennett Station, for both municipalities, is located in Luzerne at North Bennett Street.

These places and the entire region are supplied by water furnished by the Spring Brook Water Supply Company. Everybody takes public water, so it is stated.

In the extreme southern or westerly portion of the borough along Market Street, which is the principal highway between the east and west sides of the valley, there being a bridge over the river at this point, is a settlement in Dorranceton known as Westmore, where about five hundred people now reside. There is a public sewer serving this district which has an outlet across the flats westerly through

Edwardsville borough to the Susquehanna River. It is reported to be a twenty-four inch pipe and connected with this outlet are eight and ten-inch laterals in every alley of Westmore. The system is a combined one and totals eleven thousand, five hundred feet.

In the northern district there is a private sewer eighteen inches in diameter and extending in South Church Street across the flats, crossing under the run at two points and thence to the Susquehanna River. It was laid by private individuals to open up a real estate development south of Wyoming Avenue in the district. The laterals are mostly eight and ten inches in diameter and with the outlet comprises approximately seven thousand seven hundred feet. There are reported to be about twenty-five buildings connected to this sewer system.

Elsewhere in the borough the universal disposal of sewage is into percolating cesspools. The ground being low and of alluvial deposit, comprising a heavy bed of sand and gravel, rapidly absorbs sewage. This method of disposal is satisfactory for a number of years until, the ground becomes supersaturated or the cesspools clog up. It is because of the filling up and clogging of the cesspools that the public sewerage improvement is being agitated. The fact is emphasized that the citizens of the town are quite resourceful and they make the borough a suburb of the city of Wilkes-Barre. The dwellings are of the better class and are fitted with modern facilities. Therefore, the clogging up of existing cesspoools becomes a very serious matter to the comfort and health of the community and it is reported that as soon as plans are approved the borough will proceed to construct the sewers without delay.

The plan offered for consideration provides for a separate system of sewers in the northern portion of Dorranceton from Luzerne borough to the river. Over fifty per cent. of this area, including the tract occupied by the Pettibone mine, cannot be occupied by residences until it shall have been filled in. At present these low lands are utilized for truck farming. In the main the intercepting sewer follows the line of the run, but in existing public streets as far as possible. Where it crosses Wyoming Avenue the pipe is to be twenty-four inches in diameter. This size is to be continued to the river, a distance of five thousand and five hundred feet. Its location is to be on the western side of the line between the Charles Dorrance and the Pettibone estates. This line is also the line of Barrier Pillar, between the workings of the D., L. and W. Railroad and the Lehigh Valley Coal Company. Into this main outfall it is proposed to connect the present private sewer above mentioned and also to connect the district immediately south of Wyoming Avenue and west of the main intercepting sewer, these branch mains, being respectively fifteen and twelve inches in diameter. No changes are proposed for the Westmore district at the present time. Intervening are the garden truck areas, the borough having a frontage on the river of about one and a half miles.

Owing to the extreme flatness of the municipal territory, the grades of the proposed sewers are necessarily slight. Some of them will not exceed two-tenths per cent. for ten inch pipes, of greater diameters. The main outfall sewer is to have a grade of two-tenths per cent. Some of the six and eight-inch pipe will have grades of three-tenths per cent.

The sewers of the city of Wilkes-Barre empty into the river at convenient points throughout that municipality and when the time shall have arrived for the discontinuance of such sewage discharge from the city into the river, it is extremely probable that the solution of the sewage purification problem would advantageously include an area greater than that within the city. Dorranceton in this event would be included probably in the greater territory and its sewage might be gravitated to the point at which the sewage of the other municipalities might be economically collected and treated. It is reported that Dorranceton borough has an assessed valuation of over three million dollars, and that its bonded indebtedness does not exceed twenty thousand dollars, which, if true, gives the borough a borrowing capacity in the neighborhood of two hundred thousand dollars before the constitutional limit of indebtedness is exceeded. Some of the principal thoroughfares are now paved and the local authorities are proceeding to permanently surface the sewered highways of the town. It is evident that Dorranceton is in a position to take up at any time the question of sewage purification, and yet this would not be justification for the State Department of Health to decree an earlier consideration of the subject for Dorranceton than is required of the other municipalities in the valley. The Commissioner of Health has given the borough of Edwardsville and the borough of Kingston, whose sewages now empty into Toby Creek below Dorranceton borough, until January first, one thousand nine hundred and nine, on or before which date these boroughs shall either independently or in conjunction devise plans for the treatment of their sewages and submit such plans to the Commissioner of Health for approval. If on said date the plans called for have been prepared and submitted, the Commissioner of Health may extend the time in which sewage may continue to be discharged into Toby Creek by said municipalities.

There would seem to be a possible advantage to the borough of Dorranceton in joining with these municipalities in a consideration of the same subject and this would also appear to be a possible advantage to all of the borough and the City of Wilkes-Barre, in the consideration of one general project for improved sewerage and sewage disposal works.

Naturally, in an undertaking of this kind, the State's advice and co-operation would be helpful. The City of Wilkes-Barre having the largest interests involved should find it agreeable to initiate the investigation in co-operation with the local authorities of the surrounding municipalities. The present time, before sewer extensions shall have been made, is the proper time for reviewing the local situation with respect to the discharge of sewage into the waters of the State, and to so conform the existing and proposed sewers that the State's policy may be brought about at the earliest practicable moment.

It has been determined that the interests of the public health be subserved by giving approval to the proposed sewerage system and by granting a permit, and a permit is hereby and herein granted therefore under the following conditions and stipulations:

FIRST: Owing to the extreme flat grades of the proposed sewers, and in order to render them satisfactory in operation more especially since such settlements as occur in the mining regions are likely to disturb the alignment and grade of the sewers, ample flushing facilities shall be afforded and used. Plans and profiles of the sewers built each year shall be filed with the Commissioner of Health at the close of each session's work, together with such other information relative thereto as the Department of Health may require.

SECOND: Roof and storm water shall be excluded from the system.

THIRD: No pathogenic material from any laboratory shall be permitted to discharge into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

FOURTH: If at any time, in the opinion of the Commissioner of Health, the sewer system or any part thereof has become a nuisance or menace to public health, then such remedial measures shall be adopted as he may advise or approve.

FIFTH: This permit to discharge sewage into the Susquehanna River shall cease on the first day of July, nineteen hundred and eleven, and this three years' permit to discharge sewage into the waters of the State shall be contingent that the borough shall, if required by the Commissioner of Health so to do, submit plans for purification works, either independently or in conjunction with any other municipality or municipalities in the region, within six months from such request.

SIXTH: It is stipulated that such plans shall include the entire district of the borough and all sewage, whether public or private, in such territory.

The attention of the borough authorities is called to the desirability of co-operation between Dorranceton, Kingston and Edwardsville boroughs, in the preparation of the sewerage plans to be submitted on or before January first, one thousand nine hundred and nine, more especially in relation to the Westmore district.

The city of Wilkes-Barre will be notified of the prudence and necessity of its giving immediate consideration to the improvements in its sewer system or in contemplated extensions to the same, and for the ultimate purification of the sewage now discharged into the waters of the State, and that for this purpose, having in mind the possible advantages of a joint sewerage project for Wilkes-Barre and adjacent municipalities, the Commissioner of Health will give a hearing in Harrisburg to the local authorities at some date in the near future, to be determined by said Commisisoner and the said local officials.

Harrisburg, Pa., June 23, 1908.

EAGLES MERE, SULLIVAN COUNTY.

This application was made by the borough of Eagles Mere, Sullivan County, and is for permission to extend its sewer system and to discharge the sewage therefrom into a stream called Lake Outlet within the limits of said borough.

The borough of Eagles Mere, a summer resort in the mountains of Sullivan County, is situated in Shrewsbury Township in the western central part of the county. Eagles Mere, or Lewis Lake, the principal attraction of the place, is on a mountain summit, at an elevation of two thousand feet above tide water, and one thousand feet above the adjacent valleys within five miles of the lake. The stream from the lake, known as the "Outlet," is a mountain torrent following a winding and general southerly course of six miles to Muncy Creek at the village of Sonestown. Muncy Creek rises in the southern part of Sullivan County, ten miles east of Sonestown and winds through the mountain valleys past the villages of Nordmont, Sonestown and Muncy Valley and thence follows a southwesterly course through fertile bottom lands, passing the boroughs of Picture Rocks and Hughesville, eleven and fourteen miles respectively below Sonestown, to the West Branch of the Susquehanna River just above the borough of Muncy. The distance traversed by the creek below Sonestown is twenty-one miles.

Down this valley is the Williamsport and North Branch Railroad. From Sonestown village the Eagles Mere narrow gauge railroad, primarily a lumber road, follows up the general course of the Outlet stream to Eagles Mere.

Lake Lewis comprises one hundred and twenty acres of water surface, with its one hundred and ninety acres of land water shed, lies wholly within Eagles Mere borough. The borough has a total area of fifteen hundred and thirty acres, is rather oblong in shape and more than half its territory is southwest of the lake beyond the watershed and comprises a sparsely settled farming district.

The permanent population of the town is three hundred, about half being in the rural district and the other in the village, at the south end of the lake near the Outlet. The summer population is said to reach twenty-five hundred and is housed in five large hotels, two smaller ones and abount one hundred and fifty cottages, located on all sides except the east. The future may witness the development of the east shore.

Crestmont Inn, a prominent feature of the landscape, is situated on an eminence east of the lake near the south and at an elevation of about one hundred and thirty feet. It is apart from other properties and north of it the land along the shores and back therefrom is uninhabited scrub timber, interspersed with patches of virgin hemlock along the lake shore.

The railroad depot is near the Lake Outlet. The tracks extend around back of Crestmont Inn to the northern end of the lake, where there is a depot at the village there. In the vicinity is Forest Inn, around which are grouped sixty summer cottages, whose inhabitants board at the Inn. This settlement is off the lake watershed, draining northeriy into Rusty Run. Some of these buildings are owned by the Eagles Mere Company, so it is reported, which company controls several hundred acres of ground in the vicinity, but none of it is on the lake watershed. Besides the Inn, there is an amusement hall and an auditorium and picnic grounds in the vicinity.

The principal and well built up section of the borough is along and back of the lake at the south and west of the Outlet, and for the most part beyond the lake watershed, but within the drainage area of the stream and its tributary, Mackey Run. Four of the seven hotels of the borough are in this section.

The highway paralleling and several hundred feet distant from the shores extends from the Outlet around the west side of the north end of the lake. It is well built up, being lined with summer cottages. Hotel Raymond is back of this thoroughfare on a summit west of the lake. It and the other cottages are along the lake watershed.

It is said that the Eagles Mere Land Company originally owned the land surrounding the lake and that the deeds of sale of the lot upon which cottages have been erected contain clauses of restricting the character and location of buildings, their uses, drainage and sanitation and requiring purchasers and owners to conform to reasonable sanitary requirements.

The Eagles Mere Boat Company maintains bath houses on the north shore. Here there is a remarkable white sand beach. At this point and at the south end of the lake said company maintains boat houses, from which row-boats are rented to summer visitors. The small steam-boat operated by the company and affording the principal means of communication between landings at the bathing beach, railroad station and at points near the several hotels is not provided with a closet.

The drinking water is furnished largely by the Eagles Mere Water Company. The source is drilled wells on the shores of the lake near the Outlet. There are no buildings in the neighborhood. The water is drawn from a depth of over two hundred feet or less and is pumped into the street pipe system overflowing to the standpipe on the hill near Crestmont Inn. The average pressure is possibly seventy-five pounds. During the season it is customary to pump daily, although not throughout the twenty-four hours but for a week or more at the height of the season the well supply is not adequate and at such times recourse is had to the lake. This body of water is at places forty feet deep and it is fed almost entirely from springs located in its bottom. A six-inch suction pipe extends two hundred and thirty feet into the lake from the shore line at the pumping station, where the water is about eleven feet deep. In case of fire this reserve would be called into service. Analyses of the water taken by the company from the lake and well waters have shown both to be remarkably pure from a chemical standpoint.

There are said to be upwards of thirty wells in the borough, twenty being located in the main village. They are drilled. The others, located in the outlying rural districts, are mostly dug wells. These sources are the main supply of the permanent population. The water company's plant is not operated in cold weather. The water pipes are so near the surface of the ground that they would freeze up and burst were water allowed to remain in them in freezing weather.

That pollution contributed to the lake waters by means of natural surface drainage, or by bathers, or otherwise, might become accidentally serious and endanger the public health of people drinking the water is by no means impossible, although it must be admitted that with the vigilant precautions taken at Eagles Mere this danger may be slight.

There are five sewer outlets in the borough, of which one only is public. Three of them are into the Outlet stream, one is into Mackey Run and the other is into Rusty Run.

With respect to the sewers discharging into the lake Outlet the principal one is owned by the borough. It extends southerly along the western bank of the lake from the most northerly cottages on that side and thence along the south

bank a total length of forty-seven hundred feet to the water company's pump house. Thence it extends eleven hundred feet down stream and discharges into Lake Outlet. The upper seventeen hundred feet of this sewer is ten inches in diameter and the remainder is twelve inches in diameter. The lower five hundred feet is laid at very steep grade in a ravine. The sewer along the lake is distant therefrom about two hundred feet and is elevated above the water surface about thirty feet at the upper end and perhaps five feet where it passes the pumping station. All of the cottages along the west shore are said to be served by the borough sewer. An eight-inch branch, fourteen hundred feet long, is laid in Summit Avenue and Lewis Avenue. To it is connected the Raymond Hotel. The J. S. Kirk & Son eight-inch sewer with a six-inch branch, begins near the Lakeside Hotel in the main village and extends easterly across private property and Eagles Mere and Allegheny Avenues and empties into the Outlet stream about two hundred feet above the mouth of the borough sewer. There are several cottages besides the hotel connected with the sewer. The buildings are not in use during the winter time.

The William Y. Warner sewer, eight inches in diameter, starts at Crestmont Inn, has a length of about twenty-five hundred feet and empties into the Outlet stream at a point about one hundred feet above the Kirk Sewer. There is but one cottage connected. Both it and the hotel are closed during the winter.

The sewer which discharges into Mackey Run is eight inches in diameter. Its branches afford sewerage facilities to most of the main buildings and a population of upwards of one thousand people including a majority of the permanent residents of the borough. An association known as the Eagles Mere Drainage Company owns the system. The outlet into Mackey Run is in a deep wooded ravine at a point eight hundred feet from several dwellings on the outskirts of the town along the public road leading to Muncy Valley village and occupied by permanent residents. It is reported that complaints have been made about a nuisance at the outlet. Mackey Run joins the Outlet stream more than a mile below the sewer outlet. The configuration of the earth surface between the two streams forms a prohibitive barrier to the turning of the sewage from Mackey Run into the Outlet stream except by pumping. So that the problem of sewage disposal for these two valleys may involve independent disposal works.

At the north end of the lake the Forest Inn and neighboring cottages are served by a sewer system said to belong to the Eagles Mere Company, consisting of forty-four hundred feet of six and eight-inch pipe and a ten-inch outfall sewer extending from the eastern end of Forest Avenue eleven hundred feet eastward to Rusty Run. During the summer times about five hundred people contribute to the flow, but during the winter a single family only.

Rusty Run flows easterly, principally through wild, uncultivated mountain country from which most of the timber has been taken, a distance of about two miles to Shanersburg Creek, which flows northerly two miles to the Loyalsock Creek. Thence Loyalsock Creek follows a very crooked, but generally southwesterly course, thirty-nine miles, passing through the borough of Forksville to its junction with the West Branch of the Susquehanna River at the borough of Montoursville, eight miles above the mouth of Muncy Creek.

One mile or so below the mouth of the sewer is the site of an abandoned sawmill on Rusty Run. Within eighteen months a new dam has been erected on this site, forming a pond with an area of about half an acre. On the immediate bank of this pond was erected a summer cottage large enough to accommodate three families. Bath houses have been put up on the shore. The ice supply for the cottages is harvested from the pond. Further improvements are in progress. A tributary to the pond together with Rusty Run have a water shed of one square mile. During dry weather the flow from Rusty Run is mostly contributed by the sewer from Forest Inn at the sewer outlet. The sewage is diluted before reaching the pond. Complaints have been registered at the office of the State Department of Health, representing that Forest Inn sewage causes a foul scum on the surface of the pond and creates a nuisance. The Commissioner of Health has ordered the discontinuance of sewage discharge into the run and other means for caring for the sewage are now being provided.

There are said to be fifty-three privies and two cesspools in the borough, and that with the exception of two or three they are located beyond the watershed of the lake on the properties of permanent residents.

The proposed sewer extension comprises seven hundred and fifty feet of eight-inch pipe. The borough authorities represent that the only privy vault and cesspool on the western slope of the lake will be closed as soon as this sewer extension is built. It will serve ten to fifteen houses when all of the abutting properties have been built upon.

The borough has furnished sewerage facilities for nearly all the properties within the watershed not otherwise sewered and this has been done to maintain the purity of the lake water.

It is not apparent that the sewage of Eagles Mere in the Outlet stream produces a nuisance. It and Mackey Run flow through mountain ravines, uncultivated, which continue to Sonestown and in this distance of about six miles but one dwelling is passed.

Muncy Creek itself is polluted at Nordmont by the Nordmont Chemical Works, engaged in the manufacture of wood alcohol and by-products. At Muncy Valley

village tannery wastes are discharged into the creek and further down stream the sewage of Hughesville borough is emptied into the creek.

Although it would appear that these waters are much used as local sources of water supply, this is not a reason why sewage should be put into the stream. It is the object of State law to preserve the purity of the waters of the State for the protection of public health and ultimately all sewage must cease to be emptied into natural water courses.

The Eagles Mere season lasts about three months in the summer and then the place is practically closed up. The pollutions of the streams of the region are, therefore, intermittent so far as Eagles Mere contributes to the pollution. During the trouting season when sportsmen come into the district the hotels and cottages are not in use. However, if the streams be not preserved in their purity fish life will gradually become extinct and most certain it is that one of the natural resources of the district is its streams and anything tending to destroy this resource should be placed under control.

The borough valuation is said to be about one hundred and thirty-five thousand dollars and its present borrowing capacity beyond present indebtedness is said to be less than six thousand dollars. If these figures be true the borough cannot afford to treat the sewage discharged by the public sewer into the lake outlet. The action which the Commissioner of Health has taken with respect to the discontinuance of the discharge of sewage into Rusty Run is a forerunner of action that may be anticipated relative to Mackey Run and the Lake Outlet if complaint should be made. There is a community of interest which may some day bring forth a plan for the collection of all of the sewage in Eagles Mere borough and its conveyance to some one point for treatment. Because the resort has a short season, the economies of sewage treatment seem to be away from large permanent investments towards small first cost and greater operating expenses. For instance it might be cheaper and better for the Eagles Mere Company to pump its sewage over into the borough sewer than to defray the cost of the erection of a permanent gravity disposal works in the valley of Rusty Run.

The same proposition might hold good with respect to the Borough, the Warner and the Kirk sewers now emptying into the Lake Outlet and also with respect to the Eagles Mere Drainage Company's outlet into Mackey's Run. The borough might with some advantage review the proposition and prepare outline plans with a view to adoption in case outside financial assistance might become available to help along the proposition.

It has been determined that the interests of the public health will be subserved by approving the proposed sewer extension in Prospect and Pennsylvania Avenue, and a permit is hereby and herein granted therefor under the following conditions and stipulations:

FIRST: That this permit to discharge sewage into the waters of the State shall cease on June first, nineteen hundred and eleven. If at that time the interests of the public health demand it, the Commissioner of Health may extend the time in which the sewage may continue to be discharged into the waters of the State. But this permit is contingent also on the other terms herein stipulated being complied with.

SECOND: All surface water shall be excluded from the borough sewer system and no additional roof water shall be admitted to the sewer without provision for the discontinuance of such admission whenever necessity may require it.

THIRD: If the sewerage system or any part thereof or the discharge of sewage therefrom becomes a nuisance or menace to public health, then such remedial measures shall be adopted and put in force as the Commissioner of Health may advise or approve.

FOURTH: On or before June first, nineteen hundred and eleven, the borough shall prepare, either alone or in conjunction with the owners of private sewers in the borough, a plan for some other disposal of the sewage than into the waters of the State and shall submit the same to the Commissioner of Health for approval.

The proprietors of the various private sewers hereinbefore mentioned will be notified that sewage discharge into natural water courses must ultimately stop and they will be advised to co-operate with the borough authorities to the end that plans may be prepared for a joint project if such should prove desirable.

The local authorities are also advised during the resort season to co-operate with the State Department of Health relative to the purity of the public water supply. The Commissioner of Health will send bottles for samples of the water at the water works intake, and the borough will designate some officer who will collect the samples and ship the same to the Department Laboratories.

The Eagles Mere Water Company will be notified of the element of risk in using lake water and of the advisability of this source being abandoned if the ground water supply can be further developed.

Harrisburg, Pa., June 25, 1908.

EAST STROUDSBURG, MONROE COUNTY.

This application was made by the borough of East Strousburg, Monroe County, and is for permission to install sewers and to discharge the sewage therefrom into Brodhead Creek within the limits of the borough.

It appears that the borough of East Stroudsburg, a manufacturing community of thirty-three hundred inhabitants, is located along the east side of Brodhead Creek, and opposite the borough of Stroudsburg, both places having been incorporated out of Stroud township, Monroe County. Three miles below and due east the creek empties into the Delaware River immediately above Delaware Water Gap borough and most of this course is through a gorge at the foot of Godfrey Ridge, which is the outlet for a drainage basin of two hundred and eighty-six square miles, most of whose territory, particularly in the northern part, is a rugged mountain region where are located noted summer resorts, among which may be mentioned those of Mt. Pocono, Mountain Home, Swiftwater, Pocono Pines, Cresco, Canadensis and Buck Hill Falls. It is estimated that in seasan twenty-five thousand people congregate here.

It is through Brodhead Creek Gap that the main line of the Delaware, Lackawanna and Western Railroad passes from the Delaware River northerly over the divide at the head waters of the creek and the source of the Lehigh River into the Lackawanna Valley. The railroad extends along the bank of the creek in the southern part of East Stroudsburg borough and thence passes northerly through the central part of the town at an average distance of fifteen hundred feet east of the stream. The passenger station is in the heart of the town, near Washington Street. This thoroughfare leads westerly across the creek into Stroudsburg, the depot serving the needs of both the municipalities.

The part of the borough west of the railroad comprises two level strips of land, the upper one being elevated about twenty feet above the lower one, There are few houses only on the lower level. That portion of it nearest the stream is intersected by several old channels and is subject to flood, principally from the waters which come down from the hillsides to the east of the railroad.

The eastern section is hilly and the streets have steep grades. There are five natural water courses traversing this section with courses generally westerly to the main channel of the old bed of Sambo Creek. This tributary of Brodhead Creek rises in Smithville Township northeast of the borough and after flowing southwesterly about four miles enters the municipal territory at the northern boundary at the railroad, where it passes under the tracks and thence parallels Brodhead Creek through the flats for a distance of thirty-six hundred feet before entering the main stream. Formerly it continued on a southerly course through the flats, passing under West Broad Street, Lenox Avenue and Houck Street to a junction with Brodhead Creek at Washington Street, a distance of six thousand additional feet. This old bed would now be dry if it were not for ground water and the flow of four of the five runs above mentioned which continue to empty into it.

Below Washington Street there is a water course which rises in the hills above the State Normal School, thence crosses westerly until it passes under the railroad, whence it turns and passes southerly along and then west of the railroad, entering Brodhead Creek near the southern part of the borough.

These topographical conditions afford good natural drainage facilities which should be adequate, if properly improved, and obviate the necessity of the conveyance for long distances underground of surface water.

The industries are of a substantial kind. The International Boiler Works Company have two plants wherein are employed several hundred men. The W. A. Gilbert and Company's Silk Mill is said to employ in the neighborhood of three hundred people. The Elk Horn Tannery of the Elk Tanning Company furnishes work for thirty-seven hands. Then there are the factories of the East Stroudsburg Glass Company, the Empire Brass Works and the Pocono Hosiery Mill.

The East Stroudsburg State Normal School has an enrollment of about three hundred students. The summer hotels in the borough entertain possibly one thousand guests during the summer season.

Since the incorporation of the borough in eighteen hundred and seventy the population has increased steadily and there appears to be no reason why a like growth for the future should not be anticipated.

The public water works system is owned and operated by the municipality. Ninety per cent. of the inhabitants use the water. The supply is taken from Sambo Creek at a point about two miles above the borough. The intake dam is a small structure, serving the purpose only of diverting the flow of the stream into the supply main, which is ten inches in diameter. The height of the dam is one hundred and sixty feet above the town at the railroad station. The water is supplied by gravity. The water-shed is nearly three square miles in area above the dam, is hilly, well wooded and sparsely populated. Thereon are ten occupied estates. The quantity of water available is insufficient for summer consumption and an emergency supply has been taken from Fable's Spring, which is located in the flats between the railroad and Brodhead Creek, just north of the borough. From here during portions of each summer water is pumped daily into the pipe system of the town. But even this additional spring supply is inadequate for fire service, so an artificial channel has been cut from the main creek leading to the spring and the raw water may be taken therefrom. However, it is reported that this has never been done. There are quite a number of dug wells throughout the town and they are reported to be in daily use. Water borne diseases are not common and the general health of the community is excellent.

There are reported to be one hundred and forty cesspools and five hundred and twenty-five privy vaults in town. Some of the cesspools have become clogged

and the ground thereabout saturated with filth and they are now overflowing and producing a nuisance and a menace to health in the neighborhood. It is to obviate these conditions that the proposed sewerage is contemplated.

There are no public sewers in the borough. Three of the runs are subject to pollution. The first one rises in or near Zacharias Pond in the extreme northeastern part of East Stroudsburg, thence it flows southerly in an open channel under Burson Street and the railroad nearby, where there are culverts totally inadequate during heavy storms to pass the water; thence it continues in an open course to Alley "A," below which for a distance of about one thousand feet the channel is confined within masonry walls planked over, in which portion the sewage from the Prospect House, a summer hotel, and from the East Stroudsburg Glass Company plant and from other private sources is discharged into the run. This enclosed section is also inadequate in capacity and causes back-flooding of the adjoining lands, although this does not occur often. Below North Courtland Street the run is open and grade steep to the old channel of Sambo Creek.

The next run empties into the old channel of Sambo Creek at Houck Street, opposite the passenger station. It drains a built-up area of about fifty acres east of the railroad. There are a few privies on the banks of the stream which contribute to the pollution.

The next run empties into old Sambo Creek channel in the vicinity of Washington Street and drains a territory of two hundred and fifty-four acres east of the railroad in the borough. It has two branches and they meet at the railroad where the tannery is located. A few hundred feet above the tannery on the north branch is the hosiery mill, from which a small amount of acid waste and spent dye stuffs go to the run. This is the only place known to the Department to be discharging into this natural water course. The channel between the railroad and the creek is entirely closed in a stone culvert and in this portion from the tannery to Washington Street there is laid an eight-inch pipe which belongs to the Tanning Company and is used to convey the tannery drainage to Brodhead Creek. This pipe leaves the run at Washington Street and extends southerly in said street to near its outlet, which is immediately above the highway bridge over the creek. Besides this private sewer there are two other private sewers in the borough. One of them is owned by the East Stroudsburg State Normal School and the other by the Silk Mill Company.

The sewer from the Normal School is laid in Ridgway, Bridge and Brown Streets, has a total length of about three thousand feet, and joins the silk mill sewer on the flats near the outlet into the mill race just below Washington Street.

The silk mills are located on the banks of Brodhead Creek on Brown near Washington Street. The sewage therefrom is conveyed in a small pipe to and connects with the Normal School sewer near the outlet. This outlet is eight inches in diameter.

At several low points in the street grades where surface water would accumulate, drains have been provided which convey the water to a nearby water course.

The proposed system is designed to take sewage and storm water in the business district, but elsewhere the sewers are to be strictly for the conveyance of sewage only.

The borough proposes to install at once the storm sewers and a few sanitary laterals, including an intercepter to convey the dry weather flow of sewage down stream a considerable distance below the point at which the storm sewage is to be emptied into Brodhead Creek. The district to be sewered is the business section adjacent to the passenger station, between the railroad and the creek. It is long and somewhat narrow and the westerly side of it is traversed for the entire length by the old channel of Sambo Creek and paralleling it and adjacent thereto in the district is Washington Street. Within this district are the Normal School, Tannery and Silk Mill sewers, none of which is made a part of or taken into the proposed improvement.

It is proposed to build a storm sewer in Alley "D" back of the hotels on Crystal Street and thence southerly around Courtland Street to the proposed thirty-inch by forty-five inch storm sewer to begin at the head of Washington Street and to be laid therein to the creek, a distance of two thousand feet. Why this water should be carried underground in a large expensive structure when there is an open water course paralleling Washington Street and distant from South Courtland Street one hundred feet only and at the head of Washington Street three hundred feet only and at the foot of Starboard Street about one hundred and fifty feet only, is not apparent. At all three places the surface water could be readily conveyed to the natural channel at a great saving to the borough in cost not only now but for the future.

Adequate sanitary sewerage in Alleys "E" and "D," where the cesspools cause trouble, would obviate the nuisance, drain the cellars and afford speedy removal of all domestic sewage from the vicinity, and the problem of abatement of the existing menace in the neighborhood can be much more efficiently solved by handling the surface drainage independently. There are several solutions of the latter problem and the subject demands a careful revision. The inadequacy of the

existing stone culvert from the railroad to the creek channel would seem to be the most important factor now contributing to the surface flooding of the district based upon the evidence now in possession of the Department.

The proposed plan provides for an eighteen-inch dry weather intercepter leading from the large storm sewer across private property to Brown Street and thence southerly in Lincoln Avenue by a twenty-inch pipe and westerly in Harrison Street to Broadhead Creek or the mouth of the mill race into the creek at the foot of said street. This point is nine hundred feet below Washington Street bridge. The object of this intercepter is to convey the ordinary flow of the storm sewer during dry weather to a point far enough down stream below the bridge to obviate a nuisance. At such times as the eighteen-inch by-pass were insufficient in capacity to take the flow, the surplus would pass on in the big sewer to the outlet under the bridge.

The petitioners state in the application that the proposed outfall has been chosen with reference to the future erection of a purification plant on adjoining property. The plans submitted do not justify this conclusion. The invert of the proposed twenty-inch outlet is less than three feet above low water, and it is below high water. The land in the vicinity is in the proximity to buildings and is not adapted for a site for a purification plant.

Further examination of the proposed plans shows a tentative outline of proposed sanitary sewers. The topographical map submitted by the petitioners is quite complete and it would appear from this data that it would not be necessary to pump the borough sewage twice or to pump any part of it twice as it is now contemplated in the plans. The contemplated design is to convey the sewage from the Kingstown district and from the land on the flats above Lenox Avenue to a pumping station in the vicinity of Houck Street from whence it would be lifted into the proposed storm drain in Washington Street. And this part of it would again require to be lifted were it necessary to raise the outfall sewage into a purification plant. It ought to be possible to convey a large percentage of the borough's sewage to the disposal works by gravity, thus obviating for all time its pumpage. Evidently the studies have been made from the topographical map. Be this as it may, sufficient detail information has not been submitted to enable the State Department of Health to see clearly the advantages of the proposed improvements if carried out in the manner and in conformity with the plans as they now stand.

The sewers of Stroudsburg discharge into McMichaels Creek, which in turn empties into Brodhead Creek about a quarter of a mile below Washington Street bridge. Apart from considerations of public health, it shoud be a sound business policy to maintain the absolute purity of the streams of Monroe County. Mountain resorts are becoming more popular. The salubrity of the atmosphere, the attractiveness of scenery, the fishing and hunting are assets of inestimable value to the region. The preservation of the virgin purity of the mountain streams cannot be neglected with impunity, more specially since sentiment relative thereto is in the ascendency. Complaints about the sewage pollution of some of the summit brooks have already been lodged with the State Department of Health. It would be inconsistent to permit a gross pollution of the creek at Stroudsburg while causing the discontinuance of the discharge of sewage from some private sewer into a mountain run.

Nothing should be done at the Stroudsburgs to lessen the enjoyment of the waters of the Delaware River at the popular resort four miles below at the Delaware Water Gap.

Then, from considerations of health, it appears that since East Stroudsburg may at any time be compelled to temporarily draw water from Brodhead Creek, and since the borough of Stroudsburg now takes the major portion of its supply from the stream, therefore the emptying of sewage into any water course anywhere above these boroughs constitutes a menace.

Below the Stroudsburgs, nineteen miles distant on the Delaware River, Belvidere uses the river water for domestic purposes and so does Phillipsburg. This town is thirteen miles further down stream. There are many other municipalities wholly dependent for their public supply of water on the Delaware River. Such places are found within the States of New Jersey and Pennsylvania. So these authorities of these Commonwealths have adopted a joint co-operative policy whose object is declared to be the discontinuance of the discharge of all sewage into the Delaware River or its tributaries at the earliest practicable moment.

There can be no doubt but that a joint intercepting sewer and sewage purification works for East Stroudsburg and Stroudsburg would prove more efficient and economical than an independent sewer and sewage disposal plant for each place. Some form of bacteriological treatment of the sewage is the prevailing and most acceptacle mode because it is the most perfect and the cheapest one. However, to adapt these processes to municipal sewage is an undertaking prohibitive in cost if the flow from the sewers be both sewage and storm water. But if surface water, which is less harmful and may go to the streams, unpurified, be eliminated from the sewers, then it is entirely within the bounds of a reasonable outlay to affect the treatment of the flow of the sewers. This is a very important consideration and one which dictates the necessity for a reconsideration of the plans of the petitioners.

The proposed sewer system, to merit the approval of the State authorities, should be well and carefully conceived and be in sufficient detail to show how it is proposed to collect, independent of storm water, all of the sewage of the borough and to convey it to some suitable point and purify it there. After such comprehensive plan of sewerage and sewage disposal shall have been approved, the borough can then proceed to build such sewers in conformity with the plans as it may deem necessary from time to time.

To relieve the very unhealthful condition along the alleys above mentioned, sanitary sewers might be laid immediately with a temporary outlet for the sewage into the old creek bed, provided amicable arrangements could be had with the riparian owners along this channel, pending the careful revision of the entire sewerage plan; or a temporary right to use the tannery sewer might be secured.

If it be true that the municipal borrowing capacity is in the neighborhood of thirty thousand dollars only, then an added reason may be given for a joint sewer and sewage purification plant and the sooner the plans and estimates of cost have been prepared, the sooner it can be determined by the State under what terms and conditions a permit should be issued for the discharge of the limited amount of sewage into Brodhead Creek.

It has been determined that the interests of the public health demand that a permit to install the proposed sewers and to discharge the sewage therefrom as now planned should be withheld and the same is hereby and herein withheld and the local authorities are hereby requested to carry out the suggestions hereinbefore contained relative to the preparation of comprehensive sewerage plans and the submission of the same to the State authorities for approval.

Harrisburg, Pa., May 4th, 1908.

EASTTOWN TOWNSHIP, CHESTER COUNTY.

Samuel Castner, Jr., et al., Devon.

This application was made by Samuel Castner, Jr., and others, citizens of Devon, Chester County, and is for advice and approval of plans for a sewerage system and disposal works.

On June twenty-seventh, nineteen hundred and eight, a citizen of Devon, Chester County, Pennsylvania, submitted plans and a description of the proposed sewage purification plant for the treatment of the sewage of the village now being discharged onto a broad irrigation field. These plans were examined and the citizen advised to employ a sewage disposal expert to initiate a design, and this was done.

On August thirteenth, nineteen hundred and eight, a committee of citizens of Devon using the sewerage system and disposal plant discharging its effluent into a tributary of Darby Creek, in Easttown Township, Chester County, and Mr. Samuel Castner, Jr., President of said committee, through a proper representative, submitted for the approval of the Commissioner of Health, plans for a new sewage disposal plant to be erected at the site of the present plant.

Devon is a residential suburban village seventeen miles west of Philadelphia on the main line of the Pennsylvania Railroad. It is on the watershed of Darby Creek, a tributary of the Delaware River near the divide between the latter and the Schuylkill River. Water is furnished by the North Springfield Water Company from a distant source to nearly all the properties in Devon. There are a few private wells.

The real estate firm of Wendell and Treat has been largely instrumental in developing the place, and sewers and a sewage disposal plant provided by them accommodate about thirty-three properties in Easttown Township south of the railroad, including the Devon Inn, a large and popular summer resort.

The existing sewers in Devon comprise about eighty-six hundred feet of eight inch terra cotta pipe in Berkley, Arlington, Waterloo and Dorset Avenues and across private property: also sixteen hundred feet of twelve inch sewer in Chester Avenue, leading from the Devon Inn and connected at its lower end to an eight inch pipe. An additional thousand feet of eight inch sewer extends from the corner of West Arlington Avenue and Berkley Avenue in a southwesterly direction to the disposal plant located in a secluded spot surrounded by shrubbery and at a distance of about a thousand feet from the nearest dwelling other than the caretaker's.

The plant is in the fork of two runs, the eastern one of which rises in Devon while the western one rises in the village of Berwyn a mile west of Devon, in Easttown Township.

Immediately below the disposal plant is a section of Chester Avenue which has been abandoned, at least for the present. After crossing this avenue the two streams unite to form one of the main upper branches of Darby Creek.

The present sewage disposal plant is reached by the sewage after it has passed through three screen chambers on the outfall sewer line. The method of disposal is by broad irrigation, for which several acres are utilized. The area is divided longitudinally by a barrier into eastern and western halves. The sewage

on reaching the irrigation tract is diverted either to a trench extending along the upper end of the eastern half or to one at the upper end of the western half. The sewage overflows from these trenches through a loose stone and cinder barrier and passes over successive strips of sodded ground separated by loose stone and cinder barriers. The trenches and intervening areas of each half of the disposal field are about two hundred feet long at the upper end of the field while those at the lower end are considerably shorter. The sodded areas are about fifty feet wide, and there are about ten of them. In many places the ends of the trenches and barriers are within one hundred feet of the streams. During nineteen hundred and seven and nineteen hundred and eight, frequent inspections of the plant and of the streams above and below it were made by officers of the Department and numerous series of samples for bacteriological analysis have been taken of the waters of the streams above and below the plant and of the effluent from the plant. The results of these analyses prove that there has been, from time to time, and that in all probability there would be in the future, were no change made, very considerable pollution of the streams by unpurified sewage from these disposal works.

It is proposed to build a modern sewage disposal plant to remedy existing conditions. This plant is to consist of separation tanks, contact beds and sand filters. It is designed for an average daily flow of seventy thousand gallons. All parts of the structure are to have concrete sides and dividing walls and concrete bottoms. Through a submerged eight inch pipe the sewage will enter an influx chamber four by four feet and nine and a half feet deep to the flow line. Thence the sewage will pass through submerged sluices into the two similar parts of the separation tank. Each part is to be thirty feet long, seven feet wide and, respectively at the inlet and outlet ends seven and a half feet and seven feet deep to the flow line. In each tank there are to be three transversed concrete baffle walls extending from the bottom nearly to the flow line and in the intervals are to be four scum boards extending about two feet below the surface. The tanks are not to be covered. The elevation of their bottoms is such that it will be necessary to pump out the contents when they need cleaning. The outflow will be through submerged pipes into a small outflow chamber common to the two tanks. The tanks together will allow sewage to pass through them in an average period of seven and three-tenth hours.

The septic effluent will pass from this outfall chamber through a conduit in the dividing wall between two of the contact beds to automatic Aerlock controlling devices to be located at the inner corners of the four rectangular contact beds. Each bed is to be thirty by forty feet, filled with broken stone to a depth of one and a half feet and is to have a surface layer of cinders half a foot deep. Parallel lines of four inch horseshoe tile underdrains spaced two feet on centres are to be laid on the concrete floor and to drain to a twelve inch circular collector to be laid along one side of each bed, half embedded in the floor. In one of the outer corners of each bed is to be a collecting chamber to which the twelve inch collector will lead. From each of these chambers an Aerlock syphon will discharge the sewage upon one of the sand filters, that is, the four contact beds will be discharged respectively to the four sand filters, any one of the beds always discharging to the same filter. The automatic Aerlock device between the contact beds will divert the flow of sewage onto each of the four beds successively as the proceeding bed is filled and further, by means of air pressure transferred in pipe, will control the time of the beginning of the discharge of the outlet syphons at the outer corners of the beds so that by regulating the device the sewage may be held in contact any desired length of time after the bed has become full. Each contact bed will have a capacity to hold about eight thousand gallons and will, therefore receive a dose on an average of once in eleven hours and a bed will have an average resting resting period of about eight hours less the time the dose is allowed to remain in contact after the bed is full.

Each sand filter is to be eighty feet long by thirty feet wide, and they are to be arranged side by side below and adjacent to the contact beds. Each bed is to have an area of twenty-four hundred square feet so that the four beds with an area of ninety-six hundred square feet will provide for the filtration of sewage at the rate of three hundred and eighteen thousand gallons per acre per day. The filtering sand is to have a depth of about two and a half feet at the upper ends of the filters and three feet at the lower ends, above the floor. The distribution of the sewage on the filters is to be effected by means of open box distributers. The filters will be underdrained by three and four inch horseshoe tile laid on the floor. As the contact beds are to act as dosing tanks for the sand filters each filter will receive a dose of about eight thousand gallons of sewage, sufficient to flood the filter to a depth of about five inches, on an average of once in eleven hours. A by-pass is to be constructed from the inlet around the tanks and contact beds to the sand filters.

The average period of sewage displacement in the separation tanks is seven and three-tenths hours. When increased capacity is desired, additional tanks will be extended to either side.

No definite plan is submitted for the care of the sludge to be pumped from the tanks. It is understood that this will be done by hand and that the sludge will be deposited on drying areas in the vicinity and that this disposition will be accomplished in a sanitary manner.

The rate of filtration provided for in the sand beds is high and it will be necessary in the future to provide additional filtering area or some subsequent treatment of the effluent, in order to make the latter satisfactory. This will depend upon the volume of the sewage and the number of inhabitants in the sewer district. With this idea in view the vertical height in the plant has been economized as much as possible, and at the same time the plant has been located at as high an elevation above the streams as is possible without resorting to pumping of the sewage. There is available ground on both sides of the sand beds for additionals thereto in the future. Moreover, there is an area of about four acres below the site and between the forks of the stream. For the present it is understood that this area is to be utilized for broad irrigation of the sand filter effluent. At any rate this should be done. The underdrains from the filters will deliver the effluent at an elevation of about six feet above the beds of the streams and at or slightly below the elevation of the natural surface of the four acre tract. Field tile underdrainage can be afforded which will give a system of sub-soil irrigation to the sand filter effluent which should, under proper method of construction, prove satisfactory for the immediate future.

But when the flow of sewage is so considerable that the ground will be kept saturated, then the sand filter effluent should be conducted to a concrete chamber and there treated by a sterlizing chemical.

A large percentage of the seventy thousand gallon flow is delivered from the Devon Inn. This hotel is not open in the winter time, so except under adverse conditions of the weather, probably the sand filters will be capable of purifying to a high degree the flow of sewage from the residences during the first few years.

In order to locate the plant at the proposed elevation, it will be necessary to relay several hundred feet of the outfall sewer. By so doing one foot vertical height will be gained. This will make the average grade of one thousand feet of eight inch outfall sewer twenty-four hundredths per cent. Some attention will have to be bestowed on this stretch of sewer in order to keep it free from deposit. The owners of the sewers should cause a careful overhauling of them to be made and all leakage or entrance of storm water or roof water should be stopped. It is absolutely necessary that all roof and storm water should be excluded from the sewers. This has not been done in the past.

It is reported to be the ultimate intention of those interested in the sewers and proposed sewage disposal plant to incorporate a sewerage company under the laws of the Commonwealth. At present it does not appear that there is any public authority having by law the charge of the sewerage system and duly qualified to receive a permit from the Commissioner of Health for the discharge of the effluent from the proposed purification works into the waters of the State. Therefore, it seems that the Commissioner is merely called upon to review the plans submitted and approve them or suggest wherein they may be improved.

It has been determined that the applicants be notified and they are hereby and herein notified of the suggestions hereinbefore made and that, if these suggestions be followed, then the effluent from the plant, if the plant be properly operated, should prove satisfactory.

The applicants are also hereby notified that if they build the sewage disposal works at Devon, it is suggested that such works be constructed in conformity with the plans and suggestions hereinbefore made and that details thereof must be filed with and approved by the State Department of Health before construction work be undertaken.

When the works are built, complete plans of them as so built shall be filed with the State Department of Health and thereafter no sewage whatsoever shall be discharged from the sewers or sewage disposal works either directly or indirectly into the waters of the State.

It is the intention of the State Department of Health, in the event that the petitioners construct sewage disposal works, to occasionally inspect the plant and if at any time it be found that sewage is passing therefrom into the waters of the State, then such remedial measures will be enforced as the Department of Health shall determine.

Harrisburg, Pa., September 15th, 1908.

EDWARDSVILLE, LUZERNE COUNTY.

This application is made by the borough of Edwardsville, Luzerne County, Pennsylvania, and is for permission to extend its sewer system and to discharge the sewage therefrom into Toby's Creek, within the limits of the borough.

It appears that the borough of Edwardsville is a coal mining and residential community of about six thousand population, located on the north bank of the North Branch of the Susquehanna River, about opposite the city of Wilkes-Barre. The town is supported almost exclusively by the mining operations of the vicinity. It is one of a cluster of boroughs which in appearance forms a part of one community and is sometimes spoken of as North Wilkes-Barre. It is also the southernmost of this group of boroughs.

It is bounded on the east by Kingston Township, Kingston borough and Dorrancetown borough, the latter extending to the river, on the south by the Susquehanna River and on the west and north by Plymouth Township.

The southern half of the territory so incorporated is flat land subject to flood during freshets. The northern half is hilly and it is here that the built up section extends along Toby's Creek and up on the hillsides.

This stream rises in the mountains to the north in Dallas Township and follows a general southerly direction a distance of twelve miles or more to the Susquehanna River, which it enters in Edwardsville borough near the Plymouth Township line. In this course it passes through and drains the boroughs of Dallas, Courtdale, Luzerne and Kingston, besides Edwardsville. It receives more or less sewage, either from public or private drains in these places. On July third, one thousand nine hundred and six, the Commissioner of Health issued a permit to the borough of Kingston to extend its sewer system and to discharge the sewage therefrom in Toby's Creek at a point within the limits of Edwardsville borough. This permit to so discharge sewage ceases on January first, one thousand nine hundred and nine. This approved outlet is twenty-four inches in diameter and the point of discharge into Toby's Creek is a short distance below the outlet of the sewerage system of Edwardsville. It is for permission to extend the sewers in Edwardsville tributary to this outlet that permission is now asked by the petitioners.

The tracks of the D. L. & W. Railroad follow quite closely along Toby's Creek and the occupied properties are north of the railroad. The sewer outlet is eighteen inches in diameter and discharges into the creek at or near the point where the railroad crosses the stream. The outfall extends easterly along Plymouth Avenue, paralleling the railroad, to Main Street, and thence northerly in Main Street to Church Street at about the northerly limits of the principal part of the town. Main Street northerly from the railroad up to or near Slocum Avenue is the dividing line between the boroughs of Edwardsville and Kingston and the buildings in this portion of the highway are served by the Edwardsville sewer. So also is the fifteen inch sewer in Slocum Avenue, extending easterly beyond Edwardsville into Kingston borough territory.

At the point where Main Street crosses Toby's Creek there is a storm overflow, the size of the sewer here being thirty inches in diameter. During ordinary times the flow of sewage passes southerly and easterly through the eighteen inch outfall sewer to the creek at the railroad culvert or bridge, but during storms of any severity the capacity of the eighteen inch outfall is overtaxed and the surplus water is discharged through the said overflow into the creek at Main Street.

There is a culvert in Main Street near Church Avenue, through which storm drainage from the hillside to the west finds its way in a small open channel, or open most of its way, to Toby's Creek near Slocum Avenue, and at this culvert there is also an overflow for storm water. The size of the pipe is twenty-four inches and its length about two hundred feet. There are a few houses only contributing to this branch at the present time. During dry weather this flow of sewage is delivered to the Main Street sewer and passes down through the main eighteen-inch outlet of the entire system of Toby's Creek. The Main Street sewer between the two overflows above mentioned has diameters ranging from thirty inches to fifteen inches. This structure serves the very important use of removing from the surface of Main street the storm water which comes down the steep hillsides to the west. The only lateral sewer is in Short Avenue on the hillside, length being about fifteen hundred feet, smallest diameter twelve inches, and the Slocum Avenue sewer on the flats comprising seventeen hundred feet in Edwardsville of fifteen-inch pipe. The length of twelve-inch sewer in Kingston contributed to the Slocum Avenue main is not reported.

All told, there are in the neighborhood of eighty buildings only connected with the sewer system. The universal method of disposition of household waste, where connections with the sewer has not been made, obtains; that is, wash water and slops may be thrown out upon the surface of the ground or delivered into the street gutters. Shallow earth privy vaults are common and about twenty-five cesspools are reported.

It appears that the advantages of sewerage have appealed to a majority of the property owners through the principal part of the borough and that petitions have been presented to the borough council for the construction of sewers in the streets.

It is proposed to build separate sewers in these highways and to connect them with the existing main sewer in Main Street and to continue this main sewer as a conduit for the removal of both sewage and storm water until it shall become necessary to effect a separation of the two. The plan shows and provides for the construction of a new storm sewer in Main Street for the collection of all of the storm water from the hillside and its deliverance into Toby's Creek through a thirty-six-inch pipe. When this is built the only storm water admitted to the old Main Street sewer will be that contributed by the existing Short Avenue sewer. There are no catch basins on the Slocum Avenue sewer, hence it now receives sewage only.

It is the purpose of the petitioners to temporarily admit some storm water to the proposed sanitary sewers under conditions which shall admit of the exclusion of this storm water from the sanitary sewers whenever necessary.

The total length of sewer thus proposed, exclusive of the Main Street storm drain is slightly in excess of two and one-half miles.

The Kingston borough outlet is about four hundred feet down stream below Edwardsville outlet. So far as is known these are the only public sewer outlets into Toby's Creek. Between these points and the Susquehanna River there is no use made of the water, the land is low, subject to flood and the territory is unoccupied and of little value. Formerly Kingston borough has set aside a sum of money to defray the cost of extending its outlet down stream to the Susquehanna River, but this project was abandoned because of the probability of the State requiring the town to treat its sewage at some future date. Kingston sewers are on the separate plan. In approving the sewer extensions in that borough, it was considered that justice would require the treatment at one and the same time of the sewage of each one of the boroughs which are discharging sewage into Toby's Creek. The city of Wilkes-Barre empties its sewage into the Susquehanna River. The total volume of filth discharged into the Susquehanna River by Toby's Creek is comparatively small. Unless there should appear to be a special reason therefor, Edwardsville and Kingston should not be required to treat their sewages at an earlier date than the city of Wilkes-Barre is required to treat its sewage.

It is reported that the total assessed valuation of Edwardsville is slightly above three million dollars and that the total bonded indebtedness is twenty-five thousand dollars. If these figures be correct, the borrowing capacity of the borough is in the neighborhood of one hundred and eighty-five thousand dollars, and hence the town is amply able financially to undertake the construction of a sewerage system and sewage disposal works if need be.

If any of the places on Toby's Creek above Edwardsville should ask permission to put sewage into the stream, in all probability a permit would have been denied. In fact, it was unanimously agreed at the time the Kingston application was under consideration that the Commissioner of Health should prevent sewage pollution of Toby's Creek above Kingston. Viewed in this light, it seems quite probable that there may be a trunk sewer down this valley and, therefore, one common sewage disposal plant to serve all municipalities there.

The nearest place below the borough on the Susquehanna River which takes its drinking water from said river is Danville, distant about fifty-two miles. Danville filters its water. Formerly Berwick, twenty-seven miles distant, took water from the river, but this has been prohibited and the connection with the river has been cut off as a drinking supply.

It has been determined that the interests of the public health demand that a permit be issued and it is hereby and herein issued for the extension of the sewer system as proposed, under the following conditions and stipulations:

FIRST: That roof water be excluded from the system. This exclusion from the old sewers to be incorporated into the new system may be brought about gradually under terms whereby the borough may cut off all such storm water connections at any time it may deem it expedient to do so, or it may be required by the Department of Health.

SECOND: Plans and profiles of the sewers built each year shall be submitted to the Department of Health at the close of each year's work, together with such information relative thereto as the Department of Health may require.

THIRD: This permit to discharge sewage into Toby's Creek shall cease on January first, nineteen hundred and nine, which is the date on which the permit issued to the borough of Kingston to discharge sewage into Toby's Creek ceases. However, the Commissioner of Health may extend the time, having in mind the policy of the State with respect to the discontinuance of the discharge of sewage into the waters of the State from municipalities in the vicinity, provided, on or before this date, the borough shall prepare either independently or in conjunction with the borough of Kingston a plan for the treatment of the sewage of the borough, and submit such plans to the Department of Health for approval.

FOURTH: No pathogenic material from any laboratory shall be permitted to be discharged into the system. The proper authorities shall cause these wastes to be incinerated on the premises.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the sewer system or any part thereof, has become a nuisance or menace to public health, then such remedial measures shall be adopted as he may advise or approve.

Harrisburg, Pa., March 6th, 1908.

ELLWOOD CITY, LAWRENCE CO.

This permit was issued in response to an application for approval of plans for an intercepting sewer and sewage disposal works for the borough of Ellwood City, Lawrence County, Pennsylvania, under certain conditions and stipulations hereafter set forth.

It appears that on April twenty-ninth, nineteen hundred and seven, the Commissioner of Health issued a permit to the borough of Ellwood City, Law-

rence County, Pennsylvania, to extend its sewer system and discharge the sewage therefrom, untreated, into the Connoquenessing Creek, within the limits of the borough under certain conditions, among which were the following:

"FIRST: That roof and storm water shall be excluded from the sewers, or if admitted, then admitted temporarily under agreement that they shall be excluded from the sewers provided it is later determined that such exclusion be necessary.

"SECOND: That the borough authorities shall employ an engineer to design a comprehensive system of sewerage and sewage disposal for the entire borough and submit the plans thereof, together with a report to the Commissioner of Health for approval, on or before October first, one thousand nine hundred and seven.

"THIRD: This permit to discharge sewage into the Connoquenessing Creek shall cease on the first day of October, one thousand nine hundred and seven. If on that date the terms of this permit have been complied with, the Commissioner of Health may extend the time in conformity with a plan of procedure agreeable to the Governor, Attorney General and Commissioner of Health, whereby the local authorities shall bring about an interception and purification of the borough's sewage at the earliest practicable time.

"FOURTH: On or before October first, one thousand nine hundred and seven, the borough shall file with the State Department of Health a complete set of plans and profiles of existing sewers in the borough."

These terms were not complied with but the borough authorities did employ a consulting engineer to prepare the necessary sewerage and sewage disposal plans and on July twenty-fourth, nineteen hundred and eight, this consulting engineer on behalf of the borough, submitted the plans to the Commissioner of Health. Relative to the authority of submitting these plans, it appears that at a meeting of the Ellwood City Council July ninth, nineteen hundred and eight, a motion was duly made and seconded and carried that the consulting engineer be granted permission to forward to the State Department of Health copies of plans and specifications for the sewage disposal plant. But it was understood and so stated in writing that these plans had not been accepted by the council and that copies thereof were to be sent to the State Board for its inspection only. Under these circumstances, these plans were not reviewed.

On August twelfth, nineteen hundred and eight, the Commissioner of Health sent the following communication to the borough secretary:

"Dear Sir:—This is to inform you that I have issued a decree to the Ellwood City Water Company giving said company 90 days in which to begin the operation in the erection of a water purification plant.

"This is also to inform you that the time limit in which plans for improved sewerage and sewage disposal were to have been submitted by your borough to the Commissioner of Health for approval has expired. I request a prompt reply to this inquiry as to what you purpose to do about submitting said plans."

The reply was received on August fourteenth, nineteen hundred and eight, and is given in full below:

"Dear Sir:—Your letter of the 12th inst. at hand, and in reply would state, that the Council of the Borough of Ellwood City have already instructed R. Winthrop Pratt, Columbus, Ohio, to forward to your Department copy of plans, and specifications for sewage disposal, which he prepared.

(Signed) W. E. McELROY, Secretary."

It would appear, therefore, that there is a misunderstanding. On September eleventh, the Borough Clerk informed a representative of the Department that the Borough Council had adopted the sewerage plans at its last meeting and had authorized the Secretary to so notify the Commissioner of Health.

The State Department of Health made a thorough examination of the existing sewerage system of Ellwood City borough and the same is set forth in the permit of the Commissioner of Health dated April twenty-ninth, nineteen hundred and seven. At this time it is sufficient to state that there are six and twenty-five hundredths miles of existing sewers in the system, which discharge into the Connoquenessing Creek through three different outlets. The present sewers are largely on the combined plan and received considerable storm and roof water. The place has been growing rapidly and the present population is estimated at five thousand in the borough. Twenty-five hundred people live in houses which are connected to the sewers. In addition there are a number of mill employes living outside of the borough but abiding in houses not connected with the sewers but who use the sewers during working hours. It is probable, therefore, that some thirty-five hundred persons may be counted on as using the sewers at the present time.

No actual gauges of the flow of sewage have been made, but from inspection of the discharges at the various outlets it is believed that the present dry weather flow is between five hundred thousand and seven hundred thousand gallons per day.

It is proposed to construct an intercepting sewer beginning in the up-stream end of the town in Clyde street at the intersection with the existing twenty-four-inch sewer, and from thence passing principally through Pittsburg Circle and Glen Avenue to the foot of Sixth Street, where it will intersect another twenty-four-inch sewer which at present discharges into the creek; from this point the sewer will parallel the creek in a westerly and down-stream direction to the proposed site for sewage purification works, located between the B. & O. railroad and the creek in the northwesterly portion of the borough. The existing twenty-four-inch sewer near Tenth Avenue will be intercepted. The proposed intercepting sewer is principally eighteen inches in diameter and contains two twelve-inch cast iron inverted syphons. These syphons are proposed for the reason that the construction of vitrified pipe sewer on grade would be made very expensive on account of the large quantities of quarry refuse, including large boulders, which have been placed on the steep side hill along which the sewer is to pass. The intercepter is to terminate at the sewage disposal works at elevation eight hundred and twelve, which is some thirty-five feet above high water in the creek.

The intercepting sewer will discharge into a screen chamber of concrete construction, open on top and being about six feet wide by eleven feet long, interior dimensions in plan and about four feet deep. Its bottom will contain two channels in each of which is to be placed a screen composed of parallel bars, having an open space of three-eighths inches. From the screen chamber the sewage is to pass through an iron pipe into the settling tanks.

The settling tanks are three in number, built of reinforced concrete, and covered, each one hundred by ten, with a depth below the maximum flow line of eleven feet. The total capacity, therefore, is two hunded and fifty thousand gallons, or six hours' flow, based on the nominal capacity of the plant of one million gallons. The inlet at the upper end of the tank is controlled by a sluice gate opposite which is a baffle wall. The three tanks may be used in parallel or the entire flow may be admitted to take number one, thence backward through tank number two and forward through tank number three, thus giving a total length of travel of three hundred feet which, at the rate of one million gallons per day, gives a velocity of twenty-one hundredths feet per minute. This velocity will tend to economically distribute the sludge.

For cleaning purposes the tanks are divided by a cross-wall at mid-length, into two compartments, each fifty feet long. This means that one-sixth of the total tank capacity may be drained without removing the liquid from the remaining portions.

The sludge will flow by gravity onto a gravel sludge bed, having an area of one thousand square feet prepared to receive it.

The sewage flows out from each tank over two brass top plates or weirs, each two feet long. These plates are in sections twelve inches wide so that the flow level of the sewage in the tank may be varied within a range of one foot.

The effluent from the settling tank passing out over the above mentioned brass plates is collected in a channel and conveyed to a syphon chamber. This syphon chamber is of concrete construction, open on top, about three feet deep and ten feet wide by seventeen feet long in plan located to one side at the outlet end of the tanks.

The volume of each dose may be increased if desired by so adjusting the brass stop plates controlling the outlet of the settling tank that the upper portion, say from three to six inches, may be made in effect a portion of the dosing chamber. A fifteen-inch sewer pipe conveys the sewage from the dosing chamber to the filters. Just before reaching the filters there is installed on this line an equalizing tank which will serve to temporarily hold the sewage in case a resistance at the sprinkling nozzles should be so great as to interfere with the free action of the syphon. This equalizing chamber in plan is twelve feet long and six feet wide and its depth will be four feet. It is to be located at the dividing line between the two filters and its bottom will be fourteen inches above the highest elevation of the filtering surface of the beds.

The sprinkling filters are to be two in number, each sixty-five feet by one hundred and sixty-one feet. The elongated shape of the filters has been adopted in order to fit the topography of the sewage disposal site. As a further matter of economy, on account of this topography, the bottom of the filters has been placed on a slope of one in seven. The bottom and sides are to be of reinforced construction.

The filtering material varies in depth from four and a half to six and a quarter feet. The surface of the material is formed into a line of five terraces and a line of sprinkling nozzles extends through each terrace. The elevation of the highest terrace is to be eight hundred and two and eighty-three hundredths. The next lower one is to have an elevation of eight hundred and five-tenths and the succeeding terraces will step down respectively one foot. The collecting channel on the outside of the lower retaining wall of the filter beds into which the underdrains will empty the filtrate is to be elevation seven hundred and eighty-seven and eighty-one hundredths or practically fifteen feet below the filter bed surface at the top terrace. The sewage is distributed through lines of six-inch cast iron pipe, decreasing to four-inch and these lines connect with the sixteen-inch cast iron main supply pipe. The cast iron distributing pipe will be placed on concrete piers and within two feet of the surface of the filtering material. Cast iron risers will be inserted under

these lines every seven feet four inches. One-half of these risers will at one time contain a sprinkling nozzle and the other half will be capped. In operating, the risers and caps will be changed back and forth as a means of obtaining the best possible distribution.

The underdrains are formed of six-inch channel pipe placed in an inverted position on the concrete floor of the filter. Each length of pipe is slotted in order to freely admit the effluent.

The lines of underdrains are eighteen inches from center to center, and each line extends through to the lower wall of the filter and discharges into an open channel, which channel connects every twenty feet with a main collector pipe. This construction affords a means of readily inspecting and cleaning the underdrains and of observing the action in the various parts of the filters.

The effluent from the filters will be subjected to a final treatment by sedimentation in an open basin of concrete construction sixty feet long by thirty feet wide by five feet deep. The main structure is sub-divided by walls and the basements are well baffled to secure the best sedimentation effects.

A sludge bed is provided for treating the deposits which may accumulate in the bottom of these basins. They may be discharged onto the sludge bed by gravity. This bed comprises five hundred square feet of surface having two feet of coarse sand and gravel and a six-inch vitrified pipe underdrain.

As a matter of future construction, a chemical house is shown on the plans. This may be built adjacent to the final treatment basin should it at any time be deemed advisable in the future to subject the effluent to disinfection.

The entire layout occupies a strip of land on the hillside along the banks of the creek, a distance of about seven hundred feet. The invert of the eighteen-inch main sewer will enter the plant at elevation eight hundred and twelve. The elevation of the crest of the outlet weir at the final treatment basin is seven hundred and eighty-two and five-tenths or twenty-nine and five-tenths lower. The approximate elevation of high water is two and a half feet below this weir. Thus it will be seen that there is abundance of vertical height in which to accomplish the purification of the sewage.

The sludge bed for the disposal of the settling tank solids is to have an area of one thousand square feet and is to have two feet in depth of coarse sand and gravel and underneath is to be a six-inch vitrified drain pipe discharging into the creek.

There are opportunities for future extensions of the settling tanks and for sites for additional filter units.

The general site is in the ravine through which the creek flows and at an elevation of about one hundred feet below the plateau on which the borough is located.

As above stated there are three existing sewer outlets, all of which receive more or less storm water. In constructing the new intercepting sewer, it is proposed to build diverting weirs in the manholes at the junction of existing sewers and the new intercepter, so that the entire flow of sewage, up to three or four times the dry weather flow, will be diverted to the purification works. It is further proposed that the local officials cut off surface water connections with the idea of placing the entire system on a separate plan, at which time the diverting weirs will be no longer necessary.

Ellwood City borough is located on the south bank of the Connoquenessing Creek about one mile above the stream's entrance to the Beaver River. The water supply is taken from Slippery Rock Creek and at times from the Connoquenessing Creek at points just above the borough. The sewage from watersheds on which there are several boroughs, is emptied into the stream. The Commissioner of Health has issued decrees requiring the erection of sewage purification plants and the discontinuance of the discharge of sewage into these waters which afford the supply to Ellwood City.

Furthermore, as hereinbefore stated, the Department of Health has required the Ellwood City Water Company to filter its source of supply.

In turn many thousands of people take their water supply from the Beaver and Ohio Rivers within twelve miles of Ellwood City. Among these places may be metioned the boroughs of Beaver Falls, New Brighton and Rochester.

It is understood and reported that Ellwood City borough's borrowing capacity is not sufficient to enable the municipality to build the sewage purification works and effect complete separation of sewage and storm water at this time. But it does not appear that the borough is unable to begin the improvement. It is now illegally dicharging its sewage into the waters which are subsequently used as a source of public water supply.

The plans proposed for the treatment of the sewage and the main intercepter are well designed and should accomplish the purpose if the works be properly built and properly operated thereafter. The cost of intercepting the sewage as proposed and of building a portion of the sewage disposal works ought to be within the financial ability of the borough, and unless the local authorities can show good and sufficient cause why this improvement cannot be made, the project should be carried out forthwith or the penalty exacted for the illegal discharge of sewage into the waters of the State.

It has been determined that the interests of the public health demand that the plans for the proposed intercepting sewer and sewage disposal works be approved

and the same is herein and hereby approved, under the following conditions and stipulations:

FIRST: The borough, on or before three months from the date of this permit, shall have taken steps, so far as it is authorized to do so, to raise the necessary funds to defray the cost of the construction of the intercepting sewer and sewage disposal works or the raising of funds necessary to defray the cost of the building of the intercepting sewer and a portion of the sewage disposal works or the municipal authorities shall give satisfactory evidence thereof to the Governor, Attorney General and the Commissioner of Health, provided, that on or before the fifteenth day of October the borough council shall notify the Commissioner of Health of its intentions in the matter. On failure of the borough to so notify the Commissioner of Health, the State Department of Health will understand this to mean that the borough purposes to take no action with respect to raising funds to build the intercepting sewer and sewage disposal works or part thereof and in this event the Commissioner of Health and Attorney General will proceed accordingly. This declaration is deemed necessary, owing to the prior derelictness of the borough to observe the conditions of the permit issued by the Commissioner of Health in compliance with law.

SECOND: It appears that the engineers designing the sewage disposal works has found it desirable to exclude storm water from the disposal works during storms of much intensity and this shall on or before July first, nineteen hundred and nine, make an investigation and devise a plan and submit a report thereon to the Commissioner of Health, the object of which shall be to exclude storm water from the sewers.

THIRD: No new sewers shall be built into which storm water shall be admitted. All roof and storm water shall be excluded from the various additions to the system. The borough shall collect all of the sewage within its municipal territory from all occupied estates at as early a date as this can be done and deliver the same to the sewage disposal works herein approved, and treat the sewage in said works. At the close of each season's work, the borough shall prepare a plan and profile of the sewers laid during the year and submit the same with a satisfactory report to the Commissioner of Health. This is essential since the State Department of Health must always be informed of the extent of the sewerage system and the public use thereof.

FOURTH: The borough shall enforce such reasonable measures as shall be necessary to bring about at the earliest practicable moment the discontinuance of the discharge of sewage and trade wastes into drains to be used for storm water or into natural water courses or into the waters of the State within the limits of the borough.

FIFTH: Daily records of the operation of the entire sewage disposal works shall be kept by the borough in form satisfactory to the Commissioner of Health and copies thereof shall be filed in the said Commissioner's office. It is the intention of the State Department of Health to make frequent analyses of the crude sewage and the effluents at various stages of the process of treatment sufficient to show the efficiency of the plant and to enable deductions to be made therefrom under the responsible supervision of the expert who designed it for one year from the beginning of the operation, and if not by this expert, then by some other equally competent to perform such services. The results of all this shall be given to the Commissioner of Health who may make rules and regulations governing the operation of the plant, in so far as these may effect the quality of the effluent discharged into the waters of the State.

SIXTH: If at any time in the opinion of the Commissioner of Health, the sewer system or the sewage disposal works, or any part thereof, has become a menace to public health, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

Harrisburg, Pa., September, 22nd, 1908.

EMLENTON BOROUGH, VENANGO COUNTY.

This application was made by the borough of Emlenton, Venango County, and is for permission to extend its sewer system and to discharge the sewage therefrom into the Allegheny River.

The borough of Emlenton is located on the north bank of the Allegheny River, in the extreme southeastern corner of Venango County. It was incorported out of Richland Township, which township entirely surrounds the borough on the land sides. The population is estimated to be thirteen hundred, in nineteen hundred it was eleven hundred and ninety. The region round about has been rich in the production of oil. The Emlenton Oil Refinery is located in the borough. It and the woollen mill furnish the principal employment. The Allegheny Valley Division of the Pennsylvania Railroad passes through the town near the river. The lands between the railroad and the river are low and some of it north of the railroad is low. The main street of the town parallels the railroad and is adjacent thereto to the north. Beyond this thoroughfare the land rises rapidly and lies on the slope of a mountain. The drainage is therefore wholly to the river. The dwellings in the village are about equally divided, one-half being located on the hillsides and the other half on the flats.

Shallow earth privy vaults are in use throughout the borough and dug wells abound. There are also numerous springs which are used as sources of drinking water. The ground is alleged to be saturated with sewage and not a few of the wells are so located with respect to surface and underground sources of pollution as to be suspicious as safe sources of drinking water. Much of the typhoid fever occurring in the town during the last eight years has been attributed to the wells and springs.

The public water supply is furnished by the Emlenton Water Company. The source is the Allegheny River. Crude water is pumped from the river to a reservoir on the hill back of the town. This basin holds about two days' supply. Recent examinations by the State Department of Health of these waters show sewage pollution. The water company is now employed in seeking a new and pure source and if success attends these efforts the avowed intention is to abandon the river supply.

A few hundred feet above the river intake, the trade wastes from the woollen mills are emptied into the stream. Wool in the fleece is received here and manufactured into blankets. The scouring and spent dye stuffs go to the river.

Further up the stream, in the borough, is the oil refinery from which trade wastes to some degree reach the stream.

The public sewer system was designed for sanitary purposes only. The sewers were built in nineteen hundred and one. Additions have since been made. The outlet is a twenty-inch cast iron pipe and it discharges into the river near the lower boundary line of Emlenton. Connecting with this outlet are three and eight-tenths miles of sewers whose diameters range from six to twenty inches. The percentage of population using the sewers is not stated, but it is understood that over one-half of the dwellings have particular connections to the sewers.

Separate storm drains are provided to carry off the rain water. There are ten independent lines which empty into the river. They approximate a total length of one and a half miles. One of said outlets is into the river above said water works intake.

A borough ordinance was adopted in nineteen hundred and one which provided that all drains conveying sewage to the storm sewers shall be discontinued therefrom, and connected with the sanitary sewers within one year from December fifth, nineteen hundred and one. It is possible that some sewage is still discharged into the storm water sewers. This could be established by a house to house canvass.

Roof water is admitted to the sanitary sewer system. It would appear that the outlet is insufficient to discharge the entire flow from the system at all times because there is an overflow on the river bank at the foot of Third street. This overflow leads to the river.

Besides these sources of pollution and the sewage from the refinery and woolen mills, on the bank of the river below the water works pump house there are several privies. The waste from the steam laundry is discharged into the Allegheny through a box sewer and so is the sewage from the privy on the property. There are five private sewers to the river from adjacent properties. They are used for waste, sink and wash waters. One of them, near the foot of Fifth Street, has been ordered abandoned by the court. A public sewer extends in River Avenue along the top of the river bank brom the pump house down stream. It is the fifteen-inch and twenty-inch main intercepter of the borough sewer system. All properties could connect with it. The local authorities have not attempted compulsory sewer connections.

The petitioners wish for permission to make general extension to the sewer system and more particularly at this time, to receive approval of five lateral sewers already laid down and in use. They are as follows: three hundred and seventy-five feet of eight-inch sewer in Locust Alley, one hundred and thirteen feet of six-inch pipe in Chester Street, five hundred feet of eight-inch pipe in College Street, one hundred and five feet of five-inch sewer in Fourth Street and one hundred and thirty-two feet of five-inch sewer in Crawford Alley.

Evidently these sewer extensions were built without intent of violating any provision of law, else the pending application would not have been made.

The topographical situation surrounding Emlenton borough is not favorable for a phenomenal growth in the population of the town. Manufacturing sites are scarce along the railroad. There is a public highway bridge across the river from the foot of Eighth Street where the pump house is located, but on the opposite side of the Allegheny the mountain rises abruptly from the shore to a height of several hundred feet and there are no low lands or tracts suitable for industries or settlements. It is probable that a normal increase in the size of Emlenton borough is all that should be expected. The municipal assessed valuation is reported to be five hundred and seventy thousand dollars. The debt is said to be thirteen thousand five hundred dollars. If these figures be correct it would appear that Emlenton's borrowing capacity is in the neighborhood of twenty-six thousand dollars.

This amount of money might be sufficient to defray the cost of the erection of sewage purification works; but it would be so, if at all, only under the condition that all storm and roof water were eliminated from the sewers and that sewage only were conducted through the pipes to the disposal works.

Four miles below Emlenton is the village of Foxburg and three miles below this village is Parker City. Both of these places have for years taken their supply of

drinking water from the Allegheny. Recently the Foxburg Water Supply Company has sought a new supply from wells and springs on the hillside back of the town.

But below these towns along the river all the way to Pittsburg there are numerous municipalities which do now and must continue to rely on the river for a public supply of water. It is the pollution by sewage of the river at Franklin and Oil City and at other places in the valley above Emlenton that has compelled the Emlenton Water Company in safeguarding the public health to seek a new supply, but the greater proportion of the inhabitants of river towns cannot thus avoid the menace which sewage poisons in the river establish. It has become a State policy to preserve the purity of the waters of the State for the protection of the public health and in the administration of this great and beneficent law a policy has been inaugurated which will ultimately require the abandonment of the discharge of all sewage into streams used subsequently for drinking waters.

While the small borough of Emlenton may not be compelled to take its sewage out of the river sooner than some other places, yet the local authorities should be informed of the State's policy and the necessity thereunder of plans being laid out in the borough for a sewer plan involving the ultimate treatment of the town's sewage.

It is fortunate that the sewers have been designed for sanitary purposes only. The use of these sewers as carriers of storm water is not prejudicial to public health or a mistaken policy so long as the sewage is to be discharged crude into the river, but it would be a great mistake to continue this practice when the time for sewage disposal works shall have arrived, and it would be a mistake also to admit roof or storm water to the sewers, meantime under conditions which would not admit of the taking out of all such roof and storm water when a sewage purification plant shall be erected. The cost of handling and purifying the sewage is not prohibitive but when the great bulk of storm water is added to the sewage proper the total volume is so great that the cost of works to handle it would be prohibitive. Hence it is essential in the interests of economy and in anticipation of public health precaution that the local authorities should at this time consider well the questions involved in providing the borough with a sewage purification plant and enforce such rules and regulations as may be calculated to best lead up to the consummation of a complete sanitary sewerage system and sewage disposal works.

Private sewer outlets should be abandoned, the sewage of the borough should be collected in the sewer system. Outline plans for the site of a sewage disposal plant should be prepared, the preliminary plans should be adopted, additions to the sewers should be made in conformity therewith, all house connections with storm channels should be absolutely abandoned and new connections be made with the sanitary sewers, and the elimination of storm and roof water from the sewers should be gradually effected.

It has been determined that the interests of the public health will be subserved by approving the particular sewers mentioned by the petitioners, and a permit therefor is hereby and herein granted under the following conditions and stipulations:

FIRST: This permit to discharge sewage into the waters of the State shall cease on the first day of May, nineteen hundred and ten, on or before which date the borough shall submit to the Commissioner of Health a comprehensive plan for sanitary sewers for the entire borough and plans for the treatment of the sewage of the system. The Commissioner of Health will modify, amend or approve these plans and fix the time for their erection. If on said date the terms of this permit shall be complied with the Commissioner of Health may extend the time in which the borough sewage may continue to be discharged into the Allegheny River.

SECOND: The local authorities shall cause the discontinuance of the discharge of all sewage into any storm water drawn and shall regulate the admittance of roof and storm water to the sanitary sewer system whereby all or so much of it as may be necessary, shall be eliminated from the sanitary sewer system whenever this shall appear to be necessary.

The Commissioner of Health will notify the owners of privies and private sewers located along the bank of the river that the depositing of sewage into the river must cease. The borough council is requested to require the connection of such estates with the public sewer.

The State Department of Health will require the purification of the river water by the Emlenton Water Company provided an abundant and satisfactory supply from the new source on the hills be not obtained. The examination of wells and springs in use in the borough should be systematically undertaken by the local authorities for the purpose of ascertaining what wells or springs are contaminated and for the further purpose of causing the abandonment of all such sources which are polluted.

The State Department of Health will be glad to further advise and co-operate with the borough in these undertakings.

Harrisburg, Pa., April 27th, 1908.

55—17—1908

EXETER, LUZERNE COUNTY.

These applications were made by the borough of Exeter, Luzerne County, and are for permission to build a public sewer system and to discharge the sewage therefrom into the Susquehanna River within the limits of said borough.

It appears that the plans submitted with the first applications were for combined sewers in two streets only, namely, Wyoming Avenue and Schooley Avenue. The plans accompanying the last application provide for an independent sanitary sewer to be laid in the same trench with the proposed storm drain but below it, on Wyoming Avenue, both to be served by the same outlet down Schooley Avenue to the river, until such time as the treatment of the sewage may be necessary.

Exeter borough is in Luzerne County, in the centre of the northern anthracite coal fields, bounded on the north by the township of Exeter, on the east by the North Branch of the Susquehanna River and the borough of West Pittston, on the south by the said river and on the west by the boroughs of Wyoming and West Wyoming.

The area so incorporated—about three square miles—is mostly rural. Approximately one-tenth of it is built up and out of a total borough population of about twenty-five hundred about twenty-one hundred people live in this built-up part.

The northern part of the municipality is mountainous. The ridge parallels the river and at its foot there are low lands and swamps which would extend all the way to the river were it not for an intervening ridge of low elevation and flat varying in width from a third to one one-half of a mile. It is on this low plateau that the village is situated, and through which the main thoroughfare, Wyoming Avenue, extends, paralleling the river from West Pittston borough to Wyoming borough.

When the Susquehanna River is in an extraordinarily high stage, the lowlands on both sides of the village are flooded, either directly or by back water; but during ordinary wet weather the said swamps to the north and west are flooded. In eighteen hundred and eighty-four the Schooley shaft, now abandoned, was sunk on the edge of the swamp in the west central part of Exeter borough and the pumpage from the mine was allowed to flood the said lowlands where the water became stagnant and produced a nuisance. In consequence, malarial diseases, which were formerly infrequent in the district, became prevalent, and in eighteen hundred and eighty-six, when the State Board of Health investigated the place and advised adequate drainage thereof, intermittent fever, ague and dysentery were epidemic. During the first part of eighteen hundred and ninety-eight, the said Schooley colliery, the Temple Iron Company, operating the Mt. Lookout colliery, located near the southerly of said Schooley colliery, and the Lehigh Valley Coal Company, operating collieries in the eastern central part of the borough, were maintaining a common nuisance in Exeter borough by putting large quantities of water upon an extended area of ground and permitting the same to stagnate, thereby contaminating the air to the injury of the public health of all the inhabitants in and about the boroughs of Exeter and Wyoming.

Measures were taken by the said companies to abate the nuisance in accordance with the court's decree. The Schooley colliery waste matter water was carried by a pipe to the river. This made a very material reduction in the amount of water on the lowlands in the western part of the borough, but did not wholly drain the territory in that vicinity.

The Mt. Lookout colliery water was discharged into the pipe laid for the purpose and extending westerly towards Wyoming Creek.

The Lehigh Valley Coal Company dug a ditch from Carpenter's Creek—a stream in the eastern part of the borough—westerly a distance of a mile or more to Schooley's road, near said Schooley's shaft, and drained the water out of the swamp and lowlands to the east of said road, thereby reclaiming the lands and making them reasonably dry in all ordinary times.

These facts are cited to show how great has been the necessity for adequate drainage of the lowlands between the village and the mountain.

The village at present is nearly square in extent. There are no sewers in it. The plateau is of gravel formation. Privies and loose wall cesspools are the receptacles of sewage. Wells and springs are not to be found in the borough. The water supply is furnished by the Spring Brook Water Supply Company, and is brought in from the Moosic Mountains, about ten miles distant. Surface water either drains into the adjacent streets and alleys and thence into Wyoming Avenue, where it ponds up and interferes with highway traffic, or it remains on unoccupied lots, forming pools which slowly soak away or evaporate. There is no natural way for surface water to pass off of Wyoming Avenue, and consequently, great necessity exists from a sanitary point of view for adequate drainage.

The inhabitants of Exeter borough are largely foreigners, but many of them own the dwellings in which they reside and about which at the present time the conditions with respect to household waste disposal are not all that should be desired and there is a demand for sewers, the necessity being as great as that for surface drainage.

A sewer system is not proposed, but a trunk sewer which has for its object the drainage of the streets and adjoining properties along Wyoming Avenue and Schooley Street. Also the drainage of the pond in the eastern part of the village

at Penn and Wyoming Avenues. Into the pond the waste mine water of the Exeter colliery of the Lehigh Coal Company is now being pumped. It is said that this pond serves no good purposes. It is also claimed that it affords a breeding place for the malarial mosquito. The said company three or four years ago constructed a drain southerly in Wyoming Avenue and Lincoln Avenue across private property to the edge of the plateau, where an eighteen-inch pipe is now to be seen discharging into a wooden trough which in turn empties into an artificial ditch extending across the flat to the river. If this drain were lowered the said Exeter pond would be completely drained. The coal interests in the borough pay, it is estimated, a large percentage of the taxes of the municipality. The Taxpayers' Association of Wyoming Valley, whose membership is made up of the coal interests, has already considered various plans for draining the Exeter pond and proposed the plan for draining the pond and sewering the borough at the same time originally submitted in December, nineteen hundred and five.

After various conferences with the local authorities extending throughout the year nineteen hundred and six and to the middle of nineteen hundred and seven, the plans were modified and as they now stand they provide for the construction of a twenty-inch terra cotta storm drain to be laid in Wyoming Avenue through the village from Penn Avenue at the pond to Schooley Avenue. There are to be street gutter connections with this drain for the removal of surface water from Wyoming Avenue. In the same trench, but at one side and below the storm drain, there is to be laid a twelve-inch pipe sewer to be provided with wye branches and to receive sewage only. At inspection manholes to be built at intersecting streets, namely, Lincoln Avenue, Grant Avenue and Valley Avenue, a brick partition wall is to be extended up between the sanitary sewer and the storm drain to admit of ready inspection of both structures and at the same time prevent the overflow of the drain into the sewer.

At Schooley Avenue both structures will terminate in a concrete drain two feet six inches in diameter by three feet nine inches high, egg shape, which is to extend from Wyoming Avenue to the river. This is always to be used as a storm drain. When the time shall have arrived for the purification of the borough sewage, it is the intention of the borough to stop the emptying of the twelve-inch pipe into the storm drain at Wyoming Avenue and from thence to dispose of the sewage in a manner satisfactory to the State Department of Health. Both the twelve-inch sanitary sewer and the Schooley Avenue concrete structure are planned to be the main trunk sewers for their respective lateral connections. Plans of the lateral sewers, however, have not been prepared, or if so, they have not been submitted.

The question of improved drainage and sewerage has been a topic for consideration for a number of years resulting finally in the voters authorizing the issuing of municipal bonds in the sum of twenty thousand dollars, four thousand dollars of which are to be devoted to highway purposes and the balance for drainage and sewerage improvements. It is represented that local sentiment was strongly manifest for both sewerage and drainage. The details of the plan finally proposed entail the necessity of mingling sewage and storm water in the permanent storm drain only until such time as it becomes necessary to purify the sewage. It is reported that the borough is well off financially and able to undertake the treatment of sewage as soon as other municipalities in the Wyoming Valley shall be required to do the same.

Immediately above Exeter the Lackawanna River empties into the Susquehanna and in the Lackawanna basin there are two cities, fifteen boroughs and twelve townships, having a combined population of one hundred and eighty thousand people, whose sewage is discharged principally into the river or its tributary. Besides these sources of pollution there are over one hundred collieries in the valley above Exeter whose combined daily output of waste mine water during the summer time is of greater volume several times over than the natural flow of the Lackawanna River itself. This mine drainage and the water from washeries changes the dissolved properties of the water rendering it acid and imparts a dense, black color, so that about all forms of life are extinct in the flowing stream. No practical way has yet been devised and put in extensive operation in the region to obviate mine refuse pollution of the natural water courses and until some plan be devised and put in use these pollutions will continue and hence the waters of the stream will be unpotable. However, in times of freshet, the germ destroying properties of the sulphur mine water are largely neutralized and at such times the sewage from the Lackawanna Valley may in its pathogenic state be transmitted down stream and menace the health of the people living in the towns along the Susquehanna whose sources of drinking water are now drawn and must continue to be drawn from said river. The time will come when the interests of public health will demand the cessation of the discharge of sewage untreated into the Lackawanna River. Furthermore, the population of the municipalities on or abutting the north branch of the Susquehanna River in Luzerne County below the Lackawanna basin comprises fourteen townships, twenty-three boroughs and two cities, all in the northern coal field and aggregating over one hundred and eighty thousand people. The sewage from this population is also largely discharged into the natural water courses. In this district there are over seventy collieries which make a similar disposition of mine drainage, but the effect is not so pronounced because of the large volume of water in the Susquehanna.

The nearest municipality below Exeter which uses the river water is Berwick, distant thirty-four miles. But this water is used at Berwick for industrial purposes except in emergencies, but this emergency use has in two instances been the cause of an outbreak of typhoid fever. Fifty-eight miles distant the river is used as a source of supply at Danville State Hospital and it is also used by the borough of Danville. The policy of the Commonwealth is to preserve the purity of the waters of the State for the protection of the public health and no sewer plans or extensions of sewer systems can be consistently approved by the State health authorities which do not contemplate the ultimate purification of the sewage and such purification should be brought about at as early a date as practicable.

The proposed sewers for Exeter conform to this requirement partially. The temporary discharge of the small amount of sewage that can come from the buildings along Wyoming Avenue should not add in a measurable degree to the impairment of the health of the citizens of the Commonwealth so long as the sewage of the other places in the Wyoming Valley is discharged into the stream. However, there is no reason why the borough of Exeter should not at once perfect plans for a comprehensive sewer system for the village and for the treatment of such sewage and submit the same for approval and adoption. It is quite possible that a joint intercepting sewer for Exeter and the adjacent boroughs might be an ecomonical and efficient project and one practicable of attainment in the near future.

It has been determined that the interests of the public health will be subserved by granting a permit, and it is hereby and herein granted, for the proposed sewer in Wyoming Avenue and Schooley Avenue, under the following conditions and stipulations:

FIRST: That this permit to discharge sewage into the waters of the State shall cease on May first, nineteen hundred and eleven. If on that date the other conditions of this permit shall have been complied with, then the Commissioner of Health may extend the time in which sewage may continue to discharge into the Susquehanna River.

SECOND: On or before January first, nineteen hundred and ten, the borough of Exeter shall, either independently or in conjunction with other municipalities, prepare a plan for a comprehensive sanitary sewer system and for the treatment of the sewage and submit the same to the Commissioner of Health for approval, who may modify, amend or approve the same and fix the time when the sewage disposal works shall be erected.

Harrisburg, Pa., May 28, 1908.

FAIRCHANCE, FAYETTE COUNTY.

This application was made by the borough of Fairchance, Fayette County, and is for permission to lay an eight inch sewer in Church Street and to discharge the sewage therefrom into Georges Creek within the limits of the borough.

It appears that Fairchance borough is an industrial community of about twenty-one hundred population, located in George Township in the southern part of Fayette County, about seven miles north of the Pennsylvania and West Virginia state boundary line and about seven miles east of the Monongahela River and the main line of the Baltimore and Ohio railroad leading from Pittsburgh into West Virginia. A branch of the Pennsylvania Railroad system from Greensburg, Westmoreland County, and Uniontown terminates at Fairchance.

The borough is located on the west of the slope at the foot of the western slope of the ridge of mountains dividing the watersheds of the Youghiogheny River to the east and the Monogahela River to the west, known as Chestnut Ridge. The crest of the ridge, about three miles easterly, is in the neighborhood of fifteen hundred feet higher than the borough.

Georges Creek rises a short distance to the north of the borough and flows down through the centre of the town, along, between and under the two railroads at various points, being augmented by several runs which come down from the mountain sides and join the creek in the borough. Immediately below the borough the creek is joined by Muddy Run, a stream which rises to the north and northwest of Fairchance, being made up of numerous tributaries, the main one of which drains a settlement on the railroad north of the borough known as Oliphant Furnace. Muddy Run follows closely the western boundary of the borough.

Georges Creek follows a general southwestern direction and enters the Monongahela River at New Geneva. The country traversed is a very hilly, rugged and sparsely populated region.

In the eastern middle section of Fairchance, Georges Creek divides, forming an island in the town about one thousand feet long and about three hundred feet wide.

Muddy Run is principally named because its waters are highly colored. At the present time and for a number of years past it has received a large amount of coal mine drainage. In addition to the color, characteristic of sulphur water, the stream is highly acid in quality. On the other hand, Georges Creek, before it reaches the borough in its numerous tributaries, is a naturally pure mountain stream.

Besides the mining of coal, the manufacture of coke is an extensive industry. The Frick Coke Company employs about three hundred men. Its Kyle plant is located partly in the western borough territory and partly in the township in the valley of Muddy Run. The Kanawha Glass Company, employing about two hundred and twenty-five people, have a plant in the borough and the United Fire Brick Company, employing about thirty hands, have works near the glass plant. The latter industries use water from drilled wells. The Fairchance Distillery uses water from Georges Creek for manufacturing purposes and from a dug well for drinking. Dug wells and a few drilled ones furnish the source of domestic water to the inhabitants of the town. There is some surface drainage contamination, or danger of it, and the municipality desires to install a public water works system and an application for approval of plans is now pending before the State Department of Health.

Owing to lack of information or carelessness on the part of the citizens of the town and the lack of a local Board of Health to enforce sanitary rules and regulations, the conditions in Fairchance at the present time are very unsanitary. There are no rules relative to the disposition of garbage, slops and other waste matters, and with respect to the care of privies and cesspools, many of which are located in close proximity to private wells used as sources of drinking water. The conditions in some of the alleys and streets of the town are filthy because of drainage from cesspools, pig-stys and privies. Such drainage may be seen in the street gutters. This is notably so along DeForest Avenue and adjacent territory. Here the typhoid fever epidemic in nineteen hundred and seven was principally concentrated.

The geological formation in the borough is free-stone, loose shale and limestone rock. The shale is found at the top and from twenty to twenty-five feet below the surface. Many of the cellars of the town are damp. Typhoid fever is prevalent. In the nineteen hundred and seven epidemic two physicians treated between fifty and sixty cases. These were not reported to the State Department of Health.

There are no public sewers in the borough, but there are five private sewers, three of which empty into Muddy Run and the other two into Georges Creek within the town. Morgantown Street is between the railroads and Muddy Run along the summit of the ridge, so that surface drainage from it is either westerly to Muddy Run or easterly to Georges Creek. In the area sloping to the run there are three sewers. The main street through the borough east and west is Church Street. In this street there is a twelve-inch private sewer owned by the W. C. Moore Estate. It begins at Morgantown Street and extends westerly across private property to the run. There is a branch six inches in diameter extending along the alley and up DeForest Avenue to Morgantown. About twelve hundred feet down stream there is a six-inch sewer outlet discharging into the run between Smithfield and Grove Streets. This sewer is said to belong to A. B. Hutching, O. M. Bromfield, George Gates and M. A. McCormick, and was built in nineteen hundred and six. It extends up the alley parallel to Morgantown Street and terminates near DeForest Avenue. Seven hundred feet below this second outlet there is a third private sewer, size unknown, said to belong to A. B. Bromfield. It serves the Bromfield property on Grove Street. This is in the extreme southern part of the village.

In the eastern section of the borough at Church Street there is a twelve-inch sewer about three hundred feet long, extending southerly from said Church Street in Lyon Avenue to the creek. It takes the flow of a new dwelling on the north side of Church Street.

Just above this outlet there is another twelve-inch private sewer from a hotel into the creek. It is on the opposite or east bank of the stream.

There is a twelve-inch storm sewer from catch basins in Georges Street west of the Pennsylvania Railroad easterly in George Street to the creek. It is said that there is one house connection with this pipe.

The residence of J. L. Darby is said to have a connection with the twenty-four inch tile sewer which conveys storm water from a small spring running east of Main Street westerly under said street and the Baltimore and Ohio Railroad to Georges Creek.

The private sewers in the Muddy Run district were authorized by the borough authorities and the owners may sell the privileges to abutting land owners who may desire to use the sewers.

The borough purposes to construct an eight-inch sewer along Church Street for a distance of ten hundred and sixty-five feet, beginning about four hundred and fifty feet easterly from the intersection of Church Street and Morgantown Street and thence easterly in Church Street to Lyon Avenue, where the borough purposes to connect the eight-inch sewer with the twelve-inch sewer heretofore described as laid from a hotel on the north side of Church Street southerly through Lyon Avenue to Georges Creek.

Petitioners state that there will be no further extension of this proposed eight-inch sewer as all of the streets in the borough can be provided with drainage by other lateral sewers.

The main stream of Georges Creek at this point is about twenty feet wide and its flow has quite a rapid velocity. The flow is sufficient to carry away the suspended particles of sewage which the proposed sewer would discharge into the

stream. From the mouth of Lyon Avenue sewer it is about three-quarters of a mile down stream to the mouth of Muddy Run. All of this distance except the last three hundred feet is within the municipal territory of Fairchance.

The petitioners state that Muddy Run receives the drainage of a number of mines and coke oven plants and is highly contaminated with sulphur. This is true and it continues to be true of Georges Creek after it is joined by Muddy Run, as other of its tributaries drain mining districts. Below the borough the stream is not used for domestic purposes and in the borough below Church Street the property along the banks of the creek is not built upon to any great extent. The construction of the proposed sewer in Church Street is not as a practical remedy for the unsanitary conditions along that thoroughfare. The topographical situation is such that this sewer can be easily connected to a system of sewers for the entire borough at such times as such a general system may be designed and constructed.

The flow of the sewers of the entire borough can be ultimately collected and carried to a common point down stream possibly within the borough and, in any event, in George Township.

It is a very dangerous thing to draw water from the ground for domestic purposes when such source is liable to sewage contamination from cesspools and privies. The introduction of a public water works system in Fairchance will be a practical method to reduce this danger. However, it has been proved that property owners do not wholly relinquish private wells for the introduction of a public water supply and so long as these wells are in existence and in proximity to privies and cesspools there will be a great danger of a sweeping epidemic. The presence of typhoid fever in the borough in the past should be received as a warning of what may fall to a greater extent if the present unsanitary practices are continued. The local authorities should be encouraged to establish a public sewer system and extend the facilities thereof throughout the built-up part of the village.

It has been determined that the interests of the public health will be subserved by granting a permit for the proposed sewer in Church Street and such permit is hereby and herein granted under the following conditions and stipulations:

FIRST: That the municipal authorities shall prepare and submit to the Commissioner of Health for approval on or before the first day of April, nineteen hundred and nine, a plan for a complete sanitary sewer system for the entire borough. This plan shall contemplate the collection of all of the sewage from public and private sources, including the existing sewers, and its conveyance to some point either within or without the borough, where ultimately a sewage treatment plant shall be erected when this becomes necessary. The site for the plant shall be selected, its relative elevaton and topography shown in connection with the levels of the outfall sewers in order that the plan may be approved and adopted whereby the sewers may be built in conformity therewith from time to time with the assurance that no part of the sewer system will ever have to be reconstructed.

SECOND: Storm water shall be excluded from the proposed sewers.

Harrisburg, Pa., October 15th, 1908.

FOREST CITY, SUSQUEHANNA COUNTY.

This application was made by the borough of Forest City, Susquehanna County, Pennsylvania, and is for permission to install a system of sewers, and to discharge sewage therefrom into the Lackawanna River, within the limits of the borough.

It appears that on August eighth, nineteen hundred and seven, the borough of Forest City, Susquehanna County, Pennsylvania, applied for permission to install a system of sewers, and to discharge sewage therefrom into the Lackawanna River within the limits of the borough. On December twentieth, nineteen hundred and seven, the Commissioner of Health issued a permit for said system of sewers, stipulating among other things, that before the sanitary sewers or any part of the system is built, the borough shall submit a plan thereof showing the entire system, the sizes and grades, to the Commissioner of Health for approval, and suggesting that the sewers be reduced in size so as to accommodate sewage only, excluding storm water. The revised plans were filed in the Department on February twenty-second, nineteen hundred and eight.

Forest City is without a system of sewers so that surface water and sewage discharged into the gutters in the built-up portion of the town, is permitted to drain along the gutters to various culverts under the railroad and into the Lackawanna River, by way of culm banks of the Hillside Coal and Iron Company. These banks are dyked so as to form a filter and the sewage and drainage must either pass over or through this filter before reaching the river.

The former plans included an outfall sewer twenty-four inches in diameter to discharge on the lowland near the river opposite Forest City breaker. The main intercepting sewers leading out of this outfall comprised fifteen inch pipe north and south in Railroad Street, having a slope of one per cent., and a fifteen inch pipe in Main Street. The lateral sewers in the streets running north and south were uniformly eight inches in diameter. These were designed to empty into sewers from eight to fifteen inches in diameter, to be laid in the steep hillside highways. The plan showed thirty-seven inlets for storm water.

The plans as revised show a main outfall sewer near the above breaker extending from the foot of Depot Street on the opposite side of the railroad from town and extending along said Railroad to a point near the breaker, thence directly to the river, a total distance of about seven hundred and fifty feet. To this outfall sewer will be connected an eighteen inch pipe two hundred feet long, extending under the railroad. The twelve inch intercepter will extend along Railroad Street and discharge into said eighteen inch pipe. The other pipes range in size from six inches to ten inches the greater part being eight inch pipe and the smallest part being six inches.

The slopes of the streets are good, so as to insure good surface drainage and the pipes will accommodate velocities sufficient for self cleansing.

The petitioners state that since submitting the revised plans that one of the coal companies is about to build a new washery and will utilize most all of the water from the mines for washing coal from old culm banks, so that there will be no mine water entering the sewerage system. Such being the case, it is their desire to reduce the twenty-four inch to an eighteen inch pipe.

It is understood that two assessments have already been made for the purpose of constructing this sewer system and one year's taxes collected to take care of the bond issue, and it is thought that if permission is not granted for at least a small part of the system, there will be considerable trouble in getting money for this item this year.

The practice of discharging kitchen wastes and sewage into the street gutters is a menace to public health and ought not to be tolerated and the most natural place to discharge this waste is into the Lackawanna River.

The river during the dry seasons is practically all mine water and sewage at this point, and some few miles below the acidity becomes greater on account of the discharge from the many collieries draining to the stream. While mine drainage is now exempted by law from the pollutions which must cease to be discharged into the waters of the State, it is by no means a sure thing when this drainage must cease or be subject to regulation. Although the acidity of the stream no doubt renders some of the sewage which enters it harmless, it is not known to what extent the present quantity of water will render more sewage harmless.

It has been determined that the interests of the public health will be subserved by granting a permit for the proposed sewer system, and a permit is hereby and herein granted under the following conditions and stipulations:

FIRST: That all roof and storm water shall be excluded from the system but mine water may be temporarily admitted until such a time as the Commissioner of Health may determine.

SECOND: That proper ordinances be passed compelling the properties abutting the sewer district to connect with said sewers so that the discharge of sewage and wash water into the gutters will be stopped.

THIRD: That flush tanks or other suitable means of flushing dead ends shall be installed in the system and that manholes shall be placed at all intersection and change of grade. The sewers may extend from time to time and at the end of each season's work plans of the sewers built during the year under the system hereby approved shall be prepared and filed with the Commissioner of Health, together with any other information in connection therewith which he may require.

FOURTH: No pathological material from any laboratory shall be discharged into the system. The proper authorities shall cause these wastes to be destroyed on the premises.

FIFTH: That if at any time the sewerage system or any part thereof, in the opinion of the Commissioner of Health, be a nuisance or menace to public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may advise or approve.

SIXTH: This permit to discharge sewage into the waters of the State shall cease on the first day of July, nineteen hundred and ten. If the borough shall have complied with the conditions of this permit at the end of that time, then the Commissioner of Health may extend the time and fix the date when sewage shall cease to be discharged from said sewer system into the waters of the State.

Harrisburg, Pa., July 24, 1908.

FRANKLIN, VENANGO COUNTY.

These applications were made by the City of Franklin, Venango County, and is for permission to make general extensions to its sewer system, also for permission to construct a combined sewer and culvert in the Third Ward in said city, also for permission to construct a ten inch sewer in Elm Street and for permission to build a ten inch sewer in Buffalo Street.

It appears that Franklin City is the county seat of Venango County and a manufacturing and residential community located on the west bank of the Allegheny River and on both banks of the French Creek. The site of the town is principally on the flats bordering the streams and hemmed in by high hills on all sides. Many of the newer residences are on these hillsides.

The municipal territory is divided into three wards. The First Ward comprises the southern part of the city, extending along the west bank of the river and the lower portion of French Creek, the Second Ward embraces all of the remaining land south of French Creek, and the Third Ward comprises all of that portion of the city north of French Creek.

It is in the Third Ward that the principal industries are located, although in Ward One, near the southern extremity of the city, are the plants of the General Manifold and Printing Company, the Colburn Machine Tool Company and the Franklin Railway Supply Company, said to employ one hundred and fifty, one hundred and eighty and two hundred hands, respectively. These works are adjacent to the tracks of the Clearfield and Franklin Branch of the Lake Shore and Michigan Southern Railroad. Said track extend notherly and westerly through the city at the foot of the hillsides and about forty feet above the river bank, the business section and principal portion of the town lying below and between them and the river. The only land developed in the city lying west of these tracks is in the Second Ward in the valley of Gurney Run. This stream rises in the hills and comes down northerly through the city to French Creek, the last twenty-two hundred feet of its length, from Chestnut Street in Fourteenth to the river, being a brick culvert five feet by six feet in diameter.

The streets are laid out parallel to the creek and river and at right angles thereto. The two main thoroughfares are Liberty and Elk Streets, the latter being nearest the river. Between Elk Street and French Creek is Otter Street.

The highways at right angles are numbered, beginning with First Street in the extreme southern part of the city and ending with Sixteenth Street at the upper part of the Second Ward, over two miles distant.

Near the foot of Third Street is the mouth of Smiths Run, which rises in the hills westerly and drains a small precipitous agricultural district. Underneath the Railroad, Liberty and Elk Streets, and through a part of the private property developed, the stream is confined to a large masonry culvert. No sewage is discharged into this structure, but the Gurney Run culvert is an outlet for the sewage of that part of the city.

In the Third Ward, which is connected with the Second Ward by a highway bridge at Thirteenth Street, the main highway paralleling the creek is named Atlantic Avenue. And north of it is Grant Street and then Pacific Street. The Franklin Branch of the Erie Railroad, extending from Oil City down the Allegheny River valley and thence to Meadville up French Creek valley, passes through Franklin in the Third Ward between Atlantic Avenue and the creek, and it is along this track that the industries are located.

Among others should be mentioned the Galena Signal Oil Works, Franklin Rolling Mill and Foundry Company, American Steel Foundry Company, Chicago Pneumatic Tool Company and several oil well supply companies, all of which are important and thriving, and none of which produce industrial wastes of special importance. The sewage from them is at present discharged into the creek at each plant by an individual sewer. There is no reason why the sewage should not be delivered to the public system when said system is perfected.

Thirteenth Street terminates at Monkey Run and at the city line and here the highway forks, the branch to the east extending up the valley of Monkey Run being known as Dempseytown Road and the branch to the north, the continuation of Thirteenth Street, is the Waterford and Susquehanna Turnpike and the boundary between the city and Sugar Creek Township.

Rock Grove village is a settlement of about two thousand people or more on the run and Dempseytown Road, about a half mile east of the city line. It is connected by trolley line with Franklin and Oil City, eight miles further north. There appears to be no public sewer system. Kitchen drainage and sewage reaches the stream in gutters or private drains. At Thirteenth Street the run enters an eight foot masonry culvert which extends through the city to French Creek with an outlet therein below the Thirteenth Street bridge. Some sewage gets into this culvert.

Ward Three is not thoroughly sewered. There are three culverts into the creek besides the eight foot culvert. In order up stream they are as follows: Twelve inch pipe at Thirteenth Street, serving a total length of twelve hundred feet of eight inch, ten inch and twelve inch pipe laid in Grant and Thirteenth Streets. There are six street gutter inlets for the admission of surface drainage to this sewer; next an eighteen inch outlet near the foot of Orchard Street, serving a total length of sixty-two hundred feet of sewer, diameters ranging from eight to eighteen inches, the pipes being laid in Atlantic Avenue, Grant and Pacific Streets, and connected therewith are twenty-two inlets for street drainage. This outlet is one thousand feet above Thirteenth Street; and the last outlet of the Third Ward is a twenty-four inch pipe, one-half a mile above Orchard Street. It is at the foot of Missouri Avenue and it serves a total length of forty-eight hundred feet of sewer in Atlantic Avenue, Grant and Pacific Streets, having diameters ranging from ten to eighteen inches. Street drainage is admitted at sixteen places.

Not all of the buildings on these sewer lines are connected therewith. It is estimated that over half of the population in the ward does not contribute to the flow in the sewers. The unsewered portion, especially that north of Grant

Street, is in a very unsanitary condition. The lands are low and swampy, with poor natural surface drainage. Kitchen slops are discharged into the street gutters and produce a nuisance there, especially in hot weather. The northern section of this district is on the hillside and several small streams and a number of springs render the land and house lots wet. It is to obviate these conditions that the city purposes to build the three foot culvert in Grant Street.

, Wards One and Two appear to be quite thoroughly sewered and the buildings there are quite generally connected.

Beginning at the lower end of the city and naming the outlets in order, they are as follows: At the foot of Third Street there is a twenty-four inch sewer which is laid up this road to the foot of the hill. It takes water from springs and surface drainage from the hillsides and connected with it, in Buffalo, Liberty and Elk Streets, are sewers from ten to twelve inches in diameter through which sewer drainage is taken at seven points. In this district there are, all told, forty-nine hundred feet of sewer, at the foot of Fourth Street there is a twenty-four inch sewer outlet which serves all the territory as far north as Seventh Street. It, like the Third Street outlet, extends to the foot of the hillside and receives surface drainage from the steep slopes and also from a swamp at the head of Fourth Street. Connected with this sewer main is an eighteen inch pipe extending northerly in Buffalo Street, also a fifteen inch in Liberty street and a twelve inch in Elk Street. All told, in the district there are sixty-seven hundred feet of sewer, smallest diameter ten inches. Street drainage is admitted at twenty points; the next sewer outlet is a twelve inch pipe, four hundred feet long, serving six hundred feet of eight inch sewer in Elk Street and having two street gutter inlets, and discharging into the river between Seventh and Eighth Streets; at Eight Street there is a county highway bridge over the Allegheny River into Cranberry Township and here just below the bridge abutment there is a twenty-four inch sewer and an eighteen inch sewer. The twenty-four inch sewer is laid up Eighth Street and thence northerly in Buffalo to the railroad and thence along the railroad at the bottom of the steep hillside to Twelfth Street, a total length of thirty-seven hundred feet. This sewer was put in principally to drain wet, spongy land, and to carry away underground surface water from the hillsides. The Lake Shore and Michigan Southern Railroad Company contributed liberally towards the cost of this structure because of benefits received. There are at least seven street gutter inlets on the sewer and connecting with it are twelve hundred feet of ten inch lateral sewer pipe. Wherever convenient, houses have been sewered to this line; the eighteen inch outlet serves the district between Seventh and Eleventh Streets, in which there is a total length of seventy-four hundred feet of sewer, the smallest diameter being eight inches. There are at least twenty-four inlets for street drainage; at Eleventh Street there is a dam in French Creek and a mill privilege. The dam is low and the back water does not extend far up stream, the slope of the bed of the creek having quite a good fall through the city. Immediately below the dam is the Eleventh Street sewer outlet, fifteen inches in diameter, serving the territory between Tenth and Twelfth Streets, comprising fifty-one hundred and fifty feet of pipe (smallest diameter eight inches) and taking street drainage at at least eleven places; at Twelfth Street there is a twenty-four inch sewer outlet into the creek, it serves a very important part of the city, including the high lands south of the railroad. The twenty-four inch pipe extends to Liberty Street, where there are two fifteen inch and one ten inch sewer pipe discharging into it. One of the fifteen inch pipes continues on up Twelfth Street and off of these pipes lateral sewers extend, comprising in all in the district a total of twelve thousand six hundred feet of sewer, smallest diameter eight inches. Street drainage is admitted at thirty-eight points. The setting back of sewage into some of the cellars in the lower portion of this district during times of heavy precipitation is of frequent occurrence, to the inconvenience of property owners and menace to the general public health. Some damages have resulted and relief from this condition is quite generally demanded; the next sewer outlet is said to be a twenty-four inch sewer. It is at the foot of Thirteenth Street and connected with it are very old brick conduits in Thirteenth Street to Buffalo, and in Buffalo, Liberty and Elk Streets between Thirteenth and Fourteenth Streets, a total length of thirty-three hundred feet of structure of unknown size. Also six hundred feet of ten inch pipe in Otter and six hundred feet of twelve inch pipe in Franklin Avenue, the last sewer outlet into the creek in the city in the Second Ward is the five by six foot culvert at the foot of Fourteenth Street. Connected with it is a total length of fifty-eight hundred feet of lateral sewer, smallest diameter eight inch. Street drainage is admitted at eighteen points. It is also admitted at nineteen points in the district drained by the Thirteenth Street outlet.

It thus appears that there are three public sewer outlets into the French Creek from the Third ward and nine public sewer outlets into the creek and the river from the Second and First Wards. Some of them are submerged and others are above ordinary water level. The total length of twelve and one-third miles comprises eighty-six hundred and fifty feet of eight inch, twenty thousand four hundred and fifty feet of ten inch, eleven thousand seven hundred feet of twelve inch, eighty-one hundred and fifty feet of fifteen inch, twenty-seven hundred feet of eighteen inch, seventy-three hundred feet of twenty-four inch and sixty-two hundred feet of sizes unknown, probably brick structures two feet in diameter. So it appears

that the city sewer system is principally ten inch pipe. As would be expected where storm water from streets and from extended areas of hillsides is admitted to a sewer system having such small conduits as obtain in Franklin, during heavy rainfalls there is a surcharging of the system at many places.

The sewers are constructed from time to time regardless of any comprehensive plan for the efficient drainage of the city area. Desultory extensions naturally followed, with the result that to-day, if reports be true, there are pockets in some of the sewer grades. Manholes at sewer intersections or at changes in line and grade are almost unknown features of the sewers. So, the plans submitted by the city are lacking in elevations of the sewers. Furthermore, the rushing down of water from a hillside brings with it silt, which is deposited in the sewers at flat places and pockets, which contributes to the back-flooding of abutting properties. Often water will flow out of the street gutter inlets instead of into them as it should in a proper system. During the Department's inspection, sewage odors of pronounced strength were being submitted from various street inlets in the central part of the city. This was conclusive evidence that the sewers were not functioning properly.

Advice as to the best method of improvng the sewer system is requested by the local authorities. Until full information is presented relative to the condition and grade of the existing sewers and the relative elevation of some of the cellars of buildings connected with the sewers, the determination as to the most efficient as well as economical remedy is impossible.

The three foot sewer culvert proposed by the city is to begin at the present end of the Monkey Run culvert and thence extend westerly through low ground to Pacific Street and in Pacific Street to Central Avenue. From here westerly the sewer is to be fifteen and twelve inches in diameter in Pacific Street. Northerly in Central Avenue the sewer is to be twenty-seven inches in diameter and to end at Seneca Street on the hillside where two runs fed by copious springs are to be diverted into the sewer. Lateral sewer pipes in other streets of the district are to be laid. They are to be twelve inches in diameter principally and will connect with the sytem. Details as to elevations and grades have not been submitted. If these structures are built as proposed, it will be a continuation of the combined system.

The applications for sewer extensions in Elm Street, First Ward, and in Buffalo Street, Second Ward, were made after the applications for permission to make general petty sewer extensions anywhere in the city had been made, because while the general question was pending, the construction of these petty sewers was demanded without delay as a health precaution.

The Elm Street extension is to be ten inch pipe, four hundred feet in length, to connect with the twenty-four inch sewer which has its outlet at the foot of Eighth Street. The Buffalo Street extension is to be ten inch pipe, three hundred and fifty feet in length, to connect with the old brick sewer in said street extending easterly to the four by five foot culvert in Fourteenth Street, which is the sewer outlet for that section of the city. Both of these laterals are to take surface water and sewage.

It is understood by the local authorities that the pollution by sewage of streams used subsequently as sources of public water supply must eventually cease, and that when the time shall have arrived for the city of Franklin to discontinue the discharge of its sewage untreated into French Creek and into the river, the expense of such a change would be prohibitive if the combined volume of surface water and of house drainage were to be delivered to the sewage disposal works. The pathogenic poison is in the house drainage and the volume of this drainage for a city of Franklin's size is comparatively small, and, therefore, the cost of destroying the poison in the sewage before the liquid goes into the river is also a comparatively inexpensive proposition and easily within the means of the city's financial ability.

It is reported that the assessed valuation of property in Franklin is upwards of five million dollars. If it were exactly five million dollars, then the city could borrow three hundred and fifty thousand dollars without exceeding its debt limit. It is also reported that the city's bonded indebtedness is fifty-five thousand dollars. So, if these figures be substantially correct, the municipality has credit equivalent to three hundred thousand dollars. The purchase of the system of public water works now owned by the Venango Water Company by special legislative charter, is deemed by the citizens of the town to be a most desirable consummation. Legislation was enacted during nineteen hundred and seven authorizing municipalities to acquire water works systems and to issue bonds secured by such works for the payment thereof, and to provide a sinking fund therefor out of the revenues of such works. So the city of Franklin is especially well equipped to own its own water works system and to establish an improved sewerage plant.

Thirty miles below the mouth of French Creek the borough of Emlenton takes its water supply from the Allegheny River and so do other municipalities all the way down to Pittsburg. The regulation of sewage discharge into this stream and its tributaries has been effected by the Commissioner of Health both above and below the city of Franklin in all those instances where, under the law, the Commissioner has jurisdiction. In no instance has a limit of over three years been granted beyond which sewage may continue to be discharged into the waters of the State. Oil City and Meadville have come under this regulation. At the

present time the city of Meadville is engaged in preparing plans for the purification of its sewage. In keeping with this policy it is essential that the authorities in the city of Franklin should anticipate the treatment of the city sewage and do such work in the way of sewer extensions from now on as shall fit into and be a part of the comprehensive and complete efficient and economical plan for the collection of all of the house drainage everywhere in the city and its deliverance to and purification in a disposal plant. Such a plan precludes the admission of storm water or much roof water into the sewer. If any storm water is to be admitted, then it should be limited to such a maximum quantity as it may be found practicable to receive and handle at the sewage disposal works.

In solving this problem the best investment which the city can make is in the employment of proper engineering skill. As previously stated, a thorough knowledge of the existing sewers is requisite. Then judgement must be exercised as to how best to separate sewage from storm water in the existing sewers, and what sewers should be incorporated into the sanitary system and what sewers should be used exclusively for storm water. Then would follow the location or locations for the sewage disposal works and the devising of plans for the most efficient deliverance of the sewage there.

When these things are done and the plan is approved and becomes official, it will be possible for the city to make sewer improvements without wasting money, but not otherwise.

It would be most inconsistent for the State to approve the combined sewer system proposed for the Third Ward, for these reasons. It would add to the difficulty. There is no reason why conduits for the removal of surface water only should not be made by the city whenever it sees fit; but the State cannot sanction the construction of large conduits in Franklin City when these conduits are to be used for the conveyance of sewage and storm water combined.

In the case of the two petty lateral extensions, it appears that they are at summits and that on the Buffalo Street extension there are three dwellings costing about forty thousand dollars, which will not be occupied until a sewer connection be provided. Provided roof and storm water be excluded from these extensions, or if admitted it be under condition providing for the exclusion of all but sewage, if this should ever be found essential, there appears to be no urgent reason for refusal of a permit for a sewer. However, such permission could not very well be extensively given all over the entire city, which makes it all the more urgent that the city officials should give immediate attention to the preparation of the comprehensive plan for improved sewerage and sewage disposal works.

It has been determined that the interests of the public health require with respect to the proposed combined sewers in the Third Ward, that a permit be withheld and such permit is hereby and herein withheld; with respect to the lateral sewer extensions in Elm and Buffalo Streets, that a permit be granted therefor under certain conditions, which permit is hereby and herein granted; and with respect to the general extensions to the sewer system that a permit therefor be withheld for the present and it is hereby and herein withheld all under the following conditions and stipulations:

FIRST: That the Elm and Buffalo Street extensions be used exclusively for sewage, or if roof and storm water be admitted thereto it shall be under such conditions as shall provide for the exclusion of all but sewage, if this should be found essential at any time. Furthermore, manholes for inspection and of approved design shall be provided at intersections and at changes in line and grade.

SECOND: Permission to discharge sewage through the sewers or their outlets into the waters of the State shall cease January fifteen, one thousand nine hundred and ten. On or before this date the city shall prepare a comprehensive plan for the separation of its sewage and storm water wholly or in part, and for the treatment of the sewage, and submit the same to the Commissioner of Health for approval. If on said date this be done, then the Commissioner of Health may extend the time in which the city sewage may continue to be discharged into the waters of the State, and fix the time, subject to the concurrence of the Governor and the Attorney General, on or before which the city of Franklin shall erect sewage disposal works and put the same in operation.

The attention of the city officials is called to the desirability of the installation of a public sewerage system in the suburbs up Monkey Run valley. An outlet into the city sewer system is suggested and it would be prudent for the city's experts to bear this in mind when studying the problem. The Department of Health will be glad to co-operate with the city at all times.

Harrisburg, Pa., January 29th, 1908.

FREEPORT, ARMSTRONG COUNTY.

This application was made by the borough of Freeport, Armstrong County, and is for permission to extend the borough sewers as proposed.

It appears that the borough of Freeport is located in Armstrong County, Western Pennsylvania, on the Allegheny River, thirty miles above Pittsburg. It is in the extreme southwestern corner of Armstrong County and is located on a tract of land lying at the intersection of Buffalo Creek with the Allegheny

River. On the south and east it has a frontage on the Allegheny River of five thousand feet and on the west it extends along Buffalo Creek for three thousand feet.

The incorporated area of the borough consists of two hundred and fifty acres. The land along the banks of Buffalo Creek and the Allegheny River is comparatively flat and is about fifteen feet above the low water stage in the river. To the north and east the land rises more rapidly, attaining a height of two hundred feet above the lower portion of the borough at a ridge on the extreme northeastern boundary of the borough limits. On this ridge is located the storage reservoir of the water works company.

Buffalo Creek is a small tributary of the Allegheny River, having its origin in the northwestern portion of Armstrong County. It follows the boundary line between Armstrong County and Butler County in its course and drains a territory of approximately one hundred and fifty square miles. The flow in this creek during the dry season is extremely low and sluggish. During the freshets and high stages in the Allegheny River, the creek overflows its banks and the river front of Freeport, on both streams, is frequently submerged.

One mile above Freeport the Kiskiminetas River joins the Allegheny. Ten miles up stream is Ford City and sixteen miles above is Kittanning. Below Freeport on the Allegheny there are numerous towns and villages which take their water supply from the river.

Freeport is mainly a railroad community. Across Buffalo Creek on the western bank of the borough is Butler Junction, a terminal of the Butler Branch of the West Penn Railroad. One mile east of Freeport, across the Allegheny River, is Kiskiminetas Junction, where the Allegheny Valley Railroad joins the West Penn Division. The West Penn Division of the Pennsylvania Railroad passes through the borough along the bank of the Allegheny River and furnishes easy access from Butler Junction and Kiskiminetas Junction. Most of the employes of these two places live in Freeport, comprising about thirty per cent. of the total population.

The present population within the incorporated limits of the borough is estimated to be two thousand. The borough is one of the oldest in the western part of the State of Pennsylvania, and the growth has been slow. The population in eighteen hundred and eighty was fifteen hundred and in nineteen hundred, seventeen hundred and eighty, so that it is probable that the population twenty years from now will not be more than twenty-five hundred. In additon to the population within the borough limits, there is a settlement at Butler Junction and also a suburban district in South Buffalo Township immediately east of the borough limits. With these additions it is estimated that the total population within the vicinity is twenty-five hundred, with a probable future population twenty years from now of not over three thousand.

In addition to being a railroad centre, Freeport has one large industry, the Guckenheimer Distillery,, located on Todds Island, within the borough limits, on the Allegheny River near the eastern end of the borough. This island belongs to the distillery company and is being built into the mainland. The island, which is two thousand feet long and five hundred feet wide, has been laid out in lots and streets and the houses of the employes have been located thereon, in addition to the distillery warehouses and buildings. The distillery employs one hundred and sixty-five men and is equipped with a private water supply, but uses the water from the Freeport Water Works for fire purposes. The private supply is taken from the Allegheny River for boiler purposes and from a system of driven wells for the distillery.

There is a smaller distillery located west of the borough at Butler Junction across Buffalo Creek belonging to the Pennsylvania Distillery Company.

The borough is supplied with water by the Freeport Water Works Company, a private corporation which also supplies the railroad company at Freeport Junction and the distilleries. Practically every house in the borough is connected to the water mains. It is reported that the company supplies five hundred thousand gallons of water per day, of which three hundred thousand gallons are used for industrial purposes.

The water is taken from the Allegheny River through two cribs located in the bottom of the river and covered with six feet of gravel. These cribs are located three-quarters of a mile above the borough center and about one thousand feet from the borough line out in the township. The water is pumped from these cribs to a series of wooden storage tanks located on the ridge at the northeastern end of the borough and having a capacity of two hundred and fifty thousand gallons. Water is supplied from these tanks to the community through two six inch and one four inch supply mains, with an average pressure of eighty-five pounds in the main built-up district of the borough.

The water furnished by the company is, however, not used generally for drinking purposes. There is a prejudice against the use of this water, due to its being taken directly from the Allegheny River, which is highly polluted with sewage from towns located above Freeport, and also on account of the muddy condition of the water during the flood stages of the river. The people in the borough use for their drinking water several springs which outcrop at various points in the borough between the ridge and the river and probably a dozen wells. These

wells range from four to six feet in diameter and go to a depth of thirty feet, where the bottom is about on a level with the river bed. The wells are lined with dry rubble field stone.

The main streets of the borough parallel the river. Water Street abuts the river bank in the western portion of the town and paralleling it is Market Street, and next in order, High Street and Franklin Street. High Street is the only thoroughfare through the entire length of the borough. The railroad lies between Market and Water Streets. At right angles to the river, the highways are named in order: First, Second, Third, Fourth, Fifth and Sixth Streets, the first street being close to Buffalo Creek.

The business section of the town is on Market and High Streets, from Third to Sixth Streets.

The lands abutting First and Water Streets are low and subject to inundation.

The borough is equipped with a combined sewer system which drains one-half of the municipal area. There are five sewer outlets, two of them are into Buffalo Creek and three are into the river below the island. Besides these there are private sewers.

The sewers were first installed in eighteen hundred and ninety-six when the Singer Sewer Company constructed three thousand feet of sewer in the center of the borough, consisting of small sizes, with a ten inch outlet at the foot of Fifth Street. This system has been partly abandoned and partly incorporated in the borough system of sewers. The outlet at Fifth Street drains two houses.

A new twenty inch outlet sewer, belonging to the borough, discharges at this point into the river. This twenty inch outfall sewer extends up Fifth Street and carries the drainage from all of the sewered territory east of Fifth Street. It is fed by a series of fifteen inch laterals extending along Market Steet, High Street and Franklin Street, with a total length of five thousand feet in the system.

The other two outfall sewers emptying into the Allegheny River at the foot of First Street and Fourth Street, respectively; the First Street sewer is twenty inches in diameter and extends from the river front to Market Street, a distance of five hundred feet. It is fed by a series of laterals fifteen inches and eighteen inches in diameter, extending along Market Street, of a total length of sixteen hundred feet.

The outfall sewer at Fourth Street is fifteen inches in diameter and extends up Fourth Street to Buffalo Street seventeen hundred feet. It also drains the territory between Third and Fifth Streets with a series of eight and ten inch laterals one thousand feet in length.

The two outfall sewers into Buffalo Creek have been constructed since the passage of the Act of nineteen hundred and five. It is approval of this outlet for which application has been made and is now under consideration. One of these sewers empties into Buffalo Creek at the foot of High Street; it is eighteen inches in diameter. This sewer was constructed by the borough about June first, nineteen hundred and five, and extends along High Street from Buffalo Creek to Fourth Street, a distance of fifteen hundred feet. It is fed by laterals located on Second Street from Market to High Street four hundred feet; from High Street north two hundred and fifty feet.

The other outfall sewer emptying into Buffalo Creek is at the foot of Buffalo Street near the highway bridge across the creek to Freeport Junction. This sewer is twenty inches in diameter and extends from Washington Street to Buffalo Creek, a distance of twelve hundred feet. A lateral connection to this was made in nineteen hundred and eight along Second Street from Buffalo Street a distance of nine hundred feet.

These sewers have been constructed under the supervision of the borough engineer and it is reported that they have been laid in a first class manner to an accurate grade. Most of the sewers are on steep grades and are ample in size to take care of the storm flow. Manholes are located at all intersections. No flush tanks are used.

It is estimated that thirteen hundred people are using the sewers at present, with a total of two hundred and fifty connections to the sewers. Roof water is in all cases carried to the sewers and there are storm water inlets in the paved sections of the borough for carrying away the surface flow during rains. The remaining population use earth vault privies of which there are over three hundred in the borough.

In addition to the public sewer system, there are many private sewers emptying directly into the river from houses located along the river front. There are twelve or more houses with independent sewer connections located on Water Street from Buffalo Street to Fifth Street. On Todds Island the distillery company has an eighteen inch sewer which discharges the liquid run-off from the works into the Allegheny River. They also have a three inch tile sewer connection from the office lavatory, which discharges sewage directly into the river.

Typhoid fever is prevalent in Freeport and has been for many years. Accurate records, however, are wanted. During nineteen hundred and five there were sixteen cases in two weeks and during nineteen hundred and seven it would ap-

pear that there were between two hundred and three hundred cases of typhoid fever. At any rate twenty-two deaths were recorded. Physicians do not report the cases and the records of the Bureau of Vital Statistics, of the State Department of Health, relative to typhoid fever, are worthless for Freeport borough on this account. The epidemic in the fall of nineteen hundred and five, when sixteen cases occurred in two weeks, was attributed to the infection of the milk supply. All the cases were on the route of one milk dealer, at whose farm typhoid fever existed.

The general prevalence of the disease from year to year is evidently due to the pollution of the drinking water of the community. While the water furnished by the water company is highly contaminated by sewage, yet on account of the widespread use of spring and well water in the borough, taken from sources which are in proximity to privy vaults and cesspools, such water should be viewed with suspicion also. The water works company contemplates the installation of a high grade filter plant, and plans therefor are now under consideration by the State Department of Health. The construction and operation of this filter plant may not reduce the typhoid fever to a sufficiently low rate, owing to the use of the said well and spring waters. Therefore, the borough officials should co-operate by making a rigid inspection of the private water sources in the borough. The existence of so many earth closets is a menace. One remedy is the construction of sewers and compulsory connection therewith. The borough contemplates affording this remedy.

In addition to the sewers which have been constructed by the borough since April, nineteen hundred and five, and enumerated hereinbefore, the borough purposes to build extensions in the immediate future along streets where paving is to be done. These sewers are planned to carry storm and roof water in addition to the sewage and are to be connected with the existing system. The borough desires to lay three hundred and seventy-five feet of fifteen inch sewer on Sixth Street, between Market and High Streets; three hundred and sixty feet of eighteen inch sewer on Washington Street, from Fifth to Stewart; four hundred and fifty feet of fifteen inch sewer on Stewart Street, from Washington Street north; all of which discharge through the Fifth Street outfall sewer into the Allegheny River. There is also a section of three hundred and seventy-five feet of fifteen inch sewer extending from High Street to Market Street on Third Street and discharging through the First Street outfall sewer into the Allegheny River. The petitioners state that they have advertised for this work in connection with street paving and are anxious to place it in the ground before paving is begun. The total length of the extensions is fifteen hundred and sixty feet and they will drain twenty additional house connections.

The borough of Freeport is supplied with water, so it is seen, from the Allegheny River, which is polluted with sewage from various towns and boroughs located above the intake. The nearest borough above the Freeport Water Works is Ford City, which is distant only ten miles and whose sewage is discharged into the Allegheny River. The Department of Health has recently granted a permit to Ford City to discharge its sewage and to extend its system only under condition that plans for separate system of sewers and a sewage disposal plant be prepared and submitted to the Department of Health for approval in the immediate future. This policy of the Department has also been carried out in the case of the boroughs of Tarentum, Brackenridge and Natrona, located immediately below Freeport and contaminating the Allegheny River with sewage. The borough of Freeport should, therefore, expect to co-operate with this policy of the Department in protecting the purity of the water supply of the various municipalities along the Allegheny River and Ohio River, more especially since its sewage is discharged into the river at a point six miles above the water works intake at Tarentum by means of which residents of Harrison Township, Brackenridge and Tarentum boroughs are supplied with drinking water.

It appears, if reports be true, that the municipal borrowing capacity within the seven per cent. limit of indebtedness is twelve thousand dollars taking into account the present assessed valuation of indebtedness. Therefore, the borough is not in a position to assume the expense of erecting sewage disposal works or to eliminate the storm water from existing sewers. The cost of disposing of sewage mixed with storm and roof water is prohibitive and it will be necessary for the borough to change its sewer system to some extent. It would be better to exclude all roof and storm water and to carry sewage only to the disposal plant, but it may be found that a portion of the roof and street water may be permitted to continue to flow into the sewers after the sewage disposal plant shall have been erected. This is a question of engineering, which needs to be carefully studied by some expert employed by the borough, and the State Department of Health will be glad to further advise with respect to such a study. It appears that it is necessary that there should be storm sewers in the low districts of the borough to avoid washout from the hillsides. With the existence of two outlets within four hundred feet of each other at Fourth and Fifth Streets it should be possible at little expense to remodel the system so as to discharge the storm water from one of these outlets and use the other solely for sanitary sewage.

An arrangement should be made for sewering Todds Island and conducting all of the sewage and wastes produced there to the disposal plant.

In constructing the outfall sewers discharging into Buffalo Creek and their connections after the passage of the Act of April twenty-second, nineteen hundred and five, the borough violated the law of the Commonwealth in regard to the pollution of streams. The petitioners in their application state that these sewers were constructed without the knowledge of the borough officials that a permit was required from the Department of Health. They further state that the section which was constructed in nineteen hundred and eight was done under a misunderstanding that it was necessary to obtain a permit for petty extensions.

The diameters of the sewer extensions for which application is made are larger than is necessary for sanitary purposes. An eight inch sewer should be ample in size for any of these extensions. The reduction from fifteen and eighteen inch pipe to eight inch pipes will save some money. Storm water should be excluded from these lateral extensions because there appears to be no good reason submitted by the borough authorities for the admission of storm water into these proposed sewers in view of the necessity for the ultimate treatment of the sewage of the entire borough.

It has been determined that the interests of the public health will be subserved by granting a permit to the borough of Freeport to construct the proposed sewer on Sixth Street between Market and High Streets; on Washington Street from Fifth Street to Stewart; to Stewart Street from Washington Street north; and also a sewer on Third Street from High to Market Street and these sewers only and a permit is hereby and herein issued therefor, under the following conditions and stipulations:

FIRST: On or before December first, nineteen hundred and eight, the borough shall prepare a detailed and accurate plan and profile of all of its existing sewers and file the same with a satisfactory report thereof in the office of the Commissioner of Health.

SECOND: That on or before June first, nineteen hundred and nine, the borough shall prepare a plan for the collection and purification of the borough sewage, which shall include all territory within the borough limits, which plan is to be submitted to the Commissioner of Health for approval on or before said June first, nineteen hundred and nine.

THIRD: That storm and roof water shall be excluded from the sewer extensions herein approved and reduction in the sizes of the sewers proposed be made to conform to the sanitary sewer system for the entire borough.

FOURTH: Extension manholes shall be located at every change of line and grade of the sewer.

FIFTH: Approval of the sewers built by the borough since April twenty-second, nineteen hundred and five, is hereby temporarily withheld until the plans for a comprehensive sewerage system and sewage disposal works, involving the incorporation of the existing sewers or some part thereof, if practicable, into such plans for a comprehensive sanitary sewerage system, shall have been prepared and submitted to the Commissioner of Health for approval.

SIXTH: This permit to discharge sewage from sewer extensions through existing sewers into the waters of the State shall cease on June first, nineteen hundred and nine, but if on that date the terms of this permit shall have been complied with, then the Commissioner of Health may extend the time in which sewage may continue to be discharged from the borough sewer system into the waters of the State, having in mind the policy of the State with respect to the discharge of sewages into the river from other municipalities in the Allegheny River valley.

Special attention of the borough authorities is hereby called to the suggestions hereinbefore made relative to private wells and springs.

Harrisburg, Pa., September 18th, 1908.

GLASSPORT, ALLEGHENY COUNTY.

This application was made by the borough of Glassport, Allegheny County, and is for permission to extend its sewer system and to discharge the sewage through existing sewers into the Monongahela River within the limits of the borough.

It appears that the borough of Glassport is a manufacturing community of five thousand population, located along the east bank of the Monongahela River about two miles above the mouth of the Youghiogheny River and the city of McKeesport, and seventeen and six-tenths miles by the Pittsburgh and Lake Erie Railroad above the city of Pittsburg.

The borough territory stretches along the river for a distance of two and one-half miles and its greatest depth is one and one-fourth miles. It is bounded on the north by the Tenth Ward of McKeesport and on the east by the borough of Port Vue, which borough occupies all the land between Glassport and the Youghiogheny River except the Tenth Ward of McKeesport.

The industries are all located along the river on the flats between the railroad and the river. The bottom lands extend easterly of the tracks for varying widths and upon these low lands probably fifty per cent. of the people reside. The business section of the town is on the flats also. There is a ridge paralleling the river which approaches quite close to the stream at both the northern and southern parts of the borough, but in the central part it flows out easterly forming extensive bottom lands upon which most of the borough is built as above de-

scribed. However, many dwellings have been erected on the hillsides. In the northern end of the town adjacent to the Tenth Ward of McKeesport there is a settlement called Otto, comprising about eighty-five houses, the settlement taking its name from the Otto Plant of the Pittsburgh Gas and Coke Company. This plant is located at the foot of First Street, employes about two hundred and fifty men who reside largely in the vicinity. Glassport proper extends from Third to Ninth Streets, the space between Third and First Streets being open land under cultivation. Between First and Ninth Streets, which highways terminate at the railroad and extend back from there at right angles along the river bank, are located in order from Third Street up stream, the Severance Manufacturing Company, manufacturers of spikes and rivets, employing between one hundred and one hundred and fifty men, the Pittsburg Steel Company, Hoop and Band Department, employing about two hundred hands; the Pittsburg Steel Foundry, employing about six hundred and fifty hands; the United States Glass Works, employing about three hundred and fifty men; the American Axe and Tool Works, employing about five hundred men; and the Pollock Shops of the Pittsburgh and Lake Erie Railroad, employing about seventy-five mechanics.

The town was incorporated as a borough in one thousand nine hundred and two. Practically speaking, the entire growth of the community occurred in the last eight years. The principal area comprises about one thousand acres of which not over fifty per cent. are now occupied, so that there is no land restriction to a greater growth of the borough.

The citizens obtain their drinking water from the Monongahela Valley Water Company. This company furnishes water to a number of boroughs and townships and the Tenth Ward of McKeesport. The water is taken from the Monongahela River near the upper end of Elizabeth borough, four miles above Glassport, and is pumped by a low service machinery to the settling tanks, two in number, each fifty feet in diameter and twenty feet high. Sulphate of alumina is used to effect coagulation and sedimentation. The water flows by gravity from the settling tanks to three horizontal pressure type filters arranged to act as gravity filters. Each unit is eight feet in diameter and thirty feet long, each with a rated capacity of seven hundred and fifty thousand gallons in twenty-four hours. The water passes through the filters to the clear water basin located directly beneath them, from which it is taken by the high service machinery and pumped directly to the consumers, the surplus going to a reservoir of about one million gallons capacity located on high ground back of Elizabeth borough.

It is reported that there is only one private spring in use in Glassport and that there are not over six private wells in use. There is typhoid fever prevalent in the community and it seems about two-thirds of the cases, as far as has been observed, occur among the adults. Most of the industrial plants have drilled well supply for drinking water. The river water is used for industrial purposes in nearly all cases. The railroad shops are supplied with artesian wells for drinking. The river water is treated with soda ash and lime before being used in the shops. The sewage from the buildings, and probably roof water is discharged into the main borough sewer which passed underneath the shops.

On the American Axe and Tool Company's property there are two driven wells from which drinking water is drawn in the summer time. The water company supplies the plant in the winter. There are twelve sewer pipe outlets from this plant to the river. Through eight of them there is a steady flow of waste water from the wheel pits. There are six open closets on the property which are flushed daily with hose, the drainage being to the sewer system. Roof water is also pumped to the sewers.

The glass works are supplied by the water company for drinking purposes. The river water is pumped into the works for industrial uses. A private sewer takes roof water and closet drainage and all drainage back to the river.

The drinking water for the employes of the foundry is obtained from a drilled well. The river water before being used in the plant, is pumped to a settling tank and treated.

There is a sewer system on the property having three outlets, one a twelve inch, one a fifteen inch and one an eighteen inch pipe. Flush closets are connected to the sewers at different points throughout the works.

At the Pittsburgh Steel Company's works, drinking water is obtained from the well located on the premises of the Severance plant, adjacent thereto. The industrial supply is obtained partly from the river supplemented by the water company's source when the river water is unfit for manufacturing purposes. A private sewer system with two outlets, one a six inch and the other an eight inch pipe takes the drainage from the property to the river.

There is a drainage system at the Severance plant having three outlets into the river, which carries off waste water from the works. There are two privy vaults, plank sides, on the grounds. They are located probably one hundred and fifty feet away from the well.

At the Otto Coke plant there is a privy overhanging the bank of the river. The sewer system takes industrial wastes and storm water and sewage from the office building. The water company furnishes drinking water and the river source is drawn upon for operating purposes.

So far as the Department can ascertain, existing typhoid fever in the borough has not been attributed to the use of these private sources of drinking water, nor to the public water supply.

The public sewer system was begun in nineteen hundred and has been extended from time to time annually, the last sewer built, about which the Department is informed, was in nineteen hundred and six. This was a short line put in without application and approved by the Department of Health. The borough has not submitted a report and plan of its sewer system as required by law, but the local authorities are now engaged in the preparation of such report and plan.

The streets in Glassport proper are quite thoroughly sewered and the sewers take both sewage and storm water. The evidence of the existence of the sewers may be seen by the inlets in the street gutters. There are three outlets to the sewer system. The first one down stream is at the foot of Lincoln Street. The sewer is three feet in diameter, a brick structure, and it extends southerly in Monongahela Avenue to Harrison Street. There are about forty houses along this street and all of them are said to have connections to the sewer. The principal object of this sewer is to remove surface water from the avenue which parallels the railroad tracks and is the main thoroughfare of the town. The trolley tracks are on this highway.

About two thousand feet upstream from the Lincoln Avenue sewer there are two twenty-four inch pipe sewers on the property of the Otto Coke plant. The borough has connected an eighteen inch pipe having a length of about one thousand feet in Monongahela Avenue with one of these private sewer outlets. Connected with this eighteen inch pipe sewer there are a very few buildings.

A second pipe sewer outlet is at the foot of Third Street upstream about two thousand feet from the Otto Coke plant. This sewer is five feet in diameter, built of brick. and it serves all of the borough, principally north of Seventh Street, as far east as Vermont Avenue. No data as to the length of lateral sewers or of house connections is now in the possession of the Department.

The third pipe sewer outlet is upstream one mile. It serves the largest district in the borough and the most populated one, being all of the built up part south of Seventh Street and east of Vermont Avenue. How many feet of lateral sewer and how many buildings connect with the system, is not now known to the Department.

It appears that there are several hundred loose earth privy vaults in use throughout the town and where there are no sewers, kitchen drainage is emptied into the street gutters and filthy conditions may be seen in some of the highways of the town, owing to this custom.

The borough purposes to lay a fifteen inch pipe sewer along Indiana Avenue between Ninth and Fifth Streets. This Avenue extends along the hillside at an elevation slightly above the base of the hill. The thoroughfare is unpaved, about one-half of the lots are built upon, the buildings on the lower side of the street have sewer connections to Cherry Alley sewer in the rear and the kitchen drainage from the buildings on the upper side of the street is deposited in the gutter, creating a nuisance. The borough also purposes to extend the four foot brick sewer from Cherry Alley easterly in Ninth Street to Indiana Avenue, to receive the flow of the proposed Indiana Avenue sewer.

The majority of the property owners along the avenue have petitioned the local authorities for the proposed sewer.

It appears that the local Board of Health is active in enforcing cleanliness. Many of the houses are occupied by people of foreign birth who are liable to be negligent in carrying out the rules and regulations of the local Board of Health. In the matter of cleaning out the privy vaults, it is reported that so rigid is the inspection of the local health officer that whenever a sewer line is built, many of the abutting property owners voluntarily connect with the sewer and do away with the trouble and expense of frequent cleaning out of the privy vaults.

The kitchen drainage from the Indiana district now reaches the river by the street gutters. By granting permission to build the sewer, a local nuisance will be abated and the increase in sewage pollution of the river will be a measureable amount.

It has been ascertained elsewhere in the State that municipalities and industrial establishments in which water is supplied for cooling and general purposes other than for drinking, do occasionally use this water to drink in spite of warnings in reference to the pollution of the water. One or more typhoid epidemics have occurred in Pennsylvania from this cause. While the infection of the individual is due to his own negligence in a large measure after proper warning being given of the danger in the water, nevertheless, some of the responsibility it attributable to the negligence through which the sewage is first deposited in the water. There is no doubt but that the interests of public health will be subserved by removing this element of danger to the employed. At present, in Glassport, the principal borough sewer pours its filth into the river above the intakes of the water works systems and all of the industries of the towns. In turn, each manufacturing plant sewer offends in a similar manner.

The sewage if discharged at all into the Monongahela River should be emptied at a point where it can do no harm; first, to the citizens of the town, and second, to other municipalities down stream.

Owing to the proximity of Glassport to the city of McKeesport whose improved sewerage and sewage disposal problem is now up for consideration by the city officials, it might be very desirable for Glassport to work in conjunction with

McKeesport in studying the problem. It is altogether probable that a joint inspection of sewage and ultimate disposal of it would be cheaper and better than independent action on the part of these two municipalities.

The borough of Glassport has an assesed valuation of about three million dollars and a bonded indebtedness of about one hundred and ninety-eight thousand dollars, so it is reported. If these figures be true, then it is seen that the municipal borrowing capacity has about reached the limit. But the town is amply able to prepare plans for the collection of its sewage and for both present and prospective and for the ultimate proper disposal of the sewage and submit these plans to the State Department of Health for approval. After such plans have been finally adopted, they will serve as a guide and be followed in all future laying down of sewers from time to time. Thus no mistake will be made and no reconstruction of sewers will ever be necessary. The whole will fit into one perfect, comprehensive system.

There is one important point which must be kept in mind by the local authorities in preparing the comprehensive system. This is the question of the ultimate treatment of the sewage. The cost of handling both sewage and storm water is prohibitive. The separation of house drainage from storm water to some degree is demanded. A study of the comprehensive system must thoroughly comprehend this question of elimination of roof and storm water and of incorporating into the comprehensive system as much of the existing sewer system as is practicable.

While the State Department of Health will co-operate with the local authorities and assist in this study, the work must be primarily initiated by the borough and it would be economy for the town to engage the services of some recognized expert to consult with the borough engineer in initiating these studies and plans and in working in conjunction with the municipal authorities of McKeesport City if this be found a feasible thing to do.

It has been determined that the interests of the public health will be subserved by assisting the local Board of Health to abate the nuisance along Indiana Avenue and that the proposed sewer extension in said avenue be approved, and the same is hereby and herein approved and a permit issued therefor, under the following conditions and stipulations:

FIRST: That before this sewer is built the borough shall have prepared and filed in the office of the Commissioner of Health a satisfactory report and plan of the existing sewer system.

SECOND: On or before July first, one thousand nine hundred and nine, the borough of Glassport shall either independently or in conjunction with the city of McKeesport, devise plans for the comprehensive sewerage system as hereinbefore explained for the entire borough, and for the discontinuance of the discharge of sewage into the waters of the State and shall submit such plan or plans to the State Department of Health for approval. The time when sewage purification works shall be erected will be determined later by the Governor, Attorney General and the Commissioner of Health, taking into account the time when other municipalities in the valley of the Monongahela River shall be required to treat their respective sewages.

THIRD: The sewer herein approved shall be so built and its use so regulated that the sewer may be incorporated either into a sanitary sewer system or a storm drain system as the case may be determined at some future time.

Harrisburg, Pa., October 5th, 1908.

GROVE CITY, MERCER COUNTY.

This application was made by the borough of Grove City, Mercer County, and is for permission to extend its sewer system and to discharge the sewage therefrom through existing sewers and to establish a new sewer outlet into Wolf Creek within the limits of the borough.

It appears that Grove City is a manufacturing community of about three thousand population, located in Pine Township, in the southeastern corner of Mercer County on the Pittsburgh, Bessemer and Lake Erie Railroad.

The incorporated territory is about rectangular in shape. It is divided into an east and west side by Wolf Creek, which rises about eight miles north of Grove City, drains a wholly rural territory of about sixty square miles above the borough and flows southerly through it in the eastern part, emptying into Slippery Rock Creek eight miles below Grove City in Butler County.

The railroad extends in an east and west direction through the north central part of the town and north of it except adjacent to the tracks the development is wholly residential. South of the railroad and west of the creek is the business section and the principal residence district. The ground slopes gradually towards the creek. There are some level tracks thickly built up and along the stream below Pine Street as far as Main Street there are low lands unoccupied and subject to flood.

Streets in the borough are not regularly laid out owing to the additions to the municipal territory from time to time of tracts developed by private enterprise. Main Street extends northwesterly through the borough, crossing the creek in the lower part of the town just above the dam owned by the municipality and maintained in connection with its water works system. Pine Street parallels the rail-

road, is south of it and extends on either side of the creek. Broad Street is the main thoroughfare north and south in the town. Its southern terminus is at Main Street, but the highway paralleling and immediately west of Broad Street extends entirely through the borough. It is named Centre Street.

The principal industry is the Bessemer Gas Engine Works. Here and at the Bessemer Foundry are employed two hundred hands. There are also carriage works, broom factories, a brass works and other concerns and a private educational institution known as Grove City College, accommodating some three hundred students.

The appearance of the borough is that of a well-to-do progressive community. The dwellings and surroundings and numerous lawns are well kept. Many of the streets are permanently paved and the greater portion of the built-up section is sewered. The town owns its water works. Plans and a report thereof have been submitted, but the plans are not sufficiently in detail to enable the Department to judge accurately of the efficiency of the works. The source is two driven wells, each ten inches in diameter and sunk to a depth of one hundred and fifty feet along the bank of Wolf Creek. The upper well is located on the west bank of the creek north of the railroad and immediately north of Lincoln Avenue Bridge. The water is pumped into the street pipe system by a gas engine. The lower well is located immediately south of Main Street at the dam. The pump at this well is operated by power generated by water wheel at the dam. The overflow from the distributing mains is into a standpipe ten feet in diameter and seventy-five feet high located in the highest part of the borough southwest of Main Street. Every section of the town is reached by the water pipes and about everybody uses public water.

The existing sewers are supposed to be for sanitary purposes, but some storm and roof water is allowed to enter. There is a borough ordinance providing that all storm water shall be excluded from the system. A few catch basins scattered throughout the town through which street water is drained to the sewers evidences the lack of strict enforcement of the ordinance. There is another borough ordinance which provides that all properties located on the sewered streets shall connect to the sewers.

There are seven public sewer outlets all into Wolf Creek within the borough. Mentioned in order passing down stream they are as follows:

Dale Street diameter eight inches.
Lincoln Avenue diameter eight inches.
Broad Street diameter twenty-four inches.
Pine Street diameter ten inches.
Grace Street diameter eighteen inches.
Main Street west diameter eight inches.
Main Street east diameter eight inches.

All but the two Main Street sewers discharge into the pool formed by the dam whose back waters extend nearly to the northerly borough line where there is a grist mill.

The Dale Street outlet serves the McConnell Addition west of the creek in the north part of the town. The sewers which aggregate twenty-one hundred feet all eight inches in diameter were taken over by the borough when the district was annexed, so it is reported.

Lincoln Street outlet is about a third of a mile below Dale Street. It serves the Grove City Improvement Company's plan of lots comprising the district east of the creek and north of the railroad where also are the two Bessemer industrial plants. The connecting sewers are all eight inches in diameter and approximate four-fifths of a mile in length. This section of the borough is entirely new and is building up rapidly. The sewer outlet is on the east bank of the creek a few feet below the Lincoln Avenue bridge diagonally across from the upper well of the municipal water works system distant possibly a hundred feet.

Broad Street outlet is the principal one of the borough. It serves the greater part of the thickly built-up district of the town including land north of the railroad. The sewer discharges into the creek on the west bank at a point about two hundred feet below the railroad bridge or about five hundred feet below the Lincoln Street outlet. The connecting sewers have diameters ranging from twelve to six inches. The twenty-four inch sewer crosses Broad Street, Filer Alley and terminates at Centre Street. Its tributary branches and laterals comprise three miles of sewers of which the eight inch is twelve thousand seven hundred feet long. The Filer Alley sewer intercepts the sewage from the business block of the town. During the summer of nineteen hundred and seven, eight citizens and property owners living on the line of this sewer, extending along Pine Street, College Avenue, Poplar, Centre, West Main, Elm and Stewart Avenues, made a formal complaint to the Commissioner of Health representing that said sewer is but eight inches in diameter and designed purely as a sanitary sewer, but that the ordinance prohibiting the connection of water spouts to the sewer has been violated, probably through ignorance, with the result that when a heavy rain occurs, the sewer is unable to carry off the water and in consequence it backs up into cellars to a depth of from one to five feet, to the damage of property and danger to public health, and requesting since Council would not act, that the State Department of Health exercise its jurisdiction.

The Pine Street outlet serves the Monroe Addition east of the creek, south of the railroad. The volume of sewage discharge is small, there being thirteen hundred feet only of connecting pipe, and the point of discharge is into the creek just below the Pine Street bridge.

Grace Street outlet is on the opposite bank of the creek about three hundred feet down stream from Pine Street and one thousand feet below the railroad. It serves a narrow district to the west as far as the summit of the hill where the water works standpipe is located and in the district there are thirty-two hundred feet of sewer most of which is eight inches in diameter.

Below Grace Street sewer outlet the flats begin and the creek channel is circuitous and has a length of about twenty-two hundred feet to the mill dam. The pond is immediately above Main Street to the west of the creek on the flats. Its area is about four acres and the average depth of water therein is said to approximate five feet. On the shores the water is shallow. During dry seasons stored water in the pond and in the creek is regularly depleted. On the day of the Department's inspection the bottom of the pond was largely exposed.

The Main Street sewer from the west is nine hundred feet long, serves the local district and passes through or by the pump house and driven well and empties nearby into the creek below the dam. The Main Street sewer from the east is twenty-eight hundred feet long. It collects the sewage from the old district known as East Grove City, not a populous district, and empties into the creek immediately below the dam.

Besides the public sewers above mentioned there are a number of private estates located along Broad Street and between it and the creek, which have independent sewers discharging into the stream. This section of Wolf Creek was, when inspected, in a very filthy condition. The odors were manifestly a nuisance, fecal matter was stranded all along the bed of the channel and the kitchen of one of the principal hotels in the town is distant not over one hundred and fifty feet from the main sewer outlet.

The petitioners wish to make a six hundred and twenty foot addition to the Dale Street sewer system and they also wish to establish a new sewer outlet fifteen inches in diameter into the creek about one hundred and fifty feet below present Main Street sewer outlets. This pipe is to extend westerly up Poplar Street a length of twelve hundred feet with an eight inch branch in Craig Street eight hundred feet long.

In the borough beyond the ridge in the extreme western part on the slopes are lands owned by enterprising and influential citizens, where there is a growing but sparsely populated district now containing about forty dwellings, and known as the west side, where sewage is disposed of into cesspools and privies. It is reported that the water supply of this section is partly obtained from individual wells, the waters of which are in danger by the present practices of sewage disposal. The natural surface drainage is southerly into Wolf Creek, and a proposition has been discussed for the construction of a sewer down the run to admit of both sewage and storm water. However, no formal application for such a plan has been made.

Thirty miles below Grove City borough is the borough of Ellwood City on the banks of the Conoquenessing about a mile above where this creek empties into the Beaver River. Ellwood City obtains its drinking water from Slippery Rock near where said stream joins the Conoquenessing above Ellwood City. The outbreak of typhoid fever at Butler, which is located on the Upper Conoquenessing, was followed in the winter of nineteen hundred and three and four by a similar outbreak at Ellwood City. It is easily possible for the sewage from Grove City to be transmitted to the water works intake on Slippery Rock Creek and to be introduced while in an active pathogenic state into the homes of the water consumers in Ellwood City with fatal results. The Commissioner of Health has condemned the use of Slippery Rock Creek or the Conoquenessing as a source of public water supply unless the waters be purified by filtration. The borough of Butler has been ordered to prepare plans for the purification of its sewage. The Ellwood City Water Company is engaged in designing filter works and the authorities of Ellwood City borough have employed an expert to prepare plans for the purification of sewage in that borough.

Because detail plans of Grove City's water works system have not been filed, the State Department of Health is unable to say whether there be any great danger to Grove City's water supply from the present disposition of sewage. But on general principles there is a risk in drawing water from the ground by apparatus so located as to be reached by surface or subsoil water polluted by sewage. The proximity of the West Main Street sewer to the lower well is at once a cause for suspicion and a reason for watchfulness that no sewage pollution of the public water might come from this origin. The borough of Warren suffered to the number of eighteen hundred cases of poisoning in a few hours owing to the imperfection of the casing of the driven well and a nearby sewer joint through which means virulent infection was suddenly admitted to the water works system.

Health precaution dictates that the borough sewage should be removed from the vicinity of all dwellings and that the sewage should be discharged and disposed of in such a way as to injure no one. Even if water filters be installed at Ellwood City that would not warrant the pollution of Wolf Creek at Grove City. The filter might break down at any time. In fact, it was the temporary cessation of the Butler water filters that made possible the introduction of the typhoid infected water of the Cono-

quenessing. The expense of preserving the purity of the waters of the State for the protection of the public health should rightly be borne by both those who pollute the waters and those who must use the waters for the higher domestic purposes.

The borough of Grove City did not avail itself of the exemption clause of the law of nineteen hundred and five, and it has since extended its sewer system without a permit, both of which things are incidental to the main disposal of the sewage into Wolf Creek to the menace of public health at Ellwood City. A change is demanded at the earliest practicable moment.

It is reported that the borough has an assessed valuation of one million eighty-two thousand seven hundred and eighty dollars, a debt of fifty-two thousand dollars and a sinking fund of about twelve thousand dollars or a net debt of forty thousand dollars. The voters authorized a debt of twenty thousand dollars for a municipal electric lighting system. These figures, if correct, would indicate that the municipal borrowing capacity is in the vicinity of sixteen thousand dollars, a sum totally insufficient to pay for the interception of the present sewers and the erection of a sewage purification plant.

However, the borough should anticipate this requirement and plan for it. An expert should be employed to outline a method of collecting all of the sewage, both public and private, in the borough and its delivery at some common point below the town. A site should be selected for the erection of sewage disposal works, plans should be drawn therefor, sufficient in detail to enable reliable estimates of cost to be prepared therefrom and such plans and report should be submitted to the Commissioner of Health for approval.

Until such compehensive plan shall have been prepared and submitted and modified, amended or approved, and a definite time fixed for the discontinuance of the discharge of sewage into the Creek, the State Department of Health would not be warranted in giving its approval to the discharge of sewage into the waters which are used subsequently by the public in Ellwood City for drinking purposes.

It has been determined that the interests of the public health demand that a permit be withheld and it is hereby and herein withheld and the local authorities of Grove City are hereby notified that the discharge of both public and private sewage into Wolf Creek or its tributaries must cease and that said borough shall, on or before the first day of October, nineteen hundred and eight, prepare a comprehensive plan for the collection of all of the sewage of the borough and for its purification and submit the same to the Commissioner of Health for approval, and that failure on the part of the borough so to do, shall not exempt it from the liabilities under the law heretofore assumed.

The local authorities are hereby and herein notified to submit within three months from the date of this decree, satisfactory detail plans and report of its existing water works system and source of supply.

The Department would be glad to advise with the local authorities and its experts, and to assist in every way that it can in the carrying out of these requirements.

Harrisburg, Pa., May 28th, 1908.

HANOVER TOWNSHIP, LEHIGH COUNTY.

(Homeopathic State Hospital for the Insane.)

This application was made by the Homeopathic State Hospital for the Insane now being erected in Hanover Township, Lehigh County, and is for approval of plans for the installation of a sewerage and sewage disposal plant for said hospital.

The site selected by the Commissioner is located about three miles from Allentown and contains two hundred acres. The cornerstone was laid in nineteen hundred and four. The administration buildings have been completed and the others are in process of erection. The locality is about half way between the city of Allentown and the borough of Bethlehem on a hillside sloping to the north bank of the Lehigh River. A quarter of a mile inland is the village of Rittersville in Hanover Township. Along the base of the hillside on the river bank is the Lehigh Coal and Navigation Company Canal. The tracks of the Central Railroad of New Jersey and an old public highway lie between the canal and the hill. The extreme height of ground above the river on the State property is approximately three hundred and twenty-five feet. The main buildings have an elevation of about two hundred and twenty-five feet above the river. Accommodations on the cottage plan for twelve hundred inmates are being provided. The cottages will cover nine acres of ground. Surface drainage is excellent on account of steep slopes on all sides. The permanent sewerage and water works system remain to be installed.

The sewer system is to be strictly sanitary. The buildings face north away from the river overlooking a wide expanse of inland country. The eminence upon which they are built is a quarter of a mile from Allentown and Bethlehem Turnpike in which are the tracks of the Lehigh Valley Traction Company. Four and eight inch lateral sewers from convenient points at the new buildings in the rear thereof are to converge to a common point to a ten inch intercepter whose course is to be easterly to a septic tank or sedimentation basin fourteen hundred feet distant. From here the sewage will pass through an aeration chamber one hundred feet further on, thence through a dosing tank one hundred and twenty-five feet distant, and finally through sand filters three hundred and fifty feet from the dosing tank. The sludge

bed will be located about midway between the septic tank and the effluent drain from the filter beds. There will be pipes from the tanks to the sludge bed and from the sludge bed to the effluent drain. From the filter beds the effluent will drain under the public road, railroad and canal through an eighteen inch pipe to the Lehigh River.

The site of the disposal works is remote from every thing except the two farm houses on the Institution grounds and the public highway. This road is little used and even were it an important thoroughfare, the type of plant proposed could be used and operated without causing a nuisance to passersby.

The septic tank is to be reinforced concrete, flat roof, forty-six feet by forty-three feet in plan, outside dimensions, divided into three compartments, each forty-three feet long, fourteen feet wide and six feet deep to flow line, inside dimensions. Submerged baffle walls suspended from the roof to within three or four feet of the bottom are to be placed laterally across each compartment one ten feet from the inlet end and the other ten feet from the outlet end. The floor of each compartment will be channelled diagonally to a point near the center of one side wall where a fifteen inch terra cotta sludge pipe is to be provided under the concrete floor to convey the sludge from the tank to the sluge bed. However, each of the three fifteen inch pipes will lead to a single fifteen inch pipe near the outer wall and just outside of the outer tank. Each fifteen inch pipe will be controlled by a sludge valve to be set up in a chamber at the side of the tank. The arrangements so far as the plans indicate will afford no means of inspection of the interior of the pipes at this place. The reason for departing from the open invert chamber is not apparent.

The institution's sewage on its way to the septic tanks must pass into a gate chamber four feet in diameter out of which three pipes provided with valves lead, to the septic tanks, one part for each compartment. They enter through the rear wall and the end is submerged below the flow line. This circular gate chamber permits the sewage to be delivered into any one tank or combination of tanks.

On the main sewer just before it enters the gate chambers there is inserted a double branch with gate valves and a gate valve on the main line. Over the three valves is a chamber to protect the gates and their stems. Pipes lead from the side branches and provide means for by-passing the sewage to the septic tanks in case there should be any occasion for repair of the circular gate chamber. Such provisions to insure against accident is not often made.

The outlet pipe from each compartment is an eight inch Tee, cast iron, connecting to a pipe terminating in an inspection manhole outside and immediately adjacent to the tank. From here an eight inch pipe will take the septic effluent, or the settled sewage to an aeration chamber built of concrete six feet square, seven and a half feet deep, inside dimensions.

The sewage will enter through an eight inch pipe to a trough of concrete about five feet from the bottom and extending the width of the chamber. This trough will be two feet wide and will be provided with a weir six inches wide over which the septic sewage will flow in a thin sheet. Around the end of the inlet pipe and resting in the trough will be a galvanized sheet iron apron secured to the wall of the tank, so as to prevent agitation in the trough and allow an even flow of sewage over the weir. On the sides of this chamber there will be set in the wall three sets of six inch iron plates extending three inches outside the wall, forming shelves on which splash boards of heavy galvanized iron will be placed. These splash boards will be so arranged that the sewage after leaving the weir will strike the first splash board and break up into spray, thus receiving the aeration desired. An eight inch pipe will lead from the bottom of this chamber to the dosing or syphon tank.

The dosing tank is to be a concrete structure with twelve inch walls thirty-five feet square by five feet deep, inside dimensions, and built to hold thirty thousand gallons. The sewage will enter near the top through an eight inch pipe and flow across the tank to the opposite side, where an eight inch Miller syphon, or equal, with a draft of forty-two inches, will be located. The floor of the tank will slope toward the point where this syphon is set, so that it will drain toward a twelve inch by-pass located near the syphon, which by-pass is controlled by a twelve inch gate and connected to the twelve inch discharge pipe to the filter beds at a point just outside the wall beyond the tank.

The filter beds will be excavated from the natural grade and will be two in number, each one hundred and seventy-two feet long by one hundred and three feet wide. There will be a minimum depth of three and one-half feet of selected filter sand on the bottom of each bed. Through the center of each bed there will be an open trench with concrete base and wooden sides extending from the entrance to within about twenty feet of the opposite end. This trench will have a width at the start of five feet and diminish in width to three feet, two feet and one foot, respectively, as it extends across the beds, and at the end of each section there will be concrete aprons over which the sewage will pass in flooding the beds. The flow will be regulated by means of wooden gates hinged at the points of change of section in the troughs. At the end of each trough there will be a simple opening discharging onto a concrete apron with a plank front to cause a deflection of flow. There will be three sets of gates on each trough. The underdrain system will consist of channels six inches deep by twenty feet centre to centre into which four inch underdrains will be laid and extend the whole length of the beds. These four inch laterals will be intercepted in the middle by an eight inch vitrified pipe, which will extend down the centre bank between the two beds and discharge into the open trench beyond the beds. The sewage will enter the filters by way of a two way manhole located at the

upper end of the beds and on dividing line between them, and from there be diverted through a twelve inch pipe to either one of the beds. After the effluent leaves the filters it will pass through an open trench for about fifty feet to the land line and from there will pass through an eighteen inch cast iron pipe under the public road, railroad and canal, terminating at the river bank. The upper end of the eighteen inch pipe will be imbedded in a concrete head.

The sludge from the septic tank will be conveyed through fifteen inch terra cotta pipe for about two hundred and fifty feet to the sludge bed. This bed will be excavated from the slopes and will have a surface fifty feet square and a depth of four feet. The bed material is to be coarse sand or fine gravel each unit being not greater than one-half inch diameter. The sludge will enter at the middle of one end through a fifteen inch pipe and spill over a concrete apron and thence to the bed. The underdrain system will consist of a six inch drain of field tile to which four inch laterals will be connected at an angle of forty-five degrees. There will be two sets of these laterals, one on either side of the main drain. From this bed the effluent will pass through an open trench for three hundred and twenty-five feet to the entrance of the eighteen inch cast iron pipe under the raidroad. The elevation of the sludge bed is about sixty feet below the septic tank and ten feet or more above the filter bed.

The pipes are to be laid with tight joints and precautions are to be taken to prevent leakage in the various tanks. Interior surfaces are to be plastered. The filter material is to be clean, coarse mortar sand.

The general location of the plant has been well selected and contains all the elements of successful treatment of sewage. The septic tanks will be about four hundred feet from the public road and the main filter bed about fifty feet, but whether the works shall be a success is dependent on management and their capacity. With twelve hundred inmates upon the basis of two hundred gallons of water consumption per capita per diem, which is equal to the record of the per capita flow of sewage from one other State Insane Hospital the daily output would be two hundred and forty thousand gallons. The rate of filtration of crude sewage preliminarily treated in subsidence basins is about one hundred thousand gallons per twenty-four hours. Since the filter beds as designed cover an area of four-tenths of an acre, it becomes apparent that added filter units will be necessary long before the institution's sewage output attains the maximum. In fact, it is entirely problematical to-day how soon enlargement of the sewage works will be demanded.

In creating this new sewer outlet into the waters of the State the interests of the public health demand that precautions be taken to insure a pure effluent from the disposal works or one as near pure as practicable. The water works intake of the Bethlehem Consolidated Water Company is located at a point in the river one-half mile down stream.

In contemplating future enlargements, bearing in mind that the sand filters are about forty feet lower in elevation than the dosing chamber, and that the vertical height between this chamber and the septic tank is about twenty-five feet, it may be found best to substitute in place of the aerating chamber, but on the site selected for it, a sprinkling filter of approved design. Such a feature would more than double the rate at which the sand filters could be operated and give a good effluent suitable to go into the Lehigh River above Bethlehem's water works intake.

It has been determined that the interests of the public health shall be subserved by approval of the proposed plan and the same is hereby and herein approved under the following conditions and stipulations:

FIRST: All the sewage from the institution shall be intercepted and shall be conveyed to and treated in the purification plant to the satisfaction and approval of the Commissioner of Health, who will have inspections made from time to time. To facilitate this supervision, daily reports of the operations of this sewage disposal plant shall be kept on blank forms satisfactory to the State Department of Health and copies thereof shall be filed with said Commissioner.

SECOND: Some competent man shall be placed in charge of the operation of the works and it shall be his duty to devote his time to the successful operations of the plant.

THIRD: The sludge disposal beds shall be so arranged that the effluent from it may flow by gravity to the sand filter beds. There shall be no other outlet provided for the sludge bed effluent. That part of the proposed plans calling for an open drain through the eighteen inch cast iron pipe under the canal, is hereby disapproved. The dried out sludge shall be disposed of in a sanitary manner on the State property.

FOURTH: If at any time in the opinion of the Commissioner of Health the sewer system of the disposal works or any part thereof or the effluent therefrom, or from any part, has become a nuisance or menace or incapable of performing its functions, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve. This provision has special reference to repairs and to alterations or changes that may become necessary in keeping with the growth of the institution.

FIFTH: The valve chamber on the outer wall of the septic tank over the sludge drain shall be modified so that it shall also be an inspection manhole with inverts in its bottom into which the fifteen inch pipe from each compartment shall have a free discharge.

SIXTH: A detailed plan of all of the sewers to be built shall be prepared and filed in the office of the Commissioner of Health. Inspection manholes shall be built on these lines at intersection and at changes in line and grade and perforated manhole covers shall be provided for ventilation.

Harrisburg, Pa., June 26th, 1908.

HAVERFORD TOWNSHIP, DELAWARE COUNTY.

(Haverford College.)

This application was made by the Trustees of Haverford College, Haverford Township, Delaware County, Pennsylvania, with reference to plans for sewage disposal works for the institution.

Haverford College is an educational institution, conducted under the auspices of the Orthodox Friends, having a total population of students and employes and officers of about one hundred and seventy persons. The property is located on the main line of the Pennsylvania Railroad at Haverford Station, Lower Merion Township, but the buildings are far enough removed from the station easterly thereof to be in the adjoining township of Haverford, Delaware County.

At present the institution's sewage is discharged through an eight inch pipe into a large cesspool on the grounds, from which it overflows into a branch of Cobb's Creek. This condition is not satisfactory to the authorities of the college and they wish to better it. Since the stream into which the sewage flows is polluted from sources below in the city of Philadelphia, and also in the vicinity of the college, it is the desire of the institution's officers to install a septic tank and contact filter bed. After such a plant is operated for a given time, during which funds for further work are to be secured for the purpose, the intention is to put in sand filters. The President states that the college is desirous to lead in taking out sewage from the creek rather than to lag behind. The design submitted for approval is mainly to meet the financial situation so that each part as installed shall properly fulfil its functions and upon the construction of the filters all shall form a complete whole.

The present sewage output of the college is six thousand gallons per day. The design for the new plant is to take care of fifty per cent. more sewage than this quantity. The septic tank is arranged so that over one-half can be put out of use during the summer time.

The proposed septic and dosing tank and contact bed are to be located immediately below the old cesspool hereinbefore mentioned and about to be abandoned. The sand filters are to be located two hundred feet distant along the banks of the creek or run tributary to the main creek.

The eight inch sewer is to empty into a grit chamber four feet long, two feet wide and five feet deep. The walls are of brick nine inches thick and the bottom four inches of cement. From this grit chamber, two four inch pipes carry the sewage into the septic tank.

The septic tank has total inside dimensions of ten feet by five feet seven inches. This chamber is divided into two chambers of the following dimensions: First, ten feet by three feet one inch and, second, ten feet by two feet six inches. These two chambers are distinct and separate. Each chamber has brick side walls twelve inches thick except the dividing wall, which is nine inches and a five inch concrete bottom. A cover of seven-eighths inch matched flooring is provided. Each cover is to be in four sections. The sewage enters and leaves each chamber through four inch pipes. These pipes pass through the side walls two feet below the wooden cover and extend beneath the surface of the liquid three feet and above the surface one foot six inches, terminating two inches below the cover. This extension of the pipe above the surface of the liquid is open, affording ventilation. Elevation of surface of liquid is one hundred feet and bottom ninety-three and a half feet.

A dosing tank on the opposite end of the septic tank from the grit chamber is to be provided. Two four inch pipes will lead from the septic tank into a small communicating chamber three feet seven inches by two feet in plan. From this small chamber the liquid passes over a weir one foot one inch lower than the side walls of the dosing tank. The dosing tank is eight feet six inches by six feet four inches. The walls of the tank are nine inch brick and the bottom is cement and the tank uncovered. The liquid leaves the tank by three four inch Aerlock sequence dosing syphons. Elevation of the surface of liquids is ninety-nine and a half feet and bottom ninety-seven and a half.

From the one dosing tank, which holds about eight hundred gallons, the sewage is discharged automatically in rotation on the three contact beds by the three Aerlock dosing syphons. Each contact bed is ten feet by ten feet by four feet and filled with three inches of stone. Thus the three beds have nine hundred cubic feet of stone exposing a surface of three hundred square feet. The walls of the beds are brick and the bottom cement. On the cement floor of each bed are laid three four inch terra cotta underdrains. The drains from each bed extend from one corner diagonally across the bed and at their terminal a four inch vent pipe is supplied. At the union of the underdrain pipes there is a two inch drain syphon to carry off the effluent. These syphons empty into receiving basins. Two of the contact beds syphon

into one semi-circular receiving basin that is four feet deep and has a radius of three feet. The other contact bed syphons into a similar semi-circular basin and, after uniting, continues in a six inch terra cotta pipe to the creek or the sand filters when built. Also a one and one-half inch gage valve is provided at the bottom of each contact bed for thoroughly draining the bed when so desired.

The sand filters will be located beside the stream about one hundred and eight feet from the contact beds. They are three in number, each twenty-five feet by thirteen feet six inches with three feet of sand. Each filter has a side slope of one to one. Each filter is equipped with a galvanized iron slide to regulate the flow entering a branching wooden trough for effluent distribution and three four inch terra cotta underdrains, provided at their terminals with a four inch vent. Elevation of the surface of the sand is ninety-two feet and bottom eighty-nine feet. Thus the base of the sand filters is one foot above the stream elevation.

From the plans submitted it is thought that the sewage disposal plant, when completed and properly operated, will render a relatively pure and staple effluent. It is thought that without the sand filters the effluent ought to be of a staple character. From the plans submitted the capacity of the plant could not be figured with any accuracy. The period of rest for the contact beds will vary with the amount of sewage and the size of syphon carrying off the effluent. The size of the syphon could be increased as the amount of sewage increases and thus the period of rest kept about the same as when the present six thousand gallons are purified. The plan of so arranging the plant as to be able to put out of commission more than one-half of it during the summer should be highly recommended.

It has been determined that the efforts of the officers of Haverford College to properly dispose of the institution's sewage are worthy of commendation and that the interests of the public health will be subserved by approving the plans, and the same are hereby and herein approved under the following conditions and stipulations

FIRST: That the works shall be operated and careful records kept thereof on blank forms to be approved by the Commissioner of Health and copies of such records shall be furnished and filed in the office of the Commissioner of Health. If at any time, in the opinion of the said Commissioner, the sewage disposal works or any part thereof, or the effluent discharged therefrom, is prejudicial to public health or a nuisance or menace, then the college authorities shall adopt such remedial measures as the Commissioner of Health may advise or approve.

SECOND: The State Department of Health will make tests of the effluents from time to time and in so far as the interests of the public health are concerned may make rules and regulations for the operation of the plant, and the college authorities shall follow such regulations. The stipulations in this respect will be no different in kind from those which it is to be the policy of the State Department of Health to inaugurate and enforce in relation to the operation of all sewage disposal plants approved by the Commissioner of Health.

THIRD: The officers of the institution are urged to construct and complete the plant in its entirety if it is possible to do this at this time.

FOURTH: The attention of the petitioners is called to the importance of proper disposal of any wastes which may collect in the septic tank and require to be removed at intervals. Such material should be deposited in a hole in the ground and buried sufficiently deep so that the surface wash from it cannot pollute the stream; or any other method of disposal may be adopted that shall conform with the requirements of sanitation.

Harrisburg, Pa., September 1st, 1908.

HAVERFORD TOWNSHIP, DELAWARE COUNTY.

Beechwood Park Amusement Company.

This decree was issued to the Beechwood Park Amusement Company, of Beechwood Park, Haverford Township, Delaware County, with respect to sewage.

It appears that the Commissioner of Health at a previous date issued a notice to this company to abate a nuisance caused by the discharge of sewage from its present plant into Cobb's Creek, in said township.

Beechwood Park is a summer resort located on the line of the Philadelphia and Western Railroad in the eastern corner of Haverford Township, in Delaware County, and about one mile west of the Philadelphia city line. Various amusements and attractions for the entertainment of the public surround a central area. The whole is enclosed by a high board fence within which are about seven acres, nearly a square in shape.

The sewage from the four lavatories and the kitchen fixtures of the restaurants, reported to include all the drainage facilities in the park, is conducted in eight inch terra cotta pipes, reported to receive no roof or surface water, to the existing sewage disposal plant located in the eastern corner of the park in the side of a wooded ravine.

The disposal plant consists of a brick masonry tank about twenty-five feet square and six feet deep, divided into three equal parts, of which two are used as settling tanks and the third is a cinder filter or contact bed. A few loose boards are thrown over the tank. The effluent, in a foul and unpurified condition, flows through an

eight inch terra cotta pipe in the ravine to the park fence, where it discharges into the upper end of a twenty-four inch terra cotta pipe. This conveys the sewage and surface water from the ravine under the embankment of the Philadelphia and Western Railroad and a highway and discharges it onto the bank of Cobb's Creek at the side of the highway and at a point about two hundred feet northeast of the disposal plant.

The odor of sewage is noticeable on the highway near the twenty-four inch outlet. The sewage disposal plant is within fifty feet of some of the park amusements and about that distance from a walk extending along the northeastern side of the park to a neighboring picnic grove and to Brookline, a recent real estate development on which there are four or five widely scattered suburban dwellings. The Brookline Real Estate office, a small, one room building, is located about two hundred feet east of the disposal plant. The only dwelling in Brookline near the plant is about five hundred feet south of it.

Beechwood, a recent real estate development containing at present but a few scattered houses, is located across Cobb's Creek from the park and several hundred feet distant from the sewer outlet at the creek. Under date of June twenty-third, Wood, Harmon and Company, the developers of this tract, complained to the Commissioner of Health of the discharge of the sewage of the park into Cobb's Creek and of the odor arising therefrom, stating also that many cows are pastured along the creek below the sewer outlet.

Above the point of discharge of the sewage, Cobb's Creek has a drainage area of three and nine-tenths square miles. The land is cultivated. The upper end of this drainage area contains parts of Bryn Mawr, Haverford and Ardmore. Much of the sewage of each district is kept out of the neighboring streams and discharged into the Lower Merion Township sewers. The sewage of Beechwood Park enters Cobb's Creek just at the head of the back water extending eight hundred feet down stream to an old mill dam breast in connection with which there is an abandoned mill privilege. Below the breast the stream flows rapidly over a stony bed. Below Beechwood Park, Cobb's Creek flows southeast one mile to Philadelphia City and continues at the western boundary of the latter to the confluence of Cobb's Creek and Darby Creek, below which Darby Creek extends to the Delaware River.

The proposed sewage disposal plant is to consist of the remodelling of the existing plant, although the size of the latter is not to be increased. Water is furnished to the park by the Springfield Water Company, and it is reported that according to the meter readings the consumption averages seven thousand or eight thousand gallons per day, for which quantity of sewage the plant has been designed. In the plant, as it is proposed to reconstruct it, the sewage will be treated in a septic tank, contact bed or broken stone screening bed, and in sand filters.

Through submerged inlets the sewage will enter one end of a septic tank twelve feet three inches by seven feet six inches by four feet six inches to the flow line, having a capacity of three thousand one hundred gallons and providing for an average period of flow through the septic tank of nine or ten hours. The sewage will pass under a baffle board in the lower end of the septic tank and leave the latter over a seven foot six inch weir. A four inch pipe fitted with valve leads from the bottom of the septic tank to an eight inch terra cotta pipe to serve as a sludge drain. It is reported that a sand sludge bed, not shown on the plan, is to be installed in such a manner as to permit only the filtered water therefrom to reach the stream.

The septic effluent is to be discharged on to the broken stone screen or contact bed having a surface area of about one hundred square feet and a depth of about one foot, and a capacity of about fifty cubic feet or three hundred and seventy-five gallons. The stones are to average about six inches in diameter. A sludge bed fitted with a gate valve is to connect with an eight inch sludge drain already mentioned. From a sump in the lower part of the contact bed the sewage will be discharged from the latter when it becomes full alternately by each of two Aerlock sequence syphons of undetermined size respectively on to two sand filter beds. The contact beds will fill and empty on an average of once an hour.

The two sand filters are to be respectively seven feet six inches by twenty feet three inches and seven feet six inches by twenty-one feet nine inches. The filtering material will consist of a six inch bottom layer of coarse, broken stone, over this a six inch layer of cinder and a six inch surface layer of sand. The sewage will be distributed on each filter by means of a shallow, open wood trough, the sides of which throughout their entire length will be overflooded by sewage. A single line of four inch farm tile will be laid longitudinally on the floor of each filter and will discharge the effluent into a small effluent chamber. The contact bed, which will act also as a dosing tank, delivering a dose of fifty cubic feet or three hundred and seventy-five gallons on each filter at intervals averaging about two hours, will flood each filter to a depth of about four inches. The two filters having a combined area of three hundred and fifteen feet, will provide for the filtration of the sewage at the rate of about one million gallons per acre per day. There will be a by-pass provided with valve connecting the contact bed with the effluent chamber of the sand filters. The outlet from the effluent chamber to Cobb's Creek will remain as at present.

The rate of filtration provided for is much too high to insure a satisfactory effluent. Either the filtering area should be increased to provide for the filtration of sewage at the rate of about one hundred thousand gallons per acre per day or in connection with a smaller increase in the filter area, chemical sterilization of the effluent should be provided for. Perhaps the latter alternative would be the more desirable in view

of the more or less temporary character of the entire park and of its being closed during three quarters of the year and of the fact that the plant may not unlikely have to be moved to a more remote location. There is sufficient room at the present site for the installation of an adequate purification plant. In considering the capacity of the plant, it should be noted that on the morning of August thirty-first, there appeared to be a considerably larger flow into the disposal plant than was reasonable at that time, probably due to ground water. The sewers should be tested and overhauled in order to discover and stop any such leakage.

In view of the proximity of the disposal plant to the cafes, lunch counters and confectionery stands of the park, it would be advisable to have the entire disposal plant protected against flies, providing means, however, for the proper ventilation of the septic tank.

As before mentioned, it is not unlikely that the sewage purification plant in its present location may become a nuisance, and it would, therefore, be desirable while improving it to remove it to a more remote site, at which site it would be possible to enlarge the plant in the future to a sufficient size to purify the sewage of Brookline and Beechwood. However, there are at present not sufficient houses in either tract to warrant the installation of sewers. The cost of ground and of conveying the sewage of the park to a disposal plant at any great distance from it would be prohibitive for the park alone. The Beechwood Park Amusement Company is at present in the hands of a receiver, although it is expected that the company will be continued.

It does not appear that there is any public authority having by law the charge of the sewerage system and duly qualified to receive a permit from the Commissioner of Health for the discharge of the effluent from the proposed purification works into the waters of the State. Therefore, it seems that the Commissioner is merely called upon to review the plans submitted and suggest wherein they may be improved.

It has been determined that the Beechwood Park Amusement Company be notified that it has the right to dispose of its sewers on its property in any way it sees fit so long as no public nuisance or menace is caused thereby. If the suggestions hereinbefore offered are carried out, and the plant be properly operated, the effluent should prove as satisfactory as that usually turned out from individual sewage works. However, it must be distinctly understood that the State Health Department cannot sanction the putting of any sewage whatsoever from such plant into the waters of the State.

It would be advisable to locate the works remote from the Park, if works are to be built. The solution of the sewage disposal problem, which should earnestly commend itself to the attention of the Beechwood Park officials, is the abandonment altogether of the sewage treatment plant and the conveyance of the sewage to the city of Philadelphia sewer. This is what will ultimately come and possibly owners of property in the district might be willing to promote a joint sewerage scheme at this time.

After the closing of the Park at the end of the season of nineteen hundred and eight, no sewage whatsoever shall be discharged from the Park or its sewers or sewage disposal works either directly or indirectly into the waters of the State.

Harrisburg, Pa., October 23rd, 1908.

HOPEWELL TOWNSHIP, BEAVER COUNTY.

(Jones & Laughlin Steel Company.)

This application was made by the Jones & Laughlin Steel Company, of Pittsburgh, and is for approval of plans and permission to install a public sewerage system at Woodlawn, in Hopewell Township, Beaver County, Pennsylvania, and to discharge the sewage therefrom into the Ohio River, within the limits of said township.

It appears that Hopewell Township lies on the west bank of the Ohio River and extends along it for about four miles. To the north on the river is the borough of Aliquippa, and to the south on the river is the township of Cresson. The Pittsburgh and Lake Erie Railroad extends along the river bank and on it, in Hopewell Township, there are three passenger stations, named in order Shannopin, Woodlawn and Aliquippa Park, distant from Pittsburgh respectively sixteen and two-tenths, nineteen and eight-tenths miles. Paralleling the river and distant therefrom about fifty yards at Shannopin and about one-half mile at Aliquippa Park, is the foot of a ridge, which rises abruptly to the height of several hundred feet above the river. The intervening low lands between Shannopin and Woodlawn is subject to inundation That north of Woodlawn is higher and suitable for development. Elsewhere there is no opportunity for the building of a village except it be in same valley at right angles to the river.

The village of Shannopin, possibly three hundred inhabitants, is located in the valley of a small run which rises in the hills to the west and comes down through the river ridge in a deep narrow gorge.

Until recently Woodlawn was a small station having less than a dozen residences. Logstown Run, the principal stream in Hopewell Township, enters the Ohio River at this point. It rises in the western part of the township, has at its summit the village of New Sheffield, a settlement of about two hundred people, and drains a

precipitous area of about eight square miles. The gorge through which it flows near the river has a width of about five hundred feet. Farther up on the water shed the valley widens out considerably and there is an opportunity here for the laying out of a borough site.

Aliquippa Park Station was formerly a much patronized resort, owned and operated by the Pittsburgh and Lake Erie Railroad Company. The park is located in a grove on a small stream known as Jones Run.

The Jones & Laughlin Steel Company has acquired the land bordering the river southerly from Aliquippa borough to within a short distance south of Shannopin and reserved it for manufacturing purposes. At the present time the said company is engaged in erecting furnaces and mills at Aliquippa Park and Woodlawn.

Immediate accommodations for five hundred employes are demanded. Possibly as the works of this company are developed, an ultimate population of ten thousand people may have to be provided with homes in this vicinity.

It is not the intention of the petitioners to engage in extensive real estate operations in the line of towns building. It is hoped that private enterprise will carry forward the developments which the company finds necessary to initiate at this time.

Since all the land between the slope of the hills and the river has been laid aside by the company for industrial uses, the only available location for dwellings is up the valley of Logstown Run, and to a limited extent up Jones Run. It is in these two valleys that the houses are now being erected by the company, the sewage of which is to be contributed ultimately to the sewers proposed and under consideration. However, the petitioners wish, in anticipation of a larger population and the possible future incorporation of a municipality here, to so lay out the sewers at this time that they shall have become a part of a comprehensive system when the territory shall have been fully developed.

Up Jones Run there have been erected forty-two double houses and at present these are provided with ordinary privies and earth vaults in shale formation, and these are to be continued in operation. The water supply is piped from springs on the hills and is furnished to the inhabitants by hydrants in the yards.

In the rear of each dwelling there is a hopper of concrete construction connected with an eight inch sewer leading to the run, into which hopper the occupants of the dwelling are supposed to deposit all waste water and slops. There are three eight inch sewer outlets into the run from this settlement, each serving about six hundred feet of sewer.

On the river hillside, immediately south of Jones Run there are eighteen double houses whose water supply and sewage disposal facilities are similar to those above described. Along this slope to Woodlawn there is a half mile strip which may be occupied by houses. However, up Jones Run the maximum development will not exceed the addition of over twenty-five dwellings.

The hopper at the eighteen double houses on the hillside connect to six inch sewer pipes. There are five lines, each about two hundred feet in length, terminating in an eight inch pipe at the foot of the slope which leads to a sump in sandy and gravelly formation.

At Woodlawn the company is erecting fifty-five first class dwellings provided with modern sanitary facilities. The water supply is to be taken from driven wells along the banks of the river and supplied to the dwellings under sufficient pressure for domestic uses.

The company has laid out, but not yet graded, a public highway sixty feet wide up the valley of Logstown Run through its property. In this street it is proposed to build a fifteen inch sewer main from the site of the proposed sewage disposal plant on the banks of the river at the mouth of said Run, a distance of forty-eight hundred feet, and thence for a distance of about twenty-eight hundred feet the sewer main is to be twelve inches in diameter to the present boundary line of the Jones & Laughlin properties in the valley.

This highway is to the north of the Run. South of the Run and paralleling it is a street on which the forty-five dwellings above mentioned are being erected. It is here that a twelve inch sewer is proposed which is to connect with the fifteen inch main ultimately, but for the present it is to discharge into the run at the upper end of the twenty-five foot arched culvert passing under the Pittsburgh and Lake Erie Railroad, where there is an alternate site offered by the petitioners for the erection of sewage disposal works.

The company purposes to construct an eight inch sanitary sewer on the flats about half way between the railroad and the river from Jones Run southerly to the fifteen inch sewer main, which eight inch pipe is to collect sewage proper from the sanataries which are to be provided at convenient points at the mills and furnaces.

It is also proposed to intercept the sewage from the buildings lying west of the railroad on the hillside and up Jones Run Valley by a sewer or sewers which shall be tributary of the mains already described. The elevations of the ground are such that this collection by gravity is possible and economical.

The proposed sewers are to be sanitary sewers, manholes are to be built at changes in line and grade and flushing, if necessary, is to be effected without the use of flush tanks.

Details as to sewer grades for the main sewers leading to the sewage disposal works have not been submitted for two reasons. First, because the petitioners wish to be advised respecting the site of the disposal works and the type of plant adapted

to the necessities of the district, and, second, because, pending the initial developments, the company wished permission to temporarily discharge the sewage into the runs at the places above described.

There is no disadvantage apparent at this time with respect to the location of the disposal works at the proposed site on the banks of the river, provided the sewage can be delivered here by gravity at a sufficient elevation to afford the requisite vertical height for a successful bacteriological treatment of the sewage and delivery of the effluent into the river at an elevation above annual freshet line. While the gravity discharge of sewage at works is desirable from an economical standpoint, pumping has to be resorted to in some instances, in order that the plant may be built above such freshet flow as might endanger the entire structure or put it out of commission for a week or more during any month in the year. Until full information is furnished the Department relative to the topography of the proposed site and the ordinary and extraordinary freshet elevation of the river, it is impossible to advise definitely as to plans.

The alternate site proposed is inadmissable owing to its proximity to dwellings now being erected by the company at Woodlawn and to other lands not yet developed but adapted for residential purposes. The nearest dwelling is within two hundred and fifty feet of the site. The present passenger station is within five hundred feet and the proposed new passenger station is not likely to be built at a point distant over five hundred feet from the alternate site. These reasons are sufficient to warrant the disapproval of any kind of a plant to be erected here for the treatment of municipal sewage.

It has been determined that the interests of the public health demand that the proposed sewer system be approved and the said system is hereby and herein approved and a permit granted temporarily to the Jones & Laughlin Steel Company to dicharge sewage into Jones Run and Logstown Run, under the following conditions and stipulations:

FIRST: That all roof, street and storm water be excluded from the system and that at the close of each season's work a plan and profile of the sewers built during the year shall be prepared and filed with the State Department of Health, together with any other information in connection therewith that may be required.

SECOND: If the proposed sewer system, or any part thereof, be incorporated into a municipal sewer system, then upon such incorporation the Commissioner of Health shall be notified of the fact by the said company.

THIRD: This permit to discharge sewage into the Ohio River or tributaries shall cease on July first, nineteen hundred and ten. If at that time the terms of this permit shall have been complied with, then the Commissioner of Health may extend the time and fix the date on or before which sewage disposal works shall be provided for the treatment of the sewage, having in mind the time when other corporations and municipalities in the valley of the Ohio River are required by the State to treat their respective sewages.

FOURTH: On or before July first, nineteen hundred and ten, the said Jones & Laughlin Steel Company shall prepare and submit to the Commissioner of Health for approval plans for the interception and treatment of the sewage of the district contemplated by the sewers herein approved, and in the interim whatever sewers are built shall be constructed as a part of the proposed comprehensive system of sewers and sewage disposal works herein approved.

Harrisburg, Pa., February 3rd, 1908.

HOUTZDALE, CLEARFIELD COUNTY.

This application was made by the borough of Houtzdale, Clearfield County, and is for permission to build a system of sewers and to discharge the sewage therefrom into Beaver Run within the limits of the borough.

It appears that Houtzdale Borough is a mining community of fifteen hundred population at the present time, but that eighteen years ago it was fifty per cent. greater in size. This reduction is owing to the exhaustion of the coal from the upper coal measures in the borough and vicinity. It is probable that the lower coal measures will now be mined and if this is done the town is likely to endure for some time. Possibly when all of the coal shall have been taken out, the people may move away. At the present time there are no industries in the town or vicinity except that of coal mining.

The Berwind-White Company carry on operations and give employment to upwards of six hundred men. There are a few mines scattered in the outskirts of the borough, but the larger ones are in the surrounding township.

Houtzdale is on Beaver Run in the south central part of Woodward Township. Beaver Run comprises numerous mountain streams which have their sources to the southwest about three miles. The run takes a northerly and northwesterly course, passing through the central part of Houtzdale and by several small mining settlements and empties into Moshannon Creek at a point four miles beyond Houtzdale and about one mile above Osceola Borough. The Moshannon Creek is a tributary of the West Branch of the Susquehanna River and enters the same above the mouth of the Sinnemahoning. The Moshannon forms the boundary line between Clearfield and Centre Counties until the river is reached. Immediately below Osceola Borough on the creek are the boroughs of Chestnut Hill, South Philipsburg and Philipsburg.

That part of Houtzdale north of the run is the principal section. It is built on the side of the hill, the summit of which is about the northern boundary of the borough. The drainage is to Beaver Run. The southern section is also built on the slope, but the grades are not so severe as in the northern part. At present there are no sewers of a public kind. There are a few private sewers. It is reported that eight residences are connected to the private sewers. It is also reported that there are eight percolating cesspools, the remaining buildings, of which there are three hundred and four, have shallow earth privy vaults on the properties.

The Houtzdale Water Company supplies the town with water; however, there are twenty-five dug wells in use and they are liable to surface pollution. There are also some springs on the hillside that supply drinking water to those who go to the springs for it. Two hundred and seventy-five houses are connected with the water works system.

A branch of the Cambria and Clearfield Division of the Pennsylvania Railroad passes east and west through the borough near the run and the New York and Pittsburg Central Railroad parallels the Pennsylvania line in practically the same location. Hanna Street is immediately north of the tracks and it is the principal highway in the town, along which are the stores and hotels.

At right angles to Hanna Street and the railroad the principal thoroughfare is Good Street.

Along Good and Hanna Streets there is a six inch private sewer, total length about five hundred feet, with an outlet into Beaver Run at the foot of Good Street. One hotel and four dwellings are connected to this sewer.

McAteer Street is west of Good Street, in it there is a six inch sewer about one hundred feet long to which two slaughter houses have connections. The outlet is into the run at the foot of the street.

There is a six inch private sewer one hundred feet long on Good street which serves one house. The Central Hotel, located on Hanna Street, discharges its sewage into an open ditch, which extends four hundred feet to the run. This open ditch has been the subject of some complaint.

There are about forty-five individual property owners living along Good Street who desire to have modern plumbing facilities in their houses and a free outlet for the sewage. The borough stands ready to build the sewer and assess the cost on the abutting estates.

The line of the sewer proposed is southerly along Good Street, thence in Otter Alley, thence southerly in Spruce Alley, and thence easterly along the bank of Beaver Run to Brisbin Street, where it is proposed to discharge into the run. There are no houses in the immediate vicinity of this point. It is proposed to use this sewer as a main for future extensions. The outlet is to be twelve inches in diameter and in the one thousand feet length which it is intended to build at once there are to be four hundred feet of twelve inch, three hundred feet of ten inch and three hundred feet of eight inch sewer. At street intersections manholes are to be built with branches for lateral extensions. The minimum grade proposed is one and one-tenth per cent.

The petitioners state in their application as follows:

"That Beaver Run is a small creek or run emptying into Moshannon Creek, four miles east of Houtzdale, Pa.; that neither the waters of Beaver Run nor Moshannon Creek below the proposed sewer outlet are used for domestic purposes, same being heavily impregnated with coal mine drainage high in sulphuric acid and other impurities. That the borough of Houtzdale has a population of about 1500 and at present has no system of sewerage other than open water closets or cesspools for each house, except where owners of property in close proximity to Beaver Run or small tributaries have made small drains or sewers into same."

It appears that the total assessed valuation of the borough is one hundred and ninety-two thousand dollars and that the bonded indebtedness is two thousand dollars. It is reported that the borrowing capacity of the municipality is eleven thousand four hundred and forty dollars. This sum limits the town to moderate expenditures for public improvements. Good Street is in a position topographically to serve naturally the best location for a main sewer and future extension can be laid to the sewer proposed.

The local authorities are planning to use the proposed sewer for sanitary purposes only. It is to be laid about four feet deep so that cellars cannot drain into it. The amount of sewage that will be discharged from the forty-five houses will be small.

The proposed outlet is near the eastern borough line. The topography is such that in the southern section, in the future, a main sewer could be laid along the south bank of the run to serve lateral sewers and discharge at the same point as the sewer proposed for the north section. The southern section is sparsely settled and may not desire sewers.

If treatment of the sewage were called for at the sewer outlet, pumping would have to be resorted to. Possibly a subsidence tank or septic tank could be installed near the outlet.

The borough has not submitted plans showing the elevations of the sewers proposed.

Beaver Run has the appearance of being a strongly acid stream. The bottom and banks are yellow in color, which is characteristic of the mine drainage, and the water is not used for boiler purposes because of the acidity.

It has been determined that the interests of the public health will be subserved by granting a permit to build the proposed sewers, under the following conditions and stipulations:

FIRST: That before the sewers are built and used plans for a settling or septic tank shall be prepared and submitted to the Commissioner of Health for approval. These plans shall be so devised that if in the future the town should grow and a more complete purification of the sewage be required at the works, something besides preliminary treatment of the sewage may be accomplished economically by additions to the plant. When these plans are modified or amended, the borough shall build such part of the works and put such part in operation at the time the said sewer is put in operation as the Commissioner of Health may determine.

SECOND: All roof and storm water shall be excluded from the proposed sewers. Manholes shall be placed at street intersections and ventilation shall be effected through the manholes. Facilities shall be afforded for flushing out the sewers at every manhole and such facilities shall be afforded at every summit end of the sewer.

THIRD: The Central Hotel, now using the open ditch to Beaver Run, shall be required to connect to the proposed sewer system. The borough council shall also require the owners of private sewers to connect with the public sewer system and to exclude all roof and storm water from the sewers.

Harrisburg, Pa., October 6th, 1908.

HUGHESVILLE, LYCOMING COUNTY.

This application was made by the Borough of Hughesville, Lycoming County, and is for permission to extend its sewer system and to discharge the sewage therefrom into Muncy Creek within the limits of said borough.

Hughesville is a manufacturing community of about two thousand population situated on west bank of Muncy Creek in Wolf Township in the southwestern part of Lycoming County at a point about seven miles above the junction of the creek with the west branch of the Susquehanna River. The principal offices of the Williamsport and North Branch Railroad are located in the borough. The industries consist of the J. K. Rishel Furniture Company, table manufacturers, employing about one hundred and twenty-five hands; the Hughesville Furniture Company, manufacturing general furniture and employing about eighty hands; the repair shops of the Railroad Company and also a small foundry and machine shop.

In nineteen hundred the population of the borough was fifteen hundred and twenty-eight. Ten years previous it was thirteen hundred and fifty-eight. The community has grown steadily since eighteen hundred and sixty and it appears probable that a steady though not rapid growth is assured for the future.

The local topography is undulating with gentle grades and without any well developed lines of surface drainage. The public water supply is furnished by the Hughesville Home Water Supply Company and is pumped from wells located in the valley of Muncy Creek a short distance north of the borough limits from whence the water is pumped to a reservoir on the hill.

It was ascertained by the Department's inspection that about three-fourths of the houses in the town use private wells water and a majority of the people live in dwellings provided with cesspool and outside privy connections.

The soil is gravelly and the wells are dug or sunk to a depth of about thirty feet. No epidemics of water borne diseases have been reported in the past. Under the circumstances, in time, contamination of the well supply in the village must result from the proximity of the earth receptacles into which the wastes of the household are emptied. Local physicians state that the general health of the community has been excellent.

Rainwater from these parts of the town which are not reached by existing sewers, either runs off on the surface or soaks into the ground. Many low places are found in the borough, owing to the undulation of the ground, the drainage from which has been cut off in grading streets. In some instances the pockets have no natural outlet. As a result there are some places where the water stands during the season of the year when the ground is frozen, and where, in case of heavy rainfalls, flooding of cellars is sometimes caused.

The streets are laid out parallel to Muncy Creek and at right angles thereto. The existing sewers have a twelve inch pipe outlet into Muncy Creek in the lower part of the town, a short distance below Academy and Sixth Streets. The twelve inch sewer extends up into the town along Academy Street, a distance of twenty-four hundred feet to the railroad. Connecting with it is an eight inch lateral sewer fourteen hundred feet long laid in the alley between Main and Second Streets northerly from Academy Street to Walnut Street. West of Main Street in the alley there is an eight inch lateral sewer twenty-two hundred feet long extending northerly from Academy Street to the upper part of the borough.

These pipes are used for both surface water and house sewage.

The petitioners purpose to construct a line of fifteen inch pipe drain to be laid on a five-tenths per cent. grade beginning at a point where the present sewer discharges into Muncy Creek and thence across Sixth Street and Fifth Street in an alley immediately north and paralleling Academy Street and across Fourth Street and northerly in Third Street, crossing Water Street and thence in an

alley to Walnut and in Walnut to Second Street, a total length of thirty-three hundred and seventy feet. This pipe is intended primarily to carry storm water from this district, where the total drainage area is about fifty acres. It will drain some lands near the upper end of the line where considerable trouble is now experienced with pools of standing water and with wet cellars during spring thaws and after heavy rains. It is, however, proposed to permit such property owners, as may desire it, to connect their premises by particular sewers with the common drain. Therefore it will be a combined sewer.

Muncy Creek rises in the mountainous region of Sullivan County and pursues a very winding but general southwesterly course a distance of thirty-three miles to the Susquehanna River, falling in this length over fifteen hundred vertical feet and draining two hundred and twenty square miles of which about one-half is above Hughesville. The railroads follow closely along the banks of the stream for twenty-six miles to Nordmont village. A branch from Stonestown extends northerly up the valley of Outlet Run to Eagles Mere Lake in Sullivan County at the summit where is located the popular resort of Eagles Mere.

Three miles above Hughesville borough on Muncy Creek is the borough of Picture Rocks and above this point there are numerous railroad stations and small villages. The sewers at Eagles Mere empty into Outlet Run and other tributaries of Muncy Creek. At Nordmont the Nordmont Chemical Works, engaged in the manufacture of wood alcohol and by-products, discharge wastes into the stream. There is a tannery at Muncy Valley twelve miles above Hughesville, whose trade wastes drain to the stream. Below this point the waters of the creek show the dark brown color characteristic of tannery fluid.

Below Hughesville there is a dam and mill known as Shoemakers and further down another dam known as Stultz Mill. These are respectvely three and four and a half miles distant from Hughesville. The mouth of the creek is about one-half mile above the borough of Muncy on the east bank of the river.

The Susquehanna receives sewage and other pollutions from the municipalities located along its banks. At Lewisburg, eleven miles below Muncy Creek, there is an emergency water works intake at the river, and also nineteen miles below Muncy Creek at Sunbury there is also a river intake. The water at Sunbury is subjected to filtration before distribution to the consumer.

The proposed sewer extensions in Hughesville are mainly for the purpose of drainage and surface water removal. The amount of household sewage which may reach the sewers will be an inconsiderable amount, and since, because of the pollutions of the stream by chemical and tannery wastes, no use is made of the waters of Muncy Creek except for power purposes, (so far as the Department is informed) the small amount of sewage which is now added to Muncy Creek and the Susquehanna River by Hughesville sewage, together with that which may be contributed by the proposed sewers should not increase the menace to public health in those municipalities below along the river dependent on the water for drinking purposes, or at least to a degree not warranting discrimination by the State against the borough of Hughesville and the requirement that the local authorities thereof should cease to discharge the sewage into the river at a much earlier date than that on or before which other towns along the Susquehanna River in Lycoming County may be required to discontinue the sewage pollution of the river.

The petitioners contemplate making extensions to the existing sewers in the near future. It is reported that the assessed valuation of the borough is about three hundred and sixty-four thousand dollars and that the bonded debt is five thousand dollars. If these figures be true then it would appear that Hughesville has a borrowing capacity in the neighborhood of twenty thousand dollars only, a sum insufficient to erect sewage purification works to treat the present flow of sewage or to install separate sewers and a purification plant in connection therewith.

However, the interests of the public health in the towns along the river, whose populations are now and must always be supplied with river water, demand that the poisons in these waters shall be reduced to a minimum. The river and its tributaries must cease to be used as an open sewer. Household wastes put into Muncy Creek at Hughesville may within a few hours be transmitted to the city of Harrisburg and be introduced into the water pipes there. In common with other up stream municipal authorities, the borough council of Hughesville should anticipate future requirements in the way of improved sewers and sewage disposal and adopt plans for a sewer system to extend over the entire borough and to convey the sewage to a purification plant for treatment before being discharged into the creek. The existing and proposed sewers may be made a part of such system or it may be found desirable and necessary to provide independent pipes for storm water. The subject should be carefully considered and worked out and the plan be submitted to the State Department of Health and be amended or approved and when such a comprehensive plan shall have been adopted the borough may proceed from time to time, as necessity may require, to construct any part of this system without further application to the State authorities. It is by this method of procedure that the preservation of the purity of the waters of the State for the protection of the public health may be brought about in a reasonable manner. The borough should not expect the State to approve desultory sewer extensions regardless of a plan to ultimately bring about the cessation of sewage pollution of the creek.

It has been determined that the interests of the public health will be subserved by granting a permit for the proposed line of fifteen inch sewers and for this only, under the following conditions and stipulations:

FIRST: That no further additions to the proposed sewers or to the existing sewers shall be made until detail plans and profiles thereof and for a comprehensive sewerage system and sewage disposal works for all the borough shall have been prepared and submitted to the Commissioner of Health for approval and until the Commissioner of Health shall have modified, amended or approved plans and issued a permit therefor.

SECOND: This permit to discharge sewage into the waters of the State shall cease May first, nineteen hundred and eleven, provided that meantime the other terms of this permit shall have been complied with. If at that time the interests of the public health demand it the Commissioner of Health may extend the time in which sewage may continue to be discharged into Muncy Creek.

The local authorities are advised to prepare plans for a complete system of sanitary sewers covering the territory within the borough limits and providing for the discharge of sewage from a single outlet near the southerly limits of the borough and to include provision for purifying the sewage. The future sewers not intended for storm drainage should be constructed in accordance with such plan after approval by the Commissioner of Health.

Harrisburg, Pa., May 4th, 1908.

HUNTINGDON, HUNTINGDON COUNTY.

This application was made by the borough of Huntingdon, Huntingdon County, and is for permission to extend its sewer system and lay out new sewers and to discharge the sewage therefrom, untreated, into the Juniata River within the limits of the borough.

It appears that on April eleventh, one thousand nine hundred and six, the Commissioner of Health sent the following communication to borough council:

"April 11th, 1906.

"To the Honorable, the Borough Council:
"J. B. Kunz, President,
"Huntingdon, Penna.

"Gentlemen: A petition signed by half a hundred or more of the representative citizens and taxpayers of the borough of Huntingdon has been addressed to the undersigned, Commissioner of Health of the State of Pennsylvania, setting forth that a small stream called Muddy Run, extending through the central part of the borough is used as an open sewer, and that said use endangers the life and health of the residents of the neighborhood, and praying that an examination be made thereof and immediate steps be taken to abate the nuisance.

"Upon an examination of the premises, I find that several public sewers and numerous private sewers contribute to the nuisance and that one of these private sewers is from the Huntingdon High School Building.

"After careful consideration, I have determined that the discharge of such sewage into Muddy Run by private sewers and individuals is injurious to the public health. So also is the discharge from the public sewers.

"Because the borough has within its power ample ability to solve the problem of abating the nuisance, and because the local Board of Health has failed to abate the nuisance, you are hereby ordered to discontinue the discharge of sewage from the Huntingdon High School into Muddy Run.

"I suggest that you take up at once the problem of designing a sanitary sewer system to intercept all of the sewage which now does and may in the future go into Muddy Run, and plan to convey it to some point where it may be successfully disposed of.

"In this work my Department will be glad to act in an advisory capacity since efficiency, economy and the interests of the public health in this case is closely allied, and by co-operation the best results may be secured.

"It is my duty to once more call your attention to the fact that your borough has neglected to make a report and file plans with the Commissioner of Health relative to its present sewer system. The law, of which I enclose a copy, requires that such a report should have been filed last August. On December first I called your attention to this law and asked compliance with it.

"So far as I am informed, this request has not been recognized. You now have the blank form of report required by this Department. If it is not returned to me on or before May 1st, 1906, in due form, I shall consider your negligence to be an open defiance of the law and govern myself accordingly.

On August seventh, the borough not having paid heed to the subject matter of the above communication, the Commissioner of Health placed the matter in the hands of an attorney, with instructions to take such steps as might be necessary to force the borough to file plans and report of its sewer system and to discontinue the discharge of sewage from the High School into Muddy Run, or pay the penalty prescribed by law. This resulted in the employment by the

borough of an engineer to make the necessary plans of the sewer system. The report was filed on September twentieth, one thousand nine hundred and six, and soon after a plan of the existing sewers.

On September nineteenth, Mr. H. W. Fleck, a citizen of Huntingdon and the abutting land owner on Muddy Run, asked for advice as to the proper abatement of a nuisance in said run. On December thirty-first, one thousand nine hundred and six, Mr. W. H. Henderson, on behalf of various property owners along the run, requested that the matter of the abatement of the Muddy Run nuisance be taken up at once. On May thirty-first, one thousand nine hundred and seven, Mr. S. C. Postlephwaite asked the Commissioner of Health for a hearing and for an opportunity to present in person a petition from many citizens regarding improvements to Muddy Run. This petition was forwarded by mail on June twenty-seventh. To all these communications answer was made that the borough was engaged on the preparation of comprehensive plans for sewerage and sewage disposal works and until these plans were submitted to the State for approval it would be inadvisable to come to any final determination.

The borough of Huntingdon is the county seat. It is situated on the north bank of the Juniata River, on a tableland sufficiently elevated above the river to escape floods. It is surrounded by hills. The Pennsylvania Railroad, main line, follows quite closely the river bank through the borough. In the center of the town, immediately west of the mouth of Muddy Run, there is a small settlement on the flats between the railroad and the river, called Portstown. This settlement is flooded at high water.

Along the greater portion of the eastern boundary of the borough is Standing Stone Creek, a stream of considerable size draining a mountainous watershed partly under cultivation and emptying into the river within the limits of Huntingdon borough. The built-up part of the town begins about one thousand feet upstream from this creek and extends along the river for a mile and a half and back therefrom upwards of two thousand feet.

Here reside about seven thousand people. The principal industry is the paper works of the J. C. Blair Company, where about two hundred hands are employed. The place is a substantial but slow growing town, with no present indication of any boom.

There are said to be about eighteen hundred residences in the community and approximately two-third of them are supplied with public water. The works are owned by the Huntingdon Water Supply Company. The source of supply is from Standing Stone Creek, taken at a point within the limits of the borough about one thousand feet upstream from the creek mouth. The water is pumped from a small intake dam to a mechanical filter plant on the hill in the rear of the borough, from whence it is supplied by gravity to the consumers. The department has had a sanitary survey made of the watershed above the intake dam and notices of abatement of all nuisances and sources of stream pollution on the watershed have been served.

The remaining dwellings are supplied with water taken from dug wells on the premises. There are several hundred of these in the borough. Surface privies and vaults dug in the earth and percolating cesspools are scattered generally throughout the village. The ground below the surface is usually wet. The structure is a retentive shale. Considerable trouble is experienced with wet cellars, especially in the western part of the borough. On this account the cesspools are not numerous. Typhoid fever has occurred in the homes of those using both well water and public water. The maintenance of a high standard of sanitation requires that not only should constant attention be given to the preservation of the purity of Standing Stone Creek water and the efficient operation of the filter plant, but that all sources of pollution of the private wells should be removed. Experience has demonstrated it to be a difficult thing to accomplish the entire abandonment of private wells in a borough where well water is so generally used as in Huntingdon. Nearly all the wells now in use are reported to be outside of the existing sewer district. The petitioners purpose to extend sewerage facilities to these unsewered portions of the town and to bring about the abandonment of privies and cesspools. Undobtedly where all household wastes of a sewage character are discharged into the sewer system, the danger of using well water for drinking purposes will be much reduced.

Muddy Run comes down from a drainage area of about one thousand acres, having hillside slopes and passes through the western part of the borough and enters the Juniata River in the center of the town at the foot of Seventh Street. About two-thirds of its length lies within the borough, the last four thousand feet being through the thickly built-up section. The stream has been arched over in places, in other places it has been walled on the sides and planked over, and in other portions it is open with natural earth slopes.

Between the river and the railroad the channel is an open cesspool in the summer time. In mild weather the water is stagnant and strong sewage odors eminate therefrom.

The stone drain said to receive sewage from the office and adjacent buildings owned by the said Blair Company empties into the run at the railroad.

Beginning at the railroad, the run is arched over and its course is not apparent. It passes under Penn Street, the freight station and under stores in Washington Street. It makes its appearance as an open channel in the rear of the Acme De-

partment Store between Washington and Mifflin Streets. In this covered portion, which is about six hundred feet in length, two public sewers empty. One is at the foot of Seventh Street and the other is at Washington Street.

The latter is a main sewer for all that portion of the western district of the borough which is not adjacent to Muddy Run, or which does not drain directly to the Juniata River. It is a brick structure forty-five inches high by thirty inches wide. It formerly connected with the Seventh Street sewer. The disconnection was made to relieve the overtaxed Seventh Street drain. Connected with this outlet, which is two hundred and fifty feet long, there is a total of ten thousand feet of combined sewer, of which thirty-four hundred feet is a brick structure twenty inches by thirty inches in diameter, thirty-nine hundred feet is a twenty-four inch pipe and the remainder have diameters ranging from eighteen inches to twelve inches.

The Seventh Street sewer is forty-eight inches in diameter. Its outlet is at the railroad culvert. This structure serves that part of the town lying between the run on the west and Fifth Street on the east, comprising a total of six thousand feet, of which fourteen hundred feet is of brick structure, minimum diameter three feet by two feet, nine hundred feet of eighteen inch pipe, seventeen hundred feet of twenty-four inch pipe, and seven hundred and fifty feet of fifteen inch pipe, all combined sewers. Into these are twelve hundred feet of separate sewers equally divided between pipes having diameters of eight, ten and twelve inches.

The Acme Store discharges sewage directly into the run and so do the other buildings located over the said arched portion of the run. The stream crosses Mifflin and Moore Streets through arches; elsewhere in this portion the channel is open with natural earth banks. Nine private sewers have outlets into the channel here. Privies overhang the bank and garbage, refuse and ashes, and so forth, is thrown into the stream at places along the sides thereof.

The run continues northerly in an open channel, crossing Tenth Street through an arch to within about one hundred feet of Eleventh Street, where it is again arched over on private property, and continuing in the arch crosses Moore and Eleventh Streets. From here onward the run is planked over for most of its length through private property as far as Thirteenth Street. Twenty dwellings are located along this stretch and at every one of them there is a privy over or at the bank of the stream. Here in summer the odors of sewage are so great at times as to render the atmosphere stifling at night. Between Tenth and Eleventh Streets, the high school, having an enrollment of about four hundred and fifty pupils, is provided with a ten inch sewer which discharges into the run. At Tenth Street there is a private sewer serving several houses, which also empties into the stream. Along the banks, up and down stream from Tenth Street, numerous privies are located.

Above Thirteenth Street the stream is open and flows through fields.

There are three public sewer outlets into the river. They are thirty-three, thirty-six and twenty inches in diameter and are at the foot of Fifth, Fourth and Second Streets, respectively. They receive both sewage and storm water from the old section of the town.

Fifth Street passes through the public square. The brick sewer in it is twenty-two hundred feet long and there are six hundred feet of twenty inch pipe, both receiving storm water and sewage. There are forty-eight hundred feet of lateral sanitary sewers branching from the main line into the cross streets divided about equally between twelve inch and fifteen inch pipe.

Fourth Street crosses the railroad at grade at the back of the station and is carried over the river by a public highway bridge. The sewer outlet into the river is through the down stream end of the bridge abutment. Connected with the brick structure, seventeen hundred feet long in Fourth Street, are twenty-seven hundred feet of twelve inch lateral sanitary sewer.

Second Street sewer, of one thousand feet length, is combined, but its twelve inch branches, totalling twelve hundred feet in length, are sanitary sewers. Second Street is the most easterly one in the borough.

It is proposed to construct sanitary main sewers on all of the streets in which there are now combined sewers. All buildings are then to be connected to the sanitary sewers and all sewage is to be discharged into the new sewer system. The old combined sewers are to be continued in use strictly for storm water drainage. The cost of disconnecting sewage connections with the old system and of making the proper connection to the new system is to be defrayed by the borough. This is proposed because the abutting estates have been charged an entrance fee of about forty dollars for each fifty foot lot, so the local authorities deemed it encumbent on the borough to maintain sewarage facilities to all such estates.

Still another great benefit will accrue to properties in the western district, more particularly along Mifflin Street. The combined sewer in this thoroughfare is too small to carry off all of the street water tributary to it during heavy rainfall, and in consequence sewage is back-flooded into the cellars of the district. The new sewer system will obviate this trouble. The main sewer is to be twenty-two inches in diameter. Its outlet is to be into Standing Stone Creek at its junction with the river. This sewer is to pass up in the street paralleling the railroad to the valley of Muddy Run and thence it is to be extended up said valley, being laid as far as Fifteenth Street wholly in public highway, except one thousand feet at the outlet.

In the entire new system there will be a little over ten miles of sewers. The diameters will range from ten inches to twenty-two inches. Besides this, there are to be about four miles of five inch house connections, the cost of which is to be defrayed by the borough.

The design has been based on an ultimate population of twenty-five thousand people. A minimum grade is to be in the main sewer and will be thirty-nine hundredths per cent. Inspection manholes are to be provided at changes in line and grade and flushing is to be accomplished by hydrant streams whenever this becomes necessary. Particular care is to be exercised in the construction of the sewers to make the joints tight so as to keep down the total flow of the sewage.

It is proposed eventually to erect a pumping station near the outlet and to lay out a sewage purification plant east of the creek and north of the railroad on a ten acre tract lying within the borough limits.

The petitioners have an ultimate site in view more remotely removed from the avenues of travel and from habitation. Plans have not yet been submitted.

The completed sewer system without disposal works is estimated to cost one hundred thousand dollars. To provide intercepting sewers along Muddy Run so that these estates now sewering into the run may have facilities afforded for disposal of the household waste into the sanitary sewer system, and to provide the requisite sewers to obviate back flooding of cellars in the town, and to bring about the discontinuance of the discharge of sewage at the mouth of Muddy Run and elsewhere where it is now objectionable, and to make improvements in the surface drainage system, not less than one hundred thousand dollars will be required, of which probably ninety per cent. will be expended for sanitary sewers. Therefore, the borough contemplates admitting the question of the authorization of a municipal debt in the sum of one hundred thousand dollars for sewerage purposes to the voters of the borough early during the year.

It is reported that the assessed valuation of Huntingdon is one million eight hundred thousand dollars, in round numbers, and that the bonded indebtedness is twenty thousand dollars. If this be true, the municipal borrowing capacity is one hundred and six thousand dollars, or thereabouts. So the town cannot build the sewers and sewage disposal works at the same time. To build part of the sewers would involve the laying of the main sewer down Muddy Run valley and along the river to the proposed outlet. This work is the main item of expense. To relieve the unsanitary conditions in the western district of the borough and to stop sewage from being discharged into Muddy Run, about sixty-five thousand dollars will be required according to the plan proposed, including perhaps ten thousand dollars for surface drainage. At least fifteen thousand dollars should be added for the cost of constructing the outlet sewer into Stony Creek.

In the eastern district or old section of the town it appears that there are ten thousand nine hundred feet of combined sewers, mostly brick structures of large diameters into which are discharging eighty-seven hundred feet of lateral sanitary sewers. The residents and owners of property in this district have very generally connected their estates to the sewers. The contributing population of the district is in the neighborhood of fifty per cent. of that of the entire borough. No sewerage plan would be comprehensive that did not provide for the ultimate discontinuance of the discharge of sewage from this population into the river. At the present time no complaints are made about existing outlets at the foot of Second, Fourth and Fifth Streets. To effect an intercepting of the sewage now emptied into the river at these places by the plan proposed, which seems to be the only feasible plan to collect the entire sewage of the borough and deliver it at one point where in the future it can be economically delivered to disposal works, will add, so it is estimated, twenty thousand dollars more to the cost. It is not evident that the interests of the public health demand that this money be spent to stop the sewage from going into the river at the foot of the three streets mentioned (where no nuisance is now created thereby), and to put it into the same river a few hundred feet further down stream. To the contrary it would appear to be equally efficient and much more economical to permit the sewage to continue to be discharged at these points until the time shall have arrived when the borough can raise the money necessary to defray the cost of erecting disposal works to treat the entire sewage of the town. However, meantime the local authorities should prepare detailed plans of the disposal works and a definite site therefor and submit them to the Department of Health for approval, and when approved the purchase of the necessary land therefor should be consummated.

The immediate construction of the main sewer of the system and of the sewers in Muddy Run valley and the western district is imperative from the public health standpoint. The borough must cease to discharge the sewage from the High School building and from the public sewers into Muddy Run, and the plans proposed appear to be economically designed to accomplish this purpose.

The widening, straightening, deepening, walling or covering of a natural watercourse called Muddy Run, which, owing to the topography of the upper drainage area, ofttimes becomes a torrential stream, is a matter relating to public convenience and necessity and proprietory interests wholly outside of the jurisdiction of the State Health Department. To improve this channel and arch it over for the purpose of maintaining it as a covered sewer cannot be sanctioned as State authority. While the cost of such improvement would be equal to the cost of the proposed sewers in the district, this great expenditure would not effect or be a part of any plan to

effect the discontinuance of the discharge of sewage into the Juniata River or abate the nuisance now existing at the river and the mouth of this run. It is the law of the Commonwealth to preserve the purity of the waters of the State for the protection of the public health and since this river is used as a source of supply to the public at times at Newport and since the Susquehanna River, into which the Juniata discharges, furnishes drinking water to many thousands of people living along its banks, and must continue to do so, it is essential that whatever sewerage plans are adopted at Huntingdon under State sanction shall provide for the diminution rather than lasting increase of stream contamination.

Should the abutting owners along Muddy Run choose to improve the natural water course, undoubtedly the labors of the local board of health in preventing the depositing of garbage and refuse in the channel would be made much easier and other benefits should accrue; but it is encumbent on the local authorities to prevent such nuisances in any event.

It is also encumbent on the local authorities after the proposed sewers shall have been built along the run to compel the abandonment of all privies, vaults and cesspools there when the connection of all occupied estates with said sewers.

The collection of surface water which falls from the heavens on to the streets, yards and lands naturally drains into Muddy Run, either by underground structures or by artificial surface channels or natural ones, and its delivery to the said run is also a matter beyond the jurisdiction of the State Health Department. The foreign matters which such surface waters pick up in their flow over the surface of the ground may, in the strictest interpretation of the law, comprise some sewage. But this cannot be prevented and it is not the act of any one individual, but the result of the aggregation of people in a thickly populated community. Such waters cannot be kept from their natural courses even if they do carry some polluting material. It is totally impracticable to otherwise dispose of storm drainage.

In view of the above considerations it has been determined that the interests of the public health demand that the proposed sewerage plans be approved, and the same are hereby and herein approved and a permit issued therefor under the following considerations and stipulations:

FIRST: That the borough shall forthwith construct the main sewer and such other sewers tributary thereto, in Muddy Run basin, it may be necessary to afford sewerage facilities to all occupied estates therein. And upon the completion of said main and tributary sewers, the local authorities shall bring about the abandonment of the High School sewer and of the discharge of sewage into Muddy Run from any public or private sewer, privy, vault, cesspool, or otherwise, by the enactment and enforcement of an ordinance to be established for the purpose. Construction work or contracts therefor shall have been begun or executed on or before six months from the date of this permit.

SECOND: On or before the new sewer system or any part thereof shall be used the borough shall cause to be prepared and submitted to the Commissioner of Health for approval detailed plans of the site and the works to be erected thereon with accessories for the treatment and purification of all of the sewage of the borough, and upon approval of said plan, either modified or amended, the borough shall consummate a purchase of the land required for said works.

THIRD: This permit to discharge sewage into the waters of the State shall cease on the first day of November, nineteen hundred and eleven, provided, however, that the other conditions herein specified shall have been complied with. At the expiration of said time, the Commissioner of Health may extend the date in which sewage may continue to be discharged into the waters of the State provided the interests of the public health demand it.

FOURTH: Surface and roof water may be excluded from the sewer system. The local authorities shall keep a record of all buildings connected with the sewer system. At the expiration of each season's work a plan of the sewers built during the year shall be prepared and filed with the Commissioner of Health, together with any other information in connection therewith that may be called for.

FIFTH: If at any time in the opinion of the Commissioner of Health, the sewer system, or any part thereof, has become a nuisance or menace, then such remedial measures shall be adopted and the Commissioner of Health may approve or advise.

SIXTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

The attention of the local authorities is called to the desirability of having a bacteriological examination made of existing well water and a wholesale abandonment of such wells proven by test to be subject to sewage pollution.

Harrisburg, Pa., March 19th, 1908.

INDIANA, INDIANA COUNTY.

These applications were made by the borough of Indiana, Indiana County: the one is to extend its sewerage system and to discharge the sewage therefrom into the waters of the State and the other is for approval of plans of sewage disposal works.

I appears that on September third nineteen hundred and seven, a permit for several petty sewer extensions was issued by the Commissioner of Health to the borough of Indiana, on the condition and stipulation that the borough shall in

good faith comply with terms of the decree relative to sewerage issued by the Commissioner of Health to said borough on June tenth, nineteen hundred and seven. Said terms were as follows:

"In veiw of these and other circumstances, it has been unanimously agreed by the Governor, Attorney-General and Commissioner of Health that the interests of the public health demand that the Commissioner of Health withhold for the present and I do hereby and herein withhold a permit for the extension of the borough sewers until the borough shall have first prepared a plan for the treatment of the town sewage and have submitted such plans with a report, to the State Department of Health for approval. I hereby request that such plans and report be submitted on or before October first, nineteen hundred and seven.

"It would be well for the borough authorities to note that in the study of this problem, the flow of the main intercepters and the outfall sewer should be measured day and night during different kinds of weather to determine what proportion of the flow of sewage it may be possible to eliminate from the system in order to reduce to a safe minimum the total output necessary to be treated at the disposal works and how much roof and cellar drainage and surface water there is that may be more economically taken care of by some other means to be provided, possibly, by the borough. The attention of the local authorities is called to the fact that the Commissioner of Health will be pleased to advise with them and co-operate in the solution of the problem.

"These studies should make apparent the remedy for the surcharging of the sewer.

"It is also unanimously agreed that the borough be requested, and I do hereby make the request that the proper local authorities shall submit a complete plan of the existing sewers showing their sixes, grades and elevation and the same for the proposed extensions of the system, and that this plan be submitted for approval on or before October first, nineteen hundred and seven. It should be accompanied by a report thoroughly setting forth under what conditions the borough will admit private sewers to the system. This report and plan is requested at as early a date as convenient, in order that the interests of all concerned may be proected in bringing about a discontinuance of the discharge of private sewers into the streams in Indiana borough."

The above stipulations were complied with and the plans and report submitted on September, twenty-fourth, nineteen hundred and seven, but the formal application for approval thereof was made on December eighteenth. The application of September twenty-first, was for a lateral sewer on Philadelphia Street between Seventh and Eighth Streets.

Indiana borough is located in the center of Indiana County and is its seat of government and until recently has been mainly the business center for the rural community that surrounds it. However, the development of the coal lands in this county has been started on a large scale. New railroads have been projected and a new era of expansion for the region has been inaugurated.

The borough is located at the head waters of Black Lick Creek, a branch of the Conemaugh River, which in turn is a tributary of the Allegheny River. The main portion of the town is built on a ridge lying between the valleys of White Spring Run on the west and Marsh Run on the east. The outskirts of the town extend across these runs on to the rising ground beyond. These streams unite at the southern end of the borough, forming Stony Run which flows southerly three miles into Two Licks Creek. This stream in turn joins Black Lick Creek a few miles down the valley. The land along the valleys of the streams and their tributaries is low and subject to flood. The greater portion of the town, however, is on higher ground with good grades affording excellent facilities for surface drainage. Population of the borough is about seven thousand. The growth since the last census has been rapid and it promises to be more rapid in the near future owing to the operation in the coal fields of the county.

The water supply is furnished by the Clymer Water Company, comes from Two Lick Creek and is subjected to mechanical filteration. However, there are hundreds of private wells in the town used as sources of drinking water.

The public sewerage system was established in nineteen hundred and three on the separate plan. Storm water is supposed to be excluded but considerable roof and cellar water has been admitted. The main sewer is eighteen inches in diameter and extends from the junction of the two creeks at the southern end of the town to a point one mile further south in Stony Run valley, terminating at the upper end of a nine acre tract belonging to the borough and located in White Township.

Two twelve inch intercepting sewers branch from the main outfall, one extending up each run in the borough. These sewers with their laterals comprise all told seven and six tenths miles of pipe. According to the engineer's measurements from the entire system is discharged daily in dry season's two hundred thousand gallons and one million gallons daily during wet season. It is reported that seventeen hundred people only at present use the sewers.

The few factories in the town have private sewers with discharge independently in to the run. It is the purpose of the borough to admit industrial wastes after preliminary treatment. It is also planned to compel individuals to discontinue the use of private sewers and to connect with the borough system. It is also planned to cut down the maximum flow of sewage which is due to leakage at manhole covers,

to infiltration, cellar drainage and storm water connection. The petitioners anticipate that by the elimination of the undesirable flow, that the total output of sewage when the town shall have been sewered will be between seven hundred thousand and one million gallons daily.

The proposed comprehensive sewerage system involves the extension of existing sewers and mains, and the improvement of them. Storm and roof water is to be excluded, manholes are to be placed at changes in line and grade, private sewer outlets to the streams are to be discontinued and all of the sewage of the borough is to be intercepted and conveyed to the proposed disposal works.

Into White Spring Run is discharged the wastes from the brewery, woolen mill and provision company's plant and from the old hotel sewer and from the laundry at Water Street. Into Marsh Run is discharged the waste from the tannery and Collar Company's plant and from the combined sewer system connected to the county jail sewer. The recommendations of Robert M. Mullen, Borough Engineer, accompanying his plans for improved sewerage and sewage disposal works are pertinent and show a comprehensive grasp of the subject. A portion of his discussion is as follows:

"In addition to these private sewers, the brewery, tannery, woolen mill and State Normal School discharge directly into the runs. The latter institution has recently without permission been connected with the borough system of sewers. In the higher portions of the town a number of old and two new storm sewers lead to the nearest convenient point of discharge into old water courses. Sewerage connection with such drains are not permitted. The Department of Health wishes to know under what conditions private sewers will be admitted into the borough system of sewers. It would not be advisable to admit them under any conditions. In general such drains were intended to carry roof and surface water and their discharge is limited only by their capacity. All future connections with the borough sewers should be made only through water tight sewers and drains that have been regularly tested and inspected and with only such building or buildings as are accompanied by a plan of the same, accurately drawn to scale and showing the location of all down spouts; the size and lengths of all drains; with notes in regard to the disposition of roof, surface and cellar drainage and accompanied by an inspector's certificate that the drains have been laid according to plan.

"The borough authorities should co-operate with the Health Department in reclaiming the runs by extending the sewer system wherever possible to reach property now draining into private sewers and notifying private industries discharging trade wastes into the runs to present plans for treatment on said trade wastes preliminary to connection with the borough sewers. It would also seem practicable to intercept the dry weather flow of the county sewer and that of the sewer from the State Normal School until that institution shall have reconstructed its drainage system and until such time as the borough sewers shall have been extended to reach the houses now draining into the county sewers, when the present private sewers will carry roof and cellar water only which might other-wise find its way into the borough system of sewers.

"The surcharging of the sewers is confined to the two main intercepters and is due to leakage into the sewer through perforated manhole covers; to a probable leaking of the run into the east main intercepter some place between Wayne Avenue and School Streets where the discharging ordinarily occurs, to the disregard of property owners as to the proper use of the sewers, in draining roof and surface water into the laterals; to seepage, and to the sewer from the State Normal School which receives the entire drainage from five large buildings and the grounds surrounding. The immediate relief for the comparatively few cases of consequent back flooding of cellars is in the insertion of a gate valve in the house drain. The permanent relief is the building of all cellars above the level of high water in the valleys. The leakage into the sewer through the manhole covers can be reduced by raising the tops of the manholes above flood level and by closing the preforations, in which case the local Board of Health, who at present regulate the sanitary improvements, from the outside of the foundation wall to the roof of the building and who require a cast iron trap to be placed outside the foundation wall, should assist in ventilating the sewers by removing said traps. A house to house inspection should reveal the source of a large part of the surcharging. That the sewers are adequate for the use to which they were intended is shown by the results of one hundred and fifty gaugings throughout the length of the two twelve inch intercepters and eighteen inch outfall sewers which give an average depth in the twelve inch lines of three and one-half inch and an average depth of four and one-quarter inch in the eighteen inch line."

There is a drop from the end of two outfall sewer at the nine acre tract to the creek of thirty vertical feet. This tract extends either side of Stony Run and the land on the east is flat and low but the land on the western side ascends at about a twelve per cent. grade. There are no buildings in the immediate vicinity. In fact the borough purchased this land in contemplation of the erection of a sewage purification plant.

The proposed works consist of a grit chamber, septic tank, dosing tank, sprinkling filters, a settling basin, sludge beds and an auxiliary pumping outfit.

The septic tank is to consist of two units placed side by side, each fourteen feet ten inches wide and ninety-three feet ten inches long, interior dimensions, by ten feet effective depth to the flow line with a total depth of ten feet nine inches and each having a total capacity of one hundred and three thousand gallons. They are to be built of re-inforced concrete with concrete slab covers and entrance will be gained through manholes in the top. No vent pipes are shown in the roof. The sewage is to be admitted into each compartment through two twelve inch ports. The center is to be eighteen inches below the flow line and located in the wall between the tanks and the grit chamber. This chamber is to be thirty feet eight inches long by six feet wide by ten feet effective depth wth a capacity of fourteen thousand gallons and it is to extend across the inlet ends of both septic tanks. The sewer is to terminate at one end of this chamber at the top thereof in a trough two feet square and open on top, extending across the entire length of the chamber and provided with port holes spaced at equal distances five in the bottom and six on the sides, each port to be twenty inches by twenty-four inches and provided with screens to prevent the passage of every coarse material into the grit chamber. Except at the trough the chamber will be covered with a concrete slab provided with manholes.

The sewage is to pass lengthwise through each septic tank. A wooden baffle located three feet from the inlet wall and extending five feet below the flow line will reflect the sewage downward as it enters the tank. A baffle wall located at the centre and extending six feet six inches above the floor will retain the heavier sludge in the first half of the unit. The effluent must pass under a scumboard extending across the tank two feet from the outlet end and two feet below the flow line, to the outlet which is to be a weir ten feet long built in the end wall.

After passing the weir the sewage is to be collected in a dosing chamber extending across the end of both tanks. This tank is to be thirty feet eight inches by ten feet wide by three feet eight inches effective depth, with a total depth of six feet and with a capacity of eight thousand gallons.

The floor of each unit is sloped from the middle towards the outer ends the fall being six inches where in the partition wall between the units there is a manhole at either end connected by twenty-four inch pipe imbedded in concrete and built directly beneath the partition wall. The manhole at the inlet end is the lower and is connected to an eighteen inch sludge drain. This drain is also connected to the manhole in the grit chamber. Plans for the sludge bed have not been prepared and submitted.

The two manholes are provided with overflow connections for each compartment, said overflows being twelve inches square and located one foot above the flow line of the tank. There are submerged ports twelve inches square provided with gates and located two and one-half feet below the flow line by means of which the effluent from one tank can be delivered through the twenty-four inch pipe to the influent end of the other tank, thereby doubling the distance to be traveled by sewage. Stop planks may be placed upon the outlet weir of either tank.

The sprinkling filter is to be one hundred and fifty-two feet long by one hundred and two feet wide and located adjacent to the tank with the longest dimension adjacent to east wall of the septic tank structure. The floor is to be made of concrete and also the wall, and the interior dimensions are to be ninety-six feet by one hundred and fifty feet with an average depth of seven and one-half feet of filtering material.

Along the end next to the septic tank there is a gallery one hundred and fifty feet long and three feet wide, the bottom being even with the floor of the filter in which the influent pipes and operating valves are located. This gallery is roofed over to protect the valves from the weather.

In the dosing tank is to be installed a twelve inch syphon whose discharge will be into an eighteen inch terra cotta pipe leading to the sprinkling filters. The flow line in the dosing chamber will be six and eight tenths feet above the surface of the filter and the bottom of said chamber three and one-tenth feet above and when the flow from the town sewer is at the rate of one million gallons, it is calculated that the dose will continue to flow for about twenty minutes with a period of rest about one half this time. The eighteen inch supply pipe is to be built into the wall of the gallery and it will feed sixteen five inch laterals spaced nine and seventy-five one hundredths feet on centres each provided with a gate in the gallery, thus admitting of the putting out of commission of any section of the filter at choice. These five inch laterals will consist of vitrified pipe imbedded in re-inforced beams supported by re-inforced concrete columns two and five tenths feet high and eight and five tenths feet on centres. At each column there will be a three inch vertical cast-iron riser extending to the surface of the filter and surmounted with a Columbus nozzle. These parallel distributors will be laid sectionally across the filter.

The floor of the filter will slope one foot from the gallery, the filtering material being seven feet deep at the shallow end and eight feet deep at the opposite side where on the bottom and across the entire length of the side will be a collecting chamber eighteen inches in diameter built in the concrete floor and terminating at manholes at either end of the filter. This collecting channel will be covered with a concrete slab. Into this main will lead six inches vitrified channel tiles with slots cut in the sides laid in parallel rows on the concrete floor spaced ten inches on centres across the floor to the inlet gallery on the opposite side. The ends will open into this inlet gallery and a two inch flush line pipe will be provided in the gallery fitted with proper connections for flushing out the sub-drain. The

manholes at the ends of the eighteen main collector will be used to flush. The manhole nearest the run will have an eighteen inch pipe outlet leading to the nearby settling basin.

The filter will be divided into three sections by means of two inch plank partitions held in position by reinforced concrete posts located on twelve and five tenths foot centres. These partitions will extend across the short length of the filter and will divide it into a half section and two quarter sections. The half section is to be filled with slag and the quarter sections are to be filled with limestone and sandstone, respectively. The sizes of stone are not indicated.

Between the filter and the run is to be located the settling basin. It is to be circular, seventy-five feet in diameter and to be divided into two compartments, by means of a wall through the centre. It is to be constructed of earth with the walls three feet wide on top and with slopes one and one-half horizontal to one vertical. The bottom of the interior of each compartment is to be of concrete. The slopes are to be riprapped on the top to a distance of one foot below the flow line and from the bottom for a distance of six inches up. Each compartment will have an effective depth of four feet and a total depth of five feet and will hold thirty-seven thousand five hundred gallons. The eighteen inch pipe from the filters will terminate at the settling basins in a four foot concrete compartment at the end of the partition wall. By means of stop planks the sewage is to be diverted from this chamber into either compartment of the settling basin by means of a twelve inch pipe extending across the end and provided three eight inch branches four feet on centres, submerged twenty-one inches below the flow line. The outlet of each compartment is a concrete weir fourteen feet long and discharging into an outlet gallery connected at a point opposite to the partition wall with an eighteen inch pipe, out of which the effluent is to be conducted to a series of stone steps to the run. The bottom slopes toward the influent pipes where in each compartment is to be a sludge drain leading to the sludge drying area for which plans have not been submitted. The bottom of the basin is ten feet higher than the ordinary level of the water in the run and five feet lower than the bottom of the sprinkling filters.

In the centre of the setling basin is to be a clear water well six feet in diameter and five feet deep with concrete bottom and dry rubble sides. It is expected that infiltration from the basin will keep this well full. Here a pump is to be installed to raise the effluent to a tank to be located on the ground at a sufficient elevation to give adequate pressure to the flushing lines.

The success of the proposed plant would depend upon several things. The features of the design are those incorporated in modern practice, but the capacity of the units and especially the filter based on the rate of two million gallons per twenty-four hours per acre would be inadequate even if all leakage and storm waters were cut out of existing sewers if the entire population contributed to the flow. Therefore, it is important at the outset that sewage only should be admitted to the sewers and that all other flow should be eliminated.

The layout is not best adapted for subsequent additions. There is room for two additional units to the septic tank but according to the present arrangement there is very little room for economical additions to the sprinkling filter unless the land immediately north and now owned by private individuals be purchased by the borough, hence it would be advisable to change the layout which can be easily accomplished without materially increasing the cost.

Vents should be placed in the roof of the septic tank and inspection openings should be left at the weir to permit of the measurements of the flow over them. The sides of the settling basin should be lined with concrete. The cost would not be great and this would insure easy cleaning of the wall which is an important thing. Seepage through the side walls of the clear water well cannot be depended upon. Connecting pipes should be afforded.

The design as a whole is an excellent one and the plant if properly operated should effect over ninety per cent. bacterial efficiency and deliver a clear non-putrescible effluent.

No by-passes for sewage is contemplated in the plans. The nearest point to the run to be approched by sewage will be at the sludge bed. This area must perform a very important function and it must be capable of properly purifying the wastes put upon it. Nowhere at the plant should crude sewage or unpurified sewage be turned into the run. If Indiana Borough should witness a boom in growth then more units would have to be added in the immediate future. The petitioners should be made aware of the fact that a certain process has been patented and is now owned by the Cameron Septic Tank Company and if the tanks herein before described are to be operated in anyway to infringe said patent, that a royalty would be due for the use of the process.

The petitioners have issued bonds for the pavement of some of the borough streets and they purpose to build sewers in these highways before the pavement is laid down. The municipal borrowing capacity is so limited that utmost prudence in the administration of public improvements is demanded. It is unknown what the cost of stopping leakage and other inflow into the sewers except sewage may be. Probably a season's time is required for this work and another season for the erection of a purification plant. Both improvements should be made and be in successful operations by the spring or early summer of the following year.

It has been determined that the interests of the public health will be subserved by approving the proposed sewerage plans and sewage disposal works under the following conditions and stipulations:

FIRST: That all roof, cellar and storm water be eliminated from the sewer system and excluded therefrom and that at the close of each season's work a plan and profile of the work done during the year, together with any other information in connection therewith that may be required shall be prepared by the borough and filed in the office of the Commissioner of Health. And records of all connections with the sewer system shall be made and accurately recorded by the borough.

SECOND: This permission to discharge sewage into the waters of the State shall cease on July first, nineteen hundred and ten, on or before which the borough shall have erected the sewage purification plant and put the same into successful operation.

THIRD: Records of the operation of the plant shall be kept on blank forms satisfactory to the State Department of Health and copies thereof shall be regularly filed with the Commissioner of Health. The borough shall keep in attendance at the plant such watchmen as may be necessary to successfully operate the same.

FOURTH: If at any time in the opinion of the Commissioner of Health the sewerage system or any part thereof or the disposal works or any part thereof shall have become prejudicial to public health or insufficient in capacity or a nuisance or menace, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

FIFTH: Detail plans of the sludge disposal area shall be prepared and submitted to and approved by the Commissioner of Health before the completion of the other parts of the disposal works. Vents shall be placed in the roof of the septic tank, facilities for measuring the weirs shall be provided, the sides of the settling basin shall be lined with concrete and the relayout of the plant as hereinbefore suggested shall be made unless reasons satisfactory to the Commissioner of Health can be shown to the contrary.

SIXTH: No pathogenic material from any labratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

SEVENTH: The borough shall employ such reasonable measures as may be necessary to bring about at the earliest practicable moment the discontinuance of the discharge of sewage and trade wastes into storm drains or natural water courses or the wastes of the State within the limits of the borough, in substantial accordance with the report and recommendations made by the borough engineer and hereinbefore quoted.

EIGHTH: It is the intention of the State Department of Health to have examinations made of the sewers and sewage disposal works and to make suggestions from time to time with respect to the operation of the same. The plants shall be operated under responsible supervision of the expert who builds it or of some other equally competent to perform such service for one year from the beginning of the operation to the end that efficiency and economy shall be obtained.

Harrisburg, Pa., May 28th, 1908.

KANE, McKEAN COUNTY.

This application was made by the borough of Kane and is for permission to extend its sewer system and to establish new sewers and to discharge the sewage thereform into the waters of the State outside of the borough in Wetmore Township, said county.

It appears that on October seventh, nineteen hundred and seven, the Commissioner of Health issued a permit to said borough of Kane, specifying that the permit referred specifically to the extension of an existing sewer on Fraley Street under the Pennsylvania Railroad to the new hotel, and for an eighteen inch relief sewer in Hacker Street and for a twelve inch relief sewer in Dawson Street, the permit for any further extensions or for new construction and use of new sewers and outlets having been held for present under certain conditions and stipulations, among which were the following:

"That the borough shall forthwith employ a competent engineer skilled in such matters to consult with the borough engineer and local authorities and prepare a comprehensive sewerage system for the municipal territory whose object shall be to collect all the sewage and deliver it to one or more common points for purification. The study shall embrace the question of utilization of as many of the existing sewers as may be found practicable in the comprehensive plan, and the elimination of roof water from the system as far as this may be found practicable. It will be prudent for the borough to take into account the sewerage of such territory as is liable to be annexed to the municipality in the near future. The topography is such that the sewage from the small part of the borough within the Clarion River watershed can be conducted into the Kinzua Creek district, where, in Wetmore Township, remotely located, may be found favorable sites for the erection of a sewage disposal plant to serve that district. And in the valley of Tionesta Creek, in Wetmore

Township, below all property likely to be pre-empted in the future for the growth of the borough or its suburbs, there are favorable sites for a sewage purification plant for the treatment of the sewage tributary to this district.

"As soon as such comprehensive plans and studies and a report thereof shall have been submitted to the Commissioner of Health for approval, said Commissioner will give the subject due consideration and, if the interests of the public health demand it, will issue a permit for the construction of sewers in conformity with this comprehensive plan or modification of it.

"SECOND: Such comprehensive plans, together with plans for sewage disposal works, shall be submitted to the Commissioner of Health on or before the first day of May, nineteen hundred and eight. Permission to discharge sewage into the waters of the State shall cease on that date, but if the terms of the permit shall have been complied with, the Commissioner of Health may extend the time for such discharge and fix the date when the sewage disposal works shall be built and put in operation and all sewage in the borough delivered to said works."

On November ninth, nineteen hundred and seven, the conditions of the above permit were modified in a supplementary permit to the extent that the use of existing sewers built since April twenty-second, nineteen hundred and five, was allowed.

The borough has complied with the requirements of the Commissioner of Health and has submitted a comprehensive plan for sewerage and a tentative lay-out for sewage disposal works in the valley of Tionesta Creek.

On account of the peculiar topographical conditions, the town lying in three distinct water-sheds; four hundred and forty-seven acres upon the Kinzua slope, five hundred and fifty acres on the Tionesta slope and about twenty acres on the Clarion slope (the last being eliminated), the problem naturally divides itself into two parts—first, the sewering of the Kinzua slope, and, second, the sewering of the Tionesta slope.

On the Kinzua slope are found many of the sewers already built in the borough and on the combined plan. The dry weather flow from them is discharged through a twelve inch pipe about a mile below the borough in the vicinity of, but lower down than, the old saw-mill. The storm overflow is into a twenty-four inch pipe which parallels a twelve inch pipe, and discharges at a point thirty-eight hundred feet below the borough limits. Both pipe outlets are beyond any permanent settlements that have yet been made in this portion of the valley.

The sewer problem for this slope is to plan extensions to present sewers and to bring the sewage to one common outfall and also to make provision for separating the storm water as soon as requirements may demand it. New sewer extensions are to exclude storm water.

The plans submitted are designed to accomplish these purposes.

It appears that in the central part of the town there are eighty-four acres of land only from whose surface rain water is intended to be wholly taken into the sewers. This territory lies between Fraley, Haines, Hacker and Biddle Streets. There is a tract east of Hacker Street of about eighty acres from which some storm water is taken through street gutters into the sewers. The plan contemplates the laying of a new surface water drain up Hacker Street from the head of Kinzua Creek to serve this eighty acre tract and other land in the vicinity, as it may be developed.

Between Fraley and Chase Streets there are in the said eighty-four acres tract tweleve acres in the heart of the business section from which roof water is now taken into a twelve inch pipe in Field Street, which was primarily built for surface water but receives some sewage. This twelve inch pipe connects with a twelve inch pipe in Chase Street and they in turn discharge into sewers which pass down Bayard Street into the twelve inch sewer which leads to the outfall. The plan proposed is to exclude sewage from the said twelve inch pipes in Field and Chase Streets and to lay a new storm water drain east in Bayard Street to take their flow to the twenty-four inch storm outfall. Elsewhere in the district roof water now reaching the sewers will be gradually eliminated, until when the time shall have arrived for the erection of sewage purification works, the storm flow in the sewers may have been reduced sufficiently. If not, the local authorities will then adopt measures to further eliminate storm water.

On the Tionesta slope the sewers now built have had no storm water admitted to them from the street gutter, so the separation is simplified. Rain water may be readily cared for in the street gutters and the natural channels of the district.

The plans submitted contemplate the interception of the flow of all existing sewers on the slope, both public and private. The new intercepter is to be twelve inches in diameter and to start at the foot of Fraley Street and thence pass down the valley of the creek, principally in Hemlock Street, with an average grade of three per cent. to White Rock Avenue, which is outside of the borough limits in Wetmore Township in the development of the White Rock Land Company. At the foot of this avenue there is at present an eight inch sewer discharging into the creek. It is to be intercepted and from here down the valley to Spring Avenue, a distance of fifteen hundred feet, the sewer will pass across private property, following the contour and on a five-tenths per cent. grade. At the intersection of Walnut and Spring Avenues, in the township, on the land of the White Rock Land Company, the main intercepter, the latter portion of which is to be fifteen inches in diameter, and a ten

inch main to serve the Poplar Street district in the northeasterly part of the borough, join to form the outfall sewer which is to be twenty inches in diameter and to extend westerly in Walnut Street to the site of the proposed disposal works.

Walnut Street is thirty-five feet higher and six hundred feet distant from Tionesta Creek. The ground slopes more steeply from the highway for one hundred and fifty feet and here it is proposed that sewage tanks shall be erected. Beyond this part the land slopes gradually to the creek and on this part it is proposed that sprinkling filters shall be installed. Plans submitted, though tentative show conclusively that there is ample vertical height and also superficial area for the installation of a disposal plant which may be adapted when the time comes to the economies of the case. Should a critical examination prove it to be desirable to locate the plant further down the stream, this can be done without prejudice to the carrying out of the plans herein considered.

In the Kinzua valley a favorable site is represented by the petitioners to be at the saw-mill. Were this saw-mill to be abandoned, the borough might acquire the property for sewage disposal works. If not, a tract further down might be chosen. The local authorities wish to have the matter of site for this district left open for the present. It is represented that the council can act with greater prudence in this way.

A sewerage permit was issued on October eighth, nineteen hundred and seven, to the White Rock Land Company, on condition that plans of the existing sewers and for some other disposal of the sewage than into the waters of the State shall be submitted on or before the first day of May, nineteen hundred and eight. Such plans have not been submitted but the project now outlined by the borough affords a means for some other disposal, not only of the sewage from this company's tract as now developed, but for other areas of large extent belonging to the company which must ultimately sewer into Tionesta Creek valley. The borough, therefore, has devised a comprehensive sewerage plan which admirably answers the practical needs of to-day and is wisely calculated to serve the future needs of a greater borough.

It has been determined that the interests of the public health will be subserved by approving the proposed comprehensive sewerage plans and that a permit be issued therefor whereby extensions may be made from time to time and the sewage therefrom discharged into the waters of the State. The same are hereby and herein approved and a permit granted therefor under the following conditions and stipulations:

FIRST: That all storm water shall be excluded from the system or, if admitted, it shall be under such conditions as shall provide for its exclusion from the sewers whenever the necessity therefor shall arrive.

SECOND: At the close of each season's work the borough shall file in the office of the State Department of Health a plan of the sewers laid during the year with any other information in connection therewith that may be required, to the end that the Department may be always informed of the extent and use of the system.

THIRD: This permit to discharge sewage into the waters of the State shall cease on the first day of May, nineteen hundred and eleven. If on that date the other terms of this permit shall have been complied with and the interests of the public health will be subserved thereby, then the Commissioner of Health may extend the time in which sewage may be permitted to discharge into the waters of the State. However, should the occasion arise requiring it, the Commissioner of Health may order the borough to prepare detail plans for the erection of the disposal works, in which event such plans shall be submitted on or before May first, nineteen hundred and eleven.

FOURTH: If at any time, in the opinion of the Commissioner of Health, the sewer system or any part thereof is a nuisance or menace to public health, then the borough shall adopt such remedial measures as the Commissioner of Health may advise or approve.

FIFTH: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

Harrisburg, Pa., May 18, 1908.

KITTANNING, ARMSTRONG COUNTY.

This permit is issued to the borough of Kittanning, Armstrong County, and is to make certain extensions to its sewer system in response to applications made therefor by said borough.

It appears that Kittanning borough is the county seat of Armstrong County, a town of about five thousand population. It is located on the east bank of the Allegheny River largely on a level stretch of ground sufficiently elevated above the river to escape freshets. These flats are about half a mile wide, and back from them a range of hills rises abruptly.

Part of the borough territory is on the hillside. The town stretches along the river for a distance of about one and a half miles. Immediately up stream to the north lies the borough of Wickboro, practically a part of Kittanning, so far as the one community is concerned. Wickboro has a population of about fifteen hundred to twenty hundred people. While these towns are residential places, nevertheless a

considerable part of the population is supported by the industries which comprise extensive glass works, china and brick works and the manufacture of steel and iron.

The Buffalo and Allegheny Division of the Pennsylvania Railroad extends across the flats, paralleling the river. McKean Street, which is the main thoroughfare of the borough, parallels the tracks and is between them and the river. In fact two-thirds of the residents of the town, and practically all of the business is located between the railroad and the river. Surface water from the hillsides comes down on the flats and has given rise to the construction of a combined sewer system, the principal object of these sewers in the first instance being to remove the storm water under ground to the river preventing it ponding up east of the railroad.

The public supply of water to Kittanning and Wickboro is now furnished by a private corporation known as the Armstrong Water Company. Formerly this company supplied Kittanning borough only and there were other companies furnishing water to Wickboro borough.

Water is pumped from the river into a reservoir on a hill back of the town, or forced directly into the water pipe system. A portion of the supply is from springs on the hills. These springs are the original sources of supply of the Reyburn Water Company which formerly supplied water to Wickboro. The source is limited and there is an emergency intake in the upper part of Wickboro borough by means of which the river water can be introduced into the pipe system.

The main intake of the Armstrong Water Company is into the river opposite the foot of Arch Street which is in the central part of the borough and one block above Market Street highway bridge over the Allegheny River. The water is subjected to filtration before being supplied to the consumers, unless for some cause raw river water is pumped directly into the pipe system. This practice has been prohibited by the Commissioner of Health.

In the upper settlement in Wickboro, in the vicinity of the old Reyburn Water Company's pumping station, there are sewers in the different streets which have a twenty-four inch outlet into the river below the station, but above the pumping station of the Armstrong Water Company in Kittanning borough. Connected with this system there are nearly a mile of lateral sewers.

In the central part of Wickboro there is a twenty-four inch sewer outlet to the river, connected to which there is about ten thousand feet of lateral sewers.

Again in a southern section of Wickboro borough, adjacent to Kittanning, there are sewers which have an outlet into a Kittanning borough sewer which empties into the river at the foot of Union Avenue, also known as Cemetery Street.

The sewers of these three districts in Wickboro take surface and roof water as well as sewage, and their outlets are all above the intake of the Armstrong Water Company.

Within the borough of Kittanning and above said water works intake there are the following sewers:

A thirty inch sewer at the foot of an alley just north of Cemetery Street or Union Avenue.

A twenty-four inch sewer outlet at the foot of Cemetery Street.

A forty-two inch brick sewer outlet at the foot of Vine Street.

Below the county bridge at Market Street there are four public sewer outlets into the river, viz: two sewer outlets immediately below the bridge from Market Street being eighteen inches and twenty-four inches in diameter respectively; a twenty inch sewer outlet opposite the foot of Jacob Street, and a sixteen inch sewer outlet in the lower end of town opposite the rolling mill of the Kittanning Iron and Steel Company.

These sewers are built on the combined plan mostly. Probably all of them take roof water and most of them take considerable roof water and sewage. There is no information on file in the Department showing the grades of these sewers, or the location of surface water inlets. From reports at hand, it would appear that the town and especially the built up section is very well sewered. It is reported also that most of the properties have a connection with the sewer system, there being few privies between the river and the railroad tracks. Back of the railroad towards the hill is the unsewered section of the town and it is in this district that additional sewers will have to be laid.

It is here that surface water even now ponds up. The existing sewers to the river do not have sufficient capacity to remove the rain water from the streets and roofs during times of intense downpours. There is a need for more efficient surface drainage as well as for sanitary sewers.

The application of October nineteenth, nineteen hundred and seven, for a fifteen inch sewer in North Grant Avenue is for three hundred and fifty feet of fifteen inch pipe which is to be used as a combined sewer. There is at this point in Grant Avenue a depression in the street grade where the surface water collects and is discharged into a forty inch brick sewer which extends in an alley in McKean Street, thence in McKean Street to Vine Street and thence by a forty-two inch sewer the water is conveyed to the river at the foot of Vine Street. This was substituted in place of a former natural water course.

The applicants do not state why it is necessary to have a fifteen inch pipe and combined sewer here. From information at hand it would appear that this is a lateral

which will never have to be extended, and therefore, if sewage is ever to be separated from storm water, this is an instance where that principle should be put into effect in the borough.

The application of June second, nineteen hundred and eight, for a thirty inch sewer between McKean Street and the railroad is to fill a gap between two existing sewers, which gap is now an open ditch. It is evident that this structure must always serve as a storm drain for it takes the place of a natural water course. Hence, when complete separation of storm water from sewage is effected, this thirty inch sewer proposed must continue to be a storm drain.

The proposed Clay Alley sewer and its connection is to be an eighteen inch pipe about three hundred feet long. This sewer is to take storm water and house drainage also. Its primary object is to remove surface water which ponds up in the gutters and creates a nuisance. As soon as this sewer is built, the adjoining properties, totalling possibly fifteen, will be connected up to the sewer, so it is expected. On these properties at the present time there are outside privies which are not kept in a satisfactory condition. The local Board of Health has demanded of the borough council that it lay a sewer to do away with the local nuisance and councils are prepared to build the sewer as soon as a permit shall have been issued by the Commissioner of Health.

On May fourth, nineteen hundred and eight, the Commissioner of Health issued a permit to the borough of Wickboro to discharge sewage temporarily into the Allegheny River under certain conditions and stipulations, among which were the following:

"FIRST: This permit to discharge sewage into the waters of the State shall cease on May first, nineteen hundred and ten. If at that time the interests of the public health demand it and the other terms of this permit shall have been complied with the Commissioner of Health may extend the time in which sewage may continue to discharge into the Allegheny River.

"SECOND: On or before May first, nineteen hundred and nine, Wickboro shall either independently or in conjunction with Kittanning borough prepare a comprehensive plan for the collection of all of the sewage of the borough and its conveyance to some point for the ultimate treatment of the sewage and submit such plans to the Commissioner of Health for consideration and approval.

"The attention of the local authorities is hereby called to the fact that the epidemic of typhoid fever and stomach disorders of the winter of nineteen hundred and six and seven has been attributed to the sewage pollution of the Allegheny River water, and that while the State Department of Health has done what it could to bring about the proper filtration of the public water supply of Kittanning and Wickboro boroughs, and will continue to exercise supervision thereover, nevertheless, it is all important that the discharge of sewage into the river above the water works intake should be discontinued and the borough officials should understand that it is the purpose of the State to require Wickboro borough and Kittanning borough to make changes in their sewer outlets at the earliest practicable moment and to this end said local authorities are urged to prepare the plans called for during the current season and as early as possible."

The Department is informed that Kittanning has about reached the constitutional limit of indebtedness and that it is not in a position to undertake at this time the erection of sewage purification works or the separation of sewage from storm water in the existing sewers. Accepting this as a fact, it does not appear to be true that the borough cannot afford to devise plans for improved sewerage system and for the ultimate treatment of the sewage. If this were done and the plans adopted, then the local authorities could lay down lateral sewers from time to time as improvements were demanded, and do this in a way that would insure no blunders or necessity of reconstruction of sewers in the future.

The surcharging of the existing sewers during the heavy rainfalls, indicates the desirability of further improvements in surface drainage. It is not possible to purify both sewage and storm water and when sewage disposal works shall have been built at Kittanning, the household drainage only can be treated because of the prohibitive cost of treating mingled sewage and storm water. This is another reason why economy and efficiency dictate that comprehensive plans should be devised at the earliest possible moment and adopted. Since Kittanning and Wickboro are practically one community and their interests are one with respect to the public water supply, the economies of the situation would dictate that the two towns join in the preparation of plans for improved sewerage and sewage disposal and this idea is heartily commended to the consideration of the local authorities.

There would seem to be no objection to granting the right to the borough to build the Clay Alley combined sewer, since it is always to be a storm drain, provided the borough exclude sewage from it, or if the sewage be admitted, it shall be under terms whereby the sewage may be excluded whenever this should appear desirable. There seems to be no reason also why the interests of the public health will not be subserved by granting the borough permission to fill in the gap in the line of the proposed thirty inch sewer between McKean Street and the railroad. However, the necessity for the fifteen inch extension in Grant Avenue as a storm sewer is not apparent. This sewer should be laid as a sanitary sewer and if storm water be admitted it should be only temporarily and under conditions whereby such waters shall be excluded at any time the Department of Health may determine it to be necessary.

It has been determined that the interests of the public health will be subserved by granting a permit to the borough of Kittanning, and such permit is hereby and herein granted for such extensions under the following conditions and stipulations:

FIRST: This permit to discharge sewage into the waters of the State shall cease on May first, nineteen hundred and ten. If at that time the interests of the public health demand it and the other terms of this permit shall have been complied with, the Commissioner of Health may extend the time in which sewage may continue to discharge into the Allegheny River.

SECOND: On or before May first, nineteen hundred and nine, Kittanning borough shall either independently or in conjunction with Wickboro borough prepare a comprehensive plan for the collection of all of the sewage of the borough and its conveyance to some point for the ultimate treatment of the sewage and submit such plans to the Commissioner of Health for consideration and approval. Failure on the part of the borough to comply with this condition shall constitute a forfeiture of the borough's right to discharge sewage into the waters of the State from the sewer extensions herein approved.

THIRD: Sewage shall be admitted, if at all, into the Clay Alley combined sewer proposed and into the thirty inch sewer proposed under terms whereby such sewage may be excluded whenever this shall appear to be desirable or necessary in the opinion of the Commissioner of Health and the borough council be notified of the fact.

FOURTH: The Grant Avenue extensions shall be laid as a sanitary sewer and all storm water shall be excluded, or if admitted at all, it shall be temporary only and under conditions whereby such water shall be excluded at any time the Commissioner of Health may determine it to be necessary.

FIFTH: Since the borough has not submitted a satisfactory plan and report of its exisiting sewer system, it is hereby specially stipulated that such plans and report shall be submitted not later than December first, nineteen hundred and eight. To longer delay the filing of such plans and report will be understood to be an intended violation of State law and the Commissioner of Health shall govern himself accordingly.

Harrisburg, Pa., October 5, 1908.

LANCASTER, LANCASTER COUNTY.

This aplication was made by the city of Lancaster and is for permission to make two lateral sewer extensions and to discharge the sewage therefrom into existing sewers which are a part of the Water Street sewer system, so called, and also for permission to make a short sewer extension at a summit and to discharge the sewage therefrom into an existing sewer which is a part of Carpenters Run district sewer system in said city.

It appears that in the city of Lancaster, in the northwestern portion thereof, on a street known as Columbia Avenue extending from West End Avenue westerly a few hundred feet to the city line, there are several new dwellings to which private parties wish to build a sewer under the direction of the public officials and in such a way that the sewer will become a part of the sewer system. It is proposed to build an eight inch sewer from the existing fifteen inch combined sewer in West End Avenue, in Columbia Avenue a distance of three hundred feet to a manhole. The proposed sewer will be used strictly for the removal of sewage proper, and when the sanitary sewer system now being designed for the city is eventually constructed, this eight inch pipe is to become a part of such sanitary sewer system.

It further appears that in this vicinity in West End Avenue it is proposed to lay an eight inch sanitary sewer southerly from First Street to the summit near Second Street where a manhole is to be placed. This line is also to be used exclusively for sewage and is to become a part of the sanitary sewer system of the future. Temporarily it will discharge into the fifteen inch combined sewer in West End Avenue at First Street and through this and other sewers into Gas Run or the Water Street sewer system.

It also appears that in the southeastern portion of the city there is a twenty-four inch combined sewer in South Lime Street and Juniata Street which empties into Carpenters Run. On the extension of South Lime Street at the corner of Juniata Street, there are six new houses nearly ready for occupation, which must have connection with some sewer outlet before any one will take up residence there. The petitioners wish to build two hundred feet of sewer to a summit where a manhole will be provided.

Carpenters Run discharges into Conestoga Creek three miles below the city water works intake. It drains an area of one hundred and sixty-nine acres wholly within the city limits. In this district there is a population of thirty-five hundred or more and it is rapidly increasing. The contents of three sewers, namely a forty-eight inch sewer in Dauphin Street, a forty-eight inch sewer in Carpenters Alley and a thirty inch sewer in Juniata Street are discharged into this run and pass down this stream in an open natural water course, a distance of about sixteen hundred feet to the creek. The first sewer was built in eighteen hundred and ninety-two, the second in eighteen hundred and ninety-six, and the third in nineteen hundred, each in

accordance with an ordinance directing its construction. A large number of dwellings are connected to these sewers, and the sewage polution of the stream was made the subject of a suit for damages by the owner of porperty through which a part of this run extends. The suit was for permanent injury to said property on the basis that the stream was appropriated permanently as a part of the sewer system of the city of Lancaster, there being no other place for the contents of these to empty. This was held by the Court to be a permanent adoption of the stream as a sewer, and the jury found the plaintiff was injured to the amount of three thousand nine hundred and ten dollars. Judgment was affirmed on appeal in an opinion handed down by Mr. Justice Brown, June twenty-second, nineteen hundred and five.

Peter M. Wohlson, owner of land along the run, also brought suit for damages and obtained a verdict. The case has been adjusted under terms whereby the city agreed to extend the sewer down the alley of the run to Conestoga Creek.

Temporary sanction of the sewer outlets through which the petitioners propose that the sewage from the extensions herein being considered shall be discharged into the waters of the State, was unanimously given by the Governor, Attorney-General and Commissioner of Health in a sewerage permit issued by the Commmissioner of Health during nineteen hundred and six to the city of Lancaster.

In compliance with an understanding reached with said city, plans are now being prepared for a comprehensive intercepting and sanitary sewer system for the entire city and these plans are nearing completion and are to be submitted to the Commissioner of Health for approval in the near future. Several petty sewer extensions at summits have recently been granted in said city and there seems no good reason why the three extensions herein mentioned should not be granted.

It has been determined that the interests of the public health require that a permit be granted and is hereby and herein granted to the city of Lancaster to build the proposed sewer extensions under the following conditions and stipulations:

FIRST: That the proposed sewers shall be constructed in conformity with the plans thereof filed with application, and shall be used as sanitary sewers only, and eventually they shall be incorporated into the sanitary sewerage system for the entire city, for which plans are now being prepared by the city.

SECOND: It is stipulated that this permit shall operate as an extension of the said sewerage permit of nineteen hundred and six only in so far as it relates to the three particular sewers herein approved.

Harrisburg, Pa., February 3rd., 1908.

LANCASTER, LANCASTER COUNTY.

This application was made by the city of Lancaster and is for approval of plans for a sanitary sewerage system and for the temporary discharge of sewage therefrom into the Conestoga Creek within the limits of said county.

It appears that there have been five sewerage permits issued to Lancaster City. The first one was on May seventeenth, nineteen hundred and six, and among other things provided as follows:

"FIRST: That on or before said date, May first, one thousand nine hundred and seven, the city shall submit a plan of a separate system of sewerage, so called, comprising a system of sewers into which the discharge of roof or surface water shall be excluded, and whose object shall be to provide for the collection of all of the sewage of the city and its speedy removal to one or more common point or points where the sewage shall be treated according to plan to be prepared by the city and submitted for approval to the Commissioner of Health when called for by him.

"SECOND: That on May first, one thousand nine hundred and seven, provided, the city of Lancaster has complied with the above conditions, the Commissioner of Health may extend the time and fix the date of said extension, wherein the city of Lancaster may discharge sewage from its sewers into Conestoga Creek, provided, still further, that the city of Lancaster shall have constructed on or before said date a dam across the Conestoga Creek at a point near and just below the present city water works intake, according to plans drawn by F. H. Shaw and on file in the office of the Commissioner of Health, or in substantial accordance therewith, whereby means will be afforded for preventing sewage from any of the city sewers or from the pumping station, dwellings in the vicinity and wash water from the filter plant from reaching the said intake."

The second permit was issued on October twenty-second, nineteen hundred and seven, for a short lateral sewer extension in West Vine Street in which the attention of the local authorities is called to delay in fulfilling the terms of the original permit. The words used were as follows:

"Attention of the city authorities is called to the fact that the administration of the law of nineteen hundred and five does not contemplate the continuous application to the State authorities for petty sewer exensions, and that, therefore, as soon as the terms of the sewerage permit of nineteen hundred and six to said city shall have been complied with, a general permit for the extension of sewers anywhere within the municipal limits, in conformity with the comprehensive plan to be prepared and filed wth the State Department of Health will be issued. It is only

because the city has delayed to fulfill the terms of said permit that at this time it is necessary for a special application to be made for the construction of the public sewer in Vine Street."

The next permit was dated December fourth, nineteen hundred and seven, and was for several petty lateral sewer extensions at summits in the Water Street district sewer system of the city.

On December fifth the Commissioner of Health issued a decree approving plans for its sanitary sewer system for a portion of said city, said portion being District Number Two, known as the Clay Street Drainage District, and granting permission to discharge sewage therefrom into the Conestoga Creek as the present outlet of the Clay Street district system.

It appears that the Special Sewerage Commission of the city of Lancaster was not authorized by councils to prepare a system of sanitary sewers for said city until August twenty-second, nineteen hundred and seven, whereupon such plans were prepared for Drainage District Number Two and plans for other portions of the city were in progress of design on December fifth. The petitioners, showing that a great urgency for the immediate construction of sanitary sewers in the district existed, were granted a permit issued under certain conditions, among which were the following:

"This permit to discharge sewage into the Conestoga Creek shall cease on the first day of January, nineteen hundred and ten, and provided the other terms of the permit shall have been complied with on said date, the Commissioner of Health may extend the time in which sewage may continue to be discharged from the proposed sewers into the waters of the State. But if, on or before January first, nineteen hundred and nine, the city of Lancaster has not erected or taken active steps to erect a dam across the creek immediately below the water works intake, in accordance with plans to be prepared and submitted to the Commissioner of Health for approval as a part of the completion of the sewerage improvements, as fully hereinbefore outlined, then on January first, nineteen hundred and nine, the discharge of sewage into the waters of the State from the sewers herein approved shall be without State sanction and render the city liable to the penalty prescribed by law for discharge of sewage without a permit.

"This permit is also given under the express stipulation that the submission of the plans of the comprehensive sewerage system for the entire city, called for in the said permit of May seventeenth, nineteen hundred and six, shall be made to the Commissioner of Health not later than March first, nineteen hundred and eight."

The last permit was issued on February third, nineteen hundred and eight, for petty lateral extensions of sanitary sewers in the Water Street Sewerage District and in Carpenters Run District.

The plans submitted by the city and now under consideration are for a system of sewers into which the discharge of roof or surface water is to be excluded and whose object is to provide for the collection of all of the sewage of the city and its removal to convenient points for ultimate treatment.

Lancaster city is located in the valley of Conestoga Creek about thirteen miles above the mouth of the stream at the Susquehanna River. The municipal territory is about two miles square and within this area and suburbs is a population of about fifty thousand people. It is a prosperous and wealthy community; the industries are varied and important. There are tanneries, iron works, silk mills, and extensive plant for the manufacture of corks, linoleum works, boiler shops, cigar factories, soap works and numerous others. Within the last four years about five hundred thousand dollars have been expended on improvements to the municipal water works and sewer systems. It is estimated that twenty-five thousand people reside in houses connected to the sewer system and that ninety per cent. of the population live in dwellings located on the lines of existing sewers, so there are over fifteen thousand people whose sewage is otherwise disposed of than into drains.

Cesspools are common. They are of the loosely walled up kind. Possibly a hundred domestic wells are used as sources of drinking water. It is reported that in the district called "Germantown" typhoid fever among the well users is of rare occurrence and was so before the installation of the public filter.

Conestoga Creek passes southerly just east of the city, cutting across the extreme southeastern corner of Lancaster, and it drains about all of the city territory. A small area drains westerly to the tributary called Little Conestoga Creek. The proposition to enlarge the municipal area to take in all the land on the east to Conestoga Creek and on the west to the Little Conestoga and all of the suburbs to the north is now being seriously considered. The future sewage problem of the outskirts is one of the arguments for annexation. The plans proposed by the city contemplate the larger scope of territory excepting that for the Little Conestoga district.

At present the city sewers take both sewage and storm water. The earlier sewers were built perhaps over one hundred years ago. Those which have been added from time to time since, until recently, do not appear to have been designed upon a uniform basis. Many of the four, five and six foot sewers are larger than need be. The smallest size street sewer is fifteen inches. The largest size is six by twenty feet. The average depth to the bottom of the old sewers is about eight feet, so that many of the large sewers come quite close to the surface of the ground. Until within five years all the sewers discharged into small water courses in the city. The extension of trunk sewers down the valleys was planned in nineteen hundred and three, voted the same year and had been carried out in all but the Water Street dis-

trict prior to nineteen hundred and six, when the city made application for approval of the Gas Run sewer outlet, the subject of the first permit hereinbefore mentioned.

There are four sewer outlets into the Conestoga Creek at the present time, named in order up stream as follows: Water Street or Gas Run; Strawberry Street; Carpenters Run, and Clay and Lemon Streets.

The Water Street or Gas Run district comprises the business section which was formerly old Lancaster proper, an area of about one thousand acres and a population of over twenty-five thousand people. Running southerly through this district was formerly a water course known as Gas Run. In nineteen hundred and six, for a distance of about three-quarters of a mile above the point where the run emptied into Conestoga Creek, it was an open water course mostly unimproved, terminating about three hundred feet below Water Street and German Street, where a semi-circular culvert sixteen feet in diameter began. Along this open part were industrial plants, among which were tanneries, a cotton mill, soap works, gas plant and fertilizer manufactory, all discharging sewage into the stream and at five hundred foot intervals at right angles to the run were highways, at the foot of which public sewers had outlets.

Above German Street the course of the run was obliterated, its place having been substituted by large masonry drains and sewers, the trunk of the city's sewer system.

Since then the city has constructed under State approval an extension of Gas Run storm drain down the valley to the Conestoga Creek. It is a nine foot reinforced concrete structure intended to take storm water only and on either side in the foundations eighteen inch sanitary sewers were provided to serve as the intercepters for the sanitary sewer system of the contiguous district whose extent was undetermined at the time. At the present time the finishing touches to the nine foot sewer are being made and presently the open water course will be abandoned and filled up. Then all of the combined sewers in the district will discharge into the new structure until by degrees the sewage is separated and delivered to the proposed sanitary sewers.

At the mouth of the run a broad streak of sewage sleek appears on the surface of Conestoga Creek. Indications of putrefaction of sewage organic matter on the bottom of the creek may be seen in the vicinity of the outlet. The water is shallow and a very considerable deposit of sewage sludge is evidenced. Sedimentation is provided undoubtedly by slack water caused by a mill dam across the creek less than a mile down stream. The pool extends beyond Strawberry Street outlet. No complaint has been registered in the State Department of Health about a nuisance. The insecurity of the city's use of Conestoga Creek as a sewer and the ultimate necessity for purification of city sewage were the controlling reasons which brought into existence the plans for sanitary sewerage.

The Strawberry Street district outlet is a twenty-four inch pipe emptying into the creek at the foot of Strawberry Street in the city. There are no houses in the vicinity. The area served is about one hundred and fifty acres and contains a population possibly of one thousand. It lies between Gas Run and Carpenters Run.

Carpenters Run drainage district comprises an area of one hundred and seventy acres within the city limits. It lies south of the Lemon Street district and east of the Water Street district and extends easterly to the Conestoga Creek, taking in the extreme southeastern corner of Lancaster. The population is about thirty-five hundred and rapidly increasing. The county almshouse just outside the city limits is in the district and so is the Thaddeus Stevens Industrial School for which a State appropriation of one hundred thousand dollars was recently made.

At present the contents of three sewers, a forty inch structure in Dauphin Street, a forty inch sewer in Carpenters Alley and a thirty inch sewer in Juniata Street, discharge into the run and thence along the open water course a distance of about sixteen hundred feet to the creek. The first sewer was built in eighteen hundred and ninety-two, the second in eighteen hundred and ninety-six and the third in nineteen hundred, each in accordance with an ordinance directing its construction. More than two hundred houses are connected with these sewers. The owner of property through which a part of this run extends brought suit for permanent injury to said property on the ground that the stream was appropriated permanently as a part of the sewer system of the city of Lancaster, there being no other place for the contents of the sewer to empty. The court held this to be a permanent adoption of the stream as a sewer and the jury found that plantiff was injured to the amount of three thousand nine hundred and ten dollars. Another owner of land along the run also brought suit for damages and obtained a verdict. The case was adjusted under terms whereby the city agreed to extend the sewer down the valley to the creek. Carpenters Run empties into the creek about three miles below the point where the Clay and Lemon Street sewer discharges. Between these two points there are two mill dams both owned by the city, the lower one being the old water works pumping station power house and dam, and the upper one being known as the Rankes mill dam.

The Lemon Street drainage district is District Number Three in the city's classification. It contains two hundred and ninety-one acres within the city limits and seventy-eight acres outside along the creek and a total area of three hundred and sixty-nine acres. Its population is five thousand six hundred, of which about five hundred live in the township. It was formerly drained by a run extending easterly and joining the Clay Street Valley Run outside of the city limits at a point about two thousand feet west of the Conestoga Creek. Into this run the forty-eight inch sewer in Broad Street, the forty-eight inch sewer in Franklin Street, a twenty-four inch sewer in Plum Street and the eighteen inch sewer in New Holland Avenue, dis-

charged prior to nineteen hundred and three. Since then a seventy-eight inch circular sewer has been substituted for the run from Franklin Street easterly to the Clay Street extension, where both sewers empty into a ten foot sewer known as the Clay and Lemon Street outlet, which is into the Conestoga Creek at a point twelve hundred feet below the intake of the city water works plant and about one-quarter of a mile above Rancks Mill dam.

The Clay Street district sanitary sewer system is fully described in the permit of December fifth, nineteen hundred and seven, to which reference may be had for particulars. It covers the territory in the northern part of the city.

The run above mentioned has been filled up as far as Franklin Street, but between this point and New Holland Avenue it is still an open water course and receives as formerly the Lemon and New Holland Avenue sewer flow and also a large volume of bleaching fluid from the cork works. This is strong in chlorine.

The proposed sanitary sewer system provides for a separate sewer in every street except in the southwest corner of the city. In a majority of the cases the sewer will be eight inches in diameter. Manholes will be provided at street intersections and at changes in line and grade. Ventilation is to be effected through manhole covers and the grades are such as to assure cleansing velocities.

Owing to the topography and the economies of the situation it is proposed to have three sewage purification plants, namely, in Lancaster Township near the outlet of the present Clay and Lemon Street sewer, in the vicinity of the outlet of Carpenters Run and in West Lampeter Township near Gas Run outlet.

The Water Street plant will be reached by gravity flow from the area comprising all but a small territory near the run in the lower part of the valley. The outlet will be thirty inches in diameter terminating in an inverted syphon under the creek to the general location of the disposal plant. The low area in the district will have sewers intercepted by the existing eighteen inch sewer provided in the side of the nine foot storm drain whose discharge will be into a pump well from which the sewage will be automatically raised to the nearby disposal works.

The Carpenters Run plant can be reached by gravity. The district comprises both Strawberry Street and Carpenters Run areas as now served by existing sewers. The intercepting sewers will be twenty inches, twelve inches and ten inches in diameter and they will meet at an elevation sufficiently high to deliver the sewage to a purification plant located anywhere in this part of the town along the stream.

The Clay and Lemon Street plant will also be reached by gravity, the main outlet being thirty inches in diameter. The precise location of the plant has been left undetermined. A boulevard scheme to traverse the west bank of Conestoga Creek through the city is under contemplation. Its possible consummation is a factor in locating the sewage disposal works. There are also areas along this stream so low that sewage from them would require to be pumped if the lands should be occupied and require sewerage facilities.

The city's policy of procedure will be to construct sanitary sewers in streets where there are no combined sewers at the present time, providing for storm drainage by shallow drains. The sewers now in existence and receiving sewage and storm water are to be continued as combined sewers until it becomes necessary to separate the sewage from storm water.

By a regulation duly adopted it appears that the city requires a property owner in connecting to an existing combined sewer to enter into an agreement that when a sanitary sewer is provided he will connect his property with said sanitary sewer and that nothing but house drainage shall be emptied into it and that nothing but storm water must then be emptied into the storm sewer.

Immediately below the city is Levans mill dam and five miles below is the Wabank dam and power house, three and a half miles further down stream Slackwater dam, a mile further on Rockhill dam and a mile above the Susquehanna River, Taylors dam. The region is a rural one, pastures abutting the creek banks.

The water shed of the main creek below the city water works is one hundred and fifty-four square miles, including the tributaries. A simple calculation will show that during a very dry spell when the entire flow of the creek might be appropriated for supplying water to the city of Lancaster, the flow of the stream below would be nothing except that from the city sewers and from the one hundred and fifty-four miles of water shed, the former being in excess of the latter. Hence it is clear that the whole length of the creek from the city to the river would be during a prolonged drought an open sewer. This forebodes litigation if the city does not obviate the nuisance. No complaints, however, have been made to the State Department of Health by owners of property rights in the creek.

It is reported that the city has a low assessed valuation and a low tax rate and that its borrowing capacity is far beyond the present indebtedness and, therefore, the municipality is able without assistance to undertake the improved sewerage and sewage disposal project. But the construction of the purification works must follow the separation of the sewage from storm water in the town sewers and such separation is a work of gradual accomplishment. And hence while all due haste should direct sewer building and reconstruction in the city, some delay may be countenanced in the erection of purification plants.

Meantime the question should be looked into further in connection with the boulevard project of the precise location and the detail layout of the sewage works and possibly such a study might suggest important modification of the plans at the out-

lets. These considerations, however, are beyond those obtaining with the sewer design for the town itself, which design, if acceptable, should be adopted and strictly adhered to in construction.

It has been determined that the interests of the public health will be subserved by approval of the proposed plans, and they are hereby and herein approved and a permit issued therefor under the following conditions and stipulations:

FIRST: This permit to discharge sewage into the waters of the State from the Lemon Street sewerage district and from the other districts hereinbefore mentioned, excepting the Clay Street drainage district previously provided for in the permit of December fifth, nineteen hundred and seven, shall cease on the first day of July, nineteen hundred and eleven, and provided the other terms of this permit shall have been complied with on said July first, nineteen hundred and eleven, the Commissioner may extend the time in which sewage may continue to be discharged from the proposed sewers into the waters of the State. But if on or before January first, nineteen hundred and nine, the city of Lancaster has not erected, or taken active steps to erect, a dam across the creek, immediately below the water works intake, in accordance with plans to be prepared and submitted to the Commissioner of Health for approval as a part of the completion of the sewerage improvements, then on January first, nineteen hundred and nine, the discharge of sewage into the waters of the State from the sewers herein approved shall be without State sanction and shall render the city liable to the penalty prescribed by law for discharge of sewage without a permit.

SECOND: On or before July first, nineteen hundred and eleven, the city shall prepare detail plans for the erection on a definite site or sites of works for the treatment of all of the city sewage, both domestic and manufactural, and shall submit such plans to the Commissioner of Health for approval.

THIRD: The city shall adopt by ordinance or otherwise and enforce such adequate measures as shall be calculated to aid the householder to economically separate house sewage from storm water on his premises and the city shall proceed with due diligence to bring about a general use of the sanitary sewer system as fast as it shall be constructed in strict conformity with the plans herein approved.

FOURTH: At the close of each season's work the city shall prepare a plan of the sewers laid in each district during the year and file the same with the State Department of Health, together with any other information in relation thereto that may be required, to the end that the Commissioner of Health may always be informed of the extent and general use of the public sewerage system. Within its incorporated territory the city shall prohibit the discharge of all sewage and manufactural wastes into natural water courses and shall take such steps as may be necessary in co-operation with the State Department of Health to discontinue all such discharge. For this purpose storm drains shall be considered as natural water courses unless otherwise provided and then such use thereof shall be temporary only and cease when the purification plant shall have been erected.

FIFTH: No pathogenic material from any laboratory shall be discharged into the sewer system The proper authorities shall cause these wastes to be destroyed on the premises.

SIXTH: If at any time it appears to the State Department of Health that the sewer system, or any part thereof, has become a nuisance or menace, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise, but this relates more particularly to the functions of the sewers themselves. All roof and storm water shall be excluded from the sewers, or if admitted the admission shall be temporary only and under terms whereby the absolute exclusion from the sewers of all roof and storm water shall be effected when the time shall have arrived for some other disposal of the sewage than into the Conestoga Creek as now approved.

SEVENTH: The importance of careful construction of the sanitary sewers, the making of the joints of the pipe water tight and the maintenance of the sewer intact and water tight thereafter cannot be overstated. It is stipulated that the proposed sewers shall be constructed under competent engineering and supervision and inspection, and that a record of all connections with the sewer system shall be kept by the city. Attention to these details now will render more efficient and economical such works as shall ultimately be adopted for the proper disposition of the city sewage.

EIGHTH: Before sewers shall be built in Little Conestoga Creek valley, plans thereof shall be prepared and submitted to the Commissioner of Health for approval. The especial attention of the city government is called to the fact that the Thaddeus Stevens Industrial School is providing a combined sewer outlet for connection with the city sewer.

In connection with the domestic well supply, whose maintenance is always suspicious in a built-up community, particular examinations of the waters is advised and prompt condemnation of the tests prove contamination. Compulsory sewer connections are a partial remedy only.

Harrisburg, Pa., June 11, 1908.

LANSDOWNE, DELAWARE COUNTY.

This order and decree was issued by the borough authorities of the borough of Lansdowne, Delaware County, Pennsylvania, relative to the discontinuance of the discharge of sewage into the waters of the State in the said borough and elsewhere in response to a communication submitted by them. The following is a copy of this letter:

"The Natural History Club of Lansdowne, at a meeting on March fourteenth, nineteen hundred and seven, entered into the discussion of the filthy condition of Darby Creek and appointed a committee to investigate the source of its pollution.

"The report of the Committee presented on April tenth, nineteen hundred and seven, indicated that the mills are the main sources of pollution and each one is lending its part towards rendering the creek a public nuisance.

"The mills discharge their waste dye water, acids and refuse directly into the creek in such quantities that the color of the water is entirely changed, an odor offensive to the smell and prejudicial to health is given off. Property values are decreased, and it is impossible for fish to live in it.

"In other parts of the State and county communities are beginning to take up the question of protection or reclamation of their natural beauties and we hope that your borough will feel its responsibility of protecting the value of Darby Creek, which is one of the most beautiful in this section of the country.

"The club has already sent personal letters to the mill owners and would ask your earnest support in the efforts to better these conditions."

The Commissioner of Health replied that his Department now has under consideration the entire question of the pollution of Darby Creek for its whole length and requested that the borough be properly represented at a hearing which may soon be granted at Harrisburg. The Commissioner also informed the President of the Natural History Club that investigations had already been instituted and that the matter of bringing about the discontinuance of the discharge of all sewage into Darby Creek was under consideration.

On October eighteenth, a member of the said local Natural History Club sent the following communication to the State Water Supply Commission:

"The citizens of Delaware County are slowly becoming interested in the purification of Darby Creek and we have written to the Department of Fisheries, which has referred us to you.

"Five or six mills discharge their acids and dye water directly into Darby Creek within a distance of two or three miles above Lansdowne, and what would be otherwise a beautiful stream is converted into an ill smelling sewer, sometimes blue, green or brown in color.

"The local Natural History Club has appealed to the mill owners to make an effort to prevent this and they have replied that they can and will do nothing.

"The house drainage into the stream is very little and Lansdowne has a sewer to tide water to which some of the mill owners could connect drains if they were forced to.

"Can you give us any help in this matter?

"I would be glad to assist you in any way I can by obtaining a chemical analysis of the water or anything that would help you, and hope that you will be able to give us some help or advice."

This communication was handed over to the Commissioner of Health.

On December twelfth, Mr. Arthur Shrigley, of the Committee on Stream Pollution of the History Club, submitted a report of the Committee with a map and some photographs and also the following representation:

"While it is desirable to stop all sources of pollution in the creek, I feel that it is of sufficient size to assimilate the waste products from all the mills except the two known as Kent's. As you will notice on the map there is a sewer on Baltimore Avenue which follows the creek to tide water. This sewer is comparatively near both of Kent's mills and a councilman of Lansdowne, which borough owns the sewer, assured me that there would be no trouble about Kent's mills using it if they would be willing to connect and pay for the privilege."

It appears that Lansdowne borough is a residential community of about four thousand population and rapidly growing. It is located on the central division of the Philadelphia, Baltimore and Washington Railroad and the Delaware County Turnpike parallels this railroad and is immediately north of it. The borough is about one mile west of the city of Philadelphia line. The streets have been regularly laid out and the land generously allotted, upon which commodious and substantial dwellings have been erected. The general appearance of the town is attractive, the civic spirit is of high order, about every building is connected with the public sewerage system and a plenteous water supply is brought in from a distance and furnished by the Springfield Water Company. The prospects for increased growth in population are bright.

The incorporated territory is rectangular and is bounded on the northwest, north and east by Upper Darby Township; on the south from the east by Yeadon borough, Upper Darby Township, Aldan borough and on the southwest by Clifton Heights borough, the dividing line between Lansdowne and the latter two boroughs being Darby Creek, which forms the western boundary of Yeadon borough.

Almost all of Lansdowne's territory drains to the creek. The eastern portion has a sewer system comprising six miles of laterals, the main of which discharges into the twenty-four inch sewer main of the Yeadon borough system. The point of connection is at Darby Creek and this sewer follows the east bank of the creek down through Yeadon and a mile into Darby borough and discharges into the creek at two points in the very heart of Darby. A nuisance is created thereby which has been the cause of very much complaint and some litigation between the boroughs of Darby and Yeadon and with property owners relative to right of way. It is the intention of Yeadon to extend this twenty-four inch interceptor about a half mile farther down stream and discharge it into the creek in the borough of Colwyn opposite where the sewers of Sharon Hill now empty. In fact, most of this sewer from the outlet up stream has been built, only eight hundred feet of connection remaining to be completed. Probably after all legal objections are removed this link will be laid.

It is understood that the use of this intercepting sewer by the borough of Darby was one point in contention between Darby and Yeadon.

In the western district of Lansdowne there is also a sewer system, comprising all told seventeen thousand feet of lateral sewer, which appear to empty into the creek at Baltimore Avenue, although the plan shows that the twenty-four inch main follows down the eastern bank of the creek a distance of one mile and connects with the Yeadon main sewer at the same point that the sewer main from the eastern district of Lansdowne connects.

The creek between Lansdowne and Darby is in a deep ravine, narrow with high banks, with some dwellings located on these banks.

Above the borough in Upper Darby Township are the villages of Kellyville, Addingham and Garrettford. The latter is not on the creek, but the others are so located.

Addingham is about two miles by the course of the creek above Baltimore Avenue or the County Turnpike.

Above this village the water shed is farming country sparsely populated and about thirty square miles in extent. The waters are clear and trout are caught in the streams. Many extensive country estates are maintained in the region and the Commissioner of Health has been requested to preserve the purity of these upland waters. The villages of Devon, St. Davids and Wayne and also the village of Berwyn, on the main line of the Pennsylvania Railroad, are on the drainage area and field inspectors of the Department have brought about the discontinuance of the discharge of sewage into the stream, particularly at Devon and Berwyn and at Wayne. On Ithan Creek the Wayne Sewerage Company is now erecting an extensive sewage disposal plant for the purification of all of the sewage of Wayne, this having been done by order of the Commissioner of Health.

At Addingham there are three mills from which spent dye stuffs are discharged into the creek besides sewage and other matter.

On the banks of the stream in Clifton Heights are the Caledonia Mills from which sewage and manufacturing wastes are discharged into the creek.

At Kellyville, and possibly in Clifton Heights borough, is the upper mill plant of the Kent Manufacturing Company. Wool is taken in the fleece here and manufactured into blankets. A very pronounced contamination of the stream by sewage and refuse, and discoloration of the water is apparent here. This mill is a few hundred feet only above Baltimore Avenue. The sanitary conditions at the dwellings at the mills and in Kellyville are bad.

On the west bank of the creek in Clifton Heights is the lower mill of the Kent Manufacturing Company from which similar pollutions reach the stream. The sewage from two rows of houses here reaches the creek and also endangers the local well supply of drinking water.

It is quite possible to remedy the conditions complained of by the Natural History Club. It is perfectly feasible to build an intercepting sewer down the valley beginning at Addingham to intercept the output of sewage from all public and private sources. However, this sewer should be carried down stream by all of the borough to some point below the confluence or in the vicinity of the confluence of Darby and Cobb's Creek.

The borough of Lansdowne cannot be permitted to create a nuisance in the creek by its sewage and at the same time force the discontinuance of the discharge of sewage into this stream by others.

It appears that the borough of Lansdowne has an assessed valuation of real estate of about two million nine hundred thousand dollars, and a bonded indebtedness of one hundred and thirty thousand dollars. If these figures be correct, Lansdowne is amply able to assist in any project for the improvement of sanitary conditions in Darby Creek valley in so far as the borough contributes towards the existing nuisances. The local authorities failed to file plans and make a satisfactory report of the sewer system in conformity with State law and so cannot claim exemption from an order of the Commissioner.

It has been determined that the interests of the public health demand that the discharge of sewage into Darby Creek by the Borough of Lansdowne be discontinued and such discontinuance is hereby and herein ordered; and further, it has been determined that the borough be given until August first, nineteen hundred and eight, in which to prepare plans either independently or in conjunction with other

municipalities, for some other disposal of sewage than into the creek and submit these plans to the Commissioner of Health for approval, all of which is hereby and herein ordered and decreed.

Relative to other matters herein discussed, since the boroughs of Clifton Heights and Aldan do not have public sewers, and since these places, especially Clifton Heights, are growing rapidly and might well plan public sewers which should provide an outlet for the sewage of the above mentioned mills, and since it would be advisable for this trunk sewer in the valley of Darby Creek to be extended up stream into Upper Darby Township, and the State laws provide that the Board of Township Commissioners may bring about such extensions, either through public or private enterprise, and since this trunk sewer might, with advantage, be finally connected to the general sewer and sewage disposal project for the valley, each one of the above industrial corporations and municipalities should be notified to devise some other plan for the disposition of their sewages, and the municipal authorities will be requested to prepare plans for a public sewerage system and submit the same to the Commissioner of Health for approval on or before October first, nineteen hundred and eight.

Harrisburg, Pa., January 29th, 1908.

LEET TOWNSHIP, ALLEGHENY COUNTY.

Fair Oaks Land Company.

This application was made by the Fair Oaks Land Company, of Fair Oaks Village, Leet Township, Allegheny County, Pennsylvania, and is for permission to extend its sewer system in said village and to discharge the sewage therefrom into Big Sewickley Creek, within the limits of Leetsdale borough.

Leet township, until recently, comprises a rectangular area extending along the east bank of the Ohio River from the Beaver County line southerly to Sewickley borough and back therefrom about two miles. Since nineteen hundred the land in this township adjacent to the river has been incorporated into two boroughs, Edgeworth, extending from Sewickley borough northerly to Little Sewickley Creek, and Leetsdale, extending northerly from Edgeworth to the county line. This line is defined on the ground by the course of Big Sewickley Creek, which rises in Marshall Township and drains a rugged farming territory of about twenty-six square miles. The narrow strip of Leet Township now remaining and lying back of the three boroughs mentioned is a very hilly country sparsely populated and devoted wholly to farming, with the exception of Fair Oaks village and vicinity.

This village was developed by the petitioners, who purchased a two hundred acre tract of land on the east bank of Big Sewickley Creek in Leet Township about the time Leetsdale borough was incorporated, and laid out streets in that portion of the tract adjacent to the creek and nearly opposite Ambridge borough and thereon erected dwellings for the accommodation of those employed in Ambridge who might wish to purchase the new dwellings. Sewers were provided with an outlet into the creek. Public water was supplied by the Edgeworth Water Company.

At the present time there are fifty-three residences and one school house in the village which are occupied and connected to the sewers. Other houses are being erected on the hill back from that portion of the tract on which the sewered houses are located and it is to provide adequate sewerage for these new buildings and others which may follow that the proposed sewers are designed.

The topography is such that when the proposed sewers shall have been built it will not be possible to make further additions to the system tributary to the present outlet.

These citizens are afforded railroad facilities at the Fair Oaks station, which is located on the main line of the Pittsburg, Fort Wayne and Chicago Railroad in Leetsdale borough. The Fair Oaks Land Company owns land about this station and also other land in Leetsdale along the creek from Leet Township to land now or formerly owned by the said railroad company. That portion of the creek down stream from this point is through low land unoccupied and subject to annual inundation. The territory owned or controlled by the petitioners within Leetsdale borough comprises about all of the land in the northern portion of said borough and in the vicinity of Fair Oaks station that is available for residential purposes with two exceptions. These exceptions approximate fourteen acres and the company's land about seven acres.

Beaver Road is the river turnpike which extends up the Ohio River valley through the townships and boroughs abutting said river. This main highway, in passing through Leetsdale and Ambridge, crosses Big Sewickley Creek about five hundred feet from Leet Township line. Between said line and the highway bridge over the creek the main sewer of Fair Oaks village discharges into the creek. It passes for the last one hundred and fifty feet of its length through Leetsdale borough territory and discharges into the creek on land of the petitioners. The sewer is twenty-four inches in diameter and connected with it are twenty-three hundred feet of sewer, of which seven hundred and fifty feet are eight inch pipe, nine hundred feet are twelve inch pipe, one hundred feet are eighteen inch pipe and the remainder are twenty-four inch pipe. These sewers receive both sewage and storm water and roof drainage.

The grades are sufficient to maintain cleansing velocity, inspection manholes are provided at street intersections or changes in line and ventilation is effected through manhole covers.

The main sewer for the southern part of Ambridge borough discharges into the creek about eight hundred feet below Beaver Road bridge, at a point at or near the old railroad bridge.

There are other sewer outlets in Ambridge borough, but they discharge into the Ohio River, whose course is northerly. Leetsdale sewers also discharge into the Ohio River. The authorities of these municipalities have not submitted a plan and report on the existing sewers.

Where the Fair Oaks village sewer empties the creek is in a narrow, deep ravine, and from here on the channel is unobstructed and the flow is always sufficient to remove the sewage. Formerly the outlet was up stream about eight hundred feet, at the foot of Orchard Street, where the banks are low and the houses are to be constructed. A pool exists here. The sewage matters were deposited in a pool and threatened to become a nuisance. Since the outlet has been removed down stream, heavy rains have flushed out the pool and there is no further danger of a nuisance.

The proposed extensions to the existing system comprise twenty-three hundred feet of eight inch sewer, four hundred and forty feet of eighteen inch and one thousand feet of twelve inch. When built, these sewers and the old existing ones will complete the system for the entire district, which can never be drained into the outlet.

It is quite possible that the discontinuance of the discharge of sewage into the Ohio River or its tributaries by the boroughs of Leetsdale and Ambridge might be most economically and efficiently accomplished by the joint erection of a sewage treatment plant somewhere in the vicinity of the mouth of Big Sewickley Creek, in which event Fair Oaks village property, both within and without Leetsdale, could be most conveniently sewered to such a plant.

Edgeworth borough has been permitted under an agreement by the Governor, Attorney General and Commissioner of Health, issued in the form of a permit during nineteen hundred and six, to continue to discharge its sewage into the Ohio River until October first, nineteen hundred and eight. If at that time all other conditions of the permit shall have been complied with, and the interests of the public health demand it, the Commissioner of Health may extend the time for the discharge of sewage from said borough into the Ohio River.

In view of the fact that it is not improbable that the village of Fair Oaks may be annexed to the borough of Leetsdale and that the sewers in the streets may at some time be taken over and made public sewers, it has been determined in such cases to be good public policy for the State to approve such sewer plans and stipulate conditions under which the sewage from the sewers may be discharged into the waters of the State.

It would not be feasible to attempt to purify mingled sewage and storm water whether the treatment plant were built by a municipality or by a private corporation. It is positively known that the poisoning of water by sewage, where such waters are subsequently used as sources of public supply, is the cause of a vast amount of sickness and death. It is the policy not only of the Commonwealth of Pennsylvania, but of other States, to bring about a cessation of the drainage of sewage into streams before such sewage has been treated. All corporations should, in making plans, contemplate this ultimate requirement and provide for the erection of suitable disposal works. The problem in the territory under discussion should be taken up immediately and a plan be outlined and submitted to the State Department of Health for consideration. Two years should be ample time for this study.

It has been determined that the interests of the public health will be subserved by granting a permit to the Fair Oaks Land Company to make the proposed sewer extensions, and such permit is hereby and herein granted, under the following conditions and stipulations:

FIRST: That no storm water shall be admitted to the proposed eight inch and twelve inch sewer and that when the plans for the sewage disposal plant are submitted they must be accompanied by a plan to effect the separation of sewage from storm water in the entire system or the said plant shall be large enough to treat both the sewage and storm water from the entire sewer system.

SECOND: At the close of each season's work the owners of the sewer system shall prepare a plan of the sewers built during the year and file the same in the State Department of Health, together with any other information in connection therewith that may be required.

THIRD: On or before July first, one thousand nine hundred and ten, the owners of the sewers shall prepare a plan for the treatment of the sewage of the sewer system and submit or cause such a plan to be submitted to the Commissioner of Health for approval.

FOURTH: This permit to discharge sewage into the waters of the State shall cease on the first day of July, one thousand nine hundred and ten. If at that time the terms of this permit shall have been complied with, then the Commissioner of Health may extend the time and fix the date on or before which sewage disposal works shall be provided for the treatment of the sewage, having in mind the time when other corporations and municipalities in the valley of the Ohio River are required by the State to treat their respective sewages.

The attention of the petitioners is called to the fact that the State will require the boroughs of Leetsdale and Ambridge to prepare and submit plans for some other disposal of sewage than into the Ohio River or its tributaries. And in this connection it may be advisable for the Fair Oaks Land Company to confer with said municipalities about a joint co-operative plan.

Harrisburg, Pa., April 3rd, 1908.

LOWER TOWAMENSING TOWNSHIP, CARBON COUNTY.

Palmer Land Company, Palmerton Village.

This application was made by the Palmer Land Company of the village of Palmerton, Lower Towamensing Township, Carbon County, and is for permission to extend its sewer system and erect a sewage disposal works in said Palmerton village.

The Palmer Land Company is a corporation existing under the laws of the Commonwealth of Pennsylvania for the development of a town site and the housing of the men employed by the New Jersey Zinc Company at its works in Lower Towamensing Township, Carbon County. These works are located on the north bank of the Lehigh River. Aquashicola Creek, coming down from the east and draining the north slope of Kittatinny Mountain, enters the river just above Lehigh Gap. The lands owned or controlled by the said zinc company extend up the valley of this creek and also northward along the bank of the Lehigh River for a distance of one and a half miles in each direction. For the accommodation of its employees, numbering at present about two thousand, the Palmer Land Company, a subsidiary corporation, has laid out the village of Palmerton on the north bank of the Aquashicola Creek, erected many dwellings, established a water works system and sewerage and electric light plant. The village population approximates twenty-five hundred, mostly foreigners, many of whom come and go as it suits their convenience. The village is distant about a mile and a quarter from the works. The manufacturing plant has its own system of sewers and a disposal works which have been approved by the Commissioner of Health. The water supply is obtained from a tributary of the Lehigh River and brought in by gravity to the works. In the spring of nineteen hundred and five an outbreak of typhoid fever occurred among the workmen at the works and also in the village of Palmerton and suspicion was directed to the surface water supply, whereupon sanitary patrols were established on the watershed of the Pohopoco Creek supply under the general direction of the Commissioner of Health, sources of sewage pollution were removed and since then the system of sanitary inspection has been maintained. However, a well was drilled at the works, the surface supply was shut off from the village and the artesian water furnished to the town. The water is extremely hard and it has caused widespread complaint among the villagers. Undoubtedly this has promoted the use of domestic well water, which is subject to pollution. Quite a number of wells, which are dug in porous ground, are located in proximity to cesspools and earth privy vaults. These sources were thought to be one means of transmission of infection and spread of typhoid fever in the village.

Another source of possible secondary infection was thought to have been the disposition of slops and household drainage onto the ground and into street gutters in the densely populated tenement district of the village. Therefore, the Department of Health advised the extension of the sewers, and the enlargement of the sewage disposal plant or relocation of it at a distance from the centre of population. Many of the wells are still in use. They are on properties owned by individuals over which the company now has no control.

The town site is on the hillside whose summits in every direction encircle the village and whose grades insure good natural surface drainage with the exception of the flats comprising land along the creek. This low lying area extends easterly four thousand feet along the stream and back therefrom about fifteen hundred feet. It terminates at Third Street, which is the public road leading from Lehigh Gap along the river and up the narrow deep gorge through which the Aquashicola Creek passes to its confluence with the Lehigh. This gorge begins where the flats end at Third Street and here across the stream is a dam, crib construction, owned and operated in connection with the Prince Metallic Paint Company, whose works are located in the ravine immediately below.

Delaware Avenue, the principal highway in the village, ninety feet wide and about one mile long, extends east and west through the village, but the western four thousand feet of it is through the flats. The eastern half of the swale must be improved and filled in before it can be occupied by dwellings, but the western half has been improved and is not occupied and is thickly built upon. At right angles to Delaware Avenue are the streets designated by numbers, beginning with First Street to the west and ending with Seventh Street at the east. Avenue "B" is nearest the creek and in succession are Avenues Lehigh, Delaware, Franklin, Lafayette, Columbia and Princeton.

Before and during the epidemic the sewage disposal plant was located at the corner of Avenue "B" and Fourth Street on the flats in the tenement district. It was immediately removed as far away as possible and is now on the banks of the creek and along the country road or Third Street at the beginning of the gorge just above

the dam. There is no other place for it, so the petitioners represent. Down the gorge there are bottom lands, but they are subject to frequent inundation and are not adapted for the erection and maintenance of a plant capable of continuous operation in the opinion of the sewer owners.

Two twelve inch sewers terminate in storage tanks. One of the pipes serves the low level district on the flats and the sewage from this district is pumped. The other twelve inch pipe serves a high level district and discharges by gravity at an elevation sufficiently high to pass the sewage through the sewage disposal works without pumping.

The high level outfall empties into a screening chamber ten feet square and three feet deep below the invert of the sewer. The sewage after being screened passes up through a twelve inch pipe leading from the bottom of the screen chamber to the bottom of the adjacent flush tank, which is three feet higher. This tank is forty feet long and twenty-five feet wide and the flow line provides for a two foot depth of sewage. It is emptied by a syphon into a five foot chamber at one side from which leads a ten inch gravity distributing main to the filters. The sewage is always three feet deep in the screening chamber above described and as the flush tank fills the level rises in said chamber synchronously, until the depth of five feet is reached, at which time the high level outfall is back-flooded to Delaware Avenue.

Adjacent to the high level screen chamber is the screen chamber for the low level outfall sewer. Its bottom is two feet lower, and into it every week are drained the accumulations from the higher chamber, through a by-pass provided for the purpose and controlled by a valve. After being screened the sewage accumulates in a storage basin about twenty feet square, whose bottom is level with the screening chamber and in which the sewage always stands at the same level as that in the chamber. The elevation of the outfall sewer is one and nine-tenths feet above the bottom of the basin and the chamber. The depth of sewage is regulated by a predetermined height at which the electric pump automatically starts to raise the liquid into the flush tank. The suction pipe is into the screening chamber. The electric pump is installed in a deep pit between the chamber and the flush tank. The rising main terminates above the high level of the flush tank. The storage of sewage is equivalent to about ten thousand gallons. If the pump should break down, pending repairs, the flush tank would be put out of commission as a flush tank, so that the flow line and hence the back-flooding of the sewers in the low level district would be approximately the level of the bottom of the flush tank, or two feet higher than the usual level in the basin.

The above described chambers, basin and tank are made of concrete construction, open on top.

The main natural water course collecting the drainage from the streets and the hillsides as straightened and improved, extends at right angles to the avenue through the heart of the town in a culvert partly timbered and partly stoned up, but open, except at highway crossings, to the creek, and it passes by and along the above sewage disposal apparatus to the west, separating the tanks from the filters.

The filter area as now laid out is rectangular, two hundred feet long by one hundred and eighty feet wide, divided longitudinally into equal halves and sectionally into quarters, making in all eight areas each ninety feet long by fifty feet wide. This was formerly a cinder fill six feet deep. Excavations were made of the above dimensions and sand placed therein four feet two inches deep, arranged and underdrained for downward filtration. At present there are constructed six filter units arrange in pairs. The surface of the sand is ten inches below the bottom of the flush tank. The distributing pipe passes down longitudinally through the center of the filter area and on it in the middle of each pair of filter units; there is a gate chamber provided with valves out of which, on either side, the sewage passes to flumes made of wood and extending full length of the bed ninety feet. Each distributor, one for each filter unit, is provided with ports at frequent intervals on the side, and in this way the sewage is delivered uniformly over the entire sand area of the filter. The normal dose of the flush tank is equivalent to eighteen thousand gallons, but at such times as the pump is operating coincident with the discharge of the syphon tank the dose may be increased to twenty-eight thousand gallons.

The petitioners rate the purifying ability of each filter unit at nine thousand gallons daily, equivalent to about ninety thousand gallons per acre per twenty-four hours. This rate is conservative and well within the limits of successful practice in intermittent sand filtration.

The present flow of sewage is about eighteen thousand gallons per twenty-four hours.

The underdrains are four inch for the laterals and eight inches in diameter for the headers and they terminate in an effluent chamber which is provided with a partition wall in which are placed flap valves. The laterals are placed fifteen feet on centres and each header is designed to serve two filter units. In this way observations may be made of the operation of each unit with facility.

The main underdrain discharges into the culvert four and four-tenths feet lower than the surface of the filters, thus the vertical height traversed through the plant is seven and two-tenths feet.

The ordinary level of the creek is an inch or more above the bottom of the underdrain. Every shower raises the water in the culvert or the creek between one and two feet. The dam controls these heights. If it were removed, six feet in height would be gained at the plant. During extreme freshets the water floods out of the

flats, fills the cellars and attains a height above the surface of the sand filter. No flood has ever occurred to flood the cinder fill out of which excavations were made for the filters. The flap valves in the underdrain chamber are provided to prevent back-flooding and injury to the beds. The dosing tank walls and the others were placed two feet higher than the highest freshet ever recorded.

There is no by-pass provided by which crude sewage can be discharged into the creek or culvert. The screenings are removed and buried. There is room on the land for further additions to the plant. The tenement houses on Avenue "B" are within two hundred feet of the works.

The sewers are principally eight inches in diameter and all storm water is excluded. Manholes are constructed at street intersections, at changes in line and grade and at dead ends.

Practically every street opened in the village now has a sewer laid in it. Within the district of sewers about eighteen hundred people reside and it is estimated that fifteen hundred live in dwellings having sewer connections. Possibly not over two dozen dwellings have inside closets. The sewage flow is mostly from sinks and kitchen drainage. There is a silk mill on Franklin Avenue, employing about one hundred hands, whose trade wastes are emptied into the sewer. The closet drainage of this establishment goes to the sewers.

Inducements are being offered for industries to locate in the town. If all of the employes of the zinc company were to take up their residence in Palmerton, there would forthwith be a population of at least five thousand people. Probably as the place grows and the character of the sewage changes and increases in volume, the proximity of the sewage disposal plant will force its attention upon the citizens and ultimately the abandonment of the site may be necessary. Careful attention is demanded that the works shall be operated in the most efficient manner. Daily records should be kept of the operations and units should be added from time to time subject to the approval of the State Department of Health.

Compulsory sewer connections are not possible and connections will be more difficult to secure in the future when assessments for the use of the system are levied. The danger to public health under these circumstances from the continued use of individual well water is great and the Commissioner of Health will institute tests of the waters of the wells which are so located as to be liable to sewage pollution.

It has been determined that the sewerage system and sewage disposal works merit approval and that the interests of the public health will be subserved by granting a permit and the same is hereby and herein granted for extensions to the sewers, under the following conditions and stipulations:

FIRST: That at the end of each season's work the Palmer Land Company file in the office of the Commissioner of Health a plan of the sewers laid during the year, together with such other information in connection therewith as may be required, to the end that said Commissioner shall be kept constantly informed of the extent of the sewer system and its use.

SECOND: Weekly reports of the operation of the disposal works shall be kept on blank forms satisfactory to the Department of Health and copies thereof shall be filed in the office of said Department.

THIRD: If at any time, in the opinion of the Commissioner of Health, the sewerage system or the disposal works, or any part thereof, shall become a nuisance or prejudicial to public health, then such remedial measures shall forthwith be adopted as the Commissioner of Health may advise or approve.

FOURTH: No additions to the disposal works shall be made until plans thereof have been approved by the Commissioner of Health.

FIFTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

Harrisburg, Pa., May 25th, 1908.

McKEESPORT, ALLEGHENY COUNTY.

This application was made by the City of McKeesport, Allegheny County, and is for permission to build sewers and to discharge sewage therefrom through a new outlet into the Youghiogheny River and through a new outlet into the Monongahela River, both within the limits of the city.

It appears that McKeesport is a manufacturing city with a present estimated population of forty-five to fifty thousand people, located on the south bank of the Monongahela River and the east bank of the Youghiogheny River and distant about fifteen miles above the city of Pittsburgh at the confluence of the Allegheny and Monongahela Rivers. The tenth ward of the city is separated from the other wards by the Youghiogheny and comprises land west of this river and between it and the Monongahela at the forks. Of this portion approximately half is on the flat lands near the rivers. A small part, however, is subject to inundation. The remainder of the tenth ward is on hilly land which rises very rapidly from both streams.

Of the major portion of the city there is a strip of low land following the Youghiogheny and Monongahela Rivers varying in width from a quarter to half a mile on which most of the business properties, including manufacturing plants, are located. At the northerly end of the city the flat disappears, there being barely sufficient room for the railroad tracks at the foot of the hill.

The residences are nearly all on the slopes and summit. These hills, which constitute the greater part of the city area, rise to a height of four to five hundred feet above the river and are intersected by runs and ravines, which extend back some distance and afford natural channels for surface drainage. The grades are generally good throughout the whole city and on the slopes reach eighteen to twenty per cent. in some instances.

A large proportion of the streets have pavements and permanent side-walks. The general appearance of the city is favorable, making due allowance for the smoke nuisance.

In nineteen hundred the population was thirty-four thousand two hundred and twenty-seven. The community was undergoing a rapid and fairly uniform growth prior to the recent financial depression. There is reason to believe that this growth will continue after business conditions return to a normal basis.

The industries are chiefly subsidiary companies of the United States corporation. The American Sheet and Tin Plate Company, the National Tube Works, the National Tube Company and the American Sheet and Tin Plate Works give employment to nearly ten thousand hands. The Frith-Sterling Steel Company, an independent concern, employs about four hundred hands.

The water supply system is owned by the city, two-thirds of the source being derived from the Youghiogheny River and the remainder from a well on said river bank near the pumping station in the up-stream part of the city. Plans for a water purification plant were approved by the Commissioner of Health and a permit issued therefor on March seventh, nineteen hundred and seven. At the present time the river water is furnished in its raw condition to the consumers. The Youghiogheny is a highly acid stream. Below Connellsville borough, which is approximately forty-two miles above McKeesport, large quantities of sulphur mine waters are emptied into the river. Bacterial examinations of the water at McKeesport revealed the presence of few ordinary bacteria and none of the colon growth, in spite of the fact that considerable sewage is emptied into these waters. The stream is shallow and rapid flowing, so opportunities for sedimentation are not most favorable. It has been concluded, therefore, that the purification taking place in the river is due principally to the germicidal action of the acid mine drainage. However, during high stages of the river, these purifying agencies are minimized and sewage discharged into the Youghiogheny or its tributaries anywhere on the water shed may be brought down to McKeesport in a day's time or less. Since the fluctuations in the flow of this stream are wide and sudden, its raw waters are not safe as a source of public supply if sewage be put therein. The local authorities are now expending a considerable sum of money in the erection of a water softening and purifying plant.

For years the typhoid death rate in McKeesport has been high. In nineteen hundred and four, if the returns be correct, the rate was one hundred and twenty-nine deaths for one hundred thousand population. The city failed to report its typhoid cases for the year nineteen hundred and seven. For nineteen hundred and six there were sixty-two deaths registered and probably over seven hundred cases occurred, which indicates an increased rate.

There are a number of private wells in town used for domestic supply. All wells and springs which have been considered suspicious have been closed and are no longer available, so it is reported.

At the independent plant the water for industrial purposes is obtained from deep wells. Drinking water is brought from a spring on the nearby hillside. At the plant of the American Sheet and Tin Plate Company, water is taken from the Monongahela River for all purposes except drinking. Drinking water is obtained from a well ninety feet deep. The National Tube Works have city water for drinking purposes and the Monongahela River for other uses. At the National Tube Company's plant, water for all purposes is taken from five twelve inch wells fifty-four feet deep. At the American Sheet and Tin Plate plant the drinking water comes from the city water works, the other water from the Monongahela River. No sickness has ever been attributed to the use of these well or spring waters.

The local health officials claim that the typhoid figures include imported cases brought to the local hospital as well as the cases originating in the town; and that of the local cases, a large number were attributed to wells or springs which are now closed.

The city has failed to submit a report and plan of its sewer system as required by law. From information obtained by the Department's officers, it appears that there are city sewers discharging into the Youghiogheny River above the water works intake. One five foot sewer is distant but three-quarters of a mile.

Into the Youghiogheny River above the city water works intake besides numerous private sewers from residences and industrial plants, and besides the said five foot sewer there is a twenty-four inch sewer at the extension of Oak Alley.

Below the city water works intake there are numerous public sewers emptying into the Youghiogheny, as follows: a twenty-four inch pipe at Thirteenth Avenue; an eighteen inch pipe at Twelfth Avenue; a twelve inch pipe at Eleventh Avenue; an eighteen inch pipe at Yough Alley; a twenty inch pipe at Ninth Avenue; a twelve inch pipe at Eighth Avenue; pipe sewers at Seventh and Sixth Avenues; a twenty inch pipe at Fifth Avenue, and an eighteen inch at Fourth Avenue, besides numerous private sewers from properties along the bank.

In the tenth ward there are seven public sewers emptying into the Monongahela River, the diameters ranging from eighteen inches to thirty-six inches.

Into the Monongahela River from the main part of the town there appear to be at least public sewers discharging at convenient points whose diameters range from eighteen inches to seven feet.

The existing sewers are all on the combined system and comprise about four and three-tenths miles of brick sewers and about twenty-eight miles of tile sewers ten inches or more in diameter.

Crooked Run is a natural water course rising in the rugged hilly country of North Versailles Township near the borough of East McKeesport. It is said to receive some of the sewage from said borough through an abandoned coal mine. So far as the Department is informed, no complaints have been made in regard to this disposition of the sewage.

On October seventh, nineteen hundred and seven, the Commissioner of Health issued a permit to East McKeesport borough to discharge sewage temporarily into the abandoned coal mine and thence into Crooked Run until June first, nineteen hundred and eight, at which time said borough shall either independently or in conjunction with another municipality, submit plans for the proper disposal of the borough's sewage.

After passing through the township for a distance of about one mile, Crooked Run enters the city limits at the northeast line, pursuing a southerly course for about four thousand feet, whence it turns at right angles and passes northerly across the flats of the Monongahela River. This section on the flats between the railroad and the river is in a culvert. The other portion is largely open channel. The total drainage area is reported to be four and twelve-hundredths square miles, of which three-fourths of a square mile is within the city limits. Here reside about ten thousand people. The streets are unsewered, kitchen drainage goes largely to street gutters and the customary privy and vault abound. Many of the properties along Fifth Avenue, along and across which Crooked Run passes, are sewered directly to the stream.

The petitioners purpose to build a brick sewer in Fifth Avenue from the culvert at the railroad tracks, where the sewer is to be six feet in diameter, and empty into the run, thence across private land and in Fifth Avenue a distance of five thousand two hundred and forty-five feet to or near the city line, where the sewer is to be four feet in diameter.

This structure is not designed to supplant the natural water course, but it is designed to remove sewage and storm water from the districts in the city tributary to the run. Plans of sub-mains and laterals for this district have not been prepared, or in any event they have not been submitted to the Department for approval.

In the opposite end of the city there is a natural water course called Starcamp Run, which rises near St. Mary's Cemetery at the city line and flows southerly to the Youghiogheny River, the point of entry being through a culvert across the flats at the southerly city line, which is one mile above the city water works intake.

The upper half of the area drained by the run is unsewered. It is stated that the entire water shed is about three-fifths of a square mile, that thereon now reside three thousand eight hundred people. The customary methods of household waste disposal prevail. The petitioners purpose to build a sewer six feet in diameter at the river and to lay it along and in Sill, Avenue, Hill, Patterson and Starcamp Streets, which roads follow up the valley of the run, a total length of six thousand two hundred and fifty feet to the above mentioned cemetery. At the end the diameter of the sewer is to be three feet. The details of lateral sewers and branches to this main have not been submitted for consideration. It is understood that the sewer is not to receive the waters of the run, but simply the sewage and the storm water from the dwellings and streets of the district.

It is represented that the principal reason for the construction of these sewers at this time is to afford work to many of the inhabitants of the city who are temporarily deprived of employment, due to the partial or complete shutting down of the principal manufacturing plant of the town.

Nowhere do the applicants attempt to prove that the interests of the public health demand that a new sewer outlet shall be established in the river at a point immediately above the city water works intake. The fact that the municipal officers have not attempted to stop the pollution of the public water supply by the city's own sewage, and now plan to materially add to such pollution, is evidence that such local authorities are not aware of the risk to human life which such a practice continued will involve. This is all the more strange because of the prevalence of typhoid fever in the city, and because of the fact that the necessity for purifying the river water has been recognized by them. The further necessity of keeping the sewage out of the supply should also be recognized. In the event of a breakdown of the filter calling for temporary introduction of raw river water into the water works system, the consumers might unsuspectingly be treated to and drink of the town's sewage with disastrous consequences. The interests of the public health clearly demand that not only shall McKeesport sewage cease to be discharged into the Youghiogheny River above the city water works intake, but that all other sewage on the water shed above said intake from other municipalities shall eventually cease to be discharged into the waters of the State.

Furthermore, below McKeesport the towns on the banks of the Monongahela River and the Ohio largely draw upon these streams for the public supply. The Pennsylvania Water Company has an emergency intake on the Monongahela River at Port Perry, about three miles below McKeesport. There is reported to be an emergency intake from said river at Homestead about six miles below McKeesport and about four miles further down stream crude river water is drawn and supplied to the citizens of that part of the city of Pittsburgh known as the "South Side."

Most of the municipalities on the banks must continue to rely upon these rivers for drinking water, and, therefore, the public health demands the discontinuance of the use of the rivers as carriers of sewage. Especially is this true since the water filter is not a "germ proof" remedy.

It makes no difference whether the acidity of the Monongahela River and the sedimentation effected in the slack water pools of the river during ordinary times sufficiently minimize the pollution of the waters to render the source reasonably safe, because these clarifying influences and natural safeguards are not subject to regulation and control and may be entirely overcome any day or any month of the year, in which event all safeguards are removed and the waters become extremely dangerous. Under these conditions their use for drinking purposes is always a menace and the insurance to human life afforded by taking the sewage out of these waters, even at its total and final cost, will be the cheapest insurance which the inhabitants of the region can obtain.

The city of McKeesport is favorably located topographically for cheap surface drainage. The problem of the collection and treatment of its sewage is complex and needs to be thoroughly studied. Favorable points for the erection of sewage disposal works are limited. A private corporation would anticipate its future needs, devise and adopt plans therefor and purchase requisite lands. The prudent administration of municipal affairs calls for like action as soon as the State's policy with respect to stream pollution be pointed out in this instance.

It is not economical to convey storm water long distances underground when it can be readily disposed of into a nearby natural water course. It is prohibitive in cost to attempt to treat mingled sewage and storm water, because of the enormous volume of the latter. Some plan for the interception of the ordinary or dry weather flow of a city's sewers must be devised before sewage disposal works can be adopted and built. This intercepting system should involve the reduction to the least practicable amount of storm water in the sewers.

It is reported that the assessed valuation of the city April first, nineteen hundred and seven, was twenty-one million seven hundred and twenty-one thousand dollars, that the bonded indebtedness was eight hundred thousand one hundred dollars, and that adding the floating debt and deducting resources, including bonds and cash in the sinking fund and assessments due, makes the city's net debt in the neighborhood of two hundred and fifty thousand dollars. If these figures be true, it would appear that the borrowing capacity is in excess of one million dollars. However this may be, it would appear, so far as the Department is now informed, that the city is amply able to take up at once the question of improved sewerage and sewage disposal. The evolution of plans therefore must necessarily consume a period of many months. After a comprehensive plan shall have been adopted, the city can then proceed to construct sewers anywhere with the knowledge that each sewer would be a part of a complete plan. Thus efficiency and economy and the interests of the public health would be alike subserved.

The proposed sewers herein considered should either be modified to conform to the above suggestions or they should be built as storm drains only. As now planned they are not adapted to be a part of the improved sewer system. As already explained, new sewers, especially the trunk lines, should exclude storm water. Furthermore, the State cannot consistently approve of the establishment of any sewer outlet above the city water works intake, even if the use of it were to be temporary only.

It has been determined that the interests of the public health demand that the proposed sewers be disapproved and the same are hereby and herein disapproved, and the petitioners informed that, to proceed legally with the construction, all idea of the utility of the drains as carriers of sewage must be abandoned and the plans must be changed so that no house sewage or drainage, or any sewage matter whatsoever shall be admitted to the drains.

Furthermore, should the city proceed with these structures as surface water drains, it would be most economical (since it is in these waters that the very much smaller but main trunk sanitary sewer must be laid) that the project of laying a sanitary sewer in the same trench with the storm drain be given careful consideration. The especial attention of the local authorities is called to this suggestion.

Furthermore, it has been determined that since the city did not avail itself of section six of act number one hundred and eighty-two of nineteen hundred and five, it is not exempt from the provisions of said law and that, therefore, it is discharging sewage without legal authority into the waters of the State, and that the interests of the public health demand that the city shall forthwith devise plans for the discontinuance of the discharge of sewage into the waters of the State, and that it shall submit such plans to the State Department of Health for approval on or before July first, one thousand nine hundred and nine.

Harrisburg, Pa., April 8, 1908.

McKEESPORT, ALLEGHENY COUNTY.

This application was made by the City of McKeesport, Allegheny County, and is for permission to construct certain sanitary sewers and to discharge the sewage therefrom temporarily into the waters of the State.

It appears that on April eighth, one thousand nine hundred and eight, the Commissioner of Health issued a decree to the City of McKeesport, Allegheny County, Pennsylvania, relative to the construction of certain proposed sewers in which it was stipulated that all idea of the utility of the drains as carriers of sewage must be abandoned and the plans must be changed so that no house sewage or drainage or any sewage matter whatsoever shall be admitted to the drain.

It was further stipulated that should the city proceed with the structures as surface water drains, it would be most economical, since it is in and along the same streets that the very much smaller but main trunk sanitary sewer must be laid, that the project of laying a sanitary sewer in the same trench with the storm drain be given careful consideration, and the especial attention of the local authorities was called to this suggestion. The last clause of the decree read as follows:

"Furthermore, it has been unanimously agreed that since the city did not avail itself of section six of act number one hundred and eighty-two of nineteen hundred and five, it is not exempt from the provisions of said law and that therefore it is discharging sewage without legal authority into the waters of the State, and that the interests of the public health demand that the city shall forthwith devise plans for the discontinuance of the discharge of sewage into the waters of the State, and that it shall submit such plans to the State Department of Health for approval on or before July first, one thousand nine hundred and nine."

On May fourth, one thousand nine hundred and eight, the city gave notice to the Commissioner of Health of its desire and purpose to follow out the suggestions in the above decree and represented that it purposes to proceed with the storm drain in the Crooked Run district, beginning with a six foot sewer at the outlet and terminating with a four foot sewer at the upper end and that on either side of this storm drain it is proposed to build into the concrete masonry a twelve inch sewer pipe where the drain is six feet in diameter, a ten inch sewer pipe where the drain is five feet in diameter and an eight inch sewer pipe where the drain is four feet in diameter; and that it purposes to proceed with the storm drain in Starcamp Run district, beginning with a six foot sewer at the outlet and terminating with a three foot sewer at the upper end, and that it is proposed to build into either side of the storm drain in the concrete masonry a twelve inch sewer pipe where the storm drain is six feet in diameter, a ten inch sewer pipe where the storm drain is four feet in diameter and an eight inch sewer pipe where the storm drain is three feet in diameter.

These sewer pipes are to the mains for the collection of the sanitary sewage of their respective districts. Those of the Crooked Run district are to empty temporarily into the Monongahela River either directly or indirectly. Those in the Starcamp Run district are not to empty even temporarily into the Youghiogheny River, but they are to discharge into a sanitary sewer which it is proposed to construct down the river valley to below the city water works intake, where it is to discharge into said river. The plan of this sewer will be made up and forwarded with the other plans called for by said decree of April eighth, on or before July first, of the current year.

It has been determined that the proposed plans be approved and they are hereby and herein approved and a permit issued therefor under the express stipulation that the terms of the permit to the City of McKeesport issued on April eighth, one thousand nine hundred and eight, shall obtain with respect to the permit herein issued in so far as said terms may be relevant.

Harrisburg, Pa., May 28, 1908.

McKEESPORT, ALLEGHENY COUNTY.

This application was made by the City of McKeesport, Allegheny County, Pennsylvania, and is for approval of sewers built during the year nineteen hundred and seven in the tenth ward of said city.

On May twenty-eighth, nineteen hundred and eight, the Commissioner of Health issued a permit to the City of McKeesport to construct certain sanitary sewers and to discharge sewage therefrom temporarily into the waters of the State. Under the terms of this permit of May twenty-eighth, nineteen hundred and eight, the city must devise plans for the discontinuance of the discharge of sewage into the waters of the State and submit such plans to the State Department of Health for approval on or before July first, nineteen hundred and nine.

It appears that on June twelfth, nineteen hundred and seven, a contract was awarded by the City of McKeesport for the construction of a sewer in Rebecca Street and Pickwick Alley and West Fifth Avenue, these sewers all being in the tenth ward of the city.

The tenth ward is that portion of the city lying in the forks between the Youghiogheny River and the Monongahela River and bounded on the south by the borough of Port Vue and on the west by the borough of Glassport.

There are numerous sewers in the district which now empty into the Monongahela River at convenient points at the foot of the streets sloping down the hillside to the river. One of these sewers is a thirty-six inch brick structure in Rebecca Street. The ordinance providing for the construction of this Rebecca Street sewer, and for which approval is now asked, was presented in councils June eleventh, nineteen hundred and six. It provided for the construction of a three foot brick sewer in Rebecca Street from the river to the intersection of West Fifth Avenue with Rebecca Street, thence a twenty-four inch pipe along West Fifth Avenue to Pickwick Alley, thence a twenty-four inch pipe to Pickwick Alley to the borough line of Port Vue. These sewers comprising a total length of twenty-seven hundred feet, of which the twenty-four inch pipe comprises fifty per cent., were contracted for and built during nineteen hundred and seven, and so also were extensions as follows:

Four hundred feet of thirty-six inch sewer in Rebecca Street to West Fifth Avenue.
One hundred feet of fifteen inch pipe easterly in West Fifth Avenue.
One thousand feet of twenty-four inch pipe in the Avenue westerly.
Three hundred feet of fifteen inch pipe in Jim Crow Alley connecting with the said fifteen inch pipe in the avenue.
These distances are approximate only.

It is stated by the Mayor that these tenth ward sewers were built before the question of constructing the Crooked Run and Patterson Avenue sewers were taken up with the Commissioner of Health and before the officials of the city were familiar with the requirements of the act of nineteen hundred and five, obligating cities to make applications for permits to extend existing sewerage systems.

The city solicitor also pleads past ignorance of the law and the requirements of the State Department of Health in reference to permits in a request at this time for approval of the said tenth ward sewers.

It appears that some of the property owners along the sewers above described are endeavoring to escape the payment of assessments for the sewers which have been levied by the city, and among other matters the question has been raised of the city having failed to obtain the permit required by the act of nineteen hundred and five.

After viewers have been appointed to assess the properties benefitted abutting on the line of these sewers, the city solicitor discovered for the first time that a very serious error had been made in overlooking the necessary permit by the Commissioner of Health. Whereupon the city did what it could to satisfy the said abutting owners by making a very low assessment against their properties. Certain of the property holders, however, employed counsel and have filed exceptions to the viewers' report, which exceptions will be disposed of by the court this month, possibly not later than next week, so it is reported. A copy of one of the exceptions is given in full below:

IN THE COURT OF COMMON PLEAS NO. 2 OF ALLEGHENY COUNTY.

In re
Appointment of viewers to ascertain the costs and expenses of and to assess benefits for the construction of a twenty-four inch terra cotta sewer on West Sixth Avenue from Rebecca Street to the property of John J. Downing, in the City of McKeesport. } No. 94, July Term, 1908.

And now, to wit, August , nineteen hundred and eight, comes Mrs. Anna B. Reynolds, by her attorneys, Douglass and Fife, and excepts to the report of viewers and the assessments of benefits against her several properties in above case, as follows, to wit:

FIRST: That the several assessments against her several properties are inequitable, unjust and far in excess of any benefits derived.

SECOND: That the sewer in this case and for which said assessments have been made was constructed for and as a sanitary sewer. That it was constructed without the authority and consent of the State Board of Health, and was not constructed in conformity with, but in violation of the laws of this Commonwealth governing and regulating the construction of sanitary sewers. That no plans of said sewer were submitted to the State Board of Health as required by law, nor was any permit issued by said State Board of Health approving the sewer nor authorizing its construction. That the said sewer connects with the sewer known as the Pickwick Alley and Rebecca Street sewer, exceptions to which have been filed by this exceptant at No. 458 January Term, 1908, which exceptions are now pending; that through this Pickwick Alley and Rebecca Street sewer the sewage from the sewer in this case is discharged into the Monongahela River contrary to law and the use of said sewer for sanitary purposes could at any time be prohibited by the proper State authorities and rendered wholly useless for sanitary purposes to the properties of the exceptant.

THIRD: That the sewer was not constructed according to the specifications prepared and submitted to the several bidders before the letting of the contract; that in many places along the line of the said sewer it is not constructed at the depth required under the specifications upon which bids were made for its construction, but, on the contrary, at many places, along its line the sewer is built three or more feet nearer the surface than was required by the said specifications and as contracted for, thereby rendering the sewer almost wholly, and in some places entirely, impracticable for connections with the properties.

FOURTH: (Crossed out.)

FIFTH: That the cost of the sewer as constructed and the cost as certified to the viewers was far in excess of the real cost of the same.

SIXTH: That the viewers, notwithstanding the fact that the matters set forth in these exceptions were presented to them, refused to inquire as to the cost of the sewer as constructed and the value of said sewer to the abutting property as compared with the sewer if it had been constructed according to the contract.

SEVENTH: That the several properties assessed already have sewerage through a three foot brick sewer, constructed on the properties by Thomas Reynolds during his lifetime, which said sewer has become a public sewer by the city connecting the West Fifth Avenue sewer into it, and by turning into it surface drainage that was out of the range that was drained by the water course for which the brick sewer was built.

EIGHTH: That the several properties against which the assessments have been made in this case abut on Rebecca Street; that if the sewer was built on Rebecca Street in front of the several properties of the exceptant, it was built without any authority whatsoever, as there is no ordinance of the City of McKeesport authorizing the construction of the sewer on Rebecca Street in front of the propertes of the exceptant, against which benefits were assessed in this case. That the ordinance of the City of McKeesport upon which the proceedings in this case are based, does not authorize the construction of the sewer on Rebecca Street.

NINTH: That the Board of Viewers in this case had not legal authority to assess any benefits to the several properties of the exceptant, as the exceptant owns no property abutting on the sewer authorized to be constructed by the ordinance upon which the proceedings in this case are founded.

(Affidavit of Anna B. Reynolds.)

Two other exceptions by the same individual, one with respect to the sewer in Pickwick Alley and the other with respect to the Jim Crow Alley sewer, are given in full below:

In re Appointment of viewers to ascertain the costs and expense of, and to assess benefits for the construction of a twenty-four inch terra cotta sewer on Pickwick Alley from the center of a thirty foot street on the north side of Edmunson's property and the south end of the Coursin Heights Plan of Lots to the West Fifth Avenue Bridge approach, and twenty-four inch terra cotta sewer along West Fifth Avenue Bridge approach to the intersection of Rebecca Street and a three foot brick sewer on Rebecca Street from the intersection of West Fifth Avenue to the Monongahela River in the City of McKeesport.	No. 458, January Term, 1908.

And now, August, 1908, comes Mrs. Anna B. Reynolds, by her attorneys, Douglass & Fife, and excepts to the report of viewers and the assessment of benefits against her property in the above case as follows, to wit:

FIRST: That the assessment against her property is inequitable, unjust and far in excess of any benefits derived therefrom.

SECOND: That the sewer in this case and for which said assessment has been made was constructed for and as a sanitary sewer. That it was constructed without the authority and consent of the State Board of Health and was not constructed in conformity with, but in violation of, the laws of this Commonwealth, governing and regulating the construction of sanitary sewers. That no plans of said sewer were submitted to the State Board of Health as required by law, nor was any permit issued by said State Board of Health approving the sewer nor authorizing its construction. That the sewerage therefrom is discharged into the Monongahela River contrary to law, and the use of said sewer for sanitary purposes could at any time be prohibited by the proper State authorities and rendered wholly useless for sanitary purposes to the property of the exceptant.

THIRD: That the sewer was not constructed according to the specifications prepared and submitted to the several bidders before the letting of the contract; and in many places along the line of the said sewer it is not constructed at the depth required under the specifications upon which bids were made for its construction,

but, on the contrary, at many places along its line the said sewer is built three or more feet nearer the surface than was required by the said specifications and as contracted for, thereby rendering the sewer almost wholly and in some places entirely impracticable for connections with the property.

FOURTH: That no openings were left in the sewer for property connections therewith between Monongahela River and Pine Alley, a distance of two hundred and thirty feet, more or less, all in front of and along the line of the property of the exceptant.

FIFTH: That the cost of the sewer as constructed, and the cost as certified to the viewers, was far in excess of the real cost of the same.

SIXTH: That the viewers, notwithstanding the fact that the matters set forth in these exceptions were presented to them, refused to inquire as to the cost of the sewer as constructed and the value of said sewer to the abutting property as compared with the sewer if it had been constructed according to the contract.

SEVENTH: That one of the viewers in this case is the counsel for the contractors for the construction of said sewer and was inadvertently appointed and served as said viewer and his relations with the said contractors for the construction of said sewer was such that he could not have been expected and should not have been called upon to pass upon the question of the viewers going behind the certificate of the engineer and to make a judicial inquiry as to whether or not the sewer had been constructed according to contract and the property owners were getting a sewer equal in value to the cost as certified by the engineer; that the abutting property owners were entitled to have a Board of Viewers that would be untrammeled in a case of this kind and would, upon the proper showing, go behind the certificate of the engineer and make inquiry.

(Affidavit of Anna B. Reynolds.)

IN THE COURT OF COMMON PLEAS NO. 1 OF ALLEGHENY COUNTY.

In re

Appointment of viewers to ascertain the costs and expenses of and assess the benefits for the construction of a fifteen inch terra cotta sewer on Jim Crow Alley from the north end of alley of the unnamed alley opposite Dot Street; thence along said unnamed alley to Rebecca Street. } No. 465, September Term, 1908.

And now, to wit, August , 1908, comes Mrs. Anna B. Reynolds, by her attorneys, Douglass & Fife, and excepts to the report of viewers and the assessments of benefits against her several properties in above case, as follows, to wit:

FIRST: That the several assessments against her several properties are inequitable, unjust and far in excess of any benefits derived.

SECOND: That the sewer in this case, and for which said assessments have been made was constructed for and as a sanitary sewer. That it was constructed without the authority and consent of the State Board of Health and was not constructed in conformity with, but in violation of, the laws of this Commonwealth, governing and regulating the construction of sanitary sewers. That no plans of said sewer were submitted to the State Board of Health as required by law, nor was any permit issued by said State Board of Health approving the sewer, nor authorizing its construction. That the said sewer connects with the sewer known as the Pickwick Alley and Rebecca Street sewer, exceptions to which have been filed by this exceptant at number four hundred and fifty-eight, January Term, nineteen hundred and eight, which exceptions are now pending; that through this Pickwick Alley and Rebecca Street sewer the sewage from the sewer in this case is discharged into the Monongahela River, contrary to law, and the use of said sewer for sanitary purposes could at any time be prohibited by the proper State authorities and rendered wholly useless for sanitary purposes to the properties of the exceptant.

THIRD: That the sewer was not constructed according to the specifications prepared and submitted to the several bidders before the letting of the contract; that in many places along the line of the said sewer it is not constructed at the depth required under the specifications upon which bids were made for its construction, but, on the contrary, at many places along its line the said sewer is built three or more feet nearer the surface than was required by the said specifications and as contracted for, thereby rendering the sewer almost wholly, and in some places entirely impracticable for connections with the properties.

FOURTH: (Crossed out.)

FIFTH: That the cost of the sewer as constructed and the cost as certified to the viewers was far in excess of the real cost of the same.

SIXTH: That the viewers, notwithstanding the fact that the matters set forth in these exceptions were presented to them refused to inquire as to the cost of the sewer as constructed and the value of said sewer to the abutting property as compared with the sewer if it had been constructed according to the contract.

SEVENTH: That the sewer is so constructed that the properties of the exceptant cannot be sewered into it; the sewer level produced cuts the lot level or crops out on it about six or seven feet back from the street; a cellar even on the front of the lot could not be drained into the sewer unless the cellar was entirely above ground; the said properties are one hundred and thirty-five feet deep, running back to an alley, and a cross section of the said lots from Sixth Street to the alley in the rear of the lot shows a fall of approximately thirty-nine feet in one hundred and thirty feet, and another cross section shows a fall of approximately thirty-seven feet in the same direction.

(Affidavit of Anna B. Reynolds.)

The city's statement by its Mayor and Solicitor of ignorance of the law at the time and prior to the construction of the said tenth ward sewers must be accepted although this does not, as is well understood, excuse the city for technical violation of the law.

It does not appear that these sewers materially complicate the problem which is now before the city of re-designing its entire sewerage system and submitting plans thereof for approval to the Commissioner of Health during the year nineteen hundred and nine. The sewers are serving a practical purpose in that they do remove sewage and storm water from the districts they serve, and in these districts the benefits were demanded.

The Rebecca Street extension beyond West Fifth Avenue is in a hollow where surface drainage came down from the hillsides and ponded up, and where kitchen drainage also collected and caused a nuisance, although there was a private sewer up this valley known as the Reynolds sewer emptying into a natural water course beyond West Fifth Avenue and discharging eventually into the Youghiogheny River.

Whether or not the new storm sewer is best calculated to serve the entire district tributary to it cannot now be determined; that must be settled at the time the city submits the plans for the comprehensive sewerage system for the entire city. Undoubtedly at that time it will be discovered that many mistakes could have been obviated in the years past had the city adopted a comprehensive plan in the first instance.

If the Commissioner of Health approves said sewer extensions built since April twenty-second, nineteen hundred and five, it would naturally be under the condition that the sewers shall have excluded from them surface water or if surface water be admitted, it shall be under the condition that such water shall be excluded in the future if this be found necessary. Obviously the city would not ask for approval of these sewers were the question of the validity of the sewer assessment not pending.

On the ground that sewers have been built and they do benefit the abutting properties, and they are no different sewers in kind than those previously constructed by the city throughout its territory for which assessments have been levied, it has been determined that the sewer extensions should be approved and it is hereby and herein approved subject to the condition that all storm water be excluded from the sewers, or if admitted that it be temporarily, under terms whereby said exclusion can be effected at any moment if required by the Department of Health, and that permission to discharge sewage through these sewers into the waters of the State shall cease on the first day of July, nineteen hundred and nine. If on said date the city shall have complied with the terms of the permit of May twenty-eighth, nineteen hundred and eight, and shall have submitted plans for the discontinuance of the discharge of city sewage into the waters of the State, to the Department of Health for approval, then the Department of Health may extend the time when the sewage may continue to be discharged through said tenth ward sewers into the waters of the State.

Harrisburg, Pa., November 16th, 1908.

MERCER, MERCER COUNTY.

This application was made by the borough of Mercer, Mercer County, and is for permission to extend its sewer system and to discharge the sewage therefrom through the existing main sewer into Neshannock Creek within the limits of the borough.

The borough of Mercer is a trading and resident community of about twenty-one hundred population, located in the southern central part of the county on Neshannock Creek. It is the county seat and is bounded on the north by Cool Spring Township, on the east and south by Findley Township and on the west by East Lackawannock Township. The surrounding territory is open, rolling farm land under cultivation.

Neshannock Creek is formed by the confluence of two streams which meet in the borough in the southeastern part, from whence the main stream flows southerly to the Shenango River at New Castle in Lawrence County.

The easterly tributary is called Mill Creek and the northern tributary Otter Creek. The latter rises about twelve miles north of Mercer and takes a southerly course, passing by Fredonia borough and through Cool Spring Township, draining forty-eight square miles, and the former, with its north and south branches, drains fifty-one square miles lying adjacent to and east of Otter Creek water shed.

A branch of the Pennsylvania Railroad comes down the Mill Creek valley, crosses Otter Creek in the borough of Mercer and thence follows the stream and Neshannock Creek to New Castle. There are a few buildings in the borough east of this railroad in the forks, but the town site and populous district is wholly west of the railroad and principally on the summit of the hill, elevated about two hundred and seventy-five feet above the valley. The ground slopes from this eminence in all directions, more particularly towards Neshannock Creek and Greenville Run, a tributary of Otter Creek. This run flows from the northwest out of Cool Spring Township into the borough in the north central part at Pittsburgh Street and thence, continuing southeasterly in course, passes quite near and at two places crosses the borough line and finally empties into Otter Creek at East Market Street bridge. The terminal station of the Mercer branch of the Bessemer Railroad is in the vicinity north of East Market Street and the Pennsylvania Depot is south of said Market Street, between it and Grove City Avenue, which is a main thoroughfare leading from the town out into the country.

The public square and the county buildings are on the hill at the end of East Market Street, a half mile distant from the railroad station. West Market Street is the continuation of this highway westerly from the public square. Extending through the town paralleling Market Street south of it is Butler Street and Beaver Street and north of and parallel to Market Street is Venango Street and then Border Alley. The last two highways, however, terminate at the bluff along Greenville Run.

The slopes of the ground assure a very good natural drainage. In some places the street grades are quite steep. Storm water from the surface of the municipal territory finds its way principally through the channels in the street gutters to the streams above mentioned. Outside of the borough, southwest of it, is a ravine in which is collected the natural drainage from the western slopes of the town. However, no public sewage is discharged into it or into Greenville Run.

About three decades ago the population of the borough was greater than it is to-day. The removal of an orphan school whose members were enumerated in the census accounts for the reduction in the population. There is a sanatorium on rising ground east of Greenville Run and in the vicinity just over the borough line in the township is the Mercer Cottage State Hospital.

In the town there are two small industrial plants where household water filters are built and where gas stoves are manufactured.

The grist mill is located on Grove City Avenue at the dam immediately below the confluence of Otter and Mill Creeks. This dam back-floods the water in Otter Creek to the water company's intake. The pump house is built on the banks of the creek immediately above where the Pennsylvania Railroad crosses the creek and about five hundred feet up stream from the mouth of Greenville Run. Crude creek water is pumped to an iron tank twenty-five feet in diameter and twenty feet high, supported on standards sixty feet in length, and located on the hill in the centre of the town, from whence the water is furnished by gravity to the consumers. The works are owned by the Mercer Water Company. A report of the system has not yet been made, neither have plans been filed, so that the Department of Health is not informed, except in a very general way, about this system of public water works.

It is reported that the public water is furnished to about fifteen hundred people and that after a heavy rain the water is turbid. There is an attempt at the pumping station to filter the water. Two intake pipes six inches and eight inches in diameter, whose outer ends are perforated with holes and imbedded in the bottom of the creek channel, deliver the water into two wells thirty feet in diameter and twenty-five feet deep. In these structures strainers have been placed. The requisites for water purification call for features so entirely different from those apparently existing and in use at the Mercer Water Company's plant, that it is at once evident that any pollutions in Otter Creek would menace the public health of the borough.

Up Otter Creek extends the Bessemer Railroad and on it, seven miles above Mercer, is Fredonia, a settlement of about five hundred people. The entire watershed is a thickly settled farming territory and probably the usual conditions with respect to possible sewage pollutions of water courses obtain.

Scattered throughout Mercer borough are domestic wells and some springs. The Kline well, Jones Spring and Sheriff Spring are prominently mentioned by local physicians as having been the suspected medium of transmission of typhoid fever during the past two years.

Municipal sewers were first installed in eighteen hundred and ninety-eight. At the present time a public sewer is laid in almost every street in the borough. The sewers are for house drainage only; they are ventilated through manholes and flushed by automatic tanks. Owing to the topography above described, there is a west side system and an east side system, each having its separate outlet into Neshannock Creek.

The East side system serves the territory east of Erie Street, with the exception of the public square and vicinity. There are sub-mains at the foot of East Market, Butler and Beaver Streets, which discharge into the main intercepting sewer. The latter begins in East Market Street near the railroad and is a nine inch pipe in said street and thence southerly by the Pennsylvania Passenger Station to a manhole in Grove City Avenue, where the county sewer ends. From here under the railroad and thence southerly to Neshannock Creek, the

sewer is twelve inches in diameter and its point of discharge is into the stream, four hundred feet below City Avenue, which point is about a quarter of a mile north of the southerly borough line. All of the borough sewers in the east district are six inches in diameter, except the intercepter, and they comprise a length, all told, of seven and six-tenths miles.

The county almshouse is located one and a half miles north of Mercer Borough. It was erected in eighteen hundred and eighty-three, accommodates on an average one hundred and eighty-five people, is supplied with an abundance of pure spring water and the sewage from the institution is conveyed through a six inch vitrified pipe laid in the valley of Greenville Run through the township and the borough to the manhole above described, where the discharge is into the borough sewer. Some years ago the institution's sewage was emptied into the run, but this was objectionable to the farmers owning abutting lands below, so the county assumed the expense of the long line of pipe to Neshannock Creek. Into the county sewer four of the borough sewers empty, at the foot of Greenville Avenue, Franklin and Pittsburgh Streets and the sanatorium road, respectively, each sewer being six inches in diameter, and the total length is one mile. There is a six inch private sewer from the sanatorium which discharges into the county sewer.

The west side system serves the territory on the western slopes, the laterals are all six inches in diameter, comprising a total length of three and a half miles, and they discharge into an outfall sewer twelve inches in diameter which extends down through the ravine in Findley township and empties into the creek upwards of a quarter of a mile below the southern borough line.

Besides these two public sewer outlets, there is a six inch sewer from the State Hospital which discharges into Otter Creek immediately below the water works pumphouse.

The local authorities report that not over fifteen hundred people use the sewer system. Many privies and old style pits dug in some instances to the underlying loose shale rock are scattered about the town. It is the proximity of these structures to wells and springs which has menaced the purity of such drinking water. There is nothing in the appearance of the borough to attract the attention of the visitor to anything unsanitary. The town is particularly pleasing and its general healthfulness is a matter of local pride.

On Otter Street, in the eastern district between Beaver and Butler Streets, there are several unoccupied lots, upon which the owners wish to erect residences of a high class, but this will not be done until the local authorities will guarantee sewerage facilities. The petitioners, therefore, purpose to lay a six inch sewer for this purpose. Its length will be three hundred and fifty feet.

The territory traversed by Neshannock Creek below Mercer borough is quite similar to that above on the watersheds. In the distance of eighteen miles to New Castle the waters of the stream are not used as a source of public water supply, but Beaver River, into which the drainage of the Shenango River and Neshannock Creek goes, is the source of public supply at New Brighton, Rochester and Beaver Falls. On this account the Commissioner of Health has required the city of New Castle to prepare to discontinue the discharge of sewage into the Shenango River and for a similar reason prohibition must be declared with respect to the discharge of sewage at Mercer into the Neshannock Creek. It does not follow that because this stream is not now polluted with sewage to a sufficient degree to cause a complaint, that this is ample warrant for further pollution. The laws of the State contemplate the preservation of the purity of State waters as a natural resource. It is easily possible for sewage poison to be transmitted down stream from Mercer and to become a menace to the health of those citizens of the above mentioned boroughs who drink the Beaver River water. It is also true that Mercer's sewage may not add materially to the danger so long as New Castle's sewage is emptied into the river.

The conditions on the watersheds above Mercer borough, however, directly concern every citizen in the town. The Butler epidemic, or the Plymouth, or the Scranton, or the Nanticoke epidemic, may be duplicated in Mercer; the physical conditions are present, and until at every occupied estate on the watershed careful attention be given to the disposal of sewage and the maintenance of absolutely sanitary conditions be accomplished, the people who consume the public water in Mercer are constantly in great danger, and the interests of the public health demand that all such water used for domestic purposes should be boiled. The water company should install an approved purifying plant. The State Department will have a sanitary survey made of the watershed above the water works intake and orders for the abatement and removal of all menaces and nuisances will be issued.

The State's policy does not admit of any discrimination, but in the administration of the law it is not always practicable to bring about an immediate change in the disposition of a municipal sewage. Mercer's bonded indebtedness is reported to be forty-five thousand, three hundred and seventy-nine dollars, and its assessed valuation seven hundred and seventy-eight thousand, nine hundred and sixty dollars, which, if true, would indicate that the municipal borrowing capacity is limited to about nine thousand dollars, a sum insufficient to defray the cost of erecting sewage purification works. But the borough can anticipate this ultimate requirement by the preparation of plans for the collection of the sewage now discharged into the streams and its conveyance to some site adapted for the

erection of a purifying plant. The problem can be studied sufficiently to enable the selection of a site and the purchase of the land. Fortunately the sewers are on the separate plan, which simplifies the work of preparing for the ultimate purification of the sewage. There can be no doubt as to the desirability of the laying of petty lateral sewers in the few remaining unsewered streets of the town whenever there is a demand for such lateral extensions.

The interests of the public health will be promoted when attention is devoted to the proper disposal of sewage everywhere in the borough, more especially in the vicinity of springs and wells. It is always dangerous to continue the use for drinking purposes of waters drawn from the ground near the surface in a thickly built up district. An examination of all well waters and springs in the village should be undertaken, and, if the tests prove contamination, then the local authorities should cause an abandonment of the polluted wells and springs.

It has been determined that the interests of the public health will be subserved by granting a permit to the borough, and a permit is hereby and herein granted to make petty sewer extensions to its nearly completed sanitary sewer system, under the following conditions and stipulations:

FIRST: That this permit to discharge sewage into the waters of the State shall cease on the first day of May, nineteen hundred and eleven. If at that time the other terms of the permit shall have been complied with and the interests of the public health will be subserved thereby, then the Commissioner of Health may extend the time in which sewage may continue to discharge from the borough into the waters of the State.

SECOND: On or before May first, nineteen hundred and eleven, the borough shall prepare a plan for the interception of the sewage and its purification and these plans shall be sufficiently in detail to enable the Commissioner of Health to determine whether they are practicable and whether the site chosen for the disposal works is adapted for the purposes and such plans shall be submitted to the Commissioner of Health for approval, who may modify, amend or approve the same and fix the date when the works shall be constructed, having in mind the time when the sewage of other municipalities in the Shenango River basin must be treated and purified.

THIRD: At the close of each season's work the borough shall file with the Commissioner of Health a plan of the sewers laid during the year, together with any other information in connection therewith that may be required.

FOURTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

The Mercer Water Company will be notified to forthwith submit a report and plans of its exsting system and to submit plans for the efficient purification of the creek water.

The local Board of Health will be notified to warn the public to boil the public water whenever such water is to be used for drinking or domestic purposes; and the water company will also be requested to so notify its customers.

The especial attention of the local authorities is hereby called to the necessity as a health precaution of the abandonment of all private wells and springs in the borough which are polluted. Tests of the water should be made to determine this pollution, unless the location be such that the topographical evidence is sufficient to condemn the supply.

The hospital officers will be notified to prepare plans for some other disposal of the institution's sewage, preferably into the borough sewer system.

Harrisburg, Pa., May 28th, 1908.

MIDDLETOWN, DAUPHIN COUNTY.

Middletown Drainage Company.

This application was made by the Middletown Drainage Company of the borough of Middletown, Dauphin County, and is for permission to extend its sewers in said borough and to discharge the sewage therefrom untreated to Swatara Creek with in the limits of the borough.

The borough of Middletown is a manufacturing community having a present population of about six thousand, located ten miles below Harrisburg, on the Susquehanna, river and on the west bank of the Swatara Creek where it empties into said river. The town was laid out before the time of railroads, when transportation through the interior was effected principally by waterways and canals. Swatara Creek was considered the end of navigation on the Susquehanna River, owing to rapids in the river below. The first canal was constructed up the Swatara and over land to Reading, by means of which interior trade with Philadelphia was promoted. Thus Middletown was early an important commercial community. The decline of canals and development of railways and the location of the State Capitol at Harrisburg conspired to keep Middletown in the background. In spite of this the growth since eighteen hundred and fifty has been

steadily upward. Its location on the main line of the Pennsylvania Railroad, having a branch connection with the Philadelphia and Reading Railway, affords as good transportation facilities as those enjoyed by a number of the citites of the third class in the State.

The industries comprise tube works, car shops, stove manufactory, cigar factory, knitting and hosiery mill and the works of the Middletown Furniture Company, The largest plant, that of the National Tube Works, employing one thousand men, was shut down recently, but it is reported that local enterprise may reopen the plant. These industrial works are located along the line of the Pennsylvania Railroad, away from the creek and the river. The said railroad extends east and west through the borough parallel to the river and distant therefrom about three thousand feet. It crosses the Swatara Creek into Royalton, a borough of about twelve hundred population, dependent for employment upon the mills and shops of Middletown.

About half way between the railroad and the river is the old Pennsylvania canal bed. There is a dam across the creek about one thousand feet up stream from the Pennsylvania Railroad bridge, which was erected and maintained in connection with mill privileges and the Union Canal; the latter formerly extended along the west bank of the creek up the valley from the Pennsylvania canal. These old canals are largely obliterated. The dam and accompanying water power plant are maintained by the Middletown and Swatara Consolidated Water Company to run a grist mill and flour mill and to pump water in case of fire or other emergencies from the head race of the mill. This race takes water from the Swatara Creek at a point more than a mile above the dam. It and the Philadelphia and Reading railway are west of Mill Street. Where the race ends, about four hundred feet from the Pennsylvania Railroad, the water works company maintains a pump house.

The principal part of Middletown lies north of the Pennsylvania Railroad, but that section south of the railroad adjacent to it is the shopping district, where stores are located. A greater portion of the land south of the railroad is subject to flood during extraordinary freshets. The northern district drains to the mill race largely. There are several small water courses traversing the borough and emptying into the creek. They afford natural means for good surface drainage since in most parts of the town the grades are sufficient to readily dispose of storm water.

There is a stream called Bloody Run, rising in the northeastern part of the borough and flowing southerly between Pine and Race Streets, crossing High, Main and Water Streets and passing westerly by the Middletown Fair Grounds and across Emaus and Brown Streets and emptying into the end of the mill race in the vicinity of the Water Company's emergency intake. This run received the drainage from a slaughter house, from several privies or cesspools, and in its lower portion, which was bricked over through consent of the borough council in nineteen hundred and six by private parties and is enclosed in a masonry structure several hundred feet in length, the sewage from unauthorized house connections discharging into this brick portion of the run.

To the west of the mill race or Bloody Run above described, there is a larger run, a stream known as Crull's Run, which rises in the township north of the borough, and, taking a southerly course, enters Middletown, north of the railroad, west of the center, passing across Main Street, under Catherine, across Water and in Wood Street to Emaus Street near the Pennsylvania Railroad. This part is open except at the culverts under or in the street; but from Emaus Street under the railroad to Wood Street and easterly in Wilson Street to Union and thence across private property along the south bank of the Pennsylvania Railroad to Swatara Creek, a distance of about twenty-three hundred feet the run is enclosed in a five foot brick sewer. It was built by the Pennsylvania Railroad Company upon agreement with the borough in relation to the abolition of certain grade crossings, closing of streets and improved drainage.

There are a number of wells in use throughout the borough. More than half of the inhabitants rely on such domestic supply. The public water works system comprises a surface supply impounded in a reservoir on Iron Mine Run about three miles above Middletown, a gravity supply main, standpipe on the banks of the creek near the pump house, distributing mains in the streets of Middletown and Royalton and the emergency intake at the mill race.

The watershed is sparsely populated, the supply limited and during the summer of nineteen hundred and six, when the reservoir was completed, the company resorted to the creek for the major portion of the water. Complaint was made to the State Department of Health by the water consumers with respect to the quality of the water furnished from either source. Iron Mine Run comes from swamps in which there is extended stagnant water and where in adjacent fields cattle are pastured and stand in pools which after rains contribute directly to the reservoir. During nineteen hundred and six there were forty-eight cases of typhoid fever in Middletown reported to the State Department. The origin was not traced to the public supply. In a majority of cases it was thought that the probable source of infection might be sewage contaminated wells.

If reports be true not over twenty-five per cent. of the population reside in dwellings connected to sewers. The ordinary privy and vault dug in the loose earth or walled up in loose masonry may be seen all over the town. It is common

custom, where sewers are not in use, to deposit kitchen drainage and wash water into the street gutters or on the surface of the ground. Crull's Run in its open course receives the discharge of privies and drains from abutting properties in the borough. Furnace Run, a small run emptying into the creek south of the railroad, receives privy refuse from a number of properties on South Union Street and Mud Pike. Therefore, since domestic wastes from the households of a majority of the residents of the town are deposited in the soil or into the ditches in proximity to dug or driven wells from which drinking water is derived and used daily by over fifty per cent. of the population, it would not be strange if it were a fact that the typhoid fever in Middletown may be justly attributed to pollution of the well waters. It is not known how great the danger from this menace is. An examination of extended scope should be made of all well waters in the borough as a health precaution. The sources of pollution should be abated and sewer extensions afford those facilities which have been proven to combine efficiency and economy.

Besides the three runs above mentioned, and besides the sewers of the applicants, there are four borough sewers and three private sewers having outlets in the streams in Middletown.

The four borough sewers are on the flats south of the canal and they empty into the river. The upstream one is twenty-four inches in diameter, takes the flow from a small run, extends down Wood Street, terminating at the river bank. The appearance of the flow at the outlet indicates sewage, but this may come from kitchen drainage discharged primarily into the street gutters. The other three are short twelve inch storm sewers in the streets parallel to Wood Street and down stream at successive intervals of two hundred feet. Their outflow indicates more or less sewage. From the National Tube Works plant there is a private sewer twenty-four inches extending to the Susquehanna River at a point above Wood Street. The sewer carries waste water and drainage which formerly produced a nuisance in the run in the vicinity. The sewage proper from this plant or from the closets at the outlet is discharged through a connection into the sewer system of the Middletown Drainage Company.

Passing up the Swatara Creek from the river the sewer outlets mentioned in order are as follows: Furnace Run, Middletown Drainage Company's twenty-four inch outlet, Washington House outlet, Pennsylvania Railroad sewer, Middletown Drainage Company's twenty-four inch outlet, Campbell sewer and Bloody Run.

Besides these sources of pollution there are numerous overhanging privies and private drains on the banks of the creek at private estates both in Middletown and Royalton.

Furnace Run has been herein described.

The Washington House sewer is said to have been built a number of years ago for the accommodation of the hotel. It is said to receive sewage from several dwellings situated on Union Street near Ann Street. It is eight inches in diameter and discharges into a ditch on the bottom land south of the Pennsylvania Railroad and thence into the creek. The ditch is very crooked and choked with weeds and there are numerous pools containing stagnant sewage in the summer time.

The Pennsylvania Railroad sewer was laid deep enough to remove surface water from the pocket in the steep grade which was established about nineteen hundred and three, when the crossing at grade of the highway and railroad at Union Street was abolished by carrying the highway under the railroad. The change in grade of the street and the establishment of a low point at and under the railroad tracks made necessary ample provision for the drainage of this pocket. The Railroad Company therefore built the five foot drain for this purpose and extended the structure up Wilson Street and Wood Street as above described. It appears that a number of the occupied estates abutting this brick culvert have connected their particular sewers with and use the five foot drain as a common sewer, although nothing in the agreement between the borough and the railroad company made such use a condition of the contract.

Prior to the building of the said Union Street underpass, the Middletown Drainage Company had built and maintained a sewer there. The change in grade of Union Street cut this sewer off from its connection with the outlet to the creek, said to be the existing twenty-four inch outlet south of he railroad. As a substitute the railroad company connected this sewer, which is twenty inches in Union Street at the railroad, with its new five foot drain and since that time the lower portion of the brick drain has been used by the said drainage company as the outlet for the upper Union Street district outlet of its sewer system.

The Campbell sewer is an old one. It was built by Mr. Campbell and takes the sewage from the stove works and from various houses on Emaus Street and on Union Street through a six inch pipe which passes to the creek just north of the railroad or to a ditch and some low land on the bank of the creek.

The Bloody Run sewer empties above the water surface into the mill race near but below the water company's intake under conditions which constitute a very serious menace to public health. While the water of this creek and of this race is subject to sewage pollution at Hummelstown and Hershey village and at the city of Lebanon and at numerous other places, and is unfit in its raw state to be used as a source of supply, nevertheless, an immediate pollution is a much greater menace than one existing at a remote distance. It is easily possible for

the sewage from the houses connected to the brick culvert or from the privies or slaughter house along the run to be pumped into the water works system and be introduced into the homes of the water consumers within an hour from the time these poisonous matters were first deposited in the run. It is thus apparent that even when water purification works be installed for the treatment and purification of the water to be supplied to the consumers, taking into account the possibility of accident or breakdown at such a plant, that it is absolutely inadmissible from the public health standpoint to permit the existence of such pollution. While during the use of the water power, the current in the race might speedily remove the discharge of the run which is below the water works intake down stream into the creek, yet at other times accumulations and deposits of a dangerous character would occur in the race and the entire operation be attended by so much risk of a serious character as to warrant the abandonment either of the pollution or of the intake.

The Middletown Drainage Company was incorporated in eighteen hundred and ninety-three for the purpose of building and maintaining necessary sewerage and drainage works for the health, comfort and convenience of the inhabitants, and sanitary improvement of the borough of Middletown.

It appears that in eighteen hundred and ninety the borough passed an ordinance granting unto a certain citizen of the town the right and privilege of entering upon streets, lanes and alleys of the borough for the purpose of constructing sewers, reserving to the borough the right to lay such sewers as the Burgess and town council might decide upon and among other things it provided that the borough of Middletown shall have the privilege of draining surface waters into the sewers built by the said citizen and his assigns, provided, however, that the borough shall construct at least two of the inlets necessary for such drainage at the time of the construction of said sewers, and provided still further as follows:

"That the borough of Middletown shall bear one-half of the expense of keeping the said sewer or sewers clear of filth or accumulation calculated to render the said sewer or sewers unfit for service."

This ordinance was passed at the request of said citizen and several associates who had suffered in common with other citizens from the lack of proper facilities for drainage. The cellars were often invaded by water.

The said associates immediately formed a limited partnership under the name of the Middletown Drainage Company, Limited, which association was incorporated as above mentioned in eighteen hundred and ninety-three.

Prior to the incorporation, however, but while the partnership was in force, on October ninth, eighteen hundred and ninety, a contract was let by the associates for the building of a sewer in Union Street and the associates by a special agreement with the borough council built ten street gutter inlets into the Union Street sewer at a price agreed upon which was paid by the borough.

It further appears that the borough council on October thirteenth, eighteen hundred and ninety, amended the original ordinance to provide,

"That said George F. Mish and his assigns shall keep the said sewer or sewers and inlets free from dirt or obstruction, and the said borough shall in no wise be liable to any damage that may ensue by reason of the accumulation of filth, sand or other matter in said sewer or sewers and inlets, and that the said borough of Middletown shall pay no part or portion of the cost of keeping said inlets or sewer or sewers clean and free from obstruction, but the same shall be borne by the said George F. Mish and his assigns."

The drainage company did not assent and never agreed to be bound by this supplementary ordinance, but on the contrary protested against it and refused to consent to its provisions.

The sewer in Union Street was built, and at different times thereafter, additions were made by the company, in streets decided upon by the borough council and the company, under permits issued therefor by the burgess of the borough. There are street gutter inlets in most of these sewers used by the borough to drain the streets.

In eighteen hundred and ninety-six, the borough having failed to pay one-half of the expense of cleaning out the inlets, a suit was brought to recover such one-half cost and the court decided that the original ordinance fixed the terms of contract between the company and the borough, and that these terms could not be varied by the borough without the consent of the company. Since eighteen hundred and ninety-six the Middletown Drainage Company has built various sewer extensions in compliance with the requests of the inhabitants, and in the above described manner.

The twenty inch brick sewer which discharges into the railroad sewer at Union Street serves a district north of the railroad in the central part of the town along Union Street in which there is a total of six thousand three hundred and seventy-two feet. Practically every street in this district has a sewer in it. Besides the twenty inch there are seven hundred feet of eighteen inch brick sewer, two thousand feet of twelve inch pipe, one thousand feet of ten inch pipe and fifteen hundred feet of eight inch pipe in the system.

The twenty-four inch outlet belonging to the company discharging into the creek below the railroad is a brick structure submerged at the outlet to which are tributary forty-one hundred feet of sewers of which twenty-four hundred feet is twelve inch pipe, four hundred and fifty feet ten inch and seven hundred feet eight

inch pipe. The district therein, lies adjacent to and wholly south of the railroad. The twenty-four inch sewer is termed the lower Union Street outlet. The twenty inch sewer emptying into the railroad drain is called the upper Union Street outlet.

One hundred feet above the railroad the drainage company has a submerged twenty-four inch outlet which serves the eastern part of the borough north of the railroad. Tributary to this outlet called Poplar Street District, are over ten thousand feet of sewer of which seventeen hundred feet is eighteen inch pipe, fourteen hundred feet fifteen inch pipe, sixteen hundred feet twelve inch pipe, thirty-two hundred feet ten inch pipe and several hundred feet of six and eight inch pipe, respectively.

This outlet also through a submain extending westerly in Emaus Street serves the western district of the borough north of the railroad. It is in this eastern and western district that the residential growth of Middletown is likely to occur, and it is here that the proposed extensions are to be made.

As would be expected where surface water is admitted from roofs and street gutters to sewers of the above small sizes surcharging and back-flooding is of frequent occurrence. Some litigation has resulted from damages to private property alleged to have been caused by the incapacity of the sewers to carry off the flow at all times. The grades are in general such as should insure cleansing velocity in well constructed sewers.

The applicants propose to make extensions to the sewer system from time to time. At present it is proposed to lay an eight inch pipe in Lawrence Street, length one hundred and seventy-five feet, connecting to an existing sewer there which is a part of the lower Union Street outlet system.

In the Poplar Street district it is proposed to lay one hundred feet of eight inch pipe in Brown Street, in East Main Street two hundred feet of eight inch, in Nissley Street one hundred and twenty-five feet of eight inch and in Catharine Street four hundred and seventy feet of twelve inch pipe.

These sewers are for widely separated parts of the town. It is understood that the eight inch pipes are to be used for sanitary purposes only and that they are demanded by occupied properties which are in need of adequate sewerage facilities which cannot be secured in any other way.

Public enlightenment with respect to the transmission of disease by water and the extended sickness and death caused annually in Pennsylvania by the discharge of sewage from towns or cities or from individual privies into streams used subsequently as sources of public water supply has ushered in a new era of sanitation. The law of nineteen hundred and five to preserve the purity of the waters of the State for the protection of the public health has for its object the ultimate discontinuance of the discharge of all sewage into drinking waters.

The Swatara Creek at Hummelstown is the source of supply to that borough and will be to the people residing along the line of the Philadelphia and Reading Railway between Hummelstown and Harrisburg. The State is undertaking to stop sewage pollution of the creek above Hummelstown.

The Commissioner of Health has also requested the water company at Middletown to prepare plans for the filtration of the water supplied to Middletown citizens. This, however, when accomplished must not be construed as a warrant for stream pollution above Middletown. Emergency intakes are common in water works systems. Without them insurance rates would very likely be materially increased. It is clearly evident that every source of pollution to the present emergency intake of the Middletown and Swatara Consolidated Water Company's system should be removed forthwith.

The various public and private sewers in the borough which discharge into the waters of the State below the mill race do not appear to add in a measurable degree to the sewage pollution of the Susquehannan River sufficiently to justify the State in its work of conserving the purity of this river's waters, in singling out Middletown and requiring the discontinuance of such sewer outlets there, before the sewer outlets in Highspire, Steelton and Harrisburg shall be ordered discontinued by the State. But locally within the borough some of the present practices are a menace.

The existence of sewage pools in proximity to dwellings increase the risk of infection through the agency of flies. So do privies on the banks of the stream or anywhere where excrement is not deposited in proper receptacles.

Below Middletown, fifteen miles, is the borough of Marietta, where arrangements are being made to obtain an emergency supply from the Susquehanna River. Three miles below Marietta, at Columbia, the entire supply is taken from the river, the water being subjected to mechanical filtration. Above Middletown, Harrisburg and Steelton derive their public supply from the river.

In all three of these places, Harrisburg, Steelton and Columbia, sewer extensions have been permitted on condition that plans be prepared for a separation of sewage proper from storm water in anticipation of the ultimate treatment of the sewage.

At Middletown it appears that already the necessity for this separation has been demonstrated owing to the small size of the existing sewers. The cost of treating both sewage and storm water is prohibitive because the works required for the storm water treatment must be many times more expensive than works

requisite for the handling of the small volume of house drainage called sewage, which contains the poisonous matters necessary to remove before the liquids can be safely deposited in the stream.

Because the sewers are too small, during heavy rain falls, much of the street drainage goes along the gutters to the natural water courses. It would be much cheaper to dispose of all of the street drainage into the natural water courses when the time comes for the erection of sewage disposal works. The borough is now responsible with the drainage company for one-half the cost of keeping the sewers clear and fit for service, and this joint responsibility involves, so it would seem, the keeping clear and fit for service of the entire length of the sewer or sewers, including the outlets or any works required to be constructed at the outlets in connection therewith to keep the sewer fit for service. Whether or not the drainage company can rightfully limit the amount of street drainage which shall under the existing contract between said company and said borough be admitted to the sewers is not known to the Department. That the interests of the public health demand that such admittance shall be limited is clearly evident, bearing in mind the existing sizes of the sewers, and since the borough has acquiesced and permitted the sewers as they exist, it would seem to be the reasonable and essential thing to do in the interests of all concerned for the borough and the company to take up the question for the present and the future of the separation of the storm water from sewage, and for the discharge of the former into the natural water courses and for the discharge of the latter temporarily into the river or the creek, but not into the mill race, in conformity to a general comprehensive plan which shall contemplate the ultimate treatment of the sewage at one point.

The Middletown Drainage Company will not find it practicable to attempt to dispose of the mingled sewage and storm water now discharged at its outlets, including that from the five foot railroad sewer. A limited amount of storm water, however, might be successfully treated within a reasonable cost. Just what is the most practicable plan must depend upon the extent to which storm water may be eliminated. The company should take this matter under advisement and in anticipation of the ultimate treatment of the sewage build all sewer extensions from now on in conformity with a plan for the collection of its sewage and treatment at one place. Economy dictates that both public and private sewers should discharge their flow at one common treatment plant; but if the borough and private owners and the sewer company cannot agree on a co-operative plan, then each must proceed independently.

These plans should be outlined in order that all sewer extentions made in the borough shall be in conformity therewith.

The owner of the Pennsylvania Railroad sewer, which now takes the flow of Crull's Run, cannot afford to permit this substitution of a natural water course to be used as a sewer. The properties now having house connections to this drain must ultimately find some other sewer outlet.

It has been determined with respect to the application of the Middletown Drainage Company, that the interests of the public health will be subserved by approving of the proposed sewer extensions and the same are hereby and herein approved under the following conditions and stipulations:

FIRST: That this permit to discharge sewage into the waters of the State shall cease on May first, nineteen hundred and eleven. If at that time the interests of the public health demand it, the Commissioner of Health may extend the time in which sewage from the Middletown Drainage Company shall be discharged into the waters of the State, having in mind the policy of the State with respect to the similar discharge from the municipalities in the Lower Susquehanna River valley.

SECOND: On or before November first, nineteen hundred and nine, the Middletown Drainage Company, either alone or in conjunction with the borough, shall prepare a comprehensive plan for the elimination of storm water from the sewer system and for the conveyance of the sewage therefrom to some point for treatment. And thereafter extensions to the sewers of said company shall be made in conformity to these plans after the same shall have been submitted to and approved by the Commissioner of Health.

THIRD: If storm water be admitted into the sewers herein approved it shall be under terms permitting its exclusion at any time when necessity may require this to be done in the interests of public health, or the exclusion of so much of it as may interfere with the normal function of the sewer for sanitary purposes.

FOURTH: No pathogenic material from any laboratory shall be permitted to be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

With respect to the borough sewers, it has been determined that the local authorities be furnished with a copy of the permit granted to the Middletown Drainage Company and that the borough be informed that the discharge of sewage into Bloody Run is illegal and that this must be forthwith prevented, and that the Commissioner of Health will issue orders to the owners of estates from which sewage is now being discharged into said run. Furthermore, that the attention of the borough be called to the insanitary condition at the outlets of the Campbell

and Washington House sewers and at the mouth of Furnace Run, and that the council be ordered to stop the use as sewers of the open water courses in the borough in which connection the borough shall either alone or in conjunction with the Middletown Drainage Company, or before November first, nineteen hundred and nine, prepare and submit to the Commissioner of Health for approval a plan for the interception of the public sewer outlets and as many of the private sewer outlets as it shall deem expedient and for the conveyance of the sewage therefrom to and treatment in a sewage disposal plant.

The local authorities will be advised to undertake a systematic examination of all domestic well water, with the intent of causing an abandonment of the use of all such waters found to be contaminated, and the town council will be informed that the overhanging privies on the banks of the streams must be removed and that proper receptacles for excrement must be provided and that on or before that time when the public and private sewage of the entire borough shall have been collected and treated at disposal works, the State Department of Health will have required the discontinuance of the discharge of all sewage into the Pennsylvania Railroad sewer.

The Department of Health will notify the owners of the Campbell and Washington House sewers that the right to put sewage into the creek is tentative only and that ultimately all the sewage in the borough from all sewer outlets must be purified. Meantime the sewage from their respective outlets must not be discharged into any ditch or pool but directly into the creek, and in a satisfactory manner, so far as such disposal can be made temporarily satisfactory.

The Pennsylvania Railroad Company will be notified of the ultimate necessity of disconnecting all house sewage with the five foot drain.

Harrisburg, Pa., April 24th, 1908.

MIDDLETOWN TOWNSHIP, DELAWARE COUNTY.

Williamson School.

This application was made by the Williamson School, Middletown Township, Delaware County, and is relative to sewage disposal at said institution.

It appears that the property of the petitioner comprises a number of school buildings located on an eminence north of the railroad, from which at the present time there are two sewers which empty onto the steep slopes south of the railroad switch in a dense thicket all on the institution's grounds. The drainage is into Chrome Run nearby, this stream being a tributary of Chester Creek, entering the same about three miles above the borough of Upland.

The total population at the school, including employees, numbers about two hundred and seventy-five persons. The water supply, which is obtained partly from a well and partly from a surface stream, amounts to a daily consumption of about thirty thousand gallons per twenty-four hours. It is a trade school. About seven thousand gallons of water daily are used at the shops and power house.

It is proposed to construct two sewage disposal plants to be located at the outfalls of the present sewer. The type of works is the same in both, comprising a septic tank, dosing chamber and percolating filter bed. Plant Number One will take the sewage from the dwellings of the faculty chiefly. It is stated that the flow is approximately six thousand gallons each twenty-four hours.

The septic tank is to be an open brick structure, sixteen feet long by six feet wide, interior dimension, divided by a partition wall at the outlet end into a dosing chamber three feet wide. The depth of flow in the tank will be five and one-half feet. Side baffle boards are to be provided, so that the sewage entering at one end will pursue a zigzag course in its passage over the outlet weir into the dosing chamber. Connected with the side baffles are to be two submerged baffle boards under which the sewage must pass through the tank. The inlet pipe will enter the tank at mid-depth and its diameter is eight inches. A six inch drain pipe fitted with a valve is provided to drain the tank and a similar arrangement is provided at the bottom of the dosing chamber. It does not appear that any other arrangement is made for the disposition of the sludge than on to the surface of the steep hillside in the vicinity.

The dosing tank is to be filled with large stones. The capacity of the voids in the chamber is said to be directly proportioned to the capacity of the pipes in the percolating filters. The object of the placing of the stones in the dosing chamber is to secure the further retention of suspended matters and the action of aerobic fermentation. An alternating aerlock syphon is to be provided by means of which the dosing chamber will be emptied at approximate intervals of forty minutes.

The effluent will be emptied through a six inch pipe on to one of two filter beds. These filters are to be used alternately. They are to be built in the side of the slope mostly in excavation. Each filter is to be twenty-seven and a half feet long by ten feet wide and to consist of broken stone. On the entire bottom of each bed is to be laid a layer of stone six inches in diameter to a depth sufficient to give large voids for free circulation of air throughout the entire bottom of the bed.

Over this is to be placed about two and a half feet of broken stone one and a half inches in diameter, upon which is to be supported six inch and four inch farm tile laid in parallel rows eight inches apart on centres to be surrounded with large stone and covered by the small stone to a depth of six inches. An additional supply of air to the underdrainage is to be afforded by traverse air ducts and six inch air up-risers spaced eleven feet apart in the beds.

A water ditch and berm is to be built on the hill side above the filter to collect surface water and divert it away from the filters.

At the other sewer outfall is to be a similar septic tank and dosing chamber of larger dimensions, being twenty-three feet long and having a chamber five and one-third feet in width. The sewage is to be discharged into alternating filter beds of similar arrangement as the others, but whose dimensions are to be fifty-five feet by ten feet.

The bottoms of each filter bed at both plants are to slope towards the down side of the hill and it is intended that the effluent shall percolate through the stone and the big stone underdrain and pass out through the spaces which are to be filled with screened gravel at the outer end of the underdrain system. Thence the effluent will pass down over the surface of the hillside to the waterway in the thicket. Below the railroad along Chrome Run there are pasture lands on either side.

It is not the business of the Commissioner of Health to assume responsibility for the prevention of the discharge of sewage from a private estate into any stream, only in so far as he has charge by law of preventing such discharge, if the interests of the public health demand it, and in this case the Commissioner has determined that it is necessary for the school sewage to be purified. If the plants proposed be carefully executed they will accomplish a certain degree of purification and perhaps a very good degree for a while. However, it would be better if finer material, preferably sand, were to be placed in the filters. If the plans as proposed do not effect as high a purification of the sewage as they should, it will be easily possible to collect the filtrate in channels and convey it to a tank or tanks and effect sterilization by the use of chemicals. The Commissioner of Health will require this or some other remedy in the event that the necessity should arise.

However, one feature of the design is absolutely inadmissible. This is the disposal of sludge and drainage from the tanks and chambers on to slopes of the ground. No sewage whatsoever or sludge shall be put in any place where it can flow or pass to any natural water course or run, or where it can directly or indirectly pollute the waters of the State. All liquids should be drained on to the surface of the filters and the sludge should be drained on to sludge drying areas, specially provided for the purpose.

It has been determined that the proposed plans should be modified as suggested and that when the works are built complete plans of them as so built shall be filed in the office of the Commissioner of Health, and the authorities of the Williamson School are hereby notified to this effect.

Furthermore, it is hereby and herein decreed that no sewage whatsoever shall be discharged from this institution either directly or indirectly into the waters of the State.

It is the intention of the State Department of Health to occasionally inspect the disposal works, and if at any time it be found that sewage is passing from said institution into the waters of the State, then such remedial measures shall be enforced by the said school authorities as the Commissioner of Health may approve or advise.

Harrisburg, Pa., July 29th, 1908.

MIDDLETOWN TOWNSHIP, DELAWARE COUNTY.

Pennsylvania Training School for Feeble Minded Children at Elwyn.

The application was made by the President and Board of Directors of the Pennsylvania Training School for Feeble Minded Children at Elwyn, Middletown Township, Delaware County, Pennsylvania, and is for approval of plans for a sewage disposal plant.

It appears that the Pennsylvania Training School for Feeble Minded Children is a private corporation. It was established in eighteen hundred and fifty-three.

The school owns a tract of land having an area of three hundred and thirty-seven acres. It lies in Middletown Township, Delaware County, to the southwest of and within the drainage area of Ridley Creek near the borough of Media. The Baltimore Turnpike runs through the tract from east and west. Ridley or Pensgrove Road runs through the property along the eastern boundary from Ridley Creek southwest for a distance of three thousand feet. On this road is the tract of the Delaware County and Philadelphia Electric Railway. The Philadelphia, Baltimore and Washington Railroad, Central Division, runs to the south of Riddle Road and almost parallels it and, together with Church Road, forms the southeastern boundary. Elwyn Station (fifteen and eleven hundredths miles from Broad Street Station, Philadelphia) on the Philadelphia, Baltimore and Washington Railroad, is opposite the school grounds. Edgemont, or Chester

Road and Williamson Free School for Mechanical Trades partly form the southwestern boundary. The Williamson School, however, lies in the drainage area of Chester Creek.

A small brook (designated hereafter as Elwyn Brook), having its source to the west of Elwyn Station, flows northeastwardly, parallel with Riddle Road and from one hundred to two hundred feet to the northwest of the road. It discharges into Ridley Creek under the bridge of the Baltimore Turnpike. Just above the turnpike bridge there is a dam in Ridley Creek from which the water is taken in an open channel to the Media water works, about six hundred feet to the southeast. Elwyn Brook discharges into Ridley Creek through a culvert under the dam and although the brook is badly polluted by the sewage of the school, the pollution cannot get into the intake of the water works except in case of extreme high water.

The main grounds of the school lie to the northwest of Elwyn Brook, a large part of which is a hillside rising from ten to fifteen feet in a hundred feet. A small part of the tract is table-land at an elevation varying from one hundred and fifty to two hundred feet above Elwyn Brook.

Eight hundred feet northeast from Elwyn Station is the main entrance to the property and the main drive runs northwest for twelve hundred feet, then it turns and runs almost west. From this angle point, drives lead to the east and to the southwest; on the former for a distance of eight hundred feet front the administration group of buildings and on the latter, distant about one thousand feet, is the hillside group of buildings. The main or administration buildings and the athletic field are almost directly west of the proposed location of the new sewage disposal plant and some seven hundred and fifty feet distant therefrom, while the elevation of the ground at the buildings is one hundred and thirty-five feet above the settling tanks.

The school has a population at present of nearly thirteen hundred, of which number one thousand and eighty-five are inmates of both sexes, while the remaining two hundred and fifteen are employees. The population, of course, varies from time to time.

Of the above number, about seven hundred and fifty inmates are supported at the expense of the State, as provided for by Act of Legislature number four hundred and eight, approved June thirteenth, nineteen hundred and seven,

"For the purpose of maintenance, the sum of $270,000 or so much thereof as may be necessary for each year of 750 children at $180 each," et cetera.

At the present time the school gets its water supply through the Media water works, located practically at the eastern extremity of the school property. This water is filtered through a mechanical pressure filter and stored in two reservoirs having a capacity of two hundred thousand and six hundred thousand gallons each, and located respectively on high ground to the east and west of the administration group of buildings. During March of nineteen hundred and eight, five million six hundred and sixty-three thousand gallons were used by the school or an average daily consumption per capita of one hundred and forty gallons. This quantity, the Steward, Mr. Nathan Dewees, thinks is higher than the average.

On account of the great annual cost—about three thousand dollars, of procuring water from the Media works, the school is trying to get its own supply and has a driven well between Elwyn Brook and Church Road, three hundred feet south from the Baltimore Turnpike bridge and about thirty feet from the Road. The well is said to be driven practically through serpentine rock for a depth of three hundred feet and is cased with eight inch pipe from the top of the bed of under lying rock. The water rises practically to the surface and during the test, when pumped at the rate of two hundred gallons per minute for twenty-four hours, dropped but forty feet below the surface. The steward says a chemical analysis made of the water shows it to be pure.

It is proposed to force the water from the well to the reservoirs by compressed air and as soon the machinery can be installed to take the supply from this source. If this be done, provisions should be made to secure the water against surface contamination, as the ground near the well is low.

The administration group of buildings drains to Elwyn Brook through a six inch terra cotta pipe almost due east. The hillside group of buildings drain to the same brook near the main entrance. Between the two sewer outlets, but further up on the hillside, there is located a piggery in which are kept about seventy-five pigs. The drainage from the pens flows over the ground and naturally some of it gets into the brook. Near the west bank of the brook and to the south of the Baltimore turnpike is located a farm barn and cattle yard. The field along the brook from below the piggery to near the Baltimore Turnpike bridge is used for grazing cattle belonging to the school. The stream is in a bad state of pollution and considerable odor is noticeable along Riddle Road, due to the piggery and stream pollution. Seven dwellings are located on the opposite side of Riddle Road in the vicinity of the piggery and sewer outlets. The borough of Media to the east has no sewer system.

But one plan of the present sewer system is in existence. The old sewers are adequate for their purpose and receive no roof or surface water.

It is proposed to lay so much eight inch terra cotta pipe as will be necessary to connect the present sewer lines and bring them together at a common point about four hundred feet northeast from the piggery where the new disposal plant

is to be located. An entirely new sewer system is not contemplated but such work as may be found necessary is to be done according to good practice. Twenty-seven hundred feet of new sewers are to be laid.

The location of the new disposal plant northeast of the piggery has already been noted. As a convenient point at which to collect the institution's sewage and to purify it by means of a plant operated by gravity, this location at once suggests itself. However, it is but three hundred feet from the public road leading from Media to Elwyn Station. This is unfortunate as there is a possibility that odors from the plant might cause some annoyance. Other locations within the limits of the property necessitate long sewer lines and would place the plant directly on the watershed of the Ridley Creek dam, which supplies the Media water works. In designing the disposal plant, the engineers have estimated the maximum flow during any hour of the day at ten thousand gallons and the average daily flow at one hundred and fifty thousand gallons. They have arrived at these quantities by considering the average daily consumption for the year nineteen hundred and seven, which was one hundred and thirty thousand gallons and the average daily consumption for the month of August for the same year, which was one hundred and eighty thousand gallons. Now the figures for August, nineteen hundred and seven, are practically the same as for March, nineteen hundred and eight, to which reference has already been made. Taking into further consideration that the water supply in the near future is to be drawn from a well on the school property at an expense it is expected much less than what is now being paid annually to the Media Water Company, an increase in the water consumption may be anticipated, and, therefore, the figure for the daily flow of sewage assumed by the engineers is possibly low.

The sewage of the institution may be classed as domestic sewage though trade wastes or rain water is admitted into the sewers. The sewage is to be conducted by an eight inch main into a screen chamber, thence passed through a settling tank, at the far end of which is a flush tank; from this the sewage is automatically discharged upon bacteria beds through sprinkling distributers of the "splashing disc" type. The effluent from the bacteria beds is passed through a sedimentation basin and an effluent aerator. The plan shows sand filters but these the school does not expect to construct now. A sludge bed has always been provided to take the sludge from the first settling tank and sedimentation basin.

Provision for draining the surface water around the filter beds has been made by constructing open trenches around the outside of the plant which lead the surface water into Elwyn Brook.

The plans provide for a screen chamber, the inside dimensions of which are twelve feet long, five feet wide, and three and one-half feet deep. The side walls are vertical and have a thickness of twelve inches. The floor is to be of concrete six inches thick. A cast iron bar screen of a width of about four feet is set at an angle of forty-five degrees with the horizontal along the greater axis of the screen chamber for the total length of twelve feet. The bars have a thickness of one-half inch and a width of two inches and the opening between the bars is three quarters of an inch. Holes are drilled in the top and bottom of each floor and all the bars are assembled on two three-quarter inch round rods and the whole screen is held in place in the bottom by a two inch offset in the floor and at the top by a three inch by two and one-half inch "T" bar of three-eighths inch section set lengthwise in the chamber.

Between the top of the bar screen and the southeast wall there is a space of about fifteen inches into which is hung a sheet iron gutter semi-circular in section with three rows of three-quarter inch holes in the bottom, spaced three inches center to center.

Between the top of the bar screen and the southeast wall and in the middle along the longer axis is hung a sheet-iron basket, rectangular in plan, having a depth of eighteen inches, a breadth of seventeen inches and a width of twelve inches. The bottom and sides of this basket are perforated with three-quarter inch holes in the same manner as the gutters. Two baskets are to be provided.

The sewage enters the screen chamber through an eight inch pipe set sixteen inches above the floor in the southwest and near the northwest wall and the direction of the flow is deflected ninety degrees, striking the bar screen at right angles and passing out of the screen chamber through an eight inch pipe set flush with the floor and in the middle of the southeast wall. Matters contained in the sewage and intercepted by the screen may be drawn by a rake up along the bars and dropped into the perforated iron gutter and then passed along the gutter to the basket hung in the center. When the basket fills up it may be taken out and the contents disposed of, and while this is being done the duplicate one may put in its place. The discharge pipe from the screen chamber is supplied with an eight inch cast-iron gate valve which may be opened and closed by a key from the surface of the ground.

A settling tank, rectangular in plan, whose inside dimensions are fifty-eight feet by twenty feet, with a total depth of eight feet, is provided. The depth of the sewage, however, is but six feet and the capacity of the tank at this depth is fifty thousand gallons. The engineers estimate that the detention of the sewage in the tank is five hours during the period of maximum flow and ten hours at

minimum flow. The position of the settling tank is such that the extension of the southeast wall of the screen chamber forms the northwest wall of the settling tank and the extension of the northeast wall of the screen chamber forms the southwest wall of the settling tank.

The side walls of the settling tank are vertical, twelve inches in thickness. The floor is of concrete, six inches in thickness. Baffle walls are set in the settling tank parallel with the shorter axis and in a vertical position. The first one, having a thickness of eight inches is set three feet from the effluent end and three feet above the floor, but extends to the top of the bank. The second one is set seventeen feet beyond the first, having a thickness of eight inches. It extends the entire length of the tank and is provided with fifteen rectangular openings six inches wide and twelve inches high. These openings are eighteen inches above the floor line. The third is set seventeen feet beyond the second and extends from the floor to the top and is provided with openings six inches wide by twelve inches high, set four feet above the floor line. The fourth is similar to the first and is seventeen feet beyond the third and twelve inches from the effluent end of the settling tank. It sets three feet above the floor line, extends to the top and acts as a scum board. The effluent end of the settling tank is provided with a "T" bar set horizontally in the top of the masonry, so that the upper edge of the bar is two feet below the top of the tank. This "T" bar is set in level and acts as a weir. In the center, on the southeast side of the septic tank there is a manhole or blow-off chamber, square in plan, inside dimensions five feet. The walls are vertical, twelve inches in thickness and iron steps are set in the southwest wall for the purpose of entering the chamber. The second and third baffle walls above referred to divide the settling tanks longitudinally into three compartments and the construction of the floor of each compartment is such that the entire content may be drained to one point and from the low point in each compartment, eight inch cast-iron pipes lead to the blow-off chamber. The ends of the pipes in the chamber are provided with eight inch gate valves. From this chamber an eight inch terra cotta pipe drains to the sludge bed. The engineers think that the settling tank needs cleaning about twice a year and they have provided a hydrant for washing the walls, connected with the water service of the school by a two inch wrought iron pipe.

At the northeast or effluent end of the settling tank, a flush tank rectangular in plan, inside dimensions twelve feet six inches by twenty feet, is provided. The side walls are vertical, twelve inches in thickness and of the same height as the settling tank, in fact, the flush tank is but an extension of the settling tank for the distance of twelve feet six inches to the northeast. The floor of the flush tank is concrete six inches in thickness and drains to the southeast where are placed screens made of number eleven wire with three-quarter inch mesh. The height of each screen is three feet; its width is two feet five and a half inches and five are required to extend the entire width of the flush tank. The bottom of the screen is held in place by a six inch off-set in the floor of the tank and the top of a "T" bar set in the masonry parallel with the southeast end. The screens make an angle of about sixty degrees with the horizontal. Each screen may be removed by hand for the purpose of cleaning and while this is done a clean one may be set in place as the screens are to be furnished in duplicate.

The syphoning level of the sewage in the flush tank is two feet six inches below the weir of the first tank and the depth of the sewage at the northwest wall is about seven inches. At the southeast end where the screens are set it is eighteen inches. The size of the dose at this depth is fifteen hundred gallons.

From the northeast end of the screen chamber and under the bar screen an eight inch pipe is laid parallel with the northwest side of the settling tank, extending to the center of the flush tank, where a connection is made with the flush tank by means of a "T" branch and a short piece of pipe inserted in the northwest wall. The purpose of this pipe is to pass the sewage from the screen chamber to the flush tank without going through the settling tank. An extension of this pipe is also to be made temporarily to the old sewer which is to be used only if occasion demands it, while the plant is being put in operation. After the plant is put in operation, this temporary connection should be taken up and never again used.

In the center of the flush tank and on the southeast side of it, flush with the floor, is placed a six inch iron pipe, on which is set a six inch syphon in a chamber square in plan, with inside dimensions of five feet. The walls are vertical, twelve inches in thickness and on the southeast side are inserted iron steps for entering the chamber. The floor is of concrete, six inches in thickness. The six inch discharge pipe from the flush tank is made a part of the syphon and extends beyond the vertical inflow arm of the syphon for the distance of about two feet and this end is provided with a cast-iron gate valve. By this arrangement the contents of the flush tanks may be drawn off intermittently by the syphon when the valve is closed, or, should occasion demand it, continuously when the valve is open

The syphon chamber is covered with five inch concrete roof and supplied with a cast-iron frame and cover. The screen chamber, settling tank and flush tanks are not to be covered at present.

About one hundred and twenty-five feet to the southeast of the settling tank are to be located the sprinkling filters or bacteria beds, having a longer axis of about one hundred and fourteen feet and a shorter axis of forty-five feet. The longer axis takes a direction almost due north and south and the surface of the filtering material is fourteen and a half feet lower than the sewage in the flush tank at the time when the syphon begins to discharge. This rectangular area is divided into four separate beds by a wall running through the center, along the greater axis and another wall at right angles thereto, parallel with the shorter axis, making four filtering areas, two twenty-one feet by forty feet three inches and two twenty-one feet by seventy-four feet three inches, having a total area of five thousand eight hundred and eight square feet. The natural slope of the ground where these beds are to be constructed is about fifteen feet to a hundred feet and the ground is to be excavated to such depth that the entire bed will rest on natural foundation. On the west side as well as on the north and south sides of the beds the ground is to be excavated for a distance of about five feet beyond the outside of the wall; so that the entire bed, when finished, sets above the surface of the ground and is exposed to the air.

The floor of the beds is to be of concrete, six inches thick, and will have a slope east and west from the center wall of six inches in a width of twenty-one feet. On the concrete floor in parallel rows are to be laid eight inch terra cotta channel pipes as underdrains, which will carry the effluent from the center to the east and west sides of the beds where open concrete gutters collect this effluent and drain it to the north, discharging in a ten inch terra cotta pipe. This gutter is twelve inches in width and has a depth varying from five to twelve inches. The bottom of the gutter is semi-circular in cross section. It is proposed not to cover this gutter unless extreme low temperature may make it necessary to do so.

The filtering material, which is to be broken stone from two to three inches in size, is to have a minimum depth of six feet over the underdrains. It is held in place by a stone wall built around the outside of the beds. This wall has a thickness of two feet six inches to within five feet of the top of the filtering material. From there up, it decreases gradually until the thickness is eighteen inches at the surface of the bed. The wall is laid in mortar for a depth of two and a half feet and then for four and a half feet it is laid up dry, so as to afford free passage of air to the filtering material. Above this point the wall is again laid in mortar and at the surface of the bed there is a recess in the wall reducing the thickness to twelve inches for a height of eighteen inches. The same plan is followed in laying the central dividing walls. The entire filter bed is to be covered by two gable roofs supported by frame work resting on the twelve inch walls, the ridge of the roof running parallel with the longer axis of the bed. The eaves and ridges of the roofs are about five and eleven feet respectively above the surface of the filtering material and the side walls of the wooden superstructure are to be covered with clap-boards. The roof is to be shingled with cypress and there are to be doors and windows to admit light and air. Provision is also made to obtain ventilation along the ridge of the roof.

From the syphon chamber a six inch cast-iron pipe, laid partly under and partly above the surface of the ground, leads to the northwest corner of the filter bed and from this pipe three branches of five inch galvanized wrought-iron pipe lead to the distributors. At the north wall each of these three pipes is fitted with a gate valve to control the flow to the beds. Although the entire bed is divided by two cross walls running at right angles into four separate beds, the arrangement of the distributors is such that the two smaller beds are used as one unit, and, when in operation, there are really but three filter beds, all of which may be used at the same time.

The distributing pipes are hung parallel with the longer axis of the bed, on the rafters of the roof, about six feet above the surface of the filtering material, by means of rods and turn-buckles, making it possible to adjust these pipes vertically. They are spaced ten feet center to center. A brass bushing in the "T" reduces the orifice to one-half inch. Directly under each orifice is set on an inch standard about two feet above the filtering material a copper disk in the shape of a segment of a sphere, having a horizontal diameter of six inches and a depth of two inches. The base of the standard is of cast-iron in the shape of a Greek cross, the width of the arms being two inches and the length nine inches. This base is to be set firmly in the filtering material at the depth of about six inches below the surface. The vertical limb of the standard is made adjustable so that the distance between the disk and the orifice may be changed to obtain the best possible distribution.

The plan shows the diameter of the spray to be eleven feet six inches and as there are thirty-four orifices the total wetted area will be thirty-five hundred and thirty square feet, and with a daily flow of one hundred and fifty thousand gallons, the actual rate of filtration would be about forty-two gallons per square foot in twenty-four hours or two million gallons per acre per day.

From the north end of the filter beds a ten inch collector pipe conveys the sewage to a sedimentation basin, rectangular in plan, divided by a central wall into two compartments, the dimensions of each compartment being forty-five feet long and fifteen feet wide and having a working depth of about three feet. The

side walls are vertical, eight inches in thickness. The central wall is twelve inches in thickness. The floor is of concrete, four inches in thickness and so laid that the entire content is drained to the center of each compartment. From the low point in the centre of each compartment an eight inch cast-iron pipe leads to a manhole or blow-off chamber on the north side of the basin. The ends of the pipe in the chamber are fitted with eight inch gate valves. The chamber is rectangular in plan with dimensions of four feet by three feet.

At the south end, opposite the dividing wall of the sedimentation basin, there is an inlet chamber, rectangular in plan, dimensions five feet by two feet. The ten inch pipe from the filter bed discharges directly into this inlet chamber and from it the sewage may be passed into either or both of the compartments of the sedimentation basin, the flow being controlled by ten inch shear gates, operated by hand.

The sewage, after entering the sedimentation basin, is deflected towards the bottom by a baffle board set diagonally across the corner about two feet from the mouth of the inflow pipe. If one compartment alone is used, the sewage flows out at the corner diagonally across the corner in the same manner as at the inflow end. A ten inch shear gate is set in the north wall at the northwest and northeast corners and in the east wall at the southeast corner and baffle boards and weirs are provided at these outlets in the manner described. With this arrangement the sewage may be taken directly through either compartment travelling in the direction of the diagonal. And further, there is a weir set in the central wall at the north end and by closing the two shear gates at the north wall the two compartments may be used together, making sewage travel to the north in the west compartment, then passing over the weir to the east compartment and south through this compartment to the outlet pipe in the southeast corner where an eight inch pipe extends to a distributing chamber. This eight inch pipe also extends north along the east side of the sedimentation basin and there curves to the west and extends along the north side until the connection is made with the outlet of the west chamber. Connection is also made with the east chamber on the north side.

From the west side of the inlet chamber in the sedimentation basin an eight inch terra cotta pipe leads to the effluent pipe on the east side of the sprinkling filters, making it possible for the effluent to be passed directly from the filters to the sand filter without passing through the sedimentation basin. The accumulated sludge may be drained off into the blow-off chamber on the north end of the sedimentation basin and conducted to the sludge basin.

The total quantity held by the sedimentation basin is thirty thousand gallons, which allows three hours for sedimentation at the time of the maximum flow.

Two sand filter beds are provided. They are rectangular in plan, ninety-one feet long by sixty feet wide, having a total area of ten thousand nine hundred and twenty feet and at a flow of one hundred and fifty thousand gallons per day would be operated at the rate of fourteen gallons per square foot, or six hundred and twenty thousand gallons per acre per day. The side walls are to be made of earth embankment having a width of two feet at the top with sloping sides at the rate of one to one to the bottom. The depth of sand in the beds is to be two feet, laid upon a bed of gravel varying in depth from nothing to six inches. Five rows of four inch drain tile are laid longitudinally through the beds and connected with an eight inch terra cotta collector pipe, to be located in the centre of the bed and running at right angles to the tile under drain. The bottom of the bed is to be ridged and the drain tile is to be laid in the trough of each ridge and the water is drained to the tile through the surrounding layer of gravel.

The effluent from the sedimentation basin is distributed on the same beds by means of two eight inch galvanized spiral riveted pipes which run along the direction of the longer axis and are supported by concrete piers ten inches in diameter. The bottom of the pipe is about fifteen inches above the surface of the sand. These pipes are spaced thirty feet centre to centre and fifteen feet from the sides of the filters. On the under side of each pipe are fixed two inch nipples set in flanged saddles ten feet center to center and from these nipples the sewage is discharged on splash plates. The splash plates are to be of concrete, four inches in thickness, circular in plan and have a diameter of eighteen inches. The disk is circular, having a depth of one and a half inches and a width of about six inches. The sewage may be discharged on either one or both of the beds, the flow being regulated by two ten inch shear gates in the gate chamber on the west side of the sand beds.

On the pipe leading from the sedimentation basin to the gate chamber in the sand beds, there is a by-pass chamber about ten feet long south of the sedimentation basin, so that the effluent from the sedimentation basin may be delivered directly to the effluent aerator. The aerator is simply a spraying nozzle set in a chamber circular in plan with a diameter of twelve feet. The effluent passes through the nozzles under a head of five feet and falls on the floors of the chamber which takes the form of an inverted cone, from the apex of which an eight inch terra cotta pipe conveys the effluent to Elwyn Brook.

A sludge bed with dimensions of one hundred feet in length by thirty-five feet in width is to be constructed. The side walls are to be of earth having a width of two feet at the top and a slope of one to one. The top of the side walls is to be three feet above the surface of the bed. The main body of the bed is to be formed of the

natural soil and has a working depth of three feet. Two rows of four inch underdrains laid longitudinally and connected with a central six inch terra cotta pipe drain set in the center at right angles to the four inch drains convey the drainage directly to the brook. The sludge bed is to take the sludge from both the settling tanks and the sedimentation basin. The entire contents of the latter tank would fill the bed for a depth of but two feet. It is expected to let the sludge dry and then plough it in the soil or remove it.

It has been determined that the attention of the Board of Directors should be called, and it is hereby and herein called, to the proximity of the sewage disposal plant to the public road and to the main buildings of the institution. The latter are not over one thousand feet away. The public road at its nearest point is two hundred feet away. The pumping house of the water works is five hundred feet away up stream, but below one of the sewer outlets on the property. Every precaution should be taken at the drilled well to prevent any surface contamination of the water in the well.

The fact is emphasized that sewage disposal works should be placed in secluded localities. The exigencies should be great that would warrant the location of a sewage disposal plant in the front yard of an institution. This is practically what the Directors propose to do in this instance. Some other site, remote, even if pumping has to be resorted to, should be secured. Very high class maintenance indeed is required to prevent objectionable odors at sewage works.

The plans proposed embody the essential elements of successful modern sewage disposal. However well the design may be built, it is only by careful attention and intelligent operation that it can be made permanently satisfactory in use. The authorities of the institution have a right to dispose of the sewage in any manner they may see fit, so long as a nuisance is not created and sewage not discharged into the waters of the State. Tests will be made of the effluents from the proposed works at regular intervals and if at any time sewage is discharged from the plant of the institution into the waters of the State to the prejudice of public health, then the said Board of Directors shall be liable to the penalties imposed by law for the discharge of sewage into the stream, and, furthermore, remedies will be required by the State Department of Health and the Board of Directors shall adopt such remedial measures as the said Department of Health or the Governor, Attorney General and Commissioner of Health may advise or approve.

The utilization of the site proposed should not be attempted.

The proposed sand filtration rate is high. It is difficult to maintain rates in excess of three hundred thousand gallons per acre daily, or even this amount. Wherever the plant may be located, the authorities should provide for the treatment of the sprinkling filter effluent by chemicals and this chemical sterilizing apparatus should be so located as to be able to receive and test the sand filter effluent whenever this shall be necessary. It may not be required to use this apparatus at the outset of the operation of the plant. This would depend wholly upon the volume of the sewage and the ability of the sand filter to turn out a good effluent. If the suggestions herein contained be followed out, it must then be understood that this will in no wise relieve the owners of the responsibility of maintaining the sewers and sewage disposal works free of all nuisance or menace to the public health, or of keeping the sewage at all times out of the waters of the State.

Harrisburg, Pa., November 6th, 1908.

MILL CREEK AND HARBOR CREEK TOWNSHIPS.

Erie Improvement Company, Erie County.

This application is made by the Erie Improvement Company of Erie County, and is for permission to construct and extend sewerage in the townships of Mill Creek and Harbor Creek, Erie County, and to discharge the sewage therefrom, untreated, into Lake Erie within the limits of said townships.

It appears that the Erie Improvement Company was chartered October thirtieth, one thousand nine hundred and seven, for the construction and maintenance of sewers, drains, culverts, conduits, pipes, with all the necessary inlets, outlets and means of disposal for surface and under-surface and sewerage drainage, in the territory now within the bounds of Mill Creek and Harbor Creek townships in Erie County, Pennsylvania, including the construction, carry on and maintenance of such means and appliances as may tend to improve or advance the health, comfort and conveniences of the inhabitants and sanitary conditions within the boundaries of said townships and for the purpose above set forth, to enter upon and occupy any public highway with the consent of the local authorities.

The Pennsylvania General Electric Company contemplates the construction of a manufacturing plant on a tract of several hundred acres of farm land lying about one and a half miles east of the eastern boundary of the city of Erie, for the manufacture and use of various kinds of electrical machinery, apparatus, et cetera. In the development of this plant, said company purposes to construct a system of sewers with an outlet northward to Lake Erie.

The Erie Improvement Company contemplates the construction of other sewers which are designed to form a system a part of which shall be the sewers at the said General Electric Company's plant.

About one thousand acres of farm lands have been purchased by a representative of the Pennsylvania General Electric Company, who now holds the title to the land upon which it is proposed by said company to erect its plant. This owner, Mr. J. M. Sherwin, is a point petitioner with the Erie Improvement Company for approval of the proposed sewerage system.

The population at present living on these lands is approximately one hundred people. The northern boundary of the property extends to Lake Erie. The southern boundary is the Lake Shore and Michigan Southern Railroad and also the Nickel Plate Road, so-called. A small portion of the eastern part is in Harbor Creek township, and the remainder in Mill Creek township. The ground at the lake terminates abruptly in a bluff from thirty to fifty feet above the lake level. Back from the bluff the ground ascends in a gentle slope southerly. In an easterly and westerly direction the surface is uniform except where it is cut by small ravines. A stream known as Four Mile Creek rises in Green Township about seven miles to the south, drains a rural territory, passes through the eastern end of the property under discussion and enters the lake in Mill Creek township near Harbor Creek township two miles easterly from the Erie City line.

The territory is underlaid with shale rock. Near the railroads the rock is about two feet below the surface of the ground and at the lake it is about ten to fifteen feet below.

Here, if expectations be realized, will spring into existence within five years a community of ten thousand people. Possibly with the next twenty-five years, should the business of the proposed plant develop as the business of other plants now operated by this company elsewhere have developed, the additional population may have reached fifty thousand people.

Erie City is well located to increase its prestige as a manufacturing and commercial center in northwestern Pennsylvania. The two railroads above mentioned are trunk lines to the east and west. The Pennsylvania Railroad has a direct line to Philadelphia and New York. The Bessemer Railroad is a direct line to the south and the Erie and Pittsburg Railroad is important. All of these lines together with its excellent lake harbor afford superior communication with the various commercial and industrial centers and lake and seaports of the country and make Erie an advantageous point for the permanent installation of the General Electric Company's Pennsylvania plant. The Company, or its agents, have laid out into streets and house lots the thousand acre tract above mentioned and streets have been projected on paper connecting with those in the city of Erie. Car lines, a water works system, a sewer system and storm drains have been designed.

The proposed domestic water system is planned for twenty thousand employes and twenty-five thousand town inhabitants besides. The estimated consumption is two million, six hundred thousand gallons per day. It is reported that arrangements have been made with the water commissioners of Erie City to furnish drinking water to the settlement and for the plant. It appears that the system for fire protection is to be installed by the General Electric Company, the water for this purpose to be taken from the lake. There is to be an emergency connection with the Erie City water mains. Plans and an application for their approval have not been submitted to the Commissioner of Health for the above water works either by the city authorities or the private corporations.

The proposed surface drainage system is to exclude sewage. The improvement involves the abandonment of some natural water courses and the substitution therefor of drains. The tract upon which the shops are to be located will be artificially drained with an outlet eastward into Four Mile Creek. The land adjacent to this creek will be drained by pipes whose outlets will be into the stream at convenient points. The plan shows twenty such outlets between the railroads and the lake. East of the creek there is a drainage district which will have an outlet into the lake. West of the creek the plan shows four outlets into the lake and two into a run at the cemetery. The upper one of these outlets is an intercepting drain designed to collect the flow of numerous little runs and divert it away from and around the area to be developed into the cemetery run. In this general way will an admirable removal of storm water from the streets and territory of the district be effected independently of sewerage.

For the collection and removal of sewage only from the proposed industrial plant and from the adjoining territory to be developed in connection therewith, the Erie Improvement Company has laid out an extensive plan, embodying for the immediate present the discharge of sewage into Lake Erie along the shores, to be followed later subject to the approval of the Commissioner of Health by the discharge of this sewage, at three points in the lake each distant four thousand feet from the shore, or as an alternate scheme, the construction of two septic tanks, one for the district west of and one for the district east of Four Mile Creek. The effluent from these tanks would be discharged through the outfalls under the lake.

The petitioners also contemplate the ultimate possibility of the erection of a disposal plant in Harbor Creek township to which sewage would have to be pumped.

The proposed sewers will have diameters ranging from six to twenty-four inches. The number of miles of sewers proposed will approximate about thirty-eight. It is not the intention of either the General Electric Company or the Erie Improve-

ment Company to construct all of the sewers in the first instance. In fact, the number of men to be employed at the works will for a considerable length of time be limited. Consequently the amount of sewage will be small. Such portions of the sewer system are to be built as may be deemed necessary from time to time by said companies as the business of each may justify.

Detail plans of sewers have not yet been prepared, the layout above mentioned being tentative. The general plan submitted shows three shore sewer outlets east of the creek, one in the creek near its mouth and four shore sewer outlets west of the creek.

The eastern outlet is in Harbor Creek township, four thousand feet east of Four Mile Creek. It serves a district wholly within said township, comprising about two hundred acres, in which there will be ultimately, as planned, about seven and three-tenth miles of sewers.

The next outlet is also in said township near the Mill Creek township line, thirteen hundred feet westerly from the first mentioned outlet. The territory which it will serve is almost wholly within Mill Creek township and extends to Mill Creek south of Lake Road and between said road and the southern limits of the property. Lake Road is the principal highway extending easterly from Erie City. It parallels the lake and is distant therefrom about half a mile. The area tributary to sewer outlet Number Two is about one hundred and seventy acres, in which ultimately will be laid seven and six-tenth miles of sewers.

There is a seventy acre tract between the Lake Road and the lake adjacent to Four Mile Creek and east of it, which is to be served by a sewer outlet discharging into the lake at a point six hundred feet east of the mouth of this creek. It will serve ultimately two miles of sewers.

These three outlets are to have their flow intercepted and carried out four thousand feet into the lake through a pipe extension to outlet Number One in event that the Commissioner of Health requires this to be done. The tentative location of the eastern septic tank proposed is in the vicinity of outlet Number One but back on the high ground. Presumably the sewage would have to be pumped into from a part of the system.

So tributary to the eastern deep water sewer outlet is a municipal territory of about four hundred and forty acres upon which an ultimate population of thirteen thousand people may reside, contributing to the sewers a daily flow of one million three hundred thousand gallons.

East of Four Mile Creek between Lake Road and the lake there is a fifty acre tract in which one and four-tenths miles of sewers may be built having an outlet into the creek near its mouth.

The plot upon which the General Electric Company's shops are to be erected, lies between Lake Road and the railroad. It is about square and contains about three hundred acres.

Herein approximately five miles of sewers are to be built, having an outlet into the lake at a point about eight hundred feet west of Four Mile Creek.

The westerly boundary of the industrial plant as laid out is Lincoln Avenue. East of this avenue extended to the lake and between the lake and the proposed shops are one hundred and ten acres in which three and a half miles of sewers may ultimately be built. They are to have two outlets, one eight hundred feet west of the outlet to the shop sewers and the other six hundred feet still further west.

The remaining district in the territory under discussion comprises about three hundred acres, in which eleven and seven-tenths miles of sewer are planned with an outlet into the lake eight hundred feet west of Lincoln Avenue. It is in this vicinity that the western septic tank site has been tentatively selected.

The deep water outlet for the western municipal district will extend out into the lake at the foot of Lincoln Avenue and the flow from the sewer outlets Numbers Six, Seven and Eight (comprising a total territory of four hundred and ten acres, upon which ultimately may reside twelve thousand people contributing a daily flow to the sewers of one million, two hundred thousand gallons) is to be diverted to it when required by the State Department of Health.

If the sewers of the fifty acre tract to be served by outlet Number Four into the creek are connected to the sewers of the eastern district, a syphon will be provided under the creek for the purpose.

It is estimated that twenty thousand employees at the works will contribute a daily flow to the sewer system of seven hundred thousand gallons. It is proposed to extend the shore outlet of this system out into deep water whenever such an expedient is ordered by the Commissioner of Health.

In the event of the sewage of the lake outlets being collected and raised to a purification plant to be located somewhere in the country to the east of the proposed settlement, the point of collection and pumping machinery installation would be somewhere in the vicinity of the mouth of Four Mile Creek.

The sewers from all of the lake cities and towns is discharged into the lake. Most of these places derive their source of public supply from the lake also. The nearest community whose water supply is derived from Lake Erie is Dunkirk, forty-five miles east and next Buffalo, ninety miles east.

The public water supply at Erie is to be taken from the lake at a point beyond Presque Isle, a peninsula which forms Presque Bay. Into this estuary the sewers of Erie City discharge. There is a current eastward along the lake

shore which would tend to prevent any sewage contamination of the water used by the city of Erie by reason of the discharge of sewage at a point six miles distant at Four Mile Creek and in front of said peninsula.

The petitioners represent that at the present time the drinking water in the district is obtained from private wells and that except at the industrial plant, there will be no other practicable means of supplying the first comers into the new settlement with drinking water, except at a greater expense than the present development justifies; hence, in order to avoid the pollution of the ground supply of water by cesspools and privy methods, it is thought to be altogether a measure of health protection and also of economy to build sewers as fast as called for in accordance with the comprehensive plan submitted.

No doubt, for two or three years the total output of sewage will be very small and infinitesimal in comparison to the great bulk of sewage which now goes into the lake waters from the sewers of Erie.

In view of the fact that the sewage disposal problem of the city of Erie is now under consideration by the State officials and that changes in the present method will apparently involve the expenditure of a considerable sum of money and a number of years to complete, and since the plans proposed by the petitioners, while providing for the discharge of untreated sewage into Lake Erie, show a tentative lay-out for other means of disposal for further consideration at such time as it may be deemed necessary by the Commissioner of Health, it has been determined that the interests of the public health will be subserved by approval of the proposed sewers and a permit is hereby and herein granted therefor, under the following considerations and stipulations:

FIRST: That before any sewers are built and used, plans and profiles thereof shall be submitted to the Commissioner of Health for approval. At the close of each season's work a plan of the sewers built during the year, together with any other information in connection therewith that may be required, shall be filed in the office of said Commissioner of Health to the end that the Department shall always be informed of the extent of the sewer system and its use. All surface water shall be excluded from the system.

SECOND: This permit to discharge sewage into the waters of the State shall cease on April first, one thousand nine hundred and eleven. If at that time the terms of this permit shall have been complied with, then, if the interests of the public health demand it, the Commissioner of Health may extend the time in which sewage may continue to be discharged into the waters of the State.

THIRD: If at any time, in the opinion of the Commissioner of Health, the sewer system or the method of disposal, or any part of such system or disposal, has become prejudicial to public health, then such remedial measures shall be adopted as he may advise or approve.

FOURTH: No pathogenic material from any laboratory shall be permitted to be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

The attention of the petitioners is called to the fact that the extension of Erie City water mains into the proposed settlement or the establishment of works for the supply of water there cannot be lawfully done without an approval of such extensions and the source of supply by the Commissioner of Health.

Harrisburg, Pa., April 2nd, 1908.

MINERSVILLE, SCHUYLKILL COUNTY.

This application was made by the borough of Minersville, Schuylkill County, Pennsylvania, and is for permission to extend its sewerage system by building a storm sewer in Sunbury Street from an existing sewer in Second Street down Sunbury Street, a total length of twelve hundred and fifty-seven feet to the West Branch of the Schuylkill River in said borough.

The borough of Minersville, as the name implies, is a residence town for miners employed in the surrounding mines and collieries. The people are mostly foreigners, such as Slavs, Hungarians and Italians. The area of the borough is about one square mile. The population in nineteen hundred was given as four thousand eight hundred and fifteen, and the present population is said to be six thousand. This growth in population of a little over one thousand in the last eight years can be said to be due wholly to an increase in the foreign element.

The borough is situated on the west side of the West Branch of the Schuylkill River on the northern and southern sides of the narrow valley through which Wolf Creek flows. It is at the eastern foot of Mine Hill with Broad Mountain on the northwest and Sharp Mountain on the southeast. It is bounded on the north by Cass township, on the west by Branch township, and on the south by Branch and Norwegian townships and on the east by Norwegian township. Pottsville, the county seat of Schuylkill County, with a population of seventeen thousand, is four miles to the southeast and the only neighboring city of any size. Surrounding Minersville and depending largely upon it as a trading center and antitoxin station are Duncott, Jonestown, Lytle, Forestville and Phoenix Park. All of the villages have an aggregate population of about five thousand.

Wolf Creek flows through the borough in an easterly direction and the West Branch of the Schuylkill borders the borough on the northern and southern lines. The creek consists of two branches that head about two and one-half miles

away in Mine Hill and unite just before entering the borough. It is a small stream with little flow in dry weather, but at times of rain it is turned into a mountain torrent as most small mountainous streams are. The water of Wolf Creek is almost wholly acid mine water from the mines above. The northeast branch passes through Mine Hill colliery and after use in the colliery emerges heavily laden with coal dust. The other branch passes Lytle colliery where the water is also used, but here the water is hoisted by the colliery and after use is allowed to drain off the Wolf Creek watershed, thus decreasing the flow of Wolf Creek. This branch is usually dry from Lytle colliery to its union with the other branch except in time of storm.

Wolf Creek enters the borough of Minersville on the west as an open stream, crosses Fourth Street through a culvert, flows down north street one block and then crosses diagonally one block to Lewis Street, from which point it continues about twelve hundred feet as a stone arch culvert, making the road bed of Lewis Street until it crosses Delaware Avenue, after which it flows open about one hundred and fifty feet, when it joins the west branch of the Schuylkill River. The culvert is flat bottomed, about eight feet wide and has a height, from crown to base, of four feet.

The West Branch of the Schuylkill River is also a small acid mine water stream, carrying much coal dust from the mines above. This stream heads about eight to ten miles away in the Hexerville Mountains and runs down to Minersville through the Mine Hill gap just above the borough.

There are but two industrial plants in Minersville worthy of mention. The Combe Garment Company's works are located on the corner of Lewis and Front Streets, where are employed about two hundred hands. This factory uses borough water and sewers into Wolf Creek. The Lewis and Son Garment Company, situated about two squares north of the Combe Garment Company, employes about seventy-five hands. This factory uses borough water and sewers into Wolf Creek.

The borough has a public water supply furnished by the Minersville Water Company. The borough is reported to own four hundred shares of stock in the company of a total of forty-two thousand and eighty-five shares. The water is of an excellent mountain surface origin, gives an average of twenty-four hour supply of over two hundred thousand gallons and a pressure of from sixty to one hundred pounds per square inch. The storage reservoir has been so constructed that its walls may at any time be so increased in height as to double the supply. This public water is in almost universal use, there being but few wells and springs now in commission.

There is at present no plan of Minerville's existing sewer system, but the borough solicitor, Mr. John B. McGurl, says such a plan will be made at once. The engineers of Minersville, A. B. Cochran and Son, have already such a plan under way, but it will take some time to locate all private sewers now in use and to complete the plan. Minersville is an old town and little attention has been paid to sewer connections until of late years. Property owners have been at liberty to plan and place their drainage as they wish. Thus, at present there are numerous private sewer lines and others where three or four property owners would join together and lay a sewer, all entering Wolf Creek. Of such connections the borough has little connection to which a fee is charged. These sewers are located principally on Front Street, Second Street, Third, Fourth, Sixth and Sunbury Streets.

Front Street sewer heads in the southern hillside, taking spring water which is run into a twenty-four inch sewer and crosses Sunbury Street diagonally to Front Street and continues down Front Street to Wolf Creek. This sewer is principally for storm water from the hillsides, but it is said to receive drainage from probably six houses; its length is about four hundred feet. Also on the north side of Wolf Creek is about twelve hundred feet of sewer on Front Street.

Second Street has about one thousand feet of twenty and twenty-four inch sewer on the south side, beginning about four hundred feet south of Sunbury Street, crossing Sunbury Street and entering Wolf Creek. Also on the north side on Second Street about one thousand feet of sewer enters Wolf Creek. There are some lateral connections on this sewer, but the amount could not be learned.

Third Street has about four hundred and fifty feet of twenty-four inch sewer on the south side and six hundred feet on the north side, both emptying into Wolf Creek.

Fourth Street has about six hundred feet of sewer with a six hundred foot connection on Railroad Street, size unknown but probably twenty-four inches.

West Sunbury Street has about fourteen hundred feet of sewer from Sixth Street to Fourth Street, and thence through Fourth Street sewer to Wolf Creek.

New Castle Street has probably eight hundred feet of twelve inch sewer draining into an uncovered stream which enters Wolf Creek.

In the northeastern part of Minersville there is a small hill called Primrose Hill. From the side of this hill mine seepage crops out and flows open for a short distance. It enters the borough on Sixth Street a little north of Sunbury Street, from which point it flows in thirty inch sewer pipe across lots to Lewis Street, from Lewis Street to Fifth Street and diagonally to North Street, crossing lots from

North Street to Fourth Street. At this point it enters a stone culvert for two hundred and fifty feet and enters Wolf Creek. The length of this sewer is not known. It receives drainage from probably forty houses.

All of these sewers mentioned are combined sewers, receiving both storm water and house drainage. They all have good grades to Wolf Creek. Their total length is approximately as follows: Front Street, sixteen hundred feet; Second Street, two thousand feet; Third Street, ten hundred and fifty feet; Fourth Street, twelve hundred feet; West Sunbury Street, fourteen hundred feet; and New Castle Street, eight hundred feet, making a total of eight thousand and fifty feet.

On South Delaware Avenue a short distance south of the Pottsville Company station is an open stream heading in the side hill, flowing along the tracks about twelve hundred feet and then crossing under the tracks and emptying into the West Branch of the Schuylkill River. The stream receives other spring water and also numerous house sewers, carrying kitchen wastes, wash water, etc., empty therein. It is a moderately flowing stream and as it carries so much waste material it becomes foul during dry weather and overflows at times of rain, thus creating a nuisance. The Board of Health has condemned the stream as a menace to public health and has had a plan drawn for putting in a stone culvert, leaving the stream in the same condition but enclosing it. A. B. Cochran and Son, Engineers, have drawn the plans for this work. The Secretary of the Board of Health wishes to know whether or not a permit from the Department is needed for work that is an improvement upon an existing sewer. Here neither volume nor position would be changed.

These are probably not even all of the borough sewers, as no record could be found and no one seemed to know. However, the amount given is a fair estimate and shows the general nature. Besides these sewers mentioned, there are a great many private sewers entering into Wolf Creek and the West Branch of the Schuylkill River. Most of the properties on the north side of Sunbury Street drain directly into Wolf Crek.

There are in Minersville probably one hundred closets. Some are directly over streams used as sewers. Some are on properties where house closets are installed, but still the privies are in use in part. It is said that there are but few cesspools and none were seen. There are probably not over six wells in use throughout the borough. The streets are all dirt streets with usually a gutter of brick or stone carrying surface drainage to sewers at street corners.

The borough of Minersville continuously has trouble with the sewers emptying into Wolf Creek. At times of heavy rain, both Wolf Creek and the West Branch of the Schuylkill become heavily laden with culm from the culm banks above. At the union of Wolf Creek with the Schuylkill the land is low and Wolf Creek flows so slowly that the culvert is clogged and much culm deposited. Because of this the sewer outlets are blocked and often so stopped that overflows occur on the hillsides. After such rains the culm from the end of the culvert to the river must be removed to allow the culvert to clear itself. Should this culvert through which Wolf Creek flows be changed from a flat bottom to a round bottom, there would probably be little or no trouble with the culm depositing in Wolf Creek.

The proposed sewer is to consist of about three hundred and sixty-five feet of twenty-four inch sewer pipe, extending from Second Street to a manhole to be built in the Front Street sewer that crosses Sunbury Street. This manhole is to be common to both sewers. From this manhole the sewer is to be a thirty inch pipe to the West Branch of the Schuylkill River, a distance of about eight hundred and ninety-two feet. The first four hundred and twenty-two feet has a grade of four and six-tenths feet per one hundred feet; the next three hundred and ninety-one feet has a grade of one and twenty-eight hundredths feet per one hundred feet; and the last four hundred and forty-four feet has a grade of seventy-hundredths feet per one hundred feet. Thus the proposed sewer has apparently a good fall and should readily clear itself at its junction with the West Branch of the Schuylkill River. Its use is to be primarily as a storm sewer, but undoubtedly it is the intention of the borough to have house connections to the sewer, at least in the near future. There are eighteen or twenty houses that could connect at once. The others have drainage already installed and probably would not connect for some time.

This proposed sewer will receive sewage from about four hundred feet of old sewer on Second Street south of Sunbury Street and part of the sewage coming down the Front Street sewer passing through the manhole common to both sewers and the junction of Front Street and Sunbury street. Other than this the sewer will carry only storm water, unless new connections are made.

The sewer is greatly needed to carry storm water coming down Sunbury Street and the whole hillside above Sunbury Street. The grade is steep and the water rushes from the hillside into Sunbury Street, and the Front Street and Second Street sewers are unable to care for the water. Thus the properties on the lower side of Sunbury Street are flooded and damage caused.

A considerable quantity of the sewer pipe is on the ground ready to be laid and the borough wishes to complete the work at the earliest possible opportunity.

The assessed valuation of the borough is given by the borough solicitor as a little over one million dollars and the bonded indebtedness at about nineteen thousand

dollars. Thus the borough can, by vote of the people, increase the debt about fifty thousand dollars.

The time will come when Minersville and other boroughs in the upper Schuylkill River watershed must be called upon to construct sewage disposal works. The continuation of combined sewers is not in harmony with the plan for the treatment of house sewage. It is practical and economical to handle house drainage only in a purification plant, but the cost of treating mingled sewage and storm water is prohibitive. The town should anticipate the ultimate requirements of the State by laying down its sewers in conformity to a general plan that warrants State approval when considered from the standpoint of the policy of the Commonwealth to preserve the purity of the waters of the State for the protection of public health.

Now when freshets occur, the waste coal pieces transported by water the entire length of the Schuylkill River, interfere in the operation of the water filters at the city of Philadelphia. The evidence of the transportation of such foreign matter in water is indicative of the transportation of smaller things like bacteria. This disposal, during freshet periods, if poisons from the human body at Minersville should reach the intakes of the municipalities along the banks of the Schuylkill River and be introduced into the water pipe system, would cause injury to public health. Preventive medicine, which is rapidly coming to the fore, demands that such menaces shall cease. It is the effort of the Commissioner of Health in the administration of the laws of the Commonwealth to bring about the adoption of practicable measures for the ultimate elimination of all sewage from the Schuylkill River and its tributaries. Therefore, Minersville should bear this in mind and prepare plans and adopt the same after they are approved by the State, and thereafter, from time to time, in building sewers, lay them down in conformity to this plan, to the end that efficiency and economy shall be obtained and the State's policy complied with.

It has been determined that the interests of the public health will be subserved by granting a permit for the particular extension to the existing sewer system asked for in Minersville, and a permit is hereby and herein granted under the following conditions and stipulations:

FIRST: That any house sewer connections with the proposed sewer, whose object is primarily to protect properties on the lower side of Sunbury Street from floods of storm water and give the street proper drainage, shall be temporary only in character.

SECOND: On or before three months from the date of this permit, the borough shall prepare and file in the office of the Commissioner of Health a plan showing all existing sewers within the borough limits, and before any further extensions to the borough sewer system shall be made, the borough shall prepare a comprehensive sewerage plan for the collection of the sewage from all public and private sewers within the municipal limits, and its conveyance to such a point that it may prove advisable where the sewage shall be treated at some future date, and tentative outlines of a purification plant should also be prepared and submitted with the sewer plan. The Commissioner of Health will modify, amend or approve these plans and he may grant a permit therefor and fix the time, bearing in mind the State's policy with respect to other municipalities on the watershed, when the sewage purification works shall be erected.

Harrisburg, Pa., July 29th, 1908.

MONACA, BEAVER COUNTY.

This application was made by the borough of Monaca, Beaver County, and is for permission to extend its sewer system and to discharge the sewage untreated into the Ohio River, within the borough limits.

The borough of Monaca is an industrial community situated on the south bank of the Ohio River about opposite the mouth of the Beaver River. The extreme west end of Monaca being opposite said river's mouth. On the north side of the Ohio River, on the east bank of the Beaver River, is the borough of Rochester and on the west bank of the Beaver River is the borough of Bridgewater. Next down stream, on the north bank of the Ohio River is Beaver borough, the county seat. A county bridge connects Monaca and Bridgewater and Beaver. Opposite Monaca at the west end is the borough of Freedom.

The territory upon which Monaca borough is built is a level terrace of gravel formation elevated about sixty feet above the normal river level. It stretches along the river for about a mile and a quarter and back from it about a half a mile and here at present reside about thirty-five hundred people, chiefly supported by the industries which comprise several steel mills or works, glass and fire brick works, tile manufacture and foundry and enamel works. None of these have any peculiar industrial wastes which would characterize the town sewage.

Back from the plateau there is a steep abrupt hill extending up into Moon Township which surrounds the borough and at the foot of this slope, practically the borough line, is the Pittsburgh and Lake Erie Railroad. The main street

of the town, Pennsylvania Avenue, parallels this railroad and the river and is next to the railroad. It is along this thoroughfare and the railroad that the industries are located.

There are four avenues paralleling Pennsylvania Avenue between it and the river, the one on the bank of the terrace being named Atlantic Avenue.

The highways at right angles to the river beginning down stream at the westerly borough line where the railroad crosses the river to the borough of Beaver are named in order: Third Street, Fourth Street, etc., up to Eighteenth Street. The most important of these is Ninth Street, it leads to the county bridge crossing the river to Rochester. This thoroughfare and Pennsylvania Avenue are paved with brick and there are sewers in them. The borough contemplates the permanent surfacing of some of the other public highways.

The eastern end of the borough has been vacated for industrial sites to the river bank and numerous small plants occupy the land and are thriving. The most vigorous growth is evidenced on every hand in the borough. In eighteen hundred and ninety the population was two thousand and eight.

The town owns its own water works but has neglected to report the same to the State Department of Health as required by law. Unofficially it has been ascertained that the supply is drawn from a filtering crib one hundred and fifty feet long, sixteen feet wide and four feet high and buried so that the top is four feet below the bed of the river. It is connected with sixteen inch suction main to a two million gallon pumping engine. The crib and pump house are near or on the banks of the river at the foot of Sixth Street about nine hundred feet below the county bridge. The water is pumped into a brick lined earthen reservoir excavated in the hill back of the town in Moon Township and elevated about three hundred feet above the river. The reservoir holds five hundred thousand gallons, so it is reported. There are no wells in the borough but there are a few cisterns. Practically everybody takes public water, even the industries.

At present there are about two and one-half miles of public sewers in the town, partly combined and partly separated. The western district is served by a twenty-four inch outlet. The connections with this sewer are shown as follows:

In Pennsylvania Street, combined sewer, thirteen hundred feet of twenty-four inch and twelve hundred feet of eighteen inch; in Eight Street, combined sewer, three hundred feet of twenty-four inch; in a small run, combined sewer, six hundred feet of twenty-four inch; in Ninth Street, separate sewer, eight hundred feet of eight inch and in Tenth Street separate sewer, seven hundred feet of eight inch, making a total length of forty-nine hundred feet.

The outlet is into Markey Run which is an open ditch for a distance of about eight hundred feet to the river near Third Street. At Eighth Street a small run is diverted into a sewer. There are about thirty buildings contributing to the flow of sewage in this district at the present time.

The eastern district is served by an eighteen inch outlet. It goes into the river at the foot of Fifteenth Street. The sewers connected with it are entirely sanitary from which storm water is excluded. There are thirty-five hundred feet of eight inch and forty-two hundred feet of twelve inch sewer in the district. The Fifteenth Street outlet is up stream from the water works intake and therefore, the borough at the present time contributes to the menace of its own supply. About thirty buildings are on this line.

The town council desires to extend the present sewer system to accommodate the dwellings on the streets that are now unsewered. These extensions will not all be made at one time and no bond issue is contemplated for the purpose. There are to main reasons for the extensions. One reason is the economy of the laying down of a sewer in the street before the street is paved, and the other reason is that sewers are demanded by abutting properties from time to time and the borough does not want to be compelled to make an application every time a petty extension of a lateral sewer is called for.

The soil being gravelly and porous, cellars are dry and cesspools which are universally used for household drainage, prove, in most cases, to be satisfactory. Sometimes a cesspool will clog up and become a nuisance and in the end probably out of choice the great majority of owners will seek connection with the public sewer. In Monaca the cost of a sewer connection, provided the house is properly plumbed, is less than the cost of the construction of cesspools, all of which is represented by the petitioners to be sufficient warrant for the adoption of the general sewerage system.

The proposed sewers are to be extensions of the existing sewers and when all built there will be five and a half miles in the entire system. The eastern district will be much smaller. The additions to it will not exceed three-quarters of a mile in length. The plan shows a site for sewage disposal works on the lower terrace at the foot of Fifteenth Street.

All the other sewer extensions are to be in the western district. The site for the disposal works is shown to be at the foot of Fifth Street on the lower terrace. This is about six hundred feet down stream from the water works pump house and filtering crib. All of the additions are to be strictly separate sewers. The existing sewers in this district are to discharge their dry weather flow into a new twenty-four inch pipe extending down Fifth street to the disposal works and the intake. The storm overflow is to pass off in the existing twenty-four inch pipe down Pennsylvania Avenue to Markey's Run. The reason for this is

that the borough does not want to abandon the twenty-four inch pipe in Pennsylvania Avenue and up Eighth Street as a sewer. It is the intention of the borough to abandon the eighteen inch pipe on Pennsylvania Avenue as a storm drain and to also abandon any other sewers as a storm drain except the said twenty-four inch pipe. The proposed sewers are to have manholes placed at all intersections of streets and at changes of all line and grade, ventilation is to be affected through perforated manhole covers and flush tanks are to be built where necessary. The minimum grade is to be three-tenths per cent.

No detail plans are offered of the sites for the proposed disposal works. It is a question in the mind of the petitioners whether the disposal plant at the foot of Fifteenth Street should be erected. As a substitute a twelve inch pipe might be laid along the river for about a mile and end at the lower disposal works at the foot of Fifth Street. In all probability this will be the most economical and decidedly the better plan. A municipality makes no mistake under most conditions in collecting the sewage at one point for treatment. It is better to concentrate the care and attention necessary in maintaining a sewage purification plant at one place than to divide it and have two plants to look after.

It is reported that the borough's assessed valuation is one million four hundred and seventy-nine thousand, eight hundred and forty-nine dollars and its bonded indebtedness eight thousand dollars. If these figures are correct, the town's borrowing capacity is in the neighborhood of twenty thousand dollars, a sum much too small to build a sewage disposal works. However, the State cannot consistently approve of a sewer outlet into the river within the borough when said outlet is above the water works intake and at the same time compel other municipalities up stream to cease to discharge sewage into the river in order that the down stream municipalities may have their water supplies protected. It will appear that the borough is amply able financially to assume the cost of the interception of the sewage from the eastern district and its conveyance by a small sewer pipe down stream to below the water works intake.

When the borough shall have become able to build the disposal works for the treatment of all of the borough sewage, then undoubtedly it will be found economical to cut out all of the storm water in the system. Movable Dam number five of the Federal government is located in the Ohio River immediately above Sixteenth Street. Five miles below in the river is dam number six. These structures have been erected by the Federal government to improve navigation. They insure a nine foot stage in the river. When the normal flow is greater than this, the dams are down, but during dry weather the dams are put up and a pool is created and at times the velocity is very slow therein. Sewage deposited in these pools at such times is quite likely to settle to be scoured out possibly by succeeding freshets. The borough of Beaver takes its water supply from wells driven in the bed of the river and located about three-quarters of a mile down stream but on the opposite side. The drainage from all of the towns in the Beaver Valley River is a menace to the public supply at Beaver. The sewage from Pittsburgh and the Ohio River towns is a menace to the water consumers in Monaca. Even where the purification of a sewage polluted water is attempted by apparatus fitted with all modern appliances, admitting of complete regulation and control, it is only by constant vigilance that the water is rendered pure and wholesome, and most certain it is that in the case such as at Monaca, where the apparatus in use to purify the sewage polluted water is not susceptible of regulation and control, a menace exists which may prove a serious matter at any time. The Department has been making a study of this subject and the facts fully justify the conclusion that the interests of the public health demand that municipal sewage must be eventually treated before it is discharged into streams used subsequently as sources of public supply.

It is not known that Monaca sewage could endanger the water which is drawn from the wells at Beaver, but it may menace the supply drawn from the river by the towns along the Ohio in other states. The typhoid fever death rate in these places are notably high and this fact has been partially attributed to the sewage pollution of the river in Pennsylvania.

Federal compulsion has been suggested by some sanitarians, but this should not be necessary. In conserving its own resources, Pennsylvania must prohibit the defilement of its rivers, and in common with other municipalities, Monaca must plan to care for its own sewage in such a way as not to jeopardize the rights of others either present or prospective, to the use of the river waters further down within Pennsylvania.

It has been determined that the interests of the public health demand that approval be given to the borough of Monaca and approval is hereby and herein given and a permit issued therefor under the following conditions and stipulations:

FIRST: That all storm water shall be excluded from the system with the exception of the twenty-four inch pipe now in use and that ultimately on or before the time when sewage disposal works are built by the borough, this twenty-four inch pipe shall be abandoned as a sewer and shall be used exclusively for storm water drainage, so that at that time the entire system of sewers will be a separate system. At the close of each season's work a plan and a profile of each

sewer laid during the year shall be prepared and filed with the Commissioner of Health, together with any other information that may be required in relation thereto.

SECOND: No pathogenic material from any laboratory shall be discharged into the system. The proper authorities shall cause these wastes to be destroyed on the premises.

THIRD: The local authorities shall keep a record of all connections with the sewer and copies of the same shall be submitted to the State Department of Health when called for.

FOURTH: If at any time the sewerage system or any part thereof has become a nuisance or menace to public health, then such remedies shall be applied as the Commissioner of Health shall advise or approve.

FIFTH: It is expressly stipulated that the permit to discharge sewage into the Ohio River from the eastern sewage district of the borough, shall cease on October first, nineteen hundred and nine. On or before that time the borough shall have constructed an intercepting sewer to convey the sewage of the district below the water works intake, and discharge it into the river somewhere in the vicinity of Fifth Street in conformity with plans which shall be prepared by the borough and submitted to the Commissioner of Health for approval on or before May first, nineteen hundred and eight.

SIXTH: This permit to discharge sewage into the Ohio River from either the eastern or western districts shall cease on the first day of July, nineteen hundred and eleven. On or before said date the borough shall prepare detailed plans of sewage disposal works for the treatment of the borough sewage, and submit the same to the Commissioner of Health for approval. If this be done, and the other conditions of this permit shall have been complied with, the Commissioner of Health may extend the time, if the interests of the public health demand it, in which the borough sewage may continue to be discharged untreated into the Ohio River.

SEVENTH: This permit to discharge sewage into the Ohio River shall be null and void unless within three months of the date thereof, the borough shall have filed with the Commissioner of Health a complete and satisfactory report and plans of its water works system. Failure to comply with this provision of law will not only nullify this permit, but it will be the occasion for the imposing of the penalty of a fine of five hundred dollars, as provided by Act one hundred and eighty-two, approved April twenty-second, nineteen hundred and five.

Harrisburg, Pa., January 24th, 1908.

MONTGOMERY, LYCOMING COUNTY.

This application was made by the borough of Montgomery, Lycoming County, Pennsylvania, to build a sewer in Broad Street and to discharge the sewage therefrom, untreated, into the Black Hole Creek within the limits of the borough under the following conditions and stipulations.

It appears that the borough of Montgomery is a manufacturing settlement of about fifteen hundred population, located on the north bank of the West Branch of the Susquehanna River in Lycoming County, about fifteen miles down stream below the city of Williamsport. In nineteen hundred the population was ten hundred and sixty-three.

The principal industrial plant is that of the American Wood Working and Machine Company. There is also the plant of the Montgomery Door and Sash Company, the Montgomery Table Works and the Deutchle Planing Mill and other wood working establishments and just outside of the borough in Clinton township, there are two manufactories.

The town is on the main line of the Philadelphia and Erie Division of the Pennsylvania Railroad and on a branch of the Philadelphia and Reading Railway, both leading to Williamsport City. Montgomery was incorporated in eighteen hundred and eighty-seven out of Clinton township, which township sourrounds the borough.

The municipal territory is irregular in shape and abuts on the river for the distance of about a mile and extends back therefrom over a mile. Coming down through its center and entering the river a quarter of a mile below the borough is Black Hole Creek, a stream which rises in Bald Eagle Mountain four miles northerly. This creek passes between two high hills in Montgomery. The railroads parallel the river and are back therefrom nearly a half mile. The two hills are north of the railroads. Montgomery Street, the principal thoroughfare in the town, parallels the Pennsylvania Railroad and is immediately north of it extending westerly from Main Street. Main Street begins at the river and extending northerly, passes up the valley of Black Hole Creek out into Clinton township. The portion of Main Street north of Montgomery Street is on the hillside, the summit of which hill lies between Main Street and Montgomery Street in the northeast portion of the borough. The best residences of the borough are on the hill. The stores are along Main Street in this district. West of Black Hole Creek is the other high hill on which there are quite a number of residences.

South of the railroad and paralleling them is Broad Street which starts from Main Street and extends easterly. This district and the lateral streets therein are on the flats, so called, but the land is above freshet flow. Nothing but residences are built in this district except manufactories which are located all along both railroads in the town.

Extending through the flats near the river is Spring Mill Creek, a small stream which rises in the township in the mountains and after flowing along the river bank, it enters the river just inside the borough limits at the southwest corner.

The only land in the town subject to inundation is that abutting both creeks in the southwest corner west of Main Street and south of the railroad.

Montgomery Water Company supplies two hundred out of three hundred and twenty-five houses in the borough with water. The other one hundred and twenty-five houses derive their supply from individual wells. The public supply comes from driven wells located in the borough along the banks of Black Hole Creek near the northern borough line. There are two of such driven wells consisting of five inch pipe in eight inch casings, sunk to a depth of about two hundred and thirty feet. The water is pumped by a Smith Vaile Triplex pump driven by a brass water wheel twelve feet in diameter. This wheel is fed by a twenty-four inch wooden flume extending five hundred feet up stream to a dam. There is an auxiliary gasoline engine in the pump house. The water is pumped into the pipe system in the borough and overflows into a reservoir of earth construction lined with dry rubble masonry, holding about one million gallons and located on the hill west of the creek at a point just outside of the borough in the township. The elevation of this reservoir is about two hundred feet above the pumps. It is reported that this system affords an ample supply of water for all purposes.

The Montgomery Table Company has a private system for fire protection. The source is a dug well on the company's property and the water is pumped into a three hundred thousand gallon reservoir distant one-quarter of a mile and located on the hillside in the northeast part of the borough.

Judging from reports the individual well supplies throughout the town have not become contaminated with sewage. The customary method of sewage and household disposal prevails to a large extent.

The only public sewer in the borough is in Montgomery Street. It is a twelve inch outlet and it and the eight inch pipe in said street, comprising a total length of six hundred feet, discharge sewage and also street drainage into Black Hole Creek just above the Pennsylvania Railroad culvert. There are thirty houses connected to this line, most of which are on Huston Avenue, including the public school building. There is a six inch private sewer on Second Street which is connected.

Above the outlet of the Montgomery Street sewer along Black Hole Creek there are thirty private sewers whose diameters range from four inch to eight inch which empty into the stream below the Water Company's dam. These outlets are all east. In the western section of the borough there are two private sewers which empty into the Black Hole Creek. One is a six inch pipe five hundred feet long serving six houses and emptying into the creek at the foot of West Huston Avenue. The other is an eighteen inch pipe originally one thousand feet long and used as a storm water sewer. It empties into the Creek opposite Penn Street. Later fifteen hundred feet of sixteen inch terra cotta pipe was laid and connected to the eighteen inch line. Now there are about twelve houses located on the hill which are served by this eighteen inch sewer outlet. It is a storm water drain principally.

In all there are probably eighty houses having sewer connections in the borough.

It is reported that roof water is admitted into these house connections.

Along the west bank of Black Hole Creek on the properties abutting Main Street there are ten privies overhanging the stream. Manufactural wastes are emptied into cesspools.

The borough purposes to build a twelve inch combined sewer the entire length of Broad Street. Seven hundred and seventy feet are to be twelve inches in diameter and fifteen hundred and forty feet will be eight inches in diameter. The minimum grade will be in excess of six inches for each one hundred feet length of sewer. It will discharge into Black Hole Creek below the Philadelphia and Reading culvert opposite the end of Broad Street. There are about fifty houses on this street. These and houses on other streets in the vicinity will be connected. Manholes are to be built at street intersections where branches will be provided for connecting lateral street sewers.

It appears that the borough has a borrowing capacity of about eighteen thousand dollars, if reports are true.

The proposed sewer is to be a combined one, but the size is insufficient to remove street drainage from the area tributary to it, which is said to be sixty acres. Broad Street is slightly depressed. The intersecting streets have a natural slope to it. The highway is a natural one in which to lay a main collecting sewer. On the flats near the proposed outlet there is an available site for a sewage disposal plant. Here all the sewage of the borough can be delivered by gravity. If storm and roof water were kept out of the sewage the borough can afford and has the ability to borrow enough money to pay for the erection of a sewage

purification plant and intercepting sewer system. If storm water be admitted to the sewers then the cost of a plant capable of treating this mingled volume of water will be prohibitive.

If the borough should build the sewer proposed and exclude all storm water, it would be a part of its sanitary sewer system. The entire system for the borough should be planned immediately and after approval by the State authorities the borough would then be in a position to conform to this plan in the construction of sewers from time to time without wasting any money and with the assurance that the greatest efficiency now and for the future will be thus secured.

It has been determined that the interests of the public health will be subserved by granting a permit and the same is hereby and herein granted to the borough of Montgomery, to build the proposed sewer in Broad Street under the following conditions and stipulations:

FIRST: That all storm water shall be excluded from the sewer.

SECOND: That the borough shall cause the immediate removal of all overhanging privies on the banks of streams in the borough.

THIRD: That on or before the first day of December, nineteen hundred and eight, the borough shall prepare and file with the Commissioner of Health for approval a comprehensive plan for a sanitary sewer system and sewage disposal works for the collection and purification of all the sewage of the borough, and these plans shall be accompanied with a report and estimates of cost. The Commissioner of Health will modify, amend or approve the plans and fix a time when they shall be constructed, having in mind the date when other municipalities along the west bank of the Susquehanna River shall be required to treat their respective sewages.

FOURTH: This permit shall cease on December first, nineteen hundred and eight, but if on said date the borough shall have complied with the terms herein stipulated, then the time in which sewage may continue to be discharged from the borough sewer system into the waters of the State shall be extended.

Harrisburg, Pa., September 15th, 1908.

MORELAND TOWNSHIP, MONTGOMERY COUNTY.

Bryn Athyn Village Association, Bryn Athyn Village.

This application was made by the Bryn Athyn Village Association of Bryn Athyn village, Moreland Township,, Montgomery County, and is relative to sewerage and sewage disposal and for approval of plans for sewage disposal works.

It appears that these plans were handed in by the Bryn Athyn Village Association in response to an order and notification to said association by the Commissioner of Health for the abatement of a nuisance.

The village of Bryn Athyn is located in Moreland township in the southeastern corner of Montgomery County and along the Pennypack Creek, which follows a winding southerly course of about eleven miles from Bryn Athyn to Holmesburg, Philadelphia, where it joins the Delaware River. Bryn Athyn consists of about twenty-two dwellings and is strictly a suburban residential district on the Philadelphia, Newtown and New York (Philadelphia and Reading Railway system) fifteen miles north of Philadelphia.

The topography in the vicinity is rolling, almost hilly, and by far the greater part of the territory is under cultivation.

From Bryn Athyn station a road extends eastward, after a short distance branching into two parallel avenues along which are located the houses of the village and which join again just before reaching the Second Street pike, half a mile east of the station. The two avenues of the village are respectively on the north and south slopes of a distinct ridge which extends westward almost to the Pennypack Creek, to which the cultivated ravines north and south of the ridge drain. The railroad follows the course of the creek, being between it and the village but crossing to its western bank immediately above.

The Academy of the New Church is situated adjacent to Bryn Athyn on the eastern side of the Second Street pike.

Water is furnished for the inhabitants of the village and for several fire plugs through the pipes of the Village Association. The water is obtained from a deep, dug well in the eastern part of the village and is pumped to an elevated tank. The Academy's water supply is said to be obtained from a drilled well and it is further said that the two water works systems are connected.

Practically every house in the village is connected to the public water works system, although there is one private well in use.

There are perhaps four thousand feet of six inch and eight inch collecting sewers, there being a branch in each avenue and one branch extending, so it is said, to the main building of the Academy of the New Church. There are a number of manholes on these sewers which, however, are not straight in line and grade between the manholes. Roof water is admitted to the sewers in a few cases but no storm water from the ground, the latter being taken care of where necessary by short storm drains. Two automatic flush tanks installed on the sewer lines are used only occasionally.

The eight inch outlet sewer running in a westerly direction terminates in a small screen chamber from which the sewage enters a dosing tank or flush tank six feet by ten by about three feet deep to the flow line. This tank is discharged automatically by a syphon into a chamber at the side of the tank two and a half feet by three feet by four feet deep, from which the sewage enters a six inch pipe. The screen chamber, tank and syphon chamber are of concrete and are located on the brow of a steep slope extending down to the railroad tracks near the station of Bryn Athyn, which is within about two hundred feet of this tank. The six inch outlet pipe extends a short distance to a concrete switch box by means of which the sewage was at one time diverted either northward to a site to be described later, or southward one hundred feet or so along the slope of the hill opposite the station and within two hundred feet thereof and also immediately above the station well. The disposal of sewage over the hillside at this site is said to have become a most objectionable nuisance and, therefore, to have been abondoned. The six inch pipe leading northward from the switch box is the only outlet now used. This extends four hundred and seventy feet around the nose of the hill into the valley north of Bryn Athyn. Here the pipe enters a switch box by means of which the sewage is distributed onto either or both ends of a broken stone filter. This filter has concrete walls and a concrete bottom and its inside dimensions are about forty feet by fifteen feet by five and a half feet deep. There is a depth of about three feet of broken stone. Outlet pipes convey the effluent to a syphon tank immediately below the filter bed. This is of brick construction, cement lined, and is five feet by ten feet by about three and a half feet deep to the flow line. The syphon tank discharges into a channel of half pipe extending about one hundred and fifty feet along one side of an area about fifty feet wide. This area was evidently at one time prepared by levelling it off somewhat for the reception of the sewage effluent but is now overgrown and channelled so that the unpurified sewage now trickles in several distinct streams down a steep bank at the edge of the disposal area into the Pennypack Creek.

The broken stone filter is two hundred feet from the northern avenue of Bryn Athyn and only about four hundred feet from the nearest cottages of that village. The disposal area below the filter is only about one hundred feet from a pair of unoccupied, small frame dwellings on unimproved ground along the railroad and in the woods. In spite of the close proximity of the disposal plant to several of the houses of the village the plant is quite secluded, being almost entirely surrounded by trees.

The effluent enters the creek in the lower part of a stretch of back water extending up stream about fifteen hundred feet from a dam about four feet high located just above the station. Six feet is said to be the greatest elevation above the dam crest that the water during flood periods ever reaches. Below the dam the creek flows rapidly in riffles over a stony bed, while further below its course is again through quiet pools. Several hundred feet below the disposal plant and below the dam, several dwellings are located on the immediate bank of the creek and on below the course of the creek is through pasture and cultivated lands.

The Academy of the New Church comprises a main building and two dormitories, one for girls and one for boys, and a dining hall in which is located a laundry, it is said, and also a power plant. The main building is connected to the Bryn Tthyn sewer. The dormitories and dining hall and laundry are east of a divide between them and Bryn Athyn and could be connected to its sewer only, through a deep cut or perhaps a wide detour. The sewage from these buildings is conducted eastward across a public road into a concrete tank about five feet by ten feet in plan, from which it is discharged into either of two percolating cesspools about six feet in diameter. During the college year there is said to be considerable overflow from the cesspools, which overflow follows a southeasterly course in a slight natural depression for nearly one thousand feet and then enters a small run which flows past a farm house and during high water floods the spring house of the property and eventually enters a branch of Pennypack Creek, joining the creek proper at Bethayres Station. The disposal up to the time of the sewage entering the run is on cultivated and pasture lands, said to be owned by the academy, as is also the farmstead mentioned. There live at the academy during the fall, winter and spring about one hundred and fifty people.

The design for the new sewage disposal plant for Bryn Athyn, submitted for approval of the Department, is for a plant to handle eighteen thousand gallons of sewage per twenty-four hours and to be located at the site of the present disposal plant, most of the parts of which are to be incorporated in the new works.

The sewage will enter a concrete grit chamber three feet by three and a half by three feet deep to the flow line. Thence the flow will pass by means of two five inch submerged soil pipes into the two similar compartments of the septic tank, each five feet wide by ten feet long by six and six-tenths feet deep to the flow line. In each tank will be placed three baffle boards extending the full depth of the contents and jutting from alternate sides to one foot from the opposite side, thus providing a tortuous course for the sewage through the septic tanks and compensating for their shortness. The outflow from the tanks is to be through five inch submerged soil pipes. Cast iron drain pipes with four inch gate valves are to be provided at the outlet ends of the tanks as sludge drains, the

plans showing no further provisions for slude disposal. The tanks are to have a plank covering. The two parts of the septic tank, having a combined capacity of six hundred and sixty cubic feet, equal to four thousand nine hundred and forty gallons, will provide for a period of flow in the tanks of only six and six-tenths hours on the average.

The septic tanks will be constructed above and immediately adjacent to the existing screen chamber and dosing tank, both of which will be filled with large stones to above the flow line and will receive the septic effluent. This chamber is termed a digestion tank. The flow line in it, the new septic tank and the grit chamber will all be on the same level. The long discharging leg of the syphon will be removed, so that the sewage will flow continuously from the old syphon chamber to the existing six inch pipe through the switch box, which is to be cemented to allow flow in one direction only, to the new dosing tank to be built just above contact beds to be installed in the old broken stone filter.

This dosing tank is to be of concrete, ten by fourteen feet by two feet deep to the discharging level It will be discharged by each of three four inch aerlock sequence dosing syphons in turn respectively into three small discharge chambers, from each of which the sewage will pass onto one of the three broken stone contact beds. These beds are to be formed by dividing the old filter bed into three parts. Each part will be fourteen feet ten inches by twelve feet ten inches and filled with broken stone to a depth of about four and a half feet. The beds will be furnished with horse-shoe tile underdrains with vent pipes to the surface at the upper ends, the lower ends of the drains in each contact bed converging to a sump. From the sump in each bed a two inch plain syphon and a one and a half inch drain pipe with a gate valve will discharge into a common outlet chamber below the beds. These gate valves will be left open sufficiently to drain off the sewage collecting after the syphon discharge is broken. On an average of once in two and sixty-four hundredths hours, or about one in eight hours on each bed, the syphon tank will deliver a dose of two hundred and sixty-five feet, sufficient to fill the bed to a depth of three and a half feet, allowing forty per cent. for voids. One of the four inch syphons, it is said, will deliver a dose in about eight minutes and the sewage arising above the bend of the plain syphon more rapidly than the latter can carry it off, is intended to put this syphon in action discharging the sewage from the contact bed as soon as the latter is filled. The plain two inch syphon should discharge one of the contact beds in from thirty-five to fifty minutes, depending upon the details.

From the outlet chamber below the contact beds the present five inch terra cotta pipe is to convey the sewage to the existing syphon dosing tank below the contact beds. This tank is five feet by ten feet and discharges at a depth of about three and a half feet, its capacity being about one hundred and seventy-five cubic feet. From this tank the sewage is to pass to a gate chamber by means of which it will be possible to divert it onto either or all of the three sand filters to be constructed on the site of the old disposal area below the existing broken stone filter. These filters will be partly in excavation and partly within earthen embankments. The surface of each filter will be thirty by twenty-four feet and each will have a depth of sand of three feet above the bottom of the four inch tile under-drains. These are to be vented at the upper ends and to discharge at the lower ends onto the creek bank. The distribution of the sewage upon the filters will be effected by means of troughs of one and one-quarter inch spruce boards. The total area of the three filters being two thousand one hundred and sixty square feet will provide for filtration at the rate of about three hundred and sixty-three thousand gallons per acre per day. The small existing syphon tank, with a capacity of one hundred and seventy-five cubic feet, would flood all three filters at once to a depth of not quite one inch, or one filter at a time to a depth of about three inches. Although a larger dose would be delivered at one time from one of the contact beds, the flow would be much more attenuated.

If it be true that the Bryn Athyn Village Association is a voluntary association of property owners not incorporated under the laws of the Commonwealth and that the users of the sewerage system will be responsible collectively and individually for the undertaking, then it would appear that there is no public authority having by law the charge of the sewer system, duly qualified under the law to receive from the Commissioner of Health a permit for the discharge of sewage into any of the waters of the State. So, in this case it appears that the Commissioner is merely called upon to consider the plans submitted and suggest wherein they may, in his opinion, be improved.

The existing disposal plant has been complained of as a local nuisance damaging the property adjacent to the area below the broken stone filter, on which unimproved property are located the two frame dwellings mentioned. A new plant at the same location would probably be just as great a nuisance to the owner of this property. Moreover, the location of the plant within two hundred feet of the public road and only a little farther from the nearest houses of Bryn Athyn is extremely undesirable and will become more so if additional cottages are built along the road and nearer to the disposal plant. The association should bear these facts in mind and that, even though stream pollution is discontinued by the installation of an improved sewage purification plant, the latter, at the site of the present plant, may become a local nuisance such as the present plant seems to be, requiring large additional expenditures for its abatement. At several points up stream from the present

sewage disposal plant there are much more secluded spots where a new plant might be erected and be less apt to create a nuisance. All of these points are within one thousand feet of the present plant and the sewage could be conveyed to any one of them from the end of the present out-fall sewer by gravity. The bottom of the present broken stone filter is at an elevation of about forty feet above the normal level of the creek above the dam, and all of the sites mentioned where disposal plants might be erected are within the distance for which the back water extends up-stream from the dam.

The period of flow provided for in the septic tank is too short. The size of the septic tanks should be increased, preferably by lengthening them, so as to provide for the sewage remaining in them at least twelve hours; a still longer period would be better. It would be well to provide a gauging weir at the outlet of the septic tank or some other suitable place for the tanks should be provided with vents.

Definite means should be provided for disposing of the sludge from the septic tanks, which provision has been omitted from the design. Trouble will be apt to arise from the obstructing of the stone filled digestion tank. The sewer invert at the outlet of the digestion tank is only seven-tenths feet above the invert at the inlet to the dosing tank above the contact beds and, moreover, this sewer rises about two feet just before entering the dosing tank so that it will always operate under a head. It is said to have been well laid with joints carefully and completely cemented. All the existing construction appears to be of a first class character.

The small dosing tank now in use below the broken stone filter will probably be of advantage in delivering the sewage quickly upon the sand filters.

The sand filters to be constructed below the contact beds provide for the filtration of the sewage at a rate too high to assure a satisfactory effluent. The filtering area should be increased so as to reduce the rate to one hundred thousand gallons per acre per day, or thereabouts. If necessary, the dosing tank should be enlarged so as to deliver the sewage upon the filters sufficiently rapidly and to a sufficient depth to procure equal distribution. All roof water should be excluded from the sewers.

It has been determined that the Commissioner of Health notify the applicants, and the Bryn Athyn Village Association is hereby and herein notified, that if the alterations in the design are made as suggested the effluent from the plant, if properly operated, should prove a satisfactory effluent. These works, as modified or amended or some other works which must be approved by the Commissioner of Health before construction, shall be built on or before December first, nineteen hundred and eight, and they shall receive and purify the sewage on said date and thereafter.

When the works are built, complete plans of them as so built shall be filed in the office of the Commissioner of Health and no sewage whatsoever shall be discharged from the sewer system or disposal works either directly or indirectly into the waters of the State.

It is the intention of the State Department of Health to occasionally inspect the disposal works and if at any time it be found that sewage is passing therefrom into the waters of the State, then such remedial measures shall be enforced by said association as the Commissioner of Health may approve or advise.

The authorities of the Academy of the New Church will be advised to confer with the Bryn Athyn Village Association with the idea of conveying all the sewage of the Academy to the proposed disposal plant of the Association, if this is feasible, and thus most readily discontinuing the pollution of the waters of the State by the sewage of this institution.

Harrisburg, Pa., August 25th, 1908.

MORGANZA, CECIL TOWNSHIP, WASHINGTON COUNTY.

Pennsylvania Reform School.

This application was made by the Board of Managers of the Pennsylvania Reform School at Morganza, Cecil Township, Washington County, and is for permission to erect sewage disposal works for the treatment of the institution's sewage.

On February eleventh, nineteen hundred and eight, the Commissioner of Health sent a communication to the Board of Managers of the Pennsylvania Reform School, at Morganza, Pennsylvania, the following being a copy thereof:

"Gentlemen:—The Governor, Attorney General and the Commissioner of Health of the State have had under consideration the sewerage system and disposal works at Washington, at Canonsburg and at South Canonsburg, all of which are in the valley of Chartiers Creek above your institution. They have also had under consideration the sewage of places along the creek below and decrees have been issued looking towards the ultimate discontinuance of the discharge of sewage into the stream at these places.

"It has also been unanimously agreed by the above State officials that the proper officers of your institution should be notified of the desirability of the treatment of the sewage of the institution, not only from the standpoint of obviating a possible nuisance in Chartiers Creek and of consistency in ceasing to do the thing there which

should be prevented at points above to protest whatever rights these institutions may have in the waters of the creek—which rights are common ones only—but also from the standpoint of general example to private corporations and municipalities as to proper method to pursue in abating a custom which the best citizens of the Commonwealth unite in declaring shall become obsolete. The Department will be glad to advise and co-operate with you."

In compliance with an announcement dated August twenty-ninth, nineteen hundred and eight, made by the Superintendent to the Commissioner of Health, of the purpose of the management to prepare plans for a new sewer system and disposal works, on November twelfth, plans for sewerage and sewage disposal works were submitted to the Commissioner of Health for approval.

It appears that the Pennsylvania Reform School is a State institution, comprising a population, including officers, of about five hundred and fifty, located in Cecil Township, Washington County, on the Chartiers Valley Branch of the Pittsburg, Cincinnati, Chicago and St. Louis Railroad, twenty-one miles from Pittsburgh and eleven miles from Washington borough, the county seat of Washington County.

The railroad is in the valley of Chartiers Creek. This stream rises in the neighborhood of Washington borough and empties into the Ohio River south of Pittsburgh. Washington borough has been required to erect sewage purification works and plans have been approved for such works for the boroughs of Canonsburg and South Canonsburg, about one and a half miles up-stream from Morganza.

Chartiers Creek flows in a general northeasterly direction, but by the Reformatory property the course is very winding, so that it forms both the eastern, southern and western boundary of the property, a total distance of about one mile. Back from the creek there is a bluff about one hundred feet above the valley and on it are the main buildings of the institution. The natural drainage facilities are superior. There is no need of conveying surface drainage long distances underground.

The main building and the cottages on either side of it discharge their drainage and roof water into a twelve inch sewer pipe which is laid northerly to near the main road laid out northwesterly through the rising ground, in which district the future additions to the institution in the line of buildings are to be erected. The topography is such that the surface waters drain from this area to a little gully north of the road which extends northeasterly to the creek. The main sewer, fifteen inches in diameter, begins at the road where the said twelve inch sewer and a ten inch and six inch sewer unite. Thence the fifteen inch drain is laid down the gully and at present empties into Chartiers Creek at a point about eight hundred feet up-stream from Morganza Run, a natural water course rising to the northwest and draining about three square miles. It is on this run that the institution water works dam is located. The said sewer outlet is half a mile below the railroad and the Morganza Station and a half mile below an intake and pump house used to furnish creek water to the State buildings as an emergency supply.

The said ten inch sewer serves the school house, bakery and shops; the said six inch sewer serves the hospital. These buildings are all south of the main road.

The laundry is connected to the main sewer line.

The Girls' Building is north of the road and the main sewer and it has its own eight inch sewer outlet to the creek. The point of discharge is about two hundred feet below the main outlet.

No profiles or details as to location of manholes and grades of these sewers have been presented. It is known that the twelve inch sewer line is in a leaky condition. In places where it has been unearthed, joints are broken and occasionally the structure has collapsed.

The other buildings on the grounds, such as stables, barns and private dwellings for the farmer and his assistants, have independent facilities for disposal of household wastes. Three of the dwellings have pipe connections for sink drainage to ditches leading to Morganza Run. These are below the water works intake. Elsewhere on the ground ordinary privy vaults are in use. There is a barnyard drain from the main stable north of the road to the gully hereinbefore mentioned.

To the leaky condition of the twelve inch sewer has been attributed the typhoid fever outbreak in the institution during the current season. It is known that the sewage can pass seventy-five feet horizontally and fifteen feet vertically through the structure intervening between the sewer and a natural spring, and it is believed that this direct percolation through the made ground contributed to the contamination of the spring from which water was drawn for drinking purposes.

The plans submitted provide for the discontinuance of the said eight inch and fifteen inch outlets into Chartiers Creek and the substitution therefor of a modern sewage treatment plant to be located on the neck of land in the bend of the creek opposite and east of said outlets. The site selected is elevated about twenty feet above the creek and it is remote from any settlement. There are two farm dwellings within a radius of one thousand feet.

The land selected does not belong to the State at this time. Part of the tract is subject to floods, much of it is under cultivation.

Here it is proposed to erect works to treat one hundred thousand gallons of sewage per day. The plant is to consist of septic tanks, sprinkling filters, settling basins and sand filters. Septic tanks are to be built of concrete construction roofed over, two in number, each twenty-five feet long by ten feet wide by nine feet deep, interior dimensions, holding jointly eight hours flow, based on the nominal capacity of the plant. The flow of the sewers has been estimated to be very considerably

below a daily discharge of one hundred thousand gallons, the fact being attributable to the leaks on the sewers. Between the septic tanks, end to end, is the screen chamber and a dosing chamber. The sewage will pass from the screen chamber through a non-submerged pipe into the septic tank and flow around the opposite end and return on the other side of a lateral wall to the outlet weir, first passing under a submerged baffle provided to keep the scum within the tank. This overflow is into the dosing chamber holding a maximum of five hundred gallons. In this chamber will be set up an automatic syphon. The course of the sewage through the other septic tank is similar, it leaving the same screen chamber and flowing into the same dosing chamber. So the effluent from the septic tank will be discharged intermittently in comparatively small doses onto the sprinkling filters.

The flow line of the septic tank is elevation nine hundred thirty-seven and a half. Two and a half feet higher is the elevation of the sewage in the syphon chamber proposed to be located twelve hundred feet distant in the institution grounds on the line of the present fifteen inch sewer main near the Girls' Building and below the laundry connection. It is proposed to connect the Girls' Building directly by a new eight inch sewer line about three hundred feet long to this chamber. This collecting chamber is low enough in elevation to admit of the interception of the sewage from all additional buildings which may be erected on the grounds in the future, unless the sites be selected on the low grounds in the immediate vicinity of the creek. The new power house for economic purposes is being built on the line of the railroad in the valley. It will be provided with a cesspool and sub-soil disposal plant of its own.

From the said collecting chamber it is proposed to build two lines of six inch cast-iron inverted syphon to carry the sewage across the valley and under the creek and deliver it by gravity to the proposed works on the higher ground beyond.

The sprinkling filters are to be two in number, each thirty by thirty-five feet, giving a combined area of two thousand square feet. They are to be five feet deep; the average rate of treatment will be two million gallons per acre per day. Details of these filters have not been submitted.

The filters are all on one concrete base, sixty feet long by thirty-five feet wide. Half way the length there is a division wall, two feet high, supporting the main distributing pipe, and either way from this wall the filter floor slopes gently to the side wall two and a half feet high. The balance of the vertical height of filter material will be retained in natural slope. Through the outer wall every eighteen inches are holes opposite the parallel rows of five inch half tile underdrain pipes, through which the effluent will flow into a collecting channel into the settling basins, one basin for each half filter bed. The sprinkling filter effluent will be subjected to about three hours' sedimentation in these basins. The overflow will be into another dosing chamber between the subsidence basins. It will be built of concrete like the others and have a capacity of sixteen hundred gallons. This determines the size of the dose to be delivered onto the sand filters on the basis of flooding one sand filter a little over one inch in depth.

The surface of the sprinkling filters is five feet below the bottom of the septic tank dosing chamber. The elevation of the sand filter dosing tank at the bottom is eighteen inches above the sand filter. A ten inch cast-iron pipe will deliver the sewage to the sprinkling filters and a ten inch cast-iron pipe will deliver the sprinkling filtrate to the sand beds.

The sand filters are four in number, each forty feet by fifty feet, thus forming a total area of eight thousand square feet. Sand is to be two and a half feet deep resting on earth bottom puddled. The walls are to be of concrete. The underdrains are to be six inches in diameter laid in parallel rows ten feet apart. They will lead to the central collecting chamber from which the main effluent pipe will lead to the creek. The level of the bottom of sand bed is elevation nine hundred and seventeen and a half. It is reported that freshets never reach this height.

The drainage from septic tanks and from the settling basins is to be conducted by independent eight inch cast-iron pipe to a sludge bed. Details of this bed have not been submitted.

The sprinkling filter effluent will be discharged onto the sand filters at an average rate of five hundred thousand gallons per acre per day.

The present sewers admit both sewage and storm water. They are in a very defective condition and without proper inspection manholes. The main line and possibly some of the branches may crumble to pieces and become absolutely useless at any time. This conclusion is fully warranted by the discoveries made at the time excavations were carried on over the main sewer line in building the basement of one of the new cottages. It would not appear to be economy to plan on continuing the use of these faulty structures. An examination should be made, however, to determine what portion of each branch sewer may be continued permanently in use.

It is not practicable to attempt to treat mingled roof water and sewage. The Morganza Institution is an old one, a rebuilding of it along modern lines is now being undertaken, and the State will ultimately have there an extensive reformatory. The plateau has already been laid out into streets and plots for the new buildings. Additional sewers will aggregate several times the total length of existing sewers. It is not too late to plan a complete sanitary sewer system and an independent storm water drainage system. In fact, now is the time, before any more work be

done, to study the problem and prepare such plans and adopt them. Then the work of construction can proceed annually as the additions are called for and the money is made available for the improvements.

At the present time there are some storm drains in the grounds. The location of these is not indicated on the plan, so the Department is not in a position to give specific advice relative to the details of a separation of sewage from storm water.

It has been determined that the interests of the public health will be subserved by approving the proposed plans for the sewage disposal works, and the same are hereby and herein approved and a permit issued therefor under the requirement that these works be built during the season of nineteen hundred and nine under an appropriation which the Board of Managers shall endeavor to secure, and under the further conditions and stipulations:

FIRST: That the Board of Managers shall, on or before January first, nineteen hundred and ten, prepare comprehensive plans for a new sanitary sewerage system for the entire institution, present and prospective, and submit the same to the State Department of Health for approval.

SECOND: After the purification works herein approved are built, they shall be operated in such a way that no sewage whatsoever shall be discharged therefrom into the waters of the State. The records of the operation shall be kept on blank forms satisfactory to the Department of Health and copies thereof shall be filed in the office of the Commissioner of Health.

THIRD: If at any time, in the opinion of the Commissioner of Health, a nuisance or menace is being created at the disposal works, or if the same may become prejudicial to public health, then such remedies shall be adopted as the State Department of Health may approve or advise.

FOURTH: Detail plans of the works as constructed shall be filed in the office of the State Department of Health within six months of the date of the completion of the plant and the Department shall be notified when the works are put in operation.

The unsanitary condition of the main sewer warrants the securing of an appropriation for the immediate substitution of it by a new structure and it is suggested that such an appropriation be obtained to become available after the comprehensive plans for sewerage herein called for are approved.

Harrisburg, Pa., November 19th, 1908.

MOUNT CARMEL, NORTHUMBERLAND.

This application was made by the borough of Mount Carmel, Northumberland County, Pennsylvania, and is for approval of plans for the outfall sewer and sewage disposal plant.

It appears that on August thirteenth, nineteen hundred and six, the Commissioner of Health for the Commonwealth of Pennsylvania issued a permit to the borough of Mount Carmel to construct intercepting sewers and an outfall sewer for the borough sewerage system in compliance with an application duly made and bearing date of May twenty-sixth, nineteen hundred and six, subject to certain conditions stipulated therein. These conditions were as follows:

"That within six months from the date of this permit the borough shall prepare and submit to the Commissioner of Health for approval, plans of receptacles for the sewage which it is proposed to deliver to the outfall sewer, which receptacles shall be designed to be operated on the subject principle whereby the solids in the sewage will be separated from the liquid portion thereof, and wherein bacterial activity inimical to the life of pathological organisms shall be promoted, which plans may be modified or amended by the Commissioner of Health, and he shall fix the time within which the borough shall build said receptacles or intercepting chambers.

"Before the outfall sewer shall have been constructed very far below the borough limits the borough shall determine whether the sewage tanks shall be located at a point in the valley where the outfall sewer can discharge sewage into the tanks by gravity, or whether they shall be located near the borough and the sewage pumped into them, and plans of this location shall be submitted to the Commissioner of Health for his approval before the outfall sewer is constructed.

"The sewer system within the limits of the borough may be extended from time to time according to the plans proposed. At the close of each season's work, plans and profiles of the sewers built during the year shall be prepared and filed with the Commissioner of Health.

"That a satisfactory plan and profile with details of the intercepting sewers and outfall sewer, intercepting chambers and storm overflows shall be made and filed with the Commissioner of Health on or before January first, nineteen hundred and seven.

"That suitable manholes shall be provided on the intercepting and outfall sewers at intervals of not over three hundred and fifty feet, and monthly inspections shall be made of these sewers by the borough and a report submitted thereof to the Commissioner of Health on blanks to be suggested by the said Commissioner, and in case said sewers become clogged, or accumulate deposits, thereby rendering them insanitary in the opinion of the Commissioner of Health, such remedial measures shall be put in force as the Commissioner of Health may direct.

"The permission to discharge sewage from the sewage tanks into the creek is contingent on the fact that no nuisance or menace shall be caused by such a discharge. If at any time the Commissioner of Health determines that the interests of the public health demand it, the borough shall adopt such measures as shall be approved by the Commissioner of Health for the removal of any menace to health resulting from such discharge.

"This permit to discharge excess storm water and sewage through the various storm water overflows into the water courses is on the condition and express stipulation that if at any time such discharge, in the opinion of the Commissioner of Health, is injurious, or may become injurious to the public health, then the borough shall adopt means to be approved by the Commissioner of Health to obviate the trouble

"This permit is given with the understanding and stipulation that the municipalities bordering on Shamokin Creek below Mount Carmel will not offer any objections to the discharge of untreated sewage from Mount Carmel into Shamokin Creek. If such an objection is made, then the borough shall adopt measures to be approved by the Commissioner of Health for the treatment of such sewage.

"No pathogenic material from any laboratory shall be discharged into the sewer system. Proper authorities shall cause these wastes to be incinerated on the premises."

In compliance with these conditions the borough has submitted detailed plans of the sewage purification plant and for an outfall sewer and has made a formal application for approval of these plans, said application bearing date of February fourth, nineteen hundred and seven.

It will be noted that Mount Carmel is a mining community of fifteen thousand people, located in the Upper Shamokin Valley near the headwaters of Shamokin Creek. At a point nine miles below Mount Carmel on Shamokin Creek is the borough of Shamokin and twenty-eight and three-tenths miles below Mount Carmel the creek empties into the Susquehanna River. Marysville and Harrisburg are the nearest towns below Mount Carmel that use water from this creek for drinking purposes.

Shamokin Creek passes through the extreme northern portion of the borough and flows westerly. During the dry season the natural flow from the creek is extremely small due to the small watershed which this creek drains above the borough, but its capacity is augmented four or five times during this period by water from the mines in the vicinity. The limewater carries considerable free sulphuric acid in addition to sediment in the form of iron and coal dirt. The deposits from the material carried in suspension has silted up the natural channel of the creek through the borough and for a distance of two miles west, so that the water flows in a thin sheet over the natural channel and the neighboring banks.

An extensive combined system of sewers has been installed in the borough. This system is arranged with intercepters at the low points along Shamokin Creek in the northern and western portions of the borough where the dry weather flow is diverted into an intercepting sewer and the wet weather flow is discharged directly into the creek. On account of the difficulty experienced in carrying off the sewage during extremely dry weather from the borough limits a plan was prepared for constructing an outfall sewer to extend down the valley of Shamokin Creek for a distance of about two miles to a point where the flow in the creek during dry periods is sufficiently concentrated to carry off the sewage. This eighteen inch outfall sewer and the intercepters were to be constructed under the permit granted on August thirteenth, nineteen hundred and six, subject to the conditions hereinbefore quoted, which were deemed necessary for the general interests of the public health.

The proposed sewage disposal plant is to be located upon a piece of waste ground on the north bank of Shamokin Creek nearly three miles west of the borough limits. The nearest settlement is Locust Gap Junction, which is two thousand feet east of the site. The surrounding conditions are such that no dwellings are likely to be constructed in the vicinity and the site is, therefore, well isolated. The site is rectangular in shape, two hundred feet wide and seven hundred feet long approximately, with the long side parallel to the creek. The surface of the ground is eight feet above the normal water level in the creek and has a natural slope toward and parallel with the creek, which furnishes economical excavation for the various units. The sewage will be carried to the site by gravity through an eighteen inch terra cotta sewer laid on a grade of one and one-tenth feet per thousand, with velocity of one and seventy-nine hundredths feet per second when running full and a capacity of two million gallons per day. Along this outfall sewer manholes will be located every three hundred and fifty feet, which will afford ample inspection facilities.

The sewage disposal plant consists of screen chambers, grit chambers, two septic tanks, three sprinkling filters and a sludge bed, and is designed to take care of nine hundred thousand gallons of sewage per day, which would represent the sewage from a population of eighteen thousand. The elevation of the flow line in the septic tanks and grit chamber is fifteen and five-tenths and the bottom of the sludge bed is minus one, so that there is a total drop in vertical feet in the plant of sixteen and five-tenths. The water level in the creek immediately opposite the center of the plant is at elevation four, but the creek drops rapidly and the outlet pipe from the sludge beds will be extended to a point six hundred feet below the site, where the normal water level in the creek will be sufficiently low to allow it to drain by gravity. No data is given on the high water mark.

The sewage enters the plant from the small concrete screen chamber located at the inlet end of the grit chambers. This chamber will be seven feet six inches long by seven feet wide by three feet deep, interior dimensions, and will be fitted with two copper wire screens located in grooves, which permit of their being readily removed. These screens will be composed of number twelve wire with one-half inch and three-eighths inch diamond mesh, respectively. The top of the screen chamber will be covered with a re-inforced concrete slab.

From the screen chamber the sewage flows into two grit chambers, each of which is located at the end of a septic tank compartment. These grit chambers are twenty-five feet long by twenty feet wide by six feet six inches deep, interior dimensions, and have a total capacity of forty-eight thousand gallons, which is sufficient for one and one-fourth hours storage of sewage. The sewage is taken from the surface of the screen chamber through two twelve inch valved openings, each of which leads into the adjacent ends of the grit chambers. These openings discharge into the grit chambers at a point two feet below the normal water level. Five feet from the inlet and extending across the entire width of each grit chamber is a wooden baffle four feet in height from the bottom of the chamber. The outlet consists of a twelve inch valved opening located at the flow line in the middle of the outlet end of each chamber. These valved openings connect directly to the septic tank compartments.

Water is drawn off of the grit chamber through a six inch cast-iron pipe located eighteen inches above the floor of each compartment. This pipe is provided with a valve and also with a swivel joint arrangement, whereby the liquid can be drawn from the surface as the tank is emptied. This liquid is carried by gravity through a sludge line which extends the entire length of the plant to the lower end where the sludge bed is located. The grit chamber will be built of re-inforced concrete with a six inch concrete bottom and open top. The walls will be carried up to a height of two feet above the flow line.

Immediately to the west of the grit chambers and separated therefrom by a partition wall are the two septic tank compartments. Each of these compartments is one hundred and fifty feet long by twenty-five feet wide by eight feet deep, interior dimensions. The wall is carried to a height of two feet above the flow line, so that the total average depth is ten feet. Both compartments have a total capacity of four hundred and fifty thousand gallons, which is ample for a twelve hours' storage of sewage.

The sewage enters the septic tank from its adjacent grit chamber through a twelve inch castiron pipe, which is valved and connected with the grit chamber near the flow line. The inlet end of this pipe in the septic tank is carried down to a depth of eighteen inches below the flow line of the tank. Sewage flows through the entire length of the tank and is taken off at the opposite end by means of three eight inch outlets extending through the wall near the flow line and thence by means of elbows to a depth of four feet below the flow line. These outlets are valved with eight inch valves outside of the compartment and the sewage flows thence through a twelve inch outfall sewer directly to the creek. Provision is made for a future connection to each of these outlets, so that the sewage can be discharged into the distributing chamber for the proposed sprinkling filters. Across the outlet end of each compartment there is a wooden baffle board extending the entire width and to a depth of five feet below the flow line. This baffle board is located four feet from the outlet wall and serves to prevent the outlets from draining only a portion of the tank. There are also a series of wooden baffles extending across the entire width of the tank at intervals of twenty-five feet throughout the length. These baffles are three feet in width and extend to a depth of eighteen inches below the flow line. They serve to prevent the breaking up of the scum upon the surface of the tanks.

For draining the sludge from the septic tanks there is a fifteen inch trough extending through the entire length of the bottom. This trough is formed by means of fifteen inch split tile pipe and slopes on the same grade with the bottom, which has a drop of two feet from the outlet to the inlet end. The end of this trough is connected by means of a twelve inch gate valve connection to a twelve inch sludge pipe, which connects with the main sludge line leading to the sludge bed at the lower end of the plant. In order to facilitate the cleaning of one compartment there is a two and one-half inch pipe with gate valves attached extending through the partition wall between the compartments at a distance of two and one-half feet above the floor. This pipe will be used for flushing purposes.

The septic tank compartments will be constructed of reinforced concrete similar to the grit chambers. The walls will be twelve inches wide at the top and two feet wide at the bottom with a vertical system of reinforcements extending into the floor for a distance of five feet. No horizontal reinforcement is shown in the walls. The tanks will be uncovered. The floor will be composed of a six inch layer of concrete and, as stated above, will slope with a drop of two feet from the outlet to the inlet end. It is proposed to provide an earth embankment around the walls of this compartment where the natural ground line is considerably below the top, but details of these embankments are not submitted.

One hundred and thirty feet west of the septic tanks will be the sludge bed. This will be composed of an excavation trapezoidal in plan, with a length of one hundred and seventy feet and an average width of one hundred and forty feet. The excavation for the sludge bed is made in the natural ground and the earth excavated will be used in forming an embankment around the bed to protect it from high water in the

creek. The elevation of the top of this embankment is not given. The sludge bed is estimated to have a capacity of storage of water and sludge for one grit chamber and septic tank. The water level in the sludge bed will be six feet above the bottom. It is proposed to operate this bed by allowing the water to gradually evaporate and then to remove the dry solid matter left to one of the adjacent culm banks, where the culm can be mixed with the sludge.

In case the evaporation of the water is not sufficiently rapid to accomplish this purpose, a drain pipe consisting of ten inch cast-iron pipe is provided, which extends to a point six hundred feet below the sludge bed, where it can empty into the creek by gravity. This pipe is provided with a swivel joint in the sludge bed and a float connection attached to it, so that the liquid contents can be drawn off from the surface. This outlet is also properly valved.

As the location for this plant is on the side of a hill, provision must be made for intercepting the run-off from the hillside above. This is taken care of in the plans submitted by providing a gutter paved with field stones and extending along the entire northern side of the site to a point below the sludge bed on the western end where it empties into the creek.

In submitting the plans for these septic tanks, the borough authorities have made provision for a higher degree of efficiency in the purification of the sewage, which may be necessary in the future. For this purpose they propose to use sprinkling filters, which will be located on the land between the septic tanks and the sludge bed.

The sprinkling filters will consist of three units, each one hundred and fifty-four feet long and forty-three feet wide by five feet average depth, interior dimensions, with a total area of four hundred and forty-five thousandths acres and a capacity of eight hundred and ninety-one thousand gallons when operated at a rate of two million gallons per acre per day. These filters will be controlled by a distributing chamber of concrete one hundred and three feet long, four feet wide and six and one-half feet effective depth, interior dimensions, extending across the outlet ends of the septic tanks to the filters.

The walls of the filters are to be constructed of earth embankment formed from the material excavated from the filter site. The tops of the walls will be three feet wide and at a height of one foot above the filter surface. The walls will be battered on both sides where necessary with a one to one slope. The bottom of the filters is to be composed of a six inch layer of concrete with a fall of six inches from each end to the center of the filter, where the main outlet drain is located. The filters will be filled with hard anthracite coal in sizes ranging from four inches in diameter to one-half inch in diameter. The coarser material will be placed on the bottom and the top foot will be composed entirely of material of one-half inch or under.

The surface of the filter is located at a depth of five feet below the normal flow line in the septic tanks. It will be fed continuously from the distributing chamber by means of a series of fixed spray nozzles located at intervals of fourteen feet over the surface of the filter. The distributing chamber will serve mainly as a control for the fluctuations in flow and these fluctuations will allow a variation in head on the nozzles, which will assist in giving a uniform distribution of the sewage over the surface.

From the bottom of the distributing chamber there is a five inch valved connection to a wrought-iron pipe extending through the center of each filter for its entire length. This pipe will be located at a depth of three feet below the surface of the filter and will be supported from the filter by means of concrete columns. At intervals of fourteen feet along the length of this distributing pipe will be located one and one-fourth inch wrought-iron pipe laterals, which will extend for a distance of fourteen feet from this distributor and will be connected with one inch risers extending to the surface of the filter. There will also be a one inch riser on the main pipe line at the point where these laterals are taken off. On top of these risers will be fixed sprinkling nozzles. No detail of these nozzles is submitted.

The underdrainage system consists of a ten inch terra cotta drain laid in a concrete trough in the bottom of each filter extending through the center of the bottom for the entire length. These drains slope towards the middle of each filter and are there connected to a main drain which extends across all three filters and leads thence directly to the creek. This main outlet drain is provided with a twelve inch valve located in the wall of the filter nearest the creek. At this outlet drain is approximately at the same level as the normal flow line in the creek, this valve is probably provided to prevent flooding of the filter during the period of high water.

The site selected for this disposal plant appears to be well located with regards to isolation and to an economical disposal of the sewage of the community. On account of the nature of the valley of this creek it might be well to investigate the conditions of high water flow and to determine whether the location of the plant so close to the bank of the creek should be protected by means of a dyke around the entire plant.

In constructing the outfall sewer according to the profile submitted to this Department for approval, especial care should be taken in preventing carelessness in the construction of the joints and the laying of the sewer in wet places. From the profile it appears that the sewer is below the bed of the creek in many places and if the material in which this sewer is laid is porous there is grave danger of creek

water filtering in and overtaxing the capacity of both the sewer and the disposal plant. It would probably be advisable at creek crossings and at extremely marshy places to lay cast-iron pipe for short distances.

No provision is made in the septic tank compartments for measuring the flow of sewage. It would be advisable to locate weirs on the outlet ends of these compartments in order to determine the flow of sewage and also to equally distribute it between the two units. In the details of the re-inforced concrete construction for the walls of the septic tanks, there is no horizontal re-inforcing material shown and no provision made for expansion. In a wall one hundred and fifty feet long it is necessary to make provision for taking up temperature stresses and expansion joints or metal should be placed in these walls to take care of horizontal expansions and contraction. Probably this was intended but not shown.

It is extremely probable that the operation of the sludge bed as a settling tank will be unsatisfactory. At the normal rate of evaporation in this section of the country, it would take a considerable period to evaporate the water from a basin of this depth and upon the completion of evaporation there would be another interval of time before the sludge completely dried.

It would be more advisable to construct the sludge bed of some filtering medium, such as sand, so that the liquid could be drained off immediately and the sludge would be left deposited upon the surface.

In submitting plans for sprinkling filters the borough has carried the idea of a complete design for a perfect plant, but it is not the intention to build the filters at first. The borough purposes to install the septic tanks until the State Department of Health requires the town sewage to be taken out of the stream. It is reported that during time of low water the volume of mine drainage in the creek is five times the normal flow of the creek. Consequently the acid wastes destroy the sewage bacteria to a considerable extent.

The plans for the sprinkling filters as submitted furnish an area sufficiently large to purify the sewage. It might, however, be a difficult matter to operate these filters continuously with fixed nozzles, as with the spacing given of fourteen feet center to center it would require a nozzle with an extremely small orifice to accomplish this result. It has been proven by experiment and also by several practical examples in this country that it is more advisable to use a nozzle with a large orifice, such as the Columbus nozzle, in order to prevent clogging, and this type of plant is usually operated intermittently in order to allow these nozzles to spray the sewage effectively over the surface. The underdraining system would probably have to be extended more completely as no provision is made for the inspection of the underdrains and it might be more advisable to use drainage from the entire bottom. The question of the advisability of using earth embankments for these sprinkling filters which might allow an infiltration through them during the periods of high water is also a serious one. Many plants using sprinkling filters are now being constructed throughout this country, and it is probable that there will be many changes in the designs of these plants during the next few years resulting from discoveries in connection with the operation of the existing plants. On that account it would probably be more advisable for the borough authorities to submit plans for further purification of the sewage when this is deemed necessary by the Department of Health. In this way they will not be committed to the use of any fixed design and can modify their plans as improvements are made in the process.

On March thirteenth, nineteen hundred and eight, the borough solicitor of Mount Carmel and citizens of the town appeared before the Department, but not in an official capacity, and invoked the aid of the Commissioner of Health in bringing about a removal of the obstruction at the present outlet of the borough system near the town. The former natural water course, where the sewer ends, has been obliterated so far as any well defined channel is concerned by the accumulation of culm. Consequently not only now but at all times is there more or less of a nuisance by reason of the spreading of the sewage over the flats whereon the suspended matters are stranded, but during freshets and at other times there is an actual backflooding of the sewer to the inconvenience of the property owners and to the prejudice of public health, more especially in the lower parts of the borough.

The borough is aware of the fact that it is contributing to the nuisance by discharging its sewage on the flats, but it represents that this discharge is being legally done under the permit of the Commissioner of Health. In the exercise of this right so approved, it is impossible so to discharge the sewage without producing a nuisance until the culm and other obstructions to the natural water course are removed.

The detail plans of the outfall sewer as now offered for approval will afford a remedy which will do away with this nuisance by conveying the sewage down stream below the flats to the disposal works, where it is intended to construct the settling tanks and sludge beds, leaving the further treatment of the sewage for future determination.

It has been determined that the plans of the outfall sewer and sewage disposal plant will subserve the public interests and the same is hereby and herein approved and a permit granted therefor.

FIRST: That the borough officials shall cause the plans to be so modified as to provide measuring weirs on the outlet ends of the septic tanks; expansion joints or horizontal reinforcement to take care of changes in length in the walls of the septic tanks; and sludge beds which will allow the liquid material to be filtered off through sand as suggested previously in this permit.

SECOND: That the various structures at this disposal plant be suitably protected from high water in the creek during times of flood and that plans be submitted to the Commissioner of Health, showing the proposed method of accomplishing this purpose and also showing the proposed modifications in the plans of the disposal plant on or before the commencement of construction.

THIRD: The disposal plant shall be operated under the supervision of a municipal officer competent to oversee a sewage purification plant. Daily records shall be kept on blank forms satisfactory to the Commissioner of Health, and copies thereof shall be filed in the office of the State Department of Health, together with any other information relating to the plant that may be required.

FOURTH: Permission to discharge sewage into the waters of the State from the borough system shall cease on December first, nineteen hundred and nine. If at that time it appears the interests of the public health demand it, the Commissioner of Health may extend the time in which the sewage from the borough's system may be discharged into the waters of the State.

FIFTH: This permit to discharge partially purified sewage from settling tanks into the waters of the State is on the express condition that if at any time such discharge, in the opinion of the Commissioner of Health, is injurious to the public health, then the borough shall adopt additional purification units for further purification of the sewage, subject to the approval of the Commissioner of Health.

The attention of the local authorities is called to the fact that the State Department of Health does not intend to urge the construction of a sewage disposal plant for Mount Carmel at a date earlier than other municipalities in the region are required to treat their sewage unless, in the meantime, some local reason should make compulsory the treatment of Mount Carmel sewage.

The main point is the fact that the present outlet at the borough sewer system produces a nuisance, which may be remedied by carrying out the plans herein approved. At what point into the system the borough shall discharge its sewage in this instance it would seem should be settled by the local authorities themselves. No doubt the present outlet is a menace and the borough should extend the outfall sewer to the site of the disposal works and this work should be done during the coming year.

There is ample opportunity to raise the proper funds and to construct this work within the time specified, provided the borough has the ability to borrow or raise the funds necessary to defray the cost. About this point the Department is not informed.

Harrisburg, Pa., October 21st, 1908.

MT. UNION, HUNTINGDON COUNTY.

This application was made by the borough of Mt. Union, Huntingdon County, Pennsylvania, and is for permission to construct a sewerage system and to discharge the sewage therefrom, untreated, into the Juniata River within the limits of the borough.

It appears that Mt. Union borough is an industrial community of about three thousand two hundred population, located along the south bank of the Juniata river about eighty-six miles above the city of Harrisburg and twelve miles down stream from Huntingdon. The river at this point forms the northern boundary of Huntingdon County and it bows out in a pronounced manner, forming a neck of land in the northern part of the borough three thousand feet northerly and about four thousand five hundred feet wide east and west. This tract comprises flats and the greater portion of the district was covered with water during the Johnstown flood, but ordinary freshets do not reach these lands.

This neck is cut off from the southern part of the municipal territory by the old Pennsylvania Canal, which, further east and west followed closely the south bank of the river. South of the canal bed, long since abandoned for navigable purposes, are the tracks, old location, of the main line of the Pennsylvania Railroad between Philadelphia and Pittsburgh. North of these tracks and on the flats dwell possibly one-third of the entire borough population.

Recently the railroad company completed the improvements in the alignment of its road bed through the town and the new location is partly in the old canal bed line and partly north of the canal but near it. The old railroad location has been practically abandoned for through trains. Crossings at grade at the new track have been obviated, the two highways leading northerly to the flats, namely, Jefferson and Division Streets, passing under the railroad. There is no pocket in the grade of the street here. The filling in of the canal bed interfered and cut off certain surface drainage facilities, and as a substitution therefor the railroad company donated twelve thousand dollars to the borough (which was applied to a new storm water system) and constructed an open ditch east from Division Street along the new railroad embankment north of the slope a distance of twenty-two hundred feet to the Juniata River.

During nineteen hundred and seven, the borough built a twenty-four inch storm drain on Jefferson Street from Shirley Street immediately south of the old railroad track northerly to Poplar Street and thence easterly in said street to the open ditch above mentioned. It also built a fifteen inch storm drain in Water

Street from Washington to Jefferson; also a storm drain eighteen inches and twenty inches in diameter in Division Street from Market Street northerly to Poplar Street and the ditch; also an eighteen, twenty and twenty-four inch storm drain in Shirley Street easterly from Division to Hill Valley Run, a distance of about two thousand feet. This run forms the borough boundary at this point.

Shirley Street is the principal thoroughfare in the borough east and west and Division Street and Jefferson Street north and south. The two last named thoroughfares ascend very rapidly from the old railroad tracks. The extension of Division Street out into the country in the south is called Hill Valley Road. Shirley Street is approximately thirty feet higher than the old railroad track and the land continues to rise rapidly to the south, the higher portions of the borough being over two hundred feet above the flats. It thus appears that natural drainage is afforded.

The storm drains mentioned are said to receive sewage from one street only, namely, the old railroad sewer in Pennsylvania Avenue along the old tracks. Temporary connections are said to have been made with both the Division and Jefferson Street storm drains, but it is intended that the sewage shall be discharged into the sanitary sewer system as soon as such sewers shall be provided.

The leading industries are two large brick plants. One is the Harbison-Walker Refractories Company, employing about four hundred hands in the manufacture of fire and silica brick, and the Mt. Union Silica Brick Company, employing about one hundred and fifty workmen. These two plants erected since the last census have more than doubled the population of the borough. They are permanent works and assure a stable prosperity to the town.

There is a small sole leather tannery in the borough along the canal west. Possibly twenty men work here. The trade wastes are emptied into a small run which flows down from the gully in the side of the mountain. It passes through the Harbison-Walker plant.

The general disposition of sewage and kitchen drainage at the present time throughout the borough is in the ordinary privy vault and cesspool or to the street gutters. Probably not over thirty cesspools of the percolating type are in use and in each instance these properties have modern plumbing facilities installed in the buildings. It is said that there are a dozen or more abandoned wells into which household sewage is now drained. There are other wells of the dug type scattered throughout the town and still in use for drinking purposes. Some of these wells are in close proximity to the cesspools or to privy vaults. The danger of surface drainage from overflowing privies on the hillsides reaching the dug well supplies is a continual menace to public health. Typhoid fever has been altogether too prevalent. In the year nineteen hundred and five, so far as the Department is informed, there were at least seventy-five cases, forty-six for nineteen hundred and six and nineteen for nineteen hundred and seven.

The public water supply is furnished by the Mt. Union Water Company, the source being pure mountain springs and a brook entirely free from any source of pollution. Therefore, the conclusion is that the fever came from polluted well water, at least with respect to the secondary cases. It is now the intention of the local authorities to do away with the menace by providing a modern sewer system.

It is proposed to build a sanitary sewer system with one outlet, namely, an eighteen inch pipe to discharge into the Juniata River at the point immediately above the Pennsylvania Railroad bridge. A sanitary sewer is designed for every street, inspection manholes are to be provided at street intersections and changes in line and grade, the grades will assure cleansing velocities, ventilation is to be secured by perforated manhole covers and flushing, when necessary, is to be accomplished by water from the street mains.

The petitioners do not intend to build all of the sewers at once, but approval of the entire plan is asked in order that the local authorities may build such sewers from time to time as necessity may require and they deem best.

There is a taxable valuation of four hundred and seventy-five thousand dollars, so it is reported, and a bonded municipal debt of twenty-nine hundred dollars. It is understood that, taking into account all the municipal debts, the borough's borrowing capacity is between twenty-five thousand and thirty thousand dollars. This is a sum totally inadequate to defray the cost of sewers for the built-up part of the town and for sewage disposal works. Either permisison must be secured to temporarily discharge the sewage into the river, or the sewerage project must be abandoned. Negotiations are in progress for the acquirement of a tract of land near the sewer outlet on the bank of the river north of the railroad, upon which a sewage disposal plant is to be erected, when the time shall come and funds are available therefor.

The borough of Huntingdon is now engaged in the construction of a sanitary sewer system with an outlet into the river through which sewage is to be discharged untreated until November first, nineteen hundred and eleven. The borough of Newport, situated on the river approximately sixty miles below Mt. Union, has also been given permission to temporarily discharge sewage into the Juniata River.

It has been determined that the interests of the public health will be subserved by approving the proposed plans and issue a permit therefor, and the permit is hereby and herein issued under the following conditions and stipulations:

FIRST: That all roof and storm water shall be excluded from the sewer system. The local authorities shall keep a record of all connections to the sewer system. At the close of each season's work a plan of the sewers built during the year shall be prepared and filed by the borough with the Commissioner of Health, together with any other information in connection therewith that may be called for.

SECOND: All existing sewer connections with the borough's storm drain system shall be disconnected from said system and the sewage shall be discharged into the sanitary system proposed as soon as the sanitary system is ready for use.

THIRD: This permit to discharge sewage into the water of the State shall cease on the first day of January, nineteen hundred and eleven, provided, however, that the other conditions herein specified shall have been complied with. At the expiration of said time, the Commissioner of Health may extend the time in which sewage may continue to be discharged into the waters of the State, provided the interests of the public health demand it.

FOURTH: If at any time, in the opinion of the Commissioner of Health, the sewer system or any part thereof has become a nuisance or menace, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

FIFTH: No pathological material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

SIXTH: On or before January first, nineteen hundred and eleven, the borough shall prepare detailed plans of works for the purification of the borough's sewage and submit them to the Commissioner of Health for approval. Said Commissioner may approve such plans or modify or amend them and fix the date when they shall be constructed, having in mind the general policy of the State with respect to the treatment of municipal sewage at other places on the Juniata River watershed.

The local authorities' attention is hereby specially directed to the danger of the use for domestic purposes of ground water in the borough. All wells should be examined and condemned if found contaminated, and inspections should be made of every occupied estate and ordinances vigorously enforced relative to nuisances and menaces in the borough, or if there be no such ordinances, then the borough council should adopt an ordinance of approved form to accomplish these purposes. A suggested form of ordinance, or rules and regulations for the local Board of Health will be forwarded to the borough council. Compulsory connections to the sewers should be made on every estate where a nuisance or menace exists.

Harrisburg, Pa., July 10th, 1908.

NEW CASTLE, LAWRENCE COUNTY.

This application was made by the city of New Castle, Lawrence County, and is for permission to extend its sewer system from time to time as necessity may require and for the approval of plans for sewage disposal works and also for an extension of time in which the Grant Street sewer system shall be connected with the Main Street sewer.

It appears that the Commissioner of Health has issued four permits to the city of New Castle to extend its sewer system, which permits were dated September twenty-first, nineteen hundred and five; December second, nineteen hundred and five; April twelfth, nineteen hundred and seven, and May twenty-third, nineteen hundred and seven.

Among other stipulations in the first two permits were the requirements that the city perpare a comprehensive plan of the sewer system now built and of future extensions thereof and submit the same for approval and that on or before the first day of September, nineteen hundred and six, the city prepare and submit a plan for the treatment of its sewage to the Commissioner of Health for consideration. However, on September first, nineteen hundred and six, plans for a sewage disposal plant had not been submitted to the State Department of Health. Furthermore, the Grant Street sewer outlet into the Shenango River, approved by the Commissioner of Health under the express condition that said outlet be discontinued and the sewer connected with the city's main sewer outlet on or before January first, nineteen hundred and seven, had not been so connected on said date. Therefore, permission to construct sewers as applied for on June fourth, nineteen hundred and six, was withheld by the State. On November twenty-seventh, nineteen hundred and six, councils authorized the city engineer to prepare plans for a sewage disposal plant.

In view of the fact that the city's delay in fulfilling the terms of the permit was not an intentional defiance of the law, and because prior to January third, nineteen hundred and seven, the city had employed experts to design sewage

disposal works and had passed an ordinance for the extension of the Grant Street sewer to the main sewer, and also in view of the fact that some of the sewers mentioned in the application of June fourth, nineteen hundred and six, were very much in demand and needed as a matter of public health, the Commissioner of Health favorably entertained an application made by the city on January third, nineteen hundred and seven, for an extension of time to April fifteen, nineteen hundred and seven, in which plans of a sewage purification plant might be submitted, and for an extension of time to December first, nineteen hundred and seven, in which the Grant Street sewer might be concreted to the main city sewer.

The permit was issued therefor on April twelfth, nineteen hundred and seven, and it embodied permission to build the sewers mentioned in the application of June fourth, nineteen hundred and six, and also in an application for general lateral sewer extensions submitted on March twentieth, nineteen hundred and seven.

Among other conditions it was stipulated in said permit that a plan of all existing sewers with profiles thereof shall be prepared and filed with the State Department of Health on or before July first, nineteen hundred and seven. Also that manholes of approved design shall be provided at all street intersections and changes in line and grade.

On May twenty-third, nineteen hundred and seven, in response to an application made by the city and dated May sixteenth, nineteen hundred and seven, the Department of Health extended the time to November first, nineteen hundred and seven, in which a plan of all existing sewers with profiles thereof shall be prepared and filed, and the city was also excused from that portion of the permit of said April twelfth, whereby a manhole of approved design shall be constructed at every change in grade of the sewer.

Plans for sewage disposal works were submitted for consideration on April second, nineteen hundred and seven, and complete plans of the existing and proposed sewers were submitted on October eleventh, nineteen hundred and seven, both in compliance with the above requirements.

New Castle is a city of the third class, is the county seat of Lawrence County and has a population at present of about thirty-six thousand. In nineteen hundred it was twenty-eight thousand, three hundred and thirty-nine. The growth has been due to its industries, among which should be mentioned blast furnaces and steel mills of the Carnegie Company, the extensive plant of the American Tin Plate Company (said to be the largest works in the world) and the new plant of the Standard Steel Car Company. The future of the town seems to be assured and a poulation of sixty thousand people in twenty years' time is by no means an impossibility.

The Beaver River is formed by the confluence of the Mahoning River, which drains a large territory to the west in Ohio, and the Shenango River, which drains a large territory almost wholly within the State of Pennsylvania. The latter watershed is long and narrow, the headwaters are in Crawford County. The course of the Shenango is southerly through Crawford, Mercer and Lawrence Counties, a distance of about sixty miles by the stream, to the Beaver River. On the Shenango, three miles above its mouth, is a tributary called Neshannock Creek, which comes down from the northeast, and it is here in the forks between the river and the creek that the business portion of New Castle is located. The land lies low and flat, but it is not subject to overflow. Immediately north are the hills and also on either side of the valley of these streams and the main Shenango there are hills on which are located the dwellings within the city limits. These resident districts are from two hundred to three hundred feet above the valley.

A natural water course by the name of Big Run rises several miles to the east of the city and empties into the Shenango about a half mile below Neshannock Creek. The steel plant is located in the river valley north of Big Run and extends all the way up to the forks. The tin plate works are located in the river valley below Big Run. This section of the Shenango River has a very sluggish flow. The fall being slight, the lowlands bordering the banks are subject to freshet flow.

One mile above the mouth of the Shenango River there is a dam and mill privilege. About at the point the Baltimore and Ohio and the Pittsburgh and Lake Erie Railroads cross and extend westerly up the valley of the Mahoning River. A branch from each road is laid up the east bank of the Shenango to New Castle and the former stops here, but the Erie continues on. The large repair shops of the Baltimore and Ohio are located at New Castle Junction, which lies east and south of the said mill dam. The yards extend along the river bank at an elevation just above freshet level. On the other side are steep hills. The employees have found a convenient place for residence on the neck of land west of the Shenango River between it and the Mahoning and here there is the settlement of Mahoningtown, where about five thousand people abide. Ten years ago this village was incorporated as the Seventh ward of New Castle, so that now there is a very irregular tract of land belonging to the city and stretching along the valleys and contained between the Shenango and Mahoning Rivers for about two and a half miles along each stream.

South of Mahoningtown are the lowlands at the forks, the land southerly from the said mill dam being practically unoccupied and subject to inundation. In the center of it is the station of the Pennsylvania Railroad lines known as Lawrence Junction. The branch road extending up the west bank of the Shenango River through New Castle is the Pittsburg and Erie Division, and the road extending up the west bank of the Mauhoning River is the Pittsburg and Youngstown Division of the Pennsylvania Railroad system. Here are located the repair shops of this Company. The mechanics also live at Mahoningtown, which is exclusively a railroad settlement. These facts are relevant because of the proximity of the city sewer outlets and the site of the proposed purification plant.

The city of New Castle is quite thoroughly provided with a system of sanitary sewers which has been built in substantial accordance with the original design to collect sewage from the various districts by a main intercepting sewer having an outlet in the Shenango River at a point remote from town. This point is below the said mill dam and at the railroad bridges. This main trunk sewer is egg-shaped, thirty-two by forty-eight inches in diameter and has a discharging capacity of about sixteen million gallons per twenty-four hours. It is throttled at the outlet by a short length of thirty inch pipe sewer. Into it the district main sewers empty at convenient points. There is a twenty-four inch main for the Big Run sewer district. Where this crosses under the river to the main intercepter on the west bank, the pipe is cast-iron and the joints are lead caulked. This pipe is exposed to view in the bed of the stream. It is distant about a mile and a half above the outlet of the main sewer.

The next district sewer main connection to the intercepter is three thousand, two hundred feet up stream just above the mouth of the Neshannock. It is a cast-iron pipe eighteen inches in diameter, is laid on the bed of the Shenango Creek where it crosses from the east to the west bank, and it collects all of the sewage from the business section of the city and the territory lying between the Neshannock and the Shenango.

The main intercepter continues up the west bank of the river to the foot of the hill and west of Front Street. It is the intention of the city to build this sewer along the bank of the stream around the hill to Grant Street where at present there is a twelve inch sewer outlet which serves the district lying west of the river in the northern part of the city. The reason given by the city for a still further extension of time in which to build this sewer connection, so as to do away with the outlet at Grant Street, is that the cost of construction would be increased many fold were the work done during any other than that of low flow in the river, and still further that the city fail to dispose of the sewer bonds in time to admit of the construction of the sewer during nineteen hundred and seven.

There is another sewer outlet into the river at the same point where the main intercepter empties. It is twenty-four inches in diameter and it serves a fifty acre tract south of the Baltimore and Ohio Railroad in the Mahoningtown settlement.

Connecting with these mains there are about fifty miles of sewers of which the smallest diameter is six inches, but there are not many of this size; the vast majority are eight inches in diameter. Street drainage and roof water are excluded by ordinance. Flush tanks are used, one being placed on the end of every sewer, and the topography is such that self-securing velocities are generally assured. In spite of these precautions, there is a much larger output from the system than should be the case were waste water only to reach the sewers.

The water consumption is an index of the flow of sewage in a town well sewered. The public are very generally supplied with water by the New Castle Water Company. There are said to be not over one dozen wells in the town. Most of the dwellings have sewer connections. The average daily water consumption, deducting what is used for the railroads and factories, is about three million gallons or about eighty-two gallons per capita per diem. The average flow at the main sewer outlet by measurements of the city engineer is over five and one-half million gallons daily which is equivalent to a total per capita discharge of over one hundred and fifty gallons per day, which shows a leakage into the sewer system of two and a half million gallons daily. This is the dry weather infiltration; during storms and for a while thereafter the flow is at a rate of over ten million gallons. No systematic canvass of the city has been made for the purpose of cutting out absolutely every roof water connection. It is thought that considerable of the leakage occurs in the pipes extending under the river. Possibly other leaks may be found in the main sewer. Every effort to discover and prevent leakage into the system should be made. If the cost for installation is upwards of thirty thousand dollars for each million gallons of sewage treated and it is possible by careful survey to reduce the maximum flow in the present sewers from ten to four million gallons, an investment of one hundred and eighty thousand dollars is saved, at least calculation, besides a corresponding saving annually in operating expenses. It is reported that the city is aware of this fact and fully intends to discover and prevent leakage as far as possible.

Surface water removed from the streets is effected where necessary by drains provided for this purpose. The principal industrial plants draw water from the river and return it again freighted with waste products and some sewage. At

the tin works there is a special plant provided for the reclamation of by-products. So the pollution of the river is less and pronouncedly so than formerly.

The proposed extensions to the sewer system and all of the proposed sewers, according to plans submitted, and for which permission to build from time to time is asked, contemplate the collection and removal of sewage only to some common point near the existing sewer outlets at Mahoningtown and this collection is to be effected through the existing main sewers or sub-mains thereof.

The site of the proposed sewage purification plant is the low land on the banks of the Shenango River immediately south of the Pittsburg and Lake Erie Railroad embankment and west of the Erie branch of the Pennsylvania Railroad. It is triangular in shape and contains about fifteen acres. Immediately west of the Pennsylvania Railroad lies Mahoningtown village. Wayne Street, which is occupied by dwellings, is within three hundred feet of the proposed septic tanks. Within a distance of one thousand feet of the site, between one thousand and two thousand people permanently reside. The land is owned by the Pennsylvania Railroad Company and is valuable for track yard purposes.

The treatment plant is to comprise a pumping station, grit chamber, septic tanks, sprinkling filters, settling basins and sludge disposal area and it is proposed to care for the sewage of an ultimate population of sixty thousand people at a capacity of nine million gallons per day of twenty-four hours based on a per capita contribution of one hundred and fifty gallons. At present units sufficient to treat six million gallons per day will suffice in the opinion of the designers. The additional units would be added as the city grows. However, no provision is made for extensions to the works after the full limit of the plant is reached, that is all of the available land in the triangular strip is requisite for the nine million gallon plant as designed. The flow in the outfall sewer is frequently in excess of this amount per day and if it should be found impracticable to reduce this flow, then the disposal works as offered for approval would be sufficient in size for the present population of New Castle only.

The main outfall sewer of thirty-two by forty-eight inches in diameter terminates at the foot of Prescott Street. From this point the thirty inch sewer pipe above referred to turns at right angles and follows easterly along the north bank of the railroad at the foot of its slope, a distance of five hundred feet to the river. The other sewer outlet, the twenty-four inch sewer from Wayne Street and Mahoningtown, follows the foot of the south railroad embankment easterly to the river. A new thirty-six inch sewer is proposed from the end of the main sewer in Prescott Street southerly under the railroad embankments intercepting the Mahoningtown outlet and terminating in a pumping station on the sewage disposal site at the apex of the triangle formed by the railroad embankment and distant three hundred feet from Wayne Street. The invert of this three foot sewer is to be elevation seven hundred and sixty-seven and this is the intended high water level in the pump well. However, the plans show the bottom of the well two feet only below this invert, which must be a mistake, otherwise sewage will have to be maintained at a higher level in the pump well. The lateral sewer in Wayne Street at the twenty-four inch pipe outlet is elevation seven hundred and sixty-nine. It is desirable that sewage should never back up higher than this elevation, although at present it frequently does so and most all of the sewers in Mahoningtown are back-flooded during freshets. The average elevation of the river water at the sewer outlet in the winter is seven hundred and sixty-nine. Daily floods occurring any month in the year and occasioned by showers, raise the river to seven hundred and seventy-three. Every spring a freshet occurs whose elevation at the sewer outlet is seven hundred and seventy-six, or thereabout, and the highest flood ever recorded was at elevation seven hundred and eighty. After the pump well is built and maintained properly, these sewers need never be back-flooded in Mahoningtown. Thus the sewers would be rendered more efficient. The plans, however, for the connection between the existing sewers and the new thirty-six inch outfall proposed, show that it is contemplated that ten million gallons of sewage only should be intercepted or carried to the pump well. When the flow in the sewers becomes greater than this, the special manholes at the intersections are so arranged that the excess flow will go directly to the river through the existing thirty inch and twenty-four inch pipes. The elevation of the overflow weir at the main sewer connection is seven hundred and seventy-two and two-tenths and at the twenty-four inch sewer connection the overflow weir is placed at seven hundred and sixty-eight and seven-tenths. In other words, when the water in the river is higher than the latter elevation, (seven hundred and sixty-eight and seven-tenths) it will flow into the sewer from the river through the existing twenty-four inch sewer, and when the river height exceeds seven hundred and seventy-two and two-tenths, there will be an added channel through which the river water will flow to the pump well.

On the other hand these overflows are equally at variance with the object and the efficient operation of the disposal works when considered from the standpoint of handling the legitimate flow of sewage to the pump well under existing design, because whenever the sewage in the pump well exceeds the depth of three and seven-tenths feet it will overflow into the river through the twenty-four inch existing sewer. The construction of this arrangement would, in all probability result in considerable quantity of sewage being discharged directly into the river.

There is no necessity shown by the petitioners for any such feature as an overflow or by-pass to the river ahead of the pump well. It is not good practice or common, and its adoption would be a mistake. All the city's sewage at all times should be delivered into the pump well and duplicate machinery should be provided.

The pump well is to be twelve feet in diameter and directly over it is the pump house, thirty feet square, in which is to be installed one ten million and one five million gallon centrifugal pumping engine for the lifting of the sewage to the septic tank and also a sludge pump of one million gallon capacity.

As noted above, a much deeper pump well should be provided and duplicate pumping machinery is necessary in order to avoid unnecessary suspension of operation at the plant or the discharge of crude sewage into the river.

The sewage is to be raised from the pump well eighteen feet to a grit chamber twenty feet by thirty feet, inside dimensions, and nine feet deep, to the normal water level line, which chamber is provided to admit of the subsidence of the coarser suspended matters. This structure is built of re-inforced concrete, is open on the top and the normal water level therein is to be elevation seven hundred and eighty-three and three tenths. The grit is to be drained from the bottom of the chamber to the sludge sump in the pumping station.

From this chamber the sewage is to pass to the septic tanks which are open, reinforced concrete structures, arranged side by side and six in number, each compartment being about forty-four feet wide and one hundred and seventy-seven feet long and ten and a half feet deep below the mean water level of seven hundred and eighty-three and three-tenths. The intention is to provide a retention of eight hours in the tanks when the volume of sewage being treated is at the nine million gallon rate per twenty-four hours.

Across the inlet and also across the outlet end are closed channels at the top by means of which the sewage is delivered through ports provided with gates into the tanks and by means of which at the outlet end the tank may overflow and the sewage be conducted to the river. The overflow weir is at elevation seven hundred and eighty-four and eight-tenths. Below the overflow chamber is the effluent collecting chamber connecting to the conduit leading from the septic tank to the sprinkling filters.

The septic effluent is to pass out from each compartment by means of four openings, five feet from the bottom of the compartment, each opening controlled by an eighteen inch valve.

Twenty feet from the outlet end of each compartment there is to be a concrete baffle wall built across seven feet high, which is provided to retain the major portion of the septic sludge back of it. Ten feet from the outlet end is to be a floating wooden baffle full width of each compartment and extending about three feet into the water and provided to retain scum in the tank.

The sludge of each compartment is to be drained by a twenty-four inch pipe to the sludge pump well at the main pump house from whence it is to be pumped to the sludge drying area in the southern part of the disposal site. A six inch cast-iron force main is planned for the purpose. No detail plans of the sludge drying area have been submitted.

Immediately south of the septic tanks is to be the sprinkling filter, circular in plan, five hundred feet in diameter, consisting of five feet of broken stone resting on a concrete foundation. In the center of this circular filter is to be a concrete control chamber about twenty feet in diameter and about twelve feet high, roofed over with concrete, in which the sewage will stand at an equal elevation with the sewage in the septic tank, there being a concrete conduit three feet high, and two and a half feet wide, connecting the two. This conduit will be under pressure. The mean water line in this control chamber will be five feet above the surface of the sprinkling filter. The floor of the filter will have an average elevation of seven hundred and seventy-three and three-tenths and it is to be divided into six units, each being a sector of the circle and having an approximate area of three-fourths of an acre. There are to be no walls in or surrounding the units of the filters, the outer ends thereof will have a natural slope of broken stone. The sub-division into six units is to be accomplished by the system of distribution and collection.

The distribution system will consist of six concrete conduits two and one-half feet by one and thirty-three one hundredths feet, one down the center of each unit, off of which in parallel lines thirteen and twenty-five-hundredths feet on the centers, extending either side, are to be six-inch cast-iron lateral pipes, laid horizontally about one foot above the concrete floor and resting upon a layer of broken stone. Every fifteen feet on these six inch horizontal pipes there is to be a vertical three inch riser extending to the filter surface, where some kind of a sprayer is to be adjusted to the pipe.

The sizes of the crushed stone for filtering material are not specified. After the sewage is passed through to the bottom it is to be collected by a system of six inch half-tile laterals laid in rows with ends three-quarters of an inch apart, the rows being spaced nine inches on centers, which will practically cover the entire bottom of the filter. These lateral collectors will feed into two sub-main collectors, each built in the bottom of the concrete floor and in turn they will feed into the main collector to be built underneath the main concrete distributor in each section. This main collector will deliver the effluent back into the control chamber.

Here, by an ample arrangement of gates, the septic effluent may be directed at will by manual manipulation of the gates into any or all of the units. From here the effluent will go to the settling basin.

The settling basins are contiguous to and immediately south of the sprinkling filter. They are designed to take care of a four hour flow when the plant is being operated at a six million gallon rate. There are to be two units, each approximately one hundred and five by one hundred and ninety-five feet and averaging four feet in depth. The bottom and sides are to be lined with concrete. The effluent is admitted to and drawn off of each basin by means of weirs on opposite sides extending the full width thereof. The level of the water therein is to be seven hundred and seventy-one, or two feet below the flood line which may be reached in the river any day in the year on which a considerable precipitation over an area on the Shenango River may occur. And when it does occur the filter would have to be put out of commission.

The plan contemplates a dyke about thirteen hundred feet long carried up to the height of the embankment of the Pennsylvania Railroad, or to elevation seven hundred and eighty and extending along the river between the Pennsylvania and the Erie Railroad embankments, thus effectually dyking off from the river floods the triangular piece of ground upon which it is proposed to erect the disposal plant.

The liquid from the settling basins is to pass to the river by means of a thirty inch pipe, extending underneath this dyke. A flood gate chamber thereon would keep out the river water, but at such times the filter would have to be put out of commission, or the effluent be raised by pumps and discharged into the river. There is a sludge pumping station provided near the settling basins to lift the sediment drained by gravity from the settling basins into the pumping sludge pit, to the sludge drying area. This pit and pumping station is distant about nine hundred feet from the main pumping station, but the sludge area is the same as that upon which the septic tank sludge is to be deposited.

Under the present design sufficient pumping machinery should be installed at this effluent pump house to raise the purified output of the plant into the river at any time that this may be necessary in order to obviate a suspension of filter operation.

The filtering area is equivalent to four and a half acres and it is expected that this will be sufficient to handle nine million gallons of sewage and effect a purification of ninety per cent. based on removal of organic matter and bacteria. It is doubtful, however, if a non-putrescible effluent could be obtained with filters of this type having a depth of five feet only and operated at the rate proposed. It would be better design to increase the depth to seven feet and preferably to nine feet.

While the plans in the main embody the principles of modern practice in sewage purification, the adaption is not wholly satisfactory. The vital point upon which depends the cost and success of disposal works for New Castle has not been determined and that is the precise quantity of sewage which must be handled. The city is warranted in spending a liberal amount of money to keep out of the sewers every drop of roof water, street drainage, and infiltration and leakage, so far as it is practicable to stop it, and there is no way of ascertaining what is practicable until a thorough and scientific investigation has been made of the entire sewer system and until systematic and extended measurements of the flow of sewage in various sections of the system have also been made.

The city is not warranted in expending large sums of money for sewage disposal works not adapted or designed to receive and purify all of the city sewage now and in the future. Therefore, it is apparent that unless the present flow of the city sewers is reduced, the plans now offered fail to meet such demands. Even then, modifications are required, else a considerable portion of the sewage might pass untreated to the river, or the river water flow back through the sewer into the main pump well and put the entire plant out of commission. The minor modifications hereinbefore suggested are matters of comparatively easy adjustment.

But the placing of a large sewage disposal plant within a few hundred feet of Mahoningtown, when there is ample land on the opposite side of the river remote from habitations available for the purpose, is an expedient which viewed from the standpoint of public health and necessity does not seem to be warranted.

The Beaver River is used as a source of filtered water supply at Beaver Falls, New Brighton and adjacent boroughs at a point about one-quarter of a mile below the Shenango River.

The Shenango River above New Castle is the source of a filtered water supply for this city. The water company has an exceptionally efficient filter plant and exercises great care in the operation thereof. But the river receives the sewage of South Sharon, Sharon, Sharpsville and Greenville boroughs, besides many minor places. Numerous industrial plants discharge trade wastes into the stream. It is for the interests of public health that all sewage should cease to be discharged into this source of public supply, and the State Department of Health has already brought about the erection of sewage purification works at Greenville and applications relative to sewage are now pending in the Department respecting sewers at Sharpsville and the two Sharon boroughs. Permission to build sewers in West Middlesex has been given on condition that

sewage purification works be built at the same time. The Department also has a corps of field inspectors at work making sanitary survey of the entire watershed above New Castle. Every nuisance and menace and source of sewage pollution to New Castle's water supply is to be removed. This is in keeping with the general policy of the State to preserve the purity of streams which are and must continue to be the sources of supply to the public living in the towns along the banks. In the near future New Castle, in common with other places, must treat its sewage and to this end preparations should be made.

It is reported that the municipal assessed valuation is seventeen million dollars, which if correct, gives the city a borrowing capacity of one million, one hundred and ninety thousand dollars. It is also reported that the city debt at present is in the neighborhood of one hundred and sixty-five thousand dollars. Hence, on this basis, it appears that New Castle is amply able to assume the expense of the erection of a sewage disposal plant.

The petitioners represent that the justice of compelling or providing for the building of sewage works in the towns along the Shenango and Beaver Rivers in the near future as soon as the various towns can prepare for it, is fully recognized by the citizens of New Castle. This being a fact, the importance of immediate investigation of the sewers and their flow and the adoption of measures to exclude everything but sewage proper should bring results before the close of the current year and at the close of the following year all preparations should be made for the erection of adequate purification works during the succeeding year.

It has been determined that the interests of the public health demand that the city be given until August first, nineteen hundred and eight, in which to extend the main trunk sewer up the Shenango River valley to Grant Street and to connect up the Grant Street sewer outlet with the main trunk sewer.

It is also determined that the plans for the comprehensive system for the city be approved and that permission be granted to make extensions in conformity therewith from time to time as necessity may require.

It has also been determined that the proposed system of sewage purification works be modified and re-submitted for approval under the following conditions and stipulations:

FIRST: That all roof water, storm water and street drainage be absolutely excluded from the sewer system, and that so much of the leakage and infiltration into the sewer system shall be excluded as may be found practicable, after a thorough study of the sewer system shall have been made. The city shall make a report on the progress of such study and remedies as may have been adopted at the close of the current year. If satisfactory progress has not been made, then the local authorities shall put into force such measures and remedies as the Commissioner of Health may further advise or approve.

SECOND: At the close of each season's work, plans and profiles of the sewers laid during the year shall be prepared and filed with the Commissioner of Health, together with such other information in connection therewith as he may require.

THIRD: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

FOURTH: This permit to discharge sewage into the waters of the State shall cease on November first, nineteen hundred and nine and on or before said date modified sewage disposal plans designed on the basis of receiving and purifying all of the sewage output of the city at that time and arranged for the addition of units from time to time in the future to meet the growth of the city shall be prepared and submitted to the Commissioner of Health for approval. If this be done, then the Commissioner of Health may extend the time in which the sewage of said city may continue to be discharged untreated into the waters of the State, but this time will not be longer than is sufficient and necessary for the erection of an approved sewage disposal plant.

FIFTH: Some other location for the disposal works than the site now proposed shall be considered by the city. The various suggestions hereinbefore given in the discussion are offered as an aid to the city authorities in amending the plans.

SIXTH: If at any time the sewer system or any part thereof shall have become a nuisance or menace to public health, then such remedial measures shall be adopted by the city as the Commissioner of Health may advise, suggest or approve.

It is suggested that the top of any levee should be constructed sufficiently high to guard the disposal works during the period of highest flood.

Harrisburg, Pa., February 3rd, 1908.

62—17—1908

NEW KENSINGTON, WESTMORELAND COUNTY.

This application was made by a citizen of the borough of New Kensington, Westmoreland County, and is relative to the discharge of sewage from said borough sewers into the waters of the State.

On October twenty-third, nineteen hundred and seven, a citizen of New Kensington made application for permission to extend the borough sewer system into the territory of the adjoining borough of Arnold and to discharge the sewage therefrom through existing sewers into the Allegheny River within the limits of New Kensington. The applicant, it appears, was compelled to seek approval of his plan because neither New Kensington nor Arnold borough authorities would make a formal request for sewer extension.

North of the city of Pittsburgh the Allegheny River is bounded on the east bank by a rocky, precipitous ridge, which rises almost from the water's edge to a height of several hundred feet, there being so little room at the foot of the slope that the railroad of the Buffalo and Allegheny Valley Division of the Pennsylvania Railroad system, which follows up this valley, is located at many places in excavations of solid rock. Wherever the ridge recedes from the river bank sufficiently there a town has been located. The first settlement is eleven miles above the confluence of the Allegheny and Monongahela Rivers and comprises the boroughs of Verona and Oakmont. The next settlement begins on the east bank of the river six miles above Oakmont and extends for three and a half miles northerly and comprises in order up stream the boroughs of Parnassus, population twenty-two hundred, New Kensington, population sixty-eight hundred, and Arnold, population sixteen hundred or in that neighborhood. There is no line on the ground to mark the division of the municipal boundaries, it being all one community to the observer.

The railroad parallels the river at the foot of the hillsides and distant from the river about fifteen hundred feet. Here is a level plateau of sedimentary formation, elevated fifteen feet above the highest freshet recorded, on which along the river bank are located the industrial plants which support the community and where the stores and offices are located and the older portion of the town. East of the railroad the hill slopes are not so steep as to preclude their occupation by dwellings. And here in New Kensington and Arnold the newer residences have been erected and future development will mostly occur. In Parnassus there is no hillside, it being located mostly on a level peninsula formed at the confluence of the river and the Big Perquito Creek. Quite a wide flat valley extends back from the river up this creek course, where in the future it is probable, as the district grows, that a large town may be located.

Parnassus is the older settlement, dating back to the provincial times. It is largely residential and many of its citizens are employed at Pittsburgh. The streets are permanently paved with brick, there is a public water supply and combined sewer system and the town is in a flourishing financial condition. Its borrowing capacity is reported to be approximately sixty thousand dollars.

New Kensington and Arnold boroughs are distinctively industrial communities supported by the plants in operation within their limits. Arnold was set off from New Kensington borough about ten years ago and it is reported to be almost a certainty that the district will again be incorporated within New Kensington boundaries.

The latter place has a combined sewer system, well paved streets on the flats and a liberal borrowing capacity, its constitutional debt limit not having been approached. The assessed valuation from figures now at hand is three million three hundred and fifty thousand dollars and the bonded indebtedness one hundred and eighteen thousand dollars. The above statement is made on this basis, upon which it appears that the municipal credit should be good for one hundred and sixteen thousand dollars.

The borough of Arnold also appears to be well off financially, if the reports be true, which show an assessed valuation of eight hundred and ten thousand dollars and a bonded indebtedness of eight thousand dollars, equivalent to a borrowing capacity of forty-eight thousand dollars or thereabouts. However, streets are unpaved, there are no public sewers and many nuisances exist in this town. The inhabitants are of the less resourceful class, largely foreigners and non-taxpayers and continually on the move.

The water supply to all three boroughs is obtained from the Allegheny River and is furnished by the Kensington Water Company. This corporation took its name in October, eighteen hundred and ninety-seven, on the purchase at sheriff's sale of the Burrell Water Company, including the Parnassus Water Company, and on a reorganization thereof under statutory provisions. The Burrell Water Company was chartered in eighteen hundred and ninety to supply water to the public in Lower Burrell Township, Westmoreland County, and in eighteen hundred and ninety-three this concern purchased the Parnassus Water Company, which had been previously chartered to supply water to the public in the borough of Parnassus, but never did so. Therefore, the charter territory of the New Kensington Water Company comprises, so it appears, the territory of the above mentioned companies.

The intake consists of two filter cribs, each twenty-four feet long by sixteen feet wide by six feet deep, buried in the bed of the river about two hundred feet out into the stream and having their top covered with about four feet of river gravel. These

are located up stream about one thousand feet above Arnold borough in Lower Burrell Township, immediately above a small village bearing the name of Valley Camp.

The water gravitates from the cribs to a well in the pumping station on the river bank. In this well are located two pumping engines. One of them is a vertical three million gallon engine and the other is a horizontal two million gallon emergency pump, placed at an elevation above flood line. From this well the water is raised through a sixteen inch rising main into the street main system. This sixteen inch pipe is about a half mile long. It terminates at Moore Street in Arnold borough, where it feeds into two twelve inch pipes. One of them is laid in streets near the river and is the main distributing pipe to the flats in Arnold and Kensington boroughs and the other extends easterly up Moore Street to the top of the hill and the storage reservoir, rectangular, concrete-lined, depth eighteen and a half feet and holding ten million gallons. This reservoir is in the township and affords a pressure of about one hundred and twenty pounds on the flats.

Four days a week the pumps are operated continuously, the water is pumped directly into the street main system and only the surplus flows into the reservoir. For the other three days of the week the pumps are shut down and the entire supply of the district is drawn from the water stored in the reservoir. During this period every consumer receives the benefit of subsidence afforded by storage in the reservoir. When the pumps are operated the consumers in Arnold get raw river water through the cribs unsubsided, and so also do the consumers in Kensington and Parnassus. However, there is a noticeable difference in appearance of the water at all times at the latter place, the discoloration being much less. This is attributed to the fact that Parnassus is at the further end of the district and receives the supply at a sufficient time after the raw river water is drawn from the cribs to admit of natural clarification to some degree.

The source is known to be polluted by sewage and the presence of turbid water in the pipes of the water district is ample evidence that sewage organisms may pass the cribs and also be present in the water. Records of typhoid fever cases in the three boroughs are not reliable, but the data herein given is substantial enough to indicate the necessity in the interests of public health in the district of measures being taken to keep sewage infection out of the supply. An officer of the Department made a house to house canvass, and found that in the water district for the years nineteen hundred and five, nineteen hundred and six and nineteen hundred and seven the cases totalled twenty-one, fifty and fifty-six respectively.

It should be borne in mind that a house to house canvass, particularly in Arnold, where the foreigners are a roving class, frequently changing residence, would fail to show all of the cases. Undoubtedly typhoid fever has been much more widespread in the water district than would appear from the above figures. The local physicians fail to report the cases.

On the hillsides in Arnold and New Kensington boroughs there are a few outcropping springs, walled up but not enclosed, possibly liable to surface pollution, in use by the citizens of the neighborhood. And there are some dug wells on the hillsides. All told, there may be thirty such individual sources of drinking water. Six are reported to be in Arnold. On the flats in this place public water is said to be exclusively used except at the industries. On the flats at New Kensington there are, perhaps, fifteen dug wells in use, besides wells at some of the mills. Parnassus borough seems to be entirely supplied with public water, except at the works on the river bank.

The streets at right angles to the river are designated by numbers, First to Sixth Streets, inclusive, being in Parnassus, and Seventh to Thirteenth Streets, inclusive, being in New Kensington, and Fourteenth to Nineteenth Streets being in Arnold borough. Ninth Street extends to the river bank. There is a toll bridge across the river at this point. None of the other streets in New Kensington are built to the river bank; they terminate at First Avenue, which parallels the river and is distant therefrom about two hundred feet and in this space the industrial plants are erected. A twenty-four inch pipe extends from the foot of Seventh Street, across land of the Pittsburgh plant of the American Sheet and Tinplate Company, to the river. A twenty-four inch sewer empties into the river at the foot of Ninth Street. A twenty-four inch sewer at the foot of Tenth Street and a twenty-four inch pipe at the foot of Eleventh Street extend through the land of the Aluminum Company of America to the river. A twenty-four inch sewer from the foot of Twelfth Street passes to the river on the boundary line between land of the said Aluminum Company and land of the Pennsylvania plant of the American Sheet and Tinplate Company.

All of these sewer outlets discharge both sewage and storm water.

The Seventh Street outlet serves a total length of fourteen thousand six hundred feet of sewer, of which ten thousand feet are in streets on the flats.

The Ninth Street sewer is laid in said street to the railroad and is two thousand feet long. It appears to have no lateral street connection.

The Tenth Street outlet serves a total length of thirteen thousand eight hundred feet of sewer, of which fifty-eight hundred feet are on the flats.

The Eleventh Street sewer is laid in Eleventh Street to the railroad and twenty-one hundred feet long; lateral sewers totalling twelve hundred feet are connected with it.

The Twelfth Street sewer serves a district wholly within the flats in which there is a total length of seventy-five hundred feet of sewer.

The sizes of these sewers in the various streets and details thereof or number of connections therewith are not known to the Department, because the local authorities of New Kensington have failed to comply with the law requiring the submission of plans and a satisfactory report to the Commissioner of Health. On two different occasions blank forms of report have been sent to the borough council.

Besides these public sewers there are numerous private sewers from the industries to the river.

At the Pittsburgh plant of the American Sheet and Tinplate Company there are two ten inch and one twelve inch pipes which receive sewage and industrial waste, including considerable acid water. Between five hundred and six hundred men are employed at these works. At the Pennsylvania plant of this company, where about the same number of men are employed, there is one six inch pipe and two twelve inch pipes which receive sewage and considerable quantities of sulphuric acid and hydrochloric acids from the pickling vats. At this place the river water is used entirely in large quantities throughout the works for cooling and general purposes. It is drawn from a crib in the river and pumped to tanks. There is a driven well on the premises from which drinking water is supposed to be obtained in every instance. At the lower plant the public water is used entirely for manufacturing purposes, although a pump on the river bank is kept for emergency purposes. The company has driven a deep well here to supply water of undoubted quality to its workmen.

At the Union Spring and Manufacturing Company, employing about seventy men in the manufacture of springs for railroad cars, there is an eight inch and six inch sewer to the river. There is a deep well supply of drinking water. The river is the source for cooling and hydraulic uses. There is an emergency connection with the public system.

At the Aluminum Company's plant, where are employed about six hundred men in the manufacture of kitchen utensils, et cetera, there are three ten inch sewers having water closet connection and taking waste from hydraulic presses. The metal is received in form of ingots, so there are no chemical wastes. If reports be true there is no opportunity for employees to obtain river water to drink. City water is used altogether and that portion of it supplied for drinking is first filtered and then piped about the works. The water pumped from the river remains exclusively in the pipe system of the fire protection service.

A small run mostly in Arnold, but within New Kensington territory on the flats near Third Avenue, is an open sewer. A number of dwellings in Arnold are located over this stream and they and others along the course discharge sewage therein. The Commercial Box Company, employing about fifty men, and located on Third Avenue over this run in New Kensington, has a sewer connection to the stream. This discharges into the river just above Thirteenth Street. It is a menace to public health for most of its length. Ignorance of the danger of living in proximity to the menace is said to be the reason that the nuisance has not been made the subject of complaint. However, the owner of a small grocery store did petition the Commissioner of Health for relief from the flooding of the cellar on his property caused by the overflow of the run.

The petitioner wishes to lay a ten inch sewer from the end of the existing sewer belonging to the borough of New Kensington, northerly six hundred and sixty-five feet in Ivy Alley to Fourteenth Street. This extension is entirely in Arnold borough. One dwelling has been erected and fitted with plumbing facilities in anticipation of this sewer and it is reported that ten other dwellings may be erected during the current year along this sewer line. The borough of Arnold does not ask for this sewer, neither does the borough of New Kensington. However, the petitioner has represented that he has authority properly conferred upon him to lay this sewer in the public highway and make it a part of the New Kensington sewer system. In the avenue paralleling and just east of Ivy Alley there is a sewer owned by adjoining property owners and discharging into the New Kensington system.

There seems to be no reason why, provided the New Kensington authorities are willing to permit the connection, the proposed sewer should not be approved, provided still further, that the extension be made under the auspices of the municipality. Whatever negotiation the borough council may make with a contractor or abutting land owner about the payment for a sewer is not a question within the jurisdiction of the State Department of Health; neither is it within the jurisdiction of the State to consider the application of an individual for the extension of a public sewer system. It is to be presumed that the municipalities do not want the proposed sewer extension else they would apply for it.

But State sanction to the indefinite discharge of sewage from the New Kensington sewers or from private sources into the Allegheny River, or any tributary thereof, could not be consistently given. It is the policy of the Commonwealth to preserve the purity of the waters of the State for the protection of the public health. The very best apparatus which man can devise for the purification of sewage polluted waters is not absolutely germ proof and in case of accident or breakdown human life is jeopardized and usually sacrificed following the introduction of polluted water into the water pipes of the town. It is the bounden duty of the State Department of Health to stop the discharge of sewage into the Allegheny River above the intake of the Kensington Water Company. This cannot be brought about immediately. The municipalities on the banks of the river below New Kensington must in turn

cease to discharge sewage into the stream. While this cannot be done immediately, steps can be taken without delay in the preparation of plans for the treatment of the borough sewage.

The intercepting sewer to be provided for the collection of the flow from all of the public sewers should also be planned to take the flow from private sewers. While the State Department of Health must order the owners of all private sewers in the borough to discontinue the discharge of sewage into the river, the most efficient and desirable plan would be for the municipality to lay a trunk sewer to serve all sewers. This is the common policy. It seems probable that the site best adapted for the erection of a sewage disposal plant will be found outside of the limits of New Kensington borough and that in reaching this site the territory of an adjoining municipality must be traversed. In fact, the cheapest and best solution of the improved sewerage and sewage disposal problem for the boroughs of Arnold, New Kensington and Parnassus will be a joint project of interception and purification rather than an independent one for each borough. Parnassus now has a system of sanitary sewers emptying into the river whose discharge must cease within a reasonable time. Arnold borough does not have a system of sewers, but is in need of such a system. The study of the treatment of New Kensington sewage involves the study of a modification to some extent of the existing sewers, because it would not be practicable to intercept the storm water discharge of the existing sewers and convey it to a treatment plant.

Since New Kensington and Parnassus are in a financial position to make a beginning towards the ultimate treatment of their sewages, there appears to be no good reason why this should not be ordered and more especially since neither borough availed itself of the exemption clause of the law of nineteen hundred and five, and the emptying of sewage into the Allegheny River at these places jeopardizes public health at Oakmont and Verona, in the Greater Pittsburgh district and other places lower down the valley.

It has been determined that the petitioner be notified, and he has been so notified, that the interests of the public health demand that crude sewage cease to be discharged into the waters of the State in New Kensington borough or vicinity, and that as soon as the borough of New Kensington will in good faith notify the State Department of Health of its intention to prepare plans for the treatment of the municipal sewage and make an application for the sewer which the petitioner wishes to build, a conditional permit may be issued for this particular sewer.

The owners of the industrial plants above mentioned will be notified that they must stop putting sewage into the waters of the State, but that the most economical and efficient way of doing this should be for them to connect with the sewer to be provided by the borough for the conveyance of all sewage in the town to a common purification plant. The State Department of Health will defer action with respect to private sewer outlets into the river for the present pending the determination by the borough of New Kensington of the details of such improved sewerage and sewage disposal problem.

It has been determined that the borough council of the borough of New Kensington be notified, and they are hereby and herein notified, that public health is being jeopardized by the discharge of its sewage into the Allegheny River and by the discharge of sewage from the sewers in the borough of Parnassus and that, therefore, New Kensington borough shall, either alone or jointly with Parnassus, prepare plans for the interception of all of the sewage in the municipal territory and for its conveyance to and treatment in a purification plant and that said plans shall be submitted to the Department of Health for approval on or before the first day of January, nineteen hundred and nine.

The local authorities are hereby requested to make an examination and test of all private well and spring water used for drinking purposes and if such water be found contaminated, then the local authorities should and they are hereby requested to bring about the abandonment of such polluted well or spring. The local Board of Health is requested to warn the public that absolute safety requires that the public drinking water should be boiled.

A similar decree is being issued to the borough of Parnassus and a copy of this decree is to be furnished to the borough of Arnold.

Harrisburg, Pa., June 26th, 1908.

NEW WILMINGTON, LAWRENCE COUNTY.

This application was made by the borough of New Wilmington, Lawrence County, and is for permission to construct a system of sewerage and sewage disposal works.

It appears that on July nineteenth, nineteent hundred and seven, the said borough of New Wilmington submitted modified plans for a system of sewerage and sewage disposal in accordance with advice given by the Commissioner of Health in a communication to the borough council dated November twenty-second, nineteen hundred and six. This communication was as follows:

"G. H. Getty, President and to Members of Council, New Wilmington, Lawrence County, Pa.

Gentlemen:—On August 9th, 1906, the borough council submitted four blue prints of the proposed system of sewerage and sewage disposal and requested approval of the same.

It appears that the town is a residential community of about one thousand inhabitants, located ten miles above New Castle on the Little Neshannock Creek on land moderately hilly and drained by two small natural water courses into the southerly one of which several private sewers and most of the drainage of the town is discharged.

Three-fourths of the people or more use shallow privies scattered throughout the borough and there are perhaps twenty loose cesspools. Possibly three hundred people use water obtained from wells and springs near privies and cesspools. During the past two years a number of typhoid fever cases have been attributed to the use of individual wells in the borough, and public sentiment is strong in favor of the construction of a general sewer system.

It is proposed to build a separate or sanitary sewer system, sizes ranging between six inches and eight inches in diameter.

The site of the proposed sewage disposal works is in the valley of McClure's Run just east of the borough line in Wilmington Township near and west of the Sharpsville Railroad.

The lateral sewers are to be six inches in diameter; the proposed grades will be self-cleansing, with one exception; manholes are to be built at changes in line and grade and at street intersections, and at summit ends flush tanks are to be provided. A number of lampholes are proposed at street intersections because they are less expensive to construct than manholes. At the exception noted, the grade of the sewer is to be two-tenth per centum. This flat grade is proposed to save deeper trenching, which even at this grade is thirteen feet at the maximum. Stoppages are very liable to occur here and every facility should be afforded for speedy removal of any obstruction. Lampholes would not efford such facilities, yet they are proposed on this deep sewer.

An average depth of between six and seven feet is planned for the sewers. Ventilation is to be afforded by means of perforated manhole covers. The system will comprise 21,340 feet of pipe, or about four miles, of which all but about 1,200 feet will be vitrified clay pipe. The lower end of each intercepting sewer main is to be cast iron pipe eight inches in diameter, to be operated as an inverted syphon to deliver the sewage to the proposed disposal works.

It is proposed to purify the sewage by means of a septic tank followed by continuous filtration of the effluent through a natural bed of sand and gravel. The septic tank is to be forty feet long, fifteen feet wide and eight feet deep, interior dimensions. At the inlet end is a chamber formed by a partition wall extending across the end of the tank and from the bottom thereof vertically to near the top of the sides of the tank, into which chamber, at one corner of the tank and two feet six inches above the bottom thereof is an eight inch pipe, through which sewage from the town is to be admitted.

From this grit chamber, which is four feet wide, the sewage is to pass over the top of the wall into the main septic tank.

At the opposite end from the inlet there are a series of openings two feet and a half below the top of the tank, through which sewage is to pass to a chamber three feet wide and six feet long, having a triangular weir outlet placed so that the ordinary level of the sewage in the septic tank will thereby be maintained about six inches below the top of the wall.

Assuming that the sewage of the borough will amount to from 35,000 to 75,000 gallons daily during the early years of the proposed sewer system, the septic tank would provide storage capacity equal to between twenty-four and twelve hours' flow. It is proposed to build this structure of concrete or brick, cover it over by two inch wooden planks spiked down on timber resting on top of the side walls and drain it by means of a six inch pipe into McClure's Run at the railroad. The bottom of the septic tank is to be level and about midway along one side thereof is to be an opening provided with vertical notches into which are to be inserted two inch oak baffle boards serving as a dam and at the same time as the side of a chamber about three feet square on the outside of the septic tank, out of which the six inch drain pipe is to extend to the run. When it becomes necessary to drain the tank the procedure will be to remove the baffle boards, one by one, until the sewage has been drained off above the sediment in the tank, and delivered through the said chamber and the six inch sewer outlet to the run, at a point about two hundred feet down stream. The reason that the sewer does not discharge into the run opposite the tank is that the bottom of the tank is one and a half feet lower than said run.

It is proposed to remove the sludge and dispose of it on the adjoining land whereon it will dry out and eventually be plowed into the ground.

The plan contemplates by-passing the sewage directly to the run whenever the septic tank is put out of commission for cleaning or for any purpose. For a distance of 340 feet back from the septic tank the McClure's Run intercepting sewer main is to be of cast iron pipe operated as a syphon, and similarly for a distance of 860 feet on the Water Street sewer main. The level of the sewers at the point where the syphon pipes are to begin is about equal to the level of the top of the septic tank walls; so that the volume of sewage that will flow in the sewers, the pressure and hence consequent velocity would be totally inadequate to maintain a scouring current. The result would be rapid accumulations in the syphons with probably a complete clogging up of them in time. Adjacent to the septic tanks is a deposit of gravel and sand known to be at least thirty feet square. It is proposed to strip the soil from a piece of ground about thirty feet square, level it off and divide it into three com-

partments, each ten feet wide by thirty feet long, and to discharge the septic effluent on to these beds continuously. The surface of these beds is to be two feet below the elevation of the septic tank weir and about four feet above the bed of McClure's Run. The filter bed is to be underdrained with four inch pipes laid approximately level and discharging into the run near its bottom. A good deal of the time these underdrains may be back-flooded provided the drains are laid four feet below the surface of the filters. The septic effluent is to be delivered on the filters by means of a concrete carrier.

At a twenty-four hour displacement rate in the septic tank, the volume of sewage that would be delivered daily onto the proposed filter area would be seventeen times greater than experience has proven to be safe where sewage is to be purified by the intermittent filtration process, and thirty-seven times greater with a twelve hour displacement in the septic tank. Consequently the sewage would be forced into the ground in greater volume than natural processes could purify it and hence the underdrains would deliver a highly organic liquid to McClure's Run, a liquid which it is true would be separated from a large percentage of heavy suspended matters so long as the filter bed operated as a straining apparatus; but it is doubtful if this straining operation would be assured for any length of time, since the volume of septic effluent to be discharged onto the filtering surface would be disproportionate to its capacity, that the pores would become rapidly clogged up, the ground completely saturated with sewage, and other adequate avenues of escape failing the septic effluent would flow bodily over the surface of the ground to the run at the side of the filter bed.

The execution of the plans of the disposal plant as now designed would assure complete and early failure and result in the establishment of a nuisance at the point which is distant about ten hundred feet from human habitations and territory pre-empted for high class residences.

The reason that sewage should not be discharged untreated into Little Neshannock Creek is evident. The minimum flow of the creek at New Wilmington is approximately two cubic feet per second which flow would be inadequate to dilute the sewage of all the present population of the borough sufficiently to obviate a nuisance in the creek. Further to protect the public at Beaver Falls, New Brighton and Rochester, who use Beaver River water for drinking purposes, the Commissioner of Health has required the city of New Castle to prepare to discontinue the discharge of sewage into a tributary of said river. For a similar reason prohibition must be declared with respect to New Wilmington sewage discharge into the tributary above New Castle.

No accurate estimate, so far as the Department knows, has been made by the borough of the cost of the proposed sewerage improvements. The designer has striven to plan a system at a low cost. It is intended that whatever the sewerage system shall cost over and above $8,000 shall be assessed on the estates abutting the proposed sewers.

The case at New Wilmington is one where too rigid economy would prove to be extravagant. The money which would be expended on the proposed syphon and sewage disposal works would, in the opinion of this Department, be wasted and thus part of the proposed improvements should be abandoned.

More time should be given to a careful consideration of the sewage disposal problem. Test pits should be dug to ascertain if there be a suitable area of natural sand and gravel deposit, secluded, at least an acre in extent, accessible by gravity, yet high enough for proper drainage, upon which the sewage of the borough may be purified by intermittent filtration. The cost of constructing, maintaining and operating this method of sewage treatment is usually comparatively low and warrants the expenditure of money for tests to determine its adaptability in a region where natural deposits of large areas of sand and gravel are known to exist.

The best investment a municipality can make is in careful consideration and preparation of the plan by which the sewage is to be handled. The sewers proposed are, with one or two changes in detail, satisfactory in design, but before an adequate plan for disposal can be devised warranting acceptance by the Commissioner of Health, more careful investigation must be made. If tests should show intermittent filtration to be infeasible, then plans for a septic tank and some form of rapid bacterial filtration of the septic effluent should be prepared for erection at a point farther down McClure's Run at a more secluded place than the site now proposed. It would be a prudent thing for the borough to employ the services of a consulting engineer who has had experience in the matter of sewage purification works, to assist the borough engineer in the tests and preparation of plans. This Department will also act in an advisory capacity to pass upon the question of efficiency and economy."

On July eighteenth, nineteen hundred and eight, the borough's engineer gave full explanation of the details of the design of the proposed sewage disposal works.

The sewer system is to be constructed as originally planned and described in the communication above referred to of November twenty-second to the borough council with the exception that the lower end of the intercepting sewers formerly planned to be operated as inverted syphons, now, under the new plan, will be gravity sewers, the syphon feature being entirely eliminated.

The purification works are to comprise a dosing tank and intermittent filters. They are to be located on the banks of Little Neshannock Creek where McClure's Run empties into said creek on the south side of the run. The location is about twelve hundred feet distant from the location as originally proposed for the plant on the run.

The dosing tank is to be an open concrete structure twenty feet by twenty-five feet in plan and having a depth of two feet to flow line and a capacity of seventy-five hundred gallons. It is to be fitted with a Merritt Air Lock Sequence syphon device. There are to be three syphons each connecting with its corresponding filter unit.

Each filter unit is to be sixty feet wide and two hundred and forty feet long. They are to be laid side by side in natural excavations in the soil. The structure is clay and hardpan. No masonry whatever is to be provided for the sides and bottom. The excavation is to be five feet deep. On the bottom through the centre of each division, the dividing partition being natural earth, there is to be laid an eight inch half tile underdrain having four inch branches on either side laid in parallel rows twenty feet apart and over this underdrain system in each unit is to be placed twelve inches of screened gravel or field stone broken to two inches in diameter or less. Over this is to be placed two feet of granulated furnace slag, to all appearances pure silica sand, and in turn this material is to be topped with one foot of clean, sharp sand.

It is reported that the granulated furnace slag is an ideal filter material. That it is like coarse sand and that each grain is vitrified. Furthermore, that it does not pack or break down under weathering. Its use is proposed because it can be obtained from furnaces in the vicinity at a minimum cost. In brief, the method of its preparation is as follows: the granulation is effected by the running of the molten slag into a large volume of water, which crystallizes the material.

The underdrains are to discharge directly into a main collector which will empty into the Little Neshannock Creek at high water mark as recorded in June, nineteen hundred and seven. Its elevation is two and a half feet below the bottom of the underdrain system of the filter units.

It is proposed to distribute sewage over the surface of the filters through wooden sluiceways of the customary type provided with openings on the sides at suitable intervals and arranged to be adjusted to dosing in portions of the bed the requisite amount.

It is expected that the flow of the sewage will be between thirty thousand and sixty thousand gallons daily for the present and thus it is seen that the dosing tank will be used from four to eight times in twenty-four hours.

No attempt is made in the design to intercept any solid matters. Everything is to be discharged onto the surface of the filters, but there are two pipes provided from the dosing tank to McClure's Run. One is a ten inch pipe same size as the main sewer leading to the dosing tank and the other is a six inch pipe provided to drain the tank to the run. In case it is desirable to repair the dosing tank, the gate will be closed and the sewage turned crude into McClure's Run through the ten inch pipe. Whenever the dosing tank is to be drained the gate on the six inch pipe will be opened and the deposit or liquids discharged directly into McClure's Run. The design is, in this respect, similar to the original one, that is, it is an effort to provide the disposal plant at the very minimum cost. The necessity for this is represented by the borough's expert to be the lack of money to defray the cost of any extensive works. But if the borough could build the sewers in the town under the assessment plan, and temporarily discharge crude sewage into the creek until the assessments for the sewers were received into the borough treasury, these funds, if devoted to the construction of a sewage disposal plant, would be sufficient to enable the municipality to erect either in its entirety or in part, works containing all filters which are necessary to warrant the approval of the design by the State.

The Little Neshannock Creek empties into the Shenango River within the limits of the city of New Castle, but below the said city's water supply. The river above and below this confluence now receives the sewage of New Castle and until said city sewage is discharged into a purification plant and there treated, there would seem to be no dominant objection to the temporary discharge of New Wilmington's sewage into the creek, provided such temporary permission would afford the borough an opportunity to build its sewer system and to perfect the arrangements for the erection of a proper sewage purification plant.

It has been demonstrated time and again that the success in the operation of and maintaining a filter is dictated by the surface management and that an important feature of success is the elimination to a practical degree of the suspended matter in the sewage. Under the plan proposed there will be no such separation, with the result that surface clogging of the filters will be increased and liability to improper or insufficient purification of the sewage also increased. The sedimentation tank should be provided. This tank should be large enough and be designed in such a way that it will contain at least eight hours flow of sewage during any period of flow of sewage from the sewers of New Wilmington and admit of extension and added units being built as the town grows and the necessity thereof shall appear. No pipes for crude sewage or sewage from the tanks should be planned to the creek. These pipes or drains should be directly to the filters. Furthermore, detailed plans of the settling tank and dosing tank in connection therewith should be submitted and approved by the Commissioner of Health before such structures are built. Arrangements should be made to drain the accumulated deposits from this tank onto a specially prepared bed where the solids will dry out and the liquids be filtered. One such plan is to have the underdrains terminate in a pump well and to raise the sewage by hand pump into the sand filters. If choice of the septic process, so-called and claimed to belong to the Cameron Tank Company, is to be made, the borough should understand

that the process has been defined by the United States Circuit Court of Appeals and that the process as so defined is a proprietory one. Should the tank be used in such a way as to infringe this process as so defined, then a royalty would be due and permission should be obtained of the Cameron Septic Tank Company for such use. Plans for septic tank will be approved by the Commissioner of Health if submitted by the petitioners.

At least two filter units, as proposed, should be built and operated. The Department has not made tests of the granulated slag material and is not prepared to give an authoritative statement as to the propriety of its use. However, if the borough wishes to conduct the test and experiment with this material it must be with the understanding that in approving of the use of this material the Department does not assume the responsibility of any failure of its use.

If the borough can show that it is not now in the financial position to build the settling tank and dosing apparatus and two filter units but that it will be in a position to do this after the sewers shall have been built and assessments therefor received, then the Commissioner of Health, on request so to do, may grant a permit for the construction of the settling tank and dosing chamber and for the temporary discharge of sewage from said tank into the waters of the State.

It has been determined that the interests of the public health will be subserved by approving plans for the sewer system and for the erection of purification works at the proposed site, and they are herein and hereby approved and a permit issued therefor under the following conditions and stipulations:

FIRST: That all storm water shall be excluded from the sewer system, and that at the conclusion of each season's work plans of the sewers laid during the year shall be filed in the office of the Commissioner of Health, together with any other information in connection therewith that may be required to the end that the State Department of Health may be informed of the extent of the sewer system and of the use thereof.

SECOND: The borough shall cause to be made at least once monthly, an inspection of all the sewers at the inspection manholes and flushing by hand or otherwise shall be effected at times when necessary to protect the interests of the public health. The report of such inspection shall be made on forms satisfactory to the Commissioner of Health and a copy thereof filed in said Commissioner's office.

THIRD: If at any time in the opinion of the Commissioner of Health, the sewer system or any part thereof shall have become a nuisance or menace then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

FOURTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

FIFTH: The borough shall keep an accurate record of every connection made to the sewer and submit the full information in relation thereto to the Commissioner of Health whenever this shall be required.

SIXTH. On or before the sewer system is put in operation or any part thereof the borough shall construct and have ready for use a sedimentation or septic tank and sewage filters and shall deliver the sewage into such disposal works. Detailed plans of such works shall be submitted and approved by the Commissioner of Health before the plant is erected and it is herein provided that the Commissioner of Health may, under certain conditions, set forth in the preceding discussion, grant a temporary permit to the borough of New Wilmington to discharge sewage into the waters of the State.

Harrisburg, Pa., July 29th, 1908.

NEW WILMINGTON, LAWRENCE COUNTY.

This application was made by the borough of New Wilmington, Lawrence County, relative to sewerage and sewage disposal works, and is for approval of new plans for sewage disposal works and for permission to discharge the sewage out of the borough through the settling tank of said disposal works directly into the waters of Little Neshannock Creek within the limits of the township of Wilmington.

It appears that on July nineteenth, nineteen hundred and seven, the borough of New Wilmington submitted modified plans for a system of sewerage and sewage disposal in accordance with advice given by the Commissioner of Health in a communication to the Borough Council dated November twenty-second, nineteen hundred and six. On July eighteenth, nineteen hundred and eight, the borough's engineer gave full explanation of the details of the design of the proposed disposal works and on July twenty-nine, nineteen hundred and eight, a permit was issued to said borough approving the proposed sewerage and sewage disposal works under certain conditions and stipulations.

The sewer system is to consist of a series of six inch and eight inch laterals carrying sewage only and draining to a point immediately east of the borough line in Wilmington township and located a few feet south of McClure's Run. Over a thousand people live in the borough and it is estimated that the quantity of sewage to be taken care of during the first few years will range between thirty thousand and sixty thousand gallons per day.

The purification works as submitted consisted of a dosing tank and intermittent filters. They were to be located on the banks of Little Neshannock Creek, where McClure's Run empties into the creek on the south side of the run. The location is fourteen hundred feet distant from the eastern borough line. The dosing tank was to have a capacity of seventy-five hundred gallons and was to be equipped with Merritt sequence syphons. Three syphons were proposed, each connecting with its corresponding filter unit.

The three filters were to be constructed in natural excavation consisting of clay and hard pan. Each filter was to be sixty feet wide by two hundred and forty feet long and five feet deep. It was to be filled around the underdrains with twelve inches of screened gravel or field stone. This was to be covered with two feet of granulated furnace slag and topped with one foot of clean sharp sand.

No attempt was made in this design to intercept any solid matters before the sewage reached the filters. Everything was to be discharged onto the surface of the filters and by-passes were provided from the dosing tank to the run. It appears that the design was to afford and provide a disposal plant at a minimum cost.

In discussing these plans and the general conditions affecting public health, the following statements were made in this permit:

"The Little Nesquehoning Creek empties into the Shenango River within the limits of the city of New Castle but below the said city's water supply. The river above and below this confluence now receives the sewage of New Castle and until said city sewage is discharged into purification plant and there treated, there would seem to be no dominant objection to the temporary discharge of New Wilmington sewage into the creek, provided such temporary permission would afford the borough an opportunity to build its sewer system and to perfect the arrangements for the erection of a proper sewage purification plant.

"It has been demonstrated time and again that the success in the operation of and maintaining a filter is dictated by the surface management and that an important feature of success is the elimination to a practical degree of the suspended matter in the sewage. Under the plan proposed, there will be no such separation with the result that surface clogging of the filters will be increased and liability to improper or insufficient purification of the sewage also increased. The sedimentation tank should be provided. This tank should be large enough and be designed in such a way that it will contain at least eight hours' flow of sewage during any period of flow of sewage from the sewers of New Wilmington and admit of extension and added units being built as the town grows and the necessity thereof shall appear. No pipes for crude sewage or sewage from the tanks should be planned to the creek. These pipes or drains should be directly to the filters. Furthermore, detailed plans of the settling tank and dosing tank in connection therewith should be submitted to and approved by the Commissioner of Health before such structures are built. Arrangements should be made to drain the accumulated deposits from this tank onto a specially prepared bed, where the solids will dry out and the liquids be filtered. One such plan is to have the underdrains terminate in a pump well and to raise the sewage by hand pump into the sand filters. If choice of the septic process, so-called and claimed to belong to the Cameron Septic Tank Company is to be made, the borough should understand that the process has been defined by the United States Circuit Court of Appeals and that the process as so defined, is a proprietory one. Should the tank be used in such a way as to infringe this process as so defined, then a royalty would be due and permission should be obtained of the Cameron Septic Tank Company for such use. Plans for septic tank will be approved by the Commissioner of Health if submitted by the petitioners.

"At least two filters units as proposed, should be built and operated. The Department has not made tests of the granulated slag material and is not prepared to give an authoritative statement as to the propriety of its use. However, if the borough wishes to conduct the tests and experiment with this material it must be with the understanding that in approving of the use of this material the Department does not assume the responsibility of any failure of its use.

If the borough can show that it is not now in the financial position to build the settling tank and dosing apparatus and two filter units but that it will be in a position to do this after the sewers shall have been built and assessments therefor received, then the Commissioner of Health, on request so to do, may grant a permit for the construction of the settling tank and dosing chamber and for the temporary discharge of sewage from said tank into the waters of the State."

In approving the plans for the sewerage system and for the erection of purification works, it was stipulated among the conditions, that,

"On or before the sewer system is put in operation or any part thereof the borough shall construct and have ready for use a sedimentation or septic tank and shall deliver the sewage into such disposal works. Detailed plans of such works shall be submitted to and approved by the Commissioner of Health before the plant is erected and it is herein provided that the Commissioner of Health may, under certain conditions, set forth in the preceding discussion, grant a temporary permit to the borough of New Wilmington to discharge sewage into the waters of the State."

The disposal works for which the borough of New Wilmington requested approval on November thirteenth, nineteen hundred and eight, consist of two septic tanks each nine and five-tenths feet by thirty feet interior dimensions in plan and ten and eight-tenths feet effective depth, with a capacity of twenty-three thousand gallons; one dosing tank ten feet by twenty feet in plan by three and a half feet deep with a capacity of five thousand two hundred and fifty gallons and two sprinkling filters each thirty-five feet by thirty-five feet in plan and five feet deep, with an effective area of twenty-eight thousandths acres. This plant is to be located east of the borough line between the Sharpsville Railroad and Little Neshannock Creek in the vicinity of the location proposed for the former plant. An eight inch outfall sewer will extend from a point immediately east of the borough line where the two eight inch main sewers from the borough intersect to the septic tanks which will be located four hundred feet east of the Sharpsville Railroad, a total distance of eight hundred and fifty feet from the borough line.

The sewage will enter the septic tanks at an elevation of nine hundred and fifty-four and nine-tenths feet and will flow through them to the dosing chamber attached to the outlet end; thence it will be discharged onto the filters located four hundred feet east of the septic tanks near the bank of Little Neshannock Creek. The top of the filter material is at elevation nine hundred and fifty-one and five-tenths and the bottom drains of the filter and the outlet to the creek are at elevation nine hundred and forty-six and five-tenths, so that there is a total vertical head in the plant of eight and four-tenths feet. Low water in Little Neshannock Creek is at elevation nine hundred and forty-one and high water is estimated to be at nine hundred and forty-eight, so that during high water it will be necessary to pump the sewage. For this purpose a small pumping station is provided east of the filters in which a centrifugal pump will be installed.

The septic tanks are to be constructed of reinforced concrete with buttressed walls twelve inches thick and with a reinforced concrete roof. The two tanks will be constructed together with the dosing tank as one structure. The tanks, as before stated, will be nine and five-tenths feet wide by thirty feet long, interior dimensions with an effective depth of ten and eight-tenths feet and total height from the bottom of the filter to the top of the roof of twelve feet; surrounded with an earth embankment extending from the top of the wall with a width of three feet and with a slope of one and a half to one. The sewage will enter each tank at one end through an eight inch pipe valve with a gate-valve immediately outside of the tank and connecting with the eight inch outfall sewer. On the interior of the tank this inflow pipe will turn down and extend to a depth of two and a half feet below the flow line. The sewage will flow through the length of the tank and on the opposite end from the inlet will be taken through two openings in the concrete wall at the flow line. These openings consist of square holes constructed in the concrete work at a distance of three feet four inches from the side walls and provided with a weir twelve inches wide. The sewage will discharge over these weirs directly into the adjacent dosing tank. On the interior of the septic tank there is a concrete baffle provided at the outlet end and at a distance of one foot therefrom. This baffle will extend to a depth of three feet below the flow line across the entire width of the tank.

The bottom of the tank will be covered with a concrete floor laid perfectly flat and no provision is made for draining the tank and for cleaning. Entrance to each tank will be obtained through three manholes located in the roof which will be perforated to afford ventilation.

The dosing compartment extends across the outlet ends of the septic tanks and is twenty feet long by ten feet wide by three and five-tenths feet effective depth. It is also constructed of reinforced concrete and covered with a reinforced concrete roof. The flow line in the dosing tank is at the same elevation as the flow line in the septic tank and three and four-tenths feet above the surface of the filters. The sewage will be discharged from this dosing tank through a Miller syphon and thence through a twelve inch supply line to the sprinkling filters; a valved by-pass line extends from this dosing tank to the twelve inch filter supply main, so that if necessary, the dosing tank can be operated by gravity.

The sprinkling filters will be constructed with concrete walls one foot wide at the top, two feet wide at the bottom and five feet high. As previously stated there will be two units, separated by a concrete wall, each unit being thirty-five feet by thirty-five feet in plan and five feet effective depth. The bottom of the filter will have a concrete floor reinforced and three inches thick.

The twelve inch sewer pipe supplying the filters from the dosing tank will extend to a point immediately outside of the two units and opposite to the partition wall. At this point it will connect with a supply line extending the entire length of each filter and valved so that one or both filters can be used. This supply line is tapped at intervals of eight feet with a six feet feed line to the filter consisting of six inch sewer pipe laid in concrete. These feed lines will extend below the floor of the filter unit and at intervals of eight feet will be tapped with two inch vertical risers, extending to the surface of the filters and surmounted with a nozzle of the Columbus type. No provision is made for cleaning this supply system of piping or for controlling any portion of the filter other than the gate valves on the main lines leading to the two filters.

For underdraining the filters, six inch terra cotta split tile drains will be laid upon the floor of the filter at intervals of eight feet immediately between the supply

lines. These tile drains will lead to a gutter, extending along the opposite side of the two filters from the inlet side and this gutter will connect with an eight inch pipe to Little Neshannock Creek. At its connection point there is a valved connection for by-passing the sewage during times of high water through a six inch by-pass line to the centrifugal pump which will be described later. There is only a drop of seventeen hundredths feet from the supper to the lower side in the bottom of this filter, so that the bottom is practically flat. No provision is made for cleaning the underdrainage system. As the bottom of the filters are below high water an earth embankment has been planned to extend around these filters. This will be constructed to the elevation of nine hundred and forty-nine, which is one foot above high water mark.

At one end of the sprinkling filter group will be located the centrifugal pump which is to be used for pumping the effluent from these filters during periods of high water. This pump will be located in a concrete pump pit nine and five-tenths feet in diameter and nine feet deep. The walls of this pit will be one foot thick and the pump will be covered with a concrete house with a conical concrete roof. The size of the pump or the power to be used in driving it are not stated. The pump will be located in the bottom of the pit and will take the sewage directly from the filter drain. No sump is provided.

In submitting plans for septic tanks, the borough officials are complying with condition six of the permit issued to them for constructing a sewerage system, which provides that detailed plans of the septic tanks shall be submitted before the sewer system is put in operation and that said tanks shall be erected before any sewage is discharged through the system.

The sprinkling filter is submitted for approval to replace the sand filters provided for in the original plans. As these sand filters were to be composed mainly of granulated slag and were more or less experimental in their nature, the borough officials have determined to replace them with a type of filter which has been more generally used.

The plans as submitted are, however, prepared in the same spirit with which the former plans were prepared, that is, to provide a disposal plant at a minimum cost. To accomplish this purpose many important features have been omitted and the plant is impracticable to operate successfully.

The septic tanks as planned make no provision for cleaning or draining. The bottom is flat and no sump or gutters are provided for draining the sludge to a low point. In the permit issued to the borough of New Wilmington especial attention was called to draining the accumulated deposits from the settling or septic tank to a specially prepared bed where the solids could dry out and the liquids could be filtered. The counter forts for the partition wall between the two septic tanks extend at the bottom of the tank half way across the width of each tank and would seriously impede the uniform flow of sewage in these tanks.

The sprinkling filters are designed with a flat bottom and with no provision for cleaning the underdrains. With this arrangement it is more probable that sooner or later there would be a clogging of the underdrains of these filters. No provision is made for flushing the underdrains so that it would be necessary to remove the filter material to clean out the underdrainage system. It is proposed to use in these filters rounded gravel from the nearby creek as filter material in sizes ranging from three inches to one-half inch and with a total depth of five feet. To obtain good results from a sprinkling filter angular, hard material, such as broken trap rock or hard furnace slag, is usually used and the minimum depth of filter is, as a rule, placed at six feet, so that the filter material proposed for these filters would probably have to be replaced in the near future.

A pump is provided for pumping the sewage from this plant during periods of high water level in the creek, as during these periods water would otherwise back-flood the sprinkling filters. An intermittent pumping plant of this type usually does not give good results and it is probable if this arrangement was approved that during high water periods water would back-flood the filters for at least a portion of the time, as it is difficult to get any inexperienced man to properly operate the pumping station during intermittent periods.

It would not be possible to construct a sewage disposal plant with settling tanks and sprinkling filters which could be located with the drain from the filters above high water mark and with a sufficient depth to the filter to give good results. To accomplish this the settling tanks could be located west of the railroad at the junction of the two main sewers from the borough, with its flow line at an elevation of nine hundred and sixty. The sprinkling filters could be located in the vicinity of the present location and as high water mark is placed at nine hundred and forty-eight, this would allow a total vertical depth to the filter plant of twelve feet. Re-settling basins should be used with the sprinkling filters to allow material carried in the effluent from these filters to settle out before it reaches the creek.

In submitting plans for a disposal plant, the particular attention of the borough officials is again called to the fact that it is poor economy to construct a cheap plant which will prove inefficient and require great expense in maintenance and operation. It was stated in the previous permit that "if the borough can show that it is not now in a financial position to build a settling tank and dosing apparatus and two filter units, but that it will be in a position to do this after the sewers shall have been built and assessments therefor received, then the

Commissioner of Health, on request so to do, may grant a permit for the construction of the settling tank and dosing chamber and for the temporary discharge of sewage from said tank into the waters of the State."

In accordance with this, the borough council has made the statement that it will assess the abutting property for the larger portion of the expense of constructing the sewer system and that the council expect to use the proceeds of this assessment towards the construction of the disposal plant. This assessment will likely be available within one year after the completion of the sewers and it is estimated that it will amount to six thousand dollars.

It has been determined that the interests of the public health require that approval of plans for the sewage disposal works be denied and approval is hereby and herein withheld and the borough advised to present modified plans for sewage disposal works along the lines suggested in the detailed report and in the previous permit.

These revised plans should be submitted to the State Department of Health for approval, and the borough's attention is called to the necessity of making a written statement requiring the availability of funds for constructing a sewage disposal plant in the near future in accordance with clause in the original permit relative to the postponement of the construction of the filter.

Harrisburg, Pa., December 23rd, 1908.

NORTH EAST, ERIE COUNTY.

This application was made by the Borough of North East, Erie County, Pennsylvania, and is to install a sewerage system.

North East borough is a small agricultural community located in the extreme northwestern corner of the State of Pennsylvania, Erie County. It lies in that portion of the State which extends in the form of a triangle between the western boundary of New York and Lake Erie. The borough has a population of twenty-five hundred and an area of five hundred and fifty acres. It is in the center of the township of North East and one mile distant from the shore of Lake Erie.

The land along the shore of the lake for a distance of two miles or more from the beach is quite level; from the edge of this flat land hills rise to a height of two hundred feet and more and in these hills there are many small streams which feed tributaries that flow through the low land to the lake. One of these streams flows through the western portion of the borough of North East. This is known as Sixteen Mile Creek and has its source in the hills southeast of the borough where numerous tributaries feed the creek from a watershed of approximately sixteen square miles. One of these tributaries, known as Baker Creek, flows through the hills down to the low land and directly through the center of the borough, entering it at the eastern boundary line and joining Sixteen Mile Creek twelve hundred feet from the western boundary. This creek, where it flows through the built-up sections of the borough, is walled up with rubble masonry and in some places is carried through a tunnel. This creek serves to drain the storm water drains that have been constructed in some of the paved sections of the borough.

The main line of the Lake Shore and Michigan Southern Railway passes through the southern portion of the borough directly connecting the borough with the cities of Erie and Buffalo. Erie is only seventeen miles west from North East and can also be reached by trolley.

The borough is essentially a business centre for a large and prosperous fruit growing community. The low land along the Lake from Erie almost to Buffalo is devoted almost entirely to vineyards and orchards. The grape industry is most prominent and the crops are uniformly successful so that the community is very prosperous and the farm land is very valuable. Many of these vineyard owners are residents of the borough of North East. The only industry in the town is a small manufacturing establishment engaged in canning.

The growth of North East Borough has been slow and steady. In eighteen hundred and ninety it was fifteen hundred and thirty-eight and in nineteen hundred it was two thousand and sixty-eight. It is therefore estimated on the basis of the present population of twenty-five hundred that the population in nineteen hundred and eighteen, will not be over thirty-five hundred.

North East is supplied with water through a water works system owned by the borough. The supply is taken from a system of springs located in the hills about a mile east of the borough and is piped from these springs by gravity to a four million gallon open reservoir located on top of one of the hills immediately southeast of the borough and at an elevation of two hundred and thirty-eight feet above the borough. During the dry seasons this supply has been found to be inadequate and an auxiliary supply has been obtained from a large storage reservoir on a branch of Sixteen Mile Creek one mile east of the existing reservoir and two hundred and fifty feet above it. This supply has been approved by the Department of Health under condition that a filtration plant be installed for the purification of this auxiliary supply. This auxiliary supply will only be used during the dry season as the supply from the springs is sufficient for all ordinary purposes.

From the reservoir there is an eight inch distributing main leading to the town and this main connects with a system of laterals ranging in size from six inches to two inches and thoroughly covering the developed portion of the borough.

The water consumption is estimated to be fifty gallons per capita although no accurate measurements have been made.

There is no public sewer system in the borough of North East and as the borough is situated on a thick stratum of gravel and sand, cesspool waste readily leeches away. Probably fifty per cent. of the people of the borough of North East dispose of their house sewage by allowing it to flow into cesspools and the rest have privies.

There are two private sewers in the borough. One of these extends from the buildings of St. Mary's Seminary, a small Catholic College located in the extreme northern portion of the borough. The sewage from this seminary is partly purified through a septic tank and is then discharged through a series of ponds to Sixteen Mile Creek. This sewage has been the cause of a decided nuisance in this section of the borough and the college authorities have intended to supplement the septic tank treatment but have been withholding until they could consider whether arrangements could be made with the borough authorities for the disposing of this sewage through the borough system. There are two hundred students at this college and the flow of sewage is estimated at twenty thousand gallons per day.

The canning factory discharges its waste directly into Sixteen Mile Creek through a private sewer. So far this has given no trouble.

The borough has constructed a sanitary sewer along Lake Street from the creek immediately south of Main Street southerly to Clinton Street, a distance of fourteen hundred and fifty feet; thence along Clinton Street westerly for two hundred and eight feet to Pearl; thence along Pearl Street southerly a distance of two hundred and sixty-seven feet. This sewer is twelve inches in diameter and has been laid on a minimum grade of four-tenths of one per cent. No house connections have been made to it and it has not been used but has been constructed in accordance with the policy of the borough to lay sewers in advance of street paving. It has been designed so that it can be connected up and used as a part of the final system of sewers which it is proposed to install.

North East borough has submitted a set of plans and profiles for a complete system of sanitary sewers which will drain the borough eventually to a point northwest of the borough limits where the sewage can be carried through an outfall sewer by gravity to a disposal plant. The borough officials have submitted this entire system for aproval with the express intention of constructing portions of it from time to time but of not discharging any sewage through any portion of the system until a disposal plant approved by the Department of Health has been installed for the proper purification of the sewage before it is discharged into Sixteen Mile Creek.

The plans as submitted provide for two separate drainage sections for the borough which will connect to an outfall sewer at the northwestern boundary of the borough and this sewer will carry the sewage by gravity to a point on Sixteen Mile Creek one thousand feet from the borough boundary. At this point there is a precipitous drop from the top of the bank to the flow line in the creek of twenty feet or more producing an excellent site for the installation of a disposal plant where it could be operated by gravity.

One of these drainage systems comprises all of the territory north of Baker Creek with the exception of a small section of the eastern edge of the borough. This district comprises about one-sixth of the borough territory and it is proposed to sewer it through a twelve inch main sewer extending along Gibson Street to the western boundary of the borough and fed by a system of laterals ranging in size from twelve inches to eight inches. The seminary previously mentioned is located in this district and could be easily drained into this system.

The other drainage section comprises the main portion of the borough located south of Baker Creek and also a small section of the borough immediately north of Baker Creek and on the eastern boundary line. It is proposed to drain this sewer district through a twenty inch outfall sewer extending from a point north of Baker Creek near the main sewer from a smaller district, easterly to Main Street and thence along Main Street to Baker Creek and thence along Baker Creek to Lake Street. This twenty inch outfall sewer will be fed by a system of laterals ranging in size from twenty inches to eight inches and thoroughly covering the main section of the borough. The extreme southern portion of the borough where Sixteen Mile Creek crosses is too low to drain into either of these systems. If this section is developed in the future it would be necessary to drain it through a sewer extending along Sixteen Mile Creek and probably it would be necessary to lift this sewage to the inlet opening at the disposal plant.

The sewers as planned will be laid with a minimum grade of four-tenths of one per cent. and in most cases the grade is much steeper than this. Manholes are to be provided at changes of line and grade and the sewers are to be flushed through these manholes by attaching a hose to the fire hydrants.

The borough wishes to immediately construct a portion of the main sewer in the drainage district south of Baker Creek and some of the laterals in this district as they intend to pave the streets in this section immediately. The twenty inch main sewer is to be constructed along Main Street from Mill Street to Robinson, a distance of ten hundred and seventy-two feet; thence along Baker Creek from Robinson Street to Lake, a distance of one thousand feet; at this point it

will connect up with Lake Street sewer which has already been laid. The authorities also wish to construct a twelve inch sewer along Main Street from Blaine Street to Vine Street a distance of ten hundred and thirty-five feet; thence along Vine Street to Mechanics Alley a distance of four hundred and thirty-eight feet. Thence along Mechanics Alley to Lake Street, a distance of four hundred and seven feet; connecting at this point with the twenty inch main sewer of this district. Furthermore, it is proposed to construct an eight inch sewer along Main Street from the western boundary line of the borough easterly to Mill Street a distance of ten hundred and seventy-eight feet; connecting at this point with the twenty inch main sewer. The borough officials have also asked for approval of the twelve inch sewer which was constructed along Lake Street from Baker Creek southerly to Clinton Street and which is to form a portion of the ultimate sewer system.

These sewers are laid on ample grades and manholes are to be provided at changes of line and grade with the exception of two manholes on the twenty inch main sewer extending along Baker Creek. This sewer is shown coming into the manholes on an angle and it appears from the plans that a modification could be easily made. No house connections are to be made with any of these sewers and the sewers are not to be used until plans for a disposal plant have been submitted to and approved by the Department of Health and the plant has been installed.

The sewerage system as planned will take care of all of the developed portion of the borough and will allow of its disposal by gravity. The system proposed is laid out carefully and ample provision is made on the plans for inspection by manholes. The sizes of some of the larger sewers, however, are not warranted by the quantity of sewage which will be taken care of by this system. The water consumption is estimated at fifty gallons per capita and with an ultimate population in the borough of five thousand people which is double the present population, the quantity of water used would be two hundred and fifty thousand gallons which would represent the flow of sewage provided there was no infiltration from ground water. If the sewers are carefully laid infiltration should be reduced to a minimum as the soil is porous and should drain readily. A ten-inch or four-tenths of one per cent. grade would carry the entire flow of sewage from this borough when flowing half full so that the construction of the twenty inch main sewer is extravagant and will not be as efficient as a smaller sewer where the velocity reached is higher.

The borough officials do not state whether arrangements have been made with the seminary officials for the draining of this sewage into the borough system. This should be provided for in order to eliminate the nuisance which exists at present from the sewage being discharged partly purified into Sixteen Mile Creek. It would be more economical for the seminary authorities to assist the borough officials in the construction of this system than to construct a separate disposal plant for the purification of their sewage.

The borough officials have not requested permission to discharge the sewage from their system into Sixteen Mile Creek unpurified, but have assumed that the Department of Health would require the purification of this sewage and have made provision to prepare for an installation of the disposal plant before the sewerage system is used. Sixteen Mile Creek has a drainage area of sixteen square miles so that it would be impossible to discharge the sewage from the entire borough into this creek during dry weather without creating a nuisance. Sixteen Mile Creek flows through the borough for a distance of over a mile to Lake Erie where it discharges. To pipe the sewage from North East borough to the Lake and provide for discharging it directly into the Lake would probably cost more than the installation of the disposal plant and there would also be the added danger of possible contamination of the water supply of the city of Erie which is taken from Erie Harbor on the Lake and distant seventeen miles.

So that it is seen that the borough officials have acted wisely in selecting a site for the final construction of a sewage disposal plant and providing for this ultimate disposal.

The municipal assessed valuation of the borough is nine hundred thousand dollars or thereabouts and the bonded indebtedness is between forty thousand and fifty thousand dollars. If these reports be substantially correct then there is between fifteen thousand and twenty thousand dollars municipal borrowing capacity, which is too little to defray the cost of a sewage disposal plant. However, the water works bring in an income annually of ten thousand dollars and it is the intention of the local authorities to pay for the sewer system and disposal works by the revenue from the water plant. In this manner it is expected that within two years, plans will be submitted for sewage disposal works.

It has been determined that the interests of the public health will be subserved by approving the proposed sewerage system and the same is hereby and herein approved and a permit granted therefor, under the following conditions and stipulations:

FIRST: That the sewers shall not be used until the sewage disposal works shall have been built in compliance with plans prepared for the borough and submitted to and approved by the State Department of Health.

SECOND: The local authorities are advised to pay especial heed to the suggestions relative to modifying the sizes of the proposed sewers. The main sewer

along Main Street to Baker Creek should be reduced in size to twelve inches and the alignment of this sewer should be arranged so as to allow manholes to be located at changes in line and grade.

THIRD: That on or before January first, nineteen hundred and eleven, the borough shall prepare and submit to the Commissioner of Health for approval, plans for the sewage disposal works.

The attention of the borough council is called to the importance of great care being exercised in the construction of the sewers, the laying of them to proper lines and grades and the making of the joints absolutely tight. Inattention to this detail may require a greater cost for additional capacity of the disposal works than the first cost of the sewer system. Competent engineering supervision may appear to be expensive but in reality and more especially where a sewage disposal plant is to be erected at the end of the sewer system, it is the wisest investment the borough can make.

Harrisburg, Pa., November 18th, 1908.

OLYPHANT, LACKAWANNA COUNTY.

This application was made by the borough of Olyphant, Lackawanna County, and is for permission to extend its sewer system and to discharge the sewage therefrom, untreated, into the Lackawanna River within the limits of said borough.

It appears that Olyphant borough is in the central part of Lackawanna County and wholly within the drainage basin of the Lackawanna River. The incorporated territory is about four and one-half miles long back from the river and one and one-half miles wide. It is bounded on the northwest by the river which separates Olyphant from Blakely borough and Dickson City borough, on the northeast by Winton borough, on the southeast by Jefferson and Roaring Brook townships and on the southwest by Throop borough, which separates Olyphant from Dunmore borough and the city of Scranton.

The territory so incorporated is very rugged and sparsely settled except along the river where most of the dwellings and the business section of the town is located. From the main village the land rises to the Moosic Mountains, reaching an elevation in the extreme southeastern portion of twelve hundred feet or more above the river. Along the river and in the village there are extensive tracts of low land which are frequently flooded at high water.

The area draining directly into the river contains less than a square mile, but includes that portion of the borough where improvements are under way and where most of the seven thousand population of the borough reside.

In the summit district in the southeastern part there is a mining village called Marshwood. It drains into Little Roaring Brook, a stream rising in Jefferson township, flowing southwesterly through Olyphant, Throop and Dunmore boroughs, draining a very rugged and sparsely populated territory of about five square miles and emptying into Roaring Brook immediately below Reservoir Number Seven, from which water is drawn to supply the city of Scranton. The Dunmore Water Company has a reservoir on Little Roaring Brook, from which water is supplied to the borough of Dunmore and the city of Scranton. This concern is a constituent company of the Scranton Gas and Water Company. Recently extensive improvements in the sanitary conditions at the village of Marshwood have been made at the instigation of the State Department of Health.

The central rural portion of the borough is drained by Eddy Creek, which rises in Winton borough and flows across Olyphant into Throop and thence back into Olyphant borough, emptying into the Lackawanna River in the village near the Throop borough line. The area of this watershed is between five and six square miles, and upon it there are a number of coal operations. About one-eighth of a mile above the river in the village is Olyphant Mine Number Two of the Delaware and Hudson Company, from which over five million gallons per day of strong acid water is pumped into the creek. The dry weather flow of this stream may not be over three hundred thousand gallons per day. Two miles above the river is the Birdseye Mine of the same company, from which about three-quarters of a million gallons of mine drainage are emptied into the creek daily. At present it appears that no borough sewage is discharged into this creek, but on a small branch about three-quarters of a mile from the river are two ice houses, said to be owned by John J. Sherman, of Olyphant. The ice is harvested from a pond containing about five acres and receiving the drainage of seven-tenths square miles of watershed in which are located between fifty and seventy-five houses occupied by miners. The ice pond receives surface water overflow from privies and kitchen drainage from the above dwellings. The ice is sold in Olyphant.

The north central part of Olyphant borough, a rural district, is drained by Sterry Creek which rises in Winton borough, takes a circuitous course into Olyphant borough and thence out and northerly, entering the river in Winton near the Olyphant line. This stream has a drainage area of about four and two-tenths miles, receives the drainage from several coal mines and also from the village of Grassy in Olyphant at the river.

The Delaware and Hudson Railroad passes from Dickson City borough across the river into Olyphant borough and thence proceeds up the valley along the hillside. The land in Olyphant between this railroad and the river is quite flat, hav-

ing a gentle slope towards the stream. The land the other side of the railroad in the village has much steeper slopes. The sanitary conditions of the portion of the town west of the railroad are good. The streets are well paved and sewered. East of the railroad the street gutters receive some kitchen drainage and privies are in use in nearly all occupied estates.

The existing sewers are on the combined plan. The system was first installed in eighteen hundred and ninety-eight and additions have been made since, even as late as nineteen hundred and six. The district in which these sewers are built lies wholly between the Delaware and Hudson Railroad and the river and contains approximately one hundred acres. There are reported to be one and seven-tenths miles of sewers in the streets exclusive of a private sewer system.

The existing public sewers drain about fifty-six acres and are reported to have one hundred and ninety connections, serving about eight hundred people. There are about two thousand people resident in the fifty-six acre tract.

The first sewer outlet into the river is a thirty inch pipe at the foot of Lloyds Court at the up-stream side of the Delaware and Hudson Railroad bridge over the river. It has a drainage area of about forty-one acres west of the railroad and an indefinite amount on the hillside east of the railroad. The discharging capacity of the main sewer is about twenty-seven cubic feet per second, which is equivalent to sixty-six hundredths inches of rainfall per hour per acre. Since rainfalls of greater intensity are of frequent occurrence, provided there be ample street openings for the surface water to reach the sewers, there must be occasional back-flooding of the sewers.

The thirty inch outlet is above the normal river level. There are no dwellings nearby. From the railroad bridge up stream for a distance of about eighteen hundred feet to the highway bridge at Lackawanna Street, the borough has spent considerable money in improving the channel of the river by narrowing and dredging with the object in view of increasing the velocity of flow and preventing deposits and obstructions along the river. It appears that the Lackawanna River watershed is largely comprised of steep, mountainous slopes down which heavy rainfalls rush in torrents to the valley, filling the river to above its banks and flooding low lands. At such times the first story of dwellings on the flats in Olyphant borough are reached by the freshet and much damage to property has occurred. During ordinary times, fine pieces of waste coal from culm banks and washeries reach the river and deposit on its bottom in great quantities. These accumulations reduce the carrying capacity between the banks and materially add to the floods. The channel improvements above referred to were intended to help obviate accumulations in that part of Olyphant borough, but these improvements have not been carried far enough to be of much permanent benefit, so it would appear. The river, especially above the Lackawanna Street bridge, and also below Olyphant borough, is constantly shifting its channel and the portion which has been dredged is again filling up rapidly with gravel and coal dirt.

In Grassy village, near the river and the old Grassy Island breaker, now abandoned, there is a washery by means of which the old waste culm piles of the vicinity are being worked over.

Owing to the germicidal effect of sulphur mine drainage on sewage organism and the disinfecting and precipitating effect of these acids and coal dust, no nuisance exists in the river any distance away from the said thiry inch sewer outlet.

There is a slaughter house a few hundred feet up-stream on the banks of the river at the end of Hull Avenue, from which wastes are permitted to go to the river, which is reported to cause a nuisance in the summer time.

The only other public sewer outlet in the borough is into the river just above the Lackawanna Street bridge. This pipe is eighteen inches in diameter, serves an area of about twenty-two acres west of the railroad and more east of it, has a carrying capacity of six cubic feet per second, and is unable to remove all of the rainfall which descends on its watershed when the downpours approximate one-half inch per hour.

In eighteen hundred and ninety-four the Olyphant Sewage Drainage Company was duly chartered to construct and maintain sewers in the borough of Olyphant, and the same year the borough granted a franchise to said company and the company caused surveys to be made, but no other work was done. On failure of the corporation to pay for the surveys, judgment was obtained and the rights and franchises of the Olyphant Sewage Drainage Company were sold at sheriff's sale in eighteen hundred and ninety-five. The same year parties interested in the franchise of the defunct company met and organized a new corporation under the name of the Olyphant Sewage and Drainage Company and secured the rights and franchises of the former company, filing the requisite papers in the office of the Secretary of the Commonwealth on December twenty-fourth, nineteen hundred and five. The new organization did not do any work until eighteen hundred and ninety-eight, when the capital stock was increased to one hundred thousand dollars and a mortgage was placed on the property for fifty thousand dollars. Elaborate surveys were made and contracts executed for sewer constructions. In April, eighteen hundred and ninety-nine, when the company was about to begin excavating on the streets of the borough, the Burgess, aided by the police officers, prevented the company's employes from continuing the work. The courts did not support the municipality and the drainage company proceeded with the sewer

construction. The pipe, whose diameters range from thirty inches to eight inches, were laid in all of the streets west of the railroad, provided with wye branches, flush tanks and manholes and with an outlet into the river at the foot of Lloyds Alley. It originally extended out into the river. It is now covered over with gravel and culm.

The property and franchise were again sold at sheriff's sale in December, nineteen hundred and one, and in that month there was a new corporation organized. Extensions of time in which to complete the sewer system have been obtained, the last one, for five years, being filed in the Secretary of State's office, March nineteenth, nineteen hundred and six. At the present time the largest creditor of the company, who holds a mortgage for several thousand dollars on the plant, states that the company has abandoned the property, that he does not know with certainty who its officers are, that the system is in an uncompleted state, that if any parties have made house connections with the sewers it has been surreptitiously done, and that he does not know what to do with the property in the event of the foreclosure of the mortgage, since the sewers have been paralleled to a considerable extent by the borough sewer.

The petitioners want permission to complete sewer extensions in the two sewer districts west of the railroad now served by the public sewer outlet at the railroad bridge and the highway bridge. They also wish to sewer a district of twenty-two acres between the railroad and the river in the upper part of the main village, and to establish a new sewer outlet therefrom into the river at the foot of Ferris Street. This outlet is to be twenty-four inches in diameter, to be about six hundred feet long on a slope of three inches in one hundred feet, having a discharging capacity equivalent to the removal from the drainage area of a rainfall of one-half inch per hour. Connected with this outlet there is to be about a half mile of twelve inch pipe and a similar length of ten inch pipe, designed to take both sewage and storm water. The outlet will be at low water mark of the river. At high water the sewer will be submerged four feet. At the bank of the river there is to be an overflow manhole, the sewer from here out into the the stream to be of cast iron.

Opposite, in the borough of Blakely, there is a large culm pile and a few hundred feet above it is the washery hereinbefore mentioned, both of which will contribute to the clogging up of any sewer outlet built at low water or laid on the channel of the river.

It is reported that the Delaware and Hudson Railroad Company intend to build a combined sewer along the tracks from the passenger station to the railroad bridge, the size to be thirty-six inches in diameter and designed to receive all of the surface water east of the railroad and the sewage from that section of the town at such time as the borough sewers may be built in the district. Plans for such sewers have not been submitted, nor is the district included in the application now under consideration. The pipe for this sewer is now on the ground, but at the time of the Department's inspection no work had been done because of some disagreement with the borough authorities, so it is said.

The borough territory is undermined by mine workings and in the village where the improvements are contemplated the people obtain their water supply from a foreign source furnished by the Olyphant Water Company, which also furnishes water to Winton borough after having purchased it of the Winton Water Company. It is not, therefore, in connection with the preservation of the purity of any domestic well supply that the sewers are proposed; but it is on the general score of desirability of adequate sewerage that the necessity for sewer extensions is urged.

The citizens appear to be strongly in favor of municipal ownership of public improvements, else public sewers in the streets already sewered by a private company would not be undertaken. The private sewer system was designed to exclude storm water and is planned to convey all the flow to one point, while the borough sewers, though substantially of the same size as the private sewers, are planned to take both sewage and storm water. This they cannot do always, as has been explained. Besides the public sewers discharge at three widely separated points.

The time may come when it will be absolutely necessary to avoid a nuisance then caused at the borough's sewer outlets by the sewage its self or by obstructions in the channel. One remedy would be adequate prevention of stream obstruction, but until a general channel improvement plan be inaugurated and carried out for miles up and down the river valley, it would seem to be futile for any one municipality, and especially Olyphant borough, to undertake costly improvements in the river bed through its own territory. Experience has proven that the deepened channel as soon as dug out begins to fill up again. Floods follow and damages ensue.

The Lackawanna River would, on account of the sewage turned into it from about every municipality on its banks, be an open sewer, were it not for the combined germicidal, disinfecting and precipitating effect of the acids and minerals in the waters. The deposits on the river bed upon bacteriological examination prove to be rich in organic matter of sewage origin. These foul matters are scoured out and transported down stream to the water works intakes of the cities and towns on the banks of the Susquehanna River—into which the Lackawanna River empties—and some of the impurities pass through said intakes and the

water works pipes to the dwellings of public water consumers who are thus unsuspectingly treated to a poisonous water. Recently one of the towns supplying its citizens with filtered Susquehanna River water was obliged, during an accident to the purifying plant, to pump crude water into the pipe system without a moment's notice, in order to keep the industries in operation. Warnings to the citizens to boil the water were sent out speedily, but there was a space of time during which the most careful individual was subject to a great peril. It is the policy of the State to reduce these perils to a minimum by preserving the purity of the waters of the Commonwealth. So, while under ordinary conditions the sewage of Olyphant borough and other places, now discharged into the Lackawanna River, may not do any harm, under other conditions it may be a serious menace. Then, too, there is a limit beyond which sewage cannot be emptied into any stream without producing a local offence. It is prudent for the local authorities to take these matters into consideration in planning a sewer system. It cannot be reasonably expected that the State should approve sewer plans which were not adopted in contemplation of and belonging to a comprehensive plan.

It is understood that the assessed valuation of the borough is about three million dollars, and that its bonded indebtedness is thirty-four thousand dollars. If these figures be true, the borrowing capacity of the municipality is in excess of two hundred and fifty thousand dollars. The town is amply able to extend its sewers and to defray the cost of properly disposing of the sewage. However, it would not be fair to compel Olyphant to take earlier action than would be required of the borough of Taylor, whose sewers discharge into the river, or the other boroughs and towns.

When the time shall have arrived for the erection of sewage disposal works probably Olyphant borough would obtain greater efficiency and economy by joining with adjacent boroughs and possibly with the city of Scranton, in a joint project of sewage interception and disposal than by acting independently; but in either event the cost would be prohibitive if storm water were not separated from the sewage as far as practicable. The existing borough sewers are insufficient in capacity for adequate storm drainage and at times of back-flooding are, therefore, unsuitable as sewers. Pipes for the removal of house drainage ought always to be operative. If these sewers are to serve permanently as storm drains, then some other arrangement should be made for the collection of house drainage. If the sewers of the private company are in a good condition, and they could be acquired by the borough at a reasonable cost, it might be advantageous for the local authorities to acquire the plant, and plan for its use either for the removal of sewage only or of storm water only.

It is probable that a municipal co-operative plan comprising those towns along the river where flood damages are now sustained, for channel improvement and flood prevention, should also include to the advantage of all concerned the collateral question of sewage interception. The benefits of co-operation are now being exemplified in the projected highway up the valley of the river through the country. Already the Board of Trade of the city of Scranton is considering the question of straightening, deepening and walling the channel. It ought not to be difficult for Olyphant borough to ascertain the expediency of entertaining and promoting the co-operative sewerage project. The interests of the public health, however, demand that all sewer extensions in the borough shall contemplate the ultimate disposal of the sewage in some other way than at present in use. The laying of a large combined sewer by the railroad and the connection to it of future borough sewers, as hereinbefore described, cannot be approved. Neither can the State give permanent approval to the proposed sewer outlet at the foot of Ferris Street. Temporary permission may be given provided the borough at once prepare a comprehensive sewerage plan for all of the main village on both sides of the railroad and along Eddy Creek, which plan shall contemplate the ultimate separation of sewage from storm water and the possible treatment of the former and submit the same for approval. The cost of such a study and plan would be a normal amount. The benefits would be large. The borough would then be in a position to lay down a sewer anywhere in the district with the positive assurance that no alterations would ever be required, and that when all streets were sewered a perfected plan would result.

It has been determined that the interests of the public health will be subserved by approving the proposed sewer extensions, and the same are hereby and herein approved under the following conditions and stipulations:

FIRST: That all street drainage shall be excluded from the proposed sewers until it shall have been determined what plan shall be approved for the ultimate separation of the sewage from the storm water, and until plans therefor shall have been prepared by the borough and submitted to and approved by the proper State authorities.

SECOND: Inspection manholes shall be placed on the sewers at all street intersections and at changes of line and grade. A careful record shall be kept of all connections with the sewer system. At the close of each season's work, a plan of the sewers built during the year, together with any other information in connection therewith which may be required, shall be filed in the office of the State Department of Health, to the end that the Commissioner of Health may be always informed of the extent of the sewer system and the public use thereof.

THIRD: This permit to discharge sewage into the waters of the State shall cease on the first day of January, nineteen hundred and ten, provided the other conditions in the permit shall have been complied with. If on said January first, nineteen hundred and ten, all of the conditions of this permit shall have been complied with, then the Commissioner of Health may extend the time in which the borough's sewage may be discharged into the waters of the State, having in mind always the general policy of the State with respect to the discharge of sewage from the various municipalities in the Lackawanna River valley above Old Forge borough.

FOURTH: In view of the fact that the joint problem of sewerage and sewage disposal, either alone, or associated with the stream improvement as hereinbefore outlined, is a comprehensive one, and if brought about must necessarily require considerable time, therefore, it is specially stipulated that the borough of Olyphant shall, on or before January first, nineteen hundred and ten, either alone or in conjunction with one or more other municipalities in the Lackawanna valley, consider and perfect some other plan for the disposal of the sewage than into the Lackawanna River, and submit the same to the Commissioner of Health for approval. The special attention of the borough authorities is called to the various suggestions hereinbefore named and to the fact that the Department will be glad to advise and assist the borough in its study of said problem.

FIFTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these waters to be destroyed on the premises.

SIXTH: If at any time in the opinion of the Commissioner of Health, the sewer system or any part thereof, or the method of disposal, has become prejudicial to public health or a public menace, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

The Commissioner of Health will notify the Board of Health of the borough of Olyphant that the water entering the pond from which Mr. John J. Sherman cuts ice, which is subsequently sold to the residents of Olyphant and vicinity, is subject to pollution from overflowing privy vaults, kitchen drainage and surface water from yards, in the eastern portion of the village, and that the consumers should be publicly notified to this effect and warned of the possible danger. Furthermore, the local Board of Health will be requested to remove or abate all such sources of pollution. A similar notification will be served on Mr. Sherman and the borough council notified of the fact.

The Commissioner of Health will notify Mr. J. S. Mendell, of Olyphant, to abate the nuisance at his slaughter house caused by the depositing of refuse on the river banks.

Harrisburg, Pa., April 23rd, 1908.

PARNASSUS, WESTMORELAND COUNTY.

This decree was issued to the borough of Parnassus, Westmoreland County, Pennsylvania, relative to the discharge of sewage from said borough sewers into the waters of the State.

North of the city of Pittsburgh the Allegheny River is bounded on the east bank by a rocky, precipitous ridge which rises almost from the water's edge to a height of several hundred feet, there being so little room at the foot of the slope that the railroad of the Buffalo and Allegheny Valley Division of the Pennsylvania Railroad system, which follows up this valley, is located at many places in excavations of solid rock. Wherever the ridge recedes from the river bank sufficiently, there a town has been located. The first settlement is eleven miles above the confluence of the Allegheny and Monongahela Rivers and comprises the boroughs of Verona and Oakmont. The next settlement begins on the east bank of the river six miles above Oakmont and extends for three and a half miles northerly and comprises in order up stream the boroughs of Parnassus, population twenty-two hundred; New Kensington, population sixty-eight hundred, and Arnold, population sixteen hundred, or in that neighborhood. There is no line on the ground to mark the division of the municipal boundaries, it being all one community to the observer.

The railroad parallels the river at the foot of the hillsides and distant from the river about fifteen hundred feet. Here is a level plateau of sedimentary formation, elevated fifteen hundred feet above the highest freshet recorded, on which along the river bank are located the industrial plants which support the community and where the stores and offices are located and the older portion of the town. East of the railroad the hill slopes are not so steep as to preclude their occupation by dwellings. And here in New Kensington and Arnold the newer residences have been erected and future development will mostly occur. In Parnassus there is no hillside, it being located on a level peninsula formed at the confluence of the river and the Big Perquito Creek. Quite a wide flat valley extends back from the river up this creek course, where in the future it is probable, as the district grows, that a large town may be located.

Parnassus is the older settlement, dating back to the provincial times. It is largely residential and many of its citizens are employed at Pittsburgh. The

streets are permanently paved with brick, there is a public water supply and combined sewer system and the town is in a flourishing financial condition. Its borrowing capacity is reported to be approximately sixty thousand dollars.

New Kensington and Arnold boroughs are distinctively industrial communities supported by the plants in operation within their limits. Arnold was set off from New Kensington borough about ten years ago and it is reported to be almost a certainty that the district will again be incorporated within New Kensington boundaries.

The latter place has a combined sewer system, well paved streets on the flats and a liberal borrowing capacity, its constitutional debt limit not having been approached. The assessed valuation from figures now at hand is three million three hundred and fifty thousand dollars and the bonded indebtedness one hundred and eighteen thousand dollars. The above statement is made on this basis, upon which it appears that the municipal credit should be good for one hundred and sixteen thousand dollars.

The borough of Arnold also appears to be well off financially, if the reports be true, which show an assessed valuation of eight hundred and ten thousand dollars, and a bonded indebtedness of eight thousand dollars equivalent to a borrowing capacity of forty-eight thousand dollars or thereabouts. However, streets are unpaved, there are no public sewers and many nuisances exist in this town. The inhabitants are of the less resourceful class, largely foreigners and non-taxpayers and continually on the move.

The water supply to all three boroughs is obtained from the Allegheny River and is furnished by the Kensington Water Company. This corporation took its name in October, eighteen hundred and ninety-seven, on the purchase at sheriff's sale of the Burrell Water Company, including the Parnassus Water Company, and on a reorganization thereof under statutory provisions. The Burrell Water Company was chartered in eighteen hundred and ninety, to supply water to the public in Lower Burrell Township, Westmoreland County, and in eighteen hundred and ninety-three this concern purchased the Parnassus Water Company, which had been previously chartered to supply water to the public in the borough of Parnassus but never did so. Therefore, the charter territory of the Kensington Water Company comprises, so it appears, the territory of the above mentioned companies.

The intake consists of two filter cribs, each twenty-four feet by sixteen feet wide by six feet deep, buried in the bed of the river about two hundred feet out into the stream and having their top covered with about four feet of river gravel. These are located up stream about one thousand feet above Arnold borough in Lower Burrell Township, immediately above a small village bearing the name of Valley Camp.

The water gravitates from the cribs to a well in the pumping station on the river bank. In this well are located two pumping engines. One of them is a vertical three million gallon engine and the other is a horizontal two million gallon emergency pump, placed at an elevation above flood line. From this well the water is raised through a sixteen inch rising main into the street main system. This sixteen inch pipe is about half a mile long. It terminates at Moore Street in Arnold borough, where it feeds into two twelve inch pipes. One of them is laid in streets near the river and is the main distributing pipe to the flats in Arnold and Kensington boroughs, and the other extends easterly up Moore Street to the top of the hill and the storage reservoir, rectangular, concrete lined, depth eighteen and a half feet and holding one million gallons. This reservoir is in the township and affords a pressure of about one hundred and twenty pounds on the flats.

Four days a week the pumps are operated continuously, the water is pumped directly into the street main system and only the surplus flows into the reservoir. For the other three days of the week the pumps are shut down and the entire supply of the district is drawn from the water stored in the reservoir. During this period every consumer receives the benefit of subsidence afforded by storage in the reservoir. When the pumps are operated the consumers in Arnold get raw river water through the cribs unsubsided, and so also do the consumers in Kensington and Parnassus. However, there is a noticeable difference in appearance of the water at all times at the latter place, the discoloration being much less. This is attributed to the fact that Parnassus is at the further end of the district and receives the supply at a sufficient time after the raw river water is drawn from the cribs to admit of natural clarification to some degree.

The source is known to be polluted by sewage and the presence of turbid water in the pipes of the water district is ample evidence that sewage organisms may pass the cribs and also be present in the water. Records of typhoid fever cases in the three boroughs are not reliable, but the data herein given is substantial enough to indicate the necessity in the interests of public health in the district of measures being taken to keep sewage infection out of the supply. An officer of the Department made a house to house canvass, and found that in the water district for the years nineteen hundred and five, nineteen hundred and six and nineteen hundred and seven the cases totalled twenty-one, fifty and fifty-six, respectively.

It should be borne in mind that a house to house canvass, particularly in Arnold, where the foreigners are a roving class, frequently changing residence,

would fail to show all of the cases. Undoubtedly typhoid fever has been much more widespread in the water district than would appear from the above figures. The local physicians fail to report the cases.

On the hillsides in Arnold and New Kensington boroughs there are a few outcropping springs, walled up but not enclosed, possibly liable to surface pollution, in use by the citizens of the neighborhood. And there are some dug wells on the hillsides. All told, there may be thirty such individual sources of drinking water. Six are reported to be in Arnold. On the flats in this place public water is said to be exclusively used except at the industries. On the flats at New Kensington there are perhaps fifteen dug wells in use, besides wells at some of the mills. Parnassus borough seems to be entirely supplied with public water, except at the works on the river bank.

The streets at right angles to the river are designated by numbers; First to Sixth Streets, inclusive, being in Parnassus, and Seventh to Thirteenth Streets, inclusive, being in New Kensington, and Fourteenth to Nineteen Streets being in Arnold borough. Ninth Street extends to the river bank. There is a toll bridge across the river at this point. None of the other streets in New Kensington are built to the river bank, they terminate at First Avenue, which parallels the river and is distant therefrom about two hundred feet and in this space the industrial plants are erected. A twenty-four inch pipe extends from the foot of Seventh Street, across land of the Pittsburgh plant of the American Sheet and Tinplate Company, to the river. A twenty-four inch sewer empties into the river at the foot of Ninth Street. A twenty-four inch sewer at the foot of Tenth Street, and a twenty-four inch pipe at the foot of Eleventh Street, extend through the land of the Aluminum Company of America to the River. A twenty-four inch sewer from the foot of Twelfth Street passes to the river on the boundary line between land of the said Aluminum Company and land of the Pennsylvania plant of the American Sheet and Tinplate Company.

All of these sewer outlets discharge both sewage and storm water. Besides the public sewers there are numerous private sewers from the industries to the river. The sizes of the public sewers in the various streets and details thereof or number of connections therewith are not known to the Department.

State sanction to the indefinite discharge of sewage from the New Kensington sewers and from the Parnassus sewers and from private sources into the Allegheny River, or any tributary thereof, cannot be consistently given. It is the policy of the Commonwealth to preserve the purity of the waters of the State for the protection of the public health. The very best apparatus which man can devise for the purification of sewage polluted waters is not absolutely germ proof and in case of accident or break-down human life is jeopardized and usually sacrificed following the introduction of polluted waters into the water pipes of the town. It is the bounden duty of the State Department of Health to stop the discharge of sewage into the Allegheny River above the intake of the Kensington Water Company. This cannot be brought about immediately. The municipalities on the banks of the river below New Kensington now take their drinking waters from the river and must continue to do so and hence the borough of New Kensington must in turn cease to discharge sewage into the stream. While this cannot be done immediately, steps can be taken without delay in the preparation of plans for the treatment of the borough sewage.

The intercepting sewer to be provided for the collection of the flow from all of the public sewers should also be planned to take the flow from private sewers. While the State Department of Health must order the owners of all private sewers in the borough to discontinue the discharge of sewage into the river, the most efficient and desirable plan would be for the municipality to lay a trunk sewer to serve all sewers. This is a common policy. It seems probable that the site best adapted for the erection of a sewage disposal plant will be found outside of the limits of New Kensington borough and that in reaching this site the territory of an adjoining municipality must be traversed. In fact, the cheapest and best solution of the improved sewerage and sewage disposal problem for the boroughs of Arnold, New Kensington and Parnassus will be a joint project of interception and purification rather than an independent one for each borough. Parnassus now has a system of sanitary sewers emptying into the river whose discharge must cease within a reasonable time. Arnold borough does not have a system of sewers, but it is in need of such a system. The study of the treatment of New Kensington sewage involves the study of modification to some extent of the existing sewers, because it would not be practicable to intercept the storm water discharge of the existing sewers and convey it to a treatment plant.

Since New Kensington and Parnassus are in a financial position to make a beginning towards the ultimate treatment of their sewages, there appears to be no good reason why this should not be ordered and more especially since neither borough availed itself of the exemption clause of the law of nineteen hundred and five, and the emptying of sewage into the Allegheny River at these places jeopardizes public health at Oakmont and Verona, in the Greater Pittsburgh district and other places lower down the valley.

It has been determined that the interests of the public health demand that crude sewage shall cease to be discharged into the waters of the State in Parnassus borough and New Kensington borough and vicinity.

The Commissioner of Health will notify the owners of the industrial plants in the boroughs and they must cease putting sewage into the waters of the State, but that the most economical and efficient way of doing this should be for them to connect with the sewer to be provided by the borough for the conveyance of all sewage in the town to a common purification plant. The State Department of Health will defer action with respect to private sewer outlets into the river for the present pending the determination by the borough of Parnassus and the borough of New Kensington of the details of such improved sewerage and sewage disposal problem.

It has been determined that the borough council of the borough of Parnassus be notified and they are hereby and herein notified that public health is being jeopardized by the discharge of its sewage into the Allegheny River and by the discharge of sewage from the sewers in the borough of New Kensington and that, therefore, Parnassus borough shall either alone or jointly with New Kensington borough prepare plans for the interception of all of the sewage in the municipal territory and for its conveyance to and treatment in a purification plant and that such plans shall be submitted to the Commissioner of Health for approval on or before the first day of January, nineteen hundred and nine.

The local authorities are hereby requested to make an examination and test of all private well and spring water used for drinking purposes and if such water be found contaminated, then the local authorities should and they are hereby requested to bring about the abandonment of such polluted well or spring. The local Board of Health is requested to warn the public that absolute safety requires that the public drinking water should be boiled.

A similar decree is being issued to the borough of New Kensington.

Harrisburg, Pa., June 26th, 1908.

CITY OF PHILADELPHIA.

This approval of plans is given for the extensions of sewers in the Frankford Creek Drainage District, in the Main Delaware River Drainage District, in the Schuylkill River Drainage District, and in the Cobbs Creek Drainage District of the City of Philadelphia, County of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State in compliance with application duly made and bearing dates of March thirty-first, one thousand nine hundred and eight, April twenty-fourth, one thousand nine hundred and eight, and June fourth, one thousand nine hundred and eight, the applications of March thirty-first, one thousand nine hundred and eight, having been received in the Department of Health one June sixteenth, one thousand nine hundred and eight, under the conditions and stipulations set forth in one communication dated June fifteenth, one thousand nine hundred and eight, and eight communications dated June seventeenth, one thousand nine hundred and eight, addressed to Hon. John E. Reyburn, Mayor of Philadelphia, entitled "APPROVAL OF SEWER EXTENSIONS IN FRANKFORD CREEK DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT," AND "APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT," copies of which are as follows:

APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT.

June 17th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 23rd, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek Drainage District of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek drainage district, designated in the list and the plan accompanying it, dated March 31st, 1908. Said list comprises a total extension of seven thousand and ninety-four feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

June 17th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Main

Delaware River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Main Delaware River drainage district, designated in the list and the plan accompanying it, dated March 31st, 1908. Said list comprises a total extension of twenty-five thousand five hundred and thirty-one feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

June 17th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Schuylkill River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list and the plan accompanying it, dated March 31st, 1908. Said list comprises a total extension of eighteen thousand nine hundred and eighty-two feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT.

June 17th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Cobbs Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Cobbs Creek drainage district, designated in the list and the plan accompanying it, dated March 31st, 1908. Said list comprises a total extension of seven thousand six hundred and seventeen feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT.

June 17th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 23rd, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek drainage district, designated in the list and the plan accompanying it, dated April 24th, 1908. Said list comprises a total extension of four hundred and thirty-six feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

June 17th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit, dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Main Dela-

ware River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Main Delaware River drainage district, designated in the list and the plan accompanying it, dated April 24th, 1908. Said list comprises a total extension of five hundred and twenty-five feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

June 17th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit, dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to a sewer extension in the Schuylkill River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list and the plan accompanying it, dated April 24th, 1908. Said list comprises a total extension of one thousand six hundred and forty-one feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWERAGE EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT.

June 17th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit, dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Cobbs Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Cobbs Creek drainage district, designated in the list and the plan accompanying it, dated April 24th, 1908. Said list comprises total extension of two hundred and eighty-one feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

June 17th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit, dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Schuylkill River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list and the plan accompanying it, dated June 4th, 1908. Said list comprises a total extension of five thousand three hundred and twenty-seven feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

This permit shall be recorded in the office of the Recorder of Deeds for Philadelphia County.

Harrisburg, Pa., June 18th, 1908.

CITY OF PHILADELPHIA.

This approval of plans is given for extensions of sewers in the Frankford Creek drainage district, in the Main Delaware River drainage district, in the Schuylkill River drainage district and in the Cobbs Creek drainage district of the City of Philadelphia, County of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State in compliance with an application duly

made and bearing date of July seventeenth, one thousand nine hundred and eight, under the conditions and stipulations set forth in four communications, dated July twenty-second, one thousand nine hundred and eight, addressed to Hon. John E. Reyburn, Mayor of Philadelphia, and entitled, "APPROVAL OF SEWER EXTENSIONS IN FRANKFORD CREEK DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT," APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT" AND "APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT," copies of which are as follows:

APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT.

July 22d, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 23, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek drainage district designated in the list and the plan accompanying it dated July 17th, 1908, said list to comprise a total extension of eighteen thousand five hundred and fifty-two feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

July 22d, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Main Delaware River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Main Delaware River drainage district, designated in the list and the plan accompanying it dated July 17th, 1908. Said list comprises a total extension of thirteen thousand five hundred and twenty-five feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

July 22d, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Schuylkill River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list and the plan accompanying it dated July 17th, 1908. Said list comprises a total extension of fifteen thousand five hundred and fifty-eight feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT.

July 22d, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Cobbs

Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Cobbs Creek drainage district, designated in the list and the plan accompanying it dated July 17th, 1908. Said list comprises a total extension of two hundred and ninety feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

This permit shall be recorded in the office of the Recorder of Deeds for Philadelphia County.

Harrisburg, Pa., July 23rd, 1908.

CITY OF PHILADELPHIA.

This approval of plans is for the extensions of sewers in the Frankford Creek drainage district, in the Main Delaware River drainage district, in the Schuylkill River drainage district and in the Cobbs Creek drainage district of the City of Philadelphia, County of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State in compliance with an application duly made and bearing date of July twenty-first, one thousand nine hundred and eight, under the conditions and stipulations set forth in four communications dated July twenty-seventh, one thousand nine hundred and eight, addressed to Hon. John E. Reyburn, Mayor of Philadelphia, and entitled, "APPROVAL OF SEWER EXTENSIONS IN FRANKFORD CREEK DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT," AND "APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT," copies of which are as follows:

APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT.

July 27th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 23rd, 1907, issued by the Commissioner of Health upon unanimous agreement with the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek drainage district designated in the list and the plan accompanying it dated July 21st, 1908. Said list to comprise a total extension of one thousand three hundred and eighty-five feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

July 27th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Main Delaware River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Main Delaware River drainage district, designated in the list and the plan accompanying it dated July 21st, 1908. Said list comprises a total extension of thirteen thousand nine hundred and fifty-eight feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

July 27th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Schuylkill

River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list, and the plan accompanying it dated July 21st, 1908. Said list comprises a total extension of two thousand eight hundred and fifty-five feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT.

July 27th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Cobbs Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Cobbs Creek drainage district, designated in the list, and the plan accompanying it dated July 21st, 1908. Said list comprises a total extension of nine thousand three hundred and fifty-seven feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

This permit shall be recorded in the office of the Recorder of Deeds for Philadelphia County.

Harrisburg, Pa., July 27th, 1908.

CITY OF PHILADELPHIA.

This approval of plans is for extensions of sewers in the Main Delaware River drainage district, in the Frankford Creek drainage district, in the Schuylkill River drainage district, in the Cobbs Creek drainage district, and in the Pennypack Creek drainage district of the City of Philadelphia, County of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State in compliance with an application duly made and bearing date of August fifth, one thousand nine hundred and eight, under the conditions and stipulations set forth in five communications, dated August seventh, one thousand nine hundred and eight, addressed to Hon. John E. Reyburn, Mayor of Philadelphia, and entitled, "APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE PENNYPACK CREEK DRAINAGE DISTRICT," copies of which are as follows:

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

August 7th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Main Delaware River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Main Delaware River drainage district, designated in the list, and the plan accompanying it dated August 5th, 1908. Said list comprises a total extension of five thousand five hundred and forty-three feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT.

August 7th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 23, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek drainage district, designated in the list, and the plan accompanying it dated August 5th, 1908. Said list to comprise a total extension of three thousand and twenty feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

August 7th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Schuylkill River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list and plan accompanying it dated August 5th, 1908. Said list comprises a total extension of nine thousand nine hundred and forty-five feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT.

August 7th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Cobbs Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Cobbs Creek drainage district, designated in the list, and the plan accompanying it dated August 5th, 1908. Said list comprises a total extension of two thousand and seven feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE PENNYPACK CREEK DRAINAGE DISTRICT.

August 7th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 23, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Pennypack Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Pennypack Creek drainage district, designated in the list, and the plan accompanying it dated August 5th, 1908. Said list comprises a total extension of seven hundred and seventy-five feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

This permit shall be recorded in the office of the Recorder of Deeds for Philadelphia County.

Harrisburg, Pa., August 10th, 1908.

CITY OF PHILADELPHIA.

This approval of plans is given for the extensions of sewers in the Frankford Creek drainage district, in the Main Delaware River drainage district, in the Schuylkill River drainage district and in the Cobbs Creek drainage district, in the City of Philadelphia, County of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State, in compliance with an application duly made and bearing date of September ninth, one thousand nine hundred and eight, under the conditions and stipulations set forth in the four communications dated September fourteenth, one thousand nine hundred and eight, addressed to Honorable John E. Reyburn, Mayor of Philadelphia, and entitled "APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT," AND "APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT," copies of which are as follows:

APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT.

September 14th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 23rd, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek drainage district, designated in the list, and the plan accompanying it dated September 9th, 1908. Said list to comprise a total extension of five hundred and three feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

September 14th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Main Delaware River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Main Delaware River drainage district, designated in the list(and the plan accompanying it dated September 9th, 1908. Said list comprises a total extension of eight hundred and five feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

September 14th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Schuylkill River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list and the plan accompanying it dated September 9th, 1908. Said list comprises a total extension of two thousand eight hundred and sixty-four feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT.

September 14th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Cobbs Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Cobbs Creek drainage district, designated in the list and the plan accompanying it dated September 9th, 1908. Said list comprises a total extension of five hundred and eight feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

This permit before being operative must be recorded in the office of the Recorder of Deeds for the County of Philadelphia.

Harrisburg, Pa., September 14th, 1908.

CITY OF PHILADELPHIA.

This approval of plans is given for the extension of sewers in the Frankford Creek drainage district, in the Main Delaware River drainage district, in the Schuylkill River drainage district, in the Cobbs Creek drainage district,, and in the Pennypack Creek drainage district, of the City of Philadelphia, County of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State in compliance with an application duly made and bearing date of October nineteenth, one thousand nine hundred and eight, date of October nineteenth, one thousand nine hundred and eight, under the conditions and stipulations set forth in five communications, dated October twenty-third, one thousand nine hundred and eight, addressed to Hon. John E. Reyburn, Mayor of Philadelphia, and entitled, "APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT" AND "APPROVAL OF SEWER EXTENSIONS IN THE PENNYPACK CREEK DRAINAGE DISRICT," copies of which are as follows:

APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT.

October 23rd, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

1 In compliance with the terms of a permit dated April 23d, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek drainage district, designated in the list. and the plan accompanying it dated October 19th, 1908. Said list to comprise a total extension of five thousand nine hundred and eighty-three feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

October 23rd, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Main Delaware River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Main Delaware River drainage district, designated in the list, and the plan accompanying it dated October 19th, 1908. Said list comprises a total extension of four thousand nine hundred and forty-four feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

October 23rd, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Schuylkill River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list, and the plan accompanying it, dated October 19th, 1908. Said list comprises a total extension of two thousand eight hundred and sixty-one feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT.

October 23rd, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Cobbs Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Cobbs Creek drainage district, designated in the list, and the plan accompanying it dated October 19th, 1908. Said list comprises a total extension of fifteen hundred and thirty-two feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE PENNYPACK CREEK DRAINAGE DISTRICT.

October 23rd, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—
In compliance with the terms of a permit dated April 23d, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Pennypack Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Pennypack Creek drainage district, designated in the list, and the plan accompanying it dated October 19, 1908. Said list comprises a total extension of eleven hundred and fifty feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

This permit shall be recorded in the office of the Recorder of Deeds for Philadelphia County.

Harrisburg, Pa., October 27th, 1908.

CITY OF PHILADELPHIA.

This approval of plans is given for the extension of sewers in the Frankford Creek drainage district, in the Main Delaware River drainage district, in the Schuylkill River drainage district and in the Cobbs Creek drainage district, of the City of Philadelphia, County of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State in compliance with an application duly made and bearing date of November twelfth, one thousand nine hundred and eight, under the conditions and stipulations set forth in the four communications dated November sixteenth, one thousand nine hundred and eight, addressed to the Honorable John E. Reyburn, Mayor of Philadelphia, and entitled "APPROVAL OF SEWER EXTENSIONS IN FRANKFORD CREEK DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELA-

WARE RIVER DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT," AND "APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT," copies of which are as follows:

APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT.

November 16th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 23, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek drainage district, designated in the list, and the plan accompanying it dated November 12th, 1908. Said list to comprise a total extension of three thousand two hundred and ninety-eight feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

November 16th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Main Delaware River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Main Delaware River drainage district, designated in the list, and the plan accompanying it dated November 12th, 1908. Said list comprises a total extension of four thousand and forty-six feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

November 16th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Schuylkill River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list and the plan accompanying it dated November 12th, 1908. Said list comprises a total extension of three thousand three hundred and ninety-nine feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT.

November 16th, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Cobbs Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Cobbs Creek drainage district, designated

in the list and the plan accompanying it dated November 12th, 1908. Said list comprises a total extension of two thousand nine hundred and forty-five feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

This permit shall be recorded in the office of the Recorder of Deeds for Philadelphia County.

Harrisburg, Pa., November 18th, 1908.

CITY OF PHILADELPHIA.

This approval of plans is given for the extension of sewers in the Frankford Creek drainage district, in the Main Delaware River drainage district, in the Schuylkill River drainage district and in the Cobbs Creek drainage district of the City of Philadelphia, County of Philadelphia, Pennsylvania, and for the discharge of sewage therefrom into the waters of the State in compliance with applications duly made therefor and bearing date of December eighteenth, one thousand nine hundred and eight, under the conditions and stipulations set forth in the four communications dated December twenty-third, one thousand nine hundred and eight, addressed to Hon. John E. Reyburn, Mayor of Philadelphia, and entitled, "APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT." "APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT," "APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT," AND "APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT," copies of which are as follows:

APPROVAL OF SEWER EXTENSIONS IN THE FRANKFORD CREEK DRAINAGE DISTRICT.

December 23rd, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 23d, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Frankford Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Frankford Creek drainage district, designated in the list and the plan accompanying it, dated December 18th, 1908. Said list to comprise a total extension of five thousand three hundred and sixty feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE MAIN DELAWARE RIVER DRAINAGE DISTRICT.

December 23rd, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Main Delaware River drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Main Delaware River drainage district, designated in the list and the plan accompanying it, dated December 18th, 1908. Said list comprises a total extension of five hundred feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE SCHUYLKILL RIVER DRAINAGE DISTRICT.

December 23rd, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Schuylkill River drainage district of the sewerage system of the City of Philadelphia, herein

please find approval of sewer extensions in said Schuylkill River drainage district, designated in the list and the plan accompanying it, dated December 18th, 1908. Said list comprises a total extension of one thousand and seventy-three feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

APPROVAL OF SEWER EXTENSIONS IN THE COBBS CREEK DRAINAGE DISTRICT.

December 23rd, 1908.

Hon. John E. Reyburn,
Mayor of Philadelphia.

Dear Sir:—

In compliance with the terms of a permit dated April 25th, 1907, issued by the Commissioner of Health upon unanimous agreement of the Governor, Attorney General and Commissioner of Health relative to sewer extensions in the Cobbs Creek drainage district of the sewerage system of the City of Philadelphia, herein please find approval of sewer extensions in said Cobbs Creek drainage district, designated in the list and the plan accompanying it, dated December 18th, 1908. Said list comprises a total extension of five hundred and fifty-three feet only of sewers.

SAMUEL G. DIXON,
Commissioner of Health.

This permit shall be recorded in the office of the Recorder of Deeds for Philadelphia County.

Harrisburg, Pa., December 23rd, 1908.

PITTSBURGH, ALLEGHENY COUNTY.

This application was made by the City of Pittsburgh, Director of Charities, and is for approval of changes in plans for the disposal of sewage at the Allegheny City Home located at Claremont Station, O'Hara Township, Allegheny County, and for a permit therefor.

It appears that the City of Pittsburgh is increasing the accommodations and laying out a very large home at Marshalsea in anticipation of caring for the charity patients, for whom accommodations are not adequately afforded at the existing institutions. There is no likelihood of the Claremont Institution being enlarged for the accommodation of a greater population. Hence it is suggested that there is no need of building the proposed sewage disposal works at Claremont to the full size or under the arrangement as shown in the original plan as they stand approved.

The amended plans now submitted for consideration called for a septic tank with seventy-three thousand gallons capacity. The grit chamber is to be omitted and in its place a small screen chamber is to be substituted. The sprinkling filter is to be sixty feet long instead of seventy feet.

It appears that as a result of the improved sewerage system at the nearby Institution at the county workhouse the flow of sewage per twenty-four hours was reduced to ninety thousand gallons. The discharge from the City Home sewers was found to be one hundred and fifty-eight thousand gallons per day, but under the new City of Pittsburgh management this amount has been largely reduced, and will likely be further reduced when the new sewerage system, approved by the Commissioner of Health, is built; hence it is thought that the resulting daily sewage flow will not exceed ninety thousand gallons. On this basis a daily capacity of seventy-three thousand gallons for the redesigned septic tank is ample.

The septic tank is to comprise a structure seventy-two and five tenths feet long by nineteen and twenty-five hundredths feet wide over all, built of concrete with flat roof of same material, general location and arrangement similar to plans first submitted. The sewer is to terminate in a small screen chamber so arranged as to avoid any pool of sewage. The flow will pass through to the first longitudinal compartment of the tank by means of a submerged eight inch pipe. Thence the flow will be around the opposite end of the tank through a port in the longitudinal wall and thence back in the parallel compartment to the outlet syphon chamber.

It has been determined that the proposed changes be approved and that a permit be issued therefor under the stipulations that all of the conditions and stipulations of the said permit of November second, one thousand nine hundred and seven, shall stand and remain in full force.

Harrisburg, Pa., June 25th, 1908.

POTTSVILLE, SCHUYLKILL COUNTY.

This application was made by the borough of Pottsville, Schuylkill County, Pennsylvania, relative to sewerage and is in response to a formal complaint made by the Trustees of the Charles Baber Cemetery.

It appears that the Commissioner of Health issued a permit to the borough of Yorkville to extend its sewer system and to discharge the sewage therefrom into a

natural water course at the boundary line between the borough of Yorkville and the borough of Pottsville, said permit being dated April twelfth, nineteen hundred and seven. Among other conditions of said permit were the following:

"FIRST: That nothing but kitchen waste and storm water shall be permitted to enter the said sewer or the other sewers of the borough until permission to do so shall be granted by the State Department of Health.

"SECOND: That before further extensions to the sewer system in the borough shall be made, a plan of the entire borough shall be prepared and submitted to the State Department of Health showing proposed sewers for the entire borough and the method to be adopted for the disposal of the sewage therefrom, which plan may be modified, amended or approved by the Commissioner of Health.

"THIRD: If at any time, in the opinion of the Commissioner of Health, the discharge of kitchen waste from the proposed sewer into Cemetery Run has become a menace to public health, then such remedial measures shall be adopted for the removal or abatement thereof as the Commissioner of Health may approve, advise or suggest.

"FOURTH: This permit to discharge sewage into a natural water course shall cease on May first, nineteen hundred and ten. If at that date the interests of the public health demand it, the Commissioner of Health may extend the time."

This permit was not adopted by the borough of Yorkville or recorded by said borough, for the reason that Pottsville borough annexed Yorkville. It appears also that Pottsville did not adopt the provisions of the permit and record the same. Nevertheless, the West End Avenue sewer was built.

The petitioners submit the following sworn statements as evidence of the violation of the terms of the permit and of the illegal pollution of the stream passing through the cemetery:

SCHUYLKILL COUNTY, SS.:

"W. D. WILLIAMS, being duly sworn according to law, doth depose and say that he is the Health Officer of the borough of Pottsville, in said county, and has held such position for five years last past; that he is acquainted with the condition of affairs at the corner of State Street and West End Avenue; that he made an investigation as to the sanitary condition there on September 8, 1908, and found conditions very bad as to sanitation. There is a culvert in West End Avenue which has its eastern terminus in State Street; the material from that culvert percolates through the ground and creates a swamp immediately to the east of its easternmost end in the cemetery property, where the ground, by reason of such percolations, is swampy and gives out a very sickening odor. Deponent ascertained that water closets were connected with the West End Avenue culvert and that the odor at the point last named was because of that fact and of other material coming from said West End Avenue culvert.

"Deponent further says that there is a culvert extending from Market Street on State Street to West End Avenue, where said culvert empties into a small stream flowing westwardly through the cemetery. There is also a stone culvert across State Street emptying into this natural water course. Deponent followed the said water course all the way from State Street to the eastern end of the cemetery, where it crosses what is known as the road to York Farm. Along the whole of that distance in the cemetery the bed of the stream and sides was full of decayed and foul material very deleterious to health and making it impossible for any one to remain near it for any length of time without becoming sick. This foul and nauseous matter comes from the culvert on State Street and through the drain across State Street from West End Avenue and, in the opinion of deponent, the conditions are a very great menace to health, and he received complaints from people living in that neighborhood as to the condition of affairs, and further deponent saith not.

"W. D. WILLIAMS."

"Sworn and subscribed before me this 9th day of September, 1908.
"ESSIE HASENAUER, Notary Public.
"Commission expires 19th January, 1911."
[SEAL]

"SCHUYLKILL COUNTY, SS.:

"HENRY W. DOHERTY, being duly sworn according to law, doth depose and say, that he has been the sexton in charge of the Charles Baber Cemetery since June 15th, 1906, and ever since then has resided at said cemetery. That he has been in the cemetery grounds every day during that time and is thoroughly familiar and conversant with the conditions of the drainage from the said cemetery; that there is a public sewer built by the borough on West End Avenue, which sewer was not opened at its eastern end, but was put against the earth at that position without any other obstruction to prevent the contents of the sewer from percolating and overflowing into the cemetery; that there are connected with said sewer water closets and drainage pipes from the houses on West End Avenue, and that the matter from these houses is carried into said sewer and from the said sewer percolates

through the ground and over the top into the cemetery and creates a foul stench; that this condition of affairs has existed for about a year last past. This sewer on West End Avenue was completed in the summer of 1907 and ever since its completion nuisance has existed.

"There is also a public sewer built on State Street from Market to West End Avenue, where the said sewer empties into a natural water course within the said cemetery grounds. From this sewer there is carried into this water course a large amount of vegetable and other decaying matter, and the stench from the same is very strong and nauseating. When there is a heavy freshet this decaying material will be carried out of the bed of the stream and from along its banks and for a few days there will be no stench, but as soon as the water becomes lower, a fresh deposit of decaying matter is made and the stench again is created.

"There is also a sewer or drain from a house at the southwest corner of State and West End Avenue that enters into said stream and brings to it corrupt and decaying vegetables and other matter, and further this deponent saith not.

"HENRY W. DOHERTY."

"Sworn and subscribed before me this 11th day of September, 1908.
"ESSIE HASENAUER, Notary Public.
"Commission expires 19th January, 1911."
[SEAL]

"SCHUYLKILL COUNTY, SS.:

"GEORGE H. HALBERSTADT, being duly sworn according to law, doth depose and say that he has been a practicing physician and surgeon of the borough of Pottsville, in said county, for thirty years last past; that he resides in the vicinity of the Charles Baber Cemetery, and is thoroughly acquainted with the condition of affairs at the corner of State Street and West End Avenue, in said borough, for the reason that every day he passes said point going from his residence to his office.

"Deponent further says that he has made investigations as to the sanitary conditions at the corner of said streets and also in the Charles Baber Cemetery and found conditions very bad as to sanitation. There is a culvert in West End Avenue which has its eastern terminus in State Street; the material from that culvert percolates through the ground and creates a swamp immediately to the east of its easternmost end in the cemetery property, where the ground, by reason of such percolations, is swampy and gives out a very sickening odor. Deponent has been informed that water closets are connected with the West End Avenue culvert and that the odor at the point last named was because of that fact and of other material coming from said West End Avenue culvert.

"Deponent further says that there is a culvert extending from Market Street on State Street to West End Avenue, where said culvert empties into a small stream flowing eastwardly through the cemetery. There is also a stone culvert across State Street emptying also into this natural water course. Deponent has followed the said water course all the way from State Street to the eastern end of the cemetery, where it crosses what is known as the road to York Farm. Along the whole of that distance in the cemetery the bed of the stream and sides was full of decayed and foul material very deleterious to health and making it impossible for any one to remain near it for any length of time without becoming sick. This foul and nauseous matter comes from the culvert on State Street and through the drain across State Street from West End Avenue, and, in opinion of deponent, the conditions are a very great menace to health. He has heard complaints from people living in that neighborhood as to conditions of affairs, and further deponent saith not.

"G. H. HALBERSTADT."

"Sworn and subscribed to before me this 29th day of September, 1908.
"ESSIE HASENAUER, Notary Public.
"Commission expires 19th January, 1911."
[SEAL]

"SCHUYLKILL COUNTY, SS.:

"W. D. WILLIAMS, being duly sworn, deposes and says that he has made an examination of the houses on Market Street which have connections with the drain on State Street emptying into the water course flowing through the Charles Baber Cemetery, and the draft hereto annexed shows the connections from the several houses. Those marked as having toilets mean that such houses have water closets connected with said drain, and further deponent saith not.

"W. D. WILLIAMS."

"Sworn and subscribed before me this 6th day of October, 1908.
"ESSIE HASENAUER, Notary Public.
"Commission expires 19th January, 1911."
[SEAL]

"Pottsville, Pa., September 17th, 1908.

"By directions of the Board of Health of Pottsville, Pa., made a close inspection of the dwellings that is located on West End Avenue. Found that Mr. John Griessel, No. 1711, has toilet and bath and is connected into Borough Sewer that terminates at the western end of Mount Laurel Cemetery. Also that Henry J. Baatry, No. 1618, has toilet and bath and is also connected into same said sewer.

"Also Casper Becker, who has a block of two (2) frame houses on rear of lot, was connected into said sewer, but on September 14th broke the connections.

"W. D. WILLIAMS,
"Health Officer."

The petitioners state that the owners of the cemetery will contribute towards the expense of building a sewer from State Street down the valley of the run through the property of the cemetery. From this point on the total expense of a further extension to connect with some existing sewer would have to be borne entirely by the borough. The proposition of the Trustees has been rejected by the local municipal authorities and, therefore, the Trustees have recourse to the Commissioner of Health for the abatement of the nuisance above described. While the negotiations which have occurred, or may be consummated, between the petitioners and the borough are immaterial, so far as the State Department of Health is concerned, nevertheless they show a commendable spirit on the part of the Trustees. It appears, however, that if the terms of the decree of the Commissioner of Health of April twelfth, nineteen hundred and seven, had been complied with, there would be no nuisance in Cemetery Run, because all sewage would have been excluded therefrom and the wilful discharge of sewage into this stream is, therefore, contrary to the decree of the Commissioner and in direct violation of the laws of the Commonwealth.

Under these circumstances, it has been determined that the President and Members of the Borough Council of Pottsville be notified that unless the discharge of sewage into the said Cemetery Run is discontinued within ten days, or some move satisfactory to the Commissioner of Health be made within the said ten day period to bring about the discontinuance of such discharge of sewage into the Cemetery Run, the matter will be placed in the hands of the Attorney General for prosecution.

Furthermore, the borough of Pottsville is hereby advised that the discharge of sewage at any point within the borough limits into the waters of the State must be ultimately discontinued. It is easily possible, during certain stages of the Schuylkill River, for sewage from Pottsville to be transported to the water works intakes of the system of down stream municipalities and the sewage poisons to be taken into the systems and introduced into the homes of the water consumers of those places and cause sickness and death. It is the policy of the Commonwealth to preserve the purity of the waters of the State for the protection of the public health and, in conformity with this general policy, the borough of Pottsville should adopt a comprehensive plan of procedure whereby ultimately all of the sewage of the borough shall be collected at some common point and subjected to adequate treatment. These plans should be prepared at once and submitted to the Department of Health for approval, and after the plans shall have been modified or amended and approved then the borough may build in accordance therewith, laying down new sewers as they may be needed from time to time, with the assurance that no part of the new work will have to be undone, and that finally a perfected plan will have been brought about in an efficient and economical manner.

A new sewer should be laid down the valley of the Cemetery Run, and it should be a part of this comprehensive plan; and, if within ten days from the date of this decree, the borough will declare it to be its intention to incorporate such a sewer into such a comprehensive plan and to build the sewer and put it in operation on or before May first, nineteen hundred and nine, then the time in which sewage will be permitted to discharge into the said Cemetery Run will be extended to said May first, nineteen hundred and nine.

The plans for the sewer down the valley of the Cemetery Run shall be submitted to the Department of Health and have his approval before it is built and a plan for this sewer and the sewer or sewers into which it will discharge shall be submitted to the Department of Health for approval not later than the fifteenth day of December, nineteen hundred and eight.

The plans for the comprehensive sewerage system hereinbefore mentioned shall be submitted to the Department of Health for approval not later than May first, nineteen hundred and nine.

Harrisburg, Pa., November 6th, 1908.

READING, BERKS COUNTY.

This application is made by the City of Reading, Berks County, Pennsylvania, and is for permission to extend its sewer system and to discharge the sewage therefrom, treated, into the Schuylkill River within the limits of Cumru Township, said county.

Reading City has an estimated population of one hundred thousand people. In nineteen hundred it was seventy-eight thousand nine hundred and sixty-one. In point of size it ranks fourth in importance in the State. Situated on the east bank of the Schuylkill River at the entrance of the anthracite coal fields and in a fertile agricultural region and fifty miles above the seaport metropolis of Philadelphia and sixty-two miles above the Delaware River, it has from provincial times been a community of commercial and manufacturing importance. Its extensive industries, among others, comprise steel and iron mills, foundry and machine shops, furnaces, woolen and paper mills, dye works, hat factories, breweries, a tannery, hardware manufacturers, electroplating and galvanizing works and the shops and yards of the Philadelphia and Reading Railway.

About twelve years ago the city installed a sewerage system comprising thirty-four miles of separate sewers, a pumping station at the foot of Sixth Street, a twenty inch force main sixty-six hundred feet long and a sewage disposal plant below the city on the west bank of the river in Cumru Township at Millmont.

The disposal plant consisted of a double-deck filter, each deck being about two hundred and fifty feet long by fifty feet wide. On the upper deck, graded layers of slag and sand were supported and here the sewage was applied and passing down through the upper filter fell a distance of about ten feet onto the surface of the filter bed below and thus became aerated. The effluent from the lower filter was conducted to the river. The filter operations were intended to be facilitated by the removal of a substantial proportion of the suspended solids from the sewage by straining through coke at the pumping station. However, this strainer proved bothersome, its utility questionable, and finally it was abandoned.

The inability of the filters to properly purify all of the sewage delivered there was early demonstrated. During successive years, when added house connections to the sewers were frequently made, the plant was so overtaxed that, in nineteen hundred and six, when the city contracted to extend its sewerage system by the addition of some sixty miles of street sewers, it had become obvious that the material enlargement of the disposal works could not longer be postponed.

The local authorities then determined that the city was not in a position financially to issue bonds for the construction of additional sewage purification works and so they resorted to the expedient of issuing a special tax levy year by year to meet the costs. Bids were called for for an annual sum to be paid by the city to the contractor during each year for five years, this sum to cover the cost of extending the present works to a capacity of seven million gallons daily, and to cover the cost of maintaining and operating both the pumping station and purification works. The contract was awarded, on December twenty-ninth, nineteen hundred and five, but it was not executed by the Mayor. The Commissioner of Health called the attention of the Mayor to the provisions of the law which make it necessary for a city to submit plans for sewer extensions and receive a permit for such extensions and for the discharge of sewage therefrom into the waters of the State. Pursuant to this communication the Mayor and other city officials conferred with the Commissioner of Health and upon advice of the latter employed acknowledged experts on matters relating to sewage purification, who conducted a series of tests at Reading to determine the practicability of the installation of the apparatus proposed by the contractor to whom the award had been given.

The contractor proposed to furnish all materials, labor and appliances necessary to increase the capacity of the filter plant to seven million gallons per twenty-four hours and for maintaining and operating the sewage pumping station and disposal works for a period of five years, at the expiration of which all such improvements, extensions, et cetera, to become the property of the city for the sum of forty-six thousand dollars per annum, aggregating a total amount at the end of the five years of two hundred and thirty thousand dollars.

It was the contractor's intention to furnish all necessary buildings, segregators, sand driers, filters and filter beds, according to plans of his own design, and six months after December twenty-ninth, nineteen hundred and five, to demonstrate the efficiency of the additions to and the machinery incorporated into the old sewage disposal plant to the satisfaction of the State Commissioner of Health. One of the terms of the contract called for the completion of the seven million gallon plant and that it shall be in full operation one year prior to the expiration of the five year period. How much sewage the contractor shall take care of under the terms of the contract during each year of the period is not clear to the Department from the perusal of the data on file in the office of the Commissioner of Health.

On March twenty-ninth, nineteen hundred and six, the city employed Herring and Fuller, of New York City, to make a report on the Weand contract in co-operation with the city engineer. The investigation was to cover the performance of the Deery or old plant alone and in conjunction with the devices offered by Weand and to make a comparison of these data with respect to the best practice in sewage purification.

The tests were begun in April and concluded in July. At the time there were thirty-four miles of separate sewers in the system having about twenty-one hundred connections with houses and business establishments and delivering a sewage essentially domestic mixed with a limited quantity of spent dye wastes and refuse from felt hat, woolen and silk factories. The wastes from the felt hat works included more or less fibrous matter of special significance from the standpoint of ability to clog the filters. The average flow was measured and found to be two million gallons

per twenty-four hours, increasing at time of rainfall to nearly three million gallons and during dry weather falling as low as one and three-quarter million gallons. The sewage was found to be dilute with dissolved oxygen always present.

The first tests were of the old Deery filters which were put in condition and operated intermittently at four hour periods of dosing and resting, at the rate of one million gallons per acre per twenty-four hours. Though quite dilute, it was found difficult to pass the sewage through the twelve inch layer of sand and seven inch underdrain of slag. A slimy deposit together with clogged sand amounting to forty-one cubic yards for each million gallons of sewage treated, had to be removed every two or three days from the surface of the upper filter. The effluent from the lower bed was clear, non-putrescible, contained but thirteen per cent. of the suspended matters in the applied sewage and showed a bacterial removal of upwards of sixty-six per cent.. The conclusion was a confirmation of the concensus of expert opinion that sewage applied to filters should first be freed of the greater part of suspended matter. In this connection it may be noted that the cost of operating the old Deery filters not including the pumping station operation from November to March for the years nineteen hundred and three, to nineteen hundred and six, inclusive, was approximately ten thousand, eleven thousand eight hundred, fifteen thousand six hundred and sixteen thousand six hundred dollars, respectively, although not over an average of two million gallons daily was delivered to the filters.

The main object of the Weand devices proposed was to reduce the excessive cost of operating the Deery filters by first taking out the suspended matters in the sewage. A screen operated as an endless belt was tested and found to be capable of removing twenty per cent. of the suspended matter in the raw sewage. Straining through coke removed twenty-seven per cent. more and the application of the effluent to the Deery filter at the rates above mentioned made necessary the removal every third day of eleven cubic yards of clogged sand surface per million gallons of sewage treated. In other words, the Weand device effected a reduction of seventy-five per cent. of clogged material at the filters. However, this reduction which is considerably less than that which may be effected by the use of settling or septic tanks was not enough to make the proposition to continue the old Deery filters in use an economical one for the contractor or the city.

The modern so-called sprinkling filter, where aeration of the applied sewage is obtained by spraying it onto the surface of one main filter bed, may be successfully and economically operated at rates of upwards of two and one-half million gallons per acre per twenty-four hours where the sewage is diluted as at Reading.

Therefore, this type of filter bed was recommended.

The above statement of rate is based on the assumption that the sewage has first received thorough preparatory treatment. To accomplish such treatment and accomplish it economically, the experts recommended that the structure of the Deery filter be remodeled and made over into a septic tank.

There being no land available at the site of the old works for sprinkling filters, the upper portion of Fritz Island in the river, one-half mile down stream was chosen for the purpose and recommended. And finally, it appearing, so it is represented, that the contractor's scheme might be readily modified to conform with the above conclusions, on this basis the experts advised the execution of the contract, and it was executed and detail plans at once prepared and submitted. They are the ones now under consideration.

The final sewage disposal plans were not submitted until December twentieth, nineteen hundred and six, for the reason that conclusions as to details had not been agreed upon between the city and the contractor. On said date the old filter structure had been dismantled and the septic tank partially constructed and the excavations for the filters on the island made. Since then the works have been completed in substantial accordance with said plans.

As built, they comprise a segregator, septic tank, sprinkling filter, settling basin at the filters and sludge drying area.

The segregator, or fine screen, is a device patented by the contractor. It has been inserted in one of the receiveing wells at the pumping station.

The sewage pumping plant, to which all of the sewers of the city drain by gravity, is located on the banks of the Schuylkill Navigation Company's canal in the lower part of the city. The building contains an engine room, boiler room and two wells, twenty feet in diameter in which the coke strainers of the former purification system are located. It is into these wells that the sewage of the city is drained. No overflow from them to the river is provided. The sewage is lifted by the pumping engines to the purification plant at Millmont. However, there is a by-pass around the station to the river from the main sewer and until recently, when the new works were started up, all of said sewage of the city has been thus by-passed to the Schuylkill. This was necessitated by reason of the plan adopted by the contractor to build over the old filter plant into a septic tank.

In one of the wells the new rotating screening device, called a segregator, has been installed. It consists of a screen six feet in diameter and sixteen feet long, revolving about a horizontal axis. The sewage comes in at one end through the barrel of the screen and passes outward from the interior. The revolving motion is imparted to effect a cleaning, which is brought about by water jets against the outside of the screen. These jets, operating under pressure, loosen

the sludge which falls down and gravitates to the lower end, where it is elevated by a conveyor to the floor above, placed in bags, thence removed to a centrifugal dryer, whence, after having much of the moisture separated it is mixed with coal and burned under the boilers. A material percentage of the grosser solids in the sewage is removed by this process. The balance passes with the sewage to the septic tanks.

The water level in the tank is about fifty-two feet above the bottom of the pump well. The pumping engines are two in number, each duplex, compound condensing plunger type of five million gallons capacity, but owing to friction in the force main it is doubtful if the two pumps together can pump regularly more than about eight million gallons daily.

The septic tank is a reinforced concrete structure open on top, fifty-one and sixty-six hundredths feet wide by two hundred and fifty-three feet long, and seventeen and thirty-five hundredths feet deep inside dimensions. The sewage will stand one foot below the top of the wall and at this stage the tank holds about one million six hundred thousand gallons, giving an average period in the tank for a three million gallon per day flow of twelve and three-quarter hours, and for a seven million gallon flow of about five and one-half hours.

The inlet consists of a fourteen inch pipe horizontal, having five inch holes based three and one-half feet on the centers throughout its length, and submerged five feet below the flow line. The outlet consists of a weir extending across the entire width of the opposite end of the tank from the inlet. The sewage will pass under a scum board and over the weir into a collecting trough leading to a thirty inch vertical effluent pipe connecting to a thirty inch gravity main to the filters.

A by-pass is provided around the tank so that the sewage can be diverted to the filters when the tank is being cleaned. This is necessary for the present structure because there are no bays in it, the tank being one compartment.

All excess flow of sewage not delivered to the filter is discharged over an overflow weir into Angelica Creek and thence to the river. This weir is thirty-two feet long and is built into one of the side walls near the discharge end of the tank.

The plans for the disposition of the accumulated solids in this tank have not been developed. In the bottom at the side of one wall are numerous six inch pipes at the bottom of the channel, each pipe being fitted with a valve kept closed. They were a part of the old filter construction and they discharge into an open cement lined trough leading to Angelica Creek, two hundred feet distant. The petitioners represent that the limited area between the septic tanks and the river affords opportunity for the laying out of some method of sludge disposal, but this has not yet been done.

The Weand contract called for the erection of the addition to the filter plant at Millmont. The city having selected a thirty-six acre tract on the upper end of Fritz Island for the site of the proposed filters, and having purchased this tract for the purpose in the summer of nineteen hundred and six, was compelled to assume the cost of conveying the sewage from Millmont to Fritz Island. About one-third of the said thirty-six acre tract lies about the elevation of the highest flood recorded, which occurred in eighteen hundred and fifty-nine. The concrete floor of the filters has been placed four inches above this elevation.

The capacity of the sewage disposal works in excess of the Weand contract has been considered only to the extent that the layout of the septic tank, gravity conduit to the filter and the filter plant should be in conformity with a definite and permanent plan for future additions to admit of the ultimate treatment of the entire sewage of the city in an economical and efficient manner. In anticipation of a reasonable leakage of ground water into a separate sewer system one hundred miles in length and of the contribution to the sewers of a flow from buildings equivalent to the total daily consumption of city water now equalling fourteen million gallons, plus such other connections to the sewer system and growth of the city as may occur, additions to the septic tank and to the sprinkling filter may be made on land now owned by the city sufficient to serve a population of two hundred thousand people. By acquiring adjoining land it is possible in the more distant future to treat the sewage of a much larger population by extending the works now projected.

One acre of sprinkling filter has been constructed on the island. Its rated capacity is two and a half million gallons average flow per twenty-four hours with ability to treat three and a half million gallons during wet weather periods. The intended surface of the filtering material which is the actual elevation of the top of the sprinkling nozzles is thirteen and five-tenths feet below the level of the weir at the septic tank. The minimum depth of the filtering material was designed to be six feet and the concrete floor was laid accordingly. However, the contractor chose to experiment with a depth of one foot less, and, therefore, the filtering material surface has at no point been brought nearer to the intended elevation than twelve inches.

At one side of the filter has been erected a wooden tank nineteen feet in diameter and about eight feet high, divided by interior walls into three compartments of unequal size, the flow into and out of which is controlled by three butterfly valves operated by floats. The largest compartment is called the dosing chamber, the next in size the storage compartment, and the smallest the overflow compartment. This aparatus, with its appliances, automatically controls the flow of the sewage from the septic tank to the sprinkler nozzles in such a way that

when the dosing tank is full the area covered by the spraying sewage is greatest and as the dosing chamber empties this area reduces, following the loss of head at the nozzles, until when the chamber is empty and the flow at the nozzles temporarily ceases, the wetting of the entire surface area of the filter bed has been accomplished or practically so. When the dosing chamber is full the level of the water is four and two-tenths feet below the level of the weir at the septic tank. The thirty inch gravity main connecting the septic tank and the dosing chamber is twenty-eight hundred and fifty feet long, laid as an inverted syphon, being a concrete structure part of the way, a vitrified pipe encased in concrete a part of the way and cast iron pipe at two stream crossings. Its discharging capacity is about ten million gallons per twenty-four hours. All sewage delivered to the filters has to pass through this pipe and the dosing apparatus. There are no means provided at the filters for sewage to reach the river without first passing through the dosing apparatus and the filter. But at the septic, tank, as already mentioned, there is an overflow weir placed higher than the outlet weir, so that all excess of sewage escapes there to Angelica Creek. The valve at the dosing apparatus is now throttled to deliver between two and one-half and three million gallons daily, practically half the daily flow of sewage from the town.

The water in the dosing tank fluctuates six feet. At high level it is nine and three-tenths feet above the top of the nozzles at the filter. The cyle of operation is about eight minutes, equally divided between periods of dosing and resting.

The filtering material consists of furnace slag obtained in the vicinity and broken to size by hand and screened with forks and placed in position by wheel barrows and carts. The range in sizes of the particles is nominally from one to four inches. The larger pieces were laid on the floor of the filter in a layer about eight inches deep but in the remaining filter no attempt at graduation in sizes was made.

The floor is two hundred and twelve feet long and two hundred and six feet wide and across the middle longitudinally is the main drain consisting of a concrete trough covered with concrete slag and laid below the floor into which the underdrains discharge. They rest on the floor which slopes at one per cent. to the drain and they consist of six inch vitrified tile pipe split in halves longitudinally and laid in parallel rows ten inches on centers. This drain in turn connects with the main effluent collector which also passes beneath the filter floor to the final sedimentation basin. It is a thirty inch pipe made of moulded segmental concrete blocks put together in place with cement mortar and in the field.

The bed lies partly above and partly below the original ground level and the sides in the excavation are built of rough masonry. Above ground, the walls are vertical and of dry rubble to about two feet above the floor of the filter, and for the remainder of the distance, to the top of the bed, the sides are of large chunks of slag, having a batter of about two to three feet.

The sewage is distributed on to the filter by means of a twenty-four inch pipe laid down the center of the bed on the bottom, off which to either side in parallel rows on thirteen and seven-tenths feet centres are eight inch vitrified pipe laterals extending to the sides of the filter and at every fourteen and sixteen hundredths foot interval on these eight inch horizontal feeders extend a four inch cast iron riser at the top of which the sprinkling nozzles are adjusted.

The sedimentation basin built in excavation between the filter and the river, measures one hundred feet by ninety-five feet inside the slopes which are one to one. It is a brick and masonry structure, open, and its depth below water line is four feet at the end nearest the filter and five feet at the end toward the river. Since the object of the basin is to allow the sedimentation of the coarse flakes of dried material that have peeled off the slag of the filter bed, it is made quite small, the capacity being about three hundred and forty thousand gallons, sufficient for about two and one-quarter hours' flow at the maximum capacity of the bed, or three million, five hundred thousand gallons per twenty-four hours. The thirty inch effluent drain from the filters extends in a straight line to the river and the sedimentation basin is placed at one side of said effluent drain. Off of it at right angle from a gate chamber is a thirty inch pipe extending along the inlet side of the basin and through this branch are four ports or openings spaced at equal distances, through which the filter effluent enters the basin. It leaves the basin over a concrete weir extending the greater width of the side next to the river into an open collecting trough at right angles to and connecting with the said main effluent drain and thence to the river. By means of gates the filter effluent may be by-passed directly to the river or it may all be sent through the sedimentation basin. The weir is twenty-five inches below the lowest point in the filter floor, or twenty-one inches below the highest freshet ever recorded. Ordinary freshet stages are below the weir elevation.

There is a separate drain leading from the bottom of the basin to the river. The intention is to build a sump from which a pipe will lead to a portable pump and equipment for raising the sludge from the basin to adjoining land but this has not yet been done.

It is expected that in the septic tanks the suspended matters will be reduced about sixty per cent., the total organic matter about thirty per cent. and the bacteria about sixty per cent. The filter effluent is expected to show a removal of ninety per cent. of the original bacteria, with the organic matter so removed that it will be non-putrescible and with the suspended matter removed to a point where the effluent will be fairly clear.

A second acre of sprinkling filter is required of the contractor and a second sedimentation basin. The date of their installation is now under consideration by the city and contractor.

Thus far the works have been built under the responsible supervision of the consulting engineers.

Thus it appears that acting under the advice of the Commissioner of Health and later of the experts, the city has profited to a large degree. At the expiration of the Weand contract, to show for the total expenditure the city will have a modern plant established along permanent lines and adapted to indefinte extensions, while had the original plans been followed, at the expiration of the five year period the city would not have had a modern and economical plant.

The city territory extends along the river for four miles and back therefrom about a mile and one-half, where there is a mountain with precipitous sides, which effectually limits the city territory. The southern part of the town and the old section slopes gently to the river, but the central and northern part is hilly, more especially that portion lying between the cemetery on the hill and the river. Here there are steep slopes to the river. But between the hill and the eastern city limits there is a flat, swampy district which extends northerly into the township, where the surface drainage problem is an important one. The rains on the mountain side come down the slopes in torrents and pond up on the flats and expensive storm drains have been constructed to relieve the flooding and to conduct the water northerly around the hill to the river. In the flats are the yards and shops of the Reading Railway. The tracks extend north and south through the city and along the river, where also are the tracks of the Pennsylvania Railroad and the Schuylkill Navigation Company's Canal. Formerly this canal was an important factor and it is now in use and should not be overlooked. Many of the town's industrial plants are situated on the canal and along the railroad. In December of nineteen hundred and six, upon the Department's inspection, it was ascertained that several storm channels and public and private drains discharge sewage and wastes into the river and canal.

Beginning up stream near the northerly city limits, there is a big storm channel emptying into the river near Richmond Street. For most of its distance easterly to the flats it is a masonry structure from ten to fourteen feet in diameter. It is the outlet for storm water for the northern and northeast part of the city including the flats. Connected with it are four and one-half miles of drains, of which two and one-half miles are thirty inches and under in diameter and the remainder range from three by four to eight and one-half feet in diameter; one and one-fifth miles are twenty-four inches in diameter. The system is supposed to take storm water only, but the outlet into the river showed the presence of some sewage in the water.

The next main storm drain empties into the canal at the foot of **Court Street.** It is a masonry structure twelve feet and six and one-quarter feet in diameter and it serves the central part of the city and a part of the flats. It is down stream from the Richmond Street outlet two miles and between these points drainage from industrial plants and from streets is discharged at numerous points into the river and canal. There is a three and one-half foot drain into the river at the foot of Schuylkill Avenue and a twenty-four inch pipe emptying into the canal at the foot of Buttonwood Street. These are supposed to take surface water only. At Peter Barbey and Son Brewery on Little Elm Avenue hot wash water and rinsings from tubs containing ferment is discharged into the street gutter and thence through a city drain into the canal. This waste and the waste from the National Brass and Iron Works on the corner of Green and Tulpehocken Streets appear to be the only seriously objectionable ones in the river district between the two storm drains mentioned, although there are oils and greases from the Carpenter Steel Works and from the furnaces and iron mills which remain on the surface of the water along the river and the canal and give the appearance of grosser pollution. They might be easily intercepted.

The wastes from the brass works pass down Green Street to the canal. They are electro-plating liquors which are objectionable from the standpoint of a nuisance. They should be kept out of any natural water course.

The Court Street drainage district comprises a well built-up section of this city, including manufactories, residences and paved streets. There are six miles of surface drains in the system of which one-half are twenty-four inches in diameter, or less, down to fifteen inches. Into these drains some sewage is discharged and also industrial wastes or spent dye liquors from the Minig Silk Glove Works, the neversink Dye Works, the Leinbach Woolen Mill, the Nolde and Horst Hosiery Establishment, the Prospect Dye Works and fermenting liquors from Laurer's Brewery. There are also oily wastes and sewage from foundaries, machine shops and mills emptied into the drains. The pollution of the canal at the outlet of the drains is markedly evident.

Below this point there is a storm drain into the canal at the foot of Penn, Chestnut, Spruce, Bingamon and South Streets, they being one and sixty-six hundredths feet, five feet, three and three-tenths feet, one and six-tenths feet and seven feet in diameter, respectively. The latter, however, empties into the river below the canal. They are supposed to receive storm water only. Along this stretch of the canal, however, there are numerous industries whose wastes pollute the waters. Beginning at Court Street and passing down stream, they are as follows: Reading

Paper Mill, Pennsylvania Hardware Works, Winter and Goets Tannery, Reading Paper Mills, Hendel Hat Factory, the Miller Hat Factory, the Hendel Hat Factory (lower plant), the Reading Hardware Company and the Consumers Gas Company. There are other plants here whose sewage to more or less extent pollutes the canal or river.

All of these wastes should be taken out of the natural water courses or storm drains and discharged into the city sewer sytem with the exception of the gas refuse. The gas wastes should be handled on the premises.

Below the canal there is the seven foot drain into the river at the foot of South Street. This receives the flow of Old Valley Creek, now a stone arch culvert carrying much sewage, manufacturing wastes and other refuse, and is in a bad sanitary condition. In this district are the plants of the Reading Iron Company, the Penn Hosiery Company, the Hendel Hat Factory, the Kessler Hat Factory, the Mohn Hat Factory and the Reading Hat Manufacturing Company, all of whose wastes go into the city storm drain. Frequently some of these drains clog up with waste fur discharged from the hat factories, necessitating their cleaning out at city expense.

The sanitary sewer at the time of the Department's inspection in December, Nineteen hundred and six, included the old portion of the city only, lying principally south of Washington Street and between the canal and Eleventh Street. The main sewer, fifty-four inches in diameter, beginning at the pumping station at the foot of Sixth Street, extended northerly in the street next to and paralleling the canal as far as Bingamen Street and thence by other highways up the river valley to Penn Street, where it stopped. A twenty-four inch sub-main extended up Sixth and easterly to Laurel, crossing under the Reading Railway into the district lying east thereof. And through these mains and sub-mains all of the city's sewage of the old district with the exception of that discharge into the storm sewers was delivered to the pumping station.

The projection of this system easterly and northerly taking in all of the territory drained by the Court Street surface drainage system and the southerly part of the district served by the Richmond Street surface drain system and a part of the territory tributary to the river north from Court Street was well under way in December, Nineteen hundred and six.

On the twenty-eighth day thereof, the Commissioner of Health addressed the following communication to his honor the Mayor:

"Your application for aproval of the sewerage and sewage disposal improvements made in conformity with the law is now before us for consideration. It appears that your plans for the interception and treatment of the wastes and sewage matter of your city do not contemplate the collection of trade wastes which at the present time amount to a very considerable volume and are being discharged into storm drains belonging to the city or into water courses which they pollute.

"Because at some time it will be necessary in the interests of the public health and welfare to stop the discharge of some of these wastes into your storm drains and natural water courses, it would be prudent for you to foster these industries within your city limits by anticipating that time by giving the subject due consideration now, in order that you may make proper provision in your plans for the interception of these wastes and for their treatment. The subject is important and I wish to inquire what your intention is with respect to this phase of the general sewerage project."

The Mayor in his annual message to Councils requested that an investigation of the subject be made and accordingly the consulting engineers in co-operation with the city engineer were instructed to study the problem and make a report. This report was submitted on April thirtieth, nineteen hundred and seven.

Of all the industrial establishments in the city it was decided that one hundred and thirty required consideration. Ten of these were found to be outside of the sewerage districts and for some time will be unable to connect with the sewers.

The conclusion and recommendations of the engineers were as follows:

"1. The sanitary wastes from the industrial establishments within the sewerage districts shall be connected with the city sanitary sewers as soon as practicable.

"2. The thirty-one industrial establishments listed in the appendix, the trade wastes of which are summarized in Table Number Two and shown to aggregate about 1,500,000 gallons daily (roughly 10 per cent. of the water supply) shall be connected with the city sanitary sewers as soon as practicable, subject to restrictions under supervision of the City Engineer, as follows:

> "(a) The volume of wastes shall be discharged at a sufficiently uniform rate to prevent overtaxing the capacity of the sewers.
>
> "(b) Felt, fibre and other objectionable coarse suspended matter shall be satisfactorily removed before entering the sewers by the use of a screen or settling basin, preferably the former.
>
> "(c) Other suspended matter which will deposit objectionably large amounts in the receiving wells at pumping station shall be removed by sedimentation before entering the sewers.

"3. Whatever connections are necessary from the industrial establishments located within the present sewerage district, to the sewers as now designed, shall be built at once.

"4. Exhaust steam, cooling water and other liquids that are of a non-polluting nature leaving the industrial establishments, shall be allowed to continue to discharge into the river or canal. These, however, shall be freed from oil and any other objectionable matters to the satisfaction of the City Engineer.

"5. In view of the comparatively small quantity of trade wastes of widely varying quality from the individual establishments, the cost of their treatment can best be included in the general expense of the Sewerage and Sewage Disposal Department."

At the close of nineteen hundred and seven about thirty-one hundred permits for sewer connections has been issued, of which seven hundred were not in service, leaving a total of twenty-four hundred estates contributing to the sewers About one hundred and fifty connections had been made to the new sewers and the balance had been made to the old sewers.

As would be expected from an increase of the total length of sewers from thirty-four miles to one hundred miles, a corresponding increase in flow of sewage had occurred and a larger contribution may be expected both from manufacturing establishments, and from additional house connections. The flow from the ground water entering the sewer system by leakage now approximates two and one-half million gallons daily. Present measurements indicate that during dry weather the flow is in the vicinity of five million gallons from all sources. Moderately wet weather increases this flow to over six million gallons and during protracted wet weather the indications are that the sewage will amount to seven or eight million gallons daily with present connections. Some of this flow is due to ground water entering the sewers at a few places where unexpected difficulties from springs were encountered in pipe laying, some from additional manufacturing establishments and some from additional house connections. How fast additional connections with manufacturing establishments and houses may be made is a matter largely to be determined by local policies. The total trade wastes will add some two million gallons daily to the flow of the sanitary sewage, which gives a total dry weather flow without any new house connections of seven million gallons, the normal capacity of the sewage disposal works required by the Weand contract. Consequently in view of the increased flow of the sewers, it is imperative that additions to the sewage disposal works should be made at once.

When all the buildings in the city along the line of the sewers are connected therewith, the total flow of sewage should be in excess of the city water consumption, which is about fourteen million gallons per twenty-four hours.

The Schuylkill River is a source of public water supply to the city of Philadelphia and other municipalities. The object of the extension of the sewage disposal works was to provide ample capacity for the handling and treatment of the entire sewage output of the city to protect from sewage pollution the public water supply of the municipalities along the river below Reading. And the necessity of this being accomplished is not altered by the fact of the very material increase in volume of sewage to be treated.

The extent to which units should be forthwith added at the pumping station and other portions of the disposal plant to afford adequate facilities for the purification of all of the city sewage can best be determined by the city and its experts subject to the approval of the State authorities, but the subject must receive immediate attention and plans therefor be submitted at an early date for approval.

The operation of the first filter unit was started on January twenty-third, nineteen hundred and eight, and it is now treating sewage at the rate of two and a half to three million gallons daily.

It has been determined that the interests of the public health demand that approval be given and it is hereby and herein given to the city's plan for sewerage and sewage disposal works as hereinbefore described, and that a permit be issued and it is hereby and herein issued therefor under the following conditions and stipulations:

FIRST: That all storm and roof water shall be excluded from the sewer system. At the close of each season's work a plan shall be submitted and filed in the office of the Commissioner of Health showing all sewers laid during the year, together with any other information in connection therewith that may be required, in order that there shall be on file in said office an accurate plan of the existing sewer system of the city.

SECOND: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

THIRD: The city shall enforce such reasonable measures as may be necessary to bring about at the earliest practicable moment the discontinuance of the discharge of all sewage and trade wastes into storm drains or natural water courses or the waters of the State within the limits of the city, in substantial accordance with the report and recommendations made by the city's experts and hereinbefore stated.

FOURTH: Detail plans for the proper and sanitary disposal of the septic tank and settling basin sludge and drainage shall be prepared and submitted to the Commissioner of Health for approval not later than six months from the date of this permit.

FIFTH: Detail plans of the entire sewage disposal plant as now built shall be prepared and filed in the office of the Commissioner of Health within three months

from the date of this permit. And on or before said date the city shall prepare and submit plans and a report on additional units to the sewage purification works of a sufficient total capacity to accomplish the purification of all of the city sewage now being discharged by the sewer system and that may be reasonably expected to be discharged by said system in the near future.

SIXTH: Daily records of the operation of the entire sewage disposal works beginning at the pumping station shall be kept by the city in form satisfactory to the Commissioner of Health and copies thereof shall be filed in the said Commissioner's office. The city shall cause to have made frequent analyses of the crude sewage and of effluents at various stages of the process of treatment sufficient to show the efficiency of the plant and to enable deductions to be made therefrom as to management and operation. The plant shall be operated under the responsible supervision of the experts who designed it for one year, from the beginning of the operation, or if not by these experts, then by others equally competent to perform such service. Results of all tests shall be given to the Commissioner of Health, who may make rules and regulations governing the operation of the plant in so far as these may effect the quality of the effluent discharged into the waters of the State.

SEVENTH: If at any time in the opinion of the Commissioner of Health the sewer system or the sewage disposal works or any part thereof has become a menace to public health, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

EIGHTH: It is especially stipulated that this approval of and permit for the use of the existing sewage disposal works is given only under the express condition that the plans for the immediate enlargement of the works hereinbefore called for shall be submitted on or before the date hereinbefore mentioned and that following the submission of said plans to the Commissioner of Health and the modification, amendment or approval of said plans by the Commissioner of Health the city shall forthwith proceed to construct such additional works as so approved within the date which shall be determined by the Governor, Attorney General and Commissioner of Health.

Harrisburg, Pa., February 24th, 1908.

READING, BERKS COUNTY.

This application was made by the city of Reading and is for approval of plans for the proposed additions of the sewage purification works and for sludge drying areas in connection therewith.

It appears that on February twenty-four, nineteen hundred and eight the Commissioner of Health issued a permit to the city of Reading, Berks County, Pennsylvania, to extend its sewer system and to discharge the sewage therefrom, treated, into the Schuylkill River, within the limits of Cumru Township, under certain conditions and stipulations, among which were the following:

"Detail plans for the proper and sanitary disposal of the septic tank and settling basin, sludge and drainage shall be prepared and submitted to the Commissioner of Health for approval not later than six months from the date of this permit."

"Detail plans for the entire sewage disposal plant as now built shall be prepared and filed in the office of the Commissioner of Health within three months from the date of this permit. And on or before said date the city shall prepare and submit plans and a report on additional units to the sewage purification works of a sufficient total capacity to accomplish the purification of all of the city sewage now being discharged by the sewer system and that may be reasonably expected to be discharged by said system in the near future.

"Daily records of the operation of the entire sewage disposal works, beginning at the pumping station, shall be kept by the city in form satisfactory to the Commissioner of Health, and copies thereof shall be filed in said Commissioner's office. The city shall cause to have made frequent analyses of the crude sewage and of effluent at various stages of the process of treatment sufficient to show the efficiency of the plan and to enable deductions to be made therefrom as to management and operation. The plant shall be operated under the responsible supervision of the experts who designed it for one year from the beginning of the operation, or if not by these experts, then by others equally competent to perform such service. Results of all tests shall be given to the Commissioner of Health, who may make rules and regulations governing the operation of the plant, in so far as these may affect the quality of the effluent discharged into the waters of the State."

In compliance with the terms of this decree, on May twenty-eighth, nineteen hundred and eight, the city filed plans of the existing works as constructed and a complete set of plans for the additional units.

The proposed additions to the disposal works comprise increased power at the boiler house, a sludge pit at the septic tanks, two filter units at the sprinklers and two settling tanks and a sludge drying area.

Since the issuance of the said decree of February twenty-fourth, numerous weir measurements have formed the basis for a reliable conclusion that the present dry weather flow in the sewer system is an average of four and a half million gallons per twenty-four hours. This increase in volume of more than double what it was in

nineteen hundred and six is partly due to the ground water leakage coming from about seventy additional miles of street sewers and several miles of new house connections built during the past two years and partly to the inclusion of certain trade wastes. There were on May twenty-third, nineteen hundred and eight, forty-four hundred and twenty sewer connections to the sewer system and future connections will continue to be made quite rapidly. Investigations are under way to determine the sources of ground water leakage and to provide means of eliminating the same if this be found feasible. A reduction of more than a million gallons leakage should be not hoped for, so it is represented, and if such a result should be accomplished there would remain at least an average daily flow in dry weather of three and one-half million gallons daily at the present time. It appears that suitable notices have been sent out by the city officials notifying property holders to divert roof water from the sanitary sewer and this work will be proceeded with as rapidly as possible.

About two and one-half million gallons of sewage, on an average, are pumped to and through the filters each day as near as can be ascertained. The only means of measurement is at the pump house now. The surplus sewage goes to the river. It is proposed to put a counter on the dosing device at the filter at an early date so as to record the number of tanks full of sewage discharged upon the filter each day. Obviously the discharge of unfiltered sewage into the river will have to continue until the new filter units are completed. The plans call for an extension of an existing boiler house at the pumping station and for the establishment of a new boiler of one hundred and fifty horse power capacity.

The plans submitted call for two additional sprinkling units of the same construction and form and size as that of the existing filter unit. The new units to be added, one on either side of the present sprinkling filter are in conformity with the general layout approved by the Commissioner of Health in the said permit of February twenty-fourth.

The plans also call for two additional settling basins similar in form, construction and dimensions to the existing settling basin to be built in conformity with the general layout heretofore approved by the Commissioner of Health.

An examination of the plans shows that in all essentials the new structures, and more particularly the details, closely resemble the existing structures, but there have been a few modifications to secure improved facilities for operation of the enlarged plant relating largely to the method of control of the distribution of sewage. A central operating gallery is to be built across each added filter unit. This is the most important change. A new feature is the enclosure of the two new units in concrete walls and the providing of concrete wind sheilds at the outer sides of the filters. This device will prevent impurified sewage from passing beyond the filters onto the ground.

It is considered that the three filters when built will be able to satisfactorily take care of a dry weather flow of seven and one-half million gallons daily and of a wet weather flow of ten and one-half million gallons daily, or fifty per cent. in access of the quantity covered by the Weand contract. The new units are to be built by the city or by the city and by Contractor Weand. Councils have appropriated money for the immediate erection of one filter unit and its corresponding settling basin and competitive bids have been asked for this work. The other filter unit and settling basin is to be built in the immediate future either by the city or under the Weand contract mentioned in the said permit of February twenty-fourth, as soon as a disputed question shall have been settled about the interpretation of the Weand contract. In any event the plans herein under consideration are bound to be followed.

The city also purposes, in accordance with the plans submitted for approval, to build an earth levee around three sides of the disposal works and carry the top to above the extreme high water of which there is any record. And within this area adjoining the settling basins it is proposed, at intervals as required, to pump the sludge from the small settling basins. Since this sludge shows no signs of being putrescible, it is believed that this arrangement for drying out the material should satisfactorily and permanently take care of the sludge question. It is proposed that the dried out material shall be ploughed in. The soil is sandy and the liquid will soak into the ground.

A plan for the disposal of sludge from the sewage tanks at Millmont is submitted for approval. It shows a lagoon to be built by throwing a dyke around the low lying land between the tank and the river. Ordinary highwater will not reach the lagoon. The dyke is protected by a suitable stone rip-rap on the outside slope to prevent its being washed away. It is proposed to pump the upper twelve feet of the contents of the settling tank into the pipe leading to the filters on Fritz Island and then to pump the remaining four and one-half feet of sewage and sludge into this lagoon at intervals of about six weeks. Over this sludge it is proposed to place chloride of lime as a safeguard against objectionable ordors. At the expiration of certain proprietory rights in the so called septic process it is probable that the lagoon area which covers something like two acres will be used less often than during the time that the tank has to be emptied every few weeks. If the experiment of drying out the sludge in the auxiliary pool or lagoon should prove satisfactory, probably this would settle the question of sludge disposal at Millmont for all time. Otherwise other expedients must be adopted because no nuisance be set up with the works.

It appears upon investigation with respect to the daily records of the operation of the entire sewage disposal works, beginning at the pumping station, that such records have not been kept, except the record of pumpage, but since a good deal of the sewage pumped overflows to the river at the septic tank, there is no means of knowing how much or how little sewage is received at the filter plant except by estimation.

It further appears that the city has made frequent analyses of the crude, settled, filtered and resettled sewage and effluents, and that the plant has been operated under the responsible supervision of the experts who designed it, but the city has neglected to file these records in satisfactory form with the Commissioner of Health as required and stipulated.

The fact cannot be emphasized too much that the essence of the entire sewage works of the city is to remove poisons away from habitations and secure their destruction without harm to anybody. The operation, therefore, of the purification plant is the vital point and it is with the standard of this operation that the State Department of Health is most concerned in order that sewage shall not be discharged into the waters of the State. And satisfactory evidence of this, in the form of reliable record, must and shall be regularly filed with the Commissioner of Health.

From the information now at hand, it appears that the filtered sewage will not putrify upon standing at blood temperature, that it has no objectionable odor, that the oxygen consumed averages less than eighteen parts per million, and that after settling the sewage is of satisfactory appearance, averaging less than thirteen parts per million of suspended matter, all of which is indicative of the ability of the plant to satisfactorily dispose of sewage. But daily evidences of this must be recorded. Blanks on which to record the essential facts in the daily operation of the disposal works must be prepared and approved by the State Department of Health and be used.

It has been determined that the interests of the public health will be subserved by approving plans for the proposed additions to the purification plant and for the sludge drying areas in connection therewith, and the same is hereby and herein approved and a permit and decree issued therefor under the following conditions and stipulations:

FIRST: That one filter unit and one settling basin and the sludge drying area adjacent to the filters and the sludge lagoon at Millmont shall be built during the current season in conformity with the plans proposed and herein approved, and that the construction of the second filter unit and settling basin herein approved shall be accomplished not later than the close of the year nineteen hundred and nine, provided, however, that if it should appear an evidence to be submitted by the city that public health would not be endangered by the extension of this time twelve months, then the Commissioner of Health may so extend the time, but application for such extension shall be made, if made at all, on or before July first, nineteen hundred and nine.

SECOND: Within one month from the date of this permit the city shall submit blank forms of daily records of the operation of the disposal works as specified in the said decree of February twenty-fourth, hereinbefore quoted, and the Commissioner of Health may change such form and, as modified or approved, they shall be used by the city and copies filed with the Commissioner of Health.

THIRD: The plans for sludge disposal are approved under the stipulation that if the methods do not prove satisfactory then remedies shall be adopted satisfactory to the Commissioner of Health. And the general conditions and stipulations of the permit of February twenty-fourth, nineteen hundred and eight, shall operate to include the additions to the disposal works herein approved.

Harrisburg, Pa., July 1st, 1908.

READING, BERKS COUNTY.

This application was made by the city of Reading, Berks County and is relative to sewerage.

The said communication of July twenty-ninth, one thousand nine hundred and eight was as follows:

"Hon. Samuel G. Dixon,
"Commissioner of Health,
"Capitol, Harrisburg, Pa.

"Dear Sir: The City of Reading herewith ask to be relieved from the responsibility of taking care of the sludge produced at the so-called septic tanks at Millmont until the expiration of the Weand contract under the following conditions, namely, that if during this period it shall become necessary to empty the tanks of any sludge accumulated therein, the emptying and the disposition of the sludge shall be done by the contractor to the satisfaction of the Commissioner of Health: and a notification to this effect from the Commissioner of Health to the Contractor is hereby required.

"On and after the expiration of the said Weand contract the city will assume all responsibility for sludge disposal, and accomplish such disposal at the so-called septic tanks in conformity with the requirements and under the plans approved in a decree issued to the City of Reading by the Commissioner of Health under date of July 1, 1908.

"The City now holds the said contractor responsible under the said contract to the full terms of the contract and under these terms the contractor must take care of all the sewage up to 7,000,000 gallons delivered at the so-called septic tank. The contractor is not obligated to filter all of this sewage until the expiration of his contract which expires on September 1st, 1911. This is the reason for the city assuming the responsibility for the construction of the additional filter until at this time; but such responsibility does not obtain at the so-called septic tanks."

"H. P. KEISER,
"City Solicitor."

It appears that the permit issued by the Commissioner of Health to the City of Reading on July first, one thousand nine hundred and eight, was in response to an application for approval of sewage disposal plans submitted by the city. Since that time the solicitor for the city has arrived at the opinion that the sewer contractor is wholly responsible for the operation at the so-called septic tank at Millmont.

It is not the office of the Commissioner of Health to interpret the terms of a contract between a city and a contractor. The city or its proper officer or agent must be held accountable relative to the provisions of Act one hundred and eighty-two approved April twenty-second, one thousand nine hundred and five. Since the proper officer of the city in his official capacity as solicitor has determined that the city's responsibility to keep sewage out of the waters of the State from the so-called septic tank at Millmont has been temporarily shifted under contract to Mr. O. M. Weand, there would appear to be no objection to granting the request of the petitioner.

It has been determined that the city be notified that the request hereinbefore stated has been acceded to and that Mr. O. M. Weand will be notified that he will be held accountable for the operations at the septic tank, but that in the event of failure on the part of said O. M. Weand to take care of the sewage and sludge in a satisfactory manner at Millmont septic tank the Commissioner of Health will hold the contractor and the city jointly responsible.

This decree shall be supplementary to the said permit of July first, one thousand nine hundred and eight, issued by the Commissioner of Health to the City of Reading. It shall not in any way be construed as altering or affecting the provisions of said permit of July first, one thousand nine hundred and eight, except with respect the operations at the Millmont septic tank, so-called, and before this decree shall be operative, it and the said permit of July first, one thousand nine hundred and eight, shall be recorded in the office of the Recorder of Deeds for Berks County.

A copy of this decree will be furnished to Mr. O. M. Weand.

Harrisburg, Pa., August 14th, 1908.

REYNOLDSVILLE, JEFFERSON COUNTY.

This application was made by the borough of Reynoldsville and is for permission to extend its sewer system and to discharge the sewage therefrom into Soldier Run within the limits of the borough.

Reynoldsville is a trading and manufacturing centre for a local district in the western central part of Jefferson County. The incorporated territory, which contains an estimated population of four thousand, extends along the east bank of Sandy Lick Creek a distance of about a mile and back therefrom nearly the same distance. Opposite Reynoldsville is the new borough of West Reynoldsville, where possibly a thousand people reside and where is located the passenger station on the Buffalo and Allegheny Division (low grade branch) of the Pennsylvania Railroad system. This road affords the principal transportation for the district either easterly to Philadelphia or westerly to Pittsburgh. There is a spur of the Buffalo, Rochester and Pittsburg Railroad leading from some coal mines in the vicinity of Reynoldsville up the valley of Sandy Lick Creek to the main line at Falls Creek borough in Jefferson County.

The bituminous coal deposits in the region are extensive. The miners live in settlements near the coal operations. The agricultural resources of the surrounding territory are extensive. The land is rolling, well drained and under a good state of cultivation.

Within Reynoldsville borough there is a woolen mill and in the township near the borough boundary are located a tannery, woolen mill, silk mill and distillery. The census population of nineteen hundred was three thousand four hundred and thirty-five. It is clearly within the bounds of probability that the future may witness even a greater percentage of growth of population than has occurred during the last decade, so that the consideration of a sewerage project should rightly take these things into account.

There are two tributaries to the creek which flow down through the borough from the east and divide the town into three parts, a west end, the central part and the south side. The northerly one of these streams is known as Pitch Pine Run. It rises in the hills two and a half miles distant and flows southwesterly to and through the borough to Sandy Lick Creek. Its waters furnish the public supply to the town. It is an open channel throughout its course. The southerly stream is named Soldier Run. It rises in the hills in the extreme eastern part of Winslow Township, takes a westerly course, gathering in the waters from several lesser streams along which there are mining operations, and passing through the lower portion of the borough joins Sandy Lick Creek about half a mile below the mouth of Pitch Pine Run at a point about eighteen hundred feet above the intersection of the southerly borough line and creek.

The land in Reynoldsville south of Soldier Run, known as the south side, is a new and growing part. The slopes are not steep and the surface drainage is to the run.

The old and central and business section of the town lies on the sloping ground between the two runs mentioned and ascends from the main stream and the said tributaries to a summit and ridge which is elevated about one hundred and fifty feet above the valleys. Main Street extends from the Pennsylvania Passenger Station in West Reynoldsville easterly across the creek and over Pitch Pine Run and thence along the foot of the ridge and up Soldier Run valley. At right angles to it, beginning at Sandy Lick Creek, the streets are numbered from First to Tenth Streets. The Buffalo, Rochester and Pittsburg depot is at the foot of Fourth Street near the mouth of Pitch Pine Run.

The west end is well built up, principally by residences. A high ridge terminates here which sheds the water either into the run or the main creek, the distance being short.

The general appearance of the borough substantiates its reputation as a thriving business and residential community. There are public sewers and a water works system. Some parts of the town have not been reached by these improvements. As a general rule, the inhabitants use the public supply. It is reported that not over one-half of the occupied estates abutting public sewers have house connections. Privies are in very general use, but cesspools are rare. Sink drainage usually goes onto the surface of the ground. Modern sanitary facilities are being gradually put into the houses, and there is a demand for sewerage facilities. The general health of the community is reported as satisfactory. While undoubtedly it is true that the public welfare may demand an extension of sewers, it is also true that attention should be paid to the preservation of the purity of the general public water supply, and any wells that there may be in town whose location is near sources of pollution should be tested and condemned and abandoned, if the examination reveals contamination.

The water works system is owned by the Reynoldsville Water Company. On Pitch Pine Run has been erected an impounding reservoir which stores the waters which are yielded from the area above. About thirty-six hundred feet below this reservoir, on a branch of the run, is a small reservoir into which the flow from the tributary is delivered. The water from the larger reservoir is also conducted into the lower reservoir, there being a six inch line connecting the two. Along the line of this pipe are two drilled wells, from which water sometimes is pumped into the said pipes, the machinery used being the ordinary oil well apparatus. At the lower reservoir is a pumping station by means of which the water is raised into a distributing reservoir on the hill back of the town, from whence the water is distributed by gravity to the consumers in Reynoldsville and West Reynoldsville. Detail plans of the works have not been submitted by the company. On the day of the Department's inspection it was ascertained that on the water sheds above both reservoirs there are occupied estates at which menaces are likely to be established at any moment. A system of sanitary inspection must be established and maintained in order that no pollution whatsoever of the waters flowing either directly or indirectly into the sources of public supply to the inhabitants of Reynoldsville and the water district shall occur.

There are two public drinking fountains along Main Street in the centre of the town which are supplied from a spring located in the basement of the Presbyterian Church. On the hillside above the church in the vicinity are three cesspools and a number of loose privy vaults. The geological formation is loose shale rock. The natural drainage appears to be directly towards this spring. Under these circumstances, suspicion is at once attached to the wholesomeness for drinking purposes of the water supplied to the fountain from the spring. It was under conditions like this that a typhoid fever epidemic was created at Ridgway, Pennsylvania, during the season of nineteen hundred and seven.

The disposal of sewage, whether it be onto the ground or into the ground or into a flowing stream or a still body of water, may be dangerous. In a thickly settled community the waste products should be removed from the premises as speedily as possible and sewers are the cheapest and most efficient means of transmission.

There are five public sewer outlets in the borough, one of them being into Soldier Run, three of them being into Sandy Lick Creek and the other being into Pitch Pine Run. All told, the sewers aggregate a length of three and seven-tenths miles, their diameters ranging from eighteen to four inches and they take both sewage and storm water.

There is a small district in the west end served by fifteen inch sewer which is nine hundred feet long and empties into the creek at the up-stream side of the highway bridge at the foot of Main Street. There is an eight inch private sewer about three hundred feet long which empties into the creek on the down-stream side of the bridge. The creek here is about fifty feet wide. During dry weather the flow is small and the water shallow. The discharge of sewage from this point creates a nuisance to the occupants of the buildings in the vicinity and to the traveling public who must use the bridge in crossing the creek. Above the bridge in Reynoldsville are at least three private properties sewering into the creek.

The larger part of the west end and the major portion of the business section of the town is comprised in the main sewerage district, whose outlet, a fifteen inch pipe, is into Pitch Pine Run at the foot of Third and Jackson Streets just above where the two eight inch private sewers from the Reynoldsville Woolen Mills empty into the run. The run is an open course to the creek, distant five hundred feet. A nuisance exists all along it. Not infrequently the borough is obliged to remove the deposit of sewage from the channel. The contributing sewers aggregate two and two-tenths miles in length.

Into the same run within the borough excrement is deposited from the overhanging privies and private sewers discharge from some abutting properties. The Sykes Woolen Mill and the distillery are located on the banks just beyond the borough and the drainage and trade wastes from them are discharged into the run. In the summertime, when the water works reservoirs are diverting all of the upland waters, the flow in Pitch Pine Run is practically that only which is contributed by the sewers except during rains.

There is an eight inch public sewer at the foot of Swamp Alley which discharges into the creek. It begins at the National Hotel on Main Street and its total length is about one thousand feet.

At the foot of Fifth Street there is a fifteen inch sewer discharging into the creek. It serves a district in the lower central part of the borough along west of Jackson Street. The outlet and connecting sewers, the smallest of which is ten inches in diameter, aggregate a total length of two thousand feet.

The public sewer into Soldier Run is at the foot of Tenth Street. The pipe is fifteen inches in diameter and it serves that portion of the borough and Soldier Run valley lying east of the run and at present sewered. The smallest pipe is eight inches in diameter. The total length served by the outlet approximates four thousand feet. Along the run above this point on both sides of the stream in the borough the settlements are commonly spoken of as Snydertown. Here there are no public sewers. Sink drainage and slops are deposited into street gutters and on the ground.

All that portion of the borough lying south of Soldier Run and the portion east of Tenth Street is without sewerage facilities, excepting such private sewers as may have been built and discharge into the run. The local authorities propose to construct a sewer along Bradford Street from the stream southerly to the borough line. The pipe is fifteen inches in diameter and is to serve as the outlet for lateral sewers to be provided in the district later. The plan for this sewer does not show manholes or other facilities for proper maintenance.

From the several mining operations on Soldier Run water shed is discharged daily a considerable volume of sulphur water and the characteristics are evidenced all along the stream to its mouth. The petitioners represent that this acid germicide will neutralize sewage poisons which may be discharged into the waters from the proposed sewer. Sandy Lick Creek above Reynoldsville also receives mine drainage even above Dubois.

Sandy Lick Creek rises in Clearfield County east of Dubois in the Allegheny Mountains at the summit of the divide between the great Susquehanna and Ohio River basins and takes a generally westerly course for twenty-seven miles to the confluence with the north Fork and the borough of Brookville, Jefferson County, whence the stream continues southwesterly under the name of Red Bank Creek, forming the boundary line between Clarion County to the north and Armstrong County to the south, to the Allegheny River, which it enters a short distance below East Brady borough. In its course below Brookville, a distance of forty-five miles, which is also traversed by the Pennsylvania Railroad (low grade branch), there are five small boroughs, the largest of which has a population of about twelve hundred. Brookville is twelve miles below Reynoldsville. It is the county seat and has a population of under three thousand. So far as the Department is aware, the stream from DuBois to the Allegheny River is not used for public water supply purposes. The adjacent country is mostly wild and the banks high and precipitous, becoming more so as the river is approached, until within the last stretches the valley is a deep, narrow gorge. The harm which sewage might do in this stream would be secondary in extent to that which it might do after reaching the Allegheny River, the waters of which are very extensively used for potable purposes. It is in the interests of public health that Red Bank Creek and its tributaries should be preserved from pollution by sewage, since sewage discharged anywhere on its water shed might be transmitted in a day's time to the public water works of the municipalities along the Allegheny River below.

Falls Creek borough is on Sandy Lick Creek at the mouth of Falls Creek in Jefferson County at the Clearfield County line. It is a borough of about one thousand population. Here there is a large tannery owned by the Elk Tanning Company from which the wastes are discharged into Falls Creek branch and the pollution is markedly evident in summer time.

At DuBois borough, two and a half miles above and northeast of Falls Creek borough, on Sandy Lick Creek, where reside ten thousand people, there is a large tannery known as Van Tassel's, from which trade waste is discharged into the creek. The sewers of the town also empty into the stream.

Just above Reynoldsville, in West Reynoldsville, there is a large tannery owned by the Elk Tanning Company, whose trade wastes are discharged into Sandy Lick Creek. There has been complaint in Reynoldsville about the stench during low water stages, owing to the sewage from the above mentioned places. The water shed is about one hundred and ten square miles in extent at this point. The farmers along the stream below Falls Creek and above Reynoldsville have occasionally complained about the pollutions and the injury to cattle pastured along the banks who wade in the waters and drink thereof. In the fall of eighteen hundred and ninety-seven, anthrax became epidemic among cattle belonging to farmers whose properties are along Sandy Lick Creek in this territory.

It appears that during high water the sewage waters overflow the banks and cause deposits over the meadows to the damage of hay crops and injury to cattle pastured in the field or that eat hay gathered from the meadow. It was contended by physicians and experts that the cattle which died from anthrax poison had drank the creek water polluted by the wastes from the tannery. The sewage from Reynoldsville may not be a greater menace to public health than the tannery wastes. Undoubtedly both should cease to be discharged into the waters of the State. Under the law of nineteen hundred and five, it is the duty of the Commissioner of Health to stop stream pollution. It is reported that the assessed valuation of Reynoldsville is about one million dollars and that its borrowing capacity to the constitutional limit of indebtedness, taking into account the present debt, is in the neighborhood of fifty thousand dollars, a sum insufficient to establish a sewage purification works for the treatment of the mingled sewage and storm water. The present sewer system seems to have been built with the idea of discharging the sewage and storm water at the most convenient points into the streams. Owing to their small sizes, the sewers are inadequate to carry off all of the storm water of intense downpours, nevertheless, their total discharge at such times would require the building of a large purification plant whose cost would be prohibitive. When the time shall have arrived for the actual construction of disposal works, only house drainage and a very limited amount of roof water should be delivered to the plant. Meantime, whatever sewers may be built should be a part of a comprehensive plan. The State authorities could not justly approve of desultory sewer extensions which ultimately would be abandoned. The borough should at once employ competent engineering service to devise a sanitary sewer system for the entire territory within its limits, using as much of the existing system as may be practicable. After such a plan is approved by the State authorities, the borough can then build sewers from time to time as called for in any street or streets, conforming to this general plan, and in this way secure the greatest economy and efficiency. The perfected plan should aim to collect and intercept all existing sewers both public and private, including the industrial wastes. Wood scourings are a particularly difficult kind of waste to treat. This can be done better in a public plant than in a plant installed therefor at the mill. It is the policy of some municipalities to foster its industries and one way is to afford a sewer outlet. Of course, such suspended matters as might be in the sewage whose admittance to the sewer would endanger it or interfere with its function would be removed on the premises before the liquids were discharged into the sewer.

It is certain that all improper disposal of sewage in the borough and adjacent thereto must cease and that plans to obviate pollution must be adopted.

West Reynoldsville has applied for admission to install a system of sewers. It will be much cheaper for this borough and Reynoldsville to adopt a joint intercepting sewer and sewage disposal plant than for each to act independently.

It has been determined that the proposed Bradford Street sewer with the temporary outlet into Soldier Run will subserve the interests of the public health, and a permit be granted therefor and it is hereby and herein granted under the following conditions and stipulations:

FIRST: This right to discharge sewage into the waters of the State shall cease on the first day of May, nineteen hundred and eleven. If on that day the other terms of this permit shall have been complied with then the Commissioner of Health may extend the time in which sewage shall continue to discharge into the waters of the State. But this three year permit is contingent that the borough shall prepare a comprehensive plan of a sanitary sewage system and sewage disposal works for the collection of the sewage of the entire borough and for its treatment and shall submit the same to the Commissioner of Health for approval on or before the first day of May, nineteen hundred and nine. The Commissioner of Health may modify, amend or approve such plans and fix the time for the erection of the disposal plant, having in mind the date when other municipalities in the district shall be required to treat their respective sewages.

SECOND: The Bradford Street sewer shall be designed so that it can become a part of the comprehensive system for the entire borough, or it shall be designed to ultimately serve only as a storm water drain.

The importance of joint action between the boroughs of Reynoldsville and West Reynoldsville is emphasized and the adoption of the suggestion urged.

The attention of the borough council is particularly drawn to that part of the discussion relative to well water and the spring now supplying the public fountains. The suggestions should be followed.

The State Department will assist the water company to maintain sanitary conditions on the water shed and the subject of treatment of the wastes from the tanneries will be taken up with the owners thereof.

Harrisburg, Pa., May 8th, 1908.

RIDGWAY, ELK COUNTY.

This application was made by the borough of Ridgway, Elk County, Pennsylvania, and is for permission to extend its sewer system and to discharge the sewage therefrom untreated into the Clarion River within the limits of the borough and also into said river at a point in Ridgway Township.

It appears that the borough of Ridgway is located in Elk County on the banks of the Clarion River. It is a manufacturing community of about sixty-seven hundred inhabitants, prosperous, substantial, and the county seat. It is the location of the general offices of the Elk Tanning Company. There are two other boroughs in the county besides Ridgway. One is St. Mary's, eight miles above on Elk Creek, a tributary of the Clarion River, and the other is Johnsonburg, five miles above Ridgway on the river. Both have smaller populations and are of less importance than the county seat. The municipal territory lies on either side of the river and the creek. Ward One, the oldest portion of the town, where the principal residences, hotels, stores, the public square and county buildings are located, comprises the district east of the river and south of the creek.

Ward Two, locally known as West Ridgway, where the Ridgway Tannery is located, comprises all of the borough west of the river.

Ward Three, where the principal industries are located, including the Ridgway Machine Works, Russell Car and Snow Plow Works, Eagle Valley Tannery, Machine Shop and Tannery, Dynamo and Engine Works, comprises the district north of the creek.

Surface drainage in the town is into these streams and a tributary of Elk Creek, known as Gallagher Run, which rises in the township southeast of Ridgway and comes down through a deep valley into the borough. Its upper waters are impounded and used as a part of the municipal water supply. The town also has a system of drilled wells located on the flat near the river in Ward One. In case of emergency, water may be supplied from the drilled well system located on the banks of the river at the works of the Dynamo and Engine Company and the Elk Tanning Company. This emergency source and drilled well system are to be abandoned on the introduction of the new source of supply approved by the Commissioner of Health and obtained from Mill Creek and subjected to mechanical filtration.

Numerous private springs outcropping part way down the hillside, or at their foot below dwellings along the railroads and highways, are very generally used by the inhabitants for drinking purposes, even where public water is introduced into the houses. Much of this water has to be carried in buckets. Some of it is piped to a limited number of houses. Typhoid fever has been prevalent for a number of years. Cases in sufficient number to amount to a small epidemic have broken out each spring among workmen in certain shops, or in neighborhoods using certain spring water, or in dwellings supplied by public water, and these outbreaks have occurred year after year. Various investigations and conclusions condemnatory of the existing borough water works and of some of the private springs have been made public. This finally crystalized into public sentiment expressed by an overwhelming majority of votes at a municipal election held on the twenty-second day of July, nineteen hundred and seven, favorable to a bond issue to defray the cost of a new source of public water supply for the town. The epidemic of nineteen hundred and seven, totalling over three hundred cases, broke out among those who had used the County Spring water and this spring, with many others in the borough, was condemned by the Commissioner of Health.

The newer portions of the town are being built on the hillsides. The older portions are largely on the more gradual slopes of the foothills. The low lands along the streams have been pre-empted by railroads and the industrial plants. The geological structure in the conglomerates, interspersed with clays. Rain water is stored in the porous ground on the higher elevations and then percolates downward until it finds some impervious stratum, whence it follows the dip and outcrops on the surface part way down the hill or maybe at the foot thereof. A number of cellars on the hillside have springs in them. There are about seventy-five private springs and wells in the borough. Cesspools are practically unknown. Away from sewers, kitchen waste is thrown onto the ground or drained into street gutters. Excrement is deposited in loose earth vaults. There are hundreds of such structures in the town, mostly on the hillside and frequently above the springs and wells, the waters of which they continually menace.

The borough began the construction of a separate sewer system in nineteen hundred and four and it has since made extensions yearly, doing this without knowledge

of the law requiring a permit therefor from the State Department of Health, so it is represented. The local authorities wish now to secure permission to complete the sewer system, which is about half built. Roof water is admitted to the public sewer, but this may be cut out of the system and discharged into the street gutters, should such an expedient prove necessary.

The borough's policy respecting surface drainage is to conduct water by street gutters into the nearest or most convenient water course. Sometimes this is done by pipes.

The public sewer system has six outlets, four of which are into the river and two into the creek.

The one farthest down stream is twenty inches in diameter. It is in Ridgway Township and discharges into Aylworth Run at the railroad bridge near the river just below the tailrace of the Acton Tool Company's mill and immediately above the Ridgway Tannery. It serves the larger part of West Ridgway district, in fact, all of it lying on the hillside above the Buffalo, Rochester and Pittsburgh Railroad. The sizes range from six to twenty inches in diameter and the pipes were laid during nineteen hundred and six. The settlement comprises the dwellings of the employes of the tannery. The latter is in Ridgway Township. The mill race above referred to begins at the dam across the river about one thousand feet above the highway bridge at Main Street over the river, and it extends along the edge of the flats to Aylworth Run, a distance of about four-fifths of a mile.

The next public sewer outlet is eight inches in diameter. It serves the dwellings on the flats in West Ridgway, passes under the mill race and down Gillis Street across the low lands subject to flood and discharges at the west bank of the river at the foot of Gillis Street opposite the outlet of the main sewer of the town.

The third public sewer outlet is twenty inches in diameter and it is the main interceptor for all of the public sewers for the districts in the borough east of the river, comprising Wards One and Three, although some of the sewers have not been intercepted, but will be when the entire plan is carried out. Beginning at the outlet opposite the Gillis Street sewer, the course of the interceptor is up stream, across low land, between the Ridgway and Clearfield Branch of the Pennsylvania Railroad and the river, passing under main street and Elk Creek near its mouth into Ward Three, and thence continuing northerly along the railroad embankment and over or by land and the plant of the Eagle Valley Tannery and thence, at right angles, under the railroad to Broad Street, and thence northerly in Broad Street twenty-two hundred feet to the summit. The twenty inch pipe terminates where the sewer passes under the railroad. In Broad Street it is twelve and eight inches in diameter. The entire length of the intercepter is about six thousand feet. Broad Street is the main thoroughfare along the river in the north part of the town. The section is locally known as Eagle Valley and in some of the streets during nineteen hundred and six sewers were built and connected to the Broad Street main. Where the intercepter passes under the creek it is imbedded in a concrete cradle which projects above the bed of the creek and so forms a dam, which in dry weather creates a pool. By reason of the discharge of sewage into Elk Creek above a nuisance is created, more especially at the said pool.

The fourth outlet into the river is fifteen inches in diameter. It discharges at a point in the extreme northern part of the borough a few hundred feet below the site of an old dam across the river. The contributing area is small and occupied by dwellings only. It is below this district, on the river bank, where are located this Dynamo and Engine Works, the brick yards, the Elk Tanning Company's machine works and the Eagle Valley Tannery, the principal industries of the borough.

The first public sewer outlet into Elk Creek is about eleven hundred feet up stream from the mouth of the creek at the foot of Allenhurst Avenue extension, at the mouth of Gallagher Run and the tail race of the mill which was formerly operated by water power produced by a dam across the creek near the head of Allenhurst Avenue. This race extended parallel to said avenue and a short distance south of it. About ten years ago, owing to the nuisance from stagnant water and pollutions in the race, it was abandoned and filled up. Only remnants of the dam now appear in the creek. The sewer is fifteen inches in diameter and it has a connection in Broad Street. At present there are few buildings connected to the sewer.

The second public sewer outlet into Elk Creek is about four hundred feet above the Broad Street bridge. It is eight inches in diameter. It takes both sewage and surface water from low land and a few dwellings north of the creek and the main line of the Philadelphia and Erie Railroad, which passes down Elk Creek Valley north of the stream in the borough and thence up along the north bank of the Clarion River.

At the present time there are a large number of private sewers in Ward One. They have been built without record, in a desultory manner and to serve local purposes. Many of them are of faulty construction and in a bad state of repair. Some of them are partially filled up and altogether they are a menace to public health. There is no way afforded to inspect these old drains, or to repair them, except to actually dig them up. Their courses, in some instances, follow what were formerly natural water courses, diagonally across lots which are now occupied by business blocks, hotels and dwellings. Their outlets are into Elk Creek, Gallagher Run and small water courses. The location, name and size of the principal private sewers discharging into Elk Creek are given in the following table:

Location.	Name.	Size
Elk Street,	Elk Street Sewer,	8-inch.
Main Street, foot of Elk,	Metoxet Culvert Sewer,	About 2 feet square.
Between Main and Race Streets,	County Spring Culvert Sewer,	About 2 feet square.
Foot of Race Street,	Race Street Sewer,	18-inch.
Gallagher Run,		
West of Depot Street,	Catholic Church Sewer,	8-inch.
Foot of Depot Street,	Depot Street Sewer,	10-inch.
East of Depot Street, North Bank,	Norton Sewer,	10-inch.
East of Depot Street, North Bank,	Kellam Sewer,	8-inch.
	Russel Plow Works,	
Foot of Eighth Street,	Brenen Sewer,	8-inch.
	Ridgway Machine and Tool Co.,	8-inch.
Above Railroad Bridge,	Ely Sewer,	8-inch.

Elk Creek empties into the Clarion River immediately above Main Street Bridge. It parallels Main Street easterly for about four hundred feet to the foot of Elk Street, this portion passing under the Clearfield Branch of the Pennsylvania Railroad, and thence the stream's course is northerly for about fifteen hundred feet paralleling the railroad and at no place over six hundred feet from the river, thence it turns and the course is generally northeasterly, passing up stream under the Broad Street Bridge and the Depot Street Bridge.

The Elk Street sewer empties into the creek at the foot of Elk Street about two hundred feet above the obstruction to the channel caused by the intercepting sewer structure hereinbefore mentioned. Connected to this sewer, which is eight inches in diameter, are twelve buildings said to be owned by Miss Mayme McGloin and J. A. McGloin.

The Metoxet sewer is a stone culvert over a natural water way. This water way was probably improved at private expense. It operates as a main sewer, discharges into the creek near and just above Elk Street and from the outlet it passes obliquely across private property and under Main Street, Pine Alley, Centre, South and Metoxet Streets and in the latter street and up Cook Street, a total length of about twenty-four hundred feet. The culvert ends at Metoxet Street. Into this main sewer the following private sewers discharge:

Pine Alley, ...6 inches in diameter
Centre Street .....6 inches in diameter
South Street, ...8 inches in diameter
Jackson Street, ...6 inches in diameter
Metoxet Avenue and connecting laterals, ...6 inches in diameter

It is reported that the owners of the estates which are connected with the Metoxet sewer and its branches are as follows: Nine individual owners whose properties are connected to the Pine Alley sewer; one to the Centre Street sewer; six to the South and Jackson Avenue sewer; twelve to the Metoxet Avenue sewer and branches, and eleven to the main sewer itself.

The County Spring sewer is a stone culvert for part of the way along what was originally a natural water course beginning at a spring on the hillside at the corner of Spring Garden Street and Metoxet Avenue (known as the County Spring) and draining the central part of the borough. The culvert is covered over, is in a bad state of repair and there are no facilities afforded for cleaning out the closets or maintaining the sewer in a sanitary condition. It is open in two places. At its outlet, which is under a blacksmith shop on Main Street between Main and Race Streets, it is a wooden flume in a dilapidated condition and too filthy to be adequately described. In warm weather flies abound here and within fifty feet is the back porch and kitchen of a large hotel on Main Street. Into this sewer various private sewer lines and individual properties are connected. The structure is a decided menace to public health. Even where sewers are probably built and provided with modern appurtenances, constant care and supervision must be exercised to keep them clean and in a sanitary condition. The county sewer can be little more than elongated cesspool menacing public health. Into this main sewer the following private sewers are discharged:

County Jail (Main Street).
Centre Street.
Powell Sewer.
Cook Avenue.
Welsh Culvert.
Johnson Sewer.

It is reported that the following number of owners of sewers have connection with the County Spring Culvert sewer and its branches, namely: Two to the

County Jail sewer; two to the Centre Street sewer; five to the Powell sewer; five to the Cook Avenue sewer; three to the Welsh Culvert, and twenty-five to the County Spring culvert sewer itself.

With respect to the Johnson sewer, it was in this territory surrounding the County Spring that the original case of typhoid fever occurred from which the infection of the County Spring came. A Mr. Johnson had built a neighborhood sewer, which was in an unsatisfactory state of repair, and so during the epidemic the borough, under the advise of the State Department of Health, abandoned the use of this old sewer and laid six and eight inch public sewers in Stockholm, Spring Garden and Metoxet Avenues and connecting streets, terminating the same at the end of the stone culvert at Metoxet Avenue, where they continue to discharge into said culvert.

The Race Street sewer is an eighteen inch pipe. It empties into the creek at the foot of the street about two hundred and fifty feet above the Elk Street sewer outlet. It extends along Race Street to the east of Broad Street and connecting with it are two short sewers in Broad Street and another which has a branch in Main Street and the alley between Centre and South Streets. It is reported that the following owners of property have connected their estates to the Race Street sewer or its branches: twenty-five to the Race Street sewer and nineteen to the Broad Street sewer and branches.

Gallagher Run empties into the creek about six hundred feet up stream above Race Street. Into this run there is a sewer from the Hyde Murphy Company Planing Mill and also one from the restaurant in the basement of the Commercial Union and Telegraph Building.

The Klingle sewer, six inches in diameter, commences at Sheridan Street and extends to Gallagher Run, discharging the same at the culvert in Depot Street near Main. Connected to this sewer are the properties of John Klingle, Mrs. John Dyer and Bonini Brothers.

The Catholic Church sewer is eight inches in diameter, empties into the creek a short distance below Depot Street Bridge about eighteen hundred feet above Gallagher Run. This sewer serves the church, Sisters' Home and Parochial School.

The Depot Street sewer has an outlet into the creek just below Depot Street Bridge which is ten inches in diameter. Into it are discharged two private sewer systems known as the Depot Street system and the Clark sewer system.

The Depot Street sewer extends up this street to Main Street, where it branches in several directions. The lateral sewers are in the following streets, or are known by the names given below:

Main Street.
Brookville Road.
Dout sewer.
Hall sewer.
Lockhart sewer.
East Street sewer.
Kearsarge Street.
Little Avenue.
South Street.

It is reported that the following owners have properties connected to these sewers, namely: nine to the Depot Street sewer; five to the Main Street and Brookville Road sewer; five to the Dout sewer; four to the Hall sewer; seven to the Lockhart sewer; fifteen to the East Street sewer; ten to the Kearsarge Street Penfield sewer; eight to the Little Avenue sewer, and four to the South Street sewer.

The Clark sewer extends across private property just east of Depot Street to Allenhurst Street and thence to Sheridan and up Sheridan Street. The Allenhurst Avenue sewer and the Grant or Troxell sewer connect to the Clark sewer at Allenhurst Street. A sewer belonging to Murphy and Kline also joins the Clark sewer near the creek. The number of properties sewering into these pipes, which are principally eight inches in diameter, are as follows: The Murphy and Kline sewer has five connections to as many dwellings owned by the firm; there are ten connections to the Allenhurst sewer; seven to the Grant Street or Troxell sewer, and six to the Clark sewer in Sheridan Street.

The Norton sewer is a ten inch pipe and discharges into the creek on the north branch immediately above Depot Street Bridge. It extends up Front and First Streets and there are eleven properties said to have connection with it.

The Kellam sewer is an eight inch pipe and empties into the creek on the same side of the stream a short distance above Norton sewer. It serves a few houses abutting on Front Street. Connected with it are four properties.

The Russell Plow Works have a sewer to the creek about a half mile up stream above Depot Street.

The Brenen sewer is owned by J. H. Brenen. It serves a district north of the creek, where the men employed in the works of the Russell Car and Snow Plow Company and the Ridgway Machine Tool Company reside. There are eighteen dwellings connected with the Brenen sewer; the pipe discharges into the creek opposite Eighth Street.

The Ridgway Machine Tool Company has an eight inch sewer from its plant to the creek. It discharges into the creek a short distance above the Brenen sewer.

The Ely sewer is a small pipe extending from two dwellings to the creek in the extreme eastern part of the borough.

In the Eagle Valley district, Third Ward, the following industrial plants have sewers to the river:

Elk Tanning Company. Eagle Valley Tannery. Engine and Dynamo Works.	Eagle Valley Plant.

In West Ridgway, Ward Two, there were a number of properties along the mill race on Main Street which had a private sewer to the race. It is reported that these properties have been connected to the public sewer since the Department's inspection.

Into the river and the creek there are numerous individual house sewers not included in the above lists and there are quite a number of overhanging privies in the borough.

In the southern part of the borough, in Ward One, there is a small water course, herein named for convenience "Hospital Run," which rises in the hills back of Cardott Street, between Pine Street and Euclid Avenue, and thence flows down northwesterly under South Street and near Centre Street, passing by the borough water works pumping station and under the Pennsylvania Railroad, and thence turning at right angles it passes across a low marshy tract to the Clarion River. The territory east of the railroad is fairly well developed. Centre Street is one of the important thoroughfares of the town. The run under the railroad is confined to a thirty-six inch cast iron pipe. By the pump house the structure is forty-two inches in diameter, built of masonry. Under Swamp Alley and Long Avenue following the course up stream, the run passes obliquely across private property to South Street, and this part of it is confined in a wooden flume, or within stone walls planked over. Above South Street it is an open ditch, except where the run passes under Lincoln Avenue and Cardott Street. During the summer time there is very little flow in the run, except when there is a storm. Moderately extreme precipitations are liable to overtax the carrying capacity of the flume. At the time of the Department's inspection, in August, nineteen hundred and seven, the flow of the stream was principally the discharge of sewage from numerous private house drains. Comparatively few of the dwellings in the district are without some means of disposal of household waste by water carriage. Along the lower portion of the water course, where it is planked over, there are privies directly over the channel. Other privies have connections discharging directly or indirectly into the water course or the borough sewer, which is laid nearby. Other privies are of the ordinary type with shallow earth pits. In some portions of the district sink water and slops are freely discharged into the street gutters.

The sewage from the district, whether it be collected in the public sewer or in the water course, is finally gathered in a fifteen inch pipe by means of a bulk head built in the railroad culvert at its lower end, and thence it is delivered to the twenty inch main intercepting sewer of the borough system at the manhole in Centre Street; but the storm flow in excess of the capacity of the fifteen inch pipe overflows and follows the natural course of the stream to the river.

The public sewer discharging into the railroad culvert is a twelve inch pipe and its point of entry is at the lower end of the forty-two inch masonry structure and on the opposite side there is an eight inch private sewer passing by the rear end of the pump house up Centre and Elk Street. The public sewer has two forks, each twelve inches in diameter. One extends southerly along the railroad to South, and thence in South Street with branches in First, Second, Third and Powell Streets, and the other extending across private property by and near Hospital Run to South Street and thence up Pine Street.

The public and private sewers in the Hospital Run sewerage district are shown in the following table:

Location.	Name.	Owner.	Outlet.	Size.
Pump house,	Centre Street,	Private,	42-inch culvert,	8-inch.
Pump house,	South Street,	Public,	42-inch culvert,	12-inch.
Pump house,	Pine Street,	Public,	42-inch culvert,	12-inch.
Swamp Alley,	Monterey,	Private,	42-inch (upper end),	6-inch.
(Between Swamp Alley and South Street),	McCracken,	Private,	Hospital run,	4-inch and privy.
" " "	Scribner,	Private,	Hospital run,	4-inch.
" " "	Kline,	Private,	Hospital run,	4-inch.
" " "	McGinnis,	Private,	Hospital run,	4-inch and privy.
" " "	McGovern,	Private,	Public sewer,	8-inch.
" " "	Long Alley,	Private,	Public sewer,	8-inch.
" " "	Morgister,	Private,	Run,	4-inch and privy.
South corner Pine,	Hospital Sewer,	Private,	Public sewer,	
South Street,	Schell sewer,	Private,	Hospital sewer,	

It is reported that five properties are connected to the Centre Street sewer.

The Monterey sewer, sometimes called Smith sewer, begins at Cardott Street and is laid in Monterey, South Alley, terminating at the upper end of the forty-two inch culvert at the alley. Connected with it are eighteen properties.

The McCracken, Scribner, Kline, McGinnis, McGovern, and Morgister sewers are for individual properties or double buildings. The Long Alley sewer serves five properties, but since its discharge and that from other private sewers is into the public sewer, the municipality is accountable for any pollution subsequently resulting from the outlet or storm overflow hereinbefore mentioned.

The Elk County Hospital is located on the hillside between Grove Street and Euclid Avenue above First Street. A six inch private sewer extends from this hospital down the hill in first, Euclid and South Streets to Pine Street where it empties into the borough sewer extending from the foot of Pine Street across private property paralleling the run. The six inch public sewer in Pine Street discharges into the same twelve inch pipe which is known as the Pine Street sewer. Connected with the hospital sewer are the following branches: Grove Street, Euclid Avenue and the Schell sewer. On the main hospital sewer and its branches are reported to be, besides the hospital, sixty-one house connections.

It is reported that above South Street in Hospital Run there are four owners discharging sewage from their properties into the stream.

Plans submitted by the petitioners now under consideration contemplate the collection at one point in Ridgway Township north of the river below Aylworth Run in the vicinity of the Ridgway Tannery of all of the borough sewage.

In Ward Three a fifteen inch main is to be laid along the river to the northerly borough line for the purpose of intercepting all of the sewage from the industrial plants and other properties and from the fifteen inch outlet now discharging into the river near the upper dam hereinbefore mentioned. And in the Elk Creek district an intercepting sewer is to be laid up Front Street to the borough line for the purpose of taking the sewage of the Ely, Brenen, Norton and Kellam sewers and the public outlet in Ward One and conveying it under the creek to a proposed fifteen inch sewer to be laid in Allenhurst Avenue in Ward One.

In Ward One it is proposed that there shall be laid an eighteen inch main from the present intercepting sewer across the creek up stream along the western bank at the foot of the railroad embankment with branches to the Elk, Metoxet, County Spring, Race Street and Allenhurst sewers now existing. The extension of the Allenhurst sewer, above mentioned, is to intercept the Catholic Church, Depot Street and Clark sewers and by a branch serve the industrial plants further up the creek valley.

The existing main intercepting sewer outlet is to be extended under the river, thence down stream along the north bank to the site of the proposed disposal works and this length will intercept the present Gillis sewer and the twenty inch outlet for West Ridgeway.

The proposed sewers also contemplate laterals in all streets not now sewered. Storm water is to be excluded from new sewers, inspection manholes are to be provided at all street intersections and changes in line and grade, and automatic flush tanks will be ultimately installed at all summit ends.

Thus it may be seen that the plan contemplates the incorporation into the new system of all of the existing private sewers.

The petitioners represent that the borough wishes to construct at once an eighteen inch trunk sewer up Elk Creek valley with the connections from Elk, Metoxet, County Spring and Race Street sewers; also the Allenhurst Avenue extension and the extensions in Grant, Sherman and Sheridan Streets to intercept all of the private sewers now discharging in the vicinity of Depot Street; and the Monroe Street extension under the creek and up Front Street in Ward Three and the lateral sewers in First to Twelfth Street to intercept all sewers in the Hyde Hill district.

It is probably well within the facts to state that the typhoid fever epidemic of nineteen hundred and seven cost the community of Ridgway upwards of one hundred thousand dollars. The thoughtful citizens now realize the economy of the installation of sanitary methods of sewage disposal. Local sentiment is favorable to an improvement of the sewerage system and its extension to all parts of the town. The proposed plan is calculated to remove all poisonous matters from the vicinity of dwellings as quickly as possible and to discharge it into the river far below the borough and in order to accomplish this as speedily as possible it is purposed to incorporate the existing private sewers into the system.

While this is satisfactory as a temporary expedient, it should be temporary only.

The Clarion River rises in McKean County and the summit of the eastern boundary of the stream's area is the divide between the two great basins of the Susquehanna and the Allegheny River systems. The watershed above Ridgway is about two hundred and eighty-five miles in extent, including Elk Creek. Most of the land is within Elk County, is hilly, largely deforested and interspersed with narrow steep valleys in the horizon of the Kittanning coal measures. Johnsonburg is the principal place in the territory above Ridgway on the river. In that town and above it are paper mills, tanneries and chemical works from which large quantities of trade wastes are emptied into the stream and pollute the waters. The State has required the borough of Johnsonburg to prepare plans of improved sewerage with a view to some other method of disposal of sewage than into the river.

The borough of St Mary's is now constructing a new sewer system approved by the State Department of Health, which system was designed in connection with a purification plant, to be erected later.

Below Ridgway the river pursues a general southeasterly course to the Allegheny River, a distance of seventy-seven miles. In many places its banks are high and precipitous and the region traversed is sparsely populated and rural. So far as the Department knows, the waters are not used for drinking purposes except at Clarion, where there is an emergency intake. The citizens of this town complain that at this time the pollutions of the river cause a nuisance and that fish life is practically extinct. The water company obtains its source from drilled wells along the river and it may be never necessary to resort to the stream again for supply. Nevertheless, this is not a sufficient reason why the river should be used as an open sewer. It is the policy of the Commonwealth to preserve the virgin purity of its mountain streams as a public resource.

The borough of Ridgway is not financially able to erect a sewage purification plant immediately. However, the sewers should be built and extended in contemplation of treatment works at no distant date. This requirement demands the exclusion of storm water from the sewers because it is not practicable to purify the great bulk of mingled house sewage and surface drainage.

It is known that many of the private sewers are faulty, they serve as rain water drains and the public health demands their overhauling and reconstruction and, in some instances, entire abandonment. How many of them are suitable when repaired and provided with inspection manholes to be permanently incorporated into the borough sewer system can only be ascertained by critical examination. Without hesitation it may be concluded that the stone culverts and old water courses should be absolutely abandoned as carriers of sewage. They should be reconstructed under modern methods and be used exclusively for storm water and other pipes should be provided for sewage.

Owners who have been to considerable expense in laying down the private sewers or in connecting their properties to such sewers will be loath to undertake any further expense. There being such a large number of private sewers in the borough, approximately fifty per cent. of the population being served thereby, and the universal discharge of kitchen wastes and sewage being a general public menace would suggest that the local authorities should provide the remedy. Nevertheless, upon failure of the borough to do this, it would be incumbent upon the State health authorities to deal directly with the individual in discontinuing the discharge of sewage into the waters of the State.

The industrial wastes now emptied into the river total a large daily amount. This waste must eventually be treated and purified. Most municipalities afford a sewer outlet for such wastes, as being most economical and satisfactory policy for the community. This is an added reason why the borough should take up the problem and afford sewerage facilities to everybody.

When the sewer system should have been completed and all sewage shall have been delivered to the outfall proposed, it will be found that the manufacturing wastes may distinctly characterize the sewage and require peculiar facilities for purification.

All overhanging privies on banks of streams or the mill races should be at once removed, all public and private sewers to the streams should be discontinued as soon as practicable; the existing sewers should be overhauled and some of them abandoned, discharge of sewage and kitchen drainage into street gutters should cease, storm water should be excluded from the sewers, the sewer system should be extended as rapidly as possible and plans for sewage disposal works should be submitted within a reasonable time.

It has been determined that the interests of the public health will be subserved by approving the proposed sewer system under the following conditions and stipulations:

FIRST: All storm water shall be excluded from the sewer system and at the close of each season's work the borough shall prepare a plan of the sewers laid during the year and file the same with the Commissioner of Health, together with any other information in connection therewith which may be required.

SECOND: The incorporation of the existing private sewers and old natural water courses into the new sewer system shall be temporary only and is permitted in order that all of the sewer outlets in the central part of the borough may be discontinued immediately. On or before May first, nineteen hundred and nine, the borough shall critically examine all of the existing private sewers and culverts and determine which sewers or parts of such sewers are suitable when repaired to be permanently incorporated into the public sewer system and which sewers must be abandoned, and prepare a plan and report on the subject and submit the same to the Commissioner of Health for approval. Said Commissioner may modify, amend or approve the plan and issue a permit therefor.

THIRD: This permit to discharge sewage into the waters of the State shall cease on the first day of May, nineteen hundred and eleven, contingent to the other terms of this permit having been complied with. If on said date the borough shall have complied with the stipulations herein made, then the Commissioner of Health may extend the time in which sewage may continue to be discharged into the waters of the State.

FOURTH: On or before May first, nineteen hundred and eleven, the borough shall prepare a plan for a sewage purification plant and shall submit the same to the Commissioner of Health for approval.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the sewer system or any part thereof shall become a nuisance or menace or prejudicial to public health, then such remedial measures shall be adopted as the said Commissioner may advise or approve.

SIXTH: No pathogenic material from any laboratory shall be discharged into the sewer system; the proper authorities shall cause these wastes to be destroyed on the premises.

SEVENTH: The borough council shall, by ordinance or otherwise, provide for the compulsory connection of occupied estates with the public sewers, more especially in those cases where the discharge of sewage and sink water is now into the natural water courses or street gutters or onto or into the ground in the vicinity of private wells or springs.

The Commissioner of Health will notify the owners of individual sewers which now discharge into the natural water courses that such discharge must cease, preferably by connection with the existing public sewers or by extensions to the public sewer system.

The local authorities should pay special attention at once to private sewer outlets and overhanging privies along Hospital Run and Gallagher Run.

The sewage pool in Elk Street near Main Street should be forthwith abolished.

Harrisburg, Pa., July 15th, 1908.

RIDLEY PARK, DELAWARE COUNTY.

This application was made by the borough of Ridley Park, Delaware County, Pennsylvania, and is for permission to construct an outfall sewer and to discharge sewage through the same from existing sewers into Stony Creek, at a point outside the borough in Ridley Township.

It appears that Ridley Park, having a population of about two thousand, is a residential suburban community entirely within Ridley Township in the southeastern part of Delaware County, three miles west of the Philadelphia city line and on the Delaware Division of the Philadelphia, Baltimore and Washington Railroad. The municipal territory includes about one square mile, Crum Lynne Creek flows from its source in Swarthmore borough, which is one mile northwest of Ridley Park, southerly through the western part of the latter borough below which it empties into Crum Creek one mile above the mouth of the latter in the Delaware River.

From a point three miles north of Ridley Park, Stony Creek flows southerly, passing through the boroughs of Morton and Rutledge, along the western boundary of Prospect Park borough and through the eastern part of Ridley Park, three-quarters of a mile below which it joins Darby Creek half a mile above the mouth of the latter in the Delaware River. The mouth of Darby Creek is half a mile above the mouth of Crum Creek.

The village of Ridley Park is located in the central part of the borough, between Crum Lynne and Stony Creeks, and is rather compact, although the houses are not contiguous.

The Philadelphia, Baltimore and Washington Railroad passes through the town from northeast to southwest, dividing it into two equal parts and crossing the two streams. Parallel to this railroad is the Philadelphia Division of the Baltimore and Ohio Railroad, which passes just north of Ridley Park; also the Philadelphia and Chester Turnpike, which passes through the southern outskirts of the town. Several electric street railroads add to the transit facilities afforded the community.

Practically all the houses of Ridley Park are supplied with water by the North Springfield Water Company.

Sewerage improvements in Ridley Park were first started in about eighteen hundred and ninety-two. The western half of the town, comprising about one hundred and fifty houses on the slope draining westerly to Crum Lynne Creek, is pretty completely sewered. The sewage was first discharged into the creek within the borough. Later an outfall sewer, intercepting all of the sewage so that none of it is now discharged into Crum Lynne Creek, was laid to tide water and discharges into Crum Creek in RidleyTownship half a mile below the mouth of Crum Lynne Creek in the larger stream and half a mile above the mouth of the latter in the Delaware River. The course of Crum Creek below the Ridley borough sewer outlet is through tidal flats. This system now comprises three miles of fifteen inch, ten inch, eight inch, and six inch sewers. It is reported that several street inlets provide for the entrance of surface water into this system.

From a casual inspection it appears that Crum Lynne Creek is but slightly polluted. Just above the Philadelphia, Baltimore and Washington Railroad there is a dam which backs the water of the creek for a distance of about fourteen hundred feet, forming what is known as Crum Lynne Lake, which is used for boating and swimming. It contains many pond lilies and evidently considerable deposits of decaying vegetable matter. An unsightly privy overhangs the west bank of the creek at Ketcham Terra Cotta Works in the southern part of the borough. Crum Creek is polluted in Swarthmore and above it by trade wastes, gas house waste and domestic sewage, and just below the mouth of Crum Lynne Creek by the sewage from

a fifteen inch outfall sewer which receives most of the sewage of Swarthmore borough. Between this point and the outlet of the Ridley Park sewer, Crum Creek receives the sanitary sewage and trade wastes from a large plant of the Baldwin Locomotive Works located on the bank.

The northeastern part of Ridley Park, containing about one hundred and forty houses, mostly north of the Philadelphia, Baltimore and Western Railroad on ground sloping easterly to Stony Creek, is sewered by one and four-tenths miles of twelve inch, eight inch and six inch pipe sewers, discharging through a twelve inch outfall into Stony Creek within the borough halfway between the Philadelphia, Baltimore and Western Railroad and the Philadelphia and Chester Turnpike. Although it is not definitely reported that this system receives storm water, in general the sewers of the town are used to carry away roof water. A surface drain in the district sewered by this system discharges onto the surface of the ground south of the Philadelphia, Baltimore and Western Railroad.

The southeastern part of Ridley Park, comprising about forty houses south of Philadelphia, Baltimore and Western Railroad on ground sloping easterly to Stony Creek, is sewered by six-tenths of a mile of sewers discharging through a twelve inch outlet into Stony Creek just south of the Philadelphia and Chester Turnpike. This system is reported to receive considerable surface water. This outlet is only one hundred feet from the nearest residence and gives rise to extremely objectionable conditions during the summer months.

Systematic records of sewer extensions have not been kept. It is reported that numerous private sewers have been constructed connecting with the three systems described, which has considerably increased the total lengths of the sewers above the lengths already stated. These three systems, the one discharging into Crum Creek and two into Stony Creek, receive almost all the sewage of Ridley Park. Few or no cesspools and but few privies remain in use.

The surface drainage to Stony Creek above Ridley Park contains considerable household waste discharged to street gutters and the surface of the ground in the boroughs of Morton (population eight hundred and eighty-nine in nineteen hundred) and Rutledge (population three hundred and sixty-nine in nineteen hundred) and the village of Folsom, a scattered settlement on the west bank of Stony Creek in Ridley Township between Rutledge and Ridley Park, and a similar settlement known as Farrady Park on the opposite side of Stony Creek, and also from a recently developed section in the northwestern part of Prospect Park borough. It is reported that there are no sewers in any of these communities. In Morton there are privies close to the edge of the stream. Along Stony Creek, north of the Baltimore and Ohio Railroad, are the steam generating plant and car shop of the Philadelphia, Morton and Swarthmore Electric Railway. Pipes from the plant discharge into a pond formed by a dam at this point and a black scum on the water at the outlet of these pipes is evidence of pollution.

Darby Creek, above the mouth of Stony Creek, is greatly polluted by the sewage of the boroughs of Prospect Park, Norwood, Glenolden, Sharon Hill, Colwyn, Collindale, Darby, Yeadon, Aldan, Clifton Heights and Lansdowne, and the City of Philadelphia.

It is proposed to construct three thousand, three hundred and fifty feet of fifteen inch terra cotta pipe sewer along Stony Creek, for the most part on the west bank, to intercept the sewage of the two twelve inch sewers now discharging into Stony Creek within the borough and carry it down stream to tide water. The site of the proposed outlet is below Ridley Park in Ridley Township and about fifteen hundred feet above the mouth of Stony Creek in Darby Creek. The lower part of Stony Creek, below the proposed outlet, is dyked through low ground frequently inundated; and the same conditions exist along this part of Darby Creek. On the west bank of the latter, below the mouth of Stony Creek, are some fifty frame buildings used as boat houses, summer residences and a few of them as permanent residences. They have no modern conveniences.

This proposed fifteen inch sewer, from its upper end at the twelve inch sewer at the foot of Walnut Street to the twelve inch sewer in the Philadelphia and Chester Turnpike, a distance of one thousand feet, has a grade of one and six-tenths per cent.; for fifteen hundred and fifty feet below this point the grade is about fifty-five hundredths per cent. and for the remaining eight hundred feet two-tenths per cent. The object of the construction of this proposed sewer is to do away with the objectionable conditions at the present outlet into Stony Creek at the Philadelphia and Chester Turnpike.

The discontinuance of the discharge of the vast quantities of sewage now emptying into Crum Creek, Darby Creek and the Delaware River can only be accomplished gradually. Sewerage improvements installed by Ridley Park borough should have in view the ultimate purification of the sewage. Nearly all the municipalities discharging sewage into the streams in this vicinity have been ordered to prepare plans with this end in view. One of the most imperative reasons for the purification of this sewage being accomplished at as early a date as practicable is that a population of fifty thousand, centering in the city of Chester, is now supplied with drinking water, filtered, obtained from the Delaware at a point about three miles below the Ridley Park sewer outlets.

Nearly all of Ridley Park is at such an elevation that it is not impossible to provide for purifying its sewage before discharging it into the streams without resorting to pumping. The proposed Stony Creek outfall sewer, now under consideration,

will not deliver the sewage at a sufficient elevation to permit of its being purified. Furthermore, if this sewer be constructed, the sewages of the borough would be discharged into different streams at widely separated points, so that when the purification of the sewage is required it would be necessary to install two sewage disposal plants, or additional works for collecting the sewage to a single plant. It would be desirable in the interests of both economy and efficiency to dispose of the sewage of all of Ridley Park, and, if feasible, of Swarthmore, and Rutledge and Morton when these latter two boroughs are sewered, in a single purification plant.

The lower part of the twelve inch sewer in the Philadelphia and Chester Turnpike is reported to have a grade of about five per cent., at which grade it should have a carrying capacity of about four hundred and fifty-seven cubic feet per minute. Since it receives surface water from a considerable part of the twenty acres tributary to the district through which it flows, this sewer probably frequently receives, for periods of an hour or more, more storm water than it can carry and would, therefore, during such periods deliver to the proposed fifteen inch outfall sewer its full capacity, that is, four hundred and fifty-seven cubic feet per minute. The twelve inch sewer discharging at the foot of Walnut Street might at any time deliver sewage to the proposed fifteen inch sewer at a maximum rate of ten cubic feet per minute. Thus the total volume of sewage which might at any time be delivered to the proposed fifteen inch sewer below the connection of the twelve inch sewer at Philadelphia and Chester Turnpike is four hundred and sixty-seven cubic feet per minute.

This proposed fifteen inch sewer at the proposed grade of fifty-five hundredths per cent. would, however, only carry two hundred and ninety cubic feet per minute without flowing under pressure. The hydraulic gradient of flow in a fifteen inch sewer at the rate of four hundred and sixty-seven cubic feet per minute is about one and six-tenths per cent., so that in the proposed construction, when the assumed maximum amount of sewage was being discharged, the flow would back up in the fifteen inch sewer and in the two twelve inch sewers until it produced a head of thirty feet in the fifteen inch sewer at the twelve inch connection at the Philadelphia and Chester Turnpike, or until the pressure produced made an outlet for the sewage through manholes, street inlets or by blowing out the joints of the sewers. Even if such a pressure did not destroy the sewer line, overflowing of the sewage from the manholes on the surrounding ground might give rise to numerous nuisances and cause complaint along the line of the sewer. Manholes should be provided at suitable intervals for the inspection of the sewer and the flow of the sewage in it. To carry the storm water down stream would require a much larger and more expensive sewer than the one proposed. The discharge of storm water into the creek close to the town is not objectionable.

Therefore, before the sewage from the twelve inch sewers discharging into Stony Creek is turned into an outfall sewer to convey it to a more distant point, all storm water should be excluded from these sewers, and otherwise taken care of either in the street gutters or, if necessary, in short storm drains leading directly to the nearest water course. Roof water should also be excluded from the sewers or provision should be made for excluding it when the purification of the sewage is required, since this would add very materially and unnecessarily to the amount of sewage to be treated and to the size of the purification plant required.

It appears that the borough has not filed a report and complete plans of its existing sewer system with the Commissioner of Health as required by law; and, further, that, without the permission of the said Commissioner, the borough, in pursuance of an ordinance passed by the borough council on January thirty-first, nineteen hundred and seven, made an extension to its sewer system from Ridley Street north in Free Street, thence east in Dupont Street and thence north in Harrison Street to Russell Street, and that house connections to this sewer have been made.

The assessed valuation of the borough is reported to be one million, five hundred thousand dollars and its bonded indebtedness eighty thousand dollars. If these figures be true, the borough may borrow twenty-five thousand dollars without exceeding the seven per cent. constitutional limit and is amply able to defray the expense of having prepared a comprehensive sewerage design to be followed in future improvements and extensions.

It has been determined that a permit be denied, and it is herein and hereby denied for the construction of the proposed fifteen inch outfall sewer and the following decree is issued to the borough of Ridley Park:

FIRST: On or before the first day of May, nineteen hundred and nine, the borough shall, either independently or in conjunction with the boroughs of Swarthmore, Rutledge and Morton, or any of them, prepare plans for the collection of all of the sewage of the borough or boroughs and its conveyance in the most advantageous way to a suitable site for a sewage disposal plant and plans for such a plant for the treatment of all of the sewage of the borough or boroughs, and submit the same with items of cost for treating said sewage to the Department of Health for approval. Such plans will be modified, amended or approved and a time fixed for the erection of the works, the policy of the State being kept in mind with respect to other municipalities in the vicinity.

SECOND: Complete plans of the present sewer systems, showing sizes and grades and the location of manholes, shall be prepared and filed in the office of the Department of Health on or before January first, nineteen hundred and nine.

Harrisburg, Pa., November 11th, 1908.

SAINT CLAIR, SCHUYLKILL COUNTY.

This application was made by the borough of St. Clair, Schuylkill County, and is for permission to extend its sewer system and to discharge the sewage therefrom untreated into Mill Creek, within the borough limits.

It appears that the borough of Saint Clair is located near the centre of Schuylkill County and is completely surrounded by Norwegian Township. In nineteen hundred it had a population of four thousand six hundred and thirty-eight and at the present time it has an estimated population of six thousand. The borough is on the Pennsylvania Railroad and the Philadelphia and Reading Railway, which roads give employment to some of the inhabitants. The Saint Clair classification yards belong to the latter company and are located immediately south of the town, between it and Port Carbon, a borough of some three thousand or more inhabitants, two miles further south of Saint Clair. The people are employed mostly in the coal mines in the immediate vicinity and at some distance from the place, transportation being had by means of the railroads and excellent trolley system.

The seat of the county, Pottsville, is not over four miles distant from Saint Clair and is in the same township.

Saint Clair borough is situated in a valley confined by hills which rise to a height of several hundred feet on the eastern and western sides and to over nine hundred feet at the north, some distance from the borough line. A stream called Mill Creek flows southerly through the centre of the town and a smaller one called Little Wolf Creek passes through the eastern section and discharges into the former in the southern part.

On Mill Creek and its tributaries above Saint Clair there are known to be five collieries in operation draining their acid wastes into the creek. These operations are known as the Crystal Run Colliery, the New Boston Colliery, owned by Delano and Company of New York, the Morea Colliery, owned by the Dodson Coal Company of Bethlehem, Pennsylvania, the Dark Water Colliery, operated by Neil, Thorn and Company, and the Saint Clair Coal Company Colliery of Saint Clair.

On Little Wolf Creek is the Mt. Hope Coal Company Colliery, operated by I. D. Beam and Company of Sain Clair, draining into the stream.

Mill Creek heads in the Broad Mountains about nine miles above Saint Clair and discharges into the Schuylkill River two miles below it at Port Carbon. Its water shed area above the borough is twenty-three square miles.

The public water supply is furnished by the Pottsville Water Company, whose sources are from Wolf Creek, Eisenhuth Run, Kauffman Run and other branches of Mill Creek, all above Saint Clair. This is a gravity system through the town and the water is reported to be good at all times. There is a small well in the sparsely populated section of the borough known to supply five families with water. This is the only ground supply in use in the borough, as far as the Department is informed.

The principal street of the town is Second Street. It parallels Mill Creek and is west of it. In the upper and lower portions of First Street is located Mill Creek. The stream is walled up through the borough, the land on either side having been filled in. Before this filling in the land was a swamp. West of Third Street are the railroad tracks and beyond the tracks the hillside begins. To the east of Mill Creek named in order are Mill, Nichols and Morris Streets. Beyond the latter the hillside begins. The village is almost wholly on the flats.

The principal street running east and west is not reported. They appear to be about equally important. Beginning in the southern part of the borough and named in their order up stream they are Thwing, Russell, Patterson, Railroad, Lawton, Carroll, Hancock and Franklin Streets.

Little Wolf Creek enters Mill Creek between Russell and Thwing Streets.

There are two public sewer outlets into Mill Creek, both being combined sewers.

The lower and most important one is thirty inches in diameter. Its outlet is into Mill Creek. It is into the creek below Thwing Street at the southerly borough line. The land round about is unoccupied flats. The classification yards are in the neighborhood. This outlet serves a sewer line the entire length of Second Street, a total distance of four thousand and thirty-six feet. It consists of seven hundred and thirty-four feet of thirty inch, five hundred feet of twenty-seven inch, fifteen hundred and ten feet of twenty-four inch, five hundred and forty-three feet of eighteen inch and over seven hundred feet of twelve inch sewer.

The other sewer outlet into the creek is thirty inches in diameter. It empties into the creek at Railroad Street. It ends at the intersection of Third and Lawton Streets. It was built to take the place of a natural course which is now an open ditch west of Third Street. The sewer is about one thousand feet long. The flow in the run at one time was constant owing to a coal operation. Now the line is abandoned and water flows in the run only during and after heavy rains.

There are a large number of privies of the old-fashioned type in the borough and a few percolating cesspools. Some of the privies overhang the banks of the stream.

One hundred and twenty-three private estates have individual sewers leading to the streams. Most of these private sewers empty into Mill Creek, but a score or more discharge into Little Wolf Creek.

On Third Street, between Lawton and Patterson Streets, kitchen drainage goes to the street gutters. The same is true on the upper end of Mill, Nichols and Morris Streets. On Nichols Street there is a hotel urinal draining directly to the street gutter. The grades of the street are not sufficient in these places to carry off the waste water so nuisances result in dry weather.

There are reported to be one hundred and sixty-one properties connected to the public sewer. There are also one hundred and twenty-nine estates connected to the common sewers in the streets, which common sewers are owned by private individuals. There are thirteen such lines that are known to exist with outlets into the streams in the borough. Four of them are into Mill Creek, three into Little Wolf Creek and six into a tributary to Mill Creek which starts near the end of Third Street and flows southerly along the Pennsylvania Railroad to near the borough line.

The first private sewer line into the creek is at Russell Street, extends up Russell and Mill Streets a length of three hundred and thirty feet. It has thirteen connections. The next is at Patterson Street and extends up Patterson and Mill eight hundred and twenty feet and has twenty-four connections. The next is at Carroll Street and extends up Carroll and Nichols Streets six hundred and forty feet and has nine connections. The last outlet is two hundred and fifty feet long in Mill Street as far north at Hancock Street. It has seven connections.

The first private sewer line into Little Wolf Creek is on Mill Street one hundred and eighty feet long to Russell Street. It has six connections. The next outlet is at Nichols Street, the sewer extends northerly thirteen hundred and fifty feet to Lawton Street and has thirty connections. The last outlet is at the foot of Morris Street. The sewer extends in Morris Street northerly fourteen hundred feet to above Lawton Street. It has eight connections.

Into the tributary of Mill Creek above mentioned there are five short private sewer lines in Third Street. They have a total of thirteen connections. These really should not be classed as common sewers. There is a private sewer line seven hundred and fifty feet long between Second and Third Streets. It has nineteen connections and it empties into the run near Patterson Street.

Thus it may be seen that there is a total of six thousand six hundred and twenty feet of common sewers in the public streets, but owned by private individuals. It is reported that none of these pipes is over six inches in diameter. The borough has not submitted a satisfactory report or plan of the existing sewers in the municipality. The Department does not know whether these private common sewers take both sewage and storm water. Neither does it know when these sewers were built, by whom built and under what authority they were built and are now maintained.

The Department's investigation shows that the borough's streams are practically open sewers. Because of the mine drainage and coal dust emptied into the water courses the sewage does not produce a nuisance of a magnitude to be the subject of a complaint, so it appears.

To do away with some of the nuisances in the street gutters the borough proposes to make two sewer extensions, one in Third Street twenty-eight hundred feet long connecting to the Second Street sewer line near Patterson Street and the other in First Street a total distance of eleven hundred feet with an outlet into the existing sewer in First Street at Lawton Street.

The Third Street line is to range in diameter from twelve inches to twenty-four inches. There is to be a manhole at every change in line and grade with lampholes between them and catch basins along the street for the admittance of storm water. The sewer will be eight feet or more in depth and will have a grade of eight-tenths per cent. Third Street line is to be fifteen inches and twelve inches in diameter and have a minimum grade of fifty-two hundredths per cent. It also will take storm water.

The Second Street sewer was constructed under authority of a resolution of Town Council passed the tenth day of July, nineteen hundred and five, which was subsequent to the enactment of the "Purity Water Bill" so-called, approved April twenty-second, nineteen hundred and five, and requiring municipal authorities to receive a written permit from the Commissioner of Health for the establishment of a public sewer outlet into any of the waters of the State. The local authorities did not apply for such a permit for the Second Street sewer. The Department is not informed as to the date when the borough built the First Street sewer line.

It appears that on the fourth day of February, nineteen hundred and seven, the Town Council enacted an ordinance establishing a sewer system, incorporating then Second Street sewer into the system, and providing rules and regulations appertaining to the system. Under these rules it is optional with any property owner whose land fronts on a public sewer to connect the property with the sewer; but whenever the local Board of Health requires such a connection in the interests of the public health it shall be made.

Plans of this sewer system have not been submitted to the Commissioner of Health for consideration.

Evidently the borough intends to perpetuate a combined sewer system with permanent outlets into Mill Creek. Undoubtedly the acid mine wastes disinfect the sewage and destroy much of the germ life in the sewage ordinarily. But it is possible during intense rainfalls, when the volume of fresh water greatly dilutes

the sulphur drainage from the mines and reduces the acidity correspondingly, for the sewage from Saint Clair borough to be carried in a harmful condition down stream and to the water works intakes of the municipalities located on the banks of the Schuylkill River. There are a number of public water supplies taken from the Schuylkill River below the city of Reading. One of these places is Royersford, as well as Spring City on the opposite bank, where during the current year there has been an epidemic of typhoid fever attributed to the sewage poisons in the Schuylkill River water. Pottsville, Phoenixville, Norristown and Philadelphia use Schuylkill River water for drinking purposes. The Commonwealth's policy is to stop the discharge of sewage into the streams. The State has made the treatment of the sewage of the city of Reading a compulsory matter. Other municipalities above Reading must eventually build sewage disposal works.

The bonded indebtedness of Saint Clair borough is about thirty-eight thousand dollars and the assessed valuation is in the neighborhood of eight hundred and thirty-two thousand dollars, so it is reported. If these figures be true, then the borough can borrow about twenty thousand dollars, which amount is too small to defray the cost of a sewer system and disposal works at the present time. But the local authorities must anticipate a purification plant and prepare for it. The cost of treating storm water and sewage is prohibitive. Mill Creek is advantageously located so that surface drainage, by proper attention to street gutters, may be conducted short distances on the lateral streets to it. The sewers should be designed to take sewage proper from the entire borough to one common point at a suitable site for the ultimate election of a sewage treatment plant. The sewers need not be of a large size. This system of sanitary sewerage should plan to take in all private lines of common sewers that are properly constructed and suitable to be incorporated in the system. A careful study of the entire situation should be made by an engineer and in this study the State Department of Health may be called upon for further advice. By this method of procedure the money expended by the taxpayers will go a long way and give the greatest benefits to the greatest number. The borough can build such sewers as it may need from time to time as the money is raised with the assurance that no part of the expenditure is being wasted and that no part of the work will ever need to be undone. Temporarily some surface drainage may possibly be admitted to the sanitary sewers until the sewage disposal works are built. This last project will not be required until the other municipalities in the district are likewise required to treat their sewage.

It has been determined that the borough of Saint Clair should be notified, and it is hereby and herein notified, that the borough must modify the plans for the proposed sewer and prepare a plan for a comprehensive system of sanitary sewerage and sewage disposal works in conformity with the ideas and suggestions hereinbefore set forth and submit the same to the Department of Health for approval. When this shall have been done and the plans shall have been approved, the Department of Health will issue a permit for the discharge of sewage from the borough sewer system into the waters of the State under conditions which shall be determined by the Governor, Attorney General and Commissioner of Health, having in mind the conditions under which similar permits are issued by the State to other municipalities in the Schuylkill River drainage basin.

Harrsburg, Pa., October 15th, 1908.

SCALP LEVEL, CAMBRIA COUNTY.

This application was made by the borough of Scalp Level and is for permission to install a new sewer and to discharge the sewage therefrom untreated into Little Paint Creek within the limits of said borough.

It appears that on November twenty-third, nineteen hundred and seven, the Commissioner of Health issued a permit to the said borough of Scalp Level, but that this permit was rejected by the borough council and returned on December twenty-eighth, nineteen hundred and seven. On said December twenty-eighth, nineteen hundred and seven, the borough submitted a map and profile of the proposed sewer and again made application for permission to construct a public sewer system in the borough.

The permit of November twenty-third, nineteen hundred and seven, was for the construction of a part of the proposed sewer, which part was for the drainage of the public school building. Among other conditions stipulated were the following:

"FIRST: That a six inch pipe sewer may be laid from the public school building in the borough easterly in the public highway and under the turnpike to Little Paint Creek, that sewage only shall be discharged into this sewer, and that it shall be laid out in such a way as to be adapted to incorporation into a separate sewer system for the entire borough.

"SECOND. Permission to discharge the sewage from this school house sewer into Little Paint Creek at the point herein approved north of the railroad culvert shall be temporary only and shall expire one year from the date of this permit, but if on or before said date of one year after the issuance of this permit, the

borough shall prepare a plan for a comprehensive sewerage system for the entire borough in general compliance with the suggestions herein contained, and shall have submitted the same to the Commissioner of Health for approval, then the Commissioner of Health may extend the time in which the sewage from the school house sewer may continue the discharge into Little Paint Creek at the point mentioned."

Scalp Level borough, population about one thousand, Paint borough, of about equal size, and Winber borough, having a population of five thousand, are grouped together and form practically one flourishing coal mining community located in the Alegheny Mountains near the summit, in the valley of Paint Creek. This stream flows westerly, draining a very rugged mountainous district and empties into Stony Creek which, nine miles northerly, joins the Conemaugh River in the city of Johnstown.

Coal mining operations are located in the valley above and below Scalp Level and the creek waters are extremely acid, resulting from mine drainage.

The Department has not in its possession a plan of the borough territory and of the roads and general location of buildings. The plan and profiles submitted on December twenty-eighth. nineteen hundred and seven, afford no means of determination of what proportion of the borough the sewers will serve at present or be able to serve in the future. However, it is under stood that it is the old Scalp Level village, consisting of the buildings along the Johnstown turnpike from Paint borough northerly, or rather that portion of the village on said turnpike north of Little Paint Creek, that it is proposed to sewer. This turnpike ascends rapidly, following up the valley of Little Paint Creek, there being a steep slope or bank quite high between the road and the stream, many of the houses on the east side of the turnpike sewer to the creek. The church, school building, hotels and stores are in the old village. The modern school house, recently erected, is located on the north side of a road branching to the west from the turnpike. Plumbing facilities and water closets have been provided in this building and it was to secure the prompt removal of sewage from this property that the borough asked permission to construct a sewer, which permission was granted and subsequently rejected by the borough.

The petitioners originally represented that there was no way to dispose of the waste water from the school house and the buildings on the west side of the turnpike, except by public sewer and permission was requested to lay a sewer southerly in the turnpike from or near the school building to the creek. The points of discharge first proposed were into the stream at the railroad culvert in the central part of the borough and also where the highway crosses the creek in the southern part of the old village. This plan the borough abandoned because of local opposition and the plan substituted and upon which the Commissioner of Health acted called for the outlet into the creek at a point near its junction with Paint Creek proper. The size of the sewer was not stated, neither were the grades or other details given.

In the eastern part of the borough is a new village, comprising regularly laid out streets and cottages, erected and owned by the Berwind-White Coal Mining Company. This setlement is on the west bank of Little Paint Creek and comprises about two hundred frame buildings. The facilities for the disposal of excrement or for other drainage are not those calculated to promote the public health. There are sewer outlets into the creek in Paint borough and in Windber. If the time should ever arise when sewage shall be taken out of the local streams, then it would be most economical and effective for all three boroughs to have a joint intercepting sewer and sewage disposal plant. The Commissioner of Health concluded that it would be unfair to discriminate against Scalp Level borough, but nevertheless, that it behooved the local authorities of the three municipalities in making plans for sewerage extensions or for the introduction of a new sewer system to contemplate the ultimate treatment of the sewage and make reasonable provision therefor in the sewer plans. It was set forth that a sewerage plan for Scalp Level should be designed that it may be extended from time to time to all parts of the borough and that the State cannot advise with respect to the suitability of a project until details thereof shall have been submitted for consideration. The borough was informed that it should prepare plans for a comprehensive sewerage system and that all storm water should be excluded from the sewers and it was suggested that the boroughs of Windber and Paint might find it profitable to join in a project for a trunk intercepting sewer.

The sewers now proposed and under consideration will serve that portion of the old village above described. A sixteen inch main sewer is to start at Little Paint Creek and extend up the turnpike a distance of nine hundred feet to or near the angle in the turnpike. One hundred and fifty feet from the end of a twelve inch branch sewer is to be laid in the branch road westerly a distance of seven hundred and fifty feet, passing the school house for which sewerage facilities are demanded. The least grade for the sewers is three and four-tenths per cent. and the greatest nine and one-fourth per cent.

The main creek is about seven hundred feet down stream from the proposed outlet where, at one time, it was contemplated that the sewer would terminate. Owing to the very limited financial resources, the local authorities do not want to make any greater expenditure than may be necessary; hence approval of the outlet into the tributary stream where the turnpike crosses is asked. Presumably the discharge of sewage will be of such small volume for the present that

no nuisance will be created at the outlet. There are stores on either bank of the stream at the bridge. The bed of the creek is steep and the flow of water rapid. Any small pool could easily be drained.

There is one means of saving money which has escaped the borough. An eight inch pipe on the grades proposed would be many times greater in capacity than actually necessary to remove sewage from the proposed district. The local authorities can with perfect safety save the cost between an eight inch sewer and a twelve and sixteen inch sewer.

There are periods of several weeks duration in the year when the run-off from the upland watersheds is so great that the germicidal effect of the acid waters is probably neutralized, and at such time the sewage from the mining town may reach the water works intakes of the down stream towns. The waters of the region are discharged by the Conemaugh River into the Kiskiminitas River, and through the latter into the Ohio River opposite Freeport. This place takes its water from the river and below Freeport, in a distance of twenty-three miles, there are nine other places which take the public water supply from the Allegheny. Twenty miles and thirty-six miles, respectively, below Johnstown the boroughs of Blairsville and Saltsburg obtain their public supply from the river. The sewage of Johnstown is now discharged into the Conemaugh and is a menace because it may be transmitted down the river and be introduced into the homes of water consumers. Because an epidemic has not occurred from this cause is not a guarantee that it may not happen. The danger exists. It is probable that, within the period for which it is economical to design sewers, a change in the methods of disposal of sewage in its raw state in the streams, may be brought about in the Conemaugh River basin.

Scalp Level borough is amply able to defray the cost of the preparation of a sewerage plan, either independently or in conjunction with the boroughs of Paint and Windber.

It has been determined that the interests of the public health will be subserved by approving the proposed sewer in the turnpike and branch road, and it is hereby and herein approved under the following conditions and stipulations:

FIRST: That this permit to discharge sewage into the waters of the State shall cease on the first day of May, nineteen hundred and eleven. If on that date the other terms of this permit shall have been complied with, then the Commissioner of Health may extend the time when said sewage shall continue to be so discharged.

SECOND: On or before May first, nineteen hundred and eleven, the borough shall prepare a plan showing the municipal territory and the streets therein, with a system of sewers for sewage only for the built up part of the borough and for that part which may be built up within a reasonable time in the future, and for the conveyance of the sewage to one central point, and for the erection of sewage disposal works there, and such plans shall be submitted to the Commissioner of Health for approval.

THIRD: Storm water shall be excluded from the sewers herein approved, or, if admitted, it shall be under such conditions as shall provide for its exclusion at the time sewage disposal works are erected. The borough's attention is especially called to the safety and economy of reducing the size of the sewer. It should be clearly understood that the cost of a purification plant for the treatment of the sewage and storm water together would be prohibitive.

FOURTH: Whether a nuisance will be established at the outlet can be determined only by trial. If a nuisance be created, or if at any time in the opinion of the Commissioner of Health, the sewers or any part thereof have become a nuisance or a menace, then such remedial measures shall be adopted by the borough as the Commissioner of Health may approve or advise.

FIFTH: It will be necessary for the borough to provide inspection manholes on the sewers at changes in line and grade and at the dead ends.

Harrisburg, Pa., May 18, 1908.

SCALP LEVEL, CAMBRIA COUNTY.

This application was made by the borough of Scalp Level, Cambria County, and is for permission to extend its sewer outlet further down stream and to discharge the sewage at a point in Little Paint Creek near where said stream empties into Paint Creek.

It appears that on May eighteenth, one thousand nine hundred and eight, the Commissioner of Health issued a permit to said borough of Scalp Level to install a new sewer and to discharge the sewage therefrom untreated into Little Paint Creek within the limits of said borough until May first, one thousand nine hundred and eleven. Among other conditions was the following stipulated in the permit:

"Whether a nuisance will be established at the outlet can be determined only by trial. If a nuisance be created, or if at any time in the opinion of the Commissioner of Health, the sewers or any part thereof have become a nuisance or a menace then such remedial measures shall be adopted by the borough as the Commissioner of Health may approve or advise."

The point of outlet approved is at the bridge on the Johnstown and Scalp Level turnpike at the crossing of Little Paint Creek. Here there are several stores and dwellings whose sewage from overhanging privies now goes into the creek. The local authorities are fearful that neighborhood complaint might be made if the borough sewer should terminate at the bridge and said authorities believe it to be the part of prudence to maintain the sewer outlet at some point in the creek away from the vicinity of the stores and dwellings along the turnpike. So it is proposed to extend the sixteen inch outfall sewer down the bed of the stream a distance of about five hundred feet to a point near where Little Paint Creek empties into Paint Creek proper.

The new outlet is an obscure place away from dwellings. The plan is to excavate a trench in the bottom of the channel and to imbed the sixteen inch sewer in a cradle of concrete and to cover it over with the same material. This form of construction is expensive and unless it be executed with great care it will not be durable. The creek is a mountain stream subject to tremendous freshet flows and scouring currents. In the said permit of May eighteenth, the borough's attention was especially called to the safety and economy of reducing the size of the main sewer. The wisdom of a reduction in size is now more aparent than ever if the proposed plan to lay a sewer down the creek bed be carried out. The land on the north bank rises precipitously and there is no opportunity favorable for the building of a sewer in this bank from the turnpike down stream when such sewer must be begun at the level at the turnpike deep enough to drain the cellars along the highway. The petitioners represent that they have given careful consideration to the project of avoiding the construction of a sewer in the creek bed with the conclusion that there is no other location. An eight inch sewer should be large enough for all requirements, and certain it is that a ten inch pipe would never have its capacity taxed and since the cost of the laying of a ten inch pipe in the bed of the creek would be very much less than the cost of laying a sixteen inch pipe, this change in the plan ought to be adopted by the borough. Furthermore, it has been proven by experience that for small pipes it is cheaper and better where they must be laid in the bed of a mountain stream to use cast iron pipe instead of clay pipe. All things considered, it is cheaper and better to adopt this form of construction.

The petitioners further represent that there is a fall in the bed of the creek where it is proposed to terminate the sewer so that the outlet will be elevated many feet above the valley of Big Paint Creek in which a trunk sewer for the adjoining boroughs of Paint and Windber may be laid and into which it may be desirable and easily possible at some future date for the proposed Scalp Level sewer to empty.

It has been determined that the interests of the public health will be subserved by giving approval to the proposed sewer extension under the following conditions and stipulations:

FIRST: That the sewer herein approved to be laid along and in the channel of the bed of Little Paint Creek from the bridge over the said stream at the Johnstown Scalp Level Turnpike down stream to the rapids near Big Paint Creek, shall be constructed of cast iron pipe, laid with lead joints and made water tight, and be laid in such manner as not to obstruct the flow of water in the channel.

SECOND: One or more suitable connections of cast iron pipe, this material to be used in the channel bed, shall be provided to afford sewerage connection and facilities on those properties in the borough on either side of the stream which should now or in the future discharge their sewage into the borough's said main trunk sewer.

THIRD: The local authorities are advised that from information at hand, it is not clear that the best course to pursue is down the existing channel of the stream. It may be more desirable to construct the sewer along the south bank of Little Paint Creek with the outlet at the same point now proposed, and the borough should obtain comparative bids of the two routes. On the adoption of a final plan, the profile and grade of the sewer and line selected shall be forthwith submitted to the Commissioner of Health, together with any other information in connection therewith that may be required.

FOURTH: This permit in no way shall modify or affect the permit of May eighteenth, one thousand nine hundred and eight, only in so far as it relates to the point at which sewage may be discharged from the sewer system into the waters of the State. All of the conditions and stipulations of the said permit of one thousand nine hundred and eight shall obtain and are hereby stipulated into the permit herein granted for the extension of the sewer outfall to a point of about five hundred feet down stream from the turnpike bridge over Little Paint Creek.

Harrisburg, Pa., May 28, 1908.

SCOTTDALE, WESTMORELAND COUNTY.

This application was made by the borough of Scottdale, Westmoreland County, and is for permission to extend its sewer system and to discharge the sewage therefrom into Jacobs Creek within the limits of the borough.

The final report and plans of the existing sewer system were not filed in the office of the Commissioner of Health until January fifteenth, one thousand nine hundred and eight.

The borough of Scottdale is a mining and manufacturing community of about six thousand population located in the southern part of Westmoreland County in the great steel and coke region of Pennsylvania. The main offices of the H. G. Frick Coke Company are maintained in the town. There are a number of varied, important and thriving industries in Scottdale, among which should be mentioned the American Sheet and Tin Plate Company, the United States Cast Iron Pipe and Foundry Company and the Scottdale Furnace of the Corrigan, McKinney Company. These concerns and the large bituminous coal mine operations furnish employment to the citizens of Scottdale and to the citizens of other towns in the vicinity of which Mount Pleasant and Connellsville are the nearest.

Scottdale borough is situated in the valley of Jacobs Creek along the west bank at a point fourteen miles above its mouth. The creek forms the boundary line between Westmoreland County and Fayette County to the south. It drains an open rolling territory of fifty-seven square miles above Scottdale upon which there are many bituminous coal mines in operation, also extensive coke ovens. The evidence of sulphur mine drainage is seen in the creek at Scottdale. Most of the time the stream is highly colored and very acid.

The borough's topography is rugged and the built up part of the town lies principally on the knoll between two runs which come down from the northwest and empty into the creek. The northerly one is named Stauffers or Hawkeye Run, it parallels the tracks of the southwest division of the Pennsylvania Railroad for a distance and empties into the creek on land of the Cast Iron Pipe and Foundary Company, Upper Tyrone Township, Fayette County, opposite the north central part of the borough. It is only the northeastern section of the borough which is drained by this run. The water is impregnated with mine pumpage.

The other stream is called Anderson Run, is much smaller, rises a short distance north of the borough in East Huntingdon Township in a district locally known as Pine Tree Extension, and empties into the main creek near the southeastern corner of Scottdale just below and opposite the borough of Everson, Fayette County.

This settlement of one thousand people is on a hill and at the foot along the east bank of the creek are the tracks of the Mount Pleasant Branch of the Baltimore and Ohio Railroad. There are branches from this railroad across the stream onto the flats in Scottdale where are located the industrial plants.

The public water works system is owned by the Cititzens Water Company of Scottdale, a constituent concern operated by the American Pipe Manufacturing Company. The water is furnished to Scottdale and Everson. The sources are the headwaters of four mountain streams to the east of Scottdale in Bullskin Township, Fayette County. The dams across these streams are at elevation sufficiently high to deliver the water by gravity to the consumers. Three of the dams are at the headwaters of Mounts Creek, which flows southerly and joins the Youghiogheny River at Connellsville. They are named in order: Mounts Creek dam, Spruce Run dam and Butler dam and their drainage areas are respectively two and one-tenths, two, and two and four-tenths square miles. It is reported that there are no houses on the watersheds except above the Butler dam.

The three structures above mentioned are intakes only, but the fourth dam on Green Lick Run, a tributary of Jacobs Creek, forms an impounding reservoir flooding twenty-three acres and having a storage capacity of one hundred and fifty million gallons. The watershed is two and five-tenths square miles in extent, mostly wooded, and has six residences upon it. The water company has constructed new privies at some of the houses, so it is reported.

So with ordinary care the public water supply should be of a pure and satisfactory quality.

There are a few wells in Scottdale and one spring, especially noted, named Loucks Spring. It is located in the heart of the town at the foot of a hill and below the public school and some dwellings. The water gushes out at the base of a small cliff in the basement of a springhouse where milk is cooled. People from the neighborhood, more especially workmen, come with pails to obtain water from this spring for drinking. The geological formation of the borough is porous shale. Tests of this spring water made by the Department in the fall of nineteen hundred and seven, showed the presence of large numbers of colon. In June and July of this year there was one case of typhoid fever each month. There had been none reported for the months prior to June and none after October, but during the three months of August, September and October, there were forty-nine cases of the disease reported, most of which occurred in August, largely among mill hands employed in the vicinity and drinking water taken from this spring. The local records, if true, show that some typhoid fever has prevailed every year but in less numbers, since eighteen hundred and ninety-seven when there were one hundred and ten cases reported for the year. The Louck Spring has been under suspicion and its use as a source of drinking water should be abandoned. The drawing of water from the ground in inhabited districts, where the soil is porous, even if there be a sewer system, is attended with some risk. While the sewers of Scottdale are quite extensive and generally used, this does not warrant the wholesale use of ground water for domestic purposes. All well waters

should be examined. If the tests show contamination the wells should be abandoned, and even if the examination does not reveal sewage pollution, safety demands that the well be abandoned if the topograpy and the surroundings be such that it may be possible for the waters to become polluted through surface or underground channels.

There are seven and eight-tenths miles of sewers in the borough, they take both sewage and storm water and discharge into the streams at convenient points. There are eleven hundred and fifty buildings in the municipality and it is reported that all but about three hundred of them are connected with the sewer sytem. The sewers were originally planned in eighteen hundred and ninety-one to take sewage only, but gradually the system has been changed over to a combined one. There is an ordinance requiring all drain spouts, conductors or openings from buildings to be connected to the public sewer by way of under ground drains.

There are seven outlets to the public sewer system, and in order up stream from the southerly borough line they are as follows: Osage Street sewer, Anderson Run culvert, Loucks Lane sewer, the Pipe and Foundry Company's sewer (lower outlet), the Pipe and Foundry Company's sewer (upper outlet), Park Street outlet and Chestnut Street sewer.

The Osage Street sewer is a twenty inch pipe into Jacobs Creek at the foot of said street which point is about fifty feet below the bridge over the creek at Fifth Avenue It serves twenty-eight hundred feet of lateral sewer in the district of which twenty-two hundred feet are twelve inches in diameter and one hundred and sixty feet fifteen inches in diameter. The balance of the pipe is twenty inches in diameter. Most of Osage Street is outside of the borough in East Huntingdon Township and the lateral sewers of the district are partly in the township and partly in the borough. The neighborhood is locally known as Browntown. About one mile down the valley are the Old Meadow Roiling Mills. The trolley line extends to the plant and the hands live at Downingtown and in Scottdale.

The Anderson culvert is an egg shaped brick structure five feet high, three and twenty-five hundredths feet wide, empties into Jacobs Creek about one thousand feet up stream above the Osage Street outlet, and extends along the north bank of Anderson Run a distance of twelve hundred and twenty feet from Fifth Avenue where it ends. Evidently this sewer was designed to serve a very large territory. Into it at the present time there are eight lateral sewer connections aggregating a total length of seventy-one hundred and forty feet. There are not over one hundred houses in the district where these lateral sewers are laid, and most of them are connected to the sewer. Of the total length of fifty-seven hundred feet are twelve inch pipe and the remainder ten inch pipe. No street water is admitted to these sewers or the main culvert. Roof water, however, is admitted.

Loucks Lane sewer empties into Jacobs Creek at a point fourteen hundred feet up stream from Anderson Run. This sewer is a twenty-four inch pipe and the main outlet for the system which serves the business section and greater part of the town. It comprises a total of twenty-one thousand lineal feet of sewer of which over fifty per cent. is pipe twelve inches in diameter, twenty-five hundred feet ten inches in diameter and there is less than eighteen hundred feet of pipe eight inches in diameter. The outlet is at the foot of the Lane which was formerly a public highway, but is now discontinued between the railroad and the creek. The land is utilized by the American Sheet and Tin Plate Company.

In the district traversed by these sewers the buildings are very generally provided with sewer connections and roof water is conveyed to the sewer, but although the streets have good grades and some of the surfaces thereof are permanently paved with brick, so far as the Department is informed, there are no street inlets for the admittance of surface water to the sewer system.

Paralleling the railroad and at the foot of the hillside is Broadway upon which storm water is poured from the street gutters on the hillside and in this main highway, at the foot of Pittsburg Street and at the foot of Mulberry Street there are surface drains constructed with inlets for the collection of storm water and its conveyance underground to the creek.

Both of the pipe and the foundry companies' sewers above mentioned as public outlets, had their origin in the purely surface drainage conditions, the lower one formerly extending from Broadway at the foot of Pittsburg Street easterly under the railroad to the old creek channel and the borough boundary, and the upper one formerly extending from Broadway at the foot of Pittsburg Street easterly under the foot of Mulberry Street easterly under the railroad to the creek and borough boundary. It is reported that at its own cost and expense the said Pipe and Foundry Company, in connection with large extensions of its plant, widened and straightened and deepened and made an entire new channel for a portion of Jacobs Creek, and filled in the old channel and appropriated the land for its plant and as a part of this improved drainage project, said company extended the Pittsburg Street and the Mulberry Street storm drain outlets easterly through its land, a distance of about one thousand feet to the new channel of the creek.

The lower outlet is a twenty inch pipe. It receives some sewage from a hotel and building east of the railroad and from the offices and shops at plant A and B of the said pipe and foundry company. If reports are true it also takes the overflow from the Broadway sewer at Pittsburg Street. The point where the pipe

empties into Jacobs Creek is eight hundred feet above Louck's Lane sewer. The portion of this sewer built by the company is now buried beneath high banks of furnace slag.

The upper outlet or the Mulberry Street drain is one thousand feet up stream, is reported to be thirty inches in diameter, and is not known to receive sewage except that that may enter from plant C of the pipe and foundry company. Several hundred men are employed, possibly five hundred at times.

Park Street sewer outlet is twenty-four inches in diameter and enters the creek five hundred feet above the Mulberry Street drain outlet. It, like the latter, is on land owned by the said pipe and foundry company, both outlets being in Upper Tyrone Township, Fayette County. Connected with this main are seven thousand feet of sewer ranging in diameter between eight inches and twenty-four inches. The district now tributary is a small one in the extreme northeastern corner of the borough but a very much larger territory including land in East Huntingdon Township in the allotments known as North Side Land Company's plan and East Home Place could be included. There are private sewers in each allotment and they empty into Hawkeye Run.

Chestnut Street sewer is ten inch pipe, five hundred feet long connected to five hundred and fifty feet of eight inch sewer. It discharges into a run crossing Chestnut Street near Stauffer Avenue. The stream follows a ditch between the trolley tracks and the Pennsylvania Railroad for several hundred feet and finally reaches Hawkeye Run. Into this sewer at the borough line is discharged the sewage from the private sewer system in the streets of the North Side Land Company's allotment. A part of this allotment is included within the corporate limits of Scottdale. The sewer system has a twenty-four inch pipe main in Stauffer Avenue and this twenty-four inch pipe is connected to the ten inch in Chestnut Street. So far as the Department is informed, in this district sewer system are forty-five hundred feet of pipe whose diameters range from six to twenty-four inches. There is another sewer in this allotment. It is eighteen inches in diameter and serves a few houses on Chestnut Street in the township. The outlet is into the run near where the ten inch sewer discharges.

Opposite this allotment east of the railroad in the township on the East Home Place Tract, a new development where the streets have been laid out and the main street paved and curbed, and a few houses erected, there are sewers which have an outlet into Hawkeye Run within the limits of the borough. The sizes of these sewers have not been reported to the Department. In the eastern part of this district there is a sewer from the Crescent Manufacturing Company's plant to Jacobs Creek and also a private sewer from a property under development.

There is said to be one public sewer outlet into Jacobs Creek in Everson borough. The Department has no information relative to it.

So it appears that the sewers of Scottdale were originally intended to receive house sewage only and it is evident by their sizes that they were not designed to receive street drainage with the exception of the Anderson Run culvert, whose capacity is entirely disproportionate to the uses to which this structure has thus far been put. Of the total length of seven and eight-tenths miles in the entire sewer system, four and nine-tenths miles are pipe twelve inches in diameter, sewers of ten inches and fifteen inches in diameter approximate eight-tenths of a mile in length each, the twenty-four inch pipe has a total length of about four-tenths of a mile and the remaining linear feet of the system are about equally divided between the eight, eighteen, twenty and twenty-six inch pipes and the big brick sewer.

The system cannot, therefore, be transferred into a strictly combined sewer system, but should occasion ever require it, the system may be converted economically into a modified separate system.

The proposed sewers lie wholly in the watershed of Anderson Run and mostly in the district known as Pine Tree Extension.

The plan at the time the application was submitted in nineteen hundred and seven, was to extend the Anderson Run culvert from its present terminus by a thirty-six inch sewer up and along Fifth Avenue not yet built, a distance of thirteen hundred and forty-five feet and thence by a thirty inch pipe, up the valley of the run through pasture lands a distance of fifteen hundred and thirty-four feet to Pittsburgh Street where the developed property begins. In the Pine Tree District, within the borough, there is a population between six hundred and seven hundred people and it is proposed to lay sewers here in all the streets in the aggregate comprising about eighty-four hundred feet, of which thirteen hundred feet are eight inches in diameter, thirteen hundred and fifty feet ten inches, thirty-nine hundred and sixty feet twelve inches, five hundred and thirty-six feet fifteen inches, three hundred and ninety-three feet eighteen inches, five hundred and forty-five feet twenty-four inches and aproximately three hundred feet of thirty inches in diameter. These sewers were to take sewage only. Bids were received for the construction of the system and it was ascertained that the cost thereof would exceed the money available for the purpose. In consequence the petitioners have reduced the sizes of the principal sewers proposed and according to the plan submitted to the Department on January fifteenth, nineteen hundred and eight, and now being considered, it is proposed to reduce the thirty-six inch and thirty inch to a twenty-four inch sewer and the twenty-four inch to an eighteen inch sewer, the other sizes remaining as at first designed.

The district is one of good slopes, the minimum grade on any sewer being one per cent. The Pine Tree District in the township is being developed and whatever sewers are built there should find an outlet into the Anderson Run intercepter. Ultimately, the territory may be annexed to Scottdale.

At present the district is in an unsanitary condition. Household wastes reach the streets and produce a nuisance in the gutters and also along Anderson Run into which they finally are discharged. Sewers are needed and the bonds to pay for the improvements were authorized by the people at a special election held therefor.

It is also represented that the borough wishes to extend its sewers generally throughout the town.

It is estimated at ordinary low stage of Jacobs Creek, one-half of the flow is mine water. The large part of such water is pumped and when the coal has become exhausted and the mine operations cease, there will be comparatively little sulphur water in Jacobs Creek. A few mines are drained by gravity and this much acid contribution to the natural flow of the streams in the district will continue indefinitely.

Possibly within ten years the Pittsburg seam, the coking coal of the district, will have become exhausted with the exception of the Standard mine, which is just above the borough of Mount Pleasant, five miles above Scottdale. When this mine operation ceases, unless the lower veins of coal, the Freeport and Kittanning, be mined, the quality of Jacobs Creek water will approach more nearly its original condition and the discharge of sewage therein at that time would be liable to produce a nuisance and to lessen the value of the waters for natural uses by the riparian owners along the streams.

The industries of Scottdale would seem to be of the permanent kind, and the location of the town with respect to the natural resources of western Pennsylvania is such that in planning a drainage and sewerage system, the period to be forecasted warrants the assumption of permanency of population and increasing growth. Sewerage works, therefore, should be designed to serve the purposes of public health under conditions obtaining now in Scottdale and in anticipation of those of the future.

It is known that the extreme acidity of Jacobs Creek has rendered fish life extinct in the stream, and it is also observed that the acids act as powerful disinfectants. No nuisance exists in the creek by reason of the discharge of sewage therein at Scottdale except in the immediate vicinity of an outlet and occasioned by sewer gases.

A complaint was filed in the Department in the summer of nineteen hundred and six by a citizen of Everson where it was alleged that the discharge of sewage from the main Scotdale sewer opposite Everson was not into Jacob Creek directly but that the solid matter was distributed over shoals where it lay to putrefy and produce a nuisance in the neighborhood.

In the fall of nineteen hundred and seven, the assessed valuation of Scottdale was reported to be three million, three hundred and thirty-six thousand dollars, and the bonded indebtedness sixty-seven thousand dollars, with a sinking fund of eight thousand dollars, giving a net debt of fifty-nine thousand dollars, or a balance of one hundred and seventy-six thousand dollars which might be raised within the constitutional limit of indebtedness. So it appears that the town is well off financially.

Owing to the acidity of Jacobs Creek and the absolute abandonment of all use of its waters from Mount Pleasant to the Youghiogheny River, in which distance of nineteen miles the sewage of these places is likely to be quite thoroughly destroyed or relieved of all pathogenic power, the discharge of sewage from Scottdale sewers into this stream might, with reason and without prejudice to public health, be permitted to continue under approved conditions, to as late a date as any municipal sewage in the basin of the Youghiogheny River may be permitted to continue to be discharged into the waters of the State.

However, the Scottdale authorities should, in the meantime, build all sewer extensions in anticipation of the ultimate purification of the sewage before it be discharged into the creek. This can be done at a saving of money and in the interests of efficiency.

The building of private sewers in the allotments within and without the borough, without regard to any comprehesive plan is a mistake. The borough requires the developer of a tract to conform to the general plan of street and alley lay-out of the town, and this is precedent to the acceptance by the borough of any private way. In like manner, should all sewers built in private ways in districts which must finally be drained into the public sewer system, be laid out and built in conformity to a comprehensive sewerage plan. Such a plan cannot be promulgated under the auspices of any other than the local municipal authorities, and, therefore, the borough council should forthwith prepare such a plan, adopt it and then compel adherance to the plan thereafter.

There should be a trunk sewer, of a size not larger than necessary to remove sewage proper, which should start in the upper part of the borough and extend down the creek valley to some point below the lowest sewer outlet, where the sewage might be discharged temporarily or until the time shall have arrived for some other method of disposal to be adopted. This trunk sewer should be designed to intercept the flow of sewage proper from all existing sewer outlets and of outlets which may be built as the district develops.

It should be the main sewer of the comprehensive sewerage system which the borough should design for the district and while temporarily roof water may be admitted to the sewers, it should not be overlooked that ultimately, if sewage disposal works are ever required, at that time economy would demand the cutting out of a large proportion of roof water from the system. Hence all roof water connections should be made under terms permitting the discontinuance of such connection whenever necessary. It is usually more economical to discharge roof water into street gutters and therein conduct it to the nearest natural water course, rather than convey this water long distances underground in large size pipes at great expense. The policy of separating sewage and storm water, of conducting the storm water to the nearest water courses, and of conveying the sewage, which is the much smaller flow, in small sized pipes beyond the vicinity of dwellings and disposing of it in a way to produce no harm to anybody, is now prevailing through the country as the most economical and efficient plan.

Even the sizes of the sewers now proposed are much larger than absolutely necessary, if roof and storm water be excluded and the flow in the sewers be only the volume of water used in the dwellings for domestic purposes. Generally speaking, the sewage output from a community is about equivalent to the total daily water consumption of the community. An estimation of all contingencies of a per capita flow of three hundred gallons per day is a common basis for the design of the main sewers for a sanitary system for a town. If this rule be substantially followed in planning the comprehensive system for the borough, it will give results comparable with those being adopted generally in the State.

In view of the foregoing considerations, it has been determined that the interests of the public health demand that the proposed sewer extensions be approved and they are hereby and herein approved and a permit issued therefor, under the following conditions and stipulations:

FIRST: That all storm and roof water be excluded from the sewer system, or, if admitted, it shall be under such conditions as shall render practicable the exclusion from the sewer system of such water whenever it shall become necessary for this exclusion, or partial exclusion to be effected.

SECOND: The admission of sewage to storm drains shall be prohibited.

THIRD: At the close of each season's work the borough shall prepare a plan and profile of the sewers built during the year and file such plans in the office of the Commissioner of Health, together with any other information in connection therewith which may be required.

FOURTH: On or before January first, nineteen hundred and nine, the borough shall prepare a plan for a comprehensive sanitary sewerage system for its entire territory, along the lines hereinbefore outlined or suggested, and submit the same to the Commissioner of Health for approval. Said Commissioner of Health may modify, amend or approve this plan and specify conditions under which the additions and extensions to the borough sewer system shall conform to such comprehensive plan as so modified, amended or approved.

FIFTH: This permit to discharge sewage into the waters of the State shall cease on the first day of January, nineteen hundred and nine. If on said date the borough shall have submitted the said comprehensive sewerage plan and have complied with the other conditions of this permit, then the Commissioner of Health may extend the time until January first, nineteen hundred and twelve. Nothing herein shall be construed as a denial to the borough for permission to discharge sewage into the waters of the State beyond said January first, nineteen hundred and twelve, provided it shall appear on said date to the Commissioner of Health that the interests of public health will be subserved by such further extensions.

SIXTH: If at any time in the opinion of the Commissioner of Health a sewer system or any part thereof shall have become a nuisance or menace to public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may approve or suggest.

SEVENTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be incinerated on the premises.

The special attention of the borough authorities is called to the importance of a thorough examination of all wells and springs used as sources of drinking water and the necessity from the public health standpoint of the discontinuance of all such sources against which any suspicion may be justly entertained.

It is further suggested that the borough prepare the comprehensive sewerage plan at as early a date as possible. Meantime, private parties cannot legally build sewers and connect them to the public sewer system since this would be in fact an illegal and disapproved extension to the existing sewer system. Neither can such private sewers legally discharge into any of the waters of the State. The several property owners will be notified of the requirement of the State respecting the comprehensive sewerage system, and such owners will be warned not to build sewers except it be in conformity with the plan to be approved by the Department of Health.

Harrisburg, Pa., March 2nd, 1908.

SCOTT TOWNSHIP, ALLEGHENY COUNTY.

A. P. Dysart.

This application was made by Mr. A. P. Dysart, an owner of property in Scott Township, Allegheny County, and is for permission to connect the sewer system owned by said Dysart with a sewer system on adjoining property owned by the Mt. Lebanon Land and Trust Company, and for permission to discharge the sewage therefrom through said Trust Company's sewer system into Painters Creek, within Scott Township, Allegheny County.

Scott Township is located largely in the valley of Chartiers Creek and is about five miles distant southwesterly from City Hall, Pittsburg. In the northeastern part and at the summit between the watershed of Chartiers Creek and the drainage area of Saw Mill Run, a stream flowing northwesterly and entering the Ohio River at a point in South Pittsburg about two miles above the mouth of Chartiers Creek, there is a settlement known as Mount Lebanon, which has been brought into being by the activities of real estate developers.

There are two tracts of this settlement, one being known as the Clear View plan of lots, and the other as the Mount Lebanon School plan of lots.

These allotments adjoin the "Washington Road," a highway leading from Pittsburg through Allegheny County to Washington, Washington County, Pennsylvania. In a portion of this highway is located a trolley road leading to Charleroi. The transportation facilities are fairly good, the lots occupy commanding positions on the hills overlooking a wide expanse of territory to the south and west and being removed from manufacturing plants and about twenty minutes ride by trolley from Pittsburg, afford desirable sites for residences of Pittsburg business men.

The adjoining country is undeveloped farm land, all favorable for residential purposes and all of which will undoubtedly be eventually so developed.

The natural drainage of the two plats is principally into the valley of Painters Creek, which empties into Chartiers Creek above the borough of Carnegie and immediately below the borough of Bridgeville.

The Mt. Lebanon School plat is the one being developed by the petitioner. It includes thirteen and one-half acres and seventy-five lots, where have been erected thirteen residences costing from two thousand to five thousand dollars each, and at present connected to a sewerage system built by the promoter and maintained by him. There are, all told, over two miles of sewer pipe laid in the streets, the diameters ranging from eight to fifteen inches. There are nine thousand four hundred and thirty-three feet of eight inch sewer. The outlet of the system is fifteen inches in diameter and discharges into two cess-pools, the first of which is ten feet wide, ten feet long and seventeen feet in depth, covered with plank and having one and one-half feet of earth thrown over. There is no direct outlet, but there is a blind drain filled with gravel through which the sewage passes on its way to a second cesspool ten feet distant, which second cesspool is eight feet wide by eight feet long and ten feet deep and also covered with plank and earth with no visible outlet. The sewage from the second tank percolates into the adjoining soil and overflows slightly, and it is this overflow which is alleged by the developers of the Clear View plat to constitute a nuisance.

The two cesspools are located approximately two hundred feet distant from a lower line sewer in the Clear View plat, so that the sewers of the Mt. Lebanon School plat can readily be drained into the sewers of the Clear View plat.

South and west of the Dysart property is the said Clear View property owned by the Mt. Lebanon Land and Trust Company and comprising approximately sixty acres of land divided into two hundred and eighty-three residence lots, where at present there are twenty-three dwellings erected and connected with the sewerage system of this allotment. This system of sewers is of unknown size, probably ranging from eight to twelve inches in diameter. So far as the Department is informed, the total length is approximately twelve thousand five hundred lineal feet. The slope of the ground is to the southwest and the outlet of the sewer system twelve inches in diameter is into a small run at the foot of the allotment. This run is one of the headwaters of Painters Creek and in dry seasons is probably without running water. At the time of the Department's inspection in November, nineteen hundred and seven, there was a flow of about fifty gallons per minute, of which about one-third of the flow was being discharged from the sewers.

Whether the roof water is connected to the sewer system of either allotment is not definitely reported, but judging from the roof water gutters, such connections have been made and help flush out the sewers. The stream into which the sewage is discharged and others into which it leads in Scott Township, are not now or likely to be used for public water supply, but the water is utilized by stock on the adjacent farms, so it is reported. This entire territory will eventually either be supplied with water from the mains of the City of Pittsburg or from those of the South Side Water Company. There are no industries in the district and no mine drainage into the streams within two miles of the allotments, so it appears.

It seems that the sewers of the Trust Company were built and were in operation prior to the passage of the law of nineteen hundred and five, but that the Dysart sewer system has been constructed and put in operation since that time. Further,

the Trust Company, on June twentieth, nineteen hundred and seven, represented that the overflow of Dysart's cesspool constituted a nuisance and requested that some action be taken by the Commissioner of Health looking toward the discontinuance of the nuisance.

The owners of the allotments have built the system without regard to the future requirements of the adjoining lands, all of which must be sewered when populated, and served by a main sewer extending down the valley of the main stream.

Undoubtedly the cesspool overflow nuisance will increase as the land is developed, and so also will the menace produced by the discharge of sewage from the Clear View plat sewerage system into the stream.

At the present time the dwellings are supplied by artesian water, the works being owned by the Trust Company. Dysart's dwellings are supplied by individual sources, so it is reported, but this is uncertain.

Looking at the situation from a practical standpoint, the two systems at the Mount Lebanon settlement should be connected by a branch or branches and the combined sewage of both systems should be treated when necessary and purification works built at the expense of both properties under some equitable arrangement. As the territory builds up, an adequate disposal plant will be more and more necessary and in anticipation of this, the interests of all concerned locally should decide upon a site for the disposal works and take measures to appropriate the land or set it aside therefor now. The district may, in the near future, have developed sufficiently to warrant the incorporation of a borough, at which time the sewer system would be taken over by the municipality and in anticipation of this, under the ruling of the Attorney General, it has been considered good public policy for the State authorities to consider an application from private parties laying out a common sewerage system extensive enough to warrant its being considered a public system and to approve the same and stipulate conditions under which it may be used and the sewage therefrom discharged into the waters of the State.

Chartiers Creek, into which Painters Creek discharges, is an acid stream, made so by the drainage of mine operations. It is also a stream polluted by municipal sewage from towns and from two State institutions. Decrees have been issued by the Commissioner of Health requiring the discontinuance at a future date of the sewage of these places into the stream, more to obviate the establishment of a nuisance in the stream than to protect any public water supply. The harm, if any, which the discharge of sewage from the Mount Lebanon settlement can produce in Painters Creek is that incident to the drinking of the waters by cattle pastured along its banks. It is reported that there are few such cattle and that the use of the creek waters for drinking purposes is practically a negligible amount. If the petitioner can secure a right to connect the sewer system with that of the Mount Lebanon Land and Trust Company's system, under terms which shall provide that at any time when the Commissioner of Health shall deem it necessary for the sewage from both allotments to be purified, then the sewage purification works shall be installed forthwith, and if, in the meantime and within a given date, the owners of both allotments will join in a plan to select a site for the purification works and submit plans therefor, then it would seem that temporary permission to continue the discharge of sewage from the Clear View sewers or extensions thereof into Painters Creek or its tributary would be consistent with the general policy of the Department relative to such matters in Allegheny County and vicinity and more especially within the valleys of Saw Mill Run and Chartiers Creek.

It has been determined that the interests of the public health require that a permit be issued, and it is hereby and herein issued, to Mr. A. P. Dysart to discharge the sewage from the sewer systems on his property at Mount Lebanon village, in Scott Township, Allegheny County, into and through the sewer system of the Clear View plat belonging to the Mount Lebanon Land and Trust Company and located adjacent to and southwest of the said Dysart property in said township, and thence into Painters Creek or its tributary as proposed, under the following conditions and stipulations:

FIRST: That such permission to connect the Dysart sewer system with the Mount Lebanon Land and Trust Company's sewer system shall be obtained of the Mount Lebanon Land and Trust Company, the owner of the Clear View plat sewer system, under terms whereby whenever it becomes necesssary, in the opinion of the Commissioner of Health, that sewage from such sewer systems shall cease to be discharged into the waters of the State, the proprietors of said sewer systems shall jointly, or in any event the proprietor of the said Clear View plat sewerage system, which is the lower and outlet system of the Mount Lebanon settlement, shall forthwith discontinue the discharge of sewage into any of the waters of the State.

SECOND: Said proprietors of the said Clear View plat sewerage system shall prepare preliminary plans for purification works and submit the same, together with plans of the sewer system and of any extensions contemplated to said sewer system, to the Commissioner of Health for approval on or before the first day of December, nineteen hundred and ten. The Commissioner of Health may modify, amend or approve such plans and fix the terms and conditions under which the work shall be constructed and operated thereafter.

THIRD: The two said proprietors of said sewer system shall, upon reaching an agreement as to the common use of the existing outlet of the Clear View plat sewerage system, file a copy of the agreement in the office of the Commissioner of Health and within six months of the date of such agreement said proprietors shall

prepare and submit a plan of a site for purification works together with a report on the means by which the sewage is to be conducted to said plant and be treated at the proposed site, whenever this is deemed necessary by the Commissioner of Health.

Harrisburg, Pa., March 6th, 1908.

SEWICKLEY BOROUGH, ALLEGHENY COUNTY.

This application was made by the borough of Sewickley, Allegheny County, Pennsylvania, and is for permission to extend its existing sewerage system made during the summer of nineteen hundred and eight.

The borough of Sewickley is located in western Pennsylvania, in Allegheny County, thirteen miles west of Pittsburg. The borough is bounded on the north by Leet township, on the east by said township, Aleppo Township and Osborne borough, on the south by the Ohio River and on the west by Edgeworth borough. The borough is rectangular in shape and has an area of four hundred and seventy acres. It has a water frontage of a mile along the Ohio River and extends forty-five hundred feet back from the river to Sewickley Heights.

The bank of the river along the water front of Sewickley is precipitous. It rises to a height of forty feet above low water and, with the exception of a tract of ten acres in the extreme southwestern part of the borough, the entire territory of Sewickley borough is above the flood stage of the Ohio. From the river the land rises on a gradual slope to Centennial Avenue in the northern portion of the borough, which is parallel to and eleven hundred feet from the northern boundary line of the borough. At Centennial Avenue the land is fifty feet higher than in the southern portion of the borough; beyond this it rises more rapidly and at the northern boundary line reaches an elevation one hundred and fifty feet higher than at the river front.

There is a small run, known as Hoeys Run, which extends from the northern boundary of the borough southerly through the western central portion to the Ohio River. This run drains a narrow valley in this section of the borough and during the dry season has no flow. The rest of the borough drains directly into the Ohio River. The soil below Centennial Avenue is mainly porous sand and gravel formation, extending to a great depth. There are no springs and very little ground water. North of Centennial Avenue the soil consists of clay, interspersed with some rock.

The Ohio River at Sewickley is twelve miles below the junction of the Allegheny and Monongahela Rivers, which form its head waters. It drains the large watershed of these two rivers and also receives the sewage from the great industrial communities located in this region. At the head of the Ohio the sewage from Greater Pittsburg, with a population of over a half million people, is discharged into the river and further up its tributaries various communities and manufacturing establishments increase the pollution.

It is reported that during low water stages of the Monongahela River the entire flow of the river is used five times and over by the mills and other industries located along its banks. During these stages the Ohio River is, therefore, grossly polluted and entirely unfit for drinking purposes.

In order to aid navigation in the Ohio River during low stages, the United States Government has constructed a series of collapsible dams which raise the normal river level to a stage of nine feet. One of these dams has been constructed seven miles below Sewickley and there is another immediately east of the eastern boundary line of the borough. These dams form pools in the river which gradually retard the natural current and store up the sewage discharged therein for many days.

The borough of Sewickley takes its water supply from cribs sunk in the bottom of the river immediately east of the eastern boundary, in the pool formed by the dam below Sewickley. One mile below Sewickley the borough of Edgeworth also takes its water supply from a crib sunk in the river bottom and located in this pool. Seven miles below the borough of Ambridge takes its supply from wells on the river's edge and fifteen miles below Beaver takes its water supply from a crib.

Sewickley is a residential community. There are no manufacturing establishments and the business section is limited to a score of small stores grouped in the north central part of the borough. The rest of the borough is occupied by the residences of men prominent in the financial and commercial life of Pittsburg. These homes are surrounded with well kept lawns and shade trees which, combined with the paved and shaded streets, has made Sewickley famous as one of the most beautiful of Pittsburg's suburbs..

The borough is connected with Pittsburg by the main line of the Pittsburg, Fort Wayne and Chicago Branch of the Pennsylvania Railroad system. This railroad extends through the southern portion of the borough parallel to and seven hundred feet from the river bank. It maintains an excellent suburban train system, which has materially aided the growth of the borough. The population of Sewickley borough at present is forty-five hundred. In nineteen hundred it was thirty-five hundred and in eighteen hundred and ninety it was twenty-seven hundred, so that it can be seen that the future growth of the borough will not be so rapid, as the territory is now well developed and the wealthy residents will not allow a sub-division of their properties.

Sewickley borough has its own water works system. It supplies all water used for fire and domestic purposes within the borough limits and also portions of Edgeworth borough, Osborne, and Sewickley Heights, located north of Sewickley borough on the summit of the ridge. The water is taken from a crib three hundred and sixty-eight feet long by sixteen feet wide and five feet deep and submerged so as to have a cover of eight feet of gravel. This crib is located in the Ohio River two hundred feet from the northern bank and one hundred and fifty feet east of the borough limits. The pumping station is located on a tract of land east of the borough limits in Osborne borough and the water is drawn from the crib by direct suction by two pumping engines, of two million and one million gallons capacity, respectively. The water is delivered through a ten inch force main to two reservoirs located on the heights in Aleppo township northeast of Sewickley borough and having a combined capacity of five million gallons. These reservoirs supply six-sevenths of the consumption.

There is an auxiliary pumping station located adjacent to these low service reservoirs which pumps water into a high service reservoir and a standpipe. This second reservoir supplies a small portion of Sewickley borough which is above the low service section. The standpipe, which is one hundred and ten feet high, furnishes water to the residences on Sewickley Heights. There are nineteen miles of distributing mains in this system ranging in size from three inches to twelve inches. The water consumption ranges from eight hundred thousand gallons to a maximum of one million two hundred thousand gallons, which is reached during the summer months. The average consumption is one million gallons, and as it is estimated that the water works system supplies fifty-five hundred people, this represents a per capita consumption of one hundred and eighty-one gallons.

The water supply furnished from this crib appears to be satisfactory. It is clear and much harder in chemical composition than the river water. No bacteriological analyses have been made recently, but in an analysis made in nineteen hundred and five chlorine nitrites and albumenoid ammonia were present, which would warrant a suspicion that there was some infiltration from the river into this intake. It is stated by the borough authorities that the gravel substream under the river carries an enormous amount of ground water and it is reported that when coffer dams were recently constructed in the vicinity of the water works intake for building the Government dam, great difficulty was experienced in pumping the ground water from these cribs. Sewickley borough is equipped with a combined system of sewers consisting of twelve and a half miles of terra cotta sewers ranging in size from twenty-four inches to six inches. In addition to this system there are also drains which carry storm water only. The system discharges through six independent outlets into the Ohio River.

The most easterly of these outfall sewers is the Boundary Street outlet, consisting of a fifteen inch terra cotta outfall sewer discharging into the Ohio River in Osborne borough immediately across the Sewickley boundary line. This outfall is one hundred and fifty feet below the intake crib of the Sewickley water works. This sewer extends from the river front for a distance of thirteen hundred feet along the borough boundary to Beaver Street. It is fed by a system of laterals ranging in size from twelve inches to six inches and drains only that portion of the borough adjacent to the eastern borough boundary line. Storm water is admitted from street inlets into this system at several points.

One thousand feet below the Beaver Street outfall sewer there is an eighteen inch outfall sewer, known as Oak Street sewer, discharging into the Ohio River within Sewickley borough at the foot of Oak Street. This sewer is fed by a system of ten inch laterals and drains only a small portion of the borough in the southeastern district lying between the railroad and the river. Storm water is admitted to this system through street inlets.

Thirteen hundred feet below the Oak Street outfall sewer is the Chestnut Street outfall sewer. This outfall sewer consists of an eighteen inch terra cotta sewer extending from the river front up Chestnut Street for a distance of sixteen hundred feet. It is fed by a series of laterals ranging in size from eighteen inches to eight inches and drains all of the eastern portion of the borough below Beaver Street which is not taken care of by the other two systems previously described. A large quantity of storm water is carried through this system from numerous street inlets.

One thousand feet below the Chestnut Street sewer the Walnut Street outfall sewer discharges into the Ohio River. This sewer consists of a twenty-four inch outfall sewer and drains a small area of the borough in the vicinity of Walnut Street and lying between the railroad and the river. It is fed by a twelve inch sewer in Chadwick Avenue and by the eight inch River Avenue sewer. Storm water is admitted through street inlets.

Eighteen hundred feet below Walnut Street sewer the Ferry Street outfall sewer discharges into the Ohio River. This sewer is eighteen hundred feet from the western boundary of the borough and consists of a twenty inch outlet which is fed by a series of laterals ranging in size from eighteen inches to eight inches. This system extends up the valley of Hoeys Run and drains over three-quarters of the borough territory. It takes care of all of the northern and central portions of the borough and practically the entire western section, with the exception of a few laterals on the western boundary. Most of the storm water in the district covered by this system is drained directly through storm drains into Hoeys Run. There are, however, several storm inlets in the western portion of the borough which drain into this system and during wet weather there is a heavy flow of storm water.

The Academy Avenue outfall sewer discharges into the Ohio River within the borough limits near the boundary line between Sewickley and Edgeworth. This sewer consists of a twenty-four inch outfall sewer extending from the Ohio River along Academy Avenue, which is the boundary line between Sewickley and Edgeworth, for a distance of forty-four hundred feet to the extreme northwestern corner of the borough. At this point it crosses the borough boundary line and receives storm water from a large catch basin located in a gully in the hills immediately across the northern boundary line of the borough in Leet Township. This sewer was originally constructed as a storm drain for the purpose of relieving property owners in the northwestern portion of the borough from washouts due to water collecting in this gully. There are other storm inlets into this sewer located at various points along Academy Avenue and sewage is carried through this system from the adjacent property. There are also several lateral sewers ranging in size from twelve to eight inches and which discharge sewage from Sewickley borough into this outfall sewer. Several of the property holders in Edgeworth borough use this system for the discharge of sewage. On account of the large size of this sewer and the small quantity of sewage carried therein during the dry season, it has been found extremely difficult to keep this sewer clean and occasionally complaints have arisen due to the foul condition of this sewer.

It is, therefore, seen that all of the outfall sewers carry storm water in a considerable quantity in addition to the domestic sewage. It is reported that many of the residences discharge their roof water into the sewer system. The profiles submitted show that the sewers are laid on good grades and in most cases the grades are ample to carry off the sewage without flat flushing. Flush tanks are provided at dead ends and also on the flat grades and manholes are located at changes of line and grade. There are no underdrains in the system as this has been found unnecessary due to the porous condition of the soil. It is reported that there are nine hundred and twenty-five connections to the sewer system from the various residences and stores in the borough, so that it is seen that the system is quite generally used by the borough inhabitants

There are several private sewers which discharge directly into the Ohio River from houses located along the bank within the borough limits. Until recently there were several private sewers which discharged directly into Hoeys Run, but on account of this run going dry during the summer this discharge created a nuisance and all these sewers have been connected to the borough system. Formerly much of the domestic sewage in the town was discharged into deep wells dug to a depth of twenty-five feet into the porous gravelly soil. Most of these wells have been abandoned and it is reported that probably twenty-five of them are now in use.

The data on the number of cases of typhoid fever which have occurred in the borough during the past few years was furnished by the local Board of Health and shows that for the years nineteen hundred to nineteen hundred and seven, inclusive, the number of cases have been respectively as follows: sixteen, eleven, seven, ten, seventeen, four, nine and six.

When it is considered that most of the inhabitants of Sewickley borough have frequent communication with the city of Pittsburg and that many of them work in the said city, where the water supply has been grossly polluted and where typhoid fever is prevalent, it cannot be said that the above record is high. In cities where the water supply is pure and is obtained from an efficient filtration plant, the death rate from typhoid fever may be below five or ten per hundred thousand. With the introduction of a pure water supply for the city of Pittsburg, the danger of bringing typhoid fever from that source to Sewickley is not largely eliminated and the borough officials should make an investigation of the possibility of contamination or accidental pollution of their own water supply.

Sewickley has applied for approval of a sewer extension to the Walnut Street system consisting of four hundred and seventy-five feet of eight inch lateral sewer extending along River Avenue from Chadwick Avenue north and discharging domestic sewage from the existing Walnut Street outfall sewer into the Ohio River. This sewer connects to the existing system through a manhole and is ventilated at the upper end by a lamp hole. The sewer is on an ample grade to allow the sewage to be carried off without flushing.

So it appears that Sewickley sewage goes into the Ohio River and that during periods of low flow in the river this sewage is stored in a pool for weeks at a time. In addition to the sewage from Sewickley borough, is the sewage from Pittsburg and many other places above in the valleys of the Allegheny and Monongahela Rivers; so that during the low water period, the said pool is largely sewage. In consequence, there is grave peril to human life in using raw water for drinking purposes drawn from the ground below the bed of this sewage pool. In fact, said sewage pools endanger public health to a greater or less extent in all of the municipalities along the Ohio River below Pittsburg where the people obtain their drinking water from the river.

Experience has demonstrated time and again that such an intake crib as now employed by Sewickley borough cannot be relied upon to always suitably filter the water. Because it is not up where it can be seen and manipulated, there is no warning or opportunity for observing whether the crib is likely to become inefficient. In other words, no warning is given of a breakdown. Even where the most careful design and complete filter plans are provided with every facility for safeguarding accident, it requires constant attention and skilled attendants in order to obtain a

constantly pure effluent. It behooves the public of Sewickley to support the campaign against stream pollution of drinking water now waged by the State Department of Health because it has a direct bearing upon the interests of public health in Sewickley borough. Furthermore, for equal reasons, it is contrary to the interests of the public health for Sewickley to continue to put its sewage into the Ohio River indefinitely, and the borough should begin a plan for the ultimate discontinuance of the discharge of sewage into the river.

In disposing of sewage by the modern methods it is essential in the interests of economy and efficiency to eliminate storm water from the sewer system. At present all of the outfall sewers from the borough of Sewickley carry storm water and roof water from the houses. It will be noted, however, that most of the sewers in the borough are small in size and with a reasonably small expense the borough system can be remodeled so as to exclude the storm water from the sanitary system. Already the borough of Sewickley has constructed several storm drains in the central portion of the borough which eliminates most of the storm water in this section from the sewers and discharge it into the run that extends through this portion of the borough.

The large sewer on the western boundary of the borough was originally constructed as a storm sewer, and it is in the interests of the health of the community to construct a sanitary sewer through this section which will carry the household sewage. On account of the natural porosity of the ground in nearly all of the borough territory, it appears that roof water can be conveniently eliminated from the sewer system by discharging directly into short drains laid in this porous soil.

In remodeling the sewerage system and eliminating the storm water, the borough officials should look forward to the ultimate disposal of the sewage and construct an intercepting sewer in the lower section of the town which will collect sewage from the various systems and carry it to some point where it can ultimately be disposed of. This sewer could be constructed along Chadwick Avenue at an elevation sufficiently high to allow the effluent to discharge into a disposal plant by gravity during the ordinary stages of the river. The sewage which discharges through the outfall sewer at the northeastern boundary of the borough near the water works crib should be diverted from this outlet immediately and carried through one of the other existing outfalls.

The only place available for sewage disposal within the limits of the borough of Sewickley is the tract of low ground in the southwestern section on the Ohio River. On this tract is located the borough garbage disposal plant, but on account of the closeness of the residences in this neighborhood it would not be advisable to construct a sewage disposal plant upon this site. Across the Fort Wayne Railroad tracks there are several fine residences which are within four hundred feet of this site and it is not unlikely that complaints would be forthcoming from these property holders if a plant were located at this point.

Below Sewickley and the borough of Edgeworth there are several isolated tracts along the Ohio which could be used to advantage by both boroughs for the construction of a disposal plant. Both the boroughs of Edgeworth and Osborne have been granted permits for their sewer systems contingent upon an ultimate disposal of the sewage. It would be economical, both in first cost and in maintenance, for these two boroughs to combine with Sewickley in a metropolitan outfall sewer and disposal plant.

The assessed valuation of Sewickley borough is reported to be over six million dollars and the total indebtedness is one hundred and thirty-seven thousand dollars, so that Sewickley borough is in first class financial condition and could well afford to make the expenditures necessary for remodeling their sewerage system and preparing for an ultimate treatment of the sewage. The sewer extension for which approval has been asked is a sanitary sewer and can be incorporated into the revised sewer system.

It has been determined that the interests of the public health will be subserved by withholding the approval of the sewer system and the same is herein and hereby withheld until such time as the improved sewerage and sewage disposal plans shall have been prepared and submitted to the Commissioner of Health for approval and until such plans have been approved or passed upon as required by law.

It has further been determined that the Commissioner of Health notify the borough of Sewickley, and it is herein and hereby notified, that on or before July first, nineteen hundred and nine, the borough shall either independently or in conjunction with Osborne and Edgeworth boroughs, prepare plans for a comprehensive system of sanitary sewerage, intercepting sewers and sewage disposal works and submit the same to the Commissioner of Health for approval.

If, on or before July first, nineteen hundred and nine, the borough shall have complied with the terms of this decree, then permission may be given to discharge the sewage from the borough sewer system into the waters of the State, having in mind the policy of the State with respect to the discontinuance of the discharge of sewages of other municipalities in the region into the waters of the State.

The local authorities of Edgewood and Osborne boroughs will be notified by the Commissioner of Health to advise and co-operate with the authorities of Sewickley borough.

Harrisburg, Pa., November 20th, 1908.

SHARON BOROUGH, MERCER COUNTY.

This application was made by the borough of Sharon, Mercer County, and is for approval of sewer extensions constructed by the borough between the dates of April twenty-second, one thousand nine hundred and five, and January first, one thousand nine hundred and eight, consisting of three and thirty-two hundredths miles of laterals ranging in size from eight inches to fifteen inches in diameter and discharging through existing sewers into the Shenango River within the limits of the borough, and for permission to lay one-half mile of eight inch lateral sewer extensions to the sewerage system. These extensions being located in three different sections of the borough and to discharge through existing sewers into the Shenango River.

It appears that the borough of Sharon is a thriving industrial community of sixteen thousand population located on the western boundary of the State of Pennsylvania in Mercer County. It is bounded on the north and east by Hickory Township, on the south by South Sharon borough and on the west by the State of Ohio. The borough was incorporated on October sixth, eighteen hundred and forty-one, and has an area approximately one and one-half square miles. Through the center of the borough flows the Shenango River in a southerly direction, dividing it into two natural drainage sections. The eastern section, which comprises approximately three-quarters of the borough, is subdivided into two sections by Pine Run, which enters the borough at its eastern boundary and flows through the center westerly to the Shenango River. The Shenango River has its source in Conneaut Township, Crawford County, forty miles above Sharon. It flows in a general southerly direction through the western part of Crawford, Mercer and Lawrence Counties, draining with numerous tributaries a part of the eastern section of Ohio and emptying below New Castle into the Beaver River, which in turn feeds the Ohio. The valley of the Shenango River is long and narrow. The banks, in most cases, are above the flood stage. Along the banks throughout its entire length are many steel mills and allied industries, such as are found in the Pittsburg region. These mills furnish the main occupation for the inhabitants of the many boroughs and towns located in this valley. Sharon is the center of a group of these boroughs which are practically adjacent and extend for several miles up and down the Shenango River banks from Sharon.

One and a half miles north of Sharon and separated therefrom by Hickory Township is the borough of Sharpsville, with a population estimated at thirty-five hundred. Between these boroughs Hickory Township is partly built up with residences and mills, so that there is practically no unpopulated district north of the borough limits. On the south Sharon borough extends into South Sharon borough, which, in turn, at its southerly boundary borders on Wheatland borough. Three miles below Wheatland borough is the borough of West Middlesex, to which a permit has already been issued for the construction of a sewerage system. Extending in order from West Middlesex borough to the mouth of the Beaver River are Pulaski, Nashua, Harbor Bridge, New Castle City, Wampum, Beaver Falls borough, Brighton borough, Bridgewater borough, Rochester borough and Beaver borough. Several of these boroughs take their water supply from the Shenango and Beaver Rivers. Among them are Beaver Falls, New Brighton and the City of New Castle. These municipalities filter the water before it enters the mains, but in case of some great emergency, would be compelled to introduce raw water into the distributing system. The borough of Sharon also takes its water supply from the Shenango River at a point near the northern boundary of the borough and approximately two miles below the outfall sewers of the borough of Sharpsville. This water is also filtered.

The elevation of the Shenango River at Sharon is about eight hundred and forty feet above sea-level during ordinary stages. The river has a fall of about eight feet to the mile. The banks on either side range from five to ten feet above the low water stage and are, in most cases, above the flood line. The land on either side of the river is practically level for a distance ranging from two hundred to one thousand feet from the bank. From the edge of this low flat land the hills rise on both sides quite rapidly to an elevation of two hundred and fifty feet above the low land. These hills contain the residence districts; the business sections and the manufacturing plants are located on the low land on both sides of the river.

The steel industries furnish the main occupation for the citizens of Sharon. Among these are the National Malleable Castings Company, occupying an area of seventeen acres and employing about twelve hundred people; the United States Steel Corporation plant, occupying about four acres of ground and employing about seven hundred and fifty people, and the Driggs Seabury Ordinance Corporation, owning about seventeen acres of land and employing four hundred and fifty people. There are also boiler works, gas engine works, a brewery and a brake beam company. Sharon is also a railroad center. It is located on the main line of the Erie and Pittsburg Railroad, being a part of the Pennsylvania system; a branch of the Lake Shore and Michigan Southern Railroad, and the main line of the Erie Railroad from New York to Chicago.

The Sharon Water Works Company supplies water to Sharon, South Sharon and a part of Hickory Township in Pennsylvania and some individuals in the State of Ohio. The plant has a capacity of four million gallons per day and supplies, on an average, one million seven hundred and twenty thousand gallons per day to sixteen thousand nine hundred and seventy consumers, or about one hundred gallons per

capita per day. The pumping station is located on the west bank of the Shenango River near the northern boundary of Sharon borough. The supply is taken from the center of the river through a twenty inch intake to a concrete well. It is pumped from this well into a series of sedimentation tanks and then passes through eight rapid sand filters each with a capacity of five hundred thousand gallons per day when operated at a rate of one hundred and twenty-five million gallons per acre per day. A coagulant is supplied to the water before it enters the filters. After passing through the filters the water is pumped into a brick reservoir of two hundred and ten thousand gallons capacity located in the State of Ohio about three hundred feet above the low district of the town. The water is supplied to the consumers from this reservoir through a series of mains ranging in size from two inches to twelve inches. There is also a by-pass so that water can be pumped directly into the mains if necessary. This water supply is furnished to thirteen thousand two hundred and seventy consumers in the borough of Sharon and to the manufacturing establishments for industrial purposes. It is estimated that one hundred and twenty thousand gallons are used per day by the factories. For drinking purposes most of the industrial plants have drilled wells ranging in depth from two hundred feet to twenty-five feet. The United States Steel Corporation also has an additional water supply which is taken from the Shenango River for manufacturing purposes.

It is reported that no analyses have been made of the public water supply in Sharon borough for two years. During the year nineteen hundred and seven there were ninety-one cases of typhoid fever and four deaths reported. In nineteen hundred and six there were twelve deaths; in nineteen hundred and five, twenty-four deaths, and for several previous years the death rate was high. There seems to be a general distrust in the public water supply and, where possible, the citizens are using well water for drinking purposes.

Sharon borough has a combined system of sewers emptying into the Shenango River and Pine Run through eight different outlets. The policy for some time past has been to eliminate surface water and storm water from the sewer system and to carry this through storm water drains to the nearest water course. Several of these storm water drains have been constructed and it is reported that it is the intention of the borough authorities to continue this policy. Roof water from nearly all the buildings that are connected with the public sewers is discharged into the main sewerage system. The quantity of sewage being discharged through the various sewers is not reported. The sewers are ventilated by manholes with perforated covers.

Previous to the construction of the extensions for which application is made, there were fifty miles of sewers exclusive of drains in the borough, ranging in size from eight inches to a three foot four inch by five foot brick sewer. The sewage from three-quarters of the borough area is emptied into the Shenango River at a point south of the center of the town immediately below the bridge on Budd Avenue. This sewage is carried through two systems. The eastern system consists of a twelve inch outfall sewer extending from the bridge easterly along Budd Avenue and fed by ten inch and eight inch laterals. This system drains about half the borough and includes all the territory east of the Shenango River, and below State Street is drained by a three foot four inch by five foot brick sewer extending westerly along Budd Avenue and joined at the intersection of Budd Avenue with South Irvine Avenue by a twenty-four inch tile sewer and a two foot four inch by three foot six inch brick sewer extending southerly and northerly along South Irvine Avenue, respectively. These sewers are fed in turn by a system of laterals ranging in size from twenty-four inches to eight inches.

The northeastern part of the borough extending northerly from Pine Run and located east of the Shenango River is drained by a twenty inch sewer on Chestnut Street emptying into the Shenango River at the center of the town immediately below Chestnut Street Bridge. This sewer is fed by a system of twelve inch, ten inch and eight inch laterals covering this entire territory with the exception of a small lateral in the extreme southeastern end of this section. This lateral consists of one thousand feet of eight inch pipe and empties directly into Pine Run at Knox Street.

The northwestern section of the borough, located above State Street and west of the Shenango River and being approximately one-tenth of the total area of the borough, has three independent outlet connections into the Shenango River. These consist of fifteen inch sewers extending directly to the river and fed by a few eight inch laterals.

No profiles of the sewers have been submitted to this Department, so that it is impossible to determine the capacities of the existing sewers or the feasibility of constructing intercepting sewers so as to bring the sewage to one outlet by gravity.

Several of the mills use the borough sewer system. There are also private sewers discharging into the Shenango River from several of the mills. The United States Steel Corporation has a twenty-four inch tile sewer which carries the waste water and sewage from this plant and discharges it into the Shenango River. Sharon Boiler Works has a six inch sewer discharging into a small run, which, in turn, empties into the Shenango River. The Wilkes Rolling Mill also has a six inch sewer. The Stewart Iron Company discharges its sewage into the Shenango River.

In addition to the private sewers from the industrial establishments, there are several private sewers from dwellings. A number of private houses have drains into the neighboring streams which feed the Shenango River. There is also a sewer

known as the Porter sewer on the west side of the river in State Street, which discharges into the river and has nine house connections. There are also several other sewers with six or eight house connections each and discharging independently into the Shenango River.

The borough has made application for approval of three and thirty-two hundredths miles of laterals, consisting of twenty-five hundred and forty-five feet of fifteen inch, twelve hundred and fifty-seven feet of twelve inch, three hundred and twenty-five feet of ten inch and twelve thousand nine hundred and twenty-six feet of eight inch terra cotta sewers. These sewers have been constructed by the borough during the years nineteen hundred and five, nineteen hundred and six and nineteen hundred and seven. Most of them are located in the high district at the southeastern end of the borough. The fifteen inch sewer extends along High Street on the extreme westerly boundary of the town, and is the main extension that has been made in this southwestern section. All of these laterals discharge through the existing sewers into the Shenango River. No profiles of these laterals have been submitted to this Department, so that it is impossible to determine their capacity. From the plan on file in this Department of the sewerage system, it appears that manholes are located at all intersections and probably at all changes of grade. It is reported that these manholes have perforated covers to afford ventilation.

The sewage of Sharpsville, which is now discharged into the Shenango River, is a menace to public health in Sharon and South Sharon. While it is true that the public water supply of Sharon is filtered, nevertheless, it is a well known fact and thoroughly demonstrated that a filter does not always remove the poisons that are in the raw water. The well known Butler epidemic was caused by temporary breakdown in the water purification plant. During the current season, a typhoid fever epidemic has occurred in Royersford and Spring City, Montgomery County, by reason of the over-rating of the water filter. In order to protect public health, sewage must be kept out of streams used as sources of public water supply. The Department has now under consideration a decree with respect to Sharpsville sewage disposal. Greenville borough, located a number of miles above Sharon on the Shenango River, has been required to purify its sewage. The city of New Castle, whose sewage menaces the supply of water at Beaver Falls and New Brighton, has been required to perfect plans for sewage purification works. The citizens of Sharon and South Sharon cannot expect the State to take preventive measures with respect to preserving the purity of the waters above Sharon's intake and not take the same measures to protect the purity of the waters above the intake at New Castle. Therefore, Sharon borough must forthwith prepare plans for the treatment of its sewage.

It seems expedient that there should be a trunk sewer along the river to collect the sewage from Sharpsville and both the Sharon boroughs and possibly Wheatland and to terminate in a sewage disposal plant which shall serve all the municipalities in the district. This would be the most economical and efficient plan provided the municipalities would work together.

However, it is prohibitive in cost to attempt to treat sewage and storm water, and it is fortunate for the taxpayers of Sharon that such a large proportion of its storm water is conveyed through other channels into natural water courses. It will be necessary to go still further and reduce the volume of roof water which now goes to the sanitary sewers. It may not be necessary to absolutely exclude all of this roof water, but a series of measurements taken hourly during different kinds of weather, wet and dry, should be undertaken by the borough as a basis for an economical and efficient design for an intercepting sewer and sewage disposal works.

It is altogether probable that Sharon will be obliged to remodel that part of its existing sewer system in the lower part of the town where the old combined sewers exist. Comprehensive plans should be designed and adopted, and then the borough can make improvements as the years go by and conform to these plans until finally a perfect system will result.

It is reported that the assessed valuation of the borough is five million six hundred and ninety-two thousand, one hundred and ninety-six dollars. Early in April of the current year it was represented to the Department that the bonded indebtedness was three hundred and forty-six thousand dollars for sewers and street paving. Besides this, there was a bonded indebtedness of one hundred and sixty thousand dollars for schools and the proposition was about to be submitted to increase the school bond indebtedness by an additional issue of one hundred and forty thousand dollars. The attorneys for the municipalities maintain that the indebtedness for school purposes is independent of the seven per cent. limit of the indebtedness for municipal purposes. Exclusive of school bond issue, it would appear that the borough could, in the spring of nineteen hundred and eight, borrow fifty-two thousand dollars. The next assessment of property will be in nineteen hundred and nine. The last assessment increased the total about eight hundred thousand dollars. Whether Sharon borough will be in a position financially next year to defray the cost of an intercepting sewer and sewage disposal works or its proportionate part of the metropolitan project, it is not definitely known, yet it is evident that fifty-two thousand dollars is insufficient for this purpose. It would be impossible, however, for the borough to enter into a contract with private capital to construct the sewer and sewage disposal works so that there is no excuse why Sharon borough should continue to put its sewage into the Shenango River to the menace of human life.

In view of the fact that the borough has extended its sewer system in violation of the Act of April twenty-second, nineteen hundred and five, and in view of the other facts hereinbefore discussed, it has been determined that the interests of the public health demand that a permit be withheld and approval is hereby and herein withheld of the sewerage system of the borough of Sharon and a decree issued as follows:

FIRST: The borough of Sharon shall on or before the first day of December, nineteen hundred and nine, either independently or in conjunction with other adjacent municipalities, prepare plans for the collection of all of the sewage of the borough and for its purification in a sewage disposal plant, and shall submit these plans to the Commissioner of Health for approval.

SECOND: The sewerage system shall be designed to collect the sewage of the industrial plants and of all properties in the borough.

THIRD: The borough shall on or before the first day of January, nineteen hundred and nine, inform the Commissioner of Health what its purpose is with respect to complying with this decree. Failure to so notify the Commissioner of Health will be construed to be a settled purpose on the part of the borough to proceed in defiance of this decree to pollute the waters of the State.

Harrisburg, Pa., October 21st, 1908.

SHARON HILL, DELAWARE COUNTY.

This order and decree is issued to the authorities of the borough of Sharon Hill, Delaware County, relative to the discontinuance of the discharge of sewage into the waters of the State within said borough or elsewhere.

On October eighteenth, nineteen hundred and five, the borough of Sharon Hill, Delaware County, was given permission to temporarily discharge sewage from two sewer outlets into Darby Creek within the borough limits on condition that storm water be excluded from the system and on condition that the treatment of the sewage shall be undertaken at any time when so ordered by the Commissioner of Health according to plans to be submitted to and approved by him.

During the fall of nineteen hundred and six, the Board of Health of the borough of Colwyn, Delaware County, complained to the Commissioner of Health about a nuisance existing in an open ditch coming down from Darby borough underneath the railroad and paralleling Fifth Street in Colwyn to Darby Creek. The residents on Fifth Street had petitioned the borough council of Colwyn for redress and the Board of Health had brought the matter to the attention of the Darby Board of Health without results. Therefore, the Commissioner of Health was asked to take the matter under advisement and stop the nuisance.

Thereafter a Department officer made an inspection in the fall of nineteen hundred and six and again in the spring of nineteen hundred and seven.

It appeared on this inspection that the greater nuisance in the vicinity was caused by the discharge of sewage into Darby Creek from various sewers and that the remedy had a wider scope than entertained by the complainants. This remedy would involve the sewers of Sharon Hill.

Sharon Hill is a residential community of about fifteen hundred population, located on the Philadelphia, Baltimore and Washington Railroad, which passes in an east and west line through the southern portion of the town, and also on the Baltimore and Ohio Railroad, which is the northerly borough line. This road easterly towards Philadelphia, passes through Darby borough. The other railroad passes easterly through Colwyn borough. The latter municipal territory is separated from Sharon Hill territory by Darby Creek. In Sharon Hill the land has been laid out into large lots and wide streets and is occupied by estates of considerable size of the more resourceful class. The land lies quite high and level. Not all of the buildings are connected with the sewers, so it is reported. The water supply is furnished by the Springfield Water Company and is brought in from a distance. Even if every dwelling were connected to the sewer system the total flow from the system would not be a large amount at this time, but as the population increases the pollution of Darby Creek would increase from this source.

The sewers had been constructed very largely before the law of nineteen hundred and five was passed placing the jurisdiction of such matters within the State Department of Health in accordance with a comprehensive plan of sewers for the entire borough, said to have been adopted by the local authorities early in nineteen hundred and five. This was one reason for the approval of the plan by the State.

Both sewer outlets are into Darby Creek below the Philadelphia, Baltimore and Washington Railroad, the smaller outlet, twelve inches in diameter, being four hundred feet south of the railroad, and the larger outlet, twenty-four inches in diameter, being seven hundred feet below the railroad and six hundred feet above the point where a borough sewer in Colwyn discharges into the creek at the foot of Fifth Street.

The said twelve inch outlet extends northerly to the Baltimore and Ohio Railroad and is designed to be the main for all lateral sewers in the northeast portion of the town. This line is twenty-eight hundred feet long. Whether any lateral sewers have been connected with it or not since nineteen hundred and five is not a matter of record in this Department.

The said twenty-four inch pipe extends westerly in Elmwood Avenue about a mile to the borough's westerly limit and it is desired to serve all of the land in the town south of the Philadelphia, Baltimore and Washington Railroad and all of it north of said railroad in the central and western portions of the borough. Connected with this outlet there is a total of twenty-one thousand five hundred feet of sewer, a notable length for the small number of dwellings in the borough. It is at once evident that sewerage facilities are ample for a very material increase in population.

It was reported that the bonded indebtedness of Sharon Hill was sixty-five thousand one hundred dollars in June, nineteen hundred and seven. The Department does not know what the assessed valuation is, but if reports be true the real estate valuation on the above date was eight hundred and thirty-six thousand dollars. Probably the finances of the borough are sufficiently well managed to admit of the payment by the town of the proportionate share of a joint sewage disposal plant by the several boroughs whose sewage is now discharged into Darby Creek in the vicinity. But Sharon Hill might not be able to defray the cost of the erection of an independent plant.

Opposite the twelve inch sewer outlet there is a twenty-four inch sewer in the borough of Colwyn. But this twenty-four inch sewer was built by and belongs to Yeadon borough. It was the intention of Yeadon, which is located above Darby borough in Darby Creek valley, to conduct the sewage in a pipe down this valley and discharge it at the outlet of the twenty-four inch pipe. In conformity with this plan, said borough began the construction of this sewer line at both ends and worked towards the middle, and completed all but about eight hundred feet of this line. The connection remains unconstructed on account of some litigation between the boroughs of Yeadon and Darby and adjoining property owners as to the right of way. Therefore, Yeadon sewage is now emptying into the creek at a point about three hundred feet above the Baltimore and Ohio Railroad in the borough of Darby, which point is half a mile above the Sharon Hill twelve inch sewer outlet. The creek here is a tidal stream, the high water extending up the valley three-quarters of a mile above the Sharon Hill sewer outlets.

In warm weather, when the creek flow is small, the sewage emptied into this creek, oscillates back and forth through tidal action and in this manner the nuisance is accelerated and deposits of organic matter in the channel promoted, which adds to the public menace.

Colwyn borough sewer at the foot of Fifth Street is reported to be a six inch pipe and serves eighteen hundred feet of sewer. Its outlet is one thousand feet above the confluence of Darby and Cobbs Creek.

Darby Creek rises in Easttown Township in Chester County about fifteen miles north of Sharon Hill, and drains a beautiful rolling open country of about thirty-six square miles in extent, on which an estimated population of fifteen thousand people reside. The sewage from the towns along its banks is now and has been discharged into the creek above Sharon Hill. Six miles below Sharon Hill the stream empties into the Delaware River at a point above two and a half miles above the city of Chester. This city takes its water supply from the river.

In the stretch of six miles the adjacent territory is salt marsh unoccupied and much of it is flooded at high water. At places there are numerous boat houses on the banks and fishing is indulged in quite extensively.

At the confluence of Darby and Cobbs Creeks in the forks is the borough of Colwyn, and Cobbs Creek forms the easterly boundary of the latter borough and the westerly boundary of the city of Philadelphia.

Cobbs Creek rises in Lower Merion Township, Montgomery County, and also drains a part of the city of Philadelphia. It receives manufacturing wastes and sewage from many sources and is a badly polluted stream. The borough of Darby discharges sewage into it and so do the boroughs of Yeadon and Colwyn.

The city of Philadelphia is now constructing an intercepting sewer up this creek valley and it is the intention to ultimately intercept all of the dry weather flow of sewage from the city of Philadelphia's sewers and convey it to Darby Creek below the forks. The city is also studying a plan for the construction of a sewer easterly into the Schuylkill River valley, whereby the Cobbs Creek sewer will empty into the Schuylkill River valley system.

If the city would permit the Delaware County boroughs to collect their sewage in an intercepter and connect this intercepter with the proposed city intercepter, this would be a very satisfactory conclusion of the problem from a practical standpoint. There is some reason to urge this result, more especially with respect to the boroughs in the Cobbs Creek valley district because Philadelphia contemplates preempting land on either side of the creek as a part of a parkway system, thus naturally depriving the Delaware County municipalities of the opportunity of selecting sites for sewage disposal works along Cobbs Creek. The sewage from the Delaware County homes within the Cobbs Creek drainage area must either be discharged into the Philadelphia intercepter or into a new intercepter to be built down the valley on the westerly bank of the stream.

The problem of how to dispose of the sewage below Colwyn would then be involved and since Yeadon, Darby and Colwyn territory extends to both Cobbs Creek and Darby Creek and sewage from these municipalities is discharged into both streams, it may be seen that the sewage disposal problem, with respect to the Cobbs Creek district, so far as these places are concerned, is the sewage disposal problem with respect to Darby Creek also.

There seems to be a community of interest which at least commends united action, and the State Department of Health can bring this result about where other efforts might fail.

In view of these considerations it has been unanimously agreed that the interests of the public health demand that the borough of Sharon Hill be notified, and it is hereby and herein notified, to prepare plans either independently or in conjunction with other municipalities, for some other disposal of its sewage than into Darby Creek, and submit the same to the Department of Health for approval on or before October first, nineteen hundred and eight.

Harrisburg, Pa., January 29th, 1908.

SHARPSVILLE, MERCER COUNTY.

This application was made by the borough of Sharpsville, Mercer County, and is for permission to extend its sewer system and to discharge the sewage therefrom into the Shenango River within the limits of the borough.

It appears that the borough of Sharpsville is located in the extreme western portion of the State of Pennsylvania, in Mercer County, within a few miles of the Ohio State boundary line. The town is located on the Shenango River at a point where the river takes a deep bend and is bounded on the north by said river, on the east by the river and Hickory Township, on the south by Hickory Township, and on the west by said township and the river.

The Shenango River has its source in Conneaut Township, Crawford County, approximately thirty-five miles above the borough of Sharpsville. It flows in a generally southerly direction through the western part of Crawford, Mercer and Lawrence Counties, draining with numerous tributaries a portion of the eastern section of the State of Ohio and emptying below New Castle into the Beaver River. Along the valley of the Shenango River, throughout the entire length, there are many steel mills and allied industries such as are found in the Pittsburgh region. These mills furnish the main occupation for the inhabitants of the many boroughs and towns located in this valley.

Above Sharpsville, in the Shenango valley, there are several boroughs which drain into the Shenango River. Prominent among them is Greenville borough, with a population of sixty-five hundred, distant nineteen miles from the borough of Sharpsville. This borough discharges its sewage into the Shenango River, but has recently been granted a permit by the Department of Health to extend its sewer system under the condition that the sewage be properly treated before being discharged into the river. Three miles below Sharpsville and separated therefrom by Hickory Township are the boroughs of Sharon and South Sharon, with a total population of twenty-one thousand and five hundred people. The water supply for these boroughs is taken from the Shenango River and filtered. Below Sharon there are numerous boroughs and cities which take their water supply from the Shenango River. Prominent among them is the city of New Castle, with a population of thirty-five thousand and located twenty-three miles below Sharpsville. The water supply for this town is taken from the Shenango River and is filtered before being supplied to the consumers.

Sharpsville has an area of three square miles and a population of thirty-six hundred within the incorporated boundaries. The land rises from the Shenango River on the north, southerly, to a tableland at the southern edge of the borough. For a distance of one thousand feet from the bank of the river the land rises with a very gentle slope and this tract, extending along the whole river front, furnishes the site for the various steel mills and other industries. The land in this tract, with the exception of one or two isolated sections, is above the high stage of the Shenango River and is not subject to inundation. Beyond this strip the land rises very rapidly. Here is located the business section of the town, which extends over this high ground parallel to the manufacturing sites and abutting on the south the residential sections. The land continues to rise to a point beyond the southern boundary of the borough. The southern section of the borough is but partially built up, but the southeastern and southwestern sections are developing rapidly. It is expected, from the trend of the growth at present, that the future growth in the borough will be in the southeastern section.

There are three ravines which extend from the tableland at the southern end of the borough northerly to the river. The ravine which is farthest east is distant about twelve hundred feet from the bend in the Shenango River and separates the eastern section of the borough, containing probably one-sixth of the total area, from the main portion of the borough. There is a small creek in this ravine which enters the Shenango River at the northern boundary of the borough. Another one of these ravines extends through the centre of the borough and also contains a creek which flows northerly to the Shenango River. The third ravine lies about three hundred feet from the western borough line and isolates a very small tract of the western section of the borough from the borough proper. There is no creek in the ravine.

There are three railroads entering Sharpsville borough. These railroads extend through the low tract of land where the various industrial plants are located. The Pennsylvania Railroad lies along the bank of the Shenango River and crosses the river at the bend on the northeastern boundary of the borough. The Sharpsville

Railroad, which, it is reported, is a part of the Baltimore and Ohio system, parallels the Pennsylvania Railroad, but instead of crossing the Shenango River, leaves the borough on the Sharpsville side. The Erie Railroad extends through the northern portion of the borough on the southern boundary of the industrial section and is distant about twelve hundred feet from the river.

The principal business industry is the production of pig-iron, which is produced by the following companies: The Shenango Furnace Company, employing about six hundred hands; the Youngstown Sheet Tubing Company, employing one hundred hands; the Thomas D. West Foundry Company, employing three hundred and fifty-five hands; and the Sharpsville Furnace Company, employing eighty hands. There is also a planing mill operated by E. L. Gaines and Sons, employing about twelve hands, and the Sharpsville Boiler Works, employing one hundred hands.

Above the industrial section the business and residential section of the town is laid out in regular blocks with the streets extending north and south and east and west. Railroad Street, which is the northern boundary of this section, extends east and west along the Erie Railroad. The next street south of this and parallel thereto is Main Street, which, in the western portion of the borough, is called Trout Avenue. South of Main Street and parallel thereto are Ridge Avenue, Pierce Avenue, Oak Avenue and Milliken Avenue.

The most easterly of the cross streets is Mercer Avenue, which extends from the southern boundary of the borough through the entire width of the borough to the Shenango River. This street lies east of the first ravine. Parallel to Mercer Avenue and immediately west of it is Walnut Street, which follows along the ravine in the eastern section of the borough. West of Walnut Street the streets are numbered from First Street to Fourteenth Street, respectively. The central ravine lies between Sixth and Seventh Streets. The western ravine is located between Fourteenth Street and the borough boundary.

The growth of population has been steady during the last twenty years. The population in eighteen hundred and eighty was eighteen hundred and twenty-four; in eighteen hundred and ninety, twenty-three hundred and thirty; and in nineteen hundred twenty-nine hundred and seventy. The present population is estimated at thirty-five hundred and if the rate of growth of the borough is in proportion to the past increase, the population in nineteen hundred and eighteen will be forty-five hundred, and in nineteen hundred and twenty-eight, it will be about fifty-five hundred.

The borough owns its water works. Water is taken from a steel shell twenty-five feet in diameter and sixteen feet deep, which is sunk into the ground near the bank of the Shenango River in the northeast part of the borough, a short distance east of Mercer Avenue. The bottom of the well is open and water enters through a gravelly stratum. On account of the difference in chemical composition between the water from this well and the river water, it appears probable that this well is fed by a stratum below the river bottom which has no connection with the river water. The water is pumped from this well to a standpipe of ninety-two thousand gallons capacity located on the tableland near the southern boundary of the borough. The water consumption amounts to from two hundred thousand to two hundred and fifty thousand gallons per day and is used mainly for domestic and drinking purposes. There are a number of private drilled wells in use in the borough and also one spring. This spring is protected with masonry from surface drainage and is located on a hill south of the borough.

It is reported that all of the industries have drilled wells which are used for drinking purposes and, in some cases, for all purposes. These wells range in depth from thirty-five to sixteen hundred feet. In addition to the supply from the drilled wells, several of the mills have private pumping stations which pump river water for boiler and cooling purposes.

There is also one dug well in use at present at the railroad station of the Pennsylvania Railroad Company. This well is twenty feet in depth, extending to a gravel stratum and is cemented from the top for a depth of eight feet below the surface. The lower part of the well below this point is lined with open field stone. This well is used by the people in the vicinity for domestic consumption, and it is stated that the train hands fill their buckets from this well. It is also reported that there formerly existed many shallow wells in the southwesterly portion of the borough between Tenth and Fourteenth Streets. On account of the contamination of these wells from surface drainage they are condemned by the local Board of Health and have not been used recently.

The sewerage system of the borough is divided into two sections with two independent outfalls into the Shenango River on the northern boundary of the borough. The smaller section lies east of the ravine which extends to the eastern section of the borough and the outfall from this section enters the Shenango River at the foot of Mercer Avenue, about five hundred feet below the pumping station of the municipal water works. The main sewerage system covers the built up section of the borough from this ravine to the central ravine at Seventh Street. The outfall from this system enters the Shenango River at the foot of Sixth Street.

The eastern group of sewers is made up of thirty-seven hundred and sixty feet of eight inch pipe with an eight inch outfall. No profiles of the sewers have been submitted, but it appears from the topography of the land that they are laid on ample grades. It is reported that this system receives only domestic sewage and that no rain water is admitted.

The main group of sewers which discharge at the foot of Sixth Street, consists of thirteen hundred and twenty feet of eighteen inch outfall sewer, which extends up Sixth Street to Main. At Main Street this sewer is fed by a fifteen and a twelve inch outfall sewer extending from Sixth Street westerly and easterly, respectively. These sewers are in turn fed by laterals ranging in size from twelve inches to eight inches and draining the territory from the Shenango River to Ridge Avenue and from Walnut Street to Seventh. There are three hundred and eighty feet of fifteen inch sewer, forty-two hundred and ninety feet of twelve inch and five thousand and twenty feet of eight inch, making a total of two and one-tenth miles of sewer tributary to this outlet and a grand total of two and eight-tenths miles of sewer in the borough. It is stated that no rain water is admitted to the sanitary sewers and that there are several lines of storm sewers in the borough which carry rain water only.

It is reported that the population in the sewer districts is fifteen hundred and that there are at present five hundred people using the sewers. It is, therefore, seen that the municipal sewerage system is not generally used by the community. It is reported that in addition to the sewerage system there are three hundred privies in use in the borough. These are also used at all of the industrial plants. Several of the mills have private sewers which discharge sewage directly into the river.

It is reported that at one time typhoid fever occurred in the southwestern portion of the borough at frequent intervals. This was traced to a number of shallow wells located in this section which were polluted from surface drainage. As stated above, these wells have not been abandoned. During the year nineteen hundred and seven, there were eighteen cases of typhoid fever in the borough. The majority of these cases were found among people who were working outside of the borough, so that the disease cannot be directly traced to a local source. No data is submitted as to the water used by those persons for drinking purposes.

The borough purposes to construct extensions to sewers in the eastern section and discharge through the eight inch outfall at the foot of Mercer Avenue. Also, it is proposed to build an independent system located in the extreme western portion of the borough between the boundary line and the western ravine and to discharge directly into the Shenango River by a new outlet.

The extension of the eastern section is to consist of eighteen hundred feet of eight inch pipe to be constructed along Walnut Street easterly to Mercer Avenue and thence northerly to the existing sewer on Mercer Avenue. There are about twenty-eight houses which it is desired to connect to this sewer.

The westerly section consists of eighteen hundred feet, beginning at the corner of Twelfth Street and Ridge Avenue, extending thence along Ridge Avenue to the borough line, and thence along said line to the river. No plan has been prepared for this westerly system, and it is stated by the borough officials that they do not intend to construct this section immediately.

Thus it appears that the borough of Sharpsville is discharging sewage into the waters of the Commonwealth which are used for drinking purposes by many towns and boroughs located below the sewer outlets. The Sharon Water Works Company takes its water supply from the Shenango River at a point three miles below these outfall sewers and supplies this water after filtration to the boroughs of Sharon and South Sharon, where many thousands of people use it for drinking purposes. There has been a continued prevalence of typhoid fever in these communities, and it is reported that the filtration plant is suspected of being inefficient and that many of the citizens are afraid of this water supply. It is certain that even with the highest degree of efficiency in a filtration plant there is a grave menace to the citizens in these communities due to the introduction of sewage into their water supply at a point so close to the water works intake. Below Sharon the Shenango River is used as a source of water supply for the city of New Castle, and below New Castle the Beaver River, into which the Shenango River empties, is used as a filtered water supply for Beaver Falls, New Brighton and adjacent boroughs. A permit to the city of New Castle was granted for the extension of their sewerage system only under condition that the city of New Castle should purify the sewage before it enters the river and the citizens of this municipality have a right to expect that their source of supply will be protected likewise from pollution.

Twenty-two miles above Sharpsville the borough of Greenville, with a population of sixty-five hundred people, discharges its sewage into the Shenango River. This borough has been granted a permit to extend its sewers under condition that the sewage be treated before being discharged into the river. While the water supply of the borough of Sharpsville appears to come from a stratum located below the river and separated therefrom, yet it is not unlikely that at some future date the washing of the bottom of this river may cause river water to enter this source of supply, so that the sewage from Greenville would be a menace to the supply of Sharpsville borough.

In preparing for a disposal plant for treating the sewage from the borough, it is likely that a plant could be so designed and arranged that most of the sewage could reach it by gravity. This would probably require a modification in the existing outfalls.

The existing sewerage system of Sharpsville borough appears to be designed for sanitary purposes only, and it is reported that storm water is excluded from the system. The borough would, therefore, not be obliged to expend much money in remodeling the existing sewerage system, but would have to construct an inter-

cepting outfall sewer to collect the sewage from the various systems and locate it sufficiently high upon the hill immediately above the industrial works to collect the sewage and carry it by gravity to the disposal plant. It appears that it would be necessary to install a small pumping station to lift the sewage from the various industrial works to the disposal plant. This would have to be worked out in detail by some competent expert hired by the borough for this purpose.

The assessed valuation of Sharpsville is reported to be one million four hundred and sixty thousand six hundred and fifty-nine dollars. The bonded indebtedness consists of twenty-four thousand five hundred dollars of water bonds and nineteen thousand dollars of sewer bonds, making a total indebtedness of forty-three thousand five hundred dollars. If this valuation is correct the borough has an additional borrowing capacity of about fifty-seven thousand dollars, so it is in good shape financially to construct a disposal plant.

It is reported that there are several sites available for the location of a disposal plant on both sides of the river. It would also be advisable for the borough to consider co-operating with the boroughs of Sharon and South Sharon with a view to building a joint disposal plant.

The borough should employ a competent expert familiar with the problem of sewage disposal to decide upon the best method of disposal; to design an outfall sewer and disposal works; and to prepare plans and profiles of a comprehensive sewerage system, embracing the existing system and covering the entire incorporated territory of the borough.

It would be advisable for the borough to delay the construction of the extension applied for in the western section of the borough until the plans and profiles of this system have been prepared and submitted to the Department of Health.

It has been determined that the interests of the public health will be subserved by granting a permit to the borough of Sharpsville to construct the extension applied for in the eastern section of the borough, consisting of eighteen hundred feet of eight inch sewer, extending along Walnut Street, thence along Mercer Avenue to the existing eight inch sewer; and a permit is hereby and herein granted for such extension, but permission is withheld for the independent outlet sewer in the western section, subject to the following conditions and stipulations:

FIRST: That on or before November first, nineteen hundred and nine, the borough shall prepare, either independently or in conjunction with Sharon and South Sharon boroughs, a plan for the interception of all of the sewage of the borough and its conveyance to some point for treatment, together with plans for a sewage purification plant, which plans shall be submitted to the Commissioner of Health for approval on or before said date.

SECOND: All roof and storm water shall be excluded from the sewers.

THIRD: On or before said November first, nineteen hundred and nine, the borough shall also submit complete plans of its existing sewer system.

Harrisburg, Pa., October 21st, 1908.

SHENANDOAH, SCHUYLKILL COUNTY.

This application is made by the borough of Shenandoah, Schuylkill County, Pennsylvania, and is for permission to lay public sewers and to discharge the sewage therefrom into Shenandoah Creek within the limits of the borough.

It appears that Shenandoah is a strictly mining settlement of about thirty thousand population, located in West Mahanoy Township, Schuylkill County, in what is known as the Shenandoah valley drained by the Shenandoah Creek, a tributary of Mahanoy Creek, which flows westerly and empties into the Susquehanna River in Northumberland County.

In nineteen hundred the census population was twenty thousand three hundred and twenty. The incorporated territory comprises two rectangular tracts arranged in the form of an ell, the western tract extending in a north and south direction and the eastern tract in an east and west direction. The latter is a part of the Girard Estate and the former is a part of the Gilbert and Sheaffer Estate.

Within the borough limits are Kehley's Run, Indian Run, Plank Ridge, Shenandoah Ridge, Cambria, Furnace, Turkey Run, West Shenandoah and Kohinoor collieries, nearly all of which have washeries attached.

The coal companies have leases and pay royalties to the said estates on all coal produced. Most of the surface land in the heart of the village is owned by the occupants, but beyond this district the dwellings are upon leaseholds and must be removed at the option of the estates. Owing to the value of the coal deposits it has been the policy of the owners to retain complete control of the land and this is one contributing cause to the congestion of the populated district.

Within the borough limits there are approximately one and a half square miles, but the built up portion of the town occupies less than one-third of this area. The average building lot is thirty feet wide by one hundred and fifty feet deep, and, in numerous instances, four and occasionally six or eight dwellings are built on a single lot; in one instance, one hundred and twenty people are on a plot sixty feet wide by one hundred and forty feet deep.

The village occupies hilly territory with good natural drainage in all directions towards the natural water courses.

Shenandoah Creek rises in the hills to the northeast and passes approximately through the centre of the borough from east to west. There are several minor tributaries to the creek which rise in the hills to the north and flow southerly through the borough. Mentioned in order from east to west they are: Bergen's Run, Kehley's Run, Springhouse Run and Kohinoor Creek. These streams are all sulphur water courses, whose overflow is composed largely of mine drainage and washery waste.

Shenandoah Creek, after leaving the borough, flows west through West Mahanoy Township, past the villages of William Penn and Lost Creek and empties into Mahanoy Creek near the eastern boundary of Girardville borough. In time of drought the bed would be practically dry were it not for the mine drainage. Large quantities of culm are brought down from the washeries and deposited along the gradual slopes of the channel. In some places there are culm flats in the bed of the creek three hundred and fifty feet in width over which the stream flows during normal periods in small rivulets.

In the borough at intervals along the entire course of Shenandoah Creek there are banks of culm and washery waste subject to erosion in time of high water.

At the head of Bergen's Run is a distributing reservoir of the municipal water works system. Also on Kehley's Run above the colliery, but outside of the borough, there are reservoirs owned by the Shenandoah Citizens' Water and Gas Company.

Springhouse Run starts in a spring on the mountain. Formerly it was an open waterway through the borough, but later it was constructed into a culvert built partly by the borough and partly by adjacent property owners. The walls are of stone and the covers are stone flagging across highways and under houses; elsewhere, principally of plank or railroad ties.

The Home Brewing Company has built a dam on the hillside which diverts the water for brewery uses. Hence most of the time the flow through the culvert is nothing but sewage and kitchen waste. This culvert or, more properly termed, sewer passes through cellars and across lots, and for the greater part is covered by roughly placed planks or flagstones. Privies may be seen directly over the culvert. No ventilation is provided except that which emits a pronounced stench. Sometimes during heavy rains the culvert is not large enough to carry off the water reaching it and in consequence cellars and yards are backflooded. It is reported that in nineteen hundred and five the borough was sued by an abutting property owner for injury caused by such an overflow. Arbitrators were appointed to investigate and they made an award, but on appeal the court set this award aside. The nuisance is caused by the individual discharge of sewage into the waterway and not by any specific act of the municipality.

Kohinoor Creek rises a short ways north of the borough and on it in the township is a small dam diverting practically all of the water to the use of the Kohinoor colliery. This colliery is in the borough near the railroad on the flats immediately west of the village, and just below it is the breaker and washer of the West Shenandoah colliery. Mine waters from the latter operation is pumped into Kohinoor Creek at a point just north of the Lehigh Valley Railroad. The latter is entirely south of the built up portion of the village in the vicinity. Just below the railroad, on the creek, is a pump well sunk in the bed of the creek into which all of the flow passes and from which the water is pumped to and used in the washery above mentioned.

Above this pump well all of the sewage in the west portion of the borough goes to the creek, and it constitutes, during dry weather, the entire flow of the stream, since the upper natural waters are derived as previously described. So the water pumped from the creek and used in the washeries is sewage and mine water mixed.

The borough is furnished with water by two systems; one owned and operated by the municipality and the other owned and operated by the Shenandoah Citizens' Water and Gas Company. The Anthracite Water Company controlled by the Philadelphia and Reading Coal and Iron Company, supplies water to the collieries in the borough and vicinity.

The municipal system comprises surface sources and pumping station, force main, distributing reservoir and gravity pipes in streets through the town. The pumping station is located at the forks of Davis and Sand Runs, about four miles northeast of the borough in East Union Township. Water from these two streams is impounded in a small reservoir covering seven and a half acres and holding twenty-eight million gallons. The drainage area is nineteen hundred acres of mountainous, wild land covered with a second growth. The Catawissa Division of the Philadelphia and Reading Railroad passes through this water shed.

Because these streams are insufficient for the borough's needs the waters of Ulshuaffer's Run, about six miles easterly, have been collected in an intake dam and piped by gravity into the reservoir at the pumping station dam. Ulshuaffer's Run has a water shed of five hundred and fifty acres and Spiece's Run, nearby, controlled by the borough, has a water shed of three hundred and seventy-five acres. There are no dwellings on either of these sheds, so it is reported.

The water is pumped by two engines, each rated at one million gallons capacity, to the distributing reservoir located at the head of Bergen's Run, previously mentioned. This structure is of earthwork, rectangular in shape, lined with brick. Its full capacity would be about a million and a half gallons, if the reservoir did not leak. It is reported that not over one-third of the capacity is available, owing to defects in construction causing leakage.

This reservoir supplies the low pressure district of the town. The high service district is also so supplied, but it may be connected with the force main on the hill back of the reservoir in the future, if additional pressure should be required.

The local authorities report that the average daily consumption of water is one and three-quarter million gallons. The supply has been exhausted this summer and the town was put on a one hour service daily. A repetition of this famine may occur any year. To obviate it a large impounding reservoir might be constructed, in which an ample quantity of water could be stored to tide over a drought.

The Shenandoah Citizens Water and Gas Company system comprises impounding reservoirs on Kehleys Run above described, also a small reservoir on Bergens Run and a small reservoir on Springhouse Run; a gravity distributing system in the borough, and a connection with the Girard Water Company system, by which an auxiliary supply may be obtained.

On Kehleys Run there are six reservoirs, the upper three impound and the water is drawn off from them and passed down the channel of the run into Reservoir number three. It and number two reservoir are the distributing points. The supply main starts here and extends into the town. Their combined capacity is fourteen and one-half million gallons storage. The impounding reservoirs hold thirty-five million gallons.

Number one reservoir is used exclusively to supply Kehley's Run Colliery. The company reports its average daily consumption to be about one million gallons. The water pipes are laid in the principal streets of the borough. Fire hydrants are connected to the system. Nearly fifty per cent. of the consumption is supplied to the Anthracite Water Company and is used by the collieries in Shenandoah. The watersheds of the six reservoirs mentioned are uninhabited.

Reservoir number eight is on Springhouse Run and supplies the Home Brewing Company. Reservoir number seven is below the borough reservoir on Bergen Run. It is connected with the street pipe system. These waters appear to be unpolluted. The company's sources gave out during this summer and water had to be brought in tank cars for colliery use.

There being no springs or private wells in Shenandoah, the citizens have suffered for lack of water this year.

The Anthracite Water Company is owned and controlled by the Philadelphia and Reading Coal and Iron Company. The water company supplies water to coal operations in Shenandoah, Mahanoy City borough, Gilberton borough and vicinity, said operations being conducted by the said coal and iron company. Besides for industrial purposes, the water company furnishes water to the public, altogether in Gilberton borough and in the townships, more especially at the mining settlements in the latter.

The source of supply are Waste House Run and Mud Run. They are mountain streams, the former being in New Castle Township about six miles south of Shenandoah, Gilberton borough lying about half way between; and the latter being in Mahanoy Township, about three miles east of Shenandoah borough. The water is impounded and supplied by gravity. The drainage areas are unpopulated, wooded and the quality of water excellent for domestic purposes.

The other water company which affords a supply to Shenandoah borough is the Girard Water Company. Its sources of supply are Lost Creek and Raven Run, tributaries of Shenandoah Creek from the north and next west from Shenandoah borough. The waters are collected in impounding reservoirs from uninhabited watersheds and supplied by gravity to the public in West Mahanoy and Butler Townships, including the boroughs of Girardville and Shenandoah. The daily consumption is one million gallons, approximately, and about one-quarter of it is used for domestic purposes; the balance is supplied to collieries and the railroad. The watersheds are patrolled, although uninhabited. The quality of the water is excellent.

So it appears that the citizens of Shenandoah borough obtain their drinking water from distant sources and that the supplies are pure and wholesome. There is no connection between the methods of sewage disposal of the borough and the sources of the drinking water. Any pollution of the latter after reaching the borough must occur in the household.

In most of the public streets of the borough there is a sewer built and owned by individuals. Permission to construct the sewers was granted by the town council. It is reported that there is no ordinance governing the regulation or control of the private sewers. The owner charges a tappage fee. The amount is above the means of many of the abutting land owners. Nearly all of the built-up territory is tributary to these private sewers. The local Board of Health claims to be powerless to compel sewer connections, so that on the street in the poorer sections of the borough the gutters are used as sewers for house drainage. These sewers are built without manholes or means of ventilation. There are street inlets to the sewers, so that storm water is admitted. There is no public, and in many instances no private record of the location of the sewer, its size, grade and number of connections. They all empty into natural water courses. The population is made up of foreigners. Some of them have no idea of cleanliness. The unsanitary conditions in certain sections of the borough would hardly be credited without being seen. Recently a garbage collection or-

dinance was adopted and the attempt is being made to clean up back yards of all rubbish and to remove offal from proper receptacles on each property at regular intervals.

The Bradigan Brothers own a majority of the private sewers. The partnership is locally known as "The Shenandoah Sewer Company." The main sewer of this system is in Center Street and it discharges into the bed of Kohinoor Creek in the western part of the borough, above the Lehigh Valley Railroad. The sewer is eighteen inches in diameter and connected with it there are lateral sewers, the entire system comprising seventy-nine hundred lineal feet. The eighteen inch pipe is two thousand feet long, the fifteen inch three hundred and fifty feet, the twelve inch twenty-four hundred and fifty feet, the ten inch eight hundred and fifty and the eight inch twenty-two hundred and fifty feet in length.

The next outlet into the same stream is an eighteen inch borough sewer twelve hundred feet long in Lloyd Street with a branch eighteen inches in diameter, seven hundred feet long in Chestnut Street.

A twenty inch borough sewer empting into the creek at the foot of Strawberry Alley immediately above Lloyd Street extends easterly to Gilbert and north on Gilbert to Coal. It has two branches in Catharine Street. It is reported that this sewer is used for street drainage purposes only. In the same alley Kimmle and Johnson is an eighteen inch sewer fourteen hundred feet long. It empties into the creek. Into this sewer is connected a branch owned by Roberts and others. It extends in Coal Street to West Street.

Between Walnut and Vine Streets in the vicinity of Coal Street there is a group of houses from which there are four private sewers emptying into Kohinoor Creek.

In the central part of the borough just east of Main Street there is a stone culvert underneath the Lehigh Valley Railroad extending to Shenandoah Creek. This culvert was original built to afford an outlet for the water in coming down from the hillsides. This culvert has been extended by the borough about two hundred feet to the corner of Main and Cherry Streets, where there are three sewers discharging into it. One of them is a twelve inch sewer eleven hundred feet long on Cherry Street. It is owned by Brennan and others. Another is a twelve inch sewer six hundred and fifty feet long in Main Street with a ten inch branch, five hundred and fifty feet long in Oak Street with eight inch branches in Jardin Street and Pear Alley. This line is owned by J. J. Franey. The other sewer is twenty-four inches in diameter, one thousand feet long on Main Street owned by Purcell and others.

West from Main Street and north from the Lehigh Valley Railroad to Cherry Street, is a district owned by the Schaeffer Estate and occupied by about fifty dwellings accommodating approximately two hundred and fifty people. The owners of the dwellings have leased the ground and are responsible for their properties. There are no sewers in the tract, all kitchen waste and wash water goes to the street gutters. The land slopes towards the railroad and the drainage ponds up in the ditch on the side of the railroad where it causes a very great nuisance which has been the cause of a written complaint made by the Attorney of the Lehigh Valley Railroad to the State Department of Health. There is a culvert under the railroad at Chestnut Street which leads to Shenandoah Creek. Immediately west of Gilbert Street and along the railroad there is an open, swampy tract which is used as the town dump. On the day of the Department's inspection night soil in considerable quantities was found deposited here. This dump is complained of by the railroad company. Pig pens and cow sheds in this neighborhood add to the insanitary condition. The local authorities seem to be totally unable to cope with the condition or have been guilty of gross negligence.

Into Springhouse Run at Coal Street there is a ten inch sewer said to belong to J. J. Franey. It has branches on side streets. Their extent is not known to the Department. The same may be said of an eighteen inch sewer on Center Street emptying into the said run. It extends to Market Alley and has branches on White Street and Plum Alley. Into same Run at Oak Street there is a twenty-four inch sewer owned by Conroy and others. It extends up Emerick Street about one thousand feet to the Lehigh Valley Railroad. There are branch connections.

There is a private sewer eight inches in diameter south from Oak Street laid along the Lehigh Valley tracks to the culvert near Main Street. It has branches in White Street and Market Alley. Into Shenandoah Creek there is an eight inch sewer, six hundred feet long which empties at the foot of Union Street. It is owned by Frank McAndrews. There is a ten inch line on Bridge Street which empties into the Creek. It is owned by O'Hern and others. Above this outlet there is another into the Creek twelve inches in diameter. It is on Centre Street and the line is owned by Curtin and others. The last mentioned sewers are in the eastern portion of the borough. Near them is a ten inch sewer on Coal Street nine hundred feet long, which empties into Waste House Run.

There are other private sewers in the borough and there are also some drains built by the borough and reported to be used exclusively for street drainage. The names and sizes and lengths of sewers herein stated are subject to correction. Under the circumstances, absolute precision has not been attempted. However, the Department has made a house to house canvass in an earnest effort to secure the most available information.

The territory immediately south of the Philadelphia and Reading Railroad in the eastern part of the borough is occupied largely by foreigners residing in tene-

ment houses in connection with which there are many privies overhanging Shenandoah Creek.

The Borough Council has considered the project of building sewers through the territory mentioned in the complaint of the Lehigh Valley Railroad Company but an application for approval of such sewer extensions has not been made to the Commissioner of Health.

The sewers constructed by the borough for which approval is asked, is the Lloyd and Chestnut Street line already described as built and in operation. It empties into Kohinoor Creek.

The conditions in the borough invite an epidemic whose cost might easily exceed one hundred thousand dollars. From an economic standpoint alone a community of the size of Shenandoah cannot afford to tolerate such unsanitary conditions. Privies should be removed from the banks of the streams. Proper receptacles should be constructed for excrement and the local health authorities should see to it that these vaults are cleaned out before they become filled and the contents be disposed of in a sanitary manner. The natural water courses should not be used as open sewers. Sewage should cease to be discharged into them and into the street gutters or onto the surface of the ground. The practice of dumping objectionable matter into the swamp or along the railroad or anywhere in the borough should be stopped.

The borough must take the initiative. A public sanitary sewerage system is demanded. As many of the existing sewers as possible should be incorporated into the public sewer system. Manholes and ventilating devices and flushing facilities should be afforded. Some sewers may need to be reconstructed altogether. Unsewered districts should be provided with sanitary sewerage facilities. A comprehensive sewerage plan should be devised to collect all of the sewage of the entire borough and to convey it to some point where the sewage may be treated and the liquid be discharged into the waters of the State without injury to any one. An engineer skilled in the re-designing and laying out of sanitary sewers should be employed by the borough to work up the plans and these plans should be submitted to the Commissioner of Health for approval. The Department of Health will be glad to advise with the borough in this undertaking.

It is reported that the assessed valuation of Shenandoah borough is three million one hundred and four thousand dollars, and that its indebtedness is in the neighborhood of two hundred thousand dollars. If these figures be true then the municipal borrowing capacity is about seventeen thousand dollars. So it appears that the town cannot undertake any extensive improvement at the present time.. But the borough can prepare plans as herein outlined and can negotiate with the owners of the private sewers or with individuals who may wish to invest in a municipal undertaking of the kind for the construction and maintenance of an improved system of sewerage for the borough. The State Department of Health will be compelled in the interests of public health to deal with the individual owners of the sewers in bringing about a discontinuance of the existing nuisances and menaces, unless the borough shall take the initiative. A joint plan would be more efficient and economical and best serve the interests of all concerned.

The local authorities are amply able to secure the services of an expert and to prepare the plans.

It has been determined that the interests of the public health demand that approval of the Lloyd and Chestnut Street sewers be withheld and it is hereby and herein withheld and the borough council is notified that it must forthwith prepare plans for a comprehensive system of sewerage and sewage disposal works as hereinbefore outline and that it shall submit such plans to the Department of Health for approval on or before the first day of February, nineteen hundred and nine. However, the borough shall within ten days from the date of this decree notify the Department of Health of its purposes with respect to compliance with the decree. Failure on the part of the borough to so notify the Department of Health will be construed as an admission of the intentional violation by the borough of Act one hundred and eighty-two, approved by the Governor of Pennsylvania, April twenty-second, nineteen hundred and five.

Harrisburg, Pa., November 9th, 1908.

SOUTH CANONSBURG, WASHINGTON COUNTY.

This application was made by the borough of South Canonsburg, Washington County, and is for permission to extend its sewer system and to discharge the sewage therefrom through new sewers into Chartiers Creek within the limits of the borough.

The borough of South Canonsburg is a rapidly growing industrial community of about eighteen hundred inhabitants, located in the valley of Chartiers Creek along the south bank of said stream opposite the borough of Canonsburg, also a manufacturing town rapidly growing and having a population possibly in the neighborhood of five thousand. Practically these two municipalities are one community. The main street of one is also the main street of the other. The thoroughfare is known as Central Avenue and extends up into the table land country beyond the boroughs.

East of this thoroughfare, along the creek in South Canonsburg, are the lowlands subject to flood during freshets. Here in the northeast corner is the plant of the Fort Pitt Bridge Works, where are employed at times six hundred hands. A spur track affords shipping facilities. It connects to the main line of the Chartiers Valley Railroad, a branch of the Pennsylvania Railroad system, extending up the valley from Pittsburg, passing along the north bank of the creek through Canonsburg and terminating at Washington borough, the county seat, eight miles beyond. In nineteen hundred the population of the borough under consideration was six hundred and ten only. Its sudden growth has been due to the establishment of the said bridge works in the town.

Near the bridge works is the plant of the Canonsburg Pottery Company, employing about two hundred men, boys and girls. In this vicinity also is a lumber yard. These three are the only industries within the borough limits. However, south of it in the vicinity in North Strabane Township, is a large coal mine the Pittsburg Buffalo Company. And three-quarters of a mile below the town on the north bank of the creek in Cecil Township is the plant of the Standard Tin Plate Company, where are employed at times possibly a thousand hands. And up stream on the north bank in Chartiers Township just beyond the Canonsburg borough line is the plant of the Burk Stamping Company, employing seven hundred men.

The inhabitants of these two municipalities dwell in houses located principally on the hillsides, for the reason that the topography is rugged and there is no other location available. The slopes are quite precipitous and therefore natural surface drainage most excellent. Several small sums pass down to the main stream. The principal one in Canonsburg has been enclosed in a masonry structure four feet in diameter and filled over to make available sites for dwellings and business blocks. No sewage is discharged into this run. The district is well sewered on the separate plan with a main intercepting sewer ten inches in diameter discharging into the creek at the lower borough line, which is at a point about twelve hundred feet below the easterly borough line of South Canonsburg.

South Canonsburg is traversed by two small runs, both of which receive sewage from individual houses.

The principal run rises in the hills south of the borough and follows down Central Avenue to the creek. The other stream is in the northwestern part of the borough in or along Oak Alley and Richland Avenue to the creek.

The district comprised by the two municipalities has a common public water supply furnished by the Canonsburg Water Company. The source is surface water from a tributary of Chartiers Creek called Little Chartiers Creek. The water is pumped into a concrete lined reservoir, holding about eight million gallons, whence it is distributed by gravity to the two boroughs. The daily consumption metered is five hundred thousand gallons. The inhabitants of Canonsburg very generally take public water, but less than one-quarter of the dwellings in South Canonsburg are supplied with this water. The reason for this is alleged to be lack of adequate facilities for the disposal of waste water in the latter place. There are in the neighborhood of three hundred individual wells in the borough. Most of them are excavated in the gravel formation and loosely walled up.

Slop and wash water is generally thrown out on the ground or drained to a stream. The privies are located over holes dug in the ground, affording opportunities for percolation. Surface drainage into these holes is thought to be common and in consequence there is more or less danger of contamination of the well water supply. In spite of this condition typhoid fever is reported to be almost an unknown disease in the borough. No cases have been attributed to the local pollution of well water.

There are three private sewer outlets into the creek. In order up stream they are as follows:

A ten inch sewer from the Fort Pitt Bridge Company's plant.

A six inch sewer at foot of Jefferson Avenue, length nine hundred feet and with it at present are connected about eighteen dwellings. The conduit is not properly flushed and therefore, is in an unsanitary condition. The outlet is seventeen hundred feet above the first named.

The last outlet is one thousand feet above Jefferson Avenue and is also a six inch pipe. Its point of discharge is near the westerly borough boundary. It is known as the Hospital Sewer and receives all of the waste matter from this institution.

The sewage from the Burke Stamping Company's plant is also discharged into the stream. The point is probably one thousand feet above the hospital sewer.

Down stream below the Canonsburg sewer outlet, sewage is discharged into the creek and also industrial waste from the plant of the Standard Tin Plate Company, and about one-half mile below this point the sewage from the State Reform School at Morganza is discharged into the stream, so it is reported.

The petitioners employed an engineer to devise a comprehensive sewer system on the separate plan for the collection of the sewage of the borough. This plan has been adopted and submitted for approval. It contemplates a twelve inch intercepting sewer following down the valley near the south bank of the stream, beginning at the foot of Richland Avenue and terminating at the outlet into the creek at the lower borough line.

The system is to receive house drainage only, to be ventilated through manhole covers, to have manholes at changes in line and grade with flush tanks located

at all summit ends. The minimum grade is to be five-tenths per cent. Tile cellar drains surrounded by broken stone are to be laid in the same trench paralleling the sanitary sewer. The outlet is to be submerged at low water. It is represented that not over one hundred and twenty-five connections will be made with this system during the first year of its use.

The highways of Canonsburg borough are generally surfaced with brick paving. The authorities of South Canonsburg contemplate a similar improvement of the streets in South Canonsburg, where at present there is nothing but dirt surfaces. The urgency for sewers is more the one of economy in laying pipes in those streets which are to be permanently paved before the pavement is put down, than to provide for general sewerage. Therefore it is not intended that the entire sewer system shall be constructed at the present time.

In order that all existing sewers be intercepted, the proposed main sewer should be extended west of Richland Avenue or some way provided for the connection of the system to the hospital.

In some cases it is good sound policy for a municipality to afford drainage facilities to its industries. While the Burke Stamping Company is outside of the territory of both Canonsburgs, nevertheless these municipalities might with reason assist this concern to obtain a sewer outlet into the public system.

Below this point and near the Canonsburg borough line is a property owned by the Canonsburg Ice Company. Water is drawn from the creek and flooded upon the company's land in cold weather for ice harvesting purposes. Complaint has been made to the State Department of Health that this ice is sold for domestic use. Notifications had been sent out warning local officials and the ice company that the ice harvested in this manner and at this place is unsuitable and dangerous when used in any way permitting contact with food stuffs or drinkables.

Chartiers Creek rises in South Franklin Township, Washington County, a short distance above Washington borough and flows in a general northeasterly direction about forty-eight miles measured along the stream to its junction with the Ohio River, which it enters at the borough of McKees Rocks and Esplen district of the city of Pittsburgh. The area so drained comprises about three hundred and six square miles, of which about eighty square miles are above the proposed sewer outlet at South Canonsburg.

At this point it is evident that the creek has received considerable mine drainage as evidenced by the characteristic color of such water. There are thirteen coal mines on the watershed above Canonsburg. They are all below the borough of Washington. The drainage from them gravitates to the creek or its tributaries and renders the waters totally unsuitable for drinking or general household uses. The sewage of Washington borough is discharged into the creek. However, a plant for the treatment of this sewage is in process of erection.

At Morganza and also nine and one-half miles below Canonsburg at the Allegheny County Poor Farm, the waters of the creek are used for the meaner household uses. Complaint has been made about the unsuitability of the supply for bathing.

At this county institution and at the boroughs of Bridgeville, Carnegie and Crafton which are by the course of the stream thirteen and one-half, twenty-five and twenty-seven miles, respectively, below South Canonsburg, municipal sewage is discharged into the creek.

Undoubtedly the health and comfort of the citizens of South Canonsburg will be promoted by the proposed sewer system and without any measurable increase of the sewage pollution of Chartiers Creek. Nevertheless, ultimately all sewage must be treated before being emptied into the waters of the State. This is contemplated in the sewer plan in so far as the separation of sewage from storm water is concerned.

While it is the policy of the State to bring about the discontinuance of the sewage pollution of streams, this is to be done in a manner consistent with the demands of justice and until the public institutions in Chartiers valley shall have taken measures to provide some other means of disposal of sewage than into the creek, more especially, in the case of the State Reformatory, whose sewage now contaminates a portion of the water supply of the County Poor Farm at Marshalsea, the sewage of South Canonsburg might be permitted to be discharged into the stream. The equity of such a permit is strengthened by the fact that Canonsburg sewage is now discharged untreated into the stream and that economy and efficiency dictate that there should be a joint sewage disposal system for this borough and for South Canonsburg. Probably this joint project would cost each town fully one-half less than an independent plant would cost each town.

In view of the above considerations, it has been determined that the interests of the public health demand that a permit be granted and it is hereby and herein granted to the borough of South Canonsburg to build the proposed sewer system or any part thereof. However, since it is reported that the borough's assessed valuation permits a total municipal indebtedness of thirty-eight thousand five hundred dollars, or thereabouts, before the constitutional limit is reached, and the present bonded indebtedness is nineteen thousand, five hundred dollars; if these figures be correct, there is not enough money to pay for the sewer system and the extensive paving improvements contemplated and also to pay for the erection of purification works. It may be that the local authorities intend to assess the cost of sewers and paving upon abutting estates and if this were done, there would be a possible way of providing funds for the disposal works. Therefore,

the said determination that a permit be issued for the sewer system was contingent on the condition that the permit should be to the borough to build what sewers it needs in streets to be paved, but that the sewers should not be used until the borough prepares plans, either independently or in conjunction with Canonsburg for a sewage disposal plant and submit the same for approval.

Therefore the permission to South Canonsburg to install a sewer system is hereby given under the following conditions and stipulations:

FIRST: That all storm, roof and ground water shall be excluded from the system, or if admitted in limited quantities, it shall be under conditions which shall admit of ready exclusion of such waters whenever this may prove desirable. Such admission shall receive the specific approval of the State Department of Health.

SECOND: At the close of each season's work a plan and profile of the sewers built during the year shall be prepared and filed in the office of the Commissioner of Health, together with any other information in connection therewith that may be required.

THIRD: The proper local authorities shall provide at the earliest practicable moment a public sewer for every estate from which sewage is now being discharged into any of the waters of the State, or upon which a nuisance may exist whose abatement demands a public sewer.

FOURTH: Extreme care must be exercised in the construction of the sewer pipe joints to make them water-tight, more especially since tile underdrainage is to be laid in the same trench, with the sewer. In event of leakage of sewage into the tile underdrain, which doubtless will have outlets at convenient points into natural water courses, said outlets would become the avenues of escape for sewage. In this event, the tile outlets would be stopped up permanently and the borough authorities must use caution and not guarantee to the householder that the underdrain outlet shall be always and permanently maintained. To obviate the improper use of the underdrainage system, it is specially stipulated that the proposed sewerage system shall be built under the responsible supervision and direction of the engineer designing the system, or same one thoroughly skilled and competent in sewer construction.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the sewer system or any part thereof, has become a nuisance or menace to public health, then such remedial measures shall be adopted as he may advise or approve.

SIXTH: No sewage from the proposed sewer system shall be discharged into the waters of the State at any point except at the outlet of the system herein approved at or near the northeast corner of the present borough territory and not then until after the borough of South Canonsburg shall have prepared detailed plans and a report on sewage disposal works for the treatment of the borough's sewage, and these plans and report shall have been submitted to and approved by the Commissioner of Health or modified or amended.

SEVENTH: On or before July first, nineteen hundred and eight, the borough of South Canonsburg shall prepare plans, either independently or in conjunction with the borough of Canonsburg for the treatment of the borough's sewage and submit these plans and report thereof to the Commissioner of Health for approval. If this be done, the Commissioner of Health may grant temporary permission to the borough to discharge its sewage into Chartiers Creek, which temporary permission shall not cease in advance of the date upon which the sewage from the State Reform School at Morganza shall cease to be discharged into Chartiers Creek.

EIGHTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

The borough is advised to take into consideration the expediency of providing sewerage facilities for all of the industrial plants in the vicinity.

The Department of Health will notify the proper officials of the public institutions at Morganza and Marshalsea of the desirability of the treatment of the sewages from these institutions.

The Department of Health will also notify the borough of Canonsburg that it failed to comply with the section six of Act one hundred and eighty-two, approved April twenty-second, nineteen hundred and five, and that, therefore, its sewer system is not exempt from the provisions of this Act against the discharge of sewage into the waters of the State.

And further, the said borough of Canonsburg will be requested to prepare plans, either independently or in conjunction with the borough of South Canonsburg for the treatment of the sewage before it is discharged into the creek and submit these plans to the Department of Health for approval on or before July first, nineteen hundred and eight. If this be done, the Department of Health may fix the time in which such treatment works shall be constructed, which date shall not be in advance of the date upon which the sewage from the State Reform School at Morganza is ceased to be discharged into Chartiers Creek.

Harrisburg, Pa., February 11th, 1908.

SOUTH CANONSBURG, WASHINGTON COUNTY.

This permit is issued to the borough of South Canonsburg, Washington County, and is for the construction of sewage purification works for the treatment of the sewage of South Canonsburg and Canonsburg boroughs, in conformity with plans therefor submitted by the former municipality.

It appears that on February eleventh, nineteen hundred and eight, the Commissioner of Health issued a permit to the said borough of South Canonsburg, Washington County, to extend its sewerage system and to discharge sewage therefrom into Chartiers Creek within the limits of the borough, under certain conditions and stipulations, among which were the following.

"No sewage from the proposed sewer system shall be discharged into the waters of the State at any point except at the outlet of the system herein approved at or near the northeast corner of the present borough territory and not then until after the borough of South Canonsburg shall have prepared detailed plans and a report on sewage disposal works for the treatment of the borough's sewage, and these plans and report shall have been submitted to and approved by the Commissioner of Health or modified or amended.

"On or before July first, nineteen hundred and eight, the borough of South Canonsburg shall prepare plans, either independently or in conjunction with the borough of Canonsburg for the treatment of the borough's sewage and submit these plans and report to the Commissioner of Health for approval. If this be done, the Commissioner of Health may grant temporary permission to the borough to discharge its sewage into Chartiers Creek, which temporay permission shall not cease in advance of the date upon which the sewage from the State Reform School at Morganza shall cease to be discharged into Chartiers Creek."

At the same time the Commissioner of Health notified the borough of Canonsburg to prepare plans either independently or in conjunction with the borough of South Canonsburg for the treatment of its sewage.

In response to these actions both municipalities jointly engaged the services of an expert and plans were submitted on August thirteenth, nineteen hundred and eight, for joint purification works.

The borough of Canonsburg has at the present time a fairly complete system of sewers built on the separate plan. These discharge through a twelve inch main sewer into Chartiers Creek just below Bridge Street.

The South Canonsburg main sewer, also twelve inches in diameter, recently completed, discharges into Chartiers Creek at a point fifteen hundred feet above Bridge Street.

The description of the sewerage systems of both municipalities is contained in the said permit of February eleventh, nineteen hundred and eight.

It is estimated that Canonsburg has a present population of about four thousand, at least one-half of which make use of the sewers; and that South Canonsburg has a population of about fifteen hundred. Few, if any connections have yet been made with the sewers at South Canonsburg, although it is expected, now that the system is about completed, that they will be generally used in the future.

The sewage flow in the Canonsburg main sewer was roughly gauged during dry weather and found to be about two hundred thousand gallons per day. The system is intended for domestic wastes only and although there may be a greater or less number of down spout connections it is believed that the flow will never be excessively increased during wet weather. The size and grade of the main sewer is such as to make it impossible for a very large volume of sewage to reach the present outlet of the future purification works. No gaugings have been made of the South Canonsburg output, as the system was not complete at the time of the investigation.

The proposed sewage purification plant is designed to purify sewage from approximately seven thousand people. On a basis of seventy-five gallons per capita, this would be five hundred and twenty-five thousand gallons per day. This provides not only for a combined increase in both boroughs of fifteen hundred people, but also allows for the total population, when the above figure is reached, being connected with the sewers. In other words, the plant should purify about twice as much sewage as will be discharged from both boroughs during the present year. The works can be operated at excessive rates for short periods; and the pumping equipment is of sufficient capacity to handle one million six hundred thousand gallons per day, which is probably as much as the main sewer could convey to the pump well. The purification works proposed are designed to be readily extended or duplicated.

The site chosen for the sewage works is located about half a mile below the corporate limits of Canonsburg on land lying south of the creek between the creek and the highway. The nearest houses are those at East Canonsburg (a small unincorporated community) six hundred feet distant from the center of the proposed filters and at an elevation some thirty feet higher than the filters. The prevailing summer winds are from a westerly direction. This would tend to drive any odors originating from the purification works, in a direction away from the above mentioned houses or any other houses. In support of this statement the petition mentioned that the ground near the proposed site has been and is being used for dumping night soil; and that this practice is continued without complaint on the part of the people of

East Canonsburg. The site has not yet been purchased and no definite boundaries have been fixed; but a tract of eight or ten acres is contemplated as ample room for the plant and future extension.

Before choosing this site, other sites farther down stream were investigated. One of these was on low land in the rear of the "Tin Plate Mill;" and the other one was one-half mile east of the proposed site on land south of the steam railroad tracks and across the creek from the Pennsylvania Reform School at Morganza. Neither of these last mentioned sites has marked advantages, as regards distance from habitation, over the site chosen. Giving weight to the matter of prevailing winds these sites are less favorably located, so the borough considers. These facts, taken together with the matter of increased cost of extending the force main and the increased cost of pumping, afford sufficient ground for rejecting both of these sites, in the opinion of the municipal experts.

When the purification works are built it is proposed to tap the South Canonsburg main sewer with an eight inch inverted syphon, at a point seven hundred feet above the present outlet and to divert the sewage into the Canonsburg main sewer.

Just above the present Canonsburg outlet it is proposed to construct a manhole from which an eight inch syphon is to extend, beneath the creek, to the screen chamber at the pumping station. A weir with crest at elevation nine hundred and seventeen will be constructed in this manhole and will form an emergency overflow through the present outlet. The pumping machinery will force the sewage, through two thousand feet of cast-iron main, to purification works consisting of screen chamber, settling tank, sprinkling filters, final treatment basins and sludge beds. The final effluent may be readily disinfected if desired in the future.

At the pumping station the sewage, after being roughly screened, will enter a pump well ten feet by twelve feet in plan, with a maximum capacity of seven thousand gallons, or from ten to twenty minutes flow. The pumping machinery will consist of a four inch centrifugal pump and a five inch centrifugal pump driven by fifteen and twenty horse power motors, respectively. The motors will be started automatically by means of float switches when the sewage in the well has reached any desired level. The rate of emptying the pump well can be made to vary from several times the rate of inflow to approximately the same rate as the inflow.

The ten inch force main discharges into a screen chamber, provided with two sets of screens each set comprising a half and three-eighths inch screen. From this chamber the sewage passes into one or both of the two settling basins. Each of these is seventy-five feet long, twenty feet wide, divided longitudinally by a baffle wall upon which the roof rests. The minimum depth in the tank is eleven feet, this giving a capacity of one hundred and twenty-five thousand gallons each. With both in use, there will be provided, based on the nominal capacity of the tanks, a twelve hour period of retention. It is possible that one settling tank may be used for a month at the time, while the other is allowed to stand idle and the decomposition of the sludge allowed to take place.

It will be noted that the general dimensions of the tanks are such as to provide a relatively high velocity of travel with the idea of more thoroughly distributing the sludge. At a point near the center of each tank is provided a by-pass, through which the sewage can be drawn, if it is desired to decrease the period of retention. The tanks are arranged so that they may be readily cleaned.

Located between the two settling tanks is a syphon chamber which receives the flow from these tanks. When the sewage has reached a predetermined level it will discharge through an automatic syphon into the equalizing chamber and thence into the distributing system of the filters. At the outlet of the settling tanks brass weir plates are provided, by the use of which the quantity in each dose may be increased by including therein a portion of the contents of the settling tanks themselves.

The filters are two in number and they are to be composed of broken stone, having an average depth of five and five-tenths feet. The area of each is one hundred and thirteen feet by eighty feet, or a total area of forty-four one-hundredths acres. These were provided for treating the sewage, when the plant has reached a capacity at a rate of sixteen thousand people per acre, or one million two hundred thousand gallons per day. It will be some years before the filters are called upon to perform this work.

The sewage is to be distributed onto each filter through six lines of cast-iron pipe resting on concrete piers and placed about two feet below the surface of the filters. The lines are six inches and four inches in diameter. Each line connects directly with the sixteen inch supply pipe extending through the central gallery. Each line can be cut out of service independently and a flange at the upper end permits the cleaning out of any deposits, if necessary. Spaced seven feet six inches apart on each of the lateral distributors are cast-iron risers extending to the top of the filtering material. Every other riser will be provided with a sprinkler nozzle and the remaining risers will be capped. The nozzles and caps may be changed when desired in order to more thoroughly distribute the sewage.

The underdrains are formed of six inch channel pipe placed in an inverted position on the concrete floors of the filters. The lines of underdrains are eighteen

inches centre to centre. They discharge into an open channel in the bottom of the central gallery

The bottom of the filters has been placed above the level of high water in the creek. The elevation of the sewage in the settling basins is to be nine hundred and thirty-six and five-tenths. The elevation of the invert of the sewer at the pump well is nine hundred and fourteen. Hence the plans show a vertical height of twenty-two and five-tenths feet for the lifting of the sewage into the purification works. The surface of the filters will be at elevation nine hundred and twenty-eight or eight and five-tenths feet below the water level in the settling tanks.

Just below the filters are two final treatment basins, either one or both of which can be used. The combined capacity of these basins is about sixty-eight thousand gallons, or three hours' flow, based on the nominal capacity of the plant. The basins are large enough to permit, if desired in the future, the application of a disinfectant to the effluent after it has received some two hours of plain sedimentation.

The sludge beds are two in number, each twenty-five by fifty feet and have a combined area of two thousand square feet. Although placed on opposite sides of the final treatment basins, they are connected by an iron pipe so that they can be used as one filter. They will receive sludge from the settling tank through the ten inch cast iron pipes, shown on the plans, and from the final treatment basins by means of sluice gates.

Around the final treatment basins and sludge beds an embankment or protecting dyke is to be built, carried up to elevation nine hundred and twenty-four. The sludge basins are to have underdrains laid on earth and covered to a depth of two feet with sand. The underdrains will empty into the outlet pipe from the final treatment basins from which a fifteen inch terra cotta drain will lead under the embankment to the edge of the creek. This pipe will have a flap valve on it, so that the invert will be at elevation nine hundred and fourteen.

No by-pass for untreated sewage to the creek is afforded. The shortest passage through the works would be through the settling tanks and sludge bed. The filters will not be put out of commission during freshet stages of Chartiers Creek.

The entire layout is a careful design based on modern practice and should afford to the municipalities an efficient and economical system. It is adapted to additions in the future The only objection there can be to the site is its proximity to buildings.

In compliance with the previous terms of the permit hereinbefore mentioned, the boroughs now expect a formal approval of the plans, carrying with it permission to discharge sewage temporarily into Chartiers Creek until the sewage from the State Reform School at Morganza shall have ceased to be discharged into Chartiers Creek.

On general principles it is better to concentrate the care and attention necessary at a sewage disposal works to one plant if this be feasible. In the preparation of plans for the treatment of the Morganza Institution sewage, the State may bestow some thought on the advisabiltiy of one plant being erected in Chartiers valley to take the sewage from the State Institution and from the Canonsburg and South Canonsburg boroughs. However, this may not be practicable of ultimate accomplishment, and the possibility of the project need not interfere with the approval of the plan now under consideration.

It has been determined that the interests of the public health will be subserved by approving the proposed sewage disposal plant for the boroughs of South Canonsburg and Canonsburg and the same is hereby and herein approved and a permit issued for the temporary discharge of sewage into Chartiers Creek from the sewer system of South Canonsburg until plans for sewage disposal works for the State Institution at Morganza shall have been prepared and approved and an appropriation made therefor, and the construction of the work begun; at that time the Department of Health will notify South Canonsburg of the fact and South Canonsburg borough shall within one year from the date of such notification, either independently or in conjunction with Canonsburg borough, construct the sewage disposal works herein approved or such part thereof as shall be deemed necessary by the Department of Health, or in substitution for this plant or any portion thereof, shall construct such other sewage disposal works as the Department of Health may approve, all under conditions and stipulations to be made by the Department of Health of the Commonwealth.

Harrisburg, Pa., August 25th, 1908.

SOUTH SHARON, MERCER COUNTY.

This application was made by the borough of South Sharon relative to sewerage and is for approval of sewer extensions constructed by said borough between the dates of April twenty-second, nineteen hundred and five and December first, nineteen hundred and seven, consisting of nine thousand five hundred and forty-eight feet of combined sewers, ranging in size from ten to thirty inches in diameter and discharging through existing sewers into the Shenango River within the limits of the borough.

It appears that the borough of South Sharon is an industrial community of eight thousand population, located in the extreme western part of the State of Pennsylvania in Mercer County. It is bounded on the north by Shenango borough, on the east by Hickory township and on the south by Hickory township and Wheatland borough, on the west by the State of Ohio and the Shenango River. As late as eighteen hundred and ninety, the land included within the borough limits was used almost entirely for agricultural purposes, but at that time the location of steel plants in this region brought thither a large population and the settlement has sprung up as a suburb to the borough of Sharon. In nineteen hundred and two the present borough limits consisting of a tract of land with an area of one and seven-tenths square miles, was incorporated as the borough of South Sharon.

The borough is located on the eastern bank of the Shenango River, a tributary of the Ohio River. This river has its source in Conneaut township, Crawford County, approximately forty miles above the borough of South Sharon. It flows in a general southerly direction through the western part of Crawford, Mercer and Lawrence Counties, draining with numerous tributaries, a portion of the eastern section of the State of Ohio and emptying below New Castle, into Beaver River. Along the valley of the Shenango River throughout its entire length, there are many steel industries, such as are found in the Pittsburg region. These industries furnish the main occupation for the inhabitants of the many boroughs and towns located in this valley. The Sharons together with the borough of Sharpsville, comprise one of the main groups of these communities and extend for several miles along the bank of the Shenango River.

Three miles above South Sharon is the borough of Sharpsville with a population estimated at thirty-five hundred and twenty miles above is the borough of Greenville with a population of sixty-five hundred. These boroughs discharge their sewage into the Shenango River, menacing the water supply of the Sharons. Greenville has been granted a permit by the Department of Health to extend its sewerage system under the condition that the sewage be properly treated before being discharged into the river, and the Department has now under consideration a decree with respect to Sharpsville's sewage disposal. Below South Sharon there are numerous boroughs and cities which take their water supply from the Shenango River. Prominent among them is the city of New Castle, with a population of thirty-five thousand and located twenty miles below South Sharon. The water supply of this town is taken directly from the Shenango River and it is filtered before being supplied to consumers.

The elevation of the Shenango River at South Sharon is eight hundred and thirty feet above sea-level during ordinary stages. The river has a fall of about eight feet to the mile and at a point immediately west of the center of the borough it takes a deep bend entering the State of Ohio. The banks of the river are about eight feet above low water mark. On the eastern bank there is quite an extensive area of flat territory extending for a distance varying from five hundred to fifteen hundred feet easterly. This area comprises about one-half of the total area of the borough of South Sharon and on it are located the great industrial plants of the United States Steel Corporation and allied industries and also the business section of South Sharon. From the eastern edge of this level tract of land the ground rises rapidly to the eastern boundry of the borough. At this point the elevation of the land is about two hundred and fifty feet above the river. On this slope are located the residences of the borough inhabitants.

The drainage, therefore, of the borough is directly westerly to the Shenango River. The topography is broken slightly by several small runs extending from the eastern portion of the borough to the river. The largest of these is Haywood Run, which extends through the center of the borough.

The United States Steel Corporation plant and allied industries furnish the wealth and occupation of the citizens of South Sharon. The Carnegie Steel Company's plant of the United States Steel Corporation is engaged in the manufacture of pig iron and open hearth steel and employs twenty-five hundred men. This corporation occupied a tract of land consisting of five hundred acres and located in the bend of the Shenango River in the western portion of the borough. This company has about two hundred and fifty acres covered with the various furnaces and buildings representing an outlay of many thousand dollars. The American Sheet and Tin Plate Company, engaged in the manufacture of tin plate, occupied a tract of land of twenty acres and employs about eleven hundred people. This plant is also located on the Shenango River. Between the tin plate works and the Steel Company's plant are located the Mercer Works which employ five hundred people. It is also engaged in the manufacture of tin plate.

West of the Steel Company's plant is the plant of the Sharon Steel Hoop Company, located within the borough limits immediately on the Ohio boundary line. This plant occupies twenty-five acres of land and employs fourteen hundred people. There is also a wire mill owned by the American Steel and Wire Company, a subsidiary corporation of the United States Steel Corporation. In the eastern portion of the territory occupied by the United States Steel Corporation, there is a built-up section of South Sharon borough known as Little Italy. This section is occupied almost entirely by foreigners and it is estimated to contain a population of one thousand persons.

South Sharon borough is traversed by two railroads, which enter it at the southern boundary and extend northerly through the center of the borough into the borough of Sharon. These railroads are the New Castle branch of the Erie Railroad and the Erie and Pittsburg Railroad, which is a part of the Pennsylvania system.

These railroads lie in the eastern portion of the low tract of land and furnish, with numerous sidings, ample facilities for entering the various industrial plants.

The Sharon Water Works Company supplies water to Sharon, South Sharon and the portion of Hickory township in Pennsylvania and some individuals in the State of Ohio. The plant has a capacity of four million gallons per day and supplies, on an average, one million seven hundred and twenty thousand gallons per day to sixteen thousand nine hundred and seventy consumers, or about one hundred gallons per capita per day. The pumping station is located on the west bank of the Shenango River near the northern boundary of the borough of Sharon. The supply is taken from the center of the river through a twenty inch intake to a concrete well. It is pumped from this well into a series of sedimentation tanks and then passes through eight rapid sand filters each with a capacity of five hundred thousand gallons per day when operated at a rate of one hundred and twenty-five million gallons per acre per day. A coagulant is supplied to the water before it enters the filters. After passing through the filters the water is pumped into a protected reservoir of two hundred and ten thousand gallons capacity, located in the State of Ohio, about three hundred feet above the low district of the town. The water is supplied to the consumers from this reservoir through a series of mains ranging in size from two to twelve inches. There is also a by-pass so that water can be pumped directly into the mains if necessary. It is estimated that one hundred and twenty thousand gallons of water are used for industrial purposes in the borough of Sharon. The industrial works in South Sharon borough take their water directly from the river and the water works supply water only for fire protection.

The largest of the industrial water works systems is that of the United States Steel Corporation, which also supplies the American Steel and Wire Company. This supply is taken from the Shenango River at a point below the bend in the western portion of the borough after the river has re-crossed the Ohio boundary line. The supply is carried through a four foot by six foot conduit to a central cistern where the company has a pump station. The normal supply of water in this system ranges from forty-five million to fifty million gallons per day of which thirty-five million to forty million gallons are used by the Steel Company. All of the industrial plants are equipped with deep driven wells for drinking purposes. These wells range in depth from eighty-five feet to two hundred and eighty feet and are cased and protected from any surface run-off.

The borough water supply is used for drinking purposes. It is reported that no analyses have been made of the public water supply for two years. Typhoid fever has been prevalent in the Sharons, and the water supply is viewed with suspicion.

South Sharon is equipped with a combined system of sewers ranging in size from sixty to ten inches. There are over ten miles of sewer in the borough, which cover quite thoroughly the residential section of the borough and the business section located east of the industrial plants. The system is divided into two drainage districts. Spearman Avenue, which extends northerly and southerly through the entire length of the borough and about one-half way up on the slope in the eastern portion of the borough, divides the two districts.

The western district, which lies between Spearman Avenue and the industrial plants, is drained by a thirty inch outfall sewer which empties into the Shenango River near the southwestern boundary of the borough. This thirty inch sewer extends across the property of the United States Steel Corporation for a distance of fifteen hundred feet from the Shenango River to Broadway Avenue. At this point it is fed by the thirty inch and twenty-four inch sewer extending northerly and southerly along Broadway Avenue respectively. These sewers are in turn fed by a system of laterals ranging in size from twenty-four inches to ten inches and draining all the built-up territory west of Spearman Avenue. There are four miles of sewers in this district, of which over half are above fifteen inches in diameter.

The eastern drainage district is drained by a sixty inch outfall sewer which empties into the Shenango River at a point near the southern boundary of South Sharon borough. This sewer extends for a distance of nine hundred feet from the river to the foot of Spearman Avenue, crossing the property of the United States Steel Corporation. At this point it is fed by a twenty-four inch sewer which extends easterly along Broadway and by an extension of the sixty inch main sewer which extends thirty-three hundred and fifty feet northerly along Spearman Avenue and is fed by a system of laterals ranging in size from forty-eight inches to twelve inches. There are six miles of sewers in this district and nearly half of these are over fifteen inches in diameter. This system of sewers drains all of the territory in the borough east of Spearman Avenue to the borough line.

No profiles of the sewers have been submitted to the Department, so that it is impossible to determine the capacities. It is reported that the system is designed to take care of a rainfall of one inch per hour. The sewers are provided with manholes with perforated covers.

The industrial corporations in the western half of the borough discharge their sewage through private systems directly into the Shenango River. Of these the system of the United States Steel Corporation is the most expensive. It consists of over two miles of sewers, ranging in size from six foot outfall sewer to a fifteen inch lateral. Through this system the Steel Corporation discharges an enormous amount of water which is necessary for the operation of the mills. The water from the American Steel and Wire Plant is also carried through this system. In addition to the industrial wastes, Haywood Run, which enters the property of the Steel Corporation near the western center of its boundary is carried through the main outfall sewer.

The various offices of the mills in the Steel Company's plant are equipped with modern sanitary conveniences and the sewage from the closets and lavatories is discharged into this system. In the eastern portion of the steel company's plant there is a settlement known as Little Italy, which is connected with the main sewer system of the Company. Only slop and sink water, however, is admitted into the sewer system from this settlement and individual vaults are provided for each house in this group.

No data is given by the borough officials in making application in regard to the amount of domestic sewage which is taken care of by the existing system and no facts are presented in regard to the number of individual sewers and cesspools existing in the borough. On account of the extensiveness of the borough's system and the absence of streams sufficiently large to carry away the sewage from independent sewers, it is probable that most of the sewage is emptied directly into the borough system.

South Sharon borough has made application for the approval of nine thousand five hundred and forty-eight feet of laterals, consisting of six hundred and forty feet of thirty inch, three hundred feet of twenty-four inch, seven hundred feet of twenty inch, four hundred and eighty-four of eighteen inch, three hundred and seventy-two feet of fifteen inch, six thousand and thirty-five feet of twelve inch and ten hundred and seventeen feet of ten inch terra cotta sewers. These sewers were constructed by the borough during the years nineteen hundred and five, nineteen hundred and six and nineteen hundred and seven. They are located mainly in the northern portion of the borough and drain through the two existing outfall sewers into the Shenango River. No profiles of these sewers were submitted to the Department. It is stated that they were built to take care of both storm water and domestic sewage.

The sewage of Sharpsville which is now discharged into the Shenango River is a menace to public health in South Sharon and Sharon. While it is true that the public water supply of South Sharon is filtered, nevertheless, it is a well known fact and thoroughly demonstrated that a filter does not always remove the poisons that are in the raw water. The well known Butler epidemic was caused by temporary breakdown in the water purification plant. During the current season, a typhoid fever epidemic has occurred in Royersford and Spring City, Montgomery County, by reason of the overrating of the water filter. In order to protect public health, sewage must be kept out of streams used as sources of public water supply. The Department has now under consideration a decree with respect to Sharpsville sewage disposal. Greenville borough, located a number of miles above South Sharon on the Shenango River, has been required to purify its sewage. The city of New Castle, whose sewage menaces the supply of water at Beaver Falls and New Brighton, has been required to perfect plans for sewage purification works. The citizens of Sharon and South Sharon cannot expect the State to take preventative measures with respect to preserving the purity of the water above South Sharon's intake and not take the same measures to protect the purity of the waters above the intake at New Castle. Therefore, South Sharon must forthwith prepare plans for the treatment of its sewage.

It seems expedient that there should be a trunk sewer along the river to collect the sewage from Sharpsville and both the Sharon boroughs and possibly Wheatland and to terminate in a sewage disposal plant which shall serve all the municipalities in the district. This should be the most economical and efficient plan provided the municipalities would work together.

No attempt to treat the flow from the combined system of sewers as existing at present in this borough, including the enormous run-off during the times of storm, would be prohibitive. It will be necessary, therefore, for the borough authorities to make a thorough revision of the plans of the sewerage system and to construct such additions as will be necessary to separate the main storm drains from those which can be used for purely sanitary purposes. Fortunately the existing layout of the sewer system should furnish an easy solution for this problem. No profiles are on file with this Department so that it is impossible to determine the feasibility of combining the two existing drainage districts, yet it appears that the sanitary sewers in the extreme eastern portion of the borough can be directly connected to the sewers in the western section and the thirty inch outfall sewer along Broadway Avenue can be used as a sanitary sewer. This will allow the main outfall sewer from Spearman Avenue to carry the large amount of storm water which it at present takes care of.

In considering the remodelling of this system, the borough officials should pay particular attention to the exclusion of roof water in all cases where it is possible. This will materially assist in the reduction of the wet weather flow. Comprehensive plans for a sanitary sewerage system based upon the existing

system of sewers should be designed and adopted by the borough and improvements can then be made in the future to conform with these plans until finally a perfect system is installed.

It is reported that the assessed valuation of the borough is four million six hundred and eighty-four thousand eight hundred and fifteen dollars, and that the bonded debt is one hundred and forty-five thousand dollars. The main trunk sewers in the borough have been constructed entirely from borough funds and all laterals have been built by direct assessment upon abutting properties. Under these conditions it is seen that the borough can still borrow over one hundred and eighty-two thousand dollars, so that, with the system in existence of constructing laterals, the borough is well fixed financially to remodel this sewerage system and to construct sewage disposal works or to pay its proportion of cost in a metropolitan system or plant. If the borough does not care to incur an indebtedness which nearly equals the maximum amount allowed by law, it is not impossible for it to enter into a contract with private capital to construct the necessary sewers and sewage disposal works so that there is no excuse why South Sharon should continue to discharge its sewage into the Shenango River to the menace of human life.

In view of the fact that the borough has extended its sewer system in violation of the Act of April twenty-second, nineteen hundred and five, and in view of the other facts hereinbefore discussed, it has been determined that the interests of the public health demand that a permit be withheld, and approval is hereby and herein withheld of the sewerage system of the borough of South Sharon and a decree issued as follows:

FIRST: The borough of South Sharon shall on or before the first day of December, nineteen hundred and nine, either independently or in conjunction with other adjacent municipalities, prepare plans for the collection of all of the sewage of the borough and for its purification in a sewage disposal plant, and shall submit these plans to the Commissioner of Health for approval.

SECOND: The sewerage system shall be designed to collect the sewage of the industrial plants and of all properties in the borough.

THIRD: The borough shall on or before the first day of January, nineteen hundred and nine, inform the Commissioner of Health what its purpose is with respect to complying with this degree. Failure to so notify the Commissioner of Health will be construed to be a settled purpose on the part of the borough to proceed in defiance of this decree to pollute the waters of the State.

Harrisburg, Pa., October 21st, 1908.

STROUDSBURG, MONROE COUNTY.

This application was made by the borough of Stroudsburg, Monroe County, and is for permission to extend its sewer system and to discharge the sewage therefrom into McMichaels Creek, within the limits of said borough.

Stroudsburg is a substantial business and residential community and the seat of government of Monroe County. Its present population is estimated to be thirty-eight hundred. In nineteen hundred it was thirty-four hundred and fifty. It is located on the flats at the base of the Brodhead Creek drainage basin from whence this stream, by means of a deep gorge cut through a range of the Blue Ridge Mountains, passes easterly into the Delaware River three miles distant, entering the river at a point immediately above the borough and celebrated resort of Delaware Water Gap. Above Stroudsburg said basin comprises an area of two hundred and forty-eight square miles of extremely mountainous region, more particularly in the northern portion where are located many delightful summer resorts and cottage settlements. Such places as Pocono Pines, Cresco, Buckhill Falls, Swiftwater, Canadensis, Mountain Home and Mt. Pocono are known far beyond the confines of Pennsylvania. The altitude is high, the water pure, the roads excellent, the hotels comfortable as may be attested by the many thousands of people who annually frequent the region.

The main tributary of Brodhead Creek is McMichaels Creek. This stream heads in the western part of Monroe County, flows southerly for six miles and thence turning at right angles takes an easterly course and flows along the foot of the mountain known as Godfrey Ridge, a distance of sixteen miles, emptying into Brodhead Creek in the central part of Stroudsburg borough. It traverses a semi-agricultural district and drains one hundred and four square miles, nearly one-half of this amount being in the local valley of Pocono Creek which rises in the central part of the country and flows southerly to McMichaels Creek, which it enters in Stroudsburg. This valley in its lower part is an agricultural district and in and adjacent to the borough the banks of the stream are low and the adjoining land subject to inundation.

McMichaels Creek divides Stroudsburg into a north and south part and Pocono Creek is the easterly boundary of the part of the borough known as the west end. On both streams within the incorporated territory of Stroudsburg is a dam and mill privilege. A tail race from the Pocono Creek mill extends through the borough east of the stream in the built up part of the town and empties into McMichaels Creek above the dam on the latter.

The race on McMichaels Creek extends from the dam just above Fifth Street Bridge easterly between Main Street and the creek to the confluence of McMichaels and Brodhead Creeks.

The old and principal part of the town lies north of McMicaels Creek and between Brodhead and Pocono Creeks. Immediately to the north are hills. The town site hemmed in in this manner is a flat table land elevated about thirty feet above the stream. The south side is a level plateau elevated about fifty feet above the creek and extending back to the foot of Godfrey Ridge. The west end is low and sparsely populated. Here are the repair shops of the Wilkes-Barre and Eastern Division of the New York, Susquehanna and Western Railroad, employing one hundred and fifty hands.

Local passenger trains are operated on this line but it is principally a through tide water freight road from the anthracite coal fields. Both this railroad and the main line of the Delaware, Lackawanna and Western pass from the Delaware River basin over into the Lackawanna River valley by ascending the Brodhead gap and valley. The latter railroad passes northerly through East Stroudsburg borough which is opposite Stroudsburg, being separated therefrom by Brodhead Creek. The passenger station in the easterly borough serves both municipalities. The New York, Susquehanna and Western road passes through the south end of Stroudsburg and up Pocono Creek valley. The other railroad follows closely along Brodhead Creek to its summit.

The main street of the town extends easterly to North Fifth Street and thence it passes in a northeasterly direction into the valley of Brodhead Creek, connecting by a highway bridge with the main thoroughfare in East Stroudsburg named Washington Street and terminating at the Delaware, Lackawanna and Western depot.

The Kitson Woolen Mill, giving employment to about two hundred hands, is on Main Street east of North Fifth Street, between Main Street and the Mill Race, leading from Wallace's dam on McMichael's Creek. Trade waste and sewage from the plant are discharged into the race. Further east on the south side of Main Street, near Brodhead Creek, is the gas company's plant from which refuse is discharged into the stream, and this is the case at the brewery and also at the creamery north of Main Street, near the banks of Brodhead Creek. Sewage and wash water from the Monroe Steam Laundry is discharged into Pocono Creek.

The water supply is furnished by the Stroudsburg Water Supply Company. There are three sources, namely, Foxtown Spring Run, Flagler's Run and Brodhead Creek. The Department is not in possession of plans or detailed information of the system, but the company reports that the principal supply is obtained from Brodhead Creek at Stoke's Mills, two and one-half miles above the borough. Raw creek water is raised by water power pumps from this point into the mains of the town, but a portion of the water goes to Flagler's reservoir on the hill north of the borough.

It is reported that over one-third of the inhabitants use water from domestic wells and springs. The geological formation is gravel, porous and abounding in ground water. The favorable opportunity for percolating cesspools has been taken advantage of. There are three hundred and twenty-four cesspools of the loose wall percolating type and there are also five hundred and sixty-three privy vaults being used as receptacles for sewage. The danger in the practice of drinking water taken from wells in proximity to cesspools and privy vaults seems to have been recognized by the passage of local ordinances. One of them requires that any privy, cesspool or house drain, located on property fronting on a street in which a public sewer is laid shall be connected to said sewer whenever such privy, cesspool or drain is a nuisance or danger to the health of the inmates of the house. Another ordinance declares it to be unlawful to construct or use any cesspool or property fronting on any street, alley or court on which a public sewer shall have been laid and all private sewers constructed within the limits of the borough, connecting with any public sewer, shall be under the supervision of the borough authorities.

It is often the case that recognized dangerous conditions are tolerated because the penalties are not summarily exacted. It appears that typhoid fever and other water borne diseases have thus far been normal in rate in Stroudsburg.

There are three public sewer outlets, each one being into McMichael's Creek, and mentioned in order up stream they are as follows:

A forty-four inch by sixty-six inch concrete egg shaped sewer into the creek at the foot of North Fourth Street; a sixteen inch cast iron sewer at the Fifth Street Bridge; and a twenty-two inch sewer at the foot of Sixth Street. The sewers contributing to these outlets all take storm water.

The largest outlet drains the greater part of the town. The concrete structure diminishes in size until at its upper end, at the corner of Sarah and Eighth Streets, two thousand, nine hundred and ninety feet distant from the outlet it is two feet by three feet in diameter. From the creek it extends up Fourth Street to Sarah Street and for the remainder of its length it is in the latter highway. This thoroughfare is at the foot of the slope leading up the hills to the north of the borough and formerly the surface waters rushed down the lateral streets and overflowed the roads in the business section and the land along and south of Sarah Street. The primary object, therefore, of the drain was to carry off storm water. Connected with it there are eight thousand feet of sewers whose diameters range from eight to twenty-four inches. The eight inch pipe comprises a length of twenty-one hundred feet, the

ten inch pipe thirteen hundred and thirty feet, the twelve inch pipe two hundred and forty feet, the fifteen inch pipe thirteen hundred and seventy feet, the eighteen inch pipe four hundred and eighty feet, the twenty inch pipe seventeen hundred and eight feet and the remainder is twenty-four inches in diameter, these distances being scaled from the maps submitted by the petitioners.

There is an old natural water course coming down from the hill in the northwestern section of the borough. Where it crosses Scott Street, the waters have been intercepted and are now being conveyed westerly by a drain in Scott Street, a distance of twelve hundred feet to the mill race along Pocono Creek. At Thomas Street next southerly the waters are intercepted and conveyed by an eighteen inch pipe easterly in said street and thence southerly in Eighth Street by a twenty inch pipe to the main storm drain at Sarah Street, and at Monroe Street the waters are intercepted by fifteen inch and twelve inch pipes, respectively, and delivered to the main storm drain. Southerly from Sarah Street, a distance of about a quarter of a mile, the water course has been walled up and built over and is hidden from view. The interception of the flow at street crossings was accomplished because the old channel was not sufficient to carry off all of the stormwater at times. It is reported that the covered section has been abandoned, but that some house drains continue to empty therein notwithstanding the fact that orders prohibiting the discharge of sewage into the water course have been issued by the local authorities.

The sixteen inch sewer at the Fifth Street Bridge is the outlet for twelve hundred and fifty feet of sewer laid southerly in Broad Street on the south side of the borough. The upper six hundred feet of this line is six inches in diameter. The South Side has recently been laid out into streets and house lots by a realty company. There are said to be not over fifty dwellings in the district now; they are chiefly along Broad Street. So far as the Department knows, sewers have not been projected for the new development.

The Sixth Street outlet was primarily laid to serve as a storm water flow for the Monroe Street combined sewer. During dry weather it receives no sewage except from a short line of eight inch pipe from a large building on Main Street.

Besides the private sources of stream pollution above mentioned, there is a sewer emptying into the creek below Fifth Street Bridge. It extends up Main Street and Ninth into the public square. It is ten inches in diameter and has a length of about fifteen hundred feet. The private sewer from the Washington House is reported to empty into the creek near said bridge and there are other private properties from which sewage is put into the stream. There are a number of privies on the north bank of McMichael's Creek.

The petitioners purpose to build a combined sewer south in Seventh Street from the fifteen inch sewer in Monroe Street to Main Street, a distance of four hundred and thirty feet, comprising some eighteen inch, some ten inch and a short line of six inch pipe. It appears that Hotel Fulmer, having a capacity of about two hundred guests, and being fitted with numerous bathrooms and modern sanitary facilities, is located at the corner of Main and Seventh Streets and that until recently the sewage therefrom was discharged into the Main Street private sewer; but owing to some obstruction in this private sewer, the exact cause of which has not been discovered, said hotel is without any means whatever of taking care of its sewage, and since this is a matter of some public concern, the borough purposes to lay the sewer in Seventh Street for relief.

In order to provide proper drainage for that portion of the borough territory on Scott Street, west of Eighth Street, the petitioners purpose to lay a twelve inch pipe extension to the Thomas Street sewer northerly in a public way to Scott Street. Sewage from East Stroudsburg is discharged by private sewers into Brodhead Creek in that borough and an application for the establishment of a public sewer system and for permission to empty sewage therefrom into said stream is now pending before the State authorities.

Some of the mountain resort hotels empty sewage into the head waters which feed the intakes of the water works system of Stroudsburg and of East Stroudsburg. The latter's intake is for emergency purposes and has never been used, so it is reported. At least one complaint against such hotel sewage disposition has been made to the Commissioner of Health. It is easily possible that pathogenic poison from one dwelling on the watershed might be transmitted down stream and be introduced into the homes of the water consumers in Stroudsburg. The great epidemics of Plymouth and Butler, Nanticoke and Scranton, besides others, were caused by accidental pollution of the source of supply to those places. For fear that the waters of Flagler's Run watershed of the Stroudsburg Water Supply Company might be infected from the farm houses, said company has requested the services of the State Department of Health in abating any menace thereon.

Below Stroudsburg along the Delaware River there are many municipalities in Pennsylvania and New Jersey which are now using and must continue to use the river as the source of public water supply and in these places the water borne diseases are very numerous. To reduce the death rate from these causes, a co-operative plan has been adopted by both Commonwealths, whose end is the discontinuance of the discharge of all sewage into the river and its tributaries above the points from which water is drawn or may be drawn for public uses. At Belvidere and at Philipsburg nineteen and thirty-two miles respectively below Stroudsburg, water is drawn from the Delaware River for potable purposes. It is easily possible for Stroudsburg's sewage to produce an epidemic in these places. It would be inconsis-

tent for the Commissioner of Health to cause the discontinuance of the discharge of sewage into the waters of the State above Stroudsburg and to permit Stroudsburg sewage to continue indefinitely to be discharged into Brodhead Creek or anywhere to the menace of public health below.

Apart from health considerations, however, it should be a good business policy for Stroudsburg and East Stroudsburg to discontinue the pollutions of Brodhead Creek. The region round about is a notable health resort and its popularity is on the increase. The streams abound in fish and the virgin purity of the waters should be preserved as an invaluable asset, and especially since strong sentiments relative to the subject are now entertained by the public.

There are certain methods of procedure for a municipality with respect to sewerage which should govern local authorities in carrying out the State policy. One of them involves the preparation of a comprehensive sewerage plan for the entire municipal territory for the collection of all of the sewage of the town and its conveyance to some point for purification. After such a plan is designed and adopted, then the borough may build a sewer in any particular street in conformity to the general plan from time to time, as necessity may require, without application to the State Department of Health, thus obviating the necessity of rebuilding any portion of the system to make it fit in to the other parts of the system.

Another procedure is the preparation of plans for the purification works which shall be ultimately built and the adaptation of the sewerage system to such works. This involves the selection of a site for the plant and the determination of its elevations and general outline, capacity and the volume of flow which shall be provided for to the plant. It is impractical to treat the enormous volume of storm water which runs off from the street surfaces in the town because the cost is prohibitive. However, it is practicable to treat the sewage if it be separated from the storm water. It has been seen that the existing sewers of Stroudsburg are very large in size and that they serve a combined purpose. Before a treatment plant shall have been erected at Stroudsburg it will, therefore, be necessary for the borough to devise a practicable plan of intercepting sewage proper. A certain percentage of the storm water may be conveyed with the sewage to the disposal plant possibly and there be treated at a reasonable cost. But the large percentage of storm water must continue to be delivered to the natural water courses. Just how much of the existing sewer system may be incorporated into the improved sewerage and sewage disposal scheme is a matter for detail study by an expert engineer to be employed by the borough. The State Department of Health cannot initiate surveys and plans. Its office, however, is to act in an advisory capacity and this it will do.

It is reported that Stroudsburg's assessed valuation in nineteen hundred and seven was one million six hundred and twenty-seven thousand three hundred and sixty-five dollars, and that its bonded indebtedness was fifty-two thousand dollars. If these figures be correct, it would appear that the municipal borrowing capacity is in the neighborhood of sixty-two thousand dollars, a sum sufficient to enable the borough to make a beginning in the inauguration of improved sewerage and disposal works.

There can be no doubt but that a joint intercepting sewer and sewage purification works for Stroudsburg and East Stroudsburg would prove more efficient and economical than an independent sewer and sewage disposal plant for each place.

It has been determined that the interests of the public health will be subserved by approving the two short sewer extensions proposed, and approval is given for the same and a permit granted therefor, under the following conditions and stipulations:

FIRST: That the admittance of sewage to the proposed extensions shall be under conditions whereby its exclusion from said sewer shall be effected on or before the time that said sewers shall cease, by order of the Commissioner of Health, to be used as carriers of sewage, provided any such order is ever issued.

SECOND: On or before May first, nineteen hundred and nine, the borough shall prepare a comprehensive plan for the collection of all of the sewage of the borough, including trade wastes and the flow from private sewers, and its conveyance to and purification in a sewage disposal plant, and shall submit said plans to the Commissioner of Health for approval.

THIRD: This permit to discharge sewage into the waters of the State shall cease on May first, nineteen hundred and nine. If, on said date, the other terms of this permit shall have been complied with, then the Commissioner of Health may extend the time in which sewage may continue to be discharged into the waters of the State.

The attention of the local authorities is called to the advice herein given with respect to a joint intercepting sewer and disposal project for Stroudsburg and East Stroudsburg.

The borough council is advised to institute tests of well water of the town and to cause an abandonment of all wells found contaminated or so located as to be liable to gross pollution. The State Department of Health will institute a sanitary survey of the water sheds from which the public supply is derived and cause the abatement of all menaces thereon.

All private pollutions as well as public sewers must eventually cease in the borough.

Harrisburg, Pa., May 4th, 1908.

SUMMIT HILL, CARBON COUNTY.

This application was made by the borough of Summit Hill, Carbon County, and is for permission to construct a sewer system and to discharge the sewage therefrom into streams in the vicinity of the borough.

It appears that the borough of Summit Hill, Carbon County, is located on the summit of Pisgah Mountain, at the divide between the basin of the Schuylkill River to the west and the basin of the Lehigh River to the east. Below the town and immediately north lies the borough of Lansford, and ten miles east is the borough of Mauch Chunk. About three-fourths of Summit Hill naturally drains northerly into Panther Creek, a tributary of the Little Schuylkill River, and the remaining one-fourth of the borough drains southerly into Mauch Chunk Creek, which enters the Lehigh River at Mauch Chunk.

There are large deposits of coal on the north slope of the Pisgah Mountain and immediately west of the borough. The town is wholly dependent upon the coal industry. The population is about thirty-two hundred and most of the people take public water supplied by the Summit Hill Water Company. The public supply was originally obtained from springs located near the upper end of Mauch Chunk bridge. The water, of course, had to be pumped to the town. These springs proved inadequate, and at the present time the supply is obtained from a driven well. For short periods during dry weather it is occasionally necessary to pump water from Mauch Chunk Creek. The area of the water shed above the pumping station is not over one and a half square miles. The stream is fed by numerous mountain springs. The water is pumped a vertical height of about four hundred and eighty feet into an earthern reservoir located on the highest part of Summit Hill borough, whose elevation is sixty-five feet above the highest part of the town. It is not debatable that all sewage should be kept out of the streams leading to the emergency water works intake.

In Summit Hill there are possibly fifteen cesspools and upwards of six hundred shallow earth privies. Private well water is thought to be more or less polluted by surface contamination and the proposed sewers are wanted as a safeguard against unsanitary conditions.

There are three sewer outlets in the borough. They were constructed since eighteen hundred and seventy, take both sewage and storm water, and are too shallow in places, inadequate and unsatisfactory. As soon as the proposed sewers are installed, the intention is to either abandon or to use the existing sewers as storm water drains only. The total length of these sewers is one and one-quarter miles and connected therewith are about one hundred and eighty buildings.

The Holland Street outlet discharges sewage down a valley tributary to Little Mauch Chunk Creek. During dry weather the sewage is said to seep away into the ground, but during heavy rainfalls it is washed by the storm water down into the main stream above the point where water is drawn from the creek and supplied to the citizens of Mauch Chunk at times. Railroad Street sewer outlet empties into a burning coal mine in the southwestern part of the village. There is a pool at the outlet which creates a nuisance and has been the cause of many complaints. The Hazard Street outlet discharges to the north of the borough down the mountain side in the direction of Lansford.

The new system proposed, for which approval was withheld, was to receive both sewage and storm water. The outlets were to be in the same general locality as the outlets of the old sewers. There were to be four drainage districts.

The Holland Street district was to comprise about forty acres, serve about four hundred people, have an outlet twenty-two inches in diameter and empty into the tributary of Mauch Chunk Creek above the point upon which water is sometimes drawn for public uses in Mauch Chunk.

The Hazard Street district was to comprise about fifty acres, reach about one thousand people, and have an outlet thirty inches in diameter, and discharge on the same area as the existing Hazard Street outlet at a point about two thousand feet above the colliery of the Lehigh Coal and Navigation Company.

The Railroad Street outlet district was the principal one in the town. It was to comprise an area of about seventy acres, reach about fifteen hundred people and have an outlet thirty-six inches in diameter, which, if necessary, was to be carried westerly along the mountain side to Slum Creek, a tributary of Panther Creek, which it joins a mile or so below Lansford.

The West White Street district was to reach about one hundred people, have an outlet eighteen inches in diameter and discharge down the mountain side into the outcrop of a mammoth coal vein about one-third of a mile from the built up part of the borough to the northwest.

The waters of Panther Creek and the streams into which it empties are in these regions rendered unsuitable for domestic or manufacturing uses because of mine drainage, and sewage discharged therein is largely dissipated and destroyed, owing to the acidity of the waters and the presence of certain chemicals which cause the formation of a coagulant and the precipitation of suspended matter. However, it does not necessarily follow that sewage can be indiscriminately discharged into such waters, and the time may come when it will be found necessary for the sewage of Summit Hill to be subjected to some kind of treatment before the liquids go into natural water courses. Any sewerage plan for the borough should contemplate this possibility and be adapted thereto. It would be impracticable, in all probability, to

attempt to purify mingled sewage and storm water, and, therefore, the State Department of Health returned the plans to the borough for reconsideration. Both economy and efficiency seem to require that separate conduits for the sewage and separate drains for storm water be planned, and that all of the sewage of the borough shall be intercepted and discharged at one or more points on the north side of Pisgah Mountain in the valley of Panther Creek, where in the future disposal works might be located.

The modified plans now before the Department call for temporary sewer outlets at the points (four in number) above described, but the sizes of the outlets and of the sewers have been reduced to eight inches, with the exception of the one for West White Street district, which is to be ten inches in diameter because it forms a part of the main intercepting sewer ten inches in diameter, which is, in the future, to be laid around the north part of the borough to the Hazard Street district outlet.

At the Holland Street district outlet it is proposed to install a pumping plant to raise the sewage over into the other districts, but it is not intended that this pumping plant shall be built immediately.

The sewers comprise a total length of about four miles; they are well designed, have self-cleansing grades, are to be provided with inspection manholes at changes in line and grade and with automatic flush tanks.

Practically all of the land surrounding Summit Hill and in Panther Creek valley is owned or controlled by the Lehigh Coal and Navigation Company. It is understood that no objection will be interposed by said company to the conducting of Summit Hill sewage to and its discharge into some one of the tributaries of Panther Creek, provided this sewage does not reach or flow into any mine.

The applicants do not show any reason why a temporary outlet from the Holland Street district should be permitted, and the Department is not aware of any change in the conditions which obtained at the time of the formal decree herein cited, making it necessary that no sewage whatever shall be discharged into the Mauch Chunk Creek basin.

According to the last reports to the Department, the borough's borrowing capacity was in the neighborhood of thirty-seven thousand dollars. On March twenty-fifth, the municipal buildings were destroyed by fire. The question of rebuilding them is now involved with the question of raising funds for sewer construction. The installation of the proposed sanitary sewers, owing to reduced sizes, will prove an appreciated measure of economy. The added cost of installation of an automatic pumping lift to raise the sewage from the Holland Street district over into the districts in the north part of the town should not be prohibitive.

It has been determined that the interests of the public health will be subserved by the granting of a permit for the construction of the proposed sanitary sewers, and such permit is hereby and herein granted, under the following conditions and stipulations:

FIRST: That all surface water shall be excluded from the sewer system and at the close of each season's work plans of the sewers built under the system hereby approved during the year shall be prepared and filed with the Commissioner of Health, together with any other information in connection therewith which may be required.

SECOND: No pathogenic material from any laboratory shall be discharged into the system. The proper authorities shall cause these wastes to be destroyed on the premises.

THIRD: If at any time the sewerage system or any part thereof shall have become, in the opinion of the Commissioner of Health, a nuisance or menace to public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may advise or approve.

FOURTH: This permit to discharge sewage into the waters of the State shall cease on the first day of May, nineteen hundred and eleven. If the borough shall have complied with the conditions of this permit, then, on said date, the Commissioner of Health may extend the time in which sewage may be discharged from said sewer system into the waters of the State.

FIFTH: It is expressly stipulated that this permit is granted under the condition that the sewage from the Holland Street district, or from any part of Summit Hill borough, shall not be discharged anywhere into the Mauch Chunk Creek basin, but that it shall be raised over and discharged into the districts tributary to the Panther Creek valley, all in compliance with the plans herein approved. Details of the pumping station and plant shall be submitted to and approved by the Commissioner of Health before the erection of the same is undertaken.

Harrisburg, Pa., April 24th, 1908.

SWARTHMORE, DELAWARE COUNTY.

These applications were made by the borough of Swarthmore, Delaware County, Pa., and are for permission to extend its sewer system and to discharge sewage therefrom through existing sewers into Crum Creek at a point outside of the borough limits of Ridley Township.

The borough of Swarthmore, with a permanent population of about twelve hundred, including the student body, is a strictly residential suburban community, located in about the centre of Delaware County, eleven miles southwest of the heart

of Philadelphia and two and a half miles southeast of Media, the county seat. The central division of the Philadelphia, Baltimore and Washington Railroad (Pennsylvania System) passes through the borough, as does also a trolley line connecting Philadelphia and Media, while another trolley line between these points passes just north of Swarthmore. The borough is bounded on the north and east by Springfield Township, on the south by Ridley Township and an isolated piece of Springfield Township, and on the west by Nether Providence Township, which is separated from Swarthmore by Crum Creek. Five miles east of Swarthmore, in the valley of Darby Creek, are the boroughs of Lansdowne, Clifton Heights, Aldan, Yeadon, Darby, Collingdale, Sharon Hill and Colwyn, where a movement for improved sewerage has been recently set on foot. The boroughs of Morton and Rutledge, between the last mentioned district and Swarthmore, have no public sewerage. Swarthmore has a modern sanitary outfall sewer extending three miles below the borough to tide water.

The borough is probably best known as the home of Swarthmore College and the Swarthmore Preparatory School. At the college there are about four hundred and fifty persons, including students, faculty and help. At the school there are one hundred and fifty boarding scholars and several hundred day students.

Crum Creek rises twelve miles northwest of Swarthmore, near the borough of Malvern and the village of Paoli (each about half on the water shed), whence the creek flows through a comparatively narrow, hilly agricultural water shed, about thirty-two square miles in extent above Swarthmore, past that borough as its western boundary, and continues in a general southeasterly course just west of the villages of West Ridley Park, Fairview and Leiperville and just north of the branch of the Baldwin Locomotive Works, and enters the Delaware through tidal flats at a point about three miles below Swarthmore and about half a mile down the river from the mouth of Darby Creek.

Malvern is reported as having no public sewerage. It is said that no manufacturing wastes are discharged into Crum Creek above a paper mill of T. M. Royal and Company, which mill is located in Bates Hollow about a half a mile above the borough of Swarthmore. The plant is shut down at present, but is said to employ about thirty men when running and to have been operated recently in making tissue paper from comparatively clean raw material, such as paper shavings, linen scraps, etc. The waste is said to be, and probably is, comparatively unobjectionable. A very light tint is used occasionally.

The Victoria Plush Mill is located immediately north of Swarthmore borough on the east bank of Crum Creek. The materials received at the plant are linen, mohair and cotton, linen or mohair pile, according to the grade of material. A very considerable portion of the output is dyed, all dyeing being done in the piece. The spent dye stuffs are discharged into a mill race on the property or nearby, possibly amounting to eight thousand gallons daily. Spent bleaching liquors are also finally wasted to the tail-race. Two hundred and thirty hands are employed when the plant is running under normal conditions. Sewage from water closets is drained to a percolating cesspool from which it is possible for overflow to reach Crum Creek. There is also a privy over the tailrace on the property. The water privilege is used for power purposes, but there is a steam plant also.

Crum Creek thus comes to Swarthmore comparatvely unpolluted except from the dye wastes from the plush mills. The stream is colored vividly at times by these wastes.

Swarthmore borough covers about one and one-third square miles, extending about a mile east from Crum Creek, a little more than a mile north and south along the creek. Crum Lynne Creek (sometimes called Little Crum Creek) rises in the northeastern part of the borough and flows southward within the eastern borough line and further down just east of said line, joining Crum Creek about two and a half miles below Swarthmore.

The eastern two-thirds of the borough, containing more than nine-tenths of the population, slopes gradually to Crum Lynne Creek, while the western one-third, containing a few residences and a summer resort known as Strath Haven Inn, slopes precipitously to Crum Creek. The Central Division of the P. B. & W. R. R. extends east and west through the central part of the borough, a little more of the town being to the south, the part to the north being on ground rising to an elevation of one hundred feet above the other part. This district is known as "The Hill" and contains Swarthmore College. The Preparatory School is in the district south of the railroad.

Swarthmore College is located on the divide between the two creeks and shows off to great advantage. The original building, a large stone structure, was opened in 1869. Since then the total number of buildings has increased to fifteen. The number of residents at the college is now about four hundred and fifty, of which eighty-nine are day students.

The college obtains water for drinking purposes from the Springfield Water Company, while the supply for other purposes is obtained from Dick's Run, which rises in the eastern part of Media and enters Crum Creek from the west below the college. It is said that forty thousand gallons daily are used by the college from this source and that all the water is filtered and pumped. The filter is said to be about twelve by twenty feet and to have a total depth of four and a half feet, about the top fifteen inches being sand and the rest coarser material. The sand is cleaned off

as it becomes dirty to a minimum depth of six inches. Forty thousand gallons daily on this area equals a rate of seven million two hundred thousand gallons per acre per day.

Four cases of typhoid fever developed in the college about February fifteenth, nineteen hundred and seven. A careful investigation was made and it was found that all the victims had returned from a vacation about February first and the infection is believed to have occurred away from the college. The introduction of an improved filter is under consideration.

In addition to the campus, the college owns some ground in the eastern part of the borough and a considerable tract on the slope to Crum Creek and just south of the railroad within the borough. A ravine in the wooded valley of Crum Creek heads in this property of the college.

The greater part of the college sewage, including roof water, is conducted in a ten inch pipe from the college under the railroad to the ravine just mentioned and discharged into the small run therein, perhaps eight hundred feet from Crum Creek. Old farm buildings in the vicinity, also owned by the college, are sewered by a small pipe emptying at about the same point and the sewage from the Swarthmore Preparatory School on the divide between Crum and Crum Lynne Creeks and just south of this ravine and from one or two houses near the school is piped to the run already mentioned just below the college sewer outlet. The college sewerage system was installed about twenty years ago.

Waste from the coal gas plant of the college is discharged to the same run above all the sewer outlets. The gas plant is located in the ravine. Coal gas is manufactured and supplied to the college and about fifty private houses in its vicinity. The supplying of these private houses, the lighting of the college grounds the year round and the use of gas in the laboratories throughout the year necessitates the operation of the gas plant during the whole year. A well with a capacity of twenty barrels is used for the storage of the gas tar produced and periodically, as the well becomes nearly full, a concern in Wilmington is notified and ships fifteen barrels to the college, where they are filled with the gas tar and returned. The well is provided with an overflow and it is said that this has been known to come into operation, discharging to the run. Moreover, waste from drips and from the gas filter are discharged into the run.

The run is in a most foul and filthy condition from the presence of gas waste and sewage. It empties into Crum Creek through low swampy ground bordering back water in the creek above the dam and where boating is said to be indulged in during the summer.

The laundry waste from the college is discharged by an eight inch pipe into a ravine heading north of the college and of the railroad and passing down the wooded slope to Crum Creek. Conditions here are also foul. This discharge enters the creek above the back water above the dam just mentioned.

South of the railroad and of the college gas works ravine, and on the Crum Creek slope are sixteen houses, most of them too low to be connected to the borough sewerage system of the Crum Lynne Creek district, which houses are connected to the Simmons sewer installed by F. M. Simmons and discharging through a six inch pipe into Crum Creek in the southwestern part of the borough and just below the dam already referred to several times. The buildings connected to this sewer includes Strath Haven Inn, a summer resort accommodating about two hundred guests and located on the steep slope of Crum Creek overlooking the boating dam. Conditions at the outfall of this sewer were not so bad at the time of the investigation. There was but little sewage flowing, although there would undoubtedly be much more in the summer time. The outfall at one time extended well into the current, and although three or four sections of terra cotta pipe had been washed loose the outlet was still below the surface of the water. This dam also serves to divert the water furnishing power to pump the Dick's Run water from Swarthmore College.

The present public borough sewer system was installed about eighteen hundred and ninety-eight. It was designed by and put in by contract under the direction of William Easby, Jr., of Philadelphia.

The system is said to now include about thirty thousand four hundred feet of eight inch pipe (although a small proportion of this may be six inch), nine thousand nine hundred feet of ten inch in the collecting sewers and about two miles of twelve inch and one mile of fifteen inch pipe in the outfall sewer extending down the valley of Crum Lynne Creek and one thousand feet down Crum Creek valley to the outlet to tide water in Crum Creek. The present borough engineer, Robert P. Green, reports that none of the grades in the collecting system are less than five-tenths per cent. Manholes are well distributed throughout the system, there being very few, if any, intervals between adjacent ones exceeding eight hundred feet, while most of them are shorter. The perforated covers are provided with dirt buckets.

The two main sewers of the collecting system join in a manhole at the beginning of the outfall sewer in the valley of Crum Lynne Creek within fifty feet of the creek and in the southeastern corner of the borough. There is also a pipe connection (probably fifteen inch), from the creek to this manhole, through which the outfall sewer may be flushed with creek water either by damming the stream or at times of flood in the creek. About two miles below this point, just above the crossing of the creek and the sewer under the Baltimore and Ohio Railroad tracks where the sewer is below the normal flow in the creek, a similar flushing pipe connects a manhole with the creek. This connection has been effectually cemented up.

For a part of its length the outfall sewer extends through Ridley Park borough and at least two wye connections have been built in manholes with the idea of perhaps providing sewerage for part of Ridley Park. However, no agreement has ever been reached and these wyes are unused and apparently effectually sealed. Below Ridley Park the fifteen inch sewer commences, probably because of flatter grades, but also with a view to providing for the sewage of Ridley Park.

Clarence Deshonts, of Media, owns the property through which about the last half mile of the outfall sewer extends, and on which is the outlet in Crum Creek. The original agreement made under bond given by the borough to Deshonts provided that the sewer should be extended to the Delaware or at least beyond Deshonts' property within five years. Such extension was never made and Deshonts brought suit for damages and was awarded five thousand dollars about five years ago.

The outfall sewer from near its upper end to below Ridley Park is, with the exception of one or two short stretches below the level of the flow in Crum Lynne Creek. Below Ridley Park the sewer has been kept above the creek, at one place probably by as much as fifteen feet. Within three or four hundred feet of the outfall it falls at a considerable grade and then in a drop manhole and extends thence through low, flat ground to the outfall. The sewer was probably designed and laid at a considerable elevation above the creek up to this last sudden drop, with the idea of providing sufficient fall for a disposal plant or for extending the sewer to the Delaware River.

On February the twenty-fifth, nineteen hundred and eight, there was a flow at the beginning of the outfall sewer probably slightly increased by ground water, at a depth of about one-fourth of the sewer. Down stream the flow was evidently augmented by ground water though not very greatly, considering the location of the sewer. At but one manhole among the many looked into was there any evidence of the entrance of ground water. The flush pipe from the creek to the beginning of the outfall sewer, although above the normal height of the creek, was said to have been sealed. However, this had become open and apparently high water in the creek eight or nine days before the Department's inspection has caused an excessive flow of considerable duration in the sewer from this flush connection. Whether deposited by this storm flow from the stream or by some previous excessive flow from some cause, the benches (level) in the manholes were apparently covered with silt and on one or two places flow in the sewer was more or less obstructed as evidenced by retarded flow at a greater depth than half the diameter of the sewer in the manholes above these points. At one point about a mile below Swarthmore, where the sewer has a steep grade above and a flatter one below, a manhole had overflowed recently, spreading sewage deposits on the farm land around it for a radius of perhaps twenty feet, the flow having apparently extended to Crum Creek. Just above Ridley Park the sewer crosses Crum Lynne Creek several times in cast iron pipe supported on stone piers above the normal flow of the creek. Manholes with tight covers have been provided at frequent intervals along the outfall sewer. The entire system is said to have been carefully constructed and this is apparently the case.

The outfall through a cast iron pipe supported in masonry is into Crum Creek, a short distance below the junction of the latter with Crum Lynne Creek and at a point perhaps half a mile below the furthest point up the creek where tidal effects are noticeable and about half a mile above where Crum Creek takes its course through tidal flats and nearly a mile above the mouth of Crum Creek in the Delaware River. The average tidal variation at the sewer outlet is six feet. The outlet is above normal tide, but is said to be covered by unusual tides.

Ventilation of the Swarthmore sewers is provided for solely by perforated manhole covers throughout the borough, there being no ventilation of the outfall. House connections are put in with main soil pipe traps required by borough ordinance. These ventilating manholes are complained of more or less as nuisances, especially in the higher parts of Swarthmore.

Roof water is by ordinance not allowed to be discharged to the public sewers. In a few urgent cases, special permission has been granted for the connection of cellar drains to the borough sewers.

A borough ordinance requires house connections to be properly made so as to avoid, as far as possible, the introduction of ground water.

There are practically no privies in the borough. About twenty-five cesspools remain in use. It is reported that there were at one time many more, the remainder of which have been abandoned for the sewer system inasmuch as the cesspools did not indefinitely dispose of the sewage by percolation, but required frequent cleaning.

The public water supply is furnished by the Springfield Water Company, taken from Crum Creek two miles above Swarthmore and subjected to mechanical filtration and is said to be available to all the dwellings in Swarthmore. But very few wells are left. The typhoid rate is said to be very low, but records are not on file in the Department.

Crum Lynne Creek has not the appearance of being grossly polluted anywhere throughout its course. Such of Ridley Park's sewers as used to empty into it are now intercepted. However, there are one or two privies over the bank of the creek and its waters are slightly more turbid below Ridley Park than above. Its course is entirely through farm lands and much of it through wide, swampy bottoms.

Crum Creek, as already mentioned, flows comparatively pure almost to Swarthmore, where it is somewhat polluted by paper factory wastes and very noticeably by

dye wastes (perhaps not otherwise objectionable than in discolorations), and is then further polluted by gas house wastes and sewage.

Below Swarthmore, on both banks of Crum Creek, is the village of Avondale. Here are ten or fifteen houses and a stone quarry. Most of the privies are directly over the stream. The quarry is actively operated here, the outlet being via a branch (not otherwise used) to the Baltimore and Ohio Railroad, crossing the creek a mile and a half below. Down stream, about a mile below Avondale, are located in succession the villages of Millmont, West Ridley Park, Fairview and Leiperville, all east of Crum Creek and a little distant from its banks. The last named village is just above the Maryland Division of the Philadelphia, Baltimore and Washington Railroad. The settlements consist of the homes of laborers employed at the various works along the Maryland Division of the Philadelphia, Baltimore and Washington Railroad and the Chester Branch of the Philadelphia and Reading, which is still nearer the river. There are but two or three houses anywhere near Crum Creek between the river and the Maryland Division of the Philadelphia, Baltimore and Washington Railroad. The Baldwin Locomotive Works have a branch works, employing about two thousand five hundred hands, and located southwest of Crum Creek between the Reading and the Philadelphia, Baltimore and Washington. The works are said to be completely sewered to Crum Creek through two outlets, one below and one above the Swarthmore sewer outlet. A quarter of a mile below the latter just above where Crum Creek crosses under the Philadelphia and Reading and enters the tidal flats is the outlet into Crum Creek of the outfall sewer from the Principal sewerage system of Ridley Park. This is about a fifteen inch pipe. Ridley Park is said to also have some sewers emptying into Stony Creek, a tributary of Darby Creek.

The lower part of Crum Creek, as far up as its current is effected by the tide, is foul in appearance and is said to give off more or less foul odors during warm weather. At the time of the Department's inspection, when the tide was out, the sewage from the Swarthmore outlet was noticeable in the stream for perhaps one hundred feet, but it did not seem to add materially to the polluted condition of its waters.

Swarthmore borough purposes to make a petty extension to its existing sewer system on Chester Road in the extreme northwestern part of the borough and to build a lateral on Dartmouth Avenue to provide sewerage facilities to houses recently constructed. Proposals have been received for the construction of these eight inch sewers. The borough also proposes to make future extensions to the sanitary sewer system from time to time as necessity may require.

It is noted that the borough authorities have been very progressive in the adoption and construction of a modern sanitary sewer system and the local authorities are to be complimented for the foresight exercised in this important public improvement. The sewers seem to be maintained in good condition and the extensions from time to time are consistent with good public policy.

Before the installation of sewerage, the method of disposal in individual cesspools had become irksome by reason of the frequent cleaning out and the cost incident to their maintenance; also because of the fact that the final disposition of the excrement removed from the cesspools was no easy problem. The working of the existing sewer system has been satisfactory.

At the present time it is reported that the assessed valuation is about one million five hundred thousand. The municipal debt is reported to be about eighty-six thousand dollars. If these figures be correct, then the borough's borrowing capacity is less than twenty thousand dollars, a sum insufficient to defray the cost of the erection of sewage purification works.

A population of about fifty thousand in the city of Chester and its suburbs is now supplied with drinking water, filtered, derived from the Delaware River. This supply is polluted by the sewage of Swarthmore and Ridley Park boroughs and by the succession of boroughs in Darby Creek valley and by the sewers in the city of Philadelphia. The Crum Creek outlet is less than two miles distant from the intake of the city of Chester water works. In carrying out the provisions of the State law providing for the preservation of the purity of the waters of the State for the protection of the public health, the Commissioner of Health has notified the chain of municipalities in Darby Creek valley and also the city of Philadelphia and the city of Chester that other methods of disposal of sewage than into the streams must be brought about. No discrimination in favor of Swarthmore borough should be expected or given, but the State Department of of Health would not be justified in demanding the purification of the sewage of Swarthmore in advance of the treatment of the sewage of Ridley Park borough. Both of these places would find it most efficient and economical to erect joint purification works somewhere along the line of their existing outfall sewers.

The sewage discharged from the Swarthmore College and from the Preparatory School and the waste waters from the gas house and from the industrial plants should all be intercepted and kept out of the stream and properly disposed of, preferably in the public sewer system.

The part of the borough draining into Crum Creek has not been publicly sewered. Unless the borough shall, within a reasonable time, take up this problem and provide for the interception and collection of all of the sewage in this district and for its pumping over into the area tributary to the present outfall sewer, or provide some

other plan for the proper collection and disposition of the sewage, the Commissioner of Health will be obliged to proceed against the owners of the existing private sewers.

Some complaint has been made about the poor ventilation in the public sewers. It appears that in the higher portions of the town sewer gas collects and passes out through the perforated manhole covers to the annoyance of a few people and possibly of passersby. This poor ventilation may be attributed possibly to the running traps which are placed on the house connections between the house and sewer. Poor ventilation in the common sewers in the streets has been noted in other places where traps on house connections are provided. A very good remedy would be to remove the main traps on house connections, especially in the higher parts of the town, and to provide an untrapped pipe from the main sewer to the projection of the soil pipe above the roof of the house. This would afford free access and stop any accumulations of gas. On each floor of the house any fixtures connected to the main soil pipe would, of course, be trapped. This system is quite universally in use where sanitary sewers are constructed.

It has been determined that the interests of the public health will be subserved by granting a permit to the borough of Swarthmore, and a permit is hereby and herein granted therefor under the following conditions and stipulations:

FIRST: Complete plans of the present sewer system showing sizes and grades of locations of manholes shall be prepared and filed in the office of the Commissioner of Health, and at the close of each season's work, plans and profiles of the sewers built during the year shall also be filed with the Commissioner of Health, together with any other information in connection therewith that may be required.

SECOND: On or before the first day of May, nineteen hundred and nine, the borough shall, either independently or in conjunction with the borough of Ridley Park, prepare plans for sewage disposal works and submit the same with items of cost for treating all of the sewage of the borough to the Commissioner of Health for approval. Such plans will be modified, amended or approved, and a time fixed for the erection of the works, having in mind the policy of the State with respect to other municipalities in the territory.

THIRD: The borough shall prepare plans for the sewering of the territory within its limits tributary to Crum Creek with a view to intercepting the sewage now being discharged into the waters of the State in said area and submit these plans to the Commissioner of Health for approval on or before May first, nineteen hundred and nine. Failure on the part of the borough so to do, however, will not constitute a violation of the requirements of this permit, but will be construed as the exercise of a choice herein offered the local authorities, whereby if the borough so elects, the Commissioner of Health will proceed against the owners of all sewers in said district now discharging into Crum Creek within the borough limits.

FOURTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the sewer system, or any part thereof, shall become a nuisance or menace to the public health, then such remedial measures shall be adopted as the Commissioner of Health may advise or approve.

The President of Swarthmore College and the President of the Swarthmore Preparatory School and the owners of the other sewers in that part of the town will be notified that, provided plans are not furnished by the borough for the interception of the sewage from their properties, which sewage is now going into the waters of the State, then the Commissioner of Health will be obliged to compel the owners of said private sewers to discontinue the discharge of sewage into the waters of the State preferably by the preparation of the plans for an intercepting sewer down the valley to connect with the main borough outfall.

Harrisburg, Pa., August 25, 1908.

TARENTUM, ALLEGHENY COUNTY.

These applications were made by the borough of Tarentum, Allegheny County, Pennsylvania, and are for permission to extend its sewer system and to discharge the sewage therefrom into Bull Creek and the Allegheny River within the limits of the borough.

The borough of Tarentum is a growing, manufacturing place of upwards of seven thousand people, located on the west bank of the Allegheny River about twenty-one miles above Allegheny City, bounded on the north by the borough of Brackenridge and on the west and south by East Deer Township. Below Tarentum, in the township along the river, are the villages of Creighton, Hites and Glassmere.

Above Brackenridge, in Harrison Township, is the large village of Natrona.

Along the river, paralleling it, is a ridge three hundred feet or more in height with precipitous sides in some places. At Tarentum the slopes are not so steep as to prevent their occupation by dwellings. Some of the residences of the boroughs are on the summit.

A stream by the name of Bull Creek cuts through the ridge in the borough and empties into the Allegheny River in the south central part of Tarentum. The district north of this creek is the business and principal section. The district south of the creek is more hilly and the slopes steeper.

The West Penn Division of the Pennsylvania Railroad follows the foot of the slope about one thousand feet from the river in the north district, but it is only half of this distance from the river in the south district, the intervening land in both being comparatively level, and about thirty feet above the river.

Bull Creek passes to the river in a deep, narrow gorge quite level, the bottom lands being subject to overflow by the creek itself and back flood from the river.

There are three extensive industrial plants. Two of them are on the bank south of Bull Creek. The first is the works of the Tarentum Paper Mills employing one hundred and fifty hands, and the second is the plant of the Pittsburgh Plate Glass Company employing about five hundred hands.

Near the Brackenridge borough line is the plant of the Flaccus Glass Company, where are employed between three hundred and five hundred people. The water supply at this place is taken from the river for industrial purposes and from drilled wells for drinking purposes. A part of the sewage is emptied into the public sewer system and part through the company's private sewer to the river.

The drinking water at the paper mill comes from a drilled well cased off to bed rock. The water used in manufacturing is taken from the Allegheny. There are four private sewers from the works to the river. Sanitary sewers taking closet drainage are fourteen inches and eighteen inches in diameter respectively. The trade wastes are conducted in a twenty-four inch pipe and an eighteen inch pipe. Spent solutions of chloride of lime and soda are discharged into about two million gallons of water each day and passed through sewers into the river.

The drinking water at the Plate Glass Works comes from a dug well about twenty-five feet deep. The privies used by the workmen are erected on the banks of the Allegheny and the creek directly over the stream. The trade wastes are discharged into the river through a twenty-four inch pipe and an eighteen inch pipe. The waste water contains some oxide of iron and muriatic acid.

There are a number of springs outcropping on the slopes which in times past furnished drinking water to the citizens. Domestic wells are not uncommon, and it is reported that there are over two hundred and fifty now in use.

The public supply is furnished by the Tarentum Water Company operated by the Allegheny Water Company and the district comprises the boroughs of Tarentum and Brackenridge and the villages in Harrison and East Deer Townships. The pumping station is located on the river bank in the central part of Brackenridge. Formerly the water was pumped from the river into a reservoir at the summit of the hill, from whence it flowed by gravity to the consumer. Typhoid fever cases were numerous and in nineteen hundred and seven the Commissioner of Health notified the company that its supply was prejudicial to public health and that the water must be filtered. Plans for a mechanical filter plant were submitted and on September sixth, nineteen hundred and seven, they were approved and the purification plant has been erected. The sewers of Natrona village discharge into the river at a point a little over a mile above the water company's intake. The sewage from industrial plants in Harrison Township also discharges into the Allegheny above said intake. The physicians and health officers have urged the consumers to boil the water, but this was not generally done. Even now, with a filtered supply assured, the menace exists because a filter plant is not germ proof and is liable to a breakdown, in which event the sewage polluted water might be introduced into the homes of the water consumers.

From January first, nineteen hundred and five, to August first, nineteen hundred and seven, there were known to have occurred five hundred and seventy-eight cases in the water district, of which two hundred and ninety were in Tarentum. During the first seven months of nineteen hundred and seven, there were eighty-six cases in the borough. As the disease is largely a water borne one, and the public supply was known to be dangerous, the conclusions must be that the larger percentage of cases originated primarily from the poisoned public water.

Tarentum has a municipality sewerage system whose facilities are very generally availed of, but the discharge of kitchen drainage finds its way to the street gutters. Extensions to the sewers have been made without State approval.

The public sewers are built on the combined plan. Whatever natural water courses may have led to the river have been closed up and supplemented by the sewers which take surface drainage and sewage. There are six outlets, two of them are into the Allegheny below Bull Creek and the other four are into the river above the creek. They are all thirty inches in diameter except the one in Locke Street, which is twenty inches in diameter. Mentioned in order up stream from the southerly borough line, they are as follows: West Alley, West Sixth Avenue, Ross Street, Locke Street, Allegheny Street and Main Street.

The thirty inch West Alley sewer extends across the flat under the railroad to Alley Number One, from whence it is twenty-four inches to the end. The lateral sewers have diameters ranging from fifteen inches to eight inches. Their lengths and sizes are shown as follows: Eight hundred and thirty feet of thirty inch, twelve hundred feet of twenty-four inch, seven hundred and seventy feet of fifteen inch, fourteen hundred and ten feet of twelve inch, three hundred and ninety feet of ten inch, and twenty-four hundred and eighty-five feet of eight inch, making a total of seventy hundred and eighty-five feet.

The thirty inch West Sixth Avenue sewer discharges into a low swampy place and ditch leading to the river. Just below the works of the Plate Glass Company, it passes under the railroad and thence northerly in West Sixth Avenue to the foot of

Center Street. Up Center Street there is a submain beginning with a twenty-four inch and ending with a fifteen inch pipe at the hill summit. Into this submain, empty branches from either side in each cross street. The lengths and sizes of the sewers are shown as follows: Nine hundred feet of thirty inch, two hundred and fifty feet of twenty-four inch, three hundred and eighty feet of twenty inch, three hundred feet of eighteen inch, twenty-one hundred and fifty feet of fifteen inch, six hundred feet of ten inch, three hundred and fifty feet of nine inch, fifty-four hundred and twenty feet of eight inch, making a total of ten thousand three hundred and fifty feet.

The thirty inch Ross Street sewer terminates at the railroad where there is a twenty-four inch overflow into Bull Creek. The submain then continues on up the hill in Ross Street to the summit where it is fifteen inches in diameter, thence northerly in East Tenth Avenue on the ridge to the borough line where the pipe is eight inches in diameter. The lengths and sizes of sewer tributary are shown as follows: Eight hundred and fifty feet of thirty inch, five hundred and thirty feet of twenty-four inch, two hundred and fifty feet of eighteen inch, ten hundred and seventy feet of fifteen inch, seventeen hundred and twenty feet of twelve inch, nine hundred and eighty feet of ten inch, six hundred and eighty feet of nine inch and twenty hundred and fifty feet of eight inch, making a total of eighty-one hundred and thirty feet.

The twenty inch Locke Street sewer extends from the river under the railroad to East Sixth Avenue and thence by an eighteen inch, reducing to ten inches at the summit, it extends in the street up the hill, receiving the flow from the laterals in the cross streets. The lengths and sizes of the sewers tributary to this outlet are as follows: Eleven hundred and seventy feet of twenty inch, twelve hundred and fifty feet of eighteen inch, eleven hundred and fifty feet of fifteen inch, twenty-two hundred and ten feet of twelve inch, two hundred feet of ten inch, seven hundred and sixty feet of eight inch, three hundred feet of six inch, making a total length of seven thousand and forty feet.

The thirty inch Allegheny Street outlet receives the flow from some laterals on the flats and terminates at the railroad. Underneath the tracks is laid a twenty-four inch cast iron pipe which takes the flow from a twenty inch sewer serving the hillside streets in which the pipes are of the smaller sizes. The lengths and sizes of the contributing sewers are given as follows: Nine hundred and fifty feet of thirty inch, eighty feet of twenty-four inch, three hundred feet of twenty inch, four hundred feet of eighteen inch, fourteen hundred and sixty feet of fifteen inch, thirty-three hundred and thirty feet of twelve inch, nine hundred and forty feet of ten inch, forty-one hundred and seventy feet of eight inch, making a total of eleven thousand six hundred and thirty feet.

The thirty inch Main Street outlet also terminates at the railroad, where there is a connecting twenty-four inch cast iron pipe under the tracks. It serves a very small district west of the railroad. Most of the present laterals are on the flats and the contributing sewers are shown as follows: Eight hundred and fifty feet of thirty inch, ninety feet of twenty-four inch, fifteen hundred and thirty feet of twelve inch, seven hundred and sixty feet of ten inch, twenty-five hundred and ten feet of eight inch, making a total of fifty-seven hundred and forty feet.

It may thus be seen that there are about nine and one-half miles of sewers existing, of which seven and one-half miles approximately have diameters of fifteen inches or under. The large sewers begin at the foot of the hillside slopes and carry the water underground to the river. The outlets are stretched along at about equal intervals for a distance of a mile on the river front.

The petitioners have submitted a blanket application which provides for sewers in practically all unsewered districts of the town and in general the conditions in these districts are unsanitary. First Avenue, which is the highway in the north and along the river front, does not now have a sewer in it. There are many dwellings thereon having individual sewers to the river. The borough purposes to lay an eight inch sewer in this street. The outlets will be into the existing river outfalls.

The petitioners are desirous of paving East Eighth Street and wish to lay an eight inch sewer therein and the connecting sewer in Main Street. The work of sewering the other streets, as indicated on the plans, is to be done from time to time as necessity may demand it. Extensions comprise a total of eleven thousand six hundred and ninety-six feet of eight inch, two hundred and ninety feet of ten inch and thirteen hundred and sixty-five feet of twelve inch.

A new outlet is proposed into Bull Creek for a small district in the valley above the railroad bridge. The pipes are to be eight inches in diameter and have a total length of twenty-eight hundred and eighty feet.

If reports be true, the municipal borrowing capacity is in the neighborhood of one hundred thousand dollars. So Tarentum is in a position to take up the question of discontinuing the discharge of sewage into the river. This stream is the permanent source of supply of water to the public in a populous and growing district. The interests of the public health demand, and the General Assembly has declared it to be the policy of the Commonwealth, to bring about the preservation of the purity of the waters of the State for the protection of the public health. It is essential that the State authorities should approve only such sewerage plans as contemplate this end. It would not be feasible for Tarentum to assume the expense of treating and purifying mingled sewage and storm water. It is the poisons from the human body which infect the public waters and make them dangerous to drink. It is reasonable when these poisons are conveyed away from the premises in pipes carrying waste

water used in the household only, to handle the volume of water in purification works. Fortunately, the present sewer system of the borough can be revised and arranged to exclude the greater part of the storm water, and a comprehensive plan for a practicable separation of sewage and storm water and the incorporation of as many existing sewers as feasible into the improved sewerage system should be worked up at once, together with the plans for the treatment of the sewage. After such a plan shall have been approved and adopted, the borough may then, with prudence and economy, build a sewer in any street in conformity with this plan with the assurance that the work is being permanently done.

There is no physical evidence of a boundary between Tarentum and Brackenridge. The latter borough wishes to extend its sewers. The village of Natrona has been denied a right to extend sewers and to discharge the sewage into the Allegheny, but plans for a purification plant have been called for. Undoubtedly a joint intercepting sewer and sewage disposal plant for the three communities would be financially advantageous to each and the authorities of Tarentum might well give this suggestion careful consideration.

Within the borough the possible pollution of existing domestic supplies of water should be looked into and wells or springs liable to contamination should be abandoned or the menace removed, if this be possible.

Not only have the sewers been extended illegally, but the local authorities did not avail themselves of the exemption clause of the Act number one hundred and eighty-two of nineteen hundred and five, in consequence of which the borough is privileged to pay the penalty for rendering impure and prejudicial to public health a stream used immediately below as a source of drinking water by hundreds of thousands of people. It is not to be supposed that an enlightened municipality would elect to continue so detrimental a practice if ways and means be at hand whereby a change may be effected to the satisfaction of all concerned, but to arrive at a wise conclusion, plans and estimates of cost are the first requisites.

The laying down of sewers in advance of street paving is good business policy and such plans warrant approval. It does not appear, however, that elsewhere in the borough the demands are so pressing as to overbalance the broader considerations of public health.

It has been determined that the interests of the public health will be subserved by granting a permit for the sewers in the streets hereinbefore mentioned where paving is to be immediately done and that temporarily a permit be withheld for the other sewers under the following conditions and stipulations:

FIRST: That on or before August first, nineteen hundred and eight, the borough prepare a comprehensive plan for the collection and purification of the borough sewage, the plan to include not only the districts which are now sewered, but all of the municipal territory, which plans shall be submitted to the Commissioner of Health for approval.

SECOND: Storm and roof water shall be excluded from the sewers herein approved.

The local authorities should be requested to examine all private wells or springs and that each one of the wells or springs be condemned and put out of use if found to be contaminated or liable to pollution.

The attention of the local authorities is especially called to the advisability and advantages of co-operating with the proper local authorities of Natrona and Brackenridge in the study of the interception and treatment of the sewage of the district.

The Department of Health will be glad to confer with the local authorities at an early date to be mutually agreed upon.

The Township Commissioners of Harrison will be notified of the action which the Governor, Attorney General and Commissioner of Health has taken with respect to the sewers of Natrona and the said commissioners will be ordered to prepare plans for the treatment of the sewage of Natrona village and submit the same for approval on or before August first, nineteen hundred and eight. The borough of Brackenridge will also be required to submit plans for sewage purification on or before August first, nineteen hundred and eight.

Harrisburg, Pa., May 26th, 1908.

THORNBURY TOWNSHIP, DELAWARE COUNTY.

House of Refuge of Eastern Pennsylvania.

This application is made by the Board of Trustees of the House of Refuge of Eastern Pennsylvania located in Thornbury Township, Delaware County, Pennsylvania, relative to sewerage and sewage disposal, and for approval of plans therefor.

It appears that the House of Refuge of Eastern Pennsylvania, originally known as the House of Refuge of Philadelphia, was organized in eighteen hundred and twenty-six as a private corporation, and in eighteen hundred and eighty-nine the Legislature authorized the house to move to another county. Since then it has been located in Thornbury Township, Delaware County, near Glen Mills Station (distant from Broad Street Station, Philadelphia, twenty and thirty-two hundredths miles) on the Philadelphia, Baltimore and Washington Railroad.

In nineteen hundred and six a manager of the House of Refuge donated to it a farm of about one hundred acres for the purpose of establishing a Girls' Department, and, in consideration of this fact, the State, in nineteen hundred and seven,

appropriated one hundred and twenty-five thousand dollars for the purpose of erecting and furnishing cottages, etc., as provided for, Act number four hundred and ninety-eight, approved June thirteenth, nineteen hundred and seven, which reads as follows:

"Whereas, There has been donated by one of the managers of the House of Refuge, situate in the Eastern District of Pennsylvania, a farm of one hundred and one acres, more or less, for the purpose of enabling the Girls' Department of that institution to be removed to the country, where the benefits to be derived from life in the open air and contact with nature can be enjoyed and the cottage system more thoroughly carried out:

"Section 1. Be it enacted, &c., That the sum of one hundred and twenty-five thousand dollars ($125,000), or so much thereof as may be necessary, be and the same is hereby specifically appropriated to the House of Refuge for the purpose of defraying the expense of erecting and furnishing cottages, and such other buildings as may be necessary for the accommodation of the Girls' Department in the country, on the farm already donated to the institution for that purpose. On condition, however, that the officers of the institution provide an equal amount."

This farm is located about one and three-quarters miles to the east of the present House of Refuge and lies partly in Edgemont and partly in Middletown Township at the intersection of Mendenhall and Forge Roads. The farm is in the shape of the letter "L." It extends northwesterly along Mendenhall Road for the distance of about twenty-nine hundred feet from Forge Road and northeastwardly along Forge Road for the distance of about eleven hundred and fifty feet from Mendenhall Road. The extreme depth of the property is about nineteen hundred feet in a northeasterly direction at right angles to Mendenhall Road.

Along the northeastern boundary there flows through the farm, in a southerly direction for the distance of about nine hundred feet, a small stream known as Rocky Creek, a tributary of Chester Creek. The ground along Mendenhall and Forge Roads is from fifty to ninety feet above the water in Rocky Creek and, with the exception of perhaps eight or ten acres, the entire farm drains naturally to the creek. However, all of the farm lies on the watershed of Chester Creek. The natural drainage is taken by three depressions in the surface of the ground running parallel and in an easterly direction from Mendenhall Road.

It is proposed to lay out this property for the purposes of the institution by running a road or main driveway in a southeasterly direction and paralleling Mendenhall Road for its greater length, but curving first to the east and then to the west as it approaches Forge Road, where is to be the main entrance to the distance of one hundred and fifty feet northeastwardly from Mendenhall Road. This entrance is directly opposite the continuation of Mendenhall Road to the southeast, leading to Darlington Station on the Philadelphia, Baltimore and Washington Railroad. A curved driveway laid out from this main driveway is projected to the east to gain access to the other parts of the property.

To the northeast of the main driveway, approximately in the center of the property, there are now under construction two cottages to be known as number seven and number nine. It is the expectation that the cottages will be completed by January first, nineteen hundred and nine. They will provide for a population of thirty-three each, which includes inmates, overseers and servants, and make a total population, at the beginning, of sixty-six.

It is expected that two more cottages will be constructed within the next six months which will provide for an additional population of about ninety. These cottages will be located on the high ground about eight hundred feet to the north of those now under construction. Each cottage is to be furnished with the necessary toilets, bathrooms, kitchens, laundry, etc. No rain or surface water is to be taken into the sewers and the sewage therefore will be domestic sewage.

The plans show the location near the cottages now under construction of certain buildings, all of which will be demolished and not any of them form a part of the new cottage system.

About seven hundred feet to the north of the proposed sewage disposal plant and about one hundred and fifty feet west from Rocky Creek an artesian well is now being drilled. It is expected that water will be found somewhere in the neighborhood of three hundred feet below the surface. At the present time the well is but seventy-five feet deep. Its diameter is eight inches and it is cased from the top with wrought-iron pipe. The water is to be pumped by an electrically driven well pump into an iron tank, set at an elevation of about one hundred and fifty feet above the surface of the ground. The water is to be used for domestic and fire protection purposes.

The consumption of water at the beginning will probably be from six to ten thousand gallons in twenty-four hours, and at the end of six months, when the fourth cottage is completed and the population is one hundred and sixty people, the water consumption will probably be from sixteen to twenty thousand gallons in twenty-four hours.

It is the intention of the managers of the House of Refuge to have ready for use the disposal plant as soon as the cottages now under construction are ready for occupancy. The general scheme of this plant, as laid out by the engineers, is to pass the sewage without screening into a septic tank, thence to the bacteria beds operated on the draw and fill plan and to further purify the effluent by finally passing it through sand filters.

There is, of course, some difficulty in designing a plant of sufficiently flexible capacity to provide for the increase in the quantity of sewage, which will necessarily result, as the new buildings under contemplation are erected, fitted and occupied during the next few years, and for this reason the plans call for units of small area.

The drainage from the entire group of buildings is to be taken by a six inch terra cotta pipe sewer, the main stem of which follows approximately the middle depression in the natural surface already noted, and runs in an easterly direction to the disposal plant. Another branch connecting with the main branch at the distance of about five hundred feet from the sewage disposal plant runs to the north and west and will take the drainage from the two cottages which are to be constructed during the coming year. The pipe is to be laid in a straight line with uniform grades between inspection manholes, which are to be located at all angle points. The minimum fall is one foot in one hundred feet. In all, one-half mile of sewers are to be laid.

The sewage disposal plant is to be located about two hundred feet west from the most eastern extremity of the property on ground sloping to the east, having an approximate fall of ten feet in one hundred feet, and about one hundred and fifty feet from adjoining properties to the east and south. To the east and south of the proposed plant are farms, but no buildings other than those on the property of the House of Refuge are within one thousand feet of this point and the nearest cottage will be four hundred feet to the west of the plant. The plant will be within about one hundred feet of Rocky Creek, which is a small sluggish stream having a width of perhaps five feet at the present stage of the water, and an estimated flow in dry weather of one and one-quarter cubic feet per second. It flows through farming and grazing land to the east and south until it empties into Chester Creek about half way between Darlington and Wawa Stations on the Philadelphia, Baltimore and Washington Railroad.

As far as is known, the water of the creek is not used for domestic purposes. The location chosen is the most available within the limits of the farm.

The plans provide for a septic tank, rectangular in plan, twenty feet long by seven feet deep by eighteen feet wide (inside dimensions). The side walls are vertical, eighteen inches in thickness, of reinforced concrete. The floor also is of concrete about nine inches in thickness. The tanks are to be covered by a wooden gable roof, not shown on plan. The entire tank is divided into three compartments having a width of three feet, six feet and nine feet, respectively, and having capacities of thirty-one hundred and fifty, sixty-three hundred and ninety-four hundred and fifty gallons respectively, making a total capacity of eighteen thousand nine hundred gallons. At the outset, by using the smallest compartment only, with a flow of sewage amounting to perhaps seven thousand gallons in twenty-four hours, there would be a detention in the tanks of about twelve hours.

Across the inflow end of the tanks the plans provide for a sewage carrier having a width of eighteen inches and a depth of about two feet. The flow from this carrier to the several compartments of the tank is controlled by iron sluice gates set in the walls of the tank which may be opened or closed by hand, making it possible to use any one, any two, or all three of the compartments at the same time. Baffle boards are to be set at right angles to the direction of the flow, every two feet, alternately from the floor up and from the top down, the overlap being one foot.

Across the effluent end of the septic tank there extends another sewage carrier having a width of eighteen inches and a depth of about two feet and the flow of it is controlled by sluice gates. From this sewage carrier a six inch terra cotta pipe conveys the sewage to a dosing tank about twenty-five feet to the east.

The dosing tank is rectangular in plan having inside dimensions fourteen feet nine inches long by ten feet wide by three feet deep. The side walls are vertical and to be of concrete. The floor is also to be of concrete. The dosing tank is to have a working depth of three feet and will, therefore, take a dose of about thirty-three hundred gallons. It is, however, proposed to reduce the capacity of this tank by laying by hand across the inflow end, stone of sizes varying from four inches to six inches. On the north side of the dosing tank there are to be a series of small chambers in which will be set three syphons discharging automatically in sequence. The syphons are five inches in diameter. The dosing tank is to be provided with pipe valves so that the sewage may be discharged through an outlet pipe onto the bacteria beds without passing through the syphons.

The bacteria beds are six in number, rectangular in plan, each having inside dimensions of twenty-two feet long by fourteen feet wide and a working depth of three feet. The side walls have a width of twelve inches on top with a gradual increase in thickness to twenty-four inches at the bottom. They are to be constructed of concrete. The floor is also to be of concrete.

The filtering material is to be of crushed stone, local trappe rock, of sizes varying from two to four inches. The total depth of the filtering material is three feet six inches and the working depth is three feet. The filtering material is underdrained by three inch tiles laid in parallel rows and collected by a five inch tile running longitudinally and at right angles to the three inch tiles.

The bacteria beds are arranged in batteries of three, set tandem, and the scheme of operation is on the double contact system. The beds are to be filled from the dosing chamber at a point below the surface of the filtering material. Each one

of the first set of three contact beds is to be supplied with a timed syphon which discharges on the bed ahead of it. The idea is to have contact of about one hour's duration.

Assuming that the voids in the filtering material will be about one-third of the total capacity, each bed will hold about twenty-three hundred gallons and at the beginning, unless some of the beds are cut out entirely, each bed will receive a dose of sewage about once in twenty-four hours; but by the end of the year nineteen hundred and nine, with a population of about one hundred and sixty and water consumption of from sixteen to twenty thousand gallons daily, each bed will be dosed about three times in twenty-four hours and then the maximum capacity of the bacteria beds will about have been reached.

Each one of the second set of contact beds is to be supplied with a timed syphon to discharge its contents on the sand beds below. The time of contact and scheme of operation is identical with that of the first contact beds. The dosing tanks and the syphon chambers are to be protected with wooden covers.

The sand filters are three in number, each having dimensions of forty feet long by eighteen feet wide and a total area of twenty-one hundred and sixty square feet, and if operated at the rate of six hundred and fifty thousand gallons per acre per day, will have a capacity of about thirty thousand gallons. The depth of the sand is to be three feet. The side walls are to be earth embankments having a slope of about one and a half to one. The floor is to be in earthen excavation ridged longitudinally and drained by four rows of four inch horse shoe tile which is to be laid in coarse gravel. The distribution over the surface is to be by wooden troughs and the scheme of operation is to use the three sand beds in the same sequence as the bacteria beds. There is, however, provided a gate chamber in the main collector pipe from the bacteria beds in which are set three gate valves, so that the flow of sewage on the sand bed may be controlled at will by hand. The effluent from the sand beds is to be collected from the tile underdrains by a six inch terra cotta pipe and discharged in an inspection manhole at the east corner of the sand beds. From this manhole a terra cotta pipe is to convey and discharge the sewage in Rocky Creek at mid-stream.

About twenty feet to the north of the bacteria beds is to be located the sludge bed, identical in construction with the sand filters, whose dimensions are thirty feet long by twenty-four feet wide, having a superficial area of seven hundred and twenty square feet. Across the inflow end in the bottom of the septic tank there is to be constructed a sludge collecting channel with the forward side sloping from which an eight inch terra cotta pipe leads to the sludge bed. The underdrains in the sludge bed will discharge into a six inch terra cotta pipe which is to be connected with the supply pipe to the sand beds, so that the discharge from the sludge bed will always be subjected to a second treatment in the sand beds.

It is believed that the buildings will be increased within three years so as to provide for a total population of four hundred and fifty and there is no telling what may be done further in the future. For this reason, if for no other, the sewer should be made at least eight inches in diameter.

The location of the bacteria and sand beds is such that extensions to the south can be made which will increase the capacity two-fold and the capacity may be even still further increased by adding more units. After the plant is in operation it may be found necessary to provide for a greater capacity at once in order to secure a good effluent.

The sand filtration rate is too high for successful operation. It is difficult to maintain rates in excess of three hundred thousand gallons per acre daily, or even this amount, and secure good results for any length of time in the intermittent filtration of sewage through sand. The authorities should provide arrangements for the treatment of the contact bed effluent by chemicals and this chemical sterilizing tank should be so located as to be able to receive and treat the sand filter effluent whenever this shall be necessary. It may not be required to use this apparatus at the outset of the operation of the plant, but this depends wholly upon the volume of sewage and the ability of the sand filter to turn out a good effluent.

It has been determined that the Commissioner of Health notify the authorities and the Board of Trustees of the House of Refuge of Eastern Pennsylvania is hereby and herein notified that the plans embody the features of modern and successful sewage purification, that the success of a well designed sewage disposal plant depends upon the attention it receives and the intelligence exercised in the operation. Great care must be exercised that no sewage be by-passed and that the effluent from the plant shall be suitable in all respects, at all times, to go into the waters of the State.

It is the intention of the State Department of Health to watch the operation of the purification works and to take samples for examination at the outlet of the works, and if at any time it is found that sewage is being discharged into the waters of the State, then such remedial measures shall be adopted as may be necessary to prevent such discharge.

The attention of the authorities is hereby called to the fact that the contact beds will store up organic matter and in time the odors therefrom may be manifest a thousand feet distant. To obviate this trouble the beds must be cleaned before the accumulations become very extensive on the beds.

At best disposal works for sewage are a great care and responsibility and their operation must be attended with considerable expense. The suggestions hereinbefore contained, if followed out, must not be considered as relieving the owners of the responsibility of maintaining the sewers and sewage disposal works free of all nuisance and menace to the public.

Harrisburg, Pa., November 6th, 1908.

UNION CITY, ERIE COUNTY.

This application was made by the borough of Union City, Erie County, Pennsylvania, and is for permission to extend its sewer system and to discharge sewage through existing sewers into Little French Creek within the limits of the borough.

Union City borough is a manufacturing community of about four thousand population, located in the eastern central part of Erie County in the center of Union Township. The municipal territory is about one mile square. Little French Creek, or the South Branch of French Creek, as it is some times called, enters the borough from the east and flows northwesterly, passing out of the borough near its northwest corner, practically dividing the village into a northern and southern part.

There is a small tributary to the creek known as Bentley Run which heads about three miles northeast of the borough and flows southwesterly, joins the creek east of the center of the village. This run furnishes the borough's gravity water supply.

There are several spring runs rising in or near Union City borough and emptying into the Creek. Consequently the surface of the ground within the borough limits is well watered. Originally a considerable part of this area was swampy and wet and some of it remains so to this day.

The immediate valley of Little French Creek in the borough is from three hundred to five hundred feet wide while the stream bed is between fifty and one hundred feet wide. Some of the low lands on the banks are swampy and unoccupied. There are other low lands which are built upon and which were originally swampy. They are inundated at times of extreme floods.

The Philadelphia and Erie Railroad, a part of the Pennsylvania system, passes east and west through the borough and in the central part of the village, it is north of the creek. The Erie Railroad, main line, parallels the Pennsylvania Road and is entirely south of the creek. Between these two road beds lies the business section of Union City.

Since eighteen hundred and ninety the town's population has about doubled, due to its industries. The Union City Chair Works Company employs about three hundred people. The Shreve Chair Company employs about two hundred and fifty hands. The novelty Wood Works Company, manufacturing furniture, employs about one hundred and twenty-five people. The Standard Chair Company employs about two hundred hands. There are several other wood working establishments of smaller size.

The water works plant is owned by the municipality. When the Bentley reservoir supply becomes exhausted and for other reasons the town pumps water from Little French Creek at the dam located in the heart of the borough just above main street bridge. The Bentley reservoir watershed contains a rural population. Little French Creek is subjected to sewage contamination. There is an application now before the Department for increased source of supply. The public very generally use the town water. About twenty-five per cent. of the citizens are supplied partly or wholly with drinking water from drilled or driven wells. There are very few dug wells but there are some springs from which individuals obtain drinking water. The Novelty Wood Works Company, the Standard Chair Company and some of the smaller concerns furnish artesian well water for drinking.

The community has been remarkably free from water borne diseases, so it appears. When the source of the public water supply and the unsanitary conditions in some parts of the village are taken into account the conclusion follows that if these conditions remain unaltered it will be a miracle indeed if an epidemic does not result.

Union City borough is partly sewered. No record of the sewers exist. Some of the drains were built by the borough and some by private individuals. The borough Council has granted the privilege in various instances to abutting property owners to lay private sewers in the public highway. Gradually some sewers have been taken over by the local authorities, and at the present time it is reported that all of the sewers are recognized as belonging to and are operated by the borough. The pipes carry storm water, domestic sewage and manufacturing wastes.

There are a number of cesspools in use in the borough and a large number of privies having a pit underneath with earth or loose stone walls. In many instances kitchen wastes and wash water are discharged into open street gutters. Many nuisances were in existence in July when the Department made this inspection. At that time there were fifty-four estates from which drainage was being dis-

charged into the gutter along the streets and highways. Some closets were so drained. Since that time, however, some of this discharge has been discontinued because of the laying of sewers.

The major sources of sewage pollution of the creek are given in the following tables:

MAJOR POLLUTION BELOW MAIN STREET BRIDGE.

No.	Location of Sewer.	Owner.	Size.
1.	Fourth Avenue,	Borough,	12 inches.
2.	Opposite Second Avenue,	Natural water course,	
3.	East High Street,	Borough,	12 inches.
4.	Just above Pennsylvania Bridge,	Johnson House,	20 inches.
5.	Just below Main Street,	Private,	8 inches.
6.	South Street,	Public,	24 inches.
7.	South Main Street,	Private,	12 inches.
	MAJOR POLLUTIONS ABOVE MAIN STREET BRIDGE.		
8.	South Main Street,	Mrs. P. J. Everson,	8 inches.
9.	Crooked Street,	Unknown,	10 inches.
10.	Above dam,	Numerous private sewers,	

The Fourth Avenue sewer is said to be twelve inches in diameter. It is reported that it and its branches belong to the borough. If the Department is informed correctly there is a twelve hundred foot branch in West High Street, a four hundred foot branch in Third Avenue and in the entire district system there is a total length of thirty-five hundred feet. At what grades the sewers are laid is not reported. The borough has failed to comply with the law requiring the filing of plans and report of its sewer system, in the State Department of Health, in spite of the fact that blank forms of report have been sent to the borough officers and some correspondence has passed between the Burgess and other local authorities and the Commissioner of Health. Opposite Second Street at the north bank of the creek there is a natural water course which receives sewage from a public sewer and from numerous individual estates. This stream passes under Perry Street and Waterford Streets and at Perry Street there is a twenty inch storm drain emptying into the run. The pipe belongs to the borough and is laid easterly in the stream to North Main Street where it connects with a twenty inch sewer in Main Street. There are six house connections to this original line. In July at Putman Street, extending easterly from Main Street for two-thirds of a mile there was an inlet to the twenty inch private sewer in Main Street which received the flow of water from the Putman Street gutter or ditch. Into this open ditch either directly or indirectly house drainage from sixteen buildings was discharged at different points along Putman Street. Since July the residents living along Putman Street have laid an eighteen inch sewer pipe in the south gutter from the north side of Main Street and Warden Street and thence to Prospect Street. The line is of fifteen inch pipe. The sewer is shallow and the abutting properties have been connected so that kitchen waste and sewage is no longer discharged into the Putman Street gutter.

Between Perry and Waterford Streets, into the water course three privies drain and also the house drainage from five estates. East of North Main Street into tributaries of the said course two privies are on the bank of a run, two houses drain to a highway, seven dwellings sewer to a run and one manure pile is on the bank of a water course, all within the borough.

On the north bank of the creek about opposite Fourth Avenue, there are three private estates sewered directly to the stream. A residence in this neighborhood is sewered to a small run which flows into the Creek.

The east High Street sewer, built by the borough, is said to be twelve inches in diameter. It empties into the creek on the east bank just below the Pennsylvania Railroad Bridge. It follows the railroad embankment to the highway and thence easterly crossing Main Street to Warden Street. In the latter highway there is a branch eight inches in diameter owned by Jennie R. Cooper and serving four properties.

From Warden Street easterly to near Prospect Street there is a six inch private sewer extension to the east High Street public sewer which is reported to serve four properties. The total length of this system is about two thousand feet according to the information at hand.

The Johnson House sewer begins near Main Street and follows along east of the creek under High Street and empties into the stream immediately below the High Street bridge. It is twenty inches in diameter and connected with it are eleven buildings, including the Hotel.

A laundry and two dwellings have independent sewers to French Creek on the east bank in the vicinity of the railroad bridge and on the opposite bank a six inch sewer to the stream serves two dwellings. They are located on First Avenue.

Just below the Main Street bridge there is an eight inch private sewer to the creek which serves five dwellings on First Avenue and two other residences have a six inch pipe to French Creek. Opposite these outlets, on the opposite bank, there are four six inch sewer outlets to the creek which serve office and store buildings along North Main Street.

The South Street sewer is owned by the borough. It is twenty-four inches in diameter and empties into the creek below the Main Street bridge. It extends westerly on South Street nearly to Fourth Avenue, if the Department's information is correct. A branch of the same size extends southerly across private property about half a block between Second and Fourth Avenues. Here a shallow, open ditch begins, extending under Canfield Street, the Erie Railroad, Atlantic Street and Parade Street. It follows along the rear of the lots on South Main Street south of Atlantic Street and here it receives much sewage. A ditch tributary to this run following the Erie Railroad tracks, easterly beyond Lincoln Street was in a particularly foul condition on the day of the Department's inspection in August of the current year. Its filth was contributed to that in the run being finally gathered into the South Street sewer and discharged therefrom into the Creek.

Into the said Erie Railroad ditch a twenty-four inch sewer from the Standard Chair Company Works empties. In July two hundred hands were employed here, this plant has since been burned down. Into the same ditch a water closet drain emptied from the Novelty Wood Works plant. There was also a privy on the property provided with a pipe vault underneath. Lime is used as a disinfectant and the contents is removed at least twice yearly. Mrs. A. N. Hanson was reported to own a six inch private sewer serving five properties which in July emptied into the said railroad ditch. The Erie Railroad station and the Union City Laundry the latter employing about seventy hands, were also sewered to the railroad ditch. So likewise were three dwellings at the corner of Concord and Nile Streets and three other dwellings south of the railroad. So it appears that the railroad ditch was in July an open sewer. Since then the railroad Company has substituted a fifteen inch pipe in place of the ditch and the sewage described as going into the open channel now flows into the pipe which terminates at the run.

Into the main run above the railroad ditch there are five dwellings fronting on South Street north of Atlantic Street which have independent sewers to the run. There is a dwelling on Atlantic Street in connection with which there is a privy on the bank of the run. D. B. Chapin owns an eight inch sewer serving three properties. The pipe crosses under Parade Street and empties into the run near the school property. Into the Main Street gutter in the vicinity of Parade Street is discharged the drainage from a number of residences and this is true with respect to Atlantic and Center Street also.

The South Street public sewer has a six inch branch southerly across private property to near Concord Street. It serves five properties situated on South Main Street.

J. W. Middleton is reported to be the owner of an eight inch sewer on Second Avenue connecting to the public sewer in South Street. It serves nine properties.

The private sewer owned by Bert Yealy emptying into French Creek just below the Main Street bridge serves four properties.

The South Main Street sewer built by Mrs. Eberson, serves ten properties, including the city hall and high school. A branch on Stranahan Street was built by C. M. Weller. It serves four dwellings.

Crooked Street sewer empties into the creek below the dam on the north bank. It serves several furniture factories, a hotel, bank and dwellings.

The sewage pollutions of French Creek above the dam are a menace to the lives of the citizens of Union City borough. The previous statements relative to sewers and pollutions are believed to be substantially correct in the main. The statement which follows about the pollutions above the dam are based on an investigation by this Department made in the month of November, nineteen hundred and eight.

On the south bank of North Gulf Street, a six inch private sewer owned by Mrs. Mary Brumstetter, delivers bath and kitchen drainage from three dwellings to the creek. In the neighborhood, a short distance upstream, a six inch sewer drain from the Northrop Harbey House into the creek. It is reported to receive closet drainage. A short distance above this Gulf Street Run empties.

Immediately above the Pennsylvania Bridge on a small run near the north bank of the creek there is a privy on the Monroe Bush property and on the Bridget Savage property, or was at the time specified. Kitchen drainage from five dwellings in the vicinity was discharged into the highway gutter.

Along the creek above the mouth of Bently run at Bridge Street is the planing mill of H. Clark & Company, and the flour mills of Hanial Clark & Company, at each of which places there is a privy over the creek or mill race. Also at the residence on the latter property there is a six inch sewer discharging closet drainage into the creek.

Immediately above Bridge Street house sewage is discharged into the creek from three dwellings owned or occupied by E. P. Clark, A. D. Caflish and H. M. Neal, respectively.

On Bentley Run below Willow Street Thos. McMahon has a privy over the stream and at the street on the property of Caflish Brothers, in connection with the

planing mill there is a privy overhanging the abandoned mill race. Fifteen people are employed here.

Into the pond above closet drainage is discharged from the property of W. O. Gates, W. M Hubbell, and Madelin Catlish. Also kitchen drainage from the Andrew Buncomb residence.

Into Bentley Run above the pond closet drainage is discharged on the W. R. Critenden and the John Mixer properties and kitchen drainage from Mrs. J. E. Peters house. These places are not much over half a mile above the dam and public water works intake.

It is proposed by the borough council in answer to an urgent petition from the property owners on West High Street, to construct a twelve inch sewer in this street from the present Fourth Avenue sewer westerly to the borough line, a distance of eight hundred and fifty feet sewage only is to be admitted. The conditions along this street are extremely unsanitary. The soil is clay and hard pan. Many of the basements of the dwellings hold water a great portion of the year. The proposed sewer will afford drainage for the cellars and also sewerage facilities.

Nine occupied estates on the highway demand a sewer. Three new residences have been constructed and three others are contemplated in which modern sanitary plumbing is provided for connection with the sewer.

Little French Creek rises in the city of Corry, ten miles east. Elgin borough is on the stream mid-distant. Two and a half miles westerly of Union City borough is the Junction of the North and South Branches forming the main French Creek and on this stream, about twenty-three miles below Union City borough, is Cambridge Springs borough, from which water is drawn and filtered for public consumption. The intervening territory is farming land and pasturage. French Creek ultimately empties into the Allegheny River at Franklin City. The stream receives the sewage of Cambridge Springs, Saegertown, Meadville City and Franklin. In each instance, excepting Saegertown decrees have been issued requiring the preparation of plans for ultimately discontinuing the discharge of the sewage untreated into the stream. Franklin City draws a portion of its water supply from French Creek. The water is filtered. This municipality is about sixty miles by the stream below Union City borough.

The use of Little French Creek as a source of unfiltered supply to the inhabitants of Union City borough is a menace. Public health demands that the sources of pollution shall be discontinued at once. It is equally true that the discharge of sewage into the stream at Union City borough menaces public health at Cambridge Springs. While natural agencies tend to destroy pathogenic organisms soon after these leave their normal environments, in the animal body, nevertheless, some of these specific poisons may live for many days in water and thus be transported to distant points. Fatal epidemics in the most communities have been caused by such transmission of infection. The State Health authorities cannot accept the situation as protective of public health where it is planned to continue the discharge of sewage into a running stream within twenty-three miles of and above the point where water is drawn for public drinking purposes. And besides, all along the French Creek, above Cambridge Springs, at convenient points the farmers have a right which must be respected, to water their stock in the stream. Sewage polluted water menaces public health where cattle are permitted to wade in and drink contaminated water.

On August first, nineteen hundred and six, the Commissioner of Health sent a letter to Union City Borough Council, the following is a copy of it:

"J. A. Hodgins, President; John Sinnacher, Frank Camp, E. B. Landswarth, Elmer Foster, Clark Rice, members of Borough Council, Union City, Erie County, Pa.

Gentlemen: Your borough is on French Creek and its sewers discharge into it and a few miles below the borough of Cambridge Springs uses this water for a public supply.

You also use French Creek water which is introduced into the pipe system of your borough when the gravity supply is insufficient. This use of the creek water is a menace to your citizens which menace may be materially reduced by a proper attention to the occupation of the watershed.

To the end that selfish interests of the municipalities shall not jeopardize the general public health, a law has been passed placing the oversight of sewerage systems and water works in the State Department of Health. The law requires the filing of plans and reports with respect to these public necessities, and you have been furnished by this Department with blank forms.

"Up to this time you have paid no attention to this matter so far as we know. You have not acknowledged the receipt of the blanks. My Department has use for the information called for and unless you acknowledge the receipt of this letter, expressing your purpose with respect to compliance with the law, I shall consider it necessary to proceed against you and enforce the penalty. I trust this will not be necessary, however, but that as law abiding citizens of the Commonwealth you will extend hearty co-operation since the benefits will accrue to the benefit of the citizens of your borough.

I am, very truly yours,

S. G. (Signed) SAMUEL G. DIXON.

The following copy of a letter addressed by the Commissioner of Health to borough secretary dated August twentieth, nineteen hundred and six, is self-explanatory:

"Thomas Mulvin, Borough Secretary,
"Union City, Pennsylvania.

"Dear Sir: Your letter of August seventh is at hand, and I note that you have not intentionally disregarded the laws of the State and the requirements of my Department, and I am very glad to be informed of this fact; but I must inform you that it is necessary that you submit this information and that it is your business to employ assistance if necessary, in order to submit plans and report. I do not want to put you to unnecessary trouble and there are a great many of the questions in the blank which are not relevant to your case. There are others which are relevant and can be answered approximately.

"You can engage an engineer for a moderate amount of money to prepare a copy of plans of your water works and sewers, if you do not have them already.

"Yours very truly

S. G. (Signed) SAMUEL G. DIXON.

In spite of this correspondence, Union City borough has neglected to file plans and a satisfactory report of its sewers. It would appear that the municipality had purposely chosen to incur the penalty of the law in preference to filing the said plans and report.

On one street in the town, now unsewered, the owners of abutting property wish to secure sewerage facilities. The method of procedure does not differ materially from that of past sewerage extensions in the town and it is seen that necessity is urgent. The present pollution of the creek will not be materially increased by granting this sewer extension and the health of some of the inhabitants may be enhanced and protected. Furthermore, the granting of this sewer extension should in no wise delay the discontinuance of the discharge of the borough's sewage into the waters of the State, which discontinuance, in its entirety, is essential, consequently, it is consistent for the State Health authorities to permit this short sewer extension, under conditions of compulsory treatment by the borough of its sewage at the earliest practicable moment.

The town is engaged in improving its water supply, which is a public necessity. The assessed valuation of property in the borough is seven hundred and eighty thousand, one hundred and forty-four dollars; the bonded debt is thirty-four thousand, four hundred and twelve dollars and twenty cents, and there is authorized a bond issue of seventeen thousand five hundred dollars for water works extensions and other improvements, making a total debt of practically fifty-two thousand dollars, which is within twenty-five hundred dollars of the constitutional limit of indebtedness of the borough at this time, provided these figures be accurate. So it is evident that the town cannot of its own resources, build a sewage disposal plant, but it can defray the cost of plans for intercepting all existing sewer outlets and for a comprehensive system of sanitary sewerage for the entire town and submit these plans for approval to the State Department of Health. After such plans have been modified, amended or approved and adopted, the borough will be in a position to economically and efficiently abate any nuisance or menace requiring improved sewerage facilities and do it in compliance with the adopted plan.

Furthermore, it does not follow, because a borough lacks the necessary money to abate a nuisance, that a public menace shall necessarily be permitted to exist. There are numerous places in Union City where individuals should be dealt with in abating the nuisance. For instance, the individual discharge of sewage into the creek above the dam and water works intake is absolutely impermissible and must be stopped at the expense of the individual. The Department of Health will see to it that orders are issued to this effect.

It has been determined that the interests of public health will be subserved by granting a permit for said sewer extension in West High Street, under the following conditions and stipulations:

FIRST: That the right to use this sewer and to discharge sewage therefrom into the waters of the State should cease on May first, nineteen hundred and nine. Provided on said date the borough shall have complied with the other terms of this permit, then the Commissioner of Health, with the approval of the Governor and the Attorney General, may extend the time in which sewage shall continue to be discharged into the waters of the State, having in mind the policy of the Commonwealth with respect to the discharge of sewage of other municipalities into French Creek.

SECOND: On or before May first, nineteen hundred and nine, the borough shall prepare an accurate plan and profiles of the existing sewers and for a comprehensive system of sanitary sewers and for sewage purification works and submit the same to the Commissioner of Health for approval.

Harrisburg, Pa., December 4th, 1908.

UPLAND, DELAWARE COUNTY.

This application was made by the borough of Upland, Delaware County, and is for permission to extend its sewer system and to discharge the sewage therefrom into Chester Creek within the limits of the borough.

It apears that Upland borough, incorporated in eighteen hundred and sixty-nine, adjoins the city of Chester, being separated from it by Chester Creek, a tributary of the Delaware River. It is bounded on the north and the west by Chester township and on the northeast, east and south by Chester City. The creek flows in a general easterly direction by Upland borough and thence passes about southerly through the city a distance of approximately two miles to the Delaware River. The stream through the borough is tidal, the normal stage being between four and five feet.

Within the municipal territory there is a present population of about twenty-one hundred. The inhabitants are largely dependent for employment upon two manufacturing establishments; the cotton mills of S. A. Crozer and Son, employing about three hundred hands, and the cotton and woolen mills of J. Walworth & Son, employing about fifty hands.

The main highway is known as Upland Avenue. It follows the general course of the creek and is near it in the thickly built-up section of the borough. The Crozer plant is located on the bank of the stream here and a few hundred feet below is a highway bridge over the creek at a public road named Kerlin Street leading to the city. There is one other highway bridge over the creek in the borough. It is about four thousand feet up-stream in the southwestern portion of the borough, and beyond this, possibly a third of a mile, there is an old mill dam which formerly was used to divert water into a race extending to the mills now abandoned, located at the foot of Main Street. These mills are about a third of a mile above the Crozer Mills. The tide water extends up to the above mentioned dam.

The Walworth Mills are in the centre of the borough on a small run which empties into the creek above and in the vicinity of the Kerlin Street bridge, but below the Crozer plant.

There is another run in the borough. It joins the main creek immediately above the Crozer plant. Besides these two streams in the built-up section there is a natural water course forming the extreme eastern boundary of Upland borough which is worthy of mention because of its pollution.

The people obtain their drinking water from the New Chester Water Company, the source being obtained from the Delaware River. The intake extends out into the main ship channel at a point by which the sewage of the city and vicinity may pass and re-pass as the tide ebbs and flows. The pollution of the source was naturally accompanied by a high typhoid fever rate among the consumers of the water. After some litigation, the compulsory installation of a water filter by the said water company resulted. So the water now is purified to some degree before the consumers get it. The volume of sewage pollution of the source has steadily increased and this constitutes a serious menace to public health. In case of accident to the purifying apparatus, it would be quite possible for the raw river water to be introduced into the homes of those depending upon this supply.

There has not been that diminution in typhoid fever rates since the installation of the filter plant that might be expected which signifies that there may be some other source of transmission of this disease besides that of the public water supply. In Upland borough there are a few private wells dug in the porous earth. Sewers are not in general use. Dry earth privy vaults are common and because the ground is quite springy and the level of the water therein near the surface, a number of these loose vaults occasionally fill with water and overflow. Some of them are connected to the sewers by means of stone drains, by pipes or combinations. Where there are no sewers this overflow goes into the runs. Waste water from kitchen sinks is frequently conducted by pipes to the street gutters. Under these circumstances, it would not be strange if the well waters were found to be contaminated. An examination of such waters should be made and all wells abandoned where pollutions are proven.

There are six public sewer outlets in the borough. Three of them are into the creek, two of them are into Walworth Mills Run and the other is into the upper Run at Main Street.

The first sewer into the creek is a twenty-four inch brick structure with its outlet about three hundred feet down stream from Kerlin Street bridge. It is about four hundred feet long and terminates at Upland Avenue. It takes storm water from this avenue and indirectly house drainage from the adjoining estate north of this highway.

Passing up-stream next in order comes the Walworth Mills Run which run is in fact an open sewer. At Upland Avenue, which is less than two hundred feet from the creek there is an eighteen inch sewer discharging into the run. This pipe extends easterly in Upland Avenue about three hundred and fifty feet to the corner or intersection of Upland Avenue, Hill and Eighth Streets; thence up Hill Street for a distance of about two hundred and fifty feet to the end; the sewer is twelve inches in diameter. This structure is a combined sewer. It was built in nineteen hundred and four.

North of the Avenue, along the run there is an open field between Seventh and Eighth Streets. There is a twelve inch sewer in Seventh Street and across the lower portion of this field. It empties into the run at Upland Avenue. It receives kitchen and cesspool drainage and has been in use since nineteen hundred.

Above this point the run is arched over at Eighth Street and between Eighth and Ninth Streets where the Walworth Mills are located and at other street crossings. Leading into this run in an alley between Ninth and Tenth Streets is a foul open sewer in the shape of a paved gutter, a foot or so in width running full length of the alley between Main and Woodside Avenues from whence the flow reaches the run by a doubtful course underground. The polluting material comes from overflowing cesspools in the rear of the houses along the alley. Kitchen wastes are also emptied into the gutter. The appearance of the run in the open field is that of a sewer.

The next public sewer outlet into the creek is an eighteen inch pipe passing through the Crozier property and immediately east of the Crozier mills to the creek in the extension of Sixth Street. Connecting with the eighteen inch is a twelve inch sewer in Sixth Street as far as Main Street, a length of about eight hundred feet. It is reported that surface water and kitchen drainage only reach this sewer. It was constructed in nineteen hundred and seven. This outlet is about five hundred feet above the Walworth Mills run and slightly over this distance above the twenty-four inch sewer outlet.

Into the upper run the Main Street sewer, consisting of about five hundred feet of eight inch pipe and two hundred feet of twelve inch pipe, empties. The sewer takes both surface water and the discharge from four house connections. It was constructed in nineteen hundred and seven.

Third Street is about seven hundred feet long. It extends easterly from Main Street to the creek. In it there is a twelve inch sewer constructed in nineteen hundred and two. It receives drainage from kitchen sinks and cesspools. The outlet is about one hundred feet above the mouth of the upper run which receives the sewage from the twelve inch pipe in Main Street. This point is approximately seven hundred feet distant up stream from the Sixth Street outlet.

Besides the above public sewers there are dwellings in the vicinity of Kerlin Street which sewer to the creek. So does the slaughter house in this vicinity. At the Crozer Mills there are water closets connecting to a sewer leading to the creek. Also on this property there is an earth privy on the creek bank which is a source of stream pollution. Some spent dye stuffs are intermittently discharged into the creek from these works.

Opposite the plant in Chester City is Chester Park which occupies all of the land contiguous to the creek along its banks from Kerlin Street westerly. It is hardly necessary to state that the removal of all unsightly conditions along this stretch of water is desirable. Immediately below Kerlin Street in Upland borough there are a few boat houses. At the bridge a three foot city sewer has its outlet.

The pollution in the boundary run at the extreme east limit of Upland borough comes from a four foot brick sewer in Upland Avenue, this structure belonging to the city, and from a number of cotton and paper mills and other industrial establishments along its course in the city. The creek also receives the flow of numerous city sewers between here and its mouth, all of which is a menace to the purity of the public water supply system.

The petitioners purpose to build a sewer in Upland Avenue easterly from the present eighteen inch sewer at the intersection of the avenue, Hill and Eighth Streets, a distance of about fifteen hundred feet, to a summit. The object of this improvement is to remove surface water from the streets and sewage from the abutting properties. No plan has been devised, so far as the Department is informed, and it would appear that this extension is to be made as the other sewer extensions have been made without reference to any comprehensive plan for sewerage that may be called for in the future. Even the size of the sewer is not stated.

The applicants do not show that public health demands that more sewage should be discharged into Chester Creek or its tributaries, or that the sewage now discharged therein should continue to be so discharged. To the contrary, all the facts seem to demand that not only should no more sewage be put into this stream, but that the foul pollution shall be discontinued. The policy of the State is to preserve the purity of public waters for the protection of the public health by the bringing about at as early a date as practicable the discontinuance of the discharge of sewage into public waters. Any plan to merit State approbation should at least contemplate this ultimate end. Not only would it be a measure of efficiency, but also a measure of economy, for the local authorities to forthwith plan a comprehensive sewerage system, whose object shall be to collect the sewage from the entire municipal area and convey it speedily to some common point, or points, where the poisonous matters shall be properly disposed of in a harmless manner. When such a comprehensive plan shall have been prepared and adopted, the borough will have a system by which it can lay down a sewer in any particular street from time to time, as necessity may require, with the least expenditure of money and under the assurance that future alterations will not be required

It is not practicable to treat mingled sewage and surface water. The latter is very much in preponderance and can more economically be disposed of by dis-

charge into a natural water course. The sewage in its total volume is relatively small, contains the dangerous pathogenic material requiring treatment, and by separating it from storm water makes it possible for the sewage to be conveyed to a disposal plant and be purified at a cost not prohibitive.

The Department is not accurately informed as to the assessed valuation and bonded indebtedness of the borough. It is understood, however, that the municipality is free of bonded indebtedness. It is clearly apparent that the town is amply able to assume the small cost of preparing plans for a complete sewerage system and sewage disposal works. The city of Chester has many sewer outlets into the Delaware River, and tributary streams. Upland borough's contribution to the sewage pollution of the waters of the State and the contamination of the public water supply of the district is small, compared to that contributed by the city of Chester. It would not seem just for the smaller municipality to undertake to treat its sewage while the sewage from the larger municipality was being discharged untreated into Chester Creek and the waters of the State. It is extremely probable that a joint sewerage plan would prove advantageous to both municipalities and if a co-operative plan could be inaugurated, as has been done in some other places where there existed a community of interest, benefit would accrue not obtainable by independent action.

The sewers of Chester City are combined. They take both sewage and storm water. Any feasible plan for the abandonment of the existing sewer outlets would probably invoive the intercepting of sewage only. Hence, whether Upland borough should effect co-operation with Chester City, or proceed independently, economy dictates that the sewers shall exclude storm water.

It has been determined that the interests of the public health demand that a permit to extend the existing sewers in Upland borough be withheld, and a permit is hereby and herein withheld until the borough shall have prepared a plan for a comprehensive sanitary sewerage system and sewage disposal works for the collection of sewage only for the entire municipal area and for its disposal or treatment in a sanitary and harmless manner, and until the borough shall have submitted such a plan or plans to the Commissioner of Health and they have been approved, modified or amended in compliance with the State law.

The local authorities are hereby advised to carefully consider the feasibility of the co-operative plan hereinbefore suggested. The State Department of Health has communicated with the city officials of Chester relative to its sewer outlets and will invite a further consideration of the problem of improved sewerage and sewage disposal for that city.

The borough council is also hereby requested to make such ample appropriation as may be needed to enable the local health authorities to have thorough tests made of the well and spring waters in use for drinking purposes in the municipal territory.

The State Department of Health will be glad to advise with the borough council or its officers or agents relative to the various matters hereinbefore discussed.

Harrisburg, Pa., April 14th, 1908.

VERONA BOROUGH, ALLEGHENY COUNTY.

This application was made by the borough of Verona, Allegheny County, Pennsylvania, and is for permission to extend its sewer system and to discharge the sewage therefrom through exsting sewers into the Allegheny River.

It appears that on August fourteenth, nineteen hundred and seven, the Commissioner of Health issued a permit to the said borough of Verona to extend its sewer system and to discharge the sewage therefrom through existing sewers into the Allegheny River within the limits of the borough, in response to an application bearing date of June twenty-fourth, nineteen hundred and seven, under certain conditions, among which were the following:

"That all storm water should be excluded from the sewers and that sewers may be generally extended throughout the borough from time to time as necessity may require and that at the close of each season's work plans of the sewers laid during the year, together with any information required by the Commissioner of Health in relation thereto, shall be filed in the State Department of Health.

"This permit is issued under the express stipulation that on or before January first, one thousand nine hundred and eight, the borough shall prepare a plan for the collection of all of the sewage of the borough and its conveyance to and treatment in a sewage purification plant, together with a plan and report on such sewage disposal works, and submit the same to the Commissioner of Health for approval. When approved, modified or amended, the said Commisioner will fix a time when such work shall be built, during which the public sewerage system may temporarily discharge into the Allegheny River."

The borough accepted the conditions of said permit and duly recorded the same on December second, nineteen hundred and seven, in Deed Book, Volume Fifteen hundred and sixty-five, Page Five hundred and eighty-seven, in the office of the Recorder of Deeds for Allegheny County. However, the sewers were not built, so it is stated by the local authorities, and the plans called for were not submitted on or before January first, nineteen hundred and eight, and they have not yet been submitted.

It has been determined that the said permit of August fourteenth, nineteen hundred and seven be modified and amended and it is hereby and herein modified and amended by striking out, in the fourth clause of the conditons and stipulations the words "January first, one thousand nine hundred and eight," substituting in their place the words, "January first, one thousand nine hundred and nine," and that as so modified and amended the permit shall stand.

It has also been agreed that a decree be issued, and a decree is hereby and herein issued, notifying the local authorities of Verona that plans for the treatment of its sewage shall be submitted to the Department of Health by the borough on or before January first, nineteen hundred and nine, and that upon failure so to do the Department will institute proceedings against the municipal authorities for the illegal discharge of sewage into the waters of the State and the polluting of the supply of water to the public in the Greater Pittsburg District.

Harrisburg, Pa., July 24th, 1908.

WATSONTOWN, NORTHUMBERLAND COUNTY.

This application was made by the borough of Watsontown, Northumberland County, and is for permission to extend its sewer system and to discharge the sewage therefrom into the Susquehanna River.

The borough of Watsontown is located on the east bank of the Susquehanna River (West Branch) about seventeen miles north of Sunbury. It is on the Pennsylvania Railroad and also at the terminus of the Susquehanna, Bloomsburg and Berwick Railroad. The estimated population is two thousand. In eighteen hundred and ninety the census showed a population of twenty-one hundred and sixty-seven. The town is supported by its manufactories which comprise boot and shoe manufacture, table, furniture, door and sash, and knitting works. When these places are in full operation such as was the case at the date of the Department's inspection, the accommodations in the borough are insufficient and consequently a large number of employes take up their residence in Milton and possibly other places in the vicinity, going back and forth daily on the electric cars which connect Watsontown with Milton and Lewisburg.

The municipal territory has a length of about six thousand feet along the river and a width of thirty-six hundred feet at the north end and a width of eight hundred feet at the south end. The railroad location is a straight line through the town, dividing the territory into about equal parts, that portion between the railroad and the river being flat but elevated sufficiently to escape liability to inundation during freshets except for a very small portion of the area, while that part east of the railroad is hilly.

The public water supply is brought in from a distance and is distributed by the Watsontown Water Company which purchases the water from the White Deer Mountain Water Company, the source being White Deer Creek. The water is said to be of excellent quality and according to statements of local physicians, typhoid fever is of rare occurrence. It is estimated that there are about seventy private wells in use in the borough, most of which are located in the hill portion. Some of the industrial plants have drilled wells on the property.

Outside privies are in general use throughout the town and there are possibly sixty cesspools of the percolating type in commission. The Barr Table Company has a cesspool which has been in use for about two years and during this time has not required cleaning out. This company employs about sixty-five men. The Watsontown Door and Sash Company has a brick vault for the reception of sewage. Every week or two the contents is mixed with shavings and other combustibles and burned on the premises. This concern employs about one hundred hands. The Watsontown Table and Furniture Company, employing about ninety hands, has an outside privy. The Boot and Shoe Company affords work to about eighty hands. The shop has a connection to the borough sewer. The Knitting Mill, employing sixty hands, has a sewer connection. The public school building, located in the northern part of the town at the corner of Elm and Eighth Streets near the canal, has two outside privies erected over large vaults. During warm weather offensive odors are given off to the annoyance of residents in the immediate vicinity.

The old State canal formerly extended along the river bank through the town. Though long since abandoned, the bed is still in existence and in it are pools which receive sewage from some of the adjacent properties.

The existing public sewer outlet is an eighteen inch pipe discharging into the river opposite the foot of River Avenue. The length of the eighteen inch pipe is three hundred and ninety-two feet. Into it a fifteen inch sewer in Main Street empties and also a twelve inch sewer which passes easterly under the railroad and thence northerly along Railroad Street for six hundred and forty-two feet, this portion being ten inches in diameter. In Main Street the fifteen inch pipe terminates midway of the block between Sixth and Seventh Streets, the total length being twenty-seven hundred and forty-four feet. The grade of this sewer is two hundred and thirty-five thousandths per cent.. There are manholes at the intersecting streets. In Third Street there is an eighteen inch lateral sewer ex-

tending easterly to the railroad. In Fourth Street there is a ten inch lateral extending easterly under the railroad for six hundred and forty feet. Thence southerly in Railroad Street it is continued for five hundred and fifty-seven feet. These sewers comprise the public system and they have one outlet at the present time.

The main outlet is submerged at all stages of the river. This is true also of the private sewers extending from the Mansion House at the corner of Second and Main Streets to the river. This pipe is also reported to serve several residences and business blocks.

Although some of the surface water reaches the public sewers, the greater portion runs off in the street gutters into the abandoned canal.

There is a large pool in the canal bed above Third Street which receives the drainage from a slaughter house, besides that from private residences. The water works pumping station is located at the foot of Third Street on the canal bank. It is understood that no connection exists between the pump and the canal and river by means of which in an emergency water from these places might be introduced into the distributing system of the town.

It is reported that ice is harvested from the canal pool and sold in the town for general uses and that some of the country people cut their supply of ice from this pool.

The petitioners represent that the present methods of sewage disposal at the public school have become outgrown and that a sewer is demanded, and permission is asked to lay a public sewer in Elm Street from River Avenue northerly, and also to make extensions in other streets. The proposed sewers are to be incorporated into the present sewer system and the existing outlet is to answer until a disposal plant is provided.

The twelve inch submain now passing under the railroad is to serve a small district in the southeastern part of the borough. Also the ten inch submain passing under the railroad at Fourth Street is to serve the eastern central district of the borough, that portion of it lying in Railroad Street requiring reconstruction to fit into the grades of the comprehensive system; but for the northern district both sides of the railroad and for the land west of Main Street a new intercepting sewer twelve inches in diameter is planned to be laid in Elm Street. The submain will extend in Seventh Street by a ten inch pipe to Ash Street and thence it will be eight inches in diameter. A great percentage of the sewers and all of the laterals are to be eight inches in diameter. Manholes are to be placed at street intersections and at changes in grade.

The petitioners have selected a site for a disposal plant in the south part of the borough, but no surveys or plans whatsoever for the utilizing of this place have been submitted.

The proposed sewers will intercept the private sewers which now empty into the pool in the northern part of the borough and they will provide sewerage for other houses in the closely built-up district, but the State cannot consistently approve of petty sewer extensions unless they are a part of an intelligent design which provides for future as well as present needs of the borough.

Below Watsontown the river is used as a source of emergency supply at Milton, Lewisburg and at Sunbury and at other places further down stream. Quite a considerable amount of water is drawn from the river at Sunbury. It is subjected to filtration. In case of accident to the filters, raw river water, with the active poison it might contain, would be introduced into the homes of the citizens of that place. A reasonable public safeguard is demanded in the form of the enforcement of the law for the preservation of the purity of the waters of the State for the protection of the public health. It is not practicable for a town to immediately change its sewerage system and discontinue the discharge of sewage into the river, but it can prepare to do so and work out the project gradually. It is reported that the borrowing capacity of Watsontown at the present time is in the neighborhood of thirty-three thousand dollars. This in itself is evidence that the borough cannot afford to make costly mistakes. If the site selected for the erection of the purification plant be adopted, then this land should be acquired. This involves surveys and the outlining of the work sufficiently in detail to form the basis of a reliable estimate of costs and to enable the State officials to determine whether the scheme be a feasible one and worthy of approval. After such a plan has been prepared and approved, the borough will then be in a position to advance in the laying down of sewers from time to time as they may be required towards the completion of a perfect plan. In this manner the interests of the public health may be subserved without working a hardship.

It has been determined that the plans of the proposed sewers be accepted and that permit for their construction be issued and it is hereby and herein issued under the following conditions and stipulations:

FIRST: That storm water be excluded from the sewers, or if admitted it be in limited quantities to flush the sewers and under conditions admitting of the exclusion of such water whenever this may be necessary.

SECOND: That at the close of each season's work, a plan of the sewers laid during the year, together with any other information that may be required in connection therewith, shall be filed with the Commissioner of Health, in order that the Department of Health may be always advised of the extent of the system and use thereof.

THIRD: This permit to discharge sewage into the waters of the State shall cease on May first, nineteen hundred and eleven. If at that time the conditions or this permit shall have been complied with, then the Commissioner of Health may extend the time in which sewage may continue to discharge into the river.

FOURTH: On or before May first, nineteen hundred and nine, the local authorities shall prepare a plan for sewage disposal works of the character such as has been hereinbefore outlined, and submit the same to the Commissioner of Health for approval. The Commissioner may modify, amend or approve such plans and fix the date for the erection of the purification works, having in mind the time when other municipalities in the valley must erect sewage disposal works for the treatment of their sewage.

FIFTH: If at any time in the opinion of the Commissioner of Health, the sewer system or any part thereof is prejudicial to public health, then the borough shall adopt such remedial measures as the Commissioner of Health may suggest or approve.

SIXTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

It is expressly stipulated that notice to the owner of the slaughter house to discontinue discharge of sewage into the canal pool will be served.

The borough council and the local board of health should see to it that the use of the ice harvested from the canal pool is restricted to eliminate all danger of the transmission of infection by this medium to food stuffs and drinkables.

Harrisburg, Pa., May 25, 1908.

WELLSBORO, TIOGA COUNTY.

This application was made by the borough of Wellsboro, and is for permission to extend the public sewer system and to discharge the sewage therefrom into Marsh Creek within the limits of the borough.

Wellsboro, the county seat, is a trading place and residential town, slow growing, with a population of about thirty-two hundred, located in a rolling farming country interspersed with hills. The village is in a hollow surrounded by hills and through it three streams flow, Charleston Run from the southeast, Morris Run from the south and Kelsey Run from the southwest, joining in the north central part of the municipal territory and at the outskirts of the village to form Marsh Creek which empties into Pine Creek, ten miles down stream. Pine Creek in turn flowing southerly fifty miles joins the west branch of the Susquehanna River just above Williamsport. Up the narrow, deep gorge in which the creek flows are laid the tracks of the New York Central and Hudson River Railroad. A branch from Stokesdale Junction on Marsh Creek three miles below Wellsboro extends up along the creek and Charleston Run, terminating at Antrim which is several miles south of Wellsboro. In all this territory traversed by the railroad villages are scarce and the inhabitants few. In fact, the county is sparsely populated, Wellsboro being the principal and largest place in it. This borough is reported to have a borrowing capacity in the neighborhood of thirty-five thousand dollars. Under these conditions of location, population and resources, public works in contemplation of future requirements would be out of the question. Existing circumstances should largely control in considering the sewerage project.

Wellsboro village lies south of Marsh Creek and Charleston Run and on the gentle slopes through which the other two runs pass. The latter are dry a part of each year, but Marsh Creek always has water flowing in it. During showers, however, the run-off from the hillsides is so rapid as to scour out all deposits and rubbish along the courses and sometimes it washes away the banks and bridge abutments.

The sewer system was adopted in eighteen hundred and eighty-four for the purposes of removing surface water from the streets. This was thought to be the most practical means of lessening the cost of maintaining street gutters. So the combined system was adopted and nearly all of the thickly built-up part of the village has pipe sewer facilities. The outlet, a twenty-four inch pipe, is into Marsh Creek in the outskirts of the village about three thousand feet from the north borough line. The borough has recently purchased the meadow land along this stream. In times of storm, however, the sewers overflow at five points into Morris and Kelsey Runs, but this is not known to have been the cause of any complaint. It is only during periods of drought that the present disposal of sewage can produce a local nuisance. One mile below the sewer outlet on Marsh Creek is the Stokesdale Tannery, from which liquid wastes are discharged into the stream. In all the distance to the Susquehanna River it does not appear, from any information at hand, that the waters are used for domestic purposes, except it be by individuals.

These things were taken into account at the time a permit was issued by the Commissioner of Health for sewer extensions in Wellsboro. Said permit was dated September twenty-eight, nineteen hundred and five, and among its conditions were the following:

"FIRST: That the borough officials forthwith prepare a complete map of the existing sewer system, showing the sizes, grades, manholes and overflows; upon

this map future extensions are to be shown for all the territory ultimately to be drained by the system, said map to be filed with the Commissioner of Health.

"SECOND: That at the close of each year a detailed plan of the sewers built during the year shall be filed with the Commissioner of Health.

"THIRD: That the treatment of sewage to be held over to such a time as the Commissioner of Health may determine, when an extension of the outlet to an area accessible by gravity and the treatment there of the sewage by some method to be approved by the Commissioner of Health shall be required."

The first two stipulations have not been complied with. The municipal authorities state that the engineer in whose possession is the data relative to the old sewers absolutely refuses to furnish for pay or otherwise any information and so it is impossible for them to conform to the first condition of the permit. With respect to the second condition the authorities state that the provisions will be carried out at an early date.

While the original sewer design was made with some care, yet during the construction such necessary features as inspection manholes at street intersections and changes in line of grade were omitted. Obstructions, possibly of street gutter silt, are of frequent occurrence, requiring the digging up of sewers at points to effect cleaning out. There is need of a careful study and revision of the sewer system and the State cannot consistently approve of extensions to a system known to be faulty and not adaptable without some changes to a sewage purification plant, until definite and reliable plans of the existing sewers shall have been filed, with other satisfactory information, in the office of the State Department of Health.

The petitioners propose to construct a ten inch sewer twenty-eight hundred feet long, from Cone Street southeasterly along the south side of the railroad company's land and to connect there with six hundred feet of ten inch pipe in Park Place, five hundred feet of ten inch pipe in Jackson Street, three hundred feet of eight inch pipe in Austin Street, twenty-six hundred feet of eight inch and ten inch pipe in East Avenue, with a storm overflow into Charleston Creek at the foot of Park Place and another one at the foot of Jackson Street; also an extension for six hundred feet of the ten inch pipe in Grant Street, south of Rectory Lane, and an extension for three hundred feet of eight inch sewer in Nichols Street north from Sears Street.

On August twenty-eighth, nineteen hundred and seven, thirty-five citizens of Wellsboro addressed the following petition to the State Department of Health:

"We, the undersigned, citizens of the borough of Wellsboro, Tioga County, Pennsylvania, respectfully represent; That the said borough of Wellsboro, aforesaid, is maintaining a public nuisance and a menace to the public health, in that the said borough of Wellsboro has constructed a public sewer which drains practically the whole sewerage of said borough and empties all the sewage into Charleston Creek, a small stream, within the limits of the said borough on Tioga Street near the residences of a number of people. That said stream nearly all dries up in the summer months and the refuse, filth and sewage from the said borough is allowed to collect, gather and lodge along the said creek near the residences of the people along said Tioga Street and that divers bad smells, odors and noxious fumes derived therefrom which endangers the life, health and comfort to a large number of people and to the great danger and damage to the public health. We respectfully request that this condition of affairs be investigated and the State Board of Health take such action as shall to it seem necessary and the public health and the laws of the State of Pennsylvania warrant."

This brought about the purchase by the borough of the meadow land, thirteen and nine-tenths acres in all, along Marsh Creek from the said twenty-four inch sewer outlet to the northern boundary line of the borough. This tract of land is so situated and its topographical features are such that a sewage purification plant can be constructed thereon and reached by gravity. Furthermore, the local authorities made improvements in the channel of the stream, making a narrow course and doing away with pools.

It is evident that the cost of disposal works to handle the sewage and storm water now discharged from the borough sewers would be prohibitive and that changes in the sewer system to some degree should be inaugurated. It will not be prudent for the town to make additions to a combined sewer system until plans for an improved system and for disposal works are prepared and adopted and approved by the State authorities. The economies of the situation dictate that this study be made at once so that every sewer laid down from now on shall be a part of a perfect plan for the entire borough.

The conditons along the various streets where it is proposed to build the sewers petitioned for are unsanitary. The dwellings use the public water supply and the drainage therefrom is emptied into cesspools or street gutters. The borough's borrowing capacity is insufficient to defray the cost of changes and improvements to the existing sewers and for extensions and for disposal works. The time is rapidly approaching, however, when the sewage must cease to be discharged into public waters. The tannery refuse undoubtedly creates a greater pollution in Marsh Creek than does the municipal drainage. Changes in disposal at the tannery must be brought about and the virgin purity of the waters of the State of this region must be preserved as a public resource, and whatever the borough may do in sewerage work should be along lines anticipating this ultimate requirement.

The Helvetia Milk Condensing Company has recently established a plant along and south of the railroad in the eastern part of the borough, where are employed about fifty people. It is expected that the works will be considerably enlarged. A brick cesspool is on the property. It is constructed watertight. The drainage from the plant is piped into this receptacle and so is the discharge from six water closets. An overflow pipe leads to a second cesspool, from which the discharge of the liquid is into Charleston Creek three hundred feet distant. As an inducement to this company to locate in the town, the Wellsboro council voted to furnish sewerage facilities at such time as it became necessary for the company to cease to discharge its sewage into the creek. To attain this end the main sewer extension hereinbefore mentioned is proposed.

The management of the company was not aware, so it is represented, that the building of a sewer to the stream was in violation of State law. So on April eleventh, nineteen hundred and eight, the company made an application for the approval of its sewer system.

It has been determined that the interests of the public health demand that a permit be withheld for the present and it is hereby and herein withheld and the borough is notified that it must prepare a plan of the existing sewer system showing the location, sizes and grades of the sewers, the location of manholes, inlets, overflows, details of all overflows and cross sections of the stream where the overflows empty, and file the same in the office of the Commissioner of Health on or before September first, nineteen hundred and eight.

Also that before any sewer extension shall be made a comprehensive plan of an improved system of sewerage and sewage disposal works shall be prepared and submitted to the Commissioner of Health for approval, who may modify, amend or approve the same and fix the time within which the disposal plant shall be erected.

In the preparation of plans the borough should be guided by the suggestions hereinbefore offered. The State Department of Health will be glad to further advise relative to the subject.

The Helvetia Company will be notified that the Commissioner of Health is not empowered to grant permission to any individual or private corporation to discharge sewage into any of the waters of the State, and that, therefore, it must adopt some other method of disposal, presumably into the borough sewer, which the local authorities have pledged, if reports be true.

Harrisburg, Pa., May 16th, 1908.

WEST REYNOLDSVILLE, JEFFERSON COUNTY.

This application was made by the borough of West Reynoldsville, Jefferson County, and is for approval of a sketch for a sewer system, submitted by said borough.

West Reynoldsville is a community of about one thousand population, situated on the north side of Sandy Lick Creek, directly opposite the borough of Reynoldsville, which has a population of about four thousand. Sandy Lick Creek rises in the Allegheny Mountains in Clearfield County, at the divide between the great Susquehanna and Ohio River basins, and pursues a general westerly course to Red Bank Creek in Jefferson County at Brookville. Red Bank Creek is formed by the confluence of the North Fork and Sandy Lick and it pursues a general southwesterly course forty-five miles to the Allegheny River, the stream forming the boundary line between Clarion County to the north and Armstrong County to the south. A branch of the Pennsylvania Railroad (low grade branch) passes down Sandy Lick valley and thence along Red Bank Creek to the Allegheny River and it is the outlet from the region to Philadelphia to the east and Pittsburg to the west. In this region the principal industry is the mining of coal. The country, especially as the Allegheny River is approached, is wild and rugged and the river banks become higher and more precipitous until the lower stretches of the stream are in a deep, narrow gorge. The territory is sparsely populated. Below Brookville, which has a population of under three thousand, there are five small boroughs along the creek and railroad, the largest of which contains about twelve hundred people. The valley of Sandy Lick Creek is also quite wild in character, but in the vicinity of the Reynoldsvilles and above, where the land is more rolling, agricultural pursuits are followed as well as the mining of coal. Falls Creek borough is in the valley four miles above West Reynoldsville and Dubois borough is two and a half miles above Falls Creek. The latter place has a population of about ten thousand and the former about one thousand. At each of these three boroughs there is a large tannery, whose wastes are discharged into the creek.

The tannery in West Reynoldsville is the chief means of support of its inhabitants and the only industrial plant in the borough. It is located along and north of the railroad in the eastern part of the town. The railroad follows the foot of the sloping ground and between it and the creek are flat meadow lands subject to freshet flow and traversed by three natural water courses coming down from the hillsides and rising ground, upon which the dwellings of the community are located. The Pennsylvania passenger station is situated in the western part of the borough on the main street leading across the creek into Reynoldsville. This thoroughfare is called

Pike Street in West Reynoldsville and Main Street in Reynoldsville. Both municipalities are accommodated by the depot, which is distant from the creek about four hundred feet.

Pike Street extends up the hillside and out into the country beyond and it is the western street in the borough. At right angles to it and paralleling the railroad is Broadway and thence paralleling Broadway run Brown Street and Lewis Street. At right angles to them from Pike Street easterly in succession are Powers Street, Central Street, Warner Street and Arms Street.

The Elk Tanning Company's works lie between the last two highways. It is reported that there is a twenty-two acre tract of land occupied by buildings and dwellings belonging to the company and that one hundred and twenty-five men are employed at the works. On Brown Street east of Warner there is a row of tenement houses from which waste water goes to the alley to the rear, which in the summertime is in filthy condition. This drainage follows down Warner Street and along Broadway and down an alley through a culvert under the railroad to the meadows. The drainage from the other property at the tannery is into the natural water course. The privy for the accommodation of the laborers is over the stream. The sewage and trade wastes flow through a piped culvert under the railroad and thence in an open ditch along the meadow a length of about eight hundred feet to Sandy Lick Creek. Part of the ground is swampy and the sewage spreads out over it.

For tanning purposes water is drawn from a series of driven wells on the property. For other purposes the public supply is used. This is furnished by the Reynoldsville Water Company and the source is surface water impounded in storage reservoirs and pumped to a distributing reservoir on the hill back of Reynoldsville, from whence the water flows by gravity to the consumers in both boroughs. There are occupied estates on the water shed at which the disposal of sewage demands attention, as a public health precaution. It is reported that the men at the tannery drink spring water.

There are a number of domestic wells and springs scattered about in the borough from which water is drawn for domestic purposes. The universal disposition of waste water from houses into the street gutters and into the small runs and alleys leading to the runs produces in summer time a condition which is offensive and from which the property owners would be glad to obtain relief. The soil in the borough is of a heavy clayey nature and not favorable for percolating cesspools. It is reported that there are fifteen cesspools only, used exclusively for excreta. Shallow earth privy vaults are not infrequently found full to overflowing. The slopes and numerous springs are so located that surface pollution of the springs and wells is liable to happen at any time.

There is an eighteen inch storm drain in Pike Street under the railroad and extending to the creek. There are a number of house connections to it. The west gutter in Pike Street is a water course into which sewage is discharged from a number of dwellings. On both sides of Broadway, between Pike and Powers Streets, are low swampy places to which sewage and kitchen drainage gravitate, lying there until washed away by rainfall. In the borough there are in the neighborhood of one hundred occupied estates on which or from which sewage is improperly disposed.

The financial resources of the borough are necessarily limited and good judgment is called for in the expenditure of public funds. The local authorities, prior to the submission of the sewer plans, requested to be advised about the sewer system and to have the help of an engineer to co-operate with the local surveyor in laying out the sewers. Upon being informed by the Commissioner of Health that the Department would confer with the borough respecting the most efficient plan for sewerage after the borough had designed the sewers and submitted plans to the Department, the plan now under consideration was filed. This plan is a sketch, showing in a general way how it is proposed to connect the sewers in the streets with one general outfall. Elevations are given at street intersections, but the sizes of the sewers are not mentioned.

The proposed outlet is into Sandy Lick Creek in the extreme western corner of the borough at a point about five hundred feet below the Main Street bridge where Reynoldsville sewer empties. One sub-main is to extend up Pike Street and serve the western portion of the borough. Another sub-main is to pass along the creek in Water Street and thence across the meadows under the railroad and up an alley between Warner and Central Streets. It will serve the eastern and central territory of the borough

It is evident by the plan that the borough council desires that the State Department of Health initiate the sewer design. It appears from the information now at hand that no difficulty will be encountered in obtaining grades for the sewers equivalent to a fall of six inches in one hundred feet or greater, with the exception, possibly, of the main sewer across the meadows. As laid out, the sewers will follow closely the natural topography, thus requiring the least cut to obtain intersecting grades for the system. The sizes of the sewers need not be greater than necessary to remove sewage proper. Six inch pipes on four per cent. grades, or greater, should be ample for laterals. The size of the outlet might be governed somewhat by the volume of sewage discharged from the tannery. Such a volume will be much larger than the total output of sewage from all of the other buildings in the borough. Storm water and drainage from the run should be excluded from the sewer. A

moderate amount of roof water at sewer ends might be admitted for flushing. Surface drainage can be improved most economically in West Reynoldsville independent of the problem of removal of sewage from the community.

No disease is more dangerous than anthrax and no infectious disease harder to eradicate after it has once gained a foothold in a community. This poison should be killed at the outset and the discharge into any stream of tannery drainage is a menace provided the waters are subsequently used by man or beast. In the fall of eighteen hundred and ninety-seven, an epidemic of anthrax broke out among the cattle owned by the farmers whose lands abut Sandy Lick Creek between West Reynoldsville and Falls Creek. State and local authorities, after thorough investigations, arrived at the conclusion that the disease was attributable to the infection from the tanneries. The meadow lands along the stream are subjected to overflow and the grasses are thus washed by sewage water. The belief would seem to have some foundation in fact that cattle pastured along the stream, or that feed upon the hay cut from the overflowed meadows, are liable to be poisoned.

Not only the tannery wastes but the sewage from DuBois and Falls Creek and the Reynoldsvilles may be transmitted down stream to the Allegheny River and to the water works intakes of the numerous municipalities along this river's banks and thus be introduced into the homes of water consumers in a sufficiently active pathogenic condition to cause sickness and death. The extent of the menace in Red Bank Creek valley is secondary to the menace to public health in the Allegheny valley. The interests of the public health demand that these upland waters should be preserved in their purity. The question of their use is not one of a local nuisance as often popularly and selfishly thought to be the case. West Reynoldsville cannot expect a permanent right to discharge its sewage into Sandy Lick Creek and in anticipation of the ultimate purification of the sewage, the borough should plan its sewer system accordingly. It is not practicable to purify surface drainage and sewage combined and hence the necessity for the exclusion of surface waters from the sewers. The local authorities should engage the services of some qualified expert to work in conjunction with the local engineer in initiating a comprehensive sanitary sewer design for the collection of all of the sewage in the borough and its conveyance to some suitable point within or without the borough for treatment. The site should be selected and outlined plans made for the sewage works and these should be submitted to the Commissioner of Health for approval. It may then appear that the interests of public health will be subserved by granting temporary permission to the borough to discharge the sewage into the creek.

The council of Reynoldsville has made an application for permission to extend its sewer system and to discharge the sewage therefrom into the waters of the State. It would be both economical and best that the two municipalities should adopt a joint intercepting sewer and sewage disposal plant. This should prove much cheaper than if each borough were to proceed independently. The mingling of the domestic sewage of both towns with the industrial wastes from the tannery and from the woolen mills would facilitate the purification. The American Silk Company have works employing about three hundred people which are located below the borough in the township, from which sewage is discharged into the creek about a quarter of a mile below the Reynoldsville borough sewer. There is a community of interest irrespective of municipal boundaries and including the public and private corporations which can best be represented by a co-operative sewerage and sewage disposal plant. The project should be worked out and submitted to the Commissioner of Health for approval and then the sewers built in West Reynoldsville from time to time as needed should conform to the adopted plan and be a part of the project which, when completed, will have brought about the non-pollution of the stream in the territory by easy and practicable stages in an economical and efficient manner.

It has been unanimously agreed that the local authorities of West Reynoldsville be advised and they are hereby and herein advised that the proposed sewer system appears to be satisfactorily designed, as far as it goes, but that before the State can place the seal of approval on a system it will be necessary for the borough to carry out the suggestion hereinbefore offered for the preparation of a comprehensive plan for sewerage and sewage disposal works.

The advantage of a co-operative plan by the two boroughs is emphasized and its adoption recommended.

The State Department of Health will bring about the maintenance of sanitary conditions on the water sheds of the Reynoldsville Water Company, and the question of treatment of tannery wastes will be taken up with the owners of the tannery.

The local authorities should early adopt a sewer system and immediately take such measures as may be necessary to stop the pollution of all wells and springs and sources of drinking water in West Reynoldsville.

Harrisburg, Pa., May 7th, 1908.

WHITE HAVEN BOROUGH, LUZERNE COUNTY.

This decree was issued to the borough of White Haven, Luzerne County, Pennsylvania, in response to a request for advice made by the Board of Health of said borough on January third, nineteen hundred and eight, relative to the abatement of nuisances caused by the discharge of house drainage into the street gutters.

White Haven borough is an old railroad town and manufacturing community of sixteen hundred people, located in the southeastern part of Luzerne County on the west bank of the Lehigh River and on the main line of the Lehigh Valley Railroad and on the Lehigh and Susquehanna Division of the Central Railroad of New Jersey. The manufactories are more recent acquisitions. There is a silk mill, employing about one hundred hands, located between the canal and the river; a foundry employing about sixty hands, and a printing establishment, where fifty hands are employed. In eighteen hundred and ninety the town's population was the same as to-day.

The eastern central anthracite coal fields lie west of White Haven and coal operations are carried on within six miles. The eastern part of these fields drain to the Lehigh River, Sandy Creek, on whose shed are five mines, enters the Lehigh River four miles below White Haven and other streams below receive mine drainage in considerable quantities. The canal was built by the Lehigh Coal and Navigation Company for the transportation of coal out of the region. It is not now used locally for this purpose. The railroads furnish the employment to-day upon which probably one-third of the population of White Haven is dependent. The silk mill and the electric light company plants are operated by water power derived from the canal. The development of water power is a local resource which may prove of some importance in the town's future development. Nevertheless, there is lack of warrant for a forecast of a large sized town. Any public improvement whose cost was made greater, in anticipation of future needs of a considerably increased population, would invite just condemnation.

White Haven derives its principal distinction by the location in or near it of four institutions for the treatment of tuberculosis, bearing the following names: "The Free Hospital for Poor Consumptives," "Ferne Cliff Sanatorium," "Sunnyrest Sanatorium," and "The Orchards." The first two are in White Haven borough, and the latter two are in the borough of East Side, so named because it is opposite White Haven on the east bank of the Lehigh River. The two boroughs are connected by a highway bridge. East Side has a population of about three hundred and it is in Carbon County.

In the winter, but to a very much greater degree in the summer, prospective patients of the private institutions and others afflicted with the disease obtain accommodations at the hotels and private boarding houses scattered about the town, and the practice of disposing of household drainage in the street gutters from these places has aroused the fear among the townspeople that a peculiar danger to public health may impend in this case.

The municipal territory covers a large area of mountain and farm land beyond the village proper. Linesville Creek rises in a valley four miles west and flows due east through Foster Township and the central part of White Haven borough to the river along the base of a mountain ridge south of it. This ridge terminates before it reaches the river. The summit is five hundred feet above the village. About half way up the mountain is the hospital entitled the Free Hospital for Poor Consumptives.

The village proper lies considerably north of the creek on the hillside, the summit of which is to the north in Dennison Township and one hundred and fifty feet higher. The built up part of the borough is compact and the site is hidden from view from the railroads because of their lower elevation. The ground from the river bank ascends rapidly to the more gradual slopes of the town. The canal, two railroads and the public highway have been crowded into the space along the river on terraces supported by retaining walls in places. The highway between the railroads is decidedly the business street of the town, but the residential district is entirely on the gradual hill slopes above, extending to the summit of the saddle beyond which the land drains westerly.

Surface drainage in the borough is naturally excellent. There is no public sewerage system. Practically every property has a loose vaulted privy. There are said to be a few cesspools for waste water only. One hundred properties or more dispose of kitchen drainage and wash water in the street gutters, where a nuisance is created in summer time.

A natural water course passes through the central part of the borough and empties into the river near the county bridge. The last two hundred feet of its length is open and the flow is foul water apparently containing sewage. Through the town center the run has been arched over. Eleven houses with inside closets have private pipe connections to the culvert. The principal part of the surface drainage of the village gets to this water course.

Few domestic wells are said to be in use in the village. About twenty dwellings located on the western slope of the saddle are furnished with spring water supplied by an independent line belonging to the White Haven Water Company.

The balance of the village is supplied by the same company from a surface source located two miles west of White Haven. On a small run tributary to Linesville Creek is a small impounding reservoir having an unpopulated water shed of about two hundred acres, traversed by a branch of the Central Railroad of New Jersey. From this reservoir the water flows by gravity to White Haven and is available to the district not supplied by the smaller system above mentioned. The surplus flows to a small distributing reservoir on the hillside of the town. This system may also be supplied from the Lehigh River. The pumps are located between the canal and

the river above the county bridge and the silk mills. The water is taken from the fore bay or canal and ordinarily it is furnished to yard tanks of the two railroads. This emergency source to the town is used infrequently.

In May, June and July, nineteen hundred and two, there were thirty-five cases of typhoid fever in White Haven. These were confined to the neighborhood in the village where green vegetables were grown in private gardens. The infection of these vegetables by rain wash from overflow and privies was supposed to have been the origin of the epidemic. Aside from this instance, White Haven has been free from typhoid, or nearly so.

FERNE CLIFF SANATORIUM.

In the borough on the hill at Dennison Township line is the Ferne Cliff Sanatorium. Accommodations for about twenty patients are afforded. The institution has a small water supply of its own and the sewage is emptied into three percolating cesspools built tandem. The place was opened in nineteen hundred and five.

FREE HOSPITAL FOR POOR CONSUMPTIVES.

The Free Hospital for Poor Consumptives, established in nineteen hundred and one, operated under a State appropriation, although within the borough limits, is, as previously mentioned, detached from it and is located on a bench high up the mountain side south of Linesville Creek. Two hundred patients are accommodated. The buildings comprise the Administration Hall, with its two wings used as infirmaries, three brick cottages and three frame cottages and between fifteen and twenty cabins, besides the superintendent's residence and farm buildings, these buildings being scattered over a seven acre tract, which drains partly to Linesville Creek and partly east to the Lehigh River.

The institution's water supply is derived from springs and from two drilled wells on the mountain above the sanatorium and from one drilled well near the creek. Near this well is the institution's power plant, from which electric light and heat is furnished. An air compressor plant is also installed and used to raise the water for all three wells into a tank on the mountain near the two wells and the springs.

The central building, excluding the laundry, and all of the cottages are sewered to a purification plant consisting of a septic tank, syphon chamber and a series of filter trenches. There is said to be no effluent from these channels and no effluent channel is provided.

The septic tank is in duplicate. Each tank is thirty-eight feet long, six feet wide, five feet deep to the flow line at the outlet end and one foot deeper at the inlet end. The construction is of masonry, including the flat roof. The sewage is admitted through a six inch submerged inlet and taken out in the same manner to the syphon chamber, which is twelve feet long, five feet wide and two and one half feet deep to the ordinary discharge line. There is a perforated brick wall across each compartment twenty feet from the inlet end. The sludge is drained out of this compartment by a six inch pipe to a sludge pit nearby. It is reported that between five thousand and eight thousand gallons of water are consumed daily at the institution. What percentage of this total reaches the septic tank is not known.

The septic effluent is discharged through a six inch pipe from the syphon chamber to the nearby filter trenches. There are three of them parallel and about twelve feet apart. They are on the steep hillsides. The middle trench is about five feet below the upper one, and five feet above the lower one. The trenches average about fifty feet long, five feet wide and three to four feet deep. They are filled with crushed stone and covered on top about eighteen inches with earth. The sewage flows from the upper trench through the second and then through the third trench from whence it is reported the sewage spread out over the ground. To guard against this overflow during nineteen hundred and seven a trench one hundred feet long was built in the hillside further down and about fifty feet distant. Its object is to intercept the surface flow and permit it to percolate into the ground. The ground is shaley and porous. A guard trench fifty feet long and below and fifty feet from the sludge bed was also built last year to intercept the flow from the sludge pit. Both guard trenches are filled with broken stone.

The location of this plant is on the northern slope at the edge of the seven acre tract, where the mountain side becomes precipitous. A pavilion and some farm buildings are within two hundred feet of the sludge pit.

With respect to the driven well and pumping plant sewage trenches are located directly above, five hundred feet distant and about one hundred feet higher. The surface wash is probably to the creek below the driven well, but it would appear that there might be a possibility of underground contamination of the driven well supply.

Each septic tank is used continuously for about six months, one being in use while the other is out of commission. After a tank is drained to the sludge pit the solid material is hauled away in barrels and spread with other manure over the farm lands of the institution, where vegetables are grown. The sludge is not always plowed in immediately.

The waste laundry water and some surface water is conducted to a percolating cesspool on the east mountain slope towards the river. The cesspool overflows on wash days. All the laundry is done at the sanatorium.

There is a cesspool which receives the sewage from the superintendent's cottage and another cesspool for two of the cabins. Both places seem to be doing satisfactory work, so it is reported.

SUNNYREST SANATORIUM.

The Sunnyrest Sanatorium was opened in nineteen hundred and one. It is located on the high river bluff immediately south of the county bridge road in East Side borough. There are accommodations for forty-five patients. The water supply is obtained from a small run having less than two hundred acres of watershed. There is a small reservoir on it from which the water is piped by gravity to the institution. Below this reservoir the run passes through the borough to the river. The sewage from the institution buildings is discharged into cesspools and the waste water is emptied into street gutters. The laundry is sent to Wilkes-Barre. The Administration Building sewage is drained to a cesspool. The wash water goes to a pipe which takes all kitchen drainage from the dining hall and delivers it over the edge of the bank to the river. One of the cottages drains wash water to the gutter of the county bridge highway. The water closets drain to a cesspool. A cabin and another cottage have water closet connections with another cesspool. The wash water from this cottage is piped to a cesspool in the sand on the shore of the river. All drainage and sewage from the bungalow and two adjacent cottages is piped to a cesspool, formerly an old well.

The dining hall sewer has been complained of as a nuisance.

THE ORCHARDS.

The private sanatorium known as "The Orchards" and opened in nineteen hundred and six, accommodating fifteen patients or more, is also located in East Side borough. It comprises two cottages. They are built along the public highway and one of them is on the watershed of the run which supplies the reservoir used in connection with the Sunnyrest water works. The upper end of this reservoir is at the edge of a small swamp abounding in springs. The public highway here is on the edge of this swamp and immediately beyond it, opposite the swamp, is the cottage from which sewage is drained to a cemented vault with an overflow to a percolating cesspool within fifty feet of the swamp. The kitchen drainage and wash water is drained to another cesspool about fifty feet from the swamp. Within a hundred feet of the percolating cesspool receiving sewage is a dug well on about the same level. It seems possible that both this source and the reservoir supply might be polluted by sewage from this cottage.

The second cottage is on the highway below the reservoir. All waste water is apparently satisfactorily disposed of in a cemented cesspool with overflow to a percolating one sunk deep in the rock.

EAST SIDE VILLAGE.

East Side borough is without water works or sewerage. The inhabitants derive their drinking water from domestic wells and the ordinary methods of sewage disposal by cesspool, privy and the surface of the ground prevail. There is a deep driven well at the Sunnyrest Sanatorium which is used as an emergency supply. The gravity source is cheaper and is thus preferred.

There can be no doubt that the poisons eliminated from the bodies of those afflicted with tuberculosis are peculiarly dangerous and that health precautions demand that the tubercle bacilli should be killed as soon as possible before having an opportunity to infect animal life. Vegetables, fruits, water and milk are some of the mediums of transmission. The campaign against this disease is a campaign of prevention as well as of cure. Nowhere in White Haven or the vicinity should sewage or dirty laundry water or household drainage be deposited in such a way that it can reach through surface or underground channels any drinking water. The subterranean passages may not be known. Underground water may travel from a cesspool high up the hillside to some domestic well or driven well. The cases where the pumping of large quantities of water from the ground have affected the flow in wells and dried up springs whereon a large radius are so numerous and cover so many kinds of geological formation that it has come to be accepted as a dangerous expedient for any one to seek a source of drinking water from the ground in the vicinity of habitations. The driven well at the foot of the mountain below the sewage trenches at the Free Hospital for Poor Consumptives is objectionable on this score. So is the reservoir supply at Sunnyrest and the dug well at the Orchards. Any domestic well supply in White Haven or East Side is suspicious. The sludge pit at one of the sanatoria is dangerous and the material if used at all for fertilization should be under conditions where the garden truck cannot possibly come in contact with the manure. It is safer by far to destroy the sludge by fire. The pit should not be in the neighborhood of dwellings.

A happy local solution of the problem would be for the borough of White Haven to install a sewer system and a purification plant so located and designed that it would be adapted to receive and purify the sewage of the entire district, including that from the sanatoria.

White Haven borough has an assessed valuation in nineteen hundred and seven of five hundred and sixty-five hundred thousand, seven hundred and sixteen dollars, so it is reported. There is said to be no bonded indebtedness, and hence, based on these figures, the municipality can borrow nearly forty thousand dollars. Provided the sewers were built under the assessment plan a very complete system of sewers and disposal works could be provided.

The Lehigh River rises twenty-five miles northeast of White Haven in the southern part of Wayne County and drains a mountainous country of about three hundred and twenty-five square miles above White Haven on which there are several lakes used as ice supplies and on which there are numerous summer resorts. White Haven is the first place of consequence on the river. Below, the stream follows a winding course of sixty miles to its junction with the Delaware River at Easton. At Catasauqua, forty-two miles below White Haven, a water company obtains its supply for a part of the time from the Lehigh River and furnishes it to the boroughs of Alliance, Coplay and Catasauqua. At South Bethlehem, fifty miles below White Haven, water is taken from the river and supplied to neighboring municipalities including a part of Allentown.

The drainage from coal mines and washeries hereinbefore mentioned because of its acidity and precipitating quality may tend to clarify the Lehigh River at times. The towns along the banks now discharge sewage into the stream, but this practice is being changed. Sewage deposited in the river at White Haven might easily reach the water works intake at South Bethlehem in a few hours and while in active pathogenic state be introduced by the water works system into the homes of the citizens and there cause sickness and death. So permission to discharge untreated sewage into the Lehigh River should not be granted.

It has been determined that the local authorities be advised, and they are hereby and herein advised, that they secure the employment of an expert engineer to design a sanitary sewer system which should include a purification plant advantageously located to receive and treat the sewage of both boroughs and the sanatoria.

Provided the borough council will not undertake such an improvement, then every private estate in White Haven borough will be compelled, in the interests of public health, to build proper receptacles for sewage and to properly maintain said receptacles.

The cesspools at the Orchards should be abandoned and new receptacles should be built below the water shed of the reservoir supplying Sunnyrest Sanatorium, and the owners of these places will be so notified.

A modern sewage treatment plant should be provided at the Free Hospital for Poor Consumptives, provided a joint sewage plant be not feasible. The present septic tanks may be used, but the plant should be so constructed and be water tight, so that the entire bulk of the liquid may be watched in its progress of treatment, admitting of the positive knowledge at the outlet that the effluent equal in volume to the inflow, is pure and free from pathogenic poison and suitable to go into the waters of the State. The proper officers of this institution will be notified accordingly.

The Sunnyrest Sanatorium disposal of household drainage into street gutters or over the river banks should be discontinued. It would be better if the cesspools from this property were abandoned and that all sewage should be delivered to the main sewer in White Haven leading to a common purification plant, and the proprietor might with advantage to himself urge the borough council of White Haven to inaugurate a public sewerage system. The Commissioner of Health will issue a decree with respect to these matters.

The White Haven Water Company will be requested to submit satisfactory plans of its water works system and a more complete report than is now on file in the office of the State Department of Health. Any sources of pollution along the river above the dam and the canal from which the water company takes its supply for the railroad yard and for the town in emergencies should be reported to the water company and the State Department of Health.

And, in conclusion, the proper persons or managers of the four sanatoria will be notified as to the facts and conclusions of this investigation and the local authorities are hereby informed that the State Department of Health will be glad to advise with respect to the proposed sewerage improvement and sewage disposal project.

Harrisburg, Pa., July 24th, 1908.

WICKBORO, ARMSTRONG COUNTY.

This application was made by the Borough of Wickboro, Armstrong County, and is for permission to extend its sewers and to discharge the sewage therefrom into the Allegheny River within the limits of the borough.

Wickboro borough is a part of the community or old time settlement known as Kittanning, the county seat of Armstrong County. There is, along the river here, a stretch of flats on which the residences and business section of the town are located,

Back from the flats the ground rises up the slopes of the hills and on these slopes residences have been erected. That part of the community north of the borough of Kittanning and contiguous thereto, is known as Wickboro. Here reside between fifteen hundred and two thousand people. The Buffalo and Allegheny Division of the Pennsylvania Railroad extends along the flats near the river, there being one road only between the railroad tracks and the river bank. The principal part of Wickboro is in that section close to the Kittanning boundary. In the central part of the municipal territory, between the river and the railroad, are located the industrial plants comprising the Wickboro Mirror Factory, the Pennsylvania China Company, the Kittanning Plate Glass Company and the Kittanning Brick and Fire Clay Company, all important works, and contributing not only to the support of the inhabitants of Wickboro borough but to those living in Kittanning.

North of these plants, in the upper part of the borough on the flats, is a settlement, and it is here, at the foot of Colwell Street, that there was formerly located and operated a water works plant. At the present time the pumping station is not in use, but it is held in reserve for emergency purposes.

The water is pumped from the river to the reservoir on the hill or forced directly into the water pipe system. The inhabitants are largely supplied with public water furnished by the Armstrong Water Company, and the supply is partly from springs on the hills and partly from the Allegheny River; the intake being located in the central part of Kittanning borough above the county bridge at the foot of Market Street. The water is subjected to filtration before being supplied to the consumers.

In the settlement in the vicinity of the old Rayburn Water Company's pumping station above mentioned, there are sewers in the public streets which have a twenty-four inch outlet into the river below the station. Connected with this system are forty-two hundred and fifty feet of sewers, of which the eight inch comprises seven hundred feet, the ten inch four hundred feet, the twelve inch one thousand four hundred feet, the fifteen inch seven hundred feet and the eighteen inch seven hundred feet.

In the central section of the borough there is a twenty-four inch sewer outlet to the river at the foot of Montieth Street. Connected to this system is a total of ten thousand eight hundred and forty feet of sewer whose diameters range from eight to twenty-four inches, of which the eight inch comprises seventeen hundred and sixty feet, the twelve inch thirty-nine hundred feet, the fifteen inch fifteen hundred feet, the ten inch sixteen hundred feet and the eighteen inch eleven hundred feet. In this district practically every street has a sewer in it.

In the southern section of the borough adjacent to Kittanning there are sewers which have an outlet into the Kittanning borough sewer which empties into the river at the foot of Union Avenue. The contributing sewers lying in the streets within Wickboro borough comprises a total length of seventeen hundred feet, all twelve inches in diameter.

The sewers of these three districts take surface water from the street gutters, water from the roofs of houses and sewage proper. Their outlets are all above the intake of the Armstrong Water Company. So are also other sewers in the borough of Kittanning.

Judging from the sizes and the fact that the waters from the hillsides are delivered during heavy rainfalls onto the flats in torrents, at times the sewers must be incapable of effectually removing all of the surface waters which accumulate on the streets.

Undoubtedly, as the district grows in population and resources, improvements will be demanded and adequate conveyance of storm water to the river will be effected. This may, perhaps, be best accomplished by pipes laid for the specific purpose of surface water removal only.

Whatever industrial wastes and sewage are produced at the shops and mills are discharged directly into the river.

The applicants propose to build a sewer outlet twenty-four inches in diameter into the river at a point immediately above the Kittanning borough line. Its principal object is to afford a relief for the surcharging of the existing sewers in the central part of the borough and to remove surface water, which accumulates on the low land at Johnston Avenue (which avenue is at the foot of the hill and the boundary line between Wickboro and Rayburn Township), between North Avenue and Highland Avenue. The plan contemplates the laying of a twenty-four inch pipe from said Johnston Avenue in North Avenue, Grant Avenue and thence across private property to the river. A connection is to be effected with the existing sewers in Grant Avenue. Abutting properties are to be permitted to connect with this line of sewer. The total number of such properties to be served is limited.

It is at once apparent that when the time shall have arrived for the cessation of the discharge of raw sewage into the Allegheny River at Wickboro and Kittanning borough, that economy and efficiency will demand a joint sewerage and sewage disposal project for both municipalities. Also that there shall be a separation to some practical degree, of surface water from household sewage.

The cost of treating mingled sewage and storm water is prohibitive. The wash of streets is not particularly dangerous, but the pathogenic poisons which come from the households are known to be a source of great menace to the public health. Towns and cities along the river below Kittanning are now using and must continue for all time to rely on the Allegheny River as a source of public water supply, and it is the policy of the State to bring about the gradual preservation of the purity of

streams which are used as sources of drinking water for the protection of the public health. In working out this policy involving improvements to existing sewers and the ultimate treatment of sewage, plans should be devised by local authorities and they should be adopted after approval by the State Department of Health and thereafter such additions and extensions, from time to time as may be needed, should be built in conformity with this comprehensive plan. In this way the gradual elimination of sewage pollution of the stream will be brought about.

The Department is not informed of the assessed valuation and bonded indebtedness of Wickboro, but it is represented by the petitioners that the borrowing capacity of the municipality is not sufficient to defray the cost of the erection of sewage purification works or of extended sewerage improvements at this time.

It appears that the proposed sewer improvements are much needed. The surcharging of the existing sewers is not only a matter of inconvenience and damage to those estates in the central part of the borough which are connected with the system, but also a menace to health. The small amount of sewage which may be contributed to these added sewers is an immaterial amount and would not measurably increase the pollution of the Allegheny River.

It has been unanimously agreed that the interests of the public health will be subserved by granting a permit, and a permit is hereby and herein granted, to the borough of Wickboro to make the proposed extensions under the following conditions and stipulations:

FIRST: This permit to discharge sewage into the waters of the State shall cease on May first, nineteen hundred and ten. If, at that time, the interests of the public health demand it, and the other terms of this permit shall have been complied with, the Commissioner of Health may extend the time in which sewage may continue to discharge into the Allegheny River.

SECOND: On or before May first, nineteen hundred and nine, Wickboro shall, either independently or in conjunction with Kittanning borough, prepare a comprehensive plan for the collection of all of the sewage of the borough and its conveyance to some point for the ultimate treatment of the sewage and submit such plans to the Commissioner of Health for consideration and approval.

The attention of the local authorities is hereby called to the fact that the epidemic of typhoid fever and stomach disorders of the winter of nineteen sundred and six and seven has been attributed to the sewage pollution of the Allegheny River water, and that, while the State Department of Health has done what it could to bring about the proper filtration of the public water supply of Kittanning and Wickboro boroughs and will continue to exercise supervision thereover, nevertheless, it is all important that the discharge of sewage into the river above the water works intake should be discontinued, and the borough officials should understand that it is the purpose of the State to require Wickboro borough and Kittanning borough to make changes in their sewer outlets at the earliest practicable moment, and to this end said local authorities are urged to prepare the plans called for during the current season and as early as possible.

Harrisburg, Pa., May 4th, 1908.

WINTON, LACKAWANNA COUNTY.

This application was made by the borough of Winton, Lackawanna County, and is for permission to install a system of public sewers and to discharge the sewage therefrom, untreated, into the Lackawanna River within the limits of the borough.

It appears that Winton borough is located on the easterly bank of the Lackawanna River, northeast of the centre of Lackawanna County about seven miles above the city of Scranton. It is bounded on the northeast by Archbald borough and Jefferson township, on the southeast by said township, on the southwest by Olyphant borough and on the northwest by said borough and the boroughs of Blakely and Archbald. It contains about six and a quarter square miles. Within the incorporated territory there are two settlements both along the banks of the river in the extreme western part of the borough. The upstream and smaller settlement is the village of Winton, occupied by people engaged in mining coal in the vicinity, and the down-stream settlement bears the name of Jessup. It is here that the stores and offices are located. The balance of the area within the borough limits is wild mountain land, not likely to be built upon.

The population of about five thousand is chiefly in Jessup. Not over two hundred people reside in Winton village. There are a few scattered dwellings elsewhere in the municipal territory. Outside of one silk mill the industries are entirely coal mining operations.

The Delaware and Hudson Railroad passes through Winton borough along the east bank of the river. The New York, Ontario and Western Railroad follows the river along the westerly bank through the borough of Blakely. The Delaware, Lackawanna and Western Railroad has coal mine switches in the town.

The principal natural water course tributary to the river is Grassy Island Creek. It rises in the mountains at the southeasterly part of the borough and flows northwest and empties into the Lackawanna River midway between the village of Winton and the village of Jessup. Storrs Creek rises in the southerly portion of

the borough, flows west into Olyphant borough, thence north into Winton and thence west and empties into the Lackawanna at the west corner of Winton borough.

Coal operations are located along both of these creeks and empty mine drainage into them.

The public water supply in the town is furnished by the Scranton Gas and Water Company, which controls and operates the source of supply belonging to the Winton Water Company, and the pipe lines in the streets belonging to the Olyphant Water Company. The supply is impounded in three reservoirs on Grassy Island Creek or its tributaries and is furnished by gravity. The coal companies are the largest consumers. Although there are water mains on practically all of the streets, nearly one quarter of the population use water from shallow wells dug through six to eight feet of clay and boulders into a bed of water-bearing sand.

There is one sewer in town built by private parties and recently taken over by the borough. It is in Jessup and runs from the silk mill to the river. Eight houses and a mill have a connecton and more may follow.

Privy vaults are in common use. Sink water and other house drainage is run to open street gutters.

The territory for which a sewer permit is asked covers a part of the village of Jessup only, comprising portions of the area tributary to the proposed Church and Mill Street intercepting sewer. When the system is extended to take in all the built-up area, it will serve approximately one square mile. This district is naturally divided into four drainage areas, namely, the territory tributary to the Back Road, to Church Street, to Hill Street and to the part of the town between the Delaware and Hudson Railroad and the river known as the flats. It is reported that none of the territory is subject to overflow at time of flood. All of the sewers can drain to a common outlet.

Bridge Street is so named because it is a thoroughfare extending across the river into Blakely borough and it is in this street, at the bridge, that the present sewer outlet is located. Its grade may be too low to admit of connection with the proposed twenty-four inch pipe outlet from the new system. This new outlet will be into the river down stream about six hundred feet below the bridge. The Department is not reliably informed, however, whether it be possible by gravity to connect up the existing borough sewer and the proposed sewer with a sewage purification plant admitting of the deliverance of the sewage by gravity to such plant; however, it is evident from the data at hand that the sewage may all be collected at one point and there lifted to purification works.

The main sewer is to serve sanitary sewers only. The entire system has not yet been entirely developed in plan. But the sewers as now laid out comprise the district where there is a demand at present for sewers.

The Lackawanna River at the proposed sewer outlet, on June twenty-third of the current year, was flowing with a surface velocity of about two and one-quarter miles per hour with an average depth of about one foot and a width of twenty feet.

Along the river and its tributaries numerous coal mines and washeries are located and all of the mine water and much of the washery waste is drained into it. Carbondale, with a population of twenty-two thousand, discharges its sewage into the river and so do many of the other municipalities on the river above and below Winton. Blakely borough is now engaged in preparing plans for sewers. It seems quite the economical and efficient thing for Blakely and Winton boroughs to adopt a joint outfall sewer and sewage disposal project and build a joint outfall sewer from year to year in conformity with such a plan. The Department is not informed as to the financial standing of Winton borough, but it is understood, in a general way, that the municipality is not in a position at this time to assume the expense of sewage disposal works. Since permits have been issued to several of the boroughs in Lackawanna River valley to temporarily discharge sewage into said river under stipulated conditions, there would appear to be no reason why similar right should not be granted to Winton.

It has been determined that the interests of the public health will be subserved by granting a permit for the proposed sewer system and such a permit is hereby and herein granted, under the following conditions and stipulations:

FIRST: That all storm water shall be excluded from the sewer system. Inspection manholes shall be placed upon the sewers at all street intersections and at changes of line and grade. A careful record shall be kept of all connections with the sewer system. At the close of each season's work a plan of the sewers built during the year, together with any other information in connection therewith which may be required, shall be filed in the office of the State Department of Health, to the end that the Commissioner of Health may be always informed of the extent of the sewer system and the public use thereof.

SECOND: This permit to discharge sewage into the waters of the State shall cease on the first day of January, nineteen hundred and ten, provided, however, that up to this time the other conditions of this permit shall have been complied with. If, on said January first, nineteen hundred and ten, all of the conditions of this permit shall have been complied with, then the Commissioner of Health may extend the time in which the borough sewage may be discharged into the waters of the State, having in mind always the general policy of the State with respect to discharge of sewage from the various municipalities in the Lackawanna River valley.

THIRD: On or before January first, nineteen hundred and ten, the borough of Winton shall, either alone or in conjunction with one or more other municipalities in the Lackawanna valley adjacent to said Winton borough, consider and perfect some plan for the disposal of sewage other than into the Lackawanna River, and submit this plan, together with a plan for the complete sanitary sewer system for Winton borough to the Commissioner of Health for approval.

FOURTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the sewer system or any part thereof has become prejudicial to public health or a menace, then such remedial measures shall be adopted as the Commissioner of Health may approve or advise.

Harrisburg, Pa., July 29th, 1908.

YEADON, DELAWARE COUNTY.

This order and decree was issued to the borough authorities of the borough of Yeadon, Delaware County, Pennsylvania, and is in response to a communication received from the President of the Borough Council of Yeadon, relative to the discontinuance of the discharge of sewage into the waters of the State within the said borough and elsewhere.

The following is a copy of said communication:

"I would respectfully call your attention to the dangerous condition of Cobb's Creek, from Market Street south to the dam at Woodlawn Avenue, between Philadelphia and Delaware Counties. West Philadelphia empties a number of sewer mains into the creek and new houses by the hundreds are being added to these mains every month, until, during the whole summer, the odor emanating from the creek has been simply unbearable.

"A nasty sewage scum has covered the surface of the creek for perhaps half a mile running north from the dam at Woodlawn Avenue until the recent rains.

"There is a widespread complaint upon the part of the residents in this immediate vicinity, and I felt that you were the proper official to appeal to, to start the machinery necessary to abate the nuisance.

"The 'Philadelphia Press' has (in its column "In and about the City" and editorially) condemned the condition of the creek in a vigorous manner.

"The officials of the borough of Yeadon will no doubt be glad to render you aid in prevailing upon the proper authorities to remedy this evil.

"Will you kindly advise me at the earliest convenience, and oblige?"

As a result of this communication, the Commissioner of Health called the attention of the Department of Public Works of Philadelphia to the condition of Cobb's Creek, and to the law of April twenty-second, nineteen hundred and five.

On September twentieth, nineteen hundred and six, the Secretary of the Board of Health informed the Commissioner that the borough engineer had called at the Harrisburg office and been advised that one of the Department's representatives would visit Yeadon and make a personal inspection, which inspection was subsequently made both in the fall of that year and in April of nineteen hundred and seven.

The borough of Yeadon is a residential community of about one thousand population located in Delaware County immediately west of the City of Philadelphia, being bounded on the south by Darby borough, on the west by Darby Creek, separating it from Darby and Upper Darby Township, and on the north by the borough of Lansdowne and Upper Darby Township.

The territory so incorporated has a frontage on Cobb's Creek of nearly two miles. About three-fourths of the municipal area is undeveloped land. The built-up part is in the north near Lansdowne, and also easterly near Fernwood Station on the Central Division of the Philadelphia, Baltimore and Washington Railroad. There is only a small portion of this road in Yeadon borough, in the northeast corner of the town. Baltimore Avenue, just north of said railroad and paralleling it, and called the Delaware County turnpike, west of Cobb's Creek, crosses said Creek at the extreme northeastern corner of Yeadon borough. Fernwood Station is about midway of the borough line and the settlement there is partly in the township and partly in the borough. The locality is drained by a small run which rises just west of the station and flows southerly through Yeadon borough about a mile and a half to Cobb's Creek. The point where it empties into the Creek is at the Baltimore and Ohio Railroad about eight hundred feet above Darby borough line.

Upper Darby Township is a first class township. Its Board of Commissioners have not made any report relative to sewerage, so it is not known whether Fernwood settlement in the township is provided with sewers, but if so, they would naturally discharge into the Yeadon borough sewers, which sewers begin in this settlement at the borough line, and are laid in most of the streets in the borough territory draining to the run. The outfall sewer is twenty-four inches in diameter for this eastern and central district, extends down the valley of the run to Cobb's Creek and into Darby borough for a distance of about nine hundred feet, discharging into

Cobb's Creek below the dam in the vicinity of Woodland Avenue. This dam marks the upper limits of tidewater. The borough of Darby has made two sewer connections to this main.

The outfall is seventy-one hundred feet long, and connecting with it are sixteen thousand four hundred feet of lateral sewers.

In the extreme western end of Yeadon there is a small district in which sewers are built totaling five thousand feet and connecting to a twenty-four inch outfall sewer beginning at the Lansdowne borough line and extending down the east bank of Darby Creek and through Darby borough to near the Baltimore and Ohio Railroad, where it empties into Darby Creek. The total length of this outfall is seven thousand feet.

Connecting with this line at Lansdowne is the main sewer of the Lansdowne borough system by the eastern district, comprising all told, six miles of lateral sewers.

There are sewers in the western part of the built-up portion of Lansdowne which appear to empty into the creek through a sewer at Baltimore Avenue.

Where the Yeadon outfall empties into Darby Creek, it is tidal water. It was the intention of the borough to build this sewer down stream about half a mile further and discharge at a point in Colwyn borough opposite where the sewers of Sharon Hill now empty; but litigation with the borough of Darby respecting this sewer or the use thereof, and with property owners about the right of way has prevented the completion of the work.

The present outlet is throttled, the opening being eight inches in diameter instead of twenty-four inches, which causes the main to fill up and overflow at a manhole in the bank of the creek adjacent to Main street in Darby borough. This is in the heart of the town, where thousands of people daily pass. The gases emitted from this overflow are noticeable even in the shops and offices some distance away. A nuisance exists here which should be abated.

It is reported that eight-tenths of the population in Yeadon use the sewers there and most of these live in dwellings connected to the eastern outlet which empties into Cobb's Creek. A very large percentage of the flow in the western outlet is contributed by the borough of Lansdowne.

Cobb's Creek rises in Lower Merion Township, Montgomery County, and flows generally southerly to its confluence with Darby Creek, where, in the forks, is located Colwyn borough. Darby Creek rises in Easttown Township, Chester County, and flows in a general southeasterly direction about fifteen miles to its junction with Cobb's Creek. It has a watershed above this point of about thirty-six square miles, and Cobb's Creek has a watershed of twenty-two square miles. Both streams are badly polluted with sewage. At Woodlawn Avenue, Cobb's Creek receives the sewage of the rapidly growing part of Philadelphia known as Paschallville, through a structure five and five-tenths feet in diameter. Passing up stream in the vicinity, in Greenway Avenue, there is a four and five-tenths foot sewer. About a mile and a half up stream there is another outlet eleven feet in diameter, known as Thomas Run sewer, which serves quite an extensive area as far north as Market Street. In the vicinity there is also a sewer outlet four and five-tenths feet in diameter at the foot of Sixtieth Street and extending up Chester Avenue.

At Baltimore Avenue there is a new sewer five feet in diameter. Above Baltimore Avenue, at Market Street, the Robinson Street system outlet, six and five-tenths feet in diameter, is located, and just below it, in Spruce Street, there is a combined sewer outlet three and twenty-five hundredths feet in diameter.

All of these structures are in the city of Philadelphia and they receive both sewage and storm water.

Cobb's Creek is located in a narrow, winding and, in portions, well-wooded gorge, upon whose banks in Delaware County outside of the boroughs mentioned, there are extensive cemeteries, and upon whose banks and adjoining table land in Philadelphia building operations are intensely active, and a well built up residential district is assured. The stream is already badly polluted by sewage, and in summer time, when the natural flow would be naturally small, a considerable portion of its volume is undoubtedly discharged from the city sewers.

Above Market Street there is an important tributary called Indian Run, whose east and west branches are largely in Lower Merion Township and drain Narberth borough, Ardmore and Wynnewood village in Lower Merion Township, and come down through Overbrook and Haddington villages in Philadelphia to the main creek. This run receives the flow of two sewers in Philadelphia, and some pollution from Narberth borough. One of the sewers in Sixty-fifth Street is connected with the Lower Merion Township outfall sewer, which is twenty-four inches in diameter, and takes house sewage only. The city sewer into which it discharges is six feet in diameter; it empties into the east branch of Indian Run. The other sewer is at the foot of Lebanon Avenue. The run also receives industrial wastes and altogether they render the waters extremely foul and a menace to public health.

The State Department of Health has approved plans for a four and five-tenths foot sewer called the Cobb's Creek intercepter, and it is now being constructed along the east bank of Cobb's Creek from a point just above Darby Creek, a distance of about eight thousand feet. It will intercept the Woodlawn Avenue and Greenway Avenue city outlets, and also all new main sewers laid in the district within the limits of Philadelphia. The city contemplates the extensions of this intercepter up the valley of the creek and Indian Run to the city line. All dry weather flow is to be diverted into this structure, and also the first flush of storm water.

The approval of this intercepter by the Commissioner of Health was given with the following stipulation:

"That the city shall, on or before the year 1912, prepare and submit to the State Department of Health for approval, a comprehensive sewer plan for the collection and disposal of the sewage of the entire Cobb's Creek drainage district within the limits of the city of Philadelphia and elsewhere, if this be found desirable, and that the city shall, in conjunction with the State Department of Health, consider the feasibility of so laying out such a comprehensive system that it may be adapted to receive and dispose of the sewage from municipalities in the drainage district outside of the city limits."

Darby Creek below Colwyn and Cobb's Creek flows through salt marshes (which are flooded more or less at high water) for a distance of about six miles to the Delaware River. The course of this stream is about parallel with the river and the territory is unoccupied save by numerous boat houses along the bank. Boating and fishing are extensively engaged in. Two and a half miles below the mouth the city of Chester takes its water supply out of the river.

The city of Philadelphia is now studying a plan to carry the Cobb's Creek intercepter easterly through a tunnel or otherwise to the Schuylkill River sewerage system, which would obviate all pollution of Cobb's Creek by city sewage.

The city has also planned to build a Parkway up Cobb's Creek valley and the preemption of the valley for Parkway purposes precludes the location therein of sewage disposal works. So the town in Delaware County draining into Cobb's Creek must find some other means for the disposal of sewage than into the creek, either by connection with the city's intercepter or by the construction of a new intercepter.

However, Yeadon's and Lansdowne's sewage creates a nuisance in the boroughs of Darby and Colwyn and contributing to this nuisance there are also sewer outlets from the latter boroughs and Sharon Hill. The interest of the public health demand in justice that all these sewages should be intercepted and disposed of in some other way than into the creek. Common sense would dictate that both efficiency and economy would be subserved by a joint sewer project and joint works for the disposal of the sewage.

The Department of Health has been instrumental in bringing about sewerage plans in Philadelphia partly for the benefit of the citizens of Yeadon borough and surely the citizens of this borough should recognize the justice of something being done to bring about an improvement of conditions along Darby Creek.

Yeadon borough failed to submit a satisfactory report and plans of its sewer system in compliance with law. Even at this late date the Department does not have on file a satisfactory plan of the existing sewer system showing sizes, grades, etc., and therefore the borough cannot claim the right to exemption under the law. Its sewage is being illegally discharged into the waters of the State if the Department of Health orders the discontinuance thereof.

The financial ability of the borough to assume an obligation for sewerage improvement is not known to the Department, a request for this information not having been complied with.

It has been determined that the interests of the public health demand that the discharge of sewage into the creeks from the borough of Yeadon should be discontinued and that the borough be given until October first, nineteen hundred and eight, in which to prepare either independently or in conjunction with other municipalities, a plan for some other disposal of the sewage than into the two creeks and submit the same to the Commissioner of Health for approval, all of which is herein and hereby ordered and decreed.

Harrisburg, Pa., January 28th, 1908.

YOUNGWOOD, WESTMORELAND COUNTY.

This application was made by the borough of Youngwood, Westmoreland County, and is for permission to install a system of sewers and to discharge the sewage therefrom untreated into the waters of the State.

The borough of Youngwood has a normal population of approximately two thousand which fluctuates according to the conditions of the times, and has reached as high as twenty-three hundred. It is entirely surrounded by Hempfield Township and is about four miles south of Greensburg. The West Penn trolley system between Greensburg and Brownsville, Fayette County, passes through this borough, so does the southwestern division of the Pennsylvania Railroad, and the Sewickley Branch of the same line. It is at this place that the crews for the freight and coal trains from the coal fields in Fayette and Westmoreland Counties, passing over these branches, change, in consequence of which the municipality has developed into a railroad town. There are no other industries in this town.

Some of the citizens find employment in the several iron mills at Greensburg. At the present time, owing to the letup in railroad business, the borough population has been reduced and there are a number of vacant houses.

Jack's Run, a local stream, rises in the northwestern part of the township, flows southerly through Greensburg, where it receives the sewage of that place, continuing southerly, it passes for the entire length of the borough through the eastern part of Youngwood and empties into Big Sewickly Creek a mile below the

village. It has a watershed of twenty-seven square miles and total length of nine miles. On this area there are a number of coal mines from which acid wastes are drained into the stream. On Big Sewickley Creek above the mouth of Jack's Run there are also many extensive mine workings in operation.

The main part of Youngwood is built on the flats along Jack's Run, but some of the residences have been located on the hillside. There are sewers in the borough and also, according to reports, there are ten dug and drilled wells. Most of the inhabitants derive their drinking water from the Westmoreland Water Company. This corporation furnishes the borough of Greensburg and contiguous country. The source is from mountain streams.

The most densely populated district of the borough is sewered, the sewers being owned by Messrs. Rutherford and Dick, of Scottdale, Westmoreland County. This system includes a twenty-four inch outlet in Jack's Run about five hundred feet below Depot Street. The system is combined. Tributary to the outlet are three and one-tenth miles of sewers ranging from eight inches to twenty-four inches. The Department is not in possession of plans showing the details and the different sizes of pipes in this system.

During nineteen hundred and seven, without permission, as required by law, the sewer system of this company was extended on several streets a total distance of about fourteen hundred feet.

Beyond the sewer district, kitchen drainage is permitted to reach the street gutters and therein causes stagnant pools and objectionable odors. In the south end this custom prevails and in the district there are some two hundred privies. The borough proposes to provide a system of sewers for this part of Youngwood.

The plan calls for a twenty-four inch outlet into Jack's Run, two hundred and fifty feet below Low Street, which is in the south end. Tributary to this sewer there is to be eleven hundred and fifty feet of twenty-four inch, seven hundred and forty feet of twelve inch, and six thousand feet of ten inch pipe. The system is to be provided with lamp holes and manholes for inspection and ventilation. Flushing is to be accomplished by means of fire hose. Although Jack's Run is an extremely acid stream, there is no evidence of sewage pollution in its course through Youngwood, although Greensburg sewage is emptied therein four miles above. How long the water courses of the district will remain acid is problematical. At the present time the acidity of the waters must act as a powerful germicide on the sewage discharges into the creeks, but when, if ever, the streams assume their natural condition of fresh water or even now during freshets sewage from Youngwood may be transmitted down stream sixteen miles by Big Sewickley Creek to the Youghiogheny River, from which, at a point fourteen miles further on, the city of McKeesport draws water for the supply of its citizens.

It cannot be doubted that Youngwood borough should, in the interests of efficiency and economy, build the sewer system at this time in anticipation of the ultimate treatment of its sewage when the time shall have arrived that the interests of the public health clearly demand that this should be done. At the present time the borough is financially able to build a sewer system and also a purification plant, but until Greensburg shall have provided a plant for the treatment of its sewage, it would seem unjust to force Youngwood to assume this expense, owing more especially to the present ability of the waters of the region to clarify sewage. It is quite possible that a joint disposal works for both Greensburg and Youngwood would be the most efficient and economical plan.

The private sewer system in Youngwood now receives both sewage and storm water. The public sewers should not be designed to remove surface water because it is impracticable to treat both sewage and storm water, owing to the prohibitive cost involved. The laying of small pipes in the streets will accomplish two things: First, it will provide at a given sum household sewerage facilities for a much larger area than if larger storm drains were provided; and second, it will prove a more efficient system because such sanitary sewers are more even in operation, are not subject to surcharging, back-flooding, breaks and repairs incident to a combined system. And finally when the sewage must be treated, the only expense involved will be that of attaching the sewers to the disposal works.

The sewage now discharged by the private sewer system into Jack's Run must also be treated when the order shall be issued for the discontinuance of the discharge of all sewage, into the streams in the valley, and at that time changes, but to what extent the Department does not know, must be made in such private system. It would be a good plan for the borough and the sewer company to work in conjunction in laying out a comprehensive plan so that ultimately the two might have a common place for disposal.

The point cannot be emphasized too clearly that in treating sewage, especially in places the size of Youngwood, it is essential that the storm and roof water should be excluded from the sewers. It has been found more economical to build sewers for the accommodation of sewage only and storm water drains for the accommodation of storm water only.

It appears that the sewerage company has not filed plans or a report in the office of the Commissioner of Health.

It has been determined that the interests of the public health will be subserved by granting a permit for the proposed installation of the sewers and such permit is hereby and herein granted under the following conditions and stipulations:

FIRST: That all roof and storm water shall be excluded from the sewer system.

SECOND: The sizes of the proposed sewers may be safely reduced very materially. A ten-inch pipe outlet for the south end of the town is ample in size.

THIRD: Since the plans now proposed do not show sizes and grades, the map accompanying the petition being not much more than an outlined sketch, it is stipulated that on or before August first, nineteen hundred and nine, the borough shall prepare a plan for a comprehensive sewerage system for its entire territory and submit the same to the Commissioner of Health for approval. Such plans may be modified, amended or approved by the Commissioner of Health.

FOURTH: This permit to discharge sewage into the waters of the State shall cease on the first day of August, nineteen hundred and nine. If on said date the borough shall have submitted the said comprehensive sewerage plan and have complied with the other conditions of this permit, then the Commissioner of Health may extend the time until August first, nineteen hundred and twelve. If on said date it appears to the Commissioner of Health that the interests of the public health will be subserved by such further extensions, then such extensions may be given.

FIFTH: If at any time, in the opinion of the Commissioner of Health, the sewer system, or any part thereof, shall have become a nuisance or menace to the public health, then such remedial measures shall be adopted by the borough as the Commissioner of Health may approve or suggest.

SIXTH: No pathogenic material from any laboratory shall be discharged into the sewer system. The proper authorities shall cause these wastes to be destroyed on the premises.

SEVENTH: On or before August first, nineteen hundred and nine, the borough shall submit a plan, either independently, or with the private sewer company hereinbefore mentioned or with the borough of Greensburg, showing the location of the site for the treatment of its sewage and an outline plan of the scheme for delivering the sewage to said site and its treatment therein with estimates of cost, to the Commissioner of Health for approval. The said Commissioner will carefully consider the proposition and will fix the time in which sewage shall be discontinued from being discharged into the waters of the State in the region, and the borough of Youngwood will not be required to treat its sewage earlier than other municipalities in the region are required to treat their sewages.

Harrisburg, Pa., August 25th, 1908.

ZELIENOPLE, BUTLER COUNTY.

This decree is issued to the borough of Zelienople, Butler County, in respect to sewerage.

It appears that on August twenty-sixth, one thousand nine hundred and seven, the borough of Zelienople, Butler County, submitted the following application:

"To the Honorable Health Commissioner of the State of Pennsylvania:

"The petition of the borough of Zelienople, by the undersigned, its attorney, duly authorized so to do, respectfully represents: That it is a municipal corporation of the State of Pennsylvania located in Butler County, having a population of about twelve hundred, with a system of sanitary sewage emptying and flowing into Connoquenessing Creek, a draft and description of said sewer system having been filed with the State Board of Health and is by law required, the said municipality proposed to extend its sewer system by the construction of an eight inch sanitary sewer upon and along Clay Street, in said borough, from Culvert Street to Spring Street, connecting at Spring Street with the main sewer and also along and upon Main Street from a point near the southern boundary line of the borough to a point near Culvert Street, there to connect with the present sewer upon Main Street.

"It therefore prays that permits be granted by your Honorable Board for the construction of the said two sewers and the extension of the system. And it will ever pray, etc."

On May twenty-eighth, one thousand nine hundred and eight, another application for sewer extension was received by the Commissioner of Health. It was as follows:

"The Borough Council has received two petitions for sanitary sewers to be constructed by the property owners whose property abuts on Clay and Hill Streets. I enclose ordinances for same and make request for permits for same. The one on Mill Street will be one hundred and fifty-five feet long, joining Clay Street sewer, which will be eight hundred and eighty-five feet long, being started on or at the intersection of Clay and New Castle Streets, thence north on Clay and into the main trunk sewer we received permit for recently. The drawing will aid you in finding the route proposed. Along the Clay Street sewer proposed for sewer are twenty residences which contain eighty-nine inhabitants and on Mill Street three residences with eleven inhabitants and along the same street is situated the public square, i. e., a portion. On Clay Street there are nine lots which have not had buildings erected on them."

It appears that on September seventeenth, one thousand nine hundred and six, the Commissioner of Health issued a permit to Zelienople to construct a sewer system for a part of the municipal territory and to discharge the sewage therefrom into the Connoquenessing Creek at the foot of Clay Street under certain conditions, among which were the following:

"This permission to extend the sewer system and to discharge sewage therefrom into the Connoquenessing Creek shall cease on the first day of August, one thousand nine hundred and eight. If at that time the conditions of this permit have been complied with and the interests of the public health demand it, in the opinion of the Commissioner of Health, he may extend the time for said discharge in said creek.

"On or before the first day of August, one thousand nine hundred and eight, the borough shall prepare plans for the treatment of the sewage of the sewer system, and shall submit the same to the Commissioner of Health for his approval, who may modify, amend or approve the same and fix the time within which the same shall be constructed.

"This permit for the installation of a sewerage system, before being operative, shall be recorded in the office of the Recorder of Deeds for the county wherein the outlets for the said sewer system are located."

On May first, one thousand nine hundred and eight, the said permit had not been recorded, hence it was not operative. Up to this time the borough had not submitted a plan showing the location, size, depth and grade and manholes on existing sewers; but, on May eleventh, an unsatisfactory plan intended to convey this information was received in the Department.

On July fourteenth, one thousand nine hundred and eight, the following communication was sent by the borough solicitor to the Commissioner of Health:

"I regret that the occasion has risen to write you again in regard to sewage disposal matter of Zelienople borough, Butler County, Pennsylvania.

"In September, one thousand nine hundred and six, you granted said borough a permit to extend its sewer system upon condition that a sewage disposal plant be erected, and required plans therefor to be submitted to your Department for approval on or before August first, one thousand nine hundred and eight.

"Under date of June fifth, I wrote you asking an extension of this time because the borough was not in shape financially to erect such a plant, and in your reply you suggest that this is no reason for not submitting the plans according to the requirement of the permit.

"Upon receipt of your letter the borough authorities advertised for bids for plans and specifications to be submitted in accordance with the permit, and last night opened the bids, which are as follows: Trumbel and Miller, engineers, Pittsburgh, Pennsylvania, three hundred and ninety-five dollars; L. D. Tracy, Pittsburgh, Pennsylvania, four hundred and ninety-five dollars; Pittsburgh Engineering Company, four hundred and seventy-five dollars; J. G. Ross, Pittsburgh, Pennsylvania, twelve hundred dollars for plans and supervision; Ohio State Board of Health, Engineering Department, six hundred dollars, and Douglass and McKnight, six hundred dollars. The borough has not the money on hand, neither is the tax levy, which is fourteen mills, inclusive of bond tax, sufficiently large to pay so much for plans. Hence to accept either bid will increase the indebtedness of the borough, which council cannot do because the debt now is practically seven per cent. of the assessed valuation. A committee of citizens notified council if they accept a bid expending so much money they will restrain them by injunction.

"I am in full accord with the position of your department in striving to purify the streams, and feel that this matter should have been undertaken years ago, but I am at a loss to know what plan to advise in order to comply with the condition of the permit in regard to plans. I feel that the court will be obliged to restrain the council if it is taken into court and I cannot see any legal way for council to contract for the plans.

"Can you suggest any way and will you extend the limit in the permit to such time as the council, by honest and earnest effort, may be able to work a way out of the matter.

"I have only been attorney for the council for a few months, and am, therefore, not in any way responsible of lost opportunities, but must now deal with the problem as I find it."

Twelve miles below Zelienople, the borough of Ellwood City, with a population of eight thousand, takes its public water supply from Connoquenessing Creek in part. Plans for the purification of the water supply before the water is furnished to the public have been submitted for approval by the water company. When such plant is erected and put in operation, the danger will be partly minimized, but not obviated. It is recalled that the dreadful typhoid fever epidemic at Butler was caused through the temporary breakdown of the water purification plant in that place. Public safety from the health standpoint requires that sewage should be kept out of drinking water. It may be that the Legislature in its wisdom will see fit to appropriate money to help defray the erection of a sewage purification plant in towns situated as is Zelienople physically and financially.

The permit issued by the Commissioner of Health in one thousand nine hundred and six, was for a petty sewer extension. The applications for sewer extensions now under consideration call for a very material extension and will increase the pollution of the Connoquenessing Creek and add to the menace to human life in the Borough of Ellwood City. The petitioner does not show wherein the interests of

public health will be subserved by removing the poisons eliminated from human bodies in Zelienople on those estates not now connected to a sewer and depositing them in the drinking water which is the source of supply to a town of eight thousand people twelve miles distant.

The present method of disposal of sewage at such private places in Zelienople would appear to be less harmful than the method proposed. In any event, it can be regulated and controlled and it is the duty of the individual owner of every estate to properly dispose of the sewage without injury to his neighbor. Since the community, by constitutional limitation, cannot now assume the expense of a joint project of sewerage and sewage disposal, it becomes incumbent on the individual to assume the responsibility for the sanitary disposal of the wastes of his household.

It has been determined that the interests of the public health require that a permit for sewer extension be denied and permission is hereby and herein denied to the borough of Zelienople to make the proposed sewer extension.

The local authorities are hereby cautioned against permitting any private sewer discharge into the waters of the State within their jurisdiction. The importance of this subject cannot be emphasized too forcibly, more especially since it is apparent that the borough cannot in the immediate future erect sewage purification works unless the money therefor be forthcoming from an outside source. The policy of the Commonwealth to preserve the purity of the waters of the State for the protection of the public health dictates this conclusion under the circumstances.

Harrisburg, Pa., July 29th, 1908.

ZERBE TOWNSHIP, NORTHUMBERLAND COUNTY.

Trevorton Sewerage Company, Trevorton Village.

This application was made by the Trevorton Sewerage Company, of Trevorton village, Zerbe Township, Northumberland County, and is for permission to install a system of sewers in said village and to discharge the sewage therefrom, untreated, into Zerbe Run within the limits of said township.

It appears that the Trevorton Sewerage Company was chartered August thirteenth, one thousand nine hundred and seven, for the purpose of constructing and maintaining sewers in the village of Trevorton, Zerbe Township, Northumberland County.

This village is a mining settlement of about three thousand inhabitants, located in the valley of Zerbe Run, some time called Little Mahanoy Creek, about seven miles west of Shamokin on the Herndon Division of the Philadelphia and Reading Railway. The valley is narrow and deep, formed by parallel mountain ranges named Little Mountain, on the north and, and Big Mountain on the south. The ranges at the summits are one mile apart. Trevorton village lies at the foot of the mountains on the slopes. About seven-eighths of the population reside in the district south of the run. A few dwellings are located north of the run. Outside of the settlement the township is practically uninhabited. The men employed at the coal mines travel back and forth daily to the village. Besides the coal operation, there is a silk mill employing about eighty persons and the powder mill up the valley perhaps half a mile, where a few men work.

Zerbe Run has its rise about three miles east of Trevorton and its course is westerly to Mahanoy Creek, seven miles below Trevorton. At this confluence the main stream is at least one hundred feet wide and about three feet deep and flows at a rate of about three miles per hour. Five miles west is the Susquehanna River into which the creek empties near Herndon, after having pursued a tortuous course.

Between Big Mountain and a parallel range to the south named Mahanoy Mountain, is Bear Valley, the eastern part of which drains easterly to Shamokin, but the western part is drained northerly through the gap in Big Mountain to Zerbe Run. This stream is called Sulphur Run. It forms the western boundary of Trevorton village. Sulphur Run Gap is immediately back of the village at the west end. It is in this gap that the North Franklin colliery of the Philadelphia and Reading Railway Company is located. It is the only coal mine within a radius of four miles of Trevorton. The culm banks of the colliery extend along Sulphur Run to Zerbe Run and cover a large area.

The coal is mined in drifts and by shafts, so that mine drainage flows by gravity to the surface water courses, and by pumping also. It is reported that the pumpage amounts to two million gallons per twenty-four hours. It is reported that there is a virgin field of coal throughout the entire Bear Valley and that about half the field can be operated by the North Franklin Colliery, and on this basis, if the field continues as productive as that now being worked, it is estimated that between thirty and fifty years will elapse before the coal shall have been exhausted.

There is some coal on the north slope of Big Mountain below Trevorton. A new operation has been begun four and a half miles west of the village of Zerbe Run Valley.

Mahanoy Creek proper rises in Schuylkill County about forty miles east of Hunter's Station, where Zerbe Run branches from the creek. It drains extensive anthracite coal fields in which there are many active operations, and at the confluence of the creek and Zerbe Run the waters are inky black owing to the coal dust

therein. The amount of sulphur mine water in the stream is a very considerable volume. There are men at the Hunter's Run Station whose occupation is to dredge the creek for coal, and this appears to be a lucrative employment. Zerbe Run at its mouth and below Trevorton, shows marked indications of sulphur pollution; the channel has the characteristic yellow apearance.

It is under these conditions of stream quality and flow that the petitioner represents that there will be no harm to public health by the discharge of sewage into Zerbe Run at Trevorton.

It appears that the village is at present, and has been for some years, in an unsanitary condition. There are no records of disease available, either public or private, but it is stated that sickness has not been prevalent to a degree worthy of comment until recently particularly with regard to typhoid. On every property there is a well and an outhouse, and, owing to the porous character of the ground, contamination of the well water is liable to occur. Wells in the vicinity of stables and privies have been entirely abandoned in many instances. Nuisances abound in rear yards and alleys. Private house drains discharge on the surface of the street, where the water stagnates and produces disagreeable odors. Owing to the steepness of the land surface, privy vaults overflow from yard to yard. When heavy drains occur the town is washed free of filth. Thus it may be seen that a common sewer system would afford means for remedy.

There is a public water supply owned by the Trevorton Water Supply Company. The source is taken from springs on the north side of the valley and piped to a well, where the water is pumped into the street system in the village overflowing into a reservoir part way up the mountain side back of the town. There are not many consumers at the present time. The citizens prefer to use well water and run the risk of infection, and it may be that this practice will prevail until an epidemic shall demonstrate the danger of drinking water drawn from the ground in proximity to sources of sewage pollution.

The Trevorton Sewerage Company purposes to lay a sewer pipe line in Shamokin Street for its entire length. This is the principal highway in the village. The hotels, stores and offices are on it and nearly all the principal residences. It is elevated about fifty feet above the run. It is also proposed to build a pipe line in Market Street, which parallels Shamokin Street, and also in the alley between these two, each to discharge into an eighteen inch pipe to be laid down Eleventh Street from Shamokin Street, crossing Zerbe Run, and thence turning and passing down the valley to a point two hundred feet west of the junction of Sulphur and Zerbe Run, where the sewage is to be discharged untreated into the stream. The survey has not been made of the territory and no plans or profiles of the proposed lines have been submitted. A sketch outline accompanied the application. The petitioner states that the system is to be for house sewage only. No manholes are provided or flush tanks. Ventilation is not attempted.

In the section of the town proposed to be sewered there are said to be about two thousand people. It is expected that a small proportion only of the entire population will be afforded sewerage facilities at first, because of the expense attending the installation of improved household drainage.

Even if the entire population of the village were to contribute to the flow of the sewers, the proposed sizes of pipes are entirely too large. The dispensing with inspection manholes and flush tanks is proposed for economy's sake. It would seem, therefore, that the company should be glad to effect a further saving. Instead of an eighteen inch outlet a twelve inch pipe should be ample and instead of sewers fifteen inches and ten inches in diameter in Shamokin and Market Streets and the alley, the sewers need not be over eight inches in diameter. The profiles not having been submitted, the Department cannot further critically discuss the design.

There is only one house between Trevorton and Hunter's Station and this is some distance from the stream. The water being highly acid at the proposed point of sewage discharge and below the confluence of Zerbe Run with Mahanoy Creek, the pollutions by mine drainage are so much greater that the conclusion seems well founded that the discharge of Trevorton sewage as proposed into these waters would not measurably increase the danger to public health. However, this sewage during high freshet periods could be carried down stream to the intake of the city of Harrisburg's Water Works. Even the coal in fine pieces is transported this distance and deposited in the bed of the Susquehanna River. It is the purpose of the State to bring about less sewage pollution of the public streams; but in this case it would appear, owing to the peculiar local conditions whereby in the streams there are now chemical and germicidal influences at work which approach in their effectiveness the efficiency of a sewage purification plant, and in view of the necessity for improved sewage disposal works at the dwellings in Trevorton, over which there is pending an epidemic so long as present conditions exist, that public health would be subserved by permitting sewage to be emptied into Zerbe Run below Sulphur Run, provided there is no other expedient at this time. There is no way provided under the law, while Trevorton is a village in a township, for the people to obtain sewerage, except through the enterprise of private citizens. The venture is a business transaction, or is intended to be. Too great first cost is prohibitive; on the other hand, the construction of a sewer system according to ill-advised plans may commit the town, if it should ever become incorporated and thereafter purchase these sewers, to a costly blunder. Whoever builds the sewers should be required to plan a system comprehensive enough to admit of extensions to all parts of the territory now occupied by dwellings or likely to be so occupied in the future. Storm water should

be excluded from these sewers. They should be built water-tight and they should be designed to ultimately deliver the sewage to some point where it can be treated in apparatus admitting of regulating and control.

While it is not necessary to build sewers in the village to maintain the place in a healthful condition, nevertheless the cost of taking care of household drainage on each property is expensive and not as satisfactory as connection to a sewer system.

It has been determined that the interests of the public health will be subserved by granting a permit to the Trevorton Sewerage Company to install a system of sanitary sewers in the village of Trevorton and a permit is herein and hereby granted therefor on and only under the following conditions and stipulations:

FIRST: That all storm and roof water be excluded from the sewers and that great care be taken that the pipes shall be kept and laid tight. That inspection manholes shall be placed at street intersections and changes in line and grade, and provided with perforated manhole covers to afford ventilation and that proper facilities for flushing shall be afforded.

SECOND: That before any sewer is laid, the company shall prepare a comprehensive plan of sewerage for all of the village and for future extensions, showing the streets and alleys and their grades and the depth and grades and sizes of the proposed sewers and submit the same to the Commissioner of Health for approval, and until such plans shall have been modified, amended or approved the Trevorton Sewerage Company shall not build any sewer or sewers.

THIRD: The company shall prepare a plan and profile of the outfall sewer, and it shall show by plan or plans how it is proposed to treat the sewage and where, when the time shall have arrived for such treatment, if ever. In this work and the work of sewer design, the company's interests should be best served by the employment of a competent engineer.

FOURTH: After the plans shall have been submitted and approved, the Commissioner of Health may issue a permit for the temporary discharge of the sewage into the waters of the State for a term of three years, at the expiration of which an extension may be granted, if the interests of the public health demand such extensions.

The Commissioner of Health will examine the water of the wells in the town with a view of determining what wells are contaminated, and notifications should be served upon owners of such wells as may be found polluted. Such precautionary measures should be taken as may be found desirable to safeguard public health.

Harrisburg, Pa., July 2nd, 1908.

DESIGNS AND CONSTRUCTION.

THE ENGINEERING DIVISION DURING THE YEAR HAS PERFORMED CERTAIN WORK AT THE PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM RELATIVE TO THE CONSTRUCTION OF WATER WORKS, SEWERS, A SEWAGE DISPOSAL PLANT, GARBAGE DISPOSAL PLANT AND MISCELLANEOUS OPERATIONS, WHICH ARE EXPLAINED IN THE FOLLOWING PAGES.

PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM.

Water Works.

At the beginning of the year, by direction of the Commissioner of Health, the project for developing the spring water supply of the various buildings at the institution then being erected was worked up in a general way under suggestions advanced by the Commissioner. The Carbaugh spring was acquired and the right to the flow from it through a two inch pipe was purchased. The water from this spring and from others in the district flow by gravity to a pump well, from whence they are raised to a wooden tank. A continuation of this plant was a part of the project considered.

In the main, the scheme was to collect all of the available spring water and put it to economical use for all purposes, both for drinking and the other inferior domestic purposes.

The wooden tank was not high enough nor sufficient in capacity to obviate pumping day and night, its bottom being but five feet higher than the second floor of the dining hall. The highest available site for the proposed storage basin will place the bottom of it at elevation 1690 and with water never less than ten feet deep, it would give a level of from thirty-two to forty-two feet above the second floor of the dining hall.

The sanatorium grounds are divided into two parts by the topography. The eastern section contains the present developments and is the section to be first expanded. The western section may be developed later on. The infirmary is to be located in this part at the foot of the slope of Rocky Mountain Ridge.

The present population of the sanatorium is grouped in the eastern section, and at the beginning of 1908 did not amount to over one hundred people. Contracts then being let for the building of sixty new cottages in the eastern tract to hold eight people each will increase the population to six hundred people. The plans outlined for the possible final development of the eastern and western sections contemplate a future population of 3,000 people. Such a number may never be assembled.

Springs.

There are several excellent springs located on the property of the sanatorium capable of development. They extend along the southern boundary of the land and are located so that they are free from contamination by surface run-off from the proposed developments. They are named:

Carbaugh Spring, ...elevation 1,637 feet
Rothrock Spring, ...elevation 1,627 feet
Little Rothrock Spring .....elevation 1,605 feet
Sand Spring, ...elevation 1,610 feet
Moneghan Spring, ...elevation 1,598 feet
Coalburner Spring, ...elevation 1,620 feet
Snow Spring, ...elevation 1,703 feet
New Spring No. 1, ...elevation 1,623 feet
New Spring No. 2, ...elevation 1,647 feet
Forester Spring .....elevation 1,572 feet

All of these springs, with the exception of the last one, can be used for the drinking water supply.

Springs No. 1 and No. 2 are not in the land controlled by the Commissioner of Health, but they are on State Forestry Land. Carbaugh Spring is also located outside of the boundaries of the sanatorium. The quantity of the minimum flow from these springs is uncertain on account of lack of data. Several readings were made by the Department during June, October and November of the previous year and at the beginning of 1908, when the plans were made for the improved water works system, these data were all that were available. The flow from Snow Spring during June, 1907, amounted to approximately 100,000 gallons. When readings were next taken in September, the flow amounted to about 6,000 gallons only. On September 4th weirs were erected at Carbaugh, Rothrock, Moneghan, Coalburner and Snow Springs, and daily readings were taken to the end of November, 1907. The following table gives the approximate minimum dry weather flow based upon these readings:

Supply.	Dry Weather Flow.
Snow Spring,	6,400 gallons (approximate)
Little Rothrock Spring,	1,300 gallons
Moneghan Spring,	15,000 gallons
Coalburner Spring,	4,800 gallons
Snow Spring,	6,500 gallons
New Spring No. 1,	14,000 gallons
New Spring No. 2,	6,000 gallons (estimated)
Rothrock Spring,	5,000 gallons
Carbaugh Spring,	6,000 gallons
Total,	65,000 gallons

The mountain residents state that the season ending in October, 1907, was the driest one that had been known in this region for years, but, on the other hand, some of the older natives state that

there was a drier season about fifty years ago when Rothrock Spring flow failed. This is contradicted by others and seems to be doubtful. It is estimated that the flow from these springs, as represented by the September and October readings, gives very nearly the minimum flow.

The maximum flow is greatly in excess of the November readings. The rainfall during November was moderate and only increased the flow in small amounts.

Present Supply.

The eastern section of the camp is supplied by Rothrock Spring and a pipe line leading from Carbaugh Spring. The water is pumped by a gasoline engine to a 4,200 gallon water tank, from which it flows through one and one-half inch galvanized iron pipe lines through the main buildings of the sanatorium and through the resident physicians' house.

The western section of the camp is supplied from Sand Spring, which has an available flow of 6,400 gallons per day. This supply is carried through a two inch pipe to a 4,000 gallon brick reservoir located half way between Sand Spring and the dining room of the sanatorium, old camp. There is a two inch pipe from this reservoir to the dining room and this pipe is also connected with a spring house near the dining room. The elevation of the top of this brick storage tank is 1,605.9 feet. The elevation of the kitchen floor is 1,593.5 and that of the spring house 1,591.7, so the reservoir furnishes ample water for these buildings by gravity. Little Rothrock Spring is connected with a 2 inch pipe line with the main leading from this reservoir to the kitchen. It has, however, too low an elevation to be used in conjunction with the reservoir. It can, however, be used in emergencies when the supply from the reservoir is cut off. Such was the condition of springs at the beginning of the year 1908, when the proposed developments were outlined.

It was estimated that the quantity of water needed was 60 gallons per capita. Of the 60 gallons, it was estimated that 20 gallons per capita would be sufficient for drinking and culinary purposes and that, therefore, for all purposes the rate of 60 gallons per capita will be sufficient until the population has equalled the total available supply from the springs by the addition of the flow from Moneghan, Coalburner, Snow and New Springs Nos. 1 and 2, and by the addition of the total flow from Carbaugh Spring. Should it ever be desirable to have a separate system of piping for all but drinking and culinary purposes, then the proposed spring water development project would prove adequate for all time.

Proposed Spring Development.

It was estimated that the quantity of water available for the maximum supply from these springs is 65,000 gallons per day. In order to give a reserve supply ample for any such emergency, it was planned to use a storage reservoir of 300,000 gallons capacity, which would allow, in dry weather, an addition of 5,000 gallons per day, or a total of 70,000 gallons per day's consumption for a period of sixty days.

It was uncertain, in the spring of 1908, whether the dry weather period in this region would last over sixty days, but if it were found in the next few years that a period of drouth would be longer than this time additional storage could be added. So it was estimated that over eleven hundred people, at the rate of sixty gallons per capita, could be furnished from the spring water supply, thoroughly developed on the basis that these springs, plus the storage, would never fall below 70,000 gallons per day. When more people than this were congregated at the sanatorium, some other sources of supply would have to be obtained.

It was determined that to develop the supply of these springs economically it was necessary to pipe the flow to some point lower than any one of the springs, and to pump from this point to a reservoir located at a high enough elevation to supply all points in the eastern and western section by gravity. This scheme of collection comprised two collecting basins and pumping stations, namely, the eastern section of Carbaugh and Rothrock Springs, having a total estimated minimum flow of 11,000 gallons and the Sand, Little Rothrock and other springs hereinbefore mentioned for the western group having an estimated minimum flow of 54,000 gallons per twenty-four hours. In developing the eastern section, it was proposed to take care of a maximum flow of 20,000 gallons per day and to pump it to a storage reservoir through a two inch main during a period of twelve hours, and thus economize the cost of operating the pump. This demanded the storage of 10,000 gallons during the night. There was, at the pump house, a 3,000 gallon tank for storage. This storage must be increased 7,000 additional gallons. The old pumping engine was a Myers Bulldozer power pump, having a capacity of 2,000 gallons per hour when driven by a gasoline engine of two and one-half horse power. This engine and pump were housed in a brick building and it was thought that no changes were necessary in the pumping station.

In developing the western group of springs, rated from 54,000 gallons minimum to a maximum of 100,000 gallons, it became necessary to store twelve hours' flow in ordinary times and at least ten hours' flow when the maximum capacity is being used, which dictates a collecting basin of 42,000 gallons' capacity. For raising this water to the large storage reservoir, it was thought best to plan on two pumps with a total capacity of 100,000 gallons in fourteen hours.

The pipe lines of this system were designed to carry a maximum flow of 100,000 gallons from the entire group of springs to the collecting basin and pump well.

The capacity of the storage reservoir of 300,000 gallons will, when the consumption is 70,000 gallons per twenty-four hours and the maximum flow of the springs 120,000 gallons, admit of its being filled within six days with the surplus pumpage of 50,000 gallons each day. The capacity is sufficient to furnish the maximum consumption of 70,000 gallons for four days without pumpage from the springs, and its storage is available for fire purposes. To furnish a fire protection for the buildings and for the infirmary, the latter building to be located at an elevation of 1,580 or thereabouts, a six inch main leading from the storage reservoir through the camp to the infirmary would be desirable. So the plans and specifications were accordingly prepared.

Contract.

On June 9th, 1908, the Commissioner of Health received proposals for the construction of a water works system for the State Sanatorium at Mont Alto. The work to be done was set forth in the plans and specifications prepared by the Engineering Division of the Department and approved by the Commissioner. These documents described in detail the nature of the work and the method of construction. Briefly summarized, the work consisted of a reinforced concrete reservoir of 300,000 gallons' capacity, two concrete collecting wells of 40,000 and 7,500 gallons' capacity, respectively; a frame pump house, two triplex pumps driven by eight H. P. gasoline engines, 5,000 feet of six inch cast iron distributing main, 4,000 feet of four inch pipe, 10,000 feet of three inch and two inch pipe, together with various appurtenances and connections to the existing water system.

In accordance with the requirements of the plans and specifications, nine proposals were received for this work, on the basin of unit prices. These proposals are given in detail in the following table. In asking for proposals on the four inch lines, bidders were requested to submit alternate bids for cast iron, wrought iron, or cement lined pipe, and on the three inch lines, alternate bids were received for cast iron or wrought iron pipe. These alternate bids were requested to determine whether it would be cheaper to use wrought iron or cement lined pipe in place of standard cast iron. The prices from the lowest bidders were cheaper for cast iron and bids were, therefore, compared on this basis.

BIDS RECEIVED FOR WATER-WORKS SYSTEM AT MONT ALTO, PENNSYLVANIA, JUNE 9, 1908.

Item.	Quantity.	No.	W. L. Forney, Chambersburg, Pa. 1. Unit price.	W. L. Forney, Chambersburg, Pa. 1. Total.	Chas. W. Denny, Philadelphia, Pa. 2. Unit price.	Chas. W. Denny, Philadelphia, Pa. 2. Total.	W. G. Fritz, York, Pa. 3. Unit price.	W. G. Fritz, York, Pa. 3. Total.	Ahrens Cons. Co., Lewistown, Pa. 4. Unit price.	Ahrens Cons. Co., Lewistown, Pa. 4. Total.	Brady & Snavely, Harrisburg, Pa. 5. Unit price.	Brady & Snavely, Harrisburg, Pa. 5. Total.
Concrete reservoir, 60 feet diameter x 15 feet deep, including all appurtenances, as specified, each,	1	1	$5,987 00	$5,987 00	$13,786 00	$13,786 00	$5,752 00	$5,752 00	$5,975 00	$5,975 00	$5,695 00	$5,695 00
Storage reservoir, 27 feet diameter x 11 feet deep, including all appurtenances as specified, each,	1	2	1,668 00	1,668 00	4,790 00	4,790 00	1,650 00	1,650 00	1,950 00	1,950 00	1,580 00	1,580 00
Storage reservoir, 16 feet diameter x 6 feet deep, including all appurtenances as specified, each,	1	3	388 00	388 00	1,780 00	1,780 00	750 00	750 00	605 00	605 00	608 00	608 00
Concrete manholes, 3 feet diameter x 4 feet deep, including valves, etc., ----------each,	4	4	35 00	140 00	290 00	1,160 00	75 00	300 00	80 00	320 00	71 50	286 00
Concrete spring covers 3 feet x 3 feet x 4 feet deep, including connections, ----------each,	3	5	30 00	90 00	260 00	780 00	60 00	180 00	25 00	75 00	50 00	150 00
Concrete spring covers, 4 feet x 4 feet x 4 feet deep including connections, ----------each,	2	6	40 00	80 00	385 00	770 00	60 00	120 00	30 00	60 00	60 00	120 00
Concrete spring cover, irregular in plan, 4 feet deep, including connections, ----------each,	1	7	40 00	40 00	465 00	465 00	70 00	70 00	35 00	35 00	174 00	174 00
Rock excavation, per cubic yard,	400	8	1 87	748 00	4 25	1,700 00	2 25	900 00	2 50	1,000 00	1 50	600 00
6-inch c. i. pipe, 4 feet to 6 feet deep, including specials, per lineal feet, ----------	5,100	9	1 20	6,120 00	2 20	11,220 00	75	3,825 00	81	4,131 00	1 33	6,783 00

BIDS RECEIVED FOR WATER-WORKS SYSTEM AT MONT ALTO, PENNSYLVANIA, JUNE 9, 1908—Continued.

Item.	Quantity.	No.	W. L. Forney, Chambersburg, Pa. 1. Unit price.	W. L. Forney, Chambersburg, Pa. 1. Total.	Chas. W. Denny, Philadelphia, Pa. 2. Unit price.	Chas. W. Denny, Philadelphia, Pa. 2. Total.	W. G. Fritz, York, Pa. 3. Unit price.	W. G. Fritz, York, Pa. 3. Total.	Ahrens Cons. Co., Lewistown, Pa. 4. Unit price.	Ahrens Cons. Co., Lewistown, Pa. 4. Total.	Brady & Snavely, Harrisburg, Pa. 5. Unit price.	Brady & Snavely, Harrisburg, Pa. 5. Total.
4-inch c. i. pipe, 4 feet to 6 feet deep, including specials, per lineal foot.	3,100	10	1 05	3,255 00	1 98	6,138 00	60	1,860 00	68	2,108 00	1 22	3,782 00
4-inch w. i. pipe, 4 feet to 6 feet deep, including specials, per lineal foot,	3,100	11	1 13½		1 37		80		74		1 22	
4-inch cement lined pipe, 4 feet to 6 feet deep, including specials, per lineal foot,	3,100	12	1 13½		1.54		75		85		1 32	
4-inch c. i. pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	500	13	1 20	600 00	2 47	1,235 00	75	375 00	90	450 00	1 22	610 00
4-inch w. i. pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	500	14	1 28½		2.10		90		96		1 22	
4-inch cement lined pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	500	15	1 28½		2 03		85		1 06		1 32	
4-inch c. i. pipe, 8 feet and over deep, including specials, per lineal foot,	50	16	1 35	67 50	4 56	228 00	1 00	50 00	1 07	53 50	1 22	61 00
4-inch w. i. pipe, 8 feet and over deep, including specials, per lineal foot,	50	17	1 43½		4 18		1 20		1 13		1 22	
4-inch lined pipe, 8 feet and over deep, including specials, per lineal foot,	50	18	1 43½		4 17		1 15		1 14		1 32	

3-inch c. i. pipe, 4 feet to 6 feet deep, including specials, per lineal foot,	4,100	19	92	3,772 00	1 54	6,314 00	1 50	2,050 00	55	2,255 00	1 12	4,592 00
3-inch w. i. pipe, 4 feet to 6 feet deep, including specials, per lineal foot,	4,100	20	97½		1 37		50		61		1 12	
3-inch c. i. pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	950	21	1 07	1,016 50	2 03	1,928 50	60	570 00	78	741 00	1 12	1,064 00
3-inch w. i. pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	950	22	1 12½		1 84		60		84		1 12	
3-inch c. i. pipe, 8 feet and over deep, including specials, per lineal foot,	125	23	1 17	146 25	4 12	515 00	80	100 00	96	120 00	1 12	140 00
3-inch w. i. pipe, 8 feet and over deep, including specials, per lineal foot,	125	24	1 22½		3 94		80		1 02		1 12	
2-inch w. i. pipe, 4 feet to 8 feet deep, including specials, per lineal foot,	4,600	25	80	3,680 00	1 24	5,704 00	40	1,840 00	44	2,024 00	96	4,416 00
2-inch w. i. pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	650	26	95	617 50	1 73	1,124 50	50	325 00	67	435 50	96	624 00
6-inch Gate valves, including boxes, each,	3	27	20 00	60 00	41 37	124 11	16 00	48 00	21 00	63 00	20 00	60 00
4-inch Gate valves, including boxes,	1	28	12 00	12 00	28 68	28 68	10 00	10 00	17 50	17 50	16 00	16 00
2-inch Gate valves, including boxes, in new lines, each,	7	29	6 00	42 00	19 60	137 20	6 00	42 00	14 00	98 00	12 00	84 00
2-inch Gate valves, including boxes, in old lines,	5	30	7 50	37 50	30 10	150 50	10 00	50 00	19 00	95 00	16 00	80 00
Fire hydrants, including 4-inch gate connections, each,	5	31	35 00	175 00	80 98	404 90	35 00	175 00	42 75	213 75	52 00	260 00
5 x 6 single acting triplex pumps, type ——, each,	2	32	312 00	624 00	592 00	1,184 00	500 00	1,000 00	405 00	810 00	479 00	958 00
8 H. P. horizontal gasoline engine, type ——, each,	2	33	475 00	950 00	676 00	1,352 00	637 75	1,275 50			677 00	1,354 00
3 H. P. horizontal gasoline engine, type ——, each,	1	34	350 00	350 00	4 56	4 56	275 00	275 00	1,825 00	1,825 00	594 00	594 00
Frame pump house, 20 feet x 30 feet x 10 feet,	1	35	1,100 00	1,100 00	1,050 00	1,050 00	1,000 00	1,000 00	1,275 00	1,275 00	1,248 00	1,248 00
Addition to pump house, including appurtenances,	1	36	65 00	65 00	125 00	125 00	200 00	200 00	180 00	180 00	195 00	195 00
Extra concrete, per cubic yard,	20	37	8 50	170 00	8 50	170 00	18 00	360 00	18 00	360 00	15 00	300 00
Removing water tank,	1	38	40 00	40 00	165 00	165 00	15 00	15 00	50 00	50 00	52 00	52 00
Totals,		39		$32,041 25		$64,533 95		$25,167 50		$27,325 25		$36,486 00

BIDS RECEIVED FOR WATER-WORKS SYSTEM AT MONT ALTO, PENNSYLVANIA, JUNE 9, 1908—Continued.

Item.	Quantity.	No.	F. A. Havens & Co., Philadelphia, Pa. 6. Unit price.	F. A. Havens & Co., Philadelphia, Pa. 6. Total.	The Pitt Cons. Co. Pittsburg, Pa. 7. Unit price.	The Pitt Cons. Co. Pittsburg, Pa. 7. Total.	McCay Engineering Co., Baltimore, Md. 8. Unit price.	McCay Engineering Co., Baltimore, Md. 8. Total.	McCormick & Co., Philadelphia, Pa. 9. Unit price.	McCormick & Co., Philadelphia, Pa. 9. Total.	Engineer's Estimate. 10. Unit price.	Engineer's Estimate. 10. Total.
Concrete reservoir, 60 feet diameter x 15 feet deep, including all appurtenances as specified, each,	1	1	$11,263 00	$11,263 00	$4,900 00	$4,900 00	$6,686 00	$6,686 00	$5,072 30	$5,072 30	$4,139 90	$4,139 90
Storage reservoir, 27 feet diameter x 11 feet deep, including all appurtenances as specified, each,	1	2	3,551 00	3,551 00	1,850 00	1,850 00	3,852 00	3,852 00	1,623 60	1,623 60	1,098 90	1,098 90
Storage reservoir, 16 feet diameter x 6 feet deep, including all appurtenances as specified, each,	1	3	1,340 00	1,340 00	550 00	550 00	1,800 00	1,800 00	725 52	725 52	374 76	374 76
Concrete manholes, 3 feet diameter x 4 feet deep, including valves, etc., ----------each,	4	4	138 00	552 00	70 00	280 00	80 00	320 00	89 20	356 80	40 80	163 20
Concrete spring covers 3 feet x 3 feet x 4 feet deep, including connections, ----------each,	3	5	96 00	288 00	65 00	195 00	90 00	270 00	97 20	291 60	26 40	79 20
Concrete spring covers, 4 feet x 4 feet x 4 feet deep including connections, ----------each,	2	6	149 00	298 00	70 00	140 00	95 00	190 00	122 10	244 20	29 40	58 80
Concrete spring cover, irregular in plan, 4 feet deep, including connections, ----------each,	1	7	233 00	233 00	65 00	65 00	95 00	95 00	156 50	156 50	29 40	29 40
Rock excavation, per cubic yard,	400	8	3 95	1,580 00	6 00	2,400 00	3 00	1,200 00	1 50	600 00	2 25	900 00
6-inch c. i. pipe, 4 feet to 6 feet deep, including specials, per lineal foot, ----------	5,100	9	1 12	5,712 00	1 10	5,610 00	1 05	5,355 00	1 15	5,865 00	1 20	6,120 00

4-inch c. i. pipe, 4 feet to 6 feet deep, including specials, per lineal foot,	3,100	10	89	2,759 00	90	2,790 00	93	2,883 00	1 15	3,565 00	95	2,945 00
4-inch w. i. pipe, 4 feet to 6 feet deep, including specials, per lineal foot,	3,100	11	89		1 00		85		1 04		82	
4-inch cement lined pipe, 4 feet to 6 feet deep, including specials, per lineal foot,	3,100	12	98		1 10				1 05		90	
4-inch c. i. pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	500	13	1 04	520 00	1 10	550 00	1 03	515 00	1 17	585 00	1 07	535 00
4-inch w. i. pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	500	14	1 04		1 20		95		1 10		94	
4-inch cement lined pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	500	15	1 13		1 30				1 11		1 02	
4-inch c. i. pipe, 8 feet and over deep, including specials, per lineal foot,	50	16	1 18	59 00	1 25	62 50	1 15	57 50	1 49	74 50	1 25	62 50
4-inch cement lined pipe, 8 feet and over deep, including specials, per lineal foot,	50	17	1 18		1 35		1 05		1 42		1 12	
4-inch w. i. pipe, 8 feet and over deep, including specials, per lineal foot,	50	18	1 27		1 45				1 43		1 20	
3-inch c. i. pipe, 4 feet to 6 feet deep, including specials, per lineal foot,	4,100	19	80	3,280 00	83	3,403 00	75	3,075 00	80	3,280 00	78	3,190 00
3-inch w. i. pipe, 4 feet to 6 feet deep, including specials, per lineal foot,	4,100	20	75		80		75		84		73	
3-inch c. i. pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	950	21	95	902 50	1 00	950 00	83	788 50	89	845 50	90	855 00
3-inch w. i. pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	950	22	90		95		83		90		85	
3-inch c. i. pipe, 8 feet and over deep, including specials, per lineal foot,	125	23	1 10	137 50	1 20	150 00	95	118 75	1 46	182 50	1 08	135 00
3-inch w. i. pipe, 8 feet and over deep, including specials, per lineal foot,	125	24	98		1 10		95		1 47		1 02	
2-inch w. i. pipe, 4 feet to 8 feet deep, including specials, per lineal foot,	4,600	25	56	2,576 00	65	2,990 00	60	2,760 00	57	2,622 00	44	2,024 00

BIDS RECEIVED FOR WATER-WORKS SYSTEM AT MONT ALTO, PENNSYLVANIA, JUNE 9, 1908—Continued.

Item.	Quantity.	No.	F. A. Havens & Co., Philadelphia, Pa. 6. Unit price.	F. A. Havens & Co., Philadelphia, Pa. 6. Total.	The Pitt Cons. Co. Pittsburg, Pa. 7. Unit price.	The Pitt Cons. Co. Pittsburg, Pa. 7. Total.	McCay Engineering Co., Baltimore, Md. 8. Unit price.	McCay Engineering Co., Baltimore, Md. 8. Total.	McCormick & Co., Philadelphia, Pa. 9. Unit price.	McCormick & Co., Philadelphia, Pa. 9. Total.	Engineer's Estimate. 10. Unit price.	Engineer's Estimate. 10. Total.
2-inch w. i. pipe, 6 feet to 8 feet deep, including specials, per lineal foot,	650	26	71	461 50	80	520 00	70	455 00	67	435 50	56	364 00
6-inch Gate valves, including boxes, each,	3	27	20 70	62 10	20 00	60 00	27 00	81 00	32 00	96 00	20 00	60 00
4-inch Gate valves, including boxes, each,	1	28	14 95	14 95	15 00	15 00	22 00	22 00	22 00	22 00	14 00	14 00
2-inch Gate valves, including boxes, in new lines, each,	7	29	10 35	72 45	10 00	70 00	16 00	112 00	15 00	105 00	9 00	63 00
2-inch Gate valves, including boxes, in old lines, each,	5	30	13 80	69 00	12 00	60 00	16 00	80 00	15 00	75 00	12 00	60 00
Fire hydrants, including 4-inch gate connections, each,	5	31	69 00	345 00	45 00	225 00	55 00	275 00	45 00	225 00	45 60	228 00
5 x 6 single acting triplex pumps, type ——, each,	2	32	585 00	1,170 00	400 00	800 00	725 00	1,450 00	400 00	800 00	600 00	1,200 00
8 H. P. horizontal gasoline engine, type ——, each,	2	33	707 00	1,414 00	650 00	1,300 00	735 00	1,470 00	600 00	1,200 00	690 00	1,380 00
3 H. P. horizontal gasoline engine, type ——, each,	1	34	461 00	461 00	450 00	450 00	410 00	410 00	400 00	400 00	450 00	450 00
Frame pump house, 20 feet x 30 feet x 10 feet,	1	35	1,049 00	1,049 00	500 00	500 00	1,800 00	1,800 00	1,227 00	1,227 00	811 20	811 20
Addition to pump house, including appurtenances,	1	36	325 00	325 00	300 00	300 00	300 00	300 00	275 00	275 00	115 80	115 80
Extra concrete, per cubic yard,	20	37			15 00	300 00	14 00	280 00	10 00	200 00	8 00	160 00
Removing water tank,	1	38	98 00	98 00	50 00	50 00	200 00	200 00	25 00	25 00	100 00	100 00
Totals,		39		$40,593 00		$31,535 50		$36,900 75		$31,175 52		$27,724 66

As stated in the proposal blank, all bids were compared on the basis of the Engineer's estimate of the quantity of work to be done under each item and the price bid for said item by the Contractor. On this basis the lowest bidders were W. G. Fritz and Brother, York, Pennsylvania, $25,167.50; The Ahrens Construction Company, Lewistown, Pennsylvania, $27,325.25, and McCormick and Company, Philadelphia, Pennsylvania, $31,175.52. The other bidders were above these prices as shown in the table. The contract was awarded to W. G. Fritz and Brother, of York, Pennsylvania, as they were the lowest responsible bidders.

Before awarding the contract to W. G. Fritz and Brother, it was decided to replace the proposed two inch wrought iron pipe lines with three inch cast iron pipe, as the difference in cost per linear foot amounted to only ten cents. The contractors agreed to this arrangement and the contract was awarded to them with this understanding at an aggregate amount of $25,692.50, based upon the quantities as approximately set forth in the Engineer's estimate.

The contract was signed on the sixteenth day of June by W. G. Fritz and Brother and a surety bond in the sum of fifty (50) per cent. of the aggregate amount of the contract was furnished by them through the American Surety Company of New York.

Construction work was begun within ten days after the signing of the contract and the water works were built substantially as shown on the original plans with a few modifications.

Rothrock Spring System.

The water supply is taken from a series of springs extending along the north and west side of Snowy Mountain immediately south of the sanatorium. These springs are divided into two groups by the natural topography of the land and the collecting lines from these groups drain to two concrete collecting wells, where the water is pumped to a large concrete storage reservoir located on a high point on the sanatorium land immediately south of the new buildings at a sufficient elevation to supply the sanatorium and future developments by gravity.

The smaller group of springs consists of Rothrock Spring and Carbaugh Spring, located at the southeast edge of the sanatorium, on the northern slope of Snowy Mountain. Rothrock Spring, as hereinbefore stated, is located within the sanatorium grounds and Carbaugh Spring is 750 feet south of it on land owned by Jerry Carbaugh. The one inch pipe formerly leading from the spring to the collecting reservoir at Rothrock Spring has been replaced by a three inch pipe, cast iron supply line laid four feet deep in the ground and below the hydraulic grade line. A new gasoline engine of three H. P. capacity and of the Olds type A has been installed at the pump house to drive the old pump, as the engine formerly in use is nearly worn out. The pump house has been enlarged so as to allow the new engine to be installed without replacing the old engine. This will allow the old engine to be used in cases of emergency.

A new concrete collecting reservoir sixteen feet in diameter and six feet deep has been located ten feet east of this pumping station to serve as a collecting well for the flow from the springs during the

night time. This well has been constructed of a concrete wall twelve inches thick and circular in plan. The floor consists of four inches of concrete reinforced with expanded metal. The reservoir is covered with a wooden roof and lined on the outside with standard tin roofing. There is a sump provided on the side of the reservoir next to the pump house, two feet square in plan and three feet deep below the floor of the well, which is used as a suction sump for the pump. On the opposite side of the reservoir an overflow opening is provided at the surface. All piping connections to this collecting reservoir are standard flanged cast iron connections and the connection to the existing collecting reservoir is provided with a float valve so that both reservoirs can be used for storage. The capacity of this reservoir is 7,500 gallons, and, with the additional capacity of 3,000 gallons in the old reservoir, there is a total storage of over 10,000 gallons at this station, which will amply provide for the night flow from these springs and will allow the station to be operated during the day time only. The top of the old reservoir has been covered with a wooden cover under this contract and all changes in piping necessary for connecting the pump and engines have been included.

From the small pump station the water is pumped through a three inch cast iron force main located at a depth of four feet below the surface of the ground to the main storage reservoir. This force main extends from the pump house up the centre of Sixth Street to a point half way between Avenues F and G. At this point it connects with the four inch force main from the other pumping station and the supply from both is carried through a six inch connection to the reservoir located two hundred feet south of this point.

Snowy Mountain System.

The larger group of springs extends from the southwestern edge of the sanatorium, southwesterly along the slope of Snowy Mountain for a distance of over seven thousand feet. This group of springs, as previously described, consists of Sand Spring, Little Rothrock Spring, Moneghans Spring, Coalburners Spring, Snow Spring, New Spring No. 1 and New Spring No. 2. All of these springs, with the exception of the New Springs, are located within the sanatorium reservation. New Spring No. 1 is located on State Forestry land on the road to Sandy Ridge, and New Spring No. 2 is located beyond this on State Forestry land and within the Deer Preserve. All of these springs are sufficiently high to allow the flow to gravitate to a collecting well located in the southwestern part of the sanatorium.

The supply from these springs is carried through three inch and four inch cast iron mains located at least four feet deep in the ground and at a greater depth where necessary to keep the pipe below the hydraulic grade lines. In order, however, to eliminate deep trenching, which would have been very expensive, the lines were laid out as closely as possible to the contours of the ground so that a greater depth than four feet was necessary only for short distances. Each spring is surrounded by a concrete spring cover which is built up from a depth of four feet in the ground to a sufficient height to prevent surface washing. The tops of these spring covers consist of wood constructed so as to be water tight and painted. The water is taken

from these spring covers through a three inch cast iron connection at the bottom, on the end of which is a fine brass screen.

From the spring the three inch line leads to a concrete manhole located on the main line. These manholes serve as controlling manholes and permit of a ready inspection of the flow of the various springs and of the operation of the main lines. The inlet pipes into these manholes, both from the spring and from the main line, are valved so that it is possible at one of these manholes to cut out any section of springs or any individual spring when necessary. These manholes are three feet in diameter, being circular in plan with a concrete wall twelve inches thick and a concrete bottom. The top is covered with a water tight wooden cover and painted.

The main line from the springs is four inches from the collecting reservoir to the junction, with the supply line from Moneghans Spring, a distance of 2,000 feet. From this point to the end of the line the pipe is three inches in diameter. As the main line at points where the hydraulic grade line is several feet above it, follows the surface of the ground, provision has to be made for allowing the air to escape from the high points. Air valves have, therefore, been provided for this purpose by tapping the pipe at these points and extending a one-half inch pipe from the top of the main to the surface of the ground. The end of this one-half inch pipe is provided with a half-inch pet cock, which allows the air to readily escape.

Sand Spring and Little Rothrock Spring do not connect to this system of pipes. These springs formerly supplied the dining room at the sanatorium by gravity through a two inch supply line. Where this two inch line crosses Third Street it has been connected with a three inch gravity line leading to the collecting reservoir and valved so that if necessary at any time the water could be diverted to its former course by gravity to the dining room.

The collecting reservoir for this group of springs is located at the foot of Third Street west of the sanatorium. It is circular in plan and is built of concrete, being twenty-seven feet in diameter and eleven feet deep and having a capacity of 42,000 gallons. The reservoir is built in the ground and the concrete wall is twelve inches thick. The bottom is covered with a concrete slab four inches in thickness and reinforced with expanded metal. The top is covered with a wooden roof supported by a sixteen inch concrete pier in the centre and ten inch wooden beams with a lining on the outside of standard tin roofing. On the side next to the pump station, there is a sump provided in the bottom and extending to a depth of three feet below. This sump serves as the suction well for the pumps and allows the collecting well to be thoroughly drained of all water when necessary. The inlet pipes from the spring supply lines enter the reservoir at a depth of four feet below the surface of the ground and are provided with gate valves on the exterior and with float valves on the interior. These float valves automatically close off the supply to this reservoir when it is full and allow the surplus water to back up in the collecting systems, thereby providing additional storage. There is a four inch overflow pipe provided at the flow line on the side of the reservoir opposite to the pump house which will discharge any surplus flow into the wooden tract below the reservoir. The ground around this collecting reservoir has been neatly graded and covered with a layer of loam six inches thick and seeded.

The main pumping station is located ten feet west of this large collecting reservoir and faces easterly up Third Street. It is a frame structure 20 feet by 30 feet in plan and 10 feet from floor to ceiling. The exterior is finished with German siding neatly painted to match the other buildings at the sanatorium, and the roof is covered with asbestos shingles. The interior is finished with yellow pine in natural finish and linoleum strips are provided on the floor to protect it from grease. Ample ventilation is provided by large windows and also by small ventilator windows in the sides of the building above the ceiling. The foundations for this station consist of concrete piers extending to a depth of four feet below the surface of the ground and sufficiently high above it to prevent the rotting of the wooden girders.

There are two 5 by 6 triplex pumps located in this station of the single acting vertical type, made by the Deming Pump Company and capable of delivering a combined supply of 9,000 gallons per hour against a total pressure of 100 pounds per square inch. Under normal conditions these pumps will be operated under 60 pounds pressure as this is sufficient to lift the water to the storage reservoir, but in case of fire the reservoir can be closed off and the pumps can be operated at 100 pounds pressure. Each of these pumps is provided with a four inch independent cast iron suction pipe fitted with a foot valve and extending to the sump in the collecting reservoir. The discharge from each pump is three inches in diameter and is equipped with a three inch gate valve, a three inch check valve, and a pressure relief valve, set so as to operate at 100 pounds pressure. The two three inch discharge lines connect to a four inch discharging force main, which extends under the floor of the pump station to the exterior of the building and thence to Sixth Street and up Sixth Street to the reservoir. All the piping in the building is flanged and, on account of the sweating of this piping during summer time, due to the coldness of the spring water, drip pans have been provided in the station around this piping, to prevent the rotting of the floor.

These pumps are each directly connected on the pinion shaft by means of a friction clutch to a horizontal type G eight H. P. Olds gasoline engine. The gasoline for these engines is stored in two galvanized iron tanks, each having a capacity of one and a half barrels of gasoline, and located twenty feet outside of the building. There is an auxiliary pump attached to each gasoline engine which pumps the gasoline from these tanks. The surplus which is not used by the engine drains back to the tank. These tanks are located below the surface of the ground so that there is very little danger from explosion. The engines operate on the hit and miss principle, so that gasoline is only admitted to the combustion chamber when necessary.

Main Storage Reservoir.

The main storage reservoir is located near the head of Avenue F on sanatorium property near the southern property line. It is located with its bottom at an elevation of 1,690, which is sufficiently high to supply all buildings in the sanatorium and is ninety feet higher than the ground at the infirmary location. This reservoir is circular in plan, being 60 feet in diameter and 15 feet deep with a total capacity of 300,000 gallons. The walls are constructed of reinforced concrete and are twelve inches thick, the reinforcement consists of twisted

steel rods, spaced six inches centre to centre horizontally and of sufficient area to take up the tensile stresses in the wall. The bottom of the reservoir is located so that there is an average excavation to a depth of four feet, which permits the foundations to rest on solid ground. The surplus excavation is filled around the exterior of the reservoir, forming an embankment with a width on top of four feet and an exterior slope of two feet horizontal to one foot vertical. This embankment extends to within six feet nine inches of the top of the reservoir and assists in supporting the wall in the lower part where the pressure is greatest.

The bottom of the reservoir is built in eight foot sections consisting of concrete blocks six inches in thickness with lapped joints. These joints are filled with three eighths inch of asphaltum in order to make the bottom absolutely tight. The reservoir is covered with a wooden roof supported by reinforced concrete columns twelve inches square and located twelve feet centre to centre. The exterior of the roof is covered with standard tin roofing and it drains from the centre to a concrete gutter extending around the top of the reservoir and built in the wall.

The six inch inlet pipe enters the reservoir near the bottom, on the side next to Sixth Street, and extends vertically up in the reservoir to a height of ten feet above the bottom. This allows circulation of the water in the reservoir as the outlet is also on this side and at the bottom. The inlet is provided with a check valve and gate valve on the exterior of the reservoir and with a six inch float valve on the interior. This float valve automatically closes off the inflow when the reservoir is full and thereby warns operator at the pumping station.

The six inch outlet pipe extends from the bottom of the reservoir on the same side as the inlet to Sixth Street and Avenue F and thence along Avenue F through the sanatorium. It is provided with a six inch valve located outside of the reservoir. There is also a by-pass connection of six inch pipe outside of the reservoir connecting the force main with the discharge main and permitting a by-pass of the water supply around the reservoir.

On the east side of the reservoir there is provided a six inch blow-off connection, properly valved and connecting the bottom of the reservoir to a trench which leads the water to the wooded tract west of the reservoir. This drain pipe also takes care of the roof drainage. A trap door is provided on this reservoir for entrance and rungs of wrought iron are built into the wall on the exterior and interior for this purpose. There is also a tally board which indicates the depth of the water in the reservoir and can be seen from Sixth Street.

Distributing System.

The six inch supply main from the storage reservoir extends along Avenue F to Fourth Street, thence westerly along Fourth Street to Avenue J; thence along Avenue J to Second Street; thence along Second Street to the highway below the sanatorium; and thence along the sewer line to the ice pond; and from this point westerly along the slope to the infirmary site. This supply line is laid at a uniform depth of four feet below the surface of the ground and at the lowest point on it, near the ice pond, a four inch blow-off connection is made to Rocky Mountain Run. Every connection to this six inch

main has been valved and the fire hydrants located along this line have been equipped with independent gate valves. Six inch valves have also been constructed in this main at several points, so that in case of any accident a section can be quickly isolated and repaired.

Along Fifth and Sixth Streets, three inch cast iron laterals have been laid from this six inch main easterly to connect with the two inch system of wrought iron piping which was constructed when the sewers were built in 1907. These lines have been valved and new two inch valves have been inserted in the old two inch lines, so that the system is equipped for the isolation of any section in the lateral piping without disturbing the supply to other sections.

Fire hydrants have been located on the six inch main at Fifth and F Streets; Fourth and F Streets; Fourth Street and Avenue J; Second Street at the Assembly Hall, and at the Infirmary Building. Two fire hydrants have also been located in the eastern portion of the sanatorium on the new three inch mains. One of these hydrants is on Fifth Street opposite the physicians' house, and the other is located at the corner of Fourth Street and Avenue C. These hydrants are all provided with two two and one-half inch hose connections and are of the latest form of compression type. They extend to a depth of four feet below the surface of the ground and are surrounded at the bottom with broken stone to allow drainage for the drip connection.

Payments.

The contractors, W. G. Fritz and Brother, satisfactorily completed the construction of the water works system in accordance with the plans and specifications. The work was finished on October 15th, when final measurements were made, and, in accordance with the terms of the contract, the contractors were entitled to entire payment within thirty days after acceptance of the work. During the construction of the work the contract provided that monthly payments amounting to eighty per cent. of the amount of work completed during the month should be paid on or before the 15th day of the month next succeeding that in which the work was done. In accordance with this clause of the contract, monthly estimates on the work were made as follows:

Monthly estimate No. 1, August 6th, 1908,	$ 4,739 46
Monthly estimate No. 2, September 3rd, 1908,	11,380 96
Monthly estimate No. 3, October 2nd, 1908,	3,124 56
Total,	$19,244 98

These monthly estimates are given in detail as follows:

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 4, MONTHLY ESTIMATE NO. 1, FOR WORK COMPLETED ON WATER WORKS SYSTEM AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM JULY 1ST TO AUGUST 1ST, 1908. ACCOUNT OF CONTRACT WITH W. G. FRITZ & BRO., YORK, PENNSYLVANIA, DATED JUNE 16TH, 1908.

(1) Concrete reservoir, 60 ft. in diameter by 15 ft. deep. Excavation completed 500 cubic yards, at $1.50,	$ 750 00
(2) Concrete reservoir, 27 ft. in diameter by 11 ft. deep. Excavation completed 300 cubic yards, at $1.50,	450 00
(3) Concrete reservoir, 16 ft. diameter by 6 ft. deep. Completed except roof and pipe connections,	650 00
(8) Rock excavation, 1½ cubic yards, at $2.25,	3 38

(10) 2987 4 in. cast iron pipe, 4 ft. to 6 ft. in depth, including specials at 60 cents per lineal foot,	$1,792 20
(13) 517 4 in. cast iron pipe, 6 ft. to 8 ft. in depth, including specials at 75 cents per lineal foot,	387 75
(16) 96 4 in. cast iron pipe, 8 ft. and over in depth, including specials at $1.00 per lineal foot,	96 00
(19) 1720 3 in. cast iron pipe, 4 ft. to 6 ft. in depth, including specials at 50 cents per lineal foot,	860 00
(19) 1500 3 in. cast iron pipe, 4 ft. to 6 ft. in depth, including specials at 50 cents per lineal foot, 2-3 completed or 33 1-3 cents per foot,	500 00
(28) One 4 in. gate valve, including box,	10 00
(34) One 3 H. P. horizontal gasoline engine,	275 00
(36) Addition to pump house at $200, ⅔ completed, or $150.00,	150 00
Total,	$5,924 33
Deduct 20 per cent.,	1,184 87
Total, less 20 per cent.,	$4,739 46

August 6th, 1908.

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 4, MONTHLY ESTIMATE NO. 2, FOR WORK COMPLETED ON WATER WORKS SYSTEM AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM AUGUST 1ST, TO SEPTEMBER 1ST, 1908. ACCOUNT OF CONTRACT WITH W. G. FRITZ & BRO., YORK, PENNSYLVANIA, DATED JUNE 16TH, 1908.

(1) Concrete reservoir, 60 ft. in diameter by 15 ft deep. Contract price $5,752.00, 2-3 completed, or $3,834.67, less previous estimate of $750.00,	$3,084 67
(2) Concrete reservoir, 27 ft. diameter by 11 ft. deep. Contract price $1,650.00, ½ completed, or $1,237.50, less previous estimate of $450.00	787 50
(4) Concrete manholes, 3 ft. in diameter by 4 ft. deep; one completed at $75.00,	75 00
(8) Rock excavation per cubic yard at $2.25, 40 cubic yards excavated	90 00
(9) Six in. c.i. pipe, 4 ft. to 6 ft. in depth at 75 cents per lineal foot, 4,900 ft. completed,	3,675 00
(19) Three in. c. i. pipe, 4 ft. to 6 ft. in depth, including specials at 50 cents per lineal foot, 6,100 additional feet completed,	3,050 00
(19) Three in. c. i. pipe, 4 ft. to 6 ft. in depth, including specials at 50 cents per lineal foot, 1,500 ft. completed (2-3 payment made in previous estimate),	250 00
(21) Three in. cast iron pipe, 6 ft. to 8 ft. in depth, including specials at 60 cents per lineal foot, 580 ft. completed,	348 00
(23) Three in. cast iron pipe, 8 ft. and over in depth, including specials at 80 cents per lineal foot, 192 ft. completed,	153 60
(25) Two in. w. i. pipe, 4 ft. to 6 ft. in depth, including specials at 40 cents per lineal foot, 57 ft. completed,	22 80
(27) Six in. gate valves, including boxes at $16.00 each, three completed,	48 00
(30) Two in. gate valves, including boxes (in old lines), at $10.00, one complete,	10 00
(31) Fire hydrants, including 4 in. gate connection, at $35.00 each, 5 completed	175.00
(32) 5 x 6 single acting triplex pumps, at $500.00 each, two each, ½ completed,	750 00
(33) 8 H. P. horizontal gasoline engines, at $637.75 each, two ⅔ completed,	956 63
(35) Frame pump house, 20 ft. by 30 ft. by 10 ft., at $1,000.00, ½ completed	750 00
Total,	$14,226 20
Deduct 20 per cent.,	2,845 24
Total, less 20 per cent.,	$11,380 96

September 3rd, 1908.

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Assistant Engineer in Charge of Work.

Approved:

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Chief Engineer.

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 4, MONTHLY ESTIMATE NO. 3, FOR WORK COMPLETED ON WATER WORKS SYSTEM AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM SEPTEMBER 1ST TO OCTOBER 1ST, 1908. ACCOUNT OF CONTRACT WITH W. G. FRITZ & BRO., YORK, PENNSYLVANIA, DATED JUNE 6TH, 1908.

(1) Concrete reservoir, 60 ft. in diameter by 15 ft. deep. Contract price, $5,752.00. Completed, less previous estimates of $3,834.67....	$1,917 33
(2) Concrete reservoir, 27 ft. diameter by 11 ft. deep. Contract price $1,650.00. Completed, less previous estimates of $1,237.50....	412 50
(3) Concrete reservoir, 16 ft. in diameter by 6 ft. deep. Contract price $750.00. Completed, less previous estimate, $650.00, ...	100 00
(4) Concrete manholes, 3 ft. in diameter by 4 ft. deep, three completed at $75.00, ...	225 00
(5) Three concrete spring covers, 3 ft. by 3 ft. by 4 ft. deep, including connections at $60.00 each, ...	180 00
(6) One concrete spring cover, 4 ft. by 4 ft. by 4 ft. deep, including connections at $60.00, ...	60 00
(7) One concrete spring cover, irregular in plan, 4 ft. deep, including connection at $70.00, ...	70 00
(27) Six in. gate valves, including boxes at $16.00 each, two completed, ...	32 00
(28) Four in. gate valves, including boxes at $10.00 each, one completed, ...	10 00
(30) Two in. gate valves, including boxes (in old lines) at $10.00 each, three completed, ...	30 00
(32) 5 x 6 single acting triplex pumps at $500.00 each, two completed, less previous estimates of $750.00, ...	250 00
(33) Eight H. P. gasoline engines at $637.75 each, two completed, less previous payment of $956.63, ...	318 87
(35) Frame pump house, 20 ft. by 30 ft. by 10 ft., at $1,000.00, completed less previous payment of $750.00, ...	250 00
(36) Addition to pump house, including appurtenances at $200.00. Completed less previous payment of $150, ...	50 00
Total, ...	$3,905 70
Deduct 20 per cent., ...	781 14
Total, less 20 per cent., ...	$3,124 56

October 2d, 1908.

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

There is a clause in the contract which provides that whenever, in the opinion of the Engineer, it shall become necessary to use materials, or to perform work which is neither contemplated in the plans of the work nor implied in the specifications, the Contractor agrees to furnish such materials and labor at a price based upon the cost plus 15 per cent. profit to the Contractor. Under this clause, three inch gate valves were furnished in the supply mains, including boxes. This was necessary as in the original proposal two inch lines were contemplated for these mains and no provision was made for three inch valves. On the spring gravity supply lines it was found necessary to provide air valves at high points on the pipe line where otherwise there would have been danger of the line becoming air-bound. Seven of these air valves were furnished. At New Spring No. 2 it was found advisable to construct a tile drain to intercept a large underground flow of water in the gravel strata near the spring. One hundred and five feet of this four inch terra cotta drain were laid.

At the pumping station trouble was experienced after starting the engines and pumps in protecting the floor from oil and from water. A strip of linoleum was, therefore, ordered for this purpose; the floor was revarnished, and drip pans of copper were furnished to pro-

tect the floor from the water which sweated on the pipes from the pump and trickled down to the floor. The door leading out to the suction well was equipped as a sliding door and the old section of the little pump house was repainted to correspond with the new portion.

After the two three inch distributing lines had been constructed in the main sanatorium, it was decided to locate two additional fire hydrants, one, in the vicinity of the physicians' house and one in the vicinity of the Administration Building. To install these hydrants it was necessary to cut into these lines which had been already laid and to furnish additional specials for making the connections. This was allowed as an extra.

All of these extras are set forth in full in the final estimate, which will be found later in this report.

In another article in the contract, the contractor agreed to begin construction work within ten days after the signing of the contract, and to complete all the work on or before sixty working days thereafter, and if the amount of work is increased beyond that contemplated in the proposal, the contractor was to receive an extension of time in proportion to the amount of increase. The Commissioner of Health was provided with full power to grant to the contractor an extension of time for the completion of the work, if notified in writing of causes or events beyond the control of the Contractor tending to delay the work, provided the Contractor paid the cost of the extra engineering incident thereto. Subject to these allowances, the Contractor agreed to allow a deduction of $15.00 liquidated damages for every day beyond the time specified in which the work was not completed.

Under this agreement, the contractor should have completed the construction of this water works on September 7th. The work at this time was nearly completed and pumping was begun on the 19th. The main reservoir was, however, not finished for several weeks thereafter and final work was completed on October 15th. The delay due to inability to obtain construction material was, of course, uncontrollable by the Contractor. The main reservoir, which was most seriously delayed and held back the completion of the details of the work, was due to the inability of the Contractor to obtain the cement necessary for completing the concrete bottom of this reservoir.

The Contractor is also entitled to a reasonable extension of time on account of the increase in the amount of work incident to constructing three inch cast iron lines in place of two inch wrought iron lines as originally contemplated. In constructing these three inch lines the trench work would, of course, have been identical with either wrought iron or cast iron pipe, but it was difficult for the Contractor to obtain the necessary amount of three inch cast iron pipe and specials needed for this work as the makers did not have a sufficient amount in stock to fill their order and were compelled to cast them a special quantity. This caused a delay of several weeks in receiving this material.

This delay entitled the Contractor to allowance of an extension for the time of completion of this contract to the 19th, which was the day that pumping from the new pumping station began. From this date until the final completion of the work the Department of Health suffered no damages as a water supply was maintained by pumping around the main reservoir, the mains having been completed.

The Contractor, in prosecuting the work, followed strictly the specifications and plans and showed every disposition to carry out the spirit of the specifications and plans. In carrying on the actual construction he permitted the Department's engineers to arrange details to their satisfaction. The final estimate is given in full in the following tabulated statement:

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 4, FINAL ESTIMATE, FOR COMPLETED WATER WORKS SYSTEM AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM JULY 1ST TO OCTOBER 15TH, 1908. ACCOUNT OF CONTRACT WITH W. G. FRITZ & BRO., YORK, PENNSYLVANIA, DATED JUNE 16TH, 1908.

(1) One reinforced concrete reservoir, 60 ft. in diameter by 15 ft. deep, including all appurtenances, complete,	$5,752 00
(2) One storage reservoir, 27 ft. diameter by 11 ft. deep, including all appurtenances, complete	1,650 00
(3) One storage reservoir, 16 ft. diameter by 6 ft. deep, including all appurtenances, complete,	750 00
(4) Four concrete manholes, 3 ft. diameter by 4 ft. deep, including valves, etc., at $75.00 each,	300 00
(5) Three concrete spring covers, 3 ft. by 3 ft. by 4 ft. deep, including connections at $60.00 each,	180 00
(6) One concrete spring cover, 4 ft. by 4 ft. by 4 ft. deep, including connections,	60 00
(7) One concrete spring cover, irregular in plan, 4 ft. deep, including connections,	70 00
(8) 48¼ cubic yards of rock excavation at $2.25,	109 13
(9) 5,498 ft. of 6 in. cast iron pipe, 4 ft. to 6 ft. in depth, including all specials at 75 cents per lineal foot,	4,123 50
(10) 3,116 ft. of 4 in. cast iron pipe, 4 ft. to 6 ft. in depth, including specials at 60 cents per lineal foot,	1,869 60
(13) 517 ft. of 4 in. cast iron pipe, 6 ft. to 8 ft. in depth, including specials at 75 cents per lineal foot,	387 75
(16) 96 ft. of 4 in. cast iron pipe, 8 ft. and over in depth, including specials at $1.00 per lineal foot,	96 00
(19) 9,725 ft. of 3 in. cast iron pipe, 4 ft. to 6 ft. in depth, including specials at 50 cents per lineal foot,	4,862 50
(21) 673 ft. of 3 in. cast iron pipe, 6 ft. to 8 ft. in depth, including specials at 60 cents per lineal foot,	403 80
(23) 214 ft. of 3 in. cast iron pipe, 8 ft. and over in depth, including specials at 80 cents per foot,	171 20
(25) 126 ft. of 2 in. wrought iron pipe, 4 ft. to 6 ft. in depth, including specials at 40 cents per foot,	50 40
(27) Five 6 in. gate valves, including boxes at $16.00 each,	80 00
(28) Two 4 in. gate valves, including boxes at $10.00 each,	20 00
(30) Five 2 in. gate valves, including boxes in old line at $10.00 each,	50 00
(31) Seven fire hydrants, including 4 in. gate connections at $35.00 each,	245 00
(32) Two 5 x 6 single acting triplex pumps at $500.00 each,	1,000 00
(33) Two 8 H. P. horizontal gasoline engines at $637.75,	1,275 50
(34) One 3 H. P. horizontal gasoline engine at $275.00,	275 00
(35) Frame Pump House, 20 ft. by 30 ft. by 10 ft.,	1,000 00
(36) Addition to pump house, including appurtenances,	200 00
(37) Three cubic yards extra concrete at $18.00 per cubic yard,	54 00
(38) Removing water tank,	15 00
Forwarded,	$25,050 38

EXTRA MATERIAL AT COST, PLUS 15 PER CENT. PROFIT, AS SPECIFIED.

For change in size of 2 in. gate valves in new line to 3 in. gate valves.

Three in. valve at,	$4 05
Valve box,	2 48
Hauling,	1 00

Forwarded,		$25,050 38
Lead,	40	
Trench,	15	
Laying,	25	
	8 33	
15 per cent.,	1 25	
	9 58	
Six 3 in. gate valves, at $9.58, cost of one valve,		57 48
For 7 air valves connected with cast iron pipe, 31½ ft. of ½ in. g. i. pipe at 6 cents per ft.,	$1 89	
Seven ½ inch. pet cocks, at 50 cents each,	3 50	
Seven ½ inch to ¼ inch bushings, at 8 cents,	56	
14 ft. of 3 inch cast iron pipe, at 1½ cents per lb., 17 lbs., 1 ft., 238 lbs.,	3 57	
One mechanic, 15 hours, at 30 cents,	4 50	
One helper, 27 hours at 14 cents,	3 78	
	17 80	
15 per cent.,	2 67	
		20 47
For 4 in. t. c. tile at new spring No. 2, 106 ft. of 4 in. t. c. pipe at 7 cents per ft.,	$7 42	
21 laborers, 331 hours, at 14 cents,	46 34	
One foreman, 15¾ hours, at 30 cents,	4 73	
One team, 20 hours, at 40 cents,	8 00	
	$66 49	
15 per cent.,	9 97	
		76 46
Extra material at pump station for drip pans for the suction lines; linoleum for floor of pumping station: Linoleum, 18 sq. yds., at 80 cents,	$14 40	
Cartage and freight,	50	
Sliding door,	10 80	
Painting old pump house,	11 77	
Revarnishing floor in new pump house,	9 45	
Drip pans, copper,	24 71	
	$71 63	
15 per cent.,	10 74	
		82 37
Extra for labor and material for two new hydrants ordered after construction of pipe mains, laborers, 72 hours, at 14 cents,	$10 08	
Mechanic, 25 hours, at 30 cents,	7 50	
77 lbs. of lead, at 5½ cents,	4 24	
Specials,	$6 05	
Extra pipe,	4 25	
	$32.12	
15 per cent.,	4 82	
		36 94
Total,		$25,324 10

Part payments:

Monthly estimate No. 1,	$4,739 46	
Monthly estimate No. 2,	11,380 96	
Monthly estimate No. 3,	3,124 56	
		$19,244 98
Final payment,		$6,079 12

November 5th, 1908.

.....
Assistant Engineer in Charge.

Approved:

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Chief Engineer.

The estimates, as given above, included the cost of all extras ordered by the Department as necessary for the completion of this work. It will be noted that the estimate at the time the contract was awarded was $25,692.50 and that the final estimate is $25,324.10, so that the final cost was over $300.00 cheaper than expected. About

seven hundred feet of additional pipe lines were actually laid and two additional fire hydrants. This increase in the pipe lines was necessary to bring the six inch main to the centre of the Infirmary, where the fire hydrant would protect the entire length of the building, and extra piping for the by-pass around the reservoir. Very little rock, however, was encountered on the work and this made a great difference in cost of the work as shown above. The settlement in full with the Contractor, according to the Engineer's estimates, was effected

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SEWERS.

Sealed proposals for the construction of a portion of the system of sewers for South Mountain Sanatorium near Mont Alto, Franklin County, for the Commonwealth of Pennsylvania, Department of Health, were received by the Commissioner on the 24th day of September, 1907.

The Engineers' estimate of the work to be done, under the plans and specifications, by which the proposal was compared was as follows:

400 lineal feet, ten inch terra cotta sewer over five feet deep.

1,800 lineal feet ten inch terra cotta pipe sewer, four to five feet deep.

800 lineal feet ten inch terra cotta pipe sewer, four feet or less in depth.

50 lineal feet eight inch terra cotta pipe sewer, over six feet deep.

500 lineal feet eight inch terra cotta pipe, five to six feet deep.

2,400 lineal feet eight inch terra cotta pipe, sewer four to five feet deep.

318 lineal feet eight inch terra cotta pipe, sewer four feet or less in depth.

150 lineal feet six inch terra cotta pipe sewer, over six feet deep.

2,450 lineal feet six inch terra cotta pipe sewer, four to five feet deep.

130 lineal feet five inch terra cotta pipe, average six feet.

There will be approximately 3,600 cubic yards excavation in sewer trench, of which 2,600 cubic yards may be earth and loose rock excavation and 1,000 cubic yards solid rock excavation.

Two five inch Y branches on 8 inch sewer pipe.

Forty 4 inch Y branches on 6 inch sewer pipe, 3 foot lengths.

Twenty-nine castiron manhole frames and covers.

160 lineal feet of concrete manhole construction.

One concrete grease trap.

The above quantities are approximate only and are made up for the purpose of comparing the bids. They may be increased or diminished as necessity may require, and the contractors will not be entitled to any claim for damages, loss or profit, excessive costs, or otherwise, if the amount of the work actually done differs from the amount herein estimated.

The canvas of the bids received is given in the following table:

No.	Items.	Contractor's Name.	Chambersburg. Hiteschew & Gillan.		Harrisburg. Brady & Snavely.		Harrisburg. J. N. McCulloch.		Chester. M. Bunyea and Company.		Harrisburg. United Ice & Coal Company.		Harrisburg. C. F. Hessenberger.	
			Unit price.	Total.	Unit price.	Total.	Unit price.	Total.	Unit price.	Total.	Unit price.	Total.	Unit price.	Total.
1.	10-inch sewer (400feet) 5 feet deep and over,		$2 00	$800 00	$1 08	$432 00	$1 30	$520 00	$2 25	$900 00	$2 00	$800 00	$0 96	$384 00
2.	10-inch sewer (1,800 feet) 4 feet to 5 feet deep,		1 90	3,420 00	1 08	1,944 00	1 25	2,250 00	2 15	3,870 00	2 00	3,600 00	0 73	1,314 00
3.	10-inch sewer (800 feet) 4 feet deep or less,		1 80	1,440 00	1 08	864 00	1.225	980 00	2 00	1,600 00	2 00	1,600 00	0 71	568 00
4.	8-inch sewer (50 feet) over 6 feet deep,		2 10	105 00	0 99	49 50	1 04	52 00	2 00	100 00	1 60	80 00	0 89	44 50
5.	8-inch sewer (500 feet) 5 feet to 6 feet deep,		1 85	925 00	0 99	495 00	0 99	495 00	2 00	1,000 00	1 60	800 00	0 70	350 00
6.	8-inch sewer (2,400 feet) 4 feet to 5 feet deep,		1 80	4,320 00	.....	2,376 00	0 94	2,256 00	1 85	4,440 00	1 60	3,840 00	0 68	1,632 00
7.	8-inch sewer (318 feet) 4 feet deep or less,		1 70	540 60	0 99	314 82	0 90	286 20	1 75	556 50	1 60	508 80	0 60	190 80
8.	6-inch sewer (150 feet) over 6 feeet deep,		2 00	300 00	0.925	138 75	1 00	150 00	0 75	112 50	1 40	210 00	0 67	100 50
9.	6-inch sewer (2,450 feet) under 6 feet deep,		1 70	4,165 00	0.925	2,266 25	0.855	2,094 75	0 65	1,592 50	1 40	3,430 00	0 50	1,225 00
10.	5-inch sewer (130 feet) average 6 feet deep,		2 00	260 00	0 90	117 00	0 90	117 00	0 75	97 50	1 25	162 50	0 63	81 90
11.	5-inch Y on 8-inch sewer (2),		0 40	0 80	0 35	0 70	3 00	6 00	1 00	2 00	2 50	5 00	1 33	2 66
12.	4-inch Y on 6-inch sewer (40),		0 30	12 00	3 00	120 00	1 50	60 00	0 90	36 00	2 00	80 00	1 07	42 80
13.	Vert. ft. mh. (160 feet),		4 00	640 00	8 15	1,304 00	12 00	1,920 00	9 00	1,440 00	9 00	1,440 00	15 00	2,400 00
14.	Mh. frame and cover (29),		15 00	435 00	15 00	435 00	12 00	348 00	15 00	435 00	15 00	435 00	20 00	580 00
15.	Concrete grease trap,		25 00	25 00	110 00	110 00	125 00	125 00	100 00	100 00	100 00	100 00	90 00	90 00
16.	Rock cut per cubic yard (1,000),		0 50	500 00	1 50	1,500 00	3 00	3,000 00	4 00	4,000 00	2 00	2,000 00	2 00	2,000 00
	Total,		.....	$17,888 40	.....	$12,467 02	.....	$14,659 95	.....	$20,282 00	.....	$19,091 30	.....	$11,006 16

The award was made to Mr. C. F. Hessenberger because his aggregate bid was the lowest. On September 26th, 1907, a contract was executed between the Commonwealth of Pennsylvania, Department of Health, acting by and through its Commissioner and the said Hessenberger, for the construction of a part of a system of sanitary sewers at the sanatorium.

The contract was completed. The work itemized is as follows:

2,974.5 feet of sewer, 10 inches in diameter.
3,295 feet of sewer, 8 inches in diameter.
3,509.2 feet of sewer, 6 inches in diameter.
17-6 inch by 4 inch Y branches on 6 inch sewer.
29 manholes complete.
One grease trap.

One clause of the contract provided that the work may be increased or diminished, as represented by the Engineers' estimate, and if increased the Contractor shall do the work in the same manner with like materials and for same price as stipulated in the contract for work of the same character. Under this provision the work was increased by the laying of 1,945.25 feet of six inch sewer. This was in streets which had not been laid out finally at the time of the awarding of the contract.

Another clause in the contract provided that whenever it shall become necessary to use materials or to perform work not contemplated in the plans or implied in the specifications, the Contractor shall furnish such material and labor and accept in full payment therefor such price as shall be established by the Engineer, based upon the cost of furnishing such extra labor and material, plus 15 per cent., such price to be determined by the Engineer after presentation of the original bills and certified copy or pay-rolls for such labor. Under this clause such work has amounted to $213.08. Of this amount $6.38 was for two and a half barrels of cement at $2.55 per barrel. This was used in repairing the sewer in the road in front of the camp. The trench has been ordered left open to facilitate the laying of water pipe. A heavy storm occurred and damaged the sewer, for which the Contractor was not liable. The extra labor employed in repairing the sewer amounted to 441 hours, at $0.13 2-3, making a total of $73.50.

Owing to a change in the width of each plot between streets at the camp, it was necessary to change the location of one manhole to make it come at street intersection, otherwise two manholes would have been required. The angle in the main sewer line was designed to be at the original manhole, and the trench was excavated for it. The change in plan slightly altered line of the trench, necessitating extra work, as more fully hereinafter appears. The amount of money involved by the change was $121.99. More than this was saved by obviating the construction of two manholes.

At the manhole below the ice dam a connection was made to admit of flushing the sewer by water from the ice pond. The amount due the contractor on this work was $11.21.

The contract contains a clause that for Portland concrete masonry not shown on the plans and ordered by the Engineer as extra work, the sum of $6.50 shall be paid. It was necessary at the manhole in front of the lower camp, where a living spring was encountered in

the bottom of the trench, to surround the sewer with concrete. Also where the main sewer passes through the swamp and under the creek below the ice pond it was necessary to surround the pipe with concrete. It required 13.65 cubic yards of concrete, amounting to a total of $88.73.

Monthly estimates were made on the first of every month during the progress of the work, the first estimate being on November first, 1907. The amounts paid on the fifteenth of each month have been as follows:

November 15th,	$1,516 50
December 15th,	2,749 90
January 15th,	1,708 26
February 15th,	1,010 39
Total,	$6,984 70

The following are detail copies of these estimates:

DEPARTMENT OF HEALTH.—Engineering Division.

MONTHLY ESTIMATE NUMBER ONE FOR SEWERS AT THE PENNSYLVANIA SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA. ACCOUNT OF CONTRACT WITH C. F. HESSENBERGER, DATED SEPTEMBER 26TH, 1907.

1293 ft. of 10 in. terra cotta sewer, laid complete, 4 ft. or less in depth, at 71 cents per foot,	$918 03
850 ft. of 10 in. terra cotta sewer, laid complete, 4 ft. to 5 ft. in depth, at 73 cents per foot,	620 50
300 ft. of 10 in. terra cotta sewer, laid complete, 5 ft. or over in depth, at 95 cents per foot,	288 00
34 1-3 cu. yds. of solid rock excavation, at $2.00 per yard,	68 66
Total,	$1,895 19
Deduct 20 per cent.,	379 04
Total, less 20 per cent.,	$1,516 15

November 1st, 1907.

.....

Approved. Assistant Engineer in Charge of Work.

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 1. MONTHLY ESTIMATE NO. 2, FOR WORK COMPLETED ON SEWERS AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM NOVEMBER 1ST to DECEMBER 1ST, 1907. ACCOUNT OF CONTRACT WITH C. F. HESSENBERGER, DATED SEPTEMBER 26TH, 1907.

332 ft. of terra cotta sewer, laid complete, 4 ft. to 5 ft. in depth, at 73 cents per foot, 10 inches,	$242 36
200 ft. 10 in. terra cotta sewer, 3 ft. to 4 ft. deep, at 71 cents per lineal foot,	142 00
196 ft. of 8 in. terra cotta sewer, laid complete, over 6 ft. deep, at 89 cents per foot,	174 44
542 ft. of 8 in.. terra cotta sewer, laid complete, 5 ft. to 6 ft. in depth, at 70 cents per foot,	379 40
712 ft. 8 in. terra cotta sewer, laid complete, 4 ft. to 5 ft. in depth, at 68 cents per foot,	484 16
1292 ft. 8 in. terra cotta sewer, laid complete, 4 ft. to 3 ft. in depth, at 60 cents per foot,	775 20
768 ft. of 6 in. terra cotta sewer, laid complete, 6 ft. to 3 ft. in depth, at 50 cents per foot,	384 00
7-6 x 4 Wyes on 6 in. sewer, at $1.07,	7 49
48 2-3 cu. yds. of solid rock excavation, at $2.00 per cubic yard,	97 34
53.6 vertical feet of manholes complete, at $15.00 per foot,	804 00
10 manhole frames and covers, complete, at $20 each,	200 00
Total,	$3,690 39

For change in sewer line between station, 17 plus 68 and 19 plus 75, due to widening lots on force account, plus 15 per cent profit to contractor:		
Foreman, 32 hours, at 35 cents per hour.....	$11 20	
Water boy, 31 hours, at 12½ cents per hour, ...	3 88	
Laborers, 546 hours, at 13.5 cents per hour, ...	15 91	
		121 99
		$3,812 38
Deduct cost of engineering from November 2 to December 1, with allowance of 3 days for delay due to change in line 28 minus 3 equals 25 days, at $15.00, ...		375 00
Total, ...		$3,437 38
Deduct 20 per cent., ...		687 48
Total, less 20 per cent., ...		$2,749 90

December 2d, 1907.

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 1, MONTHLY ESTIMATE NO. 3, FOR WORK COMPLETED ON SEWERS AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM DECEMBER 1, 1907, TO JANUARY 1, 1908. ACCOUNT OF CONTRACT WITH C. F. HESSENBERGER, DATED SEPTEMBER 26TH, 1907.

111 ft. 8 in. terra cotta sewer, laid complete, over 6 in. in depth, at 89 cents, ...	$98 79
50 ft. 8 in. terra cotta sewer, laid complete, 5 ft. to 6 ft. in depth, at 70 cents, ...	35 00
338 ft. 8 in. terra cotta sewer, laid complete, 4 ft. to 5 ft. in depth, at 68 cents, ...	229 84
50 ft. 8 in. terra cotta sewer, laid complete, 3 ft. to 4 ft. in depth, at 60 cents, ...	30 00
181 ft. 6 inch terra cotta sewer, laid complete, over 6 in. in depth, at 67 cents, ...	121 27
2087 ft. 6 in. terra cotta sewer, laid complete, 3 ft. to 6 ft. in depth, at 50 cents, ...	1,043 50
Eight 6 x 4 Wyes on 6 in. sewer, at $1.07, ...	8 56
42.2 vertical feet of manholes complete, at $15, ...	636 00
7 manhole frames and covers complete, at $20, ...	140 00
Extra concretes used to protect sewer at creek crossings and at springs in trench, 9.15 cubic yards, at $6.50 in place, ...	59 48
2.5 barrels of cement, used in closing flow of springs in ditch, at $2.55 per bbl. in place, ...	6 38
Extra labor used in repairing sewer due to open trench and heavy rain, 441 hrs. of labor at 16 2-3 cts., ...	73 50
44 cu. yds. of solid rock excavation, at $2.00, ...	88 00
Total, ...	$2,570 32
Deduct cost of engineering from December 1 to January 1, with allowance of 2 days for delay due to repairs to sewers. 31-2 equals 29 days, at $15.00, ...	435 00
	$2,135 32
Deduct 20 per cent., ...	427 06
Total, less 20 per cent., ...	$1,708 26

January 2nd, 1908.

.....
Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 1, MONTHLY ESTIMATE NO. 4, FOR WORK COMPLETED ON SEWERS AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM JANUARY 1ST, 1908, TO FEBRUARY 1ST, 1908. ACCOUNT OF CONTRACT WITH C. F. HESSENBERGER, DATED SEPTEBER 26TH, 1907.

455 ft. 6 in. terra cotta sewer laid complete, 3 ft. to 6 ft. in depth, at 50 cts. per ft., ...	$227 50
1 grease trap, complete, at $90, ...	90 00
67.5 vertical ft. of manholes, complete, at $15, ...	1,012 50

12 manhole frames and covers, at $20.00 per set,	$240 00
Two 6 x 4 Wyes on 6 in. sewer, at $1.07,	2 14
Extra concrete used to protect sewer near ice pond, 3.79 cubic yards, at $6.50,	24 64
1 in. wrought iron pipe and fittings, from ice pond to manhole below pond, at cost, plus 15 per cent.,	11 21
Total,	$1,607 99
Deduct cost of engineering from January 1st to January 23rd, inclusive, 23 days at $15.00,	345 00
	$1,262 99
Deduct 20 per cent.,	252 60
Total, less 20 per cent.,	$1,010 39

February 1st, 1908.

The contractor agreed to begin work ten days after the engineer's notice to begin work and to complete the whole work on or before twenty-four days thereafter; no allowance to be made for inclement weather; and if the work be ordered extended beyond the engineer's estimate, the contractor agreed to accept such extension of time for performing the additional work, as represented by the relation between the cost of such additional work and the cost of the whole work, comprised in the engineer's estimate.

The work was ordered started on the day of execution of the contract, so the ten days thereafter was October 7th. The completion of the work in twenty-four days (working days) brought the time for the completion of the contract to November 2d. The original estimate called for about 9,000 feet of sewer. About 1,000 additional feet were ordered, being equivalent to three days' extension of time of contract or to November 7th. On this date the work was not finished. During this period there were 2.5 days' rainy weather only, which shows that the inclemency of the weather was not the cause of delay. Progress work was practically completed January 23rd, on or about which time the contractor dissolved his working force and left the job. Up to this time the Department was obliged to keep engineers and inspectors on the work.

However, there were finishing jobs to be done and the entire contract was not completed to the satisfaction of the engineers until April 8th, with one exception, namely, the placing of the sewers in a fairly tight condition. On April the 14th, of the current year, the chief engineer and the assistant engineer in charge of work, inspected all of the sewers and took measurements at manholes of the flow of leakage in the sewers.

At the lower manhole near the disposal plant, where the water was being turned on to the ground temporarily, the measured flow was 50,000 gallons per twenty-four hours. The observed flow at the next manhole, 689.6 feet distant, appeared to be about the same, but at the third manhole, 397 feet from the second manhole, the measured flow of leakage was 25,000 gallons per day. At No. 4 manhole distant 595.58 feet, the estimated flow was about the same, but at No. 5 manhole, distant 426.18 feet further up the line, the measured flow was 18,000 gallons. Between manholes No. 5 and No. 6, distant 866.1 feet, the sewer did not leak. But at No. 7 manhole, distant 696.6 feet above, this manhole being at one end of the swamp and No. 6 at the other end, the sewer between passing underneath the creek, the measured flow was 16,000 gallons, showing a very tight sewer for the territory.

Beyond the No. 7 the ground was high and there was no leakage to speak of, except that which might have been seen at the manhole in the public road at the gate to the lower camp. No account was made of this because of the small amount.

So in 3,000 feet most all of the leakage occurred. The hillside along this sewer was saturated with ground water which stood in the sewer trench over the pipe from one to two feet deep. Therefore, any imperfection in joints or any breakage of the pipe would manifest itself on inspection between manholes. An examination revealed the presence of at least three points at which water was pouring in through the sewer from the ground outside. Remedies were necessarily applied at these places. The contractor was notified to repair the sewer. The clause in the contract covering this point reads as follows:

"If the party of the second part shall refuse to take up and rebuild and replace as aforesaid (the State), shall have the right to work upon the same in the place of the party of the second part. The amount of work which can thus be undertaken by the (State) shall be determined in each case by the engineer. Before undertaking any such work the (State) shall give two days' notice to the (contractor), and such notice shall contain an accurate statement of the work to be thus undertaken, and upon the receipt of this notice the (contractor) shall immediately discontinue such portion of the work."

The amounts deducted from the monthly estimates for engineers and inspectors were tentative ones and so understood, being subject to revision on final payment. The total cost to the State from November 7th, 1907, to January 23rd, 1908, inclusive, for engineering and inspection, which the State would not have had to pay had the contractor finished his work on time, was $407.46. From the careful record of the time spent by the men in the State employ on repairing the washout in the sewer trench in front of the camp and in changing over the sewer trench to save an extra manhole, as hereinbefore fully described, it appears that five full days out of the 78 days' total time, is the proportionate amount which the State might reasonably assume as its share of the cost of engineering and inspection on the sewers from and after November 7, 1907. On this basis, which is $5.224 per day, the contractor was obligated to the State to the extent of $381.35.

No man devoted all of his time to the sewer work. Mr. C. A. Eckbert, who was put in responsible charge of sewer construction on resignation of Mr. Phillippi, spent 54.75 days' full time at $2.50. Ivan Glace spent 60.5 days' full time at $1.33 per day. C. R. Forbes, one day at $2.00. C. R. Barnes, 15.5 days at $2.00. William Kaufman spent 21.5 days at $1.17. Mr. Kaufman lived in the vicinity. The other men were boarded by the State, for which $1.00 per day was charged, including Sunday. The men's pay was by the month, so that Sundays have been figured in salaries. This was cheaper than to pay their expenses home each week.

On November 8th, Mr. Ennis assumed the duties of general superintendent at the sanatorium. No account of his time was taken, therefore, since he had all kind of work on his hands and did not devote himself specifically to sewer work.

The following is the final estimate of the work done and the moneys due the contractor under the contract:

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 1, FINAL ESTIMATE FOR WORK COMPLETED ON SEWERS AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM SEPTEMBER 26TH, 1907, TO APRIL 8, 1908. ACCOUNT OF CONTRACT WITH C. F. HESSENBERGER, DATED SEPTEMBER 26TH, 1907.

1484.2 ft. 10 in. terra cotta sewer, laid complete, 4 ft. to 3 ft. in depth, 71 cents per foot,		$1,053 78
1195.2 ft. 10 in. terra cotta sewer, laid complete, 4 ft. to 5 ft in depth, at 73 cents per foot,		872 50
295.1 ft. 10 in. terra cotta sewer, laid complete, 5 ft. or over in depth, at 96 cents per foot,		283 30
1153.5 ft. 8 in. terra cotta sewer, laid complete, 4 ft. to 3 ft. in depth, at 60 cents per foot,		692 10
1023.7 ft. 8 in. terra cotta sewer, laid complete, 4 ft. to 5 ft. in depth, at 68 cents per foot,		696 12
828.7 ft. 8 in. terra cotta sewer, laid complete, 5 ft. to 6 ft. in depth, at 70 cents per foot,		580 09
289.1 ft. 8 in. terra cotta sewer, laid complete, 6 ft, or over in depth, at 89 cents per foot,		257 30
96.5 ft. 6 in. terra cotta sewer, laid complete, over 6 ft. in depth, at 67 cents per foot,		64 66
3412.7 ft. 6 in. terra cotta sewer, laid complete, 6 ft. to 3 ft. in depth, at 50 cents per foot,		1,706 35
Rock excavation, 124.22 cu. yds., at $2.00 per yard,		248 44
163.67 vertical feet of manholes, complete, at $15.00 per vertical foot,		2,455 05
29 manhole frames and covers, in place, at $20.00 each,		580 00
17 6 x 4 Wyes, at $1.07 each,		18 19
13.65 cu. yds. of concrete at $6.50 per cu. yd.,		88 73
2.5 barrels of cement, at $2.55 per barrel,		6 38
1 grease trap at $90.00,		90 00
For change in sewer line between station 17 plus 68 and 19 plus 75, due to widening lots on force account plus 15 per cent. to contractor.		
Foreman, 32 hours, at 35 cents per hour,	$11 20	
Water boy, 31 hours, at 12.5 cents per hour,	3 88	
Laborers, 546 hours, at 16 2-3 cents per hour,	91 00	
As per engineer's order,	106 08	
Contractor's profit, 15 per cent.,	15 91	
		121 99
Extra labor used in repairing sewer due to open trench and heavy rain, 441 hours of labor, at 16 2-3 cents,		73 50
1 in. w. i. pipe connection at dam, as per engineer's order, at cost, plus 15 per cent. profit, as per specifications,		11 21
Total,		$9,899 69
Part payments:		
Monthly estimate No. 1,	$1,516 15	
Monthly estimate No. 2,	2,749 90	
Monthly estimate No. 3,	1,708 26	
Monthly estimate No. 4,	1,010 39	
		6,984 70
Total less previous payments,		$2,914 99
Deduct cost of engineering from November 7, 1907, to January 23, 1908, inclusive, with 5 days' allowance,		381 35
Final payment,		$2,533 64

April 13th, 1908.

.....
Assistant Engineer in Charge.

Approved:

.....
Chief Engineer.

Attention is called to the fact that the sewer system has cost $1,100 less than the amount of the contractor's aggregate bid and the engineer's estimate, although a thousand feet additional sewer were laid.

The material on hand paid for by the contractor and delivered on the ground ready to use and in good condition, but not used owing to

changes in the plan, and material which the State might use in the future and might with justice be taken off the hands of the contractor at its fair estimated cost, was as follows:

1 manhole cover and frame,	$10 00
2 8 in. flap gates,	10 00
1 4 in. pipe for grease trap,	2 00
202 ft. 6 in. pipe at 9 cts.,	18 18
110 ft. of 5 in. pipe, 7.5 cts.,	8 25
68 ft. 4 in. pipe at 6 cts.,	4 08
16 ft. 8 in. at 15 cts.,	2 40
3 10 x 6 Wyes at $1.02,	3 06
30 4 in. x 6 in. bends, at 19.5 cts.,	5 85
16 4 in. x 6 in. Y's, at 40.5 cts.,	6 48
4 6 in. lids, at 25 cts.,	25
494 ft. of pipe at 50 pieces per load, at $3 per load for hauling,	15 00
Total,	$85 55

This, added to the above amount, gives a total of $2,619.19 due the contractor.

Contractor's Claims.

M. W. Jacobs, Esq., who represented Mr. Hessenberger, made certain representations respecting claims for compensation under the contract.

One claim was that the monthly estimates of work charged the contractor with cost of engineering aggregating $1,155. Certain provisions of the contract, as understood by Mr. Hessenberger, required the contractor to pay for the services of engineers and inspectors occasioned by the contractor's delay in prosecuting the work, and the charges for this item aggregated 77 days at the uniform rate of $15.00 per day, which was believed to be excessive both as to the per diem rate and the number of days. Mr. Jacobs argued the matter out at length in support of his contention.

The monthly estimates were approximations. The contractor informed Mr. Fleming, assistant engineer, at the beginning that he did not expect to finish his work in time, and that he had figured on a certain number of days extra at a loss each day for engineering and inspection of $15. The State, therefore, without going into a detailed examination of diaries and actual costs, took this general estimate as a basis of computation at the end of each month, and the contractor offered no objection to Mr. Fleming until the final estimate of monthly payment was made, when the time had arrived for final adjustment. Therefore, there was no occasion from the State's standpoint for a discussion by the lawyer of the question.

The claim was made that the days of delay should not be charged against the contractor.

Under Item A, Mr. Jacobs represented that the time in testing the sewers should not have been included in the time specified for completing the work; that allowance for time required by extra work (additional sewer), should have been made, and that the engineer and inspector for the extra work should have been paid by the State.

These also were matters for a final estimate and were covered, as hereinbefore appears. The time the State expended in testing the sewer was not charged the contractor, neither the time required for extra work nor the engineering nor inspection therefor.

Under Item B, the lawyer claimed as follows:

"The engineer allows three days for delay due to change of line of the ditch in the public road. This allowance should be at least ten days. Much of this work was done in rock too rotten to blast, and, therefore, not drawing rock prices, but very difficult to handle. The new ditch being only a few feet away from the old one, the bank was hard to hold up and the difficulty of the work was thus increased. Not less than ten days were consumed in this extra work, including the building of manholes, etc."

The State kept a record of the time and was guided by it. The contractor did not concentrate his entire force at this one place because he could not do so to advantage. About one-third of the men were employed for one whole day and parts of six days. No doubt the change of plans somewhat confused the contractor, and in justice it may be said that Mr. Hessenberger appeared to be willing, but inexperienced. Suggestions were not heartily welcomed by him relative to management. Time was consumed needlessly and it cost the State extra for engineering and inspection on this part of the work which the State assumed, the allowance being three days. An extreme allowance in effecting an amicable settlement with the contractor would be six days instead of ten days claimed by Mr. Jacobs.

In order that no injustice might be done the contractor, the Commissioner considered a further allowance of three days for delay on work caused by the State at this point.

Under Item C, the lawyer represented as follows:—

"For some thousands of feet the engineer ordered the ditch to be left partly unfilled so that the State could put in water pipe, saving the State the cost of excavation for its water pipe line. This was wholly outside of the contract and was a cause of delay of no less than ten days and extra expense to the contractor of not less than $200. The men were ordered away when a little more throwing in would have completed the job at a small expense, and ordered back when the ground was solidly frozen and the time and labor required for the final filling in was, as I am informed, quadrupled.

"I am informed that the usual practice in such cases is, that the party, requiring the additional use of the ditch causing the delay, fills in the ditch at his own expense, or that the cost of ditching and filling is divided between the parties. This appears to be fair and is probably what the State should have done in this case."

The State's position in this matter was that it did backfill the trenches where it was thought the contractor would have been delayed if he filled them; that where the trenches were left open and finally filled by the contractor at the State's orders, it was at those points where there was ample work upon which the men were being employed and where no real delay was occasioned to the contractor by leaving the trenches open. The trench in front of the lower camp was open about three weeks pending arrival of pipe, water pipe, which we purpose to lay in the same trench. The contractor was held re-

sponsible for any damages that might occur during this time and had to protect the trench and maintain lights and it might be just to take this risk and added responsibility put upon the contractor in maintaining this trench in the public highway in front of the lower camp for a period of three weeks, into consideration in determining whether a money compensation should be given. The whole work was not delayed, but the risk of the contractor was increased. On this score and to effect an amicable adjustment, eminently fair and satisfactory to all interests, to divide equally between the State and the contractor the alleged extra expense to the contractor of $200, an allowance of $100 was made to the contractor to compensate him for all delays incident to the laying of water pipes in the sewer trenches.

Under Item D, Mr. Jacobs claimed that his client was delayed in laying the sewer pipe by the use by the inspector of peculiar methods of alignment. This contention was absurd, for most part the pipe was laid by mountaineers who had never had any previous experience and the inspectors had to do most of the work in placing the pipe properly. Mr. Barnes inspected a short length of sewer pipe laying and in care he used a plumb bob.

Under Item E, the claim was made that another serious cause of delay and expense to the contractor was the omission of underdrains. He anticipated the putting in of 3,000 feet of underdrain and had figured a profit of about $500, and also a further profit by the use of the underdrains in removing water from the trench. So the extra cost of pumping not anticipated was alleged to be $500. Not only was he deprived of these profits, but the extra time consumed in overcoming the difficulties without underdrains was also charged against the contractor. He urged this as another reason why the State should not charge the contractor with engineering and inspection.

Under the contract the State had nothing to do with anticipated profits or losses incurred in prosecution of the work or by any change in plan. It was clearly optional with the State to use the underdrains and the State chose not to use them. Furthermore, the State was put to extra expense by reason of the extra time consumed in completing the contract and for which the contractor stated he had estimated in preparing his bid.

Mr. Jacobs in concluding declared that the contract was an unusually severe one and that the State went to the utmost limit upon all points in construing it against the contractor, and in placing upon him, without compensation, burdens which could not have been in the minds of the contracting parties at the time it was made.

There is not much doubt but that the elimination of the underdrain did add to the contractor's expense at the crossing of the creek, but there only for 200 feet in length. Elsewhere on the portion of the work where underdrains were contemplated, the trench was dry. The wet places beyond the creek were where no underdrain was proposed.

The contractor had no right to assume that the specifications did not mean what they said. He should have known that a sewer leading to a sewage disposal plant must be built tight, more especially through territory extremely wet and partly under water during rainy seasons. The contractor was informed of the situation before he bid on the work or began construction.

The contractor filled over the pipe in the main sewer trench below the ice pond to a depth of about 18 inches with earth and then threw in the rock excavation from the trench. This practically made the ditch a stone drain, intercepting the surface water from the hillslope, where it would run along or stand on top of the trench and eventually fill the pipe with water and flood out the disposal plant. He was told repeatedly by the inspector and by the engineer that these rocks would have to be substituted by earth, and he promised time after time that he would soon attend to it. This he neglected to do until the latter part of March. He then took the stone out and filled in with earth and the cost he stated to have been $204.45, and this was a specific claim of the contractor. The State could not have accepted the job if left in the condition of an open sewerblind stone drain.

The price bid included all materials used for covering sewers when there was not sufficient from the trench dug to cover the depth required. The specifications also stated that the backfill was to be to the satisfaction of the engineer.

The final estimate on the contract, amounting to $2,734.86, was accepted and partial payment was made by the Commissioner of Health in the sum of $2,000, the balance of $734.86 was held as a guarantee to insure the repair of the sewers, which were in a leaky condition.

The enormous amount of leakage in the main trunk sewer was from the disposal plant to the eight inch junction at the ice pond, a distance of 3,000 feet. This leakage amounted to approximately 60,000 gallons and was evidently due to faulty construction. The contractor agreed to make repairs upon being informed where the location of the faulty construction was. Eleven leaks were definitely located, but owing to the heavy flow through the invert of the sewer it was impossible to determine where all the leakage came from.

A list of the leaks located were sent to the contractor on April 23d, and he agreed to make the repairs immediately through a subcontractor. This was approved by the Commissioner of Health. The final estimate of $2734.86 was accepted, as previously stated, and the partial payment of $2,000 made. The contractor stated in writing on May 1st that this arrangement was satisfactory and that $734.86 should be withheld as a guarantee that he would proceed to repair the leaks.

The sub-contractor started on May 4th to make repairs at the various points shown to be defective. The work progressed slowly, as the spring rains made it difficult to excavate and keep the trench dry. The excavation, in nearly every instance showed faulty joints not only at the points located by the interior inspection but also in the inverts. It was found, in making the joints, the cement had not been placed under the invert as called for in the specifications. This point is especially emphasized in the specifications.

The sub-contractor attempted to repair these joints, but it was found, upon examination, that practically every joint at the invert was faulty and that it would be a cheaper proposition for the contractor to open up the whole trench and examine every joint.

On May 29th, the contractor agreed to personally take charge of the work, to excavate the trench from the sewage disposal plant along the ten inch line as far as necessary and to repair the defective joints.

Work was begun on June 4th and repairs were made from the outfall end of the sewer at the disposal plant for a distance of 1,700 feet up to Station 83 plus 01. In making these repairs, the sewer was tested from the interior before the trench was backfilled by filling the sewer from the upper manhole in one section with the lower end plugged. This made a positive test of any existing leaks and frequently showed leaky joints which otherwise would escape attention of the inspector.

On the evening of June 18th, the contractor filled up with water a section of sewer between Station 78 plus 81 and 83 plus 01. As it was late when this sewer was filled and difficult to inspect the joints, it was decided to leave the sewer filled up over night and to make an inspection in the morning of June 19th. During the night the trench surrounding the sewer filled up with ground water to a depth of about two feet above the top of the sewer and in the morning when the contractor started work on the ground he stated that the sewer buckled through the lower section. It is probable that the buckling was due to a floating movement in the deep water in the trench.

The Department made the repairs incurred by this accident, which consisted of replacing about twelve lengths of broken terra cotta pipe. and under this arrangement the contractor stated, on June 22nd, that he would proceed with the repairs and complete the work, but on the evening of June 22nd he notified the Department of Health in writing that, upon the advice of his attorney, he would not continue the work on the sewers.

Upon the advice of the Attorney General's Department, the State proceeded to make the repairs under a specific clause in the contract, the Pennsylvania Surety Company having first, after a ten days' notice ,failed to proceed under the contract to make the repairs.

On July 14th, the Department began work upon the sewer line and extended repairs upon Station 83 plus 01 to Station 70. In almost every joint it was found that the same condition existed as on the joints in the lower section. The inverts were not properly filled with cement and had to be repaired. The work was completed on August 7th at a cost to the Department of $281.58. This cost was made up as follows:

8 sacks of cement at 60 cents,	$4 80
5 lbs. of oakum at 4 cents,	20
1,248 hrs. of labor at 15 cents,	187 20
163 hrs. of labor at 12.5 cents,	20 38
176 hrs. foreman at 20 cents,	35 20
2 hrs. blacksmith at 40 cents,	80
11 days inspector at $3.00,	33 00
Total,	$281 58

This does not represent the cost of repairs to the portions of the line which buckled. The Department repaired this part of the line at its own expense. The $281.58 deducted from the $734.86 held back to cover repairs left a final amount due the sewer contractor of $453.28. At the close of the year Mr. Hessenberger had not accepted the settlement.

SEWAGE DISPOSAL WORKS.

On October 30th, 1907, the Commissioner of Health received proposals for the construction of the sewage disposal plant. The work to be done consisted of the complete construction of two reinforced concrete septic tanks, each four feet wide by thirty feet long by ten feet deep; two sprinkling filters of reinforced concrete, each fourteen feet by thirty feet by seven feet deep; one reinforced concrete dosing tank for the filters; one chemical mixing tank and superstructure; excavation for a future sand filter; and all clearing, ditching and pipe laying necessary for completing the plant and placing it in working order.

The proposals were based on a lump sum for the whole work and were as follows:

Brady and Snavely, Harrisburg, Pa., ...	$6,595 00
W. B. Bunyea, Chester, Pa., ...	8,000 00
C. F. Hessenberger, Harrisburg, Pa., ...	16,350 00

The contract was signed on October 31st, 1907, by Brady and Snavely, of Harrisburg, Pa., as they were the lowest bidders. They furnished a bond of $2,500 with the Pennsylvania Surety Company of Harrisburg, Pa., as bondsmen.

The contract provided that partial payments on this work should be made in monthly estimates of 80 per cent. of the work completed during a month. This estimate was to be made at the end of each month and payment was to be made on or before the 15th day of the month next succeeding that in which the work was done. In accordance with this clause, monthly estimates were made on the work, as follows:

Monthly estimate No. 1, December 2, 1907, ...	$386 56
Monthly estimate No. 2, January 2, 1908, ...	951 60
Monthly estimate No. 3, February 3, 1908, ...	796 40
Monthly estimate No. 4, May 8, 1908, ...	1,098 80
Monthly estimate No. 5, June 1, 1908, ...	810 35
Total, ...	$4,043 71

In addition to this, a partial payment was made on March 7, 1908, for material on the ground which had been paid for by the contractors, but which had not been placed in the work. This payment was approved by the Commissioner of Health and amounted to $627.94, which was 50 per cent. of the cost of this material as shown by the receipted bills of the contractors. The total amount received by the contractor prior to the final payment was $4,671.65.

A detail of the monthly estimates and the partial payment follows:

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 2, MONTHLY ESTIMATE NO. 1, FOR WORK COMPLETED ON SEWAGE DISPOSAL PLANT AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM NOVEMBER 1ST, TO DECEMBER 1ST, 1907. ACCOUNT WITH BRADY & SNAVELY, OF HARRISBURG. CONTRACT DATED OCTOBER 31ST, 1907.

Clearing and grubbing 2.66 acres of land, at $100 per acre, ...	$266 00
Excavation of sprinkling filters, 215 cu. yds. at 60 cents per cu. yd.,	129 00
Excavation for septic tanks, 147 cu. yds., at 60 cents per cu. yd.,	88 20
Total, ...	$483 20

Deduct 20 per cent.,	96 64
Total, less 20 per cent.,	$386 56

December 2nd, 1907.

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 2, MONTHLY ESTIMATE NO. 2. FOR WORK COMPLETED ON SEWAGE DISPOSAL PLANT AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM DECEMBER 1ST, 1907, TO JANUARY 1ST, 1908. ACCOUNT WITH BRADY & SNAVELY, OF HARRISBURG. CONTRACT DATED OCTOBER 31ST, 1907.

Excavation for chemical dosing tank, 31 cu. yds., at $1.00,	$31 00
Excavation for sand filter, 140 cu. yds., at $1.00,	140 00
Reinforced concrete placed in walls of sprinkling filters, 47 cu. yds., at $15.00,	705 00
Reinforced concrete placed in footings of septic tank, 4 cu. yds., at $15.00,	60 00
Sewer lines laid, 498 ft. 10 in. terra cotta sewer, at 75 cents,	373 00
Total,	$1,309 50
Time for completion of concrete work expired on December 7, 1907. Time extended to December 23, on account of 13 days of bad weather, as per contract. Deduct 31 — 23 = 8 days, at $15.00,	120 00
Total,	$1,189 50
Deduct 20 per cent.,	237 90
Total, less 20 per cent.,	$951 60

January 2nd, 1908.

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 2, MONTHLY ESTIMATE NO. 3. FOR WORK COMPLETED ON SEWAGE DISPOSAL PLANT AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM JANUARY 1ST, TO FEBRUARY 1ST, 1908. ACCOUNT WITH BRADY & SNAVELY, OF HARRISBURG. CONTRACT DATED OCTOBER 31ST, 1907.

Excavation for sand filters, 351 cu. yds., at $1.00 per cu. yd.,	$351 00
Ditch from filters to dosing tank, 41 cu. yds., at $1.00 per cu. yd.,	41 00
Ditch from dosing tank to creek, 26 cu. yds., at $1.00 per cu. yd.,	26 00
Masonry in chem. dosing tank, 5 cu. yds., at $6.00 per cu. yd.,	30 00
Reinforced concrete in sprinkling filters, 13 cu. yds., at $15.00 per cu. yd.,	195 00
Reinforced concrete in septic tanks, 32 cu. yds., at $15.00 per cu. yd.,	480 00
46 ft. of 10 in. sewer at 75 cents per ft.,	34 50
56 ft. of 6 in. sewer at 50 cents per ft.,	28 00
8 wall castings, in place, at $10 each,	80 00
Total,	$1,265 50
Deduct liquidated damages for 18 days, at $15.00 per day,	270 00
Total,	$995 50
Deduct 20 per cent.,	199 10
Total, less 20 per cent.,	$796 40

February 3rd, 1908.

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 2, MONTHLY ESTIMATE NO. 4. FOR WORK COMPLETED ON SEWAGE DISPOSAL PLANT AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM APRIL 1ST, 1908, TO MAY 1ST, 1908. ACCOUNT WITH BRADY & SNAVELY, OF HARRISBURG. CONTRACT DATED OCTOBER 31ST, 1907.

Embankment for sand filters, 200 cu. yds., at 75 cents,	$150 00
Embankment for sprinkling filters, 150 cu. yds., at 75 cents,	112 50
65 sq. yds. of concrete floor and roof to septic tanks, at $1.50,	97 50
94 sq. yds. of concrete floor to sprinkling filters, at $1.50,	141 00
17 cu. yds. of masonry in chemical dosing tank, at $6.00,	102 00
Windows, doors and app. to chemical dosing tank,	100 00
150 ft. of 10 in. terra cotta sewer, at 75 cents,	112 50
170 ft. of 6 in. cast iron pipe, at $1.00,	170 00
26 ft. of 6 in. terra cotta pipe, at 50 cents,	13 00
2 wooden baffle boards and 4 wooden scum boards for septic tanks,	160 00
2 manholes of concrete, at $100 each,	200 00
Dosing tank for sprinkling filters,	300 00
Total,	$1,658 50
Deduct liquidated damages for 19 days, at $15.00 per day,	285 00
	$1,373 50
Deduct 20 per cent.,	274 70
Total, less 20 per cent.,	$1,098 80

May 8th, 1908.

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 2, MONTHLY ESTIMATE NO. 5. FOR WORK COMPLETED ON SEWAGE DISPOSAL PLANT AT THE PENNSYLVANIA STATE SANATORIUM FOR TUBERCULOSIS, SOUTH MOUNTAIN, NEAR MONT ALTO, PENNSYLVANIA, FROM MAY 1ST, 1908, TO JUNE 1ST. ACCOUNT WITH BRADY & SNAVELY, OF HARRISBURG. CONTRACT DATED OCTOBER 31ST, 1907.

180 cu. yds. of graded broken stone for sprinkling filters, at $1.00,	$180 00
Interior feed piping and underdrainage system for sprinkling filters,	200 00
Valves, standards and connections for disposal plant,	709 80
Wall castings for disposal plant,	354 81
Expanded metal for disposal plant,	67 75
Manhole castings, steps, etc.,	123 52
Two manholes, complete, of concrete,	200 00
Total,	$1,835 88
Deduct part payment on valves, wall castings, expanded metal and manhole castings made March 7th, 1908,	627 94
Total,	$1,207 94
Deduct liquidated damages for 13 days, at $15.00,	195 00
Total,	$1,012 94
Deduct 20 per cent.,	202 59
Total, less 20 per cent.,	$810 00

June 1st, 1908.

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

This is to certify that Brady and Snavely, Contractors, of Harrisburg, Pennsylvania, have delivered upon the grounds of the Pennsylvania State South Mountain Sanatorium the following material, and that I have examined the bills and receipts for this material and have found that they have been duly receipted and paid.

Coffin Valve Co., valves, standards, connections, etc.,	$709 80
M. J. Drummond & Co., wall castings, etc.,	354 81
General Fire Proofing Co., expanded metal,	67 75
W. O. Hickok Mfg. Co., manhole castings, steps, etc.,	123 52
	$1,255 88
Deduct 50 per cent.,	627 94
Total, less 50 per cent.,	$627 94

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

There is a clause in the contract which provides that whenever, in the opinion of the Engineer, it shall become necessary to use materials, or to perform work, which is neither contemplated in the plans of the work, nor implied in the specifications, the contractor agrees to furnish such materials and labor at a price based upon the cost plus 15 per cent. profit to the contractor. Under this clause, 50 feet of extra ten inch sewer pipe was laid at the chemical dosing house; the walls of the mixing tank in the bottom of the dosing house were plastered with cement mortar; a concrete inlet box with a measuring weir was constructed for measuring the inflow into the dosing house, These extras were necessary in order to handle the effluent from the disposal plant efficiently at the dosing house. The contractor furnished the bills and receipts for the material used in this work and the inspector kept a check on the amount of material used and the labor. A detail of the cost of this extra work follows:

EXTRA WORK ON SEWAGE DISPOSAL PLANT.

Sewer from Outlet of Dosing Tank.	
44 ft. of 10 in. pipe, at 33 cents per foot,	$14 52
1 ten in. wye,	85
½ bbl. Portland cement, at $2.05 per bbl.,	1 03
Labor, 99 hours, at 15 cents per hour,	14 85
Oakum for caulking pipe,	45
Total,	$31 70
Plastering Cellar Wall.	
1 bbl. of cement,	2 05
Labor, 22 hours, at 15 cents per hour,	3 30
Total,	$5 35
Inlet Box and Weir for Dosing Tank.	
6 ft. of 10 in. pipe at 33 cents per foot,	1 98
1½ barrels of Portland cement, at $2.05,	3 08
½ cu. yd. of sand, at $3.50,	1 75
1 cu. yd. of broken stone, at $2.50,	2 50
16 board feet tongue and groove forms, at 4 cents,	64
Galvanized iron weir and slot, at $3.00,	3 00
Labor, 27 hours, at 15 cents,	4 05
Carpenters, 12 hours, at 22½ cents,	2 70
Total,	$19 70
Total for three items,	56 75
Contractor's profit,	8 51
Total,	$65 26

The contractor agreed in another article in the contract to begin work upon this disposal plant within ten days after the signing of the contract and to complete all the concrete work on or before twenty-four working days thereafter and all the rest of the work on

or before thirty-six working days thereafter. In case the weather conditions should be unfavorable for the proper execution of the work and the laying of concrete, the engineer was given power to order the discontinuance of work during these periods and the total number of days in which the contractor agreed to complete the work was to be extended a proportionate amount. The Commissioner of the Department of Health was empowered to grant to the contractor extensions of time for causes or events beyond the control of the contractor tending to delay the work, upon written notice of the existence of such causes. The contractor agreed to pay the cost to the Department of Health of the salaries of the inspectors made necessary by an extension of time for these causes.

Subject to these allowances the contractor agreed to deduct $15.00 per day from the contract price for this work for each day after the expiration of the twenty-four working days allowed for the concrete work and an additional $15.00 a day for each day beyond the thirty-six days allowed for the completion of the whole work.

The initial date for the beginning of the work, according to this contract, was November 11th, 1907, and the concrete work should have been completed on December 7th, 1907, and the total work should have been finished on December 21st, 1907. During this period, however, there were many days when it was either impossible or inadvisable to perform any construction work on account of the severity of the weather. A careful record of these days was kept by the engineering department and the time for the completion of the concrete work was extended to December 23d, 1907. A similar extension was also made for the completion of the total work to January 17th, 1908. Deductions were made in the monthly estimates of $15.00 per day for all working days after the dates above given.

On January 7th, 1908, the contractors, Messrs. Brady and Snavely, submitted the following statement, giving at length the causes which they consider prevented them from completing the contract according to the time provisions:

"Jan. 7th, '08.

"Mr. Thos. Fleming, Jr.,
"Assistant Engineer, Department of Health,
"Harrisburg, Pa.

"Dear Sir: Under Article II, of the contract entered into between the Department of Health and ourselves, dated October 31st, 1907, for the construction of a Sewage Disposal Plant near Mont Alto, we commenced work on November 11th, and ask for an extension of time for the following reasons:

"(a)—The specifications required ¾, ⅞ and 1 inch twisted rods. We were unable to get delivery on these sizes within thirty days, but the Roger-Shear Co., of Warren, promised this order by November 14th, substituting 5-16, for ¾ inch rods. This substitution being approved by you, we willingly paid the extra price, and placed the order November 7th. Rods were shipped as promised, but did not reach Mont Alto until November 28th. We traced the car, and you kindly assisted to have it hurried forward. As rods must be placed in the footings, no concrete could be laid until their delivery.

"(b)—On November 8th we received detailed blue-prints of wall castings, etc. On November 12th, we placed the order with M. J. Drummond & Co., of New York, delivery to be made within three weeks. We have telegraphed, telephoned and wrote them since that time, and we are in receipt of B.-L. that same were shipped from Lynchburg, Va., on December 21st. We are tracing this shipment, but car had not reached Mont Alto to-day. Castings were paid for on December 21st.

"(c)—The Coffin Valve or equal was specified. This was the only company that could give prompt delivery, and we placed the order with them on November 16th. The valves, etc., have just reached destination, and are now on the ground.

"(d)—On November 5th order for expanded metal was placed with the General Fireproofing Company of Philadelphia, with promise of immediate shipment from Youngstown, O. This was received December 14th.

"(e)—It took fourteen days for car of logging to come from the Ensminger Lumber Co., of Harrisburg, to Mt. Alto.

"(f)—On November 15th contract was made with H. L. Spence (at which, we think, Mr. Gardner was present) to haul sand from Sandy Ridge to our work. He had been over the ground and fully understood the conditions, and promised three four horse teams as long as we desired them. We sent men to open the bank, and after more than ten days' delay, he commenced hauling, giving the sewer people one load and us the other. After hauling eight loads, without any notice to us, he stopped. We tried to hold him to his contract, but when he had hauled three loads he quit. We had sand hauled to Mt. Alto by train, and even here was delay repairing switches. We now have sufficient sand.

"(g)—On November 11th we made contract with J. C. Wishard to furnish engine and crusher to crush stone, he to be on the ground on the 13th inst. He arrived at the foot of the hill more than one week late, and after parlying for several days reached the top. He declined to go in, and as our rods had not been received, we consented to allow him to crush stone for the parties laying the sewer. When we finally compelled him to make an attempt to reach our work, the sewer ditch had been excavated in the road in front of the Sanatorium. This caused another delay of some days. The crusher is now on the ground, and sufficient stone crushed for all present purposes.

"We agree as to the days which were unfit for work, as follows: November 20, 21, 22, 23 and 25th; December 2, 3, 4, 5, 9, 10, 14, 23 and 30th. We also claim November 18th, and it was certainly our understanding with Mr. Ennis that we would be allowed for December 24th and 26 to enable everybody to go home for Christmas.

"This would make,	17 days
"Legal Holidays,	2
"Sundays,	7
Total,	26

or more than half the number of days to December 31st, that we were unable to work. This does not show the true state of affairs, as after these rains and snows it was some time before we could work with any satisfaction, which caused more expense and delay to us.

"For these reasons and for many others which we could enumerate, we respectfully request an extension of time in which to complete this work. All material is on the ground except the castings, and our advice is that they were shipped from Lynchburg, Va., December 21st. We have honestly tried to push this work as rapidly as possible, and while we have been put to additional expense on account of these unavoidable delays and bad weather conditions (including pay of our monthly men when no work could be done) we wish to assure you that if the extension asked for is granted, we will use our utmost endeavors to complete this work with the utmost dispatch.

"Very respectfully,
(Signed) "Brady & Snavely."

The statements given in this letter were substantially correct. The castings for the walls of the septic tanks arrived at the disposal plant on January 13th and as all the other material itemized in this letter was on hand at that time this time represents the greatest amount of delay due to non-arrival of material. It was impossible for the contractors to construct the concrete walls of the septic tanks until these castings arrived.

During February and the greater part of March it was impossible for the contractors to do any work on the disposal plant owing to the severity of the weather. Work was practically shut down during this period and it was not until March 24th that the contractors were able to open up the work to any advantage. The work was steadily pushed from March 24th and the plant was ready for use on June 9th.

From January 17th, the date on which the working days expired, to June 9th, the date on which the work was completed, the Department expended $153.00 for inspection work. This represents the actual cost of inspection to the Department during this period and is not the total salary paid to the inspector, as he was employed also on

other work during this period. The actual number of days spent by the inspector on the disposal plant, as taken from the diary, are: January, eight and one-half days; February, one day; March, six and one-half days; April, eighteen days; May, thirteen days; June, four days; a total of fifty-one days.

The following is the final estimate for this work:

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 2, FINAL ESTIMATE. FOR WORK COMPLETED ON SEWAGE DISPOSAL PLANT AT THE PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM, AT MONT ALTO, FRANKLIN COUNTY, PENNSYLVANIA, FROM NOVEMBER 1ST, 1907, TO JULY 1ST, 1908. ACCOUNT OF CONTRACT WITH BRADY & SNAVELY, DATED OCTOBER 31ST, 1907.

For constructing the sewage disposal plant and furnishing all materials, including the following items:

Two septic tanks of reinforced concrete, each 4 feet by 30 feet by 10 feet; two sprinkling filters of reinforced concrete, each 14 feet by 30 feet by 7 feet; one 500 gallon dosing tank of reinforced concrete; one chemical dosing tank; masonry superstructure for dosing tank; excavation for future sand filter; clearing and grubbing three acres of land; pipe connections, valves and appurtenances necessary for completing the plant; for the lump sum of.....$6,595.00

Sewer Outlet from Dosing Tank.

44 ft. of 10 in. terra cotta pipe, including hauling, at 33 cents, ..	$14 52
1 ten inch terra cotta wye, ...	85
½ bbl. Portland cement, at $2.05, ...	1 03
99 hours labor, at 15 cents, ...	14 85
Oakum for caulking, ...	45
Total, ...	$31 70

Plastering Cellar Wall.

1 bbl. Portland cement, at $2.05, ...	2 05
22 hours labor, at 15 cents, ...	3 30
Total, ...	$5 35

Inlet Box and Weir for Dosing Tank.

6 ft. of 10 in. terra cotta pipe, including hauling, at 33 cents, ..	1 98
1½ bbls. Portland cement, at $2.05, ...	3 08
¾ cu. yd. sand, at $3.50, ...	1 75
1 cu. yd. broken stone, at $2.50, ...	2 50
16 board feet t. and g. plank, at 4 cents, ...	64
Galvanized iron weir and slot, ...	3 00
27 hours labor, at 15 cents, ...	4 05
12 hours carpenter, at 22½ cents, ...	2 70
Total, ...	$19 70
Total for extra work, ...	$56 75
15 per cent. profit to contractor, ...	8 51
Total for extra work, including 15 per cent. profit, ...	$65 26
Total, ...	$6,660 26

Part Payments:

Monthly estimate No. 1, ...	$386 56
Monthly estimate No. 2, ...	951 80
Monthly estimate No. 3, ...	796 40

Monthly estimate No. 4,	1,098 80	
Monthly estimate No. 5,	810 35	
Material,	627 94	
		4,671 65
Total, less previous payments,		$1,988 61
Deduct cost of engineering from January 17th, 1908, to June 9th, 1908, actual number of days of inspection, 51, at $3,00,		153 00
Final payment,		$1,835 61

This estimate includes the cost of the engineering incurred by the Department for the extra time spent upon this work, but does not include the liquidated damages of $15.00 per day.

At the final inspection of the sewage disposal plant, as completed under the Brady and Snavely contract, the work presented a pleasing appearance and everything about it was considered a first-class job. A certificate for the final payment to the contractors of the sum of $1,835.61 was issued and accepted.

SEWAGE SAND FILTERS.

The construction of the disposal plant for the Sanatorium was begun in November, 1907. The plant was to consist of settling tanks, sprinkling filters, sand filters and apparatus for treating the effluent with hypochloride of lime. The plant was to have a capacity for the sewage from 300 people, based on a per capita flow of 60 gallons, and was to be constructed as set forth in the Annual Report of the Commissioner of Health for the years 1906 and 1907.

On account of the difficulty of constructing this work during the winter season, it was decided to build the settling tanks, sprinkling filters and chemical apparatus at that time and to postpone the construction of the sand filters until the summer of 1908. These other structures were completed on June 9th, 1908, and steps were immediately taken to obtain bids on the construction of the sand filters.

On July 14th, 1908, the Commissioner of Health received proposals for constructing two sand filters consisting of excavation, embankment, concrete work and pipe connections to the other units, but not including the sand filling which was let under a separate contract. A schedule of the bids received is given in the following table. All bids were rejected as they were too high and the work was re-advertised.

On July 31st, a second set of bids was received for this work. These are also given in the following table. The bids were based upon unit prices for the various items and it was stated that bids would be compared on the basis of the aggregate cost of the work based upon these prices and the engineer's estimate of the amount of work to be done. It was also stated that the right to reject any or all bids was reserved.

PENNSYLVANIA DEPARTMENT OF HEALTH—ENGINEERING DIVISION.

Bids Received for the Construction of Two Sand Filters at Mont Alto, Pennsylvania. Bids Received from Re-advertisement.

Item.	Quantity.	No.	W. L. Forney, Chambersburg, Pa.		Wm. H. Opperman, Harrisburg, Pa.		Baumgartner & Son, Harrisburg, Pa.		Geo. W. Miller, Baltimore, Md.		Fritz & Bro., York, Pa.	
			Unit price.	Total.	Unit price.	Total.	Unit price.	Total.	Unit price.	Total.	Unit price.	Total.
Excavation, per cubic yard,	700	1	$0 60	$420 00	$1 482	$1,037 40	$1 12	$784 00	$0 75	$525 00	$1 00	$700 00
Embankment, per cubic yard,	200	2	25	50 00	1 20	240 00	35	70 00	50	100 00	1 00	200 00
Concrete (A), per cubic yard,	30	3	15 00	450 00	15 25	457 50	15 00	450 00	8 00	240 00	18 00	540 00
Concrete (B), per cubic yard,	270	4	8 50	2,295 00	12 00	3,240 00	12 00	3,240 00	7 50	2,025 00	12 75	3,442 50
Steel Reinforcement, per lb.,	1,000	5	04	40 00	094	94 00	05	50 00			02	20 00
10-inch T. C. Sewer, per foot,	600	6	1 00	600 00	806	483 60	37	222 00	35	210 00	70	420 00
6-inch T. C. Pipe Drains, per ft.,	500	7	25	125 00	56	280 00	30	150 00	30	180 00	35	175 00
10-inch T. C. Half Tile, per foot,	200	8	23	46 00	606	121 20	305	61 00	20	40 00	40	80 00
6-inch T. C. Half Tile, per foot,	850	9	15	127 50	33	280 50	185	157 25	20	170 00	35	297 00
Wooden Appurtenances,		10	150 00	150 00	143 00	143 00	110 00	110 00			75 00	75 00
Placing Apparatus,		11	15 00	15 00	60 00	60 00	27 50	27 50			25 00	25 00
Valves and C. I. connections,		12	150 00	150 00	280 00	280 00	385 00	385 00			50 00	50 00
Totals,				4,468 50		6,717 20		$5,706 75		$3,460 00		$6,025 00

George W. Miller, of Baltimore, Maryland, submitted a bid on the large items in the contract, but failed to properly fill out his proposal blank for the small items, such as steel reinforcement and valves. His prices on the large items were lower than those received from any other bidder, and the total cost of the work based upon these prices was within a reasonable limit, in the opinion of the engineer. The contract was, therefore, awarded to him and the Department of Health agreed to furnish the items not bid upon by him, with the understanding that he was to place them in final position in the structures free of cost. The contract was signed on August 14th, 1908, and work was immediately begun on the excavation.

Description of Filters.

The sand filters consist of two units, each 40 feet by 100 feet by 3 feet effective depth, interior dimensions, with a dosing tank of reinforced concrete having a capacity of 5,000 gallons, and a sludge bed 60 feet by 20 feet by 2 feet effective depth. The filters are located immediately east of the sprinkling filters on the slope of the hill below them, and the dosing tank is located at the end of the partition wall separating these filters nearest the sprinkling filter group. The sludge bed is located on the slope of the hill above the sand filters and is arranged so that it will drain the sludge from the septic tanks by gravity and that its own drainage will gravitate on to the surface of the sand filters.

The sand filters are built of concrete and are located on the side of a hill partly in excavation and partly in embankment. The walls are of a gravity type and are built of concrete 9 inches wide at the top and 15 inches wide at the bottom with an additional 3 inch off-set on each side at the base. Outside of the exterior walls there is an earth fill 3 feet wide on top and 6 inches below the top of the wall. This fill is given a one and a half to one slope on the outside, and where there is a cut a one to one slope is used. The top of the wall is capped with a 6 inch concrete coping and the wall is provided with expansion joints to provide against irregular cracking.

The bottom of the filter is covered with a 6 inch concrete floor laid in blocks 10 feet square. The joints between these blocks are filled with asphaltum and serve as expansion joints. Through the length of each filter there is a 10 inch drain formed by a semi-circular concrete invert covered with a 10 inch half-tile. The floor of the filter slopes to this drain from both sides with a drop of 6 inches from either side to the centre. On each side of the main drain there is a system of 6 inch laterals spaced 10 feet centre to centre and extending from the central drain to the side walls of the filter. These drains are formed by laying 6 inch half-tile on the bottom of the filter in a cement grout and covering the joints with a strip of muslin and with graded broken stone. The main drains from these two filters connect with a 10 inch sewer extending along the outer wall of both filters at the lower end of the chemical dosing apparatus. This sewer was also constructed under this contract.

The dosing tank for these filters is located, as previously stated, at the upper end of the partition wall between the two units. This tank is 10 feet by 17 feet by 5 feet deep, interior dimensions, and has a capacity of 5,000 gallons, which will give a dose every 3 1-3

hours with a sewage flow of 36,000 gallons per day. It is built of reinforced concrete with the walls 8 inches thick and is covered with a reinforced concrete roof 4 inches in thickness. The floor is one foot in elevation above the surface of the sand filters.

Sewage is dosed upon the filters from this tank through two 6 inch aerlock syphons made by Merritt and Company, of Philadelphia, and arranged so as to dose alternately or in sequence with additional syphons. These syphons are installed in small concrete compartments located in the corners of the tank and two additional compartments have been constructed for the syphons which it is planned to install in the future when additional filters are built. The sewage is distributed over the surface of the filter by means of a system of wooden troughs constructed of cypress lumber and laid upon the surface of the filter. The main trough, which is 12 inches wide and 6 inches deep, extends to the centre of the filter and in turn feeds three lateral troughs 6 inches in width. The sewage is distributed over the surface of the filters from these troughs through one-half inch holes spaced 12 inches centre to centre along the sides of all troughs.

The sludge bed is constructed in excavation on the side of the hill immediately above the sand filters and no concrete lining is used. As previously stated, it is 20 feet by 60 feet in plan with an effective depth of two feet. The sludge is distributed over the surface through a trough extending diagonally across the top and similar in construction to the troughs used in the sand filters. It is drained by three 6 inch terra cotta drains extending across the bottom to a small concrete manhole on the lower side. These drains are laid with open joints and the joints are protected in a manner similar to that used in the sand filters. From the collecting manhole at the end of these drains there is a 6 inch terra cotta drain pipe extending to the surface of the adjacent sand filter unit and draining into the end of the trough on the filter.

Ample provision is made for future extensions to the filter units as was done in the case of the other units for this disposal plant. It is the intention to construct two sand filters of the same size as the existing filters and to locate one on each side of the existing group. These two filters can be fed by the existing dosing tank and, as previously stated, provision has been made for installing two additional syphons in this tank for these filters. Additional extensions can be developed in another group of units of a larger size if desired and located immediately north of these filters between them and the chemical dosing plant.

Execution of Contract.

Among the articles stipulated in the contract it is provided that the contractor is to begin the construction of the work contemplated within ten days after signing the contract and to complete all of the work on or before thirty working days thereafter, no allowance to be made for inclement weather. It is also provided that an extension of time can be made by the Commissioner of Health upon written notice of the existence of causes or events beyond the control of the contractor tending to delay the work, but that in case such extension is granted the contractor is to pay the cost of the engineering inspection made necessary by such extension. Subject to these provisions a deduction of $15.00 per day is to be made from the amount of money due

to the contractor for each day or fraction thereof in which the work is not completed after the expiration of the time specified. As the contract was signed on August 14th, work should have begun on or before August 24th, and should have been completed on or before September 28th. The work was not completed, however, until December 19th, although sewage was turned onto the surface of one of the filters during the first part of November.

The contractor was delayed in obtaining his material mainly through carelessness in placing his orders and through ignorance in handling supplies of this character. The main delay, however, was due to the lack of money on the part of the contractor with which to finance the work and frequently there were only a few men employed on the work. Several times during the progress of the work the men struck on account of nonpayment of back wages.

From September 29th to November 13th, inclusive, an inspector devoted half of his time to the construction of the filter plant, which amounts to twenty-three full days. After November 13th an inspector was employed intermittently on this work as the contractor was engaged on other work at the sanatorium and withdrew his force for a part of the time. During this time there was a total of fourteen days of inspection, so that the total number of days of inspection amounted to thirty-seven days. The inspector's salary is $2.50 a day and the cost of board and living expenses $1.00 a day, so that the total cost of the inspection incurred by the State due to the neglect of the contractor to complete his work on time amounted to thirty-seven days at $3.50 a day, equal to $129.50.

Another article in the contract provides that the contractor shall be paid 80 per cent. of the monthly estimate of the work done each month on or before the 15th day of the month next succeeding. The contractor was also required to furnish a bond upon signing the contract equal to 50 per cent. of the aggregate amount based upon the work to be done and the prices bid. The contractor failed to furnish this bond, so that it was necessary for the Department to hold back more than 20 per cent. of the cost of the work done and the monthly estimates were, therefore, made much lower than they would have been otherwise. An accurate account was kept of the labor expended by the contractor and the monthly estimates were made up on this basis, as follows:

Monthly estimate No. 1, September 3rd, 1908,	$480 00
Monthly estimate No. 2, October 8th, 1908,	598 20
Monthly estimate No. 3, November 9th, 1908,	1,006 80
Total,	$1,450 95

These estimates are given in detail as follows:

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 5, MONTHLY ESTIMATE NO. 1. FOR WORK COMPLETED ON SAND FILTERS AT THE PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM FOR TUBERCULOSIS, NEAR MONT ALTO, FRANKLIN COUNTY, PENNSYLVANIA, FROM AUGUST 14, TO SEPTEMBER 1ST, 1908. ACCOUNT OF CONTRACT WITH GEORGE W. MILLER, BALTIMORE, MARYLAND. DATED AUGUST 14TH, 1908.

(1) Excavation per cubic yard, at 75 cents, 800 cu. yds., completed,	$600 00
Total,	$600 00

Deduct 20 per cent.,	120 00
Total, less 20 per cent.,	$480 00

September 3rd, 1908.

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 5. MONTHLY ESTIMATE NO. 2. FOR WORK COMPLETED ON SAND FILTERS AT THE PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM FOR TUBERCULOSIS, NEAR MONT ALTO, FRANKLIN COUNTY, PENNSYLVANIA, FROM SEPTEMBER 1ST, TO SEPTEMBER 30TH, 1908, INCLUSIVE. ACCOUNT CONTRACT WITH GEORGE W. MILLER, BALTIMORE, MD., AUGUST 14TH, 1908.

(4) Concrete Class B, 85 cu. yds., completed, at $7.50,	$637 50
(6) 10 in. terra cotta sewer, 315 ft., completed, at 35 cents,	110 25
Total,	$747 75
Deduct 20 per cent.,	149 55
Total, less 20 per cent.,	$598 20

October 8th, 1908.

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

DEPARTMENT OF HEALTH.—Egineering Division.

CONTRACT NO. 5. MONTHLY ESTIMATE NO. 3. FOR WORK COMPLETED ON SAND FILTERS AT THE DISPOSAL PLANT OF THE PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM FOR TUBERCULOSIS, NEAR MONT ALTO, FRANKLIN COUNTY, PENNSYLVANIA, FROM OCTOBER 1ST, TO NOVEMBER 1ST, 1908. ACCOUNT OF CONTRACT WITH GEORGE W. MILLER, BALTIMORE, MARYLAND. DATED AUGUST 14TH, 1908.

(1) 50 cu. yds. of excavation, at 75 cents,	$37 50
(2) 100 cu. yds. of embankment, at 50 cents,	50 00
(3) 15 cu. yds. of concrete (Class A), at $8.00,	120 00
(4) 100 cu. yds. of concrete (Class B), at $7.50,	750 00
(5) 60 ft. 10 in. terra cotta sewer, at 30 cents,	21 00
(7) 400 ft. 6 in. terra cotta drain pipe, at 30 cents,	120 00
(8) 200 ft. 10 in. terra cotta half tile, at 20 cents,	40 00
(9) 600 ft. 6 in. terra cotta half tile, at 20 cents,	120 00
Total,	$1,258 50
Deduct 20 per cent.,	251 70
Total, less 20 per cent.,	$1,006 80

November 9th, 1908.

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

It was also provided in the contract that the contractor shall furnish satisfactory evidence when called for that all persons that have done work or furnished materials have been fully paid and otherwise the Commonwealth shall have the right to pay for such claims out of any money that may be due or become due to the contractor. In accordance with this article the contractor was requested to show his receipts. He stated that he had been unable to settle a portion of the labor claims against him and also the bills for material. He re-

quested that, as provided for under the contract, the Department of Health should pay for this and deduct the same from his final payment. These bills are as follows:

S. R. Saylor, carpenter, 158 hours, at 25 cents,	$39 50
Geo. W. Kauffman, carpenter, 60½ hours, at 20 cents,	12 10
D. E. Bailey, carpenter, 57 hours, at 20 cents,	11 40
Simon Kepner, carpenter, 79 hours, at 20 cents,	15 80
Dan Carbaugh, foreman, 533¾ hours, at 20 cents,	106 75
The Barber Asphalt Paving Co., Harrisburg, Pa., for 2 barrels asphalt cement,	23 00
Lesley & Trinkle Co., Philadelphia, Pa., for 2 carloads Portland cement,	480 00
Henry A. Good, Quincy, Pa., for lumber,	89 79
Hiteschew & Co., Chambersburg, Pa., for terra cotta pipe and specials,	197 75
Labor furnished and paid for by the Department of Health to complete the work, 124 hours, at 14 cents,	17 36
Total for labor and materials,	$993 45

The last item given in this list, which consists of labor furnished by the Department of Health to the amount of 124 hours at 14 cents an hour, making a total of $17.36, was necessary to complete the contract. The foreign labor which the contractor had used on this work left before the contract was completed and on account of the financial standing of the contractor it was impossible for him to obtain any labor in the vicinity. The Department, therefore, placed a small force of laborers upon the work and completed it.

The following is the final estimate for the work done after deducting the cost of labor and materials as given above and the cost of the engineering inspection from September 28th to December 19th:

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 5, FINAL ESTIMATE. FOR WORK COMPLETED ON SAND FILTERS AT THE PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM FOR TUBERCULOSIS, NEAR MONT ALTO, FRANKLIN COUNTY, PENNSYLVANIA, FROM AUGUST 14TH TO DECEMBER 19TH, 1908. ACCOUNT OF CONTRACT WITH GEORGE W. MILLER, BALTIMORE, MARYLAND. DATED AUGUST 14TH, 1908.

(1) 1167.2 cu. yds. excavation, at 75 cents,		$875 40
(2) 202.3 cu. yards. embankment, at 50 cents,		101 15
(3) 30.31 cu. yds. concrete, (Class A), at $8.00,		242 48
(4) 236.71 cu. yds. concrete, (Class B,) at $7.50,		1,775 32
(6) 616 ft. of 10 in. terra cotta sewer, at 35 cents,		215 60
(7) 468 ft. of 6 in. terra cotta drain pipe, at 30 cents,		140 40
(8) 198 ft. of 10 in, half tile, at 20 cents,		39 60
(9) 730 ft. of 6 in. half tile, at 20 cents,		146 00
Total,		$3 535 95
Partial payments:		
Monthly estimate No. 1, September 3, 1908,	$480 00	
Monthly estimate No. 2, October 8, 1908,	598 20	
Monthly estimate No. 3, November 9, 1908,	1,006 80	
		2,085 00
Total, less partial payments,		$1,450 95

Payments made by the Department of Health for labor and material furnished on this work and not paid for by the contractor. These payments were made as provided for under Article XII of the contract.

S. R. Saylor, carpenter, 158 hours, at 25 cents,	$39 50
Geo. W. Kauffman, carpenter, 60½ hours, at 20 cents,	12 10
D. E. Bailey, carpenter, 57 hours, at 20 cents,	11 40
Simon Kepner, carpenter, 79 hours, at 20 cents,	15 80

Dan Carbaugh, foreman, 533¾ hours, at 20 cents,	106 75
The Barber Asphalt Paving Co., Harrisburg, Pa., for 3 barrels asphalt cement,	23 00
Lesley & Trinkle Co., Philadelphia, Pa., for 2 carloads Portland cement,	480 00
Henry A. Good, Quincy, Pa., for lumber,	89 79
Hiteschew & Co., Chambersburg, Pa., for terra cotta pipe and specials,	197 75
Labor furnished and paid for by the Department of Health to complete the work, 124 hours, at 14 cents,	17 36
Total for labor and materials paid for by the Department of Health,	993 45
Total due contractor, less all payments,	$457 50
Deduct cost of engineering from September 28th to December 19th, actual number days of inspection, 37, at $3.50 per day,	129 50
Final payment,	$328 00

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

The sand filters and appurtenances were completed in accordance with the plans and specifications and a first-class piece of work was obtained. The contractor accepted in full settlement the amount shown due in the final estimate.

SAND CONTRACT.

A contract known in the Department as "Contract No. 6" with H. L. Spence, dated August 14th, 1908, for sand and for filters at the sewage disposal plant, was completed and the amount due under the contract of $1,184.17 was paid. The circumstances in connection with this contract were as follows:

The sand filters required 1,050 cubic yards of sand. It was determined that the sand should be free from soluble material and sufficiently coarse to prevent a clogging of the filter. During the early part of June of the current year samples were collected of all the sands available in the vicinity of this disposal plant and analyses were made by Prof. Charles H. LaWall, consulting chemist, Philadelphia, Pa. Professor LaWall's report on these samples showed that the best sand available for this purpose was that located on Sandy Ridge, four miles distant from the Sanatorium and many feet above it in elevation. The supply of sand at this place appeared to be inexhaustible and as the pit was located on State land under the control of the Forestry Department, the cost of it would amount to the cost of hauling and excavating.

Three samples of this sand were submitted to Professor LaWall. They were designated as Nos. 13, 14 and 15 and were taken from different spots where the ground had been opened up. Sample No. 13 showed a trace of soluble matter; insoluble silicates, slight; carbonates, none; effective size, 0.36; uniformity coefficient, 1.33.

Sample No. 14 showed a trace of soluble matter; insoluble silicates, slight; carbonates, none; effective size, 0.21; uniformity coefficient, 0.22. Sample No. 15 showed a trace of soluble matter; insoluble silicates, very slight; carbonates, none; effective size, 0.20; uniformity coefficient, 2.2.

Professor LaWall, in summing up his report, stated that No. 13, which has an effective size of 0.36, slightly above the limit usually used, has such a low uniformity coefficient that it would undoubtedly give excellent results in practical use. None of the samples contain any carbonates and none contain more than traces of soluble matter.

It was, therefore, decided to use this sand for the filters and, on July 31st, the Commissioner of Health received proposals for excavating and hauling 1,050 cubic yards of this sand to the disposal plant. Bids were received on the basis of unit prices according to the terms of a set of specifications issued by the Department of Health. The bidders were George B. Jacobs, York, Pa., $3.10 per cubic yard; George Miller, Baltimore, Maryland, $2.80 per cubic yard; H. L. Spence, Mont Alto, Pa., $2.35 per cubic yard. The contract was awarded on August 14th, 1908, to H. L. Spence, the lowest responsible bidder.

The contract called for the stripping of the surface of the ground at the sand pit and the screening of all sand excavated by the contractor under the supervision of an inspector appointed by the engineer. Measurements of the quantity of sand were to be made in the wagons at the point of delivery at the disposal plant. These requirements were carried out and constant supervision was maintained at the sand pit during the entire period of excavation. A system of blanks was used for keeping tab on the quantity of sand received at the sand pit and the contractor was given a receipt for each wagonload upon delivery.

Another clause in the contract called for the construction work to begin within five days after the signing of the contract and to be completed on or before thirteen weeks thereafter. This allowed the contractor until the middle of November to complete the work.

Another clause provided that monthly estimates should be made by the engineer of the amount of sand hauled during a month and that the contractor should be paid 80 per cent. of the value of this work on or before the 15th day of the month succeeding that in which the estimate was made. In accordance with this clause in the contract, estimates were made on September 3rd, 1908, and on October 2nd, 1908, for the months of August and September, respectively. One hundred cubic yards of sand were excavated, hauled and deposited at the site of the disposal plant during August at $2.35 per cubic yard, which with an 80 per cent. reduction, amounted to $188.00. During September 582 cubic yards of sand were excavated, hauled and deposited at the site of the disposal plant at $2.35 per cubic yard, which, less 20 per cent., amounted to $1,094.16. The total monthly estimates were, therefore, for 682 cubic yards of sand and the total payment made on this was $1,282.16.

On October 16th, the contractor completed the delivery of 1,049.5 cubic yards of sand at the disposal plant. In accordance with the contract he was entitled to a final payment for this work within thirty days after completion.

The following is a final estimate of the work:

DEPARTMENT OF HEALTH.—Engineering Division.

CONTRACT NO. 6, FINAL ESTIMATE. FOR WORK COMPLETED ON HAULING SAND FOR FILTERS AT THE DISPOSAL PLANT OF THE PENNSYLVANIA STATE SOUTH MOUNTAIN SANATORIUM FOR TUBERCULOSIS, NEAR MONT ALTO, FRANKLIN COUNTY, PENNSYLVANIA, FROM AUGUST 14TH TO OCTOBER 16TH, 1908. ACCOUNT OF CONTRACT WITH H. L. SPENCE, ORRTANNA, PA. DATED AUGUST 14TH, 1908.

1049.5 cu. yds. of sand excavation, hauled and deposited at the site of the disposal plant at $2.35 per cu. yd.,		$2,466 33
Monthly estimate No. 1, September 3, 1908,	$188 00	
Monthly estimate No. 2, October 2, 1908,	1,094 16	
	$1,282 16	
Total,		1,282 16
Final payment, November 6th, 1908.		$1,184 17

.....
Assistant Engineer in Charge of Work.

Approved:

.....
Chief Engineer.

AUTOMATIC APPARATUS FOR SEWAGE DISPOSAL PLANT AT MONT ALTO.

On October 4th, 1907, a general specification was sent to Merritt and Company, of Philadelphia, and the Pacific Flush Tank Company, of Chicago, the two leading manufacturers of automatic apparatus for sewage disposal plants in America, and proposals were requested for furnishing and equipping the sewage disposal plant at Mont Alto with automatic apparatus in accordance with the conditions outlined in these specifications.

The following is a copy of the specifications for automatic devices to be used in operating the sewage disposal plant at Mont Alto:

Description of the Disposal Plant.

The general layout of this plant is shown on the plan accompanying this specification. The plant is designed for a present capacity of 18,000 gallons per day. This plant will consist of septic tanks, sprinkling filters and sand filters, located so that the effluent from one will flow to the dosing tank of the other by gravity. The elevations of the flow line in all tanks and dosing tanks and also the depths are shown on the section through the proposed site for the location of this plant. The effluent from the septic tanks is carried to the dosing chamber of the sprinkling filters by a six inch cast iron force main, as shown on the plan.

Apparatus for Sprinkling Filters.

The dosing tank for the sprinkling filters will be 3 feet deep with a capacity of 500 gallons. The bottom of this tank will be 3½ feet above the top of the sprinkling filter. This will give a head ranging from 2½ to 5½ feet upon the nozzle of the sprinkling filter, allowing the extra

foot for frictional loss. The sprinkling filter will be divided into two units with an ultimate grouping of 4 units. Each unit will be 6 feet deep and 14 by 30 feet in plan. Each filter will be equipped with eight Columbus nozzles attached to 3 inch cast iron risers and fed by a 6 inch main pipe leading from the dosing tank. The effluent will be carried by a system of underdrains to one corner of the tank, all as shown on the plan of the sprinkling filter accompanying these specifications.

It is desired to obtain a device which will automatically discharge the dosing tank upon each of the two sprinkling filters which will be built now and also to have this device arranged so that it can discharge alternately upon each of the four units as proposed in the ultimate grouping of this division of the plant. It is desired to have the dose of 500 gallons discharge upon one filter within a period of from 5 to 10 minutes. The devices must be so designed that a by-pass can be arranged so that these units can be operated by hand whenever it is so desired.

These sprinkling filters are designed to act as contact beds in winter time. For this purpose the underdrains have been planned to come together at one outlet and to be connected at the inlet chamber with the main inlet, so that these beds can be operated on the fill and draw method.

Bids are wanted for the installation of an automatic device for operating these beds as contact beds in the following way.

It is desired to cut off the flow to the dosing tank by means of a by-pass and allow it to flow into a sprinkling filter directly through the drains. When the filter has been filled to a depth of four feet the automatic device should cut off the inlet of this filter and open the inlet of the adjacent filter. These devices should be so arranged that the same scheme can be followed when the two future filters are built in this group. At a depth of four feet, the capacity of one of these sprinkling filters will be 6,000 gallons, representing a period of eight hours required to fill this tank.

A device will be needed for discharging each of these units. This device must be so designed as to allow the tank to begin to discharge after having been filled to a four foot depth.

These filling and discharging devices must be so arranged that by-passes can be placed in them, so as to allow these beds to be operated by hand when so desired.

Devices for Operating Sand Filters.

The dosing tank for the sand filter will be 5 feet deep with a capacity of 5,000 gallons. The elevation of the bottom of this dosing tank is two feet above the top of the sand filter bed. This tank will be supplied by gravity with a six inch cast iron force main. The sand filter beds will be divided into two units, each 40 by 100 feet in plan and 3 feet deep. The total discharge of this dosing tank is to be supplied to each filter in turn at an average rate of one cubic foot per second, which will allow eleven minutes for the total discharge of the tank. The effluent from the dosing tank will be distributed over the surface of the sand filter by a system of wooden troughs of ample size, as shown on the plan of the sand filter.

It is desired to so arrange this dosing apparatus that the discharge from this tank may be thrown in the future upon each of two additional filters, as shown on the plan.

Proposals Required for This Work.

Proposals must be made for the devices necessary for dosing the two sprinkling filters and the two sand filters which are to be built now. Any additional parts to the future apparatus which should be installed in the masonry of the present tanks must also be included in these bids. A separate proposal is wanted for an automatic device necessary for the operation of the sprinkling filters as contact beds as this may not be installed immediately under this contract. Bidders will please send in their bids and a sketch showing the arrangements of their apparatus within ten days from the date of this specification. A detailed description of the method of operation is also desired.

In response to these inquiries the Pacific Flush Tank Company made a proposition for furnishing alternating syphons and Adams feeds for the two sprinkling filters and the two sand filters for a total price of $700. Merritt and Company made a proposition for furnishing the apparatus, consisting of two 6 inch automatic Aerlock sequence syphons for dosing sprinkling filters, such automatic devices for operating sprinkling filters as contact beds, and two 6 inch syphons for dosing sand filters for a total of $650, with an agreement to furnish the apparatus for the sprinkling filters immediately for $450 and to furnish the apparatus for the sand filters within a period of one year from date of installation of the sprinkling filter apparatus for $200. The contract was awarded to Merritt and Company after a thorough investigation of the apparatus constructed by this company as their price was the cheapest and it was found that the apparatus would be satisfactory.

The apparatus for the sprinkling filters was installed by Merritt and Company upon the completion of the filters in the spring of 1908 and after a thorough test payment was made on August 3rd, 1908.

On August 14th, 1908, a notice was sent to Merritt and Company that the apparatus for the sand filters would be installed as provided for in the contract and this apparatus was installed during the fall of 1908.

GARBAGE INCINERATOR.

On June 30th, 1908, the Commissioner of Health received proposals for furnishing a garbage disposal plant for the Mont Alto Sanatorium. This was in response to an advertisement appearing in the daily and engineering papers inviting proposals based upon an original design for an economical garbage and refuse disposal plant. It was specified that the plant was to consist of one battery with a capacity for the garbage, sludge and combustible refuse for 500 people. It was also specifically stated that the ingenuity of design and econ-

omy in operation would be given consideration in awarding the contract. The contractor was to guarantee that his apparatus would not infringe upon the patent rights of any party and the plant was to be so arranged that additional units could be added from time to time so that the plant could finally have a capacity large enough for 2,500 people.

In addition to the proposals for one unit, bidders were requested to state for what sum additional units would be furnished and a bond was required in the sum of 50 per cent. of the cost of two additional units to insure the furnishing of these units by the contractor within one year after the installation of the plant if so desired.

The efficiency of the plant was to be based upon the number of pounds of coal consumed per ton of garbage and in case the final test of the plant showed that the efficiency as thus guaranteed by the contractor was not obtained, the plant would be rejected and the contractor would be compelled to remove it from the premises without any compensation.

In accordance with these conditions, proposals were received as follows:

Name.	Cost of initial installation.	Cost of Additional Units.
Morse-Boulger Destructor Co., New York,	$3,850 00	$3,000 00
Kellar & Price, Lancaster, Pa., ...	5,900 00	No bid.
Lewis & Kitchen, Chicago, Ill., ...	5,400 00	$720 00
Dixon Engineering & Construction Co., Toledo, Ohio, ...	2,200 00	First, 1,700 00 Additional Unit. Second, $2,100 00 Additional Unit. Third, $1,700 00 Additional Unit.

As the specifications issued for this work were very general, there was a wide variation in the plans submitted. This was especially the case with the superstructure for the building and with the type of stack. The superstructure varied from light galvanized iron covering to a concrete building. In some of the bids brick stacks were proposed and two of the bidders gave an additional price if a brick stack was furnished. The type of plant submitted was in every case an incinerating furnace. Each set of plans submitted was accompanied by a set of specifications which were found in every case to be very general.

On account of the general character of these specifications and the various styles of superstructure proposed, it was decided before awarding the contract to allow all bidders to submit additional bids conforming with a detailed set of specifications issued by the Department and definitely setting forth the character of the building and the quality of material for both building and stack. In accordance with these specifications, which were sent to each bidder on July 10th, 1908, additional proposals were received from the same group of bidders as follows:

Name.	Cost of initial installation.	Cost of Additional Units.
Morse-Boulger Destructor Co., New York,	$4,450 00	$1,950 00
Kellar & Price, Lancaster, Pa., ...	5,225 61	No bid.
Lewis & Kitchen, Chicago, ...	5,400 00	
Dixon Engineering & Construction Co., ..	3,128 00	

After a thorough study of the plans and guarantees offered by the various bidders, it was decided to award the contract under the original bid of the Dixon Engineering and Construction Company for $2,200.00. They agreed to furnish an incinerator under the accompanying specifications attached to their proposals which would consume not over 200 pounds of coal and 10 pounds of coke per ton of garbage and to construct the plant within seventy days after being awarded the contract.

The contract was signed on the 15th of August, 1908, and work was not begun until the first part of October, as there was a delay in getting the material shipped to the site. Work was completed during the first week of November and on November 9th the testing of the plant was begun. The plant has been in operation since that date. The contract provides that payment on this work shall be made within thirty days after the acceptance of the plant.

Description of Plant.

The plant is located 1½ miles north of the built-up section of the Sanatorium at the side of the sewage disposal plant. It is constructed on the slope immediately south of the sprinkling filters and is arranged so that a driveway can extend from the road on a good grade to the entrance to the building. The plant consists of one Dixon steel shell crematory furnace with a steel stack and brick superstructure.

The furnace is 9 feet 3 inches by 4 feet in plan and 7 feet high. It rests on a concrete foundation extending to solid bottom and is located in one corner of the building which is 20 feet by 8 feet by 8 inches in plan. The furnace is divided into two sections consisting of the incinerating section where the garbage is burned and the fume consumer section where the gases escaping from the burning garbage are thoroughly consumed. The incinerating section occupies the main portion of the unit and is located in the front central part. It is built with two grates and an ash pit located below them. The upper grate is located 3½ feet above the floor of the ash pit and consists of fire clay grate bar three inches wide, six inches deep and spaced with openings between them of four inches. On this gate the garbage is thrown from a manhole opening located in the top immediately above it and serves as a drying grate. The lower grate is located half way between the garbage grate and the floor of the ash pit. It is formed with cast iron bars and on it is placed the coal for operating the furnace. As the garbage dries on the upper grate it drops on to this lower grate and furnishes additional fuel for the incineration. A large stoking door is provided in front of the furnace opposite the garbage grate and a fire and ash door are provided for the fire grate and ash pit.

Immediately back of these grates and separated therefrom by a fire wall is the fume consumer. This consists of an auxiliary grate one foot by two feet six inches upon which an auxiliary fire formed with coke or coal is burned. The wall between this grate and the stack which rises immediately back of it is formed of fire brick laid with alternate brick spaces, open, and the fire in this auxiliary grate heats this perforated brick wall so that the gases as they pass through are completely consumed. The admission doors to this auxiliary grate

and the ash pit below it are located on the side of the furnace and there is also provided on this side of the furnace a clean-out door which leads to the base of the stack.

The walls of the furnace are lined with an interior lining of 4½ inches of fire clay brick and the exterior of 4½ inches of common brick. The arch from the furnace and the base of the stack are constructed with an entire thickness of 9 inches of firebrick. The exposed portions of the interior are formed with fire brick. The entire furnace is enclosed in a steel shell of one-quarter inch steel plate riveted together and reinforced with steel angles and Tees.

A steel stack is constructed on the back of the furnace immediately above the fume consumer section. This stack is a circular steel structure 15 inches in diameter, interior dimensions, and rising to a height 43 feet 6 inches above the top of the furnace. At a point 15 feet below the top it is provided with an adjustable guy band and to this are attached four guys of three-eighth inch galvanized wire cable securely anchored with wrought iron guy anchors. The stack is lined on the interior for a distance of 19 feet above the base with a 4½ inch fire clay radial brick lining. A clean-out door, register, baffle, side and top liners are furnished near the bottom of the stack.

The superstructure, as previously stated, is constructed of brick and is 20 feet by 8 feet 8 inches interior dimensions in plan. There is a clearance room from floor to ceiling of 12 feet and the roof is covered with galvanized corrugated iron with a rise of 18 inches to the center and surmounted with a galvanized iron ridge roll extending the full length of the building. The foundations for the building consist of concrete footing 18 inches wide by one foot deep and located below frost line. These walls are constructed of brick 13 inches thick until the surface of the ground is reached where the fall is offset to a 9 inch thickness. The walls are built of common red brick and the building is lighted and ventilated by means of windows located in the sides and in the end opposite to the entrance. The entrance door is located at the end of the building facing the east and the furnace is opposite.

On the north side of the building a large, solid door is provided with a sill level with the top of the furnace. A receiving platform of wood is constructed immediately outside of this and the garbage cans are unloaded on this platform and taken through the door to the manhole in the top of the furnace, where the garbage is fed in.

On November 9th official tests were begun upon this plant and the amount of garbage consumed and the amount of coal used each day were accurately weighed. The following table shows the results of these tests:

Date.	No. lbs. garbage.	No. lbs. coal.
November 9th,	1484	102
November 12th,	1167	94
November 14th,	1446	106
November 17th,	1297	95
November 19th,	1618	108
November 21st,	1356	101
November 24th,	1604	85
November 27th,	1711	97
November 30th,	1857	110
December 3rd,	1726	108
December 5th,	1562	96
December 8th,	2075	173
December 11th,	1757	112

The guarantee stated that the battery was to have an efficiency of 200 pounds of coal and 10 pounds of coke per ton of garbage consumed when operated at its full capacity for a period of eight hours and fed by wet garbage only. The coal was to be taken as equivalent to 14,000 B. T. U. per lb. Anthracite coal has been used in the furnace and a good grade of anthracite is equivalent to the grade of coal specified. Anthracite coal has also been used in the auxiliary grate where coke is supposed to be used. It is the intention of the Department to use bituminous coal in this furnace and the builders state that a better efficiency can be obtained with bituminous coal as it is easier to start the furnaces. However, under the existing conditions the furnace has more than fulfilled the efficiency requirement of the specifications as will be noted in the table of tests as given above.

Discussion.

The Dixon Engineering and Construction Company agreed to complete the construction of this plant within seventy days after signing the contract and to forfeit fifteen dollars per day of liquidated damages for each and every day on which the contract was not completed. As the contract was signed on the 15th of August the plant should have been ready for operation by the 24th of October. On that date, however, the plant had not been completed on account of an unavoidable delay in obtaining the firebrick for lining the chimney. This was obtained, however, a few days after and the plant, as previously stated, began operations on the 9th day of November.

In view of the great efficiency of the plant and the nature of the delay in the arrival of the material for completing the work, it was decided that it would be advisable not to deduct this sum for the nonfulfillment of the time limit.

It was also specified that the temperature of the gases in the stack should be not less than 1,200 degrees F. No test has been made upon this on account of the lack of materials to do so. As there appears to be no offensive odor from the stack, the temperature must be sufficiently high to effect the desired results.

The population of the institution at present is almost 500, including the operators. The garbage, as will be noted in the previous table, is only sufficient at present to supply the furnace at the most every other day when run for a continuous period of eight hours. But how long the existing unit may be able to take care of the garbage of the institution is unknown.

When it becomes advisable to have another unit installed it can be purchased at the price specified in the existing contract. This price holds good for one year and arrangements can be made for a second installation at any time before August, 1909. A certificate of the Department's acceptance of the plant has been issued and the contractors are entitled to the sum of $2,200 within thirty days from the issuance of the certificate.

MISCELLANEOUS WORK AT MONT ALTO.

During the spring of 1908 the construction of the new buildings at Mont Alto was begun. The actual construction work was under architects employed by the Department of Health, but the location of the buildings and the setting of the elevation of the foundations was determined by the Engineering Division.

The buildings constructed numbered 80 in all and consisted of 40 cottages, 16 pavilions, 10 toilet houses, twin cottages, dining hall, laundry, addition to barn, infirmary buildings and several smaller buildings designed for various purposes. All of the buildings, with the exception of the infirmary, were located in the eastern part of the sanatorium where the original sanatorium buildings were located. The infirmary building was located in the northwestern portion of the sanatorium land at the foot of Rocky Mountain.

Before making the location for the buildings, cross sections were taken of the proposed sites and a topographical plan was made with one foot contours. The streets and buildings blocks were then accurately laid out and the profiles of the streets were run. The grades for the streets were determined and the elevations of the foundations of the various buildings were set so as to conform with the established grades of the adjacent streets.

The main streets are spaced 135 feet centre to centre and separate the building lots. These are rectangular in plan, 105 feet wide and 300 feet long and contain the cottages. At the end of each lot there is a smaller lot for pavilions, also rectangular in plan 105 feet wide and 50 feet long. Cross streets separate the small pavilion lots from the cottage locations. They are also 25 feet wide and run at right angles to the main streets. In laying out the streets the direction was adapted to the natural slopes of the ground in order to facilitate grading and drainage. As the slope in the eastern section is southerly and westerly the streets run almost due north and east with the main streets at right angles to the county road, which extends along the northern edge of this development. Across the county road there is a large grove of fine pines. This is used as a park. The main streets in the western development are laid out in a northeasterly direction, running along the side of Rocky Mountain Ridge. At the northeast end of this development the infirmary building is located with ample parking around it to completely segregate it from the rest of the development.

In making the plans for these sections the location of the cottages governed the size of the blocks and consequently the spacing of the streets. It was desirable to so locate the cottages that there would be a maximum amount of sunlight throughout the year on all four sides. In order to determine this location mathematical calculations were made of the duration of the sunlight on all four sides of a cottage when pointing in various directions and it was found that the highest average duration on all four sides is obtained by locating it with the side 45 degrees to the north. In order to prevent the shadow from one cottage interfering with the sunlight on another, they were spaced 56 feet centre to centre in both directions. In every alternate main street there are located toilet houses for the accommo-

dation of the people in adjacent blocks. These are placed in the centre of the street and connect with the sewer laterals which extend up the centre of alternate streets. The other main streets and the cross streets contain the driveways and water piping. The central dining room is located in a double block at the north end of this development. Bath houses are located at corners of standard blocks in several places and replace the end cottages in these blocks. All other buildings are segregated from the patients' quarters.

As previously stated, alternate main streets and the cross streets have been developed for traffic. They have been laid out in nearly all cases on a grade conforming closely with the surface of the ground. On each side of the road is a shallow earth gutter designed so that a lawn mower can be operated in clipping the grass in it. These gutters cross the intersecting streets through wooden box culverts and the drainage is so arranged that the flow from each main street will be discharged independently at the foot of the slope. This is necessary as all roof water from the buildings is discharged onto the surface of the ground and a part of it will reach the gutters.

The excavations from the gutters is used to crown the roads and the surface of the road is furnished with a layer of one inch broken stone placed on the surface to a depth of six inches at the crown and tapering off to two inches at the edge. No roller was used, but the roads were compacted by driving the teams used in construction over the sections previously constructed.

Sidewalks were constructed lengthwise through the centre of each cottage block. Short cross walks were built from this centre sidewalk to the entrance of each cottage and to the toilet houses. The main sidewalk was connected at the end of each block with a sidewalk extending along one side of the cross street adjacent to the pavilions. These cross street sidewalks connect with the dining room, bath houses, etc., and form the main sidewalks of the sanatorium. All sidewalks are constructed of broken stone covered with screenings. The ground is excavated to a width of 3 feet and to a depth of 5 inches. This is filled with a 4 inch layer of 1 inch broken stone and the top is finished off with 1 inch of screenings and tamped with iron tampers.

In locating the buildings the elevations are set so as to allow a uniform distance from the floor line to the ground. The cottages were set with reference to the grades of adjacent streets and the elevations of the pavilions were determined by the three abutting streets.

Before beginning the construction of the buildings it was necessary to cut down and grub the entire tract of a second growth of timber. This was done on force account and altogether ten acres of land were cleared and grubbed. The mountaineers in the vicinity were used for cutting timber and the grubbing of the stumps was accomplished mainly with dynamite, of which several thousand pounds were used.

Altogether 5,000 feet of streets were constructed and 5,500 feet of sidewalks. This work was done by force account with mountain labor. The broken stone was obtained by means of crushing stone found on the site with a rock crusher belonging to the State.

The miscellaneous work at Mont Alto during 1908 consisted of constructing 2,000 feet of 6 inch sewer on force account, constructing coal bins, derrick for handling coal, individual coal pockets for the

cottages, foundations for scales, extensions to water system, painting old buildings, inspection of concrete work on infirmary foundations and various small concrete structures which were needed at the sanatorium and enlarging the ice pond.

In addition, the resident engineer, from January to July, 1908, acted as superintendent for the institution and had charge of the handling of all the labor employed at the institution.

It was necessary to undertake all of these small pieces of work by force account as it was practically impossible to obtain bids from responsible contractors to undertake small pieces of work in this locality on account of the difficulty in obtaining labor and material in this region.

The main addition to the sewers consisted of 1,200 feet of 6 inch sewer extending from the main outlet sewer at the ice pond up to the infirmary building. Concrete manholes similar to those supplied on the main sewerage system were constructed on this line at distances not greater than 400 feet and were equipped with cast iron manhole frames and covers. The sewers between manholes were constructed in a straight line with no break in the grade so that it would be possible to make a ready inspection of any section of the sewer from the manholes. The balance of the sewers constructed are located in the main sanatorium and connect the sewers with several of the new buildings. These sewers are also supplied with manholes.

The ice pond which was constructed during the winter of 1907 had not been completed at that time on account of the severity of the weather and the necessity of obtaining a cutting of ice before the spring arrived. The pond at that time was only constructed with an area of 0.25 acres and the final plans called for an area of 0.4 acres. The completion of this excavation was made during the summer of 1908 and a canal leading from the ice pond to the ice house was constructed so as to float the ice from the ice pond to the hoisting apparatus at the ice house. The hoisting apparatus was also constructed during this year and consisted of two jigs operated by horsepower and equipped with a sloping trough on the interior of the ice house. The ice is floated onto these jigs and is then hoisted to the top of the house and is carried to position on the wooden trough in the interior of the building..

MISCELLANEOUS WORK.

The principal work under this heading done by the Engineering Division of the Department during the year has been the making of surveys and the preparation of plans for a new system of sewers and a sewage disposal plant for the State Institution for Feeble Minded of Western Pennsylvania located at Polk, Venango County. Also the making of surveys and the preparation of plans and estimates of cost of a sewage disposal plant for the State Asylum for the Chronic Insane of Pennsylvania, located near Wernersville, Berks County. Following is a detailed report of the work done at each of these institutions.

Sewers and Sewage Disposal for State Hospital at Polk.

On June 13th, 1907, the Governor of the Commonwealth of Pennsylvania approved Act No. 355 of the General Assembly, passed at the session of 1907. This Act is entitled, "An Act making an appropriation to the Trustees of the State Institution for Feeble Minded of Western Pennsylvania," and reads as follows:

Appropriation.

Section 1. Be it enacted, &c., That thirty thousand dollars, or so much thereof, as may be necessary, be and the same is hereby appropriated to the Trustees of the State Institution for Feeble Minded of Western Pennsylvania, for the purpose of building an improved sewerage, drainage and sewage disposal works. Said Trustees seek this appropriation under the condition that the Department of Health shall cause surveys, plans and specifications to be prepared for the proposed improved sewerage, drainage and sewage disposal works, and that so much of the thirty thousand dollars appropriation as may be necessary shall, on the requisition of the Commissioner of Health, be set aside, and be expended by said Trustees for said improvement, under the direction and supervision and to the approval of the State Department of Health. Furthermore, that said Department shall have a general direction and supervision, acting through said Trustees, of the operation and maintenance of the improved works after they are completed.

Approved—The 13th day of June, A. D. 1907.

In accordance with the terms of this Act surveys, plans and specifications for the proposed improved sewerage and sewage disposal works have been prepared.

General Conditions.

The State Institution for Feeble Minded of Western Pennsylvania is located in Venango County, eight miles west of Franklin. The institution buildings and the main tract of land are located within the borough of Polk and comprise two-thirds of the area of said borough and three-fourths of the population. A detailed description of the location of this institution, and the drainage of this territory, the water supply, existing sewers and sanitary conditions, are set forth in a decree relative to the subject issued by the Commissioner of Health on April 5th, 1907, to said Hospital Trustees.

As may be noted in this decree, the main group of buildings is located on an eminence in the northern part of the borough and faces easterly. The land slopes from this location northerly and easterly to Hibbs Run, a tributary of North Sandy Run, and south to Big Sandy Creek. These creeks unite at a point southeast of the institution and immediately east of the built up section of the borough and flow to the Allegheny River, eight miles southeast of the borough. The institution's population, including officials and attendants, is 1,483. It is amply supplied with a gravity supply of spring water. The sewage and storm water from the main buildings are carried through a system of sewers feeding a 24 inch outfall sewer which empties into North Sandy Run southeast of the institution in the built up section of the borough. To treat this sewage with a gravity disposal plant, it is, therefore, necessary to intercept this flow before it reaches the run.

North Sandy Run into which the main sewer from the institution empties, has a watershed of about twelve square miles, so that the flow in this creek during the dry season is extremely limited. At this

time the odors from the sewage are pronounced and are a source of frequent complaint from the citizens of the borough in that vicinity. The cows that are pastured on this creek below the outfall sewer drink this sewage and there is considerable prejudice among the people in the borough against the milk from these cows.

It was, therefore, unanimously agreed on April 5th, 1907, by the Governor, Attorney General and Commissioner of Health that the interests of the public health demanded that the Commissioner of Health advise the Board of Trustees of the institution to forthwith secure an appropriation of $30,000 for improved sewerage, drainage and sewage disposal works. This plan was carried out by the Board of Trustees and an appropriation as above stated was obtained.

Out of the $30,000 appropriation, the State Department of Health has incurred for expenses in making surveys, plans and for traveling $848.26. It is fair to estimate that at least $28,000 of the appropriation will be available for construction work, and for this sum of $28,000 the outfall sewer and the disposal plant can be built.

It is impossible to get the sewage from the existing outfall sewers of the institution into the proposed outfall sewer by gravity. Either pumping must be resorted to or the old sewer mains must be abandoned and new ones must be laid in shallow trenches at much higher elevations. This is perfectly feasible and desirable. The old sewers were laid in trenches dug in the ground before the surface was graded up about the buildings as it is seen to-day. In consequence, the main sewer outlet is buried 25 feet deep or thereabouts. It is decidedly an economical move to avoid pumping of the institution's sewage, especially when the buildings are on an eminence sufficiently high to enable the collection of the sewage and its deliverance to the proposed sewage disposal plant by gravity.

The site selected by the Department in the first instance would have enabled the sewage from the existing sewer mains to have been delivered by gravity to the purification plant.

It is proposed by the officers of the institution and at the time bids are received for the construction of the outfall sewer and the sewage purification plant, that bids also be received for new sewer lines and that the lowest bidder be awarded the contract provisionally, the condition being that the Legislature appropriate the money necessary to execute the contract.

In keeping with this method of procedure the plans for the new sewers are made a part of the project herein described.

Proposed Disposal Plant—Sites.

There are three sites available for the location of the sewage disposal plant for this institution where it can be operated economically by gravity.

One tract consists of eight acres of land belonging to the institution and located about 1,500 feet south of the main buildings across the Franklin and Mercer Road. This tract is trapezoidal in shape and lies between the Franklin and Mercer Road and Big Sandy Creek. On the eastern boundary is the main settlement of the borough of Polk, which is built up thickly to the edge of this tract. On the western boundary of this tract there is one group of houses consisting of

6 or 8 dwellings and barns, which extend from the property line along the Franklin and Mercer Road westerly. From the road this tract slopes precipitously on an average of 45 degrees for a depth of 30 feet to a meadow which extends from the foot of this slope over three-fourths of the tract to the bank of Big Sandy Creek. The elevation of the meadow is three feet below high water mark of Big Sandy Creek and is frequently flooded during freshets.

In order to construct a disposal plant on this site it would be necessary to do extensive grading so as to place the outlets at a sufficient elevation to prevent interruption of service during periods of high water. In addition to this, the location of dwelling houses in such close proximity might cause complaint and the plant would be considered a nuisance by the adjacent property holders.

The second tract of land consists of a seven acre triangular plot located 1,000 feet east of the main group of the institution's buildings. This tract also belongs to the institution, but is isolated from the main lawn in front of the institution by the Lake Shore and Michigan Southern Railroad, which extends along the western boundary of this tract on an embankment five feet high. On the northeastern side of the tract is Hibbs Run, a small stream draining the ice pond north of the institution and the northern part of the institution's grounds. This run during the dry season has a limited flow. It flows with an average grade of one per cent. and empties into North Sandy Run at a point 500 feet southeast of this tract of territory. The southeastern side of this tract is bounded by private property, which extends 500 feet south to the Franklin and Mercer Road. Across the Franklin and Mercer Road there is a built up section of the borough of Polk. Many of these houses are located along the road at this point and face the above mentioned tract. These houses will be located 700 feet from the disposal works if they are so located in this tract. This tract of land has a gradual slope extending from the foot of the embankment of the L. S. & M. S. R. R., easterly to Hibbs Run, with a total drop of 15 feet. High water has been known to exist for a depth of two feet on the extreme eastern end of this tract. This site was the first one selected by the State Department because the sewage from the existing sewer mains could be intercepted and delivered to the place by gravity.

The third tract of land available for the location of the plant belongs to the institution, and is located east of the railroad and about 3,000 feet northeast of the main group of buildings of the institution. On the eastern edge of this tract and about 1,500 feet from the railroad is North Sandy Creek. The land from the creek for a distance of 600 feet is meadow land, with an elevation two or three feet above high water in the creek. On the western edge of this meadow and extending therefrom to the railroad the land rises on a much steeper slope, reaching an elevation 20 feet above the meadow.

This slope would furnish an excellent site for a disposal plant as it is well isolated from any habitation. It could be reached by a gravity outfall sewer from the institution which could be brought across the dam at the ice pond. On account of the depth of the existing sewers at the institution this outfall sewer would not be able to drain all of the sewage from the institution without a revision of the sewerage system.

The institution authorities prefer the third site as above described on account of the isolation. They consider the isolation important enough to choose the third site and to make a request to the Legislature for an appropriation to defray the expense of revising the sewerage system so that the system shall drain into the outfall sewer leading to the third disposal site by gravity. This site was, therefore, selected.

Capacity of Works.

The plant as designed is to have a capacity for the domestic sewage from the population of this institution in 1918. Provision has been made for extensions to take care of the sewage in 1928. In order to determine the quantity of sewage, weir measurements were taken throughout 24 hour periods and these measurements showed that the average flow of sewage amounted to 315,522 gallons per day.

The population of the institution for 1908 is estimated at 1,483, so that this flow of sewage represents a per capita amount of 212.8 gallons per day. The population curve for this institution was plotted from the yearly population record from 1897 until the present date. This curve was projected to the years 1918 and 1928, and gave a population in 1918 of 2,650 and in 1928 of 3,700.

The part of the plant that is to be constructed at present is, therefore, to have a capacity for 2,650 people, which represents a total daily flow of 564,000 gallons.

General Layout.

The plant is to consist of screen chambers, settling tanks, syphon chamber, sprinkling filters, chemical dosing tank, settling basins, sludge pump and sand sludge beds.

A 12 inch outfall sewer will be built from manhole No. 7 to the disposal plant. The existing sewers will be tapped and connected by means of a 12 inch sewer to this manhole.

The sewage passes from the 12 inch outfall sewer directly into a screen chamber. This chamber consists of a concrete compartment 3 feet wide by 6 feet 9 inches long by 4 feet deep covered with two wooden trap doors. In it are located two wrought iron screens each 3 feet wide and composed of one-quarter inch rods spaced three-quarters of an inch centre to centre. Both screens are arranged so as to be removable for cleaning purposes.

From the screen chamber the sewage enters the inlet trough of the septic tanks and passes through the entire length of the four compartments to an outlet trough which connects directly with a dosing tank. This dosing tank is located at one end of the outlet trough of the septic tanks and adjacent to the sprinkling filters. The flow line in the septic tanks is elevation 1,105.25 and the flow line in the dosing tank varies from this elevation to 1,102.5.

The sewage passes through the dosing tank on to the sprinkling filters, being fed by an automatic syphon. The top of the sprinkling filters is at elevation 1,100 and the bottom is at elevation 1,093.

From the sprinkling filters the sewage gravitates to the chemical dosing tank, where it is fed with chloride of lime and thence passes through two settling basins and thence through a pipe drain to the creek. The flow line in the settling basins is 1,091 and the bottom is 1,087, so that the total vertical drop in the plant is 14.25 feet.

Settling or Septic Tanks.

The settling or septic tanks consist of 4 tanks, each 80 feet by 16 feet by 10 feet effective depth interior dimensions and with a total depth from floor to roof of 13 feet and each with a capacity of 96,000 gallons. This will allow a settling period in 1918 of 12 hours when 3 tanks are in operation. It is planned to so operate these tanks that one tank will be continuously out of operation in order to allow the sludge to be sufficiently worked over in the tank before it is discharged upon the sludge beds, thereby preventing any nuisance due to odors. These tanks are to be constructed of reinforced concrete with reinforced concrete tops. The excavation for these structures has been so arranged that the material excavated can be used in forming embankments around the walls of the tanks. The top of the concrete roof of these tanks will be located one foot above the top of the embankment. The flow line will be at elevation 1,105.25.

In operating the tanks the sewage will be admitted into a reinforced concrete trough extending along the inlet ends of the entire group. This trough will be covered with a cast iron grating. The sewage will be admitted into one or more compartments through two 3 inch gate valves located immediately below the flow line in each tank and connecting directly with the trough. The sewage will pass under a wooden baffle board located 10 inches from the base of the inlet wall and extending two feet below the surface, thence through the tank and under a movable baffle board, extending 4 feet 6 inches below the surface, which can be operated so as to be located at any point throughout the length of the tank; thence * * * * under a scum board located across the outlet end of the tank and extending two feet below the surface; thence over a steel weir six feet long located at the flow line of each compartment. The sewage flows over this weir into a reinforced concrete trough of a design similar to the inlet trough and covered with a cast iron grating. Stop planks are arranged on the outlets of the various compartments and on the inlet and outlet troughs. By means of these planks, one compartment can be shut off and the other three can be operated in parallel or in a series. At a depth of six feet below the surface there is located a six inch valved connection at the inlet end of each tank to allow the liquid contents of the tank to be drawn off above the sludge. These connections are drained by a 10 inch terra cotta sewer which extends to the sludge sump to be described later. At this sump there is located a centrifugal pump which will lift this water to the dosing tank and allow it to be distributed on to the sprinkling filters. The concrete bottom of each compartment slopes on a 5 per cent. grade to a gutter extending lengthwise through the centre of each tank. The bottom of this gutter is placed also on a 5 per cent. slope and at the centre of the tank there is a 6 inch valve connection for draining off the sludge to the 12 inch sludge line extending under the septic tanks and carrying the sludge by gravity to the sludge beds located in the lower part of the plant and to be described in detail later. Provision is also made for washing out these compartments with water. One and one-half inch connections to the 2 inch force main extending from the water mains of the institution to the plant are made for this purpose. Two 3 inch vent pipes are placed in the roof of each compartment to allow the escape of gases and 3 manhole openings for facilitating access to each compartment.

Dosing Tank.

At the east end of the outlet trough of the septic tanks is the dosing tank with automatic syphon for operating the sprinkling filters. This dosing tank is 24 feet long by 10 feet wide by 2.5 feet effective depth interior dimensions with a total depth of 5 feet 6 inches and with a capacity of 4,000 gallons. This tank will require 10 minutes to be filled in 1918 and 7 minutes in 1928. The time equired for filling at present under the average flow will be 18 minutes. The tank will be built of reinforced concrete with a reinforced concrete roof and manhole opening. The flow line will be at elevation 1,105, which is 3 inches below the flow line of the septic tanks and will prevent the backing up of the sewage into these tanks. The tank will discharge through an automatic syphon of the Miller or Aerlock type into a small compartment 3 feet wide and 8 feet long built in the tank. This compartment is also connected with the tank by means of a 12 inch valve so that in case the syphon is out of commission, the tank can be operated by hand. From the bottom of this compartment there is an 18 inch pipe extending down vertically to the inlet end of the 18 inch pipe which feeds the sprinkling filters. The top edge of this compartment is placed at an elevation of 6 inches above the normal flow line of the tank and serves as an overflow. The tank is also provided with a 10 inch connection whereby the flow from the septic tanks can be by-passed to the outfall sewer around the sprinkling filters. A connection is also made with the inlet end of the septic tanks so that the sewage flow can be sent directly around the septic tanks to the sprinkling filters. This compartment is also connected by means of a 6 inch cast iron force main to the centrifugal pump located in the lower part of the plant in order to allow the pumpage of such sewage as has been by-passed around the sprinkling filters, into this compartment.

Sprinkling Filters.

The sprinkling filters are located immediately east of the settling tanks and are separated therefrom by the dosing tank previously described. The filters are designed to be operated at a rate of two million gallons per acre per day for the flow in 1918. The filters will be built in two units each 77 feet wide by 87 feet 9 inches long by 6 feet effective depth, interior dimensions, with a total depth of 6 feet 6 inches and with a total area of 0.27 acres. The flow line will be located at elevation 1,100, five feet below the flow line in the dosing tank.

Between the two filter units there will be a reinforced concrete operating gallery 4 feet wide by 6 feet 0 inches deep, interior dimensions and extending the full length of the filter units. The top will be covered with a concrete slab and will be entered through a manhole located at each end.

These filters will also be constructed of reinforced concrete walls buttressed and backed on the outside with an earth embankment, as shown on the plans. The excavation has been so arranged as to allow sufficient earth to form this embankment. The floor will consist of a 4 inch layer of concrete sloping with a drop of 6 inches from the operating gallery separating the filters across the width of the filter to an 18 inch concrete drain located along the side opposite to the gallery.

The bottom of the filter will be covered by 6 inch half tiles spaced 12 inches centre to centre and extending from the inside of the wall of the operating gallery across the width of the filter to the main concrete drain. At each end of the concrete drain is an inspection manhole which will allow it to be thoroughly cleaned and ventilated. The filter will be built of hard slag broken by hand and ranging in size from 4 inch to 1 inch. A layer will be placed over the bottom 8 inches in thickness of 4 inch slag laid carefully around the underdrains. Above this layer there will be no attempt at graduation, but an equal admixture of the various sizes will be used. The surfaces will be sprinkled by means of brass nozzles of the Columbus type, spaced 14 feet centre to centre and fed by means of 3 inch vertical cast iron risers extending from the surface of the filter to the 4 inch distributing laterals located 3 feet below. These laterals are fed by an 18 inch conduit built under the floor of the operating gallery. This 18 inch conduit consists of 18 inch terra cotta pipe imbedded in concrete below the floor of the operating gallery. At the inlet end it is directly beneath the dosing chamber connection. An opening is provided in the outlet end for cleaning. From this conduit at intervals of 12 feet 1.5 inches there are 6 inch risers which feed 4 inch distributing lines in the two filters. A 4 inch valve is placed in this operating gallery on the inlet end of each 4 inch distributor, so as to completely close-off any line of nozzles if desired. The distributing conduits leading from this gallery consist of 4 inch cast iron pipe with 4 by 3 inch tees connecting to risers, located at an elevation of 3 feet 6 inches above the floor of the filter and supported at intervals of 12 feet by means of 12 inch concrete columns. These distributors can be cleaned by removing a flanged elbow located for this purpose in the operating gallery. From the operating gallery the 6 inch tile extending over the bottom of the filter can also be cleaned and special connections with the 2 inch water line connecting with the institution's mains, are provided in this gallery to facilitate flushing out the underdrains.

Chemical Dosing Apparatus.

The effluent from the sprinkling filters is conveyed through a 15 inch terra cotta sewer built immediately outside of the south wall of the sprinkling filters and connecting thereto through the inspection manhole at the lower end of the filters. This sewer will convey the effluent from the sprinkling filters to the chemical dosing house located immediately east of the north end of the filters at the west end of the two settling basins.

The chemical dosing house will contain the mixing tanks, dosing tanks and automatic feed apparatus for treating the effluent from the sprinkling filters with chlorine. There will also be located in this building the sludge sump for draining the settling basins which will be described hereafter, and all sewage which is by-passed around the sprinkling filters. A centrifugal pump driven by gasoline engine will be installed in this building to pump the sludge to the sludge beds and the sewage to the syphon chamber of the sprinkling filters. This pump will have a capacity of one-half million gallons per day and will be driven by 8 H. P. gasoline engine. The discharge will be through a 6 inch cast iron main extending from the pump to the sludge beds and thence to the syphon chamber. By means of a by-pass to the sludge beds, the discharge can be directed to them, but if the

valve is closed, will be pumped to the syphon chamber. The sump for collecting the sludge or sewage will be four feet square by 13 feet deep and will be constructed of concrete. The bottom is located two feet below the invert of the cast iron drain from the bottom of the settling basins.

It is proposed to treat the effluent from the sprinkling filters with chlorine in the proportion of about 5 to 10 parts per million. Chloride of lime in the form of commercial bleaching powder will be used for this purpose. It will be thoroughly mixed with water in two reinforced concrete mixing tanks each three feet by six feet by three feet deep located two feet above the floor of the dosing house and separated by concrete columns. Each tank will have a capacity for storing a three days' supply of chloride of lime solution. The solution from these tanks will be carried through a one inch brass pipe line to an orifice box. This orifice box will have a regulating float valve connected to the brass pipe line and an orifice graduated so as to discharge at a uniform and definite rate into the 15 inch pipe from the sprinkling filters. This 15 inch pipe empties into a concrete mixing tank located immediately below the floor of the chemical dosing house and so baffled with wooden baffles as to allow the thorough mixing of the chemicals in the sewage before it goes into the settling basins. This tank is five feet six inches by eleven feet six inches by two feet deep. The superstructure for this chemical dosing house will consist of a brick building, light buff in color with white concrete block trimmings and a terra cotta roof.

Settling Basins.

Immediately south of the chemical dosing house and separated therefrom by an earth embankment are the two settling basins which will be used for settling out the effluent from the sprinkling filters and for allowing sufficient time for the action of the chlorine before the sewage is emptied into the run. These settling basins will be built of earth embankments with a slope of 1.5 horizontal to one vertical, lined with a six inch layer of concrete. They will be rectangular in shape with an average width of 30 feet, an average length of 52 feet and an average depth of 4 feet. Each will have a capacity of 47,000 gallons, giving a storage of two hours for each compartment when the plant is being operated at a rate of 564,000 gallons per day. The sewage enters each tank through three 12 inch openings spaced at equal distances across the width of the compartment at the end close to the chemical dosing house and located immediately below the flow line of the basin. These 12 inch openings connect with the distributing manhole in the embankment at this end and are valved so that one or more can be used as desired. The sewage enters these distributing manholes from the mixing tank through a 15 inch terra cotta pipe line laid in the embankment at this end of the compartment. The sewage will pass slowly through the length of the compartment and will flow over an outlet weir twenty feet long located at the flow line opposite to the inlet openings. A 12 inch concrete trough built immediately behind this weir will carry the discharge to the manhole at the head of the outfall sewer located in the embankment at this end of the settling basins. On the outlet end of each compartment there is a 6 inch valved connection to this manhole located two feet below the flow line of the settling basin, so that only one half of the basin must be drawn off in cleaning.

The concrete floor of each compartment slopes on a five per cent. grade to the 12 inch gutter built in the centre of the bottom and extending lengthwise through it. The bottom of these gutters is also placed on a five per cent. slope and at the lower end connects with the sludge sump by means of a 6 inch cast iron pipe controlled by a gate valve.

The elevation of the flow line of these basins is 1,091, which is 9 feet below the top of the sprinkling filters, allowing ample fall for the sewage in the connecting drains. From the outfall manhole there is a 15 inch terra cotta sewer extending for a distance of 650 feet to the North Sandy Run. The normal flow line in North Sandy Run at the end of this sewer is 1,084 and high water is placed by the people in the vicinity at approximately 1,088, so that there is ample leeway between high water mark and the flow line of the settling basins. The embankment around these settling basins is carried to the height of two feet above the flow line or elevation 1,093, which furnishes a further margin against high water.

Sludge Bed.

South of the settling basins will be located the sludge bed. This will be 135 feet long by 100 feet wide by two feet deep filled with coarse sand and underdrained with 6 inch tile laid 10 inches centre to centre. The underdrainage system will connect with an 8 inch collector extending across one end of the filter and will be connected by an 8 inch terra cotta pipe line with the sludge sump in the chemical dosing house, so that the effluent from these sludge beds can be pumped back to the sprinkling filters. There will be no concrete lining of the sludge beds. The sludge will be fed into the bed by a 12 inch terra cotta sludge line connecting with the septic tanks and by a 6 inch sludge line connecting with the centrifugal pump at the sludge sump for the settling basins. The sludge will be distributed over the surface by means of a wooden trough. The elevation of the top of the sludge bed will be 1,090, two feet above the high water mark.

Future Extensions.

There is ample room for future extensions to the various parts of the disposal plant. Additional compartments can be added to the settling tanks on the west side of the present compartments, so as to double the present capacity. The sprinkling filters can be extended eastward from the present filters in the same manner and the supply conduit under the operating gallery of these filters has been designed sufficiently large to take care of the future supply for 20 years. The settling basins can be extended eastward from the present basins and additional sludge beds can be constructed on the lowland in the eastern part of the tract.

Proposed Sewer Changes.

The disposal plant as herein described is designed to dispose of all sewage from the institution and should do so in an efficient manner, provided storm water is eliminated. The sewage from the institution,

under ordinary conditions is extremely weak, due to the high water consumption of 212 gallons per capita per day. If in addition to this there is to be a periodic dilution of the sewage with rain water, and a consequent overtaxing of the disposal plant, it will be extremely difficult to procure a high efficiency. As previously stated, a portion of the existing system is too deep to allow it to drain by gravity to the disposal plant, and it would be more economical to remodel the sewers than to install a hydraulic lift for discharging the sewage from these low sewers.

Present Sewers.

The institution is supplied at present with a sewer system which carries, not only the sewage from the various buildings and houses, but also all roof water; as previously stated, the system consists of two outfall sewers, a 24 inch outfall sewer, which carries all the sewage and roof water from the main group of buildings and empties into North Sandy Run, southeast of the institution in the built up section of the borough of Polk; an 18 inch outfall sewer which carries the sewage and roof water from a small group of buildings at the south end of the institution and empties into Big Sandy Creek at a point immediately south of the institution and in the built up part of the borough. There is also a 6 inch private sewer extending from the dwelling house east of the barns and north of the ice pond to a point in Hibbs Run, immediately below the ice pond. This sewer carries the roof water and sewage from the dwelling house.

The existing sewers range in size from 24 inch to 8 inch with 6 and 5 inch laterals and house connections. There are only two manholes in the system. These are located on the 24 inch outfall sewer draining the main group of buildings. They are built of masonry and have wooden covers. The rest of the sewers are connected up with no lamp holes or manholes. So far as it is possible to determine the sewers are provided with good grades and very little trouble has been experienced with any clogging of the system. The connections with the sanitary traps in the buildings are, however, very poor. In inspecting these connections, it was found that there are very few cast iron traps in existence. Most of the traps from the house drains to the sewer consist of terra cotta traps buried below the floor of the basement. These traps are frequently stopped up and in several cases it was noted that the sewage was spouting out of the house connection in the basement. The superintendent of the institution states that he has had to frequently dig up these traps in order to keep the sewers open.

From weir measurements made on the flow from these sewers, it appears that they are well laid and very tight. The flow of the sewage measured at several different times checked very closely with the consumption of water during these periods. During rainy weather there is, however, a great increase in the flow due to the large roof area drained by this system. No measurements have been made of the flow during rainy spells, but it is estimated that with a fall of rain of 3 inches, there would be a run-off of 100,000 gallons from the roof water alone, for one hour. The large buildings at the northwest end of this group known as the "Boys Custodial" and the building at the

extreme north end of the group, which is used as a hospital building, do not discharge their roof water into the sewers. This same plan will be used on all new buildings constructed for the institution and has been planned for the large building at the southwest end of the group which is being constructed now.

The New Plan.

The proposed sanitary system of sewers are designed so as to take care of all the existing buildings at the institution and are arranged so as to allow extensions to be readily made for future additions. A 12 inch sewer will extend from the manhole across Hibbs Run at the dam and located at the head of the 12 inch outfall sewer, across the bridge and through the embankment forming the ice pond, to the institution. This sewer will carry all the sewage from the main group of buildings. It will be fed by a system of 8 inch laterals located sufficiently deep to be connected with the existing traps and sanitary sewer outlets in these buildings.

Another 8 inch sewer will connect with the manhole at the ice pond to the outfall sewer and will drain the barns and other buildings located east of the ice pond.

On all the sewers, manholes will be located at every change of line and grade and at intervals not exceeding 400 feet. These manholes will be supplied with perforated cast iron covers to afford ample ventilation. Where necessary, connections to the water main will be made for flushing purposes. A valve will be placed on this connection within the manhole and flushing will be carried on when necessary by hand operation.

The minimum grade adopted for these sewers is 0.37 of one per cent. which will keep the minimum velocity sufficiently high to prevent accumulation of deposits. It will be noted from the profiles that the sewers range in depth from 3 feet to 14 feet. The greater depth mentioned is rendered necessary for the location of the existing sewer connections in the main buildings and also on account of the necessity for providing sewer outlets for future extensions to the building which will be to the west of the existing group. In making the connections with the existing house drains it will be necessary in most cases to supply house traps and surface vent pipes for these connections to replace the terra cotta traps now being used. In order to facilitate the cleaning of these traps, it is proposed, as far as possible, to place them above the floor line in the basement and to carry a cast iron connection through the wall to the outside terra cotta drain.

The existing sewers will be used in the future as drains only to carry all roof water from the various buildings and are of sufficient capacity to assist in the drainage of some of the roadways surrounding the institution, if this should be desired by the management.

It is estimated that it will cost about $15,000 to construct this sanitary system of sewers and to connect it up with the existing house connections.

Plans and specifications have, therefore, been prepared for an entirely new sanitary system of sewers which will care for sewage only. The existing system of sewers with rearrangement of house connections, will be used for roof and storm water only.

Bids for Sewage Disposal Plant.

The following is a copy of the advertisement for bids for sewers and sewage disposal plant:

SEALED PROPOSALS—SEWERS AND SEWAGE DISPOSAL PLANT FOR STATE INSTITUTION FOR FEEBLE MINDED OF WESTERN PENNSYLVANIA.

Polk, Pa., November 7th, 1908.

SEALED PROPOSALS will be received by the Board of Trustees of the State Institution for Feeble Minded of Western Pennsylvania at the institution located at Polk, Pa., until three P. M., Monday, November 23d, 1908, for the construction of a sewer system and sewage disposal plant for the said institution, in accordance with the plans and specifications on file at said institution and at the office of the Department of Health in Harrisburg. The sewers and disposal plant will be constructed under separate contracts.

Work on the disposal plant will consist of 3,700 cubic yards of excavation, 1,000 cubic yards of concrete, a part of which is reinforced; 30 tons of cast iron pipe and specials; 3,500 feet of sewer pipe with all connections and appurtenances.

Work on the sewer system will consist of two miles of sewers 6 inches to 12 inches in diameter, 27 concrete manholes and appurtenances for the sewer system.

Each proposal must be accompanied by a certified check for $500 for the disposal plant and $200 for the sewers. A bond in the sum of 50 per cent. of the amount of the contract will be required of the successful bidders. The right is reserved to reject any and all bids.

Copies of the plans and specifications may be obtained at the office of the Commissioner of Health in Harrisburg, upon depositing a check for $50, which will be refunded upon the return of the plans and specifications in good condition.

JOHN A. WILEY,
Secretary.

J. M. MURDOCH,
Superintendent.

BIDS ON DISPOSAL PLANT. STATE INSTITUTION FOR FEEBLE MINDED OF WESTERN PENNSYLVANIA.

Number.	Description of Items.	Quantity.	I. Chas. R. Lewis, Ilion, N. Y. Unit.	I. Chas. R. Lewis, Ilion, N. Y. Total.	II. W. G. Fritz & Co., York, Pa. Unit.	II. W. G. Fritz & Co., York, Pa. Total.	III. Greer Filter Co., Pittsburg, Pa. Unit.	III. Greer Filter Co., Pittsburg, Pa. Total.	IV. Northwestern Con. Co. Franklin, Pa. Unit.	IV. Northwestern Con. Co. Franklin, Pa. Total.	V. McCormick & Co., Philadelphia, Pa. Unit.	V. McCormick & Co., Philadelphia, Pa. Total.
1.	Excavation, cubic yard,	3,730	$0 30	$1,119 00	$0 56	$2,088 80	$0 49	$1,827 70	$0 42	$1,566 60	$0 22	$820 60
2.	Rock, cubic yard,	200	2 00	400 00	2 00	400 00	2 00	400 00	1 00	200 00	1 25	250 00
3.	Embankment, cubic yard,	3,000	30	900 00	35	1,050 00	24	720 00	24	724 00	22	660 00
4.	Top soil and seeding, square yard,	1,000	50	500 00	10	100 00	35	350 00	10	100 00	10	100 00
5.	Walks, cubic yard,	80	2 35	188 00	1 50	120 00	2 00	160 00	2 00	160 00	1 25	100 00
6.	Concrete, Class A, cubic yard,	340	12 00	4,080 00	12 25	4,165 00	9 27	3,151 80	9 70	3,298 00	14 00	4,760 00
7.	Concrete, Class B, cubic yard,	230	11 50	2,645 00	11 30	2,599 00	8 17	1,879 10	9 30	2,139 00	12 00	2,760 00
8.	Concrete, Class C, cubic yard,	465	7 50	3,487 50	11 10	5,161 50	6 42	2,985 30	7 45	3,464 25	8 50	2,952 50
9.	Steel reinforcement, lbs.,	36,000	04	1,440 00	05	1,890 00	.0498	1,792 80	03	1,080 00	04	1,440 00
10.	Exp. metal, ribbed metal No. 4, square foot,	650	10	65 00	04	26 00	05½	35 75	06	39 00	09	58 50
11.	Exp. metal, ribbed metal No. 6, square foot,	9,100	10	910 00	06	546 00	04½	409 50	04½	409 50	08	728 00
12.	Slag filling, cubic yard,	3,020	2 25	6,795 00	1 50	4,530 00	1 97	5,949 40	2 00	6,040 00	1 25	3,775 00
13.	Sand, cubic yard,	1,000	2 25	2,250 00	2 50	2,500 00	1 97	1,970 00	1 75	1,750 00	1 50	1,500 00
14.	Siphon dosing tank, lump sum,	1	50 00	50 00	350 00	350 00	430 00	430 00	201 00	201 00	300 00	300 00
15.	C. I. Grating, lb.,	5,300	05	260 00	05½	286 00	04	208 00	03½	182 00	07	364 00
16.	Appurtenances, settling tank,	.....	.....	800 00	.....	500 00	.....	280 00	.....	483 00	.....	574 00
17.	C. I. manhole frame and cover,	34	12 00	408 00	5 00	170 00	10 00	340 00	13 00	442 00	15 00	510 00
18.	Manhole steps, each,	230	20	46 00	15	34 50	18	41 40	16	36 80	15	34 50
19.	Steel I beams, lb.,	12,500	05	625 00	03½	437 50	.0481	601 25	05½	687 50	02½	312 50
20.	18-inch conduit to filters—lin. ft.,	82	60	49 20	55	45 10	60	49 20	57	46 74	4 00	328 00
21.	Half tile in filters—lin. ft.,	170	60	102 00	22	37 40	50	85 00	33	56 10	25	42 50
22.	Half tile in filters—lin. ft.,	12,000	10	1,200 00	06	720 00	08	960 00	09	1,080 00	06	720 00
23.	Placing 4-inch distrib. pipe—filters, lump sum,	.....	.....	250 00	.....	275 00	.....	245 00	.....	471 50	.....	250 00

Number.	Description of Items.	Quantity.	I. Chas R. Lewis, Ilion, N. Y.		II. W. G. Fritz & Co., York, Pa.		III. Greer Filter Co., Pittsburg, Pa.		IV. Northwestern Con. Co. Franklin, Pa.		V. McCormick & Co., Philadelphia, Pa.	
			Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.
24.	C. I. risers, each,	70	$3 00	$210 00	$4 25	$297 50	$2 50	$[illegible] 00	$5 20	$364 00	$3 00	$210 00
25.	Sprinkling nozzles, each,	95	1 25	118 75	4 00	380 00	1 25	118 75	2 50	237 50	3 50	332 50
26.	Pump house, lump sum,			1,000 00		1,000 00		1,400 00		748 00		600 00
27.	Pump and engine, lump sum,			1,500 00		1,000 00		698 00		851 00		850 00
28.	Orifice box, lump sum,			10 00		50 00		30 00		41 50		50 00
29.	Chemical feed box, lump sum,			20 00		25 00		30 00		68 00		50 00
30.	C. I. piping—per ton—2,000 lbs.,	24	30 00	720 00	30 00	720 00	40 00	960 00	30 00	720 00	50 00	1,200 00
31.	C. I. Standard specials—lb.,	10,000	03½	350 00	05½	550 00	03¾	375 00	07	700 00	04	400 00
32.	C. I. flanged specials, lb.,	7,000	10	700 00	07	490 00	.0498	348 60	10	700 00	05	350 00
33.	15-inch T. C. pipe, ft.,	380	50	190 00	50	190 00	38	144 40	45	171 00	50	190 00
34.	12-inch T. C. pipe, ft.,	1,175	40	470 00	42	493 50	29	340 75	34	399 50	40	470 00
35.	10-inch T. C. pipe, ft.,	300	35	105 00	35	105 00	21	63 00	26	78 00	30	90 00
36.	8-inch T. C. pipe, ft.,	430	30	129 00	25	107 50	16	68 80	21	90 30	25	107 50
37.	6-inch T. C. pipe, ft.,	1,350	25	337 50	20	270 00	11	148 50	12	162 00	18	243 00
38.	2-inch G. I. pipe, ft.,	2,500	25	625 00	30	750 00	27	675 00	21	525 00	25	625 00
39.	8-inch Gate valve,	1		20 00		25 00		20 60		25 00		25 00
40.	6-inch Gate valve,	6	15 00	90 00	20 00	120 00	12 80	76 80	16 00	96 00	18 00	108 00
41.	4-inch Gate valve,	14	12 00	168 00	10 00	140 00	8 80	123 20	8 00	112 00	10 50	147 00
42.	⅝-inch brass stop cocks,	14	1 50	21 00	60	8 40	60	8 40	90	12 60	3 50	49 00
43.	12-inch Sluice gate, each,	1		25 00		45 00		38 00		46 00		37 50
44.	10-inch Sluice gate, each,	1		22 00		35 00		26 00		37 00		35 00
45.	8-inch Sluice gate, each,	8	20 00	160 00	28 00	224 00	19 00	152 00	30 00	240 00	25 00	200 00
46.	6-inch Sluice gate, each,	8	15 00	120 00	20 00	160 00	15 60	124 80	24 00	192 00	20 00	160 00
47.	12-inch Shear valves, each,	6	20 00	120 00	25 00	150 00	27 00	162 00	26 00	156 00	30 00	180 00
48.	6-inch Shear valves, each,	1		15 00		15 00		7 00		14 00		25 00
49.	12-inch Sewer, lin. ft.,	2,200	40	880 00	1 00	2,200 00	29	638 00	78	1,716 00	60	1,320 00
	Totals,			$36,695 95		$37,492 70		$31,823 80		$33,155 39		$32,394 60

BIDS ON DISPOSAL PLANT. STATE INSTITUTION FOR FEEBLE MINDED OF WESTERN PENNSYLVANIA—Continued.

Number.	Description of Items.	Quantity.	VI. Conc. Steel Con Co. Pittsburg, Pa. Unit.	VI. Conc. Steel Con Co. Pittsburg, Pa. Total.	VII. Pihl & Miller. Pittsburg, Pa. Unit.	VII. Pihl & Miller. Pittsburg, Pa. Total.	VIII. Pitt Const. Co. Pittsburg, Pa. Unit.	VIII. Pitt Const. Co. Pittsburg, Pa. Total.	Engineer's Estimate. Unit.	Engineer's Estimate. Total.
1.	Excavation, cubic yard,	3,730	$0 48	$1,790 40	$0 75	$2,797 50	$0 38	$1,417 40	$0 29	$1,081 70
2.	Rock, cubic yard,	200	2 40	480 00	1 00	200 00	95	190 00	2 61	522 00
3.	Embankment, cubic yard,	3,000	30	900 00	25	750 00	37	1,110 00	29	870 00
4.	Top soil and seeding, square yard,	1,000	18	180 00	10	100 00	20	200 00	23	230 00
5.	Walks, cubic yard,	80	3 60	288 00	2 25	180 00	3 00	240 00	46	36 80
6.	Concrete, Class A, cubic yard,	340	12 00	4,080 00	21 00	7,140 00	9 75	3,315 00	11 50	3,910 00
7.	Concrete, Class B, cubic yard,	230	11 40	2,622 00	15 00	3,450 00	9 45	2,173 50	10 35	2,380 50
8.	Concrete, Class C, cubic yard,	465	7 50	3,487 50	9 00	4,185 00	7 75	3,603 75	8 05	3,743 25
9.	Steel reinforcement, lbs.,	36,000	03½	1,260 00	04½	1,620 00	02½	900 00	03½	1,260 00
10.	Exp. metal, ribbed metal No. 4, square foot,	650	05	32 50	06	39 00	05	32 50	03½	22 75
11.	Exp. metal, ribbed metal No. 6, square foot,	9,100	06	546 00	05	455 00	05	455 00	03½	318 50
12.	Slag filling, cubic yard,	3,020	1 80	5,436 00	1 25	3,775 00	2 00	6,040 00	92	2,778 40
13.	Sand, cubic yard,	1,000	3 60	3,600 00	2 00	2,000 00	2 25	2,250 00	1 44	1,440 00
14.	Siphon dosing tank, lump sum,	1	360 00	360 00	325 00	325 00	190 00	190 00	.....	345 00
15.	C. I. Grating, lb.,	5,300	04	208 00	04	208 00	03	156 00	02½	130 00
16.	Appurt. settling tank,	.....	.....	840 00	.....	800 00	.....	500 00	.....	460 00
17.	C. I. manhole frame and cover,	34	21 00	714 00	18 00	612 00	10 00	340 00	13 80	469 20
18.	Manhole steps, each,	230	22	50 60	25	57 50	30	69 00	06	13 80
19.	Steel I beams, lb.,	12,500	04	500 00	04	500 00	03	375 00	02½	312 50
20.	18 inch conduit to filters—lineal ft.,	82	1 00	82 00	80 00	65 60	50	41 00	63	51 66
21.	Half tile in filters—lin. ft.,	170	48	81 60	50	85 00	30	51 00	40	68 00
22.	6 inch half tile in filters—lin. ft.,	12,000	08	960 00	12	1,440 00	05	600 00	07	840 00
23.	Placing 4-inch distrib. pipe—filters, lump sum,	.....	.....	300 00	.....	275 00	.....	200 00	.....	80 50
24.	C. I. risers, each,	70	1 80	126 00	1 00	70 00	2 00	140 00	1 21	84 70
25.	Sprinkling nozzles, each,	95	4 20	399 00	4 00	380 00	1 50	142 50	1 44	136 80
26.	Pump house, lump sum,	.....	.....	1,440 00	.....	1,000 00	.....	600 00	.....	557 75
27.	Pump and engine, lump sum,	.....	.....	810 00	.....	1,000 00	.....	500 00	.....	575 00
28.	Orifice box, lump sum,	.....	.....	54 00	.....	20 00	.....	40 00	.....	28 75

BIDS ON DISPOSAL PLANT. STATE INSTITUTION FOR FEEBLE MINDED OF WESTERN PENNSYLVANIA—Continued.

Number.	Description of Items.	Quantity.	VI. Conc. Steel Con. Co. Pittsburg, Pa. Unit.	VI. Conc. Steel Con. Co. Pittsburg, Pa. Total.	VII. Pihl & Miller, Pittsburg, Pa. Unit.	VII. Pihl & Miller, Pittsburg, Pa. Total.	VIII. Pitt Const. Co. Pittsburg, Pa. Unit.	VIII. Pitt Const. Co. Pittsburg, Pa. Total.	Engineer's Estimate. Unit.	Engineer's Estimate. Total.
29.	Chemical feed box, lump sum,	------	----------	$150 00	----------	$20 00	----------	$40 00	----------	$38 75
30.	C. I. piping—per ton—2,000 lbs.,	24	$54 00	1,296 00	$40 00	960 00	$40 00	960 00	$34 50	828 00
31.	C. I. Standard specials, lb.,	10,000	.0114	114 00	06	600 00	05	500 00	02½	250 00
32.	C. I. flanged specials, lb.,	7,000	.0208	146 00	06	420 00	05	350 00	03½	245 00
33.	15-inch T. C. pipe, ft.,	380	60	228 00	70	266 00	45	171 00	48	182 40
34.	12-inch T. C. pipe, ft.,	1,175	48	564 00	60	705 00	35	411 25	37	434 75
35.	10-inch T. C. pipe, ft.,	300	45	135 00	40	120 00	40	120 00	28	84 00
36.	8-inch T. C. pipe, ft.,	430	31	133 30	30	129 00	35	150 50	20	86 00
37.	6-inch T. C. pipe, ft.,	1,350	19	256 50	20	270 00	30	405 00	11½	155 25
38.	2-inch G. I. pipe, ft.,	2,500	28	700 00	22	550 00	30	750 00	17	425 00
39.	8-inch Gate valve,	1	----------	32 50	----------	27 00	----------	22 50	25 30	25 30
40.	6-inch Gate valve,	6	21 50	129 00	21 00	126 00	17 50	105 00	23 00	138 00
41.	4-inch Gate valve,	14	13 50	189 00	15 00	210 00	12 50	175 00	20 70	289 80
42.	⅝-inch brass stop cocks,	14	1 00	14 00	1 00	14 00	50	7 00	57½	8 05
43.	12-inch Sluice gate, each,	1	----------	54 00	----------	50 00	----------	40 00	----------	32 20
44.	10-inch Sluice gate, each,	1	----------	44 00	----------	43 00	----------	30 00	----------	27 60
45.	8-inch Sluice gate, each,	8	36 00	288 00	37 00	296 00	20 00	160 00	23 00	184 00
46.	6-inch Sluice gate, each,	8	28 00	224 00	30 00	240 00	15 00	120 00	20 70	165 60
47.	12-inch Shear valves, each,	6	33 50	201 00	35 00	210 00	25 00	150 00	17 25	103 50
48.	6-inch Shear valves, each,	1	----------	21 50	----------	24 00	----------	15 00	----------	10 35
49.	12-inch Sewer, lin. ft.,	2,200	45½	1,001 00	1 50	3,300 00	60	1,320 00	69	1,518 00
			----------	$37,548 40	----------	$40,684 00	----------	$31,873 90	----------	$27,969 11

BIDS ON SEWERS, POLK, PA., STATE INSTITUTION FOR FEEBLE-MINDED OF WESTERN PENNSYLVANIA.

Item No.	Description of Item.	Quantity.	1. Warren Smith, Buffalo, N. Y.		2. Northwestern Con. Co., Franklin, Pa.		3. Chas. R. Lewis, Ilion, N. Y.		4. Burns Bros., New Castle, Pa.		5. McCormick & Co., Philadelphia, Pa.		Engineer's Estimate.	
			Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.
1.	6-inch T. C. pipe, 4 feet—6 feet deep, lineal foot,	1,635	$0 35	$572 75	$0 40	$654 00	$0 48	$784 80	$0 45	$735 75	$0 45	$735 75	$0 60	$981 00
2.	6-inch T. C. pipe, 6 feet and over deep, lineal foot,	600	60	360 00	49	294 00	58	348 00	50	300 00	51	306 00	70	420 00
3.	8-inch T. C. pipe, 3 feet—4 feet deep, lineal foot,	450	40	180 00	40	180 00	53	238 50	40	180 00	39	175 50	65	292 50
4.	8-inch T. C. pipe, 4 feet—6 feet deep, lineal foot,	1,260	45	567 00	46	579 60	53	667 80	50	630 00	45	567 00	70	882 00
5.	8-inch T. C. pipe, 6 feet—8 feet deep, lineal foot,	1,080	65	702 00	67	723 60	63	680 40	68	702 00	57	615 60	85	918 00
6.	8-inch T. C. pipe, 8 feet—10 feet deep, lineal foot,	1,025	80	820 00	89	912 25	83	850 75	92	943 00	65	666 25	90	922 50
7.	8-inch T. C. pipe, 10 feet and over deep, lineal foot,	1,480	1 20	1,776 00	1 05	1,554 00	98	1,450 00	1 25	1,850 00	75	1,110 00	85	1,406 00
8.	12-inch T. C. pipe, 3 feet—4 feet deep, lineal ft.,	100	50	50 00	53	53 00	65	65 00	45	45 00	53	53 00	80	80 00
9.	12-inch T. C. pipe, 4 feet—6 feet deep, lineal ft.,	500	65	325 00	59	295 00	65	325 00	60	300 00	63	315 00	1 05	525 00
10.	12-inch T. C. pipe, 6 feet—8 feet deep, lineal ft.,	150	90	135 00	80	120 00	75	112 50	75	112 50	75	112 50	1 15	172 50
11.	12-inch T. C. pipe, 8 feet—10 feet deep, lineal ft.,	70	1 25	87 50	1 02	71 40	85	59 50	90	63 00	82	57 40	1 25	87 50
12.	12-inch T. C. pipe, 10 feet and over deep, lineal ft.,	1,050	1 35	1,390 50	1 27	1,308 10	1 10	1,133 00	1 35	1,390 50	90	927 00	1 20	1,236 00

BIDS ON SEWERS, POLK, PA., STATE INSTITUTION FOR FEEBLE-MINDED OF WESTERN PENNSYLVANIA.—Continued.

Item No.	Description of Items.	Quantity.	1. Warren Smith, Buffalo, N. Y.		2. Northwestern Con. Co., Franklin, Pa.		3. Chas. R. Lewis, Ilion, N. Y.		4. Burns Bros., New Castle, Pa.		5. McCormick & Co. Philadelphia, Pa.		Engineers' Estimate.	
			Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.	Unit.	Total.
13.	Concrete manholes—vertical, ft.,	250	$3 00	$750 00	$5 00	$1,250 00	$3 00	$750 00	$4 50	$1,125 00	$3 50	$875 00	$10 00	$2,500 00
14.	M. H. frames and covers, each,	27	13 00	351 00	10 50	283 50	10 00	270 00	16 00	432 00	11 00	297 00	11 00	297 00
15.	M. H. rungs, each,	200	25	50 00	14	28 00	20	40 00	30	60 00	15	30 00	25	50 00
16.	6-inch x 8-inch Y, each,	25	3 00	75 00	55	13 75	50	12 50	50	12 50	70	17 50	1 00	25 00
17.	Flap gates, each,	14	20 00	280 00	16 50	231 00	2 00	28 00	4 00	56 00	28 00	392 00	12 00	168 00
18.	Rock excavation, cubic yard,	100	4 00	400 00	1 20	120 00	3 00	300 00	1 00	100 00	1 00	100 00	2 50	250 00
19.	Underdrain, lin. ft.,	1,000	25	250 00	62	620 00	25	250 00	15	150 00	20	200 00	20	200 00
20.	4-inch G. I. water pipe, lineal ft.,	400	15	60 00	35	140 00	25	100 00	50	200 00	30	120 00	25	100 00
21.	Water connections, each,	10	20 00	200 00	4 50	45 00	3 50	35 00	1 50	15 00	15 00	150 00	5 00	50 00
22.	Extra concrete, cubic yard,	20	8 00	160 00	10 00	200 00	8 00	160 00	6 50	130 00	9 00	180 00	10 00	200 00
23.	6-inch T. C. drain, lineal ft.,	700	3 00	2,100 00	53	371 00	1 00	700 00	60	420 00	1 00	700 00	45	315 00
24.	House connections, each,	41	50	20 50	8 25	338 25	2 00	82 00	5 00	205 00	3 00	123 00	15 00	615 00
25.	Running trap, each,	41	10 00	410 00	10 00	410 00	3 00	123 00	2 50	102 50	8 00	328 00	2 00	82 00
				$12,071 75		$10,795 45		$9,566 15		$10,260 75		$9,153 50		$12,775 00

On December 9th, the Board of Trustees held a meeting at Polk and decided to reject all bids received for both the disposal plant and the sewers and to immediately readvertise for the disposal plant work, but to allow the sewer work to remain unadvertised until an additional appropriation was obtained from the Legislature for constructing the sewers. The re-advertisement called for bids to be received on January 15th, 1909.

WERNERSVILLE STATE HOSPITAL.

In October the Board of Trustees for the State Asylum for Chronic Insane of Pennsylvania, located near the village of Wernersville, Berks County, asked the Commissioner of Health for an estimate of the cost of constructing sewage disposal plant at the institution. A preliminary investigation was made. It was found that there was about 1,000 inmates and employees at the Hospital, that the daily output of sewage was approximately 250,000 gallons. The sewers are independent of the storm drains, therefore all that was needed was a sewage disposal plant and the works necessary to deliver the sewage from the present outlet to the purification plant.

To some of the storm drains bath tub and slop drainage was discharged, but this was done in a small degree only. The expense of changing this over in connection with the sanitary sewer system was taken into account. On the State property there is a site removed from all dwellings, which appeared to be available. Pumping, however, would have to be resorted to if this site be used. There are other remote sites which are available, but to reach them it would require longer lengths of force mains. It was thought the plant would have a capacity of 300,000 gallons daily. A new pump well, pump house and pumping machinery would be advisable. A very reliable estimate for the sewage disposal plant, including septic tanks, sprinkling filters, sedimentation basins and chemical tanks with all appliances and appurtenances, is $25,000.00, including engineering. It was thought, however, that a total appropriation of $40,000.00 ought to be asked for. This estimate was preliminary in extreme. It was given to the trustees with the understanding that the State Department of Health would immediately conduct detailed surveys and make detailed plans, and have them ready, with reliable estimates, in time for legislative consideration in the early part of 1909. Based on these last estimates, an appropriation would be asked of the Legislature. The following is a detailed report of the preliminary investigations at the institution.

General Remarks.

The State Asylum for Chronic Insane is located in southeastern Pennsylvania in Berks County, eight miles west of Reading and one mile west of the village of Wernersville. It is in the centre of Lower Heidelberg Township and lies immediately at the foot of South Mountain in the Lebanon valley. The institution is located on a

tract of land embracing over 800 acres, of which 350 acres lie in the valley at the foot of the mountain. In the centre of this latter tract are the main buildings of the institution, which are laid out on the cottage plan and are connected by means of covered corridors. The buildings are very substantial in character, being constructed of stone, and face upon a well kept lawn, which has a very gradual slope northward.

South of and in the rear of this group of buildings the land rises precipitously to a height of 800 feet above the valley level and is interspersed with several small streams which flow down into the valley and form the head waters of Spring Creek. Several of these small streams flow directly through the grounds of the institution and serve as drains for this territory. A mile and a half north of the institution these streams enter Spring Creek, which flows thence northerly for a distance of five miles to Tulpehocken Creek. Tulpehocken Creek from this point flows southeastwardly in a sinuous course and nine miles below joins the Schuylkill River on the western boundary of the city of Reading.

The land in this region consists of a limestone formation covered with a sandy clay. It is very fertile, but the surface soil is not porous and much of the water on the surface quickly runs off to the nearby streams. In the limestone underlying this surface there are many crevices which furnish storage reservoirs for the water which may seep through from the surface, or drains to adjacent water courses.

The institution is well isolated from nearby settlements. The nearest town is the village of Wernersville, with a population of 650, one mile distant. Wernersville is, however, not on the creeks which drain this institution and there are no settlements of any size in this drainage area until Reading is reached.

The Lebanon Division of the Philadelphia and Reading Railway passes along the northern end of the institution's grounds and the United Traction Company's electric street railway of Reading parallels the railroad on the opposite side from the institution, so that the institution is readily accessible by rail.

The institution was started in 1894 and at the end of that year had a total population of 925, including attendants. At the present date the population is 980, so that the growth of the institution has been small. Very few patients are admitted directly, but most of them are received from other institutions after having been found to be incurable. Judging from these conditions and the past growth, it is likely that the increase within the next ten years will be in the same ratio and that there will not be more than 1,100 people in the institution in 1918.

Water Supply.

The water supply of the institution is obtained from two mountain streams located mostly on property owned by the institution on the slope of South Mountain immediately southwest of the institution buildings. At a point about three-quarters of a mile southwest of the institution buildings these streams unite and it is at this point that the water supply is obtained. There are two concrete dams and catch basins constructed on these streams immediately above the junction point. The catch basins are connected with piping to a con-

crete reservoir which is 56 feet long by 44 feet wide by 9 feet deep and located in the ground 100 feet north of the basins. This reservoir is uncovered and is subdivided into two compartments by means of a concrete wall extending through the centre. It has a total capacity of 165,000 gallons. Across the outlet end of this reservoir there is a baffle wall of concrete construction forming an outlet compartment. A small scrubbing filter formed of charcoal, gravel and broken stone is located at the outlet ends of the two compartments adjacent to this outlet chamber and the water flows through this scrubbing filter before entering the outlet chamber.

From this reservoir the water is carried to the institution by gravity through a six inch cast iron main which extends down the valley of this creek to the institution's main group of buildings. A few hundred feet below the reservoir there is a dam on this creek forming a large mill pond, which is used by the institution for power purposes. There is a connection from this pond to the six inch main, so that in case of fire this water could be turned into the supply. So far the supply of the stream has been sufficient to meet the domestic consumption of the institution and there has been no occasion for taking an auxiliary supply from this pond.

There has been no typhoid fever at the institution for several years and the few cases which have occurred previously have been traced to outside sources. The water supply is mainly fed by large springs located in this mountain and from the records and analyses made by the institution authorities it appears to be very good. There are only six houses located on the watershed and the institution authorities frequently inspect them to guard against pollution.

Existing Sewerage System.

The institution is equipped with a sanitary system of sewers for disposing of the domestic sewage and laundry water. There is a system of storm drains for the storm water in the various roads and parkways surrounding the institution and another system of drains for disposing of roof water. To the roof water system many of the bathtubs and slop sinks are directly connected.

The sanitary sewerage system consists of two main outfall sewers, which extend from the institution to a sump well located 650 feet east of the main group of institution buildings. One of these eight inch outfall sewers drains the main group of buildings, consisting of the wards and administration building; the other takes care of the buildings in the rear of the main group, consisting of the laundry, work building and infirmary building. On account of the large quantity of water used in the laundry, the sewage is equally divided between these two outfalls. These two outfall sewers are fed by a series of eight inch and six inch laterals and all sewers are constructed on good grades.

Originally the system was constructed without manholes and no provision was made for inspection or cleaning. The work was done under contract and the sewers were poorly constructed. In 1899 and 1900 several of the sewers were relaid and manholes were constructed. The system is now provided with manholes located at intervals ranging from 150 to 250 feet on the laterals. These manholes are of brick

and are covered with a wooden top sheeted with galvanized iron. No flush tanks are provided. Altogether there are a mile and a half of sewers.

Measurements have been taken on the flow from this system by means of a weir located near the overflow from the sump and it has been found to average 250,000 gallons per day. The maximum rate, as measured per hour, is at a rate of 319,000 gallons per day, and the minimum rate per hour is at a rate of 184,000 gallons per day. During the last few years the roof water drains from a portion of the main buildings of the institution have been connected with the sanitary sewerage system. This was done to allow the bathtub water, which is connected to these drains, to discharge through the sewers, as it was proving troublesome in the creeks where it was formerly discharged, so that the flow of sewage through this system at present in wet weather is materially greater than the flow as given above. The former exits for these drains are still in position and with a small expense the bathtub connections could be disconnected and drain into the sewerage system, and the roof water could be turned into the old drain pipes. It is reported that there is very little leakage into the sewerage system during wet weather.

The sump into which the sewerage system drains consists of a masonry well 25 feet in diameter and 18 feet deep, with a capacity of 55,000 gallons. Before entering this sump the sewage passes through two screens located in a concrete screen chamber immediately outside of the sump. These screens are formed with vertical wrought iron rods spaced approximately three-quarters of an inch centre to centre and are frequently cleaned by means of rakes. Over the top of the well chamber there is constructed a circular brick pumping station in which are located a boiler and two duplex steam pumps, each $7\frac{1}{2}$ by $5\frac{3}{4}$ by 6 inches. Down in the pit there are located two pneumatic pumps of the Sweigard type, designed to handle 100 gallons per minute. The air necessary for driving these pumps is furnished by an air compressor located at the power station in the main group of buildings. The pneumatic pumps are in general use and the steam pumps are used only as an auxiliary.

The sewage is lifted by these pumps and discharged through two five inch force mains which connect by means of a series of laterals to various points located over the land of the institution in the valley. The sewage is discharged through these openings directly onto the ground and allowed to run over the surface with the idea of assisting in the irrigation of the crops. The openings are located at intervals ranging from 60 to 100 feet over nearly the entire tract of land in the valley, consisting of 350 acres, and it is estimated that there are probably 200 openings all told. Only three or four of these openings are used at a time. The openings consist of two inch wrought iron pipes extending several feet above the surface of the ground and plugged. Two or three of these plugs are removed every two or three days and the ones previously used are closed so that the discharge of the sewage is changed at intervals to various parts of the land. No attempt is made to trench or underdrain the ground so as to allow the sewage to be distributed uniformly over the area, on account of the non-porous condition of the ground, the sewage flows over the surface when discharged through these outlets, washing the surface badly. It is found to be difficult to raise the crops on this land due to this washing and it is also difficult to prevent the sewage from flowing

over the surface into the small streams. After turning off the sewage outlets on a given tract, it is found that the surface is slimy and bakes, so that the institution authorities have decided that this method of disposal is injurious rather than beneficial in the raising of crops on the farm lands.

The pneumatic pumps which were installed several years ago have proved unsatisfactory and frequently get out of working order. At these times the auxiliary steam pumping plant is placed in commission, but it is found that these pumps are inadequate to handle the flow of sewage and the excess overflows from the pump well directly into one of the small creeks which is a few feet east of the well.

The institution authorities, therefore, desire to replace this pumping outfit with a new pumping station sufficiently large to take care of the sewage flow and to install a disposal plant of modern type.

Proposed Disposal Plant.

On account of the short time allowed for making this investigation, it has been impossible to have accurate surveys made for locating the disposal plant and determining whether it would be possible to construct a plant which could be operated by gravity. Judging from the topography in this vicinity it appears probable that a pumping plant will have to be used to lift the sewage to a disposal plant. It might, however, be possible to install a series of septic tanks and sand filters on the institution's tract of land north of the pumping station so as to allow the plant to be operated by gravity. The institution owns the land east of the main group of buildings for a distance of 2,500 feet and a disposal plant, consisting of septic tanks and sprinkling filters with a sterilizing outfit for treating the effluent with chloride of lime, could be installed at a point 1,300 feet east of the buildings, provided pumping is continued.

For a plant of this type it would be necessary to install a new pumping outfit, probably consisting of two centrifugal pumps, each with a capacity of a half million gallons per day and driven by electric motors. The institution has its private electric power plant which could furnish power for this station at a very small cost, and the cost of operation of a plant of this type is reduced to a minimum as this type of plant is exceedingly simple. In installing a plant of this type it would be advisable to construct another sump well with a capacity of 55,000 gallons. This would double the present storage capacity and provide sufficient storage of sewage to eliminate pumping during night periods. It would be advisable to keep the existing steam auxiliary pumping plant in condition for emergencies.

The disposal plant should have a capacity of 300,000 gallons. This would take care of the flow of sewage from the institution for several years, based upon the present per capita consumption of 270 gallons per day. If pumping is not resorted to at night the septic tanks would have to be made larger than otherwise to take care of the greater flow of sewage from the tanks in the day time. This extra expense and the cost of constructing an additional sump well would be more than offset by the money saved in not operating the plant at night.

If a drop of four or five feet could be obtained between the invert of the outfall sewer and the creek, an installment of septic tanks and sand filters could be made which would do away with the installation and maintenance of a pumping station. The initial cost of these filters would be much higher than a sprinkling filter type of plant, but it is reported that sand has been shipped in to the institution for other purposes at a price of $1.12 per ton, so that at this rate the cost of such a plant would not be excessive.

At this time the final surveys have been completed and the detailed plans and specifications are well along toward completion. They will be ready for approval by the Commissioner of Health and for submission to the Legislative Committee on Appropriations some time during January.

SPECIAL WORK.

During the year special work has been performed by the Engineering Division relative to a sanitary survey of the Allegheny River basin; a sanitary survey of Allegheny County; relative to the examination of the methods of operation of certain water and sewage purification plants; relative to the investigation of the quality of certain public and private water supplies; relative to a joint sewerage project in the valley of Nine Mile Run, Allegheny County; and in the valleys of Cobbs Creek and Darby Creek, Philadelphia and Delaware Counties; and concerning other miscellaneous matters hereinafter mentioned.

Sanitary Survey of the Allegheny Watershed.

In carrying out the provisions of law under which the State Department of Health is conserving the purity of the waters of the State for the protection of public health, it has been found advisable to establish a uniform policy for certain watersheds. Each considerable stream may present a separate and different problem. The uses to which the waters are or may be put, the physical characteristics of the stream and its watershed, the density of population and the extent and causes of pollution are among the many points to be carefully considered in determining what particular policy will best promote and conserve public health for that particular basin. The sanitary survey undertaken for the Allegheny River basin has for its object to ascertain as nearly as practicable the essential facts required to work out a policy for the Allegheny River and its tributary streams either for the basin in its entirety or for the supplementary basins of the tributaries as the case may be. This investigation, therefore, is properly considered as special work and it is not to be confused with that work already done in the Allegheny basin by the field inspection corps of officers in removing minor sources of sewage pollution from the areas in the uplands that yield the waters which furnish the supply to the citizens of nearby communities.

This special sanitary survey was planned by the Commissioner of Health after consultation with the authorities of Pittsburg. That city and the Greater Pittsburg District is confined to the Allegheny

River as its permanent source of supply. It becomes essential that the potability of the waters of the river above the intake of the great water works system of Pittsburg shall be vouchsafed to the citizens of the community through the enforcement of the provisions of State law as administered by the State Department of Health.

At the close of the year the survey was well in hand, some field work has been accomplished of a preliminary nature and more work of a statistical nature had been done in the office. The investigations will be pushed to a conclusion as rapidly as investigations of this kind can be pushed, necessarily the collection of field data must wait upon the seasons of the year in certain parts of the basin.

Sanitary Survey of Allegheny County.

Typhoid fever in Allegheny County has not been wholly due to the polluted water supply in the city of Pittsburg and immediate territory, although much of it is rightfully attributed, no doubt, to this origin. The individual coming into the city from the rural districts would drink the polluted water supplied by the city, contract typhoid fever through this medium, and, returning to his home in the country where unsanitary conditions existed, may be, the infection would spread from the dwelling to the well or spring or to the garden and thus either directly or indirectly the milk and food stuffs produced on the farm might be contaminated and in turn, when such infected milk and food stuffs were distributed to the consumers in the city or elsewhere, a greater harvest of typhoid fever would ensue. A part of the work of stamping out typhoid fever in Pittsburg thus involved the protection of the water supplies on individual estates in the rural district and the establishment thereon of proper methods of sewage disposal.

The Department set at work a special corps of field officers, who were instructed to visit every occupied estate in the townships of Allegheny County. The work of this corps for the year is set forth in the part of the report of the Engineering Division under the title of "Field Inspection."

Assistant engineers were assigned to the investigation of the sources of water supply from wells, springs and public works in the borough and the method of sewage disposal on individual estates and by municipal and private corporations in the boroughs of Allegheny County.

At the close of the year the work had progressed favorably. The information thus collected was useful as the foundation for the conclusions promulgated in decrees relative to water works and sewerage systems in the county. The decrees appear elsewhere in this report.

The sanitary survey will be continued during the forthcoming year. Its conclusion should witness a perceptible diminution of typhoid fever in the Greater Pittsburg district and even beyond.

Public and Private Water Supplies.

Special investigations were made of the quality of the water supplied by private corporations to the public at Honesdale borough in Wayne County, at Lilly borough in Cambria County, and at the mili-

tary camp, Chautauqua grounds, picnic grove and camp meeting property at Mount Gretna, Lebanon County. Also at the borough of Confluence in Somerset County. A special investigation was made of the water and ice supplied to the public at all railroad properties in the city of Pittsburg and also supplied to the passenger coaches. Such action was taken in each instance as the circumstances seemed to warrant.

Tests of Water and Sewage Purification Plants.

During the last quarter of the year, in preparation for the establishment of a corps of engineers whose special work should be the making of efficiency tests of water and sewage purification plants in operation throughout the State, the Chief Engineer supervised the making of such tests at Cambridge Springs, Spring City and Corry. The field work was done by Mr. R. E. Irwin, who had been especially trained for the service.

At Cambridge Springs borough, Crawford County, a water purification plant had been built during the year in compliance with a decree of the Commissioner of Health. It was provided that when the efficiency test of the filter plant was made, it should be done in the presence of an expert representing the State Department of Health. On September 23rd, the first samples were collected for the Department and thereafter one every day during the ten day test on days that samples could be received at the Department's laboratory. Each collection usually included raw water, filtered water, and tap water. It was found that the contract requirements were not obtained and changes in the plant were recommended.

At Spring City or in East Vincent Township adjacent Spring City borough, Chester County, is located the new Eastern Pennsylvania Institution for Feeble Minded and Epileptic. A sewage disposal plant had been erected for the treatment of the hospital sewage. The plans had been approved by the Commissioner of Health, but the Department exercised no jurisdiction over the construction of the work for the reason that no such authority was delegated to it. The contract was let and the works built apparently in substantial compliance with the plans and specifications approved, but when the institution's sewage was turned into the plant the works would not operate. The officers communicated the fact to the Commissioner of Health and asked that the Department make an examination. This was done. It was found that the material used and the dimensions of the structures were in substantial accordance with the plans and specifications. The receiving tanks built side by side and supposed to be watertight would not hold sewage. They acted as one tank and all three leaked rapidly through the sludge pipe. The pipe connections between the tanks and the filters would not carry the sewage and needed to be rebuilt. Under the supervising direction of the Department, alterations were made and the plant was put in operation.

The Howard Brothers' tannery at Corry, Erie County, has been made a local station for a series of investigations and experiments on a practical scale for the treatment of tannery wastes. In compliance with the terms of the decree by the Commissioner ordering the company to discontinue the discharge of its wastes into streams and offering to assist and advise with the company in a study of the

problem, the company made a proposition that it would assume the expense of the experiments at its plants if the same were supervised by the Department. The Engineering Division laid out certain lines of experiment and at the close of the year the tannery company were carrying the experiments forward.

Joint Sewerage Projects.

In Allegheny County, in the valley of Nine Mile Run, comprised of territory belonging to the boroughs of Wilkinsburg, Edgewood, Swissvale and the city of Pittsburg, the sewerage problem can best be solved by joint action on the part of these municipalities. The Department made special studies of the subject during the year.

Cobbs Creek is the boundary line between Philadelphia and Delaware Counties until the stream empties into Darby Creek. The latter creek then becomes the boundary. It empties into the Delaware River above the city of Chester. These streams receive the sewage from important and growing sections of Philadelphia and from numerous boroughs in Delaware County. The waters of the creeks are polluted, a nuisance exists which interferes with the use and enjoyment of abutting property and menaces the public health. During the year the Department has been active in the furtherance of a project to unite these towns in a common movement for a joint sewerage and sewage disposal project.

Miscellaneous.

Lebanon City, Lebanon County and Ambler borough, Montgomery County, are without sewers, but such facilities are needed. Pollutions of surface and ground waters abounded in these places to such an extent that complaints were made to the Department. Investigations by the Engineering Division were made and the facts laid before the Commissioner. Plans are now being prepared to bring about the establishment of a general sewerage system in both municipalities.

A special examination of the sewers of Ligonier and Latrobe boroughs in Westmoreland County was conducted, extending over a period of many weeks, during which observations were taken of the effect of the discharge of the sewage of Ligonier into the Loyalhanna Creek upon the quality of the waters of the stream.

Various other minor special work has been attended to by officers of the Engineering Division.

IV. FIELD INSPECTION.

There are three distinct kinds of work performed by the sanitary inspectors.

The first is detail work of stream preservation and is on the upland watershed sparsely populated and of small area, where inspection and patrol can easily prevent the waters of the State from being polluted, except by accident.

The second is the less particular work on large watersheds whereupon may be located villages, towns and cities, the drainage of which

goes into a stream subsequently used as a source of public water supply. The refinements in sanitation readily accepted as practicable for the upland watersheds would be impracticable if enforced on the lower watersheds. In the latter instance two safeguards are necessary; the diminution of sewage pollution as far as practicable and the filtration of the water supply.

The third kind of work of the field officers relates to various insanitary conditions with respect to disposal of household wastes and causes of disease and mortality within or without villages, boroughs and cities more fully mentioned in the heading, "General Sanitation."

The improvement of watersheds whose yield is wholly or materially drawn upon for public domestic consumption has demanded and received attention in thirty-nine instances, involving the water supply of four cities, eighteen boroughs, one of which is a county seat, sixteen villages and one State institution.

A sanitary survey of the Ohio River watershed in Allegheny County was begun in 1907 and partially completed during the year 1908.

A sanitary survey of the Shenango River watershed was begun and partially completed during the year.

A sanitary survey of the Beaver River watershed was begun and partially completed during the year.

Besides this work the drainage areas of eight other streams tributary to the water courses entering Schuylkill and Delaware Rivers, in the vicinity but outside of Philadelphia territory, were inspected and nuisances detrimental to health were noted and reported.

Improvement of Watersheds.

There were inspected during the year 1908 properties totalling one hundred and five thousand two hundred and sixty-eight, located on fifty-three watersheds. Of the one hundred and five thousand two hundred and sixty-eight properties all were found satisfactory except twenty-six thousand five hundred and thirty-two. Abatement of nuisances totalling eight thousand eight hundred and six were effected on four thousand eight hundred and forty-four of these properties.

At the close of the year there were twenty-one thousand and six hundred and eighty-eight properties upon which nuisances remained unabated. This was largely due to the fact that the inspections were made in the fall and winter and written orders of abatement were not served in time for changes to be made before the new year.

The four cities whose watersheds were inspected are as follows: Reading, York, New Castle and Philadelphia suburbs.

Reading watersheds comprise the following streams: Maiden Creek, Antietam Creek, Bernhart Creek, Engelman Creek and Hampden Reservoir, the latter supplied from tunnel in mountain.

On these sheds two thousand six hundred and twenty-four properties were inspected, and all but five hundred and three were found in a satisfactory condition. On four hundred and ninety estates there existed seven hundred and thirty stream pollutions which were abated, leaving at the close of the year thirteen properties having nuisances still existing.

The York watershed is drained by the Codorus Creek. Two thousand nine hundred and twenty-six properties were inspected and all but six hundred and eighty-one were found in a sanitary condition. On two hundred and thirty estates there existed five hundred and forty-one stream pollutions which were abated, leaving at the close of the year one hundred and fourteen properties having nuisances still existing, twenty-one of which were referred to the legal division and are hereinafter reported.

New Castle is supplied with water from the Shenango River.

On the watershed of the Shenango River sixteen thousand two hundred and seventy-nine properties were inspected and all but twenty-nine hundred and nine were found in a sanitary condition. Nine hundred and sixteen insanitary properties were found in the boroughs and not served with orders of abatement during this year. On the eighteen hundred and twenty-three estates in the townships there existed three thousand four hundred and sixty-five stream pollutions which were abated, leaving at the close of the year one hundred and seventy properties in the townships having nuisances still existing.

The Philadelphia suburbs are practically supplied with water by the Springfield Water Company and North Springfield Water Company. These supplies coming respectively from Crum Creek and Pickering Creek.

On these areas four hundred and eighty-three properties were inspected and one hundred and eleven were found in an insanitary condition. On one hundred and two estates there existed two hundred and seven stream pollutions which were abated, leaving at the close of the year nine properties having nuisances still existing.

Stroudsburg is the county seat of Monroe County and is supplied with water from springs and Brodhead Creek.

On the watershed of Brodhead Creek two hundred and twenty properties were inspected and all but eighty-four were found in a sanitary condition. One hundred and fifty-one pollutions were removed from seventy-two estates, leaving twelve properties having stream pollutions unchanged at the end of the year.

Connellsville is supplied with water from the Youghiogheny River, Laurel Run and several large springs.

On the watershed of the Youghiogheny River, in Somerset county, one thousand three hundred and forty properties were inspected and all but three hundred and eighty-two were found in a sanitary condition. On eight estates there existed seventeen stream pollutions which were abated, leaving three hundred and seventy-four properties having nuisances still existing. Orders of abatement served in the following year.

The Womelsdorf watershed is drained by a small spring run. Four properties were inspected and all found in a sanitary condition.

The Wyomissing watershed is drained by a small spring run. Five properties were inspected and each one found in a sanitary condition. The village of Sinking Springs is also supplied from this source.

The watershed of Mt. Penn is drained by a small spring run. Two properties were inspected and each one found in a sanitary condition. The village of Stony Creek Mills is also supplied from this source.

The Kutztown watershed is drained by Kemps Run. Twelve properties were inspected and all but four were found in a sanitary con-

dition. On four estates there existed seven pollutions which were abated during the year.

The Mohnton watershed is drained by Klineginna Creek. Twenty-six properties were inspected and all but five found in a sanitary condition. On five estates there existed ten pollutions, all of which were abated. Mohnton is also supplied from four covered springs. The villages of Edson, Shillington, Hendleton and Pennwynn are also supplied from this source.

The Fleetwood watershed is drained by a small spring run. Three properties were inspected and all but one found in a sanitary condition. On one estate there existed one pollution which was abated during the year.

The Boyertown watershed is drained by small spring runs. Four properties were inspected and all but one found in a sanitary condition. On one estate two pollutions existed which were abated during the year.

The Middletown watershed is drained by Iron Mine Run. Fifty-four properties were inspected and all but three were found in a sanitary condition. On three estates there existed three pollutions, which were abated during the year.

The Coatesville watersheds are drained by Spring Run and Sucker Run. Fifty-eight properties were inspected and all but twenty-seven were found in a sanitary condition. On twenty-seven estates there existed thirty-eight pollutions, all of which were abated during the year.

The Selins Grove watershed is drained by Penns Creek. One thousand one hundred and twenty-seven properties were inspected and all but three hundred and thirty-one found in a sanitary condition. On two hundred and nine estates four hundred and eighty-three pollutions were removed, leaving, at the close of the year, one hundred and twenty-two properties having nuisances still existing.

The borough of West Reading is supplied with water from the Schuylkill River (filtered).

Birdsboro water supply is taken from mountain spring in Robeson Township, Berks County. Watershed uninhabited.

The Hamburg watershed is drained by Furnace Run and is uninhabited above point of intake.

Richland borough's water supply is taken from a spring in Mill Creek Township. No habitation on watershed.

The borough of New Cumberland is supplied with water from two spring runs upon which three properties were inspected and found in a sanitary condition.

The St. Mary's watershed is drained by Wolf Lick Creek and Silver Run, upon each of which there was found one polluting property. Pollutions reported abated.

The villages of Millmont, Oakbrook, Brookside, Oakland and Boyer Heights, Berks County, are supplied with water from the Angelica Creek. Two hundred and seventy-one properties on the watershed were inspected and all but thirty-two were found in a sanitary condition. On thirty-two estates there existed sixty-three pollutions, all of which were abated by the end of the year.

The village of St. Lawrence, Exeter Township, Berks County, is supplied with water from a small spring run. Watershed uninhabited.

The village of Grill, Cumru Township, Berks County, is supplied with water from a large spring. No pollution reported.

The village of Wernersville, Lower Heidelberg Township, Berks County, is supplied with water from six mountain springs, all walled and piped to reservoir. No pollution reported.

The village of Myerstown, Jackson Township, Lebanon County, is supplied with water from a large covered spring. No pollution reported.

The village of Bowers, Maxatawny Township, Berks County, is supplied with water from a walled spring. No pollution reported.

The State Insane Asylum at Wernersville, Lower Heidelberg Township, Berks County, is supplied with water from a small spring run. Six properties on the watershed were inspected. Four were found in an unsatisfactory condition, but were made satisfactory by the removal of eight stream pollutions.

The less particular work on watersheds involved the drainage areas of the following streams outside of the city of Philadelphia territory:

	Occupied Properties on Watershed.			Abatements.		
	Total.	Satisfactory.	Stream pollutions.	Estates.	Pollutions.	Properties unchanged.
Perkiomen Creek,	7,734	6,640	1,094	81	193	1,013
Brandywine Creek at Barnardstown,	37	8	29	10	34	19
Pennypack Creek,	534	459	75	43	44	32
Wissahickon Creek,	1,524	1,338	186	80	141	106
Little Darby Creek,	175	118	57	57	77	0
Gulf Creek,	420	389	31	12	16	19
Ithan Creek,	797	753	44	32	202	12
Rock Run Creek,	157	24	133	127	261	6
Totals,	11,378	9,729	1,649	442	968	1,207

General Sanitation.

Some industrial pollutions cannot be classed as sewage pollutions under the law. They may bring about a very unsanitary condition in a natural water course, requiring to be abated on the score of common nuisance.

Pollution of the ground water supply by sewage from a village or town or any other source is a matter for investigation and action by the State Department of Health. The Commissioner of Health is charged with the preservation of the purity of such waters in the interests of public health. All such work done by field officers which has to deal with the disposal of sewage in the villages and towns comes more particularly under the work of municipal sanitation. In many villages and hamlets throughout the State, general practices respecting disposal of household wastes are insanitary and possibly the cause of disease and mortality. These subjects are properly investigated by the Department of Health since there is no other body

having jurisdiction in the fifteen hundred townships wherein reside about one-third of the population of the Commonwealth. This class of work is distinct from other field office work and is treated under the head of General Sanitation.

Within the city, borough, village and township the remedy of the various nuisances in the streams, the pollution of public ground water supply and general unsanitary respecting disposal of household wastes, and causes of disease and mortality is found quite often to be a public sewerage system. Considerable time must be allowed, naturally, for the discussion of the introduction of such an improvement and for the inauguration of a sewer system. Therefore, it is not reasonable to expect immediate abatements of these thousands of pollutions within the municipalities. However, the sanitary survey forms a basis upon which to make a beginning.

The following table gives a summary of the survey on the Ohio River watershed outside of the boroughs and cities in Allegheny County.

The Schuylkill River watershed in Berks, Lebanon and Schuylkill Counties, Pottsville and the Maiden Creek excepted.

The Beaver River watershed in Beaver and Lawrence Counties and the watersheds of streams draining into Lake Erie, traversing dairy farms in Erie and Crawford Counties and the watershed of Mill Creek between Latrobe and Ligonier.

SUMMARY OF SANITARY SURVEY ON CERTAIN WATERSHEDS.

	Boroughs.	Villages.	Properties.	Polluting properties.
Schuylkill River, Berks Co., (Maiden Creek excepted),	12	16	15,315	2,965
Schuylkill River, Lebanon County,	1		1,717	143
Schuylkill River, Schuylkill County, (Pottsville excepted),	18		10,358	6,526
Beaver river, Beaver and Lawrence Counties,	9	9	7,587	1,243
Ohio River, Allegheny County,			27,435	7,225
Streams traversing dairy farms in Erie and Crawford counties, Lake Erie shed,	13		1,941	619
Mill Creek, between Latrobe and Ligonier,			65	28
Totals,	53	25	64,418	18,749

The sanitary survey of the Schuylkill River watershed in Berks and Lebanon Counties was made under the immediate direction of Mr. J. B. Nightingale, who had charge of the field force.

The sanitary survey of the Schuylkill River watershed in Schuylkill County was made under the immediate direction of Mr. John J. Considine, who had charge of the field force.

The sanitary survey of the Beaver River watershed in Beaver and Lawrence Counties was made under the immediate direction of Mr. James M. Clark, who had charge of the field force.

The sanitary survey of streams traversing dairy farms in Erie and Crawford Counties was made under the immediate direction of Mr. Warren S. Hood with the assistance of local health officers.

The sanitary survey of Mill Creek, between Latrobe and Ligonier, was made by Stuart H. Heist, assisted by Mr. John B. Baumgardner.

Water Sample Collection.

Samples of water used as sources of public supply or private drinking purposes have been collected at two hundred and twenty-four places throughout the State and sent for bacteriological examination to the Department's laboratories at the University of Pennsylvania. Two thousand three hundred and seventy-three of these samples were collected in twenty-eight places as follows: 786 samples at Reading, 275 samples at Mt. Gretna, 246 samples at Hastings, 155 samples at Johnstown, 117 samples at Kittanning, 78 samples at Latrobe, 70 samples at Spring City, 70 samples at Oil City, 49 samples at Royersford, 48 samples at Palmerton, 39 samples at Corry, 37 samples at Mont Alto, 35 samples at Hershey, 34 samples at Pittsburg, 32 samples at Lawrenceville, 31 samples at Lititz, 31 samples at Wayne, 30 samples at Austin, 29 samples at Easton, 26 samples at Cambridge Springs, 26 samples at Honesdale, 25 samples at Bradford, 24 samples at Altoona, 21 samples at Mahaffey, 18 samples at Emlenton, 16 at Dallastown, 13 samples from Bloomsburg, and 12 samples from Harrisburg. The balance of the total number of samples were sent in from 216 places widely scattered.

Seventeen hundred and twenty-one of the samples examined were collected by officers of the Engineering Division of the Department. The greatest number of samples sent to the Department's laboratories in any one month was 889 for December, the next was 538 samples in August, followed by 492 in September.

Wilson W. Ritter made 365 collections during the year, Stuart H. Heist made 312 collections, John B. Baumgardner made 301 collections, Ralph E. Irwin made 279 collections and Richard Bayard 264 collections.

V. EPIDEMICS.

TYPHOID FEVER EPIDEMIC AT ALTOONA CITY, BLAIR COUNTY, PENNSYLVANIA.

During the month of September the Engineering Division made an investigation of an outbreak of typhoid fever in the city of Altoona, Blair County, Pennsylvania. The origin of the infection was found at a dairy farm. The watershed furnishing the water impounded by the city and supplied to the public in Altoona City was inspected and orders of abatement of stream pollutions issued. The following report explains the situation.

Out of 95 cases of typhoid fever occurring in the town between June 22nd and September 11th, 61 patients used milk from one dairy farm. Out of the remaining 34 cases, 5 occasionlly secured milk from the same route, leaving 29 sufferers who were supposed to have secured milk at no time from this source, but who did secure milk from other and 24 different sources.

City water was used almost exclusively for drinking. The great majority of the cases were in the best residential district of the city and among the well-to-do people, whose homes were examples of cleanliness.

The typhoid cases as a whole were severe and there were many deaths. Of the 61 cases using the milk from the one dairy farm, 48 occurred in the month of August and five during the last half of July.

The 29 cases where other milk was used, occurred over the whole period between July 13th and September 11th and they are negligible. An investigation at the farm where the milk was produced and from which it was shipped to the 66 individuals contracting the fever, revealed the source of infection.

On May 23rd a helper at the farm was taken to the Altoona hospital. The case was diagnosed as typhoid fever. No particular attention was paid to this occurrence by the local authorities.

On August 15th, a house-maid was removed from the farm to the hospital while suffering from a pronounced case of typhoid fever. She had been employed for three and a half weeks only and had had nothing to do with the handling of the milk.

A week late, on August 21st, the dairyman who often delivered milk on the route in the city, was removed in a sick condition and the case was diagnosed as typhoid fever.

Nearly a month later and after the outbreak along the one man's milk route, the six-year-old son of the farmer was taken sick with typhoid fever.

The open vault privy used by the family and farm hands was located between the barn and the house, 50 feet from the former and 100 feet from the latter, on level ground and about 100 feet back from the edge of a steep bank at the foot of which is the spring from which the members of the household secured their drinking water and from which water was obtained and used in and about the dairy.

The surface drainage from the house was slightly towards the spring, but judging from the topography and clayey nature of the soil, surface and sub-soil drainage from the privy would not reach the spring.

The privy vault had been used by the members of the family during the early days of their sickness before the disease had been diagnosed as typhoid fever. Furthermore, the contents of the vault had not been disinfected or removed before September 6th, when the state health authorities were on the ground. But flies were not thought to be the medium of transmission.

The kitchen slops and wash water were thrown on the ground about the house. On and after the middle of July, following a long dry spell, there were several rainfalls which washed the surface of the ground and could have washed any infection from about the house into the spring. A sample of spring water was examined and found to contain 210 water bacteria, but no coli. A specimen of milk revealed millions of ordinary bacteria. Coli were absent.

Milk for delivery to town was taken directly from the barn to the spring house for cooling and thence to the wagon. The cleaning of the milk vessels was done at the spring house. Note, that the typhoid poison was at the farm from May to September. It had gotten into the milk the last of July and first of August. The July infection might have followed the rain wash pollution of the spring. Anyhow both the milk man and the maid came down after this. The man might have infected the milk at the barn, in the spring house or on the route. The circumstances of the trail of victims along the route teaches the lesson of danger to the milk consumer from careless disposal of sewage at the farm. Also it warns of the importance to the public of the employment at the dairy of those only who are healthy and cleanly in their habits.

The Altoona municipal water works comprise impounding reservoirs and are supplied by water from Glen White Run and Baker Run watersheds. A sanitary survey of these two watersheds prove them to be in an unsatisfactory condition. The village of Glen White is situated on Glen White Run and is an old mining town, sparsely populated at present. Twenty-one notices of abatement were served at Glen White.

The Baker Run watershed was in worse condition than that of Glen White. Here several mining villages are located on public streams and many pollutions were found. The entire watershed was gone over and 222 inspections were made, 24 being at Glen White. One hundred and three abatement notices were served. The greater number of these orders were sent to the Glen White Coal and Lumber Company and the Altoona Coal and Coke Company. The notices related to the cleaning and in many instances to the removing of the contents of overflowing privy vaults draining directly or indirectly into the stream. The coal company and the private owners were ordered to transport all the night soil off the Altoona watershed.

INVESTIGATION OF TYPHOID FEVER EPIDEMIC AT EMPORIUM BOROUGH, CAMERON COUNTY.

The Engineering Division made an investigation of a threatened epidemic of typhoid fever in Emporium borough, Cameron County.

Emporium was first visited on November 13th. A list of all cases in the borough and adjoining township was obtained from the County School Inspector and Secretary of the Board of Health. Each estate on which there was a typhoid fever patient was visited and a sanitary inspection was made. It was found that there had been twenty cases of typhoid fever in the borough and in Shippen Township between August 23rd and November 13th. Sixteen cases were in the borough and four in the township. The date of onset of cases in Shippen Township were as follows: One on August 23rd, September 19th, October 18th and November 1st, respectively.

The cases in the borough were as follows:

September 24th, 1 case.
October 13th 1 case.
November 1st, 1 case.
November 2nd, 2 cases.
November 3rd, 2 cases.
November 4th, 2 cases.
November 5th, 2 cases.
November 6th, 1 case.
November 9th, 1 case.
November 12th, 1 case.
November 13th, 1 case.
November 14th, 1 case.

The case in the township on August 23rd was that of Beatrice Wilson. The house was located on West Creek, about six miles west of Emporium. The patient was 22 years old, was treated at home, the dwelling was isolated and there was no fair opportunity for infection to reach any water course. Under the direction of the County Medical Officer, the excreta were buried. The water supply for the dwelling was obtained from a dug well.

The next case in the township was that of a housemaid, Beryl Spaulding, employed at the dairy farm of E. J. Rogers, located on West Creek, two miles out in the township. Mr. Rogers ran a milk route in Emporium.

The gravity supply main from the reservoir furnishing the public water to Emporium borough passes by the Rogers farm and a service connection to the dwelling was in use. Drinking water was also obtained from a spring on the farm. It was located on a hillside above the buildings. As soon as the case was diagnosed as typhoid fever, the patient was removed to her home at some distant place. The house is provided with inside closets and a bathtub. The sewer pipe leads to the creek and discharges therein.

Forty-two days later, on November 1st, Mr. Rogers was stricken with typhoid fever. He was treated at home. The case was attended by a trained nurse. The last delivery of milk from this farm was on November 14th. The compulsory discontinuance of the sale was ordered by the County Medical Inspector. The dairy had been pronounced unsanitary during the summer and the owner had been requested to improve conditions.

The October 18th case in the township was that of Charles Spangler, 14 years of age, employed at the water works pumping station on West Creek. The dwelling in which he resided was located on Towner Run, a small stream coming

down from the Towner Run reservoir and emptying into West Creek below the water works pumping station. The youth, although feeling miserable, persisted in his work at the pumping station until he collapsed, when he was removed to his home. The case was attended by a trained nurse. The patient died on October 29th. The dejecta were disinfected and buried. The water in the house was obtained from both the public supply and a dug well. The incipient epidemic began in the borough on November 1st.

With respect to the two earlier cases in the borough, the September 24th case was that of Robert Weeken, who was removed to Williamsport; the October 13th case was that of Andrew Vogt, 46 years old, treated at home until October 23rd, was then removed to hospital and died next day. In the following table are given the November cases in the borough, the source of milk and water supply and the name of each patient.

Date.	Name.	Water Supply.	Milk Supply.
Nov. 1st,	Lloyd Biesel,	Public,	Rogers.
Nov. 2nd,	Robert Jones,	Public,	Rogers.
Nov. 2nd,	Harry Smutz,	Public,	Rogers.
Nov. 3rd,	Lynn Smith,	Public,	Rogers, et al.
Nov. 3rd,	Ivy Logan,	Public,	Rogers.
Nov. 4th,	Lynn Houpt,	Public,	On premises and neighbors.
Nov. 4th,	Max Balcom,	Public,	Glen & Joyce.
Nov. 5th,	Robert Baker,	Public,	Rogers.
Nov. 5th,	Mrs. E. J. Smith,	Public,	Rogers, et al.
Nov. 6th,	Thomas Smith,	Well,	Neighbors.
Nov. 9th,	Mrs. Kate Houpt,	Public,	Rogers.
Nov. 12th,	Kirk Smith,	Public,	Rogers, et al.
Nov. 13th,	Mrs. Bertha Gibbs,	Public,	Rogers.
Nov. 14th,	Falevia Roman,	Public,	None.

It will be noted that all of the patients with one exception were supplied with public water and this was also true in the case of milkman Rogers.

It will also be noted that with four exceptions, all the patients were supplied with milk furnished by Rogers. However, there was nothing remarkable in this because said Rogers was the principal dairyman in the borough. Furthermore, he came down with the disease about the time of the onset of the cases in the borough, which would tend to the conclusion that the infection might have been common medium of transmission—the public water supply. By referring to the date of the sickness of the attendant at the pumping station, it will be noted that the usual incubation period had elapsed between October 18th and November 1st. Mitigating the suspicion that the origin of the outbreak was the infection of the water at the pumping station, is the fact that the disease did not spread extensively in the town. The satisfactory answer to this, however, may be found in the very fact that the State Department of Health's County Medical Inspector had notified the borough authorities of the existence of typhoid fever on West Creek as soon as he was aware of the fact, August 23rd, and that the local Board of Health had notified the inhabitants of Emporium, through the public press and by posters put up in conspicuous places, of the danger and warned the public to boil all water. With the lamentable experience of the previous year at Ridgway strongly in mind, the citizens of Emporium heeded the injunction, fearing a repetition of the Ridgway epidemic. It is owing probably to the full observation of the order to boil the water that the infection did not spread throughout Emporium.

GENERAL CONDITIONS.

Emporium borough is a community of about 2,600, the seat of government of Cameron County and located on the north bank of the Driftwood branch of the Sinnemahoning Creek. Portage Creek is the eastern boundary and the said Driftwood branch is the western boundary. West Creek coming from the south opposite the west end of the borough joins the Driftwood branch and forms the main Sinnemahoning Creek. This West Creek furnishes the principal source of supply to Emporium. It is supposed not to be used unless the other sources are insufficient.

The town has a sewer system with outlets into the Sinnemahoning Creek. The water works are owned by the Emporium Water Company. A part of the supply is taken from an impounding reservoir on Salt Run in Portage Township, and a part from an impounding reservoir on Towner Run in Shippen Township. About

80 per cent. of the population of the borough take public water. The remainder use springs and individual wells mostly located where there are no sewers. So far as is known, the outbreak of typhoid fever during the current year is the first one ever experienced by the community.

WATER SUPPLY.

Salt Run water supply is impounded in a reservoir elevated 300 feet above the borough. It has a capacity of about 4,500,000 gallons, receives drainage from 3.6 square miles of uninhabited territory and delivers water through 20,000 feet of 6 inch pipe to Emporium. This reservoir is formed by a masonry and earth embankment dam built across the ravine. The Towner Run reservoir has an elevation of 258 feet above Emporium and a capacity of about two and a half million gallons. It drains 0.9 of a square mile of uninhabited, mountainous territory and delivers water through 14,520 feet of 8 inch pipe to the borough. The reservoir is constructed by the placing of an earth embankment across the ravine.

The West Creek Water is diverted by a small intake dam into a pump well located in the engine room of the pumping station. The top of this pump well is flush with the floor. By removing a loose plank or two the water in the pump well may be seen. The intake was a small loose stone wall and considerable trouble had been experienced in keeping the pipe leading to the pump well free from leaves, woods and debris. The attendant had been obliged to go out to the intake frequently and work there keeping the pipe opening free. From the pump well the water is raised directly into a four inch main connecting a short distance away with the 8 inch gravity main carrying water from Towner Run reservoir to Emporium. At the time of the Department's inspection about the entire supply was being secured from West Creek. The impounding reservoir on Salt Run was dry and about 500 feet below the reservoir a small stone intake reservoir was constructed to direct water into the Salt Run main, an opening in the pipe having been made at this point. However, as the water in this reservoir was 6 inches in depth only, it did not provide head enough to overcome pressure from Towner Run supply. This Salt Run water supply was flowing over the inlet reservoir and being wasted. Towner Run was also dry. It was reported to have been in this condition for some time. So that the only water delivered at Emporium at the time of the Department's inspection was that from West Creek.

WORK OF THE DEPARTMENT.

On November 12th, samples of water were collected by the Department's officers and sent to the laboratories for bacteriological examination. There were four such collections: One at the Rogers farm, another at the water works pump well, and two collected at Towner Run reservoir.

The sample at the Rogers farm was collected from the trough out of which the cattle drink. Four thousand two hundred ordinary bacteria and two hundred b. coli communis were found present in a cubic centimeter of this water.

The sample at the pump well of the water works system was raw West Creek water. Two hundred and thirty ordinary bacteria and 5 b. colli were found in a cubic centimeter of this water.

The sample collected at the dam of the Towner Run reservoir showed 35 ordinary bacteria and the sample from the upper part of the same reservoir, showed 30 ordinary bacteria. Coli were absent in both samples.

On November 14th twelve samples of water were collected for bacteriological examination. Five of them were of water from the public supply and the remaining seven were from private wells and streams. The following table gives the results:

Location.	Bacteria per c. c.	
	Total.	B. Coli.
Public Water.		
West Creek at pumping station,	120	0
Tap at Spangler's residence,	210	0
Salt Run reservoir,	2,500	0
Public tap in borough,	45	0
Public tap in borough,	42	0
Private Water.		
Spring at Roger's farm,	250	0
Well at Spangler's residence,	300	0
Well in borough at Heller's residence,	500	0
Well in borough at Costello residence,	120	0
Dug well in borough at Zarp's residence,	300	0
Sassaman's well, in borough,	350	0
Dug well in borough at Bear's residence,	8,400	10

A force of field inspectors was organized to make a sanitary survey of the watershed. This work will be pushed with vigor. It is estimated that there are in the nighborhood of 150 occupied estates on the watershed of West Creek above the water works intake. The water company is now planning for the construction of a larger storage reservoir. When this is built, the use of West Creek as a source of water supply is to be discontinued.

Miss Alice O'Halleran was employed by the borough to personally supervise, under the physicians in charge, the conduct of the typhoid fever cases. The dejecta from the patients were thoroughly disinfected. There was a general cleaning up and improvement of properties throughout the town. At the close of the year the sanitary condition was of a much higher standard.

CONCLUSIONS.

It was concluded that through the prompt notification to the public of Dr. H. S. Falk to boil the water, supplemented by similar orders from the local Board of Health and the faithful observance of the orders by the public, an extensive typhoid fever epidemic was avoided. The public water supply in all probability was infected at the pump well in a manner unknown to the Department, but through the agency of the attendant who labored at the pumping station while carrying about in his body the pathogenic poison which subsequently caused his death. There were numerous ways in which this poison from the body of the attendant might have been transmitted to the water.

The Rogers dairy farm was put in a sanitary condition, changes were made in the water trough and in the methods used for rinsing and washing of milk cans. It is reasonable that if the typhoid infection had been carried to the town from the Rogers dairy many more people would have contracted the disease, because the Rogers milk route in the borough was practically the only one.

TYPHOID FEVER EPIDEMIC.

Hastings Borough, Cambria County, Pennsylvania.

In July there was an incipient epidemic of typhoid fever which broke out in the borough of Hastings among the consumers of the municipal water supply. The Commissioner of Health sent the County Medical Inspector to the town and on request of the said Medical Inspector, an investigation of the public and private water supplies and the methods of sewage disposal and other matters pertaining to the abatement of the epidemic and the adoption of permanent remedies to obviate the recurrence were delegated to the Engineering Division of the Department acting under special instructions from the Commissioner of Health. The Chief Engineer assumed personal direction of the work of the Division in Hastings by correspondence and telephone communication.

The history of the handling of this outbreak is the history of how it is possible, by prompt and vigilant action on the part of local authorities and on the part of the citizens of a stricken community as well, in accepting and carrying out directions of trained experts accustomed to handling outbreaks of typhoid fever, to prevent this infectious and semi-contagious disease from numbering many scores of secondary victims. The following report tells the story of what was done:

GENERAL CONDITIONS.

The borough of Hastings is located in the heart of soft coal fields in Elder township, Cambria County, Pennsylvania; has a population of 1,941 and is a mining community. The town is hemmed in on all sides by cultivated slopes dotted here and there by openings of mine drifts.

About one mile below the borough, Brubaker Run has its source in a bowl shaped valley. The edge of this bowl is the dividing ridge between the watersheds of the Susquehanna and Allegheny rivers. Brubaker Run takes a northern course through Cambria County to its junction with Chess Creek, which continues through the southwestern part of Clearfield County and joins the Juniata at Mahaffey borough, 15 miles below Hastings, passing in its course the small boroughs of Westover, New Washington and Newburg.

The railroad outlet of Hastings is a branch of the Cambria and Clearfield Division of the Pennsylvania Railroad, passing Garway and Patton and connecting with the main line at Cresson, 31 miles from Hastings.

The borough has an incoroprated area of a little over one-half square miles. Brubaker Run flows through its centre to the north, having on its eastern bank the railroad track which extends through the borough to mines and coke ovens above. The business section containing hotels, stores and the greater part of the town lies on the western slope of the run. On this slope about 400 feet west of Brubaker is Beaver Street. Along this street are arranged the stores and hotels.

Then higher up the hillside is Spangler Street, lined on both sides with residences, then above Spangler Street still farther up the hillside is Harvey Street on which are a few residences. The cross streets from south to north are named from First Avenue to Seventh Avenue, north of which comes Bridge Street, which extends easterly across Brubaker Run and becomes one of the highways entering the town.

SEWERS AND SEWAGE DISPOSAL.

There are three short borough sewers extending from the business section along Beaver Street to Brubaker Run.

One between Third and Fourth Avenues,
One in Fourth Avenue,
One in Fifth Avenue

The sewer between Third and Fourth Avenues starts from a hotel and crosses lots to the Brubaker Run. This also receives taps from a few of the neighboring residences, giving a total length of about 400 feet.

The sewer on Fourth Avenue starts just below Harvey Street, crossing Spangler and Beaver Streets and enters Brubaker Run beneath the bridge on Fourth Avenue. This sewer receives drainage from some 25 houses as well as surface water and has a total length of about 200 feet.

The sewer on Fifth Avenue begins at Dr. Rice's residence and office, crosses Beaver street and extends down Fifth Avenue, opening about one hundred feet below Beaver Street and then continuing as an open sewer to Brubaker Run.

Besides these three borough sewers there are two closed, private sewer lines to the Brubaker Run.

There is an open sewer on almost every cross street and alley conveying wash water and kitchen waste to the stream. As the ground about two hundred feet east of the stream is almost level, much of this drainage stands stagnant in these open sewers until they are flushed by some heavy rain.

There were, until recently, about 160 overflowing privies located about the borough. Many of these were on the hillside and at times of rains much dejecta washed over the adjoining lots. On the low ground the overflow from such privies stood in open gutters and on the lots and alleys creating almost unbearable odors at night, and unsightly and disgusting borough properties in the day. During heavy rainfalls these open sewers are partly flushed but rendered none the less objectionable. In the borough there are but two cesspools.

MUNICIPAL WATER WORKS.

The borough water works was established in 1904. There are now 166 connections therewith. The pumping station is located below the three public sewers above mentioned on the east bank of Brubaker Run at the foot of Sixth Avenue and about 175 feet from the Run.

Adjacent to the pumping station is a 12 inch brick and cement lined pumping well, 15 feet in diameter and 24 feet deep, extending 10 feet below the level of the run and having no other bottom than the bed rock on which it is founded. The capacity of this pump well is 27,000 gallons. The pumping station and well are under the same roof.

The water supply is piped to this well from two springs about 200 feet from and 15 and 20 feet, respectiveiy, higher than the highest stage of the run. The two springs are about 400 feet apart, respectively, north and south of the pump well. They were excavated in the hillside and walled up with brick and mortar and have openings closed by doors in front. These doors were left open so that any one might procure water from the pool. These two springs have a dry weather flow of about 12,000 gallons per 24 hours.

The pump forces the water from the pump well through the town, distributing system, the surplus overflowing into the concrete reservoir located at the end of Sixth Avenue on the hillside, just west of the borough limits. This reservoir is 217 feet above the pumping station. Its bottom and sides are concrete. The top is a wooden cover. The basin is 36 feet in diameter, 12 feet deep, having a capacity of 77,000 gallons to high water mark. The single inlet and outlet is 6 inches in diameter. It terminates in a sump on the bottom.

The distributing system covers almost the whole built-up part of the town, having 166 tap connections and, including the force mains, the system consists of 3.4 miles of cast iron pipe ranging from 2 inches to 8 inches in diameter. Fire protection is afforded with an average pressure of about 90 pounds. There are five dead ends and 3 blow-offs. For the last three years this supply has not been adequate during the dry summer months and because of this many springs and wells in the town are brought in use by individuals at that time of the year.

INDIVIDUAL SUPPLIES IN BOROUGH.

Over 100 wells throughout the borough, most of them dug, furnish part of the domestic water supply. However, there are two public supplies, one furnished by the borough water works and one furnished by the Hastings Water Company.

There is a so-called "Y Spring" situated in the southern part of the borough on low ground and very liable to surface pollution as little or no effort has been made to protect it. This spring supplies through a small pipe 17 families occupying for the most part two rows of company houses adjacent to the spring.

Avenberger reservoir, situated about one-fourth mile north of the borough and fed by the mountain springs, supplies water to 13 families in the part of the town adjacent to the reservoir. There was no typhoid fever among the users of this spring.

McMillan reservoir, situated about one-half mile north of Hastings and fed by several springs, supplies a club house. No suspicion was attached to the purity of this supply.

HASTINGS WATER COMPANY WORKS.

The Hastings Water Company was incorporated in 1891 by the operators of one of the neighboring coal mines. About one mile southeast of Hastings, an intake dam was constructed on Scotch Run. The supply main is a 3 inch wrought iron pipe laid down the valley of the river and entering Hastings on Bridge Street at the east end. Later in 1905 a storage reservoir dam was constructed above the old dam and a 6 inch cast iron pipe was laid to town, entering on Third Avenue and extending north on Beaver Street. There it was connected with the old 3 inch pipe line.

The new reservoir is formed by a dam of masonry construction 200 feet long. Said 6 inch main is fitted with several blow-offs. The area of the watershed above the dam is probably one square mile, sparsely populated and consisting principally of rolling country covered with second growth timber. There are a few cultivated areas. This reservoir goes almost dry at times.

In 1906 there was opened on Scotch Runabout one-half mile above the Hastings Water Company's upper reservoir, an opening in the hillside into the coal mine operated by the Pennsylvania, Beech Creek and Eastern Coal and Coke Company, whereby through said opening the said mine was drained into the valley on Scotch Run. The main drainage has since been conveyed to a point below the upper reservoir of the water company by means of an open ditch and a 12 inch terra cotta pipe extending along the northern slope of Scotch Run and by the reservoir. The terra cotta pipe extended only by the shores of the reservoir. During the time of the Department's work at Hastings in July and August one of the joints of the terra cotta pipe was broken open and the mine drainage was being directed into the upper reservoir. The flow from the pipe constituted the entire supply. There were employed in the mines at the time between 200 and 250 men. The mine drainage is strongly acid and not desirable for domestic uses. Under ordinary conditions the supply is taken only from the upper reservoir. During dry weather the supply is augmented by water taken from the lower reservoir and this constitutes exclusively all mine drainage discharged into the run below the upper reservoir. For the year 1907 the number of service taps maintained by the Hastings Water Company was reported to be 36 and the consumption for domestic purposes was reported to be about 3,200 gallons daily and for industrial purposes 10,000 gallons daily, used in connection with the mines and coke ovens. During the epidemic, the company did not have over 20 taps through which water was served to patrons for domestic purposes.

TYPHOID FEVER RECORDS.

There were no local board of health records of typhoid fever in Hastings prior to the July epidemic of 1908, although typhoid fever had been present each year in the community. During the house to house canvass made by the engineers of this division, an endeavor was made to ascertain whether a case of typhoid fever had occurred on the property any time during the last ten years. The answers do not show the true occurrences, but they afford some indication of the extent of the disease. Undoubtedly there were more cases than reported. In the following table is given the number of typhoid fever cases for each year ascertained in the manner described:

TYPHOID FEVER IN HASTINGS.

Year.	No. of cases.
1899,	4
1900,	22
1901,	5
1902,	12
1903,	7
1904,	3
1905,	3
1906,	3
1907,	1
1908,	93

The distribution of the typhoid fever cases throughout the year 1908 by months is shown in the following statement:

TYPHOID FEVER IN HASTINGS.

For 1908 By Months.

Month.	No. of cases.
February,	1
March,	1
May,	1
June,	2
July,	62
August,	14
September,	6
October,	1
November,	5
Total,	93

COMMENTS ON DISTRIBUTION OF EARLY CASES.

The February 20th case was that of Duno Roberts, a man 21 years old, employed in Pittsburg, where he contracted the disease. He came home to Hastings to be cared for by his parents. A trained nurse was immediately employed and she remained in the household until the autumn because of a succession of typhoid fever cases, four in all, in the Roberts family. On March 23rd, Mr. Ross Roberts, the father, was stricken. On June 3rd, the illness of Angelina Roberts was pronounced typhoid fever. This girl was 16 years old. Finally on August 1st, Ross Roberts, Jr., 8 years old, came down with typhoid fever. The water supply was obtained from a dug well on the premises. Water was raised from the well by a pump. A wooden trough led from the pump by the side of the house to the street gutter on the steep hillside. All of the wash water and the kitchen drainage was either emptied into this trough or thrown out on the ground in the yard. The dejecta was carefully disinfected. There is an earth privy vault in use on the property. It was well cared for and in good condition. The Department has samples of the well water collected and analyzed on several occasions but no pollutions were found. Evidently secondary infection accounts for the continued sickness in the family.

Three samples of water were collected from the Roberts well. No sewage pollution was found in the water. The following table shows the results of the examinations:

ROSS ROBERTS WELL.

Date of Collection.	Bacteria per c. c.	
	Total.	B. Coli.
July 18th,	9000	0
July 27th,	620	0
July 29th,	230	0

The May case was sporadic and bore no relation to the other cases as far as can be known.

The other June case was that of Mrs. Lilly Gray. It also appears to have been a sporadic case.

In the following table is given data relative to the July epidemic and the cases following through to the end of the year:

JULY TYPHOID FEVER EPIDEMIC.

Onset of Cases, Sex, Age, and Employment.

Total by days.	Date of Onset.	Sex.		Age.	Employment.
		Male.	Female.		
1	July 4th,	1		26	Teamster.
1	July 7th,	1		32	Miner.
2	July 9th,	1		28	Miner.
	July 9th,		1	28	Housewife.
1	July 10th,	1		15	Miner.
1	July 11th,		1	3	At home.
4	July 12th,	1		16	Teamster.
	July 12th,	1		5	At home.
	July 12th,		1	16	At home.
	July 12th,	1		8	At home.
5	July 13th,	1		34	Miner.
	July 13th,	1		25	Mechanic.
	July 13th,	1		30	Miner.
	July 13th,	1		34	Miner.
	July 13th,	1		14	Student.
5	July 14th,		1	12	At home.
	July 14th,	1		10	At home.
	July 14th,	1		16	Miner.
	July 14th,		1	22	At home.
	July 14th,		1	27	Housewife.
14	July 15th,	1		16	Teamster.
	July 15th,	1		22	Miner.
	July 15th,		1	22	Housewife.
	July 15th,		1	30	Milliner.
	July 15th,	1		19	Engineer.
	July 15th,		1	39	Housewife.
	July 15th,		1	37	Housewife.
	July 15th,		1	5	At home.
	July 15th,		1	5	At home.
	July 15th,		1	7	At home.
	July 15th,	1		27	Miner.
	July 15th,		1	28	Housewife.
	July 15th,		1	34	Housewife.
	July 15th,		1	7	At home.
3	July 16th,		1	16	At home.
	July 16th,	1		6	At home.
	July 16th,		1	64	Housewife.
4	July 17th,	1		21	Teamster.
	July 17th,	1		27	Manager.
	July 17th,		1	10	At home.
	July 17th,	1		9	At home.
9	July 18th,	1		36	Merchant.
	July 18th,	1		28	Merchant.
	July 18th,		1	25	Housewife.
	July 18th,		1	39	Housewife.
	July 18th,		1	21	Housewife.
	July 18th,		1	15	At home.
	July 18th,	1		11	At home.
	July 18th,	1		18	Miner.
	July 18th,	1		14	Miner.
1	July 19th,		1	12	At home.
	July 20th,	1		18	Merchant.
2	July 21st,	1		24	Miner.
	July 21st,	1		10	Student.
4	July 23rd,	1		28	Miner.
	July 23rd,		1	13	At home.
	July 23rd,		1	11	At home.
	July 23rd,		1	13	Student.
1	July 24th,		1	12	Student.
1	July 27th,		1	8	Student.
2	July 28th,	1		9	Student.
	July 28th,		1	1	At home.
2	Aug. 1st,	1		10	At home.
	Aug. 1st,	1		17	Miner.
1	Aug. 3rd,		1	39	Housewife.
1	Aug. 7th,	1		15	Miner.
1	Aug. 8th,	1		21	Miner.
1	Aug. 11th,		1	23	Housewife.
1	Aug. 12th,		1	10	At home.
1	Aug. 15th,		1	15	At home.
1	Aug. 17th,		1	7	At home.
1	Aug. 20th,		1	4	At home.
1	Aug. 23rd,		1	2	At home.

JULY TYPHOID FEVER EPIDEMIC—Continued.

Total by days.	Date of Onset.	Sex. Male.	Sex. Female.	Age.	Employment.
1	Aug. 25th,		1	44	Housewife.
1	Aug. 27th,	1		5	At home.
1	Aug. 29th,		1	3	At home.
1	Sept. 2nd,		1	10	At home.
1	Sept. 6th,		1	7	At home.
1	Sept. 13th,		1	31	Housewife.
1	Sept. 15th,	1		46	Miner.
1	Sept. 24th,	1		38	Hotel.
1	Sept. 29th,		1	6	At home.
1	Oct. 1st,	1		24	Miner.
1	Nov. 2nd,		1	10	At home.
1	Nov. 8th,		1	39	Housewife.
2	Nov. 26th,	1		25	Miner.
	Nov. 26th,		1	8	At home.
1	Nov. 27th,	1		22	Miner.

COMMENTS ON DISTRIBUTION OF CASES IN JULY AND LATER.

In examining this table the peculiarity of the distribution of cases by days appears pronounced. The total cases for each date appears in the first column. The epidemic due to the first outbreak seems to have covered the period of eight days, from the 12th to the 19th, in which 45 cases occurred.

Cases subsequent to this, especially for the last week in July and thereafter, would be largely secondary.

In examining the table it appears that of the 38 cases occurring after July 18th, 21 of them were of patients under 15 years of age representing 55 per cent. of the cases, while of the 50 cases occurring in July up to the 19th of the month, 14 cases only or 28 per cent. were of patients under 15 years of age. And similarly of the 38 cases after July 18th, 27 of them or 71 per cent. were of patients living at home, students and housewives who were subjected to secondary infection more constantly while of the cases in July up to the 19th, 29 or 58 per cent. were of those living at home. This all tends to the conclusion that the infection which caused the primary outbreak passed away quickly and while it lasted the danger was general and that the infection was transmitted by the medium of the public water supply or a general food supply such as milk. And that the prolongation of the outbreaks in individual cases was due to contagion through secondary infection in the house or on the property. It is impossible to trace the visiting of neighbors. There was no marked isolation of patients until the emergency hospital was established. The promiscuous throwing of wash water on the ground and into gutters of alleys and streets tended to spread the contagion.

DISTRIBUTION OF TYPHOID FEVER BY AGE, PERIODS AND EMPLOYMENT.

Age period, inclusive.	No. of cases corresponding to age periods. In July up to 19th.	After July 18th.	Employment.	No. of cases corresponding to employment. In July up to 19th.	After July 18th.
0-4,	1	4	At home,	16	17
5-9,	7	7	Student,	2	5
10-14,	6	10	Housewife,	11	5
15-19,	10	4	Miner,	11	9
20-24,	5	5	Teamster,	4	
25-29,	10	2	Merchant,	2	2
30-34,	7	1	Mechanic,	1	
35-39,	3	3	Milliner,	1	
40 and over,	1	2	Engineer,	1	
			Manager,	1	

MILK SUPPLY.

General.

The Department, upon investigation, ascertained that there were in the borough 37 private properties on which one or more cows were kept to supply the family with milk. In many instances the owner of the cow supplied milk to the neighbors.

There were also two dairy farms out in the township from which milk was furnished to 33 families in the borough. Mr. Dennis Rambau in this manner supplied ten families with milk and Mr. Thomas Carr 23 families. Thus the borough received its milk supply from 39 different sources. The first 36 typhoid fever cases of the epidemic were supplied with milk from 19 of these sources.

SICKNESS IN FAMILY OF MILK DEALERS.

In six of the 37 instances, where one or more cows were kept on the property, there was typhoid fever in the family.

The names of the owners are given in the following table:

Ross Roberts.
J. L. Cunningham.
S. J. Grassberger.
James Holtz.
Peter Foilage.
James Yeager.

Two of these owners only sold milk, Roberts and Yeager. Owing to typhoid fever in the Roberts family, the sale of milk was discontinued before the first of June. Margaret Sullivan, whose onset was dated July 16, obtained milk from this source before the sale was discontinued, six weeks or more to July 16th.

James Yeager, whose daughter Mattie was taken sick on July 14th, supplied milk to the Werfield family in which Master Ray came down with typhoid fever on July 18th, at the time so many others throughout the borough were stricken. In one part of the Yeager residence was a store. The water supply came from the borough system. The property was connected to a sewer into which all wash water and kitchen drainage went. There was a privy in the back yard. The family consisted of five members. One of them only having typhoid fever would not point to milk as the medium of infection. The sale of milk to the Werfields had been stopped before the Department's inspection of July 17th. Only one of the four members of the Werfield family had the disease. This further relieves milk as the suspicious cause of transmission of the infection; but the water supply came from the Hastings Water Company. There was a sewer connection and a privy in good condition in the back yard. It is possible but not probably that the milk from Yeager's was contaminated and caused the Werfield case of typhoid fever.

Mr. and Mrs. Cunningham were taken sick on July 9th. They had both well and borough water on the property. There was a sink drain to the street gutter and an earth vault privy overflowing in the back yard and the hillside below the well about 75 feet distant. The well was dug and topped with a wooden platform supporting a pump.

CUNNINGHAM WELL.

Date of Collection.	Bacteria per c. c. Total.	B. Coli.
July 22nd,	120	2
July 29th,	4	0
August 5th,	120	0

By orders of the Department, after the first sample was analyzed and found to contain contamination, the well was drained and cleaned out. The subsequent analyses showed no pollution.

The Grassberger family comprised three members; Master Gilbert was taken sick on July 12th. The property was supplied with water from the borough system and by a well near the house. The well water was not used after. Kitchen drainage was discharged through a pipe into the street gutter on the hillside. There was a privy in good condition in the back yard.

On July 27th a sample of well water was collected and also a sample of the borough water drawn from a faucet in the Grassberger house. The latter showed a total count of 210 bacteria and the presence of two sewage organisms in a cubic centimeter of the water. The well sample was free from coli and contained the low count of 12 ordinary bacteria. The cause of typhoid fever in this residence was attributed to the public water supply.

Amandus Holtz, the son of James J. Holtz, was taken sick with typhoid fever on July 13th. There were six in the family. The water supply came from a well and from the borough system. The well was located adjacent to the alley opposite the house. Kitchen drainage was thrown out into the alley. There was a privy in

the back yard and it was in good condition. Two samples of the well water were analyzed. The first collection was on July 18th. The water contained 14,000 total bacteria but no coli. The second sample was collected August 11th. It showed a total of 120 bacteria and no coli. The typhoid fever infection was attributed to the public water supply.

The Peter Foilage family comprised eight members, five of which had typhoid fever. The dates of onset are shown in the following statement:

July 14th, Peter Foilage, Jr., 10 years old.
July 16th, Thomas Foilage, 6 years old.
July 17th, John Foilage, 9 years old.
July 18th, Josephine Foilage, 15 years old.
August 24th, Isadora Foilage, 2 years old.

Mr. Foilage conducted a small hotel and saloon. Two inside closets and a urinal were connected to a cesspool on the property which had been cleaned out the first week in July. There was also a box privy vault in the backyard. The water supply came from the borough system. The first four cases of typhoid fever were attributed to the public water. This was the time that the general outbreak occurred in the borough. The August 24th case was clearly of contagious origin within the household.

FEVER ALONG MILK ROUTE.

Mr. Edward Waltz supplied milk to seven families in four of which a total of seven cases of typhoid fever occurred. The dates of onset are shown in the following statement:

July 12th, John Easly.
July 15th, Mrs. Emma Binder.
July 18th, Miss Emma Binder.
July 21st, Paul Binder.
July 15th, Mrs. Carrie Stewart.
July 15th, William Stewart.
July 18th, Valentine Able.

The water supply of the Waltz property came from a dug well. The household drainage was conducted in a pipe to an alley on the hillside. There was an earth privy vault in the back yard which was cleaned by the Department's orders. Two samples of well water were analyzed. The first sample was collected July 27th and the next one August 5th, showing the total count of 140 and 58 bacteria, respectively, and no coli. Apparently the milk sold by Mr. Waltz was uncontaminated. John Easly, who used the Waltz milk, was one of a family of five members who obtained their water supply from the borough system. The kitchen drainage was piped to the street gutter. There was a privy in the back yard in good condition. A trained nurse was employed. Care was taken to prevent secondary infection. The case was attributed to the public water supply.

The Binder family comprised seven members. The water supply was entirely from the borough system. The property had a connection to the sewer. All wastes were discharged to the sewer. The three cases of typhoid fever occurred at the time the general outbreak occurred in the borough. They were attributed to the town water supply.

In the Stewart family there were 6 members. The water supply was entirely from the borough system. All drainage from the house went to the sewer. The typhoid cases were atrributed to the public water.

In the Abel family there were four members. The sink drainage went to the street gutter through a pipe. The inside closet was connected with the borough sewer, all water was obtained from the borough system. The typhoid case on the property did not appear to be connected in any way with a contaminated milk supply.

Peter Yeager supplied milk to ten families in four of which a total of five cases of typhoid fever occurred. The dates of onset are shown in the following table:

June, Mrs. Ella Gray.
July 4th, Henry Yeager.
August 11th, Mrs. Lena Yeager.
July 15th, Elizabeth Strittmatter.
July 16th, Mrs. Christiana Dietrich.

The Gray case was considered sporadic. There were three in the family. They were supplied with borough water. The privy was found in bad condition and overflowing. It was cleaned and disinfected under the direction of the Department. The kitchen drainage and waste water were thrown out on the ground by the house. No disinfecting of the dejecta from the patient was done.

Henry Yeager distributed milk from the Peter Yeager cow to the Gray family and to the Strittmatter, Dietrich and Johnson families. The latter was the only family to whom he distributed the milk that did not have the disease. None of the other customers of Peter Yeager were afflicted. Henry Yeager might have contracted typhoid fever from the case in the Gray household and he might have transmitted it through the milk to the other families.

In the Henry Yeager family there were four members. Mr. Yeager contracted the disease on July 4th. His wife came down with the disease over a month later. It was probably due to contagion. A trained nurse was not employed. The water supply was from the borough system. The privy was in bad condition and was cleaned by order of the Department. The kitchen drainage and wash water were thrown out on the ground.

In the Strittmatter family there were 6 members. Water was from the borough system and there was a sewer connection to the property. The case in the family occurred when the general outbreak occurred. Three samples of water were collected and analyzed.

BOROUGH WATER AT STRITTMATTERS.

Date of Collection.	Bacteria per c. c. Total.	B. Coli.
July 18th,	27000	0
July 22nd,	20	0
August 11th,	6000	0

In the Dietrich family there were two members. The water supply came from the borough only. There was a privy on the property in good condition. The household drainage was thrown out on the ground. A trained nurse was employed. It would seem, if milk had been the medium of transmission of the infection, through the instrumentality of Henry Yeager, that more members in the several families would have contracted the disease because of direct contact with the infection, while the borough water supply, which was the only source in every instance, would have been easily the transmitter of the infection distributed in the manner the cases broke out in these families in the borough. Suspicion attaches to the Gray case as the possible origin of the Henry Yeager case and the secondary infection in the Yeager household.

In the family of John Sibert which consists of five members, there were three cases, the dates of onset appear in the following statement:

July 11th, Hazel Sibert.
July 17th, John Sibert.
July 18th, Mrs. Josephine Sibert.

The water supply is entirely from the borough system. The privy was in bad condition and was ordered cleaned by the Department. Kitchen drainage was piped to the street gutter. A trained nurse was employed. The milk was furnished by Jacob Kline. He sold to no other family. His property was in good condition and no sickness occurred there. The outbreak in the Sibert family was attributed to the borough water. In none of the other private milk supplies where milk was sold were there any cases of typhoid fever, and no suspicion was attached to milk.

Among the consumers of the Thomas Carr milk were the following cases of typhoid fever:

July 15th, Mrs. L. A. Thomas.
July 15th, Elizabeth Strittmatter.
July 15th, Mrs. Emma Binder.
July 18th, Miss Emma Binder.
July 21st, Paul Binder.
July 18th, Guy Cummings.
July 24th, Frances Larson.

An inspection of the Carr dairy showed everything about the property to be in first class sanitary condition.

All of the seven cases noted were on his route and occurred during the general outbreak in the borough. The water supply was from the borough system only.

There were three in the Cummings family, eight in the Thomas family and ten in the Larson family. Efficient work in disinfecting the dejecta of the patients and in observing personal hygiene prevented secondary infection in these households.

There were no cases of typhoid fever among the takers of the Rambau milk.

ORDERS AND CONCLUSIONS ABOUT MILK.

Thus it will appear and it was concluded that milk was not the avenue through which the typhoid contagion was spread in Hastings, with the possible exceptions noted.

Orders were issued preventing the sale of milk from properties on which typhoid fever existed. General instructions were issued to milk carriers and the public that no milk container should be carried by the milkman into any house. The householder brought out the individual container and into it the milk was poured and said container with the milk was taken into the household in this manner. This precaution tended to prevent the spread of the contagion through the agency of milk carriers. Every case of typhoid fever was placarded by the borough authorities under the direction of the Commissioner of Health.

PRIVATE SUPPLY OF WATER.

In the borough there were 109 private estates on which wells and springs existed and were in use. On six of these estates only did typhoid fever occur. Ninety-five of the wells were dug wells, nine were drilled wells and five were springs. Many of them were located on the hillsides and some in the valleys and a majority of them were liable to surface pollution.

Fifty-five estates on which such private supplies existed, comprising three springs, seven drilled and 45 dug wells, and on five of which typhoid fever occurred, were examined and the waters analyzed, 104 samples being tested and found to be unpolluted. However, instructions were given relative to precautions to prevent surface contamination. The house holders were warned to boil the water.

Thirty-eight estates on which such private supplies existed, comprising two springs, one drilled and 35 dug wells and on one of which a typhoid fever case occurred, were examined and water analyzed, 71 samples being tested and in each case on the first test the water was found to contain sewage pollution.

Twenty of the wells were closed temporarily and cleaned and found to be unpolluted on the second test, the samples being collected after cleaning. Two of the private supplies were permanently closed. Two of the wells were cleaned but not tested the second time. In nine instances the wells were not closed to use but they were cleaned and on the test thereafter the water proved to be uncontaminated. In five instances the owners did nothing.

The orders to clean the wells were issued by the local Board of Health following out the instructions given by the State Department.

Sixteen estates on which such private supplies existed comprising one drilled and 15 dug wells were examined and the waters analyzed and found to be unpolluted on the first test; but on the second test the waters were found to contain sewage pollution. Thirty-three samples were analyzed in this way.

In five instances the wells were cleaned and put in use, in five other instances nothing was done, in one instance, that of the "Y Spring," the water was piped to several dwellings. The pipe connections at the spring were disconnected by the borough authorities. In five instances the owners agreed to clean out their wells and presumably this was done.

Considering the time of year when the outbreak of typhoid fever occurred, and the extent to which the surface wells were liable to pollution, the absence of sewers to any extent, and the prevalence of the custom of depositing wash water on the ground, it was concluded that only by the prompt enforcement of preventative remedies by the local authorities under the direction of the State officers was a wholesale spread of the infection prevented. Particular care was exercised by the State Department of Health to obviate contamination of the private water supplies.

BOROUGH WATER TRANSMITTED THE ORIGINAL INFECTION.

In June, beginning about the 7th and extending through to the end of the month, the Pennsylvania Railroad Company built a side track up the valley of Brubaker Run by the water works pumping station. There was a gang of 25 laborers employed in this work. They came from Barnesboro each morning on a work train and returned in the evening. The workmen use the water at the north spring and from a pump well of the borough system. Above this spring was a hillside covered with bushes.. Excrement was found deposited about in numerous places on this ground above the spring. The railroad employees added to the menace. The door at the spring was open. Foreigners working in the neighborhood used the enclosure in which to store kegs of beer and keep them cool. When the water from this spring did not all flow to the pump well, it backed up and flowed out over the stone sill at the spring door. However, this seldom occurred. It did not occur during June and July since there was not water enough to fill the pump well and so no surplus existed. At times of rain surface water from the hillside above flowed down into the opening made in the hillside at the spring and would fill this opening up to the level, where the water would thence overflow the pool and pass down the hillside. But in this filling up of the depression the rain water would feed the spring and the pipe leading to the pump well. It is known that some of this surface water did actually wash into this spring and pass to the pump well and thence into the borough water works system.

On July 28-29 there was a scouring downpour in Hastings lasting several hours. On July 2nd, there was a downpour of less intensity. It is positively known that surface water from the hillside flowed into North Spring. The water also washed into the South Spring, but it had to first pass over a cultivated field in the latter case.

The foreman of the railroad gang which put in the side track, who drank of the spring water, was himself taken sick at Barnesboro about July 15th. He had typhoid fever. An effort was made to ascertain whether a case of typhoid fever existed among the 25 Italians comprising the gang of railroad workmen. These members had departed, the gang having disbanded. Even the names of the

individuals were not known. Their pay checks went by numbers. So it will never be known how many of this gang contracted the disease. The circumstantial evidence is strong in support of the conclusion that the origin of the infection was dejecta from some member of the railroad gang either coming down with the disease or carrying it about in his person, being deposited on the ground immediately above the North Spring from whence it was washed the latter part of June and the first part of July into the spring and the pump well from thence being pumped into the town reservoir and thence by gravity being distributed into the homes of the water consumers.

PRECAUTIONS TAKEN RELATIVE TO THE PUBLIC WATER SUPPLY.

Dr. W. T. Matthews, County Medical Inspector, appeared at Hastings under instruction from the Commissioner of Health and through his efforts, typhoid fever cases had been placarded and the local authorities had ordered everybody, through the newspapers, and by posters and other channels of communication, to boil all water and milk.

The officers of the Engineering Division arrived at Hastings July 17th. Mr. Ralph Irwin was in charge. Miss Alice O'Halloran was employed by the borough to superintend the work of the nurses. These representatives were in daily touch with the Harrisburg office.

The source of the borough's water supply was immediately inspected and condemned by the engineers. The springs were shut off, cleaned and improved. Drains were provided and the flow of surface water into the springs was rendered impossible. The doors were locked. In the following statement appears the results of tests of the waters collected from the springs:

Date of collection.	Sample.	Bacteria per c. c.	
		Total.	B. Coli.
July 18th,	North Spring,	200,000	0
July 27th,	North Spring,	12	0
July 29th,	North Spring,	6	0
July 18th,	South Spring,	54,000	0
July 27th;	South Spring,	32	0
July 29th,	South Spring,	50	0

It should be remembered that the pumps were not run more than half a day, namely each forenoon, since in this time the water in the pump well would be drawn down. Of course the springs flow continuously. The samples collected on July 18th did not show sewage pollution nor at any subsequent date. Any polluting matter of a liquid character would, of course, pass on with the flow into the pump well. No suspicion attached to the purity of these waters which flowed out from the limestone after the improvements were made on July 18th.

The sewers in Third, Fourth and Fifth avenues empty into the run a short distance above the borough water works pumping station. Evidence of sewage pollution could be seen in the stream. It was feared that in some manner this polluted water might reach the pump well. Therefore, an examination of the well was made immediately and springs were discovered in the bottom. On July 19th the bottom of the well was cemented. Leaks developed in the sides. Forms were put in place and a concrete lining to the well was built under the direct superintendence of the Department's engineers. This work was finished on August 1st. At the close of the year no leaks had developed.

After the possible sources of pollution of the water supply at the sources had been eliminated, attention was paid to the cleaning out of the reservoir and the piping system in the borough. The reservoir was cleaned out on August 2nd. On the following day a solution of copper sulphate by weight one part in a hundred thousand was applied at the pump well and forced into the reservoir. The sides were scoured with brooms and the water wasted. Subsequently a solution, one part per million, was introduced at the pump well and the water passed through the reservoir into the pipe system. Hydrants, blow-offs and taps were opened and the system was completely drained. The effectiveness of this treatment is shown in the test of the water made. The use of the chemical solution was discontinued at the close of the 6th day of August.

Date of collection.	Sample.	Bacteria per c. c. Total.	B. Coli.
July 18th,	Pump well,	78,000	0
July 27th,	Pump well,	190	0
July 29th,	Pump well,	95	0
July 18th,	Reservoir,	3,000	0
July 18th,	Tap at S. Strittmatter's,	27,000	0
July 22nd,	Tap at S. Strittmatter's,	20	0
Aug. 10th,	Tap at S. Strittmatter's,	6,000	0
July 18th,	Tap at W. P. Dillon's,	220,000	0
Aug. 5th,	Tap at W. P. Dillon's,	62	0
Aug. 5th,	J. S. Cunningham,	32,000	0
Aug. 11th,	Michael Neibauer,	32	0
July 27th,	S. J. Grassberger,	210	2
July 27th,	Brubaker Run,	5,200	20

The Hastings Water Company supply was tested.

TEST OF HASTINGS WATER COMPANY SUPPLY.

Date of collection.	Sample.	Bacteria per c. c. Total.	B. Coli.
July 18th,	Run to reservoir,	600	0
July 22nd,	Run to reservoir,	1,200	0
July 18th,	Reservoir,	6,000	0
July 22nd,	Reservoir,	70	0
July 18th,	Tap at Baum's Bakery,	5,400	0
July 18th,	Tap at Central Hotel,	5,500	0
July 22nd,	Tap at Central Hotel,	420	0
July 22nd,	Spring above reservoir,	12	0

IMPROVEMENT OF SANITARY CONDITIONS.

The local authorities with promptness and vigor enforced the injunctions which the Commissioner of Health transmitted through his proper officers and to this effort may be attributed in no small degree the satisfactory report of secondary cases. With unsanitary conditions abounding everywhere, in the summer time when avenues of secondary infection are greatest, when the fly pest abounds and people are more careless, it is remarkably that the history of the Hastings epidemic records so comparatively few secondary cases. The epidemic might easily have numbered several hundred victims.

On July 18th the borough purchased a carload of lime and distributed it throughout the town free of cost. Each householder was given some lime to use at the privy and about the property. Ditches and wet places were limed thoroughly by the men in charge of the wagon in instances where there was no one there able to do the work. Ample instructions were also issued to the householder.

The district nurse in charge performed her duties inside of the dwelling and too much praise cannot be bestowed on the attention given by her assistants to carrying out directions whenever a fever patient was found. The attitude of the citizens was receptive and this also had much to do with the efficiency of the work of combating contagion in the sick room and in the dwellings.

The sanitary survey of every estate was prosecuted day and night. Officers of the Board of Health of Hastings followed up this work by orders for the cleaning of privy vaults, and removal of rubbish, the draining of alley and street gutters and the disinfection of all these.

The borough council held a public meeting on July 21st, and it was decided to establish an emergency hospital. A committee of citizens took the matter in charge. Contributions from neighboring municipalities and from individuals were tendered and accepted. The receipts of this kind were said to have been about $2,500.00.

Night soil was removed from the borough to a farm at a remote point, was thoroughly disinfected, spread upon the ground and ploughed under under the personal supervision of officers of the State Department of Health. Twenty-four hour notices were served on all property owners where privy vaults needed cleaning. At the expiration of the time, the borough men entered the property, removed the night soil and assessed the owner with the expenses. In this way very prompt service was secured. Most of the property owners chose to let the borough do the work.

PERMANENT REMEDIES.

The Department advised the borough authorities to abandon the use of the springs and to obtain a deep seated source of ground water supply. Consequently before the close of the year a six inch well had been drilled 512 feet deep and cased to bed rock. It was located in the pump house. The water was lifted from this well by a vertical deep well pump, capacity 4,000 gallons per hour and is discharged into the suction well of the main pumping engines. The springs on the hillside were discontinued and are not now used for any purpose whatsoever. The supply from the driven well appears to be ample. When the pump is at rest, the water stands within four feet of the surface of the ground. Pumping operations lower this to a point 30 feet below the surface of the ground, at which level the water remains during pumping. So it would appear that Hastings borough has an excellent public water supply.

The borough council instructed its municipal engineer to draw plans for a comprehensive sanitary sewer system for the town. This work was in progress, but the plans had not been submitted at the close of the year.

TYPHOID FEVER AT LITITZ, LANCASTER COUNTY.

During 1907 a petition was presented to the Commissioner of Health asking for relief from the pollution by borough sewage of Lititz Creek. Field Officers of the Engineering Division were placed at work on the entire watershed of the Conestoga Creek above the water works intake at the City of Lancaster, which included as a tributary the area drained by Lititz Creek. Orders of abatement in numerous cases were issued. On January 3rd, 1908, the following communication was addressed to a large manufacturing concern in Lititz borough. This communication briefly sets forth the situation:

"January 3, 1908.

"W. H. Muth, Secretary and Treasurer,
"Ideal Cocoa and Chocolate Co.,
"Lititz, Pa.

"Gentlemen: In reply to your esteemed favor of recent date, about taking sewage out of the streams in the borough, I beg to say that the citizens of Lancaster, some fifty thousand people, are dependent for their drinking water, upon the Conestoga Creek, and at times the consumption is greater than the flow in the stream. The lives of the men, women and children in Lancaster are imperiled by the present method of sewage disposal on the watersheds above the water works intake and in conformity with the law, and the duties imposed upon me as Commissioner of Health, and in compliance with requests so to do, I have had a sanitary inspection made of the entire watershed, and am pursuing a uniform and consistent policy without regard to fear or favor.

"The individual at the farm house must be careful how he deposits excrement. He must have proper receptacles and keep the poison out of the streams, and so must everybody living in the boroughs. With the former, it is an easy matter, may be, but it is a more expensive matter in the borough.

"I do not know now what the most efficient, best and cheapest means is for Lititz, but I should think that the borough council would find it advisable to employ some one competent, like an engineer, to make a survey and prepare a plan for the system of sewers that would intercept all of the existing outlets, and convey the sewage to some one point, where it could be rendered harmless before going into the stream.

"This is what the Governor, Attorney General and the Commissioner of Health is requiring of the city of Lancaster, and other places in the State. The action taken with respect to your sewer is that taken with respect to every sewer in the borough of Lititz and other boroughs on the watershed. I wish to be conservative and to give you time to adopt some other means of disposal than into the streams, and I am this day writing to the borough council again, making the suggestion that they employ an expert to devise plans for a general sewerage system.

"If no disposition is shown on the part of the borough officials or individuals to remedy conditions, then I shall have to proceed to act through the Attorney General's Department, but I am firmly convinced that the good people of your town will be very glad to co-operate, one with the other, and with the State officials, in bringing about this certainly very desirable and necessary thing, the discontinuance of the discharge of sewage into streams, used subsequently as sources of public water supply. I am,

"Yours very truly,
"SAMUEL G. DIXON."

The following is a copy of the letter sent to the borough council and referred to in the above communication:

"To the Borough Council of the
"Borough of Lititz, Pennsylvania.

"Gentlemen: You are already familiar with the position which the State of Pennsylvania assumes relative to discharge of sewage into streams used subsequently as sources of water supply for the public. The health of the men, women and children of the city of Lancaster is an important matter. Filth which is put into the stream in your borough, within a few hours, reaches Lancaster and is the source of water supply for the people there. It is against all sense of decency, but beyond this, it is in direct defiance of the law, that sewage be discharged into the streams.

"In pursuance of my duty, I have had an inspection made all over the watershed in the country above Lancaster, and have notified everybody to stop polluting the water and several hundred menaces have been removed. As you are probably aware, I have notified individuals in your borough that they must stop putting sewage into the streams. The cost to some of your industrial plants will be considerable. Probably the better plan would be to build a system of sewers and take the sewage to some point and render it harmless before going into the stream. The borough could do this at a less cost and for the general benefit to all concerned, and I suggest it to be the rational and best solution of the problem, and respectfully request you to promptly consider the problem from this standpoint, and I would also ask that you favor us with an early reply to this communication.

"Unless some such general remedy be afforded, I shall be compelled to proceed to deal directly with the individuals who are now discharging their sewage into the waters of the State within your borough.

"Trusting that you do appreciate the situation, and will gladly co-operate with all interested to the end that the interests of public health will be preserved, I beg to remain,

"Very truly yours,
"SAMUEL G. DIXON."

"Lititz, Pa., January 28, 1908.

"Dr. Samuel G. Dixon,
"State Commissioner of Health,
"Harrisburg, Penna.

"Dear Sir: Your communication of the 4th instant, relative to the sewage of this place, which it is claimed pollutes the water supply of Lancaster, was submitted to our Town Council at their regular meeting last evening. In reply thereto, I am instructed to write you that this borough is not in a financial position to 'build a system of sewers to take the sewage to some point and render it harmless before going into the stream.'

"Very respectfully,
"C. N. DERR,
"Boro Secretary."

As throwing further light on the pollution of Lititz Creek, the petition in full, hereinbefore mentioned, is offered:

"TO THE HONORABLE, THE STATE BOARD OF HEALTH, ORGANIZED UNDER AND BY VIRTUE OF THE SEVERAL ACTS OF ASSEMBLY OF THE STATE OF PENNSYLVANIA, GREETING:—

"We, the undersigned petitioners, who live in the valley of and along the flow of Lititz Creek, in Warwick Township, Lancaster County, Pennsylvania, do hereby appeal and pray that your Honorable Body take such action in the premises as to protect us against the extreme pollution of said stream by the various factories and various sewers in the borough of Lititz, Pa., viz., the Knitting Mill, Lititz Pretzel Company, Ideal Chocolate Company, Paper Mill, Railroad Restaurant, the Slaughter Houses, Starch Factory, Creamries, Animal Trap Company, various sewers and many other smaller sources of pollution.

"The nature of the filthy matter thrown in the said stream consists of decayed vegetables, peelings of potatoes, bananas, melons, tomatoes, etc., etc., chunks of meats, corned beef, dried beef, bacon, and sausage spoiled and full of worms, dead chickens, cats and even dogs. This class of filth invariable stays on the

surface of the stream, while the bottom of the same consists of a dark, slimy, slippery sediment, more like the refuse of the various factories. These various filthy matters carry with them such a sickening stench that at times it is necessary to close doors and windows in order to eat or sleep. The fish in the said stream are also becoming extinct and hundreds of large dead fish could have been picked up along the same during the past two weeks, all dying from said polulted state of said waters.

"Hoping that your Honorable Body will take prompt action in the premises, and that Lititz Creek, once a bright, sparkling stream of wholesome water, but now a stenchy, filthy, polluted carrier of sewage, will soon again be clean and healthy."

The Department of Health followed up the pollution cases. At the close of the year twelve menaces had been abated and eight cases were placed in the hands of the Department's attorney for adjustment. They were all relative to properties located in the borough.

On July 20th, Dr. J. L. Mowery, County Medical Inspector of Lancaster County, reported the existence of a number of cases of typhoid fever in and around the borough. The Commissioner of Health at once instructed the Engineering Division to investigate the cause. The water supply was examined, disposal of sewage noted, samples of water were collected and analyzed and recommendations were made to the local authorities. The prevalence of typhoid fever was found to be not greater than that of other seasons. The following report will show what was done.

GENERAL CONDITIONS.

The borough of Lititz is a manufacturing town of about 2,200 inhabitants, situated eight miles north of Lancaster City on Lititz Creek, a tributary of the Conestoga Creek. From the latter stream Lancaster obtains its water supply at a point ten miles below the city. The water is treated chemically to precipitate suspended matters and is then subjected to filtration.

The borough is entirely within Warwick Township in the northern part of Lancaster county and is located on the Reading and Columbia Division of the Philadelphia and Reading Railway. The surrounding country is a thickly settled fertile farming district.

The renowned "Lititz Spring" rises from the limestone in the western part of the borough. The spring is in a recess in the southern slope of the valley to which is tributary, west of Lititz, a drainage basin of limestone formation about 4.5 miles in area above the spring. During dry weather said spring is the only visible outlet for the said 4.5 square miles. The flow is said to be considerably affected by local weather conditions. On July 29th about five days after a heavy storm, the flow appeared to be between three and five million gallons per 24 hours. This was reported by Mr. Cummings who had charge of the field work done by the Department.

Since 1893, or thereabouts, the public in and around Lititz has been supplied with water by means of a public water works system. It was owned by the Lititz Water Company until about three years ago, when it was purchased by the borough, and is now operated as a municipal plant.

Previous to the installation of the water works system, the domestic water supply was obtained from dug wells and rain water cisterns of which there are a large number still in use. Gradually as the water works were extended and the consumption of water increased, the waste water from the households was disposed of in cesspools and in old wells in the limestone. Earth privy vaults are in common use and in consequence water drawn from the wells in the borough is of suspicious quality for domestic purposes.

BOROUGH WATER WORKS.

The public water supply furnished by the borough is pumped from a well about six feet in diameter and twenty-five feet deep. The well is in lime stone rock and is located about 200 feet west of the "Lititz Spring." The water in the well varies in level with the local weather conditions. Adjacent to the well is the pump house, a brick structure, housing a horizontal duplex compound non-condensing pumping engine. The water is pumped into a 12 inch supply main which extends to the standpipe 200 feet distant on Maple Street in the western part of the borough. This main also extends into the borough, the standpipe acting as an equalizing reservoir. The daily consumption is reported to be 80,000 gallons. Pumping is done during three hours in the morning and three hours in the afternoon. The standpipe may be shut off and water for fire purposes may be furnished under direct pressure from the pump.

The distributing system consists of about three miles of pipe whose diameters range from 4 to 12 inches. The lines cover nearly the entire built-up parts of the borough and they extend about half a mile out in the township to Warwick

village, north of Lititz and south of the borough in South Broad Street. Fire hydrants are provided. There are from ten to fifteen dead ends on the pipe system.

The Department is handicapped considerably by lack of a report and plans of the water works system, the borough having neglected to furnish this information as required by law.

TYPHOID FEVER.

During the last ten years typhoid fever has been prevalent in Lititz. Many of the cases occurred on properties supplied with drinking water from a well on the premises. The ten year period is mentioned because it was the one covered in inquries made at every house upon a canvass undertaken by the Department officers. In the following table appears the total number of cases for each year prior to 1908:

TYPHOID FEVER IN LITITZ BOROUGH. BY YEARS.

Year.	Number of Cases.
1899,	13
1900,	7
1901,	5
1902,	15
1903,	17
1904,	19
1905,	5
1906,	6
1907,	1
	88

In 1899 there were 7 cases in one family using well water. In 1902, four cases, in 1903, seven cases, and also in 1904 there were seven cases in one family.

The entire 88 cases were on properties supplied with water as follows: 57 from private wells, 27 from the borough system and 4 from cisterns.

In 86 cases there was a loose earth dug vault at the privy. In two cases the sewage was discharged into the sewer or cess-pool. There were 29 cesspools in use, 4 sewers and in 55 instances wash water and kitchen drainage was thrown out on the ground about the dwelling.

It is not to be wondered at that typhoid fever was attributed to contaminated drinking water from private wells. As far as can be learned, no one suspected the borough water supply during these ten years.

There were 20 cases of typhoid fever during 1908 in the borough of Lititz. Their distribution is shown in the following table:

TYPHOID FEVER IN LITITZ FOR 1908. BY MONTHS.

Months.	Cases.
January,	0
February,	0
March,	0
April,	1
May,	1
June,	7
July,	3
August,	1
September,	2
October,	3
November,	1
December,	1
	20

There were three cases in June and three cases in July where the patients lived out in Warwick Township but who had visited Lititz and had drunk water supposed to have been polluted, making in all 25 cases in Lititz and vicinity.

The circumstances attending the outbreak of the disease pointed to the use of well water as a contributing cause. The suspected wells were in the oldest part of the town on the north side of East Main Street nearest Lititz Creek and paralleling the stream. The topography of the ground is such here that the underground drainage from the built-up district would naturally be towards the creek by or through the wells suspected of being polluted. Thus the water in the wells might be contaminated by sewage from the cesspools and privies of the neighborhood.

On July 30th, 30 samples of water from as many places in the borough were collected and the waters analyzed bacteriologically. The following table shows the results:

BACTERIOLOGICAL EXAMINATION OF WATERS IN LITITZ.

Collected July 30, 1908.

Number.	Sample. Class.	Sample. Owner.	Bacteria per c. c. Total.	Bacteria per c. c. B. Coli.
1	Dug well,	Matilda Erb,	6,000	15
2	Drilled,	W. C. Evans,	420	8
3	Dug,	A. D. Reidenbach,	28,000	200
4	Spring,	J. W. G. Hershey,	22,000	None.
5	Dug,	Moravian Church,	280	2
6	Dug,	Anna Becker,	98	None.
7	Cistern,	Anna Becker,	110	None.
8	Cistern,	Benj. Hertzler,	1,800	None.
9	Dug,	Benj. Hertzler,	16,000	None.
10	Dug,	N. D. Sturgis,	23,000	50
11	Dug,	James O. Sturgis,	100	None.
12	Dug,	Samuel Hacker,	3,000	20
13	Dug,	A. C. Pfautz,	15,000	75
14	Spring,	C. E. Regennas,	2,400	15
15	Dug,	Hiram Demmy,	3,000	6
16	Dug,	Jacob Kissinger,	10,000	3
17	Dug,	John Beck,	50	None.
18	Dug,	Samuel Spickler,	220	1
19	Dug,	Aaron Habeker,	2,400	100
20	Dug,	Charles Dissinger,	2,300	15
21	Dug,	Andrew Althouse,	60	1
22	Dug,	Peter Eckert,	7,000	None.
23	Dug,	S. S. Graybill,	1,800	5
24	Lititz Spring,		420	3
25	Boro water,	H. S. Kaufman, Res.,	1,200	15
26	Dug,	Clement Badorf,	600	None.
27	Lititz Creek,		65,000	None.
28	Dug,	Monroe Witcraft,	280	None.
29	Dug,	Levi Rudy,	3,000	3
30	Boro water,	Pumping Station well,	3,600	None.

Sample No. 27 of Lititz Creek water was collected below the village at a point where sewage pollution in the creek was plainly visible to the eye. Notwithstanding this, the sample was gathered in a small bottle out of which about a thimble-full of water was tested with the result shown in the table, namely, no sewage organisms were present in this thimble-full of creek water. This indicates how unreliable may be a conclusion based on one bacteriological test of water. The creek was heavily polluted and probably other samples collected of the water would have shown pollution in each case. These comments are pertinent to all of the tests in the above table. Because B. coli were not found in some sample analyzed, is not proof that sewage pollution is absent from a larger volume of water in the well or spring.

On August 10th, 1908, the Commissioner of Health sent the following communication to the Board of Health of Lititz:

"W. H. Buch,
"Sec. Board of Health,
"Lititz, Pa.

"Dear Sir:—

"On July 30th, 1908, samples of water were collected from a large number of wells in Lititz and have been analyzed in the Department's laboratories. The results show that the wells on the properties occupied by the following named persons are polluted by sewage as indicated by the presence of colon bacilli in the samples analyzed:

"Mrs. Matilda Erb, well.
"W. C. Evans, well.
"A. D. Reidenbach, well.
"Moravian Church, well.
"Nat. D. Sturgis, well.
"Samuel Hacker, well.
"Addison C. Pfautz, well.
"C. E. Regennas, spring.
"Hiram Demmy, well.

"Jacob Kissinger, well.
"Samuel Spickler, well.
"Aaron Habeker, well.
"Chas. Dissinger, well.
"Andred Althouse, well.
"S. S. Graybill, well.
"Levi Rudy, well.

"Therefore, these persons have been notified and urged to discontinue the use of these wells and you are requested to have your Board use its influence to the same end. Moreover, it is to be expected that sewage pollution might be discovered from time to time from practically every well in the town, and the Department will continue the sampling and analyzing of the wells in an effort to discover such other as may be polluted, so that the people may be fully informed.

"Furthermore, analyses taken from the borough supply and from the Lititz Spring indicate that these sources also may at times be subject to contamination, and further tests of these waters will be made.

"Very truly yours,

"SAMUEL G. DIXON."

A letter was sent out by the Department to each one of the names appearing in the above communication informing them that analyses of the water collected from their premises showed sewage pollution and that the said water was dangerous if used for domestic purposes unless the water be boiled. Each owner was respectfully urged to discontinue the use of the well or spring. In two cases only where well water was examined and found polluted had there been sickness on the property, namely, at the home of Nat. D. Sturgis and Samuel Hacker.

At the Sturgis residence is a bakery in the rear where pretzels are made. There are nine occupants of this house. Two only of them were sick. Beulah Sturgis, 11 years old, came down with typhoid fever on June 6th and Laura Sturgis was stricken on June 19th. The well is dug twenty-five feet deep, has a loose wall and is located at the side of the house under the porch. It is fairly protected. The water was raised by means of a pump. Slops and kitchen drainage were thrown out on the ground from the porch. The privies were in the backyard over one hundred feet distant from the dwelling and well. A removable box arrangement was afforded and when full the boxes were taken out and the contents emptied into holes dug in the backyard. During the sickness in the Sturgis family the stools were partially disinfected and, together with the laundry water, were deposited in the hole dug for the purpose in the backyard. Although the well water was found to contain sewage organisms, it does not appear conclusive that this water transmitted the infection, else more than two in the family might have been afflicted. It is fair to conclude that Laura Sturgis was infected by direct contact with the poison. Furthermore, Florence Putt, aged 14, a neighbor and playmate of the Sturgis children, came down with the disease on June 26th and her brother Allen, aged 12, was confined to the house several days by violent stomach disorder, which required medical attention on June 28th; but the case was not pronounced typhoid fever. In the Putt family there were five members. The water supply was from the borough system. It is not known that the Sturgis well water did not contribute to the typhoid fever in the family, but it was concluded by the Department that secondary infection in the household was more liable to have been the manner in which the poison was spread. Lothe Hacker, aged nine, residing next door but one to the Sturgises, was one of a family of three. She was taken sick May 27th. Upon the case being diagnosed as typhoid fever, the use of the well was discontinued and borough water was used.

The well on the Hacker property was under the porch at the back of the house. The kitchen drainage was thrown out on the ground nearby. There was a privy thirty feet distant on the adjoining estate. The superstructure had been removed and the vault full and overflowing remained exposed and flies swarmed about until it became a common nuisance complained of by the neighborhood. The abatement was accomplished about the first of June. The physical surroundings and method of household disposal would direct the mind of any inspector to the well as a suspicious supply for drinking purposes and, as expected, the first test of the water showed it to be contaminated by sewage. The Hacker case was the first one of the season in the neighborhood. There is no way of connecting it with the Sturgis and Putt cases except through direct contagion.

The Anna Becker estate occupies the third lot beyond the Sturgis property. It is on the corner of East Main and Water Street. Here, at the back of the porch in the yard, is a dug well about forty feet deep. On the opposite side of Water Street is the property of Amos Brubaker, on which there is a percolating cesspool one hundred and fifty feet distant from the well of Becker. There was typhoid infection in this cesspool from June first on.

The Becker well was about one hundred feet distant from the dug privy vault on the property. It had been cleaned and limed the last part of July. The wash water was thrown out on the ground near the well. Tests of this well water and of the cistern water on the property showed absence of sewage pollution.

Nine cases of typhoid fever are thought to have originated in the Becker household. The cases and dates of onset were as follows:

Date of Onset.	Name of Patient.	Age.
June 10	Amos Huber,	21
June 14	John H. Miller,	27
June 19	Agnes Burkholder,	22
June 26	Frank Burkholder,	18
June 26	Clarence Burkholder,	15
July 8	Luke Groff,	5
July 10	Mrs. Noah Hess,	35
July 13	Ada Groff,	4
July 17	Miss Hess,	20

Mr. and Mrs. Miller kept the house for Mrs. Becker. Mrs. Miller's brother, Amos Huber, lived in the family. During the first part of June he complained of being ill, on or about the 10th he went to Virginia and was there sick with typhoid fever. Mr. Miller died on July 4th.

The three Burkholders are grandchildren of Mrs. Becker and visited their grandmother frequently. Mr. Burkholder conducts a farm in Warwick Township near Brunnerville, three miles from Lititz. A trained nurse was employed at the farm to care for the patients. All wastes from the sick-room were disinfected and properly buried. The Department analyzed the water from the well on the farm on July 10th and found no sewage organisms present in a cubic centimeter of the water. It was concluded that Messrs. Huber and Miller contracted the disease from some unknown and common source and that the Burkholders had succumbed to the contagion encountered in the Becker household.

Mrs. Hess and Miss Hess were daughter and granddaughter respectively of Mrs. Becker. They had visited the Becker household on several occasions. Probably they contracted the infection through some other medium of transmission than the water of the well. Their home was on a farm in Warwick Township near Rothville, two miles from the village. A trained nurse was in charge. There was nothing at the farm to arouse suspicion of the water, milk or food as the avenue of transmission of the original case in the Hess family.

Mrs. Ada Groff, with her two children, Luke and Ada, visited Mrs. Becker about the 15th of June and at that time drank water from the Becker well. A prominent physician in the town suspected the well to have been the cause of the nine cases of typhoid fever.

The Amos Brubaker case of typhoid fever dates from June 1st. The cesspool on that property was still in use on July 30th, when the Department made the inspection and collected the sample of water from the Becker well which showed absence of sewage poliution. The following letter was sent to Miss Lizzie B. Becker about the well supply:

"Miss Lizzie B. Becker,
"201 E. Main Street,
"Lititz, Pa.

"Dear Madam:—

"Replying to your inquiry of September 4th, 1908, analysis did not indicate that the particular sample of your well water tested was contaminated by sewage organisms, and, therefore, it could not be definitely said that your well was a source of polinted water, and you were not so informed. However, numerous other wells in the vicinity were, it was found, contaminated, indicating that all the wells in this locality are dangerous sources of water supply, and the local Board of Health was so informed, and was asked to urge the abandoning of all the wells unless the water be boiled before being used.

"Another sample should be collected from your well shortly by the local health officer, who has volunteered to collect samples and send them to the Department's laboratories where the Department will have these samples analyzed.

"Yours truly,
"SAMUEL G. DIXON."

CONCLUSIONS.

In past years, during the seasons when typhoid fever was most prevalent in Lititz, the total numbers have been materially increased by a large number of cases in one family. Furthermore, the dates of onset varied, and it may not be erroneous to conclude that the contagiousness of the disease has contributed not a little to the

records. At this late date it is not possible to collect accurate data or to form accurate conclusions from the records at hand. One thing is certain, namely, that the drawing of water from the ground and the using of it for domestic purposes is attended with peril to such user in Lititz.

More careful attention to the disposal of sewage should prevail.

At the conclusion of the year and on the last day thereof, a letter was sent to Dr. James C. Brobst, of Lititz, by the Commissioner of Health. It shows the lack of appreciation of the situation on the part of the local authorities and the importance of sanitary precaution as a protection to public health. Where the attitude of the local authorities is that of opposition to safe standards, comparatively little can be done by the State Department of Health without the exercise of extreme measures:

"Replying to your favor of December 29th, I beg to say that an investigation of the water suppiy of Lititz was conducted during the past summer. Numerous samples of water were collected both from private wells and from the public supply and analyzed in the Department's laboratories. The results indicated that many of these wells were contaminated with sewage and that the public supply and the Lititz Spring were not beyond suspicion. It was thought that the sampling should be continued and this information was presented to the local Board of Health, and, the local health officer having been communicated with, a number of bottles were sent to him in which to collect samples, and the Department offered to have such samples analyzed at its laboratories without expense to the borough. Later the local health officer asked to be excused from collecting the samples. It is not to the credit of the borough that the health officer is not compensated sufficiently to allow him to devote his best services in the interests of the health of the citizens, or else that he lacks interest in this work. The Department intends to continue the investigations through its own officers at the earliest possible opportunity."

TYPHOID FEVER OUTBREAK.

Pennsylvania Reform School, Morganza, Cecil Township, Washington County, Pennsylvania.

During the summer an outbreak of typhoid fever occurred among the inmates of the Pennsylvania Reform School, located at Morganza, Cecil Township, Washington County, and the State Department of Health was asked to make an investigation. This work was conducted under the direction of the Chief Engineer of the Engineering Division. The following is a report of the investigations, the cause of the epidemic and the measures adopted to prevent a recurrence of the disease.

GENERAL CONDITIONS.

The Pennsylvania Reform School is a State institution for the care and education of incorrigible children up to the age of twenty-one years. The school was established in 1852 on the site of the present penitentiary in Pittsburg. In 1872 it was moved in its entirety to the present site at Morganza. The institution to-day comprises a main building, four cottages for boys and a large building for the care of the girl pupils, a public school building for boys, three shop buildings in which trades are taught to the boys, a hospital and farm buildings. There are in process of erection two cottages, one for boys and one for girls, and a large gymnasium and a power house. They are all situated on a five hundred and twelve acre tract of land located in Cecil Township, Washington County, north and west of Chartiers Creek, which flows in a general southeasterly direction by the property. This creek makes a large bend in its course so that it forms the western boundary of the southerly portion of the property and through this part the Chartiers Valley Division of the Pittsburgh, Cincinnati, Chicago and St. Louis Railroad extends. Morganza Station is on the land occupied by the State buildings.

The Administration Building and four cottages are directly back from the station on a bluff which is one hundred feet or so above the creek valley, and the other buildings are situated back from this bluff on rising ground, which is laid out in regular plots and drives for the prospective cottage development of the institution.

Near the northern boundary of the land reserved for future cottages is a water course locally known as Morganza Run, which rises north in the township near the village of Bishop and pursues a generally southerly direction a distance of about two and a half miles to Chartiers Creek. The latter seventeen hundred feet of the course follows closely the northern boundary of the State property.

The valley of this run and the entire watershed is under cultivation.

The population of the institution, including officers, numbers about five hundred and fifty. It is estimated that the average daily water consumption approximates 125,000 gallons.

EXISTING WATER WORKS.

On the institution grounds, in the northern part, a small intake dam on Morganza Run was erected to divert the water of the stream into the water pipe system of the institution and this source was the first supply. Later, owing to inadequacy of the supply, an intake dam and pumping station was erected near the banks of Chartiers Creek and the major portion of the supply was drawn from the creek. Subsequently, owing to coal mine operations and the pollutions of the waters by mine drainage and sewage, the creek supply was abandoned except for emergency uses, and Morganza Run was again resorted to. A small intake dam of timber construction was built on the run five hundred feet below the site of the original dam and the water was conveyed by a pipe to an artificial pond on the bank of the stream about five hundred feet distant. This basin was an earth structure partly excavated and partly held in embankment, being about one hundred and forty feet long by eighty feet wide, affording a three foot depth of water. Its use was that of a pump well and ice pond. From this basin the water was pumped into a distributing reservoir on the hill in the northern part of the institution grounds elevated about one hundred and eighty feet above the main building.

At the present time the institution's water supply is derived from three sources: first, raw water from Morganza Run for general, inferior uses; second, from springs for drinking purposes; and, third, from Chartiers Creek and a drilled well at the creek pump house for inferior uses.

The main supply is derived from the run and is diverted by means of a dam and a ten inch tile pipe to the open basin and pump well above described. The water is raised by means of a horizontal, duplex pumping engine of five hundred gallons' capacity per minute through about one-half mile of six inch cast iron force main to the distributing reservoir located on the hill north of the institution.

The distributing reservoirs are two in number, each seventeen feet deep and thirty-six feet by fifty feet in plan, vertical walls brick lined, cement bottom having a combined capacity at a depth of fifteen feet of water of four hundred and thirteen thousand gallons. There are facilities afforded at the bottom of these reservoirs for drainage. The pumping engine is operated daily for a few hours until the high water mark is reached.

From these reservoirs the water is supplied by gravity to all the buildings, including the barns, stables and farm houses, and is used for flushing, sprinkling, bathing, stock and other general purposes excepting for drinking. One of the rules of the institution prohibits the use for drinking of the faucet supply; but it has been found difficult to entirely prevent the use for this purpose.

There is no plan in existence of the distributing pipe system. There appears to be a six inch and eight inch supply line from the hill reservoir. About the grounds at convenient points fire hydrants have been erected.

It is possible by means of valves and connections to pump Morganza Run water directly into the distributing system by-passing the reservoirs, so it is reported.

For drinking purposes, water is obtained from two or three springs located on the ground. The principal spring is on the hillside in front of the Administration Building and about halfway distant between said building and the railroad station. The formation is limestone and originally there was a small ravine in which the spring gushed forth from the limestone. Rocks were thrown in here and carefully piled together and then the ravine was filled with earth up to the general level of the lawn as it may be seen to-day. A two inch pipe extends from the underground spring down hill towards the railroad and terminates in a galvanized iron tank about eighteen inches in diameter and three feet high resting on a brick foundation slightly above the surface of the ground. There is a faucet near the bottom of this tank from which water is drawn for use. Formerly a water wagon hauled all of the drinking water to the main buildings supplemented by family bucket brigades for fresh water supply to the cottages for table use. This system is maintained in part at the present time, but, generally speaking, the girls' buildings are now supplied by a pumping system. The overflow from the iron tank is piped to a brick, cement lined, storage basin of about fifty barrels' capacity, located near the railroad and the old power house, where there is a small pumping engine which raises the water through a two inch force main to a second brick, cement lined reservoir of the same size located in the ground back of the Administration Building and near the group of shops. The structure is elevated sufficiently high to furnish a gravity flow under low pressure to the ground floor or basement of the Administration Building and four cottages adjacent thereto.

Another important spring is in the grove on the slope toward Chartiers Creek northwest of the shops. The water flows from limestone rock through an inch pipe and falls free into an artificial stone basin in which there is no storage. The water is obtained here by putting receptacles under the end of the pipe.

The next spring of importance is in the immediate vicinity of one of the new cottages being erected and within seventy-five feet of the main fifteen inch sewer of the institution. It is reported that this spring, which comes from the limestone, is in what was formerly a ravine which has been filled in in a manner similar to that described with respect to the first spring herein mentioned. A six inch pipe about two hundred and fifty feet long conveys this water to an open brick lined basin about

three feet in diameter and flush with the surface of the ground. Surface water contamination is possible here. It is always full of water. The overflow is into a nearby lily pond. Water has been occasionally taken from this well for drinking purposes, more especially by the families in the three nearest cottages.

During the latter part of the current season a spring at the farm house has been drawn upon. It is in a spring house, the water flowing from the bank out of the limestone.

At the Chartiers Creek pump house there is a drilled well deep and connected up to the pump. The machinery is old. The water raised from this well has an odor and disagreeable taste and the supply is limited. At the pump house there is a 75,000 gallon circular, brick pump well into which the deep-seated water is delivered and from whence, by a second pumping engine, the water is forced into the distributing system of the institution. This latter pump may also draw water directly from the creek and deliver it into the system. Whenever the Morganza Run supply is insufficient, the driven well is resorted to and finally raw creek water is used. Any surplus pumpage overflows from the pipes into the distributing reservoirs on the hill.

On the hill adjacent to the twin distributing reservoirs is a large reservoir approximately one hundred feet square, with sloping sides, and thirteen and one-half feet deep. It is brick lined. This structure is water tight and hence is not in use. The capacity on a twelve foot basis is slightly in excess of five hundred thousand gallons.

The watershed of Morganza Run above the intake dam has an area of about two square miles and on it there are twelve dwellings, all occupied but one. Nine of the estates are farms. There are quite a number of oil producing wells on the watershed and new wells are being drilled from time to time.

THE TYPHOID FEVER OUTBREAK OF 1908.

The institution has witnessed considerable typhoid fever during its thirty-two years' existence at Morganza. Three times it has shown in epidemic form. The attending physician reports 70 cases for 1898, 60 cases for 1903, 9 cases for 1907 and 40 cases for the current year. With a few cases occurring in other years, the total has been nearly two hundred cases during the last ten years, the cause of which has never been determined.

On July 12th, 1908, the first case appeared in Cottage D, where the boys average fifteen years of age. In the following table the date of onset of each case and the location of cottage in which the patient resided are shown:

LOCATION BY COTTAGES.

1908.		Cottage.	D	F	C	B	A	E
Date of Onset.	No. of Cases.	Ave. age of boys.	15	18½	14	13½	11	17½
July 12,	1		1					
Aug. 1,	2					1		1
Aug. 2,	2						1	1
Aug. 3,	3						1	2
Aug. 6,	1						1	
Aug. 7,	2					1		1
Aug. 8,	4						3	1
Aug. 9,	4				1	1	1	1
Aug. 10,	3					2		1
Aug. 11,	2					2		
Aug. 12,	2						1	1
Aug. 13,	2							2
Aug. 14,	2					1	1	
Aug. 15,	1							1
Aug. 17,	1						1	
Aug. 18,	1					1		
Aug. 19,	1					1		
Aug. 20,	1						1	
Aug. 21,	1					1		
Aug. 23,	2						2	
Aug. 26,	1				1			
Aug. 29,	1							1
	40		1	0	2	11	13	13

During the time covered by the table and the outbreak, Morganza Run water was generally supplied to the buildings and the two principal springs were in general use for drinking purposes. It will be noticed that no cases occurred in the girl's cottages or among adults, so the infection was not likely to have come from any food or water supply in general use. The milk supply was run down and found

to be pure. If the conclusions be correct, the Morganza Run and the two principal springs are relieved from suspicion and there remains Lily Spring to examine.

It will be noted that the cases occurred in the cottages supplied by drinking water partly from Lily Spring. Cottage E is nearest the spring and in it there were 13 cases, and there were 13 cases in Cottage A, the next nearest building. There were 11 cases in Cottage B, which is the third from Lily Spring. The other three cases were in the buildings further removed. It appears the epidemic was confined to the users of Lily Spring because in Cottages E, A and B the boys had daily access and drew water from Lily Spring as previously described. The dates of onset indicate a weakened infection and a continual recurrence to the poison. It is such an outbreak as would be expected where a number of families used infected water from a spring week in and week out. The type of the disease was the mildest form. There was one death only. The investigator would naturally look for a constantly polluted source of non-virulent kind and it is believed that the Department has discovered such a source of infection in the sewer previously mentioned and distant 75 feet from the spring.

Every occupied estate on the watershed was visited. No typhoid fever was discovered. During the previous year there was one case on the shed.

The first case on July 12th was located in Cottage D, at the end of the main sewer line. During the first week of the August outbreak the main sewer was opened near Lily Spring by the Superintendent and the structure was found to be in a leaky condition and immediately Lily Spring was put out of commission permanently by cementing up the well. Its use had been prohibited August 2nd on suspicion. During the middle of the month, while excavations were being made for the basement of one of the new cottages over the main sewer, distant about 250 feet from the spring, it was discovered that every joint was broken in a distance of about 80 feet, indicating that a similar condition may obtain throughout the entire sewer line. Closer inspection revealed that the joints on the bottom had never been properly cemented. When it is recalled that such a main sewer passed 15 feet above and 75 feet distant from Lily Spring and that the structure is porous and partly filled earth, the connection between the infection discharged into the sewer line from Cottage D on and prior to July 12th, and the subsequent infection of Lily Spring followed by the daily onset as reported can be understood.

A hole was dug in the porous soil near the sewer and a salt test was applied, showing that 12 hours' time would permit the passage of the salt water into the spring. Hence sewage from the sewer pipe could pass through in this time.

A sample of water was taken, after the beginning of the typhoid cases, from the spring in the grove, from which the drinking and cooking water was obtained. This sample was analyzed to show the normal chlorine in the vicinity. The water contained seven parts per million of this salt.

Two samples of water collected from the spring below the sewer before the salt test was applied at the hole artificially dug, showed 90 and 95 parts per million of chlorine respectively. After the salt was applied to the hole the chlorine in the sample tested showed much higher, as will appear in the following table. Both tests of the spring water prior to and subsequent to the application of the salt test showed that the spring water was contaminated with sewage.

TESTS FOR CHLORINE IN THE SPRING BELOW THE SEWER.

No. of sample.	Chlorine, Parts per million.
1,	95
2,	200
3,	110
4,	220
5,	110
6,	120
7,	110
8,	130
9,	110
10,	110

A bacteriological examination of Lily Pond water was made. This analysis showed 80,000 bacteria per cubic centimeter and 33 coli communis per cubic centimeter.

No further proof should be wanted than these results to establish the certainty that the spring was polluted by sewage from the sewer. It may be readily seen how the disease in Cottages B, A and E came from the one case in Cottage D. Sewage from all the cottages passed the point of probable pollution. The infectious matter from the typhoid fever patient in Cottage D escaped from the sewer on or before July 12th, percolated through the ground and reaching the spring after a while in a weakened state of potentiality. This accounts for the delay in the onset of the disease in subsequent cases and the mild form of the fever.

It was concluded by the Institution and the State authorities that an improved sewerage system and an improved water works system were demanded at the Institution.

REMEDIES.

Plans for a new impounding reservoir above the present intake on Morganza Run and for the filtration of the Institution's water supply were immediately prepared by the Institution, and were submitted to the Commissioner of Health for approval. The report on these plans appears elsewhere in this report in the report of the Engineering Division under the heading of "Permits for Water Works," issued by the Commissioner of Health.

The Commissioner of Health advised the Board of Managers to obtain an adequate appropriation from the Legislature for the erection and completion of the impounding reservoir, filtration plant and proposed changes and improvements to the distributing system, including an additional pumping outfit, on or before the close of the season of 1909.

Furthermore, it was enjoined by the Commissioner of Health that all existing and present sources of water supply, excepting the filtered Morganza Run water, shall be discontinued and the pumping engines in connection therewith shall be dismantled.

Furthermore, the Board of Managers have been requested to maintain a sanitary patrol of the watershed. Every occupied estate shall be inspected at least once monthly, all nuisances and menaces shall be noted and promptly reported to the State Department of Health.

In November plans for outfall sewers and sewage disposal works were submitted to the State Department of Health for approval. Said plans provide for the discontinuance of the 8 inch and 15 inch sewer outlets into Chartiers Creek and the substitution therefor of a modern sewage treatment plant to be located on the neck of land in the bend of the creek opposite and west of the said outlets. The site selected is elevated about 20 feet above the creek and is remote from any settlement. Here it is proposed to erect works to treat 100,000 gallons of sewage per day. The description of the plant is set forth in a decree of the Commissioner of Health, appearing elsewhere in the report of the Engineering Division under the general heading of "Permits for Sewerage," issued by the Commissioner of Health.

READING EPIDEMIC.

Under directions from the Commissioner of Health, the Chief Engineer of the Department went to the city of Reading early Monday morning, November 30th, to make investigations relative to the cause and prevention of the further spread of typhoid fever in that city in so far as the public water works and sewer system were concerned.

He accompanied the Chief Medical Inspector of the Department, these two representatives of the Commissioner being sent to Reading to assume the local direction and control of the typhoid fever situation and to execute all orders issued by the Commissioner of Health. They were in constant telephonic communication with the head of the Department. On several occasions the Commissioner directed affairs while on the ground in Reading. In the following pages may be found the history of what was done by the Engineering Division to help stamp out the epidemic and to afford protection against a recurrence of the disease in epidemic form.

GENERAL CONDITIONS.

The city of Reading owns its water works system. The sources are principally from surface supplies. Two of the sources are filtered. The others are supplied in their raw condition to consumers. A detailed description of the water works system is essential to a thorough understanding, by laymen or by experts and public officials charged by law with the responsibility of operating and maintaining water works systems, of the distribution of typhoid fever cases, the preventive measures which were adopted during the epidemic, and the permanent measures which are to be imposed upon the municipality to prevent epidemics of a water-borne nature.

Reading is the fourth city of Pennsylvania in size and importance. It is a community of varied manufacturing interests with a population of about 98,000 estimated, rapidly growing and destined to have double the number of residents in all probability. It is located along the east bank of the Schuylkill River, which flows in a generally southerly direction to the Delaware River in the city of Philadelphia, distant about sixty miles. Philadelphia obtains a portion of its public water supply from the Schuylkill River and several municipalities on the banks between Reading and Philadelphia do likewise.

Reading has a separate system of sewers and is now engaged in constructing a modern sewage purification plant, capable of treating all of the sewage of the city. The municipal territory is confined by the topography to the land between Mount Penn on the east and the river on the west, and on the south by the Neversink Mountains. North there is considerable territory for expansion.

Coming down between Mount Penn and the Neversink Mountains is a stream known as Rose Valley Creek, and it is in this drainage area in a valley to the east of Mount Penn, between it and Mount Washington in Lower Alsace Township, that a reservoir has been constructed and a filter plant erected known as the Egelman supply.

East of these mountains is an extensive valley drained by Antietam Creek, which stream flows in a general southerly direction and empties into the Schuylkill River several miles below Reading and on its upper waters in Lower Alsace Township there has been erected a dam, forming Antietam Lake, which is one of the sources of Reading's public supply.

There is a stream called Bernhart Creek, which rises north of Deer Path Hill, (part of the Mount Penn range) and flows in a general southwesterly course through Muhlenberg Township and a part of the city of Reading to the Schuylkill River, and on this creek in said township, about one mile north of the city, has been constructed a dam forming what is known as Bernhart reservoir, which is another source of supply to the city.

The sources of supply to the public in the city of Reading are owned, operated and maintained by the municipality. In the order of acquirement they are as follows:

Hampden Springs,
Egelman,
Bernhart,
Antietam,
Hampden Drift,
Maiden Creek,

These sources, fully described hereinafter, are more or less interchangeable. The Hampden Springs supply is now delivered into the Hampden reservoir. The Egelman supply is filtered and delivered primarily to a district served by this particular water, the surplus going into Hampden reservoir. The Bernhart supply is at present unfiltered, but a sand purification plant is in process of erection. This water is supplied by gravity to the low service distributing district in the city. In this district are located the Penn Street reservoirs in which the deficiency is made up by water from the Antietam filters. The Antietam supply is filtered and furnished primarily to a district served by these waters. The Hampden Drift water discharges into Hampden reservoir. These various sources are supplemented by the Maiden Creek supply which at the present time furnishes over sixty per cent. of the water to the city.

HAMPDEN SPRINGS SUPPLY.

These springs, two in number, were the original sources belonging to the Reading Water Company, which company was acquired by the city of Reading in 1865, since which time the public water works has been a municipal plant.

They are located above the occupied districts of the city, on the side of Mount Penn, about opposite Spring Street extension. Formerly iron ore was mined from Mount Penn and the water flowing from the two drifts were collected into a masonry basin about eight feet square supporting a stone superstructure kept under lock and key. From this basin at the present time a six inch gravity pipe line delivers water into Hampden reservoir. A meter has been inserted in this pipe line and the flow from the springs is measured daily. The average daily supply thus measured for the fiscal year 1907-1908, ending April first, was 104,111 gallons. There are no known sources of pollution; the mountain is unoccupied except by a hotel at the summit.

HAMPDEN DRIFT.

The Hampden Drift was made by the city driving a tunnel into Mount Penn on the western slope at about the same elevation as the Hampden Springs for the purpose of augmenting the ground supply. No storage whatever is attempted at the mouth of the drift. The water is collected in a four inch pipe and delivered directly by gravity into Hampden reservoir. The average daily flow for the year ending April first, 1908, was 15,615 gallons. A stone bulk-head is constructed at the mouth of the tunnel provided with doors securely fastened.

EGELMAN SUPPLY.

The Egelman source is yielded from a surface area of 0.6 square mile high up in the mountain. During the fiscal year ending April first, 1908, this supply furnished 1.78 per cent. of the total amount of water supplied to the city. The

average daily supply from this source was 217,992 gallons. On the watershed there are four occupied estates containing a total population of eighteen. The water is collected in a reservoir having a storage capacity of 6,990,000 gallons. The surface area of the water is 2.4 acres. The pond is formed by earth embankments built across the valley of the stream, one embankment being contiguous to Hill Road and the other at right angles to it. The inside slopes of the reservoir are both of stone. The embankment contains a stone masonry core wall. The overflow from the waste weir passes through a thirty-six inch brick drain laid in Hill Road to a natural water course. The stream then has a rapid descent and its course is through a public reservation known as Mineral Springs Park, owned and maintained by the city. At the foot of the mountain in this reservation is the noted Mineral Springs Tavern supplied with Egelman reservoir water, but elsewhere in the park the visitors obtain drinking water from numerous springs outcropping on the eastern slope of Mount Penn. These springs are pipe and water is obtained by holding a glass under the flowing stream issuing from the end of the pipe.

Immediately above the reservoir there is a subsidence basin, small, built in the same manner and being about one-half the size of the storage basin. Water flows into it from the main stream and also by means of an open ditch gatering the surface wastes from the boulevard and the district west of the reservoir. Pipe connections are so arranged that subsided water may be delivered directly to the filter plant below. On Hill Road opposite the reservoir are located the Egelman filters. The capacity of this plant is 500,000 gallons per day. It has been in successful operation since June 11th, 1903. Prior to that time the water was supplied in its raw condition to the town, the service being in use when the city acquired the water works.

The filters are of the open slow rate type. There are two of them built side by side, each 40 feet wide and 55 feet long and 9 feet deep. The bottom is concrete and the sides of brick and stone. The underdrainage system for each unit comprises an eight inch terra cotta main drain laid in the centre of the bed lengthwise and having four inch laterals on either side on parallel rows 10 feet on centres. Around and over these drain pipes are placed to a depth of twelve inches select gravel of different sizes, ranging from two inches to 1-16 of an inch in diameter, the smaller pieces resting on top. Over all is placed four feet in depth selected Delaware River bar sand. The sides of the filter beds from the surface of the sand down are not vertical. They are stepped. The maximum depth of the water and normal height is three feet above the surface of the sand, and each unit is kept flooded to this depth when operated. The water is conducted from the Egelman reservoir or from the settling basin as desired through a twelve inch and ten inch pipe, respectively, both connected in Hill Road. On the twelve inch supply pipe between the connection and aerators, there is a by-pass ten inches in diameter, provided for the introduction of raw water into the town service if occasion should require. Before delivery on the filter bed the water is first aerated by being passed up through two vertical pipes, which are funnel-shaped on top over which the water flows and falls into a circular perforated pan and through it to the surface of the water in the aeration chamber. This chamber is of masonry construction eight feet wide by fourteen feet long. From it water is conducted by eight inch pipes to an independent line to each unit. The admission of water is accomplished in the customary manner and the height is controlled by a float valve operated in a chamber built for the purpose at one end of the aerating chamber.

Filtered water is conducted to the clear water basin which is a masonry structure 12 feet by 15 feet, interior dimensions, and 10 feet deep. The supply pipe to the town begins at this basin. The feed pipes from the filters are independent lines eight inches in diameter, and on each line is placed a Venturi meter. By means of this recording apparatus and other apparatus located in the gate house built over the clear water basin, the height of the water in the filters, the loss of head, rate of filtration and height of water in the clear water basin are noted daily and accurate reports kept. The caretaker lives in the dwelling nearby, owned and provided by the city for the purpose. The property about the plant and reservoir in control of the Department amounts to thirty-one acres.

Facilities for draining any part of the filter plant and the supply reservoir and storage basin are afforded. The blow-offs are in every instance into the paved storm water channel or run at or below Hill Road.

A special arrangement is provided at each filter bed for the rapid emptying of the water above the sand surface, and also for the removal of ice, both going to the run. These filters were built to obviate any pollution of the drinking water and to afford a constant clear supply to the Egelman District. On the watershed adjoining the city property there is a picnic ground of about one acre, where several hundred people gather on special occasions. The sewage is disposed by means of cesspools. The water has a wide range in turbidity. Usually it is quite clear, having an average turbidity of five, but sometimes it reaches as high as one hundred and twenty for the subsided water. This was during a spring freshet. The turbidities are read once a week. The raw and filtered waters are analyzed weekly.

Since April first, 1908, the average of the weekly tests reported by months have been as follows:

	Raw.	Filtered.	Pct. Removal.
April,	234	2.2	99.1
May,	512	3.2	99.4
June,	612	1.8	99.7
July,	434	3.9	99.1
August,	530	4.1	99.2
September,	676	1.8	99.7
October,	384	1.1	99.7
November,	247	2.0	99.2

The above figures are of water bacteria present in the raw and filtered water.

The filter beds are scraped on the surface and the dirty sand removed and stored for washing. The scraping is done once every two weeks or so on the average, but during the last summer about once every month was sufficient because of the lack of rain and low turbidity.

On July 15th, filter bed No. 1 was resurfaced; that is, the dirty sand was scraped off and the accumulated dirty sand was washed and replaced in position in the filters, and on July 21st, filter bed No. 2 witnessed the same operation. After a bed has been drained and cleaned the sand is back-filled with water from the filtered water well to a few inches above the sand, and then the raw water is applied.

The rate of filtration varies from 6.15 million gallons per acre per day to a minimum of about one million gallons per acre per day, the rate of filtration being determined by the rate of consumption in the water district. Because of the lack of storage of filtered water, the filters have to be speeded up to meet the demand of consumption in the water district. There have been times during the cleaning operations while one filter unit was out of commission, that unfiltered water had to be by-passed and mixed with the water being filtered by the other unit to meet the demands in the town. This operation occurred on July 14th and 15th, probably, of the current year.

The intention has been to store filtered water in the Buttonwood Street reservoir. The high service district at present supplied direct and exclusively from the Egelman filters embraces approximately that porton of the city lying east of Twelfth Street, and south of Douglass Street, as far as Mineral Springs Road, being the higher portion of the city territory on the slopes of Mount Penn. Also the high land on the opposite side of Rose Valley Creek on the slopes of Neversink Mountains, this area being south of Cotton Street, and east of Sixteen and a Half Street. Within this district there is a resident population estimated to be 3,600, who consume a total daily average of 218,000 gallons of water. The Buttonwood Street reservoir when completed will be used as the distributing reservoir for this high service district. Its capacity is 1,022,000 gallons. It is built on the side slopes of Mount Penn opposite the end of Buttonwood Street, and is formed by excavations and embankment. The inside, bottom and slopes are lined with cement concrete. The reservoir is not in service although built in 1895. There are cracks in the lining through which water escapes rapidly. The plan is to repair the leaks, cover the reservoir and to deliver the water direct from the filters to this basin for distribution. The elevation of the water level is about 36 feet below the water level in the filter water basin at the filter house. The level of this storage above the high service district is sufficient to give ample pressure for all purposes.

BERNHART SUPPLY.

The Bernhart reservoir has a water surface of 13.3 acres, holds 42,000,000 gallons when full to its maximum depth of 21.3 feet and is formed by means of an earth embankment dam containing a brick core wall. The spillway is of stone backed on the inside with puddle clay and earth filling, and the side slopes of the entire reservoir are nearly all paved with stone. It was originally the site of a mill pond acquired by the Reading Water Company, and in use as a water supply at the time the city purchased the works. Since then a new dam has been built at the site of the old dam and later enlarged. It is now about 225 feet long across the valley, 45 feet of which comprise the waste way. In this dam is located the gate house. Water from the lake is delivered into the gate house through two 30 inch pipes, one near the bottom and the other about half way to the top. On the opposite side leading out of the gate house toward the city is the gravity supply main, 30 inches in diameter. The vertical screens are placed midway in the gate chamber, between the inlet and outlet pipes. A 16 inch blow-off pipe is also provided at the gate house by means of which the entire reservoir may be emptied. The watershed has an area of 2.56 square miles. On it there are known to be 55 occupied estates. The territory is rural and hilly and about one-half under cultivation.

Bernhart Creek water is first received into a settling basin at the upper end of the reservoir. This basin is made by excavations and earth embankment with a masonry core wall and has an area of about one acre. The water first passes through this basin before entering the reservoir, but there is an arrangement af-

forded by means of which the storm water is sent around through a 40 inch masonry conduit extending along the southern shore of the reservoir, a distance of about 1,600 feet, to the creek below the main dam. There are several flowing springs in the bottom of the reservoir near its upper end, and also two in the swale north of the reservoir. The latter are walled up on the sides and the water is conveyed by pipe or open channel to the lake. At a point about middle of the reservoir on the south side there is a 24 inch inlet through which water from Maiden Creek is delivered to the Bernhart supply.

The reservoir is used for storage for the low service district of the city. The spillway is 40.3 feet above the Penn Street reservoirs in the town on the same system. The latter serve as compensating basins only. During the year ending April 1st, 1908, this supply furnished 20.54 per cent. of the total amount of water furnished to the city. The average daily supply from the Bernhart source was 2,518,754 gallons by accurate measurements at a Venturi meter located on the gravity supply main immediately below the reservoir. It did not include Maiden Creek water, as none was pumped into the Bernhart reservoir for that year, but during the current season the water pumped into the reservoir from the Maiden Creek supply has been as follows:

Up to September 16th, ...	
September 16th and 17th, ...	27,759,938 gallons
October 22nd and 23rd, ...	16,242,183 gallons
November, ...	
December 5th, ...	11,572,948 gallons
Total, ...	55,575,069 gallons

The property in control of the city at the Bernhart reservoir embraces 38 acres, including that occupied by the lake. The caretaker is provided with a residence on the ground. Besides acting as caretaker and patrolman he records the readings of the Venturi meter and assists in keeping the lawns and grounds in satisfactory condition.

The low service system of distribution in the city comprises all of the lower lying districts, principally east of Eighth Street, and south of Buttonwood Street, to the river, and resident in this territory, which is the shopping district, there are 19,400 people, estimated. Included in this estimate is the district in the northwestern part of the city between Kutztown Road and the river, known as North Reading, and comprises possibly 300 families, all supplied exclusively by the Bernhart water, although there is a valve connection with the Maiden Creek force main. The 30 inch supply main from the gate house at Bernhart reservoir terminates a short distance below the dam and connected with it is a 16 inch pipe and a 12 inch pipe, the latter reducing to 10 inch before it reaches the city. The 16 inch pipe passes down to and into Kutztown Road, making a connection with Ninth Street, within the city. The ten inch line is the older and passes in the city across private land and originally supplied the Penn Street reservoirs. It is now disconnected from the reservoirs by means of a closed gate at Spring Street, opposite the Hampden reservoir. At the present time no water is being delivered through the ten inch pipe from the Bernhart reservoir. A branch connection to the 16 inch main in Ninth Street is open and water could flow back through the ten inch pipe from the 16 inch were there any draft or occasion for such flow, but on Marion Street, in which the connection is made, there are houses and water consumers so that there is some movement of the water. Halfway the length of Marion Street, there is a six inch valve connection with the Hampden reservoir supply, and through this connection wide open Hampden reservoir water is being supplied into the low service system at this point.

On either side of Eighth and Ninth Streets, the properties are connected to the sixteen inch Bernhart service main so this narrow strip of land is included within the low service system.

PENN STREET RESERVOIRS.

About three and a half miles from the source in the town at the head of Court Street are the Penn Street reservoirs, in use as the low service distributing basins. They have a combined capacity of 5,800,000 gallons. They are built near the foot of Mount Penn and are made in excavation and embankments. The bottom and sides are puddled with clay and with stones laid in mortar. These structures were the original distributing reservoirs of the Reading Water Company. They have been enlarged and improved by the city. The north basin is 225 feet by 107 feet in plan at the bottom line, and the south basin is 185 feet long and 147 feet wide at one end and 97 feet wide at the other end, bottom measurements. The slopes are slightly less than 45 degrees and the total depth of the north reservoir is 13.7 feet and the south reservoir 15.9 feet, their respective capacities being 2,650,000 and 3,150,000 gallons. The water is admitted from the Bernhart reservoir at the bottom through the outlet pipes. At the high water mark there is an overflow pipe connected to the sewer. Drainage of the basin is accomp-

lished by pipe connections to the outlet which connections terminate into a street gutter, where the water has to flow on the surface to the nearest sewer inlet. Besides water from the Bernhart reservoir direct and from the Hampden reservoir at Marion Street, some water from the Antietam intermediate service is admitted to the Penn Street reservoirs at times of large consumption in the low district. There is a pressure regulator between the two services on the ten inch pipe at Chestnut and Eighth Streets, which during large drafts in the low service admits water from the Antietam filters. Should the Antietam supply be shut off at any time, the Hampden reservoir water would necessarily be drawn upon at the Penn Street reservoirs and Eighth and Chestnut Streets, in the event of large consumptions in the low service district.

The Water Board maintains a park about the Penn Street reservoirs, there being four acres under the city's control here. Back of these grounds are the work shops and storage yard, and in front of the reservoirs on Eleventh Street is the Executive Building of the water works. A patrolman and night watchman is always on duty.

ANTIETAM SUPPLY.

The Antietam supply was provided by the city. A dam was built in 1880 by the Water Board near the site of a mill pond on Antietam Creek in Lower Alsace Township, from which pond a water pipe had been laid previously. The dam is about 225 feet long and 58 feet high. It is built of masonry on the down-stream side and puddle clay and earth filling on the up-stream side. The inner surface is paved with loose stones. This structures creates a lake of 15.6 acres, containing 101,000,000 gallons. The maximum depth of water is 45 feet and the average 20 feet. The surface of the water is 170 feet lower than the Egelman filters and 125 feet higher than the Bernhart reservoir, and 65.2 feet above the Hampden reservoir. The drainage area of this supply is 5.44 square miles. It is largely under cultivation and contains 72 occupied properties and a population of 368. During the year ending April 1st, 1908, this supply furnished 26.35 per cent. of the total amount of water supplied to the city. The average daily draft was 3,231,033 gallons. The city owns and controls 276 acres of the watershed. Improvements have been made along the shores and some stone paving on the sides has been done. On the main creek and principal tributary, both entering Antietam Creek, there are small subsidence basins built to separate the heavy sediment brought down from the steep slopes of the watershed during showers. Considerable accumulation is removed from these basins every eight or ten years. In the lake near the dam is the gate house, from which there is a 24 inch pipe extending through the dam to town. At the low point there is a 30 inch drain pipe blow-off with a gate on it in the bulkhead built in the toe of the dam. The outlet pipe at the gate house is arranged so that water can be taken at three different heights. The waste way is excavated out of solid rock and its width is 44 feet. In a house owned by the city resides the caretaker. The rainfall records are kept here and also at the office at the Penn Street reservoirs. The watchman patrols the shores of the lake and property owned by the city.

Near the city in the borough of Mount Penn are the Antietam filters, 50 feet below the surface of the water in the lake. The water is conveyed to the filters by a 24 inch pipe, reducing to 20 inch. Part of the line is in tunnel.

The filters were built primarily to remove bad tastes and odors from the supply. The plant was put into commission in May, 1905. Its capacity is three and one-half million gallons per day. There are three sand beds uncovered and of the slow rate type, each bed is 108 feet wide, 144 feet long and 9 feet deep. The water on the filters is 15 feet above the Hampden reservoir. The filter site embraces six acres of land along the south side of Perkiomen Avenue. The neighborhood is building up rapidly. The supply main terminates in an inlet chamber supporting a stone house in which is set up the automatic apparatus which operates the inlet valves. Contiguous to this inlet chamber is an open receiving basin of concrete and masonry construction, 35 feet square, in which are placed eight aerators, four in each parallel row. The construction of these is similar to the aerators described at the Egelman filter plant. From this basin the water is conducted onto the filter beds at discretion by means of valves and piping. These filters are built side by side and said distributing basin is located midway and at the end of the middle filter bed. The construction of each filter unit is precisely the same as that mentioned in the description of the Egelman filters, except the fact that the walls at and below the sand surface are not stepped down, but have a uniform slope, and that the main underdrain pipe is relatively larger. The removal of ice and operation is similar also. At the farther end of filter bed No. 1, adjacent to Perkiomen Avenue, is the clear water basin and regulator house in which are set up the various apparatus for regulating and recording the operations of the filter plant. There is a by-pass 20 inches in diameter around the filter beds which permits the raw water to be supplied to the distributing district in the town without being filtered. The valve has never been opened since the plant was put into commission. Ample storage for dirty sand is provided for on the property. A 30 inch storm sewer has been built around the end of filter No. 3 to conduct surface water from a natural water

course in the borough, and into this drain is also discharged the waste water from the sand washing operations. The storm drain discharges into a 15 inch street sewer which takes all the drainage from the filter plant and by-passes the surplus storm water into a natural water course.

The normal capacity of each filter bed is 1,750,000 gallons per day, so it is reported.

During the current season beginning April first, the results of the weekly tests of bacteria in the raw and filtered water were as follows:

	Raw.	Filtered.	Pct. Removal
April,	185	22.7	87.7
May,	562.5	32.1	94.3
June,	225	15.1	93.3
July,	450	20.6	95.4
August,	261.2	31.0	88.1
September,	437	15.2	96.5
October,	185	8.7	95.3
November,	315	8.6	97.3

The range in the turbidity of raw water for the past two years was from 5 to 200, practically all of which was removed by the filters. The period between scrapings for the current year was approximately thirteen days, and the operation of scraping, washing sand and refilling beds is similar to that at the Egelman filters. The beds were refilled with washed sand as follows:

No. 3, ... from May 11th to 16th.
No. 2, ... from May 25th to 29th.
No. 1, ... from June 15th to 19th.

The Antietam filters are operated at a more uniform rate than the Egelman filters. The average rate observed at noon for the current year has been 2,800,000 gallons per acre per day. The maximum rate observed at that time has been 5,200,000 gallons per acre per day. The maximum rates occur when one or more of the units are put out of commission for scraping or refilling. Whenever a unit is put into commission after a period of rest, the rate of filtration begins at about 300,000 gallons per acre per day and gradually increases to the normal. As the surface of the filters clog the rate gradually diminishes until it becomes necessary to scrape the bed in order to secure the greatest yield of filtered water between scrapings.

With Antietam Lake full of water, the discharging capacity of the supply pipe to the filters is not over three and a half million gallons each twenty-four hours. Therefore, it is seen that until more supply main capacity is obtained, the filter plant is adequate in size to handle all the water that can be delivered to it. This does away with the necessity for storage of filtered water while the system is operated as at present.

The filtered water is supplied to the intermediate distributing service. While this extends over a larger percentage of the city, nevertheless the smaller portion of it only receives Antietam filtered water. The pipes are open and there is no line or boundary in the intermediate service marking the district which receives Antietam Creek filtered water and the district receiving Maiden Creek unfiltered water. The distribution of these two waters depends wholly upon the amount of consumption in each of the two intermediate districts. Naturally the part of the city nearest the filters receives filtered water and the parts remote from the filters are supplied by Maiden Creek water. That part of the city lying east of the low service district and south of the Penn Street reservoirs, and not supplied by the high service, undoubtedly is furnished with Antietam water, but at times during the small consumption in this part of the service, possibly Antietam filtered water passes into the supply pipes east of Eighth Street as far north as Buttonwood, because the pressure is slightly greater, the Antietam filters being 15 feet above the Hampden reservoir.

It is estimated that there are 24,900 people residing in the intermediate district supplied by Antietam water. The daily consumption of about three and one-fourth million gallons is quite evenly distributed throughout the twenty-four hours of the day. There is a Venturi meter on the main pipe leading to the filters, and the records of these measurements show there is very little fluctuation on the average between the day and night consumption.

MAIDEN CREEK SUPPLY.

The water needed in the city in excess of that furnished by the gravity supplies hereinbefore mentioned is furnished from Maiden Creek. This stream rises in Lynn Township, Lehigh County, and flows in a general southwesterly direction and enters the Schuylkill River at a point about six and one-half miles above the northern line of the city of Reading. This watershed comprises 210 square miles, the greater percentage of it being in Berks County. The land is generally in a high state of cultivation and in the rural districts there are upwards of 2,500 occupied estates. The Schuylkill and Lehigh Branch of the Philadelphia

and Reading Railway passes through the entire valley, crossing Maiden Creek at numerous points, and along which is the borough of Lenhartsville. The East Pennsylvania Branch of the same railroad, extending from Reading to Allentown, also traverses the southern portion of the watershed, and on it within the watershed is the borough of Fleetwood, and on a branch of the road in the drainage area is the borough of Kutztown. There are also numerous villages in the townships in the drainage area. Owing to limestone formation in a southern quarter of the watershed, Maiden Creek is an alkaline stream, although not so to a degree rendering the waters undesirable for a public supply. It is probably owing to this formation that the minimum flow of the creek is above the average yield of areas of this size. This source with storage is ample for the needs of a municipality several times greater in size than the city of Reading. On the south bank of the creek near its mouth, in 1889, the city erected a pumping station and to-day this supply furnishes about 60 per cent. of all the water consumed in the city. During the fiscal year ending April 1st, 1908, Maiden Creek furnished 50.35 per cent. of the total amount of water supplied to the city. The daily average was 6,172,655 gallons.

The pumping plant consists of three pumping engines, one being a triple expansion high duty engine of 15,000,000 gallons rated capacity; one being a 10,000,000 gallon compound duplex, high duty engine, and the other a 5,000,000 gallon low duty, compound, duplex engine. They are housed in one station. On the grounds owned by the city, comprising twenty-six acres, are two residences occupied by attendants. The sewage from these buildings is collected in a cesspool. Public water is furnished to all the dwellings. The bank of the creek has been walled up to retain the grounds. There are two ports through this wall below the high water mark. The upper one is covered by a coarse screen to keep out large floating matters. A 48 inch cast iron pipe extends about 35 feet to a circular screen chamber, in the centre of which are placed the vertical screens. Out of this chamber two 40 inch cast iron pipes extend to the pump house; each terminates in a pump well. Well No. 1 supplies water to the five million gallon pump and Well No. 2 supplies water to the ten million gallon pump. The former raises the water into a 30 inch force main, the original pipe line to the city, which reduces to a 24 inch main before the city is reached. The latter pumps directly into a new 36 inch force main having a pipe connection with the original line to town.

The other port admits water to an inlet chamber from which two 30 inch cast-iron pipes extend to a circular combined screen and pump chamber located just outside of the pump house. The 36 inch suction pipe of the fifteen million gallon pump is inserted here. This engine raises the water directly into the new 36 inch force main to the city. The low water mark of the creek at the station is elevation 238.35. The bottoms of the screen chambers are laid approximately four and one-half feet below this elevation. The floor of the pumping engine is 16.65 feet above the low water mark. During the freshet of February 28th, 1902, the water in the creek rose to the height of five feet six and one-half inches above the floor of the engine room and put the plant out of commission for three days. Ordinarily the large pump is kept in use, the others being held in reserve. Economy in pumping dictates this policy.

A statement relative to the amount of water pumped during the current year is given below. Water raised by the fifteen million gallon pumping engine:

April, 140,000,000 gallons, 11 days pump not operated.
May, 164,000,000 gallons, 8 days pump not operated.
June, 198,000,000 gallons, 4 days pump not operated.
July, 201,000,000 gallons, 6 days pump not operated.
August, 200,000,000 gallons, 5 days pump not operated.
September, 251,000,000 gallons, 3 days pump not operated.
October, 265,000,000 gallons, 2 days pump not operated.
November, 223,000,000 gallons, 8 days pump not operated.

Water pumped by the auxiliary engines:

April 24, ten million gallon pump, 10¼ hours actual operation, 3,266,000 gallons.
April 25, five million gallon pump, 5 hours actual operation, 1,163,000 gallons.
August 3, ten million gallon pump, 8 hours actual operation, 2,576,000 gallons.
August 4, five million gallon pump, 3¾ hours actual operation, 672,000 gallons.
November 12 ten million gallon pump, 2½ hours actual operation, 522,000 gallons.

The practice is to cease operating the engines only when the Hampden reservoir is full. As previously mentioned, some water is pumped into the Bernhart reservoir. Twenty-eight million gallons were so pumped in August and sixteen million gallons in September.

HAMPDEN RESERVOIR.

The Hampden reservoir is the intermediate distributing basin. Its capacity is 29,180,000 gallons. The elevation of high water mark is 190 feet above the floor of Maiden Creek pumping station. The structure is located at the foot of Mount

Penn at the head of Robeson Street. It is made in excavations and embankment. The bottom and sides are puddled and the slopes paved with stone. In plan at the bottom the dimensions are 450 feet by 237.5 feet. The side slopes are two to one and the depth 30 feet. There is a walk around the top of the embankment and an iron fence. On the property there is a watch house and a patrol is maintained day and night. There being no division wall, the entire reservoir has to be emptied when the deposits are removed. There is a drain pipe discharging into the street gutter in the neighborhood which is provided for this purpose. The water is delivered into the basin at the top or at the northeast corner and flows down in a flume fitted with projecting stones to effect aeration.

Force Main No. 1, a 30 inch pipe from the pump house for a distance of 11,687 feet and a 24 inch pipe for 22,048 feet, making a total length of 6.4 miles, extends to the Hampden reservoir. The line follows the Centre Turnpike almost a straight line to Centre Avenue in the city, thence it turns at right angles eastwardly in Richmond Street and Hiester's Lane to Kutztown Road, thence south in Kutztown Road for one block and eastwardly in Richmond Street to Thirteenth Street, and then turns at right angles and is laid in the latter highway seven blocks to Marion Street, where it passes eastwardly in said street to the reservoir.

The new 36 inch force main parallels the other in the same road to the city line where it ends, there being a cross connection nearby. It is the purpose of the city to complete the construction of this line to Fifth and Richmond Streets.

On the old force main outside of the city there are eight connections to private estates and on this force main in Kutztown Road at Adams Street there is a ten inch connection through which the city supplies water to the Reading Suburban Water Company, a corporation duly chartered under the laws of the State for the purpose of supplying water to the public in Muhlenberg Township. The village of Hyde Park lies along the Kutztown Road just beyond the city and the pipes of this company are laid in the streets of the village. The population approximates about 1,000 and possibly 50 per cent. of the people take the public water supply.

In the west embankment of Hampden reservoir midway of its length there is a screen well 7 feet by 9 feet in plan, provided with vertical screens. The water is admitted to this chamber through an open walled passage-way. Two sluice gates set in the walls and at the end of the passage-way, one at the bottom and the other at mid-depth, deliver the water from the reservoir to the screen chamber. The outlet from the chamber comprises two 16 inch cast-iron pipes connected to a 24 inch pipe a short distance beyond the reservoir. The city owns and controls 37 acres of ground here and it is parked and maintained similarly to the grounds at the Penn Street reservoirs.

The intermediate service district supplied by Maiden Creek water either directly from the force main or from the Hampden distributing reservoir, embraces approximately all of the land in the city between the river and Mount Penn lying north of Buttonwood Street and as far as Seventh Street and north of Penn Street, east of Eighth, with the exception of the higher lands on the side of Mount Penn on the high service and the territory adjacent to Eighth and Ninth Streets, and the district of North Reading supplied by the low service. In this intermediate district reside 47,500 people, estimated, or about half of the entire population of the city. The Reading Railroad shops and yards, large iron and steel mills, and numerous manufacturing plants are in this area, also one of the best residential sections.

TYPHOID FEVER PRIOR TO 1908.

On Egelman Watershed. When the Maiden Creek source of water supply was introduced into the city, none of the other sources were being filtered.

The Egelman filters were installed in June, 1903. The Department has not been able to obtain evidence of any typhoid fever cases having occurred among the 18 individuals living on the watershed either prior to or subsequent to the filtration of this supply. Nevertheless the water might have been contaminated at the public park, where picnic grounds are provided and used. There were 25 deaths from typhoid fever less in Reading during the year 1903 than during the year prior to the filtration of the Egelman supply.

On Antietam Watershed. The Antietam filters were installed in May, 1905. At least two cases of typhoid fever occurred on the watershed in 1899 and four cases in 1900. During this year 413 cases were reported in comparison with 189 cases reported for the preceding year. The infection might have been contributed through the Antietam supply. Subsequent to the installation of the Antietam filters there had been two cases on the watershed, one in 1907 and the other during the current year. There is no reason to believe that the epidemic under question bears any relation to these cases on the Antietam watershed.

On the Bernhart Watershed. A personal canvass of the 55 occupied estates on the Bernhart watershed showed that three cases of typhoid fever only have occurred during the last ten years, namely, 2 in 1905, and 1 in 1907. The large storage of the reservoir would prove a natural barrier to the spread of the infection through the distributing pipe system of this source. Typhoid deaths for the year 1905

in Reading and the number of cases reported were the lowest for any year. The rates, respectively, were 25 per 100,000 population and 183 per 100,000. The large storage on the Antietam service would also minimize the danger of infection from that watershed. During all these years raw Maiden Creek water had been furnished to the town without storage, except that afforded by the Hampton distributing reservoir.

In Reading. In the following table are given the number of cases and deaths of typhoid fever and the rate for eighteen years. Typhoid fever was present every month in the year for the last fifteen years. Occasionally the disease was in epidemic form. Prior to the current year the greatest number of cases reported in any one year was for 1900, namely 413 cases. The greatest number of deaths in any one year was 55 for 1902. Neither the cases nor the deaths reported represent the true situation with respect to the extent of the disease in the city, since not all the cases were reported and because typhoid fever in Reading has been of the mild type, so that the percentage of deaths to cases is relatively low. It is believed that 15 cases to each death would nearly represent the actual number of cases that occurred and in the table a column is given of probable number of cases for each year up to the current year.

TABLE NO. 1—TYPHOID FEVER IN READING FOR 18 YEARS.

Year.	Population.	Cases reported.	Probable cases.	Rate per 100,000.	Deaths.	Rate per 100,000.
1890,	58,661	----------	480	820	32	54
1891,	60,400	----------	435	720	29	48
1892,	62,260	----------	420	690	28	45
1893,	64 200	----------	390	607	26	40
1894,	66,200	265	450	678	30	45
1895,	68,200	178	420	615	28	40
1896,	70,200	258	540	769	36	51
1897,	72,300	139	360	497	24	33
1898,	74,400	296	675	907	45	60
1899,	76,600	189	555	724	37	48
1900,	78,961	413	600	759	40	50
1901,	81,200	266	525	646	35	43
1902,	83,480	243	825	988	55	66
1903,	85,800	256	450	524	30	35
1904,	88,160	167	435	493	29	34
1905,	90,560	166	345	381	23	25
1906,	93,000	221	510	548	34	36
1907,	95,480	245	615	644	41	43

On Maiden Creek Watershed. During this time there were specific pollutions of the waters of the creek. The following table shows the number of cases of typhoid fever for the last ten years on the Maiden Creek watershed.

TABLE NO. II—TYPHOID FEVER—MAIDEN CREEK WATERSHED FOR TEN YEARS.

Year.	Townships.	Kutztown borough.	Lenhartsville borough.	Fleetwood borough.	Total for boroughs.	Total for watershed.
1898,	5	5	----------	----------	5	10
1899,	9	5	----------	----------	5	14
1900,	2	5	----------	----------	5	7
1901,	10	5	----------	----------	5	15
1902,	37	5	----------	2	7	44
1903,	15	136	----------	1	137	152
1904,	14	5	----------	0	5	19
1905,	8	5	1	4	10	18
1906,	11	5	----------	0	5	16
1907,	28	15	----------	2	17	45
1908,	21	5	1	7	13	34
						374

It is necessary to analyze the distribution of these cases on the watershed in order to form an opinion of the relation between such cases and the occurrence of typhoid fever in Reading and as a basis for the conclusion relative to the source of the epidemic in Reading during the current year. The following table gives the water pumped from Maiden Creek into the Reading water works system each year since the creek was first used as a source of such public water supply:

TABLE NO. III—PUMPAGE OF MAIDEN CREEK WATER BY YEARS.

Year.	Million Gals. April to April.
1892,	658
1893,	1175
1894,	788
1895,	647
1896,	538
1897,	500
1898,	389
1899,	789
1900,	1293
1901,	704
1902,	1310
1903,	1396
1904,	1473
1905,	2027
1906,	2135
1907,	2259

The Maiden Creek pumping station was not put into commission until July 1892, so the pumping for the year 1892-93 was between July and April.

Maiden Creek is called Ontelaunee Creek above Kempton, in Albany Township. This is near the Lehigh County line and the creek drains most of the watershed in Lehigh County, although Kistlers Creek serves a small area and joins the Ontelaunee at Kempton. A mile below Kempton, Stony Run joins the main stream to the east and one mile further down Pine Creek enters from the west. The combined area drained by these four tributaries is 72 square miles. From this point Maiden Creek flows nearly southerly in a straight line for a distance of about 18 miles to the Reading water works intake. The watershed to the west is not far distant and all the main tributaries come from the east. Lenhartsville borough is on the main stream about 12 miles above the pumping station. The Schuylkill and Lehigh branch of the Philadelphia and Reading Railway passes up the valley by Lenhartsville and along Ontelaunee Creek into Lehigh County.

Big Sacony Creek enters the main stream at Virginsville, seven miles above the water works intake. It drains 55.3 square miles. Kutztown borough is about seven miles up stream on this branch. The entire watershed at Virginsville, of Maiden Creek and tributaries, is 115.5 miles. Hence the area directly tributary to the main stream below Pine Creek and above Sacony Creek is 28.2 square miles. Below this point the main stream has an area of 30 square miles directly tributary to it.

Willow Creek has a drainage area of 24.5 square miles. This stream comes from the east and drains all of the southern part of the watershed and on it is Fleetwood borough. The Bernhart East Penn Branch of the Philadelphia and Reading Railway passes through this borough and across the upper Sacony Creek area, a branch terminating in Kutztown. There is also a trolly line from Reading to these places. The mouth of Willow Creek is but a short distance above the Reading water works intake.

For 1907. For 1907 in the townships there were 28 cases distributed as follows: None on the uper watershed above Pine Creek; one on the main stream above Sacony Creek, 10 miles distant; and one on the main stream near Evansville and seven on tributaries of the main stream within 5 miles of the city intake.

On Little Sacony Creek there were three cases and on Big Sacony Creek and tributary 4 cases outside of Kutztown. The nearest case was 12 miles distant and the most distant one 15 miles from the city intake.

In the valley of Willow Creek outside of Fleetwood there were 12 cases, 8 of them being within 5 miles, 2 of them within 6 miles and the other 2 nine miles distant from the water works intake.

For 1906. For 1906 in the townships there were 11 cases distributed as follows: Two on the upper watershed above Pine Creek, upwards of 15 miles distant; 2 on the main stream 9 miles distant, and 1 on a small tributary 4 miles distant.

On Little Sacony Creek there was one case and on Big Sacony Creek two cases outside of Kutztown. The nearest was 11 miles distant and the farthest 15 miles distant.

In the valley of Willow Creek outside of Fleetwood there were three cases, the nearest 6 miles distant and the others about 9 miles.

For 1905. For 1905 in the townships there were 8 cases distributed as follows: Two on the upper watershed along Pine Creek, 15 and 18 miles distant; one on the main stream, 15 miles distant.

On Little Sacony Creek one and on Big Sacony Creek outside of Kutztown 2, the nearest being 12 miles distant and the farthest about 18 miles.

In the valley of Willow Creek outside of Fleetwood there were two cases, 4 and 8 miles distant, respectively.

For 1904. For 1904 in the townships there were 14 cases distributed as follows: Three on the upper watershed, the nearest being 15 miles and the farthest 21 miles from the intake.

On the main stream there were no cases.

On the Little Sacony Creek there were none, but on Big Sacony Creek outside of Kutztown there were five cases, the nearest 11 miles and the farthest 15 miles distant.

In the valley of Willow Creek there were 6 cases, all within 5 miles of the intake.

For 1903. For 1903 in the townships there were 15 cases distributed as follows: One on Little Sacony Creek, 14 miles distant, 2 on Big Sacony Creek, 12 miles distant.

Two were on the main stream, one and one-half miles distant, 10 on Willow Creek, 8 within 5 miles and 2 within 9 miles.

For 1902. For 1902 there were 37 cases in the townships distributed as follows: Six on the upper watershed above Pine Creek, 18 miles distant and one on the tributary, Moeslem Creek, 9 miles distant.

On Little Sacony Creek there were two 15 miles distant, and on Big Sacony there were 5, 4 being grouped about Kutztown. On Willow Creek there were 23, all of them being within 5 miles of the water works intake.

For 1901. For 1901 there were 10 cases in the township distributed as follows: One on the upper watershed, 18 miles distant, 4 on Big Sacony Creek, from 15 to 18 miles distant, 3 of them being above Kutztown. Five were on Willow Creek, the nearest one 1¼ miles distant, 3 of them within 5 miles and the other 8 miles distant.

For 1900. For 1900 there were two cases only in the township, one was in Blandon in Willow Creek valley, 4 miles distant and the other was in Lyons on Big Sacony Creek, three miles above Kutztown on the Big Sacony.

For 1899. For 1899 there were 9 cases in the townships distributed as follows: Three on the upper watershed over 18 miles distant, one on Little Sacony Creek, 16 miles distant, one on Big Sacony, 3 miles above Kutztown, one on Willow Creek at Blandon, 4 miles distant, and 3 on Moeslem Creek, tributary of Main Stream, 7 miles distant.

For 1898. In 1898 there were five cases. On the upper shed there was one, 20 miles distant, and four near Fleetwood on Willow Creek, 7 miles distant.

TABLE NO. IV—TYPHOID FEVER DISTRIBUTION IN ZONES OF FIVE MILE INTERVALS FROM THE WATER WORKS INTAKE ON MAIDEN CREEK FOR ELEVEN YEARS.

Distance in Miles.	Number of Cases.
0-5,	64
5-10,	43
10-15,	234
15-20,	29
20 plus,	4
	374

These cases by years are shown in Table No. 5:

TABLE NO. V.

Year.	Five Mile Intervals.					Total cases.
	0–5 Cases.	5–10 Cases.	10–15 Cases.	15–20 Cases.	20 plus. Cases.	
1898,	0	4	5	0	1	10
1899,	1	3	6	4	0	14
1900,	1	0	6	0	0	7
1901,	4	1	5	5	0	15
1902,	23	3	12	6	0	44
1903,	10	3	139	0	0	152
1904,	6	0	10	2	1	19
1905,	1	5	10	2	0	18
1906,	1	5	8	2	0	16
1907,	16	6	23	0	0	45
1908,	1	13	10	8	2	34
	64	43	234	29	4	374

Thus it will appear that were the cases recorded during the 1903 epidemic at Kutztown, namely 136, left out of the calculation, 27 per cent. of all the cases on the watershed occurred within a distance of 5 miles of the intakes and 45 per cent. occurred within 10 miles of the intake.

Of the three boroughs on the watershed, Kutztown and Fleetwood have public water works system.

At Lenhartsville. Lenhartsville has a population of 325 only; although the borough has an area of 64 acres, about 10 acres only are built up. The soil is red clay overlying a sandstone formation. The surface drainage is into Maiden Creek, on whose banks the settlement is located. The village presents a clean appearance; there is an organized Board of Health. In five cases kitchen water was piped to street gutters. Sewage is disposed of in privy vaults and there are some cesspools in use. Drinking water is obtained from wells and springs. It should be noted that two cases only of typhoid fever were reported for this borough during the last ten years.

TYPHOID FEVER AT KUTZTOWN BOROUGH.

This town has private sewers and a water works system. These constitute foci of infection of the Reading water works supply taken from Maiden Creek. The town is located by the course of the stream about 14 miles above the city water works. Its own drainage pollutes its own water supply.

Kutztown is a small manufacturing borough of about 1,600 population. The Reading and Allentown trolley line affords good transportation facilities to and from Reading. The borough is on Big Sacony Creek. Seven miles below, Sacony Creek joins Maiden Creek.

The industries include a shoe factory, employing about 165 hands and a small knitting mill, shirt factory, granite works, a creamery and two slaughter houses. In Maxatawney Township, on the banks of Sacony Creek opposite the borough, is the Kutztown Foundry and Machine Company, employing about 160 hands and the York Silk Mill Manufacturing Company, employing about 100 hands, and also a small shoe factory and a paper box factory.

The Keystone State Normal School was established in the outskirts of the borough about 1860 and has since been maintained partly by State appropriation. Including students, staff and help, there are from 560 to 860 people in attendance. During the vacation period in the summer there are from 10 to 50 persons at the school.

The main thoroughfare of the town is the old turnpike extending southwesterly towards Reading. Along this street are the stores and hotels and the State Normal School. It extends at right angles from the creek. It crosses the creek into the township to the north towards Allentown and herein the township is a suburban district in which 50 dwellings more or less were erected in the latter part of 1907, and the summer of 1908. The village is built principally on the gently rising ground extending from the creek southerly on either side of the main street. The surface drainage is entirely to the creek.

All the industries are located between a cross street named Noble Street and the creek, about 400 feet distant. The two slaughter houses and creamery are on the banks of the creek.

The Normal School is on a ridge back of the town and the drainage from it is into a small valley to the east which slopes to the creek above Kutztown. All the buildings within the borough with a few exceptions are within the area directly tributary to Sacony Creek.

The borough is on the edge of the limestone belt. The surface soil is quite retentive. In places there are deep deposits of clay. The town owns a large, modern brick school house and a municipal electric light plant. There are no public sewers. Some of the street gutters are paved with brick. It is understood that the assessed valuation is about $750,000 and that there is a municipal debt of about $30,000. The existing sewers are owned by private individuals.

Water Supply. The Kutztown Water Company established its system in 1899. The main pumping station is located on the south bank of Big Sacony Creek in Maxatawney Township, about a mile down stream from Kutztown and a mile up stream from the confluence of Little and Big Sacony Creeks. The principal source of the Kutztown Water Company is a small brook, known as Kemps Run, opposite the pumping station.

There is a small dam and intake across the run about 300 feet from its mouth. Above this intake the run has a drainage area of about 300 acres of occupied farm land. A six inch pipe extends from the intake to the pumping station. The latter is in the mouth of a ravine which extends from the creek about 1,000 feet southwesterly into the hills. It has a bottom several hundred feet wide and steep side slopes, but contains no surface stream. Slate is the underlying formation in the vicinity.

The station is a small brick building containing a steam boiler, two one-million gallon, horizontal, duplex, compound, pumping engines and a pump well sunk 26 feet deep in slate rock.

An independent open brick collecting well 20 feet in diameter and 24 feet deep is located just north of the pumping station, and 150 feet from the edge of Sacony Creek. It connects with the pump well in the pumping station. The six inch pipe from Kemps Run, provided with a valve at the station, discharges into this open brick well at an elevation of several feet above the water in the creek during normal stages. From a dry well some distance up the ravine south of the pumping station, a two inch pipe leads to the brick well. There was no flow from this pipe at the time of the Department's investigation. From a small spring close to the pumping station, a 3 inch pipe leads into the brick well. The flow from this was but a mere trickle on December 3rd, 1908. A 6 inch drilled well in the bottom of the open brick collecting well has a depth of 760 feet. It is reported that when water from other sources is excluded, the elevation of the water in this drilled well is usually lower than the elevation of water in the creek. There is no apparatus in this drilled well for raising the water so that it can furnish no part of the supply during much of the time and probably furnishes none at all during dry weather. The top of the said open brick collecting well and the pump room floor have an elevation of 7½ feet above normal water in the creek so they are not liable to frequent inundation.

An 8 inch force main extends from the pumping station to the distributing reservoir, located on the summit southeast of the station toward the town.

There is a water power dam and pumping station on Big Sacony Creek a half-mile down stream from the station just described. The back water above this dam extends to several hundred feet above the steam power station. An 8 inch force main from the lower station connects with the force main at the upper station. The lower station obtains its supply from the collecting well at the upper station.

The water from said collecting well at the upper station is conducted some of the time by gravity to the pump at the lower station, but principally by suction lift, and in the following manner. From the open collecting well at the upper station there is an 8 inch pipe laid 14 feet deep for a distance of 300 feet down stream to a loose walled reservoir, 25 by 50 feet in plan, and shallow, located on the bank of the creek. It is provided with an overflow elevated in the neighborhood of 5 feet above normal creek level. From this small storage basin a 10 inch suction pipe extends to the power pump at the lower station. There is no way for water to reach this suction pipe except through the upper collecting basin. Whenever the flow in Sacony Creek is sufficient to operate the power pump, Kemps Run yields ample water as a source of supply.

Means of introducing raw creek water into the collecting well is provided by a 10 inch pipe which extends from said well under Sacony Creek. It terminates a short distance beyond the north bank. The valve on this 10 inch line is between the south bank and said well.

On December 2nd and 3rd, 1908, the steam pumping station was in operation during the day time and was shut down at night. It was reported that the lower pumping station had not been operated to any extent since the previous spring. On these days the supply flowing into the collecting well from Kemps Run appeared to be not more than 50,000 gallons per 24 hours. The supply from the 3 inch pipe from the spring was only a trickle and the pipe from the well up the ravine was dry. One of the pumps was operated at a fair speed, evidently taking from the collecting well water many times in excess of the rate at which water was visible flowing into the well. Nevertheless, the level of the water in said well was not lowered. It was represented by the attendant at the station that the greater part of the supply was being furnished by the "artesian well" in the bottom of the collecting well and that absolutely no water was being pumped from the creek. This seemed improbable from the appearance of the water in the collecting well and the dried-up condition in the other sources. Moreover, it was determined that the elevation of the water in the collecting well and in the creek were the same. A piece of slate swung in front of the end of the 10 inch pipe leading from the creek into the well was deflected to a greater extent than could be reasonably explained by any supposed currents in the well other than through the pipe from the creek. The creek was frozen over, the ice being one-fourth of an inch thick, except for a hole about three feet in diameter in the centre of the creek and directly over the line of the 10 inch pipe. It was finally admitted by the attendant that the pipe was perforated on the sides at the centre of the creek and was furnishing the major part of the supply from this source. It was said that the valve on this pipe was closed at night in order to allow the supply from Kemps Run to fill the well as high as possible.

It was ascertained that this valve on the pipe from the creek to the collecting well had been open part of the time every day after the latter part of August, usually for two periods daily, and every day during the entire period of pumping from October 10th or 11th to December 3rd, so that the water had been pumped from the creek into the town's supply every day subsequent to the latter part of August. The distributing reservoir on the hill has brick sides and bottom and a capacity of 600,000 gallons. The water may be pumped around into the supply main leading into town or it may be pumped directly into the reservoir.

The gravity main is 8 inches in diameter, reducing to 6 inches. It is about 4,500 feet long. There is one blow-off on the line. The mains in the borough consist of 8,000 feet of 6 inch pipe and 4,400 feet of 4 inch pipe. Fire hydrants are located at numerous points in the village. There are five dead ends in the system.

The consumers number about 1,200 people. Some of these reside in dwellings in the township. There are some 50 wells in the borough in use and a few cisterns. The Normal School derived its supply for all interior uses from the water company. The drinking water, however, is obtained from a drilled well on the property. It is about 200 feet distant from the buildings on the opposite slope of the ridge. There is a deep well pump installed here.

Sewage Disposal. There are in the neighborhood of 100 cesspools in Kutztown. The practice in building these is to dig through the clay into the rock and then blast, to open up crevices through which the sewage may flow away. A few of the cesspools, notably the larger ones at the hotel, are said to overflow to street gutters or the town culvert for surface water which extends from the corner of White Oak Street and Saunders Alley for about 1,000 feet paralleling Main Street to the creek. Domestic wash water, to a considerable extent, reaches the street gutters and the creek.

The most marked source of sewage pollution for Big Sacony Creek is at a point just above the village and is contributed by the Normal School buildings. On December 1st, 1908, laundry water was seen flowing out of the sewer into the creek. It was ascertained that a new sewer system and disposal works had recently been built at the school. The work was begun July 15th. The fall term began August 31st. There were then 345 boarders, 300 day students, 150 children in the model school, besides 50 officers, instructors and employes, making a total population of 745 or thereabouts. At that time all of the sewage flowed either directly through an open ditch, or first through old cesspools into the open ditch, and thence to the outfall sewer, a 6 inch pipe about a mile long, following down the valley to the creek. The last thousand feet of this line from Noble Street is 12 inches in diameter. On November 5th a new intercepting sewer was first tried, to see if it were tight. Prior to that all sewage of the institution went to the Big Sacony. The nearest new cesspool is located several hundred feet distant from the school and back of it. It is 7 feet square and about 14 feet deep to limestone. It is shored up and timbered. It was not originally planned. The hole into which it was intended to dispose of the Institution's sewage is 100 feet further from the buildings. It is 22 feet deep, lined with loose stone and into this cesspool the main sewer was to have discharged. On November 5th, when a test was made of the line by connecting up one of the school buildings, a crevice was discovered in the sewer trench into which the sewage entirely disappeared, so a hole 7 feet square was made about this crevice and timbered up. It was known as Cesspool No. 1. Cesspool No. 2 has remained dry. Cesspool No. 3 is 74 feet deep and timbered for the first 34 feet to the limestone. The walls for the rest of the depth are solid rock. There is a connecting pipe between No. 2 and No. 3 cesspools. At the close of the year the entire institutional sewage was being taken care of by the subterranean method of disposal.

There were 6 cases of illness in the school prior to December 1st, receiving medical attention. They were among the boarders and the ailments were slight only.

Other cases of pollution on Big Sacony Creek had occurred at the industrial plants prior to the Department's sanitary survey for 1907. During the last ten years there were on an average of 5 cases of typhoid fever in the borough. For the current year there were 5 cases, for 1907, 15 cases and for 1903, 136 cases. In that year the epidemic began in the spring and extended throughout the summer into the fall. The outbreak was attributed to polluted public water. The highest typhoid fever rate ever recorded for Reading was for the year 1902. In the following table the cases by months recorded in the city Health Office for 14 years are presented. Undoubtedly more cases actually occurred than were recorded, but the table may fairly show the ratio for the different seasons.

TABLE NO. VI—TYPHOID FEVER IN READING BY MONTHS FOR 14 YEARS.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1894,	2	139	18	9	2	5	7	11	26	20	16	10	265
1895,	5	1	2	5	13	6	11	17	38	21	18	41	178
1896,	16	6	16	9	9	13	32	26	18	64	18	31	258
1897,	19	10	6	6	6	4	5	18	23	7	18	17	139
1898,	12	3	6	5	12	3	7	139	61	21	17	10	296
1899,	8	12	6	2	11	21	7	43	24	32	13	10	189
1900,	12	8	16	6	12	21	11	40	53	64	115	55	413
1901,	8	8	4	14	7	16	20	35	40	57	45	12	266
1902,	10	7	5	20	4	3	4	23	47	73	93	53	342
1903,	49	18	19	31	18	10	17	23	23	26	12	10	256
1904,	4	4	10	10	10	8	8	42	38	18	4	11	167
1905,	8	6	7	16	8	4	14	41	28	20	5	9	166
1906,	12	17	9	11	13	5	15	24	38	15	46	16	221
1907,	13	8	2	14	3	14	10	53	37	14	28	19	245
Average,	13	18	9	11	9	10	12	38	35	34	32	22	243

It should be noted for the year 1892 that the cases occurred principally during the closing months of the year, in fact those for the first seven months were far below the average. The infection at Kutztown might have come from Reading and through the public water works system at Kutztown been circulated throughout the season of 1903, since the drainage from the street gutters, carrying poisoned wash water from soiled bed linen and other specifically pathogenic sewage from the community and from the Normal School, would reach Big Sacony Creek above the point from which the water company may have had its intake into the stream.

As would be expected, prevalence of typhoid fever at Kutztown in epidemic form would naturally be followed by additional typhoid fever in Reading, more especially if the polluted Maiden Creek water were used. Such was the case throughout the year 1903 and by refernce to Table No. 6 it should be noted that there was a pronounced and unusual amount of typhoid fever in Reading for the first seven months of the year. In no year during the fourteen appearing in the table did the rates approach anywhere near the record for the first seven months of 1903. Thus possibly we have the cause and the effect. The remarkable fact is that the disease did not spread more extensively in Reading. The menace was known and it was reported that extraordinary care was taken at Kutztown.

On October 22nd, 1907, a communication was addressed by the Commissioner of Health to the water company acquainting the president of a complaint made to the Department by citizens of Kutztown regarding the poor quality of water supplied to the consumers of the company and asking what said company purposed to do to render the water pure and wholesome.

The following reply was received in response to this inquiry:

"Kutztown, October 23rd, 1907.

"Dr. Samuel G. Dixon,
"Commissioner,
" Harrisburg, Pa.

"Dear Sir:—

"Yours of yesterday relating to the quality of water furnished by our company to the consumers at Kutztown received. The same shall have our best attention. The trouble is owing, in my opinion, to a few dead ends we have on our pipe system, and it is proposed to put fire hydrants at these ends just as quickly as we can possibly manage to obtain the hyrants and stop valves necessary for the purpose. That, I think, will remedy the complaint immediately. We have had, lately, a number of very heavy rain storms, which in a measure disturbed the water, carrying along with it, probably, through the earth some vegetable matter, which would not permit the impounding of the water in those dead ends. We will do the best in the matter and as quickly as we possibly can.

"Thanking you for your courtesy, I am,
"Very truly yours,
"P. D. WANNER,
"President."

"December 4th, 1908.

"Peter Wanner, Esq.,
"Reed and Court Sts.,
"Reading, Pa.

"Dear Sir:—

"I am directed by Dr. Dixon, Commissioner of Health, to request you to inform me by return mail whether the water supplied by the Kutztown Water Company to the public in the borough of Kutztown is taken wholly or in part from Sacony Creek.

"To save time, in the event that you report that the creek is used as such supply, this letter is merely a warning that on the stream in and above Kutztown there are cases of typhoid fever reported from which pathogenic pollution is liable to reach the waters of the creek. You should, therefore, discontinue at once any use that you may be making of the creek as a source of public water supply.

"Please address your reply to the undersigned, Mansion House, Reading, Pa., and oblige.

"Yours very truly,
"F. H. SNOW,
"Chief Engineer."

"December 5th, 1908.

"F. Herbert Snow, Esq.,
"Mansion House,
"Reading, Pa.

"Dear Sir:—

"In reply to yours of yesterday relative to the water supply at Kutztown, would say that we obtain our supply from Kemps Run and an artesian well and two springs. We can draw on Sacony Creek in case of necessity.

"Very truly yours,
"P. D. WANNER,
"President."

December 5th, 1908.

"P. D. Wanner, President,
"Kutztown Water Co.,
"622 Court St., Reading, Pa.

"Dear Sir:—

"I beg to acknowledge receipt of your letter of December 5th in answer to my inquiry of the previous day, in which you say, "We can draw on Sacony Creek in case of necessity."

"Will you be so good as to inform the Commissioner of Health, through me, the precise date of the last case of necessity at which time the Kutztown Water Company drew water from Sacony Creek, and oblige,

"Yours very truly,
"F. HERBERT SNOW,
"Chief Engineer."

"Mansion House,
"Reading, Pa."

Two important communications were addresed to the borough council by the Commissioner of Health, one was in 1907, and the other at the close of 1908. The following are true copies of the same:

"To the Borough Council,
"Kutztown, Berks County, Pa.
"C. W. Snyder, Pres.

"Gentlemen:—

"This Department is about to engage in making a sanitary survey of the valley of Maiden Creek. I am informed that there are sewers and cesspools of private ownership, particularly in your borough and also some private privies and cesspools which are the cause of pollution of natural water courses. I am also informed that the sewage of the State Normal School pollutes the waters of the State in your borough, and that these several sources of pollution are a menace to the borough water supply also. Since the wells and springs near the creek are liable to pollution during ordinary flow of water and are certainly liable to greater pollution whenever a freshet occurs, immediate steps should be taken to properly dispose of State Normal School sewage and I am notifying that Institution to this effect. It is necessary that private sources of pollution within your borough should be abated. I would suggest for your consideration a sewer system as one of the remedies. An agent of this Department will call upon you in the near future.

"Yours truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

" Reading, December 5th, 1908.

"To the Honorable the Burgess,
"and Town Council,
"Kutztown, Pa.

"Gentlemen:—

"You are aware that a typhoid fever epidemic of extended proportions is now in full swing in Reading, and it is a period for extreme precautions on the part of the public authorties to do those things necessary to protect the health of the citizens locally and the public generally. It is quite possible for some one living in your borough to get the infection in Reading and returning to his home, spread that infection in the neighborhood.

"All properties, streets and alleys should be put in thorough sanitary condition. All vaults and receptacles for sewage should be disinfected, and if full, the contents removed and properly disposed of after disinfection. This disposition to be done in such a way that no drainage from it can possibly reach any stream either on the surface or underground. Proximity of cesspools to well waters should be noted. The existence of any contagious or infectious diseases should be reported immediately to the health authorities of the borough, county and State.

"Attention to these matters at once may prevent disaster in your locality.

"Yours very truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

Correspondence with the Keystone State Normal School in part is given below:—

"November 8th, 1907.

"Dr. A. C. Rothermel,
"Principal State Normal School,
"Kutztown, Pa.

"Dear Sir:—

"I beg to inform you that I am in possession of information to the effect that the sewage from your institution is a menace to the water supply of Kutztown borough and also the city of Reading; that the sewage is discharged either directly or indirectly into the waters of the State.

"An agent from this Department will call upon you within a few days to consult with you about a remedy.

"I wish to call your attention to Act 182 of 1905 and herein notify you that I consider the discharge of sewage from your institution into the waters of the State to be prejudicial to the public health, and I request you to take this matter up with me without delay. I shall be very glad to co-operate with you in an advisory capacity, in so far as I am able to do so.

"Yours truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

"November 9th, 1907.

"Dr. Samuel G. Dixon,
"Harrisburg, Pa.

"Dear Sir:—

"In reply to your letter I wish to say that when one of your representatives was here last spring we asked him for suggestions as to how to dispose of our sewage, and he did not give us any definite information at that time, and we have not received any instructions since. The Board is ready to move after it knows the best way of disposing of the question. We have recently bought a tract of land supposed to contain a sink hole. If you think there are no objections to run the sewage into a sink hole, we will try to develop the sink hole on this property and dispose of the sewage in this way. I am sure that the Board is willing to act on suggestions.

"I want to say further, that the sewage from this school does not contaminate the water for the citizens of Kutztown, since the citizens of Kutztown do not use the water of the stream that flows through the town. Moreover, our sewage is not carried directly into the stream. I am willing to admit that some of the liquid material finds its way into the Sacony Creek.

"Yours truly,
A. C. ROTHERMEL."

"Kutztown, Pa., January 28th, 1908.

"Hon. Samuel G. Dixon,
"Commissioner Health Department of Pennsylvania.

"Dear Sir:—

"Your communication to Keystone State Normal School, relative to sewage disposal, after some delay, reached me through the Principal.

"The Board of Trustees have not yet taken any decisive action in the matter, but have at various times given the subject consideration.

"Our main difficulty is the lack of funds to put up a disposal plant adequate for the purposes of the school.

"We have, however, purchased a large tract of land, located in the limestone district, whereupon we propose to construct a large cesspool, thinking that the liquids of our sewage would be lost in the strata. This work we will undertake as soon as the weather allows, if in your judgment the plan is all right.

"Respectfully yours,
"J. H. MARX,
"President Board of Trustees."

"February 4th, 1908.

"J. H. Marx, President
"Board of Trustees,
"Kutztown, Pa.

"Dear Sir:—

"In reply to your favor of January 28th, beg to say that as far as I am now informed, this Department cannot approve of the method that you propose to adopt for the disposal of the sewage of the State Normal School. I would suggest that you employ a competent expert to prepare plans for the disposal works, which will permit the purification of the institution's sewage under conditions whereby inspection and control and regulation of the works may be secured so that always there shall be a satisfactory treatment of the sewage.

"Yours very truly,
"SAMUEL G. DIXON,
"Commissioner of Health."

"Reading, Pa., December 5th, 1908.

"C. W. Miller, Sec.,
"Board of Trustees,
"Keystone State Normal School.

"Dear Sir:—

"I beg to inquire, by the direction of Dr. Dixon, whether you have by this time discontinued the discharge of laundry water into Sacony Creek and intercepted the flow into the new sewer leading to the new cesspools. As laundry water is more or less sewage and contains pathogenic poison sometimes, it is all important that not a moment be lost in making the connection between the laundry and the new sewer, and I shall be very glad indeed to be able to hear affirmatively from you by return mail to transmit the information to the Commissioner of Health.

"Furthermore, will you please have the new sewer outlet disinfected and the deposits at the mouth of the sewer outlet removed. Also take all those sanitary precautions which may suggest themselves to you relative to the old cesspools, and the open ditch from them leading to the sewer. At this time when new cases are appearing in large numbers daily in Reading and when public sentiment is rapidly intensifying regarding the unnecessary pollutions on the watersheds, extraordinary precautions which the school authorities may take at Kutztown, will be appreciated.

"Kindly address your reply to the undersigned, Mansion House, Reading, Pa., and oblige,

"Very truly yours,
"F. HERBERT SNOW,
"Chief Engineer."

"Kutztown, December 8th, 1908.

"F. Herbert Snow,
"Chief Engineer,
"Reading, Pa.

"My Dear Sir:—

"I have attended to the matter of cleaning out the small pool from which we had the water flow to the creek and are also starting in to-day in connecting the flow from the laundry to our main pipe. This may take us several days to complete as we are obliged to watch our chance on account of the machines being in operation the greater part of the time. We will however do our full duty and assure you that we will carry out your request. I am,

"Yours very truly,
"C. W. MILLER, Secy."

TYPHOID FEVER AT FLEETWOOD BOROUGH.

Fleetwood borough is a manufacturing community of about 1,250 population, located on the East Penn Branch of the Philadelphia and Reading Railway and on Will Creek about 6 miles above where the stream joins Maiden Creek.

Willow Creek rises out in the country about three miles south. It skirts the westerly edge of the settlement and flow westerly joining Maiden Creek one-half mile above the intake of the Reading water supply. On its watershed within the last ten years approximately 90 cases of typhoid fever have occurred. The larger percentage were within five miles of the Reading intake.

Fleetwood borough has a public water supply but no sewers. The soil is gravel underlaid with limestone. Earth privy vaults and a few cesspools are the receptacles for sewage. Kitchen drainage and waste water go largely to the street gutters and ultimately reach the creek. The Fleetwood Water Company has as a source three springs located about a mile and a half north of the town. The water flows through open channels to a reservoir formed by an earth dam across a small valley. The storage capacity is about 175,000 gallons. In the past it has not been fenced and cattle had access to the grounds. The water is supplied by gravity under low pressure in the village. There are about 210 connections. These supply the greater portion of the borough. An inspection revealed five wells and eight cisterns in use on individual estates. Sixteen cases of typhoid fever have been reported for the last ten years. This was ascertained by a house to house canvass.

The hosiery mill employs 55 hands. Bleaching waste is emptied into the railroad ditch and finally reaches the creek. At the Kelchner Creamery and Hosiery Mill, employing 80 hands, bleaching waste and creamery washings finally reach the creek through street gutters. At the Fleetwood Foundry Machine Company's plant where are employed 170 hands, sewage is discharged into a large cesspool.

The bleaching water from the Hietz Hosiery Mill goes to gutters on Franklin Street. There is a large privy at the works. Sixty hands are employed here. The York Silk Manufacturing Company employs 150 hands. Waste bleaching water is discharged onto the ground and is supposed to soak away.

The four cases of typhoid fever in 1905 were attributed to the public water supply, but the Department has failed to find corroborating evidence. Undoubtedly the disposition of kitchen drainage into the street gutters is a public menace. The town needs a system of sewerage. The municipal borrowing capacity outside of present indebtedness is reported to be in the neighborhood of $20,000. If the sewers were paid for by owners of abutting estates, it might be possible for the town to install a system of sewerage and disposal works.

In 1902 there were 23 cases of typhoid fever along Willow Creek valley below Fleetwood and all were within 5 miles of Reading's water works intake. It is known that infection of the creek water was probable at many of these places where the disease occurred. As would be expected, there was more typhoid fever reported that year than usual in the city. There were more deaths from typhoid than ever before and the rate was the highest. The next big year for typhoid fever on the Maiden Creek watershed (excluding 1903) was 1907, when there were 45 cases, of which 16 were within five miles of the Reading intake. The typhoid rates were correspondingly high in Reading that year.

SUMMARY OF TYPHOID FEVER STATISTICS.

Summarizing the typhoid fever statistics for Reading and vicinity prior to 1908 and noting the distribution of the cases on the Antietam watershed, the Egelman watershed and the Bernhart watershed and the Maiden Creek watershed, and taking into account the fact that the disease was equally prevalent in Reading before Maiden Creek water was introduced in 1892, it does not seem fair to conclude that typhoid is to be attributed entirely to the public water supply. But that the 23 cases within 5 miles of the Maiden Creek intake in the year 1902; and the 10 cases within the same distance in 1903 with a total of 152 cases within 15 miles of said intake that year; and the 16 cases within 5 miles and 45 within 15 miles during the year 1907; did not pollute Reading's water supply and produce added typhoid fever among the public water consumers in the city, no person, well informed respecting typhoid fever dissemination, would care to deny.

After the Egelman and Antietam filters were installed the typhoid fever rates fell off.

Table No. 6 shows a perceptible and persistent rise in typhoid fever in August for 14 years which continued through September, October and November. The change in the customs of the citizens for July and August may account for some of this. Then the schools are closed and the members of the household resort to the parks and camps either for the day or the week. Opportunities for contracting infection are much greater than in the winter and spring time. On returning to their city homes, if the methods of waste water and sewage disposal are not what they should be, the opportunity for a secondary infection would naturally spread the disease for a number of weeks. During the 14 years shown in the table, sewerage facilities were lamentably lacking in Reading over most of the municipal territory.

The 139 cases occurring in February, 1894, and the 139 cases of August, 1898, and the 113 cases of November, 1900, would appear to have been explosions from some specific source, sudden and short, like a virulently poisoned milk supply.

And so it should be borne in mind, on taking up the history of the epidemic of 1908, that Maiden Creek water is ever a menace to public health in Reading and a principal source of danger.

TYPHOID FEVER EPIDEMIC OF 1908.

The chief work of the Engineering Division of the State Department of Health during the epidemic of 1908 comprised an investigation of the water works system and sources of supply, the distribution of the typhoid cases with respect to water districts, the location of the source of infection of the water supplies, if such infection had occurred and the putting into force of such measures for removing the source of infection and preventing a recurrence of the epidemic as might be determined upon.

The examination of the milk supplies and the work done in suppressing the epidemic within the city limits may be found in the report of the Medical Inspection Division of the Department.

The Chief Engineer assembled a force of several assistant engineers and clerks and 18 field officers regularly employed in the Department and asigned to them special work. The watersheds were inspected and location of typhoid fever cases thereon noted and precautionary measures enforced to destroy any infection. The water works were investigated and samples of water were collected and analyzed. The disinfection of the Maiden Creek water was accomplished. The list of cases of typhoid fever in the city as reported to the local health bureau were checked off and methods of household wastes disposal were noted by house to house canvass by the division field officers. Corrected sheets of the distribution of the cases were made and each case was plotted on a map.

One of the first things done on November 30th by the Division was to examine the records of typhoid cases and deaths in Reading for the year. The following table of the distribution of the cases by months and days for the year 1908 is compiled from two sources of information. First from the city records and second from the State canvass. The former were based on physicians' reports. Often the doctor would delay several weeks in making a return of a typhoid case to the city Board of Health office. The State canvass more nearly shows when the cases actually occurred and hence it is the more accurate record of distribution of typhoid fever for the year.

TABLE NO. VII.

Day of Month.	January.		February.		March.		April.		May.		June.		July.		August.		September.		October.		November.		December.	
	City.	State.	City.	State.	City.	State.	City.	State.	City.	State.	City.	State.	City.	State.	City.	State.	City.	State.	City.	State.	City.	State.	City.	State.
1,		1						1				1		1	1	1	3	7	1		1	11	11	8
2,	1						1							1			16	3	1	1	2	18	50	5
3,	2		1		3							1				3	7	1	8			6	30	3
4,														1	1	1	4	1		1	2	6	58	7
5,																1	8	1		1		10	24	5
6,															3	1		3	3			4	1	
7,													1		1	1	4	3				21	17	1
8,			1													5	8	2	1	1	1	4	15	4
9,																1			1	3		12	11	1
10,	1	2									1	1		2	2	5	1	1	2	3	1	19		1
11,												1			1	5	5	1			1	5	9	
12,											1			2	1	1	1					15	5	1
13,															2	2				1	2	36		
14,		1						2								1	3	2				31	7	2
15,		1		1			1			1	3	2	1	4	1	23	2	4	1	4	2	35	8	
16,						1										3	6	2		1	2	30	6	2
17,				1									1	2		2	3			2	2	27	4	4
18,									2	2			1	1	4	5	5	1	8	3	13	31	9	9
19,		1													1	3	3	1		2	13	24	8	8
20,	1			1						1		2	3	4		10		6		2	25	57	3	5
21,							1							1	6	6			4	2	45	29		1
22,		1					1						1		2	3	3	2			10	23		1
23,											1			1		2	2		1	1	48	21	1	4
24,	1			1			1			1			2		11	5	1	3	2	1	34	12	5	
25,						2		1		2		1	1	2	7	2	1	4		1	44	23		
26,			2	1							3			2	11	4	2	2	2	2	23	21	1	1
27,													1	3	21	5		2	1	2	53	21		
28,			1				1	2					1	2	3	2	3	2	6		18	9		
29,	2					1	1		1				1		1	4	2	2		2	9	11		
30,																5					38	11	2	2
31,					1								2	1	12	4			1	1			2	1
	8	7	5	5	4	4	7	6	3	7	9	9	16	30	92	116	93	56	42	37	389	583	289	76

In the following table is given the average number of cases by months for 14 years and the corresponding cases by months recorded and occurring for the year 1908 in Reading. From this it will appear that there was nothing extraordinary about the presence of typhoid fever until August and September. The first six months' records showed less typhoid fever than usual. October was not much above the average, but 583 cases during the month of November caused widespread alarm among the citizens.

TABLE NO. VIII.

Months.	Average cases for 14 years.	Cases for 1908. City records.	State canvass.
January,	13	8	7
February,	18	5	5
March,	9	4	4
April,	11	7	6
May,	9	3	7
June,	10	9	9
July,	12	16	30
August,	38	92	116
September,	35	93	56
October,	34	42	37
November,	32	389	583
December,	22	287	76
	243	955	936

The cases in July, August and September were in dwellings without sewer connections, with 17 exceptions only. These dwellings with one exception were supplied with public water, largely raw Maiden Creek water. The waste wash drainage from the household and the slops were largely poured onto the ground in the backyards where open channels conveyed the water to alley gutters and the public highways. Excrement was universally deposited in privy vaults. The Chief Medical Inspector's returns showed the milk supply to have been obtained from over 50 sources of general distribution. Eighteen cases on one milk route was the largest number during July, August and September. Furthermore, the summer cases were in the district where the summer and fall cases annually occur and where opportunities for secondary infection invite the spread of disease. Nevertheless, one cannot fairly conclude that milk did not contribute in any degree to the sickness in these three months.

However, the November exposure of typhoid fever, 583 cases in four weeks, cannot be explained by milk infection or unsanitary conditions. The cases were widely distributed. They were all, with 85 exceptions, in the district supplied by raw Maiden Creek water.

Thirteen of these exceptions were cases in the high service district, but they were imported. Water supplied at the dwellings in the high service is filtered. Nine of the thirteen cases were men employed by the railroads, in factories, and as laborers. They were out of the district daily. Three were females, two of whom were employed in factories. A boy and a girl attended school. The single case of the patient living at home was that of a woman 40 years old.

The 72 exceptions in the low service district were distributed throughout the month. The date of onset is given in the following table:

TABLE NO. IX.

Date of Onset.	Number of Cases.
November 1st.	2 cases.
November 2nd.	7 cases.
November 5th.	3 cases.
November 7th.	2 cases.
November 9th.	4 cases.
November 10th.	1 case.
November 12th.	2 cases.
November 13th.	2 cases.
November 14th.	6 cases.
November 15th.	3 cases.
November 16th.	4 cases.
November 17th.	3 cases.
November 18th.	1 case.
November 19th.	3 cases.
November 20th.	5 cases.
November 21st.	4 cases.
November 22nd.	5 cases.
November 23rd.	3 cases.
November 25th.	2 cases.
November 26th.	4 cases.
November 27th.	3 cases.
November 28th.	1 case.
November 29th.	1 case.
November 30th.	1 case.
Total.	72 cases.

Twenty-six of the patients were females. Three of them were too young to attend school. Seven lived at home. The oldest was 20 years of age, 3 were domestics, 2 were at school, 8 worked in factories and 3 found employment in stores.

Of the 46 male patients, 5 were at home. Two of these were under 5 years of age and the others were 15, 20 and 30 years respectively; 11 were at school, 3 were pursuing professional callings, 5 were employed in factories, 3 in mills, one in a store, 6 were railroad men and 12 were laborers.

A preponderance of the cases in the low service district were of individuals whose movements about the city were unrestrained. It is not practicable to trace out each one of these cases during the incubation period of the disease, but it is fair to assume that every individual may have been subjected to the same infection which caused the epidemic in the intermediate service district. The railroad shops, large mills and numerous manufacturing plants were in the latter area. The low service district was supplied with Bernhart reservoir water. On October 22nd and 23rd, 16,000,000 gallons from the Maiden Creek supply were pumped into this reservoir. If that water contained typhoid infection and it reached the distributing pipes of the low service district, the first cases from the infection so introduced would have appeared about November 1st and thereafter for 10 to 20 days, corresponding to the actual occurrence.

The 498 cases occurring during the month of November in the intermediate district where the consumers were furnished raw Maiden Creek water were quite generally distributed throughout said district. Eight of the patients only had been out of the city for 30 days prior to the onset. These might have contracted the infection elsewhere, but the remainder received the poison in Reading. In 24 instances, more than one case occurred in the family. In the following table the dates of onset and the number of cases for the month of November in the intermediate district are given:

TABLE NO. X.—DATE OF ONSET—TYPHOID CASES IN INTERMEDIATE DISTRICT FOR NOVEMBER, 1908.

Date of Onset.	Number of Cases.
November 1.	8
November 2.	9
November 3.	6
November 4.	6
November 5.	7
November 6.	4
November 7.	18
November 8.	4
November 9.	6
November 10.	18
November 11.	5
November 12.	13
November 13.	32
November 14.	25
November 15.	32
November 16.	26
November 17.	24
November 18.	30
November 19.	20
November 20.	50
November 21.	25
November 22.	18
November 23.	18
November 24.	12
November 25.	21
November 26.	17
November 27.	17
November 28.	8
November 29.	10
November 30.	9
	498

In 54 cases only was the property on which the patient resided connected to a sewer.

The disease was contracted by 273 males and 225 females. The age period and the occupation of each patient are given in the following tables:

TABLE NO. XI.—AGE PERIOD OF TYPHOID PATIENTS IN INTERMEDIATE DISTRICT FOR NOVEMBER, 1908.

Years—Inclusive.	No. of Cases.
0–4	11
5–9	72
10–14	81
15–19	84
20–24	82
25–29	49
30–34	48
35–39	23
40–44	12
45–49	11
50–54	9
55–60	6
	498

TABLE NO. XII.—OCCUPATION OF NOVEMBER TYPHOID PATIENTS—INTERMEDIATE DISTRICT.

Occupation.	No. of Cases.
At School.	158
At Home.	94
Factory.	88
Railroad.	53
Store.	38
Mechanics or Laborers.	37
Mill Hands.	13
Profession.	10
Domestic.	7
	498

ORIGIN OF INFECTION.

The origin of the infection was on the watershed of the Maiden Creek without doubt. The circumstances hereinafter set forth substantiate this proposition. There were 34 cases of typhoid fever on the shed above the city water works intake during the year. The date of onset is important and also the dates of rainfall. The poisonous dejecta from the patient may be stored in the receptacles full and overflowing or may be wantonly thrown about on the surface of the ground where the first rainstorm would wash the ground and carry the poison thence to the nearby stream. Or the location of the property in proximity to the stream might be such as to establish a physical certainty of the drainage from the dwelling reaching the running water in the brook almost immediately after being discarded from the household. The distance of such possible point of discharge above the water works intake of the city is also relatively important. In the following table is given the dates of onset, and precipitations, and the distances of the homes of the typhoid patients on Maiden Creek above the city water works intake.

TABLE NO. XIII.—1908 TYPHOID AND PRECIPITATION DATA ON MAIDEN CREEK WATERSHED ABOVE CITY WATER WORKS INTAKE.

Date of precipitation.	Date of onset.	Number of cases.	Miles above water intake.	Precipitation at Reading. Hours and Minutes.	Penn reservoir. Inches.	Maiden Creek Pumping Station. Hours.	Snow fall. Inch.	Temperature. Degrees. Mean.	Maximum.	Minimum.
	Jan. 24,	1								
	Mar. 15,	1								
	April 3,	1								
	April 17,	1								
	June 13,	1								
July 2,				3 hours, 50 minutes,	1.08	0.72				
3,				0 hours, 50 minutes,	.06	0.08				
4,				2 hours, 10 minutes,	.16	0.04				
7,				0 hours, 25 minutes,	.10	0.02				
	July 9,	1								
12,				3 hours, 10 minutes,	.47	0.54				
13,						0.04				
14,				2 hours, 55 minutes,	.26	0.48				
	July 15,	1								
17,	July 17,	1				0.06				
18,				0 hours, 25 minutes,	.02	0.13				
21,				1 hour 50 minutes,	.68	0.50				
22,				3 hours, 10 minutes,	.10	0.11				
23,				3 hours,	1.28	0.85				
24,				9 hours, 45 minutes,	.74	1.07				
	July 25,	1		8 hours, 35 minutes,	2.01	1.59				
	July 27,	1								

TABLE NO. 13—Continued.

Date of precipitation.	Date of onset.	Number of cases.	Miles above water intake.	Precipitation at Reading. Hours and Minutes.	Penn reservoir. Inches.	Maiden Creek Pumping Station. Hours.	Snow fall. Inch.	Temperature. Degrees. Mean.	Maximum.	Minimum.
Aug. 6,				55 minutes,	.02	.02				
7,				55 minutes,	.38	.52				
9,				7 hours, 15 minutes,	.35	.23				
11,				1 hour, 45 minutes,	.21	.47				
13,						.07				
	Aug. 14,	1								
16,				2 hours, 10 minutes,	.03	.29				
17,				2 hours, 40 minutes,	.09	.19				
22,				6 hours, 25 minutes,	.08	.15				
25,				8 hours, 50 minutes,	.27	.34				
26,	Aug. 26,	1		10 hours,	1.09	.68				
Sept. 5,				4 hours, 5 minutes,	.07	.11				
5,				4 hours, 40 minutes,	.20	.24				
	Sept. 10,	1								
	Sept. 13,	1								
	Sept. 21,	1								
	Sept. 24,	1								
26,						.01				
28,				8 hours, 20 minutes,	1.44	1.31				
Oct. 1,				4 hours, 55 minutes,	.36	.39				
	Oct. 2,	1								
	Oct. 5,	1								
10,	Oct. 10,	1		5 hours, 30 minutes,	.06	.04				
11,				1 hour, 40 minutes,	.08	.02				
	Oct. 22,	1								
23,	Oct. 23,	1		1 hour, 40 minutes,	.02	.00				
24,	Oct. 24,	1		6 hours, 35 minutes,	.23	.18				
25,				9 hours, 55 minutes,	.64	.42				
26,				4 hours, 5 minutes,	.31	.18				
28,				13 hours,	.32	.36				
	Nov. 8,	1								
	Nov. 9,	1								
	Nov. 10,	1								
Nov. 14,	Nov. 14,	1		10 hours, 45 minutes,	.77	.70	6.8	33	38	28
15,							4.0	27	35	21
16,							2.5	28	37	10
17,							1.5	32	37	26
18,				4 hours, 5 minutes,	.05	.04	0.0	39	44	30
19,								45	52	36
20,								42	54	34
21,								37	49	28
22,								38	46	27
23,								45	55	37
24,	Nov. 24,	1						49	56	39
25,	Nov. 25,	1						53	57	48
26,	Nov. 26,	1		0 hours, 10 minutes,	.01			58	60	52
27,								48	58	40
28,								42	49	37
29,								45	52	34
30,								56	62	45
	Dec. 2,	1								
	Dec. 5,	1								
	Dec. 8,	1								
	Dec. 9,	1								
	Dec. 20,	1								

In the year 1908 there were 21 cases in the townships on the Maiden Creek watershed and 13 cases in the boroughs. Six township cases were on the upper shed above Pine Creek. Three of them were in Albany Township and three in Lynn Township. In order of onset the cases were as follows:

June 13, Edna Keiser, 14 years of age, Lynn Township, New Tripoli.
July 25, Maud Kistler, 22 years, Albany Township, Crumsville.
July 27, Mrs. Louise Dietrich, age 51, Albany Township, Kempton village.
November 8, Mrs. Eliza Gaston, age 27, Lynn Township, New Tripoli.
November 10, Mrs. Mary Hatfield, aged 48, Albany Township, Mountain village.
December 2, Perry Long, age 55, Lynn Township, Wanamaker.

The last four were probable sources of stream pollution. In the Dietrich case the wash water from the house was thrown upon the ground about 400 feet from the stream. The stools were buried in the field and were not disinfected.

In the Gaston case, before the doctor's visit and while the patient was convalescent, the dejecta were not disinfected and were deposited on an ash pile 75 feet from the stream.

In the Hatfield case, the waste wash water was thrown onto the ground 75 feet from the stream.

In the Perry Long case, while the dejecta were disinfected and buried, the wash water from the house was thrown on the ground not far from the stream. The privy rested on the surface of the ground with the slope towards the stream 150 feet way.

All of these cases were over 15 miles from the city intake. Heavy rains occurred on July 25th. It would not have been impossible for the infection from Kempton village to be transmitted down stream and to have contributed to the increase of typhoid fever in the city in August. There was considerable precipitation on November 14th which might have transmitted infection from the upper watershed to the city intake. Such infection, if delivered into the water works of the city, would have added to the epidemic during the latter part of November and the first part of December.

On Little Sacony Creek for the year 1908 there were 3 cases and on Big Sacony Creek 4 cases in the townships and 5 in the borough. In order of onset the cases were as follows:

LITTLE SACONY CREEK.

April 3, Amelia Schrader, age 38 years, Maxatawney Township, Eagle Point.

July 9th, Clayton Levan, age 22 years, Greenwich Township, near Eagle Point.

September 24, Calvin Old, age 20, Weisenberg Township, Steins Corner.

The last case was a probable stream pollution and the next to the last a possible one.

In the Levan case the stools were buried without being disinfected. The wash water was thrown out onto the ground in the course of a dry run, where, in case of rain, the flow would be directly to a stream several hundred feet distant. There were several heavy showers during the period of this patient's illness. Infection in this way might have been conveyed to the city intake over 15 miles distant and have contributed to the epidemic in Reading during July and August.

In the Calvin Old case the doctor first called on September 20th. Later, when the case was diagnosed as typhoid, instructions were given for the disinfection and burial of the dejecta. Prior to that time any such poison was deposited on the surface of the ground. During the patient's illness all laundry was thrown on the ground. The drainage was to a creek 250 feet distant. The pollutions might have been carried to the stream by the downpour of September 28th and thus the infection might have been spread in Reading during the second or third part of October.

BIG SACONY CREEK.

March 15, John Yenson, age 44, Maxatawney Township, Lyons village.
April 17, J. Albert Fisher, age 28, Kutztown borough.
July 15, Eugene Dietrich, age 30, Greenwich Township.
July 17, Mary Bieber, age 14, Kutztown borough.
October 5, Edgar Dietrich, age 28, Maxatawney Township.
October 23, Joseph Lamberton, age 52, Kutztown borough.
November 14, Eva W. Moyer, age 13, Rockland Township.
December 5, Paul Bordner, age 10, Kutztown borough.
December 8, Grace Bordner, age 6, Kutztown borough.

One only of these cases, namely that of Eugene Dietrich, was located on the watershed below the intake of the Kutztown water works and since through this intake more or less water was drawn daily at intermittent periods after the latter part of August to October 10th, and every day during the entire period of pumping from October 10th or 11th to December 3rd, so that raw creek water was pumped into the town supply at Kutztown borough every day subsequent to the latter part of August, without an epidemic of typhoid fever following the use of such water in the borough, the conclusion is that not one of the cases of typhoid fever on Big Sacony Creek watershed above this Kutztown water works intake contributed to the pollution of the creek, the city's water supply and the epidemic in Reading.

In the Eugene Dietrich case the stools were disinfected and buried. There was a good privy vault. The waste wash water was thrown out on the ground. Its course would be by the highway ditch to the stream 300 yards distant. It was not a probable source of pollution. But the existence of the disease is always a menace in more ways than one can prove.

Eva Moyer was in Reading the last week of October and stopped at David Friedmans on North Twelfth Street. She stayed there for a week, contracted typhoid and returned to her home in the country. Running water was passed

under the surface privy in a ditch, thence it flowed through the pig pens and across fields to a natural water course. While this practice was stopped immediately upon the case being diagnosed as typhoid fever, the situation there was not dissimilar to that on many properties throughout the watershed whereby the sewage of the household might easily find its way to a running stream. The visiting about among families of convalescents or those coming down with the disease extended the menace. Poison might have gotten into the stream in ways not known to the Department.

In the valley of Willow Creek, for the year 1908, there were three cases in the townships and 7 in Fleetwood borough.

WILLOW CREEK.

January 24, Elsie Hoffstadt, Fleetwood borough.
August 26, Sallie Leinbach, age 4, Ruscomb Manor Township.
September 21, Daniel Angstadt, age 9, Fleetwood borough.
October 2, Roy Stetler, age 22, Richmond Township.
October 10, Charles Smith, age 31, Richmond Township.
October 24, Sue Angstadt, age 19, Fleetwood borough.
November 24, Sue Brown, age 24, Fleetwood borough.
November 25, James Rothermel, aged 22, Fleetwood borough.
December 9, Dorothy Scheel, age 9, Fleetwood borough.
December 20, John J. Shaffer, age 55, Fleetwood borough.

The movements of Stetler, Smith and the Angstadts were not positively traced. There did not appear to be a stream pollution at the houses where they were confined, but they may have used the toilet of the railroad coaches while on the Maiden Creek watershed and have thus contributed directly to the infection of the city supply.

At the Leinbach estate there was a case of positive stream pollution. There were six in the family, the mother and father, the oldest child, a boy of seven, next Sallie, 4 years old, one 2 years and one a year old. Emma, the mother, ailing in July and August, had not been away from home except to Fleetwood. She did not have a doctor. Part of the time she was in bed the symptoms were those of a mild case of typhoid. On December 7th, a specimen of blood for Widall reaction was secured by the Chief Medical Inspector from Mrs. Leinbach and tested. The reaction was positive. Sallie was taken sick in August and was carried to Dr. Gearhart's office in Fleetwood. The doctor's first visit to the Leinbach estate was on August 26th.

The disinfection of excreta was indifferently performed: to say the least, it was unsatisfactory and incomplete. The stools were buried in the field, but all laundry water and drainage from the house was thrown out on the ground at the side of the dwelling and from the wash house into a road gutter where it flowed down a steep grade to the creek a short distance away in which there was a flowing stream. The surface privy was located 10 feet from the edge of a steep bank to a run. When full it overflowed to the run. Before and since the sickness of the mother and daughter, the privy was not regularly used and excrement was sometimes deposited in the barnyard where the drainage was to the run nearby. So on the property during July and August and September infection was spread around promiscuously where it could get into the creek. There were scouring downpours, especially on July 25th, August 26th and September 28th and October 25th. There were some evidences that the privy had been cleaned out prior to the scouring rains of the latter part of October and that the content had been thrown over the bank. The estate is eight miles above the city of Reading's intake. Any considerable amount of typhoid dejecta thrown into the stream from the privy prior to October 24th, when a four days' storm began, could have caused the November outbreak of typhoid in Reading. It was concluded by the Department that the Leinbach case was one of the original sources of infection.

During the year along the main stream of Maiden Creek or its smaller tributaries below Pine Creek there were five cases in the townships and one in Lenhartsville borough.

August 14, Wellington Herber, age 29, Greenwich Township.
September 10, Jacob K. Matthias, age 52, Lenhartsville borough.
September 13, William Gery, age 29, Richmond Township.
October 22, Samuel Rothermel, age 61, Richmond Township.
November 9, Myrl Gery, age 4, Richmond Township.
November 26, Zacharias Koller, age 34, Maiden Creek Township.

The first two and the last case were stream pollutions. In the Herber case the wash water and drainage from the house might have gone to the stream prior to the doctor's first visit. The dejecta were disinfected and buried subsequent to this visit, so it is reported.

In the Matthias case the waste wash water was not disinfected, but was thrown on the ground 35 feet distant from the creek. Excrement was deposited at a manure pile, distant 100 feet from the creek. The privy was 60 feet from the stream.

The stools were buried in the field without disinfection. These two properties are located about 12 miles above the city intake. They could have contributed to the September and October epidemic in Reading.

Mr. Koller was employed in the city. He travelled back and forth on the train. He contracted the disease in the city.

There were large numbers of people traveling back and forth on the trains. With hundreds of cases in the city of convalescents and those coming down with the disease, the number might have contributed to the infection of Maiden Creek water through the agency of the toilets on passenger coaches must have been large.

MEASURES TAKEN BY THE STATE DEPARTMENT OF HEALTH.

What was done to stop secondary infection in the city is explained under the work accomplished in the Department of Medical Inspection. The public was warned to boil the water and all milk. The city officials tried to abate all nuisances and put every property in a sanitary condition. Milk supplies were investigated. Premises where typhoid fever existed were placarded. District nurses were organized and proceeded in the usual manner prescribed by the Commissioner of Health in making visits and ministering to the necessities of the afflicted demanding or needing such help. All of this was done under the immediate direction of the Chief Medical Inspector.

Under the immediate direction of the Chief Engineer the following work was done. The Maiden Creek water in Hampton reservoir was sterilized Wednesday, December 2nd, by the use of a solution of copper sulphate. Apparatus was designed and set up at the Maiden Creek pumping station for the use of copper sulphate and the actual treatment of Maiden Creek water with this solution was begun at 6.15 a. m., December 4th. This sterilizing treatment by the application, in the proportion by weight, of one part copper sulphate to one million parts of water has been continued and is in use at the close of the year.

The Penn Street reservoirs were put out of commission and the water therein was treated with copper sulphate solution. Samples of water at various points were collected by the State and analyzed at the Department's laboratories at the University of Pennsylvania, Philadelphia.

A sample of water was collected on December 2nd from the reservoir on the grounds of the Philadelphia and Reading Railway from which water was supplied to the railroad shops. It showed a total bacterial count of 350 and no coli.

Samples of water were collected throughout the month from Maiden Creek at the intake at the pumping station. The total bacterial account and the bacilli, coli communis, present in a cubic centimeter of the sample collected were determined. The results are shown in the following table:

TABLE NO. XIV.—MAIDEN CREEK WATER IN INTAKE PUMPING STATION.

Date of Collection. 1908.	Total bacteria.	Coli.
December 2nd,	200	0
3rd,	180	0
3rd,	250	0
7th, 6 a. m.,	350	15
10 a. m.,	4,000	30
2 p. m.,	3,900	0
5 p. m.,	28	0
10th, 6 a. m.,	530	0
10 a. m.,	2,000	0
2 p. m.,	1,200	0
5 p. m.,	1,000	0
11th, 6 a. m.,	800	4
10 a. m.,	900	4
2 p. m.,	500	2
5 p. m.,	1,200	1
15th, 6 a. m.,	450	0
10 a. m.,	280	3
2 p. m.,	180	0
5 p. m.,	210	0
16th, 6 a. m.,	130	4
10 a. m.,	490	0
2 p. m.,	18	0
5 p. m.,	90	0

TABLE XIV—Continued.

Date of Collection. 1908.	Total bacteria.	Coli.
19th, 6 a. m.,	38	0
10 a. m.,	29	0
2 p. m.,	28	0
5 p. m.,	130	0
20th, 11 a. m.,	75	0
1 p. m.,	42	0
3 p. m.,	22	0
5 p. m.,	23	0
22nd, 10 a. m.,	500	2
2 p. m.,	250	0
3 p. m.,	190	0
5 p. m.,	140	0
23rd, 10 a. m.,	32	0
2 p. m.,	160	1
3 p. m.,	220	0
5 p. m.,	68	0
24th, 6 a. m.,	39	0
10 a. m.,	28	0
2 p. m.,	45	0
5 p. m.,	32	0
28th, 6 a. m.,	630	0
10 a. m.,	230	0
2 p. m.,	230	0
5 p. m.,	620	0
29th, 6 a. m.,	29	0
10 a. m.,	28	0
2 p. m.,	6	0
5 p. m.,	18	0

Thus it is seen that the creek water varies considerably in the amount of sewage pollution it contains. In Table No. 15 are given the results of bacteriological examinations of Maiden Creek water in the Hampden reservoir throughout the month.

TABLE NO. XV.—MAIDEN CREEK WATER IN HAMPDEN RESERVOIR.

Date of Collection. 1908.	Inlet.		Outlet.	
	Bacteria.	Coli.	Bacteria.	Coli.
December 1st,	60	0	----------	----------
2nd,	50	0	----------	----------
3rd,	190	1	----------	----------
3rd,	95	0	----------	----------
4th,	32	0	56	0
5th,	20	0	45	0
7th, 10 a. m.,	150	0	180	0
2 p. m.,	620	0	95	0
4 p. m.,	950	0	130	0
8th, 10 a. m.,	120	0	280	0
2 p. m.,	4,200	30	89	0
4 p. m.,	300	0	45	1
9th, 10 a. m.,	72	0	80	0
2 p. m.,	35	0	62	0
4 p. m.,	26	0	42	0
10th, 10 a. m.,	500	0	68	0
2 p. m.,	210	0	130	0
4 p. m.,	320	0	45	0
11th, 10 a. m.,	30	0	50	0
2 p. m.,	40	0	40	0
4 p. m.,	72	0	80	0

TABLE NO. XV—Continued.

Date of Collection. 1908.	Inlet.		Outlet.	
	Bacteria.	Coli.	Bacteria.	Coli.
13th, 10 a. m.,	48	0	35	0
2 p. m.,	40	0	60	0
4 p. m.,	40	0	40	0
14th, 10 a. m.,	32	0	45	0
2 p. m.,	30	0	41	0
4 p. m.,	30	0	42	0
15th, 10 a. m.,	9	0	29	0
2 p. m.,	22	0	16	0
4 p. m.,	17	0	49	0
16th, 10 a. m.,	22	0	38	0
2 p. m.,	42	0	35	0
4 p. m.,	12	0	14	0
19th, 10 a. m.,			58	0
2 p. m.,			18	0
4 p. m.,	28	0	55	0
20th, 10 a. m.,	35	0	28	0
2 p. m.,	90	0	63	0
4 p. m.,	52	0	210	0
21st, 10 a. m.,	98	0	70	0
2 p. m.,	40	0	42	0
4 p. m.,	18	0	16	0
22nd,	16	0	65	0
	28	0	65	0
28th,			42	0
	320	0	230	0
29th, 10 a. m.,	28	0	16	0
2 p. m.,	330	0	28	0
4 p. m.,	230	0	29	0
30th,			20	0
			16	0
			28	0
			230	0
			18	0
			20	0

The samples collected on December 4th and thereafter represent water treated with copper sulphate solution applied continuously at the Maiden Creek pumping station. Evidently all of the water in the reservoir had not been reached by this treatment until the ninth of December, for on and after that date no sewage pollution was found in the samples, but it was found in the reservoir prior to that date.

Sewage organisms were found in the Penn Street reservoirs, but not in the Bernhart reservoir or at the Mansion House receiving the Bernhart supply. Tables Nos. 16, 17 and 18 show the results of bacteriological examinations of these waters.

TABLE NO. XVI.—PENN STREET RESERVOIRS, BERNHART SUPPLY.

Date of Collection. 1908.	North Basin.		South Basin.	
	Bacteria.	Coli.	Bacteria.	Coli.
December 1st,	2,400	50	350	4
2nd,	5,400	0	12,000	20
4th,	25	0	18	0
5th,	21	0	15	0
6th,	1,500	1	45	0
7th,	18	0	20	0
8th, a. m.,	14	0	21	0
p. m.,	41	0	10	0
9th, a. m.,	14	0	12	0
p. m.,	28	0	8	0

TABLE NO. XVI—Continued.

Date of Collection. 1908.	North Basin.		South Basin.	
	Bacteria.	Coli.	Bacteria.	Coli.
10th, a. m.,	8	0	12	0
p. m.,	14	0	30	0
11th, a. m.,	8	0	18	0
p. m.,	19	0	21	0
13th, a. m.,	11	0	8	0
p. m.,	5	0	14	0
14th, a. m.,	500	0	18	0
p. m.,	230	0	95	0
15th, a. m.,	2,000	0	620	0
p. m.,	3,200	0	2,100	0
16th, a. m.,	800	0	750	0
p. m.,	190	0	900	0
17th,	420	0	2,400	0
18th,	400	0	900	0
20th,	24	0	19	0
22nd, a. m.,	2,400	0	1,200	0
p. m.,	16,000	0	200	0
28th,	45	0	900	0
29th, a. m.,	520	0	420	0
p. m.,	65	0	10	0
30th, a. m.,	10	0	22	0
p. m.,	210	0	18	0

TABLE NO. XVII—MANSION HOUSE, BERNHART SUPPLY.

Date of Collection. 1908.	Bacteria.	Coli.
December 1st,	100	0
3rd,	55	0
15th,	280	0
15th,	65	0
18th,	30	0
18th,	45	0

TABLE NO. XVIII—BERNHART RESERVOIR WATER.

Date of Collection. 1908.	Bacteria.	Coli.
December 1st,	28	0
2nd,	62	0
4th,	32	0

The Penn Street reservoir water was turned on to the city mains on the evening of December 14th. No sewage organisms had been found in the water after the treatment with copper sulphate applied in both basins. The opportunity for actual contamination of the waters of these basins is afforded. They should be covered.

Three samples of water were collected at the Antietam reservoir. Coli were absent. The total bacterial count was 210, 120 and 500 respectively for collections made on December 1st, 2nd and 4th. Subsequent to this date throughout the month, tests were made of the raw water before it went onto the filters and coli were found in the raw water. The two exceptions where coli were found in the filtered water were attributed to carelessness in the collection of the samples.

TABLE NO. XIX.—ANTIETAM SUPPLY.

Date of Collection. 1908.	Raw Water.		Filtered Water.	
	Bacteria.	Coli.	Bacteria.	Coli.
December 1st,	2,400	20	320	4
2nd,	6,000	26	300	0
4th,	290	0	16	0
5th,	250	0	21	0
6th,	450	0	39	0
7th,	350	2	18	0
8th, a. m.,	1,400	20	16	0
p. m.,	1,100	10	3	0
9th, a. m.,	35	0	600	2
p. m.,	1,100	0	20	0
10th, a. m.,	340	1	22	0
p. m.,	18	0	4	0
11th, a. m.,	1,900	0	85	0
p. m.,	1,200	0	25	0
13th, a. m.,	620	0	16	0
p. m.,	35	0	22	0
14th, a. m.,	210	0	85	0
p. m.,	400	0	30	0
15th, a. m.,			32	0
p. m.,	130	6	18	0
16th, a. m.,	820	0	35	0
p. m.,	630	0	18	0
17th,	520	0	28	0
18th, a. m.,	300	0	14	0
p. m.,	720	0	530	0
20th,	140	0	14	0
22nd, a. m.,	360	1	12	0
p. m.,	110	0	18	0
28th,	130	0	6	0
29th, a. m.,	130	0	38	0
p. m.,	520	0	10	0
30th, a. m.,	220	0	200	0
p. m.,	98	0	18	0

The Department collected samples regularly from houses along Perkiomen Avenue which were supplied with filtered Antietam water to discover, if possible, whether such water was sufficiently purified. The results showed a satisfactory supply.

TABLE NO. XX.—ANTIETAM FILTERED WATER. SAMPLES COLLECTED FROM DWELLINGS ON PERKIOMEN AVENUE.

Date of Collection. 1908.	Street number.	Bacteria.	Coli.
December 6,	1,850	28	0
7,	1,850	16	0
8,	1,850	31	0
8,	1,850	190	0
9,	1,745	25	0
9,	1,850	22	0
10,	1,850	20	0
10,	1,850	30	0
11,	1,850	65	0
11,	1,850	75	0
13,	1,723	8	0
13,	1,723	40	0
14,	1,701	45	0
14,	1,701	12	0
15,	1,723	38	0
16,	1,719	31	0

TABLE NO. XX—Continued.

Date of Collection. 1908.	Street number.	Bacteria.	Coli.
16,	1,719	16	0
17,	1,558	16	0
18,	1,558	12	0
18,	1,528	39	0
18,	1,504	14	0
20,	1,548	16	0
22,	740	16	0
22,	345	14	0
28,	345	38	0
29,	345	12	0
29,	346	8	0
30,	345	180	0
30,	345	6	0

The raw water supplied to the Egelman filter also showed evidence of sewage pollution. So did the filtered water on two occasions, the dates corresponding with the dates of collection of filtered water samples collected at the Antietam filters. Similarly the presence of coli in the Egelman filtered water on these two occasions was attributed to carelessness in methods of collection. To make sure, that the filtered water supplied to the high district was amply purified, examinations were made throughout the month of samples collected both at the filter and at the office of the Superintendent of the water works system. The results are given in Table Nos. 21 and 22.

TABLE NO. XXI.—EGELMAN SUPPLY.

Date of Collection. 1908.	Raw Water.		Filtered Water.	
	Bacteria.	Coli.	Bacteria.	Coli.
December 1st,	1,800	40	1,200	16
2nd,	1,500	5	3	0
4th,	48	0	8	0
5th,	6	0	2	0
6th,	280	0	300	0
7th,	650	0	420	0
8th, a. m.,	1,200	4	12	0
p. m.,	2,000	5	330	1
9th, a. m.,	250	5	15	0
p. m.,	630	5	10	0
10th, a. m.,	250	0	80	0
p. m.,	16	0	320	0
11th, a. m.,	120	0	28	0
p. m.,	450	6	9	0
13th, a. m.,	100	0	12	0
p. m.,	210	2	8	0
14th, a. m.,	280	0	8	0
p. m.,	45	0	16	0
15th, a. m.,	3	0	4	0
p. m.,	2,200	0	8	0
16th, a. m.,	220	0	18	0
p. m.,	230	1	10	0
18th, a. m.,	500	1	25	0
p. m.,	29	0	18	0
20th, a. m.,	70	0	18	0
p. m.,	130	0	12	0
22nd, a. m.,	140	0	35	0
28th, a. m.,	25	0	13	0
p. m.,	400	0	45	0
29th, a. m.,	10	0	650	0
30th, a. m.,	20	0	16	0
p. m.,	12	0	8	0

TABLE NO. XXII.—EGELMAN FILTERED WATER. WATER WORKS OFFICE.

Date of Collection. 1908.	Bacteria.	Coli.
December 6th,	200	0
7th,	14	0
8th, a. m.,	350	0
p. m.,	620	0
9th, a. m.,	8	0
p. m.,	10	0
10th, a. m.,	10	0
p. m.,	450	0
11th, a. m.,	22	0
p. m.,	8	0
13th, a. m.,	4	0
p. m.,	3	0
14th, a. m.,	6	0
p. m.,	180	0
15th, a. m.,	6	0
16th, a. m.,	1,000	0
p. m.,	32	0
17th, a. m.,	10	0
18th, a. m.,	350	0
20th, a. m.,	16	0
22nd, a. m.,	12	0
p. m.,	10	0
28th, a. m.,	9	0
29th, a. m.,	390	0
30th, a. m.,	110	0

Three hundred and five samples of water were collected from dwellings along streets throughout the intermediate service district where raw Maiden Creek water and later the treated Maiden Creek water was furnished to the consumer and where typhoid cases were particularly numerous.

On North Fourth Street 11 total collections were made in two dwellings, Nos. 1049 and 1051 respectively. No coli were found in the samples analyzed. The average total bacterial count was 60, the maximum 180 and the minimum 14.

On North Fifth Street 11 total collections were made in 2 dwellings, No. 1143 and 1147, respectively. No coli were found in the samples analyzed. The average total bacterial count was 58, the maximum 310 and the minimum 12.

On North Sixth Street 13 total collections were made in two dwellings, Nos. 1048 and 1136, respectively. In one sample collected on December 11th, at No. 1048 North Sixth Street, a sewage organism was found in a cubic centimeter of the water collected. No coli was found in the other samples, throughout the month. The average total bacterial count was 87, the maximum 410, and the minimum 12.

In the following table is given a summary of the total number of samples collected, by streets and by dates of collection.

TABLE NO. XXIII.

Date of Collection.	Number of Samples Collected.								
	North 4th Street.	North 5th Street.	North 6th Street.	North 10th Street.	North 11th Street.	North 12th Street.	North Church Street.	North Moss Street.	North Mulberry Street.
December 1,			1				1		
December 8,	1	1	1	8	4	3	1	2	5
December 9,	1	1	1	7	3	3	1	2	5
December 10,	1	1	1	7	4	4	1	2	5
December 11,	1	1	1	7	4	4	1	2	5
December 13,	1	1	1	7	4	4	1	2	5
December 14,	1	1	1	7	4	4	1	2	5
December 15,	1	1	1	7	4	4	1	2	5
December 16,	1	1	1	7	4	4	1	2	5
December 17,	1	1	1	7	4	4	1	2	5
December 18,	1	1	1	7	4	4	1	2	5
December 20,			1	7	4	4	1	2	5
December 22,	1	1	1	7	2	2	1	2	5
Totals,	11	11	13	85	45	43	13	24	60

The plotting of the typhoid cases on a map showing the details of the water mains in the city was sufficiently completed on December 3rd to prove that the cases were in dwellings located chiefly away from dead ends of the street pipes. At these dead ends little water is used. It was decided best not to blow off the water on street mains where there was no typhoid fever for fear that infected water from other street mains might be carried into the dead ends. It was further decided to await the disinfection of the entire supply before undertaking a complete flushing out of the entire gridiron system of street mains and this was the plan put into execution.

Hon. George F. Baer, President of the Philadelphia and Reading Railway Company, which operates all of the steam railroads in the drainage area of Maiden Creek, one branch traversing the entire length of Maiden Creek and leading to Slatington and another branch following up the valley of Maiden Creek through Fleetwood borough and Topton to Allentown with a spur terminating at Kutztown, offered his heartiest co-operation to the Commissioner of Health to help stamp out the epidemic. Since an individual who may be coming down with the disease as well as a convalescent, may unknowingly by the discharge of wastes from his body into a stream affording drinking water to the public, be the means of transmission of the deadly germ and because during an epidemic when so many people may be travelling about in a condition liable to cause this harm, it is particularly necessary that all reasonable precautions should be used to keep such poisons out of the drinking water, the Commissioner of Health requested the President to issue instructions to the proper officers of the railway that all toilet rooms on passenger coaches be locked and closed to use during the transit of the coach through the watershed above the point in Maiden Creek from which the water is drawn and supplied to the public in the city of Reading. This request was complied with.

The Commissioner of Health communicated directly with the local authorities of the cities and towns along the Schuylkill River below Reading and warned them of the presence of typhoid fever at Reading and the danger of the spread of the infection through the medium of the river as the source of public water supply.

The Department urged upon the city the establishment of the office of city bacteriologist and chemist and an ordinance to this effect has been introduced into council. Examinations of water, of milk and of effluents from the sewage works will be made daily.

The Board of Water Commissioners of the city is now building a filtration plant for the purification of the Bernhart reservoir water and plans are being prepared for the filtration of the Maiden Creek supply. The Chief Engineer and Superintendent of the water works system, Mr. Emil L. Neubling, and the Chief Engineer of the State Department of Health, at the close of the year were reviewing plans and considering further improvements to the water works system upon which action is expected to be taken in the near future.

On the watershed at every estate where typhoid fever had occurred, a thorough disinfection of the premises was accomplished. Changes were made where practicable in sewage receptacles and permanent remedies against stream pollution were effected.

Twenty-four hundred and sixty-eight properties were inspected on the Maiden Creek watershed. Of them, 489 were found in an unsatisfactory condition. Notice was served on the owners of these properties involving 737 pollutions. There were abated 718 of these pollutions, 19 were unabated at the close of the year and 19 were held for further evidence. On the watershed were 4,087 horses, 7,141 cattle and 12,127 hogs. It was necessary to refer to attorneys for prosecution 110 cases, of which 81 were abated. At the Justice of the Peace hearing 16 were settled, 3 were ignored by the Grand Jury, 9 were settled in Court of Quarter Sessions and one defendant was discharged for insufficient evidence. The following table shows the class of pollutions, their number and those abated and unabated at the close of the year. In the townships on the watershed there is a population of 11,963 human beings.

On North Tenth Street 85 total collections were made in 30 dwellings, six dwellings in the 1600 block, two in the 1500 block, five in the 1400 block, two in the 1300 block, five in the 1200 block, four in the 1000 block, five in the 900 block and one in the 800 block. In one sample collected on December 11th, at 1225 North Tenth Street, a sewage organism was found in cubic centimeter of the water collected. No coli was found in the other samples throughout the month. The average total bacterial count was 98, the maximum 650 and the minimum 11.

On North Eleventh Street, 45 total collections were made in 28 dwellings, five dwellings in the 1400 block, five in the 1300 block, one in the 1200 block, nine in the 1100 block, and eight in the 1000 block. In one sample collected on December 8th at No. 1427 North Eleventh Street, two B. coli communis were found in a cubic centimeter of the water and on December 9th and again on December 11th in the same block a sewage organism was found in the water collected. No coli were found in the other samples throughout the month. The average total bacterial count was 113, the maximum 900 and the minimum 14.

On North Twelfth Street, 43 total collections were made in 11 dwellings, three dwellings in the 1300 block, four in the 1000 block, one in the 800 block and three in the 700 block. In one sample collected on December 8th at No. 1327 North Twelfth Street, a sewage organism was found and again on December 15th a sewage organism was found in the sample of water collected at No. 728 North Twelfth Street. No coli were found in the other samples throughout the month. The average total bacterial count was 120, the maximum 2100 and the minimum 12.

On North Church Street, 13 total collections were made in three dwellings, Nos. 1130, 1135 and 1138, respectively. In one sample collected on December 9th, at No. 1138, a sewage organism was found in the cubic centimeter of the water. No coli were found in the other samples throughout the month. The average bacterial count was 72, the maximum 460 and the minimum 16.

On North Moss Street 24 total collections were made, in seven dwellings, three dwellings in the 900 block and four in the 800 block. No coli were found in the samples analyzed. The average total bacterial count was 85, the maximum 390 and the minimum was 10.

On North Mulberry Street 60 total collections were made in 18 dwellings, two dwellings in the 1600 block, three in the 1500 block, three in the 1400 block, two in the 1300 block, six in the 1200 block and two in the 1100 block. In one sample collected on December 14th at No. 1616 North Mulberry Street, a sewage organism was found in a cubic centimeter of water. No coli were found in the other samples, throughout the month. The average total bacterial count was 103, the maximum 1000 and the minimum 6.

The total area is 210 square miles, or approximately 57 per square mile for the townships.

Kind of Pollution of Stream.	Number of pollutions.	Abated.	Unabated.
Privies,	240	236	4
Bath-tubs,	16	16	
Cesspools,	9	9	
Barn-yards,	88	79	9
Pig-pens,	156	150	6
Laundry and kitchen drainage,	187	187	
Garbage,	24	24	
Creameries,	4	4	
Slaughter houses,	4	4	
Urinals,	2	2	
Dead animals,	2	2	
Laundry,	1	1	
Rendering works,	1	1	
Pomace,	3	3	
	737	718	19

The entire watershed was covered during the month of December, but the work in the above table represents the work of the Department on the Maiden Creek watershed for the entire year. The finishing up of the work was accelerated by the typhoid outbreak in Reading.

CONCLUSIONS.

The epidemic in November was primarily caused by the improper disposal of the discharges from the bodies of human beings afflicted with typhoid fever living and travelling about on the watershed of the Maiden Creek source of supply of water to the public in the city of Reading. The secondary cases were undoubtedly increased by the unsanitary conditions obtaining in the districts in the city where the disease was most prevalent.

There existed on the said Maiden Creek watershed throughout the summer and fall cases of typhoid fever in dwellings where the disposal of the dejecta was such as to have made possible the transmission of the infection in the natural water courses to the city water works intake and the distribution of the infection throughout the intermediate and low service districts in the city and in this manner the primary infection during the summer and early fall months may have reached the water consumers and have caused the outbreaks. The history of the year's experience and of that of prior years forcibly illustrates the necessity of sanitary precautions being enforced on an inhabited watershed contributing to the source of supply to the public.

There were 51 deaths from typhoid fever in Reading during the year, 22 deaths in the townships and 3 deaths in the boroughs, making a total of 76 deaths throughout Berks County for the year 1908.

TYPHOID FEVER AT ROYERSFORD AND SPRING CITY.

In the latter part of August, the Commissioner of Health directed the Engineering Division to render assistance to the Medical Division of the Department in making an investigation and in stamping out typhoid fever reported to be in epidemic form in the twin boroughs of Royersford and Spring City. Field Inspectors W. W. Ritter and Ira Zeigler were assigned to assist the County Medical Inspectors, Dr. H. H. Whitcomb, of Montgomery County, who represented the Department at Royersford, and Dr. Joseph Scattergood, of Chester County, who represented the Department at Spring City. The investigation of the water works system was conducted under the supervising direction of the Chief Engineer. During August there were 116 cases of typhoid fever in the city of Reading and 30 cases there during July. Much of the sewage of Reading reaches the Schuylkill River untreated and in its raw condition. The water supply of Royersford and Spring City is derived from the river at a point 27 miles down stream from Reading. There was typhoid fever infection in the river. The outbreak herein described is believed to have been partly produced by the introduction into the homes of the water consumers of unpurified river water containing the germs of typhoid fever.

GENERAL CONDITIONS.

The Schuylkill River flows in a general southeasterly course and forms the boundary between Montgomery County to the east and Chester County to the west. Spring City borough is located in Chester County along the west bank of the Schuylkill River directly opposite Royersford borough which is located along the east bank of the river in Montgomery County. The two municipalities are connected by a bridge spanning the river. Royersford has a population of about 3,000 and Spring City has a population of about 3,000. There are no sewers in common use in either town. There is one water works system for both boroughs. The Philadelphia and Reading Railway passes through Royersford and the Pennsylvania Railroad, Schuylkill Division, passes through Spring City. Both communities have developed and will continue to be maintained by the industries within their borders.

In Royersford the predominant industry is the manufacture of stoves. But there are also glass works, hosiery and planing mills, foundry and machine shops and a spring bed manufactory. Quite a number of employes at these works reside in Spring City. The industries are not so extensive in the latter

place. Besides the manufacture of stoves, there are knitting and underwear works, glass works and a paper box factory in Spring City. Relatively few of the employees in Spring City reside in Royersford.

In each instance where the industrial plant was supplied with other than public water, such supply was examined. The following table gives a list of such private water supplies and the results of the Department's examination of the water.

BACTERIOLOGICAL EXAMINATION OF WELL AND SPRING WATER AT INDUSTRIAL PLANTS.

Date of collection.	Location.	Well or Spring.	Bacteria per c. c.	
			Total count.	B. Coli.
	ROYERSFORD.			
Aug. 25,	Grander Stove Co.,	Well,	6	0
Sept. 3,	Buckwalter Stove Co.,	Well,	68	0
	SPRING CITY.			
Aug. 25,	Yeager and Hunter Stove Co.,	Well,	65	0
Sept. 8,	Ithaca Window Glass Co.,	Spring,	21	1
Sept. 15,	Keystone Stove Foundry,	Well,	40	0
Sept. 15,	Spring City Glass Works,	Spring,	30	0

All of the other industries in both boroughs used water from the public water works system. There are in the neighborhood of 18 dug wells on private property in Royersford, used as the source of drinking water to the occupants of the estate and in some cases to the neighborhood. In Spring City there are about 30 of such supplies. In Royersford borough there are about 600 buildings. The universal method of excrement disposal is into earth dug vaults. There are a few cesspools. Kitchen water and laundry drainage is in nearly every case conducted by pipe to the nearest highway gutter. In a number of alleys and streets throughout the borough there were found stagnant pools of such drainage. A number of nuisances existed on this account. Several of the privy vaults were found in an overflowing condition. Carelessness in disposing of night soil and garbage resulted. The same statements are true with respect to conditions found in Spring City. In that borough there are about 600 buildings. About 5,000 people in the two boroughs are furnished with the public water. The remaining 1,000 people are supplied from wells and springs owned by individuals. Samples of water collected by the Department from the wells and springs in the two boroughs and in East Vincent Township, which surrounds Spring City were found in 16 instances to contain sewage pollution. The following table shows the location and results of the tests of private water supplies.

BACTERIOLOGICAL TESTS OF WELL AND SPRING WATER FROM PRIVATE ESTATES.

Number.	Date of collection.	Location.	Well or Spring.	Bacteria per c. c.	
				Total	B. Coli.
		ROYERSFORD BOROUGH.			
1.	Aug. 21,	John W. Clemmons,	Well,	98	0
2.	Aug. 21,	G. A. Hoover,	Well,	150	0
3.	Aug. 21,	Mrs. Latshaw (Grove),	Spring,	190	5
4.	Aug. 21,	Charles Garber,	Well,	8	0
5.	Aug. 21,	Fernwood Cemetery,	Well,	220	0
6.	Aug. 21,	William Wagner,	Well,	15,000	0
7.	Aug. 21,	David Long,	Well,	130	0
8.	Aug. 21,	W. B. Hartman,	Well,	85	0
9.	Aug. 21,	A. Kelly,	Well,	12	0
10.	Aug. 21,	Mary McCann,	Well,	130	6
11.	Sept. 3,	William Place,	Well,	200	0
12.	Sept. 3,	John Culp,	Well.	850	0
13.	Sept. 3,	E. D. Fink,	Well.	210	0
14.	Sept. 3,	Edward Wiand,	Well.	120	0
15.	Sept. 3,	R. Winter,	Well.	40	0
16.	Sept. 3,	E. Bush,	Well,	190	0
17.	Sept. 3,	William Jaques,	Well,	220	0
18.	Sept. 3,	John Yeager,	Well.	68	0
19.	Sept. 8,	George Keiser,	Well,	14	0
		SPRING CITY BOROUGH.			
1.	Aug. 25,	Mr. Cressinger,	Well.	2,400	0
2.	Aug. 25,	William Skint,	Well,	35	1
3.	Aug. 25,	Mr. Tachner,	Well,	420	2
4.	Aug. 25,	Charles Reiner,	Well,	320	0
5.	Aug. 25,	Fred Deemer,	Well,	64	1
6.	Aug. 25,	John McFeat,	Well,	200	0
7.	Aug. 25,	Bayard Bullick,	Well,	62	0
8.	Aug. 25,	Orlando Bartman,	Well.	220	0
9.	Aug. 25,	John A. Benjamin,	Spring.	490	10
10.	Aug. 25,	Dora Wyman,	Well.	2,000	0
11.	Aug. 25,	Mr. Hildbrind,	Well,	2,500	3
12.	Aug. 25,	Daniel Keim,	Well.	62	0
13.	Aug. 25,	A. Emery,	Well.	140	0
14.	Aug. 25,	Samuel Hipple,	Well,	65	0
15.	Aug. 25,	David McFeat,	Well,	140	10
16.	Aug. 25,	Ida Lumis,	Well,	210	5
17.	Aug. 25,	William Van Lear,	Well,	4,200	200
18.	Aug. 25,	O. B. Finkbinder,	Well,	85	0
19.	Aug. 25,	William Yeager,	Well,	2	0
20.	Aug. 25,	Jos. Hedrick,	Well.	130	0
21.	Aug. 25,	J. A. Wells,	Well,	280	0
22.	Aug. 25,	B. L. Stauffer,	Well.	72	0
23.	Aug. 25,	Wm. P. Snyder (drilled),	Well,	4	0
24.	Aug. 25,	Frank Merbine,	Well.	220	10
25.	Aug. 25,	Samuel Hetrick,	Well.	20	0
26.	Aug. 25,	Howard Kirk,	Well.	22	0
27.	Aug. 25,	E. A. Haupt,	Well,	18	0
28.	Aug. 25,	George Cullem,	Well.	260	4
29.	Aug. 25,	William Weigle,	Well.	200	0
30.	Aug. 25,	John Jones,	Spring.	98	0
		EAST VINCENT TOWNSHIP.			
1.	Aug. 28,	W. P. Snyder,	Well,	3,000	66
2.	Aug. 28,	W. P. Snyder,	Spring,	530	6
3.	Aug. 28,	William Snyder,	Spring,	750	46
4.	Aug. 28,	Frank Beaver,	Well,	250	0
		EAST PIKELAND TOWNSHIP.			
1.	Aug. 25,	Spring City Cemetery,	Well.	450	0
2.	Aug. 25,	Bonney Brae Park,	Well.	35	0
3.	Aug. 25,	Bonney Brae Park,	Well.	560	0
		LIMERICK TOWNSHIP.			
1.	Sept. 15,	John Hilbourn,	Well,	110	0
2.	Sept. 15,	Abram Hilbourn,	Well,	130	0

In every one of the 15 cases given in the above table where the water analyzed contained sewage pollution, the owner of the well or spring discontinued the use thereof with five exceptions, namely the supplies on the Snyder, Ida Lumis and Fred Deemer estates. The Lumis well was disinfected and cleaned, so were the springs and well on the Snyder farm. Mr. Deemer did not clean or disinfect.

In the early part of July there was a picnic at Latshaw Grove. This place is small and is used principally for Sunday School picnics for classes. It does not have accommodations for a large gathering. It was ascertained that none of those who attended the July picnic had typhoid fever any time prior to or subsequent to the picnic.

Bonney Brae Park is on the line of the street railway running between Spring City and Phoenixville. It is open every day during the week in the season and considerable numbers of people gather there, especially on Saturdays. The water supply comes from two drilled wells which were found to deliver pure water. Early in July there was a union picnic at the park of the Sunday Schools of Royersford and Spring City. It is thought that the epidemic of typhoid fever following might have originated at the picnic. There was no evidence collected by the Department which would support this contention.

The town pump in Spring City, located on Main Street, was suspected of furnishing impure water. The Department's test did not reveal the presence of any contamination in the supply.

In three instances only where well or spring water was found contaminated were there cases of typhoid fever on the property, namely, on that of Mary McCann, Frank Merbine and George Cullem. There were nine residents on the McCann estate. Two of the family were sick with typhoid fever. One of the family only was sick on the Merbine estate. Two of the Cullem family had typhoid fever. There was no circumstance in connection with these cases which pointed to the spread of the infection therefrom to the neighborhood.

Relative to typhoid fever among the users of the other waters found contaminated on property where typhoid fever did not break out, it is not evident why the members of the household on the property, using such supply daily, should not have contracted the disease, if the use of such water occasionally by families in the neighborhood was the means of conveying infection to the members of such families who contracted the disease. Three people came down with typhoid fever who lived in the neighborhood of the Tachner estate and who drank water occasionally from the Tachner well. Three such cases occurred with respect to the Deemer well, one with the Skint well, one with the McFeat well, two with the Lumis well and two with the VanLear well; but in every instance the patients used borough water more liberally than any other. Had there been infection in the private estate supplies, the members of the household living on that estate would naturally have contracted the infection, and have been stricken with typhoid fever.

MILK SUPPLY.

The milk supply to the two towns was obtained from nine dairies. On one of them only was there a case of typhoid fever. The patient's name was Jesse Yeager and his age 16 years. The residence was a double tenement. Master Yeager was employed by the owner, J. H. Latshaw, who lived in the other half of the house and operated the farm. There were 15 cows kept on the property. One hundred and sixty-five quarts of milk were produced daily. The milk was sold in Spring City and East Vincent Township, being supplied to 125 families. Master Yeager was taken sick on July 26th. A trained nurse was employed. Every attention was bestowed to disinfect the dejecta and to prevent secondary infection. Everything about the dairy appeared in first class sanitary condition. Twenty-nine cases of typhoid fever appeared in the families of those supplied with milk by J. H. Latshaw. The dates of onset of the cases are given in the following table:

July 15th,	1 case,	Cressinger.
July 16th,	1 case,	Corrigan.
July 26th,	1 case,	Yeager.
Aug. 2nd,	1 case,	Cook.
Aug. 4th,	1 case,	Woodward.
Aug. 7th,	2 cases,	Mrs. Corrigan. Mary Corrigan.
Aug. 9th,	4 cases,	Mattes. Fry. Sturges. Knerr.
Aug. 12th,	1 case,	Fulmer.
Aug. 13th,	2 cases,	Reiner. Johnson.
Aug. 14th,	1 case,	Sansom.
Aug. 15th,	1 case,	Livingood.
Aug. 16th,	2 cases,	Fry. Gheris.
Aug. 21st,	1 case,	Reiner.
Aug. 23rd,	1 case,	Deimer.
Sept. 4th,	1 case,	Mattes.
Sept. 11th,	1 case,	Manning.
Sept. 17th,	1 case,	Lumis.
Sept. 20th,	1 case,	Grahn.
Oct. 2nd,	1 case,	Clark.
Oct. 29th,	1 case,	John Latshaw, Sr.
Nov. 11th,	1 case,	Fulmer.
Nov. 24th,	2 cases,	Ernest Sheeder. Elsie Sheeder.

So out of 125 families supplied with the milk from this dairy, 21 families only had typhoid in their homes and the total number of cases in such families was 29. They were distributed from the 15th of July until the 24th of November, and by months as follows: Three in July; 17 in August; 4 in September; 2 in October; and 3 in November. These facts do not indicate cause for suspicion of the Latshaw milk as the medium of transmission of typhoid infection throughout Spring City. None of the milk was sold in Royersford. Mr. James Corrigan was taken with typhoid fever ten days before Master Yeager. Mrs. Corrigan and her daughter, Mary, were subjected to secondary infection in the household. Mrs. Mattes was taken sick on August 9th and about four weeks later her husband developed the disease. Mrs. Fry developed typhoid fever on August 9th. Her daughter Emma was taken sick a week later. Similarly, Master Reiner came down with typhoid fever on August 13th. His father's case was diagnosed a week later. The Fry and Reiner cases do not look like secondary infection so much as infection from an original source other than milk. A sample of milk taken from the Latshaw wagon on September 1st was analyzed by the Department and found to be uncontaminated. The nine cases happening along this milk route subsequent to September 1st are negligible. The difference in dates of onset of the cases of Mary and Hiram Fulmer, August 12th and November 19th, do not indicate milk contamination as the cause and the same is true respecting the difference of dates of onset of the cases of Master Yeager and John Latshaw, the father of Latshaw, the dairyman, July 26th and October 29th. The Sheeder cases on November 24th were caused by one and the same poison. If the Latshaw milk had at any time been infected with virulent typhoid fever germs, it is fair to conclude that a general outbreak would have occurred like an explosion all along the route. As it was, only 15 cases were recorded for two weeks among 625 people furnished with the Latshaw milk. Nevertheless it might have been possible that negligence or carelessness in observing hygienic rules for the delivery of milk into the household where a case of typhoid fever existed promoted the spreading of the infection from the Cressinger or Corrigan or Yeager cases to others. The dates of onset, if this actually happened, would have been from about the first of August to the middle of the month. It was during this time that typhoid fever was most prevalent in Royersford and Spring City.

In the following table appear the names of the six milk dealers who produced or distributed the milk to the public along routes in Royersford; the number of families supplied by each dealer; and the total number of cases appearing in these families. Abram Hilbourn supplied milk from his own farm and from that of his brother John. J. W. Poley furnished milk from his farm and from that of William Garver. W. H. Rogers kept a milk depot from which he drove a milk route. He bought his milk from C. W. Whisler and John Rinford. The remaining three dealers shown in the table produced the milk they sold on their own farms. There was no typhoid fever existant at any time during the year at these dairies. In every instance the sanitary conditions were good, except at the Hilbourn estate. On September 1st samples of milk out of cans off the milk wagon of each dealer were collected by the Department and analyzed. All were found free from contamination except that of Hilbourn. His farm was inspected and the dairy was found to be in an unsanitary condition. It was closed; the cows were transferred and after the buildings were put in a proper condition to the satisfaction of the State Health officials, the dairy was again operated. A second examination of milk after the above mentioned improvements had been made showed the milk to be pure.

Milk Distributor.	Approximate number families supplied.	Number cases typhoid fever in such families.
Abram Hilbourn,	100	8
John Slifer,	65	0
H. S. Yeager,	110	6
J. W. Poley,	75	7
C. M. Rogers,	120	4
W. H. Rogers,	130	11
		36

These 36 cases occurred in August with three exceptions, namely, 1 on September 4th and 2 in November. And with two further exceptions, the cases occurred between the 1st and 16th of August, inclusive. It is sufficient to note that out of 3,000 people furnished with milk, 31 cases only of typhoid fever de-

veloped between August 1st and August 17th, when the epidemic was in its strength in Royersford and Spring City. Abram Hilbourn supplied over 500 customers, among whom 8 only had typhoid fever. None of the 300 or more consumers of the Slifer milk had typhoid fever. And six only out of over 500 consumers using Yeager milk were sick and 7 only out of approximately 400 Poley customers were sick. More significant even was the low rate among the customers of C. M. Rogers. He supplied in the neighborhood of 600 people, among whom 4 cases of typhoid fever only developed. Eleven out of 650 customers along the W. H. Rogers route certainly relieves the Whisler and Rinford milk of all suspicion. So it may be concluded that the milk was not the medium for the primary spread of the infection which caused the outbreak of the epidemic in Royersford during the first two weeks in August.

In concluding the consideration of milk as the medium of the spread of the typhoid poison there remain but two dealers. Latshaw Brothers furnished about 275 families, all in Spring City. Mowrer Brothers furnished 200 families, principally in Spring City. A few lived in East Vincent Township and in Royersford. The Latshaw Brothers' milk was produced on their own farm. The Mowrer Brothers' milk was produced partly on their farm and partly on the farm of H. D. Latshaw. There was no typhoid fever at any time during the year at these farms. Milk was analyzed by the Department and found to be pure. The sanitary condition of the premises in each instance was above the average. Seventy-two cases of typhoid fever appeared in the families of those supplied with milk by Latshaw Brothers. The dates of onset of the cases are given in the following table::

July 13,	1 case,	Bullock.
July 16,	1 case,	Irey.
July 20,	1 case,	Hixson.
July 26,	2 cases,	Thompson.
		Heckman.
Aug. 1,	1 case,	Bullock.
Aug. 2,	9 cases,	White.
		Placke.
		Mills.
		Hetrick.
		Powers.
		Cook.
		Kline.
		Tachner.
		Hampton.
Aug. 6,	2 cases,	Argue.
		Muntz.
Aug. 8,	1 case,	Oliver.
Aug. 9,	5 cases,	Hampton.
		Backman.
		Reiff.
		Hunter.
		Hetrick.
Aug. 10,	2 cases,	Smith.
		Lukins.
Aug. 11,	1 case,	Smith.
Aug. 12,	2 cases,	Hart.
		Culp.
Aug. 13,	7 cases,	Edwards.
		Seaser.
		Green.
		Skinner.
		Coulston.
		Freed.
		Whalen.
Aug. 14,	4 cases,	Stubblebine.
		Deimer.
		Evans.
		Mrs. Evans.
Aug. 15,	3 cases,	Guss.
		Merbine.
		Cobb.
Aug. 16,	2 cases,	Quigg.
		Wright.
Aug. 17,	1 case,	Knobler.
Aug. 18,	2 cases,	Stubblebine.
		Williams.
Aug. 19,	1 case,	Wright.
Aug. 20,	1 case,	Hipple.
Aug. 21,	1 case,	Fry.
Aug. 22,	1 case,	Newburn (Howard).
Aug. 23,	2 cases,	Hetrick.
		Beard.
Aug. 24,	1 case,	Alva Hetrick.
Aug. 25,	2 cases,	Otteringer.
		Tyson.
Aug. 26,	2 cases,	Quigg.
		Knobler.

Sept. 16,	2 cases,	Lewis.
		Tyson.
Sept. 19,	1 case,	Marshall.
Sept. 21,	1 case,	Otteringer.
Sept. 25,	2 cases,	Rhoads.
		Hughes.
Oct. 13,	1 case,	Thomson .
Oct. 26,	1 case,	Morgan.
Nov. 22,	1 case,	Cronkhite.
Nov. 24,	1 case,	Auchy.
Nov. 25,	1 case,	Epright.
Nov. 30,	1 case,	Zollers.
Dec. 21,	1 case,	Culp.
Dec. 30,	1 case,	Barnes.

So out of over 1,300 people supplied with milk from the Latshaw Brothers' dairy, 72 cases of typhoid fever only occurred in the homes of these consumers. They were distributed from the 13th of July to the last day of the year and by months as follows: Five in July; 63 in August; 6 in September; 2 in October; 4 in November and 2 in December. If the milk at any time contained virulent infection, there would naturally have been more sickness among the Latshaw Brothers' consumers. The onset would have been sudden and extended. Numerous members of the same household would have come down with the disease. The fact is, however, that the disease was prevalent throughout Spring City and also in Royersford during the first two weeks in August. Every family afflicted was a customer of some milk dealer. Latshaw Brothers, supplying the greatest number of people, would have been likely to have the greatest number of customers sick with the disease. There were nine families in which two members of the household had typhoid fever. In one such family only the date of onset was the same day for the two cases. In another family the onsets were three days apart, in another family 4 days and in another family 7 days apart. These cases were not produced by secondary infection in the household.

There was another family supplied by the Latshaw Brothers' milk in which the two cases were separated by nine days. In another family the onsets were ten days apart; in another, eighteen days; in another twenty-seven days, and in another family, the onsets of the two cases were three months apart.

In the Hetrick family, the first member was taken sick on August 9th. The two other afflicted ones developed the disease two weeks later.

Regulations affecting the use of milk containers and the interchange thereof between the house where there was a case of typhoid fever and the milk man were put in force by the local authorities in Spring City on August 21st. It will be noted that there continued to be cases of typhoid fever developed thereafter. The epidemic had begun to wane before these regulations had been put in force. While carelessness respecting milk containers may have helped spread the infection, it is believed that this was only one of the many mediums for the spread of the disease.

Ruth Bullock developed typhoid fever on July 13th; her sister Mabel came down with the disease on August first. There was no attempt at disinfection of dejecta. The privy was about 25 yards from the house. There was no vault. The excrement was spread out over the ground and was exposed to the fly pest. Kitchen drainage and wash water was discharged through a pipe into the street gutter in front of the house and reached Main Street. The soiled bed linen of the patient was washed in water which flowed out into the street gutter.

The same remarks, excepting the privy, are relevant to the Irey case. So it is seen that circumstantial evidence does not point wholly to milk.

In the Mowrer Brothers' business about 1,000 people were furnished with milk and among them 47 cases of typhoid fever occurred as follows: Seven in July; 33 in August; 3 in September and 4 in November. Four of these cases were in East Vincent Township, 12 were in Royersford and 31 were in Spring City. The following table shows the dates of onset of the cases:

Date.	Spring City.	Royersford.	East Vincent township.
July 19,	2 cases,		
July 20,	1 case,		
July 25,	1 case,		
July 26,		1 case,	
July 27,	2 cases,		
Aug. 2,	2 cases,		
Aug. 3,	1 case,	1 case,	
Aug. 4,	1 case,		
Aug. 5,			1 case.
Aug. 6,	1 case,		
Aug. 8,		1 case,	1 case.
Aug. 9,	4 cases,	1 case,	
Aug. 10,	1 case,	1 case,	
Aug. 11,		1 case,	
Aug. 13,	1 case,	1 case,	
Aug. 14,	2 cases,	2 cases,	
Aug. 15,		1 case,	
Aug. 16,	2 cases,		
Aug. 17,		1 case,	
Aug. 18,	1 case,		
Aug. 22,	1 case,		
Aug. 23,	1 case,		
Aug. 24,			1 case.
Aug. 26,			1 case.
Aug. 28,	1 case,		
Sept. 3,	1 case,		
Sept. 4,	1 case,	1 case,	
Nov. 11,	1 case,		
Nov. 22,	1 case,		
Nov. 24,	2 cases,		
	31 cases,	12 cases.	4 cases.

Six of the cases in Spring City were also supplied with other dealers' milk and three in Royersford. One familiar with typhoid fever outbreaks would not attribute the epidemic in Royersford and Spring City to milk. The distribution of the cases as shown in the above table and in the tables preceding it are confirmation of this conclusion.

There were nine instances, all in East Vincent Township, where typhoid fever occurred, the members of the family being supplied with milk from a cow kept on the premises. No milk from such premises was sold in town. The following table gives information relative to these cases:

Date of Onset.	Name.	Water Supply.
July 20th,	Mrs. Ida Wise,	Spring.
July 20th,	Mrs. John Frier,	Well.
July 31st,	Harry Yeager,	Spring.
Aug. 9th,	Jacob Kolb,	Well.
Aug. 10th,	Lucy McCrea,	Well.
Aug. 11th,	Lydia Kolb,	Well.
Aug. 20th,	Mrs. Eli Slifer,	Well.
Aug. 21st,	Anna Buckwalter,	Well.
Aug. 22nd,	Ira Overdorf,	Spring.

PUBLIC WATER WORKS.

There is but one water works system supplying water to Royersford and Spring City. It is owned by the Home Water Company. The Schuylkill River is the source of supply. The pumping station is located in Royersford on the river and 100 feet back from the east bank at a point about 500 feet north of the highway bridge connecting Royersford and Spring City. This station was erected in 1889. The filter plant was added in 1893. The intake pipe is 20 inches in diameter. It extends from the centre of the river to a masonry pump well 10 feet in diameter and 23 feet deep, located adjacent to the pumping station. The end of the pipe in the river is unscreened. At this point there was a depth of less than three feet of water during the last ten days in August. There are natural falls in the river about 150 feet down stream. During the high river stages these falls become submerged and are of no consequence in protecting the intake against back water from down stream should conditions so favor. This would probably be during comparatively quiescent state occasioned by an ice jam. But the principal danger from contamination of the water supply comes from sewage put into the river from municipalities and minor sources up-stream.

A simple duplex steam pump, called the low service pump, raises the water from the well into a coagulating or subsidence basin built of brick masonry and being 12 feet wide by 42 feet long and having a mean depth of 13 feet. Its capacity is approximately 54,000 gallons. It has a sheet gauze covering and is exposed to the weather. The inlet pipe enters the bottom of the tank. The 12 inch outlet pipe leads off from near the top.

The top of the basin is about 20 feet higher than the pump room floor and is carried about three feet higher than the ground surrounding it. Water flows from this basin by gravity to and into two old style, wood tank, Jewell mechanical filters, each 12 feet inside diameter by 16 feet high in length of staves, each having effective filtering area of 113 square feet and each being equipped with a mechanical agitator.

The filters are located within a brick building adjoining the pump house. The filter house is 25 feet wide by 54 feet long inside. Immediately beneath it is located a filtered water basin containing approximately 65,000 gallons capacity, covered completely with a comparatively tight wood floor. A compound duplex steam pump takes its suction from the filtered water basin and delivers the water into the distributing pipe system supplying Royersford and Spring City. The latter town is fed by main line laid in the bed of the river and this terminates in an equalizing or storage reservoir of 3,000,000 gallons capacity located on a hill back of Spring City borough northward in East Vincent Township, distant about three quarters of a mile from the borough.

The high service pump which takes filtered water from the filtered water basin, also has its suction connected with the river water intake well and is suitably valved. Thus it is possible for raw river water from the pump well to be delivered directly into the water pipe system in the town. However, this cannot be done when the low service pump is in operation, because the raw water pump (both raw water and filtered water pumps being connected to the same suction line) would draw filtered water away from the filtered water pump owing to the greater suction lift on the low service pump. And this would be true if there were a leak in the valve on the suction line between the two pumps.

During extreme high stages of the river the pump room floor and the filtered water basin are submerged, at which time it becomes necessary to shut down the pumping plant and depend upon the reservoir in East Vincent Township to supply the district until the river recedes sufficiently to permit of cleaning the filtered water basin beneath the filters.

On the basis of a consumption of 60 gallons per capita per diem the daily consumption would be about 330,000 gallons. As the storage reservoir contains three million gallons, it would be capable of supplying the town for about nine days. Should the filtered water basin remain under water more than nine days, it would be necessary to pump unfiltered water to meet the town's supply. The river would have to recede to a point about 7 feet below the ground surrounding the filtered water basin before the latter could be drained by gravity.

The coagulant feed apparatus at the filter plant during July and August consisted of a wooden tank two feet inside diameter by 26 inches inside depth. Filtered water was supplied to this tank by a half inch diameter pipe equipped with a globe valve and also with a ball cock and float intended to keep the tank uniformly full and to prevent its overflowing. The ball cock and float, however, were out of order at the time of the Department's inspection in August and the supplying of water to the tank was regulated by the globe valve. A one-half inch diameter pipe, provided with a globe valve, and connected with the suction pipe of the low service pump was intended to convey the coagulant solution from the tank to the raw water, the only means for regulating the feed of the coagulant solution being the said globe valve. This pipe was clogged when the Department investigated it and would not feed the coagulation solution with any regularity or certainty. It had been the custom of the filter attendant to throw into the tank unmeasured quantities of sulphate of alumina and open lightly the valve in the feed pipe leading to the pump suction and at the same time open the valve in the filtered water supply pipe sufficiently to insure a fresh water supply greater

than was being taken away and thus prevent the pump from taking air. Under this arrangement, as will be seen, it was impossible to feed any definite quantity of the coagulant solution as the feed pipe was clogged and the solution gradually became weaker and weaker.

The filtered water, therefore, must have been poor and of varying quality. The water company admitted that very little coagulant had been used and that at times none had been used, not for sake of economy but on account of the unfounded local prejudice against chemical coagulation. When the river is muddy the chemical is used to clarify the water, but when the river is clear, which is usually the case, during low stages, at which time its contamination is likely to be greatest because of least dilution, the coagulant is not used.

On August 21st, water was being delivered to the filters at the rate of 560 gallons per minute, whereas the proper capacity of the two filters combined was only 450 gallons per minute. The pump if crowded could deliver as many as 800 gallons per minute. It is probable that for some time prior to August 21st, the pumps and filters may have been operated at even higher rates than here mentioned and that no coagulant whatever was used. Under such conditions the water was certain to be improperly filtered. The filtered water basin, the pipe system in the towns and the storage reservoir could have been filled with water of poor quality and in this manner the water might have been responsible for the typhoid fever epidemic if the river water contained typhoid germs at that time.

The storage reservoir on the hill is circular and is built in excavation and embankments, the top of the latter about 8 feet above the ground. The bottom and sides to slope 1½ to 1 are built of expanded metal concrete. The diameter at the bottom is 160 feet and at the top 211 feet. The water line, high mark, is 15 feet 7 inches above the bottom of the reservoir. The structure is divided into two equal compartments by a dividing wall. Its top is 8 feet above the bottom of the reservoir. On one side at the bottom and in the dividing wall is the 16 inch cast iron main which serves as the inlet and outlet pipes for the water. It branches into each compartment and terminates in a small sump built a few inches below the floor of the basin. There is a branch strainer attachment to the pipe, one for each compartment and a valve which permits the joint or independent use of each compartment. Ordinarily the reservoir is used as a unit and its entire capacity availed of. Beneath the water main there is an eight inch drain pipe made of cast-iron. It empties into an open ditch in the field. The lot on which the reservoir is situated is enclosed by a high wire fence.

The circulation of the water in the reservoir is poor indeed. On August 21st large objects could not be seen to a depth of three feet of water in the basin. When it is recalled that the water was supposed to have been filtered before being put into the reservoir, the conclusion is that either unfiltered or partially filtered water reached the basin, or that a sufficient period of stagnation had elapsed to promote vegetable life.

It is not necessary to prove the intentional by-passing of raw river water around the filters to account for the turbidity of the water in the storage basin on the hill. The filtering material in the filters was too coarse to do good and uniform work at all times. Furthermore, the filters were intended to carry about 12 feet head of water above the surface of the sand. On August 20th the level was four feet only above the sand surface, the influent water falling through air some six or eight feet into the filters—a condition most likely to break up the coagulated particles in the applied water as well as the film on the surface of the sand bed. This film is most necessary to good bacterial removal. Again, the filter effluent pipes extended down only a few feet into the filtered water basin and were provided with no means for slowing down the rate of filtration when the filtered water basin is full. So the surplus water flowed to waste, dirtied the filters unnecessarily and maintained unusual rates of filtration when slower rates should have been maintained. Neither did the filter influent pipes have means for controlling the delivery of water to and into the filters and maintaining a uniform level therein provided on them. All these things or any one of them were serious faults. It is no wonder, therefore, that the plant as a whole should have delivered turbid water into the storage reservoir on the hill.

The pumping hours average from 8 to 10 in each 24. If necessary to meet the demand in the towns, the pumps and the filters were rushed to supply the 24 hour consumption within the few hours which one engineer and fireman were willing to labor each day. Each pump had a capacity of 800,000 gallons in 24 hours. The normal pumping capacity was in excess of the rated filter capacity. Thus it appears that to deliver 330,000 gallons of water daily in 8 hours made necessary an overtaxing of the pumping and filtering capacity.

EPIDEMIC OF TYPHOID FEVER IN ROYERSFORD, SPRING CITY AND VICINITY.

The number of cases of typhoid fever occurring in Royersford, Spring City and vicinity will never be known. On the morning of August 20th, when the officers of the State Department of Health appeared on the ground, neither boards of health of the two boroughs had records of typhoid fever cases. The Royersford

board began work at once to keep records but such records were not kept in Spring City until after re-organization of the Board of Health in that borough, which was on September 10th. The Department's inspectors set about interviewing doctors and using what records they would give. The physicians were reluctant to furnish information. Undoubtedly there were many more cases than the doctors were willing to admit. Later when the district nurses went about and visited every house where there was a case of typhoid fever reported, in a few instances admittance was refused. No house to house canvass was made throughout either town. Furthermore, the records we have are not reliable as to the dates of onset. They may be substantially correct, but they should not be the foundation for exact reasoning as to the outbreak, its cause and course. These facts should be kept in mind when the following table is studied:

TYPHOID FEVER— DATES OF ONSET OF CASES.

Onset.	Spring City.	Royersford.	East Vincent township.	Total.
July 13,	1			1
July 15,	1			1
July 16,	1		1	2
July 19,	2			2
July 20,	2		2	4
July 25,	1			1
July 26,	3	1		4
July 27,	2			2
July 31,			1	1
August 1,	1	1		2
August 2,	12			12
August 3,	1	1		2
August 4,	2			2
August 5,			1	1
August 6,	3	5		8
August 7,		1	2	3
August 8,	1	5	1	7
August 9,	12	5	1	18
August 10,	2	1	1	4
August 11,	1	1	1	3
August 12,	3	6		9
August 13,	10	3		13
August 14,	7	2		9
August 15,	4	5		9
August 16,	6	1		7
August 17,	1	1		2
August 18,	3	1		4
August 19,	1			1
August 20,	1		1	2
August 21,	2	1	1	4
August 22,	1		1	2
August 23,	4			4
August 24,	1		1	2
August 25,	2			2
August 26,	2		1	3
August 28,	1			1
September 3,	2			2
September 4,	1	1		2
September 11,	1			1
September 16,	2			2
September 17,	1			1
September 19,	1			1
September 20,	1			1
September 21,	1			1
September 25,	2			2
October 2,	1			1
October 13,	1			1
October 26,	1			1
October 29,	1			1
November 2,		1		1
November 11,	2			2
November 22,	2			2
November 24,	3			3
November 25,	1			1
November 30,	1	1		2
December 21,	1			1
December 30,	1			1
	124	44	16	184

There were no cases reported to the Department throughout the year for East Pikeland Township which bounds Spring City on the southeast. And there were no cases reported for Limerick and Upper Providence Townships in Montgomery County for the year. These townships surround Royersford.

The following gives the cases by months:

Month.	Spring City.	Royersford.	East Vincent township.	Total.
July,	13	1	4	18
August,	84	40	12	136
September,	12	1	0	13
October,	4	0	0	4
November,	9	2	0	11
December,	2	0	0	2
	124	44	16	184

Between August 1st and the 20th inclusive, 118 cases of typhoid fever developed. The bulk of these had their onset between August 8th and August 15th, a total of 72 cases in one week. It will be noticed by referring to the table that between the 6th and the 16th, inclusive, in Royersford there were 35 cases, and in Spring City 49 cases. It is evident that the original infection appeared suddenly in Royersford and disappeared in like manner. The cases were distributed very generally throughout the town. The avenue of transmission of infection open to all was the public water supply. If this water contained typhoid infection and it was introduced into the homes of the water consumers for a few hours only in its raw or partially purified condition, it would have produced the effect noted for Royersford. Furthermore, naturally the outbreak would occur in Royersford if anything sooner than in Spring City because the water from the pumping station would reach Royersford slightly in advance of Spring City.

However, a polluted public water supply would not account for the numerous cases of typhoid fever in Spring City prior to the outbreak in Royersford; but these cases in Spring City occurring in warm weather on properties where sanitary conditions were neglected and there was ample opportunity for secondary infection on such property and the infection was disseminated by means of street gutters, even along the main thoroughfare in the town and but a few feet away from exposed edibles on the sidewalks in front of stores could have been the original source of the outbreak during the first part of August and for that matter the entire epidemic might be explained in this way. It is believed, however, that negligence in killing the infection in the bed chamber, coupled with careless and negligent disposal of the wastes of the typhoid patients and the general unsanitary conditions and lack of sewerage facilities in both boroughs and the favorable conditions induced by warm weather for the spread of the infection accounts for the earlier and the later cases in the district. It is also concluded that the public water supply transmitted the infection which caused the main explosion of the disease between the 6th and the 16th of August, inclusive. If this conclusion be true, something went wrong with the water works system during the last ten days of July. According to detailed studies, a summary of which is given in the following table, in which the cases of typhoid fever are classified by age periods, there was nothing peculiarly significant in the ages of the patients:

Age Period. Years.	Number of Cases.			
	Spring City.	Royersford.	East Vincent township.	Total.
0-5,	13	2	4	19
6-10,	24	8	2	34
11-15,	17	8	0	25
16-20,	25	7	4	36
21-25,	14	8	0	22
26-30,	11	7	0	18
31-35,	5	2	1	8
36-40,	7	2	4	13
41-45,	1	0	0	1
46-50,	2	0	1	3
51-55,	1	0	0	1
Over 56,	4	0	0	4
	124	44	16	184

Every estate on which a typhoid fever case existed was visited by an officer of the Engineering Division and the conditions were noted and, so far as possible, the physicians' reports were checked. The following tables of patients arranged by sex and attending physicians are based on this data.

CLASSIFICATION BY SEX.

	Spring City.	Royersford.	East Vincent township.	Total.
Male,	70	16	4	90
Female,	54	28	12	94
	124	44	16	184

ATTENDING PHYSICIANS.

Physician.	Spring City.	Royersford.	East Vincent township.	Total.
McWhinney,	42	2	9	53
Good,	12			12
Brower, C. P.,	18		4	22
Spencer,	7	1	1	9
Vaughn,	9	8	1	18
Janvier,	2			2
Tyler,	1	17	1	19
Melvin,		1		1
Everhart,		2		2
Smith,	1			1
Garber,		1		1
Phoenixville Hospital,	13	8		21
Pottstown Hospital,		2		2
Not given,	19	2		21
	124	44	16	184

REMEDIES AND PREVENTIVE MEASURES ENFORCED.

The remedies and preventive measures enforced by officers of the Engineering Division aimed first, to help stamp out the epidemic and second to prevent a recurrence, so far as the water works system was concerned. What was done in improving the individual sources of water supply has been explained hereinbefore.

On August 20th, immediately after the arrival of the Department's representative and expert engineer, George F. Hodkinson, the speed of the pumps was reduced to 420 gallons per minute which made the rate of filtration less than 125 million gallons per acre per diem. A scale graduated in inches and half-inches was affixed inside of the coagulation solution tank and the water company was instructed relative to how much sulphate of alumina to put into the tank when full of water, how to effect the proper solution, and how much of this solution in vertical inches per hour should be applied to the raw water. The amount was equivalent to about one grain of coagulant per gallon of filtered water. This was sufficient to give good bacterial removal as the river water contained very little turbidity.

Arrangements were also immediately made for dropping the coagulant solution into the intake well because the feed pipe from the tank was clogged.

The water company set to work on August 20th by direction of the Department to freely flush the distributing mains and particularly at dead ends. It was not thought advisable to cut out the storage reservoir on the hill, as so doing would have caused a shortage of water and would have rendered more irregular the rate of pumping and consequently the rate of filtration. The better plan was to put the filter plant temporarily in as efficient a condition as possible, drain the distribution pipe system and then drain one compartment of the storage reservoir, and after sterilizing this compartment and filling it with pure water to empty and clean the other compartment. Owing to the poor circulation in the basin there seemed little likelihood of drawing back therefrom water of a different quality than was being pumped.

On August 25th, the eastern half of the storage reservoir was sterilized by using 20 pounds of copper sulphate to approximately 424,000 gallons of water, equal to about one-third of a grain per gallon. The copper sulphate crystals were placed in a burlap bag secured to the end of a rope and dragged about the reservoir until the crystals were completely dissolved. The concrete slopes, walls and bottom of the compartment were scrubbed with the chemically treated water, they were then thoroughly cleaned and rinsed with newly filtered water and then the compartment was turned into service. The second compartment was then treated in a similar manner. The bottom of the basin after the compartments were filled with newly filtered water was clearly visible to a depth of 12 feet.

The following table shows the results of bacteriological examinations of raw river water collected at the intake well at the pumping station:

Date of Collection.	Bacteria per cubic Centimeter.	
	Total.	Colon.
August 20,	180	0
August 25,	1,200	0
August 27,	210	6
September 3,	120	0
September 8,	32	0
September 14,	110	8

It may be well to recall that at Reading, 27 miles up stream, there were 116 cases of typhoid fever during the period covered by these tests. The low total count in the above table does not signify much with regard to the safety of the river water at Royersford for drinking purposes. Neither does the absence of colon in four out of the six samples, signify much. The deadly germs of the disease were lurking about in the river some of which had the power to survive for several week possibly. Not many hours after they were discharged from the bodies of human beings in Reading the germs or some of them might pass by the intake of the Royersford pumping station and some of them might be drawn into the pipe. Under favorable circumstances enough of this infection in virulent form could pass into the distributing mains of the Home Water Company and produce a sudden epidemic without leaving a connected trail which could be followed by bacteriological evidence. In other words the physical circumstances should direct conclusion.

On September 28th, 1908, the Commissioner of Health sent the following communication to the Home Water Company:

"I beg to inform you that in the interests of public health it is necessary for you to submit in the immediate future plans to the Commissioner of Health for approval for additional filter capacity, for improved and reliable coagulant feed apparatus, for the installation of rate control apparatus on the filters for the quick drainage of the storage reservoir in Spring City and for the better circulation of water in the reservoir.

"I also beg to notify you that it will be necessary for you to dispose with the present filtering material in the filters and to put in filtering material of proper effective size and uniformity coefficient in substitution for that now in use in the filters.

"It appears that your company owns three acres of land near Yankee Dam, more than a mile up-stream above the pump house and intake, and comparatively close to the reservoir in Spring City. This property was purchased with the intention of ultimately moving the pumping station and filter plant to it. The sooner the pump and filter plant is moved to this site, the better, as it possesses the following advantages:

"(a) The intake could be located where there would be 8 or 10 feet depth of water at all times and obviate any possibility of contamination by sewage or run-off whether from Royersford or Spring City.

"(b) On the new property the filtered water basin could be conveniently located above high water in the river, rendering it unnecessary at any time to cut out the filter plant and pump unfiltered water.

"(c) Locating the pumping plant on the new ground would also insure better circulation of the water in the reservoir.

"We expect to hear favorably from you as to your intentions at an early date."

Before the end of the year the water company had replaced the old sand in the filters with new sand and had materially lengthened the hours of pumping each day so that the filter units were operated at normal rates. Furthermore, the company was negotiating for other changes in the plant.

In Spring City there were three sources of ice supply, viz: The Snyder pond, which is formed of an old mill dam in the upper part of the borough between the canal and the river; another source is a pond between Main Street and the canal opposite the foot of Poplar Street. It is known as Peterman's ice pond. Mr. Peterman exhausted the ice harvested from this pond early in the summer and during the epidemic he was delivering the third source of ice supply to Spring City throughout the town. It came from Phoenixville and was artificially made. Tests of this ice showed it to be pure. Relative to the Snyder pond ice, it is reported that this is little used for domestic purposes owing to suspicion of contamination.

In Royersford the general ice supply comes principally from Kerns ice pond, located in the eastern part of the borough. A sample of the ice was analyzed and absence of all contamination was noted. There is possibility of pollution which will increase as the borough grows. The Department suggested that possible sources of pollution be abated and this was done by the local Board of Health.

The Commissioner of Health sent out a general letter of instruction to the local Boards of Health of Royersford and Spring City upon receipt of preliminary reports from the County Medical Inspectors about the epidemic.

These medical inspectors kept a careful oversight of the progress in carrying out the instructions given by the Commissioner of Health and continued various investigations, leaving the execution of details largely in the hands of the inspectors of the Engineering Division. This work involved a personal examination and giving of orders by these inspectors of said Division to owners or occupants of every estate on which a case of typhoid fever existed relative to putting such estate in a sanitary conditon, both as to water supply and household waste disposal; and where there were other nuisances on the property, the ordering and seeing to it that abatements were effected. These inspectors had the co-operation of the Health Officer of Spring City and four constables. Every evening these local and State officers would meet with the Chief Burgess, W. P. Miles, who exercised full authority on the part of the borough in co-operating with the State in carrying out the instructions of the Commissioner of Health.

In Royersford the local Board of Health and the Health Officer exercised the authority vested in them by law in doing similar work in that municipality.

An account of the work performed by the district nurses and the prosecution and conviction of physicians for not reporting typhoid fever cases may be found elsewhere in the Commissioner's report under the part entitled "Division of Medical Inspection."

At the regular monthly meeting of the Spring City Town Council, held September 7th, a resolution of appreciation of the services rendered the community by the State Department of Health was unanimously adopted. This included the district nurses who were not permanently connected with the Department.

Following is the letter of instruction issued by the Commissioner of Health. It suffices to say that these instructions were faithfully carried out:

"The reports sent to us by our County Medical Inspector and by citizens of your boroughs bring to our attention the fact that your Board has to deal with a typhoid epidemic.

"The following points are brought to your attention.

"In the handling of any epidemic of typhoid fever there are a number of things which assume a considerable importance and I desire to bring these matters to your attention and would ask whether you have instituted any regulations along the lines indicated and if so, to what extent?

"Especially in times of epidemics of any disease the physicians should be compelled to promptly report all cases either conclusively diagnosed or presenting the clincal symptoms of the disease in question. If physicians are negligent in the matter of reporting typhoid fever to your Board at the present time they should be arrested and fined in order that no case may be neglected and thereby allowed to become a focus for secondary infection.

"All houses in which typhoid fever exists should be placarded with a penalty attached for the removal of such placards. Circulars setting forth the Rules and Regulations to be observed by nurses or attendants having the care of typhoid fever should be distributed in every household where the disease exists and for this purpose I am sending you under separate cover a number of the Department circulars on typhoid fever.

"The Health Officer should placard the house and ascertain the conditions existing on the premises, character of the privy, cesspool or whatever means are used for the disposal of excreta and the needs of the family, reporting the same to your Board and a lime wagon should be started to distribute freshly burned, unslaked lime to the houses where the owners or occupiers are unable to provide the same for their individual use, this lime to be used in the form of Milk of Lime for the disinfection of excreta and for use in all closets or privies. The work of the lime distributor should be checked up by the district nurse, who should visit each home where typhoid fever exists and where they are unable to procure the services of a nurse, directing them as to the precautions to be observed and seeing that the instructions of the physicians are carried out.

"Whenever possible in indigent families the patient should be transferred to a hospital at once and the room and its contents thoroughly disinfected, together with the privies.

"Warning placards should be posted in conspicuous places, preferably upon telegraph poles, in saloons and in the street cars, directing all people to boil their water and milk at least thirty minutes prior to its use for domestic purposes.

"The delivering of milk in milk bottles should be prohibited and all dairymen should be compelled to deliver their milk into an individual container supplied by the householder, this container not to be handled by the dairyman at all. Unless this precaution is taken due to the interchange of individual milk bottles or the infection of the general milk supply of the dairymen, the infection is very apt to be carried in this manner.

"All proprietors of meat markets and of meat carts which go about the streets peddling meats should be compelled to have their meat so placed in their markets that the handling of the same by customers should be prohibited and all those delivering meat from wagons should be instructed that the customers must not handle meat before purchase, that the rear curtain of their wagon should be closed and that sales should be from the front of the wagon. In other words, no meat should be handled by prospective customers.

"If the municipal water supply is found to be at fault the mains should be repeatedly flushed, all dead ends bled and copper sulphate introduced into the reservoir or screening chambers in the proportion of one to a million, this addition to be kept up for at least ten days.

"Our records show that your Board has been derelict in making reports, and we expect weekly reports to be sent this office promptly henceforth."

CONCLUSIONS.

The epidemic in the twin boroughs is believed to have been first introduced through the medium of the public water. Prior to this there was a smaller outbreak possibly due to the dissemination of a weak infection through milk containers. The prior outbreak was in Spring City. A large number of secondary cases followed the main outbreak. They were attributable to contagion in the household, but principally to lack of proper sewage disposal methods. With outhouses over shallow vaults, full and overflowing, the excrement exposed to the fly pest in the warmest weather, and these dangerous places under such circumstances in many instances being in close proximity to kitchens where food stuffs were exposed to flies, these conditions taken in connection with the fact that over 90 cases of typhoid fever were in existence in Spring City before the citizens were aware of it and before general instructions were given and enforced for the disinfection of all dejecta from the typhoid patients, make it no wonder that secondary infection occurred. Probably the towns were seeded with the germs

of this disease. The great majority of citizens do not realize that the dirty water from the washing and cleansing of soiled bed linen contains the most virulent infection which needs to be killed at once in the household or human life outside may be jeopardized. And yet, everywhere throughout the twin boroughs this poisoned water from the laundry was emptied either onto the ground in the back yard or principally into the gutters of the alleys and streets where the infection could be picked up a thousand different ways to the prejudice of public health. No doubt that the promptness with which these gutters were scoured out and flushed and disinfected and no doubt the disinfection of the premises generally throughout both boroughs prevented the spread of the disease. Otherwise hundreds of victims must have been added to the list.

Royersford and Spring City stand in need of sewerage facilities.

The epidemic serves to emphasize the necessity for prompt reporting of typhoid fever cases and the placarding of them, and the enforcement by the local health authorities of the regulation of the State Department of Health about the handling of milk containers at an estate whereon a typhoid fever patient exists. Failure to observe this regulation in one instance might cause the disease to develop in every family along an entire milk route.

The epidemic further teaches a lesson which the Department of Health has been teaching, that pathogenic poison must be kept out of streams used as sources of public water supply. Water filters are not enough of a safeguard. They may be most of the time, but it is the potentiality of the raw water to reach the consumer's home and cause sickness and perhaps death in his family which the water filter cannot remove. When the plant breaks down or is overworked or some emergency arises like a great conflagration, requiring the introduction of the unpurified river water, the harm may be done.

State regulation of filter plants to compel the fulfilment of charter obligations by the water company should reduce to the minimum the danger from careless or negligent operation of the filter plant. But such State attention cannot insure against accident or breakdown. The degree of safety afforded to the public by the keeping of the sewage out of running streams, therefore, warrants the assuming of the expense that this policy involves. Thus the Royersford and Spring City outbreak demonstrates the necessity for the preservation of the purity of the streams of Pennsylvania for the protection of public health.

VI. REFERENCES TO SPECIAL COUNSEL.

In the prosecution of the work of removing sources of sewage pollution of the streams in the State on complaint of petition, as elsewhere hereinbefore described has made necessary the reference to special counsel for criminal proceedings a number of cases where the owner of the property would not comply with the orders of the Commissioner of Health. These references for the year 1908 are shown in the following table:

County.	Attorney.	No. cases referred to attorneys.	No. cases settled out of Court.	No. cases settled by Court trial.	No. cases pending at close 1908.
Berks,	Innes & Williams,	94	83	11	
Lehigh,	Innes & Williams,	16	16		
Chester,	Innes & Williams,	70	69		1
Delaware,	Innes & Williams,	6	6		
Montgomery,	Innes & Williams,	5	5		
Bucks,	Innes & Williams,	1			1
Susquehanna,	Selden Munger,	5	2	2	1
Luzerne,	Mose H. Salsburg,	1	1		
Elk,	Joseph Flynn,	2	1	1	
Franklin,	Chas. Walters,	3	3		
York,	N. Sargent Ross,	7			7
Lackawanna,	E. C. Ammerman,	1			1
Bradford,	Benj. N. Kuydendell, Jr.,	1			1
Union,	F. E. Bowers,	11		11	
Westmoreland,	Jos. A. McCurdy,	1			1
Monroe,	W. A. Erdman,	1			1
	Totals,	225	186	25	14

During the year (1908) one hundred and ninety-two (192) cases were referred for prosecution to Innes & Williams, of Philadelphia, special counsel for the Department. Louis J. Palmer, Esq., associated in practice with that firm, was in direct personal charge of the prosecutions. It was, however, while engaged in the work of the Department in Berks County that Mr. Innes, senior member of the firm, contracted the illness which resulted in his death in September, 1908, since which time Mr. Williams has continued to conduct the practice of the firm, Mr. Palmer continuing as an associate as theretofore.

These cases, following the general practice of the Department, were only placed in the hands of counsel after completion of the necessary inspections by the field inspectors and after due effort on their part to effect the removal of sources of sewage pollution by service of notice on the occupants of premises. Thereafter a personal inspection in all cases was made by counsel as not only desirable in order to obtain a familiarity with exact conditions before instituting proceedings, but also in order that by personal interview with the persons in fault a compliance with the requirements of the Department might be brought about, if possible, without litigation. Satisfactory results were obtained in this way in many instances.

The cases referred to counsel arose chiefly in connection with the work done on the watersheds of Maiden Creek, Little Darby Creek, Pickering Creek and their tributaries, and were distributed among the counties named below, as follows:

Berks County,	94
Lehigh County,	16
Chester County,	70
Delaware County,	6
Montgomery County,	5
Bucks County,	1
	192

The disposition of the cases in Berks County may be summarized generally as follows:

Nuisances found to have been abated at the time of first inspection by counsel,	23
Cases in which abatement was made after inspection and interview with owners of premises,	23
Cases in which no evidence of pollution could be obtained under any conditions of weather,	4
Cases in which action was witheld in order to secure evidence during periods of wet weather,	21
Cases in which warrants were issued but abatements made and costs paid before returned to court,	11
Case discharged on technical grounds,	1
Cases abated after return to court and ended by pleas of guilty, etc.,	10
Case returned to court and bill of indictment ignored on promise of abatement,	1
	94

In none of the above cases was a warrant issued except after a positive refusal on the part of the occupant of premises to comply with the law. The greatest care was exercised in making inspections to see that the evidence in each case fully justified prosecution. After issuing the warrants in each case the defendant was informed in the presence of the Magistrate that he would still be given an opportunity to abate the nuisance, and that by so doing and payment of costs the case might be disposed of before the Magistrate. As will be seen from the above summary eleven defendants availed themselves of this opportunity.

The work of the Department in Berks County has been materially aided by the effect produced by the disposition during the December term of the Quarter Sessions Court of five cases based on the pollution of streams, by agreement providing for abatement and payment of costs by the defendants and the entry of pleas of guilty. Isaac Heister, Esq., of Reading, was retained by the Department as local counsel in connection with Philadelphia counsel in the trials at this term of court. Widespread ignorance of the law under which the Department was acting and marked antagonism toward its representatives, had existed throughout the rural districts of this country. The disposition of the cases above referred to, and the wide publicity given to the matter by the local press, has helped to a marked degree to correct the misapprehension formerly prevailing, and to convince the residents of this section that they cannot with impunity continue to maintain nuisances on their premises contrary to the orders of the Department. In fact, since these cases were disposed of there has been frequent reports, as compared with the former instances of antagonism, of property owners who, after service of notice upon them, have voluntarily sought out the local inspector to obtain information as to proper methods of abatement.

Two of the cases included in the above summary may be particularly mentioned, as their disposition constitutes the elimination of two grave sources of pollution. The first was the case of the Keystone State Normal School, a large institution, all the sewage from which had been emptied for some years into Sacony Creek, a tributary of Maiden Creek. The matter had been the subject of protracted consideration, interviews and correspondence with no satisfactory result, until after a meeting between the trustees and counsel, which resulted in the adoption and establishment of a new and sufficient drainage system. The second was the case of a rendering plant, which drained its waste products into the same creek, the operation of which was finally discontinued when its proprietors were brought face to face with prosecution.

The cases arising in Lehigh County were principally found in Lynn township on the small tributaries of the Maiden Creek watershed. The general disposition is shown by the following summary:

Nuisances found to have been abated at the time of first inspection made by counsel,	8
Cases in which abatement was made after inspection and interview with the owners of premises,	7
Case in which warrant was issued but abatement made before hearing,	1
	16

The attitude of the people in Lynn Township was very much more favorable toward complying with the requirements of the Department and in the majority of cases abatement was made simply at the request of the inspector or upon the service of the formal notice. In the seven cases where interviews were had with the owners, such interviews were more for the purpose of determining the best methods of abatement rather than for the purpose of persuading the owners to comply with the Department's orders. In only one case was it necessary to institute legal proceedings and in this case the magistrate, before whom the warrant was issued, gave the owner notice personally that he would have to issue the warrant unless the law was complied with, which had the desired result.

In the county of Chester the work arose in two sections, i. e.: On the watersheds of the Pickering and Little Darby Creeks. Following is summary of general disposition:

Nuisances found to have been abated at the time of first inspection by counsel,	32
Cases abated after inspection and either interview or letter,	13
Cases in which action was withheld in order to secure evidence in time of wet weather,	22
Cases in which warrants were issued but abatements made before return to court,	2
Cases returned to court and now pending,	1
	70

In the cases arising along the Pickering a number of the complaints were kitchen waste and wash water cases. The majority of the balance were based on drainage from barnyards or pig pens. In almost all the cases arising along the Little Darby the complaint was that of kitchen waste and wash water running to the highway and it was remarkable how many of the people in that community had obeyed the orders of the Department by constructing cesspools on their premises for the purpose of taking care of the waste. The credit for this work cannot be claimed by special counsel. Yet even in the cases included under the first group in the above summary, care was taken to investigate the conditions and consider the possibility of future pollution, as there have been many cases marked abated in which it was subsequently found that nothing had actually been accomplished further than to remove the evidence of pollution.

Special mention may be made of the case of the Phoenix Iron Company, referred to in the reports of the two previous years, which formerly was drained into French Creek. During the year 1908 this company completed the second sanitary privy and also built two concrete vaults to take care of the office building and their foundry. In addition to this the third sanitary privy was begun and on its completion these large works will be entirely free of any cause of complaint. The fact that this drainage system is used by some 3,000 men shows the importance of the abatement in this case.

The work in Chester County also included the case of Commonwealth vs. Charles R. Kennedy. This case involved the drainage system operated by the so-called Devon Sewage Company. This case has been continued at two different terms of court at the defendant's request, pending the hoped for incorporation of a local company proposing to install and operate a new system which would relieve the defendant from the operation of the present system. This case is now pending in the courts. Meanwhile measures have been taken which effect at least a temporary abatement of pollution.

The following is a summary of the disposition of the cases in Delaware County:

Nuisance found to have been abated at the time of first inspection by counsel,	3
Cases abated after inspection and either interview or latter,	2
Case in which action was withheld in order to secure further evidence in wet weather,	1
	6

In this county the most important case was that of the Wayne Sewerage Company, which was charged with pollution and nuisance arising from disagreeable odors. The matter was taken up at a joint conference with all the parties interested and it was decided that the main difficulty was faulty operation on the part of the company. To test this its officers, therefore, were permitted to operate for one month according to the strict letter of the instructions received from the Department of Health, whose inspectors should keep in close touch during that period of operation and report on the results. After the expiration of that period it was found and so reported by Mr. Mebus, special engineer, that the effluent from the plant was satisfactory and, therefore, the charge of pollution was withdrawn, for so long as proper operation should continue and prove effective. Certain recommendations for improving the construction and operation of the plant were made and since their adoption no complaints have been received concerning the odors theretofore reported.

Of the five cases referred to counsel from Montgomery County, the following disposition has been made:

Nuisance found to have been abated at the time of first inspection by counsel,	1
Cases abated after inspection and interview,	2
Case in which action was withheld in order to secure further evidence,	1
Case in which warrant was issued but abatement made before hearing,	1
	5

In the work done in this county the one warrant issued was in the case against one Rhoads, who operated a rendering plant. The institution of prosecution resulted in the construction of an embankment to prevent the pollution of the stream, and an actual hearing before the magistrate was accordingly rendered unnecessary.

One case has arisen in the county of Bucks, namely that of the Doylestown Sewage Company, which is at the present time in abeyance, pending proposed alterations and improvements which are expected by the company to abate the nuisance complained of.

The appeal to the Supreme Court in the case of Commonwealth vs. Emmers, referred to in report of 1907, was argued on March 31st, 1908, the Attorney General and Mr. Innes appearing for the Commonwealth. In a per curiam opinion handed down May 11th, 1908, the judgment of the Superior Court affirming the judgment of the Montgomery County Court entered on the verdict of guilty was affirmed by the Supreme Court without comment. The constitutionality of the so-called Purity of Water Act of 1905, under which so much of the work of the Department has been done, has therefore been passed upon by three different courts and has been finally upheld without qualification by the highest court of appeal in the State. The character of the references to other attorneys are briefly stated in the following notes under the headings by counties.

BRADFORD COUNTY.

Benj. W. Kuykendall, Jr., Atty. Towanda, Penna. The case of Shepard Bristol, Bradford Township, Bradford County, for maintaining an unsanitary slaughter house and premises was referred on May 18th, 1909, and final settlement pending at the close of the year.

ELK COUNTY.

Jos. Flynn, Ridgway, Pa., Att. The case of Geo. Schaberl, St. Marys, Pa., for the pollution of Wolf Lick Creek in Jay Township, was referred June 22nd, 1908. The Grand Jury found a true bill on October 7th, 1908, defendant plead guilty October 8th, and sentence suspended pending the abatement of the nuisance.

Chas. Kerner, St. Marys, Pa., for the pollution of Silver Run, Benzinger Township, was referred on June 23rd, 1908, was arrested on July 1st, 1908, and entered bail for court. Nuisance abated and suit withdrawn.

FRANKLIN COUNTY.

Charles Walter, Chambersburg, Pa., Atty. The cases of Hummell, Hines & Co., Shippensburg, Pa., T. S. Zerfer and C. D. Minehart, Orrstown, Pa., were referred on June 26th, 1908. Abatements were reported on July 15th without bringing suit. The above were all stream pollutions.

LACKAWANNA COUNTY.

E. C Ammerman, Scranton, Pa., Atty. The case of Ira Turner, Springbrook Township, for stream pollution, held over for the February Court of Quarter Sessions in 1909.

LUZERNE COUNTY.

Mose H. Salsburg, Wilkes-Barre, Pa., Atty. The case in equity against the Harveys Lake Hotel and Land Company for discharging sewage into Harveys Lake. The matter was adjusted out of court, the defendants agreeing to discontinue the discharge of sewage into said Lake.

MONROE COUNTY.

W. A. Erdman, Stroudsburg, Pa., Atty. Mrs. Chas. Brown, Pocono Township, for stream pollution, referred on October 27th, 1908. Case pending at the close of the year.

UNION COUNTY.

F. E. Bowers, Middleburg, Pa., Atty. The following cases of stream pollution in Limestone Township were referred on June 19th and abatements made without entering prosecution:

Jas. Schock, owner, F. C. Kratzer, tenant.
James Oberlin.
Joseph Sowers.
John Grubb, owner, Harry Koser, tenant.

William Shaffer.
H. J. Solomon.
William Barbers' Heirs, owners, Daniel Bartley, tenant.
William Dribelis.
Cedar Run School House, S. I. Bingaman, Secretary School Boards.
Emanuel Yarger.
William Grubb.

WESTMORELAND COUNTY.

Joseph A. McCurdy, Greensburg, Pa., Atty. Solomon G. Shuster, Penn Township, for unsanitary condition of premises, dead horses, improper disposition of offal from butcher shop, referred April 21st, 1908. Case still pending at close of 1908.

YORK COUNTY.

N. Sargent Ross, York, Pa., Atty. The following cases of stream pollution were referred and still pending at the close of 1908.

Albert Noll, Dallastown, Pa., York Township.
John Eveler, Red Lion, Pa., York Township.
William Huffman, Red Lion, Pa., York Township.
Isaac Koehler, Yoe, Pa., York Township.
Albert DeHuff, Dallastown, Pa., York Township.
W. H. Shearer, York, Pa., York Township.
William Wolf, owner, Frank Kline, tenant, Shrewsbury Township.

SUSQUEHANNA COUNTY.

Selden Munger, Attorney. A. P. Bedford, for case of stream pollution at Dimmock. M. S. Allan, for pollution of stream from milk station at Dimmock. The nuisance remained unabated at the close of the year. Mrs. Henry S. Felton, pollution of stream at Lathrop Township, by drainage from vault abated. J. Felton, of Lathrop Township, for stream pollution from a privy. Abated at the request of attorney. William Waterman, owner, John Waterman, tenant, for stream pollution in Lathrop Township, by careless and negligent disposal of sewage on the banks of Horton Creek, abated.

VII CONCLUSIONS.

There are two propositions which encompass the entire scope of the administration of the law for the preservation of the purity of the waters of the State for the protection of the public health in so far as the discharge of sewer systems is concerned and they are:

FIRST: The degree of safety which can be expected to be obtained in treating sewage for the removal of bacterial infection.

SECOND: The relative importance of sewage disposal plants and other health protective work, including treatment plans for water works, regarded in the light of the limited resources of the municipal corporations as defined by the constitutional limit of indebtedness and of private corporations, as determined by water rates fixed by franchise or contract with the municipality.

In settling these questions in any particular case a thorough consideration of all the factors must be had. The policy of setting forth at length many of the reasons which govern the determinations of the Commissioner of Health, or the Governor, Attorney General and Commissioner of Health, in the case of sewage disposal, makes the decree quite voluminous, but it enables the local authorities to obtain an insight into the entire subject as viewed by the State Department of Health and is accepted as an eminently fair and satisfactory procedure. It has obviated the criticism of arbitrary exercise of power. At the close of the year it is believed that a continuation of the policy of publicity is fully warranted.

DIVISION OF SUPPLIES.

CHARLES HARTZELL, *Superintendent.*

DIVISION OF SUPPLIES.

The following is a statement of the work of this Division since the report for November and December of 1907.

At the beginning of the year 1908, the entire work of the Division devolved on the Superintendent, but it increased so rapidly as to necessitate assistance and three clerks were accordingly appointed as occasion required.

An additional room was also assigned to the Division by the Board of Public Grounds and Buildings to meet the demand for space for the arranging, storing and shipping of supplies. An extra assistant was employed for this work.

The Superintendent receipts and signs for all goods received by the Department.

The shipments by express and freight of boxes, bales and packages, and the large quantities of mail matter, pamphlets, circulars and letters give some idea of the work accomplished during the year.

The following comparative table shows the actual increase by semi-annual periods in shipments by express companies alone:

Shipments by Express.

1907—July to December,	832
1908—January to June,	1,824
1908—July to December,	2,512

showing that more than three times the amount of business was done during the last six months of 1908 than for the corresponding period of 1907.

Each of the different Divisions of the Department is dependent upon this Division for the proper receipt of its supplies and furniture and distribution of its documents and material.

To the General Division are furnished desks, chairs, typewriters, printing machinery, carpets and any other materials that may be required from time to time. Also the preparation and sending of large mail orders, such as pamphlets, books and packages is entrusted to the Division of Supplies.

The Medical Division: To each of the sixty-seven County Medical Inspectors of this Division are sent the following articles:—Pamphlets, manuals, circulars, placards, cards, vouchers, letter heads, envelopes, descriptive books and county directories.

There are also about seven hundred Health Officers connected with this Division, and it is necessary to keep them supplied with everything pertaining to their work, such as pamphlets, circulars, placards, school and dairy inspection cards and letters of instruction; besides the various requisites used in disinfecting premises:—formaldehyde, potassium permanganate, bichloride of mercury, sealing paper, disinfecting suits and cans.

To the eight thousand doctors in the State, outside of Philadelphia and Pittsburg, are furnished cards for reporting communicable diseases, circulars, Health Officers' directories and vaccination cards.

Engineering Division: In addition to receiving and shipping all customary supplies and furniture for this Division and complete outfits for field inspectors, of whom there were fifty-nine this year, there were also shipped to different points daily, water boxes and cans containing bottles with directions for collecting and shipping samples of water from reservoirs, streams, ponds and wells, from which to make tests at the Department's Laboratories in Philadelphia.

Division of Vital Statistics: For this Division all express and freight packages are handled and receipted for. Cards, circulars of instruction to the two thousand one hundred and fifty-eight Registrars, Deputy Registrars and Sub-Registrars, and all other printed matter, typewriters, furniture and whatever else pertains to the workings of the Division, are supplied and kept in storage ready for immediate delivery.

Antitoxin and Vaccine Division: The Superintendent makes requisitions on account of this Division for all printed matter, such as forms, reports, applications and receipts for diphtheria antitoxin, furniture, carpets, typewriters and accessories.

Division of Dispensaries: For this Division the requirements are many and varied and it is necessary to have a complete stock on hand in order to be able to supply the hundred or more Dispensaries at a moment's notice. There were twenty-two Dispensaries at the beginning of the year 1908; and at the end of the year there were one hundred and six. For these the various supplies are carried in bulk and shipped promptly as they may be ordered. These include circulars of information, cards, forms of instruction, paper napkins, bags, cuspidors and drinking cups; medical instruments, clinical thermometers, protective gowns and blankets. As the number of Dispensaries increases there are constant demands for new articles.

Division of Sanatoria: This Division is supplied with pamphlets, circulars, cards and all printed matter pertaining to the examination, admission, regulation and discharge of patients. During the present year the State South Mountain Sanatorium at Mont Alto has been kept supplied with sputum cups, aseptic drinking cups, paper napkins, paper bags, typewriters and stationery.

Division of Laboratories: For this Division is maintained the supervision of the outfits furnished on request to the physicians, (about 8,000) in the State, outside of large cities, for sending specimens of certain suspected diseased tissues and fluids to the Laboratories for analysis. Directions and instructions accompany each outfit as well as request cards and envelopes addressed to our Laboratories, so that they will be sent direct. The use of these free outfits, Nos. 1, Blood Test for Malaria; 2, Widal Test for Typhoid Fever, and 3, Sputum, Urine, Growths, etc., is growing daily, indicating that they are much appreciated by the doctors throughout the State. In addition there are constantly shipped boxes and tin cans containing bottles of water collected from reservoirs, streams and other sources, which again are reshipped to the Laboratories, in order to make examinations for the presence of sewage and bacterial pollution.

Division of Accounting and Purchasing: This Division is furnished with vouchers of different kinds, letter heads, envelopes and other miscellaneous stationery. Also, from time to time, typewriters and typewriter supplies, office furniture, such as chairs, desks and other necessary appliances.

The close of the year finds the Division of Supplies growing rapidly, with a further demand for increased facilities for work and additional space for storage and shipping in order that the requirements of the different divisions may be promptly attended to.

DIVISION OF ACCOUNTS.

E. I. SIMPSON, *Accountant.*

83—17—1908

THE DIVISION OF ACCOUNTS.

Financial Report.

The Commissioner begs leave to respectfully report that under the three appropriations of the Legislature of 1907, for the use of the several divisions of the Department, the following sums were received and expenditures made during the year 1908.

Summary showing balances December 31st, 1907, as per the second annual report of the Department.

APPROPRIATIONS.

Act. No. 673 for general salaries and expenditures of the Department for two years ending May 31, 1909,	$1,100.600 00	
Total expenditures as per report to December 31, 1907,	134,921 72	
Unexpended balance of Appropriation January 1, 1908,		$965,678 28
Act No. 673 for the establishing and maintenance of Tuberculosis Dispensaries for two years ending May 31, 1909,	$400,000 00	
Total expenditures as per Report to December 31, 1907,	8,810 82	
Unexpended balance of Appropriation January 1, 1908,		$391,189 18
Act No. 157 for the establishing and maintenance of one or more tuberculosis Sanatoria for two years ending May 31, 1909,	$600,000 00	
Total expenditures as per Report to December 31, 1907,	69,366 93	
Unexpended balance of Appropriation January 1, 1908,		$530,633 07

And that the Receipts and Expenditures from January 1st, 1908 to December 31st, 1908, on acount of the General Fund have been as follows:

GENERAL FUND ACT NO. 673.

Cash balance on hand January 1, 1908, as per Report for year ending December 31, 1907,		$52,839 24
Received from the Auditor General warrants on account as follows:		
March 7, 1908,	$44,138 00	
April 23, 1908,	44,138 00	
May, 21, 1908,	44,138 00	
July 1, 1908,	44,138 00	
July 5, 1908,	44,138 00	
October 14, 1908,	44,138 00	
November 14, 1908,	44,138 00	
December 5, 1908,	44,138 00	
		353,104 00
The Auditor General has issued warrants on account of general salaries to December 31, 1908,		20,644 00
Total receipts to December 31, 1908,		426,587 24

The expenditures from January 1, 1908, to December 31, 1908, have been as follows:		
Inspecting, disinfecting, quarantining, etc., account the following diseases:		
Chickenpox,	$2,910 75	
Whooping Cough,	5,190 02	
Pneumonia,	420 82	
Scarlet fever,	15,829 05	
Smallpox,	4,516 02	
Measles and Mumps,	28,003 59	
Diphtheria,	34,453 93	
Typhoid fever,	16,313 46	
Scabies,	68 08	
Erysipelas,	68 29	
Leprosy,	1,028 70	
Cerebrospinal meningitis,	245 09	
Rabies,	8 10	
Puerperal fever,	5 89	
Tuberculosis,	120 74	
Foot and mouth disease,	7 75	
Anthrax,	2 81	
Yellow fever,	11 08	
Also the following general expenses of the Department:		
Advertising Rules and Regulations,	91 82	
Legal services,	3,138 93	
General salaries,	44,702 74	
General Office expenses,	8,150 57	
Maintenance and supplies for laboratory (exclusive of salaries),	1,877 99	
Laboratory salaries,	7,485 00	
Amount carried forward,	$174,651 22	

Amount brought forward,	$174,651 22	
Initial expenses and supervision in appointing health officers,	8,483 26	
Organizing local boards of health,	112 33	
Sanitary engineering division, traveling and general expenses (exclusive of salaries), in pure water inspection,	46,647 12	
Sanitary engineering division salaries,	27,941 34	
Sanitary inspection of schools,	22,669 67	
Disinfectants,	5,593 10	
Inspecting and abating nuisances,	54,399 04	
Collecting, tabulating and filing vital statistics,	6,174 74	
Collecting, tabulating and filing marriage statistics,	2,479 90	
Collecting, tabulating and filing morbidity statistics,	19,233 92	
Commissioners' traveling expenses,	229 55	
Attending scientific and educational meetings,	101 27	
Traveling expenses, Secretary to the Commissioner,	17 42	
Advisory Board, traveling expenses, attending meetings,	255 43	
General sanitary inspection,	2,574 83	
Total expenditure during 1908,		$371,564 14
Cash balance on hand January 1, 1909,		55,023 10
		$426,587 24

Note: That the following amounts were paid to the Department during the year:

September 5, interest on bank deposit,	$332 02
December 3, interest on bank deposit,	416 56
Total,	$748 58

These were returned to the State Treasurer on the following dates:

September 8th,	$332 02
December 31st,	416 56
Total,	$748 58

SUMMARY.

Appropriation,		$1,100,600 00
Expenditures to December 31, 1907,	$134,921 72	
Expenditures to December 31, 1908,	371,564 14	
Total expenditures to December 31, 1908,		506,485 86
Unexpended balance of Appropriation, January 1, 1909,		$594,114 14

And that the Receipts and Expenditures from January 1st, 1908 to December 31st, 1908, on account of the Dispensary Appropriation have been as follows:

DISPENSARIES FUND ACT NO. 673.

Cash balance on hand January 1, 1908, as per report year ending December 31st, 1907,		$24,522 52
The following amounts have been received from the Auditor General on account:		
March 3, 1908,	$16,666 67	
April 23, 1908,	16,666 67	
May 21, 1908,	16,666 67	
July 1, 1908,	16,666 67	
September 2, 1908,	16,666 67	
October 14, 1908,	16,666 67	
November 13, 1908,	16,666 67	
December 5, 1908,	16,666 67	
		133,333 36
Total receipts to December 31, 1908,		$157,855 88
The expenditures from January 1st, 1908, to December 31st, 1908, have been as follows:		
Rental of Dispensaries,	$10,552 63	
Maintenance of Laboratory,	4,190 27	
General office expenses,	1,545 27	
Salaries of Doctors and Nurses,	36,355 75	
Furnishing and equipping dispensaries,	11,461 05	
Examination for admission to Mont Alto,	261 73	
Drugs,	3,633 22	
Operating supplies,	7,521 75	
Milk and eggs,	35,477 22	
Traveling expenses of Doctors and Nurses,	3,147 95	
Disinfectants,	1,441 76	
Administration,	25,739 00	
Advertising,	33 78	
Legal services,	105 00	
Inspectors' convention,	2,761 81	
International Congress on Tuberculosis,	3,440 76	
Total expenditure during 1908,		$147,668 95
Cash balance on January 1st, 1909,		10,186 93
		$157,855 88
Note: That the following amounts have been paid to the Department,:		
May 28, interest on bank deposit,	$226 80	
October 31, interest on bank deposit,	109 00	
December 5, interest on bank deposit,	75 08	
September 31, interest on bank deposit,	32 34	
		443 22
Note: That the following amounts have been returned to the State Treasurer on the following dates:		
May 28, interest on bank deposit,	$226 80	

October 31, interest on bank deposit.	109 00	
December 31, interest on bank deposit, ...	75 08	
		$410 88
Cash on hand January 1st, 1909, ...		32 34
		$443 22

Note: That the interest received December 31, amounting to $32.34 does not show on the Report as having been returned to the State Treasurer. The reason for this is that check was mailed to him in January, 1909, and will appear in the next report.

SUMMARY.

Appropriation, ...		$400,000 00
Total expenditures as per Report to December 31, 1907, ...	$8,810 82	
Total expenditures as per Report to December 31, 1908, ...	147,668 95	
Total expenditures to December 31, 1908, ...		156,479 77
Unexpended balance of appropriation January 1, 1909, ...		$243,520 23

And that the Receipts and Expenditures from January 1st, 1908 to December 31st, 1908, on account of the Sanatoria Appropriation have been as follows:

SANATORIA FUND ACT NO. 157.

Cash balance on hand January 1, 1908, ...		$30,633 07
Received from the Auditor General warrants on account as follows:		
May 3, 1908, ...	$25,000 00	
April 21, 1908, ...	25,000 00	
April 23, 1908, ...	25,000 00	
May 21, 1908, ...	50,000 00	
July 1, 1908, ...	25,000 00	
September 3, 1908, ...	25,000 00	
October 6, 1908, ...	25,000 00	
October 14, 1908, ...	50,000 00	
November 13, 1908, ...	25,000 00	
December 8, 1908, ...	25,000 00	
		300,000 00
Total receipts to December 31, 1908, ...		$330,633 07

The expenditures from January 1, 1908, to December 31, 1908, have been as follows:

Eggs and green stuffs, ...	$13,256 50	
General office expenses, ...	699 24	
Operating supplies, ...	25,716 75	
Salaries, doctors, nurses, etc., ...	18,916 09	
Drugs, ...	1,003 73	
Building materials for additions and improvements, ...	6,489 58	
Amount carried forward, ...	$66,081 89	

Amount brought forward,	$66,081 89	
Furnishings,	30,205 96	
Traveling expenses,	1,121 85	
Salaries, engineers, etc., account construction,	19,186 69	
Advertising, account construction,	1,542 20	
Examination for admission to Sanatorium at Mont Alto,	14 10	
Administration,	1,387 77	
Legal services,	65 00	
Sewage, disposal plant, account construction,	11,289 35	
Cottages, pavilions and toilet houses,	57,599 93	
Ice house, account contract,	1,899 25	
Dining building, laundry and bath houses, account contract,	46,889 78	
Insurance on buildings and furnishings Sanatorium at Mont Alto,	1,298 07	
Food stuffs,	13,154 90	
Sand filters,	4,706 79	
Water work system, account contract,	25,324 10	
Infirmary building, account contract,	26,636 75	
Laundry machinery, account contract,	558 40	
Heating apparatus for dining and infirmary building, account contract,	2,196 41	
Painting building, etc.,	515 00	
Total expenditures during 1908,		$311,674 19
Cash balance on hand January 1, 1909,		18,958 88
		$330,633 07

Note: That the following amounts were paid to the Department during the year:

July 30th, interest on bank deposit,	$119 36	
December 31, interest on bank deposit,	461 70	
December 31, interest on bank deposit,	161 31	
Total,		$742 37

These were returned to the State Treasurer as follows:

July 30,	$119 36	
December 31,	461 70	
December 31,	161 31	
Total,		$742 37

SUMMARY.

Appropriation,		$600,000 00
Total expenditures as per Report to December 31, 1907,	$69,366 93	
Total expenditures as per Report to December 31, 1908,	311,674 19	
Total expenditure to December 31, 1908,		381,041 12
Unexpended balance of Appropriation January 1, 1909,		$218,958 88

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