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health authorities were requested to make an investigation and the Commissioner of Health was notified at Harrisburg, and his instructions promptly executed by the company. Officers of the State Department assumed charge. The County Medical Inspector gave full instructions regarding disinfection, etc., which were apparently faithfully carried out by the graduate nurse who had taken charge Saturday night, September 16th. In the family, besides the parents and the two boys, were four girls, ages ranging from three to twenty-one years.

The water company furnished a guard by day and night to see that all regulations were strictly enforced. The old privy structure was removed to a temporary location, the contents of the old vault were taken out and cremated and the hole filled with lime and clay in alternate layers. A new masonry tight vault was constructed for permanent use. The springs and run on the property were limed and so were the barn-yard, and the pig-pens, all of which were in a filthy condition. The barn cellar was utilized for cattle stalls and pig pens. Stagnant pools of filthy water were most offensive, however, several live springs created a flow and the output was also always filthy and reached Mill Creek in a gross state of contamination. It was alleged that the owner had purposely neglected all sanitary precautions in order to compel the company to buy at an exorbitant figure. The Department officers issued orders to the tenant relative to the maintenance of sanitary conditions and prohibited the sale of any milk from the farm.

On September 25th, the purchase of the farm was consummated by the company. As soon as the patients were convalescent, they were removed, about October 20th, the live stock taken away and the buildings dispensed with.

Meantime, the Mill Creek supply had been entirely shut off on September 19th, the blow-off of the reservoirs left open and the full volume of the stream flow passed through them. Copper sulphate solution was applied and a series of tests of the water made. The waste of the water stored in these reservoirs was debatable, since the Dalton reservoir, with the weather continuing dry, would be rapidly depleted, and bring about the use of Stony Creek water (which is a sewage polluted stream draining populous places all the way up its course into Somerset county) unless the Mill Creek waters were conserved and used. On November 17th this permission was granted by the Commissioner of Health and Mill Creek water was again turned on to the town.

Undoubtedly, typhoid infection must have entered the Mill Creek supply. Had there been no storage there, an epidemic of large proportions would naturally have followed in the city. The prompt shutting off of the supply, the complete drainage and cleaning of the distributing system, the destruction of the infection at the farm and in the reservoirs and the prevention of the sale of milk from the farm, all operated to avert a catastrophy. The conditions for a Plymouth or Butler experience were present.

The value of the prompt reporting of infectious diseases on a water-shed is brought forth in the review of this case. The barrier which a storage reservoir sets up against the entrance of virulent infection to the water pipe system is seen and emphasis is placed upon the necessity of State preservation of the purity of natural waters for the protection of public health.

State Water Shed Inspection.

During the season of 1906, thirty-seven properties were inspected on the four water sheds by Department officers and twenty were found to be in a satisfactory condition. There were seventeen formal notifications served, of which nine were for menaces resulting from overflowing privy vaults, two were for house drainage, and six were for drainage from pig-pens and manure piles to the public water supply. At the end of the year, six owners out of the seventeen served with notices had persisted in maintaining the menaces and the cases will be settled in court.

BERWICK.

An outbreak of typhoid fever occurred in the boroughs of Berwick, West Berwick and Nescopeck, during September and October of 1905. The locality is situate on the Susquehanna river, 20 miles below the borough of Nanticoke, where an epidemic had been raging since the first part of September. Publicity of the fact through the newspapers should have been a sufficient warning to all corporations below Nanticoke, taking their sources of supply from the said river.

This publicity accounts possibly for the request made to the Commissioner of Health on September 25th by the Board of Health of West Berwick, for advice respecting the duties of the local Board of Health relative to typhoid fever, it being stated in the communication that 4 cases of the disease had been reported during the month.

On October 7, typhoid fever being reported on the increase in the district, the Commissioner of Health directed that the river supply of water be cut off and that ample warnings to the public to boil water be posted and that typhoid fever should be placarded. He emphasized the general danger of the

disease being communicated to Berwick through water taken from the river in spite of care exercised by the Department to disinfect the sewage at Nanticoke. Examinations of the public water supply and of the milk and ice supplies were ordered with a view to ascertaining definitely the cause of the infection.

On the same date, the County Medical Inspector drove over the local water sheds from which the source was being partially obtained and found no sickness thereon. Very little water was flowing in the streams, the reservoir supplies were depleted and recourse to the river seemed warranted, else the town would be without water.

Two days later a hasty canvass showed 34 cases in various stages of the disease and 25 convalescents in Berwick and West Berwick, and this was reported to the Commissioner of Health by the County Medical Inspector.

On October 11th, the Commissioner of Health notified the water company that a potable water must be furnished to the people for drinking purposes. In response thereto, on October 19th, the water company cut off the river supply from the town by the breaking of a branch connecting the street main system with the force main leading from the pump house to the lower works of the American Car and Foundry Company, so that river water only could be supplied to said works, leaving the mountain water for town consumption. The street mains were then flushed out with reservoir water obtained from the mountains and thereafter mountain water only was supplied to these pipes.

At this time the various instructions previously given by the Commissioner of Health by telephone or letter were sent out in written form to the local authorities of all three boroughs, in which directions were given for the boiling of water used for domestic purposes, for placarding the disease, for care of the wastes from the bodies of those afflicted with fever, for complete draining of dead ends on water pipe lines, for the flushing for one-half hour daily of all service pipes through spigots, for investigations of milk and ice supplies and for regulations relative to the distribution of milk into dwellings, and the prohibition of the peddling of vegetables or other food stuffs.

On October 22nd, the Commissioner of Health detailed the Chief Medical Inspector, the Chief Engineer and Dr. George H. Fox to represent the Department and to advise with the local authorities.

The engineering inspection was confined to examination of the water works system and source of supply and to whether the directions of the Commissioner relative thereto were being complied with. There was not much to be done. It appeared subsequently that the backbone of the epidemic had been broken.

General Conditions.

Berwick borough, 8,000 population, a community composed largely of a foreign element, and supported by one great industrial concern, the American Car and Foundry Company, lies on a comparatively level plateau, 60 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 3,000 and rapidly growing, on the north and east by Briar Creek township, the suburbs being known as North Berwick, where 1,000 people reside, and also on the west, for a short distance near the river banks by Luzerne county.

On the opposite or south bank of the river and in Luzerne county, is the borough of Nescopeck, formerly connected by a highway bridge to Berwick, but now by ferry only pending the erection of a new bridge. In this settlement of about 1,800 people, there are approximately 350 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 and this is utilized as the motive power for the ferry boat. Probably sewage from Nescopeck does not pass across the river to the pumping station intake 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 6-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, of humble pretensions, 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.

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 1,520 buildings in the town but only 187 of them have sewer connections, 31 of them are on the private sewers. Cesspools are very common. The soil is light and gravelly. There are 920 earth privies in use.

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 roller mill, steel works, wheel, forge, paint and smith shops and others where the vast majority of workmen are employed. The upper plant where the frame and wood work is done, is in the eastern central part of the borough.

Water Works.

The Berwick Water Company supplies water to the entire district, as follows: Berwick, 8,000 population; North Berwick, 1,000 population; West Berwick 3,000 population; Nescopeck 1,800 population.

There are 3 sources of supply, namely Glen Brook, Varners Run, and two alleged springs at the edge of the Susquehanna River in Berwick borough.

On Glen Brook in Briar Creek township, there are two reservoirs situated about 2 miles north of Berwick. Both of them are artificial. The lower one holds 15 million gallons, is termed Reservoir No. 1 and is used for impounding purposes. Reservoir No. 2 holds about 7.5 million gallons and is used largely as a subsidence basin. The water shed comprises 2.33 square miles. It is a 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 7 occupied homesteads. On the west branch there are 20 dwellings, one school house, 2 churches and a store. All of the buildings except 8 residences are in the little village of Summer Hill on the extreme western edge of the water shed.

Ordinarily when there is plenty of flow, the water is taken directly from the stream above Reservoir No. 2 and piped to the town. The supply main from the lower dam to Berwick is 12 inches in diameter and 9,200 feet long to the borough line. On the way it passes through the village of Foundryville, where the pipe is tapped several times.

To protect the water supply from pollution the reservoirs are fenced in and a man who lives in the neighborhood below the dams is constantly employed on patrol duty.

On Varner's Run, in Salem township, Luzerne county, distant about a mile and a half due east of the Glen Brook reservoirs, is reservoir No. 3. It is smaller than No. 1, 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 water shed which is 2.25 square miles in extent, there are eight occupied estates, one church, one cemetery and a school house. This area is also patrolled by a man in the employ of the water company. His name is Stephen Varner. He resides on the water shed about a half mile above the reservoir. From this dam a 10-inch supply main, 10,000 feet long, is extended to and connected with the 12-inch pipe from Glen Brook reservoirs, the juncture is in Foundryville at a point 5,000 feet below reservoir No. 1. There are four taps off this 10-inch line.

The patrols are maintained because the water company realizes that pure water if infected by nascent fecal matter becomes most dangerous and that, therefore, on the steep slopes of the mountain shed such poisons accidently put into the streams would 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 36 feet long and 7 feet wide and 7 feet 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. Therefor, it is claimed, that the only water which passes up through the gravel into the boxes is that flowing from the alleged springs. The box nearest the shore is on the edge at low water and it is about 100 feet from the bank at high water. In this box about midway thereof, is a smaller box about 3 feet square and 7 feet long filled with stone and a perforated 16-inch pipe which extends out through one end of the main box to a 3,000,000 gallon pumping engine in the nearby pump house. This is the pump suction pipe and by this means water is drawn from the alleged spring and forced directly into the system of street pipes in the town.

The second box, not now in use, is located about 70 feet farther out in the stream and is said to be connected by a 24-inch pipe to the first box.

On October 23rd, 1905, there were 15 inches of water over the intake. At least one leak in the cast iron plate was observed by a Department officer and evidences of downward currents could be seen. As the river rises and the pressure increases, the leakage and the infilteration downward then upward through the gravel into the intake chamber would correspondingly increase and it was admitted by the water company officials that all of the water which flowed into the intake did not come from the supposed underground flow.

The 16-inch force main from the pump house reduces to a 10-inch main at the corner of Market and Third streets, the 10-inch extending to and thence in Oak to the lower works of the American Car and Foundry Company. At the corner of Market and Third streets, prior to October 19th, there was a connection to

the town system of street pipes, but as previously stated, this was absolutely severed on said date. The upper works of the said Car and Foundry Company are on the town system and, therefore, after October 19th, could obtain mountain water only.

The supply to West Berwick and also to Nescopeck is taken off the town distributing pipes so that whatever water is supplied generally throughout Berwick is also supplied to these other two places and also to North Berwick settlement. For all purposes, the consumption averages 3,000,000 gallons daily, of which about one-half is for manufacturing purposes, and largely used at the lower plant. The water company supplies the town exclusively and the shops with mountain water as long as it lasts. This, of course, saves pumping. The next arrangement of operation is to pump the water supplied to the lower industrial plant, keeping the town and the upper plant supplied exclusively with mountain water. Finally when the mountain supply becomes insufficient 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, capacity 1.5 million gallons. It is held in reserve for fire protection.

Thus it is seen 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 wholly to the lower industrial plant.

Typhoid Fever.

During August, September and October, 1905, while a little water from the river entered the domestic system, almost all of it went to the lower shops. Typhoid fever broke out among the men who worked here 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. The following table shows the proportions of shop employes contracting the disease to the total cases in the water district during the rise and decline of the epidemic:

Dates Inclusive.	Total cases.	No. employed at lower works.
Sept. 1 to 15th,	34	20
Sept. 15th to 30th,	10	9
Oct. 1 to 15th,	41	30
Oct. 15th to 31st,	7	4
Total,	92	63

The other 29 cases out of the total of 92 included 11 women, 6 boys, 2 girls and 10 men of various avocations in the town or surrounding country.

The distribution of the cases with respect to places of residence appears to have had no significance. 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 outbreak was almost exclusively at the lower works. The upper plant was exempted. Geographically the cases were distributed as follows:

Berwick,	27 cases.	
West Berwick,	46 cases.	
Nescopeck,	5 cases.	
	78 cases	in water district.
	14 cases	outside water district.
Total,	92	

Of the 27 cases in Berwick, 17 worked at the lower shops; 33 out of the 46 cases in West Berwick, all of the Nescopeck cases, and 8 out of the 14 cases occurring in the country district were of men employed at the lower works.

Extra Precautions.

Warning signs had before Oct. 23 been posted all about the shops at the lower works.

The company had erected numerous ice coolers and kept them supplied with spring water. These were placed conveniently about the plant. The men desisted in drinking the river water only after enough of their number had been stricken with typhoid fever to produce a general scare.

The general use of earth privy vaults and cesspools in the water district directed the efforts of the local health board to the disinfection of vault con-

tents. Lime was liberally supplied for this purpose. The local authorities were not thoroughly awake to the responsibility resting upon them and welcomed the assistance of the Commissioner of Health and his officers, and to the best of their ability executed orders. Undoubtedly this prevented secondary infection and early stopped the spread of the disease.

The water company on Oct. 23 was at work putting in blow-offs at low points in the domestic water pipe system to make possible the complete drainage of the pipes. This drainage was later effected. However, before this, hydrants and house faucets had been used to flush the mains and service pipes.

An examination of occupied estates on the water sheds with a view to prevent contamination of the streams was made by Dr. Fox. About one-half mile above No. 3 reservoir there are 3 residences each occupied by a family by the name of Varner. One of them is Stephen Varner, the patrolman. The slop water from his house was being thrown out of the back door onto the surface of the ground on the hillside 50 feet from the run.

Alexander Varner maintained a nuisance at his barnyard and pig pen. The privy was a direct pollution. These menaces were ordered abated within 5 days. Thus the patrolman was given a lesson in the character of service demanded.

Typhoid Fever on Watershed.

A year later, on Oct. 1st, 1906, there was a case of typhoid fever at Theodore Cope's residence on the east branch of Glen Brook, one mile above the reservoir. The patient was Master Charles, 14 years old. The attending physician did not report this case. However, the water company's patrolman was informed and the company gave prompt attention to the matter. The old privy, a surface closet only, located in a dangerous position on the hillside, 125 feet from the brook, was torn down, contents removed and buried, and a new vault dug.

Lesson.

The Commissioner of Health had a sufficient part of the information as to sources of water supply in Berwick and vicinity and whether any sewage was being discharged into the water, necessary to enable him and the officers under his control to deal promptly with health conditions in that community, when the epidemic developed. Thus is emphasized the value to the people of the State of the law making it compulsory for public and private corporations to record in the office of the Commissioner of Health the sources from which the water supply of every community in the State is taken and a like record of any sewer system discharging into the waters of the State.

The hearty and intelligent co-operation of the local authorities made possible splendid results which otherwise would have been impossible of accomplishment. Too high praise cannot be bestowed upon these men and the public spirited citizens of the community.

Through prompt action all along the line a sweeping epidemic was avoided. As it was, 92 cases and 7 deaths were recorded.

In a sense every dwelling on the mountain watersheds is a menace.

It is easily possible by efficient patrol and the maintenance of sanitary conditions, to keep the streams pure and wholesome for domestic uses. The responsibility is divided. It rests, first, on the individual householder; second, on the water company, and third, on the State. At present it is not generally realized by the rural population that negligence in sewage disposal is criminal and may result in great loss of human life.

JOHNSONBURG.

By direction of the Commissioner of Health, the Chief Medical Inspector and the Chief Engineer of the Department made an examination in the borough of Johnsonburg, Elk county, on January 22nd, 1906, to ascertain the cause of continued outbreaks of typhoid fever there and to advise with the local authorities as to remedies.

General Conditions.

The borough of Johnsonburg, Elk county, is a municipality of about 4,200 people, located in the valley of the Clarion river, at the forks of the eastern and western branches thereof, about seven miles above Ridgway, the county seat.

It is purely a manufacturing community, is supplied with public water works and sewerage, and good railroad facilities. In 1900 the population was 3,895, in 1890, 1,280.

The main line of the Pennsylvania Railroad from Philadelphia to Erie, a branch of this line leading to Laridee, and the Rochester and Pittsburg branch of the Erie Railroad pass through Johnsonburg. They follow the valley of the river along which are located the manufactories which are principally pulp and paper, the tanning of hides and chemical works. The New York and Pennsylvania Paper Company is the dominant concern. In the operations of tanning,