

THESIS  
OF  
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CLASS 1904

A

SANITARY SURVEY

OF THE DELAWARE RIVER AND ITS TRIBUTARIES

BETWEEN

EASTON AND THE DELAWARE WATER GAP.

by

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The city of Easton, Pa., situated at the junction of the Delaware and Lehigh rivers, receives its water supply from the Delaware, just above the city. The following is a sanitary survey of the Delaware and its tributaries between the pumping station at Easton and the Delaware Water Gap. The object of the present investigation was not to determine whether the water taken in at the Easton pumping station was entirely free from contamination, but to discover any and all sources of pollution to the Delaware and its tributaries within the above limits..

The survey was made by following both banks of the River, and the principal tributaries nearly to their sources; visiting all towns and villages situated on the streams; making a thorough examination of every apparent form of pollution; interviewing manufacturers and others well acquainted with the streams and their probable sources

of pollution. The field work was done during the months of April and May. The survey was made starting from Easton, going up the streams and the various sources of pollution found will be given in that order.

About an  $1/8$  of a mile above the Easton pumping station are two privies over cess-pools, within twenty feet of the River, and used by two families and three or four men working at the ice-house close by. These families also throw garbage into the River.

Just above Zearfoss & Hilliard's saw-mill is a small stream which has garbage thrown into it and may become polluted by it. There is a privy about twenty feet from the stream<sup>a</sup> used by one family. There is a  $1-1/2$  sewer pipe from brick house on the River Road emptying into this stream, about two hundred feet from the River.

The third house above saw-mill has a gutter leading from it to within

fifty feet of the River, carrying wash water etc. Along side of a stable near the house is a pile of manure about one hundred feet from the river. The soil along the River at this place is sandy. There is a privy back of the house next to the Riverside Chapel, about thirty feet from a little stream which flows into the River at Pot Rock. The privy undoubtedly pollutes this stream. When the survey was made however, the house was unoccupied. For about 100 feet at Pot Rock garbage and ashes is <sup>h</sup>thrown along the bank, which is readily washed into the River in time of rains.

At the Mountain Spring Hotel a privy drains directly into a little stream beside it, which comes from Mountain Spring and runs into the River across the road. There is a closet in the bar room of the hotel which drains by a pipe directly into the river. There is also a privy, which is little used, about sixty feet from the River.

From the Mountain Spring Hotel for about an 1/8 of a mile up the River there are eight or ten houses from <sup>h</sup> which the people throw garbage along the bank and it is easily washed into the River by the rains. From ~~this~~ point until Martin's Creek is reached no further indication of pollution was discovered.

At the junction of Martin's Creek with the Delaware are two large cement plants employing from fifty to one hundred hands each. At the lower plant there are two privies overhanging the creek which are used by the employes.

Following up Martin's Creek, about 1/4 of a mile from its mouth is an old tannery, which is little used at present. It is worked by one man about three months of each year. The washings and waste from it go into the creek. At the village of Martin's Creek which contains about twenty houses, there is but one privy that is near enough to the banks of the stream to be liable to pollute it. That

one is on the South bank of the stream.

About an 1/8 of a mile from Martin's Creek (the village) there is a farm house which has a pipe from the house leading into the creek.

A mile below Flicksville are two privies and a pig pen over the creek.

A Flicksville, a little hamlet of a dozen houses, there are five

privies over the creek. At Nazareth Junction, about three miles

from Martins Creek, Waltz Creek empties into Martin's creek. Along

this creek are the small villages of Factoryville, Ackermanville and

Delable and the town of Pen Argyle, but there is no indication of

pollution from any of these places.

A quarter of a mile below Bangor are two slaughter houses whose com-

bined kill averages about two beeves per day and about ten sheep

and five calves per week and during the Winter a great many hogs are

killed. All washings from these houses go directly into the creek.

Hogs and cattle are kept in a yard near by, <sup>h</sup>which drains to the creek.

An 1/8 of a mile below Bangor there is a privy and a pig pen over the creek. There is one privy at a small foundry, used by ten employes. The closet used by the employes at Salant & Salant's shirt factory empties into the creek. There are two or three privies near the shirt factory whose contents go into the creek. A privy over the creek at the railroad yards is used by fifteen or twenty men. Not far from the railroad station, on north side of creek is a large boarding house which empties all sewage into creek. Just below it are five privies on the bank of the creek, used by as many families. On the branch of the creek from the Bangor Quarries is Flory's Machine Shops, employing two hundred men. They use closets that are directly over the creek. There is also a pig pen over the creek at the machine shops and not far from it a privy at the blacksmith shop. The closets at the railroad station are over the creek. All sewage from a restaurant and a large store comes into the creek nearly op-



posite the railroad station.

Between the Bangor House and the Market St. Bridge there are fourteen privies overhanging the creek. The Mansion House sewers into the creek. Also the Bangor House. About fifty feet above the Market St. bridge a small sewer empties into the creek. A small stream comes into the creek opposite the Bangor House which is practically used as an open sewer. Garbage is thrown into it all along and there is every indication that house and privy drains run into it, although they are not supposed to. Its general appearance is dirty. About 100 yards above the Bangor House there are two privies twenty-five feet from the edge of the creek. A quarter of a mile above the Bangor House a very small stream of slaty water from the slate quarries runs into the creek and greatly discolors the stream. Just north of Bangor is a dam which holds the water back and gives it an opportunity to become stagnant. From this dam a closed flume

twenty-four inches in diameter carries a large part of the water of the creek to the Flory Machine Shops.

Bangor is a town of 5500 inhabitants. The principal industry is slate quarrying. There are no large manufacturing plants, except the Flory Machine Shops and these have no foul drainage except from the closets used by the men. Martin's Creek runs through the center of the town and is used by all those living near it as an open sewer. The volume of water flowing in the creek is not very great especially in the summer time, and its condition is particularly foul for two or three hundred yards on either side of the Market St. bridge.

At Rosette, a small Italian settlement about a mile above Bangor, most of the houses are on the hillside some little distance from the creek. There are four privies overhanging or near the edge of the creek and three pig pens close to the bank.

Returning to the Delaware; there are no towns until Belvidere, New Jersey is reached, fourteen miles above Easton. At Hutchinson, two miles from Martin's Creek, the Buckshorn creek, a small stream comes into the River. There are three or four houses near its mouth but investigation showed no signs of any pollution.

Belvidere is a town of between 1900 and 2000 inhabitants and is the county seat of Warren County. The Pequest river runs through the town and empties into the Delaware at the northern end of the place.

The industries are two or three grist and flour mills, two saw-mills, a silk mill, a furniture factory, a felt works and a tannery.

There is one main sewer in the town, used by the Belvidere House, the Court House, the Jail, the R. R. Station and about twenty residences.

The sewer is an eight inch pipe and when it was inspected on a Wednesday at 2.30 P.M. it was flowing with a good velocity with the

sewage about an inch an a half deep. This sewer discharges into the Delaware. The silk mill, which is on the Pequest river employs one hundred and fifty hands. The flush closets, which are used by the employes go directly into the Pequest. The felt works, just above the silk mill employs fifty hands and has flush closets which empty into the Pequest. They also use a small quantity of acids in dying wool and the waste from this goes into the stream. At the tannery which is one the Pequest above the town, two hundred and fifty sides per week are treated. In treating these hides a solution of eight hundred gallons, containing sulphide of sodium bi-chromate of sodium, hyposulphide and muriatic acid is used. This solution and all other waste is drained into the Pequest river. Near the tannery and on the edge of the stream is a pig pen containing ten large hogs. There are twelve privies on or overhanging the Pequest and four stables with manure<sup>piles</sup> on the edge of the stream.

There are also four or five private sewers emptying into the Pequest; two of them from hotels.

Belvidere takes its water supply from the Delaware River just above the town.

There are no towns or villages from Belvidere to Portland, except Delaware, a small village of about two hundred people.

There are not houses near the River. About 150 yards from the River is a small cemetery.

Portland is a town of 700 inhabitants twenty-three miles from Easton. There is a slate quarry and three or four saw-mills in the town. On the Jacoby creek, which runs through the town is a slaughter house at which there is an average kill of about one beef and two or three calves per day. Considerable rubbish and garbage is thrown into the creek. There are several privies near the stream, but none right on the banks.

From Portland to the Delaware Water Gap, a distance of five miles there are no towns and at the Water Gap there are no signs of pollution to the River.

From this it will be seen that the principal sources of pollution between Easton and the Water Gap, are Bangor and Belvidere. The distance from Bangor to the junction of Martin's Creek with the Delaware is eight miles. At many places the Creek flows with considerable velocity and there are a number of quiet eddies. Between Martin's Creek and Easton, a distance of eight miles, the River is pretty thoroughly shaken up in three or four places by passing over rapids. Just below Belvidere there are rapids for at least a mile and at three or four other places from there to Martin's Creek there are rapids, some on the Jersey side and some on the Pennsylvania side which gives the water a thorough shaking up. At other places

the River is wide and flows with a low velocity, giving abundant opportunity for sedimentation.

As a proof that the water above Belvidere is not affected by pollution, the town has taken its water supply from the River for years and has had very little sickness.

Paulins Kill a good sized stream entering the Delaware just below Portland was not investigated, as there are no towns on it of any size within twenty-five miles of its mouth.