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Excerpts from

**Surveys for a Future Water Supply
of the City of Philadelphia.
*Annual Report of Progress during 1884***

by Rudolph Hering, C.E., Engineer in Charge
February 14, 1885

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This report is a companion to the Sanitary Survey of the Schuylkill Valley, also contained in the 1884 Annual Report. It is of interest for its intimate descriptions of various nearby watersheds which the City considered using for an alternative water supply. Most of these watersheds, unlike the territory draining into the Schuylkill, were relatively unspoiled in 1884.

--ADAM LEVINE

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SANITARY SURVEY.

A most essential part of the inquiry regarding the fitness of the watersheds to furnish potable water consists in the collection of data showing whether any, and if so how, the streams are at present polluted by sewage, also whether the causes of such pollution are removable, and if not whether they would be likely to increase.

The examinations having this end in view were made by Mr. Dana C. Barber, and his report embodying the detailed results is appended. [See below]

Some of the elements having a bearing on this question will be more fully determined when the topographical surveys have been mapped, such as the areas under cultivation, the number and character of buildings, etc.

Perkiomen Scheme:--The valley of the Perkiomen and its branches, from which water could be stored and brought to the city, contain no sources of pollution which at present are not capable of correction. There is considerable difference, however, between the several valleys. The water shed of the main stream above Green Lane and the East

Swamp Creek, including Rich Valley, have a small population, comparatively less farming country than the rest, only a few creameries and one small paper mill, using paper rags only, near the Berks County line. Between Green Lane and the mouth of West Swamp Creek the Perkiomen receives the surface drainage of a number of buildings, which, however, would have to be removed, as they are situated on the site of the proposed storage reservoir.

The Macoby Creek shows much inferior conditions. The area is almost entirely under cultivation, and as it almost runs dry in the latter part of the summer, the water is at such times highly charged with sewage and other polluting matter.

The West Swamp Creek, while it is less advantageous than the former streams, is better than the latter. Near the stream there are a few tanneries, a few creameries, and one small [PAGE 329] woolen mill, and nearly all of the area is under cultivation. Its summer flow as well as its area are much larger than those of the Macoby, and the relative pollution is less.

The Northeast Branch has a long and narrow water-shed, almost entirely under cultivation. It has several villages near the creek, notably Sellersville and Perkasio; besides a few creameries. The summer flow is very small comparatively, and the distance from the creek to the water-shed line is short. A low flow will therefore be relatively highly charged with polluting elements.

The above unfavorable sanitary conditions increase still more in the valley of the Skippack, which is the lowest affluent of the Perkiomen, and it was therefore decided early in the season to omit the consideration of its hydrographic and topographic conditions.

To conserve the streams of the Perkiomen valley so that they will be suitable as a source of water supply, will require the effluent waters from creameries and manufactories to be purified before they enter the stream and the discharge of domestic sewage to be absolutely prohibited. It will be necessary further to allow the late summer flow and the first water after a storm, in the case of the Northeast Branch, to pass by without being stored. The same should be done with the water from the Macoby, were it not for the fact that its flow is extremely small compared with that of the rest.

It is feasible therefore to remove all the serious causes of pollution in the Perkiomen valley so that the water could be made potable. A second railroad has been projected to run through the valley, and it is likely that the cultivation of the area will increase rather than diminish. But in this event there seems to be no reason why the same precautions which would thoroughly guard the stream now would not do the same then, because a great increase of population cannot take place from the lack of natural advantages for manufacture or trade.

Delaware Scheme.--The Tohickon water-shed has a totally different character from that of the Perkiomen. While the [PAGE 330] latter is rugged and sparsely inhabited at its head waters, but flat and cultivated below, the former presents the reverse condition. This has the effect that whatever organic matter is washed into the upper part of the Tohickon has a better chance of getting oxidized below than in the Perkiomen. Nearly all the elements of pollution in the Tohickon Valley from habitations, industries, and cultivated fields, are found in the upper part. Quakertown, the largest village on the water-shed, is over twenty miles above the point where the water would enter the proposed conduit. Comparatively little objectionable drainage enters the creek, mostly from creameries and tanneries, and none that could not be readily kept out.

The Neshaminy watershed again has a similar character to that of the Perkiomen, but its upper parts are less elevated and rugged and much more extensively cultivated. It has, like the North East Branch of the Perkiomen, a quick watershed. The summer flow is small for the area, and this as well as the first wash from a rain after a drouth would contain a large percentage of polluting and suspended matter. At other times the water is clear and receives objectionable drainage only from a few creameries and one small tannery. Doylestown, the only centre of population of any size, from its situation on a hill, with no runs or water-courses of any kind leading from it to the creek, cannot contribute to the permanent pollution of the same.

The Little Neshaminy and Mill Creek valleys, from which water could also be turned into the Delaware conduit, do not contain any objectionable features beyond being a fairly well settled agricultural country.

It is not likely that the conditions at present existing in the above valleys will be materially changed. A railroad was projected a number of years past to cross apart of the territory, but has not yet been located. No inducements prevail for development beyond agricultural pursuits, which have already caused all available territory to be placed under cultivation. To protect the streams against pollution, it is therefore only [PAGE 331] necessary to compel the purification of the effluents from a few creameries and tanneries before discharging into the streams, and to prohibit any future contamination by domestic sewage. It would further be necessary in using the Neshaminy water for the city supply, to prevent the summer flow and first wash from a storm from entering the conduit.

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Appendix. Report on Sanitary Surveys of Proposed Future Supply Watersheds.

PHILADELPHIA WATER DEPARTMENT,
February 4, 1885

Mr. Rudolph Hering,

Engineer in Charge of Surveys for Future Supply:

SIR:--I have the honor to submit the following report of sanitary surveys of proposed future supply watersheds, made by me under your direction during the past season. These surveys comprise the whole of the Tohickon Valley, the valleys of the Neshaminy and the Little Neshaminy above their confluence, together with that of Mill creek above Forrestville, and the Perkiomen above Schwenksville, with the North East Branch and the Skippack above Evansburg.

The object of this investigation was to ascertain to what extent the natural advantages of the valleys in supplying water of satisfactory purity have been altered by habitation and industries.

The Valley of the Tohickon was investigated in June by following the stream on horseback by the nearest roads from near its sources to its mouth and by interviewing various parties well acquainted with the whole valley.

The head-waters of the stream are in a very flat farming country about the borough

of Quakertown (about 23 miles from its mouth) which village it drains, so far as it is drained at all; being very nearly level a great part of the rain-fall is absorbed and comparatively little surface drainage reaches the creek without being filtered through the soil. The town has a population [PAGE 345] of about 1,900, but contains no manufactories having foul drainage to the creek, except a small creamery which discharges its liquid waste--cheese whey, buttermilk and wash water--into a ditch about 100 feet long, emptying into the creek. In summer the grass grows luxuriantly along the ditch, consuming much of the organic matter which is discharged only periodically, so that the stream receives but little pollution from this source which, however, causes a local nuisance, much complained of by the residents in its vicinity.

The town has no public water supply, but obtains water from wells and by collecting rain water. The latter is mostly used on account of the hardness of the well water, which also contains some iron from bog ore.

The borough government contains no Health Board, so that complete vital statistics cannot be given, but the following information was obtained from Dr. Moyer, one of the leading physicians. The mortality is very small and largely from old age. Pulmonary consumption is the most prevalent disease, and pneumonia, which was formerly very rare, is increasing. There has been no epidemic of diphtheria for fifteen years, and scarlet fever is very rare, while cholera infantum is almost unknown. There was formerly much typhoid, but it has been largely reduced, Dr. Moyer thinks, by artificial drainage of the meadows about the town. He also stated that Richland township, which contains the borough of Quakertown, and is drained entirely by the headwater tributaries of the Tohickon, is exceptionally healthy. It consists almost entirely of farming land, highly cultivated. One Quakertown dealer in fertilizers sells 75 tons of artificial manure per year--most of it going to the Tohickon watershed. On account of the flatness of the land probably but little of the fertilizing material reaches the streams directly.

Below Richland township the greater portion of the Tohickon watershed is contained in Rockhill, Bedminster and Haycock townships. This is also largely farming country, though but little artificial fertilizer is used. A mile or two below Quakertown [PAGE 346] the creek loses the character of a meadow stream, has steeper slopes and considerable hard wood growing on its banks. It continues broad and sluggish with a great quantity of *algae* in its bed for two or three miles further when its banks become more densely wooded and rugged.

At Keelersville, a small hamlet about seventeen miles from the mouth, is a creamery about an eighth of a mile from the creek. Most of the waste seemed to be absorbed in flowing through the fields. A small tannery at the same place drains over the meadows a quarter of a mile.

The only sources of pollution discovered below this point were two creameries and one tannery. The latter (Atherholt's) is on a small brook about half a mile from the creek, above Tohickon Post Office, some twelve miles from the Delaware. It is larger than the preceding and has direct drainage. Moreover, dead animals from the surrounding country are taken to this point and buried in a manure pile below the tannery, allowed to rot, draining into the stream. This is the same place referred to by Dr. Leeds in his report of last year as being probably a main cause of the large amount of albuminoid ammonia found in the Tohickon samples.

One of the creameries referred to, on Haycock creek, about two miles from its confluence with the Tohickon a mile below the tannery, gives but little pollution, but the

other, in Bedminster township, on Wolf run, half a mile from the Tohickon, six or seven miles from its mouth, is uncommonly bad in summer, when the waste whey and buttermilk is not taken by the farmers.

Haycock creek, referred to above, drains the northeastern slope of Haycock mountain (640 feet above the Tohickon), which is rough and wooded, and surrounded by several square miles of uncultivated land. The eastern side of the valley of the same stream is also about half covered with wood. Other'wise the watershed is almost entirely occupied by farms, except along the Tohickon itself whose banks continue to become steeper and more rough. In the last two miles the [PAGE 347] stream falls 150 feet, forming rapids and cascades over a very rocky bed. Above these cataracts, for fifteen miles the fall averages about ten feet to the mile. The larger tributaries, from Bedminster township, have a fall of 25 feet to 30 feet per mile.

In general, the sources of the Tohickon are in a rich farming country of nearly level land on which are used large quantities of artificial manure; while the lower-twenty miles and the principal tributaries in this portion are rapid streams, generally over a rocky bed, draining a gently sloping country, for the most part cultivated (except Haycock mountain and vicinity) though with but little artificial manure. In collecting samples of this water near its mouth at Point Pleasant every fourth week from July 2 to December 17, I have found the water to be almost without exception very clear and pleasant to the taste. The total population of the Tohickon watershed is about 10,000.

The Valley of the Neshaminy, including the Little Neshaminy and Mill Creek, was, for the most part, investigated in June by following the streams on horseback by the nearest roads from their sources to the Forks (confluence of the Little Neshaminy with the main stream).

The Neshaminy has its most distant sources (about twenty miles from the Forks) in the North Branch and Pine Run, uniting with the main stream at Chalfont, about ten miles above the Forks. Both are meadow streams, draining long, straight valleys, for the most part highly cultivated. The slopes to the north branch are quite uniform and direct, so that the rainfall runs off quickly, leaving this stream nearly dry after summer droughts, while Pine Run is fed by never-failing springs. No manufactories or other special sources of pollution were discovered in either of these valleys except the following creameries: One near Deep Run, about six miles above Chalfont; one two miles below, near the crossing of the Doylestown and Dublin turnpike, and one at Woodlawn, on a [PAGE 348] small brook entering the North Branch about a mile and a half above Chalfont.

At New Galena, about three miles above Chalfont, is an abandoned lead mine, where very rich ore has been found, but no mining done for many years.

The main stream above Chalfont is mostly through gently sloping farm lands, less fertile than the tributary valleys above named, and the highest portion of the watershed, in the southern part of Hilltown, is very irregular and rocky. The stream from this region drains a small tannery on the county road one mile above Line Lexington, and a creamery near Colmar station, which are the only special sources of pollution discovered above Chalfont.

Below this village the Neshaminy is a broad, shallow stream with sandy or rocky bed, and a gentle fall--about twelve feet to the mile. The farm lands which slope moderately to the creek are not naturally rich or highly cultivated. On one side of the stream the bank is frequently steep and wooded. A small creamery near New Britain and another near Chalfont, and a very large one at Jamison's Corners, Warwick township, on a

small brook one and a half miles from the creek and five miles from the Forks, are the only sources of pollution discovered.

The borough of Doylestown, though in this watershed, causes no pollution of the stream, being on a hill and using so little water that all is evaporated before reaching a water-course. Nor does it seem likely ever to become a source of pollution of the Neshaminy or any other stream.

The Little Neshaminy drains a farming country, not very rich but nearly all cultivated, with small areas of woodland. The surface is gently undulating, and the fall of the stream considerably greater than in the Neshaminy. No sources of pollution were discovered in its watershed, which in general is better adapted for water supply than the main stream.

Mill Creek, entering the Neshaminy just below the forks, has a more irregular and rugged valley than any of the [PAGE 349] streams heretofore mentioned, containing more pasture and woodland, with many springs, and no special sources of pollution.

The population of the Neshaminy watershed (including Mill Creek) is about 16,400.

The Valley of the Perkiomen above Schwenksville, together with the tributaries Northeast Branch and Skippack entering below that point, was investigated mostly in November by driving over the roads nearest the streams throughout the watershed, but the upper portion of the Northeast Branch was followed in June on horseback.

The sources of the main stream, about twenty miles above Schwenksville, in the eastern corner of Berks County and the southern corner of Lehigh County, are mountain springs of a very uniform flow, yielding their full supply when the tributaries below are nearly dry. They flow through irregular valleys, largely wooded on the hillsides and but little cultivated. After reaching the broader valleys below, in Montgomery County, they assume the character of meadow streams through intervals of richer farming land, with considerable wood on the hills on either side, some of which are quite steep and rough. This, in general, is the nature of the main valley all the way to Schwenksville, though the woodland decreases and the cultivated land increases in proportion towards its mouth. The valley is sparsely populated and there are few towns of any size. The villages are generally scattered collections of separate houses, at some distance from the creek, containing few, if any, manufactories. The only establishments having foul drainage directly into the main creek above Schwenksville (so far as discovered) are a creamery at Hossensack, Lehigh County, and one at Perkiomenville. A small paper mill (using paper rags only for unbleached wrapping paper) is located on the West Branch, near the Berks and Montgomery county line, about twelve miles above Schwenksville.

The Macoby, entering at Green Lane, drains a moderately [PAGE 350] rich farming country, but little wooded, with gentle slopes to intervals along the streams. At Greenville is a creamery, and another at McLean's Station, both near the creek.

The East Swamp Creek, entering the Perkiomen below Green Lane, has the wildest and most rocky valley of any of the streams investigated. From Sumneytown to the Bucks County line (four miles) the land along the stream is almost entirely uncultivated and with scarcely any inhabitants, being covered with boulders and stunted trees. The sources in Bucks County are more level and drain some farming land, as also the lower part below Sumneytown. In the former are three creameries, at Trumbauersville, Milford Square, and Spinnerstown.

Rich Valley creek, joining the East Swamp creek, at Sumneytown, has not so

rugged a valley as the preceding, having more intervalles along the stream and considerable wood land. The soil is rocky but quite fertile. A small tannery is located near its confluence with the Swamp creek.

West Swamp creek, entering at Zieglersville station, about a mile above Schwenksville, drains a large area of farming country, mostly of quite flat or gently rolling land. The lower three or four miles of the main valley is more irregular with considerable pasture and wood land, but the fall in the lower portion (about 50 feet in three miles) is not sufficient to effect so complete an oxidation of organic (vegetable) impurities received from the swampy land in the upper part as occurs in the Tohlckon which it somewhat resembles. There is a small tannery and a creamery at New Hanover, a creamery n Fagleysville and another near Obelisk Post Office (Frederick township), all on small branches of the main stream; also near the sources, in Berks County, a small woolen mill and two small tanneries, and a small tannery near the main stream within a mile of its mouth

The valley of the Northeast Branch does not greatly differ in general from the West Swamp creek, the upper portion of the creek being a meadow stream, generally with a pebbly or rocky bed which becomes more clayey and muddy, broad and [PAGE 351] sluggish in the middle portion between Tylersport and Branchville. The watershed much resembles the N eshaminy, above described, but the water appeared to be not so good at the time of my investigation in June. The stones in the bed of the upper middle portion were covered with brown *algae*, and the horse refused to drink at the fords though thirsty. The lower portion contains considerable meadow intervale lands with gently sloping farms well cultivated. A manufacturer of phosphates near Sellersville sells seventy-five tons per year, a large part of which goes on this watershed. A creamery near Dublin, one near Sellersville, one near Tylersport, and one near Salfordville are the only sources of special pollution discovered. The first three have more or less drainage into the streams.

The Skippack, entering two or three miles from the Schuylkill, drains a large area of very flat and gently sloping farming land. That portion above Evansburg only was investigated. This stream is less suited for a water supply than any investigated, containing much swampy land along the stream and very gentle slopes, even to near the sources. Most of the first rainfalls after dry weather are absorbed before reaching the streams, so that this creek was very low when others above, having steeper slopes, were high. The only manufactory found draining foul waste products into this stream was a small creamery on a branch nearly east of Lederachville

In general you will observe that the Perkiomen watershed above West Swamp creek is fairly well suited for a water supply of superior quality; the West Swamp creek and Northeast Branch are inferior--the former much so; while the Skippack is quite unsuitable.

The population of the Perkiomen watershed above Schwenksville, excluding the Northeast Branch and the Skippack, is about 21,600, and of the Northeast Branch 8,500.

Very Respectfully,
DANA C. BARBER,
Assistant Engineer.