

River had in the position of their intakes to the westward of a known polluted current. Even when it became generally known that, at best, position of the intake could afford but a slight and insecure measure of protection, seldom was the prompt and obvious remedy, filtration of the water, applied.

Much valuable time was lost usually by attempting every known scheme for preventing pollution at the intake. Many of these schemes demanded removal of sewage outfalls to a greater distance or sewage disposal of some kind involving serious engineering problems and expenditure of great sums of money.

In almost every instance sewage disposal of some kind was a consummation devoutly to be wished. But the problem and expenditure made its immediate accomplishment impossible. As at Erie and Niagara Falls, the citizens continued to drink sewage-polluted water for years, and eventually filtration plants will have to be installed to prevent water-borne typhoid, while the sewage-disposal problem is still unsolved.

Filtration of Lake Erie water used as public water supply is inevitable.

Treatment of a clear water with hypochlorite of lime or other methods is capable of rendering the treated water safe. However, such treatment does not remove the turbidity in roily waters, and there is a growing sentiment for filtration methods which not only furnish a safe water but also remove the objectionable turbidity.



Fig. 3.

In a report to the United States Government, Mr. Allan J. McLaughlin draws the attention of that body to the necessity of controlling the sewage pollution of Lake Erie. The zone of polluted water, he states, should be lessened and not widened. No crude sewage should be discharged into the lake without treatment. Existing faulty sewer systems should be eliminated as rapidly as engineering and economic problems connected with the change can be solved. Inasmuch as the development of these sewer systems has extended over a number of years, and their existence to-day represents capital invested, their elimination will be correspondingly low.

There are six points of pollution of Lake Erie and Niagara River that are seriously viewed by United States officials. They are:—

- (1) The lake shore from the New York State line to the City of Dunkirk.
- (2) The City of Dunkirk.
- (3) The lake shore from Dunkirk to the City of Buffalo.
- (4) The City of Buffalo.
- (5) The cities of Tonawanda and North Tonawanda.
- (6) The City of Niagara Falls.

From the City of Dunkirk to the state line, Lake Erie receives the water of numerous creeks and streams. These are usually short and of torrential characteristics. The most important of these is Chautauqua Creek, and in flood times carries a great deal of farm and roadside drainage.

The City of Dunkirk has about twenty outlets, ranging in size from 12-inch to 48-inch.

The entire sewage of the city, probably 2,000,000 cubic feet daily, is poured into a shallow harbor, which is esti-

mated to contain not more than 100,000,000 cubic feet of water. The excessively polluted water is carried out of the harbor entrance and given certain abnormal conditions of wind, could readily reach the waterworks intake.

That portion of Lake Erie from the City of Dunkirk to the Buffalo city line receives numerous creeks, and upon this shore line are several towns and villages of importance from the standpoint of lake pollution. About ten miles north-east of Dunkirk, Silver Creek and Walnut Creek discharge into the lake by a common mouth. At this point is situated the village of Silver Creek, with a population of 2,500. Walnut and Silver Creeks drain a combined area of about 59 square miles. There are no towns or villages above Silver Creek contributing sewage in any considerable amount to these streams.

The sewage of Silver Creek will be cared for according to plans approved by the State of New York Board of Health. These plans provide for screening and septic tank treatment, with some form of treatment of the effluent to be carried out later. Provisional authority was granted, February, 1908, by the New York State Board of Health to discharge the effluent from the screening plant into Silver Creek without further treatment for the present.

Silver Creek takes its water supply from Lake Erie. The intake is located near the mouth of Silver Creek and a little to the west.

Cattaraugus Creek rises in Wyoming County and flows west into Lake Erie. It has a watershed of about 560 square miles. Its watershed is hilly and contains some of the highest ground and the greater part of the forest area existing in the western part of the State. The watershed is rather sparsely populated, but the development of the waterpower means increased population and an increasing amount of pollution carried to Lake Erie by this stream.

Hamburg has a population of about 2,000, and is situated upon Lake Erie and Eighteen Mile Creek, 20 miles south of Buffalo. The State Board of Health approved plans for sewage disposal, September, 1908. This system provides for settling tanks (8-hour retention), and discharge of the effluent into Eighteen Mile Creek. Hamburg gets its water supply from two wells. One of these is a well 20 feet deep, furnishing satisfactory water. The other, located outside the village, furnishes a highly sulphuretted ground water, aerated to get rid of the odor, and filtered mechanically after treatment with alum. An analysis of this water made by the State hygienic laboratory showed a low bacterial count and absence of *B. coli*. The raw water seemed to be as good as the filtered sample.

North-east of Hamburg on the lake shore drainage area are situated Athol Springs, Bay View, Woodlawn Beach, Blasdell, and the industrial towns of West Seneca and Lackawanna. The pollution from the last two is the most important.

The City of Buffalo has a population of about 425,000. Its sewage is discharged into the Niagara River by means of four principal outlets. The sewage discharge of Buffalo is problematical, but is placed at 160,000,000 gallons per diem. The sewage from the Tonawandas, a community of over 18,000, ultimately goes into the Niagara River. The City of Niagara Falls discharges its sewage matter directly into the same river in addition to 10,000 tons of garbage and refuse yearly. All this waste material is dumped into the Niagara River through a steel chute.

Dr. Horton, city bacteriologist of Niagara Falls, N.Y., examined water from the municipal water supply daily from October 21, 1910, to January 1, 1911. The lowest bacterial count was 3,100 per cubic centimeter, and counts reached as high as 36,000.