

## TYPHOID FEVER OUTBREAK AT TONAWANDA\*

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ON December 30th, 1919, the writer submitted a report to the State Commissioner of Health of New York, Dr. Hermann M. Biggs, on an epidemic of typhoid fever at Tonawanda which had been long predicted and, when it came, was checked by means which would have prevented it had they been provided when the local authorities were urged to give the matter consideration. The facts in the case, as developed from the official records and examinations made at Tonawanda by Dr. Senftner, epidemiologist of the State Department of Health, and E. S. Chase and Earl Devendorf, assistant engineers, are as follows:—

The water supply for the city has been drawn from an intake crib in the Niagara River about 1,800 ft. from the American shore in about 30 ft. of water. The crib or pier is at a point in the river where the water is ordinarily less polluted than it is nearer the American shore. The typhoid rate in the city has always been high, although there is no record of any epidemic reaching the proportions of that in the autumn of 1919. For years this supply had been used without any purification whatever despite the urgent recommendations of the state health officials that some form of treatment was greatly needed. To show how slow local officials sometimes are to heed the warnings of specialists that water supplies are in danger of serious pollution, the record of the notices sent to the Tonawanda officials is given here:—

## Notices to Municipal Officials

In 1912 a report was submitted recommending the immediate purification of the existing supply or the introduction of a satisfactory new supply. In 1916, a report was made recommending filtration and sterilization, and the immediate installation of duplicate chlorination apparatus. In 1918, the principal assistant engineer of the State Department of Health appeared before the common council and board of health and urged the installation of a chlorination apparatus; later a letter was sent to the superintendent of the water works giving the names of manufacturers of chlorination apparatus and general advice concerning chlorination. On January 25th, 1919, a letter was sent to the mayor explaining the need of chlorination. No acknowledgment was received; so on April 4th, 1919, another letter was sent to him covering the same points. No acknowledgment was received, so a third letter was sent to him on June 5th, 1919, which was acknowledged on June 18th by the city clerk, who stated that nothing had been done about chlorination. Before that answer was received an inquiry was sent to the superintendent of water works asking what steps had been taken to treat the water, and the superintendent replied promptly that nothing had been done. On July 19th, 1919, the secretary of the Chamber of Commerce was urged to press the need of immediate chlorination of the water supply upon the city authorities.

## Old Intake Broken

As a result of orders issued by the federal government the intake main had to be lowered to permit dredging a deeper ship channel in the river. The work was begun in the spring of 1919 and involved laying a 48-in. wood-stave intake main at the required depth, which entailed crossing and breaking through the old intake line 350 ft. or more nearer the American shore than the intake crib. At the point where the old intake was broken the water is more polluted than at the crib. The break was made some time between June 19th and July 4th. Following it there were many cases of severe intestinal illness in the city and somewhat later, a few cases of typhoid fever. On July 8th advertisements were printed in the newspapers advising all persons to boil water used for drinking purposes and circulars were distributed from house to house warning every-

body of the danger of drinking water which had not been boiled.

On July 19th a letter was received from the secretary of the Chamber of Commerce advising the State Department of Health of the breaking of the old intake line and asking for analyses of the supply. Authorization to collect the samples was given at once, and attention was again called to the importance of the purification of the supply. Nothing was said about the prevalence of typhoid fever in the letter from the Chamber of Commerce, and it was not until August 7th that the state department was informed of the fact. Its emergency chlorination apparatus was at once shipped to Tonawanda and an engineer was sent to the city. He found that the city officials had ordered a liquid chlorine apparatus which was then on its way by express.

## Chlorination Stopped Typhoid Outbreak

The city's chlorination apparatus was installed and started on August 11th, 1919, and has been in use since then. There are two manual control solution feed chlorinators installed in the suction well and the chlorine solution is applied to the raw water in the well before it enters the suction of the pumps. Every time the installation has been visited by the engineers of the state department it has been found to be carefully and properly operated.

There were 236 cases of typhoid fever having onsets between July 5th and October 4th, 1919. Of these 202 were residents of Tonawanda and the remaining 34 cases were residents of neighboring municipalities and suspected of being infected at Tonawanda. The majority of the cases in Tonawanda occurred between July 4th and September 15th, beginning soon after the break in the old intake and continuing for about four weeks after the installation of the chlorination plant, the latter plainly checking the outbreak. Considering the character of the raw water during this period, of which more will be said later, it is noteworthy that chlorination alone was effective. Since October but 5 cases have been reported. The investigations of the department's representatives showed that local wells and an industrial water supply occasionally used for drinking water may have had some influence on the typhoid case rate, but the evidence is clear that the city water was the principal source of infection.

## Garbage in the Water

The character of the river water as pumped between September 15th and October 3rd was so bad that the water works superintendent was confident that something was wrong with the new intake line. On October 3rd an examination was made by a diver employed by the contractors and he found a leak near the American shore, where the pipe was 4 ins. off centre, leaving a large opening for water to enter the intake. This was repaired by placing a sleeve around the joint. A few days later the diver found another leak about 300 ft. from the intake crib, where one end of a length of pipe was in such bad condition that it had to be replaced, which work was completed October 14th. So far as known to the author, this is the last work done on the line. The trench in which the pipe was laid has been back-filled to a depth of about 4 ft.

During the period from September 15th to October 4th, while the intake was leaking, it is reported that water of very objectionable character was delivered to the city. In fact, it is reported that particles of garbage and offal were removed from the pumps and suction well during the latter part of September.

The Alberta government has appropriated \$600,000 to assist in the financing of the Lethbridge Northern Irrigation District, which includes approximately 200,000 acres.

Within the past few months the Saskatchewan Department of Highways has tested more than 449 samples of gravel from various parts of that province. These samples were submitted by 200 municipalities and about 75% of them were satisfactory for use as road material, and about 60% were found to be suitable for concrete.

\*Presented to the American Water Works Association.