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THE TORONTO WATER CHLORINATION PLANT.

Toronto is supplied by water from three sources, two of which are more or less intermittent. One of these, in East Toronto, where the water supply is obtained from the open lake opposite Balmy Beach, supplies from one-half to one million gallons a day. This water is chlorinated by a small temporary plant of little mechanical interest.

The West Toronto Pumping Station, which formerly supplied the Junction district, is capable of pumping one and a half million gallons of water per day, and draws this supply from the Humber Bay, about 700 feet from shore. As this water is usually contaminated with sewage, it is only operated when absolutely necessary to maintain a sufficient supply of water. This supply is chlorinated by means of injectors attached to the piston rods of the pumps, so that each gallon of water forced into the main is given at the same time a sufficient quantity of chlorine to practically sterilize it.

The main chlorinating plant is situated over tunnel shaft number two on Toronto Island near Hanlan's Point. Formerly the water flowed directly by gravity from Lake Ontario, through a pipe across the Island, and fell into the tunnel at this point. Since the first of January, 1912, however, the water is intercepted by the slow sand filters, through which it passes, and again flows to the tunnel, clarified, and with a large portion of the bacteria removed.

The plant consists of four tanks, namely, a mixing tank, two solution tanks and a constant head tank, which is divided into two, so that one can overflow into the other, or they can be operated independently.

The weighted charge of calcium hypochlorite is placed in the mixing tank, a little water is added, and the mass pounded smooth and then filled to the top with water. The thick milky solution is then run into the solution tank, which is about half-filled with water. The solution tank is then filled, and the mixture stirred at intervals until an hour and a half before it is to be used, so that the sediment can completely settle out.

The clear, supernatant fluid, which is alone used, flows into the constant head chamber. At first this was kept at a constant level by a valve operated by a ball float, but not proving satisfactory, a hand valve was substituted. The overflow from the chamber is caught and dipped back into the main tank whenever this becomes necessary.

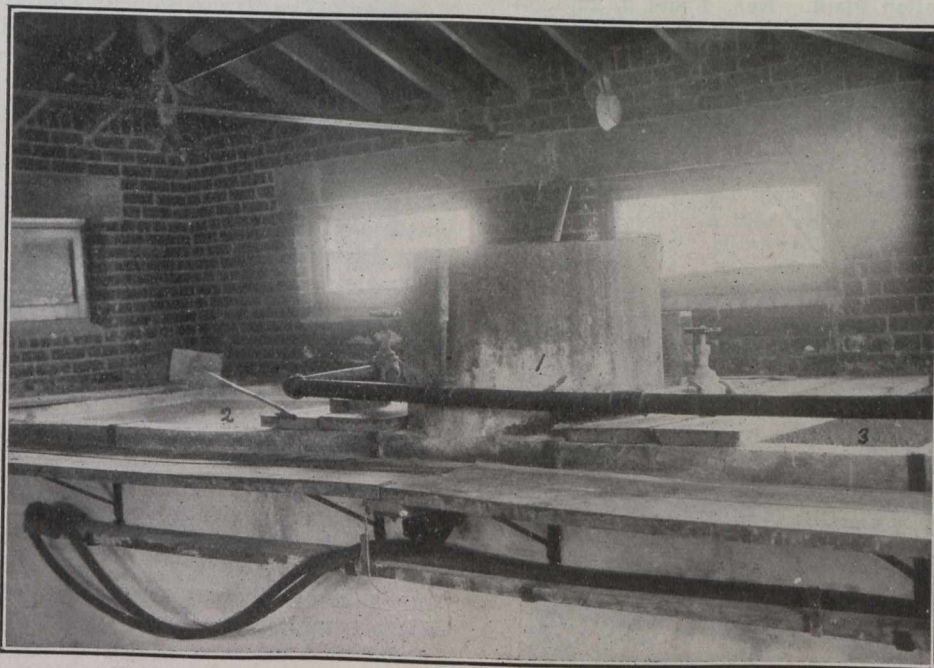
A calibrated valve allows the solution to flow from this constant head chamber into the pipe leading to the grid in the tunnel shaft. A needle connected to a registering device points out the amount of water flowing along the pipe into the tunnel shaft, the mechanism having been previously calibrated by the amount of water pumped at the main pumping station. The operator opens or closes the gate valve to the proper notch, according to the flow registered by the needle.

The grid consists of a two-inch iron pipe, containing cross arms of $\frac{1}{2}$ -inch pipe perforated at intervals. The grid is hung across the stream of water just as it falls into the tunnel shaft, and where it gets a thorough mixing.

The plant is by no means a perfect one, but it has, on the whole, worked satisfactorily since the device for registering the flow of water has been installed. Lake

Ontario water is peculiar in this, that the amount of free chlorine required to sterilize the water is very close to the amount which can be detected by taste, i.e., about .3 parts free chlorine per million parts of water. If this amount is reduced, its bactericidal effect is also reduced; if increased, it can be detected by the consumer. The application has, therefore, to be closely watched, and two men are maintained on each twelve-hour shift, night and day, one of whom has always been a chemist, to check up the strength of the hypochlorite, solutions, etc.

The efficiency of the plant may be gauged from the fact that *B. coli*, though frequently present in the unchlorinated water before the filtration plant was installed, and for some time after, has not been obtained in the laboratory tap since



Toronto Water Chlorination Plant. No. 1 shows mixing tank. Nos. 2 and 3, solution tanks.