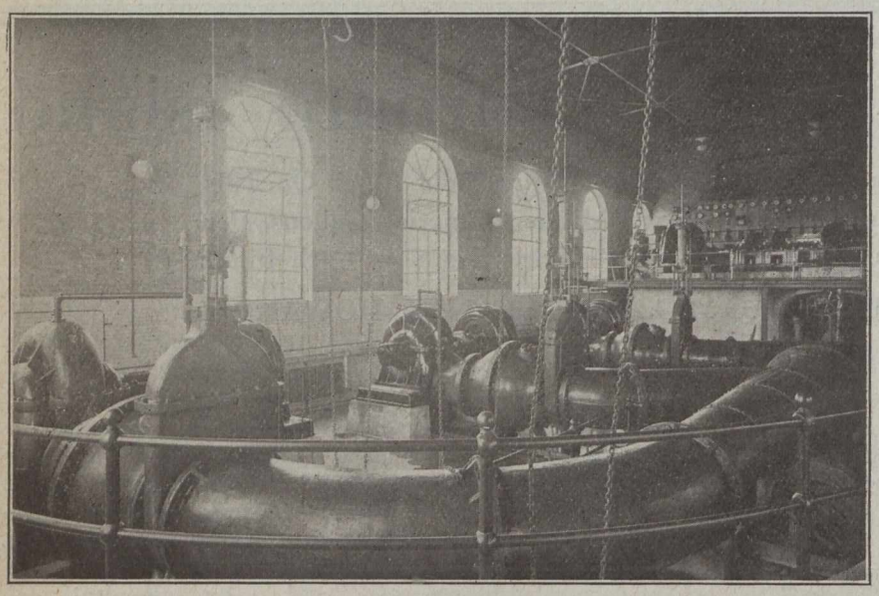
On the days on which the bacteria count in the raw water was from 50 to 500 per cc., the removal by the filter was 97 per cent., where the specifications call for a removal of 90 per cent.

Only one occasion occurred where there was a bacteria count of over 500 per cc., in which case the removal was 99.4 per cent.

B.—(Excluding results for reasons specified).



Main Pumps and Switchboard

The total removal was 93.5 per cent. of all the bacteria present. When the bacteria count in the raw water was from 50 to 500 per cc. the removal was 97.2 per cent.

In both groups the bacteria count is away above the 90 per cent. called for in the specifications.

B. Coli Removal

A.—The total B. Coli removal inclusive of all results during the thirty-two day period was 95.8 per cent

B.—Exclusive of results on days previously mentioned the removal was 98 per cent. This is the removal called for in the specifications.

The difference of 2.2 per cent. in efficiency is probably due to the failures cited above, is of no practical significance, and may well be discarded. That this is true may be seen in the results of the B. Coli efficiency of the individual filters. These samples from the individual filters were collected at times when there was no disturbance due to Hydro failure or to insufficient amounts of alum.

In the case of the five filters tested separately, the B. Coli removal in all cases exceeded 99 per cent.

From these results it will be seen that the efficiencies and requirements demanded in the specifications have been attained. The difference of 1/50 grain of alum per gallon over the one grain per gallon specified may be considered a negligible quantity.

Addendum

Since the foregoing report was made and the new plant has been completed a considerable amount of time has been devoted to research work on the treatment of Lake Ontario water with aluminium sulphate.

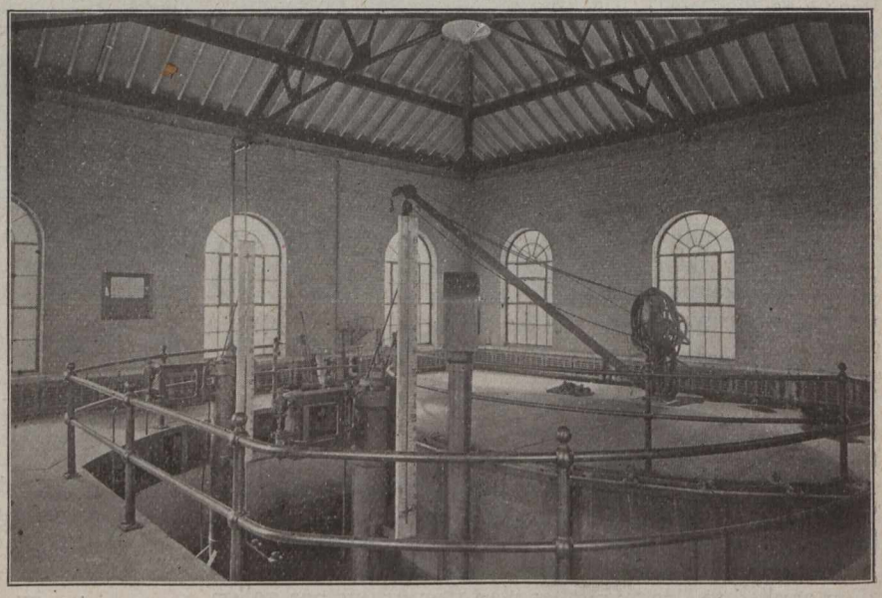
It has been frequently noted that whilst the raw Lake Ontario water at Toronto seemingly did not vary to any great extent chemically, yet considerable physical and bacteriological variations followed the addition of aluminium sulphate. This was particularly noticeable at times when variations in the temperature of the water, as a result of wind currents, occurred. The flock formed slower in a cold water (35°-45° F.) than was the case in a warmer water (46°-70° F.), but the water in which the best flock formation occurred did not, as is generally supposed, give the best bacteriological purification after filtration. The colder waters generally gave the best results and were easier to treat.

Further tests were made to determine the differences between alum-treated waters after 30 minutes contact and three hours sedimentation periods. With this object in view, two small, rapid sand filters were set up, filtering at the rate of 120 million imperial gallons per acre per day. All tests were run in parallel. The raw water was treated with varying quantities of alum, ranging from .5 to 3.5 grains per gallon, and the above-mentioned tests were made on the effluents therefrom. Throughout the whole series the results were uniform, showing relatively small differences, and also establishing the important point that the time element was not a factor in the purification process. Numerous brands of alum were tried, and it was found that the purer the alum the better the results. Our conclusions may be summarized as follows:—

1. Cold water (35°-45° F.) treated with alum always gave better results than waters of a higher temperature.

2. Cold water required less alum, but flocked slower.

3. Water which was moderately polluted and had a low turbidity (1-10 p.p.m.), with a temperature over 46° F., required at least two grains per gallon to get



Suction Well and Screen Chamber