

precaution which can be applied is a rigorous supervision of the process of sterilization which has been carried on since 1913 by the generous use of hypochlorite of lime. In this connection it may be explained that the quantity of water pumped is measured by means of a pitot tube which indicates the fluctuating quantity from time to time. The water is examined by the chemist of the Lake Superior Pulp Co. and hypochlorite of lime is added according to his direction. It is desirable to observe, however, that this lime is delivered in large iron drums, and once they are opened the lime deteriorates rapidly. It is therefore essential that it should be tested frequently to ascertain the available chlorine contained therein, for even if the correct quantities are used as per the chemist's direction, the proportion of chlorine content is gradually diminishing. Unless attention is paid to this the chlorination will vary. When a new drum is opened the chlorine will be

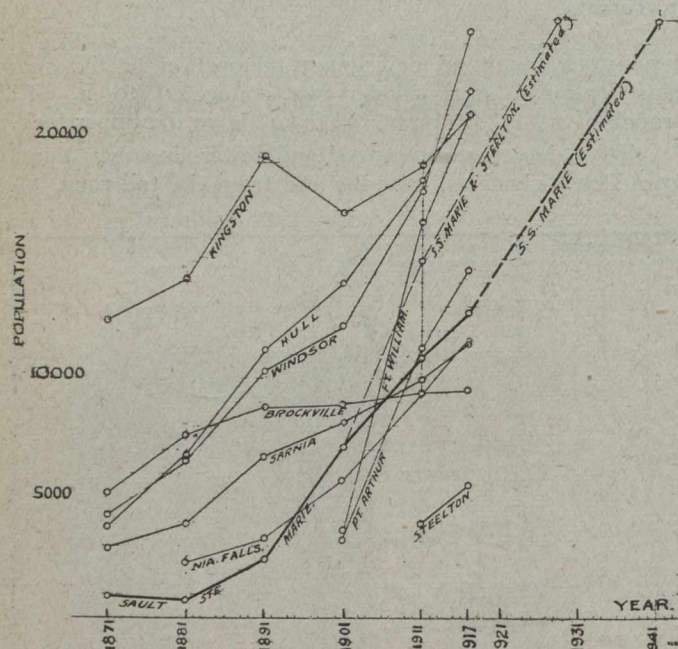


Diagram Showing the Growth of Population in Various Canadian Cities.

powerful, but by the time the drum is being emptied the chlorine will be inadequate.

Apart from reasons of quality and reliability of supply the city is under an obligation to provide a pump station and to remove the pumps out of the present building. The company is entitled to call upon the city to comply with the agreement by giving six months' notice.

The water is delivered to the city through two mains, a 24-inch and a 10-inch, and is measured by means of a pitot tube inserted in the 24-inch main in the pumping station. This is connected to a glass U-tube. As the velocity of the flow of water in the mains fluctuates according to the changes in the rate of consumption, the hydraulic head correspondingly varies and causes the liquid in the U-tube to rise and fall. This gauge (supplied by the Municipal Supply Co., Chicago, in 1915) is calibrated to indicate the quantity of water pumped. The attendant makes periodical observations and records them and computes the approximate pumpage. These computations, added up, give the daily supply.

According to the records the average daily quantity pumped during the year ended September 30th, 1915, was about 2,084,000 U.S. gallons. The largest quantity during one day was about 2,726,000 U.S. gallons. The average consumption per head per day was about 150

U.S. gallons. During the six months ending 31st March, 1915, the maximum daily pumpage was the same as above; the average daily pumpage was about 2,257,000 U.S. gallons, and the daily average per head was about 174 U.S. gallons. These figures were extracted from the fire underwriters' report dated 9th October, 1915, but converted into U.S. gallons.

The report sheets of the pump attendant for twelve months ending June 13th, 1917, show that the daily consumption ranged from 2,557,000 U.S. gallons on November 18th, 1916, to 3,823,000 U.S. gallons on April 6th, 1917. The average daily consumption during the past year was approximately 3,200,000 U.S. gallons. The average from the 1st to the 13th June was 3,400,000 U.S. gallons daily.

There is no apparent reason why such a large quantity of water should be necessary for Sault Ste. Marie.

The hourly fluctuations are exceedingly small. Following is a table based upon the assumption that there are no great industrial users of water who require large quantities during the night time:—

Table I.—Showing the Present and Normal Requirements.

Hour morning	Present pumpage gallons per minute	Normal pumpage gallons per minute	Hour evening	Present pumpage gallons per minute	Normal pumpage gallons per minute
1	2,180	837	1	2,540	1,314
2	2,180	792	2	2,570	1,242
3	2,190	720	3	2,580	1,188
4	2,200	711	4	2,540	1,125
5	2,140	711	5	2,520	1,062
6	2,200	729	6	2,480	1,044
7	2,250	891	7	2,460	1,062
8	2,340	1,125	8	2,430	1,062
9	2,420	1,287	9	2,350	1,062
10	2,480	1,404	10	2,280	1,017
11	2,560	1,404	11	2,210	963
12 (noon)	2,580	1,350	12 (midnight)	2,170	945

The column showing the present pumpage represents the record for May 14th, 1917, when the consumption amounted to 3,407,000 U.S. gallons. If the quantity is reduced to the normal the consumption would be about 1,500,000 U.S. gallons per day.

Although there are many exceptions, it may be calculated that the daily consumption per head in North American cities is about 100 U.S. gallons. This quantity can be appreciably reduced by careful inspection, regulations and metering. Allowing, however, that the total daily consumption was reduced to two million U.S. gallons per day, delivered at 80 lbs. pressure, there would be a saving on the cost of electrical energy alone of about \$2,000 per annum. If this sum was yearly set aside as a sinking fund for twenty years at 5 per cent. it would amount to about \$66,000.

It is anticipated that by constructing a reservoir which will receive the water at a constant head, a tangible saving in the consumption of electric energy can be effected.

#### Requirements with Respect to Supply of Water.

It is reasonable to estimate that the population of Sault Ste. Marie will increase to at least 20,000 by 1931, and if Steelton unites in the meantime, the total population will probably be at least 27,300 by 1931. It is possible, however, that the increment will exceed this estimate; indeed, it is urged that the future industrial ex-