

a mountain or hill upon which to erect a reservoir, but simply took advantage of what nature had provided.

"At Cleveland the capacity of the reservoir is over 100,000,000 gal., and dozens of cities might be mentioned where the reservoirs are of even greater capacity. If the city of Montreal had been provided with a reservoir containing 3 or 4 days' supply, the recent water famine might have been averted. At the rear of Mount Royal, a large reservoir for the Montreal Water and Power Co. is now in course of construction, and the fire underwriters and expert engineers have recommended additional storage reservoirs to lessen the possibility of water famine.

"We admit that there would be a loss of pressure due to friction. The longer the conduit and the smaller its diameter, the greater the friction, but, if I am not mistaken, the citizens of Toronto would prefer paying the trifling extra cost of pumping water through a few miles of large pipes, to the cost of the extra amount of chloride of lime necessary to disinfect a more polluted water supply, and the extra cost of filtration at the Victoria Park station.

"Furthermore, the extra cost of pumping through the mains, which would not exceed 10 or 12 pounds, would be offset by the extra cost of the pumping at Victoria Park. All of the water at this point will require to be pumped twice, first to the filters by low lift pumps and second by high lift pumps into the distribution system. No practical man will deny that pumping water twice will cost more than pumping it once to the combined height of two pumpages. The records at the John Street station and at the filtration plant, will, without a doubt, prove the above statement, but as no report of the city engineer or the public works department has been published since 1911, the public is in the dark respecting costs of operation and maintenance.

"In regard to the length of the proposed steel conduit from Scarboro westward, the distance is only four miles greater than with the Victoria Park scheme. With a new steel conduit of this length under an exceptionally light head, the possibility of breakage or interruption would be a minimum. When the population of the city of Toronto reaches 700,000 people, a second conduit will probably be required, but no one can foresee where this additional population will be distributed, and we did not, therefore, consider it advisable to include a duplicate conduit in our project. In an emergency, if the new conduit should for any reason be closed for repairs or inspection, the high level district could be supplied as it is at present by the high level pumping station, the water to be taken from the low level district and the Rose Hill reservoir.

"In regard to booster stations, the costs were not included in our report as we did not consider they would be required for a few years.

#### Pumping Machinery.

"In regard to pumping machinery, our recommendation was for an electric plant. The city had at that time contracted for a large block of electric power, electric pumps were being installed at the John Street station, and at the high level station, and as patriotic citizens we advocated electric power, on condition that two independent transmission lines should be constructed, also a reservoir of 130,000,000 gal. capacity.

Mr. Harris' statement respecting the pumpage of the entire water supply to a height of 370 ft. has been pointed out as incorrect. Of the 45,000,000 gal. per day now

pumped at the John Street station, about 15,000,000 gal. per day is now re-pumped at the high level station, and the volume re-pumped is increasing rapidly each year. Mr. Harris' report only confirms that made by our commission.

"The maximum daily consumption in the low level district (south of College Street) is now given as about 50,000,000 gal., and in the high level districts, about 22,000,000 gal., or 72,000,000 gal. now pumped at John Street, of which 22,000,000 gal. are re-pumped at Poplar Plains station.

#### Pollution at Intake.

"Assuming two points near the north shore of Lake Ontario where the water is practically of the same depth and at the same distance from shore, the pollution due to the main sewer outlet near the Woodbine will vary inversely as the squares of the distances from the sewage outfall. This is axiomatic and can not be controverted.

"It must also be admitted that if the distance from shore be doubled and the depth of water also doubled, that the pollution will certainly be less than half. At Victoria Park intake, the supply under existing conditions would unquestionably be polluted at least four fold what it is at present, while at Scarboro the pollution would undoubtedly be less than one-half what it is at present, and probably less than one-fourth.

"The Harris report states that further treatment of the sewage of the city will be necessary if the water supply be taken from Victoria Park, also that the water supply should at all times be chlorinated, thus admitting the certainty of gross pollution."

#### ASBESTOS PRODUCTION IN QUEBEC.

The Province of Quebec contains the principal asbestos-producing areas of Canada. The present workable deposits are scattered through the great serpentine range which strikes through the townships of Broughton, Thetford, and Coleraine. The total length of the belt is 23 miles, with a width of 100 feet in the extreme easterly part, increasing to 6,000 feet in the Mock Lake area. The principal deposits are at Thetford, Black Lake, Danville, and East Broughton; the first two are the most important. The mineral occurs in a series of narrow and irregular veins, sometimes, though rarely, reaching a width of six inches. Large mills are now in operation in which the rock is broken and crushed and the fibrous asbestos is taken up from screens by suction fans, and blown into settling chambers. At present the annual production is over 100,000 tons, valued at upwards of \$3,000,000. It includes a large variety of grades, from the long-fibred crude asbestos, valued at \$300 a ton, down to the shortest mill fibre, valued at only \$2 or \$3 per ton, and "asbestic sand," used for wall plaster, and valued at from 75 cents to \$1.50 per ton.

In a summary of the waterpower of the world the possible horsepower of France is estimated at 4,500,000, of which only 800,000 is utilized. About an equal amount of power is available in Italy, but only 30,000 horsepower is utilized. Falls of 10,000 horsepower are abundant in the Alps. The estimate for Switzerland is incomplete, but about 300,000 horsepower is in use. Germany has 700,000 horsepower available, with 100,000 applied. Norway has 900,000 horsepower available, with a large part already developed. In Sweden there is 763,000 horsepower available, but mostly at a considerable distance from any industrial centre. In Great Britain there is 70,000 horsepower already utilized, and an equal amount in Spain. The resources of Russia are estimated at 11,000,000 horsepower, of which only 85,000 has been developed. The United States is credited with 1,500,000 horsepower, while Japan has 1,000,000, of which 70,000 has been exploited; and in India 50,000 horsepower has already been developed.