

one-half to three-quarters of a million gallons per day next winter.

His Saskatchewan River scheme, he said, included pumping at the river of all the water through a pressure pipe to the height of land, a height of 330 feet, into a two million gallon reservoir, and from there to the Caron head-works through a 24-inch continuous wooden stave pipe line.

#### Sixty-Mile Pipe Line

The shortest route from Caron to the river is 54 miles and the longest route considered is 70 miles. The short route cannot be used, however, owing to the fact that high ground intervenes between the river and Caron. In Mr. Mackie's opinion it will be necessary to build a pipe line of 60 to 62 miles to get the gravity flow from the height of land at the river to Caron. A survey would have to be made to determine the best route, as every mile of pipe line saved means a saving of \$17,000.

In determining the size of pipe to be used for his scheme, Mr. Mackie stated that he started with the consideration of four million gallons per day capacity, an amount larger than the present needs. He therefore proposes a pump at the river sufficient only for the present needs, and to keep the cost as low as possible, has not provided for stand-by pump in the event of break down. This means that it could be figured that the pump at the river would have to be shut down two days per month because of accident, during which time the Caron system would be in a position to supply the city's wants. No filters would be used, it being planned to use the same type of infiltration gallery as in use at Battleford and North Battleford.

#### Wood-Stave Pipe Cheapest

"The cost of the auxiliaries to such a scheme," said Mr. Mackie, "is mere bagatelle to the cost of the pipe line. There has been a great deal of discussion here on wooden pipe lines, but I intend to advocate a wooden pipe line for financial reasons." He then quoted figures showing that the cost of 24-inch wooden pipe laid in the ground, exclusive of the cost of excavation and back-filling is \$2.30 per foot, of steel \$5.74 per foot, and cast-iron \$10.51 per foot. The cost therefore for 70 miles of wooden pipe would be \$850,000; for steel, \$2,123,000; and for cast-iron, \$3,890,000. In addition there would be a tremendous saving in the tonnage hauling cost, the wood tonnage being about 9,000 tons, steel 15,000 tons, and the cast-iron the heaviest, about 45,000 tons.

The outside cost of the entire scheme for the three types of pipe, wood, steel and cast-iron, were quoted by Mr. Mackie as follows: Wood, \$1,630,000; steel, \$2,900,000; iron, \$5,000,000.

Figuring the life of the wooden pipe line at but fifteen years, he said the saving on the carrying charges would be some \$60,000 per year, which would amount in fifteen years to a sum sufficient to enable the city to replace the wooden pipe line.

#### Total Cost \$1,630,000

The cost of the system with 24-inch wood pipe, would be as follows:—

Diesel engine and pump at river .....	\$ 148,000..
Force pipe to height of land, 330 ft. ....	65,000
2 million gallon reservoir at river .....	65,000
Pipe line laid .....	1,184,925
Damages .....	88,630
Engineering and contingencies .....	78,445

Total .....\$1,630,000

In further describing the type of pipe line recommended, Mr. Mackie declared that it is different from the old type in that it is of the continuous stave type, thus avoiding joints and the leakage which occurred and always will occur in such joints. In addition, the bands of the pipe, instead of being continuous, are individual, so that when one break occurs the whole pipe will not leak, as in the case of the Snowy Spring line, for instance. He would lay the pipe but 6 feet in the ground, sufficient only to protect it from rodents, etc., and to keep it below ground. That depth is sufficient to protect from frost at the velocity the water would travel through it. The El Paso Railway was faced

with a similar situation for water, he said, and decided on wood because of the prohibitive cost of iron or steel. They now have 116 miles of this pipe in operation, and it is giving satisfaction.

The present Caron line has a capacity for 2,400,000 gals. per day. This can be increased to a maximum of 3,960,000 gals. per day, by different placing of pumps, and different methods of taking water from new to old pipe line, either through Caron reservoir, or direct to the old pipe line. The minimum winter flow of the Saskatchewan River at Saskatoon is 600 million gals. per day.

#### The Financial Problem

In conclusion, Mr. Mackie dealt with the financial aspect of the scheme, saying that while it did not present any engineering difficulties, it does present financial difficulties.

He presupposes the issue of 20-year debentures, assuming that the life of the wooden pipe is fifteen years. In the life of the pipe he plans to set aside a sum of \$400,000, which, after the debentures had been retired, could be used as a nest egg for the replacing of the line. The carrying charges on this basis, at 5½% would be as follows: Interest charges, \$89,000 per year; sinking fund payments, \$54,000, and depreciation, \$20,000 per year; a total of \$163,000 per year, which, added to the carrying charges for the present water works, would make the carrying charges for the entire system \$318,000 per year. Figuring on the sale of half a million gallons per day more water than at present, the annual deficit on water would be \$146,000 per year, which on the present assessment would cost the citizens 7 mills additional tax rate.

On the 1913 assessment, he said, this could be handled by 3 mills additional levy.

Mr. Mackie next dealt with the city's borrowing power, which at the present time is \$400,000 in round figures. His suggestions for increasing it to bring down the mill rate necessary to handle the water system proposed were several. One method was by increasing the improvement assessment to 60% instead of the present 45%. Another was to revert to the old business tax assessment instead of the present business license. A third was to increase the present land assessment by four million dollars. All three of these suggestions, if adopted, would bring the city assessment up to \$31,000,000 and would make it possible to carry the proposed and present water systems for 5 mills instead of 7 mills.

The Canadian Board of Commerce has now been constituted and will shortly be available for such complaints as may be laid before it. It will act under the Combines and Fair Prices Act, and is given power to institute investigations on its own motion or at the request of any responsible parties who bring subjects to its notice. The chairman states that the procedure will be of an informal character.

Perhaps the largest reforestation scheme ever undertaken in Canada is being carried out in Quebec this year. The Laurentide Co., of Grand'mère, is planting over 1,000,000 seedlings, mostly Norway spruce, with some white Scotch and jack pine and balsam. The Riordon Co., of St. Jovite, is also planting about 750,000 seedlings. Much the greater number of the seedlings used are imported from forest nurseries in the United States.

In a recent address before members of the Advertising Club, of Baltimore, Md., H. D. Hubbard, of Washington, D.C., secretary to the U.S. Government Bureau of Standards, made an earnest plea for the adoption of metric units of measurement in the United States and Canada. Mr. Hubbard pointed out that during the war many United States and Canadian manufacturers were forced to use the metric system in the manufacture of guns and other ordnance, and two principal works had to use it in the building of locomotives. If the work on the blue prints for these locomotives had to be done in feet and inches, Mr. Hubbard said, the locomotives would never have been built on this continent. He further said that by refusing to adopt the metric units, United States and Canada are as far behind in the matter of proper standards as was China, but that China has now adopted the metric system.