

neither case has interest on the investment been included nor charges for depreciation in the plant. If this were added the total cost of the process would be between 20 cents and 25 cents per 1,000,000 gallons of water treated.

As to depreciation in either process, it may be well to point out that, although the plant has now been in operation over seven months it has not been necessary to replace any of the piping, pumps or valves, and such repairs as have been made are not worthy of mention.

In general terms when hypochlorite of lime or soda is added to water the chemical and physical characteristics of the water are changed to some extent. Through the action of carbonic acid, either free or half bound, hypochlorous acid is released from the hypochlorite, and this acid, although very weak, is an active oxidizing agent. In the presence of organic matter its oxygen is released and this attacks the organic matter and oxidizes it. As hypochlorite of lime is a mixed compound, composed of calcium chloride and calcium hypochlorite, it follows that the former will add to the hardness of the water. In the electrolytic process where sodium hypochlorite is produced, the resultant solution contains in addition a slight amount of caustic soda and some sodium chloride, and the hardness of the water would, therefore, not be increased by its addition to it. In both cases the total solids in the water would be increased, and the color, if an organic stain, would be reduced. The carbonic acid in the water would be reduced, since it is essential for the liberation of hypochlorous acid from the hypochlorite.

In more concise terms it may be said that by adding hypochlorite of lime or soda to a water, the organic color thereof will be reduced; there will be an oxidation of organic matter; the carbonic acid will be reduced; the total solid matter in the water will be increased and, in the case of hypochlorite of lime, the total hardness of the water will be increased. With hypochlorite of soda this is not the case. All of the above changes were noted in a series of chemical analyses of the raw reservoir and treated waters. The amounts of chemical applied were so small, however, that the differences in the physical and chemical characteristics of the water before and after treatment were so slight as to be hardly noticeable and were well within the limits of accuracy of the methods of analysis.

The most important chemical change which is brought about in this process is the reduction of carbonic acid. This has considerable practical significance from a standpoint of the incrusting and corrosive action of water on iron and steel pipe brought about by the action of carbonic acid.

The claim has been made that free chlorine is liberated in this process, and that it may persist in water treated with hypochlorite of lime. This is in no sense true for the reason that free chlorine cannot be liberated from hypochlorite of lime or soda in a natural water. To do so it would first be necessary to decompose all the alkaline constituents in the water with an excess of strong mineral acid. Again, even if free chlorine could be liberated from hypochlorite of lime in a natural water, the chlorine would immediately combine with the hydrogen of the water and liberate atomic oxygen.

## ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

Copies of these orders may be secured from the Canadian Engineer for a small fee.

8053—Sept. 9—Authorizing the C. P. R. to construct, maintain and operate spur into the premises of the Brandon Gas & Coal Co.'s plant, Brandon, Man.

8054—Sept. 9—Authorizing the C.P.R. to construct, maintain and operate three industrial spurs for the Manitoba Rolling Mills, in the Town of St. Boniface, Man.

8055—September 13—Authorizing the Grand Trunk Railway to construct, maintain, and operate, branch line to and into the premises of Messrs. Davies & Doty, Oakville, Ont.

8056—July 13—Approving location of the C.N.O.R. Railway through Township of Gloucester, and the city of Ottawa,

8057—September 13—Extending for period of two weeks from date of order time within which the C.N.Q. Railway may operate its trains from Quebec City or Garneau Junction.

8058—September 13—Authorizing the C.P.R. to construct, maintain, and operate branch line in the city Saskatoon, Sask., to a point to be determined by the city engineer.

8059—September 10th—Authorizing the C.P.R. to operate branch line to the premises of George Vrooman, Lethbridge, Alta.

8060 and 8061—September 10th—Granting leave to the Corporation of the village of Stirling, Ont., to place its electric wires across the track of the G.T.R. at Bake Street, Stirling, Ont., and at Edward Street, Stirling, Ont.

8062—September 10th—Granting leave to the Laval Electric Company to place its electric wires across the C.P.R. near Therese, P.Q.

8063 to 8065 Inc.—September 13th—Granting leave to the Bel' Telephone Company to cross with its wires the tracks of the G.T.R. at Howick, P.Q., Stevensville Station, Ont., and Bridgeburg Station, Ont.

8066—September 14—Amending Order No. 7963, dated September 1st, 1909, authorizing the C.N.R. to alter its existing level crossing on Pembina Street, Winnipeg, Man., by substituting for the plans approved thereunder plans marked "A" on file with the Board.

8067—September 14—Authorizing the G.T.R. to construct, maintain, and operate spur into the premises of H. Corby Distillery Company, Limited, municipality of the Township of Thurlow, Ont.

8068—September 10th—Approving masonry work to be constructed at bridge No. 27.3, McLeod Section, C.P.R.

8069—September 10—Authorizing the C.P.R. to construct, maintain, and operate branch line in Blocks, 3, 7, 12 and 14, Plan Q, 10, town of Saskatoon, Sask.

8070—September 14—Approving and sanctioning location of the C.N.O.R. Company's Udney-Orillia line of railway through Township of Mara, County Ontario, Province Ontario.

8071—September 10—Granting leave to the Rural Municipality of Strathcona, to cross C.N.R. tracks one mile east of Belmont, Man.

8072—September 10—Granting leave to the Rural Municipality of Macdonald to cross with its wires the tracks of the C.N.R. at public crossing, two miles north-east of Brunkild, Man.

8073 and 8074—September 10—Granting leave to the Bell Telephone Company to cross the tracks of the M.C.R.R. near Bridgeburg, Ont., and near M.C.R.R. station at Welland, Ont.

8075 to 8078 Inc.—September 14—Authorizing the Volcanic Oil & Gas Company, Limited, to cross with its gas pipe under the track of the M.C.R.R. at four points in the Province of Ontario.

8079—September 14—Authorizing the G.T.R. to construct, maintain, and operate branch line in the town of Oakville, Ont.

8080—September 14—Authorizing the G.T.R. to construct, maintain, and operate branch line of railway and two spurs in the town of Orillia, Ont., to planing mills of J. R. Eaton & Sons.

8081—September 14—Authorizing the C.P.R. to open for the carriage of traffic that portion of the Nominating Extension of its railway from Nominating, mile 0 to Rapide de l'Orignal, mile 34.6, a distance of 34.6 miles.

8082—September 14—Approving Standard of Tariff of Parlor Car Rates C.R.C., No. S. 2 of the Esquimalt and Nanaimo Railway Company.

8083—September 14—Authorizing the C.P.R. to construct extra track of its railway across road allowance lying between Sections 14 and 23, Tp. 11, Range 12, west principal meridian, Province Manitoba.