may export such power without a government license which is revocable. This, at first sight, seems reasonable. Why not sell our surplus power until such time as we may want it for our own purposes? A very palpable objection to this course is now, however, manifesting itself, for the Public Service Commission of the State of New York, and other interests in the United States, have now taken the ground that if such power is once secured and with it industries are founded and built up, this establishes a vested claim or of a vested interest in the power in question, and Canada cannot legally revoke the permit to export the power even if she should require it later on for her own use. In fact, certain interests in the neighboring Republic have urged that as much electricity as possible, at as early a date as possible, be imported from Canada and employed in the United States, since otherwise manufacturers will go to Canada and establish themselves there to the detriment of the United States industries. This is a difficult question, but it is one which Canadians should have clearly in view.

The need for all the available power which Canada possesses is well set forth by Professor Herdt in his recent address before the Royal Society of Canada, who spoke as follows:—

"The use of coal for the production of power in our large cities will before long be almost entirely abandoned and hydro-electric power, economically transmitted and distributed, will in turn light every home and drive the machinery of every factory in this country. To provide the immense quantity of power required for this purpose, we shall require the surplus waters of our canals, the falls and rapids of the St. Lawrence River and the powers of our great inland waters. These are, and will remain, among Canada's richest assets, and will be the great source of our future development. The importance of effectively and economically utilizing these water powers cannot be overestimated. A definite, comprehensive policy, with respect to the nation's vast water power resources should be formulated. This great asset of the raw material from which the finished product is made by the expenditure of money and brains should not be given away unless the power is developed and placed at the service of the people. Reasonable encouragement, however, should be given to power schemes, bearing in mind that a water power undeveloped is like unmined gold—it takes money to place it at man's service. They should be developed in such a way as to render available, in a profitable manner, the energy which is now going to waste, and at the same time conserving for future generations our other natural resources."

NIAGARA RIVER BOULEVARD MAINTENANCE COSTS.

In our issue of November 4th, 1915, some figures were given on page 535 relating to the cost of road repair and maintenance in Queen Victoria Niagara Falls Park. The following corrections are forwarded us by Mr. John H. Jackson, C.E., superintendent. In the data relating to Tarvia-A treatment the surface treated was 50,400 square yards and not 54,400, as stated. The cost per square yard was 11.08 cents. The cost of Tarvia, including freight and demurrage charges, amounted to 5.72 cents per square yard, bringing the total cost of materials per square yard to 7.60 cents as given. These corrections apply also to the figures presented in the report for 1914 of the Commission.

A COMPARISON BETWEEN BLEACH AND LIQUID CHLORINE DISINFECTION.*

By C. R. Avery, M.A.Sc.

ON account of the claims made by the advocates of liquid chlorine on the one hand and by advocates of bleach on the other, the following work was undertaken with the idea of ascertaining what difference, if any, existed between the disinfecting quality of bleaching powder and liquid chlorine when used in water treatment.

From the results of the following experiments it is evident that the disinfecting qualities may be considered in all respects equal on an available chlorine content basis. Taking the results as a whole, the advantage of what difference there is seems to lie with the bleach. This difference is small, however, and the conclusion is that if a normal water supply be treated with the same amount of available chlorine, whether from bleaching powder or liquid chlorine, and provided proper mixing takes place, the disinfection in either case will be the same.

In this report no account has been taken of the problems of mixing and other problems more or less of a mechanical nature met with in municipal chlorination plants. It is quite true that both methods have their advantages and disadvantages; experience has shown that the most fool-proof arrangement is the best with regard to treating a water supply. A municipality should be well advised and should look carefully into the matter of plant arrangement before deciding which of the two to use. The difficulty of obtaining proper diffusion is probably the most

TABLE 1.

SEWAGE INFECTED WATER TREATED WITH 0.2 PARTS PER MILLION AVAILABLE CHLORINE REDUCTION OF BACTERIAL GROWTH.

Date of Experiment.	Source of Available Chlorine. Bleaching Powder. Initial Count.	20 min. Action.	50 min. Action.	90 min. Action.	Liquid Chlorine. Initial Count.	20 min. Action.	50 min. Action.	90 min. Action.
	18°–22°C. count.							
December 31, 1914	3,266	2,400	800	720	.....	4,800	520	1,400
	.....	1,280	640	450	.....	2,700	1,100	1,600
January 4, 1915	11,000	10,400	5,000	7,000	.....	11,000	12,000	7,800
" 5	.....	7,000	6,500	8,800	.....	8,000	8,800	6,500
	5,033	5,600	3,600	3,200	.....	6,000	4,800	4,800
" 5	.....	5,500	4,000	4,200	average	8,000	4,800	4,000
	6,733	4,800	4,000	5,600	.....	6,800	4,800	2,800
" 6	.....	2,500	3,000	4,400	8,738	6,400	7,200	1,500
	10,200	4,400	2,800	3,400	.....	1,200	440	250
" 7	.....	6,000	3,200	1,000	.....	480	200	400
	1,600	2,800	1,600	300	.....	2,400	1,600	2,100
" 8	.....	1,600	2,800	180	.....	2,200	720	600
	23,333	16,000	9,600	3,600	.....	7,200	5,200	1,000
	.....	10,000	11,000	4,400	.....	8,800	8,400	2,000
Average	8,738	5,734	4,182	3,375	8,738	5,247	4,327	2,625
Per cent. Reduction	.....	35.5	52.0	61.3	.....	40.0	50.4	70.0
	37°–40° Count.							
December 31, 1914	.....	760	360	160	.....	760	240	440
	.....	980	340	360	.....	1,100	450	220
January 4, 1915	2,800	2,800	2,800	450	.....	3,200	4,800	4,200
" 5	average	2,900	3,600	2,400	average	2,500	3,600	2,900
	.....	4,000	1,800	4,400	.....	5,000	2,500	1,500
" 5	5,376	4,500	2,000	2,600	5,376	4,000	3,200	1,600
	.....	4,800	2,800	2,400	.....	5,000	800	1,400
" 6	.....	4,500	3,000	2,000	.....	3,200	4,400	1,600
	.....	1,000	360	800	.....	200	160	220
" 7	.....	1,400	300	300	.....	300	200	280
	.....	2,000	4,800	1,000	.....	1,000	2,800	1,000
" 8	.....	1,900	1,900	1,200	.....	1,600	5,600	2,200
	.....	8,400	3,000	1,050	.....	2,400	1,680	1,000
	.....	7,200	2,800	1,600	.....	2,000	2,000	640
Average	5,376	3,367	2,133	1,515	5,376	2,304	2,316	1,371
Per cent. Reduction	.....	37.3	60.3	71.8	.....	57.1	56.9	74.5
	Colon Group. (per 100 c.c.)							
December 31, 1914	550	100	20	0	.....	100	20	100
January 4, 1915	1,000	100	100	100	.....	20	100	0
" 5	1,000	100	100	100	average	100	100	100
" 5	100	100	20	100	4,664	100	100	100
" 6	10,000	100	20	4	.....	100	100	100
" 7	10,000	100	100	100	.....	100	100	100
" 8	10,000	100	100	20	.....	100	100	0
Average	4,664	100	65	60	4,664	88.6	88.6	71.4
Per cent. Reduction	.....	97.8	98.6	98.7	.....	98.0	98.0	98.5

*From the 33rd annual report (for the year 1914) of the Provincial Board of Health of Ontario.