

often been necessary to run one or two filters for a time and then suddenly have to use eight filters.

The ratio of costs during one month's operation with liquid chlorine, with an average raw-water supply and the treated filtered water as low in bacteria as when using hypochlorite, was 1 to 3 in favor of liquid chlorine. It is hardly probable that every plant will show such a large difference in the costs of disinfection by the two methods.

LETTER TO THE EDITOR.

Grinding Slag for Concrete.

Sir,—In your issue of March 11 you published the result of some tests with regard to concrete made from slag, and again in your issue of March 18 you presented an article on the utilization of clinkers from garbage destructors.

As I have had considerable experience in this subject, perhaps some of your readers would be interested in a few remarks which are the result.

Some few years ago I was interested in a company manufacturing paving blocks and artificial stone from blast furnace slag and concrete. I found that, as then manufactured, the paving slabs did not wear well and were apparently soft and rotten. The proportion of cement was increased without at all diminishing this defect.

After microscopic examination, it was decided to pass the slag through a very fine mesh after grinding it in an edge-runner mill. The result of this treatment was that a perfect, hard artificial stone was obtained, which did not disintegrate with wear.

A short time after this I designed machinery for the treatment of destructor slag for the purpose of utilizing it in the manufacture of paving blocks. I found that the same conditions existed in this class of slag as obtained in furnace slag, and consequently it was found necessary to grind the refuse slag to a powder, from which excellent results were obtained.

The explanation of this is a simple one. The internal strains set up in the cooling of slag from the molten state, in which process the outer layers solidify first, are very great. They render every particle of it susceptible to cleavage with the slightest blow or even with variations of temperature. The same thing happens to a small atom of slag in a paving block when subject to passenger traffic as happens to a large slag cinder which is readily broken up by a hammer.

Thorough admixture of the component parts is also an essential to success.

The influence of variation of temperature on slag can be readily observed by the most elementary of experiments. Limestone, however, can be heated to a very high temperature before there is any appreciable effect, while granite does not disintegrate till it is red hot.

The above remarks refer particularly to paving blocks where the strength is not of the same importance as in the case of building blocks, but the test of blocks made under the above conditions came out equal to those made from granite chips and concrete.

From the use of slag concrete in building, other questions arise and the result of tests on test blocks is no criterion as to its suitability.

HENRY J. SCOTT, M.I.M.E.

Toronto, Ont., April 3rd, 1915.

ROAD CONSTRUCTION IN ALBERTA.

To effect closer co-operation between the provincial government and the rural municipalities in the matter of a well-defined and continuous system of trunk roads throughout the province, it was proposed, at the annual convention of Rural Municipalities and Local Improvement Districts, held in Calgary a few weeks ago, that a permanent good roads commission be appointed. The proposal met with the support of Hon. Chas. Stewart, minister of public works, and Mr. John Stocks, deputy minister.

Since the organization of the province in 1905, the provincial government has expended a large amount of money on the roads of the province, and very valuable work in this direction has been done by the public works department. Up to the present, however, there has been very little co-operation between the government and the various municipalities and it is with the idea of securing this, and getting down to a reasonable working basis, that the question of a good roads commission has been mooted, so that the main arteries of traffic may be linked up and a standard series of roads evolved. About half a million dollars will be available for trunk roads during the present year.

The difficulties of road-building in the province were pointed out by Mr. Stocks, who told of the various soil formations that have to be contended with, such as muskeg, bog, clay highly charged with vegetable matter, and soils of a spongy nature that would absorb all the rain that fell on them. Such soils could never be relied on for road material.

Outside of the cities there are no permanent roads in the province. The problem was as to how best to drain and maintain the existing roads at a reasonable cost, and maintain them in a manner to fairly meet the requirements.

Mr. Stocks made one statement which will surprise those who have been looking with longing eyes to the asphaltum deposits of the north as a means of cheapening the cost of permanent road-building in the province. "Tar sands on the Athabasca River," he said, "and at several other points, some not far from the city of Edmonton, give promise of an asphalt, suitable for road purposes, that would likely reduce the cost on this type of road surface in the future. It is hardly likely, however, that this possibly cheaper asphalt would very materially reduce the cost of paved roads, as such roads appear to require a concrete base to carry heavy traffic, which would raise the combined cost too high for very general use. The average cost of an eighteen-foot strip of paved road, extending into the outlying portions of the city of Edmonton, exceeded \$30,000 per mile. Any possible cost reduction in top or surface would still leave the charge too high to permit of very general use in country roads, and while a cheaper asphaltum product would be of great value, the cost reduction in highway construction would not be what many expect."

Mr. Stocks went on to say that crude oil treatment of sand road surface, or sand spread over a clay base, would seem to be a possibly cheaper road, and was used largely in districts adjacent to oil fields. Should crude oil be found in paying quantities in Alberta, great possibilities would be opened up along this line of construction.