MUNICIPAL DEPARTMENT

SEWAGE DISPOSAL IN ONTARIO.*

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(Continued from last issue.)

"That the most desirable method of disposing of sewage is by land irrigation wherever this is practicable. This method is especially important for cities and towns situated inland, or on such rivers and streams as are or may be used for public water supplies.

"Inasmuch as it has at times been found necessary (especially in older countries where the land is expensive, and the best land for sewage farms is not always available) to concentrate the sewage, some method of precipitating the suspended organic portion of it has to be adopted.

"In every instance, however, where the town to which sewage disposal is applied is situated on a lake or river whose pollution may possibly affect a public water supply, it is found necessary with every precipitation method to cause the passage of the effluent from the precipitation works to a land area for filtration."

The above defines very clearly the stand at present taken by the Provincial Board of Health, and it is probable the tendency will be to incline to greater strictness as the Province develops.

In France, Germany, England, and the United States, the purification of sewage by application to land has been proved to be a success even in cases where the combined system of sewerage is in operation. There are a few isolated cases where its opponents claim it has been a failure, but, if a failure at all, the failure has been due to carelessness in attendance, or else it has been a case of putting fertilization before purification. It is most instructive to read instances of the purifying power of earth when under favorable conditions. At Gennevilliers, in France, experiments were made to ascertain this power. Large tanks were constructed, filled with earth to a depth of six feet, and underdrained. Sewage at the rate of 24,000 cubic metres per hectare in six months was applied, and out of this only 1,600 cubic metres reached the drains below, nearly fourteen-fifteenths being evaporated. The above quantity is equivalent to about 14,000 gallons pet acre per day, or at 60 gallons per person per day is equivalent to 232 persons per acre. Of course, this by no means represents the total capacity of the land, other experiments at the same place having demonstrated that in permeable lands the yearly irrigation may reach 100,000 cubic metres per hectare, or, on the same basis as before, 500 persons per acre. At Breslau, where storm water is admitted, the proportion reaches 400 persons per acre.

*Abstract of paper read before the Engineering Society of the School of Practical Science, Toronto.

An idea of the degree of purification reached by filtration at Gennevilliers may be best obtained by comparing the following results of bacteriological analysis:

Sewage at outlet of main contained per cubic cent	20,000	microbes
Water of Siene contained per cubic cent	1,200	"
Water of Vanne (Paris drinking) contained per cubic cent	62	"
Rain water contained per cubic cent	35	"
Underdrainage of Gennevilliers contained per cubic cent	13 to 14	"

An extensive series of experiments in sewage purification has been also carried on at Lawrence, Mass., under the direction of the Massachusetts State Board of Health. Space will not permit of our going into the details of these experiments, but we may note some of the conclusions to be deduced from them, which are:

(1) In order to get the best results, it is imperative that the sewage be applied to the land intermittently.

(2) That the capacity of earth to purify increases with use, under proper conditions, up to a maximum depending on the quality of the soil.

(3) That the application of sewage to land is at present the only practicable method of purification.

(4) That the process of purification is due to the work of minute organisms in the soil, which convert the organic matter of the sewage into harmless inorganic substances capable of sustaining plant life.

(5) That the process of nitrification or purification goes on between 32° and 130° Fahr., and is most active at about 100° Fahr.

In one experiment the necessity for intermittent application was shown more conclusively. While acting intermittently the filter removed 99.2 per cent. of the sum of the ammonias in the sewage, but when kept continuously saturated the sum of the ammonias in the effluent gradually increased until they exceeded those in the sewage, some of those previously stored in the filter escaping. The sewage was then applied intermittently as before, when the nitrates in the effluent began to rise, until they exceeded the ammonias in the sewage by fifty per cent., the impurities collecting during the continuous filtration becoming nitrified. After three months the effluent was again purer than the average drinking water of the state. In each case the amount of sewage treated was the same, the difference in purification being entirely due to the different methods of treatment. In speaking of the purity of the effluent treated by intermittent filtration, the amount treated being from 117,000 gallons to 60,000 gallons per acre, the report says: "We have found that the sum of the ammonias which have been taken to indicate the amount of nitrogenous organic matter has been reduced to 0.5 of one per cent. of those in the sewage, and is less than the sum of the ammonias of most of the public drinking water supplies of the state." One result of these experiments has been to bring the question of sewage purification more forcibly before the people, and to demonstrate, in response to the constantly increasing demand for some system of sewage purification, that the only practicable method where purification, and not simply classification is required, is to apply the sewage to land.

The stand taken by our Provincial Board of Health, together with the interest that is being aroused in local sanitarians, due to the imperative demand of our increasing population for some practical and economical method of sewage disposal, is being already felt.

(To be Continued.)

INVERTED SYPHONS ON THE PARIS DRAINAGE WORKS.

In the extension of the sewage disposal works of Paris, says the Engineering Record, it was designed to relieve the river Seine of all the polution resulting from the turning into it of an amount of sewage estimated at 360,000 cubic yards daily. The irrigation farms at Gennevilliers have already covered 1,900 acres, and no more land was available there. Accordingly a more remote district has been selected at Archères on the northeastern boundary of the forest of St. Germain and along the left bank of one of the bends of the river Seine. The extension of the works include a new pumping station at Colombes, equipped with four groups of pumps, each of 300 horse-power, which will lift the sewage 115 feet. These pumps deliver into four pipes 43.3 inches in diameter and built of steel plates. These pipes are carried across the Seine under the girders of a road-bridge. From this point to Herblay opposite the new irrigation area the sewage is carried in two iron mains of 70.8 inches in diameter laid within a gallery or conduit of steel and cement concrete. At Herblay the line is taken across the Seine by an inverted syphon consisting of a double line of pipes 39.37 inches in diameter. These are built of steel plates 0.71 inch thick, are placed paraliel to each other and 20 inches apart, and are connected at intervals of 10 feet by a braced framing. The total length of each pipe is 668 feet. The pipes are not laid horizontally but are curved to follow the bed of the river. Before setting them in place a trench 13 feet wide was excavated in the river bed and a uniform bearing was made in the bottom of the trench with concrete. The double syphon complete weighed 259 tons. The pipes when built and connected were placed on a floating stage moored along one side of the river. Guiding piles were driven in the bed of the river on each side and a staging was erected on them. The pipes had been closed at the ends so that ample flotation was secured, and they were then towed out into the stream and brought immediately over the trench. They were laid in position against the guide piles and loaded with rails until they sank upon the bed prepared for them in the bottom of the trench. When a fair bearing had been secured water was admitted into the pipes and divers were sent down to remove the rails. The pipes had been tested before laying to a pressure of 90 pounds to the square inch, and they were finally covered with cement concrete. It was necessary to impede the navigation of the river as little as possible and the work was completed within three days' time.