

manurial value, and if not a source of revenue should at least cease to be the drag and bugbear at all sewage disposal works.

The purification of sewage by forced aeration has been demonstrated as a scientific fact by Dr. Fowler, who is admittedly on correct lines, and the object of presenting these notes is not to prove the principle of forced aeration or to make pretensions of having solved any of the difficulties, but to arouse the interest of engineers so that by concerted action we may translate Dr. Fowler's experiments to a working scale of an extensive character.

Up to the present the matter has been dealt with almost exclusively by the chemists, but the small open tank and the few experiments conducted therein at Wakefield have proved that the engineering difficulties to be faced are numerous. These can doubtless be overcome by experimental work, but more money is required for such purpose than the author has at present at his command.

One of the greatest possibilities of the process lies in the fact that it may be feasible to effect in tanks a much higher percentage purification than has hitherto been accomplished, so that the effluent might be applied to existing filters at a high rate and thus avoid extension of filter area.

If sufficient energy and money were expended on this aeration principle there is ample justification for assuming that disposal works could be designed which would possess the following advantages:—

- (1) Since the rate of purification would be accelerated, sanitary conditions would be improved.
- (2) The residual sludge, owing to the ease with which it could be handled and its high nitrogen content, would be more readily converted into a valuable fertilizing agent.
- (3) Putrefaction would be less likely to occur, thus avoiding offensive smells, and if percolating filters could be dispensed with, fly troubles would cease.
- (4) A very high percentage of purification could be obtained yielding an effluent which would be non-putrefactive on incubation.
- (5) Smaller outfall works would suffice, thus effecting a reduction in the area of land required.
- (6) Reduction in capital costs for the following reasons: (a) Purification would be accomplished by single tank treatment, obviating the necessity for bacterial filters; tank capacity would be less than that required for preliminary treatment in either septic or sedimentation tanks. (b) Owing to the improved sanitary conditions, the absence of smell, and the reduction in area of land required, the sites of works might be much nearer towns and on areas which under present methods would be impossible, or open to grave objections. The length of outfall sewers would consequently be curtailed.
- (7) Reduction in maintenance costs for the following reasons: (a) Chemicals would be unnecessary with a corresponding reduction in the bulk of sludge to be manipulated. (b) The sludge being of higher manurial value for agricultural purposes, doubtless the revenue derived from its sale would at least meet the cost of its removal. (c) Works being smaller and more compact, the expenditure on supervision and attendance would be reduced.

The most important uses of coke are in metallurgical operations, such as the smelting of iron in blast furnaces; the remelting of iron in the iron foundry; and the smelting of copper, lead, nickel, silver, etc. Oven coke is always used for these purposes, as a strong, hard coke is required. For blast furnaces, great compressive strength is essential; but for copper smelters, porosity is important.

DEEP BORING IN CANADA INVESTIGATED BY THE GEOLOGICAL SURVEY.

FOR several years the Geological Survey of the Department of Mines, Ottawa, has been collecting and recording information regarding deep well borings throughout Canada. As a rule, the Survey acquires first knowledge of drilling operations through the newspapers or similar sources of information, and preliminary data respecting each instance is then obtained by the establishment of correspondence relations. The characteristics of and variations in the strata penetrated are ascertained most generally from samples illustrative of every few feet of boring. The results of the work of this division of the Survey, apart from the accumulation of records and samples will be made available to the public through reports, bulletins, etc., and there is no doubt that much benefit will be derived from them. The Commission of Conservation has already referred to the great need for collecting information on borings.

This work was begun by the Geological Survey in 1885. In 1891 a report was issued giving particulars of all borings which were available in Ontario prior to 1891. This report gave plans of the different gas and oil fields of the province together with cross-sections of the strata as worked out from these data. Important sets of samples of drillings were then collected and are now filed in the present Borings Division. Supplementary information of this nature was published in the annual reports. In the year 1898 maps showing the limits and distribution of the various gas and oil fields of Ontario were published from data resulting from field studies. A similar report for the use of those interested in borings in the north-west provinces was published in 1913 and includes all available boring records for the above region up to the date of issue.

The increasing activities in boring in recent years and its expansion over the whole of Canada called for special provision for the carrying out of the work and in the inauguration of the Department of Mines, the Act provides that it shall be a function of the Geological Survey Division: "To study and report upon the facts relating to water supply for irrigation and for domestic purposes, and to collect and preserve all available records of artesian or other wells." It thus falls to the lot of the Borings division to study all sources of information relating to these matters so as to collect all data bearing on the problems involved and by consultation with other members of the Survey staff, having special local knowledge, to interpret the information thus collected in the interests of the operators.

Outside the efforts made by the Geological Survey a certain amount of attention has been paid to this subject by the officials of the provincial governments. The annual reports of the Novo Scotia government give details of the operations of their own drills. These are mostly core drills and are used at different points in the province in the search for seams of coal and for iron and other mineral deposits. In the other eastern provinces no systematic work has been done either in boring or in collecting records. The provincial government of Ontario has never operated drills, but the officials of the Bureau of Mines have published from time to time very complete studies of the gas and oil fields of the province with logs of borings and all information necessary to an understanding of the mode of occurrences of these minerals. In the north-west the official reports issued under the territorial governments contained particulars of the operation of drilling