

rigs, a few of which were owned by the government. Numerous auger drills were similarly owned and loaned to the various municipalities and to others using them for shallow wells in search of water. This policy was discontinued, however, shortly after the inauguration of provincial governments.

The attempt to acquire the valuable geological and economic data obtained as a result of the hundreds of borings made in Canada in any one year is found in practice to be beset by many serious difficulties. The particulars must be obtained at second hand through the mechanics operating the drills, and it is difficult in most cases to enlist and maintain their sympathetic co-operation. Then, too, it is seldom that the operator will have such a knowledge of geology that he will see the importance of the details the geologist finds it necessary to observe if any useful results are to be gained. It is further found difficult to impress operators with the necessity for sending complete tests of samples taken at close enough intervals in the drilling.

An added difficulty arises from the finely pulverized character of the rock material sent in, which results from operations of the churn drill, the apparatus most generally used, since in such samples there is little chance of getting fossils. Larger fragments are sometimes obtainable in this method of boring, but it has been found very difficult to impress upon the working driller the need for preserving and transmitting these. It is important, also, that drillers should send unwashed samples and that the logs of wells should be accompanied by corroborative sets of samples.

In New Brunswick, a large number of new drillings were added during 1914 in the Moncton gas and oil field. In boring operations the chief activity seems to have been in connection with cleaning out and deepening operations. The gas from the Moncton field is utilized in the towns of Moncton and Hillsborough.

Deep boring in Quebec has been practically limited to the operations of two companies in the St. Barnabé district of St. Hyacinthe county. This is situated a short distance northwest from the town of St. Hyacinthe. In the year 1910 a deep boring was put down to a depth of 1,880 feet by local capitalists in the search for natural gas or oil and a flow of gas was struck at 1,860 feet which still persists. This find was reported upon by Mr. Theo. Denis in his report of 1910 to the Quebec Government. The present operations are undertaken with the purpose of further testing this field. The position of the anticlinals and synclinals and other factors of this region can only be ascertained in a very general way from surface geological studies as the rock exposures are so few and scattered. For this reason boring for some time will be experimental in character.

Mr. Robert Harvie, of the Survey staff, made an examination of the country in the vicinity of the borings in conjunction with Mr. Theo. Denis, Superintendent of Mines of the Quebec Government, and, as a result, further light was thrown on the problems involved in the experiment. When the policy of putting down a number of comparatively short holes, as suggested to the operators, has been carried out, deeper borings placed more definitely along the crests of the anticlinals thus located, will show more effectively whether larger pools of gas exist than those partially proved by the boring ventures so far completed.

In Ontario deep borings are naturally most actively carried on in the southern portions where the surface deposits are underlain by the sedimentary series of Palæozoic

formations. These divide naturally into two main areas: that west of the Archæan axis which crosses the St. Lawrence River between Brockville and Kingston, constituting the Thousand Islands, and the other east of this divide.

In the eastern area of Palæozoic rocks, occupying the wedge between the Ottawa and the St. Lawrence rivers, sporadic boring has been done in the past and a number of deep wells have been put down. Some of these reached almost to the underlying Archæan and in one case penetrated it for a few feet.

In Ottawa city a number of these wells have been put down to obtain water and in several instances a little natural gas was encountered. In the case of the deep bores put down at different points in the territory east of Ottawa, the object was the search for the gas or oil; but while neither was obtained in commercial quantities both were found to be of widespread occurrence. Considering the extent of the territory, the comparatively few borings, and the conditions under which some of them were prosecuted, the question of the occurrence of pools of gas or oil in portions of the region where the general geological conditions are fairly favorable, would seem to be still an open one. During 1914 no further ventures were made in this field.

West of the Archæan divide, already mentioned, the sedimentary strata underlie the whole of the peninsula of Ontario bounded by Georgian Bay, Lake Huron, and Lakes Erie and Ontario. A line drawn from the south-east angle of Georgian Bay to the vicinity of Kingston constitutes the easterly limit of this area, the underlying rocks of the Archæan complex rising from beneath the sedimentary formations constituting all the country to the east and north.

The lower Palæozoic strata, the limestones of Black River and Trenton age, outcrop from beneath the covering strata over a broad belt of country between the above mentioned eastern boundary and the line extending south-easterly from Collingwood on Georgian Bay to the shore of Ontario. Along this belt of country numerous borings were made during 1914 in search for water and small quantities of natural gas have been reported from isolated points, as in past years. Considering the lack of impervious covering strata, it is not to be expected that any lasting sources of natural gas or oil will be encountered in this area.

Westward, where the Trenton group lies beneath the shaly series of Utica, Hudson River, and Median age, in two deep borings for water in the vicinity of Toronto flows of gas were said to have been encountered which would seem to be equal in importance to the limited flows reported from borings in previous years from this district from horizons in the Hudson River and the lower part of the Trenton. A similar occurrence was reported from a depth of 1,600 feet at Milton in Halton county. No logs are at present available from any of these wells, but from the depths reported the showing of gas might come from the bottom of the Utica or upper part of the Trenton.

North of this a development of great interest is reported in the finding of gas in considerable quantity in a boring made in Puslinch township, Wellington county. Here the surface rocks are limestones of Guelph age and the gas is reported as coming from a depth of about 2,000 feet. At this depth the bore would probably be in the upper part of the Trenton. According to reports, the flow and pressure were such as would differentiate this find from the small pockets of no lasting value apt to be encountered in deep borings in any part of the Palæozoic series. Northwesterly along the outcrop of the same