

evident that 1,800 pounds of water must be removed in order to recover 200 lbs. of solid matter. Moreover, this solid matter not only represents the combustible substance, but also the ash and mineral matter which is associated with the peat.

The separation of this large quantity of water, and the handling of so large a quantity of raw peat substance, in order to obtain a comparatively small quantity of combustible matter, represent the difficulties with which we are confronted when an attempt is made to manufacture peat into a fuel, on a commercial basis, and in a thoroughly economic manner.

The only economic process in existence to-day is that which employs the forces of Nature—the sun and the wind—for the removal of the moisture. The process employing these forces is called the “wet process,” and the product obtained is termed “machine peat.” This is the process which the Mines Branch, Department of Mines, demonstrated at the government peat plant at Alfred, Ont.

We not only have the process for manufacturing peat fuel, but also sufficient detailed information concerning peat bogs of immediate importance, to make a good start in the formation of a peat industry.

During the period covering the past ten years, the Mines Branch has completely investigated and mapped 58 Canadian bogs, all of which are situated conveniently with respect to inhabited and industrial communities, and also well situated with respect to railway and other transportation facilities. The investigations are conducted with a view to determining the principal and controlling characteristics of a bog, *viz.*, its area, depth, quality at different depths, quantity in tons, and, in general, its suitability for any particular purpose. The area examined in detail comprises 170,000 acres, and represents a quantity of standard peat fuel, *i.e.*, fuel containing 25 per cent. moisture, estimated at 120,000,000 tons. Seven bogs conveniently situated with respect to Toronto could supply that city with 26,500,000 tons of fuel, and seven bogs in easy reach of Montreal could supply 23,500,000 tons of fuel. Excellent bogs are, likewise, conveniently situated with respect to thickly inhabited communities, in Nova Scotia, New Brunswick, and other parts of Canada. This completes our inventory of the solid fuels. In regard to oil, we are not so favorably situated.

### Sources of Oil

The oil fields of Ontario, the oil shales of New Brunswick, Nova Scotia and elsewhere and the bituminous coals and lignites constitute the only economic sources of oil known to exist at the present time. Energetic and intelligent prospecting directed by able petroleum geologists may disclose new oil fields of economic importance. This, however, must be accomplished before the above statement of our oil resources can be modified.

The productivity of the oil fields of Ontario is decreasing at so rapid a rate that it will be comparatively only a short time before they will cease to be a source of oil.

The oil shales of New Brunswick and Nova Scotia are, on the other hand, a most valuable source of oil. They are of large extent and rich in oil. The average oil content of a large number of samples representing various portions of the New Brunswick shale deposits is from 35 to 40 Imperial gallons per ton and if these samples are representative of the entire deposits, the total quantity of oil contained in these shales is very large.

Our bituminous coals and lignites also may become important sources of oil. The yields of benzol and tar from one ton of bituminous coal when coked in a by-

product recovery oven are respectively  $1\frac{1}{2}$  and 5 gallons. The maximum yield of oil which might be expected when lignites are distilled solely for this purpose is probably not more than 3 per cent. of the weight of the fuel distilled. This figure may be subject to change; but the results of the work so far completed by the Mines Branch in connection with an investigation concerning the value of lignites as a source of oil do not indicate that a higher yield can be expected.

The total quantity of coal coked in Canada during 1915 was 1,856,393 tons, and if this quantity were coked in by-product coke ovens the yields of benzol and tar would be 2,800,000 and 9,000,000 gallons respectively. This yield of benzol could be further increased by distilling the tar recovered. The maximum quantity of benzol which could be recovered from the above quantity of coal is about 3,712,786 gallons.

The yield of light and heavy oils from 1 ton of bituminous coal is considerably increased when this coal is carbonized at low temperature.

Our oil requirements, as stated before, were, in 1916, nearly 300,000,000 Imperial gallons, while our domestic production was less than 7,000,000 gallons. A small quantity of benzol also was recovered in the by-product coke ovens operated during that year. In order, therefore, to produce sufficient oil to equal our imports of this commodity, we would have to distil an enormous quantity of coal and lignite, or oil shales, or both. The production of 300,000,000 gallons of oil from lignite would necessitate the distillation of about 30,000,000 tons of this fuel. This is manifestly impracticable.

As far as the oil shales are concerned, their distillation on a very large scale is not only entirely practicable, but very desirable. Large plants for the distillation of oil shale are in continuous operation in Scotland, and such plants were in operation in France prior to the war. Our shales are in no sense inferior to those of Scotland and could be exploited as easily and as profitably. No sound reason, therefore, exists for allowing this valuable source of oil to lie undeveloped.

Our domestic production of oil cannot be increased without great effort and the expenditure of considerable money, but provision must be made, and immediately, to provide against the time, not far distant, when the United States will be compelled to cease exporting her crude and refined oil products.

This will be forcibly brought into evidence by the following statement regarding the present status and future outlook of the oil industry in the United States. The production of oil, from 1859 to the year 1915, was 3,616,561,244 barrels, of 43 gallons to the barrel, and the possible future production is estimated at 7,629,000,000 barrels. This estimate was prepared for Senate Document 310, and was made by 30 prominent petroleum geologists of the United States Geological Survey. The United States, up to the year 1915, had exhausted 32 per cent. of her possible petroleum resources. If the present annual production is maintained, but not increased, her total crude oil supplies will be exhausted in less than 30 years. But, if the present rate of increase of production is maintained, total exhaustion will occur in a much shorter time.

It is apparent, then, that we will not be allowed to enjoy the advantages of the oil resources of the United States for a great while longer.

We can scarcely hope, for some time to come, to produce oil on a scale comparable with our demands—but we can appreciably reduce the quantity which must be imported and when oil can no longer be imported we will