

Near Orepuki, Southland, where the oil-shale property of the New Zealand Oil and Coal Company (Limited) is situated, mining and retorting operations have been suspended since 1903, but in view of the attention which has recently been directed towards a petroleum industry in the Dominion I have recently, by instruction from you, inspected the property, the following being a brief report thereon:—

The oil-shale-bearing area and oil-works are situated in the County of Wallace, adjoining the Township of Orepuki. A Government lease for mining coal and shale over 1,260 acres is held by the company over sections 37, 106, and 6, Blocks I, II, and III, Longwood Survey District. The lease is held for a fixed annual rental of £63, merging into a royalty of 3d. per ton, the duration of the lease being for sixty-six years from the 27th June, 1899. After securing its lease the company systematically laid out oil-works of modern type to treat 60 tons of shale per day, the cost with subsequent expenditure being stated by the managing director to be £124,000. The mining and treatment of the shale commenced during 1901. About two years later—viz., on the 17th July, 1903—operations were suspended, and have not been resumed; but during the past six years it is stated that £6,000 has been expended, chiefly in boring. The total output of oil-shale was 14,422 tons. The company earned during 1903 the Government bonus of £5,000 for the production of the first 100,000 gallons of crude petroleum.

Since March, 1913, the company has annually been granted suspensions of the output clauses of its lease. The last suspension terminates on the 11th September, 1919. The output conditions of the lease require a production of 12,000 tons of coal or shale per annum. Failure to comply with the output conditions entails liability to forfeiture of the lease by the Crown. During 1910 three successful boreholes were drilled by Government diamond drill. These proved the oil-shale over a distance of about 16 chains to be from 4 ft. to 4 ft. 10 in. in thickness.

The following are, I believe, the causes of failure of the initial operations at Orepuki: (1.) Retorting at too high a temperature, the result being a low extraction of crude oil and an excess in sulphur contents. (2.) Difficulties at the mine, which was opened in an isolated and much-faulted fragment of shale of small extent, the roof being difficult to support. The shale and underlying coal-floor was liable to spontaneous combustion and fires.

*Future Prospects.*—Although the operations of the company have hitherto been unsuccessful, the shale-deposit should not be condemned. By further boring to prove its extent, and by the installation of improved retorts of more up-to-date type, a superior oil will probably be produced. During 1906 a shipment of 57 tons of this shale was tested at the Pumpherston Oil-works in Scotland under the direction of Sir Boverton Redwood, an acknowledged authority. The results showed the average yield of the shale to be 38.41 gallons of crude oil and 19.12 lb. of sulphate of ammonia per ton. Samples of the crude oil obtained during the tests were refined, and the report states that the various oils and solid paraffin were found to resemble the corresponding products from Scotch shale-oil; further, that no special process of desulphurization in the treatment of the oil was necessary.

The following is an abstract of the fractionation as taken from the analyses in Sir Boverton Redwood's report:—

	Per Cent.
Burning-oil or kerosene .. .. .	25.92
Gas-oil .. .. .	3.07
Medium oil .. .. .	4.05
Lubricating-oil .. .. .	17.55
Hard paraffin containing 4 per cent. of oil M.P. 119.5° .. .. .	19.03
Soft paraffin M.P. 86.5° .. .. .	1.08
Total per cent. of commercial products .. .. .	70.70
Loss in refining .. .. .	29.30
	100.00

The Pumpherston Oil-works are of similar type to those at Orepuki.

With an output of 100 tons of shale per day, upon these results, during one year, there may be produced—kerosene or burning-oil, 299,500 gallons; lubricating-oil, 201,600 gallons; in addition to other oils and hard paraffin. This output would provide only for a very small proportion of the Dominion's requirements, the total quantity and value of imported oils during 1917 being—

	Value. £
Burning-oil (viz., kerosene) .. .. . 4,534,862 gallons	134,367
Lubricating-oil .. .. . 934,973 ..	96,798
Gas-oil .. .. . 8,528,635 ..	594,788
Paraffin wax .. .. . 3,174,530 lb.	66,130
	£892,083

The above value is estimated at a fair market price at the place of production plus 10 per cent.

During the current year the company has commenced to work the coal-seam of about 12 ft. to 14 ft. in thickness from an outcrop on its lease on the bank of the Waimeamea Stream, situated about one mile north-west of the shale-works, and about a quarter of a mile from Waimeamea Railway-siding on the Invercargill-Tuatapere Railway.

In view of the fact that the company's operations in connection with the Orepuki oil-shale deposits constitute up to the present time the most advanced step in this Dominion towards a much-desired oil industry, further boring is warranted and necessary to prove the extent of the oil-shale seam.

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FRANK REED,

Inspecting Engineer and Chief Inspector of Coal-mines.