

From the foregoing it will be observed that the bulk ore within the ore-body is 6.36 units lower grade than the average outcrop ore; but the hidden ore-body carries slightly less phosphorus, which, however, is of no advantage, as the ore contains more than 0.05 to 0.06 per cent. of phosphorus, the maximum proportion for the manufacture of acid or Bessemer steel. For the conversion of Parapara pig iron into steel it will therefore be necessary to employ the more costly and less efficient basic process. Incidentally it should be stated that the designation "acid process" is due to the lining of the open hearth bath, in which the molten pig iron is treated, consisting of silica, an acid substance; but with such a lining the elimination of the phosphorus is impossible. In the basic process the lining of the bath is composed of dolomite (magnesian limestone) as a base, and in this process the phosphorus can be eliminated, and comes out of the pig iron in the form of phosphate of lime in the slag.

It is to be regretted that no suitable deposits of dolomite for the furnace-lining are known to exist in Australasia. For a similar purpose at the Lithgow Ironworks, New South Wales, calcined dolomite in casks is imported from Middlesbrough, England, at a cost of about £5 per ton c.i.f., which quantity is necessary to repair once a 15-ton furnace—*i.e.*, for each charge of 16 or 17 tons. It is a most expensive item. In the United Kingdom phosphoric pig iron may generally be estimated as worth 11s. per ton less than pig iron from non-phosphoric ore, and the difference in the average value of phosphoric and non-phosphoric ore is about  $\frac{1}{2}$ d. per unit in favour of the latter. Acid or non-phosphoric steel is preferred as more reliable in the workshops and in the work, and is therefore always specified for boilers or purposes involving high steam-pressure. Roughly, about one-third of British pig iron is made from imported ore, which in 1909 amounted to 6,326,000 tons, nearly 6,000,000 of which was Bessemer, acid or non-phosphoric ore, which are synonymous terms.

The distance from which ore may be profitably imported to the United Kingdom is limited. Freight exceeding 12s. per ton, even on rich ore of the Bessemer quality, would be considered prohibitive.

#### PETROLEUM.

To facilitate operations in connection with drilling for and storage of mineral oil, provision was made in the Mining Amendment Act, 1911, by which any district in which there was reasonable possibility of petroleum being discovered could be brought under the Mining Act of 1908. In accordance with such provision the following districts have been defined and gazetted, all during 1912: Hawke's Bay—The whole of Mangatu, Waingaromia, Mangatoro, and Weber Survey Districts, within which the prospecting operations of the New Zealand Oilfields (Limited) and the Kotuku Oilfields (Limited) are being carried out. Taranaki—A large area of irregular shape containing about 700 square miles, extending about forty-nine miles along the coast from the mouth of the Mokau River south-eastward to that of the Pitone Stream; within this area the operations of the Taranaki Oil-wells (Limited) and some other companies are situated. Wellington—The whole of the Mangaone and Mount Cerebus Survey Districts; also Blocks I, II, and III, Mataikona Survey District, within which the prospecting operations of the Mangaone Oilfields (Limited) are being carried out. Westland—The whole of the Brunner, Waimea, Hohonu, and Arnold Survey Districts, within which prospecting for oil has recently been discontinued by the Kotuku Oilfields (Limited). The total area of the above gazetted districts is about 1,850 square miles.

A considerable amount of drilling has been carried out during the year, four different companies having been so engaged in the North Island. The results of the year's operations have not been conclusive, no new oil-supplies having been tapped, although gas-emissions have occurred in some of the holes being drilled.

The Kotuku Oilfields (Limited), who, during 1911, tested unsuccessfully the Lake Brunner district, Westland, have transferred their operations to southern Hawke's Bay, where two wells are now being drilled near Oparae (or Waipatiki), about a mile from the Dannevirke-Weber Road. The drilling-site was selected in the immediate vicinity of a blower of natural gas, which is now utilized as a supplementary fuel for the boiler used in connection with the drill. On 23rd June, 1913, No. 1 bore had been drilled 1,660 ft. and No. 2 bore, 1,322 ft.

The New Zealand Oilfields (Limited), having replaced their percussion drill by a modern rotary drill, are now engaged on the Tertiary rocks at Waihirere and Totangi, near Gisborne. At the No. 1 bore, Totangi, a total depth of 511 ft. has been drilled in soft clay with sandstone bands. Operations were suspended pending the trial of the rotary system of drilling at Waihirere. No. 2 bore, Waihirere: On the 10th April, 1913, the total depth attained was 1,375 ft., being for the most part in papa, with occasional thin bands of Tertiary sandstone. The gas-pressure has been strong at times, with small "shows" of oil in the return water.

During the early part of the year the property of the Taranaki Petroleum Company was sold for £110,000 to the Taranaki Oil-wells (Limited), a new company having a capital of £400,000, about half of which is to be provided for working and the general expenses of the company. This company were successful applicants for the second Government bonus of £2,500 for the production of a second 250,000 gallons of marketable crude oil containing not less than 90 per cent. of products obtainable by distillation, the first bonus of a similar sum having been won by the former company in May, 1911. On the 27th August, 1912, I again gauged the oil impounded in tanks, and found that from all sources since the commencement of operations 528,715 imperial gallons had been won. The following is the