Geologically, the New Plymouth Subdivision presents few features of economic importance save the occurrence of oil. The present investigation was undertaken with the object of supplying such geological knowledge as would enable oil-prospecting to be carried on in a systematic manner.

Physiographically, the New Plymouth Subdivision may be described as a deeply trenched plain showing no marked elevations, but exhibiting a distinct belt of higher country which separates a low-lying coastal belt of variable width from an open plain to the south, through which flow some of the numerous streams draining the slopes of Mount Egmont. The coastal plain, of comparatively recent elevation, is in places being rapidly encroached upon by the sea, and must at one time have extended over a considerable portion of the North Taranaki Bight.

Outline of Geology.

The beds of the district may be separated into the

Onairo Series, } Miocene.
Pouakai Series, }
Pleistocene and Recent.

The oldest rocks belong to the Onairo Series, and consist of claystones, sandstones, and conglomerates, to which, from palæontological considerations, a Miocene age is assigned.

The Pouakai Series, which overlies the Onairo Series with apparent unconformity, consist of volcanic *débris* of all grades of coarseness. The age of this series cannot be definitely fixed, but the beds are believed to be but little younger than those of the Onairo Series.

The alluvial deposits in the valleys of the various streams, together with the sand-dunes of the coast and various marine and fluvio-marine accumulations, may be classed as Pleistocene and Recent.*

Economic Geology.

Oil.

After a study of the very imperfectly revealed geological structure of the subdivision and a careful comparison of the generally unsatisfactory bore records, the following conclusions have been reached:

(1.) The chief oil and gas producing strata are the rocks of the Onairo Series.

(2.) The gas which is found escaping in considerable quantity from the rocks of the overlying Pouakai Series, and the oil, of which a few undoubted seepages from the same rocks occur, originated mainly or wholly in the Onairo rocks.

(3.) There is no evidence as to the mode of origin of the gas and oil.

(4.) No distinct anticlines and synclines can be distinguished in the rocks of either the Onairo or the Pouakai Series, nor are there any geological data which justify the selection of bore-sites.

(5.) Petrolaceous substances exist at or near the surface in the country to the east of the New Plymouth Subdivision.

(6.) The rocks in which the petrolaceous substances occur conformably underlie the Miocene rocks which are exposed in the subdivision, and are probably over 5,000 ft. below the surface in the neighbourhood of New Plymouth.

(7.) Oil has been found in payable quantities on the Taranaki Petroleum Company's property.

(8.) The oil horizons as disclosed by boring lie approximately 1,000 ft., 2,000 ft., and 3,000 ft. below sea-level near New Plymouth, but, owing to the variable character of the strata, are ill defined, and are at greatly varying distances from the surface in neighbouring bores.

(9.) The 3,000 ft. horizon is the most productive.

(10.) The 1,000 ft. horizon is of least importance, but merits more careful prospecting than it has yet received, especially near Booth's well.

(11.) The position of oil-reservoirs in the subdivision can be determined only by systematic deep boring.

(12.) A belt of country about three miles wide in which gas-vents occur extends from the Sugar-loaves in an E.S.E. direction for at least fifteen miles.

Recommendations concerning Oil-prospecting.

In view of the above conclusions Mr. Clarke recommends,—

(1.) A thorough geological examination of the country to the E. and N.E. of the subdivision, in the hope that payable oil-reservoirs may there be located nearer the surface.

(2.) A systematic prospecting of the subdivision by means of deep bores at regular and considerable distances. No bore should be abandoned as "dry" unless it has reached a depth of 3,000 ft. below sea-level without obtaining oil.

(3.) The systematic recording of the strata passed through in the bores, and the keeping of large and accurately labelled samples of these strata.

(4.) The co-operation of all parties engaged in oil-prospecting, more especially in regard to the comparison of the strata passed through. The only way to obtain comparable results is to secure the constant presence on the field of a competent geologist, who should examine and record all the specimens obtained.

(5.) Although geological data are very meagre, the most likely zone for exploration by deep boring is the strip of gas-producing country defined above.

* For a fuller account of the geology of the New Plymouth Subdivision see the Fourth Annual Report of the New Zealand Geological Survey, 1910, pp. 19–23.