

based on geological structure. In the Gisborne—East Cape field the structure has been several times investigated by geologists; and employees of the oil companies have endeavoured to locate suitable structures. As a whole the reports have been written on insufficient work and the structure elaborated on too little evidence. No work has yet been attempted in the detail required in modern oilfield examination. Although the survey of the Tokomaru Subdivision is far from complete, the general structure of a part of the possible oilfield can be indicated.

The rocks of the area examined can be easily subdivided into three groups, the topmost being the Tertiary, which gives no evidence of oil except where in close proximity to Cretaceous rocks, the lowest being the closely folded Lower Cretaceous which gives no oil-indications, and the middle being the possible oil-belt. The lowest part lying in the west and north is steeply folded and gives no evidence of oil. It is not greatly metamorphosed. In places it contains pieces of wood. These when analysed will give the “carbon ratio,” and show whether the beds are too altered to be likely to retain oil. They are closely folded, and strike approximately magnetic north. No bed is distinctive enough to be followed, and therefore the folding cannot be traced in detail. The beds are steeply inclined, and in places are vertical. They dip constantly only for short distances, and in places dip in opposite directions several times within a chain.

The Tertiary beds lying to the east and south are unbroken, and, except near the Cretaceous contact, dip at a low angle—about 10° . The Cretaceous oil-rocks underlie; and in places in the Gisborne Subdivision pieces of them come to the surface through faults in the Tertiary. Oil in quantity may therefore be found below the Tertiary. Previously, from a study of Tertiary structure, sites were indicated for boring through the Tertiary to tap the underlying oil-rocks, but until the favourable sites in the Cretaceous rocks have been tested it is premature to talk of boring on Tertiary structure. It may well be that the Cretaceous rocks under the Tertiary are less disturbed and more favourable for oil-accumulation than where exposed at the surface, for as the rocks are progressively more distant from the steeply folded mountains in the west they are found to be less contorted. The folded oil-belt, however, should first be thoroughly investigated.

The belt containing the oil-smelling rocks runs from the south-west of the subdivision twenty miles north-eastward to the Mata-Waitahaia Junction, then eastward twenty miles to the coast. In the south-west it is some fourteen miles wide, at the Mata-Waitahaia Junction one mile and a half, and it widens to the east beyond the area mapped. The rocks of this belt are intricately folded. Moreover, they contain several patches of conglomerate with pebbles derived from the underlying beds, indicating erosion-surfaces not far away. The beds vary laterally and grade into others along the strike, and in many places the boundaries between any two beds is arbitrary, as there is no distinct lithological change. The structure of parts has been mapped; other parts remain yet to be mapped.

It has been well pointed out in the classification of petroleum and gas fields by Clapp* “that while geological structure is the most important factor in any examination for finding oil or gas, all the other factors must be given due weight in forming our conclusions; and, above all, we must use our judgment in digesting the field data. It is important, after finding the structure, to proceed in the following manner: (1) Make as accurate a structure-contour map as available data will permit; (2) with the help of ‘convergence maps,’ make a separate geological and well map for every individual sand; (3) before making any recommendations consider carefully the question of local peculiarities of the structure—water conditions, number, character, parallelism, and continuity of the sands, character of overlying beds, possible source of supply, metamorphism and ‘structure habits’ for the particular group of fields. By such an appraisal of the characteristics of the region it will not be difficult to form some conclusion of the probabilities of the prospective field.”

Enough work has been done to indicate that the Gisborne—East Cape district probably contains an oilfield. It is not necessary here to enlarge on the present world-wide importance of oilfields; suffice it to say that the development of an oilfield in the Gisborne—East Cape district would make New Zealand the commercial and naval centre of the Pacific and give a great stimulus to the progress of the Dominion.

Urgent work remains yet to be done. The oil-belt must be followed and mapped wherever it appears. The more promising parts of the oil-belt must be mapped in greater detail. In particular it is necessary to “walk out” the structure and the boundaries in the complicated areas.

4. TANGARAKAU COALFIELD, NORTH TARANAKI.

(By P. G. MORGAN.)

The results of Messrs. H. A. Ellis and H. M. Marshall's field-work in the Tangarakau—Ohura district may be summarized as follows:—

A considerable area, extending from Tahora northward through the Tangarakau Gorge to north of Ohura, in Pouatu, Heao, Waro, and Ohura survey districts, has been geologically and topographically surveyed. Part of this area, notwithstanding its comparatively low altitude, is very rugged, and was unpleasant and difficult to survey. Dense forest added greatly to the difficulty of the work. Several quite large streams as well as many small ones, hitherto not on the Lands and Survey maps, have been surveyed, and it will now be possible to produce an excellent topographical map of the area examined.

* F. G. Clapp: “Revision of the Structural Classification of Petroleum and Natural-gas Fields.” Bull. Geol. Soc. Am., vol. 28, pp. 553–74, 1917.