

*Coal*.—So far as present observations go, the coal in North Auckland is found in quantity only where the rocks of the Whangarei Series rest directly upon the older and more durable rocks of the Waipapa Formation. The coal-measures, however, have a sporadic development, and coal is absent in many localities where the two series occur in juxtaposition. No indications of coal have been found at the base of the Onerahi Formation, nor has it been found where the rocks of the Whangarei Series overlie the softer Onerahi strata. It would therefore seem that these facts, if generally applicable, will considerably simplify the search for coal. During the past year there has been a steady output of coal from the Hikurangi and Ngunguru coalfields, while the Whangarei coal-mine has recently been reopened. The seam recently laid bare at Kawakawa, in an area which was prospected by the late Bay of Islands Company, has been found less extensive than was at first anticipated. The coal-seam in the Waitangi Valley to the east of Waimate North is thin, impure, and of small area: it therefore seems to be valueless.

*Other Minerals*.—The cinnabar-mines at Puhipuhi are being developed but slowly. The antimony and manganese deposits of the subdivision have not been worked for a number of years. There is a steady output of hydraulic cement from Portland, in Whangarei Harbour, and an increasing demand for pulverized and calcined limestone for agricultural purposes.

*Soils*.—The geological map now in course of preparation is virtually a soil-survey, for each of the various formations encountered gives rise to a soil of fairly uniform lithological and chemical character. Research will tell us what agricultural treatment best suits the soil derived from each particular formation. When this is known the settler can be given precise directions as to the treatment of his land in order to reap the greatest profit. If the agriculturist finds he can just pay his way without external assistance, any advice which will enable him to increase the production of his farm will be profitable both to himself and to the State. Lastly, the published map will be of value to the settler, to the county authorities, and to the State, for it will show where hidden sources of roadmaking material may be located, and thus reduce the cost of road-construction and road-maintenance.

### 3. PRELIMINARY REPORT ON THE TOKOMARU SUBDIVISION, WITH SPECIAL REFERENCE TO PETROLEUM PROSPECTS.

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#### INTRODUCTION.

Before the white man came to New Zealand inflammable gas in the Gisborne—East Cape district was known to the Maoris, who gave to conspicuous vents the names Te Ahi-o-te-Atua and Te Hau-o-te-Atua. After the discovery and development of the Pennsylvanian oilfields, about 1860, Europeans became actively interested in these phenomena. More gas springs and oil-seepages were discovered; and from these occurrences, similar to those of known oilfields, people quickly concluded that here, too, was an oilfield. Several companies attempted to tap the “oil-pool” by digging pits and sinking bores near the seepages. Up to the present time the same method has been used. Gas and oil in small quantity have been obtained in several localities. The small production has disappointed those who thought they had only to make a hole near the seepage to get into the “oil-pool”; but, geologically considered, the obtaining of small quantities of oil and gas in such unfavourable localities as fault-pug zones is decidedly favourable. The operators, however, attempted to get oil without giving any heed to the geology at all; and at the present time the general geology of only a small part of the field is known, while no part has been done in the detail required in modern oil-work. But further haphazard ventures are not to be regarded as part of the systematic investigation of the field; for failures due to misguided effort have been taken, and are apt to be again taken, as indicating that there is no oil in the field. The steps in the work must be—first, geological examination and mapping of the whole possible oil-country, to mark out the more promising parts of the field; second, detailed examination and close mapping of the promising parts; third, structure-contour mapping and location of bore-sites; fourth, actual drilling.

#### RÉSUMÉ OF FIELD-WORK.

From November, 1920, to June, 1921, the writers were examining a part of the Gisborne—East Cape field, and covered the survey districts of Arowhana, Tutamoe, and Hikurangi, comprising some 470 square miles lying to the north of the area described in Bulletin No. 21. As a result of the work (1) indications more favourable than those previously known have been found, (2) the zones of petroliferous rocks have been demarcated, (3) some possible “oil-sands” have been located, and (4) in part the structure has been elucidated. Moreover, the sequence of the Cretaceous strata has been established.

##### 1. *Oil-indications.*

The oil-indications given in Cunningham Craig’s “Oil-finding” (pp. 143–83, 2nd edition, 1920) will be taken in order and discussed in relation to the East Coast field.

*Seepages of Oil*.—Within the Tokomaru Subdivision so far examined no seepage of oil is known; but at Waitangi Hill, which lies five miles to the south, oil with a paraffin base is escaping at the surface. Samples have been collected, but are not yet analysed. As pointed out by Craig, paraffin oil does not yield conspicuous seepages.

*Asphalt Deposits*.—In dealing with paraffin oil, asphalt deposits are not to be expected.