### General Geology.

The formations identified in the 1927–28 season (see last year's annual report) were followed and mapped in the new districts examined during the season that has just passed. An erosion interval was found dividing into upper and lower sets the beds formerly included in the Mapiri Series. The contact between the two sets of beds can be examined at three places in Hangaroa Survey District —on the road below Te Ratetahi peak, in the Hangaroa Valley two miles to the south-east of the peak, and at a spot two and a half miles farther west on the Hangaroa Road. The two sets of beds have the same attitude at these three places. The under-bed is dense fine dark mudstone. Upon it lies fine conglomerate a foot thick, containing well-rounded pebbles of mudstone (most of them about $\frac{1}{4}$ in. through, but a few are 2 in. in diameter), broken shells, pumice-flakes, shark-teeth, and coarse crystal tuff-fragments. Above the conglomerate lies coarse tuff and pebbly shell-rock in beds 5 ft. and 6 ft. thick respectively.

In the north-west and west of the subdivision rocks older than any seen in the two previous seasons are exposed. On lithology they are correlated with the Raukumara and Taitai Series of the Waiapu Subdivision, as described in N.Z. Geological Survey Bulletin No. 30. In the rocks in the south-east of Moanui Survey District that are correlated with the unfossiliferous Taitai Series of Waiapu on strong lithologic evidence (the peculiar igneous conglomerate and massive sandstone at the two places being indistinguishable) fossils were found. Among them Dr. J. Marwick recognized *Aucella spitiensis* Holdhaus, a characteristic Jurassic species. As the Waiapu equivalent of these fossiliferous Jurassic Taitai strata overlie the Tapuwaeroa and Raukumara Series, that both contain upper Cretaceous fossils, is strong evidence that the Taitai conglomerate has been thrust over them, as suggested by C. W. Washburne in 1926. The difference of opinion with regard to this conception is set out at length on pages 28, 54, and 55 in N.Z. Geological Survey Bulletin No. 30. The recognition of the existence of overthrust gives a new outlook with regard to our views on the structure of New Zealand.

In the west of Ngatapa Survey District and over much of Koranga Survey District Upper Cretaceous (Mangatu) mudstones crop out, and, as elsewhere in the East Coast districts, they generally smell faintly petroliferous and yield hydrocarbon gases at points situated along faults. In Koranga Survey District these mudstones are less disturbed than in any other places so far examined, and provide more favourable oil-drilling sites than are known elsewhere in areas covered by Cretaceous beds.

### Structure.

Over a large part of the area Tertiary beds have a regional strike to the north-east, and dip to the south-east at low angles, generally less than 30°, but in places where they strike more to the north or more to the east the dip is correspondingly more nearly east or south. The differing attitudes of the beds indicate a large dome-structure in the north-west quadrant of Koranga Survey District, with the Tertiary beds dipping off it round its south-eastern slopes. This regional structural uniformity is interrupted in several places by reversed dips. Every reversal of dip is worth investigation.

In previous annual reports a few main "structures" were mentioned—namely, the Morere anticline, Moumoukai syncline, Mangapahi anticline, Wairoa syncline, and another unnamed anticline west of the last. During the past season the Wairoa syncline was followed northward, and the covering limestones were traced across its narrowing and rising end in Hangaroa Survey District. The anticline west of it—namely, Hangaroa anticline—was followed north through the west of Hangaroa Survey District and eastward across its northern boundary into Patutahi Survey District, where the anticline grades into the fault that runs up the Mangawehi Valley and through Gentle Annie Hill. Another Tertiary anticline crosses the south-east of Koranga Survey District into Ngatapa, the next survey district to the east.

The Upper Cretaceous beds form strong monoclines dipping 20° westward in the north-east of Koranga Survey District, and south-west in Ngatapa Survey District. In the north-west of Koranga Survey District the complex structure of the Taitai overthrust mass has not yet been worked out, but further work will be done there and also in Moanui and Motu Survey Districts next season.

### Economic.

The Taranaki Oil Fields Ltd., is drilling a trial borehole in the Morere and also in the Mangapahi anticline.

## 3. TONGARIRO SUBDIVISION.

(By L. I. Grange and J. A. Hurst.)

### Introduction.

The geological and volcanological survey of the active volcanic belt of the North Island of New Zealand as outlined in previous reports was extended from Lake Taupo to the western slopes of Tongariro, Ngauruhoe, and Ruapehu. The field season lasted from the 1st November, 1928, to the 28th May, 1929. During the early part of the season the Ohaki and Reporoa districts, north of Lake Taupo, were mapped, the remainder of the season being devoted to areas south of the lake. A great deal of topographical work was done on the volcanic mountains, the maps in existence displaying little accurate work other than the trig. stations. Altogether an area of 480 square miles was surveyed in detail.

The senior writer hastily examined the Kaingaroa Plains between the Waiotapu–Murapara and Taupo–Napier roads to ascertain whether water could be obtained on them.