and accumulations of agglomerate. The Waipapa rocks are much folded. Above them lie the Kaeo Series of argillites, claystones, sandstones, and limestones. These rocks, which are greatly disturbed and faulted, but are not actually much folded, seem to vary in age from late Cretaceous to early Tertiary. Above the Kaeo rocks lie two great series of volcanics—the first andesitic in character, the second doleritic. Each consists of pyroclastics and lava flows, but in the earlier series (known as the Wairakau Series) fragmental rocks predominate, while in the latter series (Kerikeri) the lavas are more conspicuous. With the Wairakau Series occur in a few places thin beds of water-laid sediments. Since the Wairakau Series was deposited, acidic volcanics have reached the surface, and still more recently basic volcanics have built up several cones and formed a number of lava flows.

From a physiographic standpoint the most salient feature of the Whangaroa Subdivision is a broad faulted table-land (from 700 ft. to 1,400 ft. high), the individual blocks of which are almost intact near the centre of the area, but are deeply dissected towards the sea to the north, east, and west by the various streams.

The shore-line is interesting, as it displays to a remarkable degree the effect of a relatively recent advance of the sea over a well-dissected land.

From an economic mineral point of view there is little of any great importance, if we except kaurigum, which is still dug in considerable quantity, though in annually diminishing amounts. Ores of copper, mercury, iron, and manganese occur in the area, but none apparently in very great quantity. Deposits of oil-shales are also found in the neighbourhood of Pungaere.

The copper deposits consist of irregular and much-faulted lenses in shaly argillites, and occur in the slopes of Maungaemiemi Mountain. The ore is mainly cupriferous marcasite (in places pyrite), with some chalcopyrite and a very little chalcocite, bornite, and covellite. The gangue-material is mainly calcite and country rock, but there is generally a little quartz. A number of claims have been staked in the cupriferous area, and on several—notably the Hare-Ratjen Claim, the Whangaroa Amalgamated Claim, and the Ferguson Company's Claim—considerable exploration has been conducted, though so far not with very marked success. On the Hare-Ratjen Claim occur the most definite veins, but these never exceed 5 ft. in thickness, and are rarely as much. Moreover, their greatest longitudinal extension so far discovered amounts only to 24 ft. However, there is no doubt that further prospecting of the claim is warranted.

The Whangaroa Amalgamated Claim exhibits some very handsome ore, containing a large percentage of chalcopyrite with the marcasite and pyrite; but as yet no continuous seam of ore has been located.

The mercury deposits are located at the Ohaeawai Hot Springs, about four miles south-west of the township of the same name. The deposits are of great scientific and possibly of some economic value. The ore, which is mainly cinnabar, though with some native mercury, occurs as impregnations with marcasite and native sulphur in shattered and sintered claystone and sandstone of probably late Tertiary date. There is still marked hydrothermal activity in the vicinity, with numerous warm pools from which steam issues. Hydrogen-sulphide is also expelled from the surface in many places, and petroleum is being naturally distilled in at least one locality. It seems probable that mercury is still being deposited by the heated waters, as traces were found in some of the waters analysed.

It is very difficult to state how great is the quantity of mercury-ores available. The quality in general seems to be low, the material as a rule assaying less than 1 per cent. in the metal. Mining operations are said to have been difficult owing to the great heat of the ground, while in the plant the condensation of the mercury was not effective. In the opinion of the writer, the quantity of mercuriferous sinter sufficiently rich in the metal to be called ore is not great, but the exact amount can be ascertained only by very careful prospecting. This exploration seems distinctly warrantable at the localities known as Shaft Springs (Area No. 1 of Bulletin No. 8), and the Maori Reserve (Area No. 5). The difficulty formerly experienced with the great heat of the ground could be overcome by mining in wide, open pits. It may be mentioned *en passant* that the waters of the Ohaeawai Hot Springs are of marked therapeutic value in connection with certain skin-diseases.

Though the iron-ores of the Whangaroa Subdivision are of widespread occurrence and of very great purity, they never occur in very large quantity. The ore is limonite, and generally contains about 50 per cent. of metallic iron. The largest deposit occurs on the Okaihau–Kerikeri Road, about three miles from Okaihau. A careful estimate gave about 100,000 long tons at this locality. Another small deposit is situated near Pungaere, and a still smaller deposit on the ridge between the Pungaere and Kohatu Whakangaongao creeks.

The manganese veins in Waipapa rocks are of no economic importance, being merely narrow seams of very impure material. The manganese minerals are psilomelane and pyrolusite.

The oil-shales mentioned above as occurring at Pungaere are found outcropping for 3 or 4 chains along the right bank of the Waiarewau Stream. The oil content is not high, as will be seen by the subjoined analyses, and the amount varies in the different beds; but it is possible that more improved methods of refining than those now in use may make the beds of value in the future. Paraffin-oil is obtained in Scotland from rocks yielding only a slightly higher percentage of volatile hydrocarbons than those at Pungaere.

Of the following two analyses, No. 1 is from a representative specimen of the poorer material, and No. 2 is from that of better quality:—

	(1.)	(2.)
Fixed carbon	7·47	4·75
Volatile hydrocarbons	18·12	26·95
Water	1·11	1·50
Ash	73·30	66·80
	100·00	100·00