

The sulphur that is in sight is confined to the margin of the crater. High-grade sulphur can be obtained from active and almost extinct fumaroles. The company that was working the deposits in 1914 had a dump of about 1,000 tons of sulphur mined from the foot of Troup Head, but this was lost in the 1914 disaster. The present company has quarried small amounts from the northern edge of the flat.

The White Island Products Company intends boring the flat, and later the lake-site for sulphur. Seams of sulphur are known to exist below the floor of the infilled lake. W. McCandlish* in 1885 had fifteen bores put down on the lake-floor, which was then dry. The bores, which ranged in depth from 3 ft. 11 in. to 18 ft. 3 in., penetrated two seams of sulphur, each 3 ft. thick. Mr. McCandlish estimated that 20,954 tons of high-grade sulphur could be obtained. Blocks of sulphur as much as 6 ft. in greatest length were thrown from the lake bed in 1914 and carried down the crater-floor. Little is known of what sulphur lies below the eastern flat even at shallow depths. A thin seam of sulphur occurs in a shallow pit 6 ft. below the surface at 9 chains north-west of the wharf. The flat seems to be worth testing by shallow bores. The rocks are soft and will give no trouble in drilling, but a high temperature gradient must be expected. In this connection it may be mentioned that when the ground at "The Geysers," California, was bored for compressed steam a temperature of 100° C. was found close to the surface. "As cracks are cut by the drill the steam-flow increases and the temperature rises rapidly 25° C. or more per 100 ft. in the upper strata."† Over the lake-site, where there is a heavy overburden, some modification of the Frasch process, in which the sulphur is melted by superheated steam or water and forced to the surface by compressed air acting on the principle of an airlift, seems to be the only possible means of winning the sulphur. The first cost of the plant required for this process is very great, and therefore it is suitable only where the sulphur deposits are very large.

The best deposit of the sulphur-gypsum fertilizer is situated at the foot of Troup Head, where there is about 10,000 tons. The material appears to contain a fair amount of gypsum, but the sulphur content is high only in hard bands and lenses. The company has been grading up the rock low in sulphur with the high-grade sulphur obtained from the fumaroles. Other deposits apparently high in gypsum, but in general low in sulphur occur on the margin of the flat area and in a few places on the northern cliffs. The average analysis‡ of the sulphur-gypsum fertilizer sold by the company is:—

Sulphur (S)	..	..	..	..	..	44.02
Inorganic matter	..	..	..	..	..	42.26
Water-soluble salts	..	..	..	..	..	9.42
Nitrogen (N)	..	..	..	..	..	0.06
Moisture at 104° C.	..	..	..	..	..	3.68
Undetermined	..	..	..	..	..	0.56
						100.00

The water-soluble salts of the above analysis contain—

Ferrous sulphate (FeSO ₄)	..	..	..	..	1.02
Aluminium sulphate (Al ₂ (SO ₄) ₃)	..	..	..	..	0.68
Calcium sulphate (CaSO ₄)	..	..	..	..	4.07
Magnesium sulphate (MgSO ₄)	..	..	..	..	0.28
Phosphoric anhydride (P ₂ O ₅)	..	..	..	..	0.02
Potash (K ₂ O)	..	..	..	..	0.11
Chlorine (Cl)	..	..	..	..	Trace
Sulphuric acid (free) (H ₂ SO ₄)	..	..	..	..	2.88
Carbonates	..	..	..	..	None
Undetermined	..	..	..	..	0.36
					9.42

A decomposed andesite coloured red by iron oxide, outcropping high in the cliff above Lot's Wife, is considered by the company to contain sufficient iron to be useful for the "bush sick" country of the Rotorua district. Several thousand tons of the rock have broken away and spread out over the flat in front of Lot's Wife. The analyses of this material for ferrous iron and gypsum are not yet to hand.

On the two southern points and the western point of the island are gannet-rookeries of a total area of about 3 acres. The excrement of the birds is found only to a depth of 3 ft. It rests on ash-beds from 30 ft. to 40 ft. thick on the southern points. From the surface to a depth of 3 ft. the average phosphoric anhydride content is 2.11 per cent,* and to a depth of 1 ft. from the surface the highest percentage of phosphoric anhydride is 4.42 per cent. The nitrogen content of all samples is less than 0.50 per cent. The material is thus seen to be lower in fertilizing content than one would have expected.

* Information taken from copy of report by Mr. McCandlish in the possession of the company.

† E. T. Allen: "Further Evidence of the Nature of Hot Springs (*Jour. Wash. Acad. Sci.*, p. 74; 4th Feb., 1926). Quoted in "The Volcano Letter," 4th March, 1926.

‡ From pamphlet "Fertilizers" issued by White Island Products, Ltd.