

APPENDIX.

FIRST REPORT of the RESULT of ANALYSES of Samples of Fine-grained Dust from the Volcano at Tarawera, No. L/4324.

Two of these only have, as yet, been fully examined: No. 1, Tauranga, and No. 2, Hicks Bay. Neither of these samples was distinctly acid; No. 1, indeed, was feebly alkaline. No. 1 is grey, No. 2 is pale brown. The subjoined results show a remarkable uniformity in the character of these two samples, although collected from localities miles apart.

<i>Analysis.</i>				Tauranga.	Hicks Bay.
Silica ...	...	...	...	60·74	59·37
Iron oxides ...	...	...	...	11·58	10·18
Alumina ...	...	...	...	16·09	17·96
Manganese ...	...	...	...	Trace.	Traces.
Lime ...	...	...	...	5·69	5·98
Magnesia ...	...	...	...	·96	1·19
Phosphoric acid ...	...	...	...	Trace.	Traces.
Water ...	...	...	...	2·26	2·21
Salts soluble in water ...	...	...	...	Trace.	Traces.
Organic matter ...	...	...	...	Trace.	·99
Alkalies ...	...	...	...	2·68	2·12
				100·0	100·0

It may be mentioned that the hardened mud (No. 5) from Wairoa afforded 62·98 per cent. of silica. Both are fine-grained, but No. 1, from Tauranga, is the finer-grained of the two. Free quartz is present in both, and, as owing to their fineness, it is impossible to separate it, I cannot yet determine how much of the silica in the analyses is combined; and so I am unable to affirm exactly as to the nature of the silicate or silicates present in these dusts. If 20 per cent. of free quartz be assumed to be present, the proportion of combined silica is about 50 per cent., which fixes the major part of the compounds as *unisilicates*. These dusts, though of much the same nature, behave in a remarkably dissimilar manner when moistened. No. 1 (Tauranga) is extremely absorbent of water, and, even if previously caked, speedily falls therein to a mobile sand; No. 2 (Hicks Bay dust), on the other hand, seems to repel water, and, even when wetted partially, clogs to an adhesive mud. From the few experiments which I have made, I feel pretty certain that the reason of this dissimilarity is simply this: the dust No. 2 has the oils of a partial combustion of organic matter condensed upon it. Possibly these are the organic matters in the analysis. I base this opinion upon the fact that, when heated to redness a short time, this dust is just as absorbent of water as the other; while, if merely heated to 212° Fahrenheit, this change in character does not obtain. In this way I would also explain the pasty condition which the Hicks Bay dust assumes when kneaded with a small quantity of water. It then becomes adhesive, from which it has been supposed to contain a notable proportion of clay, which it certainly does not. Washed with water, only 1·2 per cent. of material was obtained, which had not any tendency to keep in "suspension," and this proved devoid of plastic properties when collected. The lumpy and semi-plastic character this dust assumes in water is due, not to the presence of clay, but to a surface-repulsion of its particles.

The Tauranga dust affords 35·8 per cent. of substances capable of prolonged suspension in still water. Yet it is not adhesive or plastic; this suspended matter being fine grains of silicates and quartz, which hydrate on their superficies, and on these only.

In order to ascertain the degree to which these two dusts are likely to be affected by atmospheric agencies they were digested for one hour with hydrochloric acid diluted with four volumes of water.

Appended are the results of the approximate analysis of the matters which, in each case, were dissolved, as stated, centesimally:—

				1.	2.
Silica (¹) ...	...	...	...	·46	·61
Iron and alumina ...	...	...	...	6·42	7·02
Lime ...	...	...	...	1·84	2·06
Magnesia ...	...	...	...	·32	·26
Alkalies (²) ...	...	...	...	·48	·39
Phosphoric acid ...	...	...	...	Trace.	Traces.
Total dissolved ...				9·52	10·34

(¹) Most of the silica liberated was, it appears, kept in the insoluble form.
(²) Was especially examined for the quantity of potash dissolved from the dust by the same process; only ·24 per cent of potash was obtained.

These results, as compared with the result of the approximate analysis of soil by the same method as above, show that both these dusts are much inferior to even very indifferent soils. For clay lands they might be of service mechanically.

W. SKEY,
Colonial Analyst.