REPORTS ON WORKING TESTS.

The particulars and details relating to some of the more interesting parcels of ore treated by me during the past year are given in the following reports, copies of which were supplied to the owners:—

No. 1.—Ore from Monowai Mine, Waiomo.

Four separate parcels of ore were forwarded for treatment. Nos. 1 and 2 consisted of rusty-coloured, rather soft, friable quartz, containing a considerable proportion of iron-oxides and clayey matter. Nos. 3 and 4 consisted of hard, bluish-grey-coloured, splintery quartz, containing base metallic sulphides, principally iron and pyrites, galena, and zinc-blende. All the parcels were dried, dry-crushed, and treated separately with solutions of potassium-cyanide, with the following results:—

No. 1: Weight, 2 tons 5cwt.; treated, 2 tons.

	Assay-value.	Oz.	dwt.	gr.		Extraction.
Bullion ...	... ...	31	15	5	per ton.	...
Gold ...	... ...	3	0	12	"	92 per cent.
Silver ...	... ...	28	14	17	"	58 "
	Value, £14 5s. per ton.					87 "

No. 2: Weight, 1 ton 1cwt.; treated, ½ ton.

	Assay-value.	Oz.	dwt.	gr.		Extraction.
Bullion ...	... ...	10	11	17	per ton.	...
Gold ...	... ...	1	2	16	"	91 per cent.
Silver ...	... ...	9	9	1	"	77 "
	Value, £5 5s. per ton.					84 "

When crushed these ores produced a large quantity of the finest slimes, which rendered it impossible to effect the leaching by percolation even with the aid of a vacuum. When mixed with water the slimes, when only 2in. thick, settled on the filtering-cloth, forming an impervious bed through which it was impossible to draw the solution. In the case of No. 1 parcel, the pulp was subjected to agitation, by means of which the leaching was effected in six or seven hours. The separation of the solution from the pulp, however, was a long and tedious operation, and extended over eight days. It was effected, but not very satisfactorily, by agitating the ore, allowing the slimes to settle, and then drawing the clear solution off by a syphon. The weak solution and wash-waters were added in succession, and the same operation performed after each.

In order to ascertain the degree of fineness to which No. 2 ore was reduced when crushed, I made a number of experiments with a 60-mesh, 40-mesh, and ordinary battery-punched screen, and found that the results were the same in each case, as follow: 82 per cent. passed through a 90-mesh sieve, 95 per cent. passed through a 60-mesh sieve, 100 per cent. passed through a 40-mesh sieve. Subsequent experiments proved that the sliming of these ores was in a great measure due to the construction of the stamper-box, and not to the nature of the ore.

No. 3: Weight, 2 tons 3cwt.; treated, 1 ton. Ore hard, splintery, mineralised, contained occasional large fragments of soft mullocky ore. This parcel was crushed through a 24-mesh screen, but formed a considerable quantity of fine slimes. The pulp was treated by percolation, the first charge with a depth of 4in. of ore, the second with 6in. of ore, and the third with 8in.

With 4in. and 6in. of pulp the percolation was slow, but offered no special difficulties; but with 8in. the rate of percolation was so slow as to render this depth impracticable on a large working scale.

	Assay-value.	Oz.	dwt.	gr.		Extraction.
Bullion ...	... ...	7	8	17	per ton.	...
Gold ...	... ...	0	12	14	"	77 per cent.
Silver ...	... ...	6	16	3	"	13 "
	Value, £3 0s. 7d. per ton.					72 "

The preliminary laboratory experiments showed an extraction of—gold, 80·8 per cent.; silver, 63 per cent.; value, 81·3 per cent. The large extraction of silver in the laboratory tests was due to the use of a greater proportion of solution to the quantity of ore treated than in the case of the working test.

No. 4: Weight of ore, 1 ton; treated, ½ ton. Ore hard, greyish-blue, splintery, mineralised, containing copper-pyrites. Somewhat similar to No. 3. This parcel was treated in the new leaching- and filtering-vat. The extraction took eight hours, and the washing eleven hours.

	Assay-value.	Oz.	dwt.	gr.		Extraction.
Bullion ...	... ...	15	4	23	per ton.	...
Gold ...	... ...	1	5	4	"	70 per cent.
Silver ...	... ...	13	19	18	"	13 "
	Value, £6 1s. 6d. per ton.					68 "

The laboratory experiments showed the following extraction: Gold, 90 per cent.; silver, 78 per cent.; value, 87 per cent.