

"It will be seen from the foregoing that the cost of raising, bringing to the mill, and crushing, averaged a little over eight shillings and ninepence (8s. 9d) per ton—equal to a yield of two penny-weights and eight grains per ton, beyond which all is profit. I think this result one of the most important yet achieved in New Zealand. Our hills and mountains are seamed with auriferous quartz, from Green Island to Mount Aspiring. But as in the alluvium, so in the rock, the gold is scattered over a large surface area; and it is only by economical agencies that satisfactory results can be attained. The Blue Spur, for instance, enormously rich though it be, would not pay to work, were it not for the immense water power brought to bear thereon. It may not, then, be out of place, here, if I briefly describe the *modus operandi* adopted by the Gabriel's Gully Quartz Mining Company. The "reef or lode" is situated about half-way down the western face of the range which divides Wetherstone's from Gabriel's, and opposite to the Blue Spur, and is wrought by an adit, or tunnel, piercing the breast of the mountain at a point several feet below the cap of the reef. A tramway leading from the lode conveys the stone raised to the machine in the gully below, the full trucks descending pulling up the empty. A single line of rails suffices for this purpose. At the meeting point elliptical curves, enable the trucks to pass each other. The machine itself is a ten stamp battery, the stamps being of 60 lbs. weight each, worked by a turbine of new and greatly improved construction. The motive power—water—is conveyed in an open race from the Phoenix Reservoir to the saddle above the reef, and thence with a fall of 150 feet, in iron pipes to the battery. The reservoir belongs to the company, under lease, and the surplus water is sold at a profit, independently of the water used for crushing purposes. On the first crushing it will be readily understood by practical machinists that a considerable loss occurs through new and unused plates. Still better results have been obtained since the date of my report, and from data possessed I may safely say that the battery will now regularly crush, say, 125 tons per week, at a profit of not less than 10s. per ton. The reef is now from eight to ten feet thick. . . . I may mention here that coarse, unworn gold—semi-crystallized—is found in the boxes. At the first crushing 25 dwts. (one piece over 8 dwts.) occurred, and similar results have since been obtained." The total quantity of stone crushed to March 31st is 1,500 tons, yielding 470 oz. of gold. Twelve days' crushing, from 15th to 27th March gave 244 oz. of amalgam. No portion of the reef has yet been found absolutely barren, and gold seems to be equally distributed over the entire body of stone, 120 feet from North to South, worked to date. The turbine continues to work satisfactorily, and I am assured by the manager that for the last two months not more than 35 inches of water (220 gallons per minute) have been used for driving the full battery of 10 stamps.

The ridge between Gabriel's and Wetherstone's, in which these workings are carried on, is composed of micaceous and talcose slabs, overlaid with clay to a depth of from 3 to 30 feet. The upper rocks are of a deep red colour, and non-pyritous. The underlying rocks are of the ordinary blue tincture, and highly pyritous. Between these two layers there is usually a thin seam of mullock, and the rock faces exhibit indications of slickensides. When the lode occurs in the red slates, the quartz is much decomposed, and only slightly pyritous; whereas in the blue slates, the lode, like the surrounding rock, is remarkably full of pyrites. Both these slates are traversed with veins of quartz. The general lie of the slates shows a dip to the South at an angle of about 30 degrees, the cleavage planes dipping to the Eastward at about the same angle. The course of the lode is, as usual, North and South, with an underlay to the West. From a general consideration of these and other circumstances, I am inclined to believe there has been a vast slide at some remote geological period, which has precipitated the original crown of the range to its base, leaving between, to the Eastward, the broken-off lower continuation of the lode. It is remarkable that here, as in other parts of Otago, the quartz lodes should have struck far down the side of the range, a fact which adds additional confirmation of my theory.

Two tunnels have been put in to test this matter, and the extent of the gold-bearing character of the ridge, on both flanks of which coarse gold has been found in the gullies in small runs nearly to the summit. One these, known as Walsh's Gully Tunnel, has been driven 350 feet. Several small leaders have been cut in the excavation. The other is the Clarke's Hill Company. This has been commenced with the view of tunnelling through to Wetherstone's, so as fully to test the range. An application has been made to the Government to subsidize this undertaking, the importance of which can scarcely be exaggerated. Taking into consideration the magnitude and difficulty of the work, I think that a portion of the vote for prospecting would be well expended in rendering assistance thereto.

At Waipiri the quartz workings are just now at a standstill. There is not, however, any reason to doubt that the old O P Q lode would yield handsome returns if wrought economically by the aid of water power.

At Table Hill the work done has been very considerable, and the claimholders have been most persevering. Here there are two distinct lodes, running parallel—namely, the Oxford reef and the Ocean View reef. The Oxford reef has been worked to a depth of 112 feet, with a lode from 3 to 6 feet broad. It is now abandoned.

On the Ocean View, three claims have been wrought to a depth of 80 feet, on a lode 3 to 6 feet thick. Work is at present suspended, pending the erection of pumps to drain the lower levels, where the water is very heavy. The Alexandra Company are now erecting a turbine to drive five head of stamps, for which they possess ample water privileges. These reefs are perhaps the best defined of any yet discovered in Otago, having almost perpendicular walls with white casing. As at Gabriel's, the upper rocks are red, and contain very little pyrites. At 80 feet the rock changes to a blue pyritous slate, and the quartz is also highly charged with pyrites. At this point the explorations have been stopped. I shall await with much interest the draining of the mines, and the bringing to "grass" of quartz from lower levels. I have great faith in the future development of this part of my district, and in these reefs in particular.

There is nothing worthy of special mention in connection with the alluvial workings.

During the year ending March 31st, 1873, there has been a steady increase in production of gold from this district. The escort returns show that in the above-named period there have been 37,401 oz.