

The crosscut at No. 7 level has been driven for about 300 ft. It cuts small veins at 17 ft. and 35 ft. and larger bodies of quartz at 120 ft. and 220 ft. A drift following the 120 ft. lode extends for 15 ft. to the north-north-east, but at 10 ft. the lode is cut off by faulted ground. The faulting is irregular, but the lode ends at a break striking  $277^\circ$  and dipping at  $45^\circ$  to the north. Again a drift on the course of the lode has been extended for 142 ft. to the south-south-west, but at 112 ft. the lode ends against a break which strikes in a north-westerly direction and dips at (say)  $50^\circ$  to the north-east. At the end of the drift a crosscut has been driven for 23 ft. to the north-west, but no lode has been found. Probably the lode-track continues to the south-south-west without much displacement. If so, it contains no quartz where exposed beyond the break by the drift, but there may be vein-stone farther south.

At 150 ft. and 170 ft. in the main crosscut there is drag quartz in a considerable fault or fault-zone which seems to strike about  $340^\circ$ – $345^\circ$ , and to dip steeply eastward. A drift on the lode exposed at 220 ft. goes 74 ft. northward, but at 70 ft. the lode is cut off by a break striking  $266^\circ$ , and dipping at  $40^\circ$  northward. The lode is followed southward by a drift, but at 21 ft. is cut off by a strong fault, apparently that mentioned above as striking  $340^\circ$ – $345^\circ$ . The drift, bending to east of south, follows this fault for another  $25\frac{1}{2}$  ft., and at its end is a crosscut to the east for 20 ft., and one to the west for 10 ft.

The lodes cut at 120 ft. and 220 ft. in the crosscut vary in width from 1 ft. to 2 ft. 6 in. The quartz in these and in the smaller veins assays from several pennyweights to several ounces of gold per ton, and the average assay is well over an ounce. Under ordinary circumstances the two larger bodies might be expected to pay for working, but unfortunately they are of no great length. I have no doubt but that they are portions of one and the same lode, separated by the north-north-west-striking fault previously mentioned. Further, though a little out of line, they form a continuation of the Blackwater lode.

The upward extension of the 220 ft. lode is without doubt the lode cut at the end of the No. 6 level crosscut, and similarly the upward extension of the 120 ft. lode is the vein intersected at 160 ft. in the same crosscut. The veins seen at 17 ft. and 35 ft. in the No. 7 level crosscut most likely are the same as those seen at 35 ft. and 80 ft. in the level above.

From a prospecting point of view the North Blackwater Mine may be considered to have been successful, for a continuation of the most northerly of the Blackwater Mine shoots has been found in the expected position. From a commercial point of view the results are not so satisfactory. Severe faulting has broken the shoot of ore, which, moreover, so far as known, is small both in length and in width. The further exploration needed to discover new ore-shoots, if such exist, will be costly.

One point with reference to the faulting deserves mention. The lodes of the Reefton district follow fault-planes, and the shoots of quartz appear to end where (pre-mineral) faults, small or large, cross the lodes. This explanation is given by J. Henderson in Geological Survey Bulletin No. 18 (page 119), and accounts well for the peculiarities of the shoots. In addition to the early faults which preceded or accompanied the period of lode-formation, there are later faults that dislocate the lodes. In the Blackwater district the faults with north-north-west strike appear to belong to the later faulting-period. In all known cases of importance the faulting is normal, and therefore the rule, independently formulated by Schmidt and by Zimmermann, for finding the faulted portions of lodes is applicable, though sooner or later a marked exception may be expected to occur.

##### 5. WAIHI GRAND JUNCTION MINE.

(Report by P. G. MORGAN, abridged and slightly modified.)

During December, 1924, several days were spent in examining the Waihi mines and the surrounding country. The principal object in view was to obtain data for a report on the diamond-drilling operations then being conducted in the Waihi Grand Junction Mine, mainly in the hope of striking a payable ore-shoot in the Martha or Empire lode below No. 11 (1,639 ft.) level, and on the advisability of further prospecting in the ground held by the Grand Junction Company.

At the time of my visit a bore (No. 1) had been drilled vertically from a special chamber close to No. 1 shaft to a depth of 600 ft., and discontinued. A second bore, No. 2, had been drilled from a chamber perhaps 30 ft. south of No. 1 bore chamber, on an inclination of  $70^\circ$  from the horizontal, and in a south-east azimuth (bearing approximately  $127^\circ$ ), to a depth of 583 ft., and ultimately reached a depth of 756 ft. The boring, so far as I could ascertain, had been undertaken without geological advice.

In No. 1 bore, down to 325 ft. or thereabouts, as shown by the cores, layers of andesitic tuff and of flow andesite alternated, then tuff, in part silicified, came in, and continued to near the bottom of the hole, except that at 390–407 ft. glassy low-grade quartz with plentiful pyrite (a lode of unknown but probably small size) took its place. The rock at 600 ft. seemed to be a quartz andesite, containing numerous foreign fragments or inclusions (xenoliths). Some of the cores showed dips which varied, but on the average were probably over  $10^\circ$  (presumably to the south-east). The bore was not very easy to drill, but a large percentage of core was obtained, and serious trouble occurred only at 370 ft., where the diameter of the bore had to be diminished.

No. 2 bore was expected to intersect the Empire lode between (say) 350 ft. and 580 ft., but at 583 ft. was in broken rock (probably andesite). Down to this depth it had penetrated alternating bands of andesite and andesitic tuff, with andesite predominating except at 110–261 ft., together with a few small quartz veins, and at 135 ft. a foot of white quartz. At 561 ft. the rock was broken and silicified. Much trouble was experienced in drilling this hole. It does not correlate well with No. 1, and probably the greater part of it was in a fault-zone, parallel to the Martha lode, which in the crosscut south of No. 10 level is represented only by a "slide," but nevertheless is the dominant lode of the Waihi Gold-field. Probably the Empire lode does not continue downward through the plane of the Martha lode.

According to later information No. 2 bore from 583 ft. to 599 ft. passed through andesite and quartz rubble; from 599 ft. to 620 ft. through tuff; from 620 ft. to 628 ft. through andesite; from 628 ft.