

UR 1952/21-24

S. de BOMFORD'S PROSPECT
QUEENSTOWN

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INTRODUCTION

In March 1951 Mr. S. de Bomford of Queenstown pegged a prospecting area on Diamond Hill some three miles West of Queenstown.

During the year he carried out prospecting work on the area by means of pits and cuts. On the 29th October 1951 he wrote to the Director of Mines and asked for an opinion upon the value of the prospect.

The fieldwork upon which this report was based was carried out on 27th - 29th November 1951 and consisted of reconnaissance geology of the area in the vicinity of Diamond Hill and the taking of samples for assay. In addition photo-interpretation of geology was carried out in the office.

LOCATION AND ACCESS

Diamond Hill, a small peak rising above the Madame Howard Plains, lies some three miles West of Queenstown. It may be reached by two tracks.

(a) From the roadmetal quarry on the West side of the Strahan Road, a few chains South of the Zeehan turnoff.

(b) From the Zeehan Road by turning off to the West along a ridge several chains North of the point where the road crosses the Lake Margaret Tram.

These tracks join and proceed to within $\frac{3}{4}$ mile to the prospect. The first track is negotiable by a fourwheel drive vehicle, the second could be made so negotiable by clearing of scrub. The last $\frac{3}{4}$ mile must be covered on foot. The area is covered by low scrub interspersed with patches of bush.

TOPOGRAPHY

The Madame Howard "Plains" consist of a series of ridges which show summit accordance. They are in fact, a peneplain which is in the process of being dissected. The valley floors are generally eighty to hundred feet below the level of the ridges. Diamond Hill is oval in outline and rises approximately a hundred feet above the general level of the ridges. Pearl Creek flows South paralleling the Lake Margaret Tram as far as the roadmetal quarry at which point it turns abruptly to flow West and Southwest for six miles to join the Yolande River. Diamond Creek flows South from Diamond Hill to join Pearl Creek two and a half miles West from the metal quarry. Westwards from the creek, streams flowing into Pearl Creek show a remarkable parallelism, all flowing slightly East of South. The South-flowing tributaries East of Diamond Creek and all North-flowing tributaries of Pearl Creek have a random orientation. The nature of the streamcourses is determined by the geological formation as will be detailed below. From the metal quarry an old timber tram follows the course of Pearl Creek as far as its junction with Diamond Creek.

Two prominent ridges occur in the eastern portion of the area mapped. The first is

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composed of quartzite and runs westward from the road-metal quarry for three quarters of a mile. The eastern end of this ridge is an abrupt face - on the West it merges into the surrounding plain. The roadmetal quarry is located in this quartzite. The track from the Zeehan Road mentioned above traverses for half a mile a low ridge paralleling the quartzite ridge. The crest of this ridge is marked by a series of outcrops of barite and the strike of the ridge is also the strike of the barite lode.

GENERAL GEOLOGY

Preliminary photo interpretation prior to the commencement of fieldwork indicated that there were at least three rock groups present within the area now mapped. Subsequent fieldwork has confirmed this interpretation - the rock groups have been identified and their structural relationship established. The rock groups present are as follows:-

(1) Cambrian Group (approximately equivalent to the "Dundas Series"). These occur Northwest of a line drawn from a point on Pearl Creek one quarter of a mile upstream from the Diamond Creek junction towards the barite quarry. They extend well West of the area mapped. The rocks consist of fine grained dark shales and quartzites with many tuffaceous horizons. They are well compacted and the shales usually show a slight development of slaty cleavage. No time was spent on a search for fossils to give an age determination. However, the lithology of these rocks is identical with that of rocks occurring in the type area at Dundas and in the North Pieman Mineral Area. In both of these latter areas fossils have shown that the group is of Cambrian age. In the area under review, therefore, it may be stated that the shales and quartzites to the West are of Cambrian age.

(2) Eldon Group. The rocks occurring Southeast of the line mentioned above are the two upper members of the Eldon Group as defined by Gill and Banks ("Silurian and Devonian Stratigraphy of the Zeehan Area, Tasmania" Royal Society of Tasmania 1949). The ridge extending westwards from the roadmetal quarry consists of Florence Quartzite. This has been absolutely identified from its lithology and the numerous highly fossiliferous bands contained therein. Overlying the Florence Quartzite to the South there occur the Bell Shales in their normal stratigraphic position. These shales are generally darkgrey in colour with some reddish horizons. Narrow quartzite bands often appear. Within the shales occur many highly fossiliferous horizons containing abundant trilobites. The whole of Pearl Creek from just South of the roadmetal quarry almost to the Diamond Creek junction is in Bell Shales. The age of the portion of the Eldon Group present within this area ranges from Upper Silurian to Lower Devonian.

(3) Quartz Porphyry. The oval shaped Diamond Hill consists of quartz porphyry rather weathered on the surface. The rock is a pale cream colour and contains numerous phenocrysts of corroded quartz ranging up to an eighth of an inch in diameter set in a fine grained groundmass. There appears to be little variation in the texture or nature of the porphyry over the whole of the exposed outcrop.

That the porphyry is intrusive into

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Cambrian rocks is beyond doubt. As with other quartz porphyries occurring on the West Coast, it is a reasonable assumption that they represent apophyses from larger granitic masses below, which are coeval with the exposed batholiths at Heemskirk, Meredith Range, etc. By analogy, therefore, a Devonian age is assigned to the quartz porphyry at Diamond Hill.

The crest of Diamond Hill is marked by an irregular outcrop of pure white quartz. Several cuts have been made in this material and adits driven below it. It is said that some gold has been obtained here in the past. It appears that the quartz is a true vein and has been injected into a cooling crack in the quartz porphyry during the final phase of crystallisation.

STRUCTURAL RELATIONSHIPS OF THE ROCK GROUPS

The Cambrian Group shows a marked regularity of strike in a direction a little West of North and dips steeply to the East. Strike ridges can be traced for several miles along the general North - South direction occasionally being slightly sinuous. It is this feature which has been responsible for the parallelism of South-flowing tributaries of Pearl Creek in the western portion of the area. Pearl Creek itself, on the other hand cuts generally across the strike and thus has a very tortuous channel.

The Eldon Group, on the other hand, strikes generally East-West and dips at moderate angles (40° - 50°) to the South. The outline of the Florence Quartzite ridge shows that the strike of this group is also slightly sinuous.

The contact between the two groups, then, must be a fault. At the point where the fault is shown on the accompanying plan as crossing Pearl Creek a crushed and contorted zone was found showing that it is more in the nature of a fault zone rather than a clean fracture. By photo - interpretation the faultzone has been traced for three quarters of a mile Southwest and a quarter of a mile Northeast of the point at which it was actually identified.

The fault zone, then, strikes about Northeast. When this is plotted, it is seen that the fault is heading towards the barite outcrop which also has a North-westerly trend. It is reasonable to assume therefore that the barite deposit is along the line of faulting. East of the barite outcrop the fault has not been identified.

The quartzporphyry is intrusive into the Cambrian Group and has itself been intruded by a quartzvein. This intrusion was approximately coeval with folding and faulting described above, both being produced during the Devonian orogeny which was responsible for the present structure and mineralization of the West Coast.

MINERAL PROSPECTS

In this area there exists the conditions necessary for the formation of a mineral deposit viz:-

(a) The presence of a body of intrusive material of acidic composition which may have brought mineralizing

solutions and
(b) the presence of at least one line of structural weakness, in this case a fault zone, along which the solutions may have percolated and solidified as mineral deposits.

Mr. De Bomford has confined his prospecting to the northern portion of the quartz porphyry outcrop and has opened up over twenty small pits and cuts. In his letter he states that he has obtained traces of a large number of metallic elements, in particular lead and zinc. During the present investigation a series of twelve samples was taken from the pits cut by Mr. De Bomford and sent to the Mines Department Laboratory at Launceston for assay for lead, zinc and copper. The Laboratory reports a nil result for all samples.

The presence of traces of metallic elements within the porphyry is quite in accord with general theory, but it is unlikely that sizeable deposits of base metals will occur within the quartz porphyry itself. Such mineral bearing solutions as are brought by the magma percolate into the surrounding rocks and usually only traces remain within the intrusion itself. This is the case in the present instance. The presence of traces of metal is not prima facie evidence that sizeable deposits exist nearby although it is presumptive evidence. It is considered that, if deposits of base metals exist within the area, they will occur along the general course of the fault zone which is the natural zone of weakness along which they would tend to be localized. In this regard it is of interest to note that during the investigation a small outcrop of gossan was observed on the South side of the timber tram near the point where the fault is shown as crossing Pearl Creek.

RECOMMENDATIONS.

- (1) On general theory it is recommended that prospecting within the boundaries of the quartz porphyry be abandoned.
- (2) Geological conditions and surface indications are favourable for ore deposition and it is considered that the zone of faulting mapped is the zone which should be investigated.
- (3) Prospecting should consist of shallow trenching across the fault zone.
- (4) The gossan outcrop mentioned above should be investigated.
- (5) When sufficient prospecting work has been carried out to enable a clearer picture to be obtained, further geological advice should be sought.

Sgd. (B.L. Taylor) B.Sc. (N.Z.)
A.M.A.I.M.M.

GEOLOGIST

Zeehan,
22nd February, 1952.

The Director of Mines,
HOBART.