

TR 65-70

FUTURE PROSPECTING AT THE ABERFOYLE MINE

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At present it is not proposed to write a detailed report on the Aberfoyle Mine. Reports in plenty have been prepared during the last 12 years. The most comprehensive being the latest report on structure and vein systems by Lyon (1) while the actual mineralisation is described by Edwards and Lyon (2) in the same publication. Connolly (3) prepared private reports for the Company in 1946-1950 and a published report in 1953. Departmental reports have been prepared by Henderson (4) and Robinson (5).

It would appear that the limits of the vein system now being worked have been determined by normal company prospecting and it is now necessary to discover a repetition of this vein system in order that the Company's operations can continue beyond a foreseeable future.

Future prospecting can be divided into two categories; that based on broad structural principles and that based on observed surface formations. It is recommended that the latter should be the first attempted and that with fairly shallow drill holes.

The Aberfoyle vein system occurs in a broadly folded series of rocks of pre-Devonian age, the Mathinna Group. Sometimes these rocks are quartzites, sometimes slates, but more often a rock somewhere between the two in appearance. This series was intruded in the Devonian by granite and at the mine workings a late phase of this granite intrusion is in the form of a bump of a fine grained

variety on the main granite roof. This bump has been variously called a cupola, dome, ridge, and the rock type an alaskite, aplite or micro-granite.

The veins form a sheeted zone, 200 feet in width and about 1600 feet along their strike in a meridional direction. The general dip is steep to the west. These veins usually consist of a core of quartz often containing sulphides with a selvedge of mica. Cassiterite and wolfram usually occur along this selvedge and appear of later generation than the quartz. Associated with the veins is a fault system of which the principal break is the Aberfoyle Fault which has a downthrow to the west. This fault and the eastern limit of the vein system corresponds to the western edge of the granite cupola at the 11th level.

Cutting across the vein system is a series of small faults striking north-west. In the lower levels, these become more concentrated and to the south of these, values become low. The movement, south block west, is very small varying from several inches to a few feet. Half a mile west of the Aberfoyle fault is a parallel feature, the Burn's Marsh Fault which has a movement with west block up.

It would appear that all this movement originated during the Devonian Period and the key to any development of ore deposition is related to the granite intrusion—not only as providing a source material for the ore-bodies but also as the mechanism that caused the channel ways into which the ore-minerals and quartz were deposited. There have been later movements. Post-Permian movements have dislocated strata of Permian age, but it seems that these movements have occurred along pre-existing zones of weakness. The sequence of events probably was:—

1. Intrusion of the main granite mass causing the broad folding of the Mathinna rocks.
2. A second phase of granitic intrusion to form the cupola in the granite roof.

This second local intrusion forced up a block of country causing a major break, the Aberfoyle Fault System, and a number of sub-parallel minor breaks which became a passage-way for first silica and later mineral solutions. It is assumed that the large faults were too full of pug and fault material to allow much room for the passage of the hot liquids although some mineralisation does occur within the faults. Along the edge of the block being forced up tension cracks developed and these are represented by the north-west cross-fractures.

3. During the Jurassic and again in the Tertiary, earth movements resulted in further displacements along the old zones of weakness, the Aberfoyle and Burn's Marsh Faults.

Future Prospecting

The search for a repetition of the Aberfoyle vein system can be carried out on the basis of broad structural principles or by the investigation at depth of vein systems observed at the surface. Although the first approach is partly from theoretical principles

and is contingent upon many "ifs" and "supposings", much information can be gained by various means before deep drilling is necessary.

It seems fairly obvious that the rising of the granite cupola from the roof of the main mass of granite caused a rise in a block of country rock immediately above it, and this thrusting up of the country rock caused the Aberfoyle Fault System and the openings which later became filled with cooling mineralising solutions to form the Aberfoyle vein system on the western side of and above the cupola. On the eastern side of this upthrust block; it would be expected that a similar set of fractures would develop and hence a vein system similar, but dipping east instead of west. In examining any underground work that has been done to the east to test this theory, it is found that a bore hole of several hundred feet was drilled east from the plat at No. 8 level and although several mineralised veins were intersected, there was nothing of importance found. Perhaps this drill hole did not go far enough as it is thought that the two vein systems diverge at depth. The adit driven from Aberfoyle Creek to No. 4 level is probably too far to the south to intersect any main vein system associated with the cupola. The adit to 2 level apparently failed to intersect anything of interest, although it would be expected that it should, but again it may be too far west and this eastern fault system may reach the surface somewhere in the vicinity of Aberfoyle Creek.

The possibility of another cupola in the granite roof causing a similar set of structural conditions must be considered. It should be noted that the Burns Marsh Fault shows the country to the west upthrown compared with that to the east and this may be compared with conditions at the mine where the country to the east is upthrown by the Aberfoyle Fault in relation to country to the west. It may be argued that the Burns Marsh Fault is of Jurassic origin and has moved Permian strata as well as the Mathinna rocks. But this is also true of the Aberfoyle Fault, and, as mentioned earlier these later movements occurred along planes of weakness already instigated by earlier earth movements. This difference in height of the beds on either side of the Burn's Marsh Fault may then indicate that the country to the west has been pushed up by a similar cupola to the Aberfoyle one. If this is so, then there should be a similar set of fractures but dipping to the east instead of the west as it would be the eastern side of the cupola in the vicinity of the Fault. Two bores have been put down in the vicinity of Egan's Workings but these were directed on the supposition that the veins would dip westerly and may have missed east-dipping veins.

A third possibility is the continuation north or south of the Aberfoyle cupola. It has been argued that the structure is a ridge rather than a dome or cupola and that this ridge lies not in a meridional direction but runs north-east from the main shaft area to somewhere under Johnson's workings. This I do not think, as the veins both to the north and south of the stoped area become narrower and narrower suggesting that the fracturing gradually dies out, as does the Aberfoyle Fault. However, there is a possibility that another dome, perhaps oriented north-east, exists below Johnson's Workings; and this brings us to the second approach to prospecting, because in this general area a surface vein exists

sufficiently strong to encourage further prospecting. In a small adit known as the Battery adit is a quartz formation 12 inches thick, striking at 47° and dipping steeply to the east. Above the adit this vein can be traced on the surface, but here only two to three inches wide for over 150 feet to the south-west, that is to the limit of outcrop. If this direction is prolonged beyond the outcrop limit for 600 feet, it connects up with a small vein system exposed in Johnson's Adit. This vein should be examined at depth by means of drill holes for the following reasons:—

1. An increase in width has been noted downward from surface to adit level.
2. The walls of the formation are very well defined both on the surface, in the adit level and in a winze (seven feet) from adit level.
3. Broken material in the formation at adit level indicates that there has been plenty of room for mineralising solutions.
4. The length of this one vein at surface indicates that it should persist also at depth.
5. Although no assays have been done of this vein material, the presence of tin in the locality can be seen in the form of coarse crystals both in part of the vein and in floaters on the surface.

Therefore a drill site has been recommended at the position of the old battery site just above creek level and below the Battery Adit. The inclination of the hole should be 60° and this should give an intersection of the vein between 200 and 300 feet. The direction of the hole should be about 310° . Dependent upon the evidence of the first hole a second parallel hole should be drilled about 300 feet south-west of the first.

This then is the first recommendation based on evidence of a vein system at the surface.

Recommendations based on structural ideas are:—

1. If it is possible for a seismic survey to determine the position of granite domes beneath the surface, then the Bureau of Mineral Resources should be approached to carry this out. The investigation should be able to indicate—
 - (a) the shape of the roof of the known cupola in the vicinity of the main shaft, where its depth below surface is about 1000 feet.
 - (b) the presence or not of a second cupola, west of Egan's Workings and its approximate depth below the surface.
 - (c) the presence or not of a third cupola or the extension of the original one beneath Johnson's and Battery Workings.
2. The determination of the eastern side of the cupola by drilling from No. 11 plat east. Following this information a bore should be planned to go east from the plat at 5 or 6 level to reach if possible the vicinity of Aberfoyle Creek. This section would test the theory of east dipping veins, east of the present workings.

PROPOSED BORE SITE — BATTERY ADIT LOCALITY
ROSSARDEN

0 60 120 180 240 300 FT

Veins on surface -----
Veins in adits -----

MAGNETIC MERIDIAN

D.D. 514 \rightarrow $119^{\circ} 75'$ Map
 $112^{\circ} - 54'$

NORTH COSTEAN

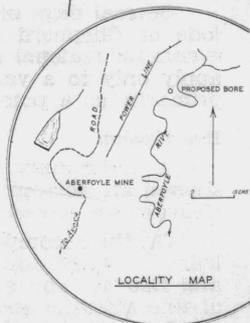
JOHNSON'S ADIT

BATTERY ADIT

PROPOSED BORE

ABERFOYLE TWT

TWEED



LOCALITY MAP

SECTION ALONG BATTERY ADIT

SECTION ALONG JOHNSON'S ADIT

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Plate 20

5 cm

3. A boring campaign west of Egan's Workings consisting of west dipping bores.

- (1) LYON, R. J. P.—Aberfoyle Vein System. *Proc. Inst. Min. & Met.*, March, 1957.
- (2) EDWARDS, A. B. AND LYON, R. J. P.—Mineralization at Aberfoyle. *Proc. Inst. Min. & Met.*, March, 1957.
- (3) CONNOLLY, H. J. C.—The Aberfoyle Tin-Wolfram Mine. *Geology of Australian Ore Deposits*. 5th Empire Min. & Met. Con. 1953.
- (4) HENDERSON, Q. J.—Geology of the Tin Tungsten Deposits of Aberfoyle District 1946. (Unpublished.)
- (5) ROBINSON, R. G.—Correlation of Granite at Aberfoyle Tin N.L. *Tas. Mines Dept. Tech. Papers*. (In Press.)