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REPORT TO

ABERFOYLE TIN N.L.

and

STOREYS CREEK TIN MINING COMPANY N.L.

on

GEOLOGY and EXPLORATION
of the ABERFOYLE - STOREYS CREEK FIELD

by

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Accompanying Plan: Geological Plan of the Aberfoyle-
Storeys Creek Field, Scale 1" = 800'

SUMMARY

It is thought that the economic ore deposits in the field are formed within a fault zone under the influence of a cross structure. The resulting zone of tension is responsible for the aplite emplacement, fracture pattern and wolfram-tin-quartz veins. These favourable structural positions may be repeated elsewhere in the field. Vertical zoning may be responsible for the concealment of some of the deposits in the field. Concealment may also be caused by soil and a thin cover of Permian sediments.

Exploration for extensions and repetitions of the known deposits has so far been unsuccessful. Another two holes are recommended to further test the extension prospects at both Mines.

It is recommended that exploration be extended in the future to test new structural positions. To aid this testing it is suggested that a geophysical survey be undertaken in likely areas where the Mathinna is concealed by soil or Permian sediments.

The proposed drilling programme consists of four holes, a total of 4,800 feet of drilling at an estimated cost of £24,000. The holes are :

Aberfoyle

S.16 An inclined hole to test for a northern extension of the Aberfoyle deposit. This hole is in progress.

Station: 1500 N 1975W

Collar angle: 71° 30'

Azimuth: East

Length : 1300 feet

S.17 An inclined hole to test the Aberfoyle Fault Zone near its junction with the Kookaburra Line.

Station: 3000 N 2000W (approximate)

Collar angle: 70°

Azimuth: East

Length : 1400 feet

S.18 An inclined hole to test the Burns Marsh Fault near its junction with the Eastern Hill Line.

Station: 1970 N 4175W (approximate)

Collar angle: 50°

Azimuth: East

Length : 800 feet

Storeys Creek

SC 8 A vertical hole to test the Eastern Hill vein system near the Creek Fault and within the zone of Easter Hill folding.

Station: 500 N 3000 E

Collar angle: Vertical

Length: 1300 feet

The positions of the proposed holes are shown on the accompanying plan. This programme should take almost 12 months, working on a one shift basis.

Previous surface drilling at both mines does not appear to have disclosed any significant veins, except for the vein in SC 5 at Storeys Creek. This area should now be investigated by underground openings.

INTRODUCTION

This report is a general summary of the Storeys Creek-Aberfoyle field in relation to the latest thoughts on the Geology and exploration for new tin and wolfram deposits.

These topics are dealt with under the following headings:

- Notes on the General Geology
- Strike Structures
- Cross Faults
- The Ore Deposits

- a Aberfoyle
- b Storeys Creek

- Structure and Ore
- Proposed Exploration

- a Extension Drilling
- b Geophysical Exploration
- c Structure Drilling

- Review of Previous Drilling

- a Aberfoyle Area
- b Storeys Creek Area

NOTES ON THE GENERAL GEOLOGY

The Aberfoyle-Storeys Creek tin and wolfram veins occur within the Mathinna slates and quartzites, of Silurian age. These veins are associated with a large body of massive granite of presumed Devonian age lying to the south and west of the field.

The Mathinna beds strike north-west with the edge of the granite, and are repeatedly folded in a great number of small upright folds. Bedding dips are from 40° to vertical.

The granite extends flatly north and east below the Mathinna, so that there is a marked concordance, both in plan and sectional view, between the bedded rocks and the granite margin.

Below both Mines the granitic rocks occur as an aplite. It is thought that this aplite is a late or marginal phase of the granite closely related to the quartz and associated mineralisation.

Overlying these mineralised rocks is a series of Permian and Triassic sediments. These are capped in places by Jurassic diabase. Some post-Permian and post-Jurassic movement has taken place along some of the old Palaeozoic fault lines.

STRIKE STRUCTURES

A number of structure are present which parallel the granite margin and the strike of the bedding in the Mathinna. These structures trend about N 30 W. Recent work by the Mine Geological staff has suggested that these strike features are more numerous than thought previously.

These structures are shown on the accompanying plan as the Northern Fault, Lutwyche Line, Kookaburra Line, Eastern Hill Line and the Dam Fault. The surface expression of the Lutwyche and Eastern Hill features is a zone of narrow, tin-bearing quartz stringers. The Eastern Hill line, which passes through both mines, appears underground to be a zone of close upright folding in which bedding plane slips frequently faults the tin and wolfram veins. There is little doubt that these structures extend down to and are seated in the underlying granite.

CROSS FAULTS

The cross faults are discordant with the bedding and granite margin, all running across the country on a bearing of about N 15 E, with the exception of the Creek Fault which strikes due north. These features are shown on the accompanying plan as the Aberfoyle No. 1, No. 2 and No. 3 Faults, and the Burns Marsh Fault. These cross faults dip steeply and dislocate the bedded Mathinna, the underlying granite and also the shallow Permian cover, indicating some post-Permian movement. Some of the faults are veined with tin bearing quartz, and the Aberfoyle deposit is seated in a zone parallel to the Aberfoyle No. 1 Fault.

THE ORE DEPOSITS

a ABERFOYLE

The Aberfoyle Deposit is a zone of quartz veins striking almost north and dipping around 55° W. The veins, carrying tin and passing into wolfram at depth, appear to be developed between the Forty Fault on the hanging wall and the Aberfoyle Fault on the footwall. Between these faults the deposit occurs as a complex system of tensional fractures filled with quartz.

At depth the quartz-wolfram veins become barren as the aplite is approached. This aplite is probably a final stage of the granite which tends to develop in the zones of rock tension.

In plan view the vein system is strongly warped about a N 30 W trending cross component. This cross component is the continuation of the Eastern Hill line which passes south-eastwards through Egans to Aberfoyle. Within this tightly folded zone numerous bedding faults displace the Aberfoyle veins with a north block east movement.

b STOREYS CREEK

The Storeys Creek deposit is a flatly dipping vein system striking north-west. The average dip of the vein system is around 30°.

No obvious fault system parallel to the veins has been disclosed in the underground workings. However, at Storeys Creek faults parallel with the bedded Mathinna may be inconspicuous. The Mine Geological staff have suggested that the Storeys Creek vein system may run off the Dam Fault at depth. Drill Holes SC 5, SC 6 and U8-12 suggest a steeply dipping fault in the hanging wall of the Mine. The Creek Fault, passing between Storeys Creek and Eastern Hill, may form a footwall to the deposit. It is also possible that a bedding fault marks the northern edge of the Eastern Hill and Storeys Creek veins. Within the Storeys Creek mine, small bedding slips displace the veins a few inches to a few feet, as do similar slips in this same zone at Aberfoyle.

The vein system at Storeys Creek is also warped about a cross axis trending east of north. As at Aberfoyle, the centre of this warping corresponds to the zone of maximum vein widths and the top of the underlying aplite.

STRUCTURE AND ORE

The pattern of veins in both Mines, and their relationship to faults and cross warping, their strong discordance to bedding and many minor features, shows quite clearly that the ore veins are a product of strong tension. If we consider the amount of quartz infilling and replacement a measure of this tension, then the zone of maximum dilation coincides with the axis of cross warping. This axis leads down to the top of the aplite.

It can be argued that the aplite intrusian-replacement process may be responsible for the structure and associated veins. To some degree this may be true. However, the regional pattern of linear fold zones and faults, and the appearance of wide veins at structural junctions, strongly suggests that the aplite and quartz has found its way into the tensional zones. If this is indeed the case, then the fracture pattern, vein quartz and aplite can be regarded as an expression of the structure. This is an important concept in considering exploration in the field. It means that given the proper structural environment, aplite and mineralized quartz will enter to form a vein system.

The above considerations deal with the location of the deposits in plan view. Because of the zoning from aplite upwards to barren quartz

to wolfram-quartz to tin-quartz, the vertical range of a vein system is restricted. The known zoning in the two Mines indicates that this vertical range is in the order of 1000 feet, and this may be an important factor in concealment of a new vein system.

PROPOSED EXPLORATION

It is recommended that the exploration programme should be continued along the following lines. Firstly, the extension prospects of both mines have not been systematically covered, and another two holes are needed to complete this programme. Secondly, it is thought that geophysical work may aid the exploration of new structural positions, and this should be undertaken. Thirdly, and preferably after completion of geophysical work, selected structural positions elsewhere in the field should be drilled.

a EXTENSION DRILLING

At Aberfoyle there is a serious gap in the extension drilling to the north of the Mine. In fact there is not a single deep hole ahead of the northern underground workings. Hole S 16, now in progress, has been planned to cut the Aberfoyle Fault system at some depth between the 7 and 9 level horizons, approximately 1500 feet north of the mine workings. Details of this hole are as follows:

<u>S 16</u>	Station:	1500 N	1975 W
	Collar angle:	71°	30'
	Azimuth:	90°	- Mine east
	Length :	1300 feet	

At Storeys Creek, hole SC 1 was drilled to test for a development of the Eastern Hill veins at depth. Reviewing our present knowledge of the geology of this area, it now seems possible that this hole may have passed below a north pitching vein system going into the ground with the Creek Fault. Hole SC 8 is planned to test this possibility within the Eastern Hill zone of steep folding. Details of this hole are as follows:

<u>SC 8</u>	Station:	500 N	3000 E
	Collar angle:	Vertical	
	Length:	1300 feet	

b GEOPHYSICAL EXPLORATION

Apart from extension prospects at both mines, structural targets have been established in a number of places in the field. The problem in drilling these positions is to determine accurately on the ground the position for a test hole. This is a problem because some of the structures involved run under soil or Permian cover in the crucial position. Geophysical work may be helpful in tracing the structural features through areas of concealment.

It is possible that by using the self-potential or induced polarisation methods, areas of sulphide concentration could be detected. In this case the geophysical method would be a direct indication of concealed ore at a shallow depth.

The areas likely to respond to Geophysical work are:

- a The area south-west of Storeys Creek where Permian cover obscures the Dam Fault zone.
- b The area south of Aberfoyle along the Aberfoyle No. 1, No. 2 and No. 3 Faults. Such a survey may be hampered by Rossarden township.
- c The concealed ground north-west of Lutwyche where the Lutwyche and Kookaburra Lines intersect the Aberfoyle No. 1 Fault Zone.
- d The concealed ground along the Burns Marsh Fault at and south of Egans.

The advice of the Bureau of Mineral Resources should be obtained on this proposed work. It is likely that the B.M.R. would undertake the survey.

c STRUCTURE DRILLING

The drilling for extensions and repetitions of the Aberfoyle and Storeys Creek Deposits has been disappointing. However, it cannot be said that the density of drilling is sufficient to eliminate the possibility of lateral development of new veins at both Mines. But the negative results of this exploration, coupled with our present knowledge of the ore-structure relationships in the field, suggests that exploration should be extended to new structural positions. The underlying thought here is that the deposits in the field will be widely spaced at favourable structural positions, where faults and lines of folding intersect.

There could be two reasons why a new vein system, developed at such a position, has not been discovered. The first and obvious reason is concealment by soil or Permian. The second reason is the vertical zoning of the deposits in the field. Some of the zones of narrow quartz stringers, especially on the Lutwyche Line far from the granite, may actually represent the tip of a concealed vein system.

In the selection of new targets, consideration must be given to the strongest features in the field. Without doubt, the Aberfoyle No. 1 Fault, and the Eastern Hill Line, are on present evidence the best developed lines of mineralisation. It is recommended that two holes be drilled to test new structural positions on these features.

The first hole would test the Aberfoyle Fault zone approximately 3000 feet north of Aberfoyle, at its anticipated point of junction with the Kookaburra Line. Details of this proposed hole are as follows :

S17 Station: 3000 N 2000 W
Collar angle: 70°
Azimuth: 90° - mine east
Length : 1400 feet

e second hole would test the Burns Marsh Fault at its junction with with the Eastern Hill Line at Egans. Previous holes S 11 and S 12 may have been collared too far east to cut the Burns Marsh Fault. Details of this hole are as follows:

S 18 Station: 1970 N 4175 W
Collar angle: 50°
Azimuth: 90° - mine east
Length : 800 feet

REVIEW OF PREVIOUS DRILLING

a. ABERFOYLE AREA

At Aberfoyle the surface holes have been aimed at extension prospects below, to the south of and in the walls of the Aberfoyle vein system. Holes S 1, S 2, S 3, S 4, S 5, S 6, S 7, S 8, S 9, S 10, S 13 and S 15, fall into this category. This drilling failed to find any extensions or recurrences of the Mine vein system.

S 11 and S 12 were drilled to test Egans structural position. It seems likely that both these holes were collared too far east to find the Burns Marsh Fault. At all events, no significant veining was disclosed.

S 14 was drilled to test the Lutwyche Line near its junction with the Aberfoyle No. 3 Fault zone. Some narrow mineralised quartz veining was disclosed in this hole, but no veins of economic width.

b. STOREYS CREEK

The obvious prospect at Storeys Creek is strike extensions of the known vein system. SC 1 was drilled to test for a southern extension (or repetition) of the deposit below the veining on Eastern Hill. This hole was completely negative. Holes SC 2, SC 3, SC 4 and SC 7, were drilled to the north of the Mine. SC 2 gave some encouragement with two narrow quartz stringers heavily mineralised with wolfram. Holes SC 3, SC 4 and SC 7, all drilled in the same section, disclosed a wide zone of barren quartz stringers, including a .152 inch quartz intersection. It is now thought that this strongly veined zone lies within the Dam Fault. It also seems unlikely that a new vein system could have been missed in the area covered by the drilling.

SC 5 and SC 6 were drilled to test the hanging wall of the Mine for a make of veins in this country. SC 5 disclosed an interesting vein about the 9 level horizon in the hanging wall country. SC 6, drilled to test for a down dip continuation of this vein, only found a zone of narrow quartz stringers. Holes SC 5 and SC 6 may have traversed the Dam Fault zone, with only SC 5 penetrating east of this zone into vein country. Underground hole U8-12, drilled to make a further test of the SC 5 vein, encountered faulted country and heavy water.

It is recommended that this area should now be investigated from underground with a crosscut to the west.

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