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RAZORBACK TIN PROSPECT. TNS

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Razorback Tin Mine, Leelan District
(Mt. Isa Mines Ltd.)
by
M.D. Ganetty
May 1951.

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REPORT ON THE RAZORBACK TIN MINEZEEHAN DISTRICT, TASMANIA.

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INTRODUCTION.

The Razorback Tin Mine was brought to the attention of Mount Isa Mines Ltd. by Henry Stokes, of Zeehan, acting on behalf of the syndicate holding the property. The writer made a preliminary examination of the property, and investigation in to the proposed terms of sale or option, in May 1951.

SITUATION.

The Razorback Tin Mine is situated at Dundas, about seven miles east of Zeehan. The third class road from Zeehan to Dundas passes near the property, being separated from it by the Dundas Rivulet.

GEOLOGICAL ENVIRONMENT

The Razorback Tin Mine, which was found in 1909, occurs at or near the contact of slate and serpentine, much dolomite being associated with the latter. The lode is similar in character and general geological setting, to the other members of the suite of pyritic tin lodes in the Dundas-Renison Bell-Stanley River District. In particular, it is closely similar to the large ore bodies now being tested at Mt. Lindsay, and to those at Renison Bell. The ore bodies at Renison Bell are the best known of the group, having been worked extensively for some years, but they are not necessarily more attractive than the other members of the group.

The Razorback lode occurs in a shear zone which for the most part occupies the boundary of the Dundas Slates and the intrusive serpentine. The development of dolomite along the boundary is believed to have resulted from alteration of the serpentine. The shear zone does not, however, adhere rigidly to the boundary of the two rock types;

The lode material consists of pyrite, pyrrhotite, arseno-pyrite, and quartz. Minor amounts of other minerals occur. In the oxidised zone, a friable gossan is found. The gossan is easily milled, and the tin released.

DEVELOPMENT.

The lode can be traced on the surface for about one mile. The most actively tested section is about 800ft. in length. In this last section, some open cuts have been excavated, eight main tunnels have been taken through the lode at shallow depth, and sundry costeans have been dug. A description of the workings occurs in Geological Survey Bulletin No.36, "The Dundas Mineral Field", by A. McIntosh Reid, 1925. However, a good deal of additional work has been carried out since the Bulletin was published, particularly at No.1 open cut, and further to the north.

ORE POSSIBILITIES.

The lode is steeply dipping, and oxidised to a depth which varies, but which probably averages 45 feet. It is considered that the oxidised zone probably fairly represents, with the exception of possible alluvial contamination right

at the surface, what may be expected in the sulphide lode at depth, with respect to both width and grade. In any case, no information is as yet available on the sulphide portion of the lode.

The oxidised section of the lode has been tested by openings which are fairly closely spaced over a length of 800 ft., but which have also extended further north and south, so that a total length of 1500 ft. is known in outline.

The width of the lode can be determined only after adequate assay data are available, because it is not practicable to determine with accuracy by eye where the tin bearing portion of the lode starts and stops, in the oxidised zone. The adequate sampling of the existing openings would require some weeks of work, and has not yet been undertaken. A few samples taken at random would not materially affect one's judgment of the property, and it was considered best to rely rather on the information available from the vendors and elsewhere, in order to achieve a working hypothesis. If the working hypothesis, taken in conjunction with the terms offered by the vendors, proves attractive, the next step would be to check it by adequate sampling.

Some sampling information is given in the Bulletin by McIntosh Reid, mentioned above. It should be stated here that the Bulletins by this author are generally believed in Tasmania to be unreliable; this applies to both his conclusions and his statements of fact. My personal assessment of his work elsewhere in Tasmania has not given me any contrary impression.

The assay information given by Reid is in any case insufficient to enable any conclusions to be drawn concerning the lode as a whole. Fifteen samples are quoted on Page 44. Of these, some at least are known to have been taken in material which is not now considered to be part of the lode proper. The others range from 0.2% tin to 3.5% tin, over widths ranging from three to six feet. Some of them are successive samples along the one cross-cut tunnel. Generally, Reid's samples are not in conflict with those supplied by the vendors, & stated to have been taken by a Mr. Brock (well known Tasmanian investor) about ten years ago. Brock's samples were taken over widths which ranged from 21 ft. to 45 ft. and gave values which ranged from 0.4% tin to 2.3% tin. The figures cannot be accurately enough related to the workings to make an average of much value, but the arithmetical average of Brock's samples, for what it is worth, comes to 1.0% tin.

The oxidised ore is at present being mined and milled in a crude plant consisting of a bell mill, one Wilfley Table, and a corduroy stake which is sometimes used. The recovery could hardly be more than 40% to 50%. The tin recovered represents 1.25%. Thus, the head grade of the material being mined is probably about 2.5% tin.

As a first approximation, we may take the oxidised ore available as probably being about 800 feet along, 25 feet wide, and 45 feet deep; these figures are conservative. At 15 cubic feet to the ton, we would then have 60,000 tons available. The grade might possibly be about 1% tin. The recoverable tin (at 50% recovery) would be 300 tons, worth £52,000 at the official selling price, without bonuses on the Tin Pool.

Reid in Bulletin 36 emphasised that the tin occurred in shoots which he believed to pitch flatly to the north. I was unable to determine the reason for his making this statement, and do not accept it. Moreover, considerable work has been done since Reid's examination, and much of it has disproved his views. While there are undoubtedly rich and poor sections in the lode, it is not practicable as yet to outline them. The detailed sampling may help.

The sulphide section of the lode may be expected to be similar in width, grade, and disposition of ore shoots to the oxidised section. Thus, an accurate knowledge of the oxidised section would help considerably in the planning of drill holes designed to test the sulphide section.

The figures given previously in the hypothesis based on Brock's sampling suggest that the lode may have 1,400 tons per vertical foot of ore carrying perhaps 1% tin. The hypothesis has yet to be tested. If on testing it is found to be correct, and it is found that the ore shoots are of suitable size and favourably placed, the Razorback lode could be an important profitable one.

OPTION TERMS. Three leases are held in the name of Hodge and a further twenty acre block has been applied for. The three leases held are of twenty acres, twenty acres, and five acres respectively.

The syndicate consists of Hodge (50%), R. Clarke (25%), and the Robertson Brothers (25%). Henry Stokes represents the syndicate, but has no direct interest he depends for his remuneration on a commission.

Stokes stated that the terms if purchases are a perpetual interest of 5% of gross revenue from the sale of tin, with a minimum payment of £3,000 per annum. It was pointed out to him that a percentage of gross earning would not be acceptable, but a percentage of net profit might be considered. It was further pointed out that an unconditional payment per annum would probably not be favourably received.

It appears that both the members of the syndicate and Stokes himself, (who admitted that he had not made any calculations himself), all believed that at least 1,000,000 tons of easily obtained oxidised ore were available. I went into the matter with Stokes on the basis of the figures quoted earlier in the report, and he readily agreed that 60,000 tons at 1% tin was a more reasonable expectation. Stokes then stated that he would discuss the matter further with the vendors.

In a subsequent letter, received to-day, Stokes states:

"Since seeing you, the Razorback Syndicate have gone into the matter of a suitable price of the property but no finality could be reached on this point.

They have agreed to withdraw the offer of the property to Mount Isa for the time being.

If it should eventuate that the Syndicate can agree on a new set of terms I shall be happy to contact you about the matter."

It was my personal impression that the vendors were not always in complete agreement among themselves. It also seemed that there was a strong element among them which favoured selling out.

RECOMMENDATIONS.

The property has considerable attraction, and I believe that some effort to interest the vendors in terms which would be mutually acceptable to them and to the Company, is desirable. I consider that if an arrangement could be reached whereby the Company undertook to provide equipment and to mine the oxidised ore at a rate of perhaps one hundred tons per day, instead of less than one ton per day, as at present, and to pay the vendors a substantial proportion of the working profit, they might agree. The provision of suitable mining and milling plant for the oxidised ore would probably not be very expensive and in a couple of years tin of a gross value of £300,000 might be won. If the vendors were offered a substantial ~~of~~ proportion of the actual working profit, say 15% or 20% on the oxidised ore only with no interest in the sulphide ore the position might well be advantageous to the Company.

I recommend therefore:

1. The exclusive right to negotiate, for several months, be obtained from the vendors.
2. That the available workings be adequately sampled and mapped. This would probably cost, with incidentals such as travelling and assaying, about £300.
3. The results of the mapping and sampling should be used to prepare estimates of ore available and probable grade. Investigations on probable mill recovery the cost of the cheapest mining and milling plant, and probable profit, should follow immediately.
4. If the foregoing investigations disclose an attractive target in the oxidised zone, an agreement with the vendors, along the lines discussed above, should be sought.

The proposals above imply an expenditure of about £300. for which the Company would have no security other than the exclusive right to negotiate. I consider that the risk is worth taking.

M. D. Garretty.

RAZORBACK TIN PROSPECT, TASMANIA

Object

To determine the nature of the tin and associated minerals in sulphide and gossan samples from the Razorback prospect Tasmania.

Conclusion

In both the gossan and sulphide, cassiterite accounts for the major part of the tin - the sulphide does contain a minor amount of stannite.

The cassiterite, in the sulphide is for the most part quite massive - it is mainly contained in pyrrhotite which forms the chief sulphide mineral. Other sulphides and quartz are present but only in small quantities.

Both ores should be amenable to gravity concentration, the sulphide ore combining both gravity and flotation concentration. The flotation section being primarily for rejection of sulphides.

Discussion

The ore minerals found in polished section are cassiterite, stannite, pyrrhotite, pyrite, arsenopyrite, chalcopyrite and an unidentified grey mineral associated with cassiterite.

The following chemical analysis was obtained:-

	<u>Sulphide</u>	<u>Gossan</u>
Sn	1.1	3.7
Fe	31.0	31.4
S	31.4	-
As	.95	.75
SO ₄	1.4	-
Insol	27.4	41.0

A complete analysis was not obtained but as the sulphides have undergone considerable oxidation it could be assumed that the discrepancy is due to the presence of calcium and magnesium soluble salts. Microscopic examination did not reveal any mineral to account for the discrepancy.

Cassiterite

Cassiterite was the only tin mineral observed in the gossan sample whilst in the sulphide sections examined it accounted for practically all the tin.

It occurs mainly in massive form - sections 5 mm x 3 mm having been observed; however, there are small areas throughout the sulphide of an average size 50 u x 50 u. The cassiterite is associated with quartz, an unknown grey mineral and pyrrhotite - these three minerals tending to replace it. Fig. 1.

It was found impossible to reat the gossan sample as received and a superpanner head of a size product was used for determinative purposes.

The difference in specific gravity between cassiterite (7.0) and pyrrhotite (4.5), the latter forming the major portion of the gangue, should permit satisfactory gravity separation. A preliminary removal of sulphide may be effected by flotation.

Stannite

An occasional grain of stannite, associated with chalcopyrite - Fig. 2, was observed in the sulphide sample. The amount of stannite observed would account for only a small percentage of the tin. The grain size varies from 50 - 100 u.

Pyrrhotite

Massive pyrrhotite forms the bulk of the sulphides in the sample.

Arsenopyrite

Small idiomorphic crystals of arsenopyrite - Fig. 2, were observed in the sulphide sections. The grain size is quite variable ranging from 15 u to 60 u. These idiomorphs are quite common and account for the .95% arsenic in the heads.

Pyrite

Pyrite veins are to be observed in the pyrrhotite ground mass. The amount of pyrite present is quite small.

Chalcopyrite.

The chalcopyrite is mainly associated with cassiterite but the amount present is small, the grain size varying from 150 u to 15 u - it is partially replaced by stannite. Fig. 2.

Unidentified Mineral

An unidentified dark grey, anisotropic mineral is associated with cassiterite - Fig. 2. This mineral is negative to all etching reagent including aqua regia. These tests, although negative, limit the mineral to a special group containing mainly iron, manganese and titanium oxides. It was found impossible to isolate this mineral for special tests requiring fusion with a soda nitre flux. The amount of this mineral associated with cassiterite is small.

Experimental Detail

The minerals were identified by hardness, colour, effect on polarized light, etching and microchemical tests.

The yellowish colour of the pyrrhotite is misleading but all etching tests confirm the iron-sulphide. The following properties are listed for reference.

Colour - Yellowish Pink
 Hardness - D
 Polarised Light - Anisotropic, yellow to blue grey.
 HNO_3 - Fumes tarnish iridescent, surface stains brown but rubs clean.
 HCl - Stains black - after 1 minute evolution of H_2S
 HCN - Negative
 FeCl_3 - Negative
 HOH - Irridescent staining on periphery of drop.

Microchemical tests prove the presence of iron.

Digest

The tin mineral from the Razorback prospect is cassiterite. The ore should be amenable to gravity concentration in conjunction with preliminary elimination of sulphide by flotation.

May 1951

(Sgd.) J.W. Morgan