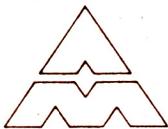


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AMDEX MINING LIMITED

TRIAKO MINES N.L., BUKA MINERALS N.L.,

GIPPSLAND MINERALS N.L., KIBUKA MINES PTY. LTD.

169 MILLER STREET, NORTH SYDNEY, AUSTRALIA 2060

TECHNICAL REPORT

ARBA MINE AREA, BRANXHOLM, TASMANIA.

OCTOBER 1980.

AUTHOR: R. A. A. Munro.

INVESTIGATIONS CONDUCTED BY: R. A. A. Munro.

TYPED BY: G. Tucker.

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INTRODUCTION

A substantial portion of the Branxholm alluvial tin field is contained within the south-west corner of Exploration Licence 28/76. Included is a major past tin producer (2000 tonnes SnO₂) - the Arba Mine (see Fig. 2). This report deals with an area of several square kilometres within 28/76. It has been subject to a brief field examination and a review of published geological and mine information.

The long abandonment of the major workings of the Branxholm Lead System, together with widespread tailings cover, and rehabilitation of mined areas coinciding with other land usage practices has hindered a full geological appreciation of the area. Reliance on previously published information has been extensive.

PAST MINING AND EXPLORATION REVIEW

The mining history to 1925 is adequately described by P. B. Nye (1925) in his study of the placer deposits in the Ringarooma Valley. Since that date (when tributors were still working about the Arba Mine) no mining details are recorded in the literature for this deep lead system (see Bibliography).

W. A. Walsh and party are known to have worked shallow ground to the east of the abandoned Arba face. Walsh's workings may include Tertiary deposits described by Nye as a portion of an "unnamed tributary lead". Walsh appears to have been actively engaged in mining in the period between the 1929 depression and the second World War.

In 1972-72 a small hydraulic mining venture was operating on Black Creek beside the eastern Arba Mine tailings. This lease was first held in the name of J. P. Targett and others and later in the name of Seidenburg and Wilkinson (see Fig. 2). It was soon closed down by the Department of the Environment.

The testing for further extensions to the worked deposits in this area have been partly reviewed by Nye (1972). His article reviews exploration, investigating a continuance of the Branxholm Lead north of Arba Hill and the testing of deep Tertiary sediments related to the Ringarooma Lead in the same area. All drilling documented in Nye (1972) is located on Figure 1. Other inclusions on this map are locations of the Briseis Consolidated N.L. drilling in the main Arba face, showing high cassiterite grades and two lines of Government Bores on Ringarooma Flats drilled since 1972.

Exploration of the Arba Deep Lead has been incomplete and inconclusive to date. Several geophysical surveys have done little to clarify the geological situation. Exploration has been hampered by the following conditions :-

- 1) The presence of a long held mineral lease over all Arba Hill on which no exploration activities have been undertaken.
- 2) The difficulty of drilling to depths exceeding 40 metres by some exploration concerns.
- 3) The knowledge that the depth of overburden would probably preclude the profitable mining of any cassiterite deposit that might be discovered.

AMDEX APPRAISAL

- Shallow Sediments -

There is little scope for even a small mining operation of this type. Walsh and party appear to have exhaustively worked the economic remnants of this category. An area of pasture (see Land-use map, Fig. 3) to the east of the cemetery may be of minor potential. The area is partly covered by tailings. Past investigations have probably found this small area to be unpayable.

- Branxholm Deep Lead (Under Arba Hill) -

This portion of the lead has never been tested. The continuity of the grades found by the Briseis Consolidated in the old face down lead is therefore unknown. Drilling to the north of the hill has not intersected any ore, however it has also failed to confirm or disprove the concept of a northerly or north-easterly trending lead. Most indicators point to a decrease in cassiterite grade in this section. Other placer deposits such as the Valley Lead demonstrate the rapidity in which cassiterite content can diminish in a short distance down lead.

This area is wholly within Edwards/Arba Tin Pty. Ltd. 160P/M mineral lease. At present, Amdex Mining Limited is not in a position to further evaluate. If the recommended drilling (see next section) achieves its goals, drilling or perhaps reflection siesmology could be used as exploration tools on this area.

A partially theoretical ore reserve is appended to this report. It indicates the potential of this section if cassiterite grades found in the abandoned face are maintained under this hill.

- Branxholm Lead, Ringarooma Lead - Ringarooma Flats area -

This area is the most intensely drilled (Fig. 1), however, only one hole has recorded a grade figure greater than 100g/m³.

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Most cassiterite recorded from drill holes in this area is from two perched placers well above basement. Several strategic holes have not reached basement. The east-west line of drill holes at the foot of the northern Arba Hill slopes has a gap of over 300 metres where the postulated lead is indicated on Figure 4. It is recommended that three drill holes 50 metres apart be drilled to infill this gap.

Further exploration away from the toe of Arba Hill is not advised.

ORE RESERVE EXERCISE - ARBA HILL AREA

- expected maximum reserves for a block (Fig. 4) underneath Arba Hill.

Assumptions

- 1) Safe mining conditions would necessitate a cut at the base of at least 120 metres and a batter of 70° or less.
- 2) Grade used in calculations representative of the width of the cut.
- 3) Length of unmined section under hill is 780 metres.
- 4) Depth of basement from top of the basalt is
 - a) southern end = 61 metres Block 1
 - b) northern end = 105 metres Block 2
- 5) Average grade 600g/m³ - Block 1, 350g/m³ - Block 2 (ie. optimistic). Grade partly based on Briseis Consolidated drilling in mine face.

Results

Block 1	Total Volume	3,380,000m ³
	Volume of Basalt O/B	1,100,000m ³
	Volume of Drifts etc	2,290,000m ³
	SnO ₂ content	1,264,000Kg

Block 2	Total Volume	6,480,000m ³
	Volume of Basalt O/B	1,470,000m ³
	Volume of Drifts etc	5,010,000m ³
	SnO ₂ content	1,474,000Kg

Total Volume	=	10,860,000m ³
Total SnO ₂ content	=	2,738,000Kg
Av grade	=	277g/m ³

Note : Minimum reserve figures could be as low as 10% of the last two quoted figures, ie. if the lead is not mineralized.

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All reserves are on developed, private land covered by a mineral lease - 160P/M.

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TESTING OPERATIONS ON RINGAROOMA FLATS
NORTH OF ARBA HILL

Introduction

The Ringarooma Flats north of Arba Hill include tin-bearing drifts of the Main and Arba deep leads and their tributaries. The principal testing of them was by drilling and five campaigns were carried out in the past. In recent years, two geophysical surveys were conducted.

History of Testing Campaigns

The first known testing was the drilling by the Tasmanian Department of Mines in 1930 and 1931. Eight holes were put down, six being in one line trending north-westerly and the other two in an east west line about 1300 feet to the south-west. A total of 1496 feet was drilled. All holes were bottomed.

The second testing campaign was drilling by the Tasmanian Department of Mines 1937. Nine holes were drilled, six being in an east-west line (southern line) that was an easterly continuation of the 1931-32 line of two holes (No.7&8). The other three holes were in a parallel line (northern line) about 150 feet to the north of the other line. The total footage drilled was 1060. All holes except No.4, were bottomed.

A drilling campaign was conducted by Briseis Consolidated N.L. in 1938, but it is not known whether it was for that company, or on behalf of some other company. The drilling was in the same general area as the drilling by the Department of Mines in 1930-31 and 1937 as far as the first three lines (no.1to3) were concerned, but the fourth line (No.4) was about 46 chains to the west of the second line. The lines were north-south ones and 14 holes were drilled. The total footage was 465.5 The deepest holes were 50 and 75 feet and it is certain that none was bottomed.

In 1957, Mr. J.H. Rattigan investigated the Arba lead on behalf of Rio Tinto Australian Exploration Pty.Ltd. His investigations included a geological survey and consideration of results of previous drilling campaigns including the three referred to above, and also a campaign by Briseis Consolidated Co for Burma Malay Co. near the Arba workings at the south-eastern portion of Arba Hill. Mr. Rattigan gave consideration to the possibility of dredging the Ringarooma Flats between Branxholm and Derby, but did not carry out any investigations other than attaining the results of the first three drilling campaigns referred to above.

In 1965, Utah Development Company had a geophysical survey (induced polarisation) made, and a plan prepared showing the I.P. traverses and resistivity contours. Seven holes were drilled and according to a hand-written note on the plan, two (No.20 & 21) were drilled by a Failing 1500 plant, one (No.200) by a percussion plant, and four A130-A.133) by an Auger. The same note stated that the holes were not bottomed, and the small amount of information about the depths of the holes supports that view.

Six of the holes were drilled from sites along the western part of I.P. traverse (No.15), but that traverse is more or less along the lines drilled by the Department of Mines in 1937, and the Utah holes could be regarded as being along a line representing the western extension of the Northern line of the 1937 drilling.

In 1970, a topographical and geological survey was made of Arba Hill and its surroundings by A.C.A. Howe Australia Pty. Ltd on behalf of United Petroleum Reserves N.L. in accordance with or recommendation in an earlier report by A.C.A. Howe. In 1971 a gravity survey was made on the level country around the hills, and paralalled to, but 500 feet from the base of Arba Hill. The objects of these surveys were to locate the Arba or Branxholm Creek deeplead under Arba Hill so that testing by drilling could be undertaken. Such drilling was done later in 1971.

The gravity survey included the flats to the north of Arba Hill, but although some results were given, the plan showing the observation stations has not been supplied to Mineral Holdings Australia by United Petroleum Reserves. Little information resulting from the gravity survey can therefore be given about the flats north of Arba Hill

REPORTS ON THE AREA AND ON THE TESTING CAMPAIGNS

The first report on the area is the following Bulletin (No35) of the Geological Survey of Tasmania.

The Sub-Basaltic Tin Deposits of the Ringarooma Valley by P.B. Nye, 1925.

This report gives the results of a geological survey. As far as it is known no testing had been carried out up to that date, but the drilling campaigns of the Department of Mines in 1930-31 and 1937 were, in part at least, based on the results of the above survey.

The 1930-31 drilling results are described in the following typewritten report of the Department of Mines.

Report on the boring campaign on the Arba Lead, Branxholm, by P.B. Nye, 21/6/1933

The 1937 drilling results are described in the following typewritten report of the Department of Mines Report on Boring Campaign on Arba Lead, Branxholm by F. Blake, 13/4/1938. The results of the 1938 drilling by Briseis Consolidated are given in the following typewritten reports of Rio Tinto Australian Exploration Pty. Limited.

Notes on Edward's Area proposition, by

J. H. Rattigan, 29/11/1957

Further Notes in the Arba (Branxholm Creek) Lead, by J.H. Rattigan.

That drilling campaign is referred to in the following typewritten report of A.C.A. Howe Australia Pty. Limited. Preliminary Report on the Arba Lease 16OP/M County of Dorset, Branxholm, Tasmania, by A.C.A. Howe Australia Pty. Limited, January, 1971. The testing campaign by Utah Development was probably described in a report, but a copy has not yet been obtained. A copy of a plan which no doubt accompanied a report shows the I.P. traverses, the resistivity contours and the positions of the drill holes (but no details of the holes).

This campaign is briefly referred to in the report by A.C.A. Howe quoted above, and the results of two drill holes (No.20&21) are given in it.

The gravity survey for United Petroleum Reserves is described in the following typewritten reports
 Arba Tin Prospect, Branxholm - Review of Gravity Data by S.J. Watson. 29th March, 1971.

Notes on Progress of the Arba Prospect, Tasmania by United Technical Services Pty. Ltd by Bruce W. Menzel, 1st June, 1971.
 (S.J. Watson was a geophysicist hired by United Technical Services, a subsidiary of United Petroleum Reserves N.L.
 B.W. Menzel is a geologist with United Petroleum Reserves)

RESULTS OF THE TESTING CAMPAIGNS (see plates 1 and 2)

The 1930-31 Drilling by Department of Mines, the following results have been taken from report by P.B.Nye.21/6/1933:

TABLE No.1

Number of Hole	Depth		Average value of Ground in ozs of tin oxide per cub.yd		
	of hole	to bottom	To Depth of	To total depth of drifts	
	Feet	Feet	feet	value	Value
1	176	170	119	0.48	0.45
2	154	149			0.51
3	191	180	98	1.388	0.75
4	198	190	112	0.67	0.47
5	203	198	119	0.73	0.44
6	206	203	84	0.48	0.20
7	184	173	119	0.74	0.59
8	182	174	91	0.44	0.34

The results show that the ground was tin bearing in each hole, but that the values were low. The highest result was 1.388oz of tin oxide per cubic yard in hole 3 between the surface and 98 feet. This hole (No.3) has the highest value (0.75oz per cubic yd.) over the full depth of the drifts the figures show that the upper part of the ground had higher values than the lower part.

The depths of bedrock in holes 2,1,3,4,5,&6 indicate fairly deep ground with the depth increasing from No.2 No.6. The section tends to suggest that the line of holes is across the Main Lead, and that any gutter is near hole 6 or to the north or north-west of that hole. However another possibility is described under the 1937 drilling holes 7 & 8 will be considered in conjunction with the 1937 drilling.

The 1937 Drilling by Department of Mines.

The following results have been taken from report by F. Blake, 13/4/38

TABLE No.2

Number of Hole	Depth		Average value of ground in ozs of tin oxide cub.yd70%sn		
	of hole	to bottom	To Depth of	Grade	To bottom of drifts
	feet	feet	feet		
Southern line	1	153			1.100
	2	145	79 $\frac{1}{3}$	4.200	2.910
	3	105	68	3.021	2.014
	4	144	79 $\frac{1}{3}$	3.035	2.217
	5	106	68	1.931	1.287
	6	58	54		
Northern	7	58			1.325
	8	173	79 $\frac{1}{3}$	4.960	2.893

Note Hole No.4 was not bottomed.

The results show that the ground was tin-bearing in every hole. The values were fairly low but up to four times the values in the 1930-31 drilling. The highest value was the upper 79½ feet in hole 8, which contained 4.96 oz of tin oxide per cub.yd, and hole 2 a value of 2.91oz of tin oxide per cubic yard. As for the 1930-31 drilling, the upper part of the ground was higher grade than the lower part.

The drilling was along two east-west lines, the Southern one having holes 1 to 6 (holes 7 & 8 in the 1930-31 drilling from a western extension of the line) and the Northern one having holes 7, 8 & 9. The Southern line showed a gutter near hole 4, and another either between the 1930-31 holes 7 and 8 or to the west of hole 8. The Northern line indicated a gutter probably between holes 8 & 9; this would be a north-easterly extension of the gutter near hole 4. This gutter is not revealed on the line of the 1930-31 drilling and it seems improbable that extended easterly and to the east of the 1930-31 line. The gutter therefore probably trends north-westerly and parallel and close to the line of the 1930-31 holes.

At the western end of the Southern line, there is a deep and wide gutter either between holes 7 & 8 (1930-31 drilling) or to the west of hole 8. This could be the northern extension of the Arba lead.

The 1938 Drilling by Briseis Consolidated N.L.

The following results have been taken from Plate 1 attached to J. H. Rattigan's 1957 report.

TABLE No.3

	Hole	Depth Feet	Grade	Hole	Depth Feet	Grade
Line 1	{ 1	32	0.26	10	75	0.06) Line 3
	{ 2	30	0.20	11	25	0.07)
	{ 3	26	0.12	12	30	0.055)
	{ 4	25	0.20	13	33'	Nil } Line 4
Line 2	{ 5	20	Nil	14	12	Nil }
	{ 6	40	trace			
	{ 7	50	trace			
	{ 8	26	0.18			
	{ 9	41.5	0.16			

The units used for the grade are not stated but they are probably "lb of cassiterite concentrates per cub.yd." because those units are used by Rattigan in connection with the Burma Malay bore-holes on the south-eastern side of Arba Hill. (and are shown on his Plate 3.)

The drill holes are all shallow, and were probably designed to test the ground for sluicing or shallow dredging. The depths were mostly between 20 and 40 feet, only two being 50 feet or more. The two deepest holes were No.7 (50feet) and No.10 (75 feet).

The values were low and only three holes were 0.20 lb per cub.yd. or more. These three holes were on line 1 (4Holes) which was the only line to give consistent values. The only other holes with comparable values were No.3 & 9, so that the holes with better values were confined to the south-eastern part of the drilling area.

This drilling campaign gave no information about the Main lead to the north of Arba Hill.

The 1965 Testing and Drilling Operation by Utah Development Co. No report has been obtained in regard to these operations, and nothing can be said as to the results of the I.P. survey. The plate showed resistivity contours, but no other details are available. In the A.C.A. Howe Australia report of January, 1971, it was stated. "The results of the I.P. traverses are inconclusive and contain insufficient detail regarding the methods used.

The following information regarding the drill holes was taken from the Utah Development map and from the A.C.A. Howe Australia report referred to in the previous paragraph. The positions (see plate) and numbering of the drill holes were obtained from the map and the values and depths from the A.C.A. Howe report.

TABLE NO. 4

Number of Hole	Depth feet	Average value of ground lb./TIN. / cub. yd
20	93	0.037
21	128	0.029
A130		
A131		
A132		
A133		
200		

*try? was used to try & delineate location
these results were not reproducible
due ground water/clay influences - it
was decided I.P. did not work in the
conditions prevailing. Res. comm. [Signature]*

It is doubtful if any of the holes reached bedrock. The values of the two holes were low. The results gave no information about the Main lead, Arba lead or any other lead to the north of Arba Hill.

The 1970 and 1971 operations of United Petroleum Reserves N.L.

This company conducted topographical, geological and gravity surveys and some sampling and drilling. The only survey that could have given any information about the area north of Arba Hill, was the gravity survey. Unfortunately, neither a detailed report nor a plan showing the gravity stations has been made available.

In S.J. Watson's report of 29/3/1971, three anomalies that could be due to basement undulations, were reported. One of these (Anomaly 2) was stated in correspondence to occur in the extreme north-west of the area. The description of this anomaly in Watson's report was "This anomaly is at gravity station 104. It represents a mass deficiency equivalent to 1.0 milligals. The reading is legitimate. It is unusually sharp, and can be interpreted as a channel 100 feet wide and 100 feet deep. The bedrock lies at a very shallow depth.

The sharpness of the anomaly is a puzzling feature, and the picture is not the ideal upon which the original model was made. It is such a strong anomaly that it should be included in further investigation."

This anomaly is too shallow to represent the northerly extension of the Arba Lead. Moreover its position is probably too far to the west to represent the extension of that lead.

It would appear, therefore, that the gravity survey gave no information about the Arba and Main leads in the area north of Arba Hill.

SUMMARY AND CONCLUSIONS

General testing campaigns have been conducted on the Ringarooma Flats to the north of Arba Hill. The campaigns included geophysical surveys and drilling. The geophysical surveys included an I.P. survey made for Utah Development (and by virtue of which resistivity contours were drawn) and a gravity survey by S.J. Watson through A.C.A. Howe for United Petroleum Reserves. The resistivity contour plan of Utah Development was available, but showed no special features. No report was available but in the A.C.A. report it was stated that "The results of I.P. traverses were inconclusive".

The gravity survey for United Petroleum Reserves showed an anomaly representing a narrow and steep sided but shallow gutter in the flats to the north-west of Arba Hill. This gutter is too shallow to represent a northerly extension of the Arba lead or a part of the Ringarooma lead. It probably therefore represents a small tributary lead.

The drilling campaigns by Briseis Consolidated and Utah Development were to shallow depths only, and not to bedrock. Therefore, though they gave some information about the Ringarooma River gravels and the upper parts of the drifts of the deep leads, they gave little or no information about the positions of the leads.

The drilling campaigns of the Department of Mines in 1931-32 and 1937 included, except for one hole, drilling to bedrock, and therefore, gave information about the depths and values of the drifts. They also gave indirect evidence in regard to the positions of the Arba and Main deep leads.

The No.1 to No.6 line of the 1930-31 drilling indicates that bedrock slopes downwards from No.1 to No.6, and that any lead is near or to the north-west of No.6 hole. The line is clearly on the southern side of the Main lead and gives no indication of the Arba lead.

The east-west line represented by Nos 1 to 6 holes of the 1937 drilling and Nos 7 and 8 of the 1930-31 drilling shows that the deepest ground is at No.8 of the 1930-31 drilling. The deep ground of the 1930-31 No.6 hole (203 feet) is therefore to the west or north-west of the No.8 hole of the 1930-31 drilling. The Main lead is certainly to the north-west of the No.8 hole of the 1930-31 drilling, and the Arba lead may probably be to the west of that hole.

On the line of Nos 1 to 6 holes of the 1937 drilling there is a gutter near No.4 hole (not bottomed at 144 feet). This gutter would have to pass near, and to the east of, No.9 hole of the 1937 drilling.

If this north-easterly course was maintained this gutter would have to pass between the No.6 hole of the 1937 drilling and the No.2 hole of 1930-31 drilling. Such a course is possible but not considered likely, and drilling would be necessary to prove if the gutter trends to the north-east. Another possibility is that the lead would trend to the north-west and trend more or less parallel to the line of the Nos 1 to 6 holes of the 1930-31 drilling and be on the south-western side of that line.

All information available about each drill hole has been given above. Averages for each line or group of holes will be given below.

LINE OF HOLES NO 1 TO 6 OF 1930-31 DRILLING (see Table No.1)

Full thickness of Drifts 6 holes, average value of 0.5 oz per cub.yd. over average depth of 181 feet.

Richer upper parts of drifts 5 holes, average value of 0.74oz.per cub. yd over average depth of 106 feet.

Line of holes Nos 1 to 6 of 1937 drilling and Nos 7 and 8 of 1930-31 drilling (see Tables No 1 and 2)

Full thickness of drifts 8 holes, average value of 1.36 oz per cub. yd. over average depth of 129.5 feet

Richer upper parts of drifts 6 holes, average value of 2.06 oz.per cub.yd. over average depth of 84.1 feet

Line of Holes No.7,8 and 9 of 1937 drilling (see Table No.2)

Full thickness of drifts , 3 holes, average value 1.99 oz. per cub.yd. over average depth of 112.7 feet

Richer upper parts of drifts 2 holes, average value of 2.27 oz per cub. yd. over average depth of 79.3 feet

BRISEIS CONSOLIDATED 1938 (see Table 3)

Line	Number of holes	Average value (lb.per.cub.yd.)	Average depth feet
No 1.	4	0.20 (3.2 oz)	28.1
No 2.	5	0.006 (0.1oz)	35.5
No.3	4	0.03 (0.50%)	25.0

UTAH DEVELOPMENT, 1965 (see table No.4)

Details are available for only two holes (20 & 21) These averaged 0.03 lb per cub yd. (0.5 oz) over 110.5 feet.

The testing campaigns have, therefore, not given much information about the positions of the Main and Arba deep leads. The greatest depth of drifts proved was 203 feet in No.6 hole of the 1930-31 drilling. The Main lead is probably not far to the north or north-west of that hole. The Arba lead is possibly to the west of the No.8 hole of the 1930-31 drilling.

The tin contents of the drifts were generally low. The line of holes including the Nos 1 to 6 holes of the 1937 drilling and Nos 7 and 8 of the 1930-31 drilling gave the highest grade namely 1.36oz per cubic yard over and average depth of 129.5 feet. The highest grades for the full depth of drifts in any hole was for hole No.2 of the 1937 drilling, namely 2.91 oz. of tin oxide per cubic yard.

The upper parts of the drifts were, in general of higher grade than the lower parts. The highest grade for any part of a hole was 4.2 oz of tin oxide per cubic yard over the top 79½ feet in the No.2 hole of the 1937 drilling

Further drilling would be necessary to determine the positions and courses of the Arba and Main deep leads, and to determine the average grade and depth of the drifts to the north of Arba Hill and especially the grade and depth along the courses of the Arba and Main deep leads.

P. B. NYE.

P. B. NYE.