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PRELIMINARY REPORT
ON
TIN - TUNGSTEN MINERALIZATION
IN
ML 27M/77

(Based on Previous Work by Aberfoyle Tin Ltd. & Rossarden Mines Ltd.)

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ML 27M/77

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INTRODUCTION

Consolidated Mineral Lease 27M/77 covers an area of 2546 ha in north east Tasmania, with the towns of Storeys Creek and Rossarden located respectively near the northern and southern lease boundaries. Rossarden is 20km north of Avoca, itself 80km by road from Launceston.

The lease was originally granted to Aberfoyle Ltd. in 1977, subsequently transferred to Rossarden Mines Ltd., and is currently in the process of being transferred to H. J. Stacpoole.

The areal extent of the lease is depicted on Mines Department Mineral Charts Mt. Rex, Rossarden, Ben Lomond and Sphinx Bluff.

The recently abandoned Aberfoyle (tin - tungsten) and Storeys Creek (tungsten) mines are situated within the lease.

In addition, several prospects, including the promising Lutwyche ore bodies, are situated in ML 27M/77, and this report provides a brief outline of the mineralization potential within the lease, with particular emphasis on the Lutwyche area.

SUMMARY

Several Prospects containing tin - tungsten mineralization are identified within Consolidated Mineral Lease 27M/77.

They range in status, according to the level of previous exploration activity, from having inferred ore resources to hypothetical ore resources potentially suitable for underground mining.

The main prospect is Lutwyche, but only because of the tenor of exploration done in that area.

Other, adjacent and probably similar types of mineralization are termed the Lutwyche South East, Kookaburra and Kookaburra South East Prospects; these have virtually not been tested below the surface (by costeaning, drilling).

Many of these prospects also have hypothetical resources of ore possibly amenable to open cut extraction.

REGIONAL GEOLOGICAL SETTING

The Storeys Creek and Aberfoyle mines are situated in a small, but significant tin and tungsten mineral field associated with the Ben Lomond Granite.

The geology of the area was described in detail by Blissett (1959) and Kingsbury (1965). Host rocks to the mineralization are mudstones, siltstones and sandstones of the Mathinna Beds (Silurian and early Devonian age), which have been intruded by pre-ore mafic sills and dykes. The sediments were tightly folded along NW - SE trending axes during the Tabberabberan Orogeny, and subsequently intruded by the post - kinematic Ben Lomond Granite in mid/late Devonian time.

The granite is coarse/grained, porphyritic, leucocratic biotite granite, with a fine grained margin containing tourmaline and muscovite, and is intruded by numerous irregular dykes of grey porphyritic microgranite. Local bulges in the granite may be capped with cupolas of aplite (e.g. beneath both the Storeys Creek and Aberfoyle deposits).

The aplite consists of quartz, sericitized orthoclase feldspar, and muscovite, with minor sphalerite and rare molybdenite.

Only minor cassiterite and wolframite occur in the granite itself (e.g. in greisenized granite from Rex Hill). Contact (thermal) metamorphism of the Mathinna Beds is shown by biotized sediments and chiastolite slate, generally within 100m of the alpite.

Following the emplacement of the granite, a long period of erosion and peneplanation occurred, culminating in the deposition of marine and freshwater sediments during Permian - Triassic time. These sequences were then intruded by Jurassic dolerite (e.g. Ben Lomond Plateau).

Post - Jurassic erosion has since removed much of the post-ore cover, and has virtually restored the pre-Permian surface.

MINERALIZATION

Primary mineralization in the area is related to the Ben Lomond Granite, and occurs in one of three categories:

1. Large scale quartz vein systems of considerable strike extent, and carrying tin, tungsten, and sulphides in Mathinna Beds host rocks;
2. Small scale quartz veins associated with jointing in the granite, and having a margin of altered, mineralized granite; these carry tin and tungsten, with local concentrations of sulphides and uranium;
3. (a). Pipes of altered granite, carrying tin, zinc and lead with silver;
   (b). Altered alpite, containing disseminated zinc, tin and tungsten.

Because the first group has substantial significant long term mining, it is regarded as the prime target for investigation in the lease. The Storeys Creek Mine, between 1923 and 1979, produced 1.1 million tonnes of ore grading 0.18% Sn, 1.09% WO_3; the Aberfoyle Mine from 1932 - 1979, produced 2.1 million tonnes of ore grading 0.91% Sn. 0.28% WO_3.

The latter two groups of mineralization are considered to be secondary targets in the lease area.

The Aberfoyle and Storeys Creek deposits consist of hydrothermal quartz - cassiterite - wolframite veins, which are tension fissure fillings in the folded Mathinna Beds. These veins are genetically related to the aplite cupolas which underlie both deposits.

The Aberfoyle vein system consists of 8 main veins (ave. 1.0m wide), forming a steep, west dipping sheeted zone $\backsimeq$70m thick and $\backsimeq$500m long. This zone strikes $\backsimeq$020°, dips 60°/65° W in the upper levels and flattens to 45°/50° in the lower levels.
Economic* mineralization extends from $\backsimeq$30m above the aplite, almost to the surface. (*N.B. for underground mining).

Cassiterite and wolframite occur throughout the vein system, but mine production statistics indicate a vertical zonation, with the tungsten (W) to tin (Sn) ratio increasing with depth.

The Storeys Creek vein system consists of 2 main veins, (ave. 1.2m wide), and 5 smaller "caunter" veins; the main veins have many splits and branches, and form a flat, west dipping zone ≒ 30m thick, and ≒ 500m long. This zone strikes NW, dips 30 - 50° in the upper levels, and flattening to ≒ 20° at depth.

Economic (see previously) mineralization extends from ≒ 50m above the aplite cupola to the surface, and the cut off appears to reflect the shape of the cupola, so that the mineralization extends below the cupola level, but outside a barren aureole.

Similarly to Aberfoyle deposit, cassiterite and wolframite occur throughout the veins, but with the exception of the upper levels, the mine was essentially a tungsten mine.

Minerals of economic interest in both deposits are the oxides cassiterite, wolframite and sulphides arsenopyrite, chalcopyrite, sphalerite, stannite, tetrahedrite, galena, molybdenite and bismuthinite. These minerals, plus the accessory gangue minerals, occur in 3 overlapping, paragenetic stages (Edwards and Lyon, 1957).

Important features of the deposits may be summarised as follows:

Aberfoyle

(i) Quartz grades: averaged 5 - 6% CM in the upper levels, and declined to ≒ 3%CM below 4 level (210m above the aplite);

(ii) Head grades: these reflect the quartz grades, and ranged from ≒ 2%CM in the upper levels, declining progressively to ≒ 0.7%CM at the base of the mine.

(iii) Tin - Tungsten ratios: as mentioned previously, a vertical zonation occurs whereby the Sn : WO_3 (i.e. the cassiterite to wolframite ratio) ranges from ≒ 20 : 1 in the upper levels, and gradually declines to ≒ 2 : 1 at depth;

(iv) Sulphide Content: the average was ≒ 3%.

Storeys Creek

(i) Quartz grades: averaged 4%CM in the upper levels, and dropped to ≒ 2%CM between 6 and 8 levels (≒ 200m above the aplite);

(ii) Head grades: these also parallel the quartz grades, and ranged from

≒ 2%CM to ≒0.8%CM from upper to lower levels.

(iii) Tungsten - Tin ratios: ranged from ≒ 2 : 1 in the upper levels to ≒ 20 : 1 at depth, but the vertical zonation is not as regular and consistent as at Aberfoyle.

(iv) Sulphide Content: the average was ≒ 2%.

NB (i) Quartz grade is the undiluted combined grade (CM) of Sn + WO_3 in the quartz veins;

(ii) Head grade is the diluted in situ combined grade of Sn + WO_3 due to mining a 1.2m wide stope. Recovered grades averaged 80% of the head grades in both mines.

(iii) The slightly lower quartz grades in the Storeys Creek Mine were partly offset by the greater vein widths.

Both deposits are characterised by the following:

(i) A vertical extent of 300m from surface to aplite apex;

(ii) A strike extent of ≒ 500m;

(iii) A sheeted zone (vein system) 30 - 70m thick;

(iv) Quartz grades which decline from ≥ 4%CM (>200m from aplite) to ≤ 3%CM (< 200m from aplite);

(v) Head grades which decline from 2%CM (>200m from aplite) to ≒ 0.8%CM (<200m from aplite);

(vi) Tin - tungsten ratios which, while characterizing individual deposits, also reveal a generally similar order of magnitude, with one deposit having recipricol ratios of the other deposit.

(vii) Relatively tin rich upper levels, gradually increasing in tungsten towards the underlying aplites.

PROSPECTS

LUTWYCHE

INTRODUCTION

The Lutwyche veins outcrop as a vein swarm 900m NE of Spiers Shaft (Aberfoyle Mine). During the period 1962 - 73, Aberfoyle Tin Ltd. (ATL) conducted a thorough exploration program in this area, including surface mapping, geophysics (seismic, gravity), and both shallow and deep diamond drilling.

In 1968, a crosscut was driven NNE from Spiers Shaft to investigate the Lutwyche vein system ≒350m below surface, before underground exploration was suspended in 1969. Development on 13 Level (RL 285m) succeeded in outlining 2 major veins (Hanging Wall and Pay).

By 1976, it became apparent to ATL that declining tungsten prices, increasing labour costs, and a decline in ore reserves in both mines, would render the Aberfoyle mining and milling operations increasingly uneconomic.

The solution to these problems lay in the optimization of the Aberfoyle operations by increasing production rates, and a more efficient utilization of infrastructure.

Accordingly, the Lutwyche area was reappraised for its potential to host a significant ore resource, and thus allow a higher, and more efficient, production rate for the Aberfoyle operations.

Exploration development recommenced in 1977, and culminated in late 1979 with the mining of a bulk sample from 13 Level. Underground exploration was resumed over the period 1981 1982 by Rossarden Mines Ltd.

GEOLOGY

A. SURFACE EXPLORATION

The rocks in the Lutwyche area consist of low grade metasediments (quartzites, pelites etc.), which have been folded and faulted. The Lutwyche vein swarm is an intensely veined zone ≒40m wide, (within a broad 130m wide zone), over a mapped strike length of 300m which strikes NW, and dips 50 - 60° SW.

Included in the numerous, narrow quartz veins are 14 separate veins mineralized with cassiterite and wolframite, with a maximum thickness of 15 cm.

Although the vein outcrop terminates at the NE striking Battery veins, drilling has shown the vein swarm to continue NW for a further 350m, and to extend a further 150m SE from the southern end of the outcrop, giving a drill- indicated strike extent of 800m.

S.E. of Battery Vein

A total of 11 surface drill holes tested down dip of the vein outcrop; the Lutwyche vein system was encountered in all of the holes, with intersections of significant veins below RL 560m. These veins ranged from 11.4 - 33cm (true widths), and averaged 21cm. The zone of mineralization is open to the SE beyond the southern most drill hole (S33).

N.W. of Battery Vein

A total of 8 surface drill holes tested down dip of the strike extension of the Lutwyche veins, of which 5 (testing below RL 500m) achieved significant vein intersections, with an average true width of 25cm. The 3 shallow holes (testing above RL 500m), encountered the Lutwyche vein swarm sensu stricto, and showed it to be ± 80m thick. The zone of mineralization may be closed to the NW beyond the northernmost drill hole (S36), although there is a suggestion, (based on vein thickness contours), that the zone may plunge to the NW, and this being the case, the mineralization may continue at depth beyond S36.

Battery Vein

This vein is a set of near vertical quartz veins (<10cm wide), which strike NE, transecting the Lutwyche veins.

It contains abundant cassiterite, extends for a mapped strike length of 90m, and is virtually untested by surface drilling.

B. UNDERGROUND EXPLORATION

Development and drilling on 13 level Lutwyche, has exposed several major quartz veins, which fall into 3 groups:

(i) Lutwyche Type: Irish, Footwall, Hanging Wall, Hanging Wall South, and Lutwyche Extension Veins, which strike NW, dip 45 - 70° SW, and are generally

30 - 50cm wide;

(ii) Aberfoyle Type: Pay and Prospect Veins, which strike N - S, dip 70 - 75° SW, and are generally 25 - 40cm wide;

(iii) Battery Type: Battery Vein, which strikes NE, dips ≒90°, and is generally 50 - 70cm wide.

Most development has been on Footwall, Hanging Wall, Pay and Battery Veins.

Drilling below 13 Level (RL 285m) indicates continuity of potentially mineable quartz veins to RL 135m.

The 2 deepest holes were AU 13 - 125A and AU13 - 127, sited 130m apart at the SW and NE ends respectively of the Battery drive.

Hole 125A located mineralized quartz veins to a depth of 153m, minor thermal alteration from collar to 63m, and minor greisenized aplite veins from 72 - 74m.

Hole 127 did not locate any significant mineralization, but did reveal thermal alteration effects from 55 - 272m, and numerous greisenized aplite veins from 155 - 272m.

Although neither hole intersected an aplite cupola, the latter is inferred to be not deeper than 150m below 13 level, and situated an unknown distance (?100m) east of AU13 -127, where its apex may be at the same elevation as 13 Level.

A previous gravity survey done by ATL suggested the presence of granite/aplite at a depth of 165m below 13 Level, and Krummei (1969) proposed the presence of an aplite cupola to the SE of Footwall Vein on the basis of vein width contour maxima.

ORE RESOURCE

A. TONNEAGE

The results of underground development and exploration, in conjunction with surface drilling (which indicated significant vein widths below RL500 - 560m), are shown in Table 1.

TABLE 1. LUTWYCHE ORE RESOURCE TONNEAGE

Vein	Mean Dip (degrees)	Dip Length (m)	Developed Strike (m)	Undevel. Strike (m)	Inferred Diluted ore (T)	Potential Diluted ore (T)
Irish	45	560	30	50	51 610	86 016
Hanging Wall	50	520	200	-	319 488	-
Footwall	50	520	80	(NE)	127 795	(NE)
HW. South	55	480	30	(NE)	44 237	(NE)
Lut. Ext.	?45	680	(NE)	50	(NE)	104 448
Pay	70	440	65	180	87 859	243 302
Prospect	75	400	30	30	36 864	36 864
Battery	90	400	170	100	208 896	122 880
		TOTALS	605	410	876 749	593 510
			TOTAL TONNES =		1470 259	

Notes:
1. Developed strike length is the average of 12 and 13 Level development on each vein;
2. Undeveloped strike length is the average vein extent as indicated by drilling on both 12 and 13 levels;
3. NE: not explored;
4. Vertical interval taken from 6 Level (RL540m) down to RL140m (145m below 13 Level);
5. Inferred diluted ore = the tonnes of quartz diluted by Mathinna Beds wall rocks over a stope width of 1.2m (using an SG for ore and waste = 2.56 T/m^3), and based on the developed strike length of the veins;
6. Potential diluted ore: as above, but based on the drill indicated (undeveloped) vein strike length.

The veins are assumed to be of mineable width and grade over a vertical interval of 400m, over the strike lengths shown in the table.

The Lutwyche Task Force Report prepared by ATL (Reynolds et al, 1980), was based on Battery, Footwal, Hanging Wall, Pay and Kookaburra veins, plus undefined Lutwyche veins.

The total ore potential arising from this study by ATL was 1.08 million tonnes, using a vertical interval of 355m from 6 Level to 100m below 13 Level, a total strike length of 760m, and 45° dips for the Footwal and Hanging Wall Veins.

The present data indicates a 40%increase in tonnage due mainly to the increased strike length (1015m), and partly to the increased dip length.

The apparent tonnes of (diluted, unsorted) ore per vertical metre, (allowing for 25% of subeconomic material), ranges from 2000 (ATL) to 2800 (present report).

Comparison of these figures with Aberfoyle and Storeys Creek mines where figures of ≒6000 and ≒3500 tonnes/vertical metre respectively, were achieved during production, shows that by using a factor of increase of 500/350, the Lutwyche tonnes/vertical metre range from 2800 to 4000.

B. GRADE

Estimation of grades in veins characterized by sporadic "nugget" type mineralizatio is extremely difficult.

Various different methods were attempted by ATL, including

1. Visual estimation of drill core intersections;
2. Assaying of drill core by wet chemical methods;
3. Visual estimation of in situ ore (factored after reconciliation with mill head grades);
4. Assaying of channel, groove and chip samples taken underground.

Point counting was considered, but not put into practice.

The most reliable (but costly and often impractical) method of grade estimation is to mine and mill a bulk sample.

Tester (1970) discussed the relative merits of groove, chip and chemical sampling in terms of sample density. It was found that veins containing selvedge type cassiterite and wolframite mineralization (e.g. Lutwyche and Aberfoyle type veins), required a closer sampling density than the original channel samples (over intervals of 75cm).

Groove samples taken at 15cm intervals, and chip samples taken over a diamond pattern (with each 2cm chip located ≒15cm from adjacent chips), gave comparable results, which were approximately twice the channel sample values.

The Battery Vein, with scattered mineralization throughout the vein, (and parts of Hanging Wall Vein) was found to give comparable results for all 3 methods.

Tester (1970) implied that grades derived from drill core intersections (by assaying), could not be improved upon, because the samples were "collected" in random fashion.

Rossarden Mines Ltd. (RML) considered the ATL Lutwyche Task Force Report findings to have optimistic grades, and observed that the grades decreased from 13 Level to 12 Level.

Smart (1981) based his comments on grade values obtained mainly from factored visual estimates and some channel sample assays (Hanging Wall Vein). However, he further stated that factored visual estimates suffered from

(i) Uneven sample intervals;
(ii) Tin values being underestimated;
(iii) An unknown accuracy on any individual veins;
(iv) A "consistent"overestimation (of CM) of 100%.

Consequently, it would appear that the grade estimates obtained by RML are not necessarily more reliable than the grades estimated from several methods by ATL.

Estimation of grades in the Lutwyche veins has been the subject of much discussion by both ATL and RML, and the following table provides assummary of the grade estimates.

TABLE 2. LUTWYCHE RESOURCE GRADE

Grade Estimation Method	Source	Vein				Comments
		Battery	F.W.	H.W.	Pay	
		Grade CM% (over 1.2m)				
V.E. drill core	Kingsbury (1963)	-	-	1.20	0.70	
Assay drill core	Mason (1968)	-	-	1.78	1.22	High grade
				1.43	> 0.84	Low grade
Assay drill core	Krummei (1968)	-	-	1.29	0.83	
Assay of Ch. S.	Krummei (1969)	-	-	0.67	-	
V.E. & drill core assay	Tester (1970)	0.95	-	1.34	0.75	
Bulk sample	Reynolds (1979)	1.17	0.80			13 Level
		<—— 0.93 ——>				Wt. ave.
F.V.E	Reynolds (1980)	1.02	1.13	1.23	0.66	12 & 13 Levels
F.V.E. & Ch. S	Smart (1981)	0.64	0.74	-	-	12 Level
(channel sample)		> 0.75	1.06	0.70	< 0.85	13 Level
Ave. Visual estimate (VE, FVE)		0.80	0.98	1.04	0.74	
Ave. drill core assay		-	-	1.50	0.96	
Bulk Sample		1.17	0.80	-	-	
Total ave. (excluding bulk sample)		0.84	0.98	1.20	0.84	
" " (including bulk sample)		0.91	0.93	1.20	0.84	

Weighted average of Battery and Footwall veins (i.e. bulk sample): 0.93%
Arithmetic " " " " " " (excl. " "): 0.91%
" " " all veins (excl. bulk sample) : 0.96%
" " " " " (incl. " ") : 0.97%

Notes.....See next page.

Notes Table 2

(i) Drill core assay grades appear 30 - 40% higher than visual estimates.

(ii) Bulk sample grades show a wide dispersion about the VE grades, but are generally close to the average of all other sampling methods results (0.93%CM compared with 0.91%CM and 0.96%CM).

(iii) Bulk sampling appears to give the most reliable grades when the sample is taken from 2 or more veins.

(iv) The overall grade of veins between 12 and 13 levels is most likely to be in the range 0.90 - 1.00%CM.

C. CONCLUSIONS

1. The Lutwyche vein system is similar to the Aberfoyle and Storeys Creek vein systems on mineralogical, geometrical and structural grounds.

2. Lithological, metamorphic, vein mineralogy and gravity data imply the imminent presence of an aplite cupola at about the same elevation as 13 Level, but east of the present underground development.

3. The Lutwyche system of veins is inferred to be vertically zoned in tin and tungsten in a similar manner to the zoning in the Aberfoyle deposit. Evidence for this is seen in the bulk sample of Battery and Footwall Veins on Lutwyche 13 Level, where the head grade was 0.93%CM, the Sn:WO3 ratio was 1 : 1, and the sample was notably rich in sulphides. Similar values were obtained from the lower levels at Aberfoyle (below 9 Level).

4. It is therefore a reasonable premise that the Sn : WO_3 ratios and the combined metal values will increase significantly above 13 Level, at least as far as 6 Level (RL 540m).

5. The grade of the quartz stringers Between 6 Level and the surface (≈100m vertical interval) is unknown, but may be tin rich. No known parallels of this upper zone occur elsewhere in the Rossarden area.

6. The combined inferred and potential diluted ore resource over a strike extent of 350m, and a 400m vertical interval is ≈1.1 million tonnes, (allowing for 25% wastage due to subeconomic vein widths and grades). The drill indicated strike extent of 800m consequently suggests the presence of a significant ore body in the Lutwyche area.

BUTWYCHE SOUTH EAST

GEOLOGY

This area is located along strike of the drill indicated SE extent of the Lutwyche Prospect, and extends for 500m in a SE direction. Krummei (1968, 1969) described poorly outcropping Mathinna Beds, partly overlain by Permian sediments. Both in situ and quartz vein float containing cassiterite and wolframite occur in this area.

A soil geochemical survey was conducted over an area 200m x 300m in 1968, and followed by electrical geophysical investigations. Two major zones with anomalous values of tin, tungsten and arsenic were located, and were complimented by above background copper and zinc values.

Several self potential anomalies were also found (in the genreal area of the soil sampling), and interpreted as indicating weathering sulphides.

POTENTIAL

This area has a good potential to host tin - tungsten mineralization of the Aberfoyle etc. type, and further exploration effort is certainly justified.

Hypothetical ore, assuming 3000 tonnes/vertical metre, over a vertical interval of 300m and a strike extent of 500m, is 900 000 tonnes.

KOOKABURRA

GEOLOGY

The Kookaburra vein system is located 200m SW of the Lutwyche veins, and consists of a 40m wide zone of irregular, narrow quartz veins (one vein being 30cm wide), srtiking NW and dipping 50° - 70° SW.

The Kookaburra veins are mineralized with cassiterite and wolframite over a strike length of 200m trending SE from Battery Vein to Aberfoyle Rivulet.

The Lutwyche 13 Level cross cut indicated the Kookaburra Vein to terminate against the Battery Vein.

Near this junction on the surface, an Aberfoyle type vein (Johnson's Vein) strikes NNE and dips 80°W; this vein is mineralized with cassiterite and wolframite, is 5cm wide, and crops out over a distance of 60m.

A single drill hole (S21) tested the down dip extension of Johnson's Vein, when it was seen to have increased in width to ≏20cm. This vein is correlated with the Pay - Prospect set of veins present on Lutwyche 13 Level.

The Kookaburra veins have only been drilled from 13 Level Lutwyche, where at least 2 veins ranging in width from 11 - 43cm appear to be the down dip correlates of the surface stringer veins.

POTENTIAL

The prospect appears structurally and genetically related to the Lutwyche vein system. It is likely that with additional exploration (e.g. surface drilling), the Kookaburra vein system will emerge as being similar to the Lutwyche.

Providing several veins of similar extent and grade etc. to the Lutwyche veins below surface, are confirmed, the hypothetical ore in this prospect assuming 2000 tonnes/vertical metre, over a vertical interval of 300m, and a strike extent of 150m, is 600 000 tonnes.

KOOKABURRA SOUTH EAST

GEOLOGY

This prospect is located along strike of the Kookaburra Prospect, and extends from Aberfoyle Rivulet to the SE for ≒500m (Krummei 1969), although it was only mapped over a strike length of 200m.

Little detail is available on the prospect, except that quartz stringer veins strike NW, NNW - NNE, and NE, suggestive of Lutwyche, Aberfoyle and Battery type vein orientations. Krummei (1969) reported several large quartz veins ≮20cm wide, and observed cassiterite - sulphide mineralization in quartz float.

POTENTIAL

The prospect is considered worthy of further exploration, but until this occurs, the present level of data precludes an estimate of hypothetical ore.

RIFLE RANGE

GEOLOGY

The Rifle Range Line is defined by a belt of quartz float and shattered blue-grey, veines quartzite varying in width from 20 - 30m; the belt is traceable for a discontinuous strike length of approximately Lkm in a NW direction.

Exposures in the Aberfoyle Rivulet suggest that the Rifle Range Line may consist of several sub-parallel, closely spaced zones of fracturing and irregular quartz veining. These zones cut across an upthrown block of Mathinna sediments bounded to the north and south by northwest trending faults and to the east by the Aberfoyle No 3 Fault.

The main rock types of this area resemble those at the Aberfoyle Mine and in the Lutwyche area. These consist of dark quartzites and psammopelites with minor slaty bands which strike NW and dip to the south west from 30° - 80°. Sporadic spotting may be seen in some of the slaty bands.

The quartz veining and float which defines the Rifle Range Line is previously of a white, milky and massive variey. The veins themselves may be drusy in parts, with cavities containing small quartz crystals and, rarely, crystals of haematite. Limonite and haematite-stained quartz is not common. Neither sulphides nor tin/wolfram mineralization was observed, but a short narrow, poorly developed zone of limonitic quartz, psammopelit and gossan - like material was noted. This zone overlies a low, narrow spur on the eastern bank of a bend in the Aberfoyle Rivulet.

Several narrow, well defined cross-veins striking about 070° and dipping 80° to the north were noted to be parallel to a jointing direction.

ATL conducted a soil sampling program on a 15m x 15m grid. Soil samples were screened to -80#, and analysed for copper zinc and arsenic.

The main soil anomaly of interest was extending for 700m from 3500E 9500N to 2400E 10900N, west of the quartz veins.

The general conclusion was made that the Rifle Range Line represented a vein system comparable with Lutwyche, but slightly deeper, so that no metal bearing veins were exposed on the surface.

POTENTIAL

The Rifle Range Line of quartz veins is virtually untested, Rossarden Mines Ltd. having drilled 2 cored holes to the east of the vein outcrop.

The apparent absence of any tin - tungsten mineralization is difficult to resolve in terms of Lutwyche/Kookaburra models which carry tin/tungsten mineralization right through to their stringer vein extremities.

However, it is possible that the quartz veins could host tin/tungsten mineralization at depth, and accordingly further exploration effort is warranted.

ABERFOYLE OPEN CUT

GEOLOGY

The Aberfoyle vein system occurs as an intense swarm of quartz - cassiterite - wolframite veins striking N - S, and dipping 50 - 60°W. This swarm covers a zone 60m in width, over a minimum strike length of 550m, down to 5 Level (153m below surface).

The host rocks for the veins are quartzites and slates of the Mathinna Beds, and the surface is covered by $<$18m of Permian sediments.

MINERALIZATION

The quartz veins range in width from 1mm to 1.5m; with increasing depth a general increase of vein width occurs, associated by a decrease in the frequency of stringer veins, so that below 5 Level, the deposit is comprised of much fewer but wider veins.

As discussed previously, quartz grades in the Aberfoyle mine above 4 Level were 5 - 6%CM, resulting, resulting in head grades of $\simeq$2%CM, and were typified by Sn : WO_3 ratios of 20 : 1.

POTENTIAL

Samples of ore and waste mined from the 4 Level drive between Brandon and Spiers Shafts, assayed 0.47 - 0.87%CM; an 1895 tonne parcel of the same material was screened, and the -5cm fraction put through the mill, with a resultant head grade of 1.08%CM.

McGushin and Keyes (1980) appraised the open cut potential of the narrow quartz veins above 4 Level, and based on an ore block 200m long, 60m wide, 120m deep with a slope of 45°, they calculated an ore resource of 4.49 million tonnes (waste : ore ratio of 3.6 : 1).

The parameters of utmost importance in this exercise are the quartz volume and quartz grade.

Quartz grade was assesed at 5%CM above 4 level, while limited level development and drilling in the area suggest a quartz volume of $\geq$3%; these parameters

combine to indicate an ore* block head grade of 0.15%CM.

In late 1980, ATL conducted a percussion drilling program over the Aberfoyle vein system south of Brandon Shaft; this program consisted of 9 holes over a strike length of 600m, and following sampling and analysis of the percussion chips, a weighted average head grade was calculated at 0.13%CM (Palmer 1980).

Subsequently, for a variety of reasons stemming from this grade, the project was abandoned as being economically non viable.

However, before this figure of 0.13%CM can be used with confidence, the following deficiencies in the drilling program require clarification:

(i) Only two holes achieved planned targets;
(ii) The remaining seven holes intersected stopes and bad ground, and were unsuccessful;
(iii) Providing sample recovery from the drilling was 100%, and provided detailed logging of the rock chips was possible, the percussion drilling may have been a satisfactory method of establishing quartz grades and volumes. However, the fact remains that core drilling would have provided considerably more detail about these quartz parameters.
(iv) The methods of sampling and analysis were not stated, but it seems likely that regular drill intervals were either assayed individually, or as composite samples. As the mining method contemplated by ATL involved a 70% waste rejection* in the pre-concentration stage, assaying of "bulk" samples seems inappropriate. (*McGushin and Keyes (1980) suggested that the ore resource of 4.49 million tonnes @ 0.15%CM could be up graded to 0.45%

CONCLUSIONS

1. The most likely problems associated with the Aberfoyle (and any other) open cut proposal are:
(a) Establishing reliable quartz volumes;
(b) Proving the viability of upgrading the ore;
(c) Establishing satisfactory metal recoveries from ore of relatively low head grades.

2. Because ATL did not succeed in thoroughly evaluating these questions, the

viability of such a proposal remains unknown, and deserves a proper investigation.

3. In view of the frequency and size of quartz - cassiterite - wolframite vein systems in the lease (e.g. Aberfoyle, Lutwyche, Lutwyche South East, Kookaburra etc.), the concept of open cut mining the tin rich higher CM, quartz veins from the upper levels of these prospects appears particularly attractive. Investigations to more rigidly establish the parameters of an open cut operation(s) should therefore be given high priority.

OTHER PROSPECTS

Limited time has not permitted a complete appraisal of the mineral potential of the lease.

At least two further areas of interest occur, namely the Storeys Creek - Eastern Hill area, and an un named area 2km NE of the Storeys Creek Mine.

Both areas are adjacent to gravity "low" anomalies.

The un named area consists of some quartz veins ranging from 20 - 90cm in width, and containing pyrite and iron oxides. Stream sediment sampling in this area by RML located an anomalous tungsten value.

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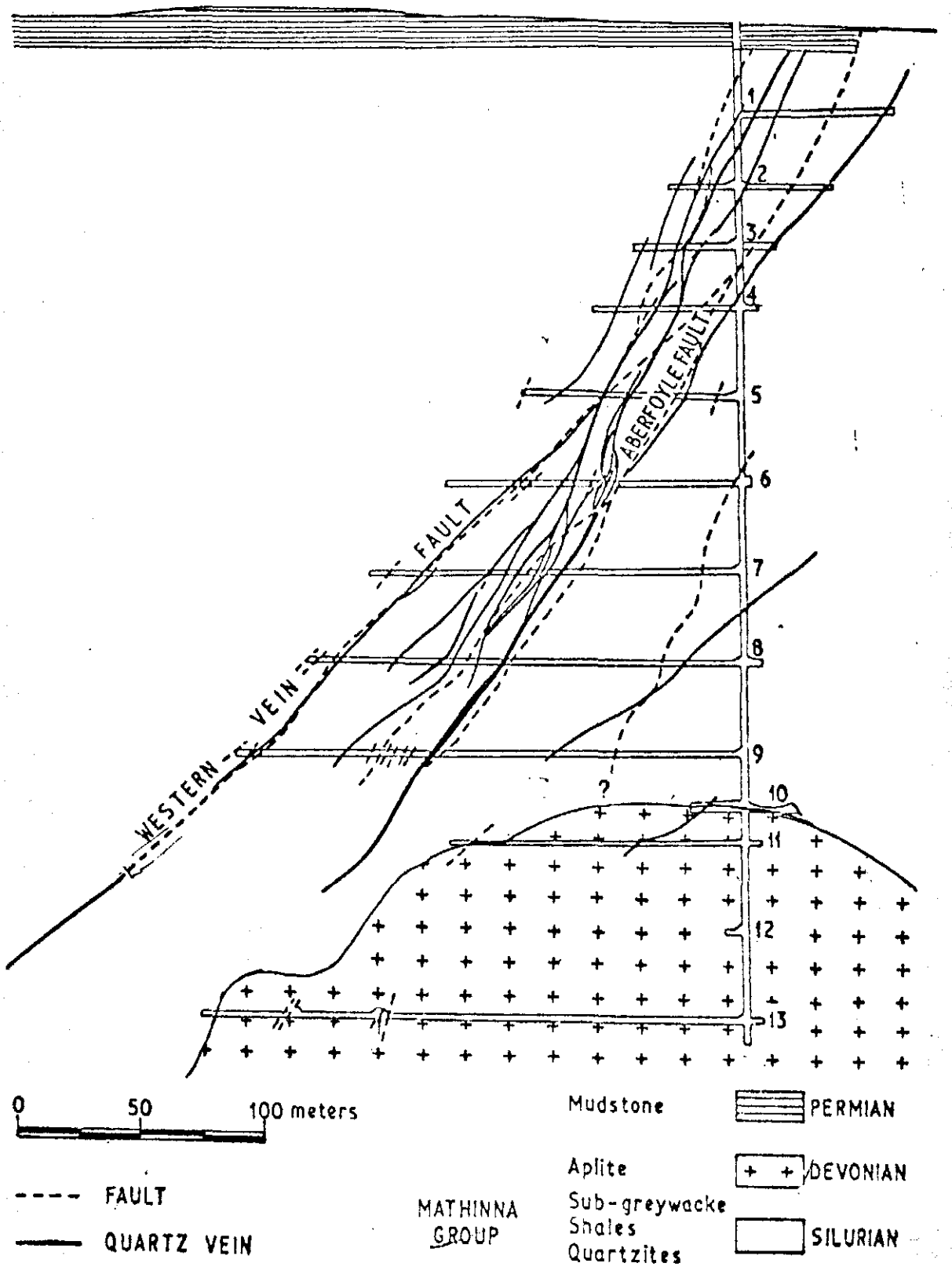
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?
ABERFOYLE FAULT
FAULT
WESTERN VEIN
0
50
100 meters
FAULT
QUARTZ VEIN
MATHINNA GROUP
Mudstone
PERMIAN
Aplite
DEVONIAN
Sub-greywacke
Shales
Quartzites
SILURIAN
5 cm

ABERFOYLE MINE PRODUCTION

1933 — 1970 (1979)