AMAX AUSTRALIA LIMITED

INTER-OFFICE MEMORANDUM

SUBJECT:	PROGRESS REPORT ON THE RATTLER HILL TIN PROSPECT.	LOCATION:	BEACONSFIELD
		DIVISION:	EXPLORATION
TO :	A.I.A. STEWART	DATE:	20th August, 1982.
FROM :	R.J. YEATES	REFERENCE:	RJY:SP

06_5357
Progress Report on the Rattler Hill Tin Prospect
Amax Australia Limited*
Yeates, R.J.
EL11/1977

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INTRODUCTION

During the past two months intensive exploration has proceeded at the Rattler Hill Tin prospect in N.E. Tasmania. Gridding, geological mapping and a chip sampling program have now been completed along with a petrographic study of four representative samples. As a result of this work, several new facts have come to light.

1. HEADS OF AGREEMENT

The Option to Purchase Agreement which was darwn up between Amax and the lease holder, Mr. H.P. Reicher, was signed 13th July by the respective parties and the first payment of $7,500 has been paid to Mr. Reicher.

2. GRIDDING

A 50m grid based on magnetic north has been established over an area of 200m X 300m covering the deposit. The lines were completed using a compass, clino and 50m tape.

3. MAPPING

The first draft of a geological map of the deposit has been completed at a scale of 1:500 and as a result of the mapping several additional and revised facts have been recognised.

a) Geology

-although the dominant quartz vein direction superficially appears to remain 090°, the strike of the greisen zones is nearer 100° to 110°.

-not only does the partly greisenized porphyritic biotite granite interfinger with the greisen, but up to 4 main zones penetrate the full length of the deposit.

-although these altered granitic zones are only suspected to carry tin in the order of 500ppm, the quartz veining within was often found to carry abundant cassiterite.

-clots and pods of soft dark green chloritic material collected from within a zone of altered granite were found to contain abundant, often nuggetty cassiterite.

b) Dimensions

-a revised width of the zone of mineralization has been set at 110m from an original estimate of 150m. The initial error was due to an assumption that the greisen zones corresponded to the dominant quartz vein direction and thus the original chip sample lines traversed the deposit at an oblique angle.

-of the 110m width an estimated 75 - 80% is suggested to be strongly mineralised greisen while the remainder is more poorly mineralized altered porphyritic granite.

-the length of the mineralised zone is still uncertain as the eastern extremity extends outside M.L. 77M/77, however, the distance between the last definite greisen outcrops at either end is 280m and a "working" length of 200 - 250m is suggested for the entire deposit.

-one of the larger greisen zones indicated by the mapping to be on the southern boundary of the deposit appears to have a strike length of only 90m.

-the possible depth of the deposit still remains the biggest question mark, however, the vertical distance from the highest to lowest greisen outcrops using hill-slope measurements was estimated to be 25 - 30m.

-an estimated 100,000 tonnes of strongly mineralised greisen scree litters the steep slope at the eastern end of the deposit. This material may be worthy of consideration if the economics of the deposit are assessed at a later date.

4. SAMPLING

A chip sampling program has now been completed at Rattler Hill. Ninety three samples were collected over 8 lines where outcrop permitted. The sample lines run north - south, corresponding to the grid, and are 25m apart. The sample locations on these lines were centred every 10m and were generally collected within a 5m radius of these "centres". Where outcrop was poor, an endeavour to locate outcrop within 15m along strike was made or in flatter areas the largest boulders of float were sampled. In many instances samples were not taken due largely to superficial scree or elluvium. No distinction was made between greisen and porphyritic granite where both occurred at the same locality, and an appropriate amount of quartz vein material (approximately 1 part in 100) was included in each sample.

The samples were submitted to Analabs for tin, tungsten and fluorine analysis, the results of which were most encouraging. The sampling indicates an anomalous zone of tin and fluorine over the greisen including an area of approximately 100m by 100m of greater than 0.2% Sn. A considerable portion of this area averages greater than 0.4% Sn. and several values exceed 0.6% Sn. As the greisen appears to extend a further 150m outside M.L. 77M/77 it is assumed that the area of possible economic interest could be as much as double that outlined to date.

5. PETROGRAPHY

A suite of 4 representative samples were sent to Dr. Hugh Herbert in Toowoomba for petrographic study and the resulting report presents some interesting facts:

-the host is essentially a bimineralic quartz-phlogopite greisen (50% - 50%0

-the precursor was a porphyritic biotite granite

-greisenation of the precursor occurred prior to structural preparation and subsequent tin-fluorine deposition and diffusion

-fluorine does not exist as fluorite or topaz but is incorporated in the phlogopite lattice

-60 - 70% of the cassiterite present in the samples is included in the quartz veins, and cassiterite abundance in the greisen decreases away from the veins due to diffusional limitations

-the greisen has a 3% void porosity

-no beneficiation problems such as sliming or packing are anticipated.

Richard Yeates

R.J. Yeates,
GEOLOGIST.

ATTACHMENTS:

1. Analytical data for initial chip sampling traverse.
2. Analytical data for chip sampling program.
3. Petrographic Report by Dr. H. Herbert.
4. Geological plan, scale 1:500.
5. Contoured plan of tin geochemistry, scale 1:500.

ATTACHMENT 1.

R A T T L E R   H I L L

ASSAY RESULTS

OF

INITIAL ROCK - CHIP

SAMPLING PROGRAMME

(Sample No's RH 1 to RH 15)

SAMPLE RECORD

AMAX IRON ORE CORPORATION
(MINERALS EXPLORATION DIVISION)

Whi
Yel
Gre

1:250,000 Sheet Area Launceston

Property or Prospect Rattler Hill

Date: 22nd March 1982 Collected by: R.J.Y. and D.A.E. Sample Batch No. Analyses by: Analabs

Sample No.	Description	Location	Analyses (ppm unless otherwise stated)					
			Sn	W	F	Bi	Mo	Cu
RH 1	Chip samples over 10m intervals	across strike	3300	4	2000	10	8.0	11
2			1280	x	2080	6	4.0	17
3			2910	x	1940	40	9.0	16
4			3520	10	1940	2	8.0	25
5			3370	11	1960	6	10.0	12
6			2140	7	2040	10	8.0	20
7			6860	10	1720	4	3.5	12
8			7520	12	1940	6	4.5	10
9			2600	x	1880	8	5.5	30
10			1630	x	2080	2	3.0	30
11			2520	4	1320	x	4.0	15
12			1540	x	1730	10	3.0	36
13			3050	8	2460	30	4.5	33
14			2640	x	2740	2	5.0	24
15			1950	x	2700	X	4.0	10
Repeat 2			1350					
" 8			7950					
" 14			2950					

M.P. - FORM 2

ATTACHMENT 2.

RATTLER HILL

ASSAY RESULTS

OF

DETAILED ROCK CHIP

SAMPLING PROGRAMME

Along Grid Lines:-

1825E/1220N - 1250N
1850E/1190N - 1250N
1875E/1150N - 1250N
1900E/1130N - 1250N
1925E/1160N - 1250N
1950E/1080N - 1250N
1975E/1070N - 1230N
2000E/1070N - 1220N

Sampling Centred at 10 metre intervals along grid lines.

ANALABS

A division of MacDonald Hamilton & Co. Pty. Ltd.

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	3.1 08 1359	9.8.82	RYJ/116	OF

TUBE No.	SAMPLE No.	F	Sn	W					
1	1825E 1220N	2500	630	X					
2	1825E 1230N	2400	820	15					
3	1825E 1240N	1800	130	X					
4	1825E 1250N	2100	440	10					
5	1850E 1190N	1500	670	X					
	1850E 1200N	1600	1300	X					
7	1850E 1210N	1500	1000	15					
8	1850E 1220N	2400	2150	X					
9	1850E 1230N	2800	1100	X					
10	1850E 1240N	2600	1450	X					
11	1850E 1250N	1900	820	10					
12	1875E 1150N	1600	220	X					
13	1875E 1160N	1400	110	X					
14	1875E 1170N	2000	320	X					
15	1875E 1180N	1600	90	X					
16	1875E 1190N	1500	850	10					
17	1875E 1200N	1700	710	10					
18	1875E 1210N	2400	910	X					
19	1875E 1220N	2800	2700	10					
20	1875E 1230N	2400	1800	10					
21	1875E 1240N	1700	3450	X					
22	1875E 1250N	2300	1000	X					
23	1900E 1130N	1900	730	X					
24	1900E 1140N	2500	2850	X					
25	1900E 1150N	1700	8300	15					

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER [signature]

ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	3.1 08 1359	9.8.82	RYJ/116	OF

TUBE No.	SAMPLE No.		F	Sn	W					
1	1900E 1170N		1800	4800	X					
2	1900E 1180N		1800	760	10					
3	1900E 1190N		1300	4900	X					
4	1900E 1200N		1800	1700	X					
5	1900E 1210N		1800	2650	15					
[illegible]	1900E 1220N		2600	2300	X					
7	1900E 1230N		2600	3050	25					
8	1900E 1240N		2000	1550	25					
9	1900E 1250N		1800	1350	10					
10	1925E 1160N		2200	1300	X					
11	1925E 1170N		1700	530	20					
12	1925E 1180N		2300	3700	10					
13	1925E 1190N		1800	3800	X					
14	1925E 1200N		2000	1500	X					
15	1925E 1210N		1500	4100	20					
16	1925E 1220N		2200	1300	X					
17	1925E 1230N		2100	1800	X					
18	1925E 1240N		1100	900	X					
19	1925E 1250N		1900	1500	X					
20	1950E 1080N		1700	310	10					
21	1950E 1090N		1400	340	10					
22	1950E 1100N		1800	830	X					
23	1950E 1110N		1100	980	X					
24	1950E 1120N		2200	3450	X					
25	1950E 1130N		2300	2850	15					

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	3.1 08 1359	9.8.82	RYJ/116	OF

TUBE No.	SAMPLE No.	F	Sn	W					
1	1950E 1140N	1300	1550	15					
2	1950E 1150N	2100	3300	X					
3	1950E 1160N	1400	2000	15					
4	1950E 1170N	1300	3350	15					
5	1950E 1180N	1800	2550	15					
6	1950E 1190N	1600	4000	15					
7	1950E 1200N	1900	9600	20					
8	1950E 1210N	1600	6500	10					
9	1950E 1220N	1400	2950	15					
10	1950E 1230N	1700	490	X					
11	1950E 1240N	1800	3800	10					
12	1950E 1250N	2500	2150	X					
13	1975E 1070N	2000	310	X					
14	1975E 1080N	1900	230	X					
15	1975E 1090N	2300	510	X					
16	1975E 1100N	2800	2950	20					
17	1975E 1110N	2800	4600	25					
18	1975E 1120N	2500	3000	15					
19	1975E 1130N	1800	2500	10					
20	1975E 1140N	2100	3100	10					
21	1975E 1150N	1900	1750	10					
22	1975E 1160N	2500	2600	20					
23	1975E 1170N	2200	1300	15					
24	1975E 1180N	2800	2300	20					
25	1975E 1190N	2200	6100	10					

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

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ANALABS

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	3.1 08 1359	9.8.82	RYJ/116	OF

TUBE No.	SAMPLE No.	F	Sn	W					
1	1975E 1200N	2600	2450	10					
2	1975E 1210N	1600	3250	15					
3	1975E 1220N	2700	4250	10					
4	1975E 1230N	3600	6300	20					
5	2000E 1070N	2600	530	X					
6	2000E 1080N	1300	2050	15					
7	2000E 1090N	4200	1250	15					
8	2000E 1120N	4200	4200	15					
9	2000E 1130N	3500	2450	X					
10	2000E 1140N	2900	2550	10					
11	2000E 1150N	2300	4300	X					
12	2000E 1160N	2000	3400	10					
13	2000E 1170N	2300	2750	X					
14	2000E 1180N	2600	4400	15					
15	2000E 1190N	2600	2850	10					
16	2000E 1200N	2400	3750	10					
17	2000E 1210N	2700	1250	15					
18	2000E 1220N	1500	1100	15					
19									
20									
21									
22									
23									
24									
25									

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER [signature]

ATTACHMENT 3.

PETROGRAPHIC REPORT ON SAMPLES R.H.P.1 - R.H.P.4, RATTLER HILL TIN PROSPECT, TASMANIA.

by

Hugh K. Herbert

Prepared for: AMAX Iron Ore Corporation. 25th June, 1982.

PETROGRAPHIC REPORT ON SAMPLES R.H.P.1 - R.H.P.4, RATTLER HILL TIN PROSPECT, TASMANIA.

MATERIAL AND AIMS

Three extensively "greisenated" samples, designated R.H.P.1 - R.H.P.3, and one less altered "granite" sample, designated R.H.P.4, from the Rattler Hill Tin Prospect, Tasmania were submitted for petrographic examination. There were three main aims to the study :-

(1) To establish the mineralogy and the relationship to ore genesis;

(2) The mode of occurrence and distribution of tin mineralisation in both quartz vein and "greisen" material; and

(3) Beneficiation considerations.

In this connection, two thin sections of each sample were cut to span the full range of possible variation in the samples. Because extensive petrographic study of the sections of Sample R.H.P.3 failed to disclose any evidence of tin mineralisation that would account for the average assay of 0.32% Sn (as per accompanying correspondence, R.J.Y. 2/6/82), a further two random thin sections were cut and examined. These too, turned up negative with respect to tin mineralisation.

PETROGRAPHY

Sample R.H.P.1

Hand Specimen:- The sample consists of a massive pale grey-green rock bordered by a coarse-grained quartz-cassiterite vein greater than 2 cm wide.

Quartz-cassiterite vein

The quartz is milky-white and transluscent and contains 10-15% open free-growth voids in which terminal quartz crystals occur. In some voids, these quartz crystals have formed a substrate for coarse-grained cassiterite crystal overgrowth. This coarse cassiterite forms crystal aggregates up to 0.7 cm in size. Still other voids are infilled by a white to pale lime-green "clay" material. In addition, reasonably coarse (0.5-3 mm) cassiterite occurs dispersed throughout the quartz with the suggestion of a concentration at the host rock-vein interface. The cassiterite distribution clearly reflects contemporaneous and overlapping cassiterite-quartz deposition.

Rock Matrix

This comprises about 50% coarse quartz aggregates up to 1 cm in size enmeshed in a pale lime-green matrix. The quartz aggregates are pale grey to colourless, transparent and appear to be typical igneous quartz. The matrix appears to be a very fine-grained micaceous material superficially resembling an intimate admixture of chlorite and sericite. The whole is rather porous containing about 3% open voids together with a similar percentage of voids infilled with white "clay". No macroscopically visible cassiterite occurs throughout the rock matrix.

Thin Section:- In thin section, the rock matrix is essentially bimodal - quartz and phlogopite (all optical properties of the mica are consistent with phlogopite - a microprobe analysis would be reuqired for confirmatory identification) - no muscovite/sericite or chlorite is present. Coarse igneous quartz aggregates (up to 1 cm in size) are composed of grains ranging from 0.05 to 3 mm. Extensive grain boundary "dissolution" attests to some metasomatic interation. The aggregates show some evidence of post crystallisation strain but are, by and large, unrecrystallised. This strain is probably related to the stress causing the intimate fracturing of the rock into which the quartz-cassiterite veins were introduced.

Phlogopite presumably reflects complete metasomatic replacement of feldspar. It mainly occurs as very fine-grained (on average less than 0.05 mm) interfelted, decussate platelets and rosettes (Plate 1). Dispersed throughout this phlogopite, and occasionally partially interlocked with quartz, is abundant disseminated cassiterite ranging from 0.005 to 0.4 mm grainsize with a median around 0.1 mm (Plate 2).

The quartz-cassiterite vein is largely made up of coarse-grained quartz often showing beautiful growth zoning, indicative of free growth. These growth zones are mainly picked out by concentration of fluid inclusions. Some of the growth voids are infilled with a pale brown chlorite (?) (Plate 3). Furthermore, the vein quartz shows evidence of stronger strain with narrow zones of recrystallisation parallel to the vein walls indicative of a later-stage shearing.

Enmeshed within the quartz is coarse cassiterite roughly an order of magnitude coarser than that within the rock matrix (Plate 4). Additional coarse cassiterite aggregates (up to 0.7 mm) occur lining vughs within the quartz attesting to its very late stage introduction.

Sample R.H.P.2

Hand Specimen:- This sample is not unlike sample R.H.P. 1 and could well be a finer-grained varient. Thus, the rock consists of quartz aggregates enmeshed in a pale green-grey rock matrix and bordered by a 0.7 mm coarse-grained quartz-cassiterite vein.

Quartz-cassiterite vein

This is a sharply defined vein 0.7 mm wide consisting of about 75% coarse-grained milky white transluscent quartz in which is enmeshed about 25% coarse cassiterite grains and aggregates ranging in grainsize from about 0.5 to 5 mm. The "free" surface of the vein is a growth, not a fracture, surface and is made up of terminal quartz crystals with interlocking cassiterite crystals.

Rock Matrix

This consists of about 50% fine- to medium-grained (maximum 5 mm) quartz grains and aggregates in a pale grey-green micaceous matrix. Within this matrix are numerous iron-stained voids up to 5 mm in size having a pseudo-boxwork texture. No macroscopic cassiterite is evident in the rock matrix.

Thin Section:- In thin section, the rock appears to be a finer-grained varient of R.H.P.1, being, if anything, slightly richer in quartz (about 50%). The micaceous matrix is composed of interfelted platelets and rosettes of phlogopite commonly in the grainsize range 0.01 - 0.1 mm (Plate 5). Unlike R.H.P.1, coarser plates and aggregates of phlogopite (up to 0.25 mm) occur but collectively represent less than 10% of the micaceous material.

Dark irregular clots of limonite/goethite (Plate 6) and wispy veinlets and streaks occur dispersed throughout. In general, this limonite/goethite is associated with areas of coarser phlogopite, themselves commonly associated with "leach" cavities, as an overprinting stain and as diffuse granules and clots. It is suggested that the iron staining and limonite/goethite, together with the leach cavities in the rock, are related to weathering rather than a hydrothermal event. It is further suggested that the leach cavities may be related to the leaching of Fe-silicate or carbonate, but not Fe-bearing sulfide.

Whereas sample R.H.P.1 had abundant disseminated fine cassiterite throughout the matrix, this sample does not. Rather, isolated cassiterite grains, commonly in the range 0.1-0.2 mm are scattered throughout the phlogopitic matrix (Plates 5 & 7).

Cassiterite in the quartz-cassiterite vein is distinctly bimodal in grainsize and occurs as dispersed discrete grains (0.001 - 0.1 mm) and grains and aggregates (0.5 - 1.5 mm) (Plate 8).

Sample R.H.P.3

Hand Specimen:- This sample is a massive light green-grey rock, sparsely porphyritic in quartz. It closely resembles the rock matrix of R.H.P.2, but does not have the large iron-stained leach cavities of that sample. Nevertheless, the sample does contain fairly abundant fine leach cavities (less than 0.5 mm) often partially infilled with pale orange-white "material".

Thin Section:- The sample is composed of about 50% quartz and 50% phlogopite. About 10-15% of the quartz is as "phenocrysts" up to 5 mm in size. Phlogopite occurs as fine interfelted platelets, rosettes and sheafs (Plate 9 (a) and (b)).

No cassiterite has been identified in four random thin sections of this sample.

Sample R.H.P.4

Hand Specimen:- This is a sample of a coarse-grained, light orange-buff-white altered granite, porphyritic in K-feldspar and quartz. Traversing the sample are a number of fine (less than 0.5 mm) dark-grey "fractures". This rock could well be a less metasomatised precursor to R.H.P.1-3.

Thin Section:- In thin section, this rock is a metasomatised biotite granite. Feldspars are extensively altered to phlogopite and coarse primary biotite has, by and large, been made over to phlogopite. This appears to have occurred by iron removal with attendant deposition of iron hydroxide (Plates 10 and 11).

The orange-brown nature of the feldspars is due to extensive "iron" staining associated with phlogopitic alteration (Plate 12(a) and (b)). Traversing the rock are phlogopitic microveinlets with which occurs blue-green tourmaline and cassiterite (Plate 12(a) and (b)). The cassiterite is in the size range 0.05 - 0.15 mm with a mean around 0.1 mm.

Some of the residual primary biotite contains a little interleaved muscovite. Mica alteration has preferentially occurred in acid oligoclase whereas K-feldspar is turbid due to phlogopite and clay alteration together with associated iron staining.

DISCUSSION

Samples R.H.P.1-3 represent extreme metasomatic alteration of a porphyritic acid granitoid to produce essentially a bimineralic aggregate of quartz and phlogopite. Sample R.H.P.4, a porphyritic biotite granite, is an acceptable precursor to R.H.P.1-3. Samples R.H.P.1 and 2 both contain a coarse quartz-cassiterite vein whereas sample R.H.P.3 does not. Furthermore, both R.H.P.1 and 2 contain finer grained cassiterite disseminated throughout the phlogopitic matrix with definite increase towards the quartz veins.

It would appear that a rock similar to or, in fact, R.H.P.4 was subjected to pervasive metasomatism. This metasomatism completely destroyed the rock feldspar and biotite producing, under the prevailing conditions, the magnesium mica, phlogopite. No cassiterite accompanied this "wall rock" preparation episode. Further, despite the consistent 2000+ ppm fluorine in the rocks, no fluorite has been observed. It is therefore assumed that the fluorine is substituting for hydroxyl ions in phlogopite. This raises the question as to wether the fluorine was premineralisation metasomatic or whether it has been "fixed" by the mica during cassiterite deposition, e.g.,

$$SnF_4 + 3H_2O = SnO_2 + 4HF + H_2O$$

The latter alternative is favoured insofar as fluorine would be rapidly fixed as fluorite in the presence of Ca^{2+} ions during metasomatic alteration of acid oligoclase.

Subsequently, the "prepared" rock was extensively fractured permitting introduction of Sn-bearing silicic hydrothermal fluids from which the quartz-cassiterite veins were deposited. At the same time, diffusion of volatile $SnF_4 + H_2O$ into the adjacent phlogopitic rock matrix was accompanied by finer-grained cassiterite deposition. The cassiterite grainsize was here controlled both by the "tight" fine grainsize of the metasomatised host rock and diffusional availability. Nucleation at many disçrete sites occurred and fine disseminated grains formed. The concentration of the cassiterite dies out away from the quartz-cassiterite veins as a result of diffusional limitations. Hence, sample R.H.P.3, whilst extremely metasomatised, is nevertheless barren of cassiterite because it was most likely outside the limits of Sn diffusion.

Coarse cassiterite accompanied and continued beyond quartz deposition in the veins. This is clear from the late-stage crystals grown on a substrate of terminal quartz crystals in vughs. Hence, the hydrothermal fluids became impoverished in silica prior to final stage cassiterite (+tourmaline) deposition. Mineralisation permeates out into less altered rocks such as R.H.P.4.

Concerning beneficiation, it should be noted that there is a wide range of cassiterite grainsize in a variety of matrices and having a range of locking characteristics.

Clearly, a multistage grinding circuit will be required for progressive comminution of the rock with a number of intermediate cassiterite recovery stages. Ultimately, both the quartz vein and rock matrix material will require very fine comminution to liberate cassiterite in the 1-10 micron grainsize range. Clearly cost/recovery factors will dictate the optimum size reduction. Apart from the "fine" cassiterite, this ore should be reasonably amenable to beneficiation and high recoveries can be anticipated. The fine grained interfelted, decussate nature of the phlogopite, interspersed with quartz, should not pose problems of packing or sliming in the grinding circuits.

On visual estimation, about 60-70% of the cassiterite in samples R.H.P.1 and 2 occurs as coarse vein cassiterite, whilst the remainder is as fine vein and rock matrix cassiterite.

(Hugh K. Herbert, M.Sc., Ph.D.)

25th June, 1982.

AMAX IRON ORE CORPORATION
(MINERALS EXPLORATION DIVISION)
P.O. Box 58, Beaconsfield, Tas., 7251.

003 831100
067 722339

2nd June, 1982

Received 9/6/82.
HKH

Dr. H.K. Herbert,
M.S. 1082,
4 Niddrie Drive,
TOOWCOMBA, QLD., 4350.

Dear Sir,

I am presently investigating a tin prospect in the N.E. of Tasmania which is of considerable interest to Amax. The tin mineralisation appears to be associated with a 150m wide vertical zone of quartz greisen within which is an abundance of mineralised sheeted quartz veins. Samples submitted for assay to date show that the unveined greisens carry in excess of 0.3% Sn, while the unsampled vein material may sweeten this to as much as 0.6% Sn.

Enclosed is a suite of 4 samples (RHP. 1,2,3,4.) for which I would like a petrographic analysis. The guidelines for queries are presented below, however, any other information you consider relevant would be greatly appreciated.

RHP. 1.

Vertical vein material and adjacent coarse quartz greisen.

1. Mineralogy and relationship to ore genesis.
2. Mode and abundance of tin distribution in both quartz vein and greisen.
3. Implications for tin liberation.

N.B. This comparatively coarse greisen is uncharacteristic of the deposit.

RHP. 2.

Vertical vein material and adjacent fine quartz greisen.

...2/

2nd June, 1982

1. Mineralogy and relationship to ore genesis.
2. Mode and abundance of tin distribution in both quartz vein and greisen.
3. Implications for tin liberation.
4. Nature of iron oxide cavities in the greisen.

N.B. This finer greisen is the most abundant rock type and appears to be homogeneous throughout the mineralised zone.

RHP. 3.

Characteristic fine quartz greisen not intimately associated with any quartz veining.

1. Mineralogy.
2. Tin distribution.
3. Implications for tin liberation.

Average Assay (ppm)	Sn	W	F	Bi	Mo	Cu
	3200	4	2000	10	8.0	11

RHP. 4.

Porphyritic granite adjacent to greisen zone.

1. Mineralogy including hairline fractures.
2. Degree of greisenisation.
3. Is this a comparatively ungreisenised version of RHP.3. or a separate phase?

2nd June, 1982

Average Assay (ppm)	Sn	W	F	Bi	Mo	Cu
	45	x	1220	x	2.5	7

I have also enclosed a copy of the preliminary report on the prospect and trust it will be of some use in gaining a general impression of the geological environment.

Yours faithfully,

Richard Yeates

R.J. YEATES

RJY:sw
Enc.

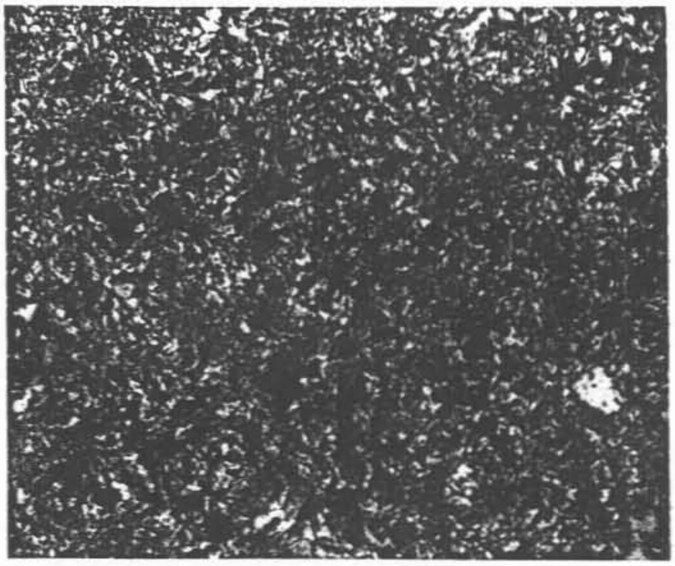


Plate 1 (Sample No. R.H.P.1)

Photomicrograph showing detail of typical matrix phlogopite (birefringent) with minor quartz (grey). Note the uniform fine grainsize and decussate habit.

Micrograph 0.4 x 0.5 mm; crossed polarised light.

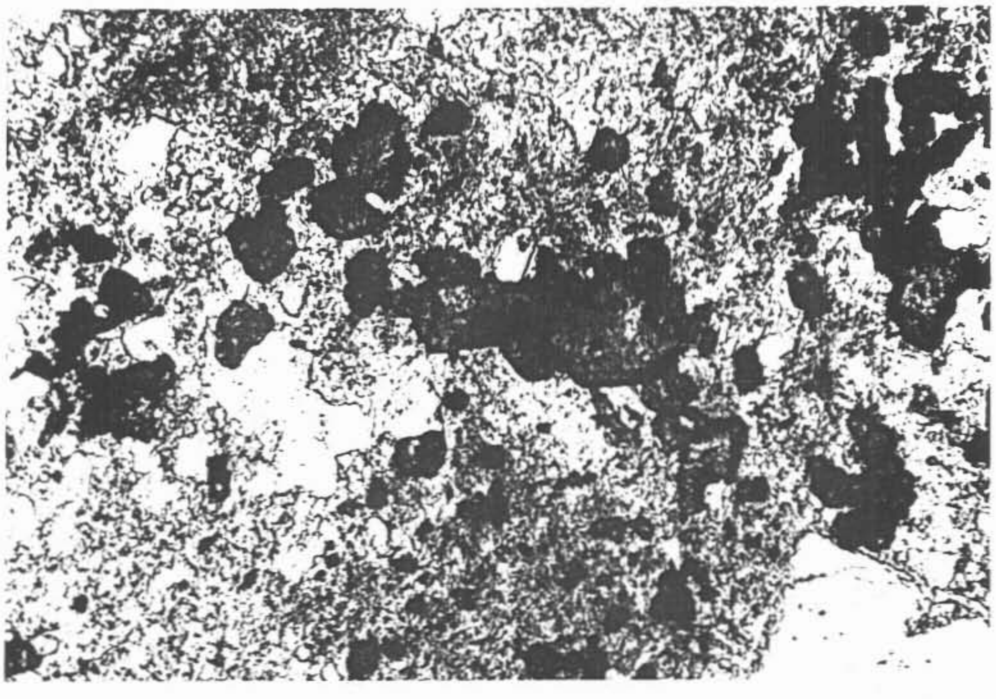


Plate 2 (Sample No. R.H.P.1)

Photomicrograph showing concentration of disseminated cassiterite grains (variable dark brown, high relief) in a matrix of phlogopite (variable light brown) and quartz (colourless). Cassiterite grainsize ranges from 5 to 150 microns.

Micrograph 0.5 x 0.9 mm; plane polarised light.

Plate 3 (Sample No. R.H.P.1)

Photomicrograph showing strongly zoned free-growth quartz crystals in coarse-grained cassiterite-quartz vein. Growth void is infilled with late-stage chlorite(?) (variable brown). Growth zoning in quartz is picked out by trains of fluid inclusions (black and black speckling).

Micrograph 0.5 x 0.9 mm; crossed polarised light.

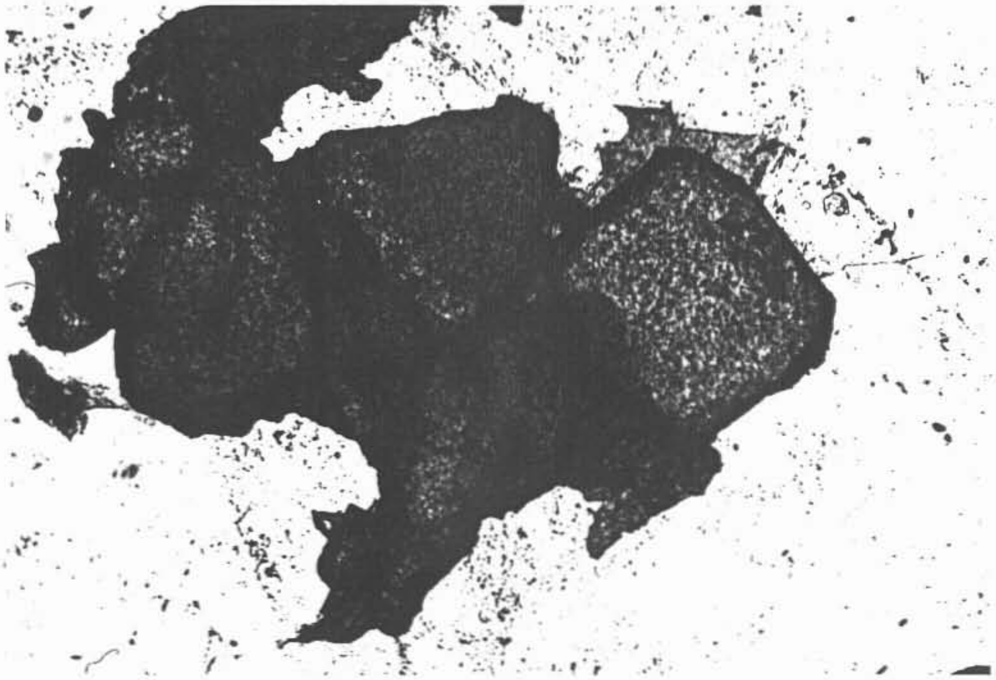


Plate 4 (Sample No. R.H.P.1)

Photomicrograph showing reasonably coarse cassiterite aggregate (variable brown, high relief) in quartz (colourless) with minor associated late-stage chlorite(?) (pale orange-brown). Note that the cassiterite is an order of magnitude coarser than that in the rock matrix (Plate 2). Black speckling in quartz is fluid inclusions.

Micrograph 0.5 x 0.9 mm; plane polarised light.

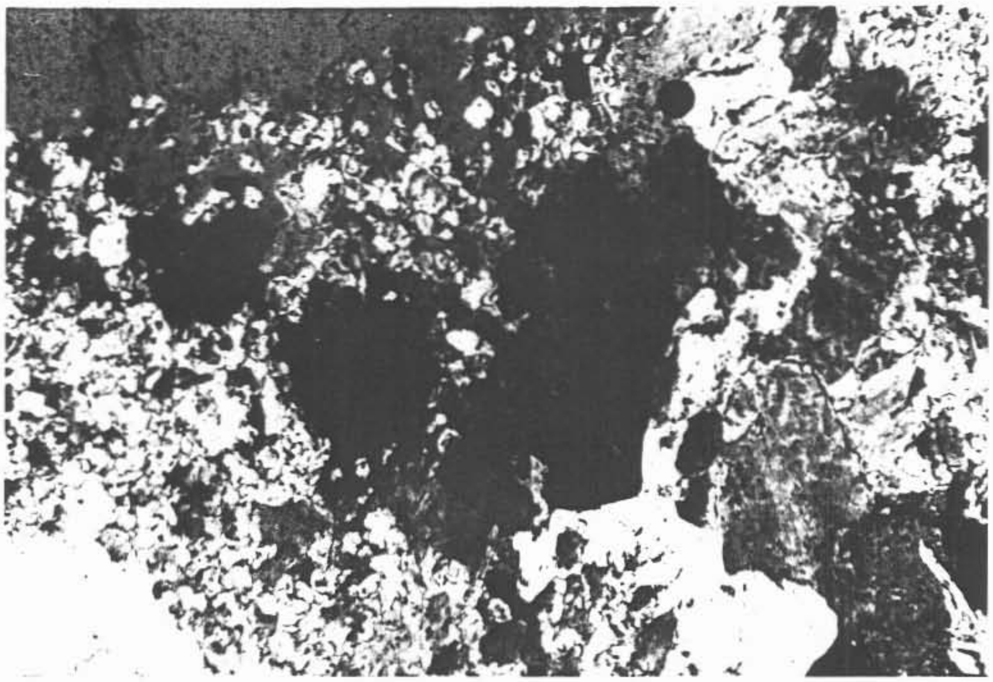


Plate 5 (Sample No. R.H.P.2)

Photomicrograph showing plates and fanaggregates of phlogopite, of variable grainsize (birefringent), with associated quartz (cream to grey) and disseminated cassiterite grains (dark brown-black). Note that the cassiterite grains are here partly encapsulated in quartz.

Micrograph 0.5 x 0.9 mm; crossed polarised light.

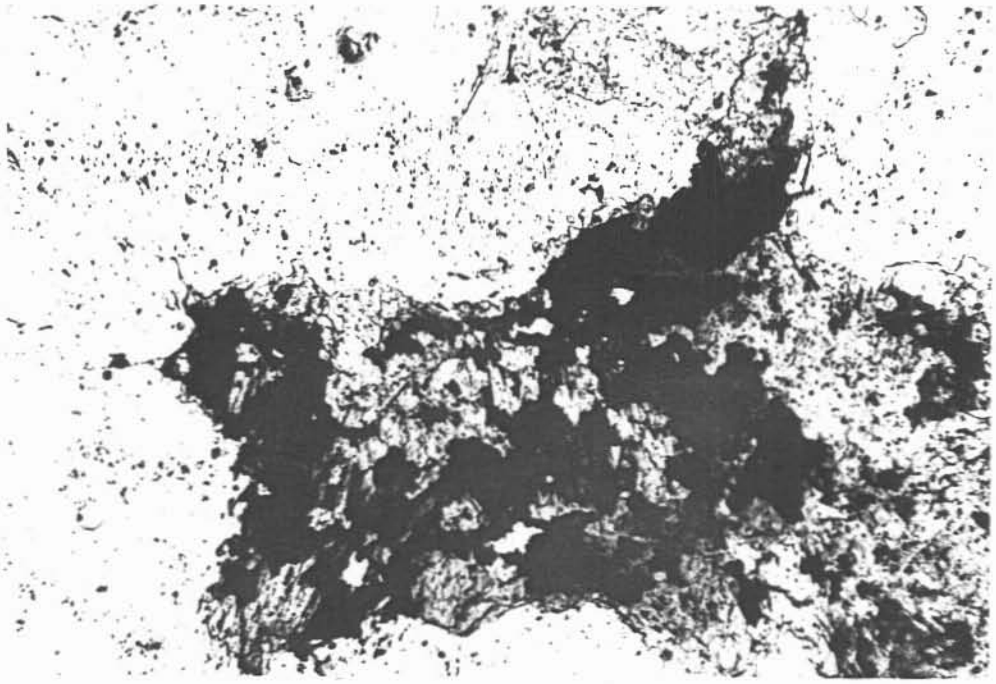


Plate 6 (Sample No. R.H.P.2)

Photomicrograph showing common limonite-goethite clots and granules (dark-brown); colourless areas are quartz-black speckling is fluid inclusions. This limonite-goethite commonly occurs as "coatings" to leach cavities in this sample. It is not possible to identify the iron-hydroxide precursor on the basis of morphology. However, it is suggested that it was unlikely to have been sulfide.

Micrograph 0.4 x 0.9 mm; plane polarised light.

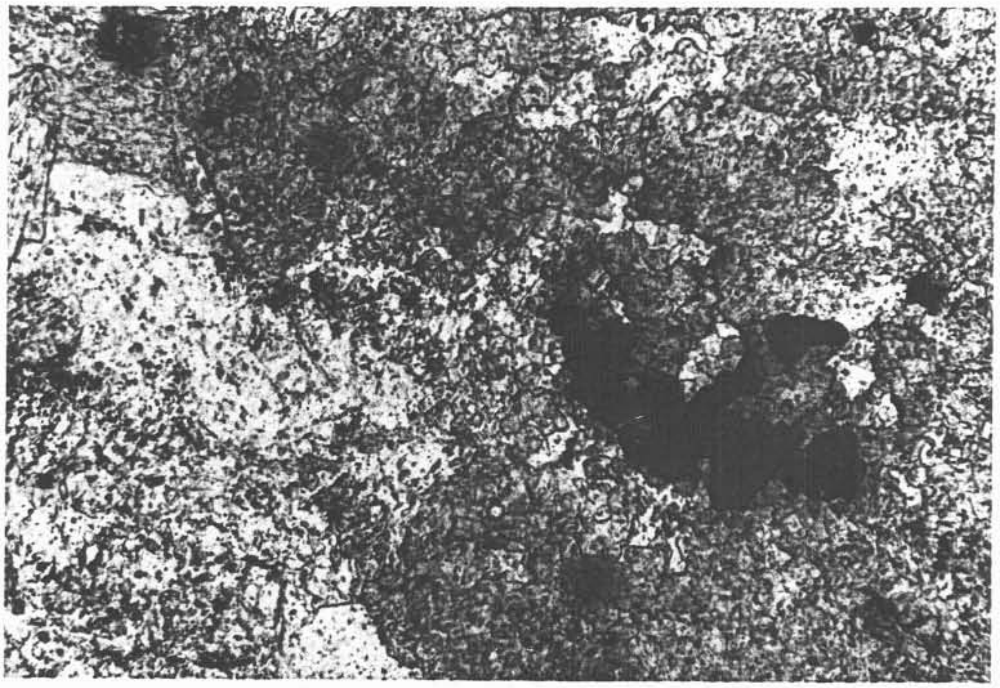


Plate 7 (Sample No. R.H.P.2)

Photomicrograph showing scattered cassiterite grains (dark-brown, high relief) in a matrix of quartz (colourless) and phlogopite (variable pale brown).

Micrograph 0.4 x 0.9 mm; plane polarised light.

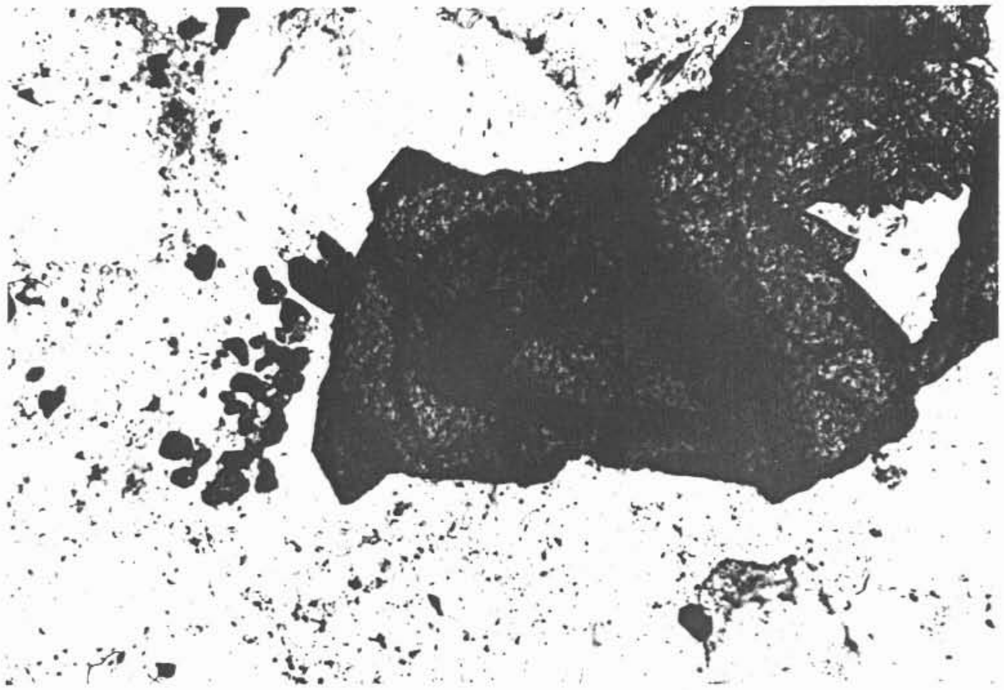


Plate 8 (Sample No. R.H.P.2)

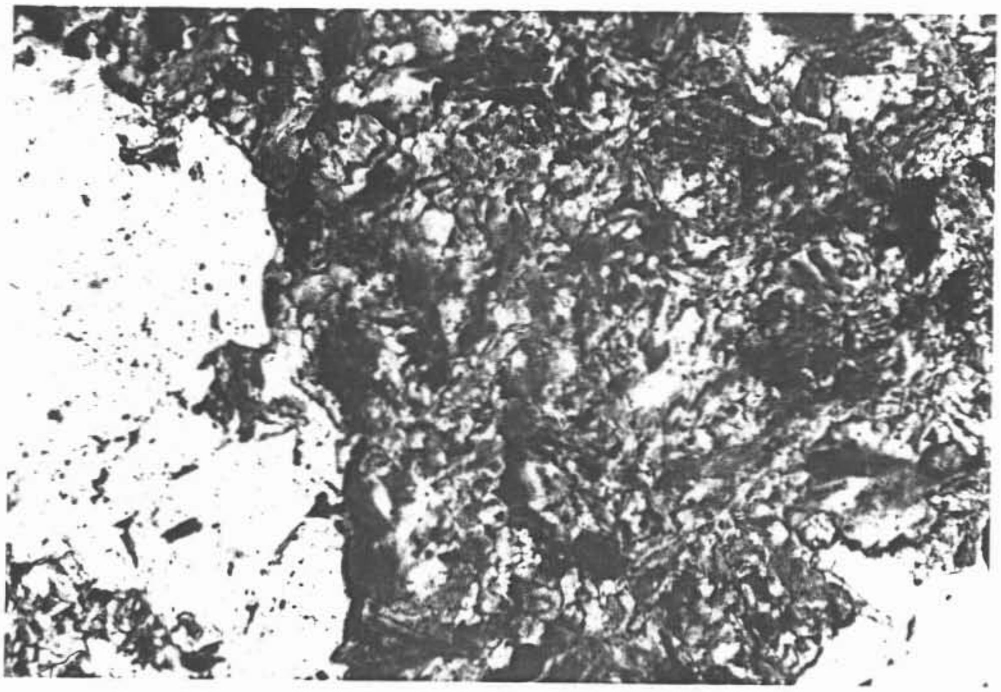
Photomicrograph showing example of common strongly bimodal cassiterite (variable dark-brown, colour zoned, high relief) in quartz (colourless) of coarse-grained cassiterite-quartz vein. Black speckling in the quartz is fluid inclusions.

Micrograph 0.4 x 0.9 mm; plane polarised light.

Plate 9 (Sample No. R.H.P.3)

(a) Photomicrograph of a typical area of sample R.H.P.3 showing equant decussate metasomatic phlogopite (variable pale-brown) and quartz (colourless). Black speckling in the quartz is fluid inclusions. Note that this material is essentially identical to matrix material of samples R.H.P.1 and R.H.P.2 but does not contain any cassiterite.

Micrograph 0.4 x 0.9 mm; plane polarised light.



(b) Crossed-polarised light micrograph of same area as (a).

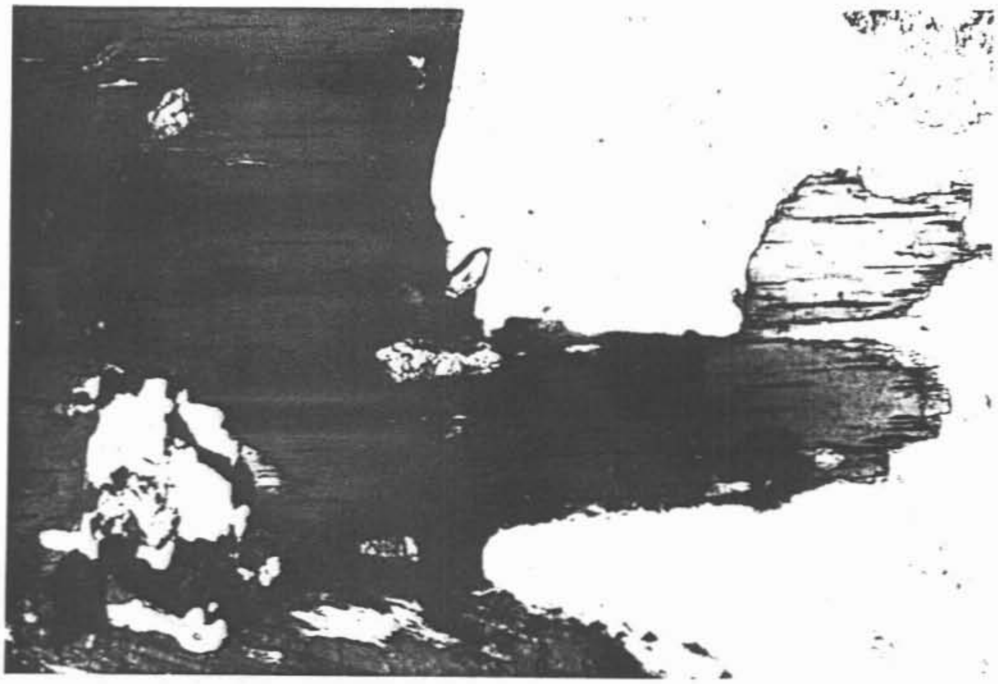


Plate 10 (Sample No. R.H.P.4)

Photomicrograph showing a small portion of a large primary biotite flake (foxyred brown) showing marginal "decolourisation" attendant upon metasomatic conversion to phlogopite (pale brown) by "iron" leaching. Colourless areas are mainly quartz and, in the biotite flake, ziron which is surrounded by radiogenic damage haloes.

Micrograph 0.4 x 0.9 mm; plane polarised light.

Plate 11 (Sample No. R.H.P.4)

Photomicrograph of coarse metasomatic, phlogopite clot (variable pale brown) interpreted to be pseudomorphous after primary biotite. Colourless areas are mainly quartz. Note the common development of limonite-goethite (dark brown) along the cleavage and the presence of minor interleaved primary(?) muscovite ("colourless"). Note also the absence of ziron with associated damage haloes.

Micrograph 0.4 x 0.9 mm; plane polarised light.

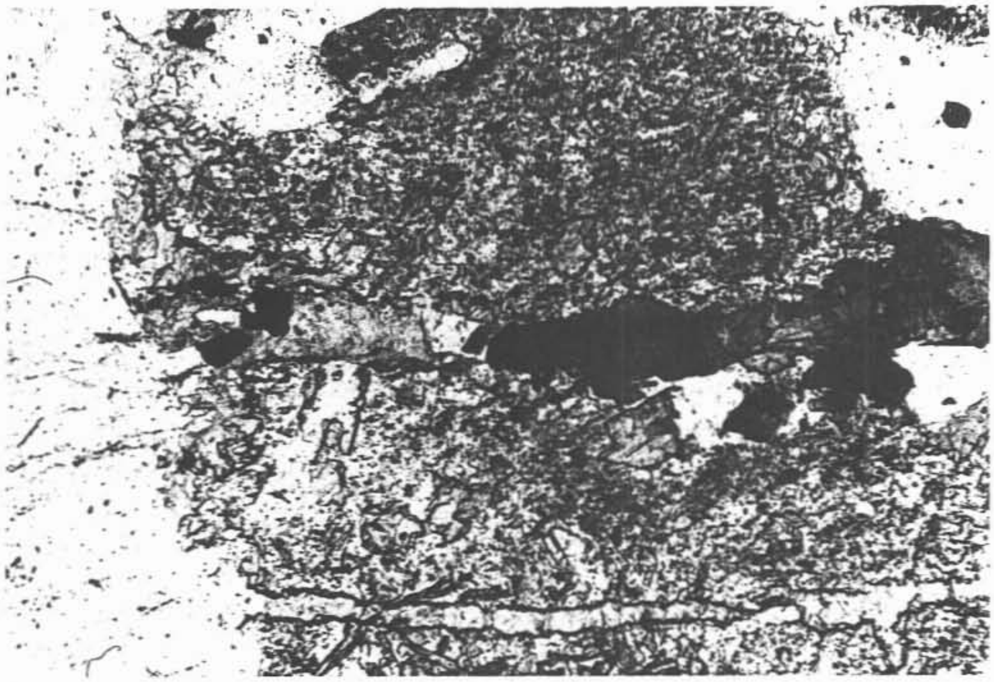
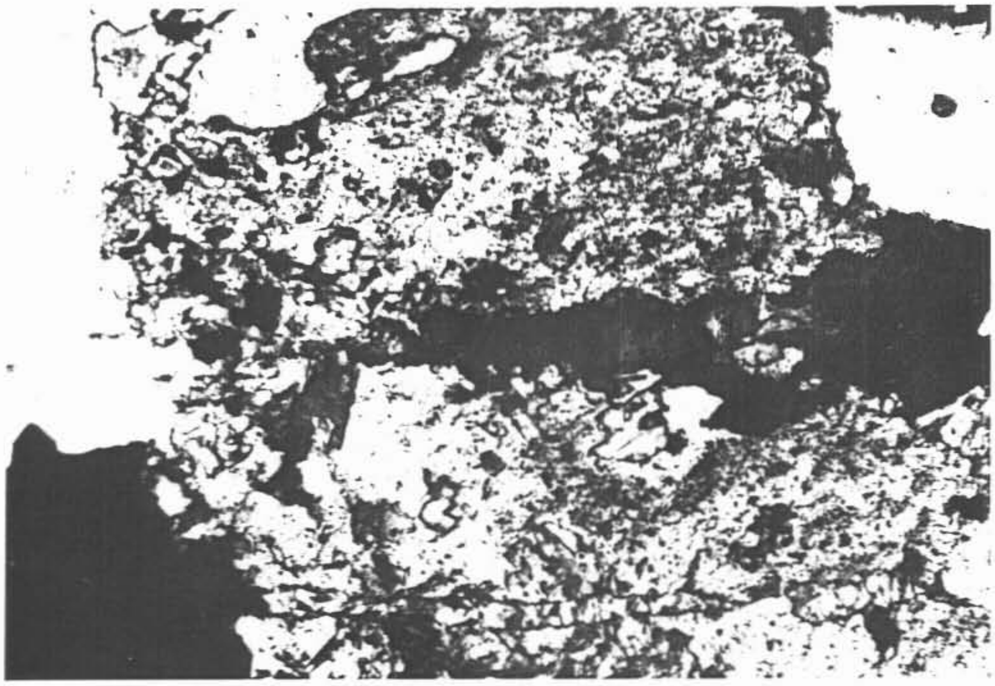


Plate 12 (Sample No. R.H.P.4)

(a) Photomicrograph of metasomatically altered biotite granite traversed by phlogopite (variable pale brown) - cassiterite (dark brown, high relief) - tourmaline (indigo blue) microveinlets. Turbid area is K-feldspar showing phlogopite-clay alteration. Colourless areas are quartz grains showing speckling by fluid inclusions (black). Note that the microveinlets are truncated at the feldspar-quartz interface. Micrograph 0.4 x 0.9 mm; plane polarised light.



(b) Crossed polarised light micrograph of same area as (a). Phlogopite, highly birefringent; K-feldspar, turbid showing phlogopite and day alteration; quartz, white-grey-black.

LEGEND

Mineralized Quartz Phlogopite Greisen containing <10% Porphyritic Biotite Granite zones and abundant mineralized sheeted veining

Altered Porphyritic Biotite Granite containing <10% Greisen zones and some mineralized sheeted veining

Marginal fine Quartz Greisen containing minor muscovite or phlogopite and irregular chalcedonic quartz vein networks with drusy cavities

KEY

Definite Outcrop: P–Porphyritic Biotite Granite
G–Quartz Phlopite Greisen

Definite Geological Boundary

Infered Geological Boundary

Postulated Geological Boundary

Note: Greisen zones dip vertically
Dominant mineralized sheeted vein set strikes approxmatley 090° mag and dips vertically

AMAX AUSTRALIA OPERATIONS Ltd

RATTLER HILL TIN PROSPECT

Compiled By R.J. Yeates	Scale 1:500
Drawn By D.A.Ellis	Date 3rd August 1982

AMAX AUSTRALIA OPERATIONS Ltd

RATTLER HILL
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Progress Report on the Rattler Hill Tin Prospect
Amax Australia Limited*
Yeates, R.J. EL11/1977