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REF. No. 2834/82				

EXPLORATION LICENCE 18/80

ARTHUR RIVER, TASMANIA

PROGRESS REPORT TO 31st JANUARY, 1982

MICROFILMED

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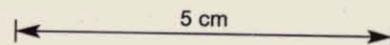
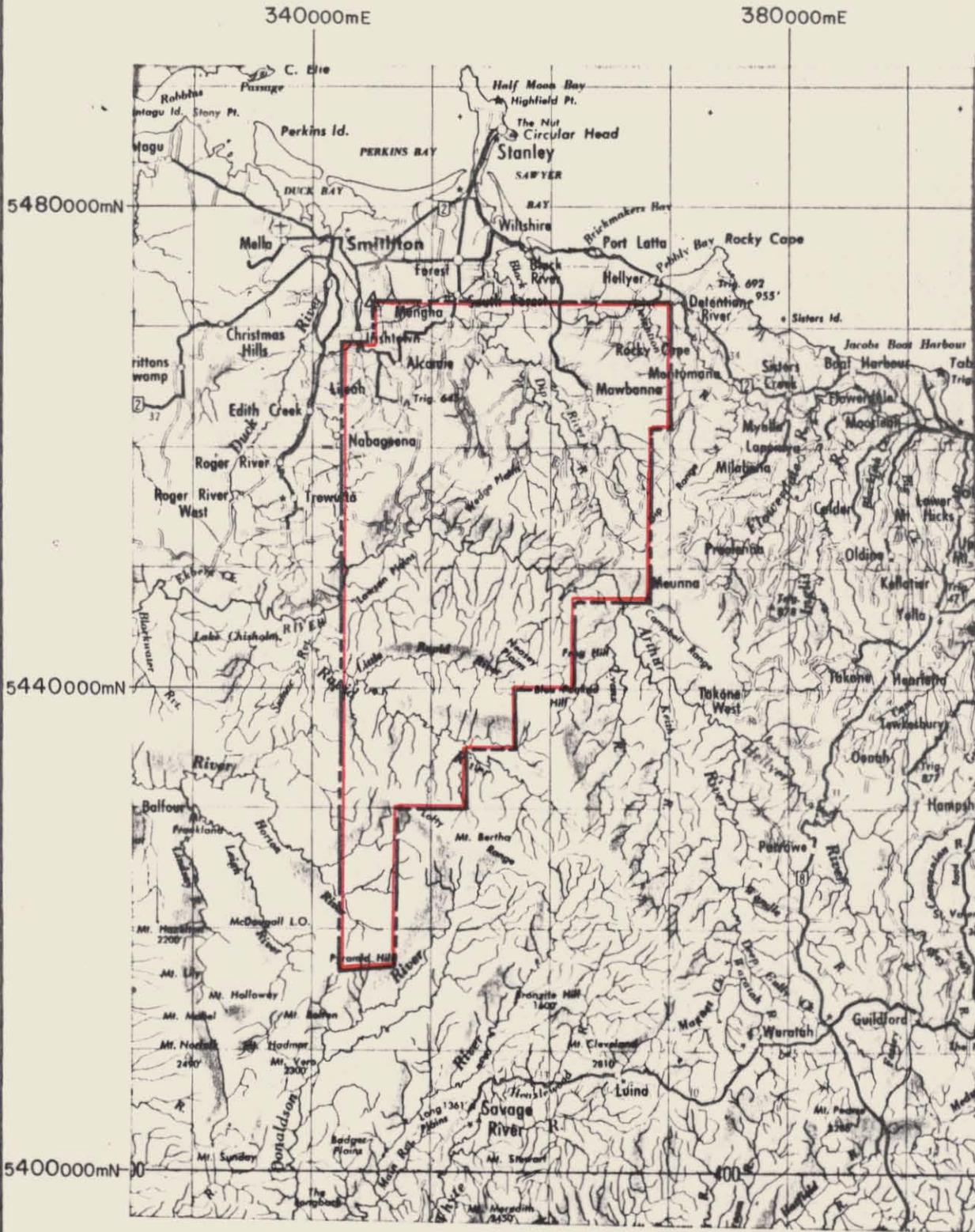
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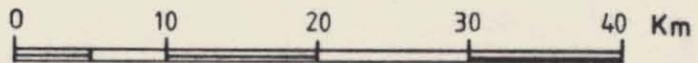


This map accompanies an application dated
by The B.H.P. Co. Ltd.



E.L. 18/80

Scale 1:500,000



This map photo copied from Tas. Lands & Surveys Dept.
1:500 000 Sheet "TASMANIA"

Centre Melbourne
Date 18-4-80

THE BROKEN HILL PROPRIETARY CO. LTD.	
E.L. 18/80 - ARTHUR RIVER, TASMANIA	
LOCATION MAP	
Project N ^o :	
Drawing N ^o :	A4-2095

1.

1. GENERAL

Exploration Licence 18/80 of 1010 square kilometres was granted to the Broken Hill Proprietary Company Limited on 4th August 1980. An application for renewal has been submitted. (For location see figure 1.)

2. SUMMARY OF WORK COMPLETED

- a) Photogeological study and preliminary interpretation of landsat image.
- b) Evaluation of existing INPUT E.M. and magnetic data (Esso, 1974)
- c) Reconnaissance stream sediment, bank and soil sampling in the Black River, Neasey Plains and Lawson Rivulet areas.
- d) Heavy mineral examination of pan concentrate samples from the Arthur River.
- e) Petrological description of chert samples.

3. SUMMARY OF WORK IN PROGRESS

- a) Re-interpretation of Rio Tinto aeromagnetic survey data (flown 1956)
- b) Ground follow-up of airborne magnetic, INPUT E.M. and unusual photogeological features.

4. RESULTS4.1 Photogeology

A photogeological map of the licence area has been prepared (figure 2) which incorporates detailed mapping from the northern part of the area by Mines Department officers and by Company personnel. A number of features worthy of ground follow-up, such as circular structures, vegetation anomalies, lineaments and domes were recognised during the study of both the aerial photographs and the landsat satellite image of the area. Notes on the photogeological assessment are included in Appendix I.

4.2 Geochemistry

4.2.1 Neasey Plains Area

Two soil sample traverses were completed by way of follow-up on an Esso Input anomaly in the Neasey Plains area (figure 3). Samples were sieved to minus 40 mesh and analysed for base and precious metals, arsenic, antimony, tin, tungsten and uranium. Trace lead (to 245 ppm), copper (to 135 ppm), zinc (to 100 ppm), arsenic (to 101 ppm) and gold (to 0.02 ppm) were recorded. Bedrock in the area includes black, pyritic shales and siltstones, and amphibolite. Stream samples and bedrock chip samples were not anomalous with respect to base metals, tin or tungsten. Trace molybdenum to 21.5 ppm and uranium to 7.2 ppm were recorded in black shale samples.

4.2.2 Black River Area

Further sampling in the Black River area failed to indicate the presence of mineralization. Stream, bank sample and pan concentrate sample locations are shown in figure 4.

4.3.3 Lawson Rivulet

An attempt to locate and sample a deposit of limonite (reported by McNeil, Tas. Mines Dept. Tech. Rpt. No. 5, 1960) in a tributary of the Lawson Rivulet was unsuccessful. Stream samples from the upper part of the tributary (T67153C to E) were not anomalous with respect to any of the elements determined (Appendix 2).

4.3 Heavy Mineral Studies

A programme of sampling of heavy mineral concentrates in sediments of the Arthur River and its major tributaries was carried out in June 1981. The aim of the programme was to attempt to determine the source of the fine grained, angular, cassiterite and tin mineral associates (topaz, tourmaline) previously recorded (see report by Ringenbergs 1981 in report on EL18/80 to 31st July 1981).

The study shows:

- a) that there is an obvious increase in the amount of cassiterite in the Arthur River sediments above its junction with the Hellyer River;
- b) that there is a general increase in the degree of roundness and decrease in the size of cassiterite grains downstream from the Hellyer River junction;
- c) that the persistence of some cassiterite bearing composite grains is probably due to the high abrasion resistance of the enclosing material (i.e. quartz and massive, fibrous topaz);
- d) that disaggregation of granular, and less resistant composite grains, could be largely responsible for the presence of mono-mineralic angular cassiterite grains in the Arthur River within the licence area.

4.4 Petrology

Three chert samples from the Rapid River Road area were submitted for petrographic examination during the period. All rocks were probably formed by the partial silicification of dolomite followed by leaching of the remaining carbonate (see appendix 3 for full report).

5. WORK PROPOSED

- 1. Continue reconnaissance sampling and mapping programme;

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3.

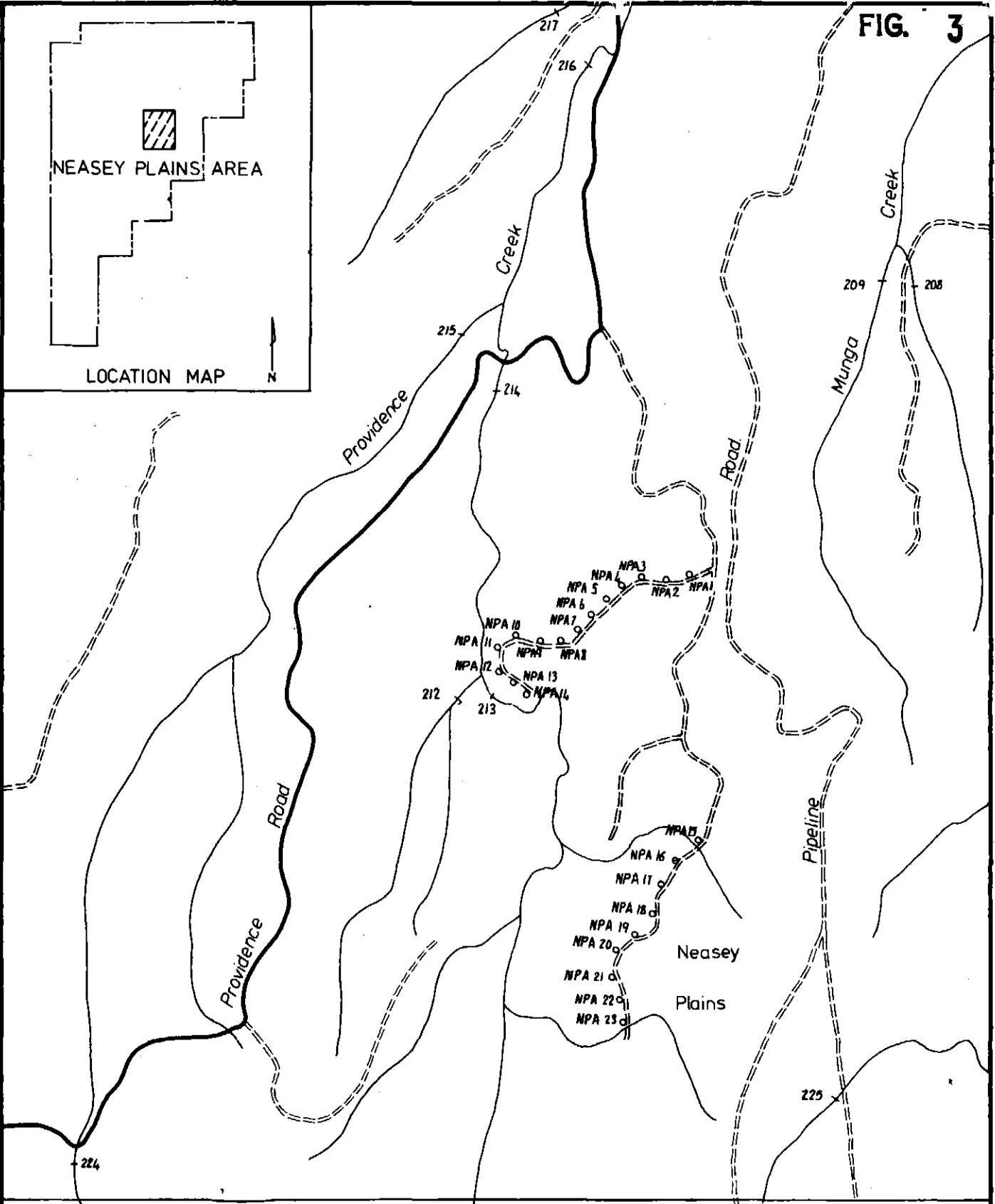
2. Continue programme of follow-up on INPUT and airborne magnetic anomalies;
3. Diamond drill selected targets.

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FIG. 3

NEASEY PLAINS AREA

LOCATION MAP



-  Stream sample locations
-  Soil sample locations

Lilleah

5 cm

Scale 1:25,000

0 1 2km

G.N.



810008

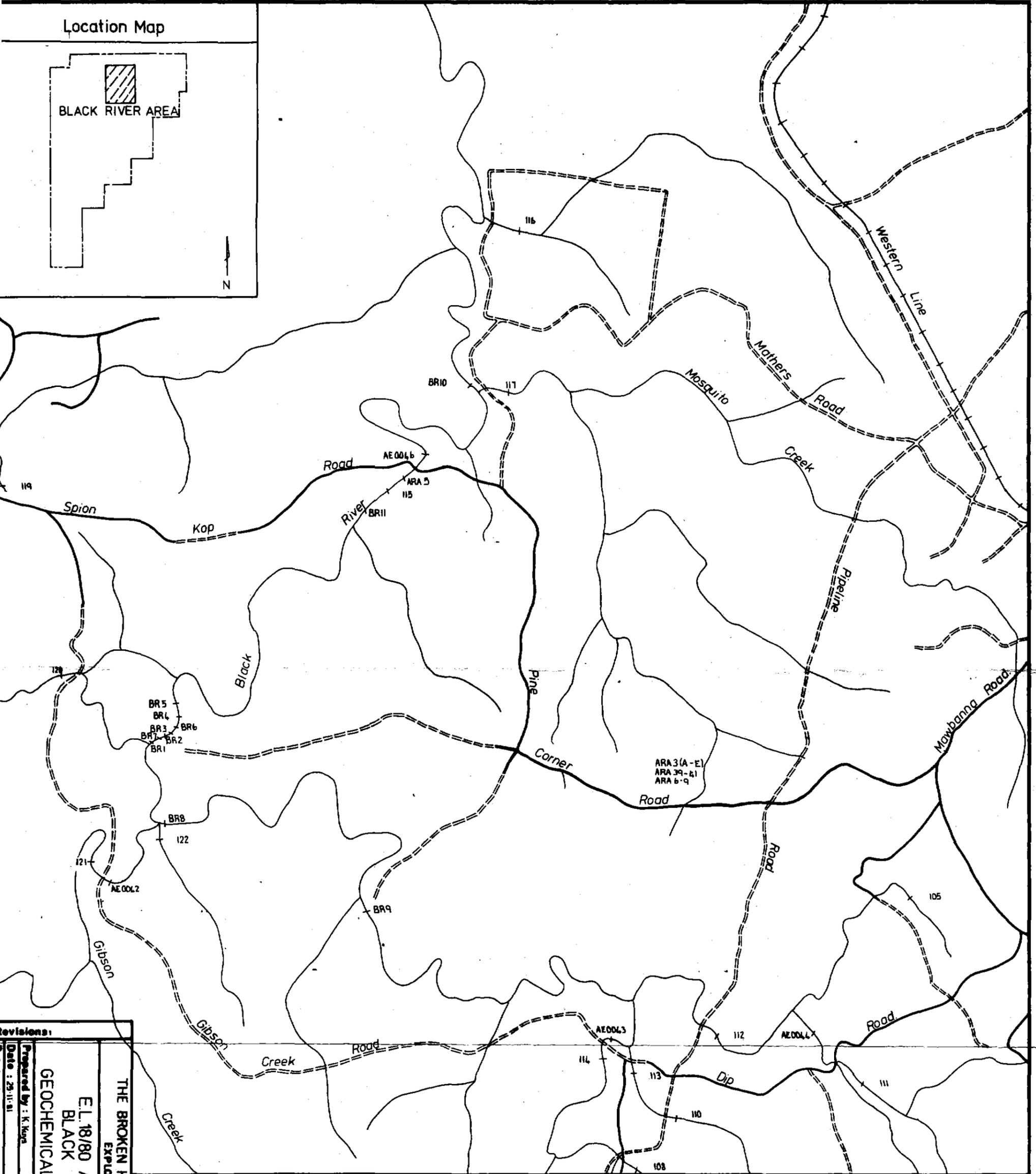
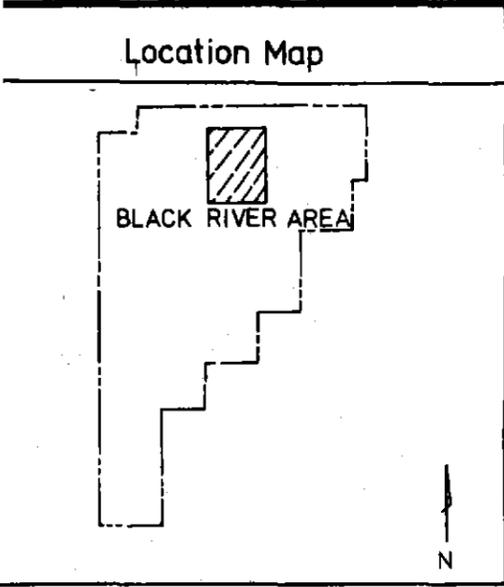
Centre:
Hobart

Date:
25.11.81

THE BROKEN HILL PROPRIETARY CO. LTD.
 E.L18/80 ARTHUR RIVER TASMANIA
 NEASEY PLAINS AREA
 GEOCHEMICAL SAMPLE LOCATIONS

Project No:
T670

Drawing No:
A4-18/80-4



Revisions:

Prepared by: K. Kays

Date: 25.11.81

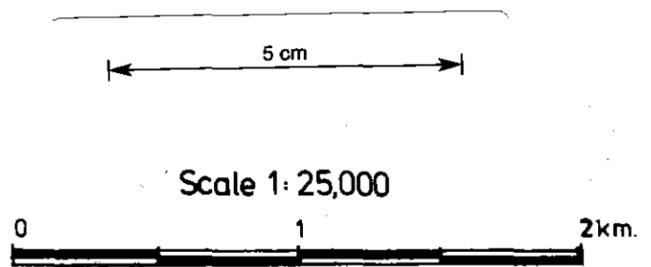
Centre: Hobart

Project No. T670

Drawing No. A3-1/Ko-5

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT

EL. 18/80 ARTHUR RIVER
BLACK RIVER AREA
GEOCHEMICAL SAMPLE LOCATIONS.



- Stream Sample locations.
- Rock sample locations
- Soil sample locations
- Gravel sample locations

FIG. 4
810009

APPENDIX I

REPORT ON PHOTOGEOLOGY

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NOTES ONPHOTOGEOLOGY OF E.L. 18/80ARTHUR RIVER, TASMANIA1. INTRODUCTION

The airphotos available for this study are 1:40,000 scale black and white copies of the Tasmanian Lands Department coverages Sandy Cape/Arthur River flown in 1974 and North West flown in 1980.

The quality of the photos is not good. Most of them have poor contrast and are too dark, particularly their eastern halves. The southwestern quarters of many photos show a whitish area, due to the back-scattering of sun light from low lying haze. These defects may have hindered the detection of subtle ground details during photointerpretation.

The study consisted of preliminary photogeology, field checking and final photogeology.

The results were presented on overlays attached to the airphotos. To help in positioning the photogeological information, selected drainage channels were traced on the overlays.

2. PRECAMBRIAN

In the northeast part of the E.L. area, Lennox et al. (in press) have mapped three formations: Cowrie Siltstone, Detention Quartzite and Inby Siltstone. The Detention Quartzite and Inby Siltstone show distinct geomorphological characters and it was not difficult to photointerpret their boundaries. Southwards their characters become indistinct and their boundaries could not be traced.

cont./..

..2..

In the west-central part of the E.L. (photos SC/AR 1/11-13, 2/21, 3/10-12 and 4/9-11), the boundaries traced by Longman and Matthews (1961) between Green Siltstone, Black Siltstone, Siltstone and Quartzite, and Smithton Dolomite were plotted on the photos. On the airphotos there is not much evidence on which to base this separation and it could not be extended outside the photos listed above.

The black shales visible on the ground in several places along the Tayatea Road (photos SC/AR 2/21-19) are not distinguishable on the airphotos from the siltstones, mudstones and shales which form the bulk of the undifferentiated Precambrian (Pu).

No features related to the Black Slate boundary mapped from geophysical data by Neale and Won (1974), were seen on the airphotos.

The general bedding trend of Pu swings from about 60°E in the north to about 20°E in the south. There is some evidence (curving trend lines, a few opposing dip slopes) suggesting that Pu is folded, tightly in some places, with fold axes parallel to the general trend.

Probably many trend lines are dolerite dykes.

Two dominant trends of faulting are present, one parallel and the other perpendicular to the bedding trend. Jointing is predominantly perpendicular to the bedding trend.

The east-west fault visible on photos NW 4/19-21 is shown in Lennox et al. (in press) to extend westward and to disappear under the Tertiary basalt. The photo study could not confirm this.

cont./..

..3..

A remarkable lineament is visible on both Landsat image 97-89 and topographic maps along the Rapid River. On the airphotos this lineament does not appear to be a continuous linear feature, but a belt of parallel joints, suggesting that, perhaps, a system of tensional stress is present, but that faulting has not taken place.

3. CAMBRIAN

Apart from photogeological unit Ev (Cambrian Volcanics) which displays fairly distinct geomorphological features, none of the Cambrian boundaries mapped by Williams and Turner (1973) or by Lennox et al. (in press) could be seen on the airphotos. One reason could be the complete alteration of the natural vegetation by human intervention, particularly in the northwestern part of the area.

Bedding information is not well displayed either. As a test, the dip symbols from published maps were plotted onto photos NW 3/12 and 4/13. Only very few of them correspond with features visible on the airphotos.

4. TERTIARY BASALT

The boundary between Tb and the other rock units is generally well displayed on the airphotos. Checking the preliminary interpretation along the road Trowutta - Lileah - Mengha - Forest - Black River (photos SC/AR 1/11-13, NW 4/13-15, NW 3/10-06) showed the boundary to be correct in most places. Therefore the Tb boundary is probably correct, except where the - ? - symbol is used.

The base of the basalt follows a pre-existing topographic surface. Where it is visible on the airphotos, the thickness of the basalt varies from a few metres to about

cont./..

..4..

80 m. This is consistent with published data (e.g. Longman and Matthews, 1961, p. 49).

A couple of possible volcanic vents are visible in the northwest corner of the area (photo NW 4/13). They are located along a major northwest-trending fault system, also visible as a lineament on Landsat image 97-89.

5. REFERENCES

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McNEIL, R.D. 1960 - Geological reconnaissance of part of the Arthur River area. Tasmanian Department of Mines, Technical Report No. 5, p. 46-60.

NASA, November, 1980 - Burnie Landsat image 97-89, I.D. number 22119 - 23151, 1:250,000 scale, processed by BHP Exploration in 1981.

NEALE, R.C. and WON, G.W. 1974 - Interpretative geology of E.L. 2/73 at 1:100,000 scale. Esso Australia Ltd., Minerals Department (unpublished).

WILLIAMS, E. and TURNER, N.J. (compilers), 1973- Burnie 1:250,000 scale geological map. Tasmanian Department of Mines, Hobart.

LEGEND

green ———— ? ———— Outcrop/non-outcrop boundary

blue/purple ———— ? ———— Lithological and/or geomorphological boundary

red
F ———— ? ———— F Fault

red
L ———— L Lineament

red
- - - - - Joint, minor fault

red
⊙ C.F. Circular feature

Horiz. 0°-10° 10°-35° 35°-90° Vert.

+ T orange II III
(generally used on dip slopes)

orange
~ ~ ~ ————
(generally used along edge of beds)

)
)
)
) Estimated dip
) of beds
)
)
)

orange • • • ? • • • Possible dykes

orange ———— ? ———— Trend lines, edge of beds; dykes in some areas.

blue → Selected drainage channels

Field observations are annotated in black pencil. Dip information from other maps is annotated in red ink.

<u>Photogeol. unit</u>	<u>Possible geological equivalent</u>
Cz	Cainozoic, undifferentiated - Alluvium, colluvium, soil etc.
Trrc	Alluvial terraces.
Tb	Tertiary Basalt.
Eu	Cambrian, undifferentiated - Siltstone, mudstone, greywacke; minor basic volcanics.
Ev	Cambrian Volcanics - Basalt, tuff; minor siltstone, greywacke.
Bu	Precambrian, undifferentiated - Siltstone, mudstone; minor quartzite, sandstone. Many trend lines annotated on areas probably are dolerite dykes.
Brd	Detention Quartzite - Quartzite, minor siltstone.
Bri	Irby Siltstone - Siltstone, mudstone.
?	Unknow.

26 November, 1981

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APPENDIX 2

GEOCHEMICAL RESULTS

REGION: NW Tas PROJECT NO.: T670 PROSPECT: Black River GRID CO-ORDS: LOCAL A.M.O.

DESCRIPTION Sample Type: Bank, sed, pan con Rock Type: Soil/Sediment Size Fraction: -40 mesh (bank and sed)

BR 1a bank sample ;
 BR 2a " "
 BR 3a " "

ANALYSIS Laboratory ANALABS Batch No 14-4-08-707 Date Analysed 4/12/81

Element	Cr	Fe	Co	Ni	Cu	Zn	As	Mo	Ag	Au	Pb	Sb	U	Sn	W		
Method Sample #										LG20		AI/I	AI/PLU	YRF	YRF		
BR 1a	75	7250	15	20	5	5	3	bld	bld	bld	bld	<1	1.5	5	<10		
BR 2a	135	9300	10	25	5	10	3	bld	bld	bld	5	4	1.6	8	10		
3a	110	3.60%	10	25	10	10	5	bld	bld	bld	20	<1	1.4	7	10		

REMARKS:

Logged or Sampled by: R. Hine
 K. King Date: 23/12/81

REGION: NW Tas PROJECT N^o: T670 PROSPECT: Black River GRID CO-ORDS: LOCAL A.M.G.

DESCRIPTION Sample Type Rock Type Soil/Sediment Size Fraction: -40 mesh

BR 4a bank ; BR 4b stream ; BR 4c pan con.

BR 5a " , BR 5b " BR 5c " "

ANALYSIS Laboratory Batch N^o Date Analysed

Element	Cr	Fe	Co	Ni	Cu	Zn	As	Mo	Ag	Au	Pb	Sb	U	Sn	W		
Method	AAS									LG20	AAS						
Sample #																	
BR 4a	105	5700	10	15	5	5	2	bld	bld	bld	10	<1	1.0	5	<10		
.. 4b	165	3150	bld	20	bld	5	1	bld	"	"	bld	<1	0.4	6	<10	*	
.. 4c	250	3300	"	20	5	10	bld	"	"	"	5	<1	0.6	3	10	*	
BR 5a	70	8100	5	25	5	20	1	bld	"	"	15	3	0.2	8	<10		
.. 5b	165	3550	bld	15	15	15	bld	bld	"	"	10	<1	0.6	5	<10	*	
.. 5c	195	2650	"	20	10	10	"	"	"	"	5	<1	1.5	<3	<10	*	

REMARKS:

Logged or Sampled by: R.H. K.K.

Date:

REGION: NWTAS PROJECT NO.: T670 PROSPECT: Black River GRID CO-ORDS: LOCAL A.M.G.

DESCRIPTION Sample Type: Stream Seds Rock Type: Soil/Sediment Size Fraction: -40 mesh

BR6 - sediment in dry gully
 BR7 - " " " "
 BR8a bank sample, BR8b stream sed.

ANALYSIS Laboratory ANALABS Batch No Date Analyzed

Element	Cr	Fe	Co	Ni	Cu	Zn	As	Mo	Ag	Au	Pb	Sb	U	Sn	W		
Method Sample ID										LG20		41/1		YRF	YRF		
BR6	100	1.5%	bld	20	10	25	6	bld	bld	bld	25	<1	0.2	6	<10	*	
BR7	150	2.35%	75	50	45	75	12	..	..	..	50	<1	1.0	<3	<10	*	
BR8a	290	6900	10	25	10	20	1	..	..	..	15	<1	0.7	3	<10		
BR8b	135	3750	bld	15	10	15	bld	bld	..	..	bld	<1	0.4	<3	<10	*	

REMARKS:

Logged or Sampled by: R.H./K.K. Date:

REGION: NW Tas PROJECT NO.: T670 PROSPECT: Black River GRID CO-ORDS: LOCAL A.M.D.

DESCRIPTION Sample Type: Rock Type: Soil/Sediment Size Fraction:
 a = bank, b = stream sed c = pan concentrate.

ANALYSIS Laboratory ANALABS Batch No Date Analysed

Element	Cr	Fe	Co	Ni	Cu	Zn	As	Mo	Ag	Au	Pb	Sb	U	Sn	W		
BR9a	95	135?	bld	30	10	20	2	bld	bld	bld	15	<1	0.6	<3	<10		
9b1	155	5000	..	20	5	15	1	..	..	..	10	<1	0.7	8	<10	*	
9c1	210	3800	..	10	15	15	bld	..	..	..	10	<1	0.4	<3	<10	*	
BR10a	315	155?	10	30	10	25	2	bld	..	..	10	3	1.2	3	<10		
10b1	120	2400	bld	15	5	10	bld	..	..	..	10	<1	0.5	4	<10	*	
10c1	180	2600	..	20	10	10	..	..	..	..	10	<1	0.7	3	<10	*	
BR11a	135	145?	10	30	15	20	2	bld	..	..	20	<1	1.0	3	<10		
11b1	175	3500	bld	20	10	15	bld	..	..	..	5	<1	0.4	4	<10	*	
11c1	245	3350	..	15	10	25	..	..	..	..	15	<1	0.6	8	<10	*	

Logged or Sampled by: R.H. K.K. Date: 23/12/81

REGION: NW TAS PROJECT NO.: T670 PROSPECT: Neasy Plains GRID CO-ORDS: LOCAL A.M.O.

DESCRIPTION Sample Type: SOIL Rock Type: Soil/Sediment Size Fraction: -40 mesh

- follow-up Esso E.M. anomalies in Neasy Plains area.

- NPA 4 red soil on weathered amphib. bohite & access pyrrhotite, 40 metre exposure

- NPA 11 grey loam on pyritic black shale

ANALYSIS Laboratory ANALABS Batch No 14-4-08-707 Date Analysed 4/12/81

Element	Cr	Fe	Co	Ni	Cu	Zn	As	Mo	Ag	Au	Pb	Sn	Sb	W	U		
Method Sample #	AAS	%							AAS	LG20	AAS	XRF	A11	XRF	A1/FLX		
NPA 1	30	2.05%	5	15	10	15	7	x	1.0	x	15	5	<1	<10	1.2		
2	30	1.90%	10	15	5	15	8	x	1.0	x	10	15	..	..	1.3		
3	15	2.60%	x	25	x	20	8	x	1.0	x	20	9	..	..	1.5		
4	40	14.2%	80	60	135	100	12	x	.5	x	245	10	..	..	1.5		
5	20	1.50%	5	10	5	10	11	x	1.5	x	30	10	..	..	1.2		
6	20	6300	10	5	x	5	4	x	1.0	x	15	15	..	..	0.8		
7	120	7.20%	15	30	45	40	16	x	.5	x	50	20	..	..	1.2		
8	15	2.85%	10	15	20	15	11	x	1.0	x	20	20	..	10	1.2		
9	10	4.60%	15	15	15	60	7	x	1.0	x	45	4	..	<10	1.2		
10	20	2.15%	10	15	10	5	45	x	1.0	x	60	8	..	..	4.2		
11	35	2.70%	10	15	30	10	101	x	1.5	x	120	15	..	..	5.9		

x = below lower detection limit. Logged or Sampled by: R.H., K.K. Date: 23/12/81

REGION: NWTAS PROJECT NO.: T670 PROSPECT: Neasy Plains GRID CO-ORDS.: LOCAL A.M.G.

DESCRIPTION Sample Type: Soil Rock Type: Soil/Sediment Size Fraction: - 40 mesh

NPA 12 red-yellow clay some quartz and amphibolite in float

NPA 13 yellow-grey clay on weathered siltstone.

NPA 15-23 yellow-grey clay rich in black pyritic slates

ANALYSIS Laboratory ANALYSIS Batch No Date Analysed

Element	Cr	Fe	Co	Ni	Cu	Zn	As	Mo	Ag	Au	Pb	Sn	Sb	W	U
NPA 12	205	5.60%	10	55	30	30	20	x	1.0	0.021	40	6	<1	<10	0.6
13	30	1.45%	15	10	5	5	11	x	x	0.016	20	10	4	"	1.1
14	20	14.0%	x	10	10	5	27	x	x	x	30	3	<1	"	1.6
15	40	2.95%	5	30	20	20	20	x	x	x	25	10	"	"	2.6
16	35	1.65%	5	20	15	10	35	x	x	x	20	5	2	"	3.2
17	45	2.30%	5	15	5	5	15	x	x	x	20	<3	<1	"	1.7
18	30	1.35%	x	20	10	5	14	x	.9	x	5	10	"	"	2.1
19	55	2.20%	10	10	10	10	43	x	x	x	10	8	"	"	2.5
20	60	1450	x	10	5	5	7	x	.5	x	5	4	"	"	2.5
21	65	5950	x	10	15	5	20	5.0	1.0	x	35	7	3	"	6.0
22	50	5600	15	10	15	5	14	x	.5	x	25	6	4	"	3.2
23	85	8300	5	15	20	5	10	1.5	x	x	5	8	6	"	2.8

Logged or Sampled by: R.H., K.K. Date: 23/12/81

810024

REGION: NWTAS PROJECT NO.: T670 PROSPECT: Neasy Plains GRID CO-ORDS: LOCAL A.M.G.

DESCRIPTION Sample Type: Stream sed Rock Type: Soil/Sediment Size Fraction: -40 mesh
 - Stream samples near corresponding NPA soil samples.

ANALYSIS Laboratory ANALYSIS Batch No 14.4.08.707 Date Analysed 4/12/81

Element	Cr	Fe	Co	Ni	Cu	Zn	As	Mo	Ag	Au	Pb	Sb	U	Sn	W		
Method Sample #										HG-20		A11/1	A1/FLU	TRF	XRF		
NPAGa	155	6500	bld	15	5	15	4	bld	bld	bld	10	<1	0.2	5	<10	*	
7a	230	8500	"	25	5	25	3	"	"	"	20	"	0.6	8	"	*	
10a	155	2500	"	15	5	15	2	"	"	"	15	"	0.8	7	10	*	
14a	250	7150	"	20	10	20	5	"	"	"	15	"	0.2	9	<10	*	
15a	230	6250	"	20	15	15	13	"	"	"	10	"	0.6	3	"	*	

REMARKS:

Logged or Sampled by: R.H., K.K. Date: 23/12/81

REGION: NW TAS PROJECT NO.: T670 PROSPECT: NEASY PLAINS GRID CO-ORDS: LOCAL A.M.G.

DESCRIPTION Sample Type: Rock Rock Type: Dolerite/Black Slate Soil/Sediment Size Fraction:

ARA43: Wld/fresh dolerite, v. weakly magnetic, minor dissemin pyrite, po (NPA4 site); essntls hbl? - play rock.
 .. 44: Black slate with dissemin pyrite & pyrite rich beds (NPA11 site)
 .. 45: leached slate white to light grey, some limonite aft- pyrite (NPA14 site)
 .. 46: Hard black slate minor pyrite beds, some leaching of pyrite locally.
 .. 47: Black slate as above, c of g mths, v. minor copper? staining.
 .. 48: " " " " leached pyrite beds & nodules, graphitic.

ANALYSIS Laboratory ANALABS Batch No 14-4 08 707 Date Analysed 4/12/81

Element	Cr	Fe	Co	Ni	Cu	Zn	As	Mo	Ag	Au	Pb	Sb	U	Sn	W		
Method Sample #	AAS									AG20	AAS	AAS(II)	Fhr ^{AI}	XRF	XRF		
ARA 43	55	4.95%	35	95	95	130	18	bid	<0.5	bid	50	<1	0.6	<3	<10		
44	20	6400	20	70	75	65	43		0.5		70	6	5.2	<3			
45	15	7850	bid	25	20	15	20	21.5			45	3	5.5	<3			
46	35	2.45%	20	85	70	60	44	bid			35	5	5.4	3			
47	55	2.30%	10	90	40	35	25	13.5			40	4	7.2	<3			
48	50	6550	10	170	95	55	41	bid			45	5	3.8	<3			

REMARKS:

Logged or Sampled by: R. Hine
 K. Knys Date: 23/12/81

REGION: NWTAS PROJECT NO.: T670 PROSPECT: LAWSON RIV'T GRID CO-ORDS.: LOCAL A.M.B.

DESCRIPTION Sample Type: Stream Rock Type: Soil/Sediment Size Fraction: - 40 mesh.
 T67 153 C, D, E stream samples collected to follow-up limonite occurrence reported by T.M.D. in trib. of Lawson R. (old sample site: 153A,B)

ANALYSIS Laboratory ANALABS Batch No 14-4-08-707 Date Analysed 4/12/81

Element	Cr	Fe	Co	Ni	Cu	Zn	As	Mo	Ag	Au	Pb	Sb	U	Sn	W		
Method																	
Sample #										1620		A11/1	A1/FLU	XRF	XRF		
T67 153 C	245	1900	bld	15	5	10	1	bld	bld	bld	10	<1	<0.1	<3	<10	*	
D	240	1700	"	15	10	25	bld	"	"	"	25	"	"	"	"	*	
E	250	1850	S	10	5	10	"	"	"	"	10	"	0.1	"	"	*	
153 A*	10	NR	NR	<4	4	2	<2	<4	<1	<0.05	<4	<4	NR	<4	15	*	
B*	12	"	"	<4	8	4	"	"	"	"	<4	"	NR	"	<10	*	

REMARKS: * Comlabs results A= stream sed B= pan con. 1980

Logged or Sampled by: R.H., K.K. Date: 23/12/81

027

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APPENDIX 3

PETROLOGICAL REPORTS

Heavy Mineral Concentrate Sample Sites
Arthur River Area

- A.R.1 Arthur River, lag deposit below bridge at Arthur River Heads
- A.R.2 Arthur River, Kannunnah Bridge, Sumac Road
- M.R.L. 12781 Tayatea Bridge, Tayatea Road
- A.R.3 Arthur River, Savage River Pipeline Bridge
- A.R.4 Arthur River, Hilders Bridge
- A.R.5 Arthur River, Farquhars Bridge
- A.R.6 Arthur River, upstream from Hellyer River Junction, Blackwells Road
- A.R.7 Arthur River, near Jozic's alluvial tin workings, Rubber Road, off
Wandle Road

Table Concentrate, Jozic's alluvial tin workings, Rubber Road, off Wandle Road.

ABSTRACT:

Examination of stream gravel samples collected from the Arthur River and tributaries revealed the presence of cassiterite in samples AR 2-7, Jovic's Alluvial workings, KR1, SR1 and FR1.

In AR2-7, Jovic's, and KR1, the cassiterite was associated with topaz, blue tourmaline (ferrian dravite) and quartz in a similar assemblage to that found at Mt. Bischoff and in sample MRL 12781 (i.e. in aggregates composite with associates, as monominerallic aggregates and as discrete grains).

Individual cassiterite crystals range in size up to approximately 0.5mm., are generally coloured greenish grey to greyish brown.

The cassiterite content appears to be at its maximum in AR6 and progressively falls to AR3. Minor anomolous increases to MRL 12781 and AR2 may reflect further input of cassiterite and associates or may be due to statistical effects in sampling and counting.

Angular monominerallic aggregates and discrete grains are found in all samples bearing cassiterite of the Arthur River - Mt. Bischoff type and association. Even grains from the lower sample sites (e.g. MRL 12781, AR2) are only affected by minor edge wear. Cassiterite euhedra partly included in, and protruding from, abrasion resistant hosts such as quartz crystals show a progressive increase in wear and rounding from AR6 to AR2.

The discrete, worn, reddish, yellow or brown cassiterite found in SR1 and FR1 is distinct from that in the Arthur River and is not associated with topaz or blue tourmaline.

No cassiterite was detected in AR1, HR1, RR1 or LR1.

1.

INTRODUCTION

Detailed study of pan concentrates from the Tayatea Bridge (MRL 12781) revealed the presence of minor cassiterite as single grains, monominerallic aggregates and in composite aggregates with topaz and tourmaline (blue, ferrian dravite). Mineralogically this association is similar that accompanying cassiterite at Mt. Bischoff. However the ability of angular, discrete or aggregated grains of cassiterite to survive stream transport over 50 km is in doubt. This study therefore examines the progressive changes in rounding, concentration, mineral association and grain size of cassiterite along the Arthur River.

Methods

With the exception of the Table Concentrates from Jovic's Alluvial Workings (MRL 13035) all the samples were separated into "sinks" and "floats" using bromoform (S.G. $\sim 2.2\text{g.ml.}^{-1}$) as the separating medium. The concentrate was screened into +0.85mm, +0.42-0.85mm and -0.42mm size fractions prior to examination.

A small sample of the -0.42mm fraction was placed on zinc sheet with dilute HCl, allowing the cassiterite to develop a coat of metallic tin and thereby facilitating its detection. Cassiterite included in many composite grains did not "tin", presumably because no electrical contact between the inclusion and the zinc base was established, however these grains could generally be readily recognised by their form, colour and association.

The number of monominerallic cassiterite grains (i.e. discrete crystals + monominerallic aggregates) and the number of composites bearing cassiterite in 300 grains of size +0.15mm to 0.42mm, were recorded.

Hopefully this should give an estimate of the concentration of cassiterite in each sample and provide a measure of the relative abundance of composites and monominerallic grains.

Results and Comments

1. Cassiterite is present in all samples from the Arthur River with the exception of ARL. It characteristically occurs as brown, greyish brown or greenish grey grains often intergrown with topaz, ferrian dravite and/or quartz, as monominerallic aggregates or as discrete, often euhedral crystals. Quartz-cassiterite composites were most prominent in the coarser fractions, the cassiterite being wholly or partly included in discrete subhedral quartz crystals up to 0.9mm. in length.
2. Cassiterite crystals usually range in size from 30 to 200 μm with occasional euhedra reaching 500 μm . Monominerallic aggregates usually do not exceed 500 μm in size. Composite grains are present in all size fractions, the largest grain measuring approximately 0.9mm. in length.

- 3. Cassiterite similar to that found in the Arthur River also occurs in trace quantities in KRL.
- 4. Small amounts of cassiterite were detected in the -0.42mm. fraction of SR1 and KRL. In both cases the grains were discrete, rounded and coloured reddish brown, orange, amber or black. They are distinctly different from the Mt. Bischoff cassiterite.
- 5. The cassiterite count per 300 grains is summarised in Table 1.

TABLE 1

CASSITERITE IN 300, -0.42 +0.15mm GRAINS

MONOMINERALLIC CASSITERITE		COMPOSITE GRAINS WITH QUARTZ AND/OR DRAVITE AND/OR TOPAZ
Jovic's	16	11
AR 7	1	1
6	40	30
5	7	6
4	-	4
3	-	3
MRL 12781	-	6
AR 2	-	7
1	-	-
SR 1	1	-
KR 1	3	-
HR 1	-	-
RR 1	-	-
LR 1	-	-
FR 1	3	-

Features of this table include

- i) The dramatic increase in cassiterite content from AR7 to AR6.
 - ii) The rapid decline in cassiterite content from AR6 to AR5.
 - iii) The greater persistence of cassiterite in composite grains.
 - iv) An apparent anomalous increase in cassiterite content from AR3 to MRL 12781 and AR2. (This may, in fact be due to statistical sampling and counting uncertainties, or to differences in the ability of sample sites to act as heavy mineral traps).
6. The characteristics of cassiterite found in the Arthur river system are summarised in Table 2.

TABLE 2

CHARACTERISTICS OF CASSITERITE IN AR1-6, JOVIC'S, AND MRL 12781

ASSOCIATION	SIZE	COMMENTS
Jovics		
Composites	To 900 μ m (quartz).	Protruding C. Little or nowear restricted to edges, angular to subangular.
Individuals	To 400 μ m.	Usually angular with little or no wear.
Monomin. Agg.		Little or no wear.
AR 7 Composites		
Composites	To + 850 μ m (topaz)	Protruding C. Slight wear & rounding of edges.
Individuals	Occasionally to approx. 400 μ m.	Angular, some show slight edge wear.
Monomin. Agg.	Commonly to approx. 400 μ m.	Angular, some show slight edge wear.
AR 6 Composites		
Composites	To + 0.85 (topaz, quartz).	Protruding C. usually slight wear on edges at most, occasionally some rounding to "sub rounded".
Individuals	up to 350 μ m.	Usually angular with minor edge wear.
Monomin. Agg.	Aggregates up to about 600 μ m. Individual crystals in aggregates up to about 400 μ m, usually 30 - 150 μ m.	Usually angular with minor edge wear, occasionally tend towards subrounded.
AR 4 Composites		
Composites	In +0.42 -0.85mm with dravite, topaz, quartz.	Protruding C. generally rounded but not worn down to level of including material.
Individuals	rare, <200 μ m.	Very few grains found.
Monomin. Agg.	rare, <420 μ m.	
AR 3 Composites		
Composites	included +0.85mm quartz. also with dravite and topaz in - 0.85mm.	Cassiterite euhedra (<200 μ m), protruding ends usually rounded off.
Individuals	rare in +150-420 μ m range.	
Monomin. Agg.	rare in +150-420 μ m range.	
MRL 12781 Composites		
Composites	Included in + 0.85mm quartz also with dravite and topaz in -0.85mm.	Protruding ends rounded off almost level with quartz.
Individuals	rare in +150-420 μ m range.	
Monomin. Agg.	rare in +150-420 μ m range.	

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TABLE 2 (Cont.)

CHARACTERISTICS OF CASSITERITE IN AR1-6, JOVIC'S, AND MRL 12781.

ASSOCIATION	SIZE	COMMENTS
AR 2 Composites	Included in +0.85mm quartz also less commonly with -0.85mm, dravite and topaz	Cassiterite euhedra ($<200\mu\text{m}$) protruding ends usually rounded and well worn.
Individuals Monomin. Agg.	rare in +150-420 μm range. up to 300 μm .	Angular usually with minor wear on edges.
	Individual euhedra in aggregates usually range in size up to 150 μm and occasionally exceed 200 μm .	
AR 1	No cassiterite detected.	

Features include

- i) The maximum size of composites falls from +0.85mm to -0.85 +0.42mm while the maximum size of discrete crystals appears to remain approximately constant with distance, downstream of Mt. Bishoff. However the rarity of cassiterite in the more distant samples did not allow an accurate estimate of size to be made.
- ii) Cassiterite euhedra, partly included in and protruding from resistant grains (e.g. quartz) appear to show a progressive increase in degree of roundness and wear. At Jovic's such cassiterite is angular and shows little wear while from AR 3 downstream, the few grains examined showed pronounced wear.
- iii) Monominerallic grains of cassiterite, both as single crystals and in aggregates, tend to remain angular and show only a slight possible increase in wear with increasing distance downstream. The most distant samples (AR 2, 3, 4, MRL12781) contained only rare usually angular, monominerallic cassiterite, possibly derived from the break-up of cassiterite bearing composites.

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APPENDIX 1

Sample No. AR 1

MRL 13022

+0.85 mm.

no concentrate.

+0.42 -0.85mm.

Very little concentrate,
mainly apparent shell
fragments.

-0.42 mm.

Dominant - shell fragments.

Abundant Topaz

Colourless, often broken
single crystals, less commonly
cryptocrystalline (massive)
aggregates.

Tourmaline

Subangular to rounded
greenish-brown to black.

Epidote
Limonite

Minor

Ferrian dravite

Subangular to subrounded blue
crystal fragments and
subrounded to well rounded
fine grained aggregates.

Chromite
Zircon
?Almandine

Dull orange fluorescence.

Trace

?Fuschite
Muscovite
?Ilmenite
?Rutile

No cassiterite was
detected.

035

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Sample No. AR 2

MRL 13023

+0.85 mm.

Abundant	Limonite Ferrian dravite	Blue very fine grained aggregates, subangular to rounded.
----------	-----------------------------	---

	Topaz	Micro- to crypto- crystalline aggregates, subrounded to rounded, less common individual crystals and distinctly crystalline aggregates show some wear on edges and are generally subangular.
--	-------	--

Minor	Orthopyroxene ?bronzite-hypersthene	Yellow green anhedral.
-------	--	------------------------

Trace	Cassiterite-quartz intergrowths	Cassiterite occurs as small (<200µm) crystals wholly or partly included in quartz crystals. Generally worn and rounded where they protrude. Coloured brown to greenish grey.
-------	---------------------------------	--

+0.42 -0.85mm.

Abundant	Limonite Ferrian dravite	Subrounded to rounded aggregates and rare angular to subangular individual crystals.
----------	-----------------------------	--

	Topaz	Aggregates subangular to unded, occasional colourless to orange individual crystals, generally angular.
--	-------	---

Minor	Cassiterite	-inclusions and intergrowths with quartz or less commonly with dravite or topaz.
-------	-------------	--

	Carbonate	(probably mainly siderite)
--	-----------	----------------------------

Trace	Orthopyrxene Chromite	Yellow-green. Often small euhedra.
-------	--------------------------	---------------------------------------

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-0.42 mm.

Similar mineralogy to that outlined above.

Cassiterite usually occurs in aggregates with quartz, dravite or topaz and more rarely as individual grains or monominerallic aggregates. Individual crystals in aggregates generally range in size from 30 μ m - 150 μ m and occasionally attain a size of 300 μ m.

Of 300 grains counted cassiterite was present in seven, and all of these were composite aggregates.

Sample No. AR 3

MRL 13024

+0.85 mm.

Dominant Limonite
Minor Topaz

Commonly rounded, very finely crystalline to fibrous aggregates.

Ferrian dravite

Blue subangular to subrounded aggregates.

Trace Cassiterite-Quartz intergrowths

Some small (<200 μ m) cassiterite crystals embedded in quartz. These are generally rounded off where they protrude. The cassiterite is greenish grey to brown in colour.

+0.42 -0.85 mm.

Abundant Limonite
Topaz

Rounded masses of commonly fibrous to acicular, very fine crystals. Radiating texture in some cases. Granular aggregates less common. Minor apparently unworn, sharply angular, individual crystals and crystal fragments.

Minor Ferrian dravite

Blue generally fine grained aggregates. Subangular to subrounded. Edges of crystals and broken fragments generally show some wear. Some aggregates are composed of radiating acicular crystals.

037

810038

+0.42 -0.85mm.

Carbonate
?siderite

Cleavage fragments
generally show rounded edges.

Cassiterite
(intergrowths)

Small greenish-grey to brown
grains of cassiterite are
intergrown with quartz, topaz
and more rarely dravite. No
monominerallic aggregates
observed.

Trace Tourmaline
?schorl

Black, brownish or greenish.

Orthopyroxene

Yellow-green in colour.

-0.42.

Mineralogy similar to
that described above
+ minor Ferrian dravite

As well formed, fractured
hexagonal prisms.

Trace Almandine
Zircon

Cassiterite occurs as rare
individual crystals and
monominerallic aggregates as
well as composite aggregates
with quartz, topaz and
dravite. The grains
comprising the aggregates
usually appears to range in
size from 30 to 150 μm. The
colour is dominated by
greenish-grey, brownish grey
and brown tones. Of 200
grains counted, six
cassiterite bearing composite
aggregates were found.

038

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Sample No. AR 4

MRL 13025

0.85mm.

Dominant Rock fragments Mainly schistose and ferruginous.

Abundant

Ferrian dravite Blue aggregates, very finely crystalline. Subangular to subrounded.

Topaz Crypto- to micro-crystalline masses and granular to fibrous crystalline aggregates, generally subangular to subrounded.

-0.85 -0.42mm.

Dominant Rock fragments Mainly schistose and ferruginous.

Abundant Topaz

Fine grained masses and granular to fibrous aggregates, angular to subrounded, minor well formed single euhedra.

Ferrian dravite Blue fine grained aggregates, angular to subrounded.

Minor Carbonate (?Clino) pyroxene

Probably mainly siderite. Olive green to dark green in colour.

Cassiterite Occurs in composite grains with tourmaline, topaz or quartz. Where crystals protrude they are generally somewhat rounded but usually not worn down to the level of the including material.

039

810040

-0.42mm.

Dominant	Topaz	aggregates+abundant euhedra
Abundant	Limonite	
	Ferrian dravite	
Minor	Carbonate	Probably mainly siderite.
	Chromite	Common euhedra.
	?Clinopyroxene	Olive green to dark green.
	Cassiterite	In composite grains with topaz, dravite or quartz, or rarely as individual crystals or monominerallic aggregates. Of three hundred grains counted, four composite cassiterite grains and no monominerallic cassiterite grains were found.
Trace	Epidote	
	Tourmaline	Black, brown, greenish.
		?schorl.
	Rutile	

Sample No. AR 5

MRL 13026

+0.85mm.

Dominant Limonite and ferruginous rock fragments

Abundant	Topaz	Subrounded to rounded fine grained masses and granular to acicular aggregates.
----------	-------	--

Minor	Ferrian dravite	Blue subrounded aggregates.
	Carbonate	Probably mostly siderite.

Trace	Tourmaline	Black.
	Pyroxene	

-0.42 -0.85mm.

Dominant Limonite and ferruginous rock fragments

Abundant	Topaz	Subangular to rounded fine grained masses and granular or acicular, radiating aggregates.
----------	-------	---

Minor	Almandine	Subrounded to rounded blue aggregates.
	Ferrian dravite	?probably mainly siderite.
	Carbonate	Commonly euhedral.
	Chromite	

040

810041

Cassiterite

Commonly as small euhedral grains in topaz or dravite aggregates or with quartz. Some protruding grains are rounded off but most others remain angular or are only slightly worn on edges.

Trace

Tourmaline

Dark green, brown, black. (?schorl)

Biotite

Epidote

Pyroxene

Green.

-0.42mm.

Mineralogy similar to above.

+ Ferrian dravite

As minor quantities of fractured prismatic crystals.

Cassiterite

As monominerallic aggregates and occasional single crystals (<400 μm) as well as composite aggregates (<420 μm). Individual grains in composite and monominerallic aggregates are normally in the size range 30 to 200 μm. Six composite cassiterite bearing grains and seven monominerallic cassiterite grains were found in 300 grains examined.

041

810042

Sample No. AR 6

MRL 13027

+0.85mm.

Dominant	Rock fragments	
Abundant	Limonite	
	Topaz	Very fine grained massed, granular to acicular radiating aggregates, subangular to rounded.
	Ferrian dravite	Subrounded to subangular blue aggregates.
Minor	Cassiterite	Fine crystals in aggregates with topaz and quartz.
	Carbonate	Probably mainly siderite.
	?Epidote	
Trace	Tourmaline	Dark green.
	Orthopyroxene	Yellow-green ?hypersthene-bronzite.

+0.42 -0.85mm.

Dominant	Rock fragments	
Abundant	Limonite	
	Topaz	As above + euhedral colourless topaz crystals.
	Ferrian dravite	As above.
	Carbonate	Probably mainly siderite.
Minor	Chromite	Often euhedral.
	Cassiterite	In composite aggregates and minor monominerallic aggregates, angular to subrounded.
Trace	Epidote	
	Orthopyroxene	Yellow-green ?hypersthene-bronzite.
	?Clinopyroxene	Olive green.

Mineralogy similar to that above.

Cassiterite abundant. Often brown with greyish tones. As monominerallic and composite aggregates, and single crystals. Size range up to 350 μ m. but generally 30-150 μ m. (for individual crystals in aggregates). Often angular with minor edge wear but range to subrounded. Of 300 grains counted 30 were composite, 40 monominerallic.

042

810043

+ Minor pyrite		
Trace Ferrian dravite		As blue fractured hexagonal prisms.
Zircon		Fluoresce bright golden orange.

Sample No. AR 7

MRL 13028

+0.85mm.

Dominant Limonite +
ferruginous rock fragments
Abundant

Carbonate	Probably mainly siderite $\rho=1.69$, $\omega>1.78$.
Sphalerite	Subrounded, rough, dark brown aggregates.

Minor Pyrite	
Ferrian dravite	Angular to subrounded blue aggregates.

Trace Cassiterite	Fine crystals in topaz aggregates. Protruding crystals only slightly rounded and worn on edges.
-------------------	---

+0.42 -0.85mm.

Abundant Carbonate
Limonite +
ferruginous rock fragments

Probably mostly siderite.

Pyrite	
Topaz	Generally angular masses and aggregates. Some individual crystals. Some rounded radiating aggregates.

Minor Ferrian dravite	Generally blue fine grained aggregates, angular to subangular.
-----------------------	--

Chromite	Commonly euhedral.
----------	--------------------

Cassiterite	Granular composite aggregates with quartz, dravite and/or topaz, up to 850 μ m. in diameter.
-------------	--

Trace Clinopyroxene	Dark green to olive green.
Monoclinic amphibole	Pale blue-green in colour.
Olivine	Pale green equant to rounded grains.

043

-0.42mm.

Mineralogy similar to
above.
+ Trace cassiterite

810044

As monominerallic grains and
single crystals. Angular,
some with slight edge wear.
Two composite grains
containing cassiterite
crystals were found in 300
grains examined.

044

MRL 12781

The original sample from Arthur River was re-examined in order to compare the colour, roundness and abundance of the cassiterite with that occurring in samples AR 2-7. The sample was screened at 0.85mm, 0.42mm. and 0.15mm. enabling closer examination of the small quantities of concentrate occurring in the coarser fractions. The distribution of cassiterite grain size therefore is recorded as covering a wider range than detailed in memo M574.

+0.85mm.	Dominant Topaz	As fine grained to granular masses, subangular to rounded.
	Minor Ferrian dravite	Fine grained subrounded to well rounded masses.
	Trace Limonite	
	Trace Chromite	
	Trace Cassiterite-quartz intergrowths	As inclusions in one quartz grain. Grey brown in colour. Protruding ends rounded off almost level with quartz.

+0.42 -0.85mm.	Co-Dominant Limonite Topaz	Fine grained to granular or acicular masses, angular to subrounded masses. Occasional euhedra.
	Minor Ferrian dravite	Blue masses, fine grained to acicular, subangular to rounded.
	Trace Cassiterite	In aggregates with quartz topaz or dravite. Angular to subrounded aggregates. Protruding cassiterite is somewhat worn and slightly rounded.
	Trace Orthopyroxene	Yellow-green. Layered appearance, very good cleavage.

-0.42mm.
+0.15mm.

Mineralogy is as recorded in memo M574 and similar to that described above with additional traces of carbonate almandine, rutile and sphene. Greyish, greenish to brown cassiterite occurs as composites, monominerallic aggregates and individual crystals. Of 300 grains examined, six cassiterite bearing composites were found. No monominerallic cassiterite occurred in this small sample. Cassiterite crystals in composites usually <120 μm.

045

THE BROKEN HILL PROPRIETARY CO. LTD.
EXPLORATION DEPARTMENT
 Petrology Section

810046

245-273 Wellington Road
 Clayton, Victoria 3168
 P.O. Box 264, Clayton
 Telephone 580-7088

Memo to: MR. K. KUYS
 GEOLOGIST-HOBART OFFICE

Subject: E1/15 PETROGRAPHY OF CHERTS FROM ARTHUR RIVER AREA,
 TASMANIA.

Date: Nov. 12, 1981
 Our Ref: WHR/SLD
 Your Ref:
 File:
 Date: M593

SAMPLES: SRQ 1-3 = MRL 13334 - 13336

The rocks SRQ 1-3, MRL 13334-6, are cherts, probably formed by the partial silicification of limestone or dolomite followed by leaching of the remaining carbonate.

HAND SPECIMENS

Hand specimens of the rocks are very fine grained and highly porous. Alternating bands of light and dark material, thin laminations and nodular textures are represented. Fractures, both open and quartz filled, disrupt the banding. SRQ1 contains numerous rounded nodules up to 0.5cm in diameter. Cavities of a comparable size and shape are closely associated with the nodules.

THIN SECTION - MINERALOGY

The rocks consist mainly of fine to cryptocrystalline quartz with less frequent patches and spherulitic aggregates of fibrous chalcedony. Traces of muscovite and opaques were detected optically. XRD showed accessory illite-sericite, montmorillonite, and traces of smectite probably associated mainly with the dark bands. No carbonate was detected by either XRD or optics (with alizarin stain).

TEXTURE

Nodular textures, cavities, thinly layered dark ?organic bands and ??microfossils are visible and often distinct in thin section.

The nodules are either internally uniform or consist of a multiple cored, complex distribution of very fine interlocking and cryptocrystalline quartz. An envelope of cryptocrystalline quartz forms the outer boundary of the nodule as seen in thin section. Cores are often clouded by a slight brown stain.

The nodules are surrounded by a matrix of finely crystalline quartz and minor chalcedony in the case of SRQ1 and by dark brown material in SRQ2.

Dark brown bands present in SRQ2 and SRQ3 are very finely laminated and consist of cryptocrystalline or amorphous material of uncertain composition. The laminae vary in continuity from small lenses enclosed in fine quartz, to continuous layers easily traced across much of the section. The laminae are smooth and even to wavy to irregularly contorted. In the nodular band (SRQ2) they tend to curve around and between the nodules.

Numerous spherical bodies 50-120 μ m in diameter composed of very finely crystalline quartz or fibrous chalcedony occur within the dark bands. These occasionally show an internal structure comprising a pale brown rim and a clear core. While the origin of these structures is uncertain their uniformity of size and shape and their internal structure suggests they may be fossilised tests of micro-organisms.

Part of the brown material in SRQ2 appears to have a vague cellular texture (cell diameter 5-10 μ m). It is tentatively suggested the brown material is organically derived and may be algal in origin.

The light coloured areas consist of a fairly featureless distribution of colourless fine and cryptocrystalline quartz and fibrous chalcedony. Under high magnification rare rhombohedral shapes outlined by a peppering of opaque dust are visible. These are now quartz filled but their shape suggests they may be psuedomorphs after carbonate.

CONCLUSIONS

Many of the textures described are rather vague and therefore somewhat ambiguous. However taken together there is some evidence that the rock was originally a carbonate of algal-pelletal type.

1. Presence of rhombic outlines suggests the presence of original carbonate.
2. The low detrital content implies the sediment was chemical and/or organic in nature and characterizes an environment that could suit the development of algal mats and pelletal carbonates.
3. The lamination thickness and texture of parts of the dark material (wavy, cellular) resembles that found in algal limestones.
4. The fine microspherules might be interpreted as microfossils incorporated into the algal film.

Subsequent partial replacement of the carbonate by silica followed by a leaching cycle has produced the porous chert now present.

W.H. RINGENBERGS

Whingenberg
PETROLOGIST

cc. Dr. A. Goode then Mrs. D. Jenkinson-Camberwell.
A. Clarke - Brisbane.

APPENDIX 1PETROLOGICAL DESCRIPTIONS

SRQ1
MRL 13334

ROCK TYPE - POROUS NODULAR CHERT

HAND SPECIMEN

Grey and white irregularly banded. Numerous subrounded to rounded nodules (to 0.5 cm. in diam.). Some flattened. Porous. Numerous cavities similar in size and shape to nodules, grey inner surface. Fine grained porous matrix.

THIN SECTION

Quartz dominant. Montmorillonite, illite/sericite detected by XRD. No Carbonate. Nodules of fine grained to cryptocrystalline quartz. Internal structure occasionally composite with cryptocrystalline patches surrounded by fine granular quartz, enclosed in outer envelope of cryptocrystalline quartz. Occasional quartz grains to 100 μm in nodules. No distinct concentric banding. Some cores have slight brown stain.

Matrix interlocking to polygonal granular quartz to 150 μm . Numerous small irregular pores.

Cavities mimicing nodules, generally rimmed by granular to elongate relatively coarse quartz impinging into the cavity.

SRQ2
MRL 13335

ROCK TYPE - LAMINATED NODULAR CHERT

HAND SPECIMEN

Alternating white and dark bands of varying thickness. Light bands uniform and featureless. Dark bands laminated. One dark band contains numerous spherical to elongate, light coloured nodules to 0.5mm in diam. Numerous open and quartz filled fractures transect banding.

THIN SECTION

Fine grained interlocking to polygonal granular quartz dominates matrix and nodules. Chalcedony in fan shaped to spherulitic fibrous aggregates is a minor matrix component.

Dark bands comprise thinly laminated dark brown (?organic, cellular in places, cells 5-10 μm) material which, in one band encloses and wraps around both quartzitic nodules and numerous fine (50-120 μm) quartz or chalcedony filled spherules (??microfossils, uniform in size, some have light brown rim and clear core). When not associated with nodular bands the laminations are generally uniform in thickness (approx 10-20 μm) smooth to wavy, and lensoid to reasonably continuous.

Occasional plates of muscovite up to 70 μm in length occur in dark layers and generally lie parallel to lamination.

Tiny rare rhombohedral to irregular quartz filled features outlined by an opaque dusting suggest the presence of original carbonate.

048

Numerous stumpy hexagonal prisms (mostly approx. 20 x 30 μ m) are associated mainly with the dark bands. These appear to be holes. (RI < quartz. SEM analysis records only Si).

SRQ3
MRL 13336

ROCK TYPE - LAMINATED CHERT

HAND SPECIMEN

Fine grained rock banded in grey and white. Dark bands finely laminated. Fractures, either open or quartz filled, transect and occasionally displace banding and lamination.

THIN SECTION

The section is dominated by fine grained to cryptocrystalline quartz and less common fibrous radiating chalcedony. Laminated bands of dark brown (?organic) material contain a few small spherical (??micro fossil) features but nodules are absent. The laminations are 10-20 μ m thick, smooth to wavy and reasonably continuous. Thin veinlets of quartz are emplaced along microfractures which transect and occasionally displace the banding and lamination.

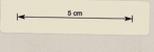
Traces of muscovite occur as plates to 70 μ m length lying in parallel to the lamination.

Colourless hexagonal prisms similar to those described with reference to MRL 13335 are associated with dark bands. They are probably holes left after some earlier mineral has been leached out.

Xray diffraction has detected accessory illite/sericite/muscovite and traces of smectite associated with the dark bands.



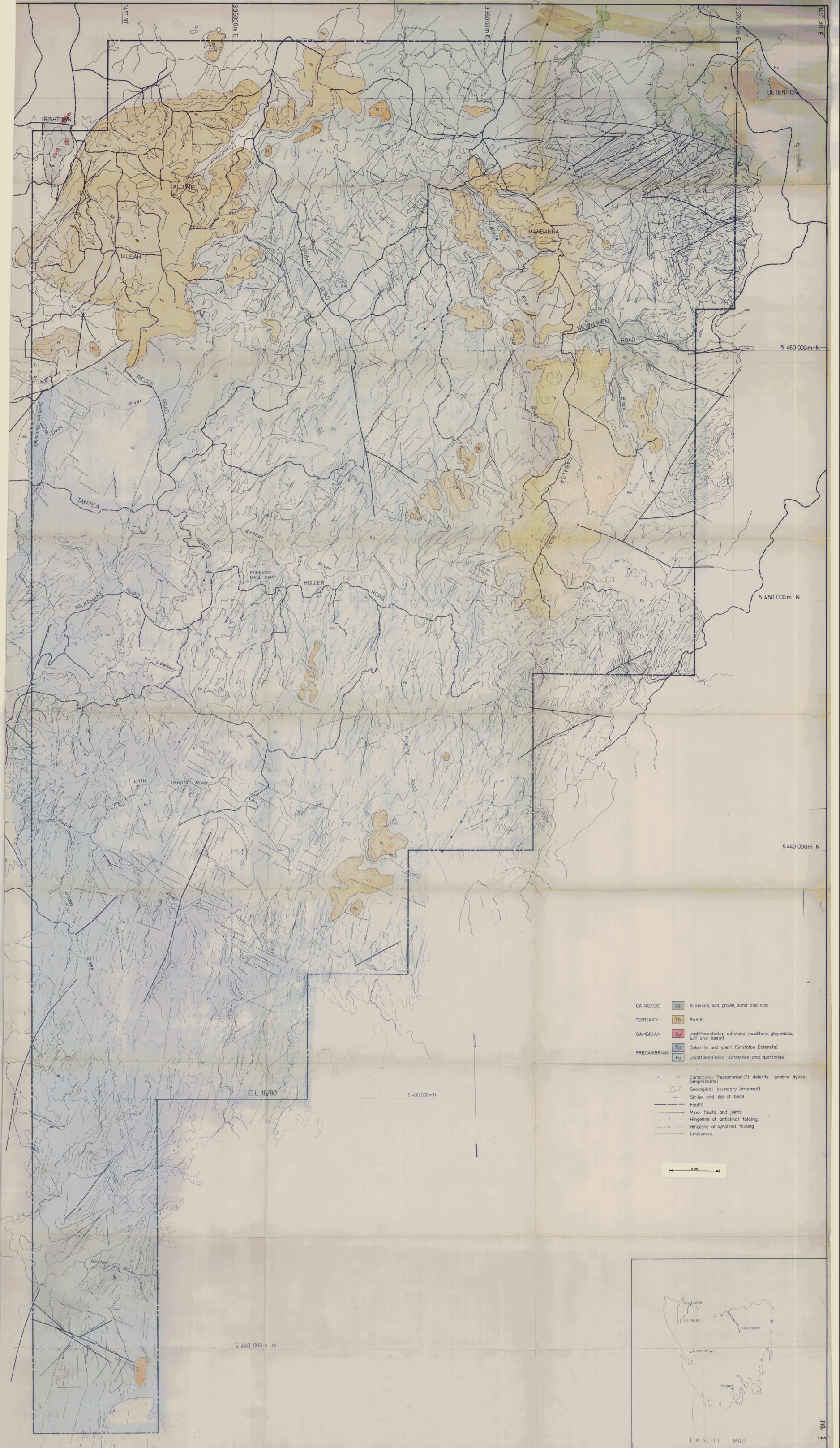
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EXPLORATION DEPARTMENT
EL.18/80, ARTHUR RIVER, TAS.
INTERPRETIVE GEOLOGY

Revisions	
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CAINOZOIC	Cz	Alluvium, soil, gravel, sand and clay
TERTIARY	Tb	Basalt
CAMBRIAN	Cu	Undifferentiated siltstone, mudstone, greywacke, tuff and basalt
	Pd	Dolomite and chert (Smithton Dolomite)
PRECAMBRIAN	Pu	Undifferentiated siltstones and quartzites

- Cambrian - Precambrian(?) dolerite - gabbro dykes (amphibolite)
- Geological boundary (inferred)
- Strike and dip of beds
- Faults
- Minor faults and joints
- Hingeline of anticlinal folding
- Hingeline of synclinal folding
- Lineament

