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THE SHELL COMPANY OF AUSTRALIA LIMITED

METALS DIVISION

21 SEP 1982

E.L. 14/80 - HAYES PEAK

Progress Report on Exploration during the Period

1/8/81 to 1/7/82

Author: P.A. Ruxton

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AMG REFERENCE POINTS ADDED

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@ 83-1929

Note Portions of
Elks (8/77, 14/80, 4/77, 36/76, 1/76, 7/74) Airborne magnetic 82-1728
" " " " ") E.M. 83-1929

SUMMARY

Regional exploration has been continued on E.L. 14/80, Hayes Peak. Input, gravity and stream sediment surveys in addition to aeromagnetic and radiometric data are being combined in the search for Sn - W bearing greisen veins and skarns related to the Housetop Granite.

1.0 REGIONAL STUDIES

1.1 Geological Appraisal

Exploration on Hayes Peak E.L. 14/80 has continued during the period 31/7/81 to 1/7/82 in the search for Sn-W bearing greisen vein systems in the Housetop Granite and for related skarn deposits. Since several barren skarn bodies have been located around the granite recent attention has turned towards the location of fringing granite cupolas and the search for greisen Sn-W in the Housetop Granite itself. Several Sn shows are reported in the granite principly Crane's Tin Prospect where chloritized and sericitized greisen and open quartz veins host cassiterite (Refer Appendix 1) and at Hooper's Creek Prospect where Sn is reported from kaolinized granite.

Current exploration involves aeromagnetic, radiometric and Input data to locate pyrrhotite and magnetite skarns, gravity to search for granite cupolas and stream sediment sampling over the Housetop Granite to locate primary Sn-W deposits.

1.2 Aeromagnetic Survey

Four aeromagnetic anomalies were located (Refer Fig. 1 and Plan D/MQ 01/014). Work has continued on the Upper Stowport anomaly but Dear Creek, Ellis Creek North and Ellis Creek South have not progressed beyond the reconnaissance stage. (Banwell, 1981).

1.3 Radiometric Survey

This survey is currently undergoing recorrection and evaluation.

1.4 Input Survey

A 248 km line Input survey was flown over part of the Riana and Hayes Peak licences (Refer Fig. 2) in early January, 1982 by Geoterrex. Six anomalous areas were located, three on Hayes Peak (Refer Appendix 2). One priority 1 anomaly is coincident with the Upper Stowport aeromagnetic feature, one priority 2 and one priority 3 anomalies were recommended for ground follow-up by Geoterrex (Refer Appendix 2).

1. Upper Stowport anomaly 20/4044/IR4 - follow up is in progress.

2. 20/4044/IR2. This anomaly is located 2 km north of the Upper Stwoport Grid and forms part of a synclinal feature which straddles the Riana - Hayes Peak boundary (Refer Fig. 2). Follow up on the Hayes peak licence has involved a VLF traverse across part of the anomaly. (Refer Plans D/MQ 01/021 & 022). The anomaly is situated in Precambrian Burnie Formation shales. Several pits and adits have been dug by previous prospectors on the Emu River in to pyritic black shales. The coincidence of the Input synformal structure with regional fold axes, a negative gravity and magnetic response on the eastern arm with the occurrence of graphitic shales in the anomaly, tend to suggest a lithological source.

3. 20/4044/IR6. This anomaly was not completely covered by the Input survey and appears to be associated with a basalt hill. Follow up is planned.

1.5 Gravity Survey

A gravity survey with over 1000 stations across was completed over the Housetop Granite (Refer Fig. 3). This survey was designed to locate granite cupolas and to enable further modelling of the Housetop batholith. The results are currently being terrain-corrected, however preliminary data appears to confirm that the granite is laccolith-shaped with the upper portions removed by erosion. Sheehan (1969) came to a similar conclusion suggesting that any mineralization associated with the top of the granite has been removed.

1.6 Stream Sediment Survey

A regional stream sediment sampling program has recently commenced with the aim of locating mineralization associated with the Housetop Granite. The initial survey is designed to cover the Hayes Peak licence but will be extended into the Riana and Highclere licences to include the margins of the granite. An orientation survey across Crane's Tin Prospect indicated that the -10# sieve sample collected in the field produced the highest contrast assay results for Sn, W, Mo, Cn, Zn, As and Pb. In areas of granite outcrop -10# samples are being analysed for Sn, W, Mo, Bi, Cu, Pb, Zn, Fe, Mn and As but at the granite margins samples will be sieved to -20# to +80# for Sn, W, Mo, Bi and -80# for Cu, Pb, Zn, As, Fe, Mn and Ni assay. Panned concentrates are taken at each site and assayed for Sn and W.

The survey is expected to be completed by Christmas, 1982 and anomalous areas will be followed-up later with more detailed stream and soil sampling.

2.0 UPPER STWOPORT ANOMALY

Coincident aeromagnetic (4044/2) and input (4044/1R4) features form the Upper Stowport anomaly.

2.1 Re-gridding

The anomaly was re-gridded to produce a square grid with a 200 m line spacing on a bearing of 270°M, tied together with a perpendicular baseline at 1650 E (Refer Plan D/MQ 01/023). The new grid covers 1.36 sq. km. across the Emu River. Lines 2000 N on the old and new grids are coincident.

2.2 Geology

Geological mapping of the grid (Refer Plan D/MQ 01/018) has shown Precambrian Burnie Formation sediments and igneous rocks intruded by the Housetop Granite and overlain by varieties of Tertiary basalt. Recent petrological data revealed magnetite and sulphide-bearing Precambrian dolerites and basalts within the Burnie Formation (Refer Appendix 3). A conglomeratic unit containing basalt, dolerite, chert and limestone clasts lies above the Precambrian basement. The granite contact is steep and an irregular contact aureole is present. Aplitic dykes and segregations occur at the granite margin. Metamorphic effects include recrystallization, the formation of red hornfels and spotted rocks in addition to alteration of the Precambrian basalts and dolerite. Rock Chip sampling (Refer Appendix 3) reveals anomalous Pb 0.18% and Zn 0.08% in metasomatized sediments/volcanics.

2.3 Ground Magnetics

Magnetic measurements were taken every 10 m on the new grid and integrated with previous values to produce a contour map of magnetic intensity (Refer Plans D/MQ 01/ 015 & 017). The ground magnetic anomaly was closed off to the south. Several magnetic features were identified some of which appear unrelated to the basalt cover.

2.4 VLF Surveys

VLF surveying was done along line 1800 N (Refer Plan D/MQ 01/020).

2.5 Conclusions & Recommendations

Further investigation is necessary to explain the ground magnetic and INPUT anomalies. Follow-up will include magnetic modelling, soil sampling in areas of interest plus Max-Min EM and possibly IP to define drill targets.

3.0 CONCLUSIONS & RECOMMENDATIONS

Three conductive anomalies were outlined by an INPUT survey flown over part of the licence in early 1982. Follow-up involving gridding, ground EM, IP, magnetics, mapping and soil sampling is underway. The most prospective INPUT anomaly is coincident with the Upper Stowport aeromagnetic anomaly where re-gridding, ground magnetics and mapping have recently been completed.

A regional stream sediment sampling survey now in progress across the Housetop Granite will be completed and followed-up.

Regional gravity data will be evaluated and interesting areas investigated.

P.A. RUXTON
Exploration Geologist

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APPENDIX 1

Geological Report on Crane's Tin Prospect

CRANE'S TIN PROSPECT

by

P. Ruxton, May, 1982

INTRODUCTION

Crane's Tin Prospect is located 6 km SW of Upper Natone over the Housetop Granite and Tertiary basalt cover. A Mining Lease (496P/M) is held by A.P. Crane over the prospect which lies in the Highclere E.L. 4/77 (50% Shell, 50% Comalco) (Fig. 1A). Investigations into the economic potential of the lease have been carried out by P. Collins of the Mines Department and by Geopeko in 1980 and 1981.

Tin occurs in greisen veins and in Tertiary and Recent alluvium.

GEOLOGY

The Housetop Granite is predominantly an equi-granular adamellite, porphyritic and aplitic variants occur in the lease area.

1. Alluvial Tin

Tin is present as cassiterite in Tertiary alluvium principally a coarse, quartz-rich sand. 201.51 kg of tin metal have been extracted from two sluiced areas at the margin of Tertiary basalt near Osbourne Creek (Fig. 1B). Recent alluvium contains upto 0.4% tin but distribution is erratic and tonnage small (Fig. 2) The greatest potential for alluvium tin lies under a basalt filled valley east of Osbourne Creek. However, P. Collins calculated 2.7 million tonnes of basalt cover over the valley - a sizable deterent for exploration.

2. Tin in greisen veins

Greisen veining takes the form of sericitic, chloritic alteration, tourmalization and silicification. Biotite alters to sericite, chlorite and argillite whereas feldspars breakdown to clays. Open quartz fills form the core of many greisen veins in the western part of the lease and contain cassiterite in the southern sluice locality.

Veins trend NNE to SSW, can usually be traced along strike and vary from 20m across (H2 in Fig. 1) to a few centimetres (average 1m around Hi, H2 and H3 and 10 - 20 cm on Aitken's Hill).

Assay results on rock chip samples indicate low tin values generally with the exception of the Se corner of the lease (Appendix 2 and 3).

ECONOMIC POTENTIAL

The prospect has the potential of a greisen vein system located beneath the basalt valley east of Osbourne Creek. Evidence:

a) cassiterite occurs in Tertiary sediments which rest directly on granite at the margins of the valley (sluiced areas).

b) a quartz greisen vein present in the southern sluice contains cassiterite (Collins, 1980).

c) altered granite is easily weathered and is probably preferentially located in topographic lows after weathering.

The proposed greisen vein system could be 150 m wide and around 500 m long and if it attained a depth of 200 m may give rise to 40 million tonnes of rock assuming a specific gravity of 2.6. In other words there is room under the basalt-filled valley for an ore deposit of interest.

RECOMMENDATIONS

A regional study of the Housetop granite is currently in progress in the hope of locating greisen-style tin mineralization using stream sediment sampling, geological mapping and radiometric techniques. Any further work at Crane's Tin Prospect should follow this survey. It may include:

a) Geological mapping to establish the extent of greisen veining and rock chip sampling to determine average grades.

b) Investigation of anomalous tin localities near Lake Kara (1 km south) and Paton's Creek (1½ km east of Crane's Lease).

c) To test the possibility of greisen veining beneath the basalt valley east of Osbourne Creek a drill hole would be necessary. According to Mr. P. Crane the basalt thickness is 30 to 40 m. Several drill holes and a shaft have been sunk in this valley in the past but only one hole intersected granite and that information is lost (Collins, 1980).

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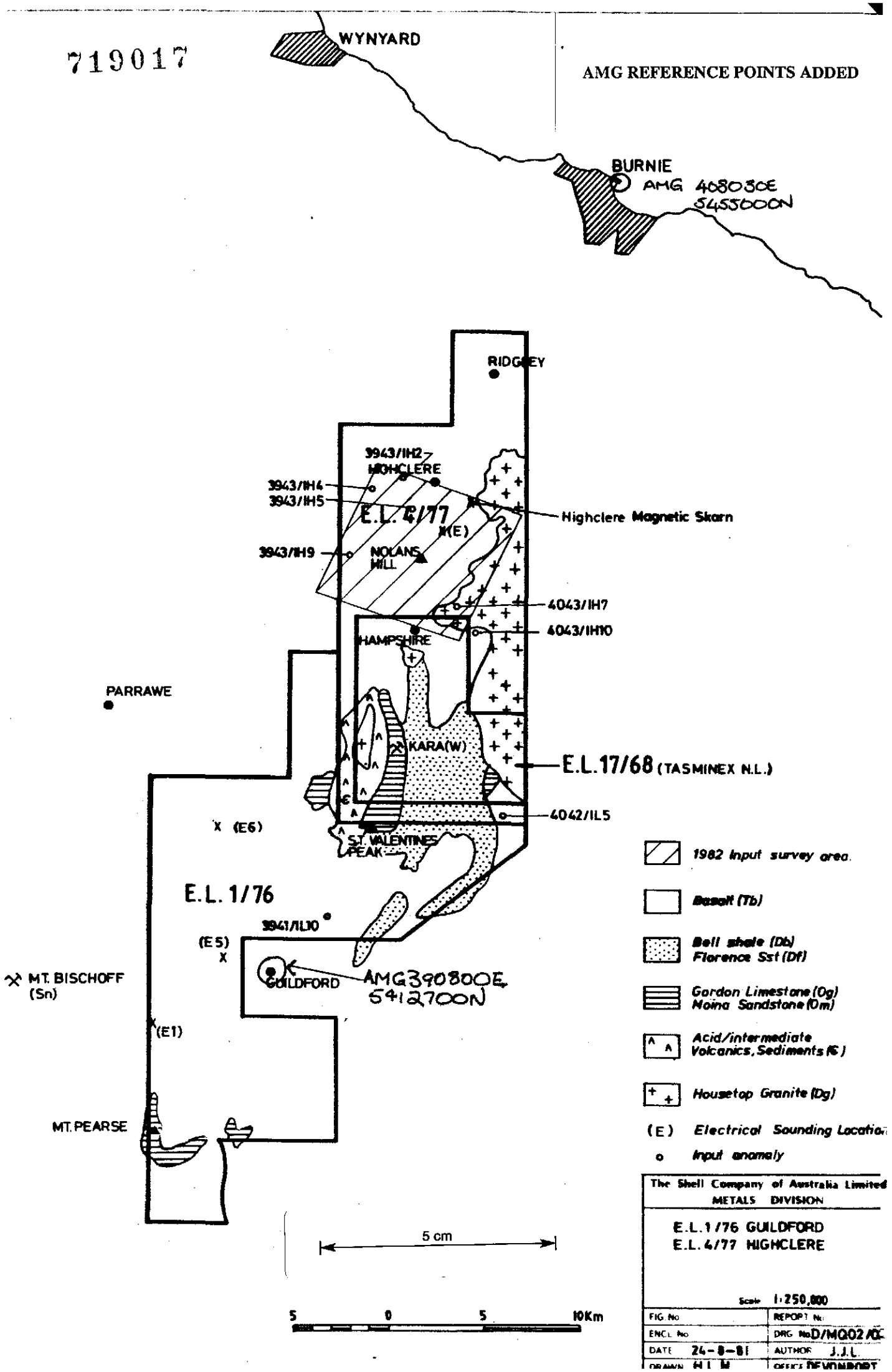
AMG REFERENCE POINTS ADDED



The Shell Company of Australia Limited
METALS DIVISION

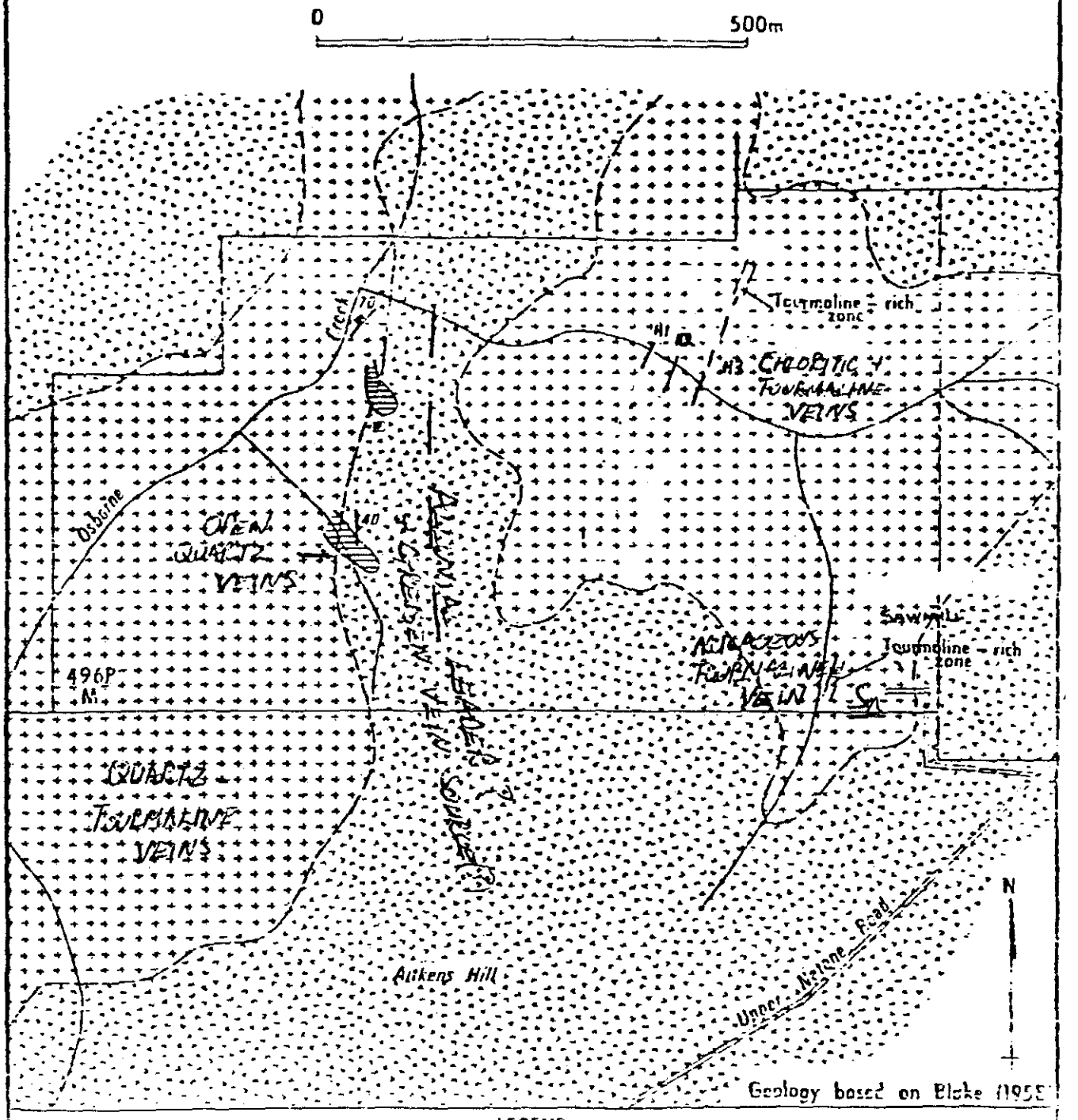
E.L.1/76 GUILDFORD
E.L.4/77 HIGHCLERE

Scale 1:250,000

FIG. No	REPORT No.
ENCL. No	DRG No D/MQ02/0
DATE 24-8-81	AUTHOR J.J.L
DRAWN H.L.M	OFFICE DEVONPORT

CRANES TIN PROSPECT — UPPER NATONE

ARTEA P.L.F. COLLINS June 1980



LEGEND

TERTIARY
- Basalt
- Probable course of deep lead

DEVONIAN
- Granite

- Bedding
- Jointing
- Geological boundary – approx
- Shaft
- Sluiced area
- Lease boundary

TASMANIA DEPARTMENT OF MINES 4657-78

Figure 1

5 cm

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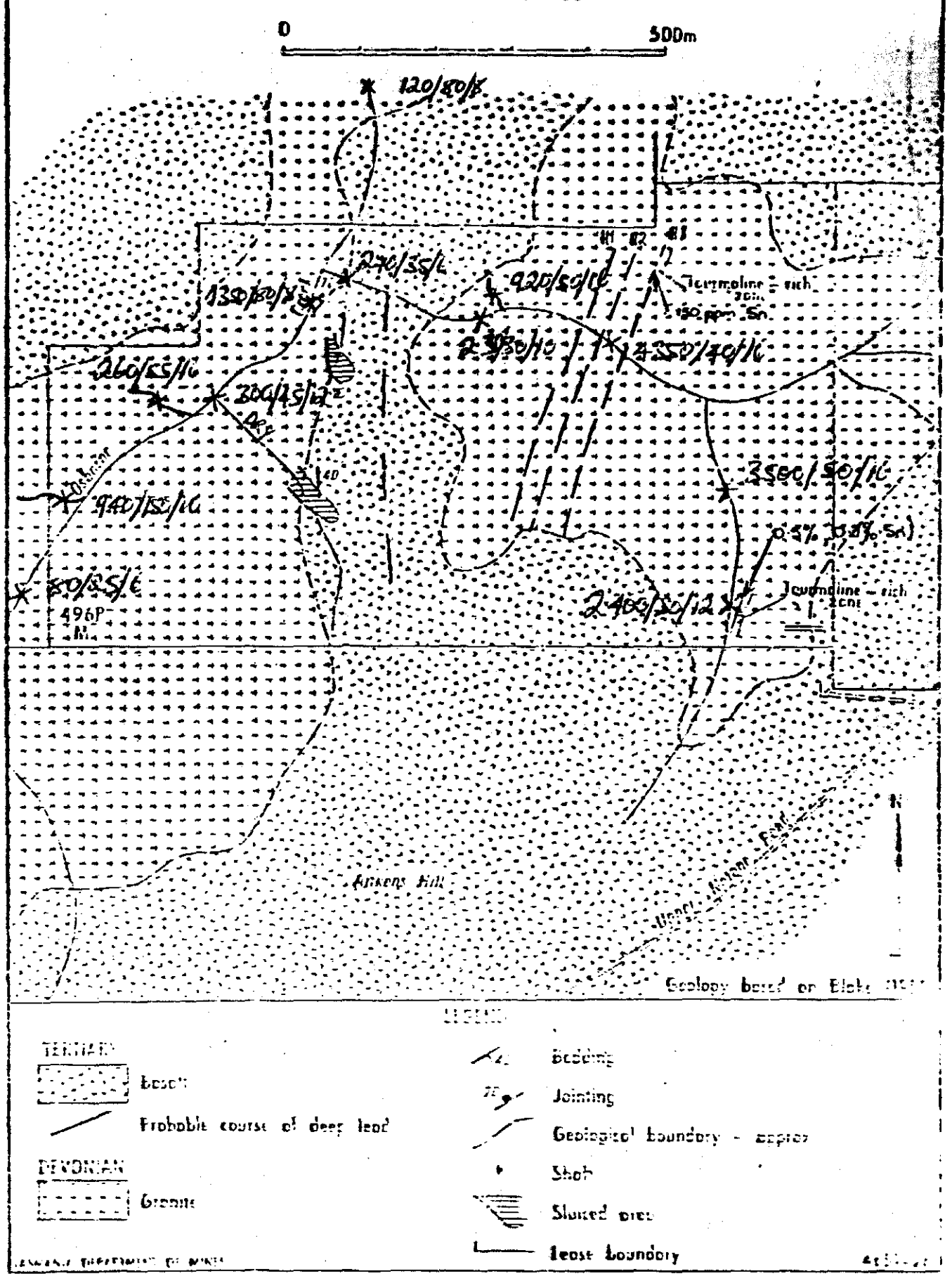
STREAM SEDIMENT Sn/W/Mo ppm FIGURE 2 719019

CRANES TIN PROSPECT — UPPER NATONE

P.J.I.COLLINS June 1980



LEGEND

TERTIARY

Basalt

Probable course of deep lead

DEVONIAN

Granite

Bedding

Jointing

Geological boundary - approx

Shaft

Sluiced area

Lease boundary

5 cm

1980/20. Cranes tin prospect, Upper Natone.

P.L.F. Collins

Abstract

A N-S trending tongue of Tertiary basalt defines the probable course of a deep lead occuring in a pre-existing valley in Devonian granite. Tin-bearing gravels overlying the granite have been worked along the western edge of the basalt tongue but the main gutter of the lead is probably located to the east of these sluiced workings towards the centre of the tongue of basalt.

The amount of overburden to be removed would probably preclude a viable sluicing operation.

INTRODUCTION

Cranes tin prospect is situated in the valley of Osborne Creek (previously known as Falls Creek) on the northern flank of Aitkens Hill [DQ028326]. The prospect is located within 61.9 ha of freehold land in the name of A. Crane and is covered by mineral lease 496P/M, of which the owner is the lessee. The lease is located on the northern side of the Upper Natone Road, approximately 6 km south-west of Upper Natone (fig. 1).

HISTORY AND PREVIOUS LITERATURE

Early reports dealing with mineral deposits in the Upper Natone area (Montgomery, 1896; Blake, 1936) mention prospecting for stream tin to the north-west of Mt Housetop in tributaries of the Emu River, principally in the headwaters of Tittie Gee Creek (previously called Trial Creek) and Osborne Creek. Blake (1958) undertook a survey of the prospect in 1957 and recommended drilling to define the course of a N-S trending sub-basalt deep lead. Two percussion drill holes apparently have been drilled by the Department of Mines subsequent to Blake's visit.

The early history of the area is described by Blake (1958). Prospecting by A. Crane began in about 1953 and has consisted of intermittently working tin bearing sub-basalt gravels which are exposed to a limited extend around the denuded edge of basalt flows.

PRODUCTION

Total production from the lease is 353.58 kg of tin concentrate containing 201.51 kg of tin metal (table 1). Production during 1956 - 1960 was mainly from the sluiced area north of the shaft and in 1980 from the sluiced area towards the southern boundary of the lease.

GENERAL GEOLOGY

The basement rocks of the district consist of uniformly medium-grained adamellite of the Devonian Housetop Granite Batholith (Gee, 1977). Porphyritic and aplitic variations of the normal granite occur, with tin-bearing greisen veins traversing the aplites (Blake, 1958).

An extensive cover of Tertiary basalt blankets much of the granite (fig. 1). The basalt flows filled pre-existing valleys, and in places alluvial deposits, occurring along the course of former streams, underlie

Table 1. TIN PRODUCTION FROM CRANES TIN PROSPECT, UPPER NATONE.

Date	Sn(conc.) (kg)	Sn assay (mass%)	
July 1956	56.70	73.8	
July 1956	44.45	46.0	Cassiterite-quartz
October 1956	30.39	42.0	Cassiterite-quartz
March 1958	53.52	72.0	
March 1959	88.90	59.0	
December 1960	27.22	32.5	
March 1980	52.4	68.0	(assigned)

the basalt. The course of a probable deep lead was identified by Blake (1958) as extending in a north-south direction, approximately through the centre of the lease (fig. 1).

THE PROSPECT

There are several workings scattered about the lease, but most of the prospecting, sluicing and production has been carried out and derived from along the western boundary of the N-S trending tongue of Tertiary basalt (fig. 1).

In the south-east corner of the lease is a small pit or shaft (fig. 1) which has been excavated in partially decomposed, altered, aplitic granite containing tourmaline - rich stringers. The stringers impart a foliation which trends 210° and dips 75° W. The altered granite here has assayed 0.53 and 0.58 mass% Sn.

In the north-eastern part of the lease is a zone of dark green tourmaline-rich rock, trending approximately 205°.

In the creek flowing west from the eastern boundary of the lease and into Osborne Creek, preparations are in progress for sluicing the alluvial sediments in the creek bed.

Most of the mining on the lease has been undertaken in an open cleared area along the western edge of the northerly trending tongue of basalt, beneath which is a probable deep lead (fig. 1). Apart from a shaft, all the mining has been by sluicing, and all the tin produced from the lease has come from this area. There are two sluiced areas, one to the north of the shaft and the other in the small tributary of Osborne Creek (fig. 1). Cassiterite has been recovered from both the sluiced workings.

The northern sluiced area is overgrown and partially filled in, but from Blake's (1958) description of a prospecting cut at this locality, granite is overlain by 0.6 - 1.2 m of clay, grit and quartz gravel containing a small amount of medium- to fine-grained cassiterite. Quartz in the gravel also contains cassiterite crystals. The sediments are covered by partly decomposed basalt and basalt-derived clay. The granite bottom is uneven but dips to the east at a low angle, and alluvial gravel overlying the granite is only slightly waterworn, indicating a close proximity to the source (Blake, 1958). The sluiced cut is 40 - 50 m in length, widening at the southern end, and trends approximately 140°. On the western side of the cut, just above the floor, weathered,

decomposed greisenised granite is exposed. Here there is a probable fault trending approximately 160° and filled with quartz. The granite adjacent to the fault was later altered to a quartz-tourmaline greisen carrying cassiterite.

Approximately 20 m south of the sluiced cut, a shaft has been sunk to a depth of about 12 m in weathered basalt without penetrating the underlying wash. The sinking of this shaft was assisted by the Department of Mines under the Aid to Mining Act.

Several holes were reported to have been drilled vertically into the basalt to depths of 15 - 30 m, along a north-south line between the shaft and the southern boundary of the lease. Of the six holes drilled, none penetrated the sediments or granite, but four were reported to have stopped in a clayey pug. One of the holes was collared 14 m south of the shaft and was drilled to a depth of 21 m through weathered basalt before being stopped by pug.

In the small tributary of Osborne Creek, the banks of the creek have been sluiced where it has dissected the basalt. Again, the workings are overgrown and much of the western wall has collapsed, but the uneven granite/basalt interface is exposed along the eastern wall and has a general trend of about 180°, dipping about 40°E.

Subsequent to Blake's (1958) report, two percussion holes were drilled by the Department of Mines on the flat, open area to the north-east of the northern sluiced area. There is no record of the results of this drilling, which was apparently undertaken in the summer of 1959-1960. The collar of one of these holes is still marked and Mr Crane reports this hole was drilled to a depth of about 27 m through basalt, and bottomed in granite.

CONCLUSIONS

A north-south trending tongue of Tertiary basalt at least 30 m in thickness defines the probable course of a sub-basalt deep lead, resting upon a bedrock of Devonian granite. Within the granite are tin-bearing greisenised and tourmaline rich zones. Tin-bearing gravels overlying the granite have been worked along the western edge of the basalt tongue. As previously concluded by Blake (1958), the main gutter of the lead would probably be located to the east of the present sluiced workings towards the centre of the basalt tongue, and it is along this gutter that richer tin-bearing sediments would be expected to occur.

Any further effective exploration of the prospect would best be undertaken by drilling a series of holes across the lead to locate the gutter and determine the size, depth and grade of the lead. This drilling would also provide information on the thickness and hardness of the basalt overburden.

However, even if the presence of tin-bearing sediments was indicated by drilling, the amount of overburden which would need to be removed to allow sluicing of sediments in the main gutter, may preclude an economically viable mining operation. As a guide to the amount of overburden present it may be assumed that the basalt filled a V-shaped valley 600 m in length (through the lease), 30 m in depth (minimum estimate) and an average of 120 m in width. Tertiary basalt has a density of about 3.0 t/m^3 but as the basalt is weathered near the surface an average density of

2.5 t/m^3 is probably more realistic. Using these figures it is estimated that there is about 1.08 million metres^3 or 2.7 million tonnes of basalt overburden.

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[30 June 1980]

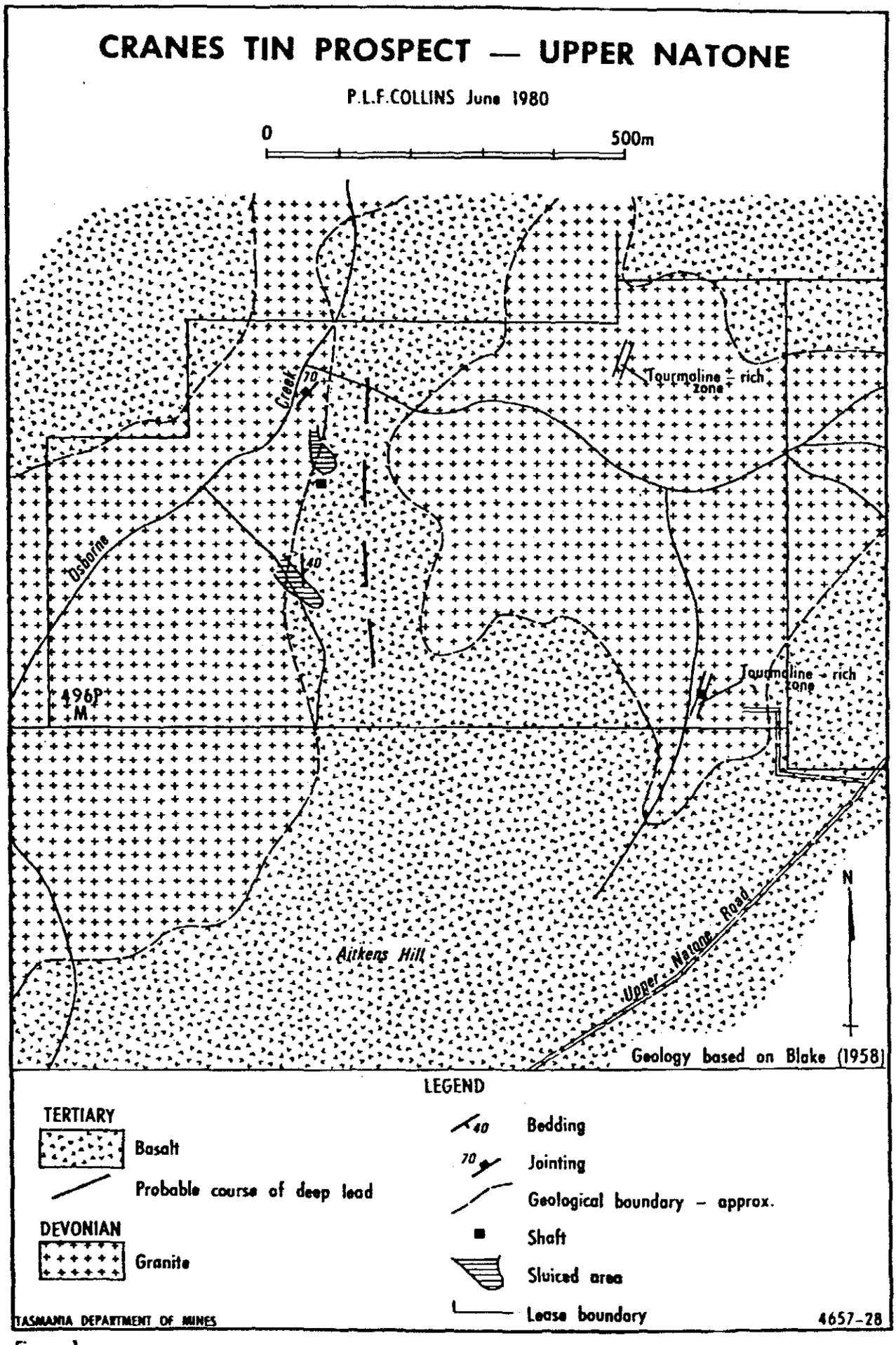
CRANES TIN PROSPECT — UPPER NATONE
P.L.F.COLLINS June 1980
0
500m
Tourmaline - rich zone
Creek
70
40
Osborne
496P
M
Tourmaline - rich zone
N
Aitkens Hill
Upper Natone Road
Geology based on Blake (1958)
LEGEND
TERTIARY
Basalt
Probable course of deep lead
DEVONIAN
Granite
40 Bedding
70 Jointing
Geological boundary - approx.
Shaft
Sluiced area
Lease boundary
TASMANIA DEPARTMENT OF MINES
4657-28

Figure 1

5 cm

024

ATTACHMENT 2

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CRANE'S TIN PROSPECT

GEOCHEMISTRY RESULTS

Sample	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Au ppb	Sn ppm	W ppm
KR 6701	25	460	350	1	50	0.14%	(10
KR 6702	5	30	150	(1	25	815	(10
KR 6703	10	150	580	1	20	0.12%	(10
KR 6704	10	25	60	(1	15	0.68%	(10
KR 6705	(2	15	40	1	10	140	(10
KR 6706	5	30	110	1	10	100	(10
KR 6707	(2	400	180	(1	10	20	(10
KR 6708	(2	15	20	(1	10	75	(10
KR 6709	5	15	40	(1	10	(5	(10
KR 6710	(2	5	100	(1	10	50	(10
KR 6711	(2	35	80	(1	10	40	(10
KR 6712	5	45	350	(1	10	50	10
KR 6713	5	35	120	(1	10	50	10
KR 6714	(2	60	100	1	10	15	10
KR 6715	(2	15	40	(1	10	10	(10
KR 6716	(2	30	50	(1	5	15	(10
KR 6717	(2	100	100	1	5	140	(10
KR 6718	5	35	180	(1	10	275	(10

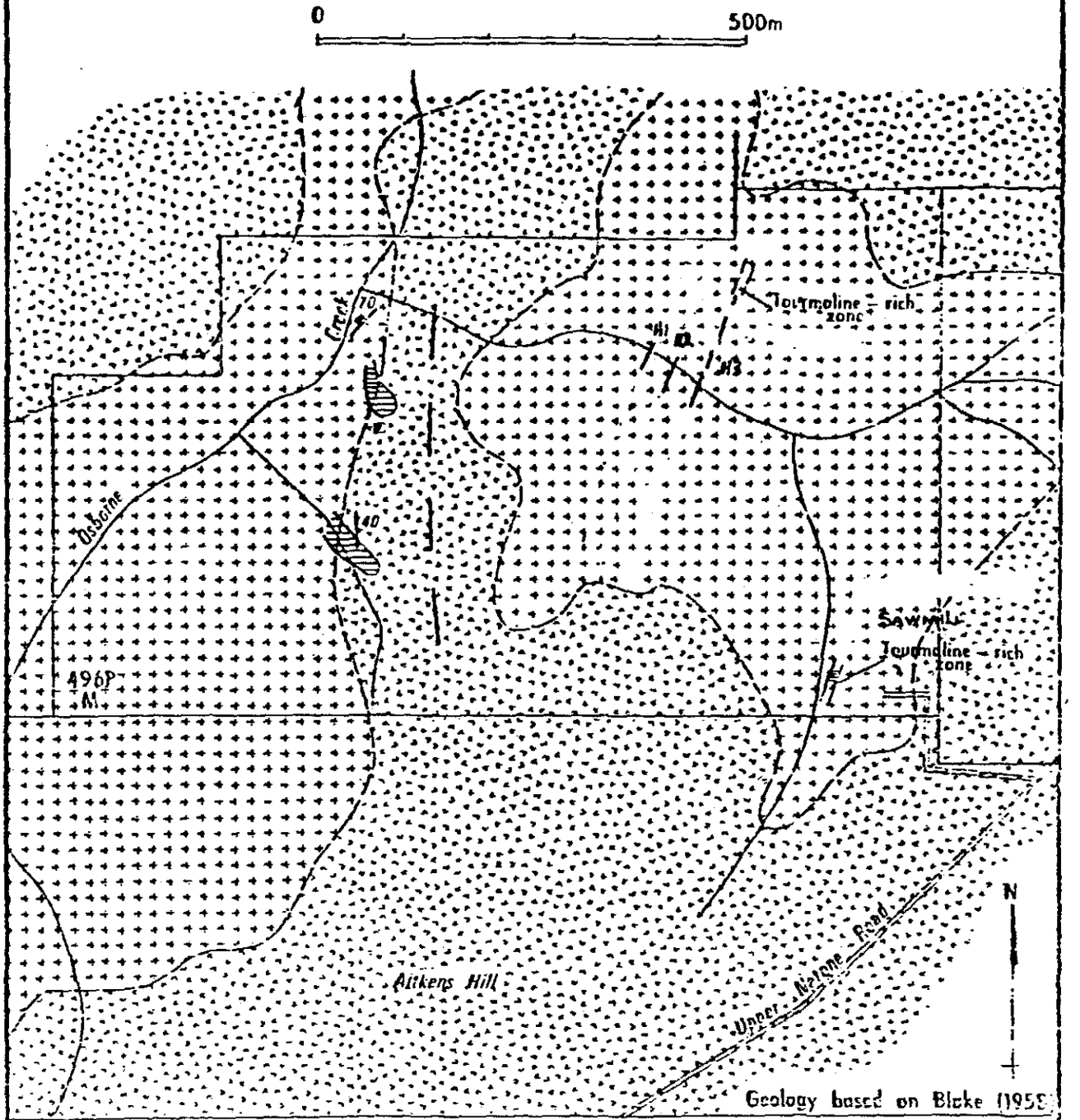
ppm: parts per million

ppb: parts per billion

FIGURE 1 719026

CRANES TIN PROSPECT — UPPER NATONE

AFTER P.L.F.COLLINS June 1980



LEGEND

TERTIARY

Basalt

Probable course of deep lead

DEVONIAN

Granite

Bedding

Jointing

Geological boundary — approx.

Shaft

Sluiced area

Lease boundary

TASMANIA DEPARTMENT OF MINES

#657-78

Figure 1

20-5

5 cm

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CRANES TIN PROSPECT — UPPER NATONE

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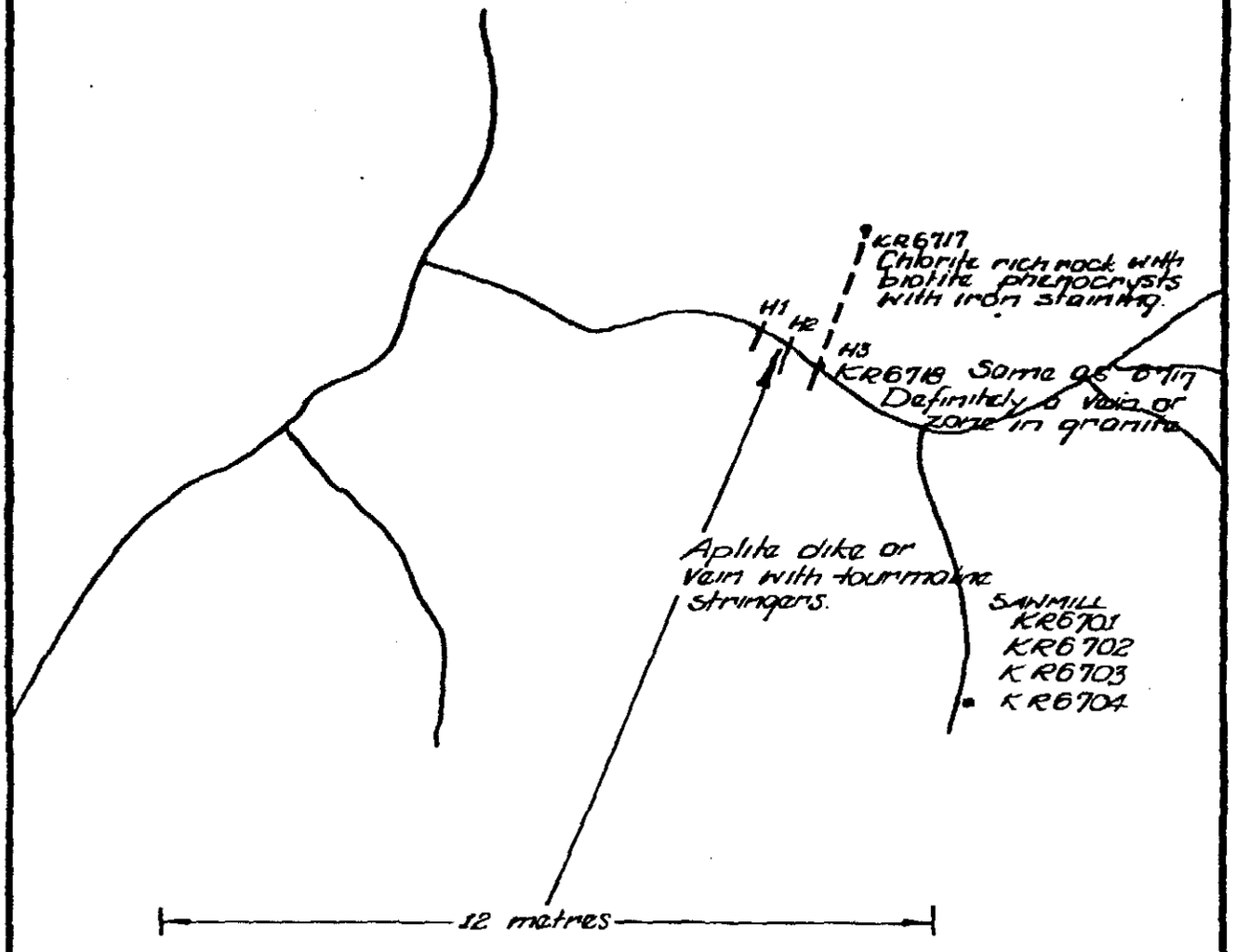
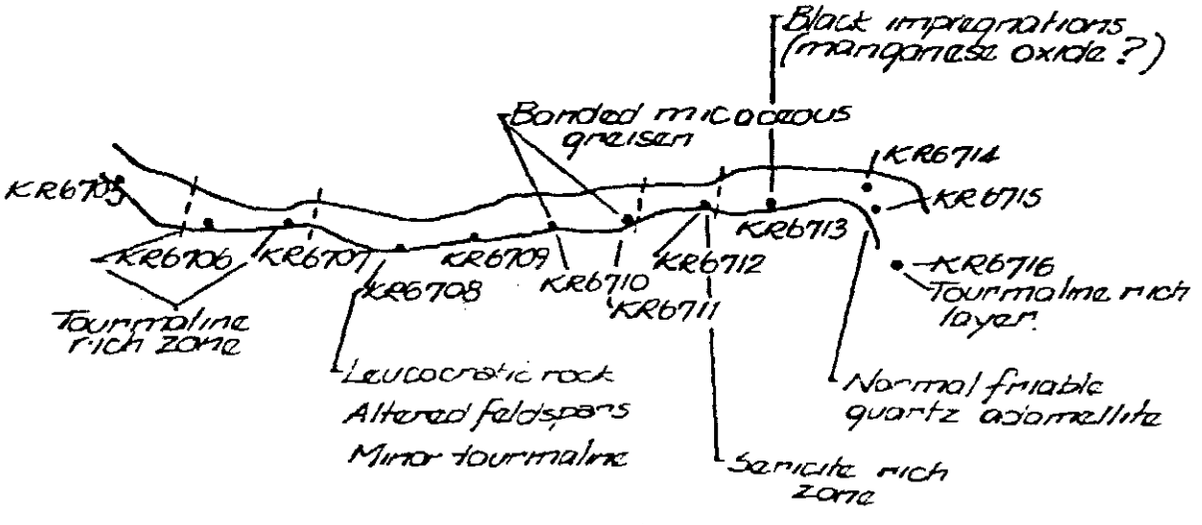




5 cm

APPENDIX 3

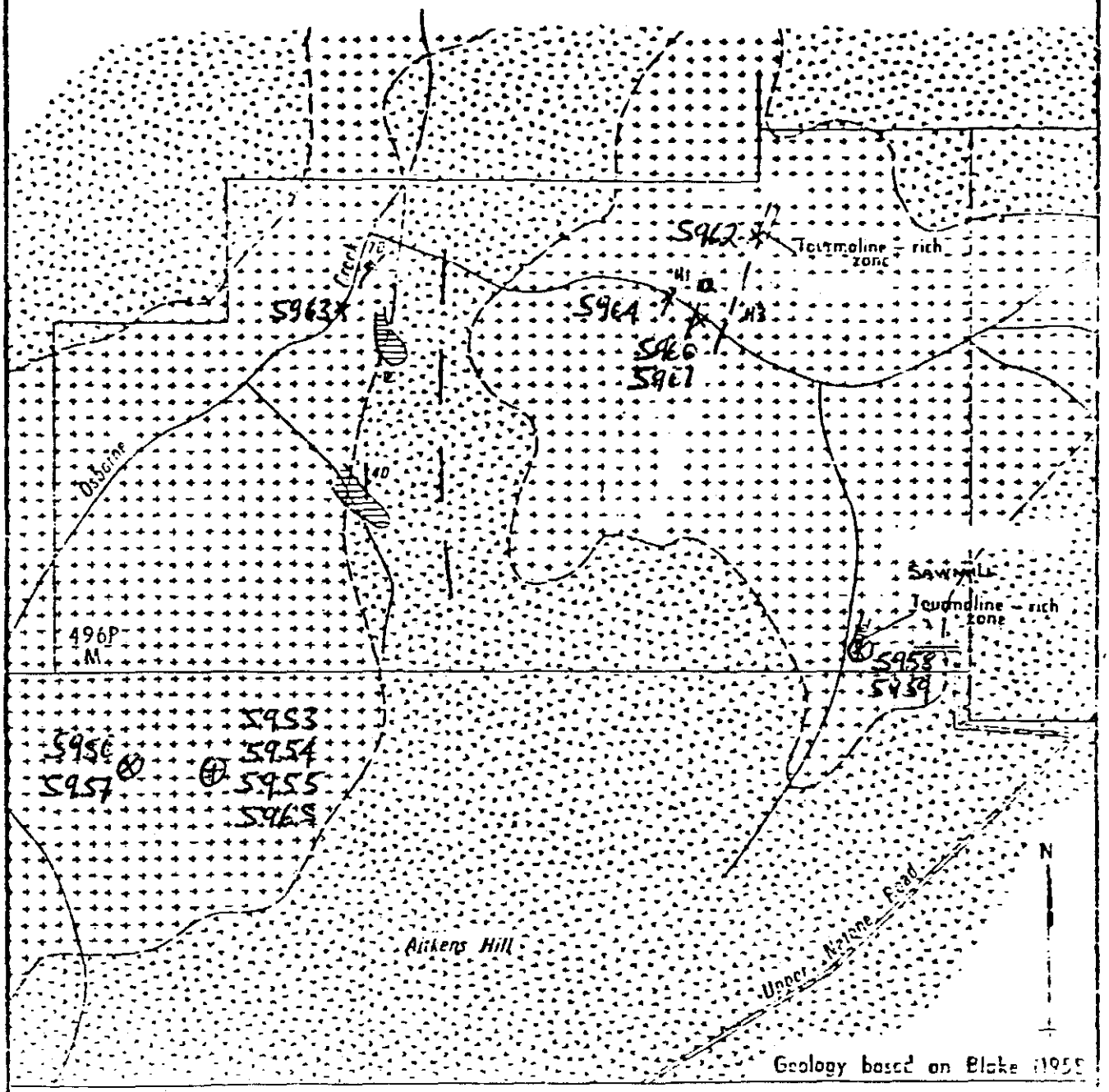
CRANE'S TIN PROSPECT - ROCK CHIP SAMPLES

5953 - Tourmaline vein in aplitic granite
5954 - Quartz/tourmaline vein
5955 - Quartz/tourmaline vein
5956 - Fine grained granite
5957 - Tourmaline-bearing granite
5958 - Aplitic granite
5959 - Greisen vein
5960 - Chloritized granite
5961 - Chloritized granite
5962 - Chloritic/tourmaline rock
5963 - Quartz open vein
5964 - Chloritic/sericitic altered granite
5965 - Tourmaline vein
5966 - Upper Natone roak greisen vein (Road cut 2 km south of township)

CRANES TIN PROSPECT — UPPER NATONE

Area P.L.F.COLLINS June 1980

0 500m



LEGEND

TERTIARY

Basalt

Probable course of deep lead

DEVONIAN

Granite

Bedding

Jointing

Geological boundary - approx.

Shaft

Sluiced area

Lease boundary

TASMANIA DEPARTMENT OF MINES 4657-78

Figure 1

5 cm

029

ILABS Pty. Ltd.
COMPUTERISED ANALYTICAL LABORATORIES

719030

ANALYTICAL REPORT

JOB CODE20677 O/N : 4291/H001/111/57

Results in ppm

SAMPLE	Sn	V	Mo	Ti	As	Sb
5953	20	320	<4	125	650	<4
5954	60	380	<4	230	2750	6
5955	20	60	<4	6	12	6
5956	6	10	<4	<4	10	6
5957	8	<10	<4	<4	4	<4
5958	30	10	<4	<4	4	8
5959	15	<10	<4	4	7	6
5960	22	20	<4	6	2	10
5961	44	15	<4	<4	2	6
5962	240	85	<4	6	5	10
5963	60	<10	<4	4	3	<4
5964	65	20	<4	6	3	8
5965	12	<10	<4	<4	3	10
5966	6	<10	<4	<4	6	8

Method of Analysis : Sn V Mo Ti As Sb : XRF1

030

ILABS Pty. Ltd.
COMPUTERISED ANALYTICAL LABORATORIES

719031

ANALYTICAL REPORT

JOB CODE: 20677 O/L : 4251/1001/TAT/57

Results in ppm

SAMPLE	Cu	Pb	Zn	Co	%Fe	Mn
5952	12	160	8	<4	0.55	16
5954	12	44	10	4	0.75	12
5955	4	6	8	<4	0.65	20
5956	4	<4	8	<4	0.40	28
5957	4	<4	10	<4	0.60	44
5958	6	6	40	<4	0.90	24
5959	18	<4	14	<4	0.70	16
5960	4	26	195	<4	9.00	1050
5961	6	24	85	<4	2.90	1200
5962	4	160	770	8	16.5	6700
5963	4	<4	6	<4	0.35	75
5964	6	14	120	<4	4.50	990
5965	6	<4	6	<4	0.50	40
5966	6	4	14	<4	0.75	130

Method of Analysis : Cu Pb Zn Co : AAS1
Fe Mn : AS2/2A

.../2

APPENDIX 2

Details of the Geoterrex Input Survey

Flown over the Riana & Hayes Peak Licences

VII. INTERPRETATION OF RIANA SURVEY DATA

The INPUT data from the Riana survey shows a mixture of responses, including extensive broad regions of high conductivity, large highly conductive bedrock features with identifiable structure, potential massive sulphide occurrences and many cultural responses.

As for the Highclere area, geology and aeromagnetic maps indicate that the majority of the area is covered by tertiary basalts. The INPUT data reflects this, as can be seen by the broad conductive areas which extend from the southern to the northern boundary. Within these areas, some of the strongest (and hence most conductive) 6 channel responses have been delineated and discussed (eg zone 20/4144/IR1). Again it must be stressed that no assumption regarding the possible association of sulphides with the most conductive response has been made (as can be seen from the priority usually given to these zones), but should further geological/geochemical evidence be acquired these zones may assume a greater importance.

Unfortunately, there are many cultural responses which interfere with the ground response to an extent where anomaly boundaries become uncertain (eg: 20/4044/IR3) and any source geometry information becomes disguised. Also there are responses which are characteristic of culture but occur just a little to far away from obvious culture on the tracking film to be dismissed outright (eg: 20/4043/IRS).

Zone 20/4044/IR2 is a very interesting area due to its high conductivity and structure inferred from the INPUT data. Whilst INPUT data is certainly not definitive about the absolute magnitude

of conductor dip, it is often possible to gain a firm impression of the dip direction. In the case of this zone it is certain that the conductor has some dip and the inferred directions suggest it may be part of a synformal structure. The major implication of this interpretation is to reduce the likelihood of massive sulphides being the source of the response and to suggest a very conductive unit being responsible such as carbonaceous material.

ZONR 20/4144/IR1 — Priority 3

Line 125.1	Fiducial 381406 to	Ratio 31.0/5.0
Line 122.1	Fiducial -	Ratio ---

Anomalies	Shape	:	Broad and symetric
	Amplitude	:	Large
	Decay Rate	:	Moderate - slow
	Cultural Signs	:	None
	Mag Association	:	None
Conductor:	Dimensions	:	600 metres wide, 1.0 kilometres long, open at both ends
	Strike	:	North East
Location:	Cultivated fields		

Remarks:

This zone represents the strongest 6 channel response from within the broadly conductive zone related to the basalt cover. The best individual response occurs on line 123.1 at fiducial 375864. This zone broadens considerably to the north east and south west where the 6 channel response no longer stands out strongly against the generally conductive background, hence the open zone boundaries.

Recommendations:

The determination of the source and its geometric/geophysical properties is very difficult in cases such as this where the object is to discriminate between changes in the "overburden" and real bedrock sources. Therefore, ground follow up would require either a deep penetration, discriminatory system or some geochemical techniques.

ZONE 20/4044/IR2 — Priority 2

Line 108.1	Fiducial 575928	Ratio 30.0/9.0
	Fiducial 575890 to Fiducial 559800	Ratio 29.0/8.0
Line 102.1		Ratio 10.0/1.5

Anomalies:

Shape	:	Dependent on flight direction
Amplitude	:	Moderate
Decay Rate	:	Slow
Cultural Signs	:	None
Mag Association	:	None

Conductor:

Dimensions	:	2.4 kilometres long, horseshoe shaped
Strike	:	North East

Location: Cultivated Plateau

Remarks:

The shape and position of the INPUT anomalies indicates that the source of this zone has discernable structure, which has significant implications when considering the geological nature of the source. The dependence of the plotted peak position upon flight direction (a phenomena well displayed from lines 104 to 106) indicates that both limbs of the zone are dipping. The direction of dip may be found from the channel 1 to 6 peak effect on individual anomalies. The most westerly limb shows strong channel 1 to 6 peak offsets on lines 104.1NW, 106.1 NW and 108.1 NW which suggests that these lines were flown up dip. Lines 107.1SE, 106.2SE, 104.2SE and 103.1SE shows no such peak offsets, suggesting these lines were flown down dip. However, Line 105.1SE has peak offsets akin to an updip response and 105.2NW has no offsets as shown on the other downdip lines.

The easterly limb exhibits very little dip information other than the anomaly plotting position being dependent on direction. The responses on Lines 104.1NW, 105.2NW show no channel 1-6 peak offset, implying a down dip response. Lines 105.1SE, 106.2SE and 107.1SE have responses with channel 1-6 peak offsets implying an updip response. Again, there are two lines which don't fit in with this interpretive scheme; Line 104.2SE shows no channel 1-6 peak offset which is inconsistent with the other lines flown. SE and Line 106.1NW which shows peak offsets when you would not expect to see them if the response is from a down dip direction.

Therefore, the INPUT data suggests that the westerly limb dips towards the south east and the easterly limb dips towards the north west. A plausable geological structure consistent with these dips and the ever decreasing distance between limbs to the north east would be a syncline cut an oblique angle as shown in the figure.

The implication of such a structure are to downgrade the importance of this zone as a high priority sulphide target since the structure implies that the same geological unit is the source of both responses. This being the case, the slow decay and high conductivity is more likely to be representative of a carbonaceous unit rather than sulphides.

Recommendations

Ground follow up is recommended to best determine the structure and the form of the source.

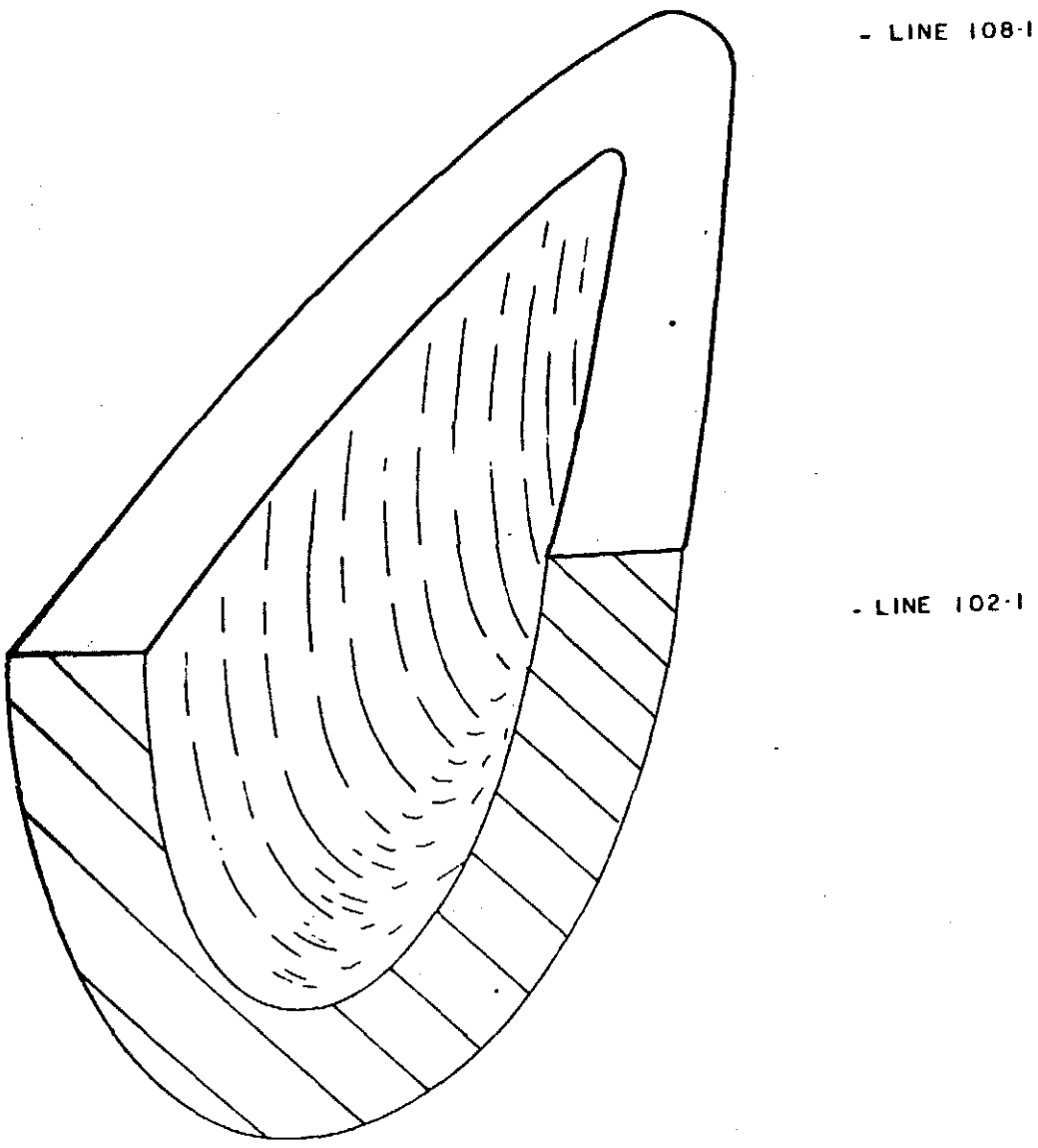


Figure 1 - Possible geometry of 20/4043/IR2

ZONE 20/4044/IR3 — Priority 1

Line 110.1 — Fiducial 584430 — Ratio 17.0/2.0

to

Line 106.1 — Fiducial 570546 — Ratio 14.0/3.0

Anomalies

Shape	:	Narrow, asymetric often contaminated by cultural interference
Amplitude	:	Moderate
Decay Rate	:	Slow
Cultural Signs	:	Power lines and fences nearby
Mag Association	:	Large broad anomaly on 106.1 to 108.1

Conductor:

Dimensions	:	1.6 kilometres long
Strike	:	North

Location: Cultivated fields

Remarks:

There is come contribution from cultural noise in this zone which casts doubts on to the northerly (dashed outline) extension of this feature. Also, on lines 107.1 and 108.1 there is consistent 6 channel response between this zone and 20/4044/IR2 which may indicate that the two zones could be related. The anomalies are sufficiently contaminated to cloud any dip information that may have been present, however, the culture is too far away to be the direct cause of the anomaly.

Recommendations:

Ground follow up is recommended to establish the source and its geometric parameters.

ZONE 20/4044/IR4 — Priority 1

Line 102.1 — Fiducial 559652 — Ratio 10.0/1.0

to

Line 101.1 — Fiducial 556310 — Ratio 12.5/1.5

Anomalies:

Shape	:	Relatively broad & symmetric
Amplitude	:	Small
Decay Rate	:	Slow - very slow
Cultural Signs	:	None
Mag Association	:	Broad dual peaked anomaly

Conductor:

Dimensions	:	300 metres wide x 800 metres +, long
Strike	:	East

Location: River

Remarks:

This zone strikes parallel to zone 20/4044/IR2 and is along strike from the eastern limb of that structure. There is some corrilation with a broad dual peaked magnetic anomaly which becomes less apparent north of line 102.1. The very slow decay rate and small amplitude of the INPUT response would suggest that the conductive source is quite deep as is the source of the magnetic anomaly, but it is unlikely that the same source gives rise to both anomalous geophysical quantities.

Recommendations:

Ground follow up is recommended.

ZONE 20/4043/IR5 Priority 3

Line 1042 Fiducial 354240 Ratio 12.51

Anomalies:	Shape	:	Very narrow & symmetric
	Amplitude	:	Moderate
	Decay Rate	:	Moderate - Fast
	Cultural Signs	:	Farm houses
	Mag Association	:	None
Conductor:	Dimensions	:	200 metres wide
	Strike	:	--

Location: Farmhouses and paddocks

Remarks:

This anomaly appears to be cultural, yet examination of the tracking film places the peak some 100 metres away from the evident culture (houses etc). For this reason there is some doubt as to the source of the anomaly. There does not appear to be any similar anomaly on line 104.1 (which crosses 104.2 near the fiducial range we are looking at.)

Recommendations:

Follow up is required to determine whether the culture is the only source present.

ZONE 20/4044/IR6 — Priority 3

Line 104.1	Fiducial 565780	Ratio 9.0/1.2
	to	
Line 102.1	Fiducial 560128	Ratio 11.0/1.0

Anomalies:

Shape	:	double peak on 104.1 otherwise symmetric
Amplitude	:	Small
Decay Rate	:	Slow
Cultural Signs	:	None
Mag Association	:	Broad 100 mt anomaly

Conductor:

Dimensions	:	300 metres wide x 600 metres long
Strike	:	North east

Location: Outside survey boundary, coincident with heavily wooded section.

Remarks:

This zone falls outside the survey area and the shape of the response on lines 102.1 and 104.1 appear to follow the altimeter record closely. However the anomaly on line 103.1 has similar amplitudes but at an altitude of 160m instead of 120m. The INPUT zone has a plan extent coincident with a heavily timbered topographic feature which is the probable source.

Recommendations:

Ground follow up recommended to establish true nature of the source.

NOTE: - This zone cannot be plotted accurately on the ETI anomaly Map since it is outside the limits of path recovery and therefore was omitted from that map.

TABLE 2. SUMMARY OF SELECTED CONDUCTORS - RIANA AREA

Priority 1	Priority 2	Priority 3
4044/IR3	20/4044/IR2	20/4144/IR1
4044/IR4	20/4044/IR6	20/4043/IR5

APPENDIX 3

Upper Stowport Anomaly

Petrology & Rock Chip Sampling Results

Upper Stowport Petrology & Rock Chip Sample Results

SAMPLE NO.	DESCRIPTION & LOCATION
5984	Conglomerate with clasts of quartz, shale, basalt and limestone in an amphibolitic matrix. Petrology. (1600 N 1530 E).
5985	Altered micro-gabbro with arsenopyrite (1600 N 1550 E).
5989	Precambrian basalt/shale with ?sulphides. (1200 N 1370 E).
5990	Andesine-Gabbro - Precambrian. (Natone).
5991	Precambrian basalt/sediment with layers of arsenopyrite (1600 N 1550 E on OLD GRID)
5992	Altered basalt (1800 N 1180 E).
5993	Metasomatized basalt (1600 N 940 E).
6000	Conglomeratic sample (1600 N 1500 E).

045

719046

ROCK CHIP SAMPLING RESULTS

SAMPLE NO.	Cu	Pb	Zn	Ni	Fe	Mn
	ppm	ppm	ppm	ppm	%	ppm
5984	20	6	16	34	0.70	200
5985	60	50	70	85	2.80	720
5989	90	1800	830	12	8.00	350
5991	120	70	48	44	2.300	450
600	18	16	36	24	0.62	220

	Sn	W	Mo	As	Sb
5984	6	<10	<4	38	4
5985	10	15	<4	7	24
5989	14	75	30	3100	32
5991	4	<10	<4	65	6
6000	4	<10	–	9	10

REPORT CMS 82/5/32

Five rock samples and two panned concentrates were received for petrological/ mineralogical examination; thin-sections were prepared of the rocks, and the concentrates were examined without further preparation.

Summary

Most of the rocks are igneous, and all have been affected by metasomatism to varying degrees, presumably through the actions of the nearby granite.

5984 is still clearly recognisable as a conglomerate, though thoroughly metasomatised; the contained pebbles may well be correlatable with the basic igneous rocks, and thus the conglomerate is younger, though still pre-dating the granite.

The igneous rocks are believed to be related, and comprise gabbro, microgabbro and basalts; in fact, the finer-grained rocks may simply be chilled equivalents of the coarser ones, perhaps from a contact, as all are thought to be intrusive. There was no evidence of sedimentary rocks (except 5984).

The panned concentrates consisted of the following minerals, in approximate order of abundance:

HP 04 Iron-stained quartz and limonite grains, spinels of the picotite-chromite series, magnetite, minor pyroxenes and zircon; trace tourmaline.

HP 50 Dominant quartz, minor picotite-chromite spinels, magnetite and goethite; there are traces of tourmaline and ortho- and clinopyroxenes.

The spinels appear to range in composition from picotite (chromiferous spinel) to magnesiochromite and ferrochromite; they generally have a shiny black appearance with conchoidal fracture.

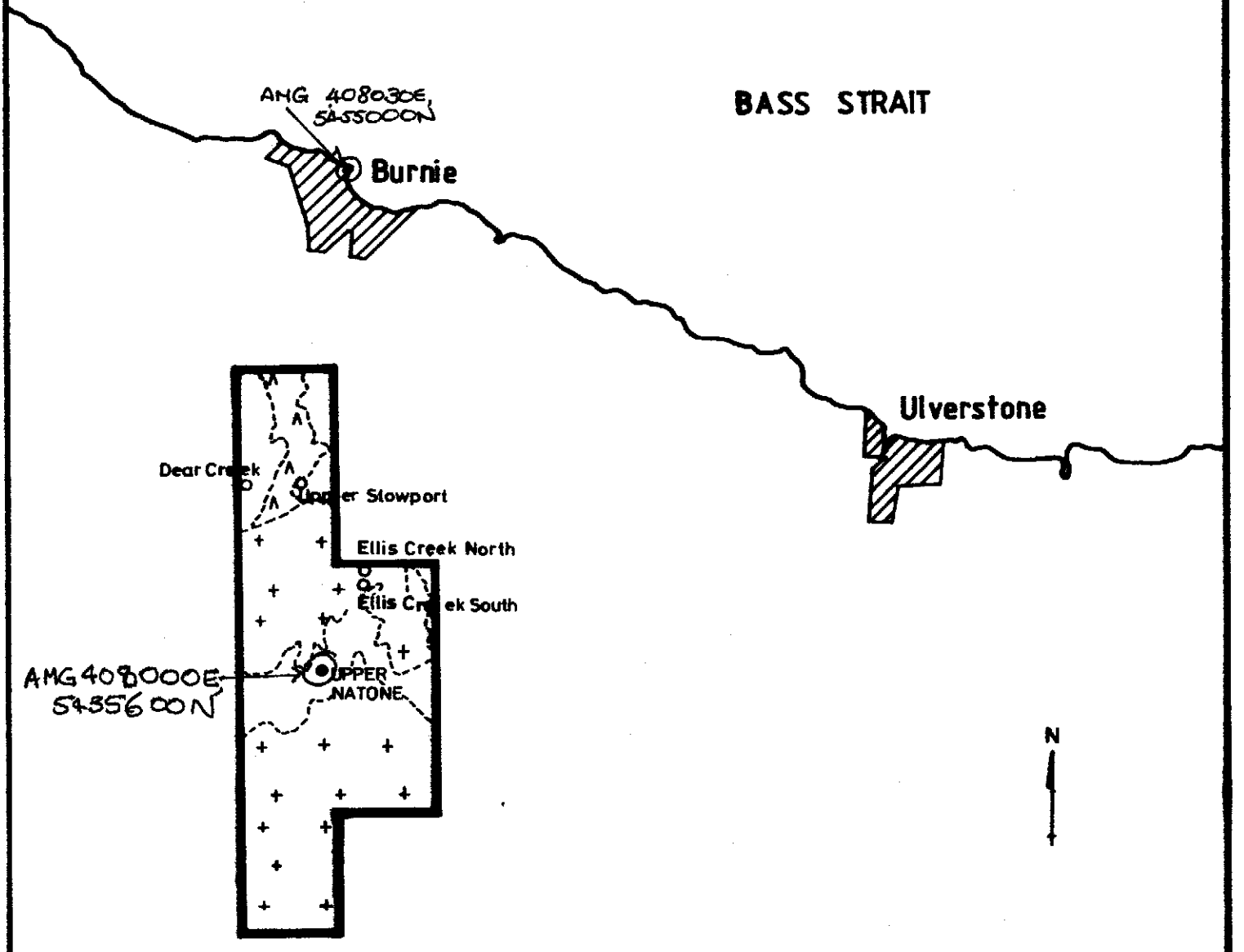
H.W. Fander, M. Sc.

Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Central Mineralogical Servic Comments
5984 (T.S. 42292)	Metasomatised Conglomerate. Severely altered pebbles of gabbro-dolerite-basalt, cherts, limestones, in matrix of diopside, actinolite as matted intergrowths.	Conglomerate fabric and rock fabrics preserved despite metasomatism.	Cloudy sphene developed in many pebbles. ?Zeolite infillings.	Only the chert grains are relati unaffected by pervasive meta-somatism, but relict features remarkably well-preserved.
5985	Altered Microgabbro. Subophitic patches of uralitised pyroxene, and laths of saussuritised plagioclase; magnetite crystals, granular sphene.	Well-preserved micro-gabbroic fabric and ophitic textures; medium-grained.	Actinolite veins. Fine pyrrhotite throughout. Carbonate-chlorite patches.	In addition to normal deuteric alteration, this rock also shows some metasomatism.
5990 VATONE	Uralitised Andesine-Gabbro. Large fresh prismatic andesine crystals and subhedral pyroxene represented by fibrous amphibole pseudomorphs.	Coarsely-crystalline gabbroic fabric; intersertal/subophitic textures.	Conspicuous primary magnetite. Patches, veins of fibrous actinolite.	Probably a coarser equivalent of 5985; also fresher. Fabric suggests minor intrusive. Incipiently metasomatised?
5992	Altered Basalt. Fine altered plagioclase laths, uralitised pyroxene, fine magnetite. Extensively veined by actinolite with sulphides.	Weak preferred orientation and finer/coarser bands.	Primary magnetite. Sulphides are pyrrhotite, chalco-pyrite.	May well be genetically related to 5985, 5990, perhaps from a contact; believed to be intrusive
5993 (T.S. 42296)	Metasomatised Basalt. Fine matteduralitic amphibole and magnetite, interstitial quartz; fine sulphides and magnetite throughout.	Original features largely destroyed; fine-grained, uniform; faint fine banding.	Sulphides are pyrrhotite, chalco-pyrite. Many actinolite veins.	Rock is severely altered; presenc of magnetite supports (but does not prove) igneous origin.
	719048			

719049

FIGURE 1.

AMG REFERENCE POINTS ADDED



LEGEND

- *Pre Cambrian*
- *Housetop Granite*
- *Aeromagnetic Anomalies*

0 5 10K.

5 cm

The Shell Company of Australia Limited
METALS DIVISION

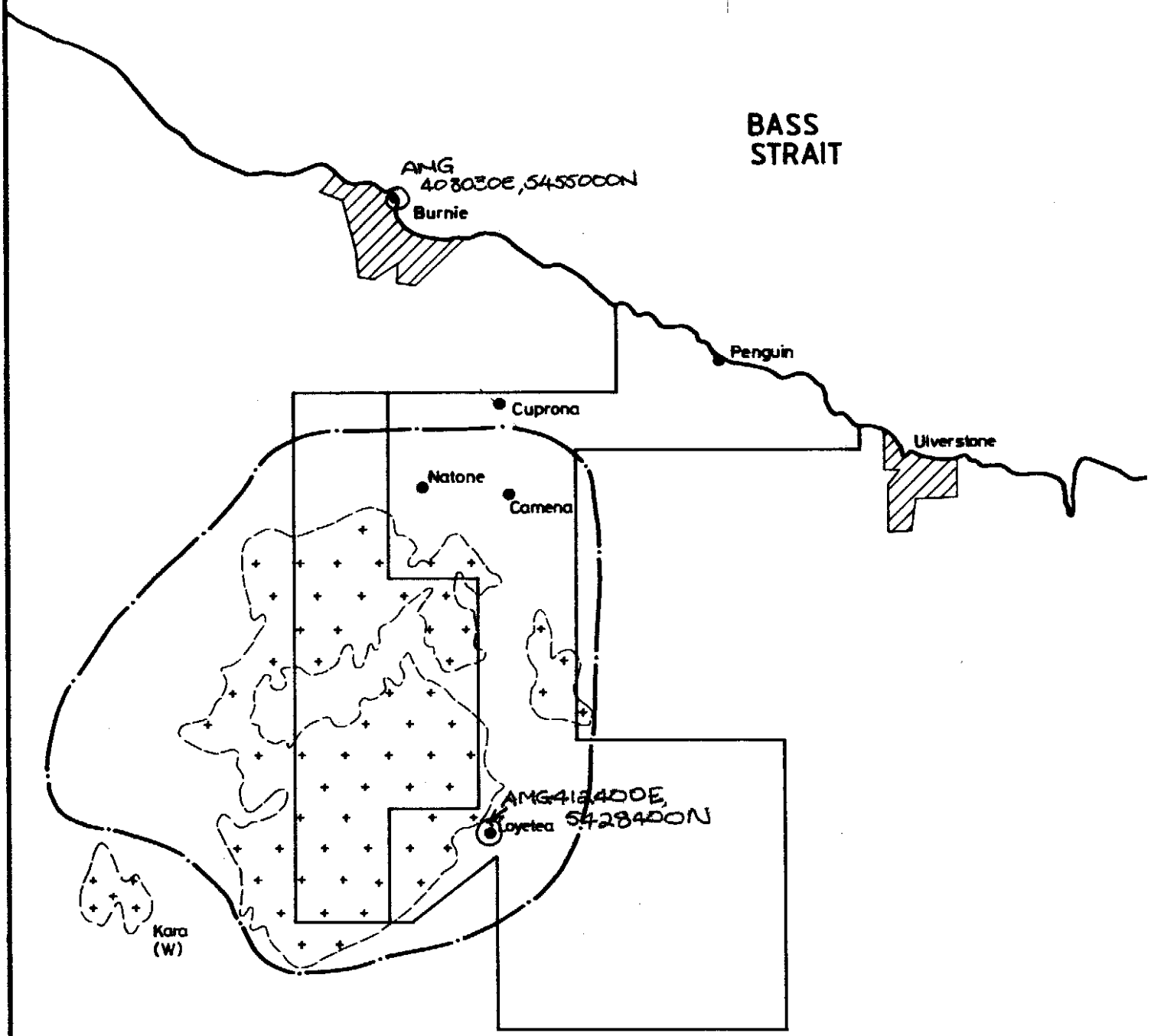
E.L. 14/80
HAYES PEAK

SCALE 1:25000	DATE 5-10-81
AUTHOR L.D.B.	DRAWN H.L.H.
OFFICE DEVONPORT	
DRG. No. D/MG01/012	

048

719050

AMG REFERENCE POINTS ADDED



Housetop Granite

Approx. extent of gravity survey

5 cm

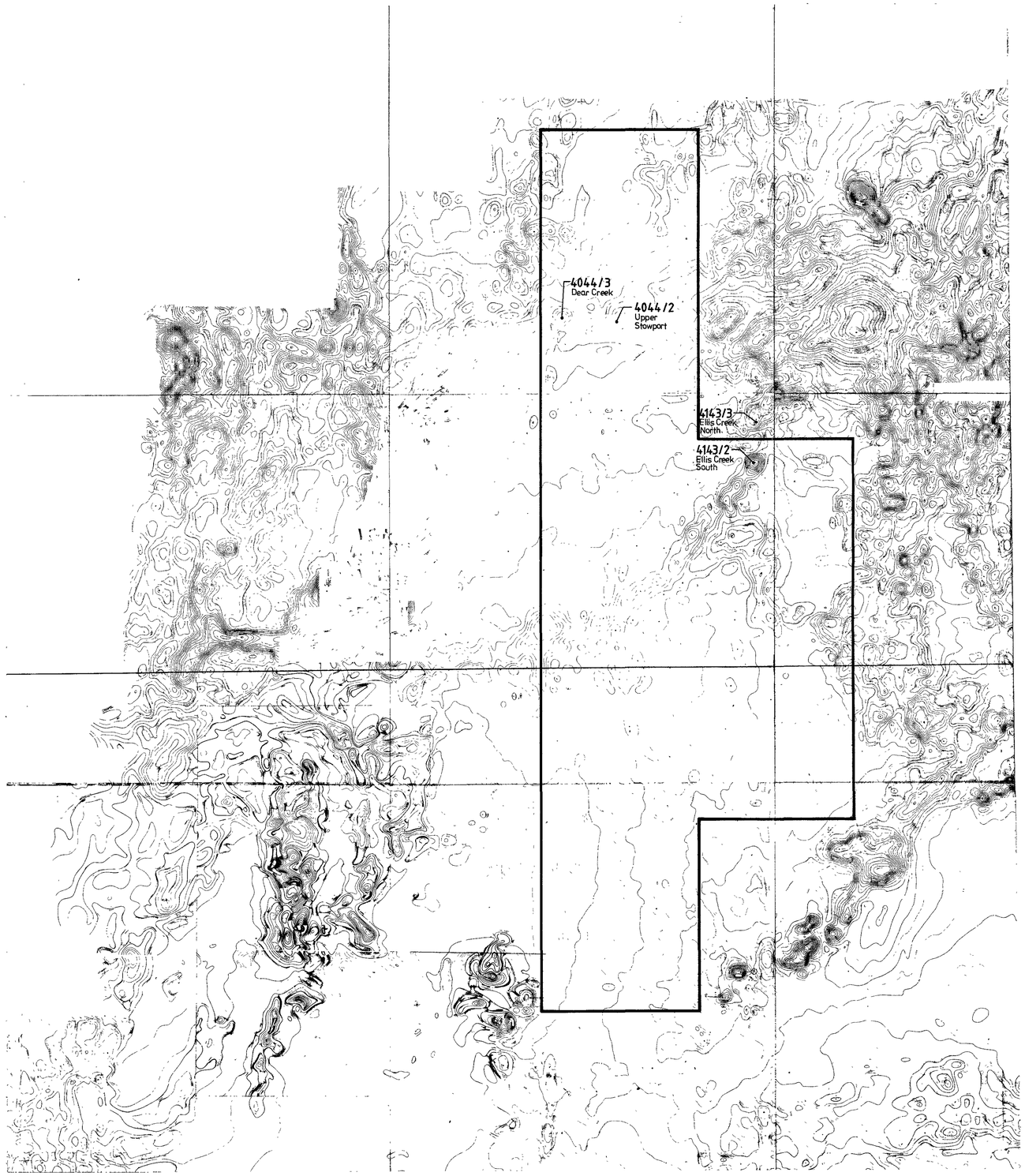
The Shell Company of Australia Limited
METALS DIVISION

E.L.14/80 HAYES PEAK
E.L.8/77 RIANA

REGIONAL GRAVITY

SCALE 1:250 000	DATE 25-6-82
AUTHOR P.R.	DRAWN H.L.H.
OFFICE Devonport	FIG. No. 3
DRG No D/H0001/019	

5 450 000 N



5 420 000 N

390 000 E

719051

TN

5 cm

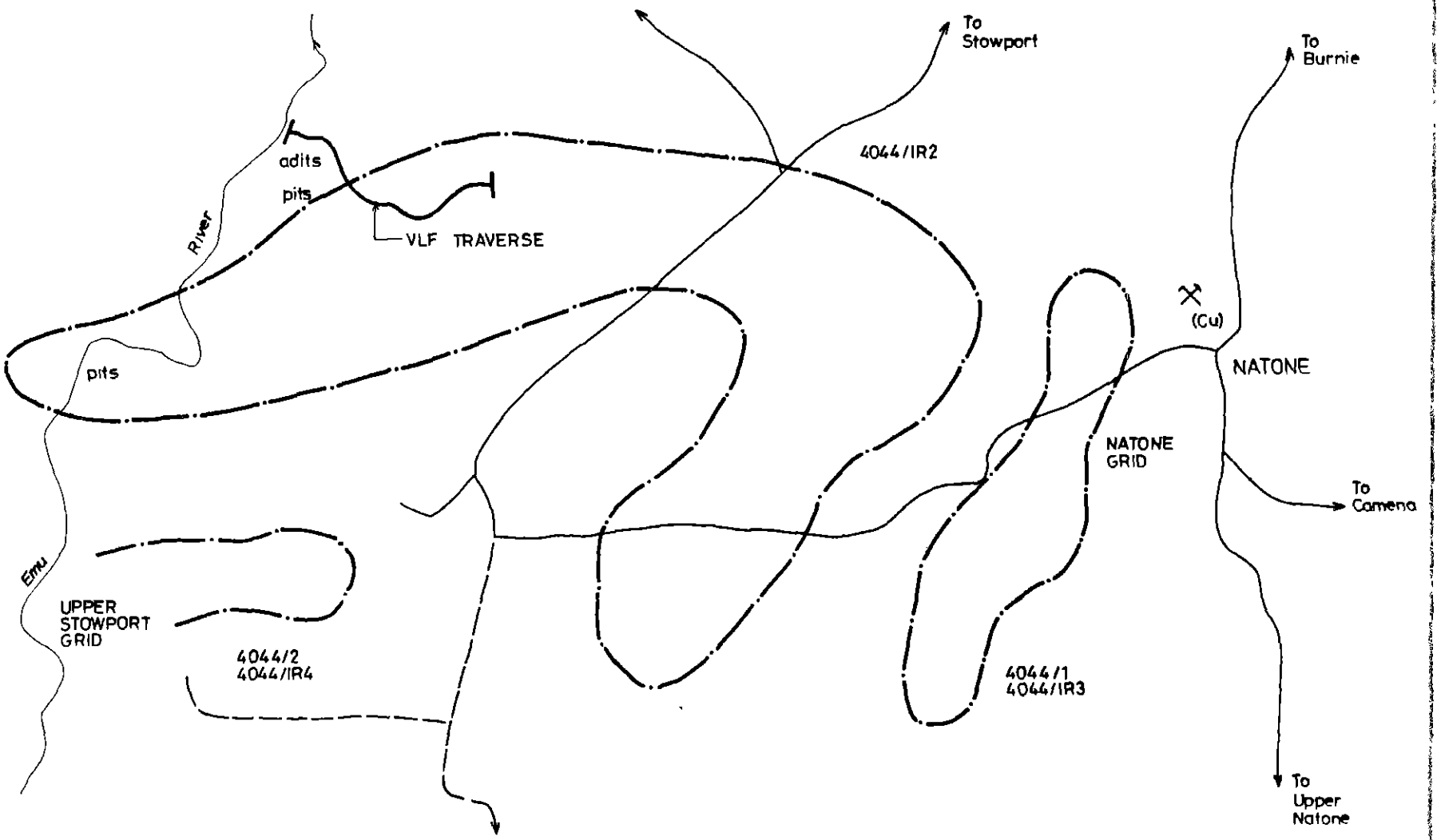
1 0 1 2 Miles

The Shell Company of Australia Limited METALS DIVISION	
E.L. 14/80 HAYES PEAK GEOMETRICS Airborne magnetics survey with anomaly numbers.	
Scale 1 63 360	2465
FIG No	REPORT No
ENCL No	DRG No D/MQ01/014
DATE 4-1-82	AUTHOR L D BANWELL
DRAWN H. L H	OFFICE DEVONPORT

32-1822

E.L. 14/80
HAYES PEAK

E.L. 8/77
RIANA



The Shell Company of Australia Limited
METALS DIVISION

E.L 14/80 HAYES PEAK

VLF TRAVERSE ACROSS
INPUT ANOMALY 4044/IR2

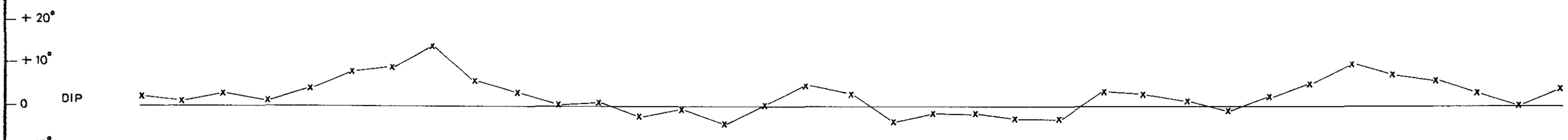
SCALE	1:2000
DATE	16-6-82
AUTHOR	P R
DRAWN	H L H
OFFICE	Devonport
REP No	
DRG No	D/MQ01/021

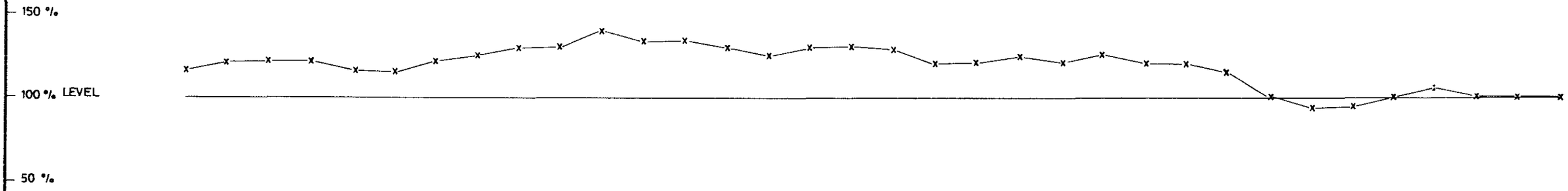
82-1822

2190052

N.W

S.E.





Traverse down track across Anomaly 4044/IR 2
Survey done between 3 15pm & 4 48pm Tuesday 19-1-82
(Dip convention +ve for Northerly dip & -ve for Southerly dip)
North West Cape transmitter

719053

5 cm

100 Metres

The Shell Company of Australia Limited
METALS DIVISION

E.L. 14/80 HAYES PEAK V.L.F. TRAVERSE OVER INPUT ANOMALY 4044/IR2

2466

SCALE	1 2500	DATE	18-2-82
AUTHOR	P RUXTON	DRAWN	H L H
OFFICE	DEVONPORT	REP No	
DR No	D/MQ01/022	F S No	

82-1822

2000 N / 2000 E

old grid

1800 N / 1850 E

new grid

1600 N / 1850 E

1400 N / 1850 E

1350 E

2000 N

1800 N

1600 N

1400 N

1200 N

1000 N

T.N.

M.N

5 cm

719054

0 100 200M

500 E 600 E 700 E 800 E 900 E 1000 E 1100 E 1200 E 1300 E 1400 E 1500 E 1600 E 1700 E 1800 E 1900 E 2000 E

The Shell Company of Australia Limited METALS DIVISION	
E.L. 14/80 HAYES PEAK UPPER STOWPORT ANOMALY 4044/2	
Scale 1:2500	2467
FIG No	REPORT No
ENCL No	DRG No D/MQ01/023
DATE 22-1-82	AUTHOR P RUXTON
DRAWN H L.H	OFFICE DEVONPORT

82-1822

277°60°N
Py + silicified

TREE

Silicified
AsPy

AsPy

AsPy

Hornfels

Hornfels

Housetop
Granite

Contact dips
steeply to North

Hornfels

Red Hornfels

AsPy

Hornfels

ENU RIVER

2000 N

1800 N

1600 N

1400 N

1200 N

1000 N

500 E
600 E
700 E
800 E
900 E
1000 E
1100 E
1200 E
1300 E
1400 E
1500 E
1600 E
1700 E
1800 E
1900 E
2000 E

T N
M N

Housetop Granite
Tertiary basalt
Conglomeratic facies
Burnie Formation (black shales - Sandstone & Hornfels)
As Py Arsenspyrite
Py Pyrite
Geological boundary
Track
Creeks
House or outbuilding
Swamp

5 cm

719055

0 100 200M

The Shell Company of Australia Limited
METALS DIVISION

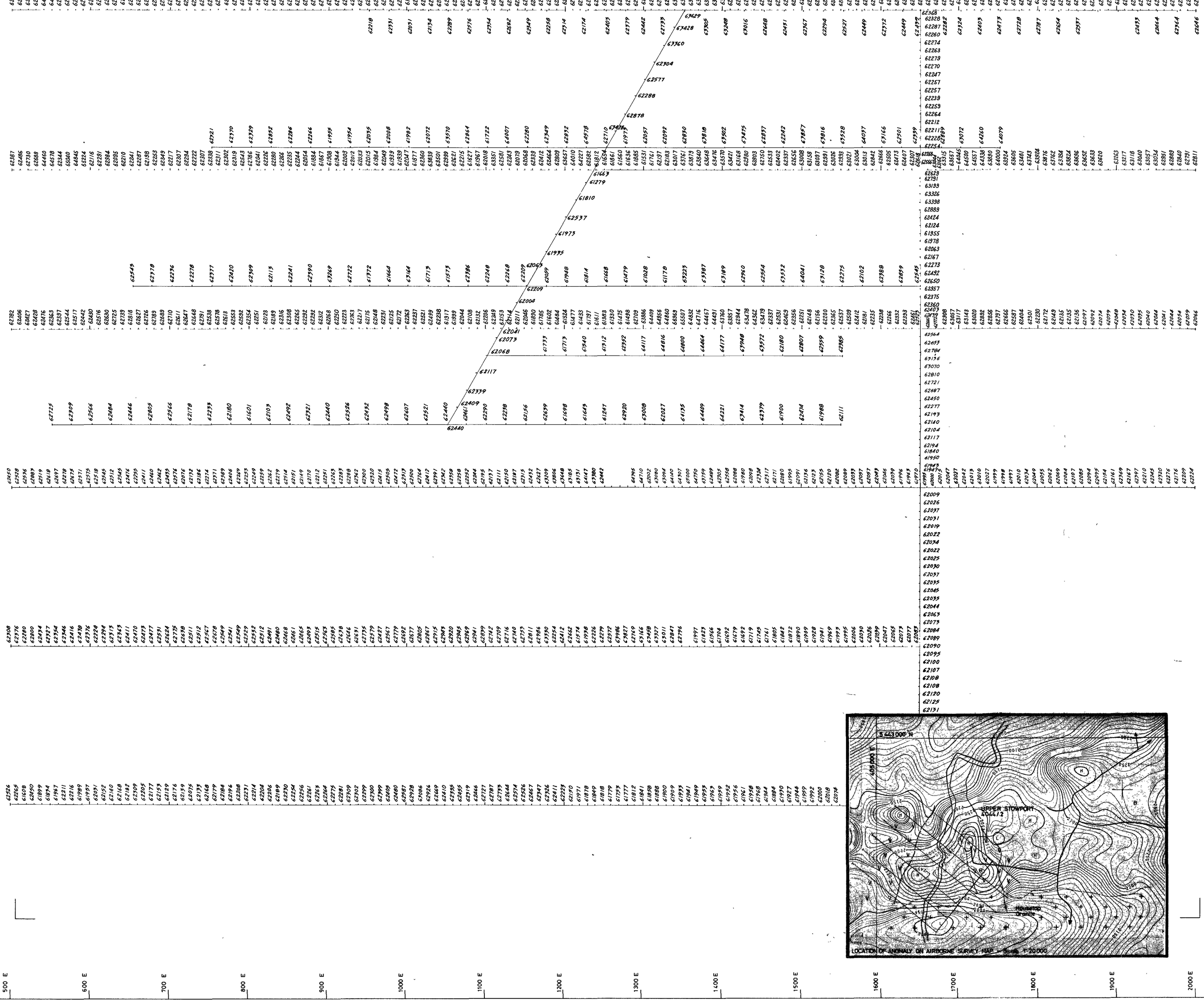
E.L. 14/80 HAYES PEAK
UPPER STOWPORT
ANOMALY 4044/2
Geology & Culture Map

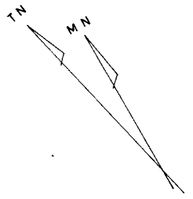
Scale 1:2500

2468

FIG No	REPORT No
ENCL No	DRG No D/MQ01/018
DATE 22-1-82	AUTHOR P RUXTON
DRAWN H L H	OFFICE DEVONPORT

82-1822





5 cm

719056

0 100 200M

The Shell Company of Australia Limited METALS DIVISION	
E.L. 14/80 HAYES PEAK UPPER STOWPORT ANOMALY 4044/2 GROUND MAGNETICS 2469 Scale 1:2500	
FIG No	REPORT No
ENCL No	DRG No D/MQ01/015
DATE 22-1-82	AUTHOR P RUXTON
DRAWN H L H	OFFICE DEVONPORT

82-1922

2000 N

1800 N

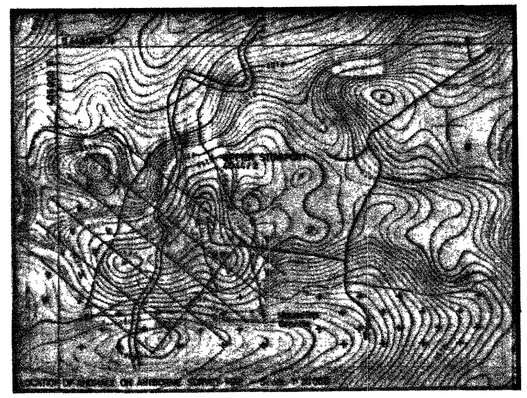
1600 N

1400 N

1200 N

1000 N

500 E | 600 E | 700 E | 800 E | 900 E | 1000 E | 1100 E | 1200 E | 1300 E | 1400 E | 1500 E | 1600 E | 1700 E | 1800 E | 1900 E | 2000 E



TN

MN

5 cm

0 100 200M

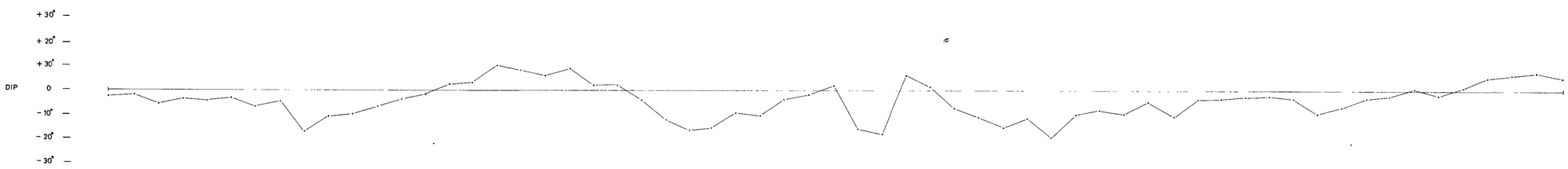
719057

The Shell Company of Australia Limited METALS DIVISION	
E.L. 14/80 HAYES PEAK UPPER STOWPORT ANOMALY 4044/2 GROUND MAGNETIC CONTOURS	
Scale 1:2500 2470	
FIG No	REPORT No
ENCL No	DRG No D/MQ01/017
DATE 22-1-82	AUTHOR P RUXTON
DRAWN H L H	OFFICE DEVONPORT

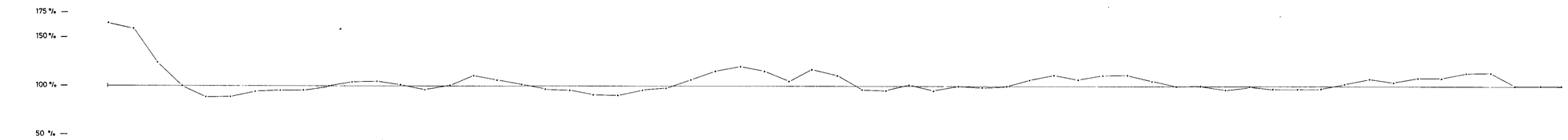
32-1822

500 E | 600 E | 700 E | 800 E | 900 E | 1000 E | 1100 E | 1200 E | 1300 E | 1400 E | 1500 E | 1600 E | 1700 E | 1800 E | 1900 E | 2000 E

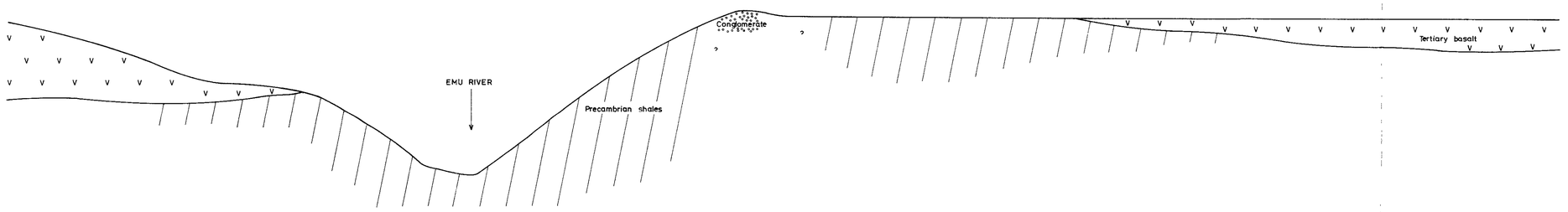
N.W. S.E.



V.L.F.
N.W. Cape transmitter
Dip convention +ve for Northern
-ve Southern dip
(Friday 22nd Jan')



TOPOGRAPHY



500 E | 600 E | 700 E | 800 E | 900 E | 1000 E | 1100 E | 1200 E | 1300 E | 1400 E | 1500 E | 1600 E | 1700 E | 1800 E | 1900 E | 2000 E

719058

5 cm

0 100 200M

The Shell Company of Australia Limited
METALS DIVISION

E.L. 14/80 HAYES PEAK
UPPER STOWPORT
LINE 1800 N

2471

SCALE	1 2500	DATE	28-6-82
AUTHOR	DHM/PRUXTON	DRAWN	H L H
OFFICE	DEVONPORT	REP No	
ENCL No		DRG No	D/MQ01/020

82-1822