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BILLITON AUSTRALIA  
 The Metals Division of the Shell Company of Australia Limited

EL 30/84 AVOCA

Progress Report on Exploration  
 for the period 18/7/85 to 31/12/85  
 and Final Report

Author: A J Whitaker  
 Date: January 1986

Report No.: 08.3178

**OPEN FILE**

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1. Tasmanian Mines Department
  2. Billiton Australia, Melbourne
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## 1. Rock Assays

SUMMARY

Exploration during the term of the tenement was based on regional geological mapping and stream sediment sampling. Mapping failed to locate any targets worthy of further work.

The stream sediment sampling highlighted a number of areas shedding tin. In the Rosiers-Gilligan creeks area, stream anomalies of 98-1240 ppm Sn are sourced by small (max 0.3mx50m), granite hosted, quartz-sericite-tourmaline lodes. Similarly, anomalous streams (40-2140 ppm Sn) in the NW of the EL, draining into Storeys Creek, are sourced by a few small granite hosted quartz-sericite-tourmaline lodes. Stream sampling also highlighted two areas of Mathinna Beds as worthy of follow up, namely Thompsons Gully, (44-195 ppm Sn) and the Dog Kennels (40-165 ppm Sn). In both cases however, further sampling gave spotty results of similar magnitude to the stream sediment assays and thought to be due to erratic leakage from shallow underlying granite. Roy's Hill prospect was the only group of workings of sufficient interest to justify a detailed inspection. However, poor tin assays both in this and previous sampling (by CRA) and negative drilling results from the old Mines Department holes have down-graded the prospect.

## 1. PROPERTY

Exploration Licence 30/84 was granted to The Shell Company of Australia Limited on the 18th July, 1984.

The 216 sq km licence is roughly centred on the township of Avoca (Fig. 1) approximately 100 km southeast of Launceston. Property and forestry tracks give good access to the licence area.

## 2. OBJECTIVES

A number of granite and sediment hosted tin prospects/mines occur either in or near the licence. The most significant occurrences in the region are Royal George, Aberfoyle and Storeys Creek tin, tin-tungsten mines. Exploration was carried out to assess the various prospects and locate 'new' tin bearing systems.

## 3. REGIONAL GEOLOGY (Figs 2 & 3)

### Silurian-Devonian

The oldest rocks in the area are sandstones and siltstones of the Mathinna Beds. Mines Department work suggests that they are deepwater sediments of turbidity current origin.

The Mathinna Beds are complexly folded with the most prominent fold axes trending NW and bedding dipping to the NE and SW. Quartz veining is common and often fills steeply dipping fractures roughly parallel to the fold axes.

### Upper Devonian

Phases of the Ben Lomond Granite intruded the Mathinna Beds during the Upper Devonian. The granite is composed of an erratic distribution of porphyritic fine, medium and coarse grained phases with variable biotite contents, generally about 5%. Erosion is believed to have exposed only the upper 300 m of the granite as small areas of Mathinna Beds still cap the main body of granite 7-8 km north of Avoca.

### Permian-Triassic

Erosion prior to the Permian unroofed much of the now exposed granite. The basal Permian conglomerates contain cobbles of Mathinna Beds and granite adjacent to the respective source rocks. The Permian sediments grade rapidly upwards into sandstones and silty-sandstones, many of which are fossiliferous.

Overlying the Permian sediments are sandstones, siltstones and coal measures of the Triassic. No attempt has been made to separate these two rock groups when mapping.

### Jurassic

Overlying the Permian-Triassic sediments are extensive dolerite sheets. Although now largely hill capping, the dolerites apparently intruded as sills. A number of small bodies of dolerite occur in the St. Pauls and South Esk River valleys and must represent eroded feeder 'pipes'.

### Tertiary

Tertiary basalt is exposed in the South Esk River valley both east and west of Avoca and in the St. Pauls River valley south of Avoca. The flows are generally composed of vesicular basalt.

### Recent

Extensive areas of alluvium/colluvium occur in and flanking both the St. Pauls and South Esk River valleys.

## 4 WORK UNDERTAKEN

### Summary

- Prior to report period
  - Regional Geological mapping
  - Stream sediment sampling
  - Prospect evaluation

- During the report period
  - Thompsons Gully - Ridge sampling and mapping
    - Grid sampling
  - Dog Kennels - Ridge sampling and mapping
    - Grid sampling

## Discussion

### 4.1 Work Completed prior to the Final Report Period

#### 4.1.1 Stream Sediment Sampling (Figs. 4 & 5)

A stream sediment orientation programme carried out on adjacent ELs in which Billiton has an interest (18/84 Rossarden and 7/78 Royal George) concluded that the -10# fraction was the most appropriate. Nearly three hundred stream sediment samples were collected with a sample density of about 3-5 samples/sq km for streams draining Mathinna Beds, and 2-3 samples/sq km in granite country. Statistical treatment of the results was carried out in conjunction with results from the adjoining EL's using the methods of Sinclair 1974. The results gave a mean background value of 17 ppm Sn for the granite, with a lower threshold value of 60 ppm Sn. In practice, it was found that for stream sediments in granite country, in the upper most 0.5-0.75 km of drainages, assays of 60-500 ppm Sn were generally sourced by a few small tin lodes of little economic significance. The background level of Sn in streams draining Mathinna Beds away from areas of outcropping or shallow granite was less than the detection limit of 4 ppm Sn, however the mean assay of all sediment sourced samples (excluding follow up samples) was 11 ppm. With a lower threshold of 36 ppm Sn selected, two main areas of Mathinna Bed sourced anomalies were identified, Thompsons Gully (anomaly 1) and the Dog Kennels (anomaly 2). A third anomaly (anomaly '3') of 516 ppm Sn approximately 2 km west of Ormley homestead was not repeated in follow up sampling. Anomalies of 98-1240 ppm Sn in the Rosier's-Gilligan Creek area are sourced by a number of small workings, however, none are of sufficient size (max. dimensions 0.3mx50m) to warrant further work. The same can be said of anomalies

of 40-2140 ppm Sn for streams draining into Storeys Creek in the NW of the tenement.

#### 4.1.2 Prospect Evaluation

##### Roy's Hill (Figs. 1 & 3 location)

Roy's Hill Prospect exposes a greisenised granite cusp beneath 1-2 m of Permian conglomerates and sandstones. The cusp dips under Mathinna Beds at 15-35° to the west, north and east of the prospect (Fig. 6). The old workings exploited the tin bearing basal Permian conglomerates and the uppermost portions of the greisenised granite. Chip samples of the greisen gave assays of only 84-513 ppm Sn while the overlying conglomerates assayed 210 ppm Sn (sample assays Appendix 1). These results are similar to sampling results reported by CRAE.

With assays from the workings well below values expected for significant mineralisation, and Mines Department drill holes (2) immediately to the west of the prospect indicating both a steep westerly dip of the granite contact and little associated alteration/mineralisation, little economic potential is thought to exist.

#### 4.2 Work Completed during the Final Report Period

##### 4.2.1 Thompsons Gully (Location Figs. 1 & 5)

The initial stream sampling gave assays of 44-116 ppm Sn for the area. Follow up sampling at approximately 250 m intervals up streams, confirmed the high levels of tin in the streams. Ridge sampling was also undertaken with five lines sampled at 50 m intervals (Fig. 8). Spotty assays of tin in the range 44 ppm-192 ppm Sn suggest erratic leakages. The area is underlain by spotted sandy siltstones and siltstones of the Mathinna Beds (Fig. 7). Three granite cusps and a small granitic dyke outcrop in the area. A number of small workings on sediment hosted tin bearing quartz-tourmaline veins (up to 20cmx30cm) are located in the south of the area.

A soil grid (1400mx700 approx.) was established to cover the best geochemistry and the workings (Figs. 9, 10A & 10B). The sample interval was initially 50 m, however, this was reduced to 25 m in the vicinity of the workings.

A number of tin highs occur throughout the grid, with two principal groupings. The northern part of the grid contains a zone of +600x200m at +20 ppm Sn with spotty highs to 425 ppm. This area lies immediately adjacent to two small granite outcrops and is coincident with an area of minor tourmaline veining in the sediments. The low tin tenure and the close associations of the anomaly to the granite suggest that the tin enrichment is related to minor leakage from the underlying intrusion. Similar leakage occurs along most of sediment-granite contact in the Royal George area.

The second anomaly lies immediately down slope of two small abandoned tin mines. Highest values occur within the drainage system directly below the mines and the anomaly is open down stream. No economic significance is placed on these results, as the tin is thought to be derived directly from the old workings.

Assays of As were generally in the range 2-6 ppm with a few values of 10-70 ppm As down stream of the old mines. Assays of Cu (<2-12 ppm Cu), Pb (<5-16 ppm), Zn (9-17 ppm Zn) and Ag (<1 ppm) were all considered to be at background levels.

The grid sampling largely confirmed the erratic nature of tin leakage from the underlying granite. No worthwhile target has been defined and therefore no further work is recommended.

#### 4.2.2 The Dog Kennels (Location Figs. 1 & 4)

The initial stream sediment sampling identified the Dog Kennels area (3x1.5km) as shedding anomalous (40-164 ppm Sn) levels of tin.

The area is underlain by weakly contact metamorphosed siltstones and silty sandstones of the Mathinna Beds (Fig. 11). A small granite cusp was located immediately south east of the area and a dolerite

feeder has also intruded the Mathinna Beds in the north. Permian sediments overlies the Mathinna Beds to the south.

Follow up stream, ridge and slope sampling gave further anomalous tin values of 40-185 ppm Sn (Fig. 11). Values of 2-17 ppm As, 5-36 ppm Cu, <5-30 ppm Pb and 13-105 ppm Zn are not considered significant (Fig. 12).

A grid (1.0x0.5km) was established (location Fig. 11, results Fig. 13) on the ridge between Ormley Creek and Rostrevor Rivulet, as it gave the most consistently (although still erratic) high tin values.

A total of 81 samples were taken, producing a range of Sn values from 4 to 235 ppm. Values for As, Cu, Pb and Zn show little correlation with the Sn values.

The result for Sn gives a mean value of 52 ppm, with a standard deviation of 46. On the premise of  $|\text{mean} + 2 \text{SD}|$  being anomalous, i.e. 145 ppm, 5 values are anomalous (see Fig 13A).

There is no geological evidence of these elevated Sn values being sourced from a major tin-bearing lode or system, and it is concluded that they reflect local leakage.

## 5 CONCLUSIONS

Regional geological mapping and prospect evaluation has failed to locate targets worthy of follow up. The best of the stream sediment anomalous areas were followed up with: 1. those in granite being due to small lodes of economic significance; and 2. those sourced by Mathinna Beds i.e. Thompsons Gully and Dog Kennels, being due to weak erratic leakage from underlying granite.

No further work is justified, and it is recommended that the tenement be relinquished.

REFERENCES

Sinclair, A.J., 1974. Selection of threshold values in geochemical data using probability graphs. J. Geochem Explor., 3:129-149.

Whitaker, A.J., 1985. EL30/84 Avoca Progress Report on Exploration for the Period 18/7/84 to 18/7/85. Shell unpubl. Rep. No. 08.2846. 85-2407

APPENDIX 1

Rock Assays

# SAMPLE RECORD

Sheet \_\_\_ of \_\_\_

012

**METALS DIVISION**

**SAMPLE TYPE:** \_\_\_\_\_

**LOCATION / PROJECT:** AUCLA  
LD03

**SAMPLER:** ATW

**DATE:** \_\_\_\_\_ **MAP / PHOTO REF:** \_\_\_\_\_

**ASSAY LAB:** ANALABS

**SAMPLE DESPATCH** \_\_\_\_\_

**ASSAY REPORT NOS:** \_\_\_\_\_

**ORDER NO:** \_\_\_\_\_

**SAMPLE STORAGE:** \_\_\_\_\_

SAMPLE NO.	LOCATION				ANALYSES							DESCR.	DESCRIPTION
					Sn	As	Cu	Pb	Zn	Ag	Au		
6926	AUCLA	ROSSARDEN	ROAD		<3	<2	20	440	50	2.5	<0.008		Chip of granite hosted quartz veins
6932	ROY'S	HILL	PROSPECT		84	18	35	315	140	1.0			chip of greisen cap
6933	"	"	"		88	45	25	1500	35	5.6			chip of quartz rich greisen
6934	"	"	"		210	25	10	90	30	1.0			chip of basal Permian
6935	"	"	"		85	4	10	615	20	7.5			chip of vertical quartz vein
6936	"	"	"		513	82	10	85	50	3.5			chip of greisen cap
6955	BENHAM				43	<3	5	20	20	0.5			Quartz tourmaline veins in hornfels
6956	"				11	3	5	10	10	0.5			Quartz-tourmaline veins in quartzite
6962	BURNT	GULLY			<3	<2	5	<5	10	<0.5			Quartz veins in silty sandstone
6963	"	"			<3	9	5	<5	5	<0.5	*		Quartz veins in " "
6964	"	"			<3	10	5	<5	5	0.5	*		Quartz veins in silty sandstone
6965	"	"			<3	12	5	<5	20	<0.5	*		Quartz veins in sandstone
6966	"	"			<3	17	5	<5	5	<0.5			" " " "
7800	The	Thompson's	Gully anomaly		<3	3	5	<5	35	<0.5	*		Quartz veins in quartzite
11801	"	"	"		<3	9	10	10	10	<0.5			" " " "
11804	"	"	"		<3	<2	5	10	10	<0.5			" " " "
11805	"	"	"		3	9	5	<5	15	<0.5	*		" " " "
11824	WORKINGS	Thompson's	Gully		4190	2	5	35	5	<0.5	*		" " in silty sandstone
11826	Thompson's	Gully	anomaly		<3	<2	5	<5	5	<0.5	*		" " " "
11827	"	"	"		<3	<2	5	<5	<5	<0.5			Quartz Scree
11835	DOG	KENNELS			<4	3	7	<5	9	<1	*		Quartz veins in silty sandstone

**REMARKS:** \_\_\_\_\_

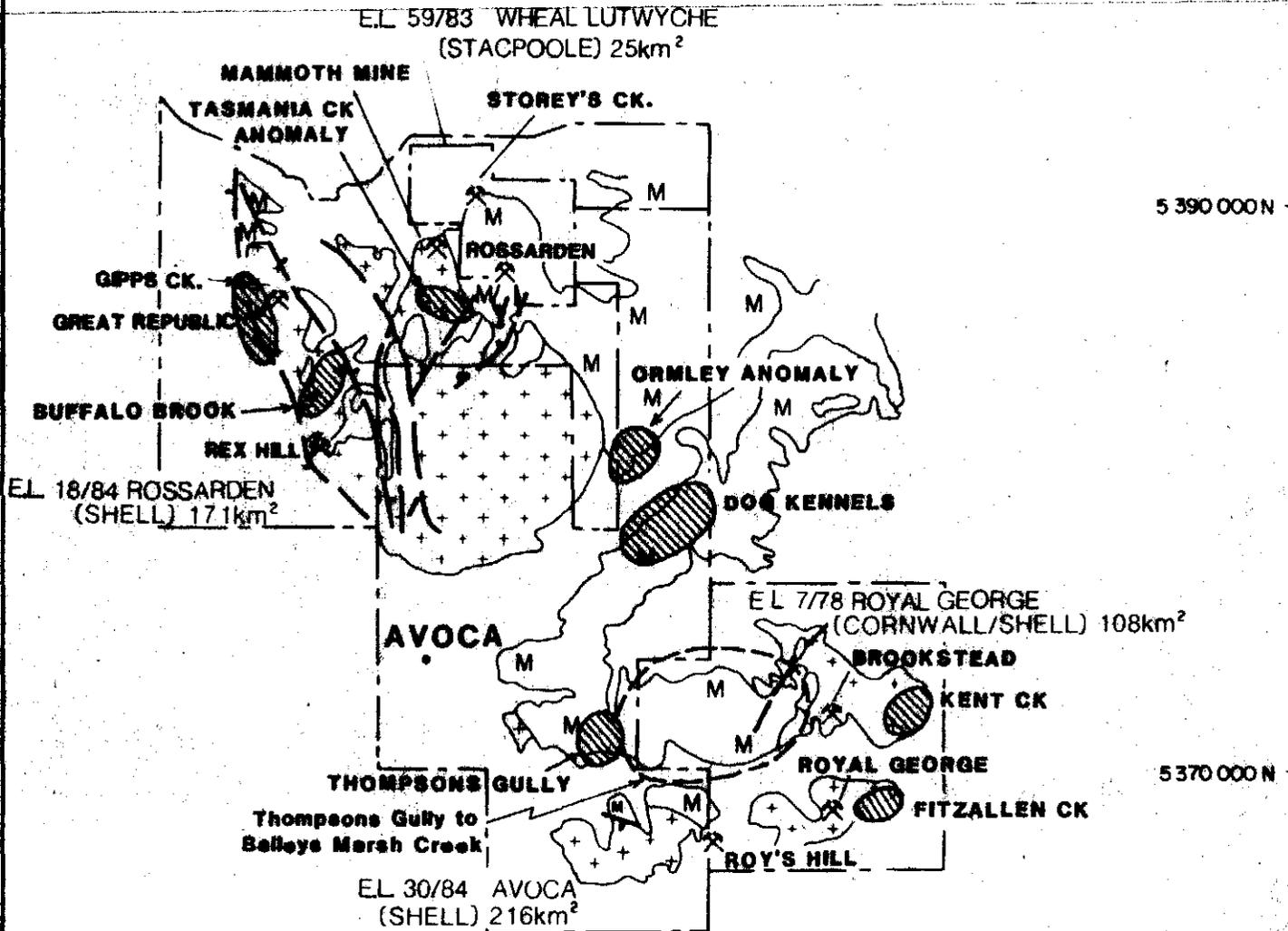
023013

213

560 000 E

580 000 E

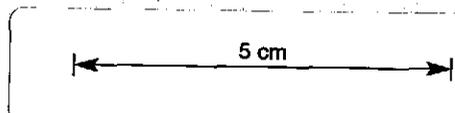
023014



-  COLLUVIUM/ALLUVIUM/PERMIAN SEDIMENTS
-  DEVONIAN GRANITE
-  MATHINNA BEDS
-  PROSPECT

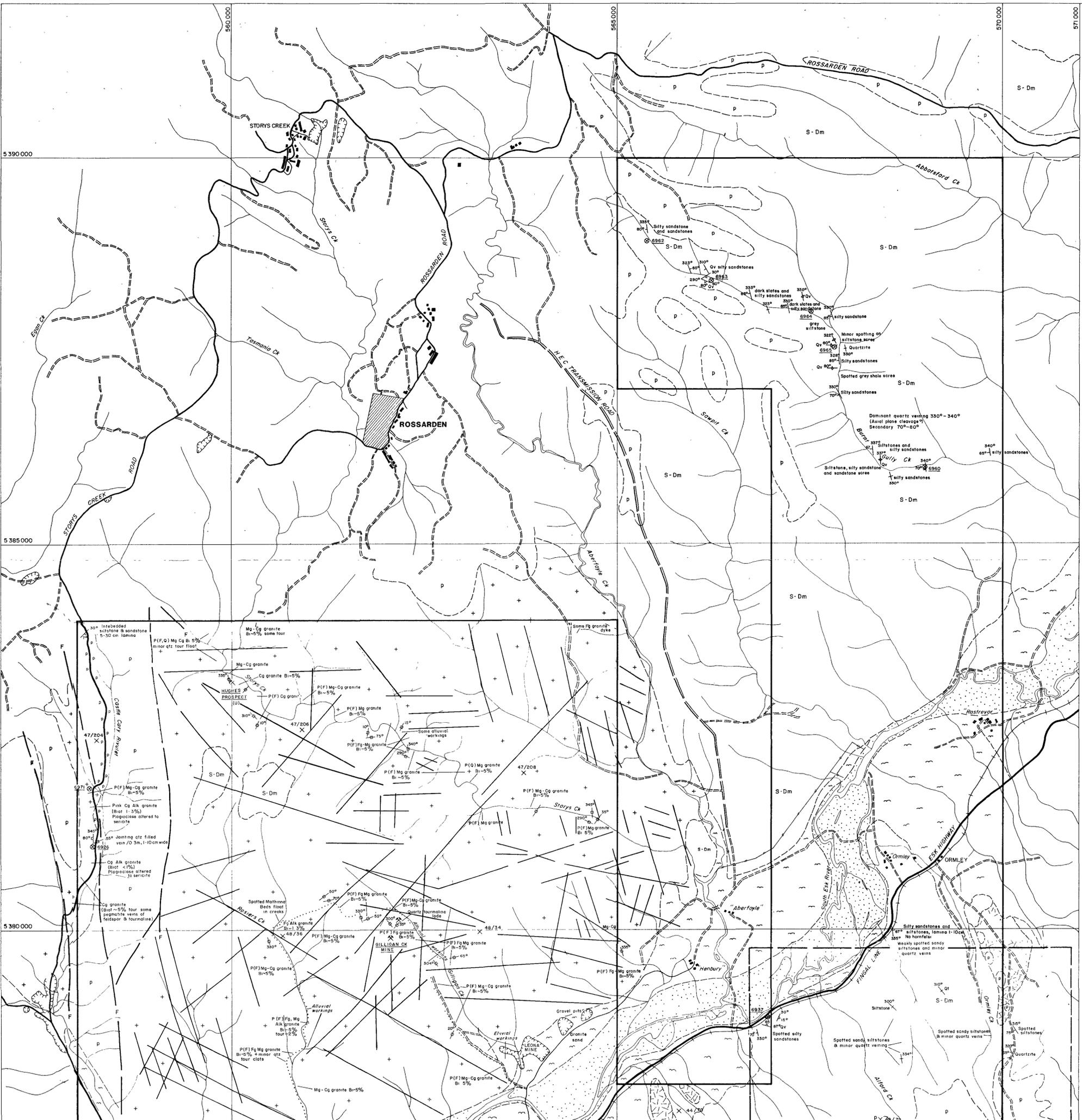


--- E.L. BOUNDARY



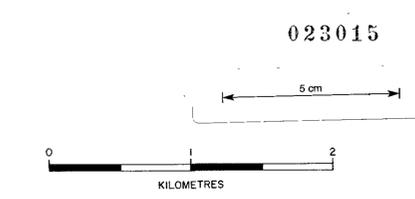
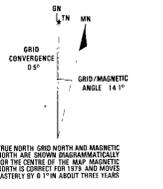
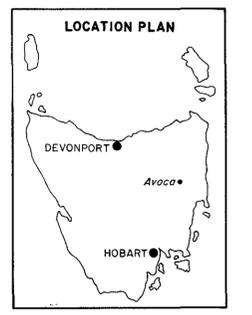
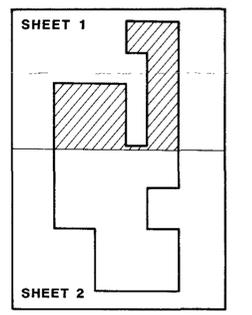
Bilkon Australia		
TASMANIA REGIONAL		
LOCATION PLAN		
BEN LOMOND GRANITE		
D.C.	/85	1:250 000
J.B.	AHO	
MT24 / 1086		

86-2556



RECENT		River alluvium (St Pauls R)
		Alluvium / colluvium
TERTIARY		Basalt
JURASSIC		Dolerite
		Dolerite / talus (All Recent)
UNDIFFERENTIATED TRIASSIC & PERMIAN		Sandstones, conglomerates, siltstones, shale, coal measures
CARBONIFEROUS - UPPER DEVONIAN		<b>BENLOMOND GRANITE</b> P (F, Q) Porphyritic (Feldspar and quartz porphyroblasts) Fg Mg Cg Fine grained, Medium grained, Coarse grained Bi, Tour, Musc Biotite, tourmaline, muscovite accessories Alk granite Alkaline granite i.e. biotite content < 5% gen 1% Qtz tour clots Qtz tour clots Quartz ring with tourmaline cores
SILURIAN - DEVONIAN		<b>MATINNA BEDS</b> Sandstones, silty sandstones, siltstones Hornfelsed in places by the Benlomond Granite

	Rock sample
	Air photo linear
	Jointing dip and strike (Bearings are magnetic)
	Cleavage dip and strike
	Bedding dip and strike
	Geological traverse in granite - road, foot
	Granite/sediment contact, apparent dip direction
	Fence, gate
	Pit workings
	Alluvial workings



023015

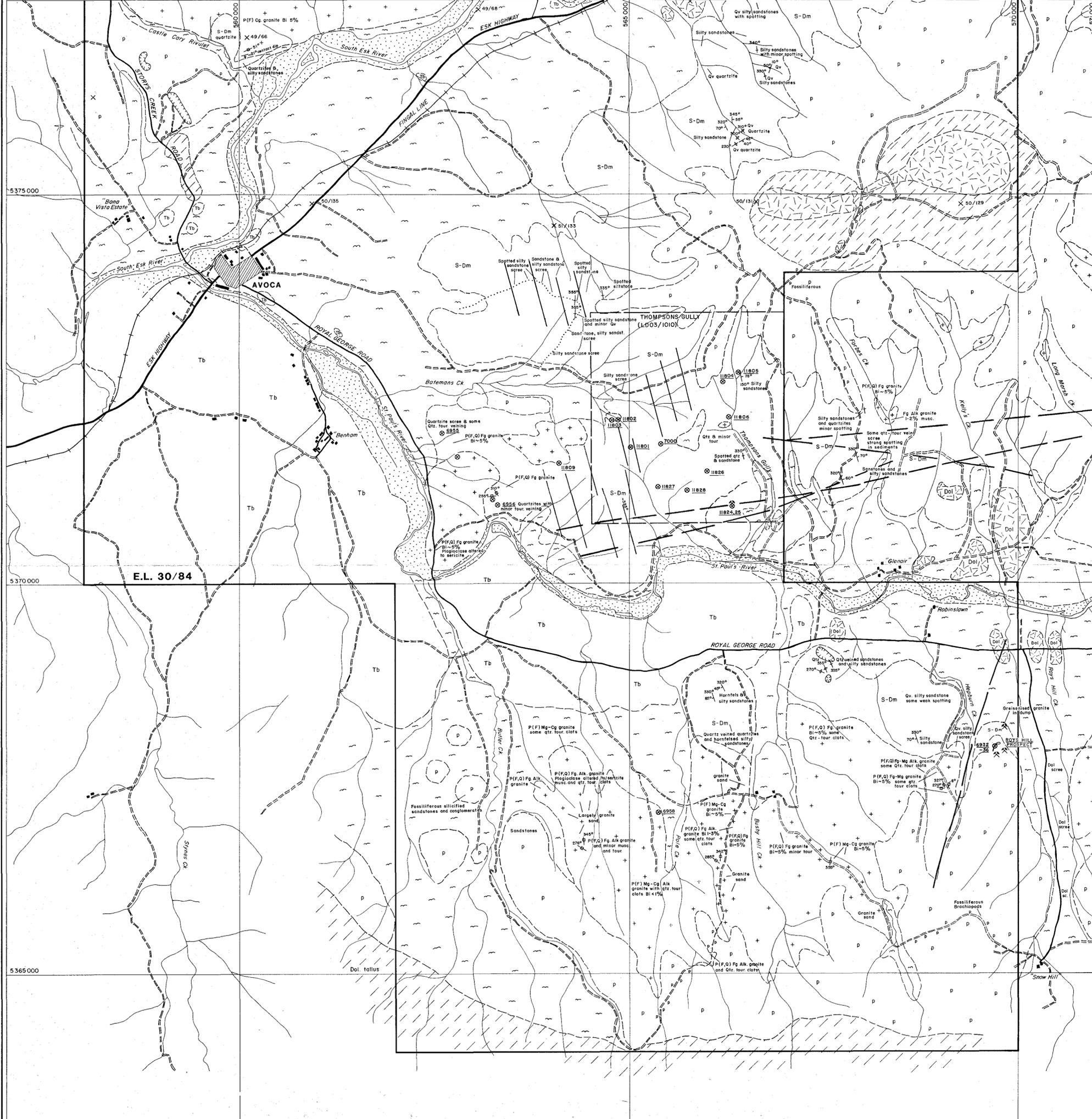
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METALS DIVISION

**TASMANIA**  
AVOCA E.L. 30/84

**GEOLOGY**

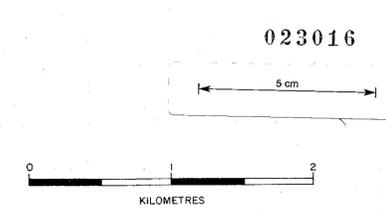
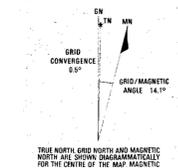
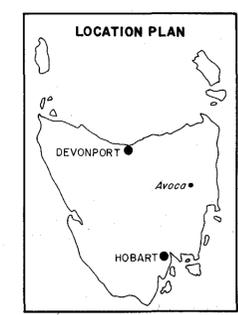
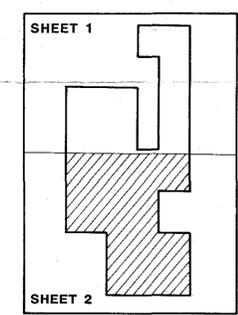
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SCALE	1:25000	DATE	Oct 1985
AUTHOR	A.W.	DRAWN	A.S.V.C.
OFFICE	Melbourne/AHO	REP No	
DRG No	LD 02 / 1000	FIG No	FIG. 2



- RECENT River alluvium (St. Pauls and St. Esk Rivers)
- Alluvium / colluvium
- TERTIARY Tb Basalt
- JURASSIC Dolerite
- Dolerite / fallus (Aft. Recent)
- UNDIFFERENTIATED TRIASSIC & PERMIAN Sandstones, conglomerates, siltstones, shale, coal measures
- CARBONIFEROUS - UPPER DEVONIAN BENLOMOND GRANITE  
P (F,Q) Porphyritic (Feldspar and quartz porphyroblasts)  
Fg Mg Cg Fine grained, Medium grained, Coarse grained  
Bl, Tour, Musc. Biotite, tourmaline, muscovite accessories  
Alk. granite Alkaline granite i.e. biotite content < 5% gen. 1% qtz. four clots Quartz ring with tourmaline cores
- SILURIAN - DEVONIAN S-Dm MATAINNA BEDS Sandstones, silty sandstones, siltstones  
Hornfelsed in places by the Benlomond Granite  
Qv (Quartz veined)

- Rock sample
- Air photo linear
- Jointing dip and strike (Bearings are magnetic)
- Cleavage dip and strike
- Bedding dip and strike
- Geological traverse in granite - road, foot
- Granite/sediment contact, apparent dip direction
- Fence, gate
- Pit workings
- Alluvial workings



023016

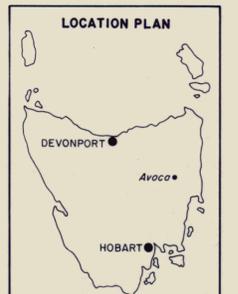
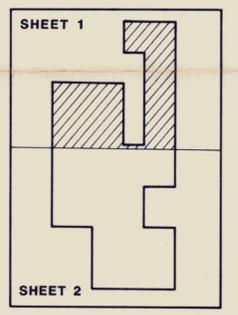
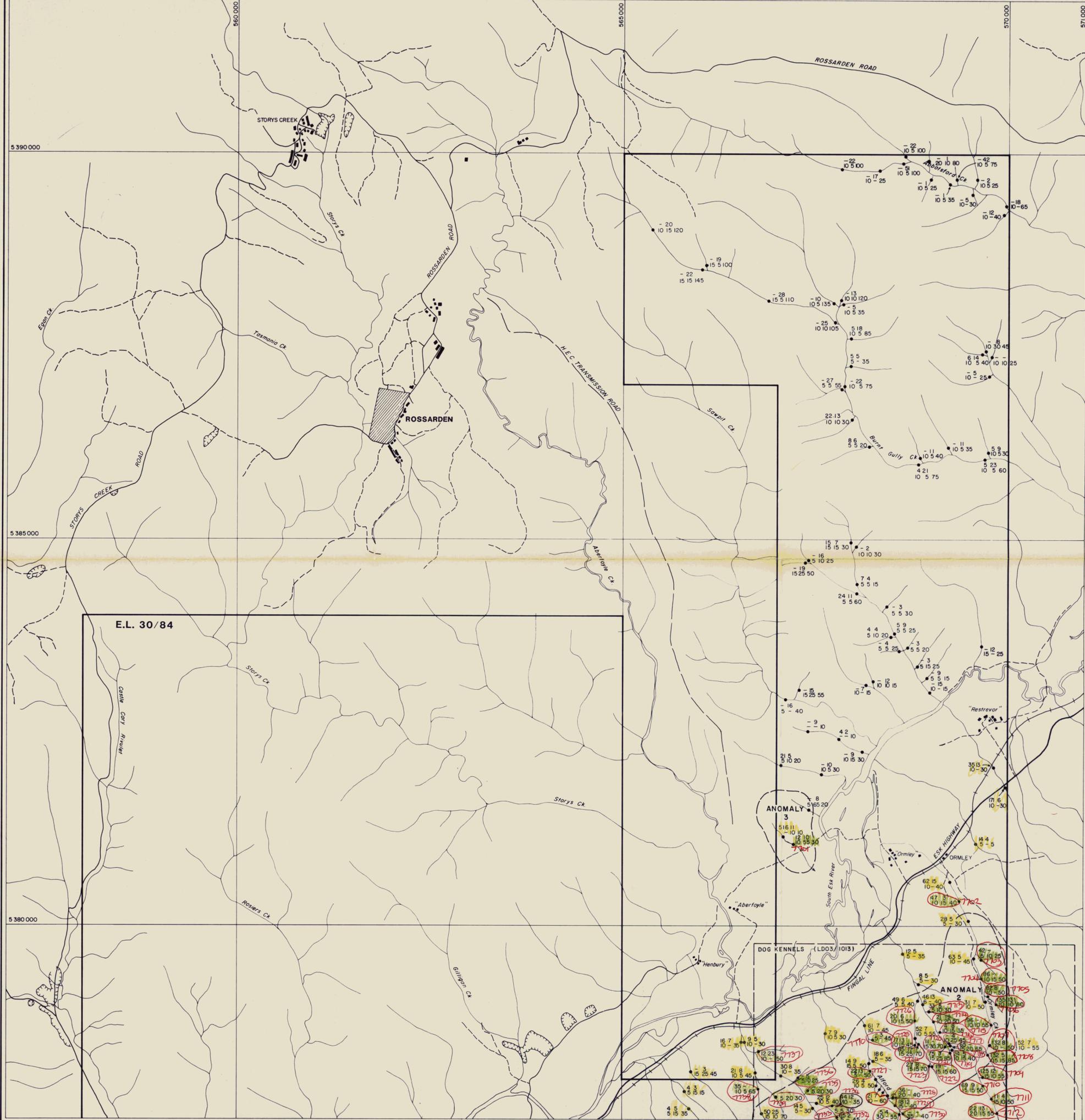
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METALS DIVISION

TASMANIA  
AVOCA E.L. 30/84

**GEOLOGY**

SHEET 2

SCALE	1:25000	DATE	Oct 1985
AUTHOR	A. W.	DRAWN	A.S., V.C.
OFFICE	Melbourne/AHO	REP. No.	
DRG. No.	LD 03/1001	FIG. No.	FIG. 31



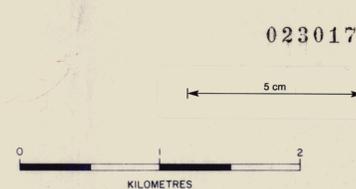
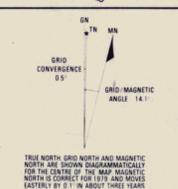
**LEGEND**

7 9 Sn As  
 10 5 30 Cu Pb Zn

All samples were sieved with the -10# portion retained for assay.

All values in ppm.

SAMPLES ADDITIONAL TO TCR 85-2407  
 SHADED IN GREEN  
 OTHER SAMPLES (INCLUDING THOSE IN YELLOW)  
 RECORDED FROM 85-2407  
 DATA BASE NOS IN RED



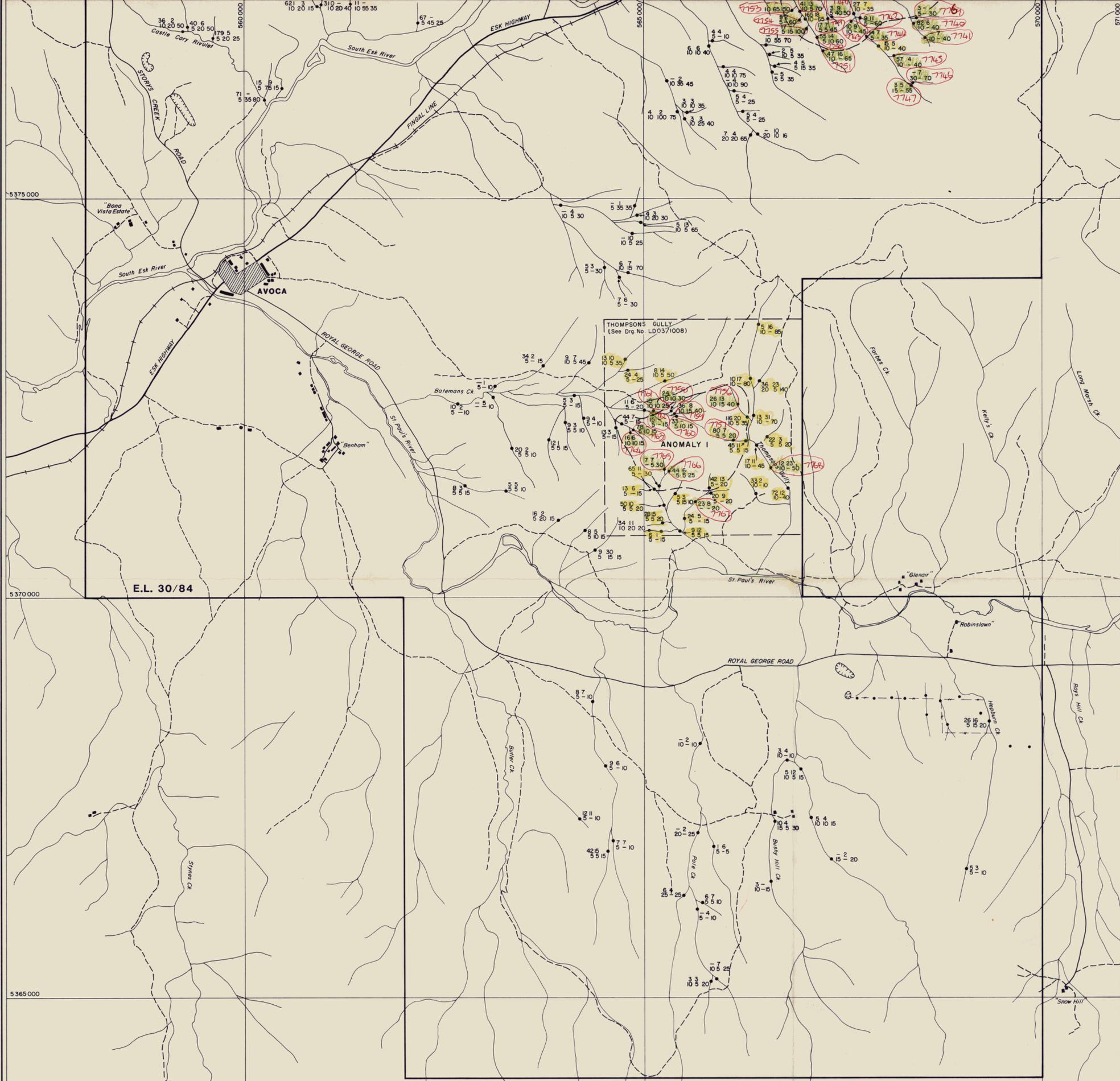
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 METALS DIVISION

TASMANIA  
 AVOCA E.L. 30/84  
 STREAM SEDIMENT  
 ASSAY RESULTS

SHEET 1

SCALE	1:25000	DATE	May 1985
AUTHOR	A.W.	DRAWN	V. Caton
OFFICE	Melbourne/AHO	REP No.	
DRG No.	LD03/1005	FIG No.	FIG. 4

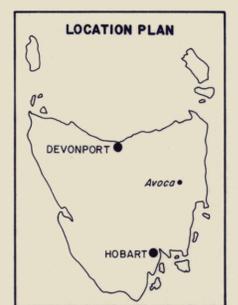
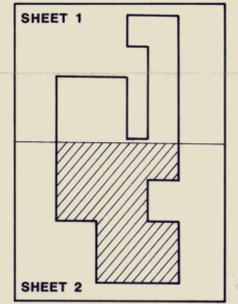
86-2556



E.L. 30/84

THOMPSONS GULLY  
(See Drp No LD03/1008)

ANOMALY I



LEGEND

Sn As  
 Cu Pb Zn

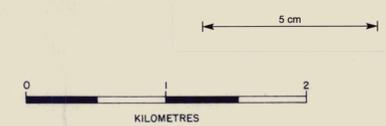
All samples were sieved with the -10 $\phi$  portion retained for assay.

All values in ppm.

SAMPLES ADDITIONAL TO REPORT  
85-2407 SHADED IN GREEN  
OTHERS (INCLUDING THOSE SHADED YELLOW)  
REPEATED FROM 85-2407



023018



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METALS DIVISION

TASMANIA  
AVOCA E.L. 30/84  
STREAM SEDIMENT  
ASSAY RESULTS

SHEET 2

SCALE	1:25000	DATE	May 1985
AUTHOR	A.W.	DRAWN	V.Caton
OFFICE	Melbourne/AHO	REP No.	
DRG No.	LD03/1006	FIG No.	FIG. 5

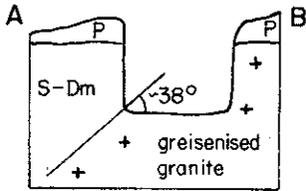
86-2556

305

014

023019

SECTION



Hornfelsed silty sandstone  
S-Dm

175°, 55°

Scree

S-Dm

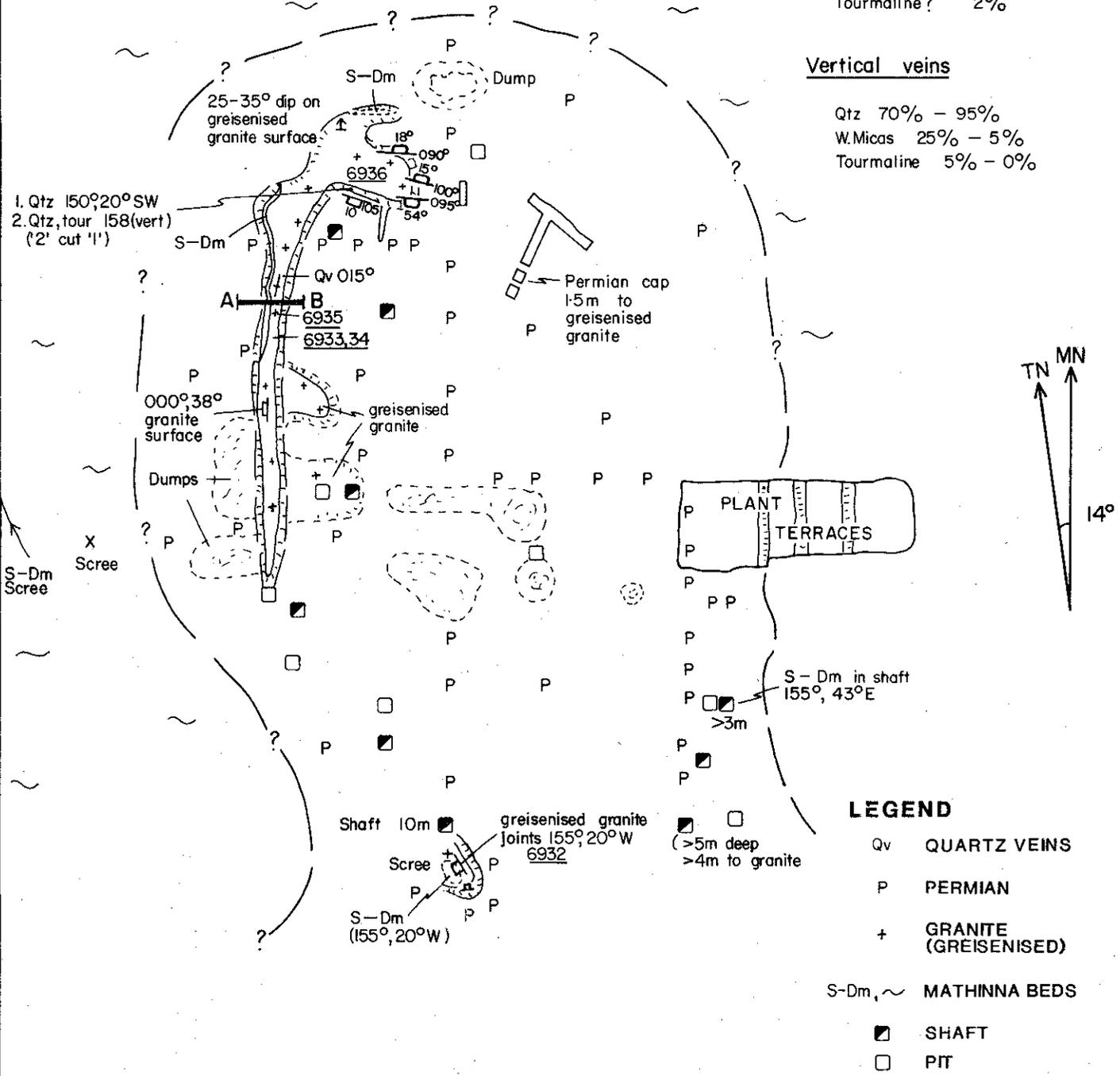
ALTERATION STYLES

Greisenised granite cap

Qtz 50%  
W. Micas 25%  
Sericite } Feldspars 23%  
Kaolinised }  
Tourmaline? 2%

Vertical veins

Qtz 70% - 95%  
W. Micas 25% - 5%  
Tourmaline 5% - 0%



LEGEND

- Qv QUARTZ VEINS
- P PERMIAN
- + GRANITE (GREISENISED)
- S-Dm, ~ MATHINNA BEDS
- SHAFT
- PIT

0 25m  
Scale 1:1250

Samples	Sn	As	Cu	Pb	Zn	Ag	Description
6932							Chip of GREISEN
6933							Chip of GREISEN
6934							Chip of BASAL PERMIAN
6935							Chip of VERTICAL QUARTZ VEINS
6936							Chip of GREISEN

**Billiton Australia**

Project: **E.L. 30/84 AVOCA**

**ROYS HILL PROSPECT MAP**

Author: A.W. Date: 5/85  
 Drawn: J.B. Date: AHO  
 Drawing No: LD03/1002 Fig No: 6

86-2556



**RECENT**  
 ~~~~~ Alluvium

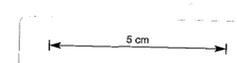
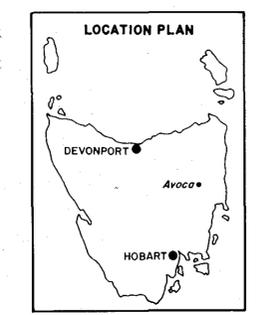
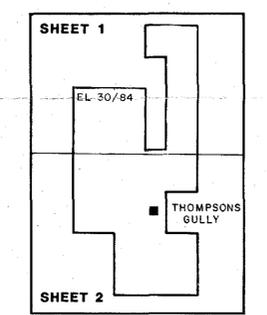
**PERMIAN**  
 P Sandstones

**UPPER DEVONIAN - CARBONIFEROUS**  
 + Ben Lomond Granite, fine grained  
 Qtz-tour Sugary Quartz tourmaline rock

**SILURIAN - DEVONIAN**  
 Mathinna Beds  
 Qt Quartzite  
 S-Dm Siltstone  
 SS Silty sandstone  
 SdS Sandy siltstone

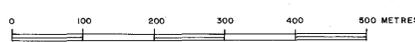
**Abbreviations:**  
 Qv Quartz veining Fg Fine grained  
 tour Tourmaline veining Alk Alkali  
 musc Muscovite  
 Fe Iron staining  
 Sc Scree

Geological traverse  
 Track  
 Fence  
 Shaft  
 Prospect, pit  
 Rock sample  
 Soil sample traverse and selected sample nos.



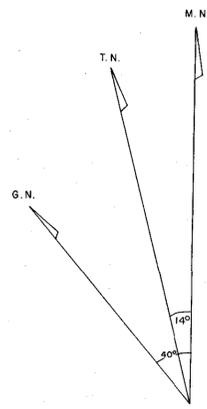
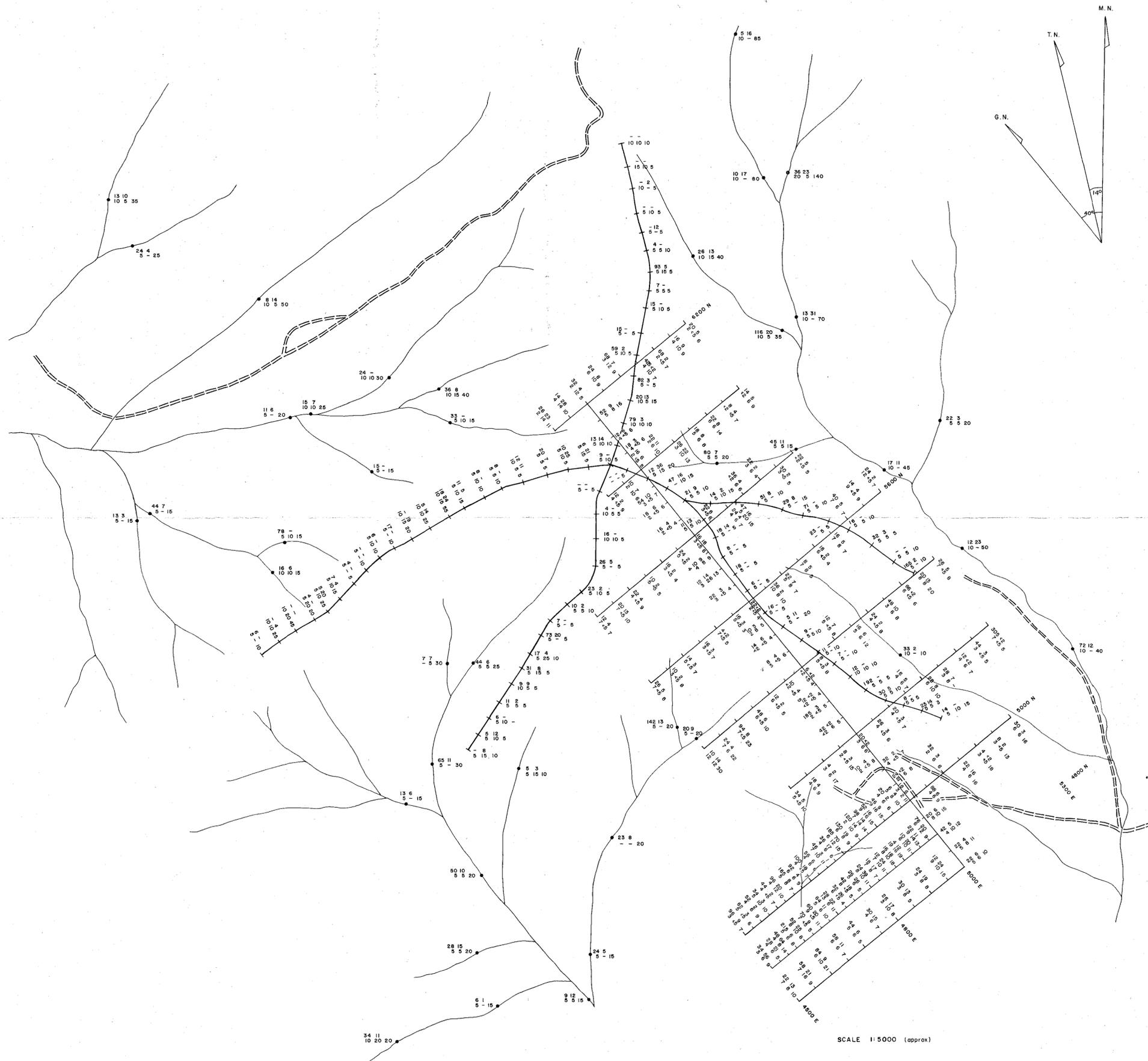
|                                      |           |                       |              |
|--------------------------------------|-----------|-----------------------|--------------|
| <b>Billiton Australia</b>            |           |                       |              |
| Project <b>E.L. 30/84 AVOCA</b>      |           |                       |              |
| Title <b>THOMPSONS GULLY GEOLOGY</b> |           |                       |              |
| Author A.W.                          | Dept.     | Scale 1:5000 (approx) |              |
| Drawn A.S.                           | Date 9/85 | Revised               | Date 2/86    |
| Checked                              | Date      | Checked               | Date         |
| Sheet No.                            | FIG. 7    | Drawing No.           | LD 03 / 1010 |

SCALE 1:5000 (approx)



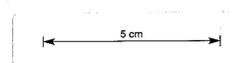
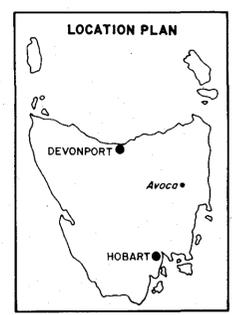
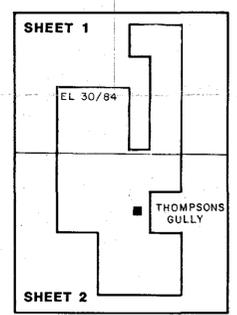
023020

86-2556 306



**LEGEND**

Stream sediment sample  
 Soil sample  
 24 22 10 - 65 Sn As Cu Pb Zn  
 All samples were sieved with the -10 $\phi$  portion retained for assay.  
 All values in ppm.



SCALE 1:5000 (approx)

0 100 200 300 400 500 METRES

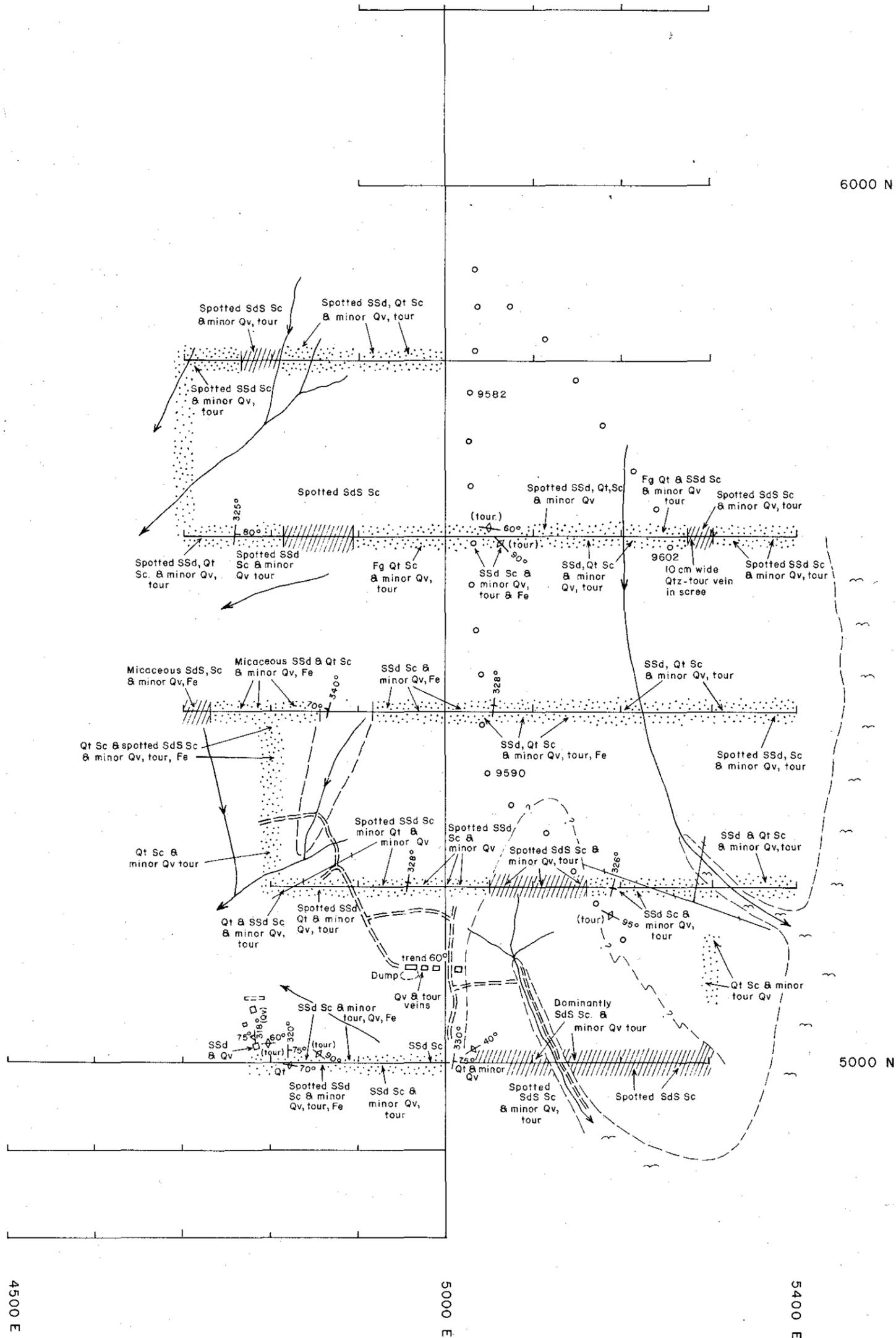
023021

|                                                                        |           |                       |            |
|------------------------------------------------------------------------|-----------|-----------------------|------------|
| <b>Billiton Australia</b>                                              |           |                       |            |
| Project<br><b>E.L. 30/84 AVOCA</b>                                     |           |                       |            |
| Title<br><b>THOMPSONS GULLY SOIL AND STREAM SEDIMENT ASSAY RESULTS</b> |           |                       |            |
| Author A.W.                                                            | Dept.     | Scale 1:5000 (approx) |            |
| Drawn A.S.                                                             | Date 8/85 | Revised               | Date 2/86  |
| Checked                                                                | Date      | Checked               | Date       |
| Sheet No.                                                              | FIG. 8    | Drawing No.           | LD 03/1008 |

6000 N



SCALE 1:5000

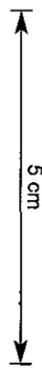


5000 N

4500 E

5000 E

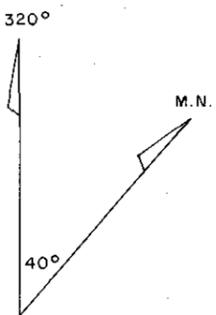
5400 E



86-2556

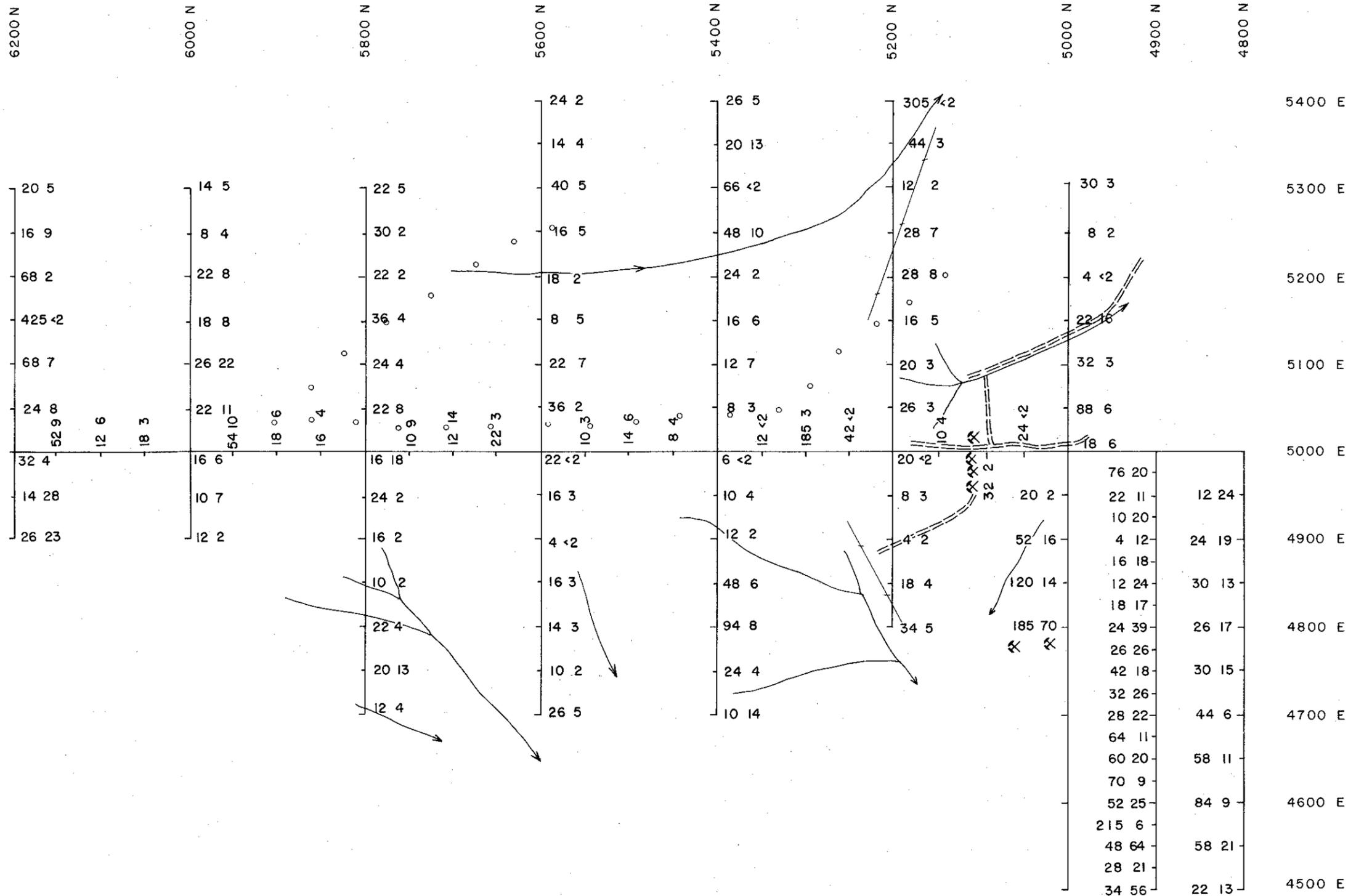
308

023022



|    |                  |      |                            |
|----|------------------|------|----------------------------|
|    | Sandy siltstones |      | Ridge, spur sample         |
|    | Quartzites       |      | Strike and dip of bedding  |
|    | Silty sandstones |      | Strike and dip of cleavage |
| Sc | Scree            | tour | Tourmaline veining         |
| Qv | Quartz veining   |      |                            |
| Fe | Iron stained     |      |                            |

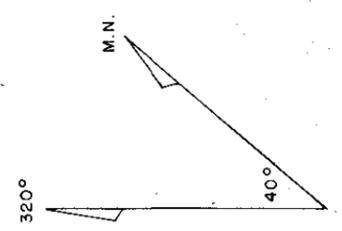
|                                                           |                            |
|-----------------------------------------------------------|----------------------------|
| <b>Billion Australia</b>                                  |                            |
| The National Division of the State Government of Victoria |                            |
| Project                                                   | AVOCA EL 30/84             |
| Title                                                     | THOMPSONS GULLY GRID       |
| <b>GEOLOGY</b>                                            |                            |
| Author                                                    | AJW Date 1/85 Scale 1:5000 |
| Drawn                                                     | AS Office AHD Revised Date |
| Drawing No.                                               | LD 03 / 1017 Fig. No. 9    |



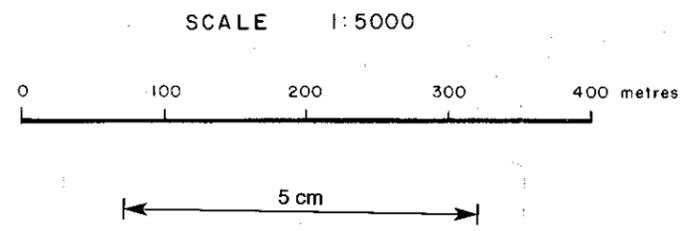
Ridge and spur sample

Sn As assay results (ppm)

88 6

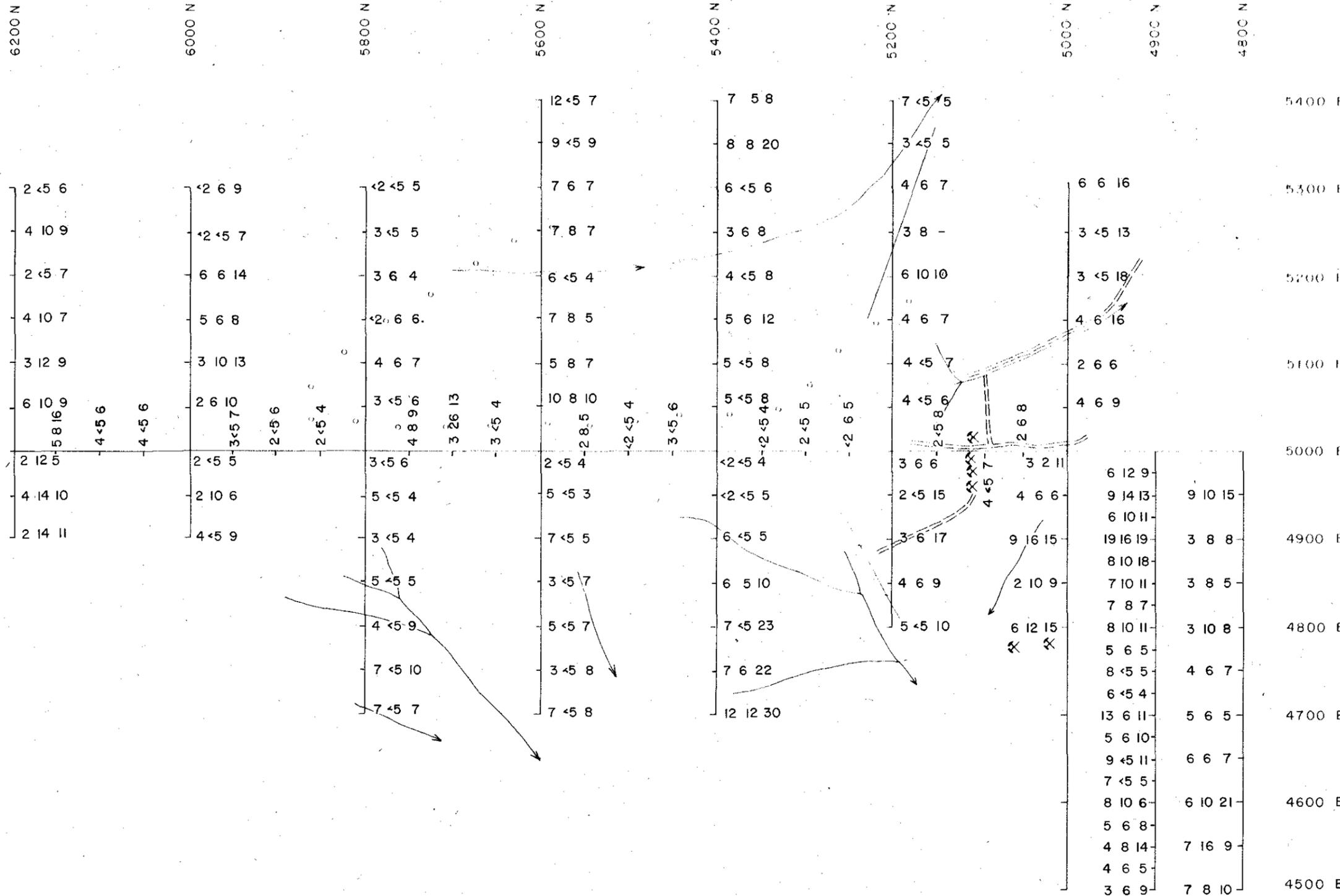


023023

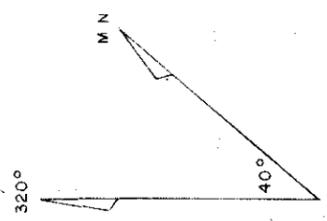


|                           |                                                      |        |            |
|---------------------------|------------------------------------------------------|--------|------------|
| <b>Billiton Australia</b> |                                                      |        |            |
| Project                   | AVOCA EL 30/84                                       |        |            |
| Title                     | THOMPSONS GULLY GRID<br>SOIL ASSAY RESULTS<br>Sn, As |        |            |
| Author                    | AJW                                                  | Date   | 1/86       |
| Scale                     | 1:5000                                               |        |            |
| Drawn                     | AS                                                   | Office | AHO        |
| Revised                   |                                                      | Date   |            |
| Drawing No                | LD 03 / 1018                                         |        | Fig No 10A |

86-2556



Cu Pb Zn assay result (ppm)  
 6 12 9



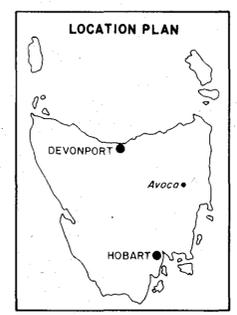
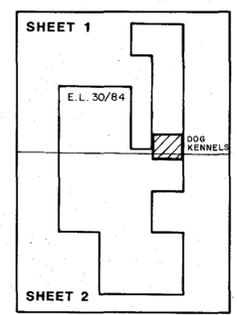
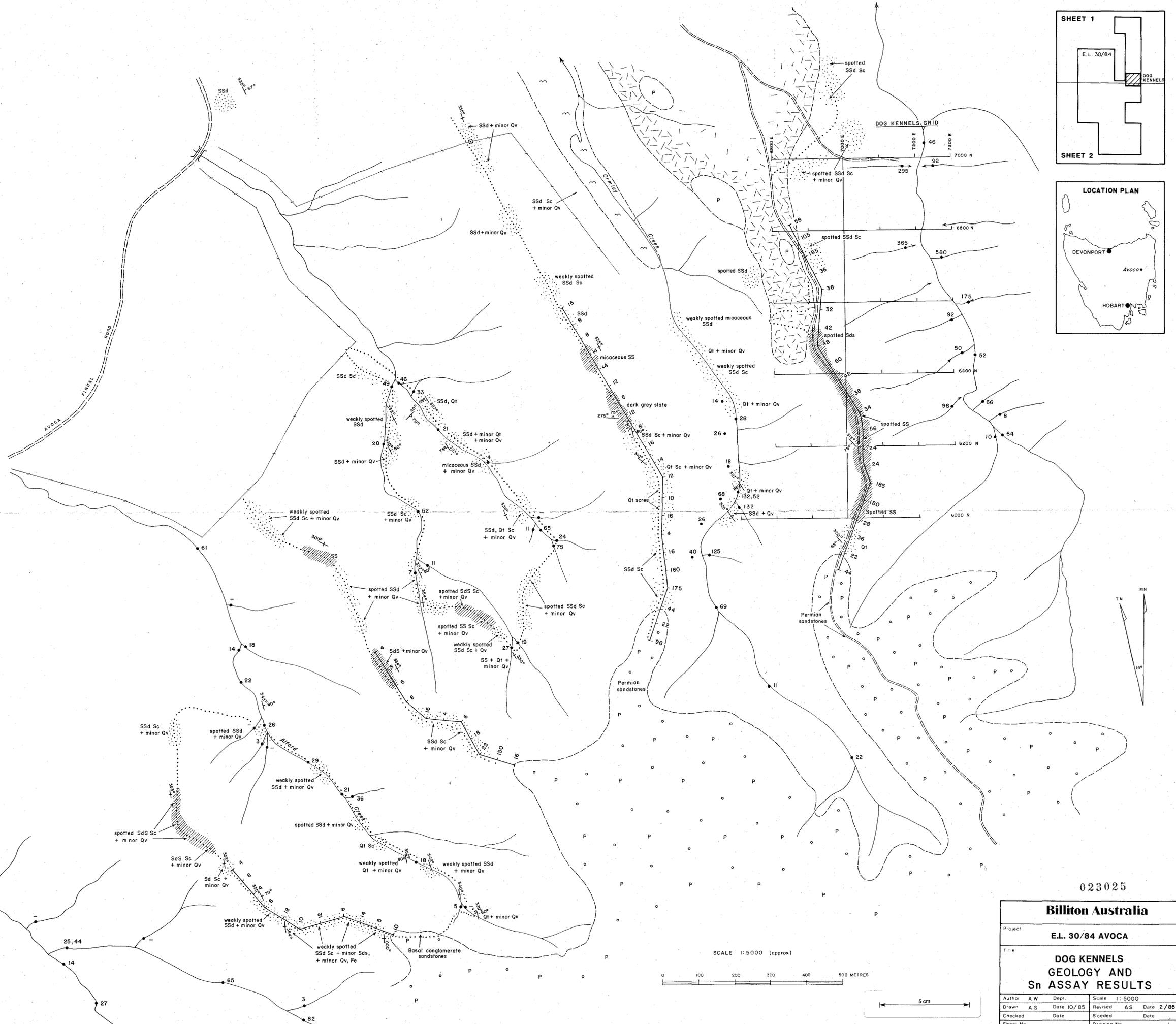
023024

|                                                          |              |                |             |
|----------------------------------------------------------|--------------|----------------|-------------|
| <b>Billiton Australia</b>                                |              |                |             |
| Project:                                                 |              | AVOCA EL 30/84 |             |
| Title                                                    |              |                |             |
| THOMPSONS GULLY GRID<br>SOIL ASSAY RESULTS<br>Cu, Pb, Zn |              |                |             |
| Author                                                   | AJW          | Date           | 1/86        |
| Scale                                                    | 1:5000       |                |             |
| Drawn                                                    | AS           | Office         | AHO         |
| Revised                                                  | Date         |                |             |
| Drawing No.                                              | LD 03 / 1019 |                | Fig No. 10B |

86-2556

- RECENT**
- Alluvium
- JURASSIC**
- Dolerite
- PERMIAN**
- Basal conglomerate and sandstones
- SILURIAN DEVONIAN**
- MATHINNA BEDS**
- Sandstone (Sd), silty sandstone (SSd), quartzite (Qt)
  - Siltstone (SS), sandy siltstone (Sds), slate (SS)
- Qv Quartz veined  
 Sc Scree  
 Fe Iron staining
- Strike and dip of bedding  
 Strike and dip of cleavage

- Foot traverse  
 Road, track  
 Fence  
 Creek  
 Soil sample traverse  
 Stream sample location
- with Sn assay results (ppm)
- Soil samples were sieved with  $-10\phi$  fraction assayed for Sn, As, Cu, Pb, Zn, Ag
- Assay method (Sn) XRF

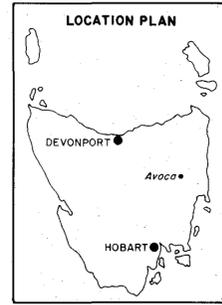
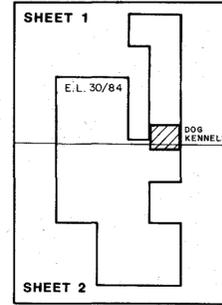


023025

|                                                                  |         |             |                      |
|------------------------------------------------------------------|---------|-------------|----------------------|
| <b>Billiton Australia</b>                                        |         |             |                      |
| Project<br><b>E.L. 30/84 AVOCA</b>                               |         |             |                      |
| Title<br><b>DOG KENNELS<br/>GEOLOGY AND<br/>Sn ASSAY RESULTS</b> |         |             |                      |
| Author                                                           | A W     | Dept.       | Scale 1:5000         |
| Drawn                                                            | A S     | Date 10/85  | Revised AS Date 2/86 |
| Checked                                                          | Date    | Scaled      | Date                 |
| Sheet No.                                                        | FIG. II | Drawing No. | LD03/1014            |

5 cm

86-2556



- Road, track
- Fence
- Creek
- Soil sample traverse
- Stream sample location

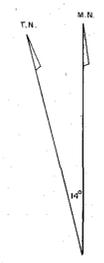
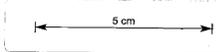
**ASSAY RESULTS** (in ppm)

As  
 • Cu Pb Zn

**ASSAY METHOD**

As by XRF  
 Cu Pb Zn by AAS

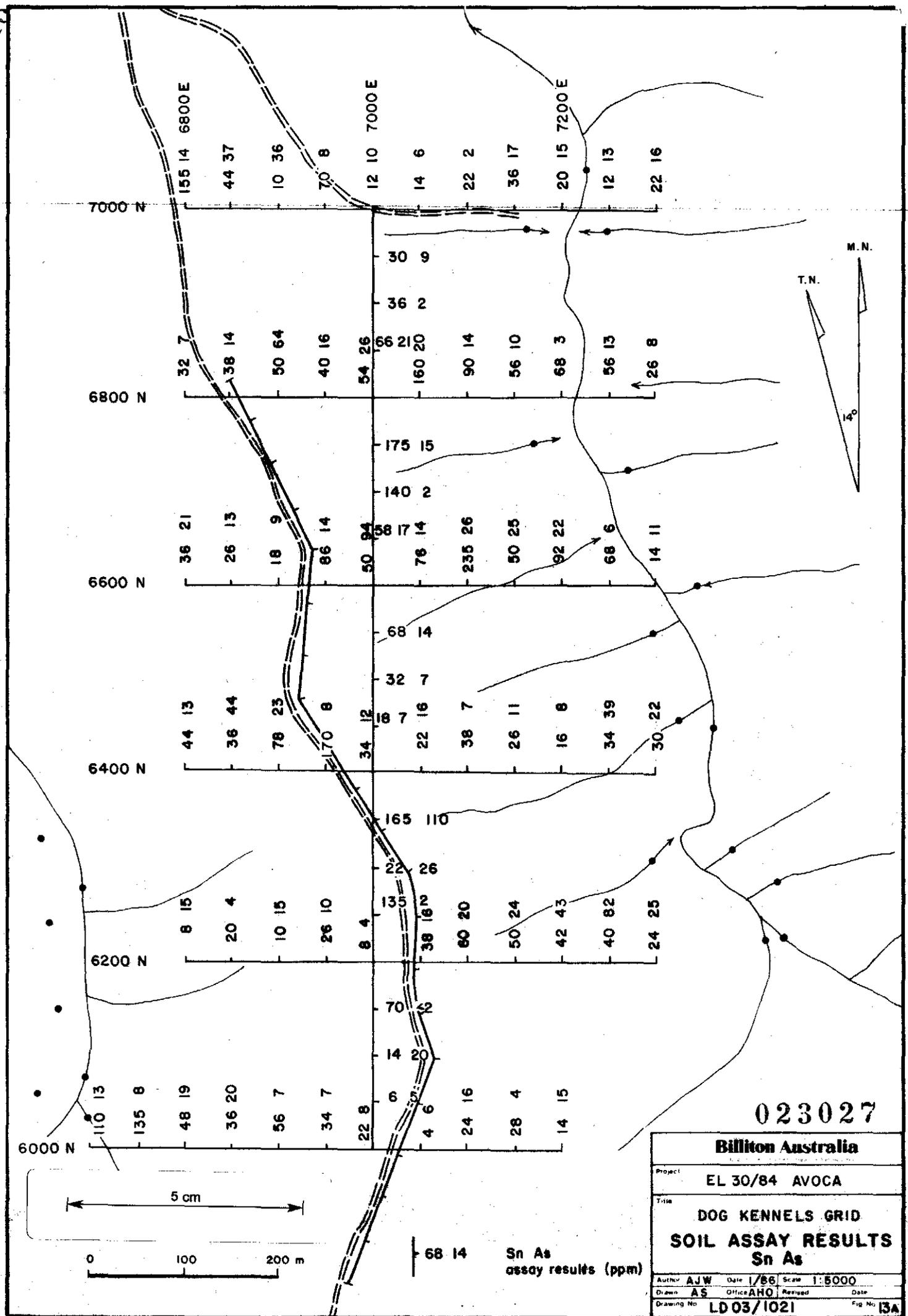
SCALE 1:5000 (approx)



|                                                            |                       |              |           |
|------------------------------------------------------------|-----------------------|--------------|-----------|
| 023026                                                     |                       |              |           |
| <b>Billiton Australia</b>                                  |                       |              |           |
| Project <b>E.L. 30/84 AVOCA</b>                            |                       |              |           |
| Title <b>DOG KENNELS<br/>ASSAY RESULTS<br/>As Cu Pb Zn</b> |                       |              |           |
| Author A.W.                                                | Dept.                 | Scale 1:5000 |           |
| Drawn A.S.                                                 | Date 10/85            | Revised      | Date 2/86 |
| Checked                                                    | Date                  | Checked      | Date      |
| Sheet No. FIG. 12                                          | Drawing No. LD03/1013 |              |           |

86-2556

015

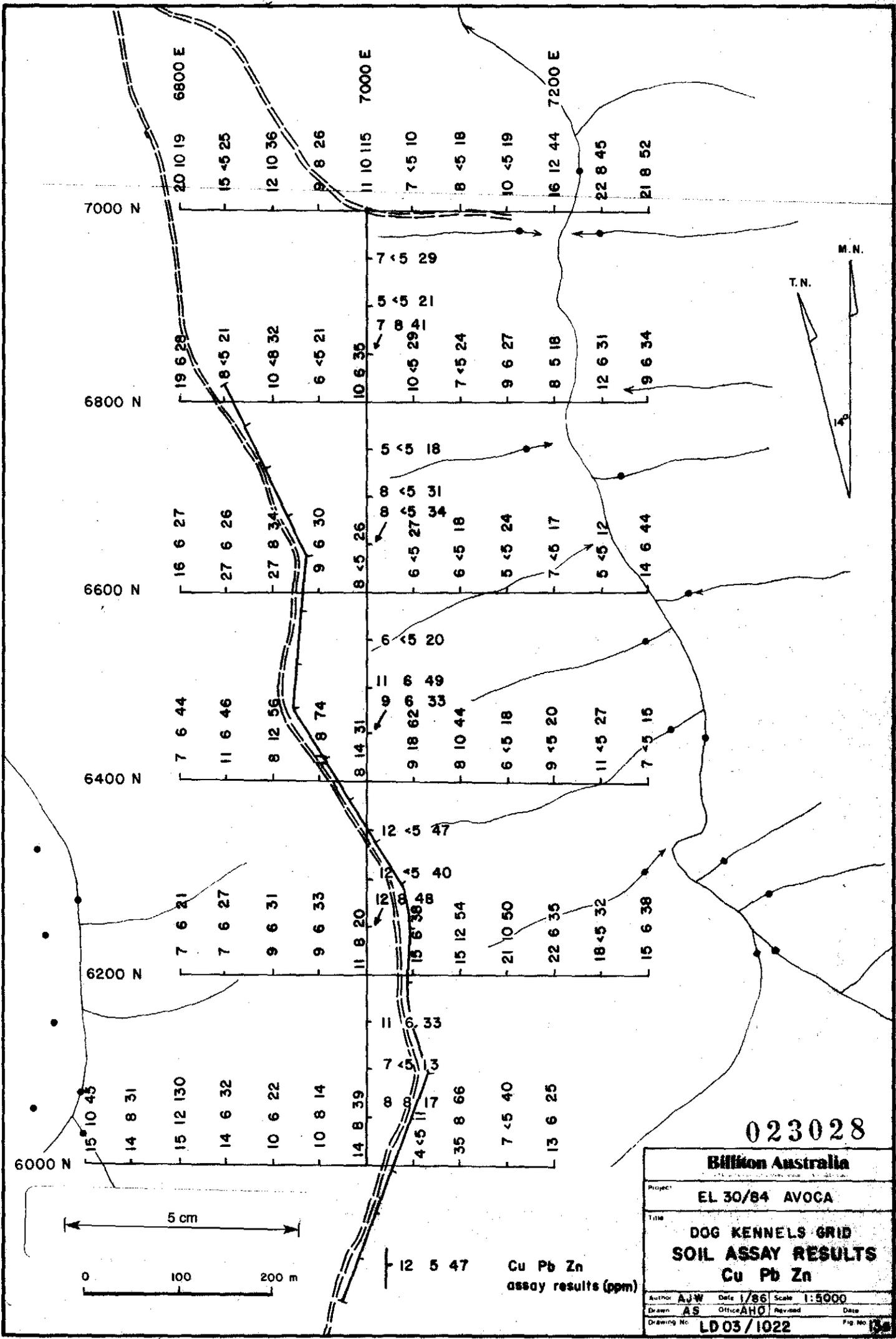


023027

|                           |                                                 |
|---------------------------|-------------------------------------------------|
| <b>Billiton Australia</b> |                                                 |
| Project                   | EL 30/84 AVOCA                                  |
| Title                     | DOG KENNELS GRID<br>SOIL ASSAY RESULTS<br>Sn As |
| Author                    | AJW                                             |
| Date                      | 1/86                                            |
| Scale                     | 1:5000                                          |
| Drawn                     | AS                                              |
| Office                    | AHO                                             |
| Revised                   |                                                 |
| Date                      |                                                 |
| Drawing No                | LD 03/1021                                      |
| Fig No                    | 13A                                             |

86-2556

010



86-2556