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

EL 12/78 SCAMANDER

Report on Exploration from 15/8/85 to 31/1/86

and Final Report

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1. Tasmania Mines Department
2. BHP
3. Billiton Australia, Melbourne
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SUMMARY

During the course of exploration of EL 12/78, Scamander, a re-assessment of drill hole, channel and bulk sampling data of Great Pyramid was made. Additional bulk and channel sampling was carried out and included in the assessment which gave an estimated geological reserve of about 3.3 mt at 0.22% Sn. Gridding was extended NW of Great Pyramid, (Pinnacles Grid) to cover the NW trending metamorphosed/silicified ridge heading back towards outcropping tin granite. Although several anomalous Sn in soil zones were identified, drilling failed to give better results with common intersections of 10-500 ppm Sn and a few isolted values to 0.3% Sn.

Stream sediment sampling of the EL highlighted alluvial workings, the granite sediment contact zone, prospect areas already being explored and the Flagstaff area. Ridge and Spur and then grid sampling lead to the drilling at Argus grid of AG1 which gave a best intersection of 2 m of only 656 ppm Sn.

Prospect evaluation highlighted only Loila Tier prospect as having sufficient vein development to warrant further work. Sampling however suggests that the system at Loila Tier is generally tin poor. As significant intersections of tin bearing magnetite-pyrrhotite-chlorite vein mineralization were made in the deep hole SPG1A at Great Pyramid (42 m @ 0.25% Sn) and at North Scamander prospect, exploration during the final report period was aimed at locating further mineralization of that type. Five aeromagnetic anomalies, Silver Echo, Wolfram Creek, Scamander River, Flagstaff Ridge and Spur, and Cramps, were further detailed with ground magnetics and, where warranted, mapping and sampling. The best of the results came from Cramps grid which was subsequently drilled. The hole CRD1 intersected weakly pyrrhotite veined sediments but failed to intersect any significant tin mineralization.

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2. Cramps, drillhole CR DH-1, drill log.

1. PROPERTY

Exploration Licence 12/78, Scamander, of 125 sq km, is located between Scamander and St Helens on the NE coast of Tasmania (Fig. 1). The tenement has been managed by The Shell Company of Australia Limited under the terms of Joint Venture with BHP.

The licence was reduced from 273 sq km and renewed for twelve months from 15/9/84.

2. OBJECTIVES

The licence area covers a variety of sediment hosted Sn, W and base metal prospects, the most significant defined to date being Great Pyramid Prospect. At Great Pyramid, cassiterite occurs in sub-parellel veins hosted by quartzites and later stage cassiterite-magnetite-chlorite veining which locally cross-cuts the sub-parallel mineralization.

These two styles of mineralization were the target types sought within the tenement.

3. REGIONAL GEOLOGY

Silurian-Devonian

The oldest rocks in the tenement are those of the Mathinna Beds. They consist of siltstones, silty sandstones and sandstones which are believed to be turbidite deposits. The Mathinna Beds are folded with general 2-4 km wavelength NW-SE fold axes, and gentle SE plunges. Locally, tight folding is superimposed on the above.

Devonian

During the Devonian, the Mathinna Beds were intruded by a number of granites which may be roughly separated into two types:

1. Early non tin bearing hornblende/biotite granodiorites-adamellites which include the Scamander Tier Dyke, Avenue River Dyke and the St Helens Pluton; and

2. Tin bearing biotite adamellites - granites which include the Mt Pierson Pluton and Echo and Loila Tier granites. The highly fractionated biotite-muscovite-tourmaline-fluorite bearing Wolfram Creek Granite is believed to be a specialised contact phase of the Mt Pierson Pluton.

The Mt Pierson Pluton is dominantly a coarse grained equigranular biotite (to 10%) granite with fine and porphyritic contact phases. The contact phases are often cut by narrow (to 0.5 m) quartz/greisen lodes which diminish with increasing distance from the contacts. The greisen lodes generally trend WNW-NW and are mineralised with W, Mo$\pm$Sn.

Tertiary - Recent

Since the beginning of the Tertiary there has been a complex history of erosion/deposition in the region of the licence. The Tertiary sediments are largely fluviatile and marine, clays, sands and gravels. They are non tin bearing but were largely sourced by eroding Mathinna Beds.

Erosion during the Quaternary saw the main unroofing of the tin bearing granites and the build-up of tin bearing alluvial deposits at Thureau's Lead, Transit Flats and Constables Creek, in and to the north of the licence. Recent erosion has further distributed small deposits of alluvial tin.

4. WORK UNDERTAKEN

Summmary

Prior to the report period -

- Literature research/data compilation
- Great Pyramid
  - mapping
  - channel & bulk sampling
  - digital processing and interpretation of BHP ground magnetics
  - drill hole SPG 1/1A
- Pyramid South
  - sampling
- Pinnacles
  - mapping
  - sampling
  - twelve reverse circulation/percussion drillholes
- Stream sediment sampling/follow up
  - Flagstaff Ridge and Spur sampling
  - Loila Tier grid sampling
  - Argus grid sampling and percussion drillhole AG1
- Prospect evaluation
- Silver Echo
  - mapping
  - sampling
  - ground magnetics
- Wolfram Creek
  - mapping
  - sampling
  - ground magnetics
- Flagstaff ridge and spur extensions
  - sampling
  - ground magnetics
- Scamander River
  - gridding/ground magnetics
  - ground geological checking
- Cramps
  - mapping
  - sampling
  - ground magnetics
  - drilling of percussion/diamond hold CRD1

Discussion

4.1 Work completed prior to the report period

4.1.1 Great Pyramid

Geology

The Great Pyramid tin prospect is a closely spaced sheeted vein system developed in silicified and hornfelsed Mathinna Beds overlying an inferred granite ridge. Four main controls on the mineralization have been identfied: (1) a gross alignment of Pyramid, Pinnacles and North Scamander Sn prospects coincident with WNW silicified/hornfelsed sediment ridge overlying an inferred ridge of 'tin' granite; (2) NW trending sandstone/quartzite units within the Mathinna Beds (these give rise to greater brittle fracture/open space filling than the more dominant surrounding metamorphosed silty sandstone and shales); (3) closely spaced NE trending factures (which are normal to local fold axes); and (4) fluid inclusion work on the prospect by G Plummer (La Trobe University) suggests a temperature control with preference for tin deposition between 220^{o}C and 260^{o}C.

Grade estimate

A grade estimate using Aberfoyle, Mines Department and BHP data gave 3.3x10^{6} tonnes at 0.22% Sn (using a 0.1% Sn cut off). A high grade section of 400,000 tonnes at 0.4% Sn using a 0.3% Sn cut off was outlined within the above probable resource estimate. Details of the estimate were previously presented in Ruxton 1984.

Some metallurgical testing was carried out on a composite bulk sample (details also given in the above mentioned report) from the deposit. Results suggest that a 65-70% recovery of Sn is possible with concentrates grading 65-70% Sn. The testing of the bulk sample also suggests that earlier drilling and chip sampling may have under estimated the grade of the deposit. Further chip and bulk samples were then taken, however, the results indicate that the initial chip sampling gave a good estimate of local Sn grades. The detailed results of this work are presented in Hall D., Carter D., 1985.

Drilling (Location Fig. 3)

An off line precollar SPG 1 (157.6 m) and an adjacent deep hole SPG 1A (348.3 m) were drilled at Great Pyramid prospect to test:

1. the continuity of Sn grade with depth;
2. any trends in mineral zonation;
3. the source of a broad magnetic anomaly;
4. the depth and nature of the postulated underlying granite beneath Pyramid Hill.

Details of the hole are presented in Ruxton 1984 (Drill logs in Appendix 2 of that report).

The best intercepts were at 30-40 m (10 m downhole) at 0.24% Sn and 236.8-279.5 m (42.9 m downhole) which also gave 0.24% Sn. Granite was not intersected in the hole and therefore, due to flattening of the hole, can only be said to be at greater than 250 m depth. The lower zone of Sn mineralization is related to chlorite-magnetite-pyrrhotite-sphalerite veining which cross cuts the earlier sheeted vein mineralization style. Magnetic susceptibilities of the core showed good correlation with high tin assays for the deeper mineralization.

4.1.2 Pyramid South Grid (Located on Figs. 1 & 2)

Extensions were made to the south of the Great Pyramid grid to cover existing costeans. Only two small areas of up to 250mx100m were defined with a maximum Sn assay of 290 ppm Sn. The anomalies are thought to be too small and of low value to overlie significant mineralization. Further details of the grid geochemistry were previously reported (Whitaker 1985).

4.1.3 Pinnacles (Located on Figs. 1 & 2)

Gridding was extended NW from Great Pyramid along the NW trending silicified/metamorphosed ridge. The area covered included the East and West Pinnacles Sn prospects and has since been referred to as the Pinnacles grid.

Soil samples (-10#) were collected at 50 m intervals along lines spaced 100 m apart. Five anomalous Sn in soil zones of up to 450mx200m with typical assays in the range 200-800 ppm Sn (spot highs to 1600 ppm Sn) were defined. (For greater detail of the sampling results see Ruxton 1983 EL 12/78).

The Pinnacles grid dominantly covers siltstones and shales with only minor outcrops of sandstone, these all being units of the Mathinna Beds. Silicification and contact metamorphism are more evident in the northern half of the grid.

Twelve reverse circulation/percussion holes were drilled during 1984 to test the tin anomalies. Details of the holes are presented below and their locations given in Fig. 3. Further details are reported in Ruxton P.A. (1984).

Hole No.	Co-ords	Inc	Azimuth	Total depth
PPH1	1345W 200S	-60^0	120^0	120 m
PRC1	1433W 477S	-60^0	120^0	98 m
PRC2	1766W 267S	-60^0	120^0	120 m
PRC3	1654W 214S	-60^0	120^0	120 m
PRC4	1615W 220S	-60^0	120^0	120 m
PRC5	1505W 207S	-60^0	120^0	120 m
PRC6	1440W 200S	-60^0	120^0	120 m
PRC7	1349W 200S	-60^0	120^0	120 m
PRC8	1268W 199S	-60^0	120^0	120 m
PRC9	1191W 195S	-60^0	120^0	120 m
PRC10	1596W 100S	-60^0	120^0	120 m
PRC11	1769W 127S	-60^0	120^0	120 m

The drillholes intersected weakly mineralized veined sediments which gave disappointing assays typically in the range 10-500 ppm Sn. In all, the drilling only produced seven isolated 2 m intervals which assayed greater than 0.1% Sn with the highest assay, 0.38% Sn, for the interval 48-50 m in PPH1. Ranges of other elements assayed were As 10-100 ppm, Cu 30-700 ppm, Pb 10-60 ppm, Zn 100-300 ppm, Ag less than 0.5 ppm, Ba 300-800 ppm, W less than 10 and Mo less than 4. There is little correlation between the high values of the above elements.

4.1.4 Stream sediment sampling/follow up (Flagstaff Ridge and Spur, Argus Grid)

A stream sediment survey was carried out during 1983 with -20# samples assayed for Sn, WO_3, Cu, Pb, Zn and As. The general background for Sn in streams draining Mathinna Beds is less than 10 ppm Sn. Streams draining North Scamander, Great Pyramid and Pinnacles grid areas gave assays of 90-2850 ppm Sn. Stream draining Quaternary-Recent tin bearing gravels in the NE of the tenement gave assays to 7250 ppm Sn while those draining the contact zone of the granite and Mathinna Beds gave assays of 10-200 ppm Sn. Further details of the sampling and results are given in Ruxton 1984.

Flagstaff Ridge and Spur Sampling (Located on Fig. 1)

The main area highlighted by the stream survey which was not due to reworked alluvium, minor mineralization associated with fractures around the granite contact and was not already the subject of investigation, was the Flagstaff Creek area. Numerous streams draining the area gave values of 40-500 ppm Sn. Some 19 km of ridge and spur sampling (at 50 m intervals along line) was completed. The sampling generally gave low order anomalies of 10-75 ppm Sn with isolated high values to 770 ppm Sn. Ground magnetics was carried out in conjunction with the sampling, however, only a few low (~20 nT) anomalies were located. Details of the geochemistry and ground magnetics were presented in Whitaker, 1985.

Argus Grid (Location Figs 1 & 2)

The Argus grid was established within the Flagstaff area in a zone highlighted by higher tin values. The best anomaly located is approximately 300mx150m at +100 ppm Sn with a maximum Sn assay of 770 ppm. The anomaly was tested by a single drill hole PDH-AG1 which was drilled to 144 m. The hole was collared in sandstones and intersected minor zones of quartzite but the last 22 m intersected black shales. The hole was terminated short of the planned 200 m depth as it was set up to drill across Pyramid oriented vein sets in the quartzites but in so doing, deviated and drilled down dip leading to rod jamming. Down hole surveys indicated however that the hole was a reasonable test of the anomaly and with a best intersection of only 4 m at 656 ppm Sn (56-60 m), no further work was justified in the grid area. Further details of the grid geochemistry and drillhole were presented in Whitaker 1985.

4.1.5 Prospect evaluation (Loila Tier)

Besides Great Pyramid some 20 sediment hosted and a further 4 granite hosted prospects were visited, sketched mapped and grab sampled. The prospects are listed below with location and sample details presented in Appendix 1 of Ruxton 1984. Although several of the prospects were eventually covered by grids, only Loila Tier was of sufficient interest to justify more detailed work on geological grounds only.

Prospects

Granite hosted

Stony Ford
Echo North
Silver Echo

Sediment hosted

Baden Powel
Carson de Beers
Lutwyche
Pinnacles E
Pinnacles W
Loila Tier
Williams W
Williams E
North Scamander
Orieco N
Orieco S
Ringarooma
Dunns
Arm
Cramps
Paul Beahrs
Scamander Mine
Beulah
Scamander Bell
Yarmouth

Loila Tier Prospect (Figs. 1 & 2)

A grid was placed over Loila Tier prospect due to the presence of two zones of silicified cleaved and well quartz-tourmaline veined sediments. Although a couple of rock grab samples gave assays of up to 3.95% Sn, soil samples gave a maximum of only 85 ppm Sn suggesting that the vein system is generally tin poor. Further details of the work are presented in Ruxton 1984. No further work is recommended for the prospect.

4.2 Work completed during the final period

As the deep hole at Great Pyramid (SPG-1A) intersected 42 m at 0.25% Sn associated with magnetite-pyrrhotite-chlorite veining, work during the final period concentrated on aeromagnetics as a guide to mineralization. The anomalies were selected after exclusion of those thought to be due to dykes or contact metamorphic effects. Those anomalies which fall within, or close to, the 'tin zone' surrounding the granite, were given high priority. Five anomalies were chosen; Silver Echo, Wolfram Creek, an anomaly on the Flagstaff Ridge and Spur grid in the region 3500N-4500N, Cramps and Scamander River (see Fig. 1 for locations).

4.2.1 Silver Echo (Location Figs. 1 & 2)

Geology (Fig. 4)

The Silver Echo grid covers poorly outcropping spotted contact metamorphosed siltstones, sandy siltstones and quartzites of the Mathinna Beds. Granite outcrops extensively to the west of the grid and creeks expose small outcrops to the south of the grid. Depth to granite is thought to be in the order of 100-160 m. Only minor tourmaline-quartz veining has been observed in the otherwise well fractured metasediments. Several rock samples were assayed (Appendix 1) and although weakly anomalous in Sn, the highest result was only 47 ppm Sn.

Geochemistry (Figs. 5 & 6)

Soil samples (-10#) were collected at 50 m intervals along lines spaced at 200 m. Only two values of Sn greater than 100 ppm were returned (120 ppm and 188 ppm) with the results suggesting erratic leakage from the underlying granite. Low values of As (to 145 ppm), Cu (to 105 ppm), Pb (to 70 ppm), Zn (to 100 ppm) and Ag (to 2 ppm) were also returned.

Ground magnetics

The aeromagnetic anomaly (Fig. 7) coincides with a hill of Mathinna Bed sediments which probably sit on granite. The filtered ground magnetic profiles (Fig. 8) only show one distinct anomaly on line 10800E, for which no obvious source was found in outcrop. This anomaly was modelled using a computer inversion program which suggested a source at about 150 metres, i.e. possibly at the sediment/granite interface (Fig. 9).

However, the aeromagnetic anomaly could be simply due to a slightly greater amount of magnetite in the sediment hill compared with the underlying granite.

Conclusion

In view of the poor geochemistry, lack of a well defined vein system and lack of strike extent to the magnetic anomaly, no further work is recommended on the anomaly.

4.2.2 Wolfram Creek (Location Figs. 1 & 2)

Geology

As work by BHP suggested erratic and poor geochemistry in the grid area only reconnaissance geological checking adjacent to magnetic anomalies was undertaken. Traverses on lines 9100N and 9600N suggest that the grid covers variably quartz veined siltstones and sand siltstones. Susceptibilities of 10-60x10^{-5} SI units were common for the sediments while some strongly quartz veined rocks and some soils gave values of 150-2000x10^{-5}SI. The grid lines are essentially at right angles to the general strike.

Geochemistry (Figs. 10 & 11)

Only five lines and the base line were soil sampled (50 m interval, -10#). The highest tin assays returned were 87 and 75 ppm Sn with most results being below the limits of detection (4 ppm). Maximum values for the other elements assayed (As 1730 ppm, Cu 115 ppm, Pb 110 ppm, Zn 240 ppm and Ag 1.5 ppm) occurred as isolated spot highs.

Ground magnetics (Figs. 12 & 13)

The ground magnetic survey clearly located the aeromagnetic anomalies. There appear to be two distinct sources both of which are shallow, lending support to their causes as being due to the magnetite noted in surface veins.

Conclusions

In view of the association of high magnetic susceptibilities with quartz veined material, general lack of associated tin geochemistry, and either shallow magnetic source or limited strike extent of the magnetic anomalies, no further work is recommended on the area.

4.2.3 Scamander River (Location Figs. 1 & 2)

Geology

The Scamander River aeromagnetic anomaly occurs over thick Quaternary-Recent alluvium associated with the Scamander River drainages. As a result no geochemical sampling was undertaken.

Ground magnetics (Figs. 14, 15)

The aeromagnetic anomaly is weak (25 nT), and the ground magnetic profiles are noisy (due to a combination of culture and alluvium possibly containing magnetic boulders). As a result the ground anomaly is hard to define. However, it is obviously very localised on line 9700N and as such is probably of very little economic significance.

Conclusions

Without a well defined magnetic anomaly of substantial extent and no geological encouragement, no further work is recommended.

4.2.4 Flagstaff Ridge and Spur estimates

Geochemistry (Sn Fig. 16, As Fig. 17, Cu Fig. 18, Pb Fig. 19, Zn Fig. 20)

Three spur lines 5850E, 4700N and 3550N were gridded to give additional information adjacent to previously defined weak magnetic responses (~20 nT). The sampling returned poor assays for Sn (maximum value 21 ppm Sn). Elevated values of Cu (to

305 ppm), Zn (to 375 ppm) and As (to 423 ppm) were received for samples from line 3550N (6200E-6500E).

Ground magnetics (Fig. 21)

The additional line 3550N indicated an isolated ground magnetic anomaly of about 60 nT which has low associated Sn assays but slightly elevated base metals. The magnetic source appears to be shallow and is probably associated with magnetite in veins.

Conclusions

As with the proceeding areas investigated, poor geochemistry and ground magnetic responses have made further work unwarranted.

4.2.5 Cramps Grid (Location Figs. 1 & 2)

Initially the old BHP grid at Cramps was to be upgraded, however, a new grid was established so that the lines would be perpendicular to the 'strike' of the aeromagnetic anomalies.

Geology (Fig. 22)

The grid at Cramps covers poorly outcropping silty sandstones and sandy siltstones and siltstones of the Mathinna Beds. The sediments strike from 290^{o}-015^{o} with generally steep westerly dips. The most common cleavages trend 068-090^{o} however local dominant cleavage directions are quite variable. Magnetic susceptibilities of the main rock types typically fall in the range 10-60×10^{-5} SI, however, some of the quartz veined, iron stained rocks found throughout the grid area gave 150-4000×10^{-5} SI (i.e. less than 1% vol. magnetite). Several rock grab samples from the grid were assayed (Appendix 1) and although all were anomalous in tin, the highest assay returned was only 510 ppm Sn.

Geochemistry (Fig. 23)

Several points of the BHP grid were recovered and the existing geochemical data related to the new grid. Portions of four new lines were sampled, however, as they extended beyond the edge of the BHP grid. The gridded area has a general background level of 5-15 ppm Sn with three large weak anomalies at +20 ppm Sn of 600mx200m. Several isolated high soil values of 100-1300 ppm Sn occur within the +20 ppm contoured area. Rock float chip sampling adjacent to the magnetic anomalies and anomalous soil geochemistry gave assays of 20-80 ppm Sn.

Ground magnetics

The aeromagnetic anomaly has a strike length of approximately 5 kms (Fig. 24) with 3 small pits or shafts on or adjacent to it. A Dighem resistivity trend is also partly coincident with the aeromagnetic anomaly. The Cramps grid covers the northern part of the anomaly that has associated anomalous Sn soil geochemistry.

Fig. 25 shows the (Billiton) ground magnetics on 3 lines of the old BHP grid and indicates the relationship between the magnetic and tin anomalies in profile form. It is apparent that the correlation is closest on the southernmost lines even though the magnetic anomaly is not at its strongest here.

Figs. 26 & 27 show the raw ground magnetic profiles and Figs. 28 & 29 the filtered profiles (11 pt binomially weighted filter). Fig. 30 is the hand contoured map of the magnetic field.

The anomaly on line 10000N was chosen for testing partly because of ease of access (on a Forestry Commission road) and partly because it appears to have a somewhat shallower source than the anomalies on the more northern lines. In addition in general terms, the tin soil geochemistry is rather more enhanced in the southern part of the grid.

The anomaly on line 10000N was modelled using a computer inversion program (Fig. 29). The raw data profile has a satisfactory fit (normalised weighted standard deviation of fit=0.29). The resultant model was a strike limited, tabular magnetic body with a depth to top of about 70 metres, and an apparent susceptibility equivalent to less than 0.5% magnetite. Also shown on Fig. 29 is the model resulting from an inversion of the anomalies on all lines from 10200N to 11000N assuming a prismatic shape. Depth to top in this case is about 170 metres (st. devn. of fit=0.49).

The dips indicated by the two models are in contradiction, the 1000N model being closer to the steep westerly dip of the Mathinna Beds in this area. The drill hole was sited to intersect both models (Fig. 29) using a vertical drill hole (the dip of any vein system present was unknown).

The chips from the pre-collar percussion hole and core from the diamond hole were logged for susceptibility as shown on Fig. 30. Both sets of readings were uncorrected for volume, so that the logged values will be about half the true susceptibility values. The magnetic anomaly can be satisfactorily explained by the total sum of pyrrhotite veins intersected throughout the length of the drillhole. The true dip of the bulk magnetic source (i.e. vein system) may be vertical rather than to west or east.

Drilling

A single vertical percussion/diamond hole to 279.20 m was drilled at Cramps to test the magnetic source (drill log is presented as Appendix 2).

The hole intersected interbedded shales, sandstones and minor phyllite. Weak spotting was observed at approximately 258 m. Sulphides, mostly pyrrhotite, fill small fractures (<1 mm wide) and the centres of small tension gashes (up to 20cmx1cm). The pyrrhotite is surrounded by quartz and rare pyrite. A few intervals showed minor disseminated pyrite in the sediments.

The sediments generally gave magnetic susceptibilities of $20\text{-}60 \times 10^{-5}$ SI with sulphide vein responses of $100\text{-}800 \times 10^{-5}$ SI.

No tin mineralization was observed. Sulphide veining rarely accounted for more than 2% of the core while barren quartz veining made up to 10% of the core in a few small zones of approximately 1-2 m. Filleted sections of the most intensely veined portions of the core gave tin values ranging between 6 and 65 ppm.

Conclusion

The drillhole suggests that the source of the magnetic anomalies at Cramps is a broad zone of weakly pyrrhotitic veined sediments that carry low Sn. The sediments are at best weakly metamorphosed and are not, in general, conducive to the development of brittle fracture. This, coupled with the low tin content of the veins, downgrades the prospect area greatly. No further work is recommended.

5. CONCLUSION

During its participation in the licence Billiton has:

1. re-assessed sampling and metallurgical work at Great Pyramid in order to determine if grade and extraction estimates were reasonable;

2. attempted to locate additional (higher grade) mineralization at depth at Great Pyramid;

3. assessed the sources of geochemical anomalies arising from a detailed stream sediment survey;

4. completed prospect evaluation of known workings;

5. followed up aeromagnetic anomalies as a possible guide to Sn-magnetite-pyrrhotite-chlorite mineralization.

No additional prospects of significance were located by the work and therefore Great Pyramid remains the largest tin resource in the licence. Work completed by Billiton gives an estimated grade for Great Pyramid of 0.22% Sn which is considered uneconomic under present market conditions.

References

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APPENDIX 1

Rock Grab Samples

Shell METALS DIVISION

992025

SAMPLE RECORD

Sheet ___ of ___ 024

SAMPLE TYPE: ______ PROJECT / LOCATION: SCAMANDER HOLE / GRID: ______ SAMPLER: AJW DATE: ______

ASSAY LAB: ______ SAMPLE DISPATCH ______ ASSAY REPORT Nos: ______ MAP REF: ______

SAMPLE STORAGE: ______ ORDER Nos: ______ PHOTO REF: ______

SAMPLE No.	LOCATION	INTERVAL	INTER'L (m)			Sn	As	Cu	Pb	Zn	Ag	Au			DESCRIPTION
11907	10200E	9425N	SILVER ECHO GRID			<3	3	10	5	55	<0·5				Quartz-tourmaline veins in silty s…
11908	10600E	9350N	"	"	"	47	4.	<5	<5	5	<0·5				tourmaline veins in quartz…
11909	10800E	9875N	"	"	"	18	22.	20	<5	60	<0·5				tourmaline veins in silty sa…
11910	10800E	9215N	"	"	"	10	175	70	25	25	<0·5				limonitic (gossanous) float
11911	11000E	9640N	"	"	"	15	1080	280	730	220	<0·5				limonitic (gossanous) float
11914A	10650N	10,005E	CRAMPS GRID.			40	115	280	98	530	<1				Fe STAINED BRECCIA
11914B	~10200N	9775E	CRAMPS GRID			94	96	42	18	42	<1				QTZ. MT. 'VEINS' in SILTY SANDSTONE
11915			ORIECO			58	7	52	28	13	<1	<0.005			'BRAIN ROCK', QUARTZITE
11916			ORIECO			76	6	275	26	44	1	0.005			MINOR SULPHIDE
11917			ORIECO			6500	72	620	320	100	23	<0.005			QTZ. BRECCIA + MINOR BOXWORKS + CU
11918			ORIECO			42	33	315	60	115	1	<0.005			CARBONACEOUS SHALE
11919	10000N	9425E	CRAMPS GRID			510	540	165	9850	245	3				SILTY SANDSTONE + Q + FE
11920	10215N	9825E	"	"		347	7	56	44	39	<1				Fe STAINED SILTY SANDSTONE
11921	11000N	9575E	"	"		16	28	125	248	21	2				RED BROWN SILTSTONE + QV
11922	11000N	9375E	"	"		185	130	26	98	24	<1				Fe + QV IN SILTY SANDSTONE
11923	11400N	9490E	"	"		52	520	1660	36	345	<1				BOXWORKS OF SULPHIDES IN DIORITE DYKE
11924	10200N	9750-9800E	"	"		32	16	17	16	25	<1				CHIP FLOAT
11925	"	9800-9850E	"	"		62	13	16	58	31	<1				CHIP
11926	"	9850-9900E	"	"		54	26	23	42	38	<1				ROCK CHIPS
11927	"	9900-9950E	"	"		20	14	12	30	28	<1				ROCK CHIPS
11928	"	9950-10000E	"	"		26	8	10	56	74	<1				ROCK CHIP
11929	10600N	9800-9850E	"	"		80	54	38	305	15	<1				ROCK CHIP
11930	"	9850-9900E	"	"		12	27	28	42	25	<1				ROCK CHIP
11931	"	9900-9950E	"	"		22	19	17	22	36	<1				ROCK CHIP
11932	"	9950-10000E	"	"		50	11	16	32	19	<1				ROCK CHIP
11933	11400N	9850-9900E	"	"		24	34	9	18	23	<1				ROCK CHIP
11934	"	9900-9950E	"	"		18	54	11	16	23	<1				ROCK CHIP
11935	"	9950-10000E	"	"		22	48	22	42	33	<1				ROCK CHIP
11936	"	10,000-10050E	"	"		22	115	24	42	100	<1				
11937			SILVER ECHO PROSPECT			<4	12	1·19%	<5	35	4				SULPHIDES
11938			WOLFRAM CK GRID.			92	80	70	22	1100	1				QUARTZITE + CALC SILICATES

REMARKS:

APPENDIX 2

CRAMPS DRILL HOLE CRD1

Drill Log

992027

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

Hole No : CR DH1

PROJECT : SCAMANDER

LOCATION CODE : LH02

COLLAR CO-ORDINATES : 9998N, 9775E

COLLAR R.L. :

LOCATION : CRAMPS

MAP/PHOTO REFERENCE :

DATE STARTED	21/10/85	HOLE SIZE		FROM	TO	TOTAL	CORE STORAGE	
DATE FINISHED		NON CORE	6"	0	4.5	4.5	No OF TRAYS	
TOTAL DEPTH			4½"	4	100	95.5	SAMPLE STORAGE	
LOGGED BY	AJW	CORE					ASSAY LAB.	
CONTRACTOR	STACPOOLE						ASSAY REPORTS	
RIG	FOX B-80 MOBIL DRILL							
DRILL CREW	WAYNE BALD	CASING					MIN. & PET. LAB.	
	TERRY LODGE						MIN. & PET. REPORTS	
		CASING LEFT						

HOLE SURVEY DATA

INSTRUMENT : EASTMAN CAMERA

DEPTH	INSTRUMENT INCL.	INSTRUMENT AZ.	ACID ETCH INCL.	ACID ETCH AZ.	REMARKS
COLLAR					
4m	-89°	016°			
25m	-89°	334°			
50	-87°	010°			
75	-85½°	016°			
100	-85°	014°			

GRAPHIC/LETTER SYMBOL LOGGING KEY

Ss	Sandstone	Qtz	Quartz	Fg	Fine grained
Ssd	Silty sandstone	Py	Pyrite	Mg	Medium grained
Qt	Quartzite	Po	Pyrrholite		
		Chl	Chlorite		
		FELD	Feldspar		

STRUCTURE / ALTERATION CODE

- B BEDDING
- J JOINTING
- C CLEAVAGE
- F FOLIATION
- sh SHEARING
- q QUARTZ VEINS

O OXIDATION

(0°, 45°, Po)

(cleavage dip relative to bedding, cleavage dip, minerology)

DRILLING SUMMARY : 0.279.2 : Interbedded shales, sandstones and quartzites of the Mathinna Beds. Minor quartz veins with traces of pyrite and pyrrhotite.

No camtente observed.

026

992028

PROJECT : SCAMANDER CRAMPS **SCALE :** **HOLE NO :** CRD - 1

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays $K \times 10^{-5}$ SI	Weighted Assays/Ratios	% Estimates	Core Angles	Alt.	T.S. P.S.	Description
0	4						10						Tan and White Siltstone
4	6						10						Tan and White Siltstone
6	8						15						Tan and White Siltstone
8	10						60						Tan and White Siltstone
10	12						10						Tan and White Siltstone some f.g. grey Qtz
12	14						17						Tan and White Siltstone some f.g. grey Qtz
14	16						10						Tan, Grey, White S.S and minor Qv
16	18						11						Grey, Tan, White S.S and trace Fe Oxides
18	20						20		LEVEL OF OXIDATION				Grey, Yellow, White S.S
20	22						8						Dark Grey SS, White and Yellow fractures, trace Py
22	24						9						Dark Grey SS, White and Yellow fractures, some Py
24	26						14						Dark Grey SS, minor Yellow on fractures, Minor Qv, Py~0.1%
26	28						13						Dark Grey Shale, minor QV, Py 0.4% in fractures
28	30						16						Grey Shale, minor QV, Py 0.2%
30	32						20						Grey Ssd, minor dark grey shale, minor QV, Py~0.2% in fractures
32	34						25						Dark Grey Shale, Grey Ssd, Py ~ 0.1% in fractures
34	36						17						Dark Grey Shale, minor grey Ssd, Py~0.4% in fractures
36	38						24						Dark Grey Shale, minor grey Ssd, Py ~0.2% in fractures
38	40						28						Grey Ssd, dark grey shale, minor QV, Py ~0.2% in fractures
40	42						30						Dark grey shale, grey Ssd, minor QV, Py ~0.2% in fractures
42	44						30						Dark grey shale, grey Ssd, minor QV, Py ~0.1% in fractures
44	46						28						Grey Ssd, dark grey shale, Py ~0.2% in fractures
46	48						45						Grey Ssd, dark grey shale, Py ~0.1% in fractures
48	50						15						Grey Ssd, dark grey shale, Py ~0.7% in fractures
50	52						21						Dark grey shale, minor grey Ssd, Py ~0.4% in fractures
52	54						30						Grey f.g. Qt and minor dark grey shale, Py~0.2% in fractures
54	56						30						Grey f.g. Qt and minor dark grey shale, Py~0.2% in fractures
56	58						27						Grey f.g. Qt and minor dark grey shale, Py~0.3% in fractures
58	60						17						Grey f.g. Qt and minor dark grey shale, Py~0.1% in fractures
60	62						19						Grey f.g. Qt and minor dark grey shale, Py~0.1% in fractures
62	64						15						Grey f.g. and minor QV, some Py in fractures
64	66						15						Grey f.g. and minor QV, some Py in fractures
66	68						20						Grey f.g. Qt and minor grey shale, some Py in fractures
68	70						26						50% dark grey shale, 50% grey f.g. Qt, minor QV, some Py
70	72						27						Grey f.g. Qt, dark grey shale, white-grey Ssd, minor QV, Py~0.1% in fractu
72	74						53						Grey fg Qt, drk grey shale, minor sugary Quartz, Py~0.1% in fr
74	76						24						Grey f.g. Qt, dark grey shale, some Py in fractures
76	78						16						Grey f.g. Qt, dark grey shale, minor Py in fractures
78	80						20						Dark Grey Shale, Grey PyQt, Py~0.2% in fractures
80	82						28						Dark grey shale, grey PyQt, minor QV, Py~0.2% in fractures
82	84						39						Dark grey shale, grey PyQt, minor QV, Py~0.1% in fractures
84	86						26						Grey f.g. Qt, dark grey shale, minor QV, minor Py in fract.
86	88						48						Dark grey shale, grey f.g. Qt, minor Qv, minor Py in fract.
88	90						46						Dark grey shale, grey f.g. Qt, minor Qv, minor Py in fract.
90	92						85						Dark Grey shale, minor Qv, Py 0.1% in fractures
92	94						60						Dark grey shale, minor QV, Py 0.1% in fractures
94	96						35						Dark grey shale, minor Qv, minor Py in fractures
96	98						54						Dark grey shale, minor QV, minor Py in fractures
98	100						50						Dark grey shale, minor QV, minor Py in fractures

20

SHEET ... OF ... SHEETS

HOLE NO :

↑ arrow points up for sediments.

PROJECT : SCAMANDER SCALE : HOLE Nº :

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	Assays W	Weighted Assays/Ratios	% Estimates Kx10^{-5} SI	Core Angles BEDS (Cleavage)	Alt. Way Up	T.S. P.S.	
100	100.20	2.20	2.13	97						10-40x10^{-5}	45°(0°,45° Py Qtz)	↑		
100.20	105.20	3.00	3.05	102							47°(0°,45° Py Qtz)			(40°,Po,Qtz,Py)
105.20	108.20	3.00	3.05	102										
108.20	111.20	3.00	3.05	99						20-80	35°(59° Py Qtz)			
111.20	114.20	3.00	2.97	99										
114.20	117.20	3.00	2.97	99						80 350				
117.20	120.20	3.00	3.10	96						80 170	42°(110°,10° Po Qtz)	↑		(0,42°, Po Qtz)
120.20	123.20	3.00	2.88	96						250 800	42°(86°,12° Po Qtz)	↑		(0,42°, Po Qtz)
123.20	126.20	3.00	3.00	100										
126.20	127.20	1.52	1.52	100						20-60	45°			
127.72	129.20	1.48	1.48	100										
129.20	130.30	1.10	1.10	100						10-30	54°(230°,5° Po Qtz)	↑		(150°,60° Qtz)(105,70,Qtz)
130.30	132.20	1.90	1.80	95						30-55	43°(8°,43° Po Qtz)	↑		
132.20	135.20	3.00	3.03	101										
135.20	138.05	2.85	2.91	97						60-500	52°(110°,10° Po Qtz)			(005°,15° Po Qtz Py)
138.05	138.20	0.15	0.15	100						30-400	54°(260°,15 Py Po Qtz)			
138.20	141.20	3.00	2.94	98						10-40	52°			
141.20	143.85	2.65	2.70	102										
143.85	144.20	0.35	0.35	100						20-50	30°(50°,25° Po Qtz)	↑		(320°, 65°, Po Qtz)
144.20	147.20	3.00	2.96	99						40-350				(?,5° Po Qtz Chl(?))
147.20	150.20	3.00	3.05	102										
150.20	150.40	0.20	0.20	100										
										20-450	55°(175°,75 Po Qtz)	↑		(190°,5°,Po Qtz)(245°,35°,Po Qtz)
										100-600	60°			
150.40	153.20	2.80	2.78	99						20-200	58°(160°,50° Po Qtz)			(110°,7°,Po Qtz)(95°,73°,Po Qtz)
153.20	156.20	3.00	3.02	101						100-200	56°(170°,10° Po Qtz)			
156.20	159.20	3.00	2.98	99						40-150				
159.20	162.20	3.00	3.05	102			65	210						
162.20	164.50	2.30	2.30	100						40-90	54°(140°,30°, Po Qtz)			
										10-200				
164.50	165.20	0.70	0.73	100						200-500	35°(140°,30 Po Qtz)			
165.20	168.20	3.00	3.00	100						100-300				
168.20	171.20	3.00	2.97	99										
171.20	174.20	3.00	2.97	99			6	210						
174.20	175.40	1.20	1.20	100										

Description

100.00 - 127.72 Dominently dark grey shales with minor interbeds (1.5c, - 1cm) of tight grey sandstones/quartzite.

Veins are generally 1mm thick are lined quartz with Po cores. Vein density is generally less then 20v/m.

127.72 - 130.30
Light grey quartzite with occasional 0.5-3cm interbeds of dark grey shale. veining generally 1mm with up to 2 veins per metre (to 3mm wide)

130.30 - 138.05 Dominentlydark grey shale with occasional interbeds of 1cm - 0.65m of light grey quartzite. Generally 10-20 fine (<1mm) veins/m

138.05 - 138.85 Fine - medium grained finely light grey quartzite. Veining generally less then 1mm thick but up to 2mm.

143.85 - 150.40 Dominently dark grey shale with minor interbeds of light grey quartzite. Up to 6 1x10mm tension gashes filled with quartz and sulphides/m. Generally 10-20 <1mm veins/m

150.40 -164.50 Fine grained, finely laminated. Light grey quartzite. Fair amount of fine network veining from 159 - 160.10. 1.5cm Qtz Chl, Po, vein at 159.20. 10mm Qtz vein at 160.93

164.5 - 175.4 Variably deformed dark grey shale with lesser then 1cm - 30cm fine medium grained quartzites. Some large 10cmx3cm tension gashes in the quartzites filled with quartz and minor Po. Many small (1.5 x 0.5mm) tension gashes in the dark shale filled with pyrthotite (less than 20v/m)

HOLE NO :

PROJECT : SCAMANDER SCALE : HOLE No : CRD - 1

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	Assays W	Weighted Assays/Ratios	% Estimates Susc	Core Angles Bdg	Core Angles Cleavage	Alt.	T.S. P.S.	Description
175.40	177.20	1.80	1.81	101							35°				175.40 - 185.50 fine - medium grained light grey quartzite
177.20	180.20	3.00	2.97	99						10-60	65°				with lesser thin 0.5 - 30cm grey - dark siltstone
180.20	183.20	3.00	2.96	99			30	410	vein response	10-150	40°	(? 35° Qtz Py) (? 10° Poly)			interbeds. Thin tension gashes commonly filled
183.20	185.50	1.30	1.30	100								(? 70° Qtz Co)			with dark quartz. Occasional broarder gashes
															filled with milky quartz & Po large domiaanlty Po
															filled gash at 182.80 (mag susc 3000x10^{-5} SI with
185.50	186.20	1.70	1.70	100											minor Py on vein edge
186.20	189.20	3.00	3.01	100			20	400		40-100					~~198.45-203.45 light grey medium grained quartzite~~
189.20	192.20	3.00	3.11	104					vein response	90-400	45°	(600° 85° Qtz Po)(190° 65° Qtz)			with minor interbeds of grey green phyllite (1-10cm)
192.20	195.20	3.00	3.00	100					vein response general	25-400					Much network quartz veining 185.50 -187.70. Only
195.20	198.20	3.00	2.97	99							55°	(150° 35° Qtz Po) (350° 12° Qtz Po)			minor (3-10v/m) 1-5mm veins from 187.70 -198.45.
198.20	198.45	0.25	0.25	100					vein response	15-90	49°	(260° 75° Qtz Feld)			Thin quartz feldspar veins developed at 187.40,
															189.16,195.54,195.72.
									vein response	10-70	57°	(000° 57 Qtz Cit Py) (090° 75° Qtz Fld)			198.45 - 203.45 light grey medium grained quartzite
198.45	201.20	2.75	2.75	100						10-40					with occasional 1cm - 20cm dark grey shale lamina.
201.20	203.45	1.25	1.25	100											occasional quartz filled tension gashes and very
															minor thin (<1mm) Qtz Po filled veins.
203.45	204.20	0.75	0.69	92						50-100	35°				203.45-206.55 Dominantly dark grey shale with
204.20	206.55	2.35	2.35	100					vein resource	20-800	60°	(190° 53° Qtz) (346° 25° Qtz Po Py)			a few thin 0.5-30cm beds of medium grained quartzite
															grey wacke
206.55	207.20	0.65	0.62	95					vein resource	20-70	38	(240° 15° Qtz Po) (090° 15° Qtz Po)			206.55 - 222.30 Fine medium grained light grey
207.20	210.20	3.00	3.06	102					" "	30-800	60	(310 12 Qtz)			quartzite with lesser interbedded light grey green
210.20	213.20	3.00	3.01	100					vein resource	10-90					phyllite many qtz filled (10-15%) tension gashes
213.20	216.20	3.00	3.00	100			25	260			34°	(280° 15° Qtz Po)			~~with minor Po~~ from 215.20 - 219.20
216.20	219.20	3.00	2.94	98					vein resources	40 600	45°	(270° 35° Qtz Po)			
219.20	222.20	3.00	3.00	100											
222.20	222.30	0.30	0.30	100											
222.30	225.06	2.76	2.76	100					vein respose	10-80					222.30-225.06 Grey fine - medium grained quartzite
															moderate amount of quartz filled tension gashing
225.06	225.20	0.14	0.14	100											225.06 - 230.63 Dark grey shale with minor 20cm-
225.20	228.20	3.00	3.01	100						20 200	80°	(285° 35° Qtz Po)(075° 7° Qtz Po)			0.7m interbeds of grey wacke and light grey
228.20	230.63	2.43	2.41	99						100 500	35°	(90° 5° Qtz Po)			fine grained quartzite. Some dissemineted 0.5-1mm Py
230.63	231.20	0.57	0.57	100											
231.20	234.20	3.00	3.00	100						150 350		(? 60-80 Qtz Feld)(? 10° Qtz Po)			230.63 - 235.20 Dark grey shale with minor
234.20	235.20	1.00	1.00	100											disseninated Py and 10-15 (~1mm) small veins/m
															mineralized with quartz edge and Po centres.
															235.20-240.40 Dark grey shale with occasional
235.20	237.20	2.00	2.00	100											thin (10-30cm) fg-mg light grey green quartzite.
237.20	240.20	3.00	3.02	101											Quartz-Po fills small veins to 20v/m generally 1mm
240.20	240.40	0.40	0.40	100											thick Po fills small tension gashes (2cmmx0.5mm)
															Occasional (to 5mm) Qtz-Po veins and quartz feldspor
															veins to 3mm

992031

(4)

PROJECT : SCAMANDER SCALE : HOLE No :

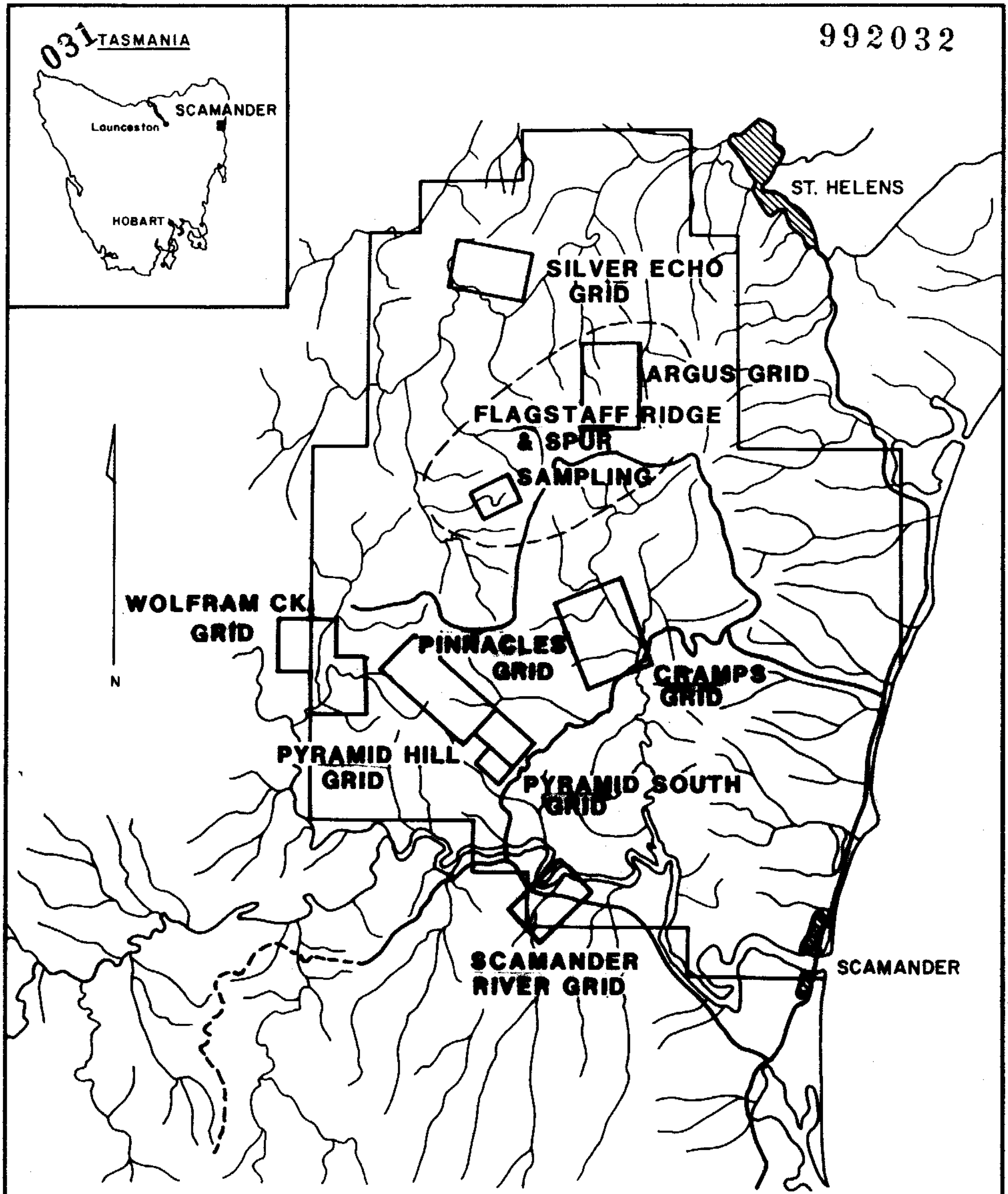
From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays	Weighted Assays/Ratios	% Estimates	Core Angles	Alt.	T.S. P.S.	Description
240.40	243.20	2.80	2.86	102									240.40 - 243.46 Light grey-green fg-mg quartzite with occasiona.
243.20	243.46	0.26	0.26	100									10-25cm interbeds of dark grey shale. Quartz with minor Po
													filed tension gashes weakly disseminated Py to 0.5mm (1%)
													243.46 -265.40 Interbedded dark grey shale grey green fg mg
243.46	246.20	2.74	2.75	100									quartzite and grey green phyllite. Interbeds of 1cm - 0.8m.
246.20	249.20	3.00	2.94	98						(080°,80°,Qtz,Feld)			Weak spotting observed in dark grey shales at 258.70 Weak
249.20	252.20	3.00	3.01	100						(180°,70°,Qtz,Fdd)			disseminated Py (<1%) to 0.5mm. Occasional tension gashes and
252.20	255.20	3.00	3.01	100						40° (? 75° Qtz Po)			veins filled with qtz-po
255.20	258.20	3.00	2.99	100						53° (340°,80°,Qtz,Po)			
258.20	261.20	3.00	3.03	101									
261.20	264.20	3.00	2.92	97						40°			
264.20	265.40	1.20	1.20	100									
													265/40 - 268.60 Dark grey shale with occasional thin (1cm-10cm)
265.40	270.20	1.60	1.60	100									interbeds of fg-mg quartzite. tight small folds evident.
267.20	268.60	1.40	1.39	99									Minor very thin quartz veining.
													268.40 - 275.22 Light grey mg quartzite with occasional
268.60	270.20	1.60	1.69	100									interbeds of (10-40cm) of dark grey shale and grey green
270.20	273.20	3.00	3.04	101									phyllite. Quartz filled tension gashing common.
273.20	275.22	2.02	2.02	100									Occasional quartz feldspar veins to 3mm. Few Qtz-Po veins(to 1mm)
													275.22 - 278.00 Dark grey shale with occasional light grey
275.22	276.20	0.98	0.94	96						17°			shale interbeds. Minor 1-5cm lamina of quartzite. Occasional
276.20	278.00	1.80	1.70	94									thin QtzPo veins <1mm Erratic disseminated Py
													278.00 - 279.20 Interbedded dark grey shale and light grey
													mg quartzite. Minor tension gashes filled with Qtz Po/Py.
278.00	279.20	1.20	1.20	100									Weak disseminated Py in quartzites.
							END OF HOLE						

HOLE No :

080

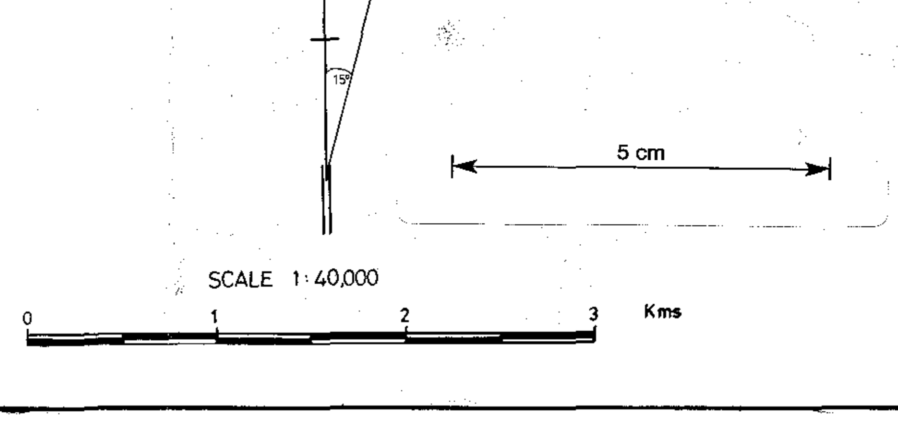
SHEET OF SHEETS

992032



Billiton Australia

Project	SCAMANDER E.L. 12/78
Title	LOCATION MAP
Author / Date	Scale 1 : 100 000
Drawn / Office A.H.O.	Revised / Date
Drawing No LH02/1027	Fig No 1



LEGEND

- Bedding, facing determined.
- Bedding, facing not determined.
- Lineament.
- Shear Zone
- gn, fe — Gossanous rocks, ironstones.
- Hard rock mines, prospects
- Quartz veins.
- ap — Aplite.
- qfp — Quartz-feldspar, porphyry.

- Tu — Tertiary – undiff. — sand, silt, gravel.
- Pss — Permian – sandstone, conglomerate.
- Sm — Silurian – Lower Devonian, Mathinna Beds, quartzite, slate.

Igneous Rocks

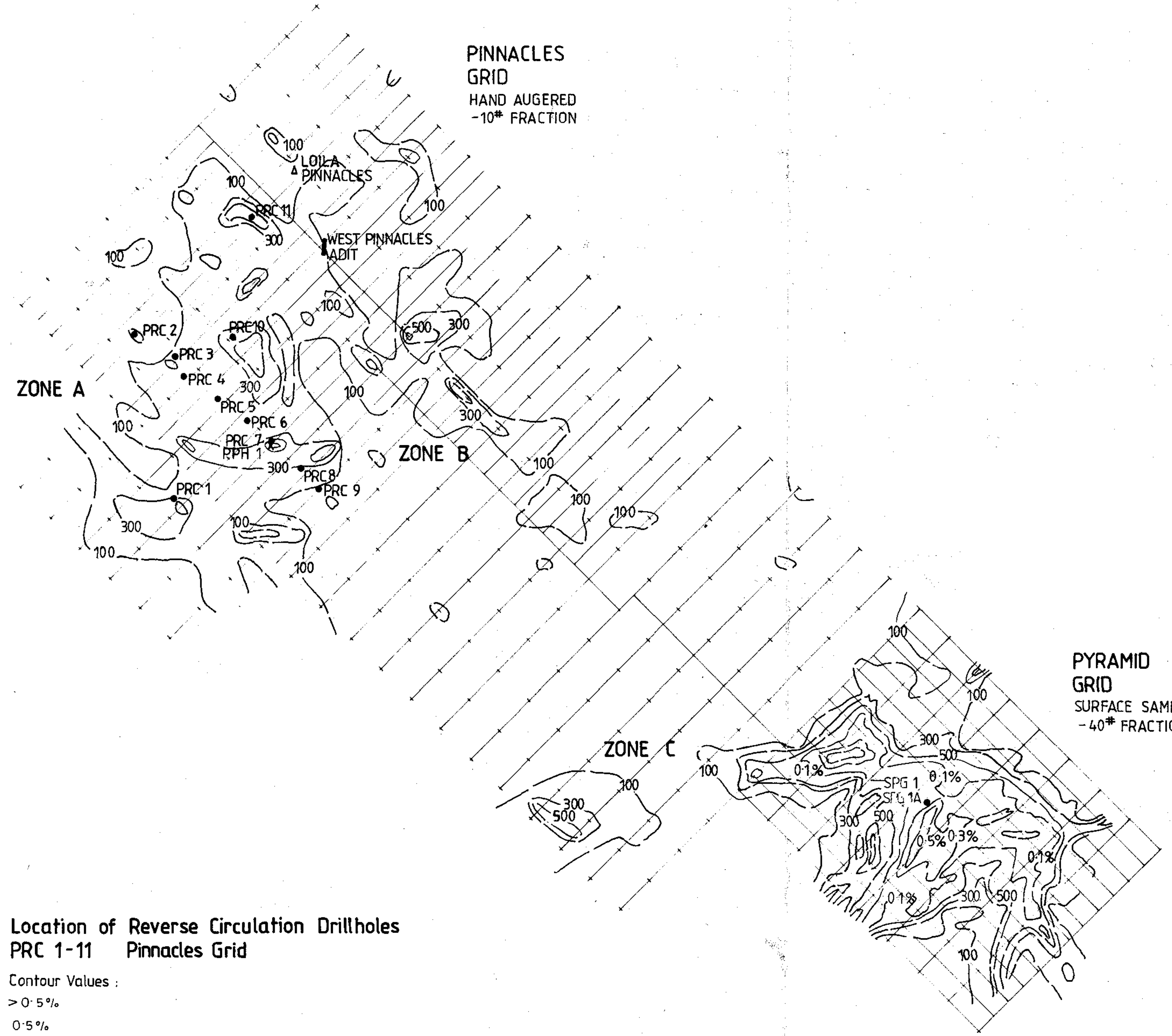
- Jdl — Jurassic – dolerite.
- dio — Upper Devonian (?) diorite.
- Upper Devonian granitic rocks, subdivision in St Helen's area after Groves, Cocker and Jennings, 1977 (Geol. Survey Tas. Bull. 55).
- Biotite-(muscovite) granite.
- Biotite-microgranite

992033

Billiton Australia
The Metals Division of The Shell Company of Australia Limited

Project	SCAMANDER EL12/78
Title	GEOLOGY
	B.H.P. DWG. No. 12/78-61
Author BHP	Date 9/81
Scale	1:40,000
Drawn	Office
Revised A.S.	Date 1/86
Drawing No. LH02/1055	Fig. No. 2

86-2588



Location of Reverse Circulation Drillholes
PRC 1-11 Pinnacles Grid

Contour Values :

> 0·5%
0·5%
0·3%
0·1%
500 p.p.m.
300 p.p.m.
100 p.p.m.

033

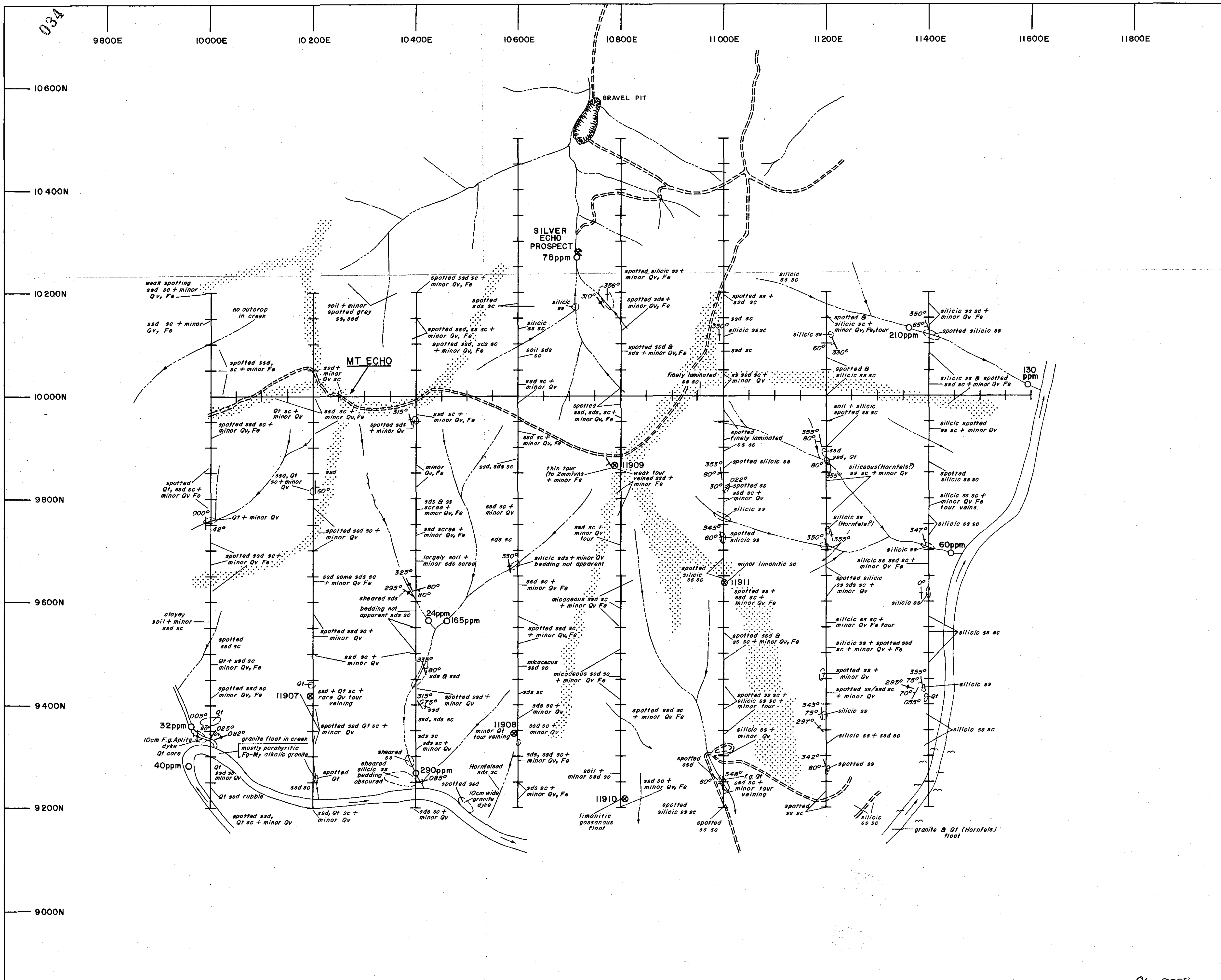
992034

86-2588

The Shell Company of Australia Limited
METALS DIVISION

PINNACLES / PYRAMID GRIDS
Sn in SOILS
DRILL HOLE LOCATIONS

SCALE	1:10000	DATE	22-9-83
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/LH02/506	FIG.No.	3



LEGEND

ss	SILTSTONE
sd	SANDSTONE
ssd	SILTY SANDSTONE
sds	SANDY SILTSTONE
sc	SCREE
Qt	QUARTZITE
Qv	QUARTZ VEINED
Fe	IRON STAINING
tour	TOURMALINE VEINING

RIDGE & SPUR TRENDS

343° 70° BEDDING STRIKE, DIP

343° 70° CLEAVAGE STRIKE, DIP

11910 ROCK SAMPLE

60ppm STREAM SEDIMENT Sn ASSAY

TRACK

992035

0 100 200 300 400

METRES

Billiton Australia

The Metals Division of The Shell Company of Australia Limited

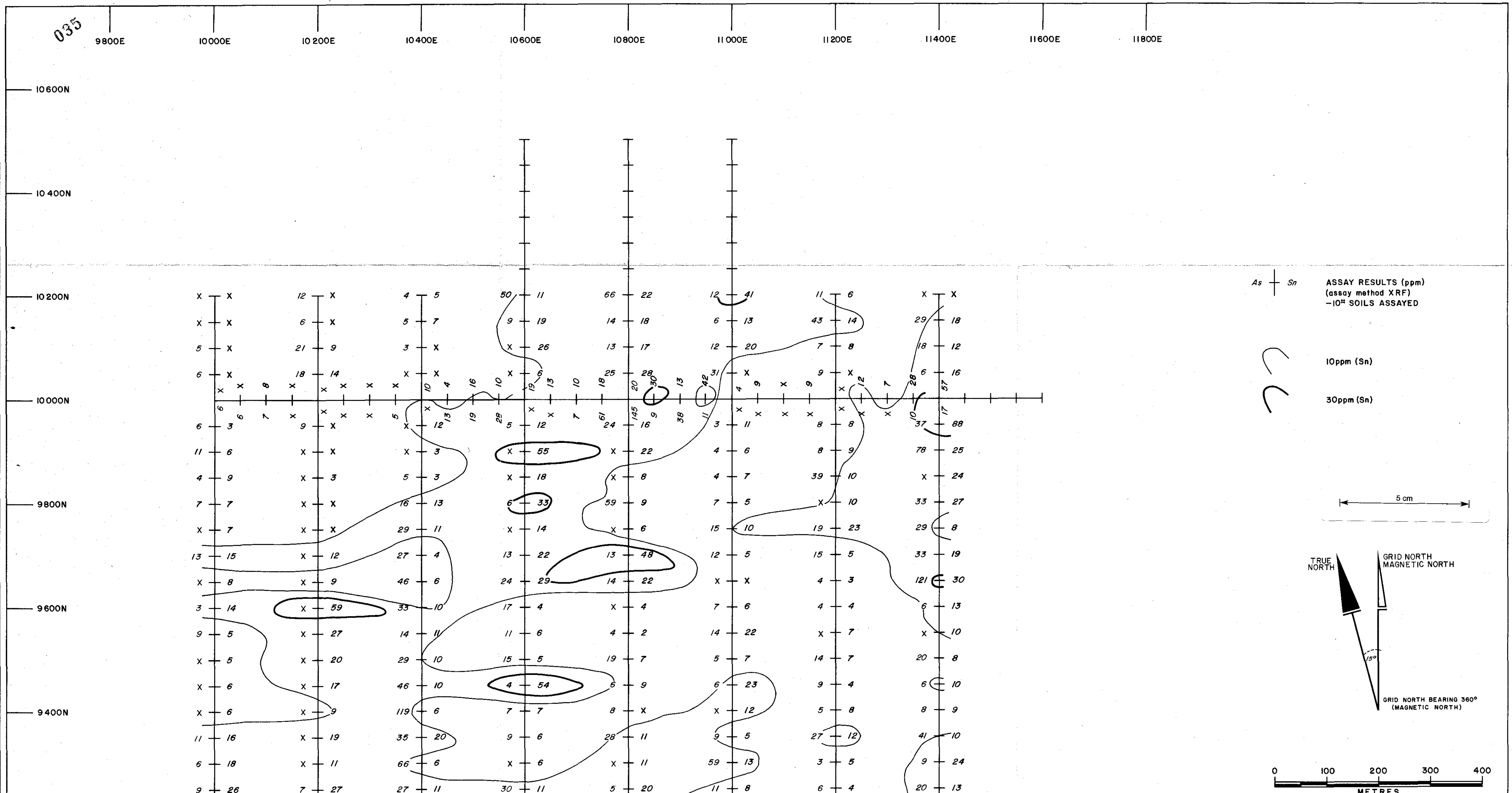
Project: E.L. 12/78 – SCAMANDER

Title: SILVER ECHO GRID

GEOLOGY

Author A.W.	Dept. TAS.	Scale 1 : 5000	
Drawn H.M.R.	Date 9/85	Revised	Date
Checked	Date	S'ceded	Date
Sheet No. 4		Drawing No. LH02/1035	

86-2588



992036

86-2588

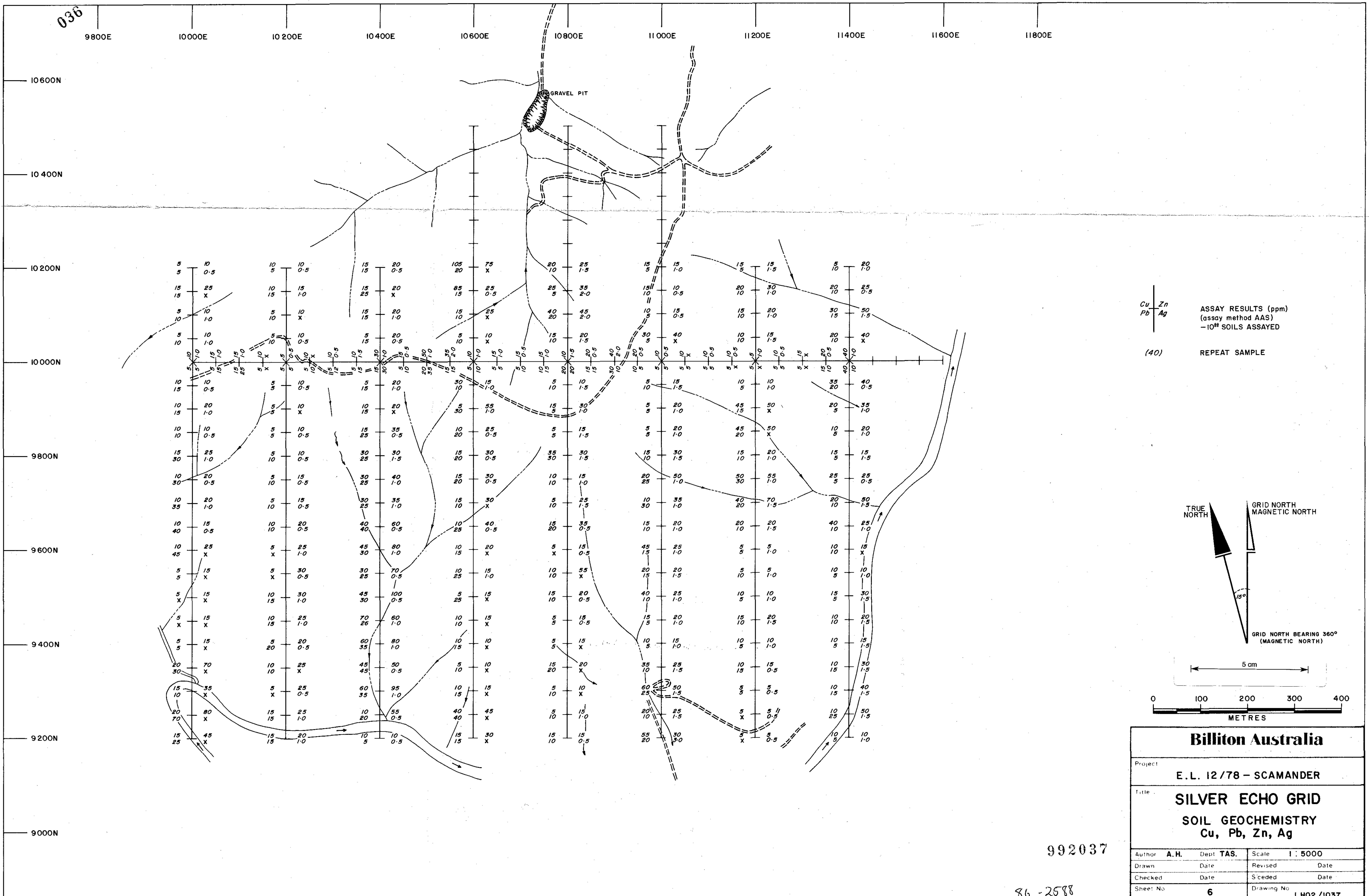
Billiton Australia

The Metals Division of The Shell Company of Australia Limited

Project: E.L. 12/78 – SCAMANDER

Title: SILVER ECHO GRID
SOIL GEOCHEMISTRY
Sn, As
(Sn CONTOURED)

Author A.H.	Dept. TAS.	Scale	1 : 5000
Drawn H.M.R.	Date 9/85	Revised	Date
Checked	Date	S'ceded	Date
Sheet No.	5	Drawing No.	LH02/1036



Billiton Australia

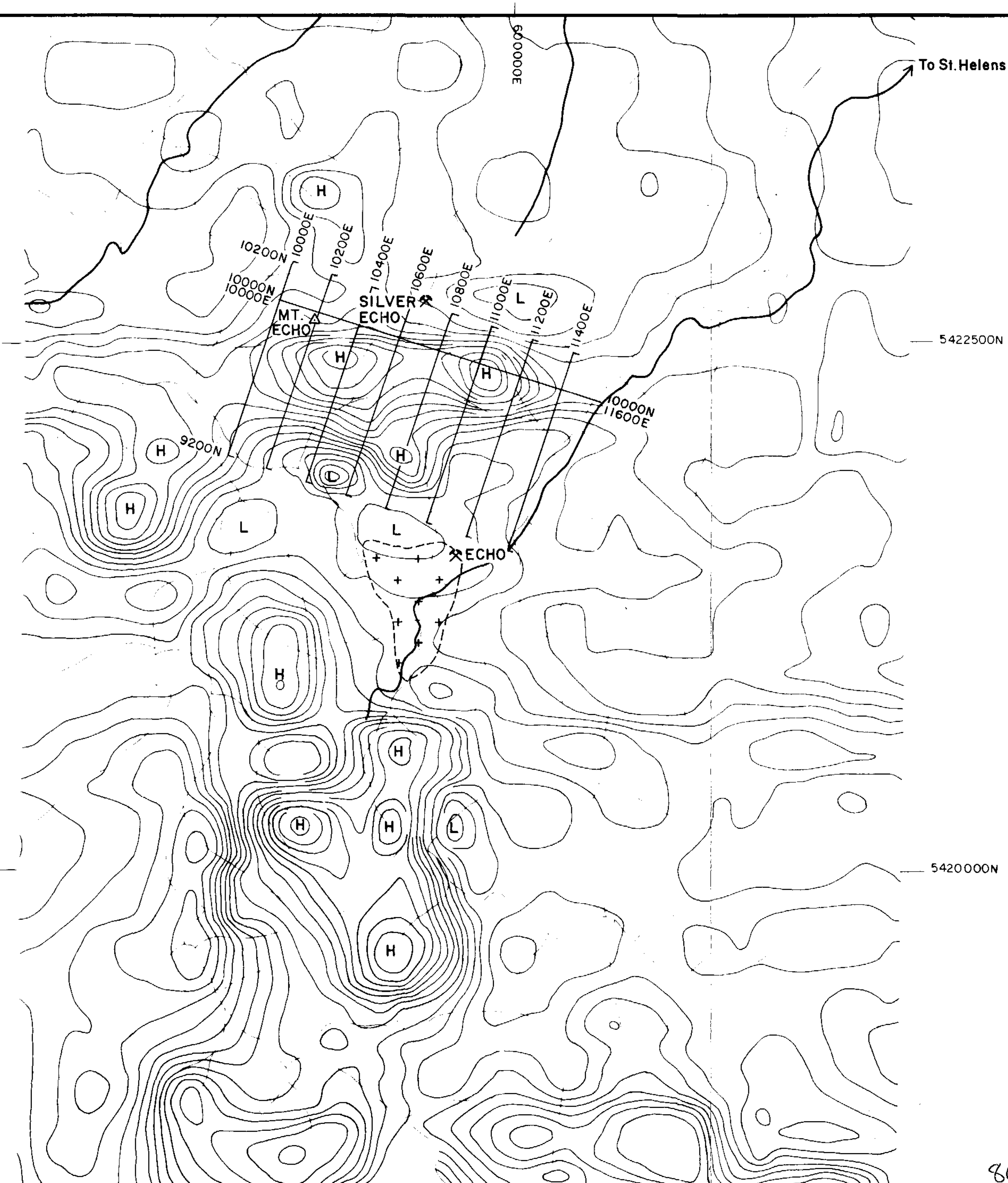
Project: E.L. 12/78 – SCAMANDER

Title: SILVER ECHO GRID

SOIL GEOCHEMISTRY

Cu, Pb, Zn, Ag

Author A.H.	Dept TAS.	Scale 1 : 5000	
Drawn	Date	Revised	Date
Checked	Date	S'ceded	Date
Sheet No 6		Drawing No LH02/1037	



TN MN 13°

5 cm

BASE LINE BEARING 106°TN
93°MN

MAG. STATION INTERVAL 10m
LINE INTERVAL 200m

GRANITE

CREEKS

TRACKS

AEROMAG CONTOURS
Line spacing 300m
mtc 90m
Direction E-W
C.I. 2.5nT

0 500 1000m

992038

86 - 2588

037

The Shell Company of Australia Limited
METALS DIVISION

N.E. TASMANIA
SCAMANDER E.L.

SILVER ECHO AREA

AEROMAGNETICS
C.I.= 2.5nT

SCALE	1:20000	DATE	March 1985
AUTHOR	N.H	DRAWN	V.C
OFFICE	MELB-AHO	REP.No.	
DRG No	LH02/1019	FIG.No.	7

86-2588

038

SHELL COMPANY OF AUSTRALIA METALS DIVISION R.O.C.S. : PROFILE	SCAMANDER, N.E. TAS SILVER ECHO GRID GROUND MAGNETICS 7 PT. FILTER SCALE 1 : 5000.00	FIG No : 8 DATE : 6/85 AUTHER : OFFICE : DRAWN :	LEGEND MAG.7PT: 25.0/cm -61750.0 10m stn spacing 10000E @ M.N. = 15°T.N DRG. No. LH02/1030

992039

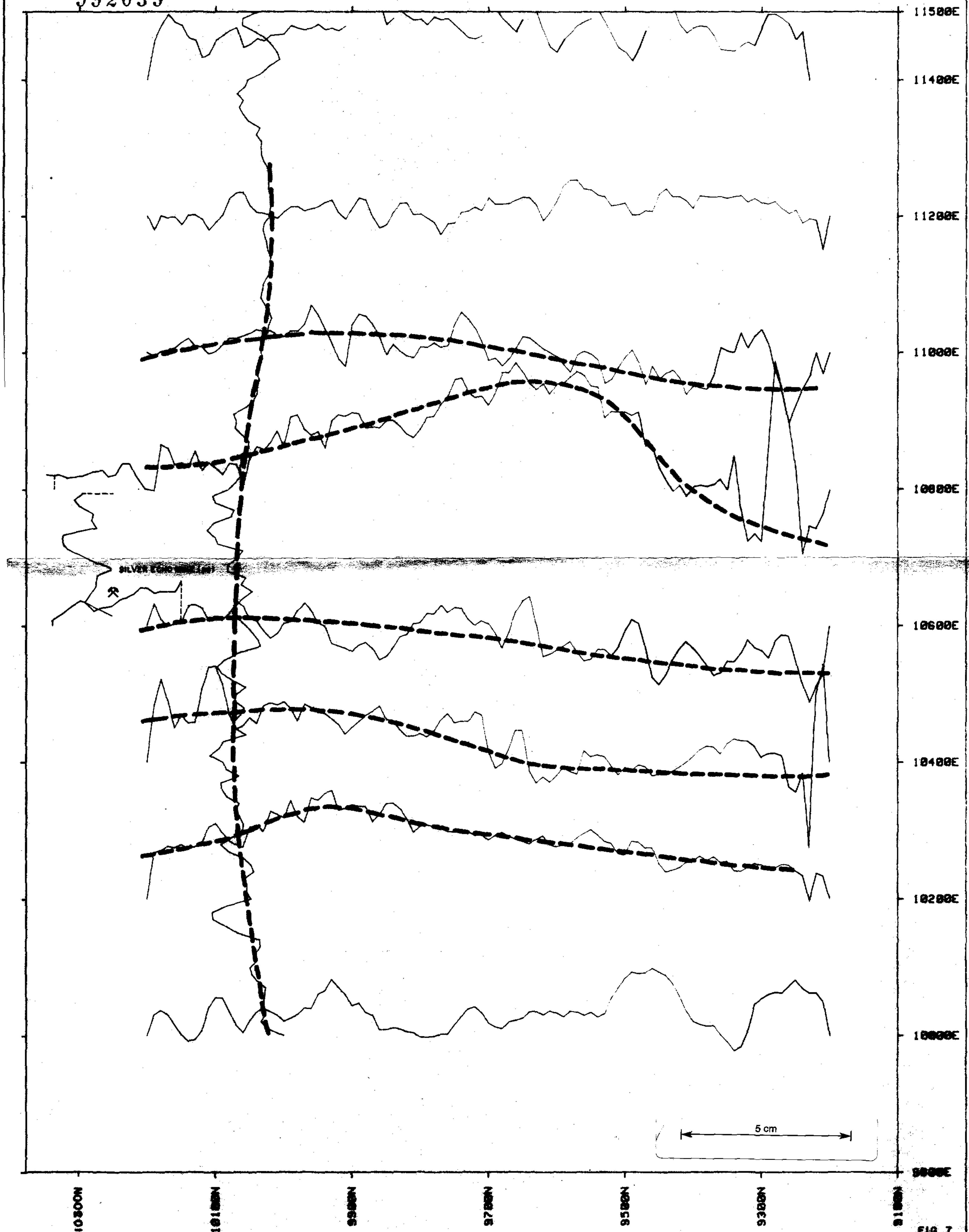
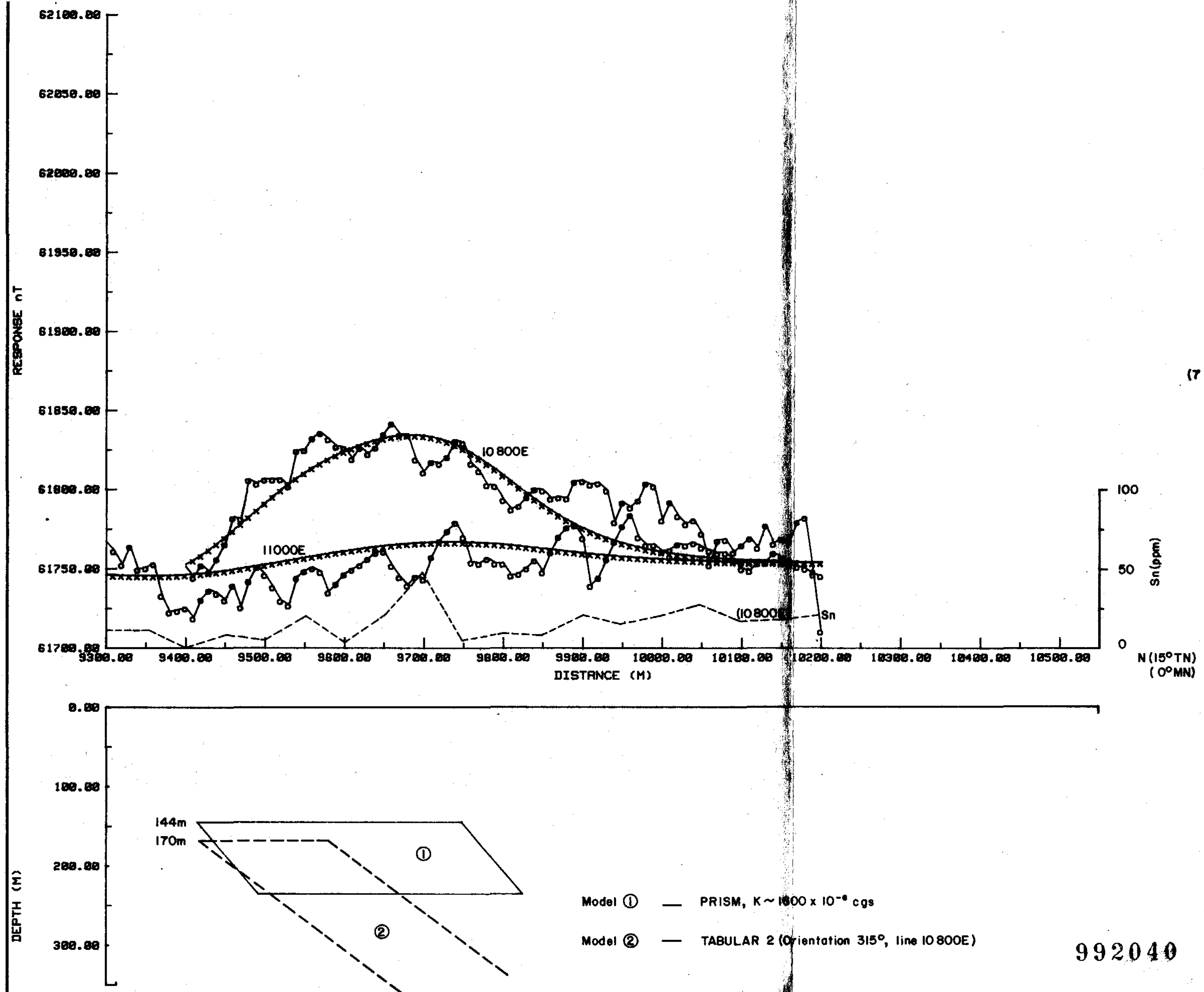


FIG. 7

039



R.O.C.S.

GEOPHYSICS SYSTEM - MAGMOD

MODEL : PRISM

CALCULATED RESPONSE : x
(7 PT FILTERED) OBSERVED DATA : o

MAGNETIZN	100.6114
DIP	49.7169
BASE LEVEL	61754.0114
X-SLOPE	0.0000
Y-SLOPE	0.0000
X-POSITION	9580.9558
Y-POSITION	10000.0000
X H-WIDTH	166.4172
Y H-WIDTH	100.0000
DEPTH	144.4271
THICKNESS	90.6076
INCLINATN	-71.0000
DECLINATN	0.0000
FIELD	0.0000
ORIENTATN	0.0000

SCALE

DISTANCE :	50.00	M/CM
FIELD :	25.00	nT/CM
DEPTH :	50.00	M/CM

SHELL COMPANY OF AUSTRALIA
METALS DIVISION

SCAMANDER, N.E. TAS
SILVER ECHO

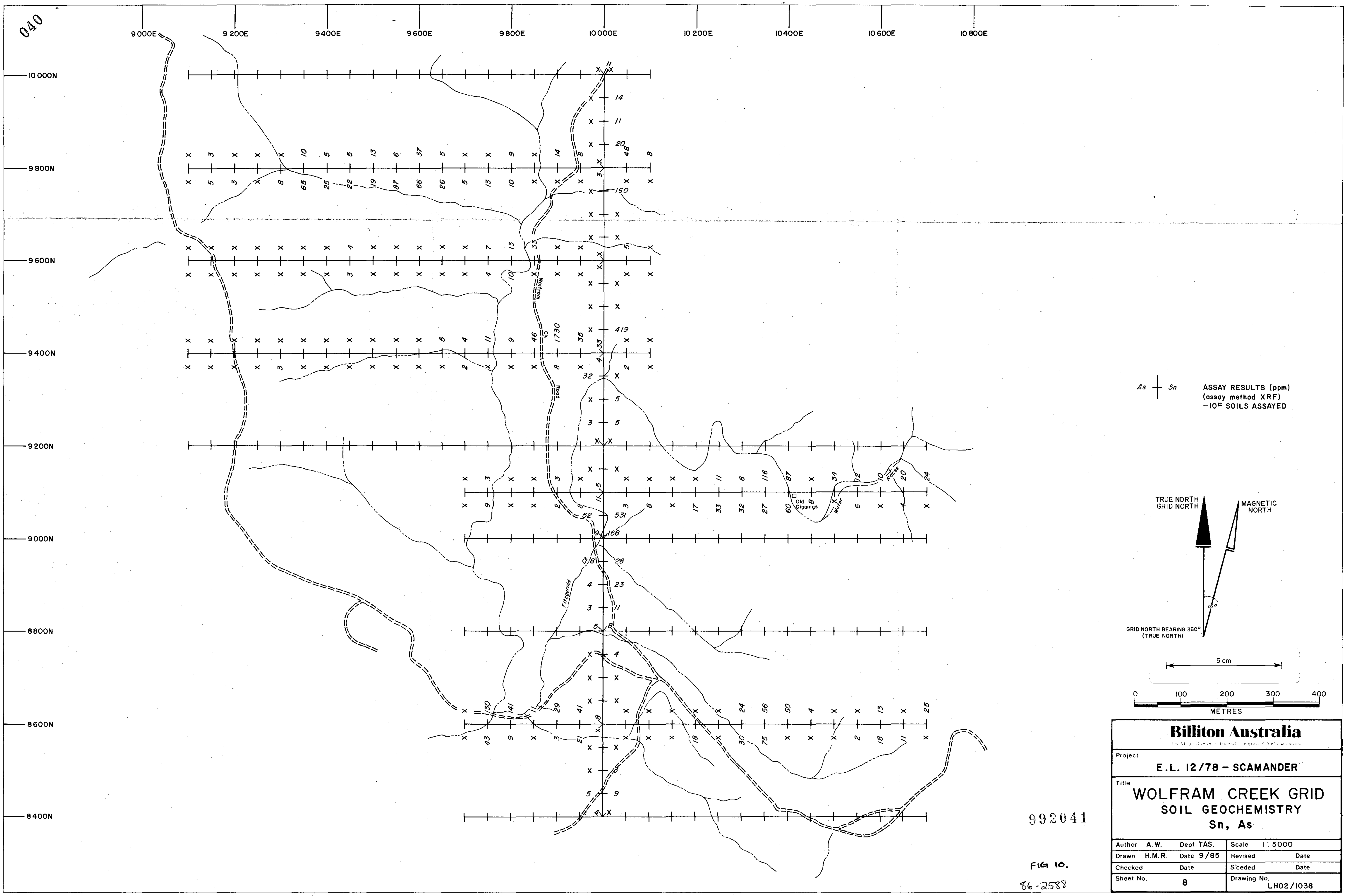
GROUND MAGNETICS
LINE 10 800E, 11000E

MAGNETIC MODELLING

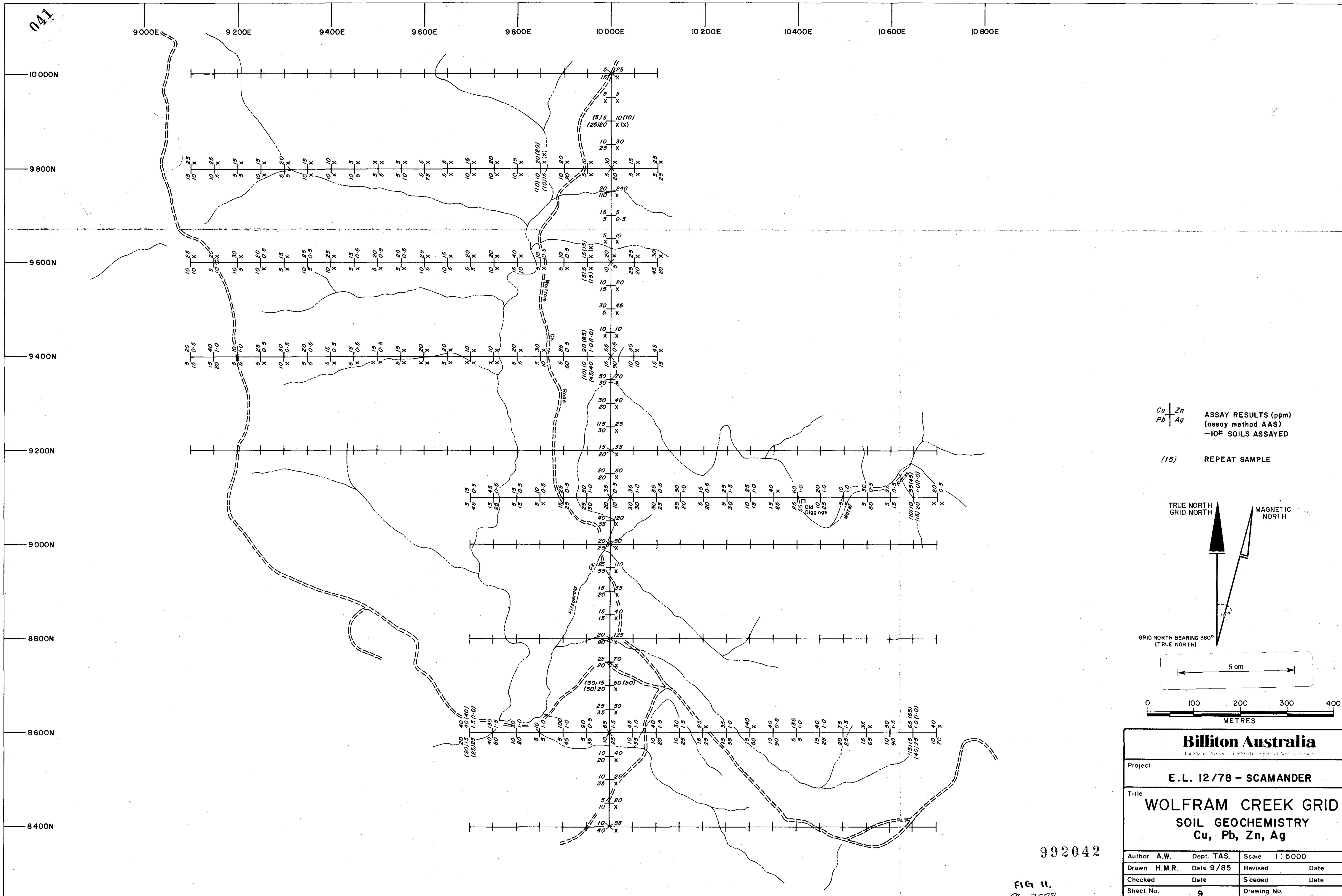
FIG. NO: 9	REPT. NO:
ENCL. NO:	DRG. NO: LH02/1029
DATE: 8/85	AUTHOR: N.H.
DRAWN:	OFFICE: A.H.O.

992040

86 2588


040
9000E
9200E
9400E
9600E
9800E
10000E
10200E
10400E
10600E
10800E
10000N
9800N
9600N
9400N
9200N
9000N
8800N
8600N
8400N
Wolfram Ck
Road
Fitzgerald Ck
Old Diggings
Water Races
As Sn ASSAY RESULTS (ppm)
(assay method XRF)
−10# SOILS ASSAYED
TRUE NORTH
GRID NORTH
MAGNETIC NORTH
15°
GRID NORTH BEARING 360° (TRUE NORTH)
5 cm
0 100 200 300 400
METRES
Billiton Australia
Project
E.L. 12/78 – SCAMANDER
Title
WOLFRAM CREEK GRID
SOIL GEOCHEMISTRY
Sn, As
Author A.W. Dept. TAS. Scale 1:5000
Drawn H.M.R. Date 9/85 Revised Date
Checked Date S'ceded Date
Sheet No. 8 Drawing No. LH02/1038
992041
FIG 10.
86-2588

041



992042

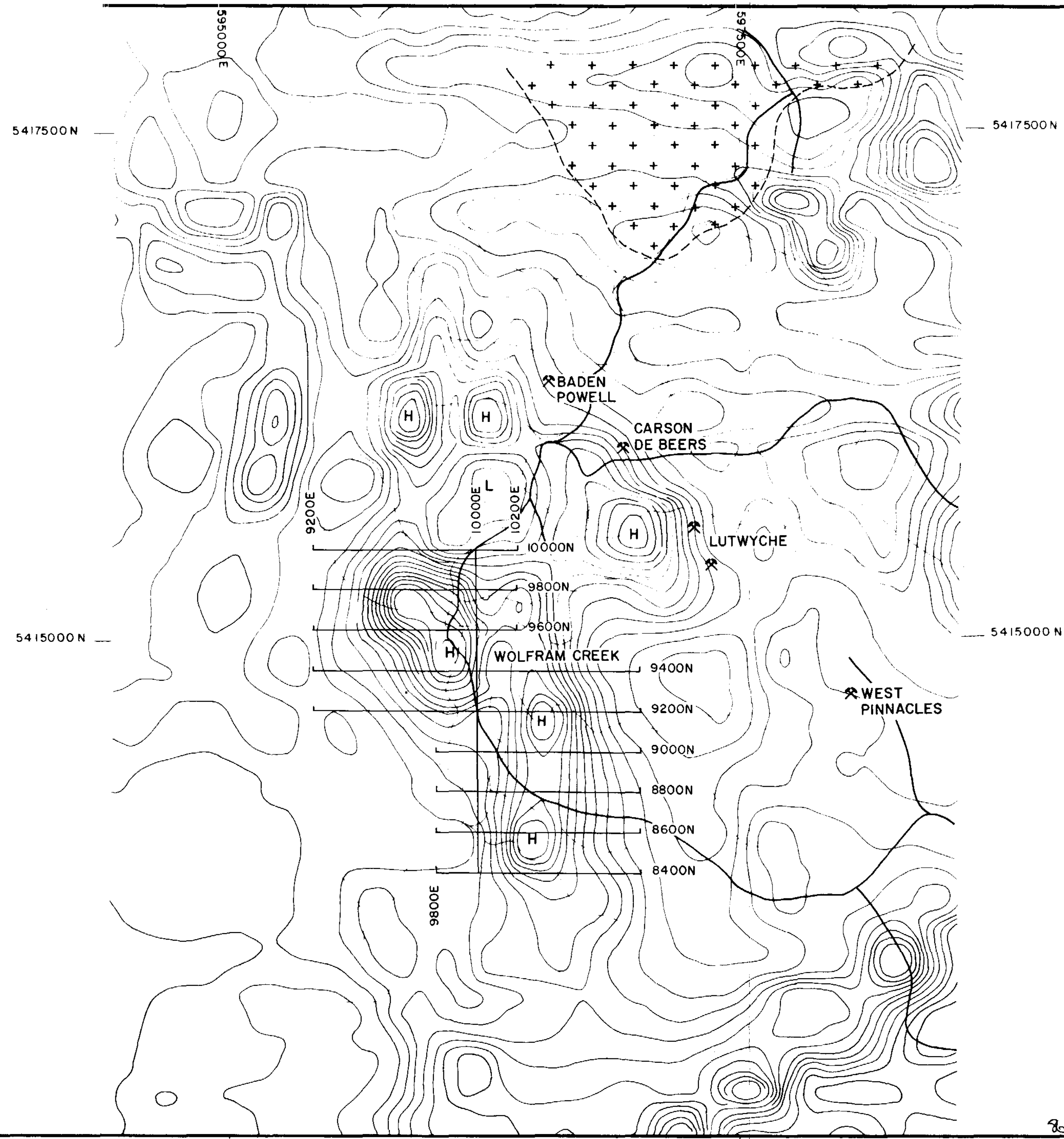
FIG 11.
86-2588

Billiton Australia

Project: E.L. 12/78 – SCAMANDER

Title: WOLFRAM CREEK GRID
SOIL GEOCHEMISTRY
Cu, Pb, Zn, Ag

Author A.W.	Dept. TAS.	Scale 1:5000	
Drawn H.M.R.	Date 9/85	Revised	Date
Checked	Date	S'ceded	Date
Sheet No.	9	Drawing No.	LH02/1039



042

TN MN
13°

5 cm

BASE LINE BEARING 0°TN
347° MN
MAG. STATION INTERVAL 10m
LINE INTERVAL 200m
GRANITE

CREEKS
TRACKS
AEROMAG CONTOURS
Line spacing 300m
mtc 90m
Direction E-W

0 500 1000m

992043

86-2588

The Shell Company of Australia Limited
METALS DIVISION

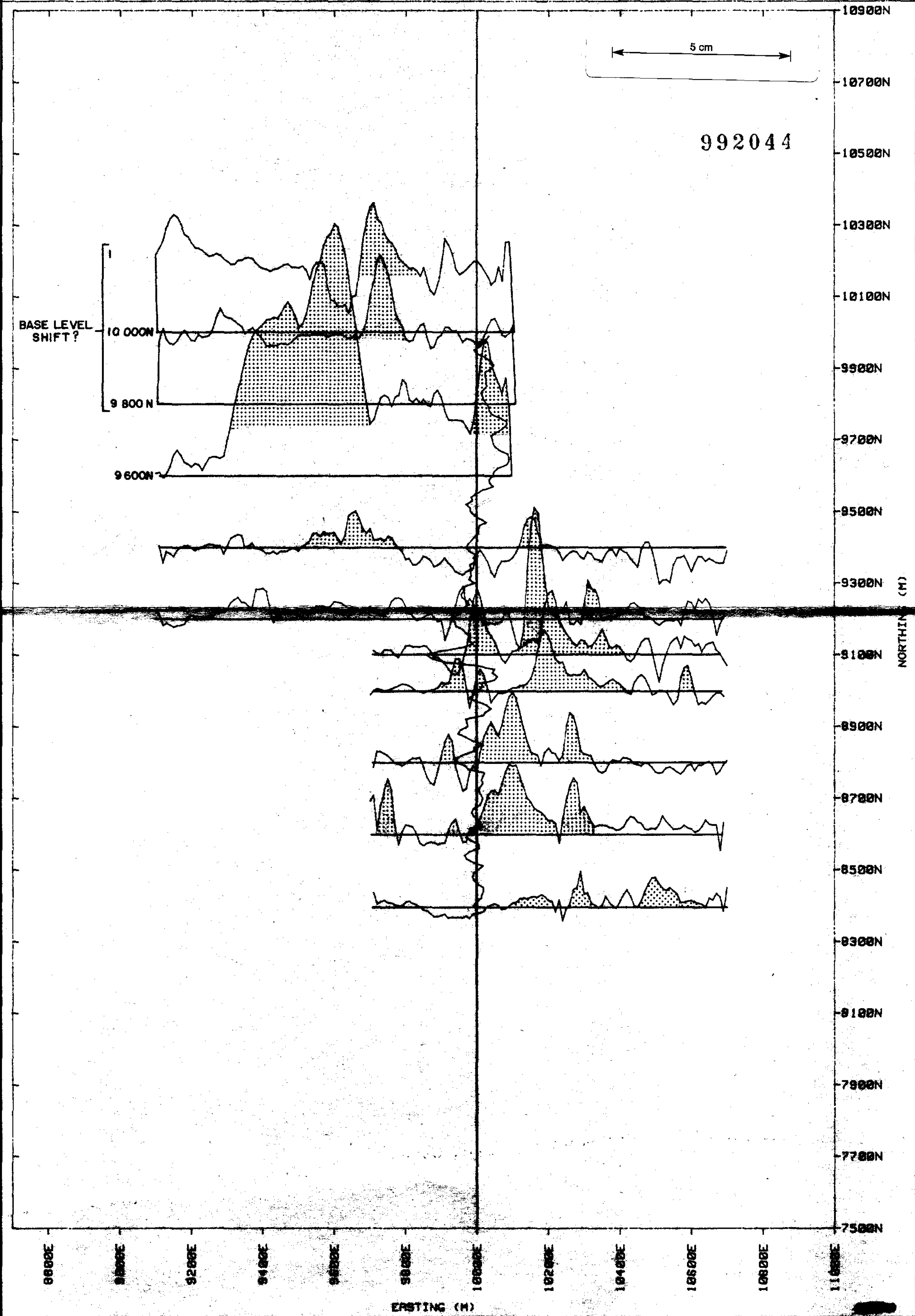
N.E. TASMANIA
SCAMANDER E.L.

WOLFRAM CREEK AREA
AEROMAGNETICS
C.I.= 2.5nT

SCALE	1:20 000	DATE	March 1985
AUTHOR	N.H	DRAWN	V.C
OFFICE	AHO	REP.No.	
DRG.No.	LH02/1021	FIG.No.	12

043

SHELL COMPANY OF AUSTRALIA METALS DIVISION R.O.C.S. - PROFILE	SCAMANDER, N.E TAS WOLFRAM CREEK GROUND MAGNETICS 7PT. FILTER SCALE 1 : 10000	FIG No : 13 DATE : AUTHOR : OFFICE : DRAWN :	LEGEND Base Level 61800nT Scale 60nT/cm Bearing 10000E = T.N. DRG. No. LH02/1028



044

The Shell Company of Australia Limited
METALS DIVISION

N.E. TASMANIA
SCAMANDER E.L.
SCAMANDER RIVER
AEROMAGNETICS
C.I. = 2.5nT

SCALE	1:20000	DATE	March 1985
AUTHOR	N.H	DRAWN	V.C
OFFICE	MELB-AHO	REP.No.	
DRG.No.	LH02 / 1020	FIG.No.	14

992045

86-2588

SHELL COMPANY OF AUSTRALIA	SCAMANDER, N.E. TAS	FIG No : 15	LEGEND
METALS DIVISION	SCAMANDER RIVER	DATE :	MAG 7PT: 25.0 / -81775.0
	GROUND MAGNETICS	AUTHER :	
	7 Pt. FILTERED	OFFICE :	10000E a 325°TN
R.O.C.S. : PROFILE	SCALE 1 : 5000.00	DRAWN :	DRG. No. LH02/1055

992046

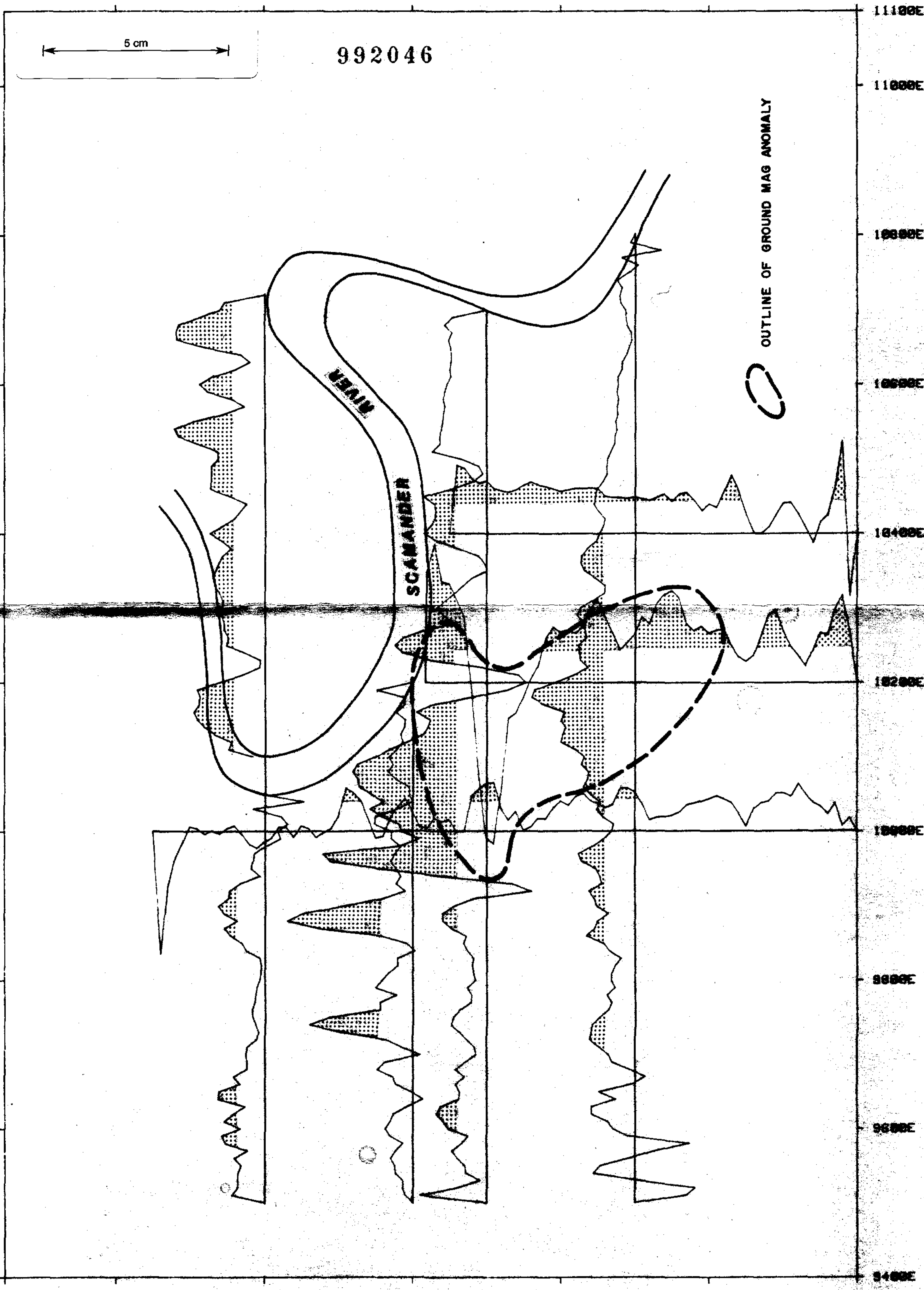
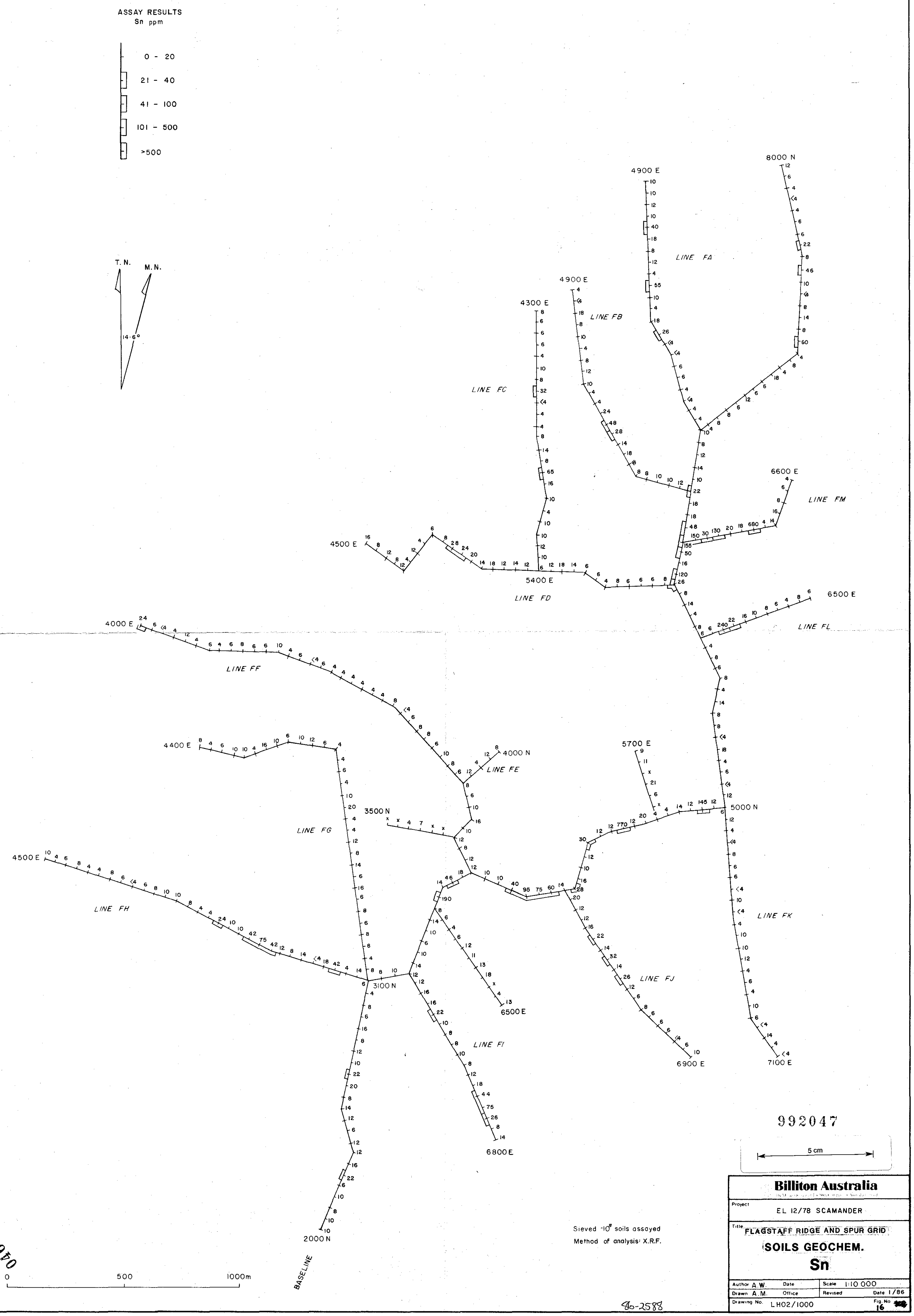


FIG. 15

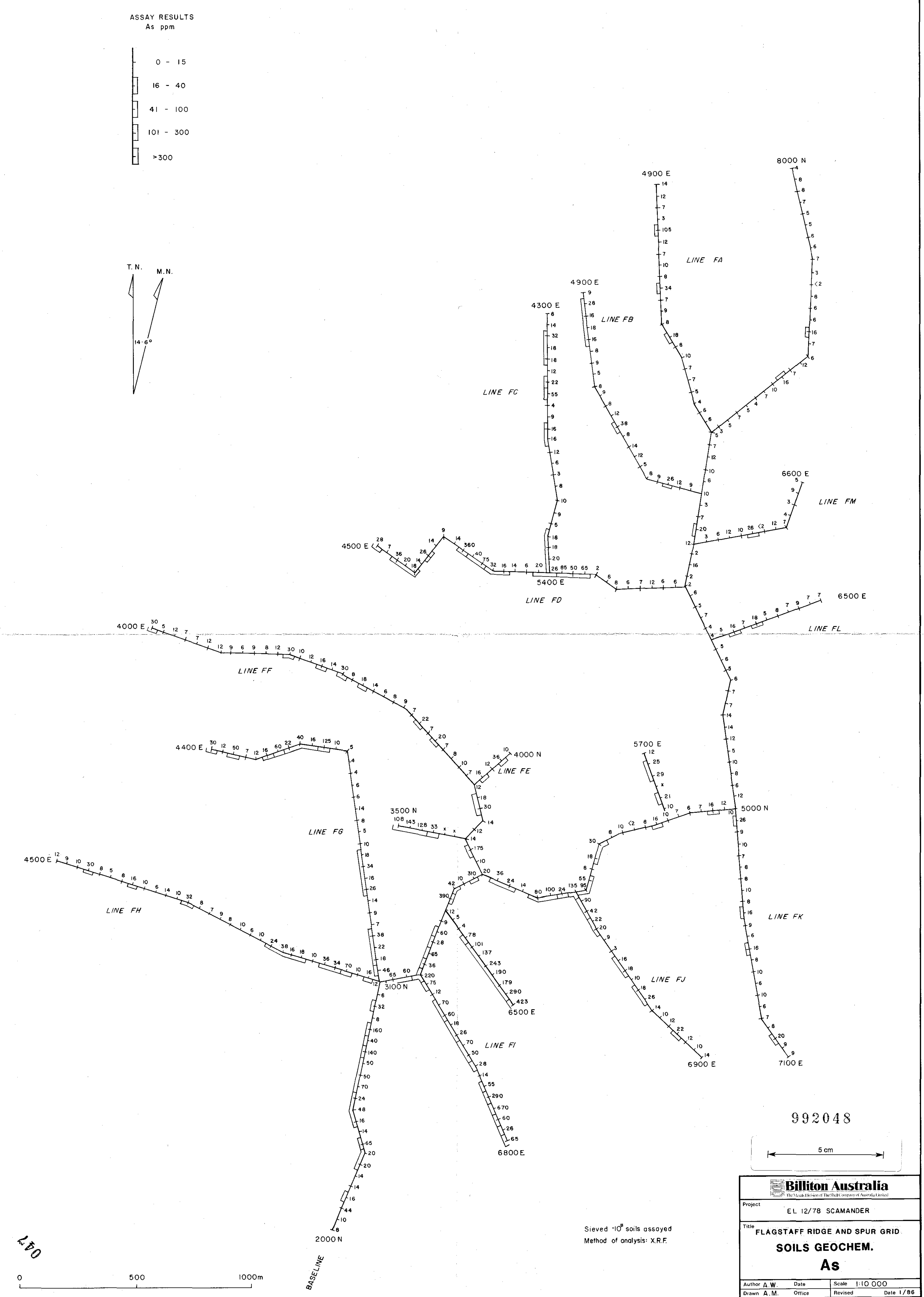
46



992047

046

86-2588



992048

Billiton Australia

The Metals Division of The Shell Company of Australia Limited

Project: EL 12/78 SCAMANDER

Title: FLAGSTAFF RIDGE AND SPUR GRID

SOILS GEOCHEM.

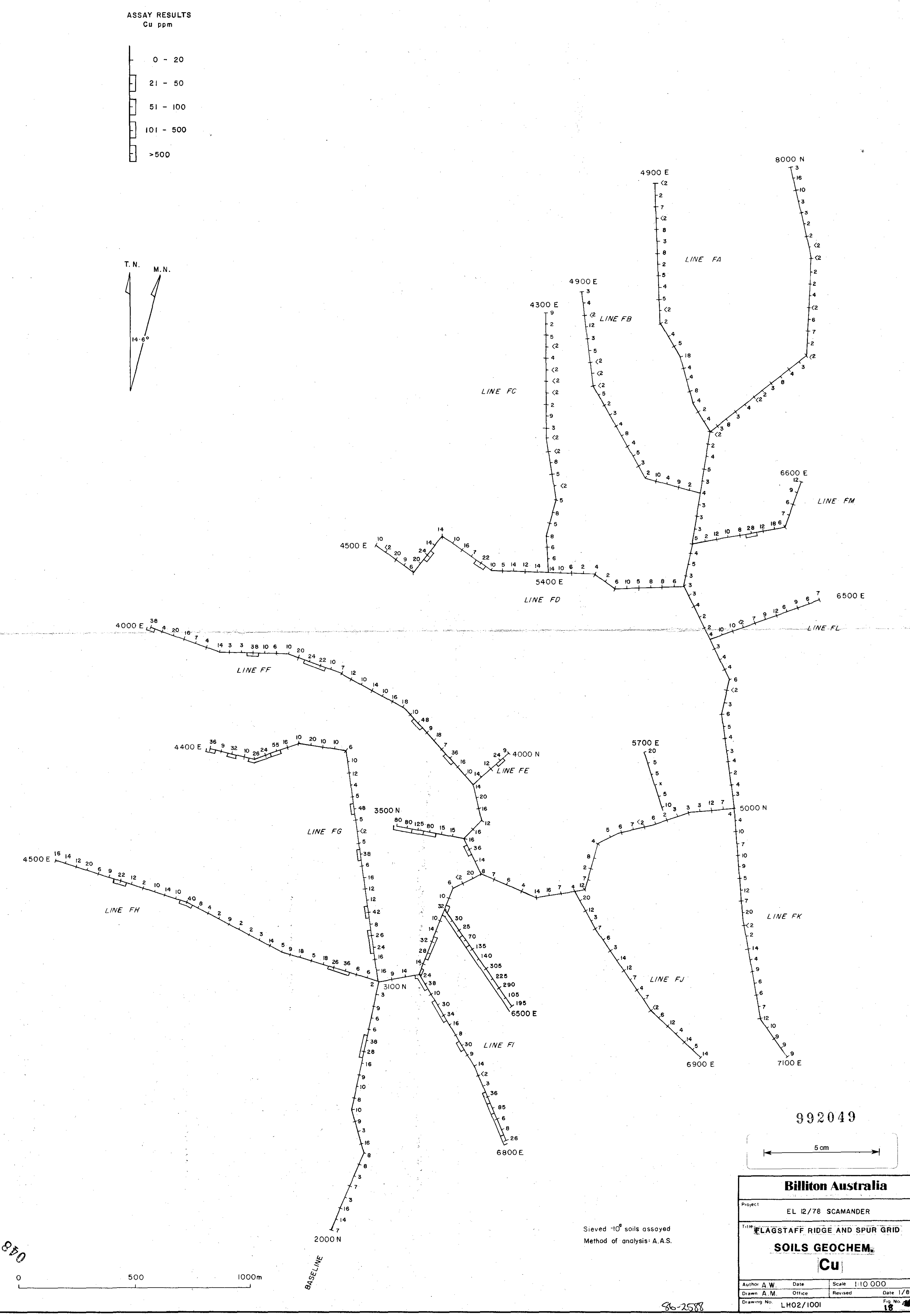
As

Author A.W.	Date	Scale 1:10 000	
Drawn A.M.	Office	Revised	Date 1/86
Drawing No. LH02/1005			Fig. No. 17

86-2588

047

48



992049

Billiton Australia

Project: EL 12/78 SCAMANDER

Title: FLAGSTAFF RIDGE AND SPUR GRID

SOILS GEOCHEM.

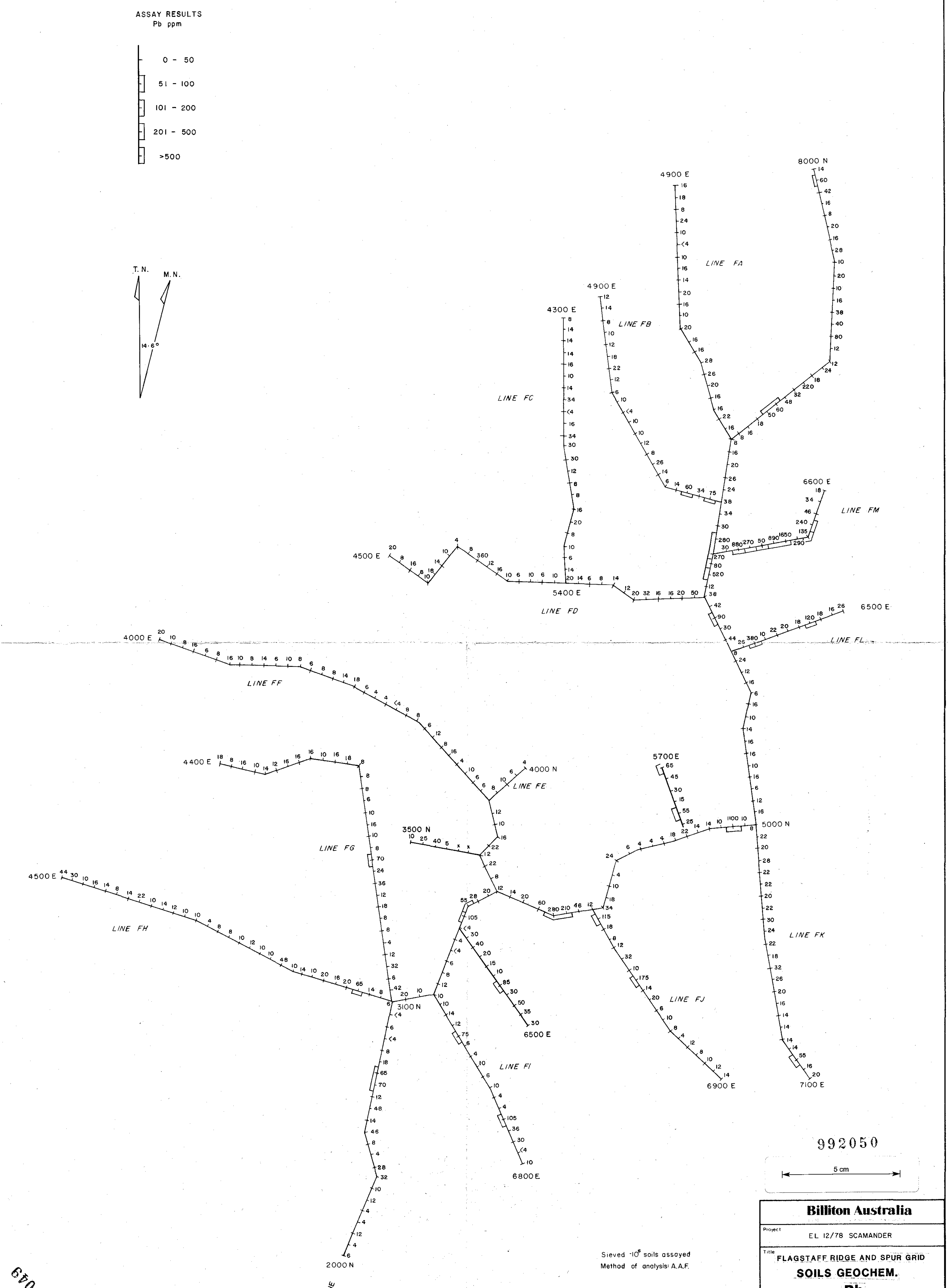
Cu

Author A.W.	Date	Scale 1:10 000	
Drawn A.M.	Office	Revised	Date 1/86
Drawing No. LH02/1001			Fig. No. 18

048

86-2588

49



992050

5 cm

Sieved -10# soils assayed
Method of analysis: A.A.F.

0 500 1000m

049

Billiton Australia

Project: EL 12/78 SCAMANDER

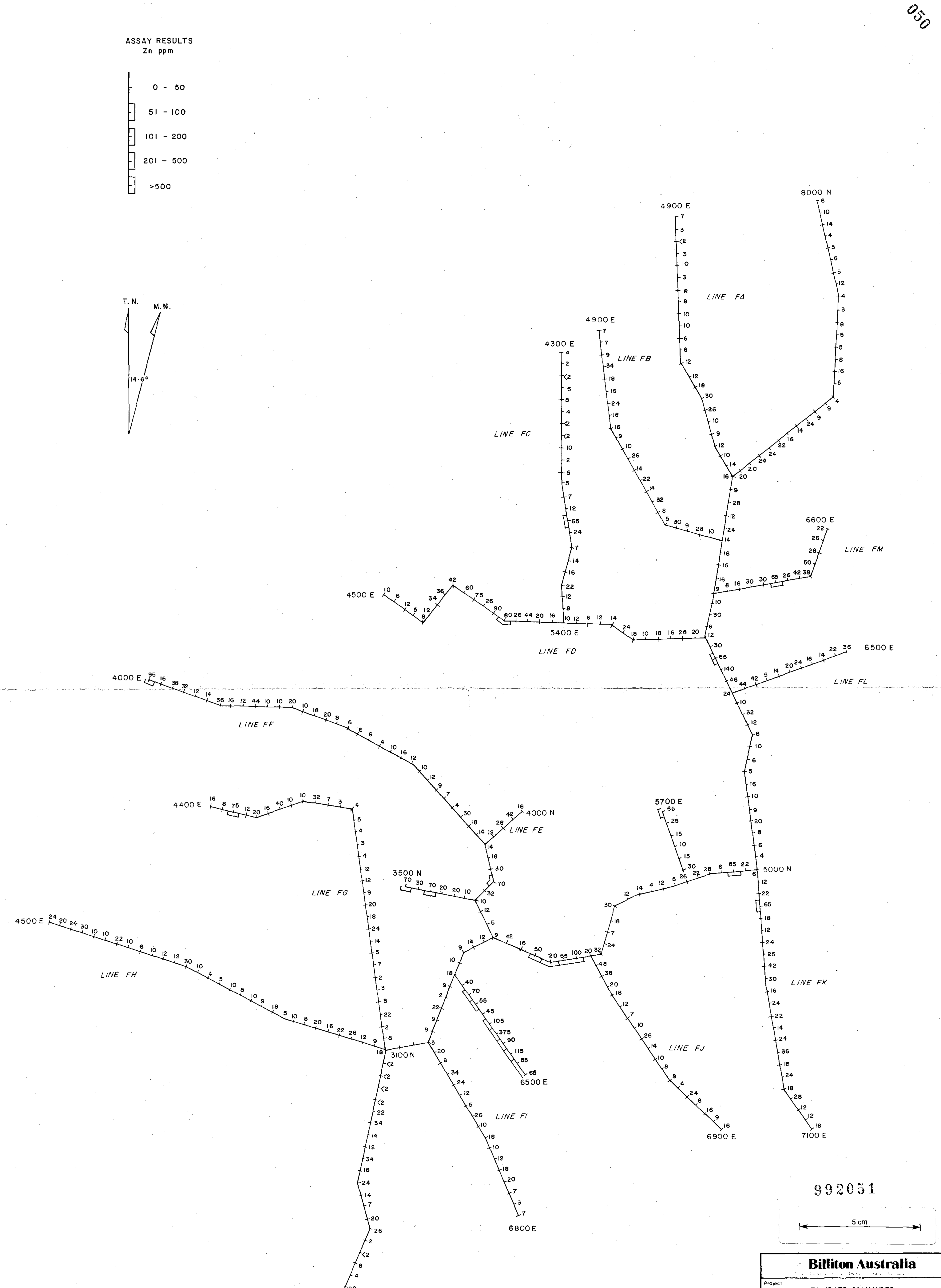
Title: FLAGSTAFF RIDGE AND SPUR GRID

SOILS GEOCHEM.

Pb

Author A.W.	Date	Scale 1:10 000
Drawn A.M.	Office	Revised / Date 1/86
Drawing No. LH02/1002		Fig. No. 19

86-2588



992051

Sieved -10# soils assayed
Method of analysis: A.A.F.

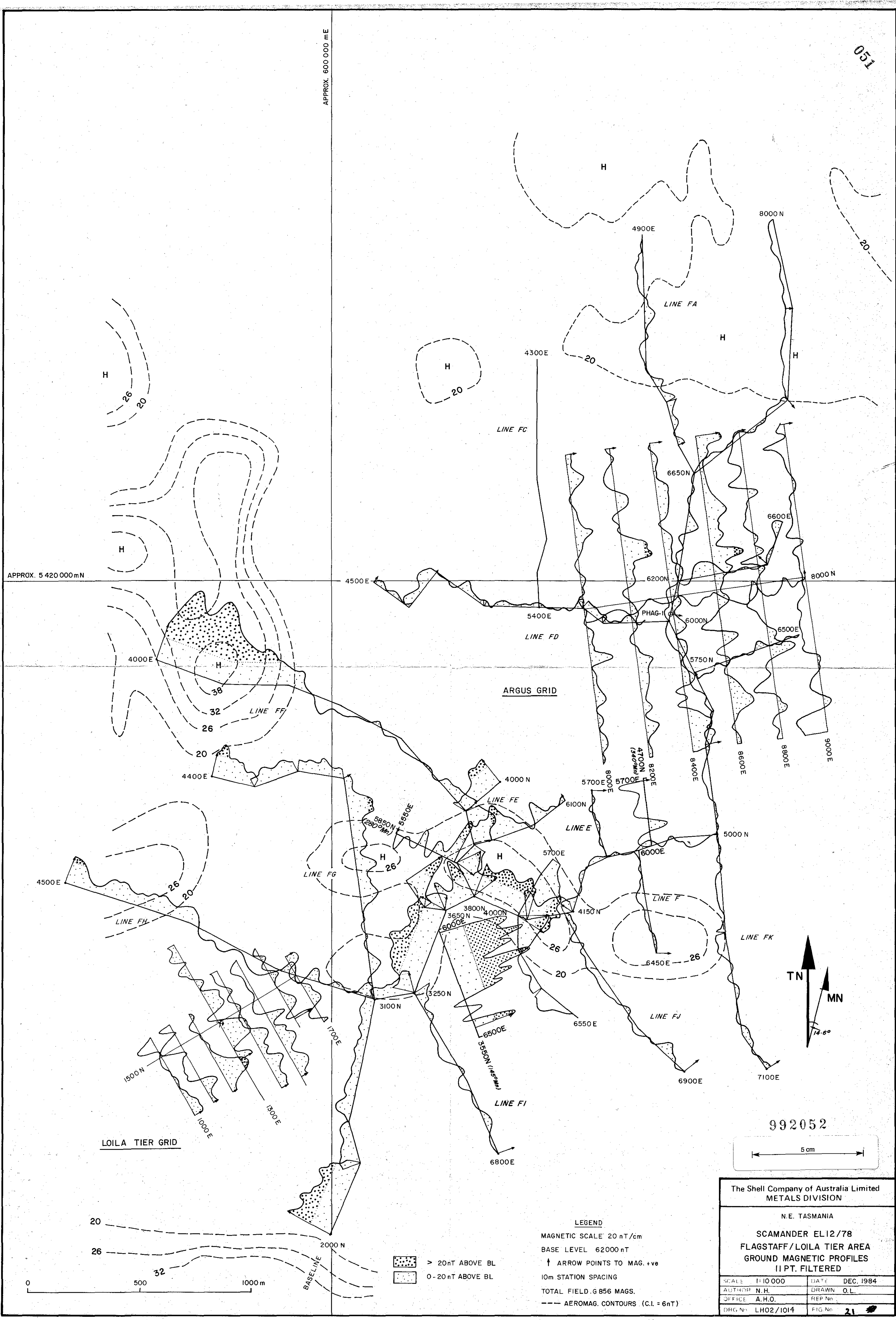
Billiton Australia

Project: EL 12/78 SCAMANDER

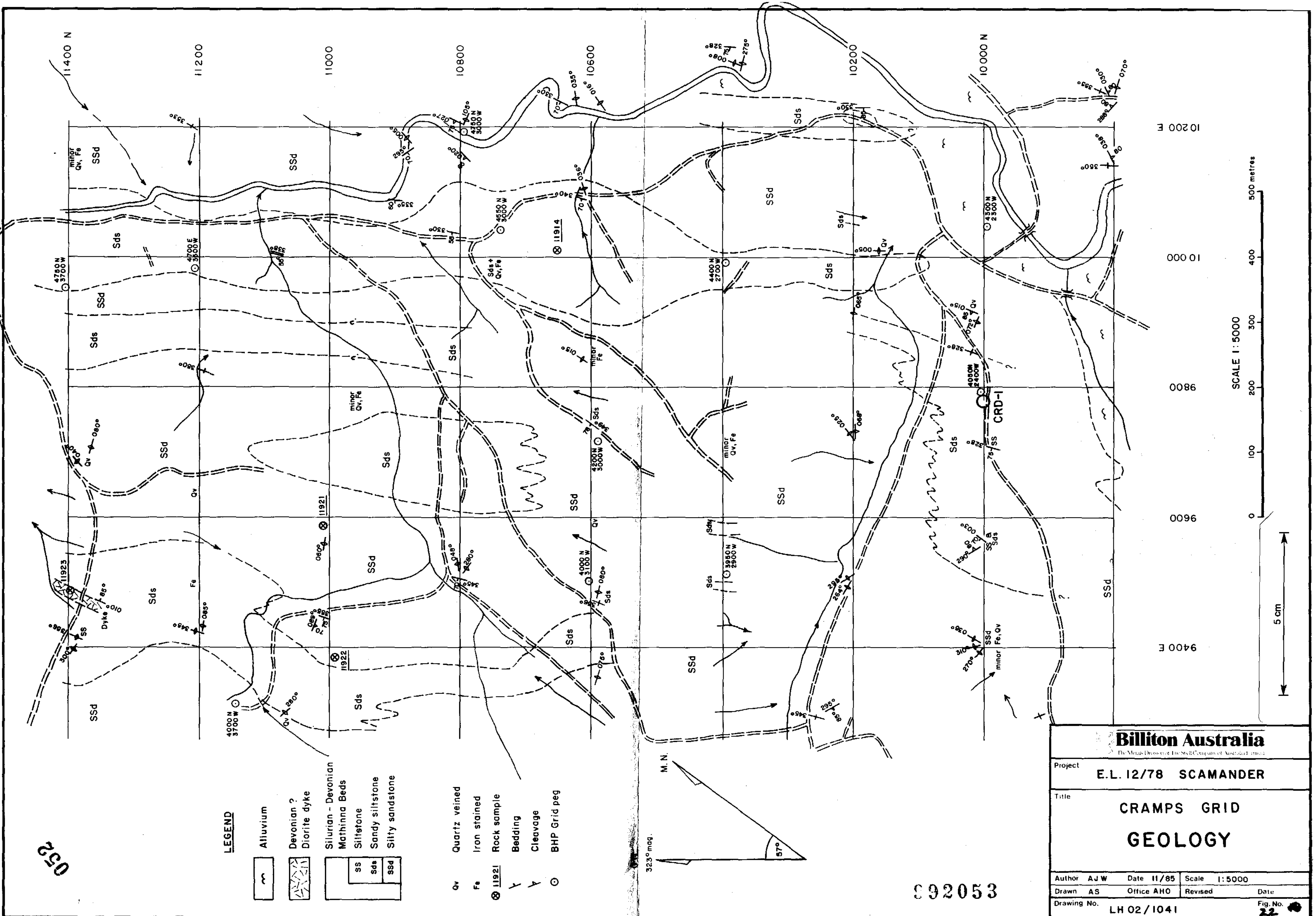
Title: FLAGSTAFF RIDGE AND SPUR GRID
SOILS GEOCHEM.
Zn

Author A.W.	Date	Scale 1:10 000	
Drawn A.M.	Office	Revised	Date 1/86
Drawing No. LH02/1003			Fig. No. 20

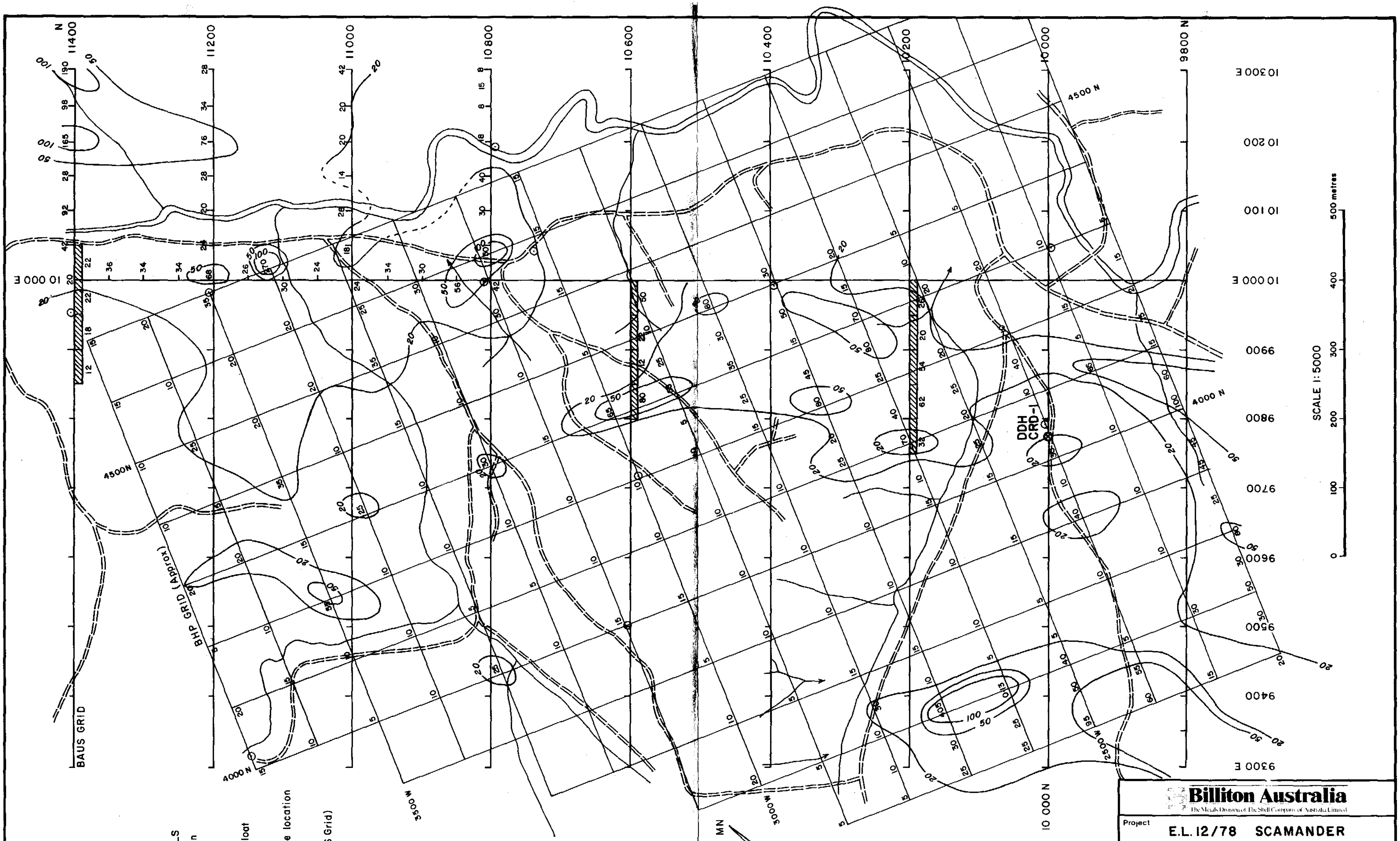
86-2588


051
APPROX. 600 000 mE
APPROX. 5 420 000 mN
ARGUS GRID
LOILA TIER GRID
LINE FA
LINE FC
LINE FD
LINE FE
LINE FF
LINE FG
LINE FH
LINE FI
LINE FJ
LINE FK
LINE F
LINE E
PHAG-1
TN
MN
14·6°
BASELINE
992052
5 cm
0 500 1000 m
LEGEND
> 20nT ABOVE BL
0-20nT ABOVE BL
MAGNETIC SCALE 20 nT/cm
BASE LEVEL 62000 nT
↑ ARROW POINTS TO MAG. +ve
10m STATION SPACING
TOTAL FIELD, G 856 MAGS.
--- AEROMAG. CONTOURS (C.I. = 6nT)
The Shell Company of Australia Limited
METALS DIVISION
N.E. TASMANIA
SCAMANDER EL12/78
FLAGSTAFF/LOILA TIER AREA
GROUND MAGNETIC PROFILES
11 PT. FILTERED
SCALE 1:10 000
DATE DEC. 1984
AUTHOR N.H.
DRAWN O.L.
OFFICE A.H.O.
REP No.
DRG No. LH02/1014
FIG No. 21

86-2588


Billiton Australia
Project
E.L. 12/78 SCAMANDER
Title
CRAMPS GRID
GEOLOGY
Author AJW
Date 11/85
Scale 1:5000
Drawn AS
Office AHO
Revised
Date
Drawing No. LH 02/1041
Fig. No. 22
LEGEND
Alluvium
Devonian ?
Diorite dyke
Silurian - Devonian
Mathinna Beds
Siltstone
Sandy siltstone
Silty sandstone
Quartz veined
Iron stained
Rock sample
Bedding
Cleavage
BHP Grid peg
SCALE 1:5000
500 metres
5 cm
M.N.
323° mag.
57°
CRD-1
092053
052

86-2588



CONTOUR INTERVALS
20, 50, 100 ppm Sn

Composite rock float sample (ppm Sn)

Diamond drill hole location

BHP Grid peg (located on BAUS Grid)

053

992054

Billiton Australia
The Metals Division of The Shell Company of Australia Limited

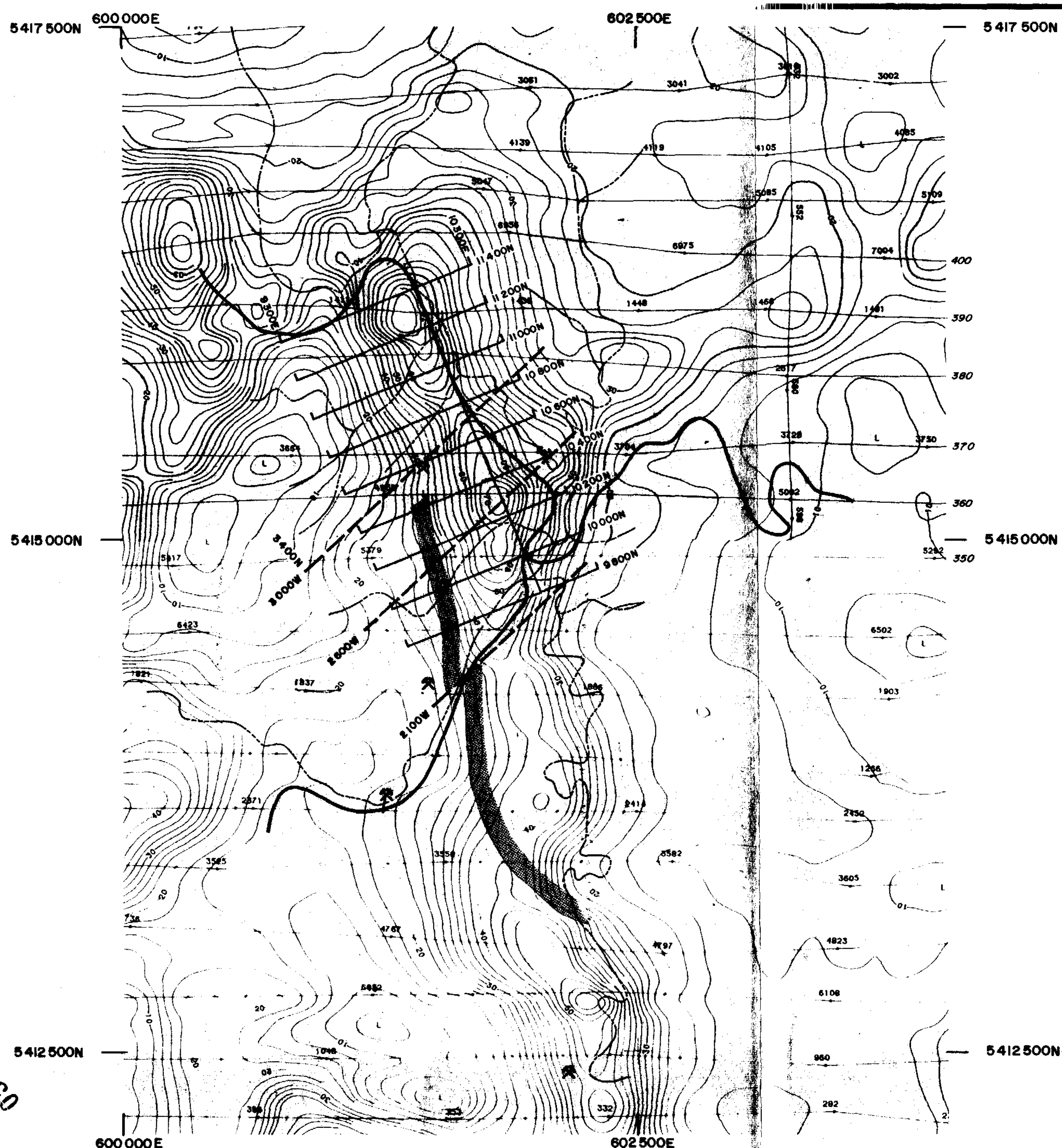
Project: E.L. 12/78 SCAMANDER

Title: CRAMPS GRID

Sn ASSAY RESULTS

Author AJW	Date 11/85	Scale 1:5000
Drawn AS	Office AHO	Revised / Date
Drawing No. LH02/1042		Fig. No. 23

86-2588



TN

MN

13°

BASE LINE BEARING	337° TN
	324° MN
MAG STATION INTERVAL	10m
LINE INTERVAL	200m

PROPOSED BILLITON GRID 1985

ORIGINAL BHP LINES SURVEYED BY BILLITON, 7/85 (approx. positions)

DIGHEM RESISTIVITY LOW

CREEKS

ROADS

AEROMAG CONTOURS
LINE SPACING 300m
mtc 90m
DIRECTION E - W

5 cm

0 500 1000
METRES

Billiton Australia
The Metals Division of The Shell Company of Australia Limited

Project N.E. TASMANIA
SCAMANDER E.L.

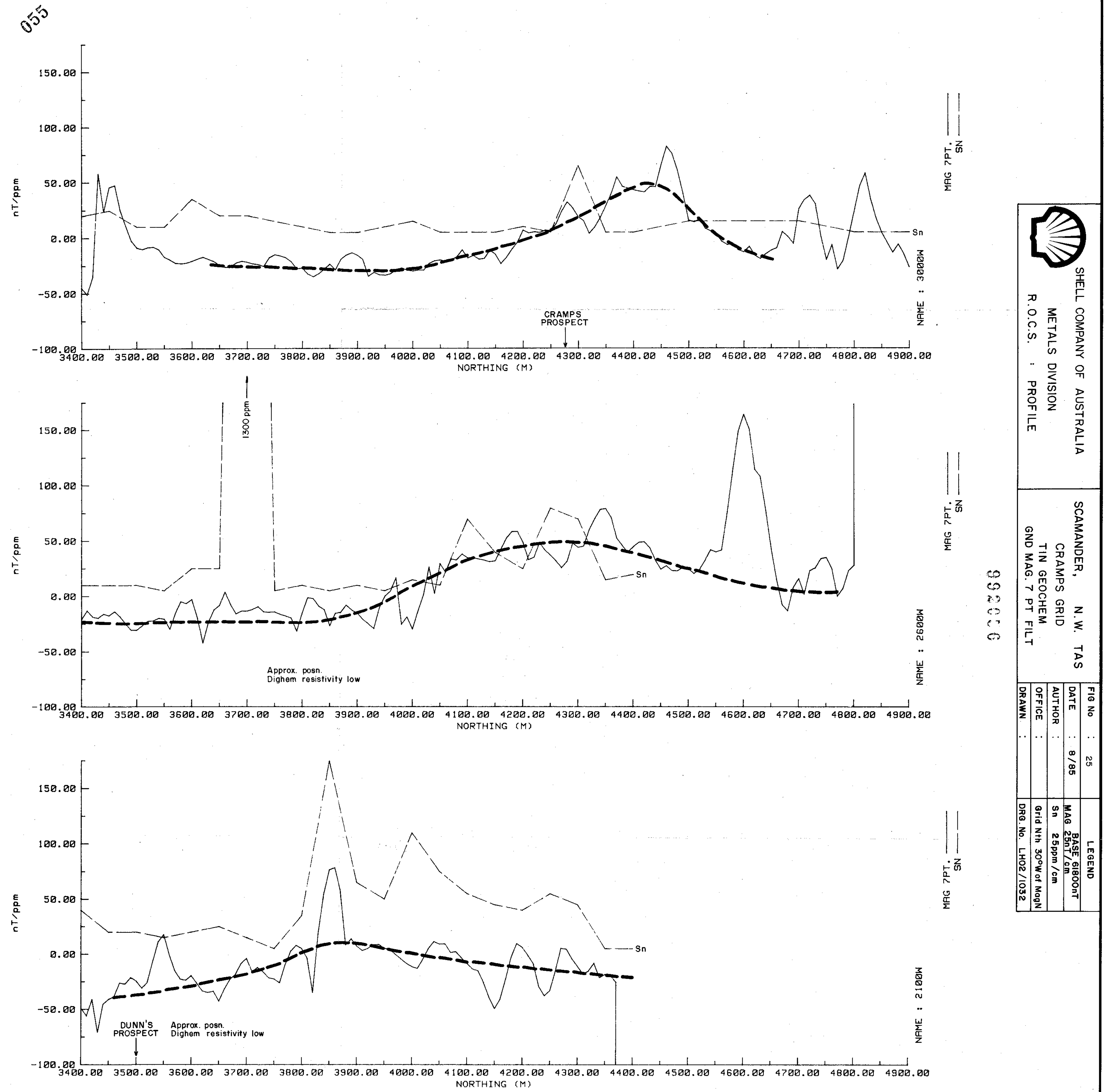
Title
CRAMPS AREA
AEROMAGNETICS
C.I. = 2·5nT

Author	N.H.	Dept. A.H.O.	Scale 1:20000		
Drawn	H.M.R.	Date 6/85	Revised		Date 9/85
Checked		Date	S'ceded		Date
Sheet No.	FIG. 24		Drawing No.	LH02/1024	

054

992055

86-2588

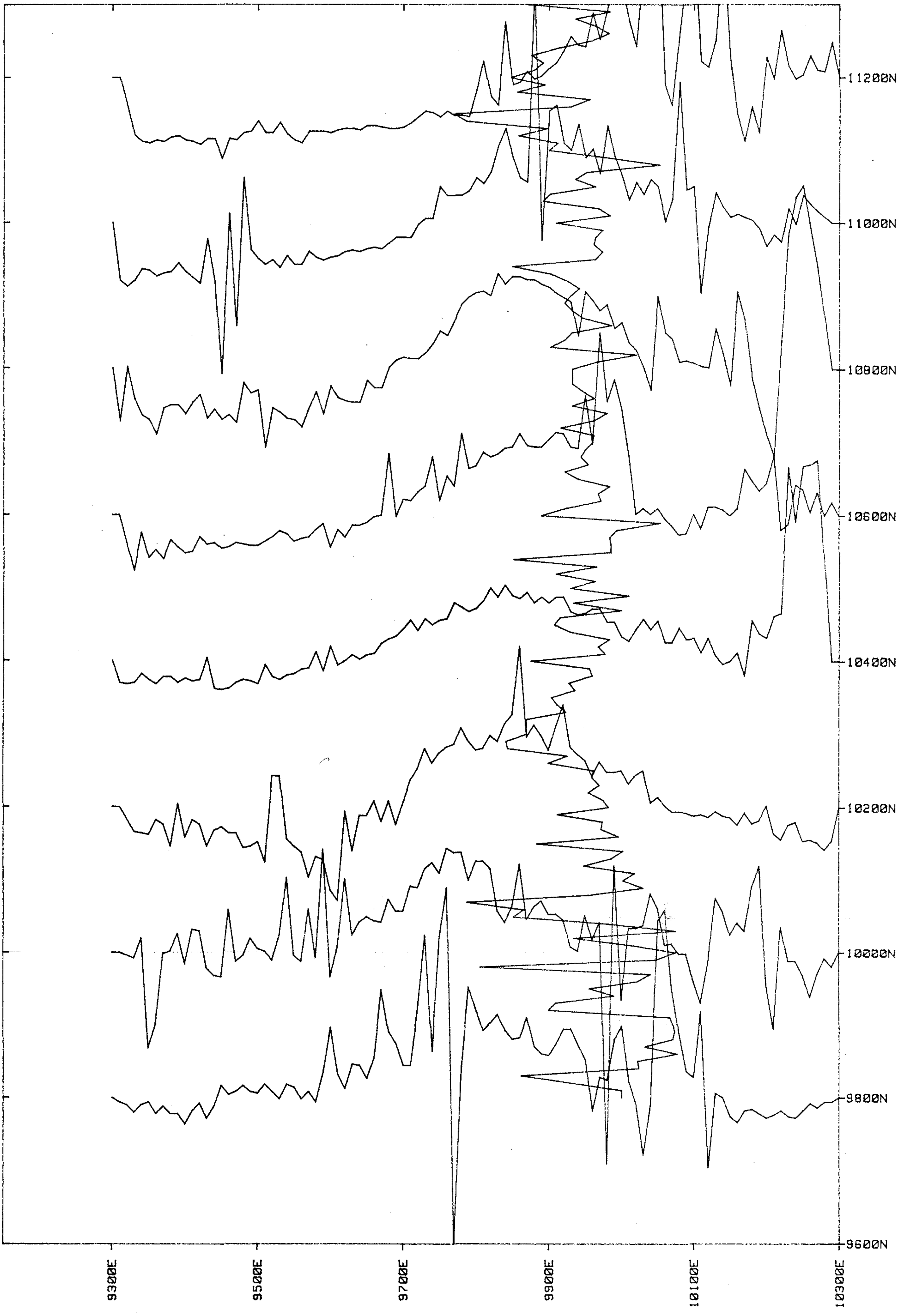


SHELL COMPANY OF AUSTRALIA
METALS DIVISION
R.O.C.S. : PROFILE
SCAMANDER, N.W. TAS
CRAMPS GRID
TIN GEOCHEM
GND MAG. 7 PT FILT
FIG No : 25
DATE : 8/85
AUTHOR :
OFFICE :
DRAWN :
LEGEND
BASE 61800nT
MAG 25nT/cm
Sn 25ppm/cm
Grid Nth 30°W of MagN
DRG. No. LH02/1032
MAG 7PT.
Sn
NAME : 3000M
NAME : 2600M
NAME : 2100M
nT/ppm
NORTHING (M)
CRAMPS PROSPECT
1300 ppm
Approx. posn. Dighem resistivity low
DUNN'S PROSPECT

FIG. 25

992057 86-2588

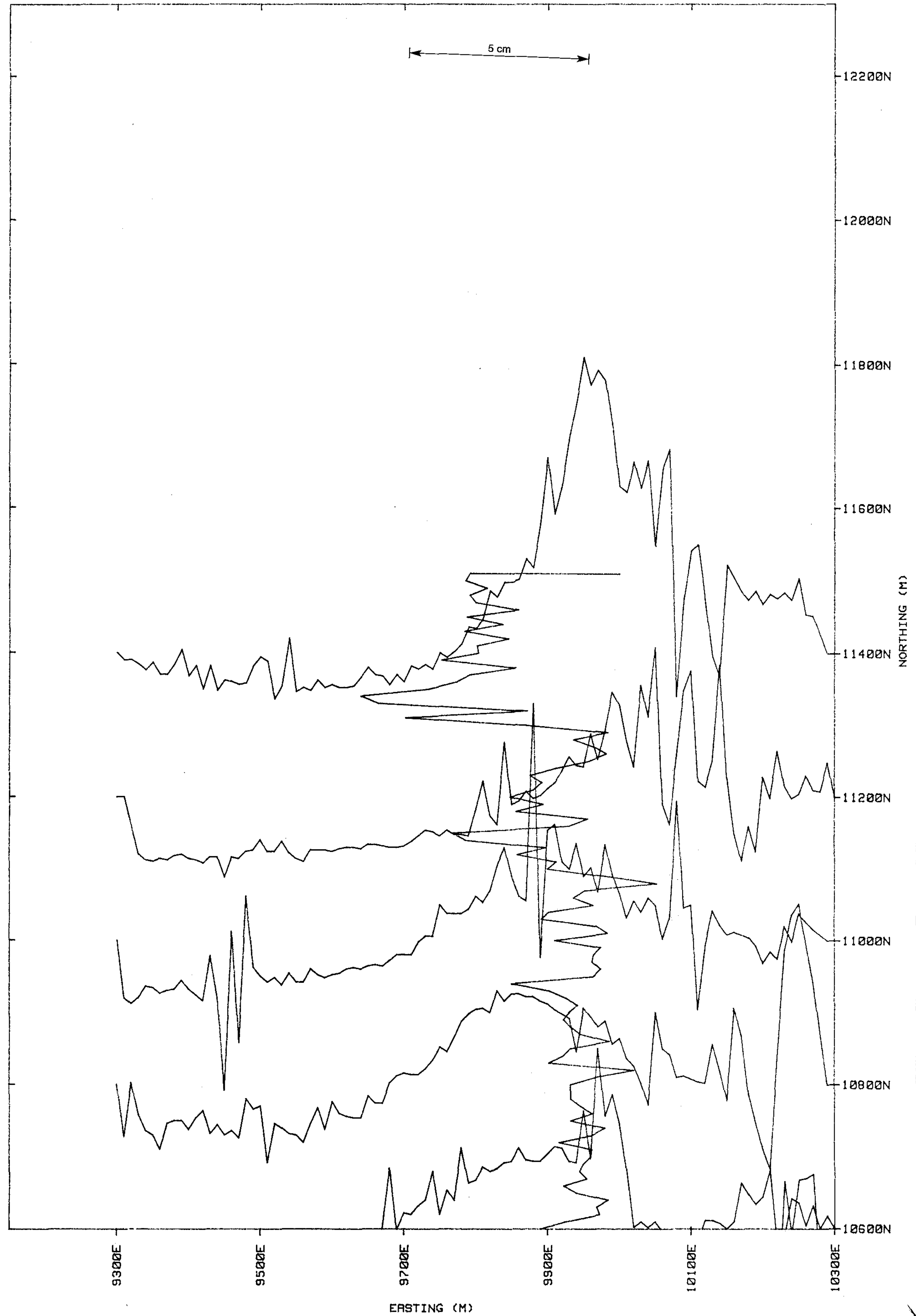
056 SHELL COMPANY OF AUSTRALIA METALS DIVISION R.O.C.S. - PROFILE	N.E. TASMANIA CRAMPS GRID GROUND MAGNETICS RAW DATA SCALE 1 : 5000	FIG No : 26 DATE : 10/85 AUTHOR : NH OFFICE : AHO DRAWN :	LEGEND TOTAL FIELD G856 BASE LEVEL 61800nT 50 nT/cm DRG. No. LH02/1046



992058 86-2588

057

SHELL COMPANY OF AUSTRALIA	N.E. TASMANIA	FIG No : 27	LEGEND
	CRAMPS GRID	DATE : 10/85	TOTAL FIELD G856
METALS DIVISION	GROUND MAGNETICS	AUTHOR : NH	BASE LEVEL 61800nT
	RAW DATA	OFFICE : AHO	50 nT / cm
R.O.C.S. - PROFILE	SCALE 1 : 5000	DRAWN :	DRG. No. LH02/1047

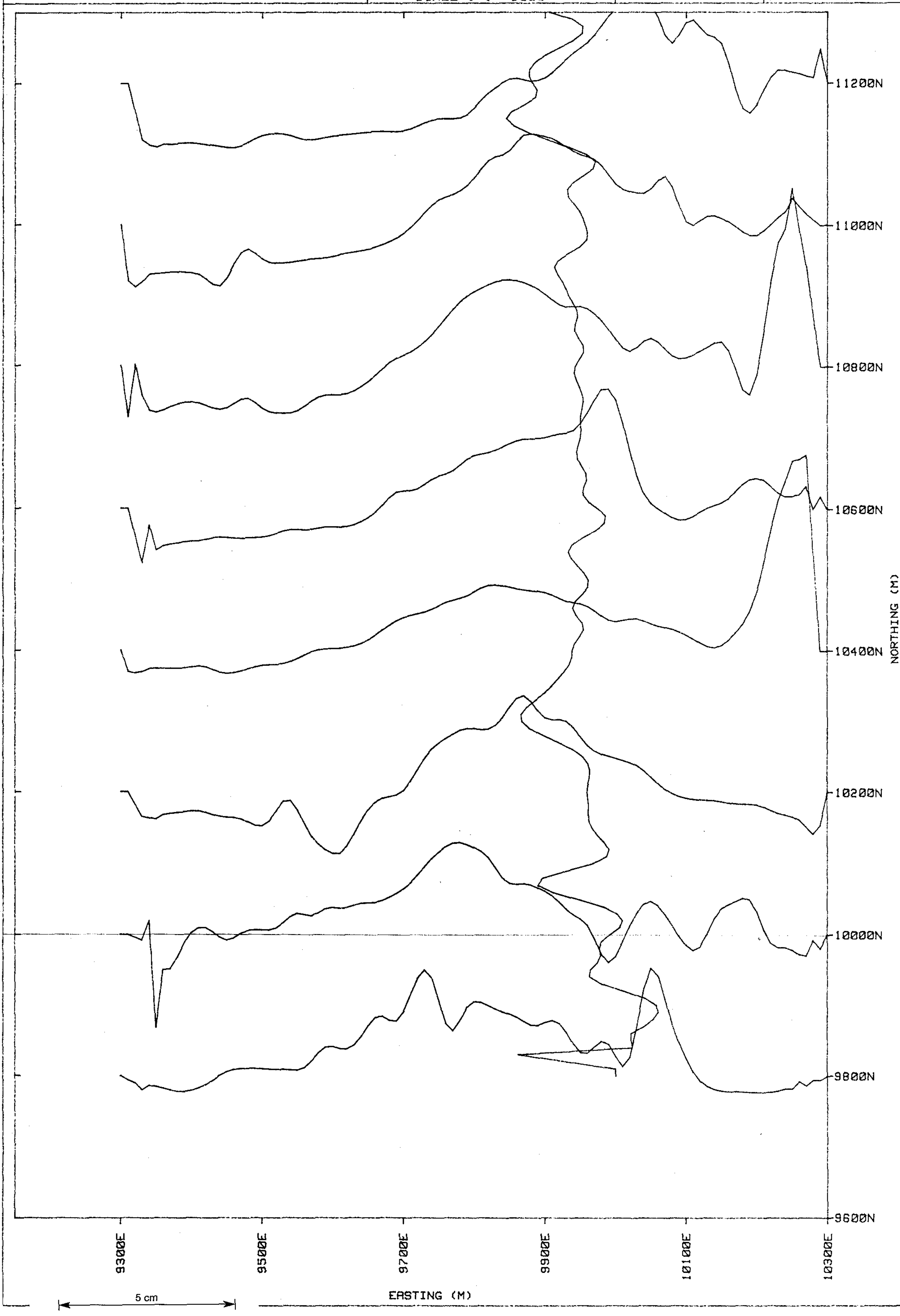


86-2588

992059

053

SHELL COMPANY OF AUSTRALIA METALS DIVISION R.O.C.S. - PROFILE	N.E. TASMANIA CRAMPS GRID GROUND MAGNETICS 11PT FILTERED DATA SCALE 1 : 5000	FIG No : 28	LEGEND
		DATE : 10/85	TOTAL FIELD
		AUTHOR : NH	BASE LEVEL 61800nT
		OFFICE : AHO	50 nT/cm
		DRAWN :	DRG. No. LH02/1048

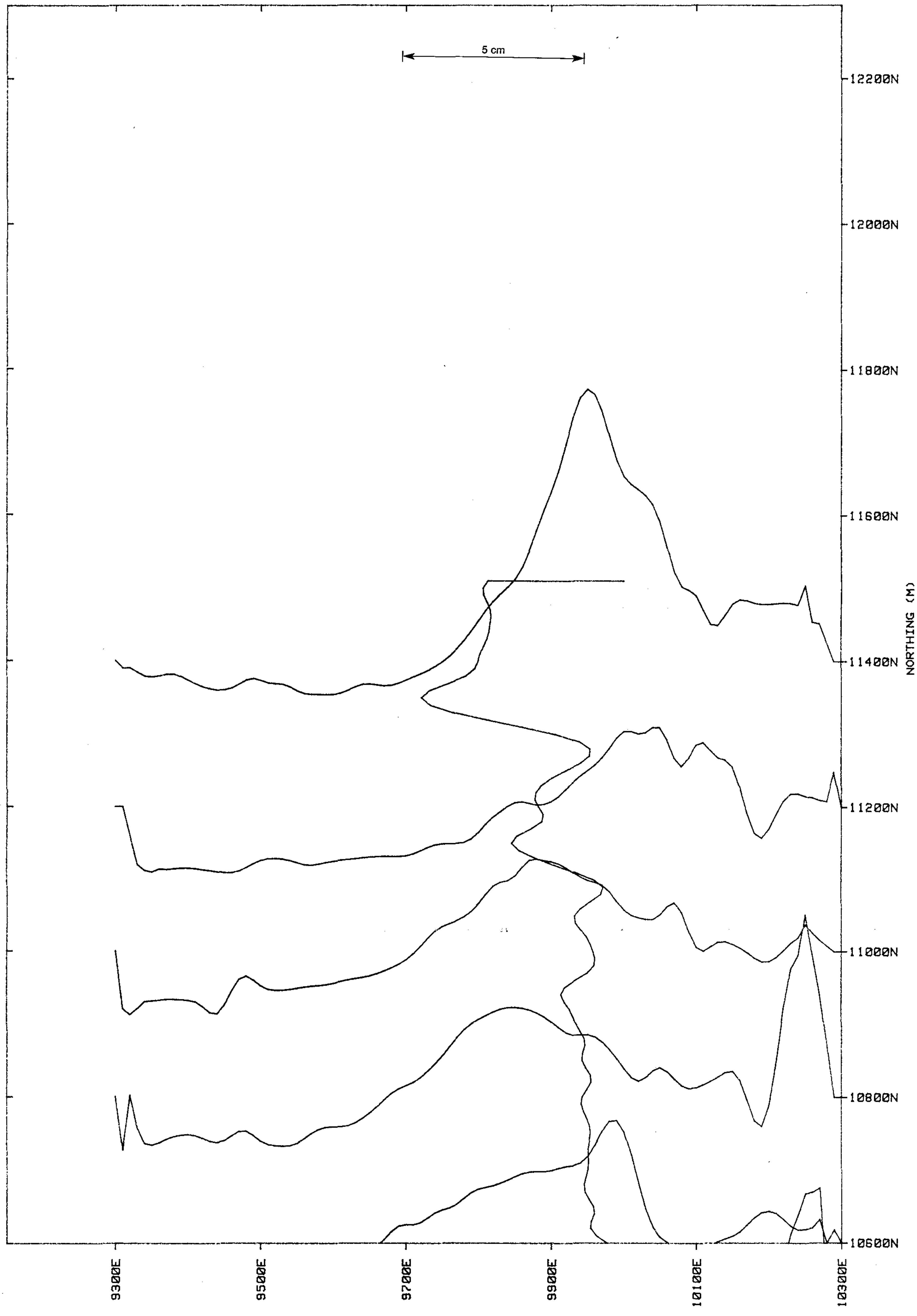


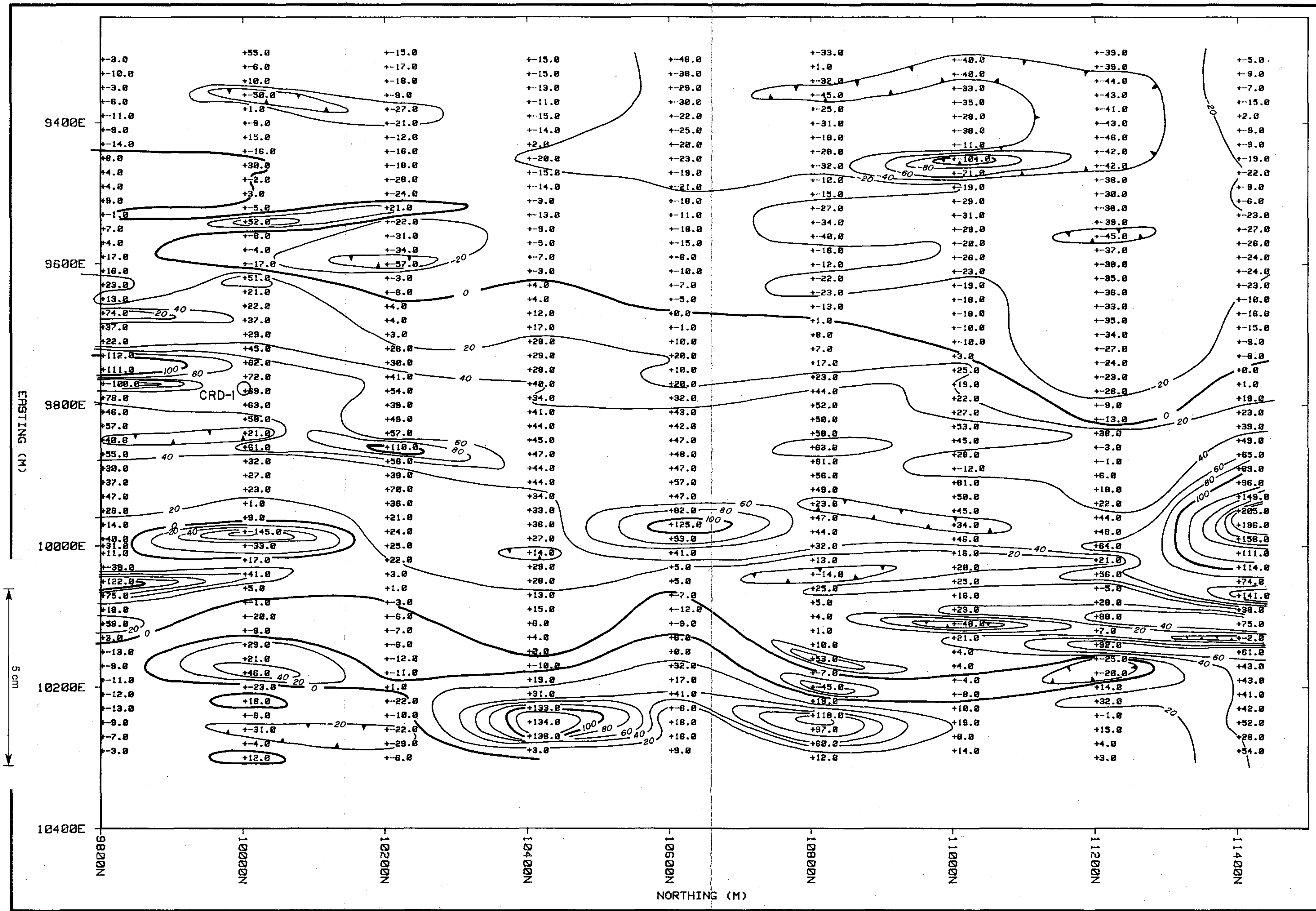
86-2588

992060

059

SHELL COMPANY OF AUSTRALIA	N.E.TASMANIA	FIG No : 29	LEGEND
METALS DIVISION	CRAMPS GRID	DATE : 10/85	TOTAL FIELD
R.O.C.S. - PROFILE	GROUNG MAGNETICS	AUTHOR : NH	BASE LEVEL 61800 nT
	11PT FILTERED DATA	OFFICE : AHO	50 nT/cm
	SCALE 1 : 5000	DRAWN :	DRG. No. LH02/1049





SHELL COMPANY OF AUSTRALIA

060

METALS DIVISION

R.O.C.S. - POST

N.E. TASMANIA
CRAMPS GRID
GROUND MAGNETICS
11PT FILTERED DATA

SCALE 1 : 5000

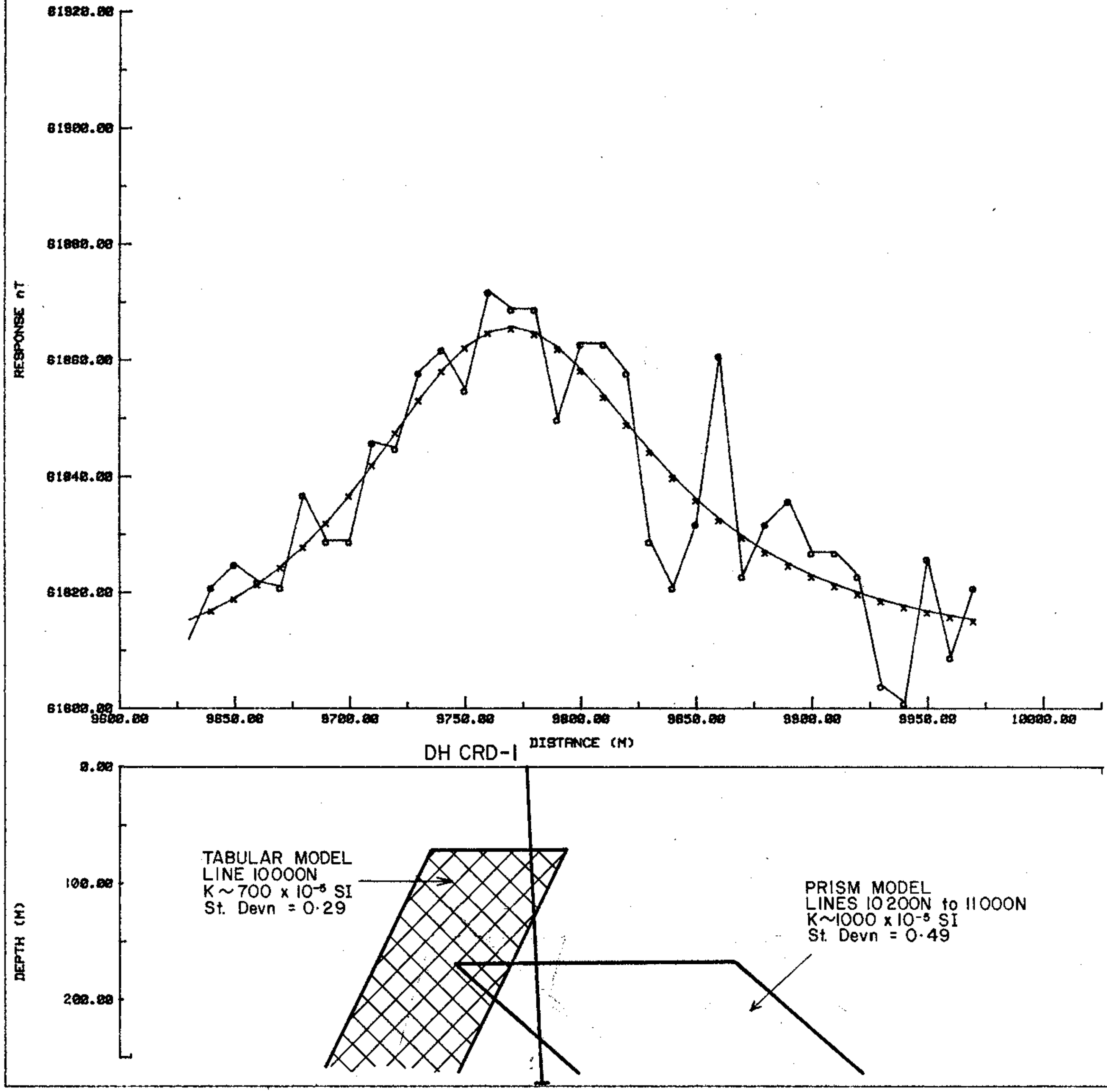
FIG No : 30
DATE : 11/85
AUTHOR : N.H.
OFFICE : A.H.O.
DRAWN : H.M.R.

LEGEND
TOTAL FIELD G856
C.I. = 20nT

LH02/1040

86-2588

992061



R.O.C.S.

GEOPHYSICS SYSTEM - MAGMOD

MODEL : TAB 2

CALCULATED RESPONSE : x
OBSERVED DATA : o

		KEY
MAGNETIZN	45.9793	1
DIP	105.0748	1
BASE LEVEL	61810.9567	1
BASE SLOPE	0.0000	0
POSITION	9783.4798	1
HALF WIDTH	28.9601	1
HALF LNGTH	400.0000	0
DEPTH	72.8772	1
THICKNESS	418.5457	1
INCLINATN	-71.0000	0
DECLINATN	54.0000	0
FIELD	0.0000	0
ORIENTATN	355.0000	0

SCALE

DISTANCE : 25.00 M/CM
FIELD : 10.00 nT/CM
DEPTH : 50.00 M/CM

SHELL COMPANY OF AUSTRALIA
METALS DIVISION

SCAMANDER, N.E. TAS
CRAMPS GRID

LINE 10000N
GROUND MAGNETICS

FIG. NO: 3	REPT. NO:
ENCL. NO:	DRG. NO: LH02/1056
DATE: 1/86	AUTHOR: N.H.
DRAWN:	OFFICE: A.H.O.

061

86-2588

86-2588

062

992063

BILLITON AUSTRALIA

Geophysical Log

FIG. 32

PAGE......OF......PAGES

DIAMOND DRILL HOLE N° : CRD-1

LH 02 / 1057

PROJECT	: SCAMANDER	STATE	: TASMANIA
ANOMALY N°	: CRAMPS	GRID COORDS	: 9998N, 9775E
INCLINATION	: -89°	AZIMUTH	: 016°
DATE DRILLED	: Oct/Nov 1985	TOTAL DEPTH	: 279 m
CASING	: Percussion 0-100 m		

GROUND GEOPHYSICAL ANOMALIES : Magnetic

IP / RESISTIVITY LOGGING —

CONTRACTOR	:	DATE LOGGED	:
ARRAY	:	ELECTRODE SPACINGS	:
RECEIVER	:	TRANSMITTER	:
INTEGRATION WINDOW	:	TIMING	:
PLOTTING POINT	:		

SUSCEPTIBILITY LOGGING

BY : BAUS

DATE LOGGED : Nov/Dec '85

DEPTH metres	ASSAYS	GEOLOGICAL DESCRIPTION	DENSITY / CHARGEABILITY ms	SUSCEPTIBILITY 10^{-5} S.I.
		NB uncorrected ~~readings on chips.~~ min value on JH-8 meter=10×10^{-5} S.I.		
50m		Siltstones + shales with minor qtz+pyrite (0.1-0.2% infractures)		
100m		Percussion / Core		
		NB Max response plotted. Uncorrected readings.		
		Shales		
		Qtzte		
		Shales w. qtzte veins		
		Qtzte		
		Shale		
150m		Qtzte w. veining incl. po		
		Shales w. qtz & minor po. veins.		
		Qtzte w. minor qtz & po veins		
		Qtzte w. minor qtz veins		
200m		Qtzte		
		Shale		
		Qtzte		
		Shale w. minor qtz & po veins		
		Qtzte		
250m		Shale w. minor qtz & po veins		
		EOH 279 m