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673001

THE SHELL COMPANY OF AUSTRALIA LIMITED

METALS DIVISION

E.L. 49/80 - MARRAWAH

Progress Report on Exploration During the Period April, 1981 to June, 1982

Author: W.D. SMYTH

Report No: 08.1261

Date : 27-9-82

Copy No : 1

Distribution:
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3. BXH/Devonport

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SUMMARY

The Shell Company of Australia Limited was granted Exploration Licence 49/80 Marrawah in April, 1981.

The main target for exploration within the licence is tin mineralization, either as a stockwork type or skarn deposits.

Initial work consisted of location of the major fault/structure in the area and sampling that zone for possible mineralization. None was identified.

Subsequent work has consisted of an aeromagnetic/radiometric survey over the eastern half of the licence and followup. Six aeromagnetic anomalies have been ground checked to date. None appear to be highly prospective although the source of two of the anomalies has not yet been explained.

Work will continue on ground checking other aeromagnetic anomalies, of which only one appears to be non basalt related.

1.0 INTRODUCTION

The Shell Company of Australia Limited was granted Exploration Licence 49/80, Marrawah on the 29th April, 1981.

This report covers all investigations in the licence area undertaken by SCOA from the date of granting up till 30th June, 1982.

2.0 LOCATION & ACCESS

The E.L. is located on the Burnie 1:250 000 geological map and the Welcome 1:100 000 topographic map. The licence includes 119 sq km of mostly undulating farm country which has as one boundary the Southern Ocean. The area includes the townships of Marrawah and Redpa.

Access to the E.L. is via Highway 2 which divides the area in half, and within the area by numerous minor roads. (Fig. 1).

3.0 PREVIOUS INVESTIGATIONS

The licence area has been formerly explored by Pickands Mather (E.L. 16/67), E.Z. Co., The Australian and New Zealand Exploration Co. (E.L. 11/73) and Aberfoyle Exploration (E.L. 18/78).

Pickands Mather, E.Z. Co and Aberfoyle Exploration investigated cassiterite in the Recent sand dunes at Anne Bay. Results of these investigations are tabulated. (Table 1).

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5 cm

G. N.

1 Red Creek Anomaly
2 Bowood Hill Anomaly
3 McKays Road Anomaly
4 Seymour South Anomaly
5 Linnanes Rd. South Anomaly
6 North East Anomaly

40° 50'

SOUTHERN

OCEAN

1700
3300
2500
400
15
MARRAWAH
REDPA
25
DATUM
6
1
2
3
4
5

41° 00'

0 2 4K

LEGEND

- Holocene sand
- Tertiary basalt
- Tertiary marine Limestone
- Cambrian sediments
- Underlain by p€ Dolomite
- Pre Cambrian metamorphics
- Volcanics - Cambrian/Precambrian?
- Aeromagnetic Anomalies
- Road traverses
- × 1700ppm Sn in stream sediment or beach sand

The Shell Company of Australia Limited
METALS DIVISION

E.L. 49 / 80

MARRAWAH

GEOLOGY

Scale : 1:100,000

FIG. No. 1	REPORT No.
ENCL. No.	DRG. No D/PW44/001
DATE 18-6-81	AUTHOR M. R.

Aberfoyle Exploration considered the grade of sands (10-20 ppm Sn) insufficient to be of any interest.

The Australian and New Zealand Co. investigated the possibilities of a hard rock silica deposit at West Point. The quartzites were too high in impurities to warrant further work.

Several references are made to the Precambrian ?dolomite and the Tertiary marine limestones in various Mines Department publications.

A list of references is included in Appendix 1.

TABLE 1

	Pickands Mather	E.Z. Co.	Aberfoyle Expl.
Sand	3.5 million ton	2.5 million ton	
Average HM content	3.6%	5.3%	
Total HM content	108,000 tons	100,000 tons	
Rutile	2700 tons (2.5% HM)	2800 tons (2.8% HM)	
Zircon	5490 tons (5% HM)	6300 tons (6.3% HM)	
Cassiterite	103 tons (80 tons Sn) (0.098% HM)	430 tons (334 tons Sn) (0.43% HM)	
Sn Grade	20 ppm	134 ppm	10-20 ppm

4.0 EXPLORATION TARGETS & METHODS

The Marrawh E.L. was applied for because of the potential for hard rock Sn deposits in the area. The source of the cassiterite in the beach sands is not known. It was hoped it may be on land and associated with a major structure which cuts through the E.L. and also the Balfour

Tin field. Tertiary basalts cover part of the area and may conceal a deposit which has shed the cassiterite now contained in Recent sands. The main target was Sn mineralization of a quartz/greisen stockwork or vein type related to major NW faulting. With the realization that Dolomite was present on the E.L. the possibility of replacement type deposits was also considered.

Initially a programme of stream sediment sampling and general geological reconnaissance was proposed. This was extended to include an aeromagnetic survey because of the possiblity of skarn/replacement bodies being present in the dolomite.

5.0 REGIONAL GEOLOGY

The Exploration licence is included within the Rocky Cape Block. The Block consists of orthoquartzites and comparatively unmetamorphosed laminated mudstone, with occassional pyrite rich horizons, in the licence area. This is overlain, unconformably, by the Smithton Dolomite of Precambrian age. The Dolomite was formed in the Smithton Trough within the Rocky Cape Block. Other dolomites of possibly the same age are located elsewhere in the western half of Tasmania. Cambrian rocks which include siltstones, greywacke and spillitic lavas unconformably overlie the dolomite. These are possible correlates of the Crimson Creek Formation, better developed in the Dundas Trough. Tertiary marine limestones and basalts overlie these units. Holocene sands are present in the swampy areas and recent sand dunes are formed parallel to the west coast beaches. Gabbros of possible Cambrian age, similar to those at Savage River, intrude the region. Devonian Granite outcrops on Three Hummock Island 50 km to the north, and as Pieman granite 50 km to the south.

Geopeko believe, from gravity data, that granites are close to the surface near Smithton, 20 - 30 km to the northeast.

The licence area covers the northern end of a major NW trending fault system which passes through the Balfour Tin Field to the SE. The fault approximately bisects the licence area along the NW diagonal with Precambrian psammites and pelites to the southwest of the fault. The Smithton Dolomite outcrops in the eastern portion of the area and strikes NW through the licence to the northeast of the fault. Cambrian greywackes/volcanics outcrop in the east of the area. Tertiary basalt covers most of the northwest portion of the area and minor Tertiary marine limestone outcrops overlie basalt and dolomite. Holocene, poorly consolidated sandstones outcrop in areas of low relief, possibly overlying dolomite, in the north of the licence. Recent sand dunes, to 10 m high, are developed parallel to the coast at Anne Bay. The southern portion of these dunes contain some cassiterite. (Refer Plan D/PW 44/003).

A report by Amdel on the beach sand (Appendix 2) indicates the presence in the heavy fraction (2.96 sp gr, 30% of total) of zircon (5%), tourmaline (5%), garnet (3%), magnetite (1%), pyrrhotite (tr), andelusite (tr), monazite (tr) as well as cassiterite (tr). These minerals may indicate a granite or related skarn source for the cassiterite. Approximately 35 % of the other heavy minerals include olivine, orthopyroxene, clino-pyroxene and epidote, probably derived from the basalt.

The best concentration of heavy minerals appears to be the central southern portion of Anne Bay within 300 m of the high tide mark. The larger portion extends to the north outside E.L. 49/80.

012

673013

6.0 INVESTIGATIONS COMPLETED

6.1 Regional

An initial reconnaissance was undertaken to establish the presence of the major fault and any mineralization associated with it. The extent of the basalt cover was also to be outlined.

6.1.1 Geology

No Sn mineralization in the area was observed. Material thought to be a gossan, which had associated anomalous geochemistry (140 ppm As, 1300 ppm Ba, 110 ppm Cu, 100 ppm Ni, 32 ppm Mo, 48.5% Fe, 1.75% Mn), was identified by petrographic examination to be lateritised basalt. Material with similar anomalous geochemistry was identified as fault associated breccia (Appendix 2). The anomalous values may be due to Fe/Mn scavenging during weathering ferruginisation and lateritisation. Some values may also be due to the presence of the fault.

The Smithton Dolomite was located in the east of the E.L. and is thought to subcrop through most of the east of the licence.

The Tertiary basalt appears to be quite thin in most of the area (less than 50 m) and appears to be mainly restricted to the north of the major fault. A fault scarp may have prevented the southward flow of the basalt, which appears to have crossed the fault in only a few places. (Refer Plan D/PW 44/003).

6.1.2 Geophysics

Four lines of geophysics were done across what was presumed to be the fault in an effort to better locate the fault. VLF-EM and ground magnetics were used along the Arthur River Road, Linnanes Road, McKays Road and Well's Road. No good conductor was located by the VLF-EM on any of the traverses. Ground magnetics remained remarkably stable considering most traverses crossed from Precambrian quartzites onto Tertiary basalts. One minor ground magnetic anomaly of 800 nT was located on McKays Road (Refer Plans D/PW 44/002, 004, 005).

6.1.3 Geochemistry

A reconnaissance stream sediment survey of 5 samples was done in the area using -80# and panned concentrate samples. This was done to try to establish the presence of mineralization beneath the basalt covered area. All the streams sampled were congested with basalt derived material and of no use for sampling.

Soil sampling was done along the four geophysical traverses to try to locate the fault zone geochemically. No anomalous values were reported. (Refer Plans D/PW 44/006, 007, 008).

Several regional auger holes were drilled in areas of Holocene sand cover in the east and northeast of the area. No anomalous values were reported. Values for Ni indicate the material sampled has a large basalt component. Water bores in the area indicated the unconsolidated sands and silts are from 12 m to 20 m thick. No sludge pump was used for the augering which only went to 5 m depth in mostly waterlogged sands and clays. (Refer Plans D/PW 44/006, 007, 008).

6.2 Aeromagnetic Survey

An aeromagnetic/radiometric survey was flown by fixed wing aircraft over the eastern portion of the licence, thought to be underlain by dolomite. Four broad regional features could be distinguished in the E.L. Two NW trending broad (50 nT) highs associated with Cambrian volcanics are located in the northeast of the area. A radiometric high is associated with the westerly belt of volcanics. A central, intensely magnetic zone trending north-west is associated mainly with Tertiary basalts, the southern part being due to Cambrian gabbros. On the southwest margin of the area flown, a northwest trending high of 50 nT is associated with a radiometric high. An east-west magnetic high trends out of the survey area from this zone. Between these four main NW trending magnetic high zones are three lows. The two northern-most lows are probably due to subcropping dolomite, in part overlain by Holocene sands. The third southern-most magnetic low zone is associated with outcropping quartzite. (Refer Plans D/PW 44/031, 032).

Several anomalies have been picked from the aeromagnetic data. Most of these are from within the basalt zone. One anomaly is in Precambrian quartzites and another is included in the zone of Cambrian volcanics in the NE.

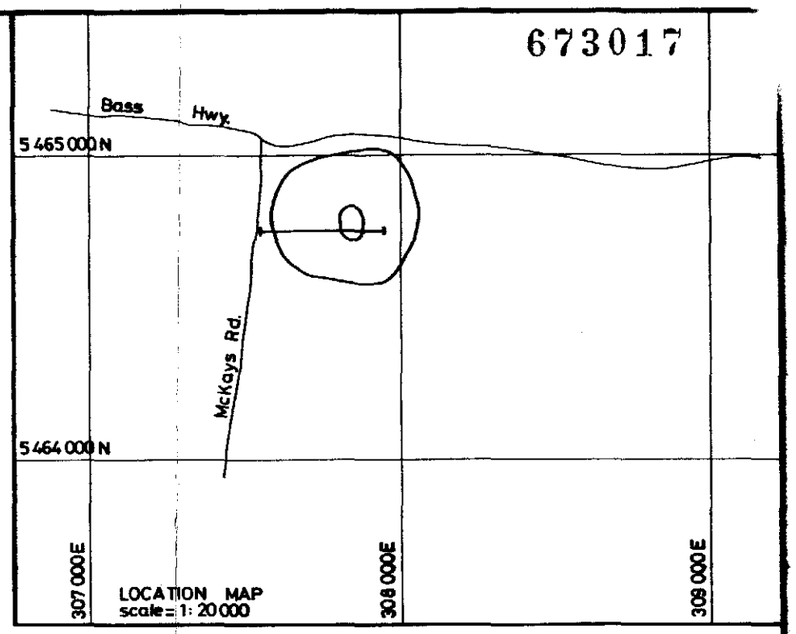
6.2.1 McKays Road Aeromagnetic Anomaly

This isolated bullseye anomaly of 350 nT is located on the western side of the main basalt zone in the centre of the licence. A part of this anomaly probably extends on to the McKays Road regional road traverse (6.1.2).

One ground magnetic reconnaissance compass and topolite traverse was made over the anomaly which peaked at 64,400 nT on top of a basalt hill. Magnetic susceptibilities of 200 - 500 x 10^{-5} SI units.

It is thought the anomaly is due to the basalt hill. (Fig. 2).

673017



64 000 nT

63 000 nT

62 000 nT

61 000 nT

surface profile approximate

Tertiary basalt

Magnetic susceptibility : 200 – 500 x 10^{-5} S.I.
1500 x 10^{-5} S.I.

62011 61991 62009 62019 62019 61941 61935 62508 62579 62543 63193 64132 64399 64214 63984 63601 63050 62397 62161 62178 62300 63866 63040 63189 63325 62864 62888 62680 62480 62550 62369 62019 61866 61833 61877 61886 61904

00 E 100 E 200 E 300 E 400 E 440 E

5 cm

Proton precession magnetometer
Sensor height 2.5M

0 50 100M

The Shell Company of Australia Limited METALS DIVISION	
E.L. 49/80 MARRAWAH McKays Rd. aeromagnetic anomaly PROFILE	
SCALE 1: 2000	DATE 15-7-82
AUTHOR W.D.SMYTH	DRAWN H.L. SMYTH
OFFICE DEVONPORT	REP.No.
DRG.No D/PW44/027	FIG No

6.2.2 Bowood Hill Aeromagnetic Anomaly

This 200 nT aeromagnetic anomaly is in the southern part of the main basalt zone near Mt. Seymour.

One ground magnetic reconnaissance compass and topolite traverse was made over the anomaly which peaked at 64,000 nT on top of a basalt hill. Magnetic susceptibilities of 1500 - 2000 x 10^{-5} SI units were recorded from basalt on the top of the hill and the adjacent Mt. Seymour.

It is thought the anomaly is due to the basalt hill. (Refer Plan D/PW 44/029).

018

430 W | 400 W | 300 W | 200 W | 100 W | 00 E

64000nT
63000nT
62000nT
61000nT

surface profile approx.

Magnetic Susceptibility (1500 – 2000) x 10^{-5} S.I.

700 N
600 N
500 N

62109
62154
62179
62216
62304
62417
62203
62242
62201
62149
62268

Adjoins drawing No D/PW44/009

62276 62270 62249 62252 62256 62246 62252 62183 62173 62228 62201 62147 62169 62148 62094 62126 62215 62310 62309 62263 62248 62173 62183 62252 62256 62246 62252 62249 62270 62276

5 462 000 N
5 461 000 N
311 000 E
312 000 E
Fourteen Rd
LOCATION MAP scale = 1:20 000

673019

M.N.

Proton precession magnetometer
Sensor height 2.5M

5 cm

0 50 100M

The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/80 MARRAWAH
BOWOOD HILL ANOMALY
GROUND MAGNETICS

SCALE	1: 2000	DATE	16-7-82
AUTHOR	W.D. SMYTH	DRAWN	H.L.SMYTH
OFFICE	DEVONPORT	REP No.	
DRG No	D/PW44/029	FIG No	

6.2.3 Red Creek Aeromagnetic Anomaly

This 100 nT linear aeromagnetic anomaly is in the southern part of the main magnetic high zone. A road traverse and several compass and topolite lines were surveyed by ground magnetics in the area.

6.2.3.1 Geology

Very little outcrop was seen. The material available was mainly Precambrian quartzite, frequently fractured and quartz veined, and possibly chert and Precambrian micaceous siltstone. Abundant ferruginous float was found, often with slightly anomalous geochemical values, which from petrographic inspection is weathered lateritised and ferruginous basalt and fault breccia (Appendix 2). This area appears to be near the major fault zone. An extremely weathered gabbro with martitised magnetite was located in the centre of the magnetic anomaly (Appendix 2). This gabbro appears to be the cause of the magnetic anomaly and trends northwest parallel to the direction of the major structure in the area. (Refer Plan D/PW 44/013).

6.2.3.2 Geophysics

Four ground magnetic traverses located the magnetic anomaly along a strike length of 600 m. On the road traverse the anomaly appears to be centred on the gabbro dyke(?) which appears to be approximately 50 m wide. A magnetic susceptibility of 300×10^{-5} SI units was measured for the very weathered gabbro. Modelling indicates that the anomaly is caused by a dyke like body, with however, much higher susceptibilities. At depth the fresh, magnetite bearing gabbro would possibly have such susceptibilities ($10,000 \times 10^{-5}$ SI units). (Refer Plan D/PW 44/013).

6.2.3.3 Geochemistry

Soil sample results from across the magnetic high are not anomalous. (Refer Plans D/PW 44/015, 016, 017).

Rock chip sample values are generally low except for some ferruginous samples with slightly anomalous As (40 - 140 ppm) and Mo (8 - 16 ppm) probably due to scavenging. (Refer Plan D/PW 44/014).

6.2.3.4 Recommendations

No further work is recommended on this anomaly.

6.2.4 North East Aeromagnetic Anomaly

This 50 nT anomaly is located in the extreme northeast of the licence area. A road traverse was done and a small grid established over the anomaly.

6.2.4.1 Geology

This anomaly is coincident with a zone of north-north-west trending Cambrian sediments. Petrographic descriptions (Appendix 2) indicate the rocks are lithic (tuffaceous) greywacke with fragments of lithic material, quartz, feldspar and iron oxides. The lithic grains include siltstones shales, altered intermediated volcanics of various types and ironstones. The volcanic fragments are clearly reworked. Possible phlogophyte is reported in one sample (21076). These may be northern correlates of the Crimson Creek Formation.

6.2.4.2 Geophysics

A broad 200 nT anomaly was located by ground magnetic followup. Magnetic susceptibilities of 20 - 30 x 10^{-5} SI units were measured for most of the very weathered sediments exposed in the road cuttings. One unit from 10 m W to 20 m W had susceptibilities of 200 - 300 x 10^{-5} SI units. Modelling to explain the ground magnetics indicated one possibility of a body 60 m wide at a depth of 90 m with a susceptibility of 4000 x 10^{-5} SI units. However, a series of outcropping steep dipping beds of sediments with susceptibilities in the order of 300 x 10^{-5} SI units may explain the noisy profile. (Refer Plan D/PW 44/012).

A VLF-EM survey was done over the grid. No obvious good conductors were located. (Refer Sections D/PW 44/30).

6.2.4.3 Geochemistry

Soil sample results from the grid are uniformly low. Rock chip samples are not anomalous. However the slightly elevated Ni, Zn and Cu values appear similar to Crimson Creek Formation values further to the south. (Refer Plans D/PW 44/018, 019, 020).

6.2.4.4 Recommendations

No further work is recommended on this anomaly.

6.2.5 Linnanes Road South Aeromagnetic Anomaly

This is a 50 nT aeromagnetic anomaly located in the southwest of the survey area. A small grid was established.

6.2.5.1 Geology

Very little outcrop is available, however the grid appears to be entirely within Precambrian quartzites.

6.2.5.2 Geophysics

A ground magnetic survey located an east-west trending anomaly of 400 nT. Magnetic susceptibilities in the area are all very low, of the order of 20 x 10^{-5} SI units. Modelling the ground magnetics indicates a thin (10 m) steeply dipping body of high susceptibilities (10,000 x 10^{-5} SI units). No magnetic material of this susceptibility was observed anywhere on the grid. (Refer Plan D/PW 44/011).

A VLF-EM survey failed to locate any conductors. (Refer Section D/PW 44/30).

6.2.5.3 Geochemistry

Results from soil sampling are uniformly low for all elements. One ferruginous sample from a dam wall had no anomalous geochemistry, nor was it derived from basalt (Ni 14 ppm). (Refer Plans D/PW 44/024, 025, 026).

6.2.5.4 Recommendations

Further work to determine the cause of the magnetic anomaly is needed. A line of Max-Min EM and gravity may indicate something of the nature of the magnetic source.

6.2.6 South Seymour Aeromagnetic Anomaly

This is an intense 40 nT aeromagnetic anomaly surrounded to the east, west and south by magnetic lows. It is located in a swampy area in the south of the main basalt trend.

6.2.6.1 Geology

The centre of the anomaly is located in a swamp which is surrounded to the east, west and south by Precambrian quartzites. To the north is Mt. Seymour, a basalt hill. Soil samples indicate the northern part of the grid is underlain by basalt soils.

6.2.6.2 Geophysics

The ground magnetic survey located a small circular 1500 nT anomaly. Because of lack of outcrop no magnetic susceptibilities were taken. Modelling indicates a thin shallow body dipping to the east striking 20^{o} W of N. A very high susceptibility of 9000×10^{-5} SI units is assumed. (Refer Plan D/PW 44/010).

The VLF-EM survey located a conductor at the contact between the quartzite and swamp on the east-west line. (Refer Sections D/PW 44/30).

6.2.6.3 Geochemistry

The soil sampling indicates the presence of basalt soils, but no anomalous values are recorded. (Refer Plans D/PW 44/021, 022, 023).

6.2.6.4 Recommendations

The source of the magnetic anomaly has not yet been explained. Further work will be required to do this.

6.2.7 Highway 2 Traverse

A ground magnetic traverse was done along the highway to try to locate the zone of magnetic highs thought to be associated with the Cambrian volcanics in the east of the licence.

No significant increase in the magnetic field was recorded for the 1.5 kms of the traverse. (Refer Plan D/PW 44/028).

7.0 CONCLUSIONS & RECOMMENDATIONS

No prospects of obvious interest have been located. Two of the aeromagnetic anomalies gridded, South Seymour and Linnanes Road South, require further investigation to identify the source of the magnetic anomaly. One high priority and several lesser priority aeromagnetic anomalies remain to be investigated. A greater effort should be made to obtain meaningful stream sediment samples from the area.

W.D. SMYTH
Exploration Geologist

APPENDIX 1

REFERENCES

REFERENCES

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APPENDIX 2

PETROGRAPHIC REPORTS

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Central Mineralogical Services

39 Beulah Road
Norwood, S.A. 5067
Telephone 42 5659

Mr. W.D. Smyth
Exploration Geologist
The Shell Co. of Aust. Ltd.
Metals Division
P.O. Box 860
DEVONPORT / TAS. 7310

30th June, 1982

REPORT CMS 82/6/11

YOUR REFERENCE:	Sample Despatch No. 4135/PW44/WDS/140
DATE RECEIVED:	16th June, 1982
SAMPLE NOS.:	21076, 21078
SUBMITTED BY:	W.D. Smyth
WORK REQUESTED:	Petrology

H.W. Fander, M. Sc.

030 673031

CENTRAL MINERALOGICAL SERVICES PTY. LTD.

Date 30th June, 1982

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

IDENTIFICATION
21076, 21078
21076 - Lithic Greywacke 21078 - Lithic Greywacke

Job No. CMS 82/6/11 Date Received: 16.6.1982

Reference Sample Despatch No. 4135/PW44/WDS/140

Sample No. 21076, 21078

Nature of Sample: Hand Specimens

DESCRIPTION **SECTION No.** 42456, 42457

a. Hand Specimen:

Brownish, friable clastic rocks.

b. Microscopic:

1076 (T.S. 42456)

This rock is perhaps best termed a lithic (tuffaceous) greywacke, though alteration and mild shearing have obscured or obliterated some details, and the rock could be an impure tuff (xenotuff).

The rock consists of subangular grains of quartz, feldspars, altered lithic fragments (both sediments and volcanics), and numerous small lenses of degraded chlorite and ?phlogopite, as well as detrital oxide opaques.

The rock has definite preferred orientation due to shearing, and stretching of less competent grains, accentuated by subparallel limonite films.

It seems likely that this rock can be correlated with units of the Crimson Creek formation; the presence of?phlogopite suggests that the rock was mildly metasomatised as well as being dynamically metamorphosed.

21078 (T.S. 42457)

This is a lithic greywacke, broadly similar to 21076, but coarser; also, the volcanic grains are clearly reworked. Because of coarser grainsizes and poor sorting, shearing effects are not as marked.

The framework consists of subrounded, irregular grains of lithic material, quartz, feldspars, and iron oxides; the lithic grains include siltstones, shales, altered intermediate volcanics of various types, andironstones. Interstitial material consists of streaks/lenses of chlorite, and limonite films. Grainsizes range

from fine-sand to grit (2-4 mm), and sorting/sizing are poor; the fabric shows preferred orientation due to weak shearing.

The components of the rock were derived from a variety of sources; although the rock is a greywacke, it may not be correlatable with 21076, depending on field observations.

H.W. Fander, M. Sc.

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Mr. W.D. Smyth
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Metals Division
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DEVONPORT / TAS. 7310

7th May, 1982

REPORT CMS 82/4/9

YOUR REFERENCE:	Sample Despatch No. 4123/NL01/WDS/128
DATE RECEIVED:	8th April, 1982
SAMPLE NOS.:	7 Samples
SUBMITTED BY:	W.D. Smyth
WORK REQUESTED:	Petrology

H.W. Fander, M. Sc.

ample	Classification - Composition	Fabric	Accessories	Comments
1132 r.s. 1623)	Stressed Quartzite. Framework (70 %) of sub-angular to rounded quartz grains, minor quartzite, vein-type quartz composites, sericitic pelite clasts. Matrix of quartz/ fine-grained muscovite, weakly hematite-stained.	Strongly stressed, partly recrystallized, medium-grained sand-stone in microfractured contact with pebbly sand.	Martitised clastic magnetite, minor traces detrital schorl.	Strongly stressed, variably micro-fractured argillaceous orthoquartz ite/"quartz pebble" sandstone. No tangible alteration/mineralisat features.
1139	Weathered Labile Sandstone; limonite-stained kaolin aggregates with patchy relict leucoxenic stainings, disseminated oxidised/ leucoxenised relict clastic opaques.	Contorted to brecciated/ kaolin-healed relict silty fine sandy turbidite-like bedding.	Thinly disseminated relict detrital quartz grains, degraded mica flakes.	Deformation apparently reflects weathering/dilatation. Relict grai shapes splintery to angular, recognisable kaolinised feldspar grains, ?lava clasts. "Tuffaceous
1141	Weathered Labile Pelite. Variably Fe-stained, degraded fine-grained mica (?phlogopite-biotite), variably replaced by kaolin. Minor relics detrital silt-sized quartz, degraded feldspar, conspicuous fine leucoxenic semi-opaques.	Relict shale-parted laminated fine silty pelitic bedding.	Disseminations of oxidised carbonate (?siderite) and fine-grained sulphide (pyrrhotite, at least in	greywacke" Pelitic variant of 21139 type facies. Mica is indeterminate although general features consiste with "phlogopitic" alteration, dis seminated pyrrhotite mineralisatio
1149	Weathered Greywacke. Kaolinitic/Fe-stained relict framework of semi-aphanitic lava clasts, subordinate to minor quartz, degraded feldspar grains, sericitic pelite clasts. Relatively ferruginised indeterminate matrix.	Relict, weakly bedded, poorly sorted (silty fine to medium sandy), turbidite-like bedding.	Leucoxenic TiO_2 part). (degraded clastic opaques in part). Sparse degraded clastic mica flakes.	Strongly volcanomict greywacke. Detail obscured by weathering/part ferruginisation, butno real eviden of alteration/mineralisation.
)R 9	Weathered Greywacke. Partly degraded/ ferruginised framework of lithic (mainly lava, minor pelite) clasts, subordinate quartz, de-graded ferruginised feldspar grains, minor mica flakes. Ferruginised indeterminate matrix.	Relict, weakly bedded, silty fine sandy clastic.	Conspicuous leucoxenic TiO_2 stainings, leucoxenised/oxidised clastic opaques.	Essentially similar to 21149, but finer-grained, moderately sorted, with higher proportion detrital quartz, mica. No tangible alterati features.
1311	Weathered Gabbro. Extensively degraded ("isotropised") augite laths with interstices of montmorillonitised feldspar. Disseminated leucoxenised opaques (Ti-magnetite).	Essentially gabbroic (with coarse feldspar enclosing felted pyroxene laths).	Apatite, traces of partly degraded uralitic tremolite, patchy relics of phlogopite.	RElict features consistent with ?deuteric phlogopitisation feldspa weak uralitic tremolitisation of pyroxene. No evidence of sulphides
1319 r.s. 1629)	Weathered Microgabbro. Sericitic pseudomorphs of phenocrystal feldspar laths in groundmass of kaolinised feldspar, degraded/ferruginised pyroxene laths, conspicuous fine, partly martitised magnetite.	Essentially finely porphyritic, doleritic.	Rare degraded olivine phenocrysts.	Thoroughly weathered basic minor intrusive, alternately core of flo Possibly initially saussuritised/ uralitised, but no positive evidence.

034

673035

A .W.G. WHITTLE & ASSOCIATES.

M I N E R A L O G I C A L R E P O R T

SHELL 4/82

SAMPLES 21302, 21305 (ex-devenport)

W.D SMYTH, 6th APRIL 1982

O.N. 4124 (PW44/WDS/129)

DISTRIBUTION: 2 copies of report to devenport office
(Shell Company of Australia Limited.)
P.O. BOX 860
DEVENPORT 7310

035

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SAMPLES 21302, 21305.

The report was prepared from observations on the polished sections of ironstone float samples which were submitted by Mr W. D. Smyth. Because of their opacity, the samples were prepared as polished, rather than as thin sections.

21302 Lateritised vesicular basalt.

The texture and structure of this ironstone are of the types found in laterites. However, the lateritisation has not been upon the weathered remnants of either quartzites or acid volcanics. There are only trace amounts of quartz in the ironstone.

The principal mass is nondescript highly ferruginised clays which are devoid of any textural expression. It is probable that the clays are the end decomposition products of ferromagnesian silicates.

Enclosed in the ferruginised mass of clays, there are sparse isolated minute quartz grains, occasional leucoxenised ilmenite granules, occasional pseudomorphs of decomposed chlorite, and more prominent larger scale structures.

These larger scale structures (0.5 - 1.5 mm) appear to be the pseudomorphs of spherical and ovoidal vesicles in a basic effusive rock, e.g. basalt. In some of these, the radiating fibrous texture of the original vesicle fillings may be seen.

Apart from the sparse quartz and leucoxene, none of the original mineral components of the former rock remain. The vesicle-like structures, and the dominant ferruginised clay indicate the probability that this ironstone is lateritised basalt.

21305 Ferruginised arenite-fossiliferous argillite breccia.

This ironstone has different features from those of 21302. The first of these is its fragmentary structure which may relate to the proximity of a fault zone. The second feature of significance is the contrast in the types of fragments.

Ferruginised slightly micaceous sandstone and quartzite fragments are prominent. The fine clay matrix in these is ferruginised.

The darker coloured, more strongly ferruginised fragments contain numerous pseudomorphs of fossils of various types. These fragments were probably fossiliferous calcareous argillites; and although there is now no evidence of carbonates, the fossils were probably calcareous within a fine clay matrix.

No other types of fragments are included in the section; i.e. there is no manifestation of acid volcanic material.

Trace Element Analysis

The presence of the large proportion of exotic iron, with minor manganese, coupled with leaching during weathering, ferruginisation and lateritisation, have probably produced a spurious trace element characteristic which cannot be presently related to the original rocks.

A.W.G. WHITTLE
22nd April 1982.

The Australian Mineral Development Laboratories

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In reply quote:

673039

amdel

28 July 1981

GS 3/114/0

The Shell Company of Australia Limited,
Metals Division,
P.O. Box 860,
DEVONPORT, TAS 7310.

Attention: R. Wright

REPORT GS 5160/81

YOUR REFERENCE: Letter dated 21st April 1981; from E.M. Baker

MATERIAL: A beach sand sample

IDENTIFICATION: 2037

DATE RECEIVED: 24 April 1981

WORK REQUIRED: Determination of the source of the tin anomally and information of how prospective the beach sands are.

Investigation and Report by: Helen Brown

Manager, Geological Services Division: Dr Keith J. Henley

Keith Henley

for Norton Jackson
Managing Director.

c.c. The Shell Company of Australia Ltd.,
Metals Division,
P.O. Box 872K,
MELBOURNE, VIC. 3000.

Attention: P. Askins

bs/4

Pilot Plant: Osman Place
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039

673040

ANALYSIS OF HEAVY LIQUID AND MAGNETIC SEPARATION PRODUCTS OF A BEACH SAND SAMPLE

1. INTRODUCTION

A sample of beach sand was submitted by the Shell Company of Australia Limited, Metals Division, for determination of the source of the tin anomally and for information on how prospective the beach sands are.

The sample was labelled 2037.

2. PROCEDURE

A riffled portion of the sample was separated in tetrabromoethane (sp.gr. 2.96). A representative portion of the >2.96 sp.gr. product was submitted for semi-quantitative analysis for Sn, W, Ta, Nb, Ce, Cr, Cs, Zr, Ti, Th, Au, Pt, In and Os using emission spectroscopy, simply to give an indication of the presence of any of these elements before more expensive, accurate analytical work is carried out on elements present in abundance.

The highly magnetic minerals were removed from a portion of the >2.96 sp.gr. product using a hand magnet. The >2.96 sp.gr. product was further magnetically separated using a Frantz Isodynamic Separator set at a side slope of 15° and in turn at 0.1, 0.5, 1.0 and 1.5 amps. Riffled halves of each of the magnetic products were submitted for analysis of tin using X-ray fluorescence. The distribution of tin in the magnetic products and a head sample tin analysis were calculated.

Temporary oil mounts of each magnetic product were examined and the Polished briquettes (PS 29808, 29600 and 29601) were made which included representative portions of the hand magnetic, the <0.1A and the 0.1-0.5A magnetic products. Polished thin sections (TS 44086 and 44087) were made of the 1.0-1.5A and >1.5 Amp non-magnetic products. The magnetic products were then examined using reflected light and transmitted light microscopy and visual estimates of the constituents were made. Identities of selected minerals were confirmed using the electron-microprobe, and using X-ray powder photographs. The hand magnetic, <0.1A magnetic, and 0.1-0.5A magnetic fractions were scanned using the electron microprobe in order to determine the location of Sn.

A portion of the >2.96 sp.gr. non-magnetic product was treated in a zinc crucible using dilute hydrochloric acid, and then examined using a stereo binocular microscope.

The magnetic fractions likely to contain monazite were examined using unfiltered ultra violet light.

3. RESULTS

Table 1 shows the weight percent of sample 2037 in the heavy liquid products.

TABLE 1: WEIGHT PERCENT OF SAMPLE 2037 IN HEAVY LIQUID PRODUCTS

Sp.Gr.	Wt %
<2.96	69.94
>2.96	30.06
Total Sample	100.00

Table 2 shows the weight percent of the >2.96 sp.gr. in the magnetic fractions, and the distribution of the tin in the >2.96 sp.gr. magnetic fractions.

TABLE 2: DISTRIBUTION OF >2.96 SP.GR. PRODUCT AND OF TIN IN THE MAGNETIC PRODUCTS

Magnetic Fraction	Distribution of >2.96 Sp.Gr. Product (%)	Sn Assay (%)	Distribution (%)
<0.1A magnetics	3.97	0.120	2.18
0.1-0.5A	68.63	0.070	22.01
0.5-1.0A	5.68	0.045	1.17
>1.0A non-magnetics	21.72	0.750	74.64
Total >2.96 sp.gr. prod.	100.00	(0.218)(calc.)	100.00
Total Sample	100.00	(0.060)(calc.)	100.00

A semi-quantitative analysis of the >2.96 sp.gr. product using emission spectroscopy gave the following results:

Element	Sn	W	Ta	Nb	Ce	Cr	Cs	Zr	Ti	Th	Au	Pt	In	Os
ppm	1000	<50	<100	250	2000	>10,000	<30	>10,000	>>10,000	400	3	-	<10	-

Because of the abundance of rare earths in the sample, platinum and osmium were undetectable using emission spectroscopy; however, there may be some of these elements present and accurate analysis for them would required fire assay work.

Visual estimates of the constituents of the magnetically separated >2.96 sp.gr. products are as follows:

Hand Magnetics (0.67% of total >2.96 sp.gr. product):

	%
Magnetite	80
Magnetite+gangue	5-10
Others	10

The magnetite is mostly sub-rounded to rounded and averages 0.9 mm in grain size.

<0.1A Fraction (3.30% of total >2.96 sp.gr. product):

	%
Fresh ilmenite	40
Magnetite	≏10
Pyrrhotite	2
Other Fe and Ti oxides and Cr, Fe, Al, Mg oxides	50

This product comprises about 98% opaques which are generally rounded to well rounded and which average 0.1 mm in grainsize. There are rare grains that consist of a gangue mineral in association with magnetite.

0.1-0.3 Amp Magnetic Fraction (35.6% of total >2.96 sp.gr. product):

	%
Olivine/orthopyroxene	25
Tourmaline	2
Garnet	10
Ilmenite/altered ilmenite	50
Other oxides including Cr, Fe, Al, Mg-oxides	5-10

The ilmenite and altered ilmenite grains are generally sub-rounded to well-rounded and they average 0.12 mm in diameter. The fresh ilmenite grains show strong anisotropy, and a pinkish-brown colour under reflected light, whereas the altered ilmenite grains are almost isotropic and more mottled and grey in colour. Other oxides in this product include some altered hematite and some (?)chromite.

The garnet is easily distinguished in transmitted light as it has very high relief, it is isotropic, and it shows colours from pale pink to colourless. Its grains are generally subangular and equant. There are some almost euhedral crystal forms of garnet also present, which are generally pink in colour.

Olivine and orthopyroxene are present in this product in relative abundance. Olivine, which is clear to pale yellow-green in colour, was identified using an X-ray powder photograph. The orthopyroxene is easily identified as it is pale green showing well defined cleavage and parallel extinction. There is perhaps a small amount of clinopyroxene present; however, this is difficult to distinguish from the olivine. The olivine and pyroxene grains are generally sub-rounded to rounded and equant in shape.

Tourmaline is another silicate which is present in this magnetic product, but only in small proportions. It occurs as green-brown, well-rounded grains.

0.3-0.5A Magnetic Fraction (32.87% of total >2.96 sp.gr. product):

	%
Olivine) Clinopyroxene) Hornblende) Epidote)	55-65
Tourmaline	10-15
Garnet	Trace
Chromite	5-7
Ilmenite/altered ilmenite	10-15
Other oxides	5
Monazite	Trace

There is much less fresh ilmenite in this magnetic fraction and most of the opaque oxides are altered ilmenite and other oxides. There is some chromite present which was identified using the electron microprobe. The chromite averages 0.1 mm in diameter and occurs as sub-rounded grains, some of which display a hexagonal shape.

Clinopyroxene is the most abundant silicate in this product, occurring as equant, rounded grains that show well developed cleavage and inclined extinction. Olivine is only present as a minute trace. Epidote is present and may be distinguished from the clinopyroxene which is of similar pale yellow-green colour, by its lack of cleavage and its low refractive index. Hornblende is much more highly coloured than any of the other silicates present and it is generally elongated and subrounded to rounded in shape. Tourmaline is strongly pleochroic and is present in various well-rounded grains showing colours of blue and yellow to brownish-green.

There are only rare grains of garnet present in this product, which are probably present as entrailment from the magnetics.

Monazite is also present only in trace amounts and is entrailment from the non-magnetics.

0.5-1.0A Fraction

	%
Monazite	5-7
Tourmaline) Amphibole) Clinopyroxene) Epidote)	70
Rutile & quartz	8-10
Other Cr, Fe, Ti, Al, Mg oxides	5-10

The monazite grains in this product are well-rounded and average 0.1 mm in diameter. They are smaller than the average grain size of this product which is about 0.15 mm. The monazite is generally pale yellowish-green.

The opaque oxides in this product are mostly altered oxides that contain Cr, Fe, Ti, Al and Mg. Some grains of red to opaque rutile, complexly intergrown with quartz, are also present. All of the oxides are subangular to rounded and equant in shape.

Various silicates are present including abundant, well-rounded grains of pleochroic tourmaline, elongated grains of green-brown amphibole, and some grains of pale green, clinopyroxene. Epidote is more abundant in this magnetic product than in the 0.3-0.5A product.

1.0-1.5A Fraction (0.62% of total >2.96 sp.gr. product):

	%
Zircon	2-3
Monazite	Trace
Tourmaline	2-3
Andalusite	Trace
Epidote	5-10
Rutile	25-30
Leucoxene	45-50
Altered ilmenite	10
Cassiterite	Trace

Leucoxene, the most abundant mineral in this product, occurs as fine, white crystals making up sub-rounded grains that were originally ilmenite/altered ilmenite. Black altered ilmenite is also present in this fraction.

Rutile, the next most abundant mineral, occurs as generally dark, orange-red to opaque, ovoid, well-rounded grains.

The tourmaline in this fraction occurs as well-rounded grains which are generally strongly pleochroic and show colours of yellow-colourless to green and blue.

The monazite grains are generally slightly smaller than the average grain size of this product (0.1 mm), and they are well-rounded, equant grains that have a pale yellowish-green colour.

Several grains of epidote are also present in this product.

The rare zircon grains, cassiterite and andalusite grains in this fraction are simply products of entrailment of the non-magnetics.

1.5A Non-Magnetic Fraction (21.10% of total >2.96 sp.gr. product):

	%
Zircon	60-65
Tourmaline	5
Andalusite	2-3
Cassiterite	Trace-1
Rutile	15-20
Leucoxene	15-20

The zircon is generally well-rounded and transparent-translucent, and many grains reveal their original prismatic habit. Most of the zircon grains are colourless to pale yellow and average 0.1 mm in size.

Tourmaline in this product is generally black to dark brown in colour and occurs as fractional prismatic crystals.

The andalusite grains are mostly rounded and equant in shape. They are strongly pleochroic and coloured pale pinky-brown to colourless, and thus they are easily distinguished from other constituents of this product.

The rutile is strongly coloured, bright yellow-orange-red to opaque. Some of the rutile is associated with quartz with which it is complexly intergrown. The rutile grains are generally rounded to well-rounded and ovoid in shape.

White leucoxene, an alteration product of ilmenite, occurs as fine crystals forming, or coating subrounded grains.

Cassiterite is only a very minor constitutent of the sample and it occurs as rare, rounded grains that are generally coarser-grained than the other grains in this sample and average about 0.25 mm in size. The cassiterite is very difficult to distinguish from the rutile in thin section and "tinning" of the sample made distinction of the cassiterite using a stereo binocular microscope possible.

The hand magnetic and the <0.1A magnetic products were probed for tin; however, no tin was detected (detection limit = 0.1%). The detection limit is of approximately the same magnitude as the value gained from analysis of the combined hand magnetic and <0.1A products. It may thus be inferred that the tin known to be present after analysis using XRF, is not concentrated in any small area, but it is probably evenly distributed in solid solution throughout some iron oxide mineral phases.

The 0.1-0.5A magnetic product contains 22.01% of the tin in the sample; however, it has only 700 ppm tin. The 0.1-0.3 and 0.3-0.5 magnetic fractions were probed for tin; however, none was detected. It may again be inferred that the tin is in solid solution within some mineral or minerals within the product. Garnet and chromite are possible hosts.

The >1.0A magnetic product contains 74.64% of the tin in the sample, most of which is present as cassiterite.

On the basis of the mineralogical results the overall contents of the potentially valuable minerals may be calcualted to be as follows:

	Wt %
Cassiterite	0.06
Zircon	4-5
Rutile	1-2
Monazite	0.2
Leucoxene	2
Ilmenite	8-10
Chromite	1-2

This beach sand appears to be worthy of economic interest and further exploration work in order to determine the extent of the deposit.

673046

The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/80 MARRAWAH
GEOLOGY

82-1872 2566

SCALE	1:20 000	DATE	23-7-82
AUTHOR	W.D. SMYTH	DRAWN	H.L. SMYTH
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/PW44/003	FIG.No.	5 470 000 N

300 000 E 302 000 E 304 000 E 306 000 E 308 000 E 310 000 E 312 000 E

5 470 000 N
5 468 000 N
5 466 000 N
5 464 000 N
5 462 000 N

1 0 1
Kilometres

5 cm

N

LEGEND

- Alluvials/basalt talus
- Recent sands
- Holocene sands
- Tm — Tertiary Marine Limestone
- V — Tertiary basalt
- Є — Cambrian sediments/volcanics
- × — Cambrian ? Gabbro
- pЄ — Precambrian dolomite - Smithton dolomite
- Precambrian quartzites/mudstones
- Aeromagnetic linears
- Air photo linears
- Swamp
- Bedding

MAGNETIC ANOMALIES

1 Mc Kay's Rd.
2 Bowood Hill
3 Red Creek
4 South Seymour
5 Linnane's Rd
6 North East

Southern Ocean

Dunes

MARRAWAH

REDPA

To Smithton

Green Point Road
Comeback Road
Point West Road
Arthur River
Wells Road
McKays Road
BASS HIGHWAY
Fairview Road
Linnane's Road
Lewis Road
Possible fault zone

Tm
pЄ dol
70°

673047

The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/80 MARRAWAH
SAMPLE LOCATIONS

82-1872 2567

SCALE	1: 20 000	DATE	23-7-82
AUTHOR	W.D. SMYTH	DRAWN	H.L. SMYTH
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/PW44/002	FIG.No.	

5 cm

1 0 1
Kilometres

( ) Magnetic susceptibility x 10^{-5} S.I. Units on basalt.
X Rock chip sample.
(s.s.) Stream sediment sample.
Auger sample
Mag. & V.L.F. traverses
$X_{R.M.}$ Remnant Magnetism sample

300 000 E
302 000 E
304 000 E
306 000 E
308 000 E
310 000 E
312 000 E

5 470 000 N
5 468 000 N
5 466 000 N
5 464 000 N
5 462 000 N

Approx. position Abertoyle Exp. P.L. sample line.

5317 X
5318
5319

5314 (s.s.)

X 5315
5316

21064
21065
21066
21067
21068

X 21007

X 21005
21006

X 21004

5321 (s.s.)

Green Point Road

MARRAWAH

Comeback Road

21061
21062
21063

REDPA

21053
21054
21055
21056

21057
21058
21059
21060

21016
5324 (s.s.)

21049
21050
21051
21052

(600)

(800)

5322(s.s.)
21021
21001 (s.s.)
21020

Bluff Road

West Point Road

Creek

Doctors

Southern Ocean

21082 X
R.M.

(800)
21022
21005
21023
21003 (s.s.)
21008
21024

Wells Road

Arthur

(100)
(400)
X 21080
R.M.

21028
21027
21025
21026
McKays Road

X 21011
X 21010

BASS HIGHWAY

(60)
X 21014
(250)

21081
R.M.

Road

X 21012

21013 X

L. Linnaes Road

21929
21030
21031
21032

Fairview Road

To Smithton

Kings Road

X 21019

21033
21034
21035
21036

X 21018

X 21017

Welcome River

21045
21046
21047
21048

Road

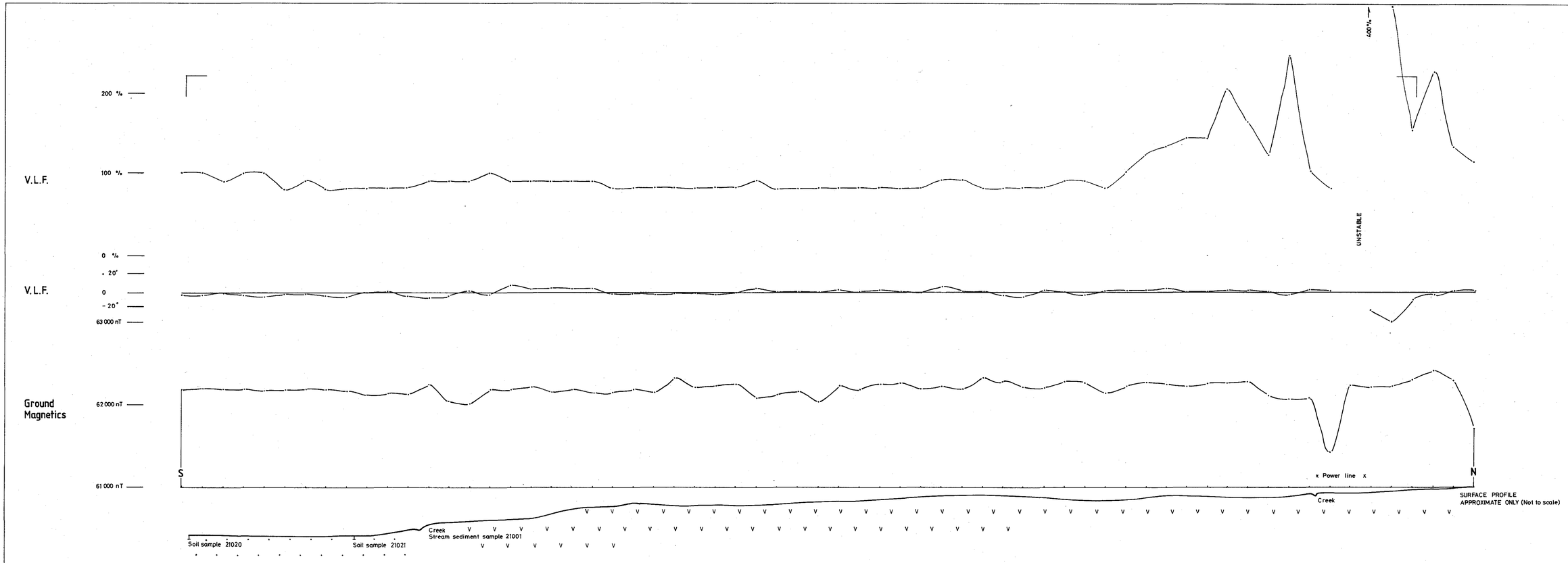
5323 (s.s.)

21041
21042
21043
21044

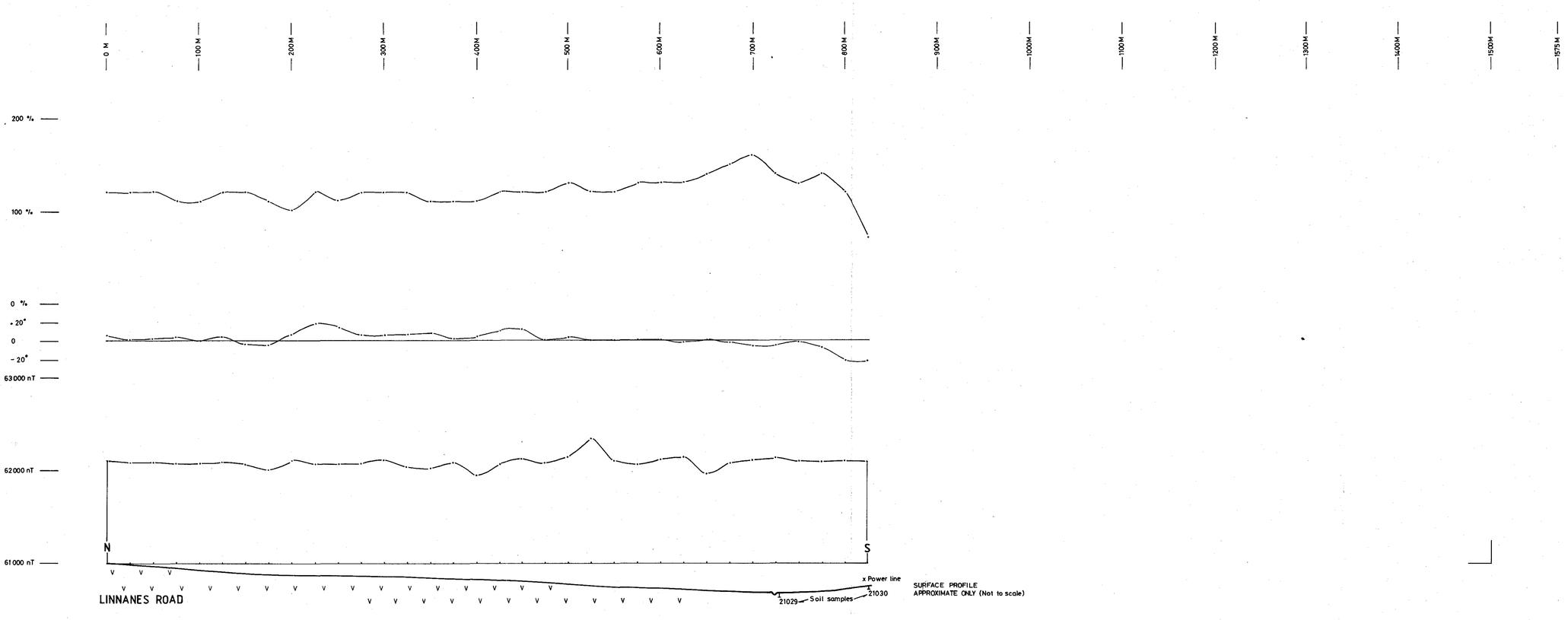
21037
21038
21039
21040
X
21079
R.M.

Fair-view

21002(s.s.)



ARTHUR RIVER RD.



LINNANES ROAD

TERTIARY V V Basalt

PRECAMBRIAN Quartzite

NOTE : Proton precession magnetometer.
V.L.F. - EM

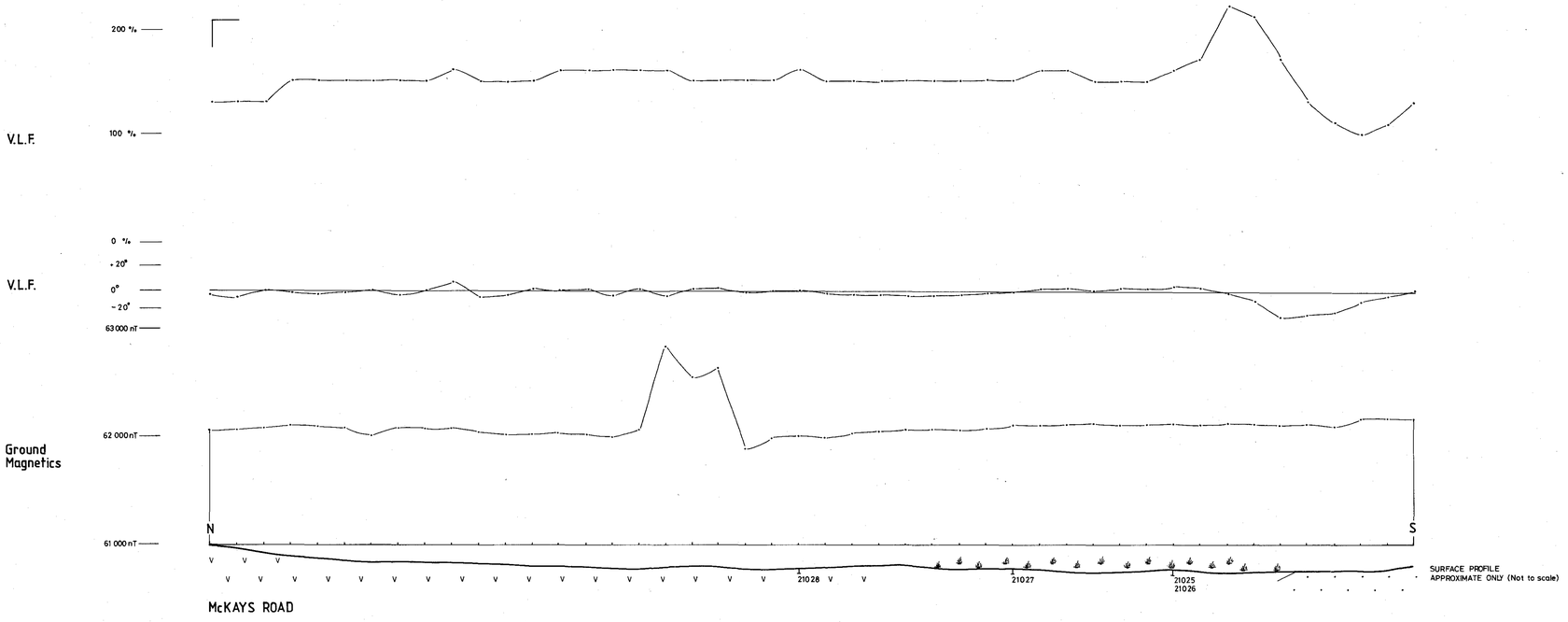
5 cm

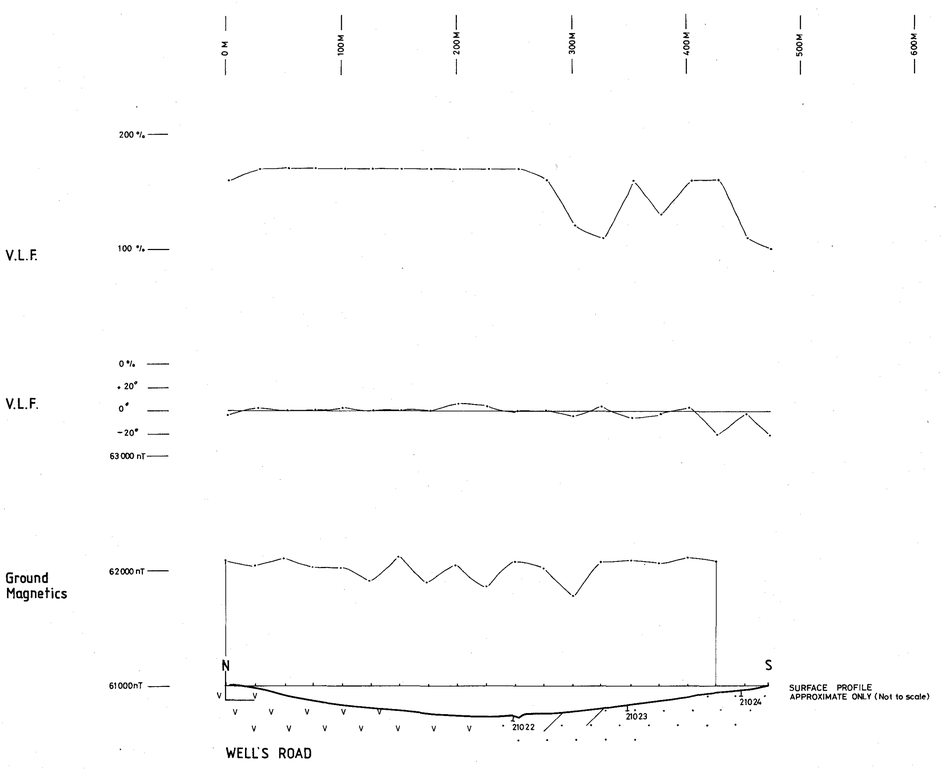
673048

0 100 200 M

The Shell Company of Australia Limited METALS DIVISION	
E.L. 49/80 MARRAWAH GROUND MAGNETICS & V.L.F. ARTHUR RIVER & LINNANES RD.s	
2568	
Scale : 1:2500 Horizontal = Vertical	
FIG. No.	REPORT No.
ENCL. No.	DRG. No. D/PW44/004
DATE 27-10-81	AUTHOR W.D. SMYTH.
DRAWN H.L.H.	OFFICE DEVONPORT

82-1872





TERTIARY V V Basalt

PRECAMBRIAN Quartzite

Swamp

NOTE : Proton precession magnitometer.
V.L.F. - EM

5 cm

673049

0 100 200 M

The Shell Company of Australia Limited METALS DIVISION	
E.L. 49/80 MARRAWAH GROUND MAGNETICS & V.L.F. McKAYS & WELL'S ROADS 2569	
Scale : 1:2500 Horizontal & Vertical	
FIG. No.	REPORT No.
ENCL. No.	DRG. No. D/PW 44/005
DATE 28-10-81	AUTHOR W.D.SMYTH
DRAWN H.L.H.	OFFICE DEVONPORT

82-1872

N
Approx

SOUTHERN OCEAN

GREEN POINT ROAD

MARRAWAH

COME BACK ROAD

REDPA

WEST POINT ROAD

ARTHUR RIVER

TO ARTHUR RIVER

BASS HIGHWAY

WELLS ROAD

MCKAYS ROAD

LINNANES ROAD

FAIRVIEW ROAD

KINGS ROAD

TO SMITHTON

673050

The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/80 MARRAWAH
SAMPLE ASSAY RESULTS
Sn/W

2570

Scale approx. 1: 20 000

FIG. No.	REPORT No.
ENCL. No.	DRG. No. D/PW44/006
DATE 19-10-81	AUTHOR W.D. SMYTH
DRAWN H.L.H.	OFFICE DEVONPORT

X = Rock chip sample.
(s.s.)= Stream sediment sample.
(P.C.)= Panned concentrate of stream sediment sample.
● = Auger sample.

NOTE: Overlay air photo enlargment North West run 4 0024-004 (8-1-80)
Analyses in ppm.

5 cm

0 500 1000M
approx.

82-1872

N
Approx.

GREEN POINT ROAD
WEST POINT ROAD
ROAD
RIVER
ARTHUR
TO ARTHUR RIVER
OCEAN
SOUTHERN
MARRAWAH
COME BACK ROAD
REDPA
BASS HIGHWAY
WELLS ROAD
McKAYS ROAD
LINNANES ROAD
FAIRVIEW ROAD
KINGS ROAD
TO SMITHTON

3/30
10/35
81/35
14/470
12/13
140/<10
<2/13
140/1300
12/25
<2/<10
81/25
<2/220
<2/<10
<2/<10
3/<10

× = Rock chip sample.
• = Auger sample.

5 cm

NOTE: Overlay air photo enlargment North West run 4 0024-004 (8-1-80)

Analyses in ppm.

0 500 1000M
approx.

673051

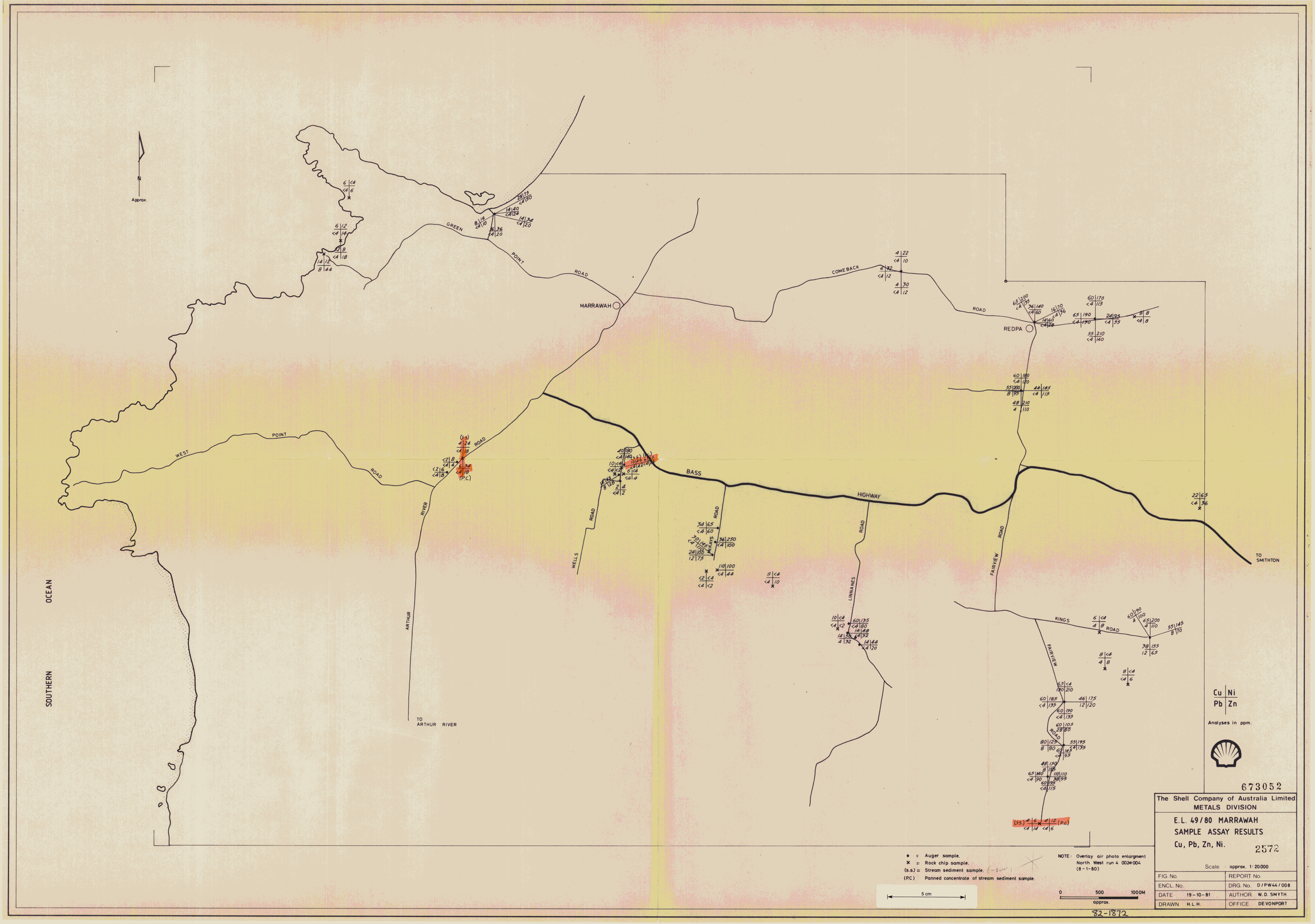
The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/80 MARRAWAH
SAMPLE ASSAY RESULTS
As/Ba
2571

Scale : approx. 1:20000

FIG. No.	REPORT No.
ENCL. No.	DRG. No. D/PW44/007
DATE 19-10-81	AUTHOR W.D. SMYTH.
DRAWN H.L.H.	OFFICE DEVONPORT

82-1872



673052

The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/80 MARRAWAH
SAMPLE ASSAY RESULTS
Cu, Pb, Zn, Ni. 2572

Scale : approx. 1:20000

FIG. No.	REPORT No.
ENCL. No.	DRG. No. D/PW44/008
DATE 19-10-81	AUTHOR W.D. SMYTH
DRAWN H.L.H.	OFFICE DEVONPORT

82-1872

470000
468000
466000
464000
462000
460000

302000 304000 306000 308000 310000 312000 314000 316000

Airborne Geophysical Survey and Compilation by GEOEX PTY LTD 673053

for

THE SHELL COMPANY OF AUSTRALIA LIMITED

MARRAWAH AREA TASMANIA

CONTOURS OF RESIDUAL TOTAL MAGNETIC INTENSITY

SCALE 1:20000

0 400 800 1200 1600 2000 METRES

5 cm

SURVEY LOCATION

The Shell Company of Australia Limited METALS DIVISION	
E.L. 49/80 MARRAWAH 2573 82-1872	
SCALE	DATE
AUTHOR	DRAWN
OFFICE DEVONPORT	REP No
DRG No D/PW44/031	FIG No

The data presented is the residual magnetic intensity, after subtracting the International Geomagnetic Reference Field from the observed Total Magnetic Intensity
The data was corrected for diurnal drift using a base station monitor at SMITHTON Airfield, Latitude 40.837 S
Longitude145.083 E
Altitude 9 Metres
The sensor height was 3 metres.
The adopted value for this location was 62190 nT
Final detailed levelling of the data was performed using tie-line crossover analysis. A simple 3 point filter was applied to the data, which was then gridded and contoured using a 75m by 75m mesh cell.

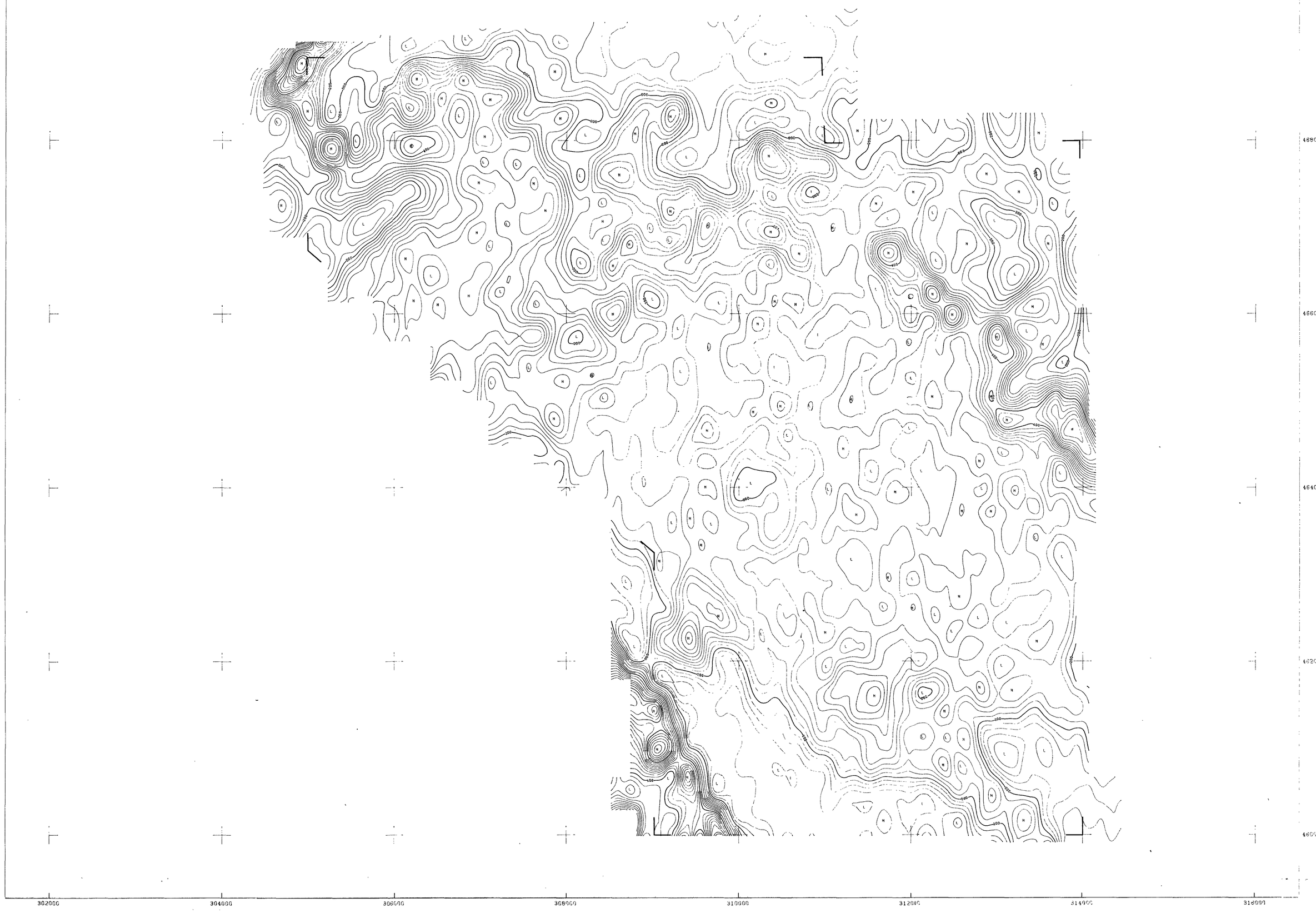
SURVEY BOUNDARY

CONTOUR INTERVAL 5 nTesla

PROJECT NUMBER 82738 SURVEYED FEBRUARY 1982

EQUIPMENT SPECIFICATIONS
Cessna A185E Aircraft
SONOTEK IGSS1 SYSTEM
0.1 nT MAGNETOMETER
256 CHANNEL SPECTROMETER
24 Litre NaI(Tl) DETECTOR
KING KRA10 RADAR ALTIMETER
16mm Ground Tracking Camera
Industry Standard 9 track
32 RPmm Magnetic Tape
8 Channel Analogue Recorder
3 Channel Analogue Recorder for Magnetometer

The nominal flight line separation was 250 metres, and the nominal tie-line bearing was 0 degrees.
The observed mean sample interval in the flight direction was 28 metres, achieved with a nominal aircraft speed of 90 Knots, and a reading interval of 0.6 seconds. The mean sensor height was 70 metres, using a towed bird configuration. The magnetometer accuracy is 1.0 nT, and the resolution 1.0 nT.



673054

Airborne Geophysical Survey and Compilation by GEGEX PTY LTD

for

THE SHELL COMPANY OF AUSTRALIA LIMITED

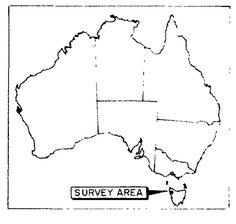
MARRAWAH AREA TASMANIA

CONTOURS OF TOTAL RADIOMETRIC INTENSITY

SCALE 1:20000

0 400 800 1200 1600 2000 METRES

5 cm



SURVEY LOCATION

The Shell Company of Australia Limited METALS DIVISION		
E.L. 46/80 MARRAWAH		
2574		
SCALE		DATE
AUTHOR		DRAWN
OFFICE	DEVONPORT	REP No
DRG No	D/PW44/032	FIG No

82-1872

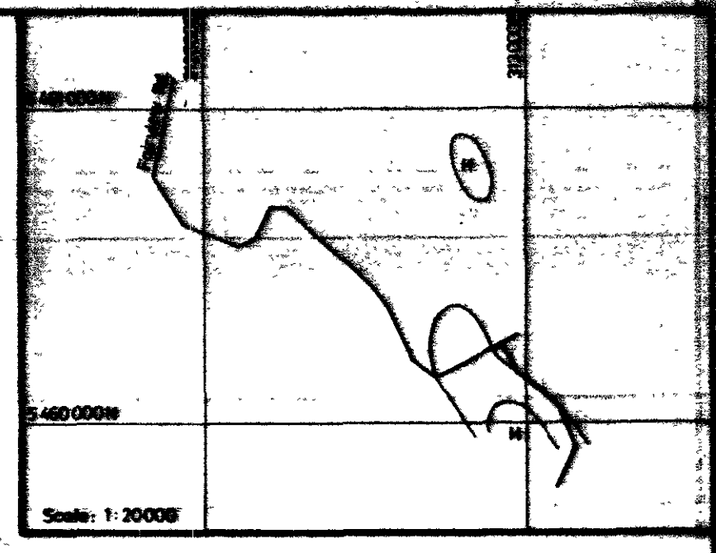
SURVEY BOUNDARY

CONTOUR INTERVAL 20cps

PROJECT NUMBER 82738 SURVEYED FEBRUARY 1982

EQUIPMENT SPECIFICATIONS
Cessna 185E Aircraft
SONOTEK IOSSI SYSTEM
0.1 nT MAGNETOMETER
256 CHANNEL SPECTROMETER
24 Litre NaI(Tl) DETECTOR
KING KRA10 RADAR ALTIMETER
16mm Ground Tracking Camera
Industry Standard 9 track
32 BPmm Magnetic Tape
8 Channel Analogue Recorder
3 Channel Analogue Recorder
for Magnetometer

The nominal flight line separation was 250 metres, and the nominal tie-line bearing was 0 degrees. The observed mean sample interval in the flight direction was 28 metres, achieved with a nominal aircraft speed of 90 Knots, and a reading interval of 0.6 seconds. The mean sensor height was 70 metres, using a towed bird configuration. The magnetometer accuracy is 1.0 nT, and the resolution 1.0 nT.



G = Cambrian Gabbro
S = Precambrian Micaceous Siltstone
Q = Precambrian Quartzites

M.N.

NOTE: Proton precession magnetometer - sensor height 2.5M
( ) Magnetic susceptibility $\times 10^{-3}$ S.I.

0 50 100M

5 cm

673055

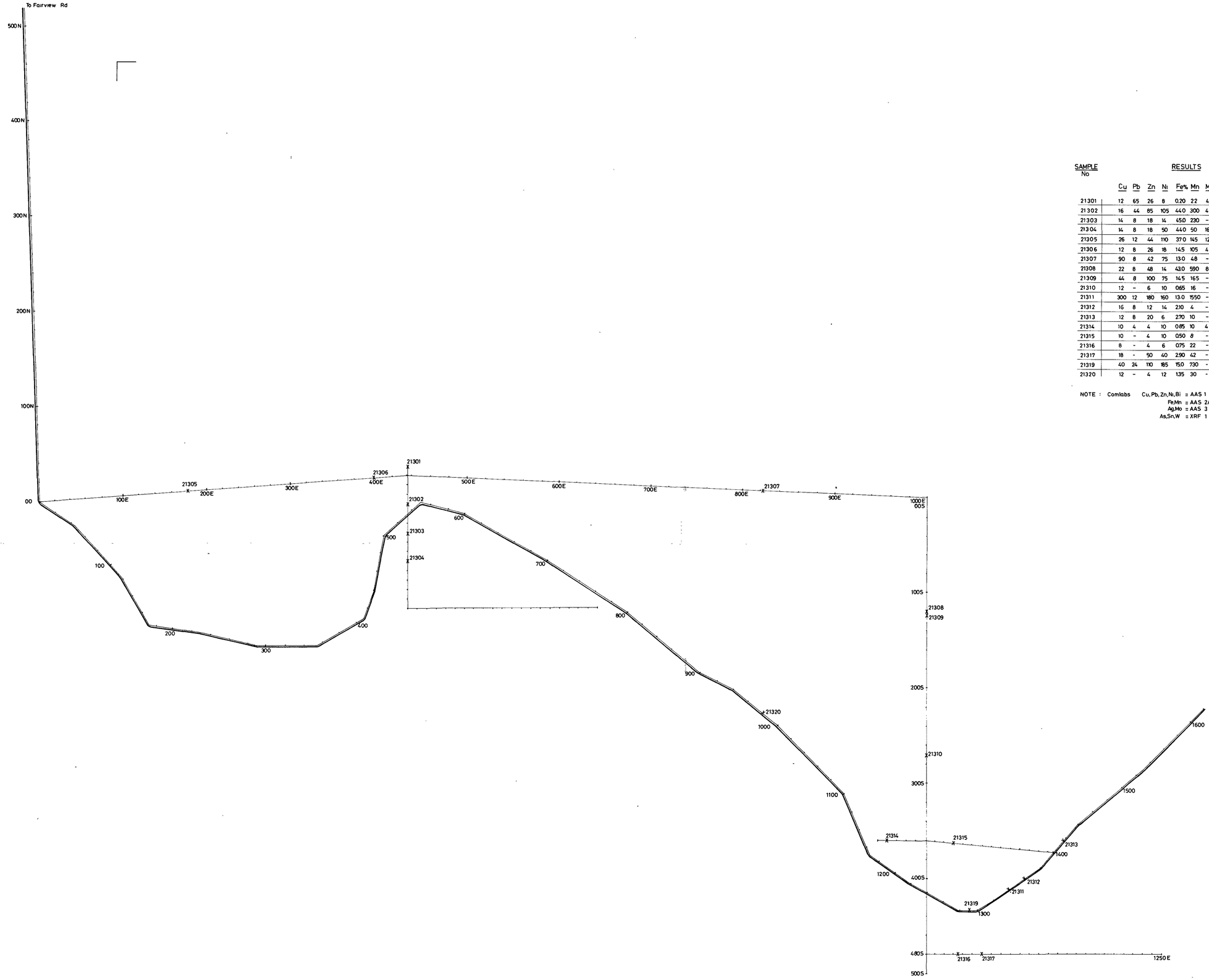
The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/80 NARRAWAN
RED CREEK AEROMAGNETIC ANOMALY
GROUND MAGNETICS

2575

82-1872

SCALE	1: 2000	DATE	21-5-82
AUTHOR	W.D. SMYTH	DRAWN	H.L.H.
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/PW44/013	FIG.No.	



SAMPLE No

RESULTS

	Cu	Pb	Zn	Ni	Fe%	Mn	Mo(4)	As(2)	Sn(4)	W(10)	Bi	Ag
											ALL	ALL
21301	12	65	26	8	0.20	22	4	–	16	–	<4	<1
21302	16	44	85	105	4.40	300	4	115	–	30		
21303	14	8	18	14	4.50	230	–	38	–	10		
21304	14	8	18	50	4.40	50	16	60	–	30		
21305	26	12	44	110	3.70	145	12	140	-	25		
21306	12	8	26	18	1.45	105	4	44	-	10		
21307	90	8	42	75	1.30	48	-	7	-	-		
21308	22	8	48	14	4.30	590	8	40	–	15		
21309	44	8	100	75	1.45	165	–	8	–	15		
21310	12	–	6	10	0.65	16	–	–	-	10		
21311	300	12	180	160	13.0	1550	–	60	–	10		
21312	16	8	12	14	2.10	4	–	4	–	10		
21313	12	8	20	6	2.70	10	–	5	22	10		
21314	10	4	4	10	0.65	10	4	–	–	-		
21315	10	–	4	10	0.50	8	–	–	–	-		
21316	8	-	4	6	0.75	22	–	3	–	-		
21317	18	-	50	40	2.90	42	–	6	–	15		
21319	40	24	110	185	15.0	730	-	20	6	10		
21320	12	–	4	12	1.35	30	-	-	4	–		

NOTE : Comlabs Cu,Pb,Zn,Ni,Bi = AAS 1
Fe,Mn = AAS 2/2A
Ag,Mo = AAS 3
As,Sn,W = XRF 1

M N

Road

Traverse

5 cm

673056

0 50 100M

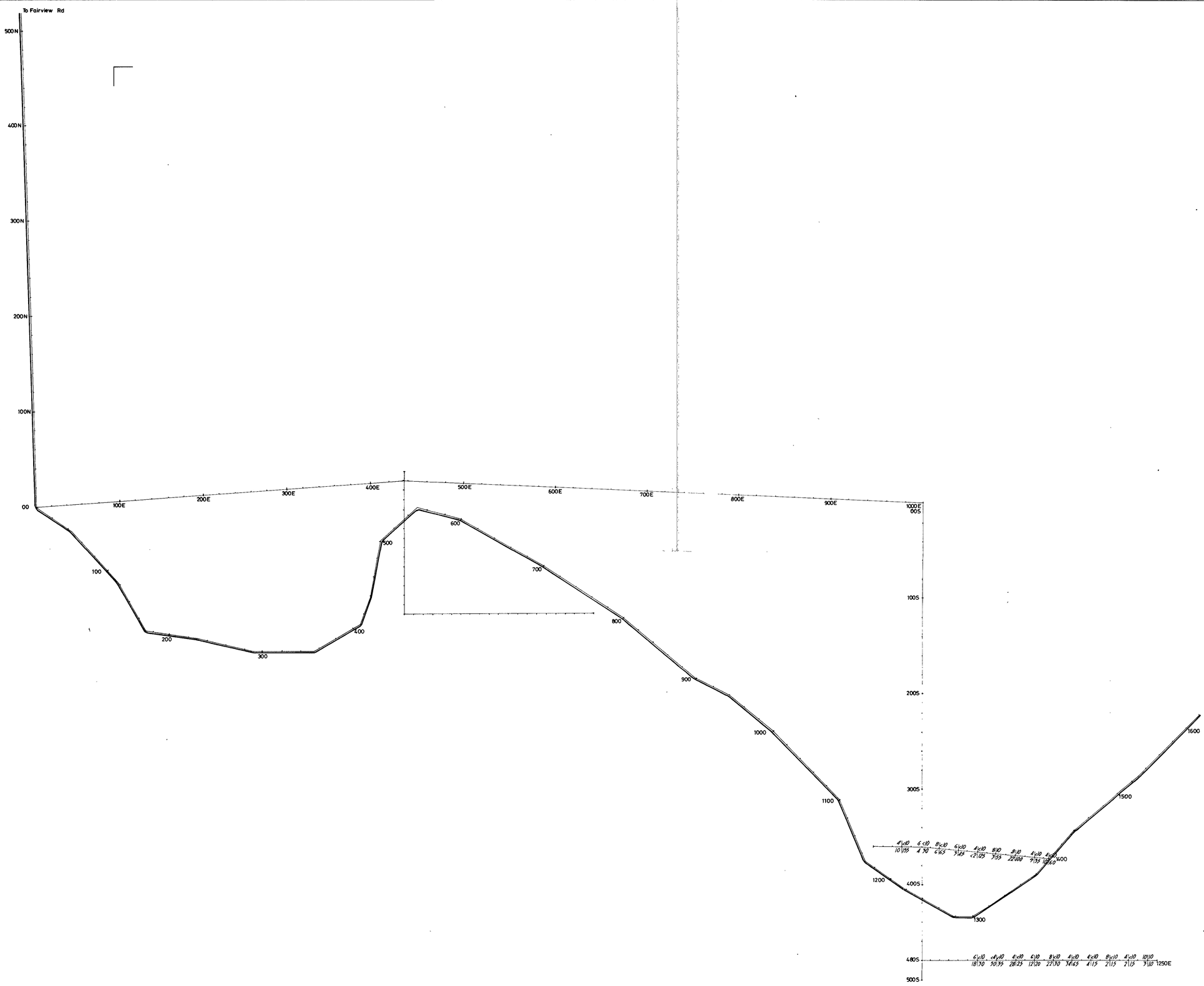
The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/80 MARRAWAH
AEROMAGNETIC ANOMALY
RED CREEK ANOMALY
ROCK CHIP SAMPLING 2576

Scale 1 2000

FIG No	REPORT No
ENCL No	DRG No D/PW44/014
DATE 16-3-82	AUTHOR W D SMYTH
DRAWN H.L H.	OFFICE DEVONPORT

82-1872



M N

Road

Traverse

Sn | W
As | Ba

Analyses in ppm
Comlabs XRF1

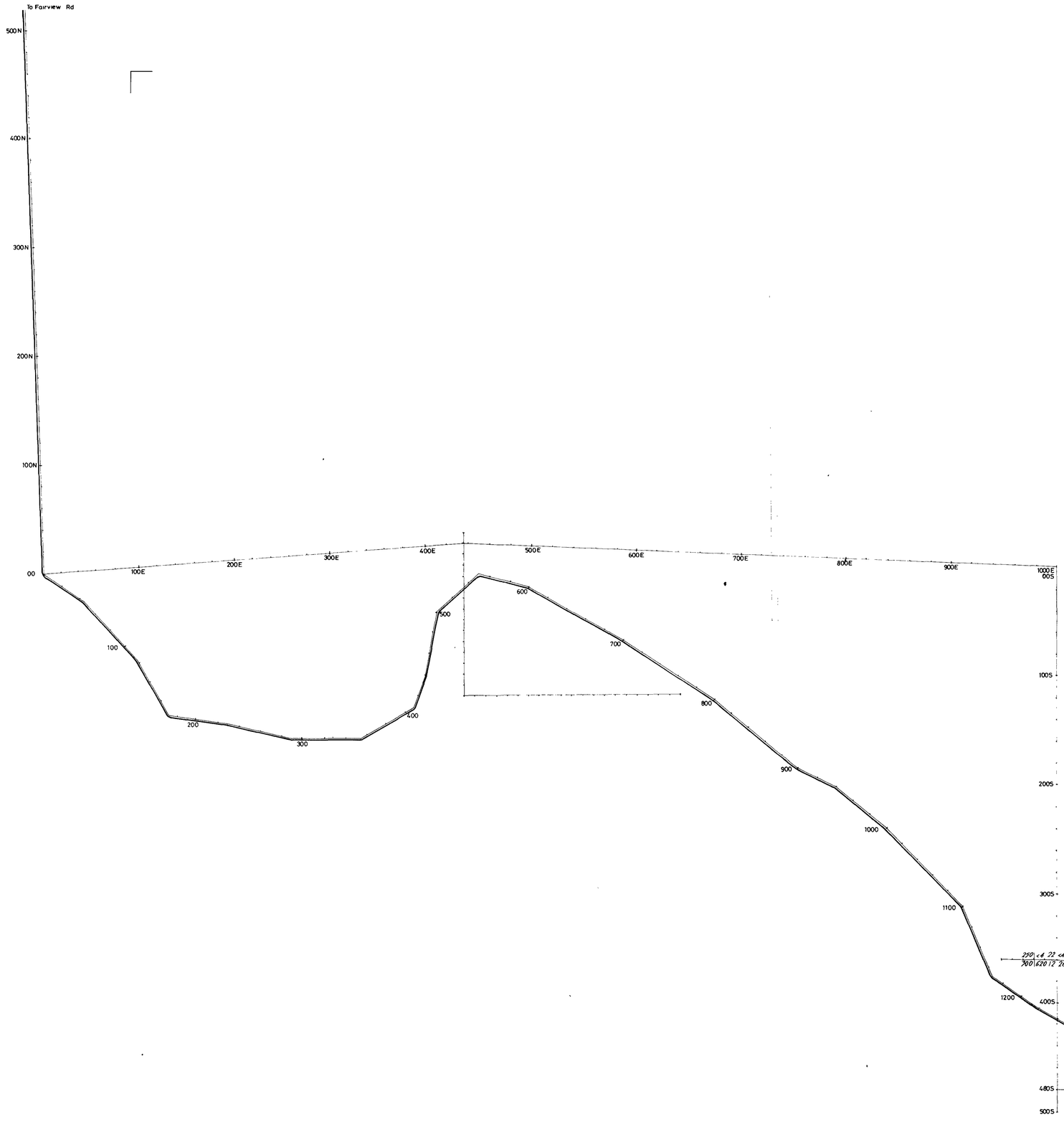
5 cm

673057

0 50 100M

The Shell Company of Australia Limited METALS DIVISION	
E.L. 49/80 MARRAWAH AEROMAGNETIC ANOMALY RED CREEK ANOMALY SOIL GEOCHEMISTRY Sn,W, As,Ba Scale 1 2000 2577	
FIG No	REPORT No
ENCL No	DRG No D/PW44/016
DATE 16-3-82	AUTHOR W D SMYTH
DRAWN H.L H	OFFICE DEVONPORT

82-1872



M N

Road

Traverse

Cu | Pb
Zn | Ni

Analyses in ppm
Comlabs AAS 1

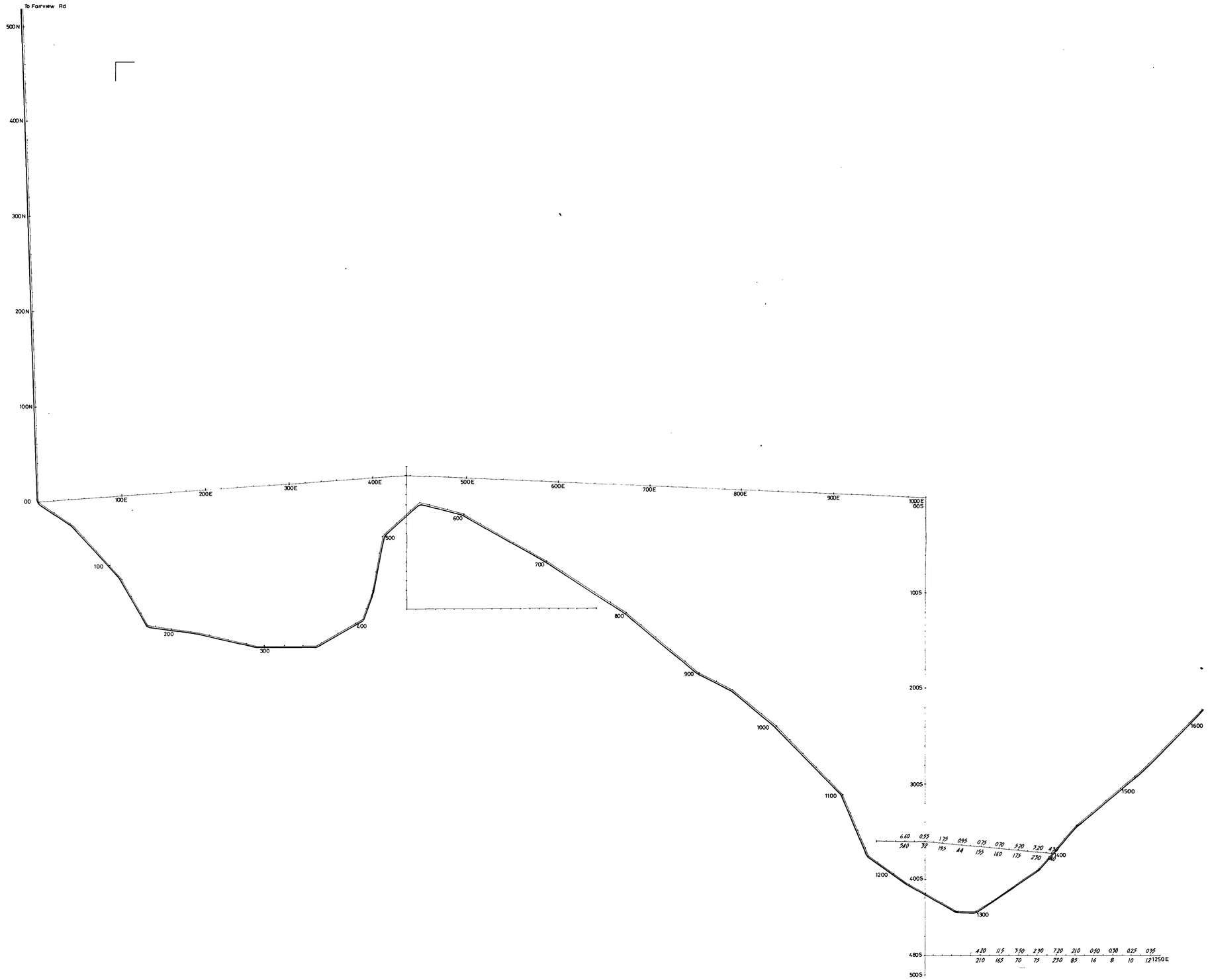
5 cm

673058

0 50 100M

The Shell Company of Australia Limited METALS DIVISION	
E.L. 49/80 MARRAWAH AEROMAGNETIC ANOMALY RED CREEK ANOMALY SOIL GEOCHEMISTRY Cu, Pb, Zn, Ni. 2578 Scale 1 2000	
FIG No	REPORT No
ENCL No	DRG No D/PW44/015
DATE 16-3-82	AUTHOR W D SMYTH
DRAWN H L H	OFFICE DEVONPORT

82-1872



M N

Road

Traverse

Fe %
Mn

Analyses in ppm
Comlabs AA52/2A

5 cm

673059

0 50 100M

The Shell Company of Australia Limited METALS DIVISION	
E.L. 49/80 MARRAWAH AEROMAGNETIC ANOMALY RED CREEK ANOMALY SOIL GEOCHEMISTRY Fe, Mn 2579 Scale 1 2000	
FIG No	REPORT No
ENCL No.	DRG No DJPW44/017
DATE 16-3-82	AUTHOR W D SMYTH
DRAWN H.L H	OFFICE DEVONPORT

82-1872

82-1872

The Shell Company of Australia Limited
METALS DIVISION

EL 49/80 MARRAWAH
NORTH EAST
AEROMAGNETIC ANOMALY
GROUND MAGNETICS

2560

Scale 1:2000

FIG No	REPORT No
ENCL No	DRG No D/PW44/012
DATE 10-5-82	AUTHOR WD SMYTH
DRAWN H L H	OFFICE DEVONPORT

673060

0 50 100M

5 cm

Proton precession magnetometer
Sensor height 2.5M
(x) = Susceptibility $\times 10^{-5}$ S.I.

M.N
T.N

LOCALITY PLAN 1:20000

5 467 000 N
5 468 000 N
313 000 E
313 000 E
To Banks Lane
H
H

673061

5 cm

0 100 200M

The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/80 MARRAWAH
V.L.F. PROFILES

2581

SCALE	1 2500	DATE	24-8-82
AUTHOR	W.D.SMITH	DRAWN	H.L.S
OFFICE	GEOIMPORT	REP No	
ENCL No		DRG No	D/PM4/1030

98-182

LINNANES RD. SOUTH
(NW Cape Station)

LINE 100E

+10°
0
-10°
200%
100%
0

100 S | 00 | 100 N

LINE 00 N

100 E | 00 | 100 W | 200 W

LINE 200 W

+10°
0
-10°
200%
100%
0

200 N | 100 N | 00 N | 100 S | 200 S

LINE 00E

200 S | 100 S | 00 N | 100 N | 200N

200 E | 100 E | 00 E | 100 W | 140 W

SOUTH SEYMOUR

Japan
NW Cape

LINE 00 E

+10°
0
-10°
200%
100%
0

200 W | 100 W | 00 E | 100 E | 200 E

LINE 00 N

200 E | 100 E | 00 E | 100 W | 200 W

N.E. ANOMALY

Japan
NW Cape

LINE 400 N

+10°
0
-10°
200%
100%
0

200 W | 100 W | 00 E | 100 E | 200 E

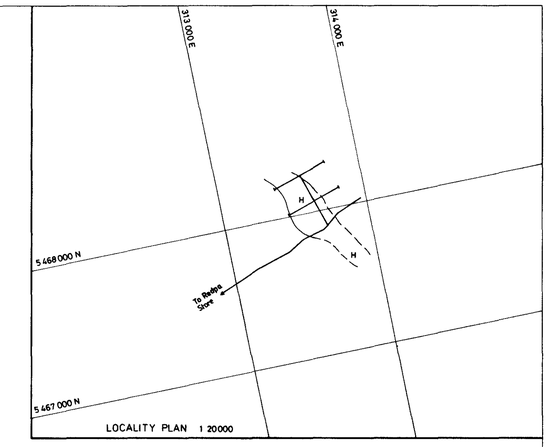
LINE 200 N

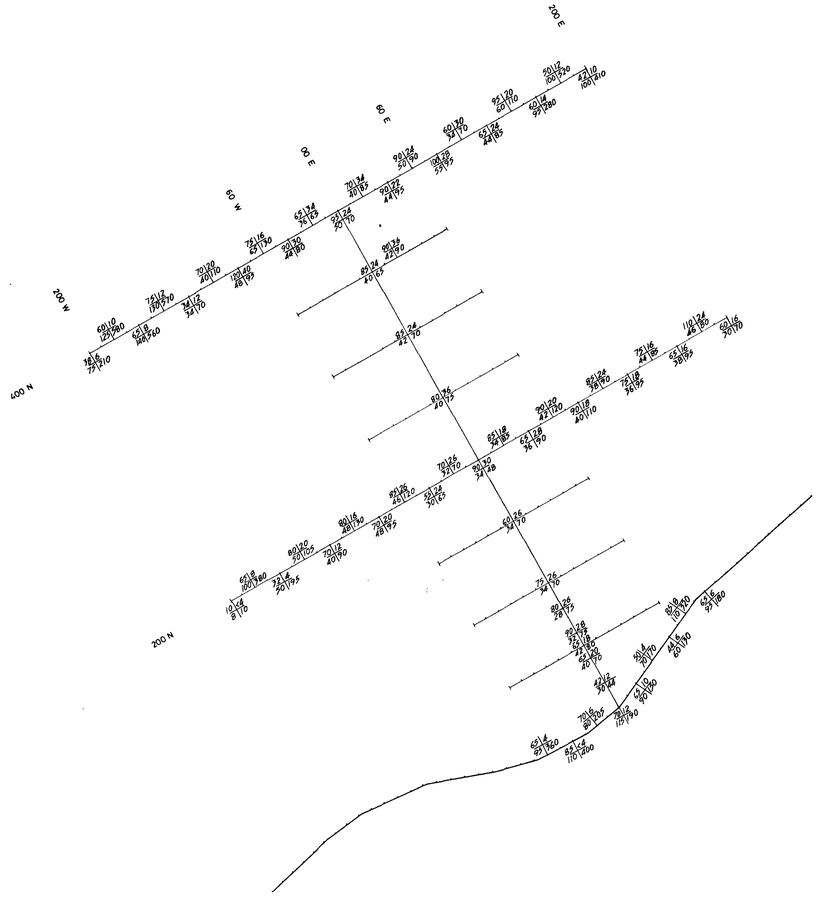
200 E | 100 E | 00 E | 100 W | 200 W

ROAD

+10°
0
-10°
200%
100%
0

200 E | 100 E | 00 E | 100 W | 200 W | 300 W | 400 W





5 cm

M.N
T.N

Cu | Pb
Zn | Ni

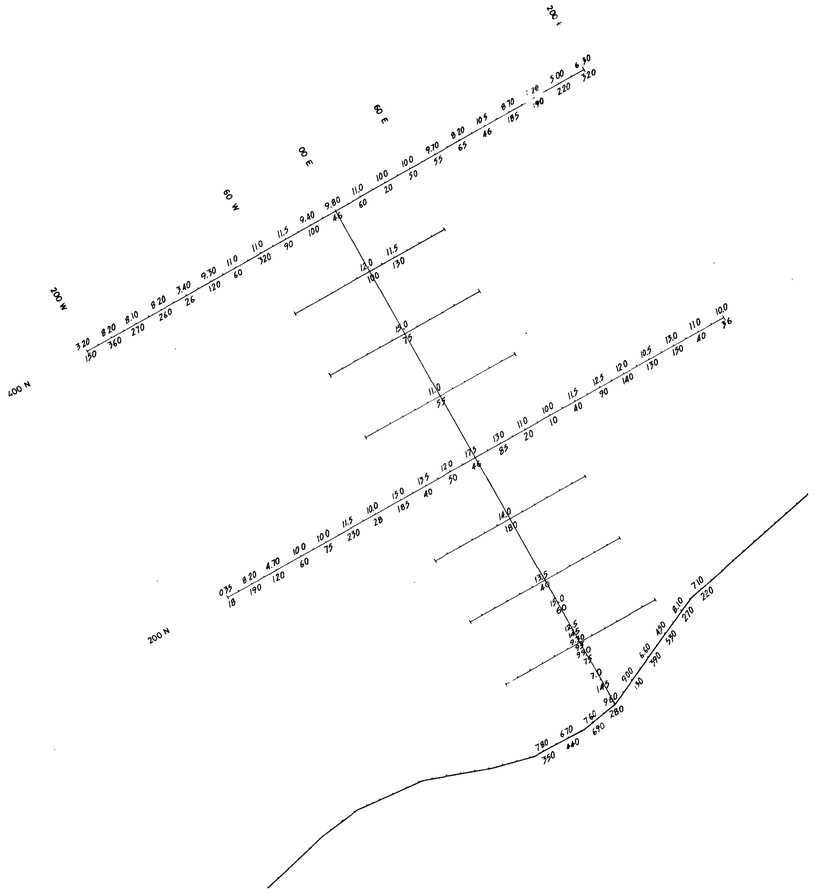
Analyses in ppm
Comlabs AAS1

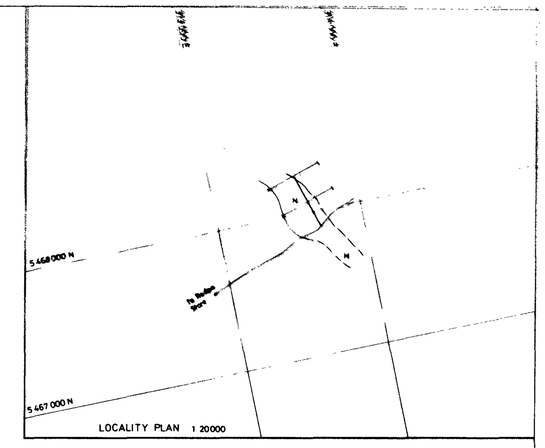
673062

0 50 100M

The Shell Company of Australia Limited METALS DIVISION	
E.L. 49/80 MARRAWAH NORTH EAST AEROMAGNETIC ANOMALY SOIL GEOCHEMISTRY Cu, Pb, Zn, Ni. 2582 Scale · 1·2000	
FIG No	REPORT No
ENCL No	DRG No D/PW44/018
DATE 10-5-82	AUTHOR W.D. SMYTH
DRAWN H.L.H.	OFFICE DEVONPORT

82-1872





5 cm

M.N
T.N

Fe %
Mn

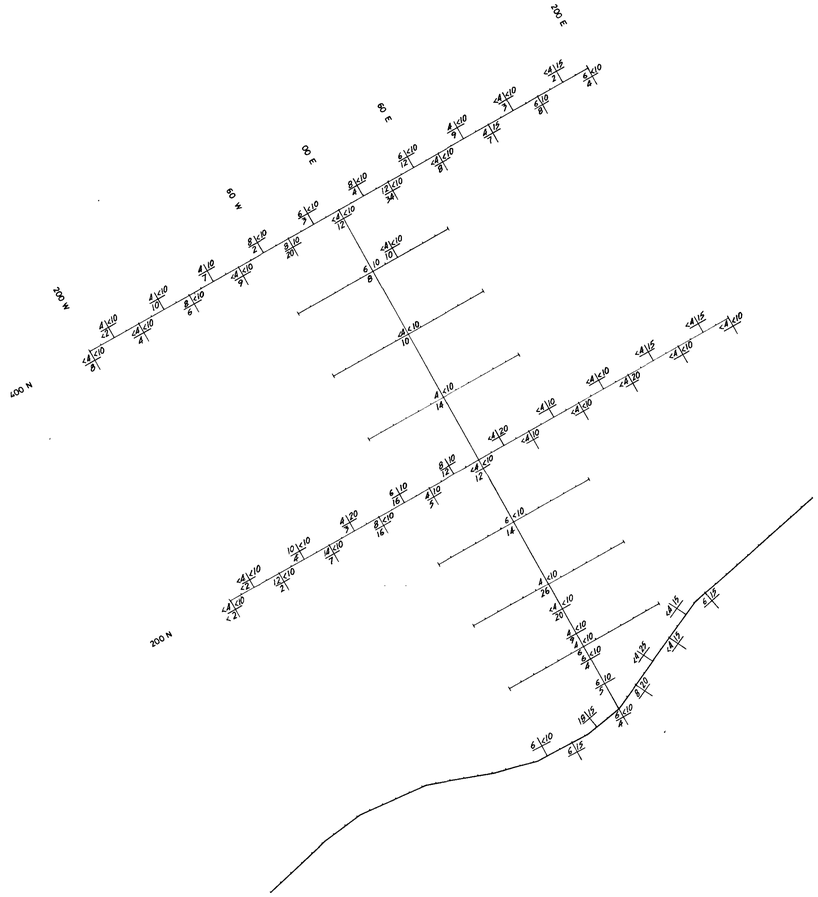
Analyses in ppm
Comlabs AAS2/2A

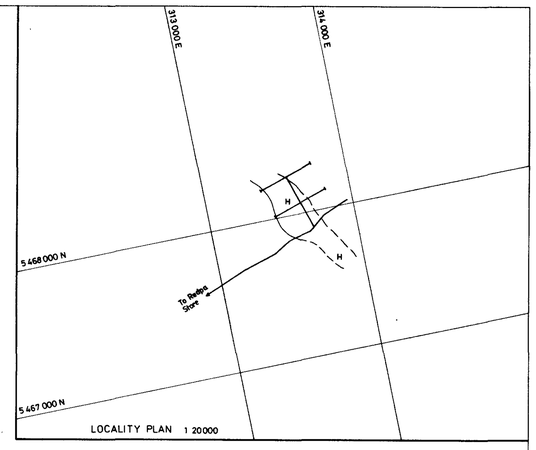
673063

0 50 100M

The Shell Company of Australia Limited METALS DIVISION	
E.L. 49/80 MARRAWAH NORTH EAST AEROMAGNETIC ANOMALY SOIL GEOCHEMISTRY Fe, Mn. 2583 Scale 1:2000	
FIG No	REPORT No
ENCL No	DRG No D/PW447/019
DATE 10-5-82	AUTHOR W.D SMYTH
DRAWN H.L.H.	OFFICE DEVONPORT

82-1872





5 cm

M.N
TN

Sn | W
As

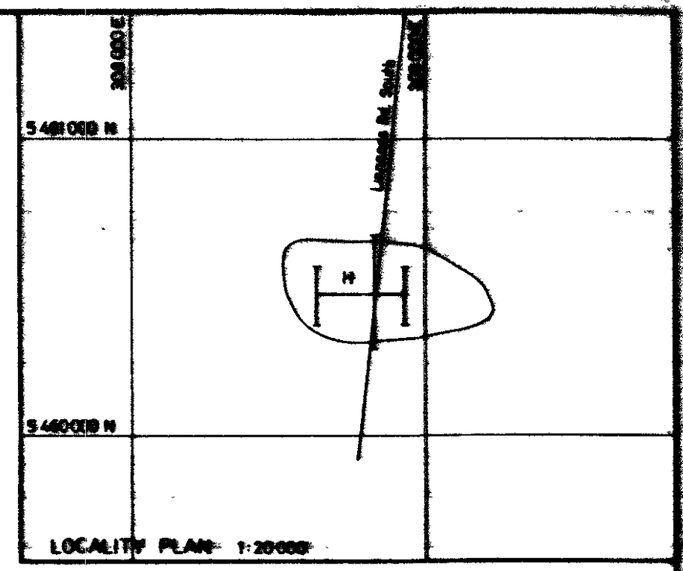
Analyses in ppm
Comlabs XRF 1

673064

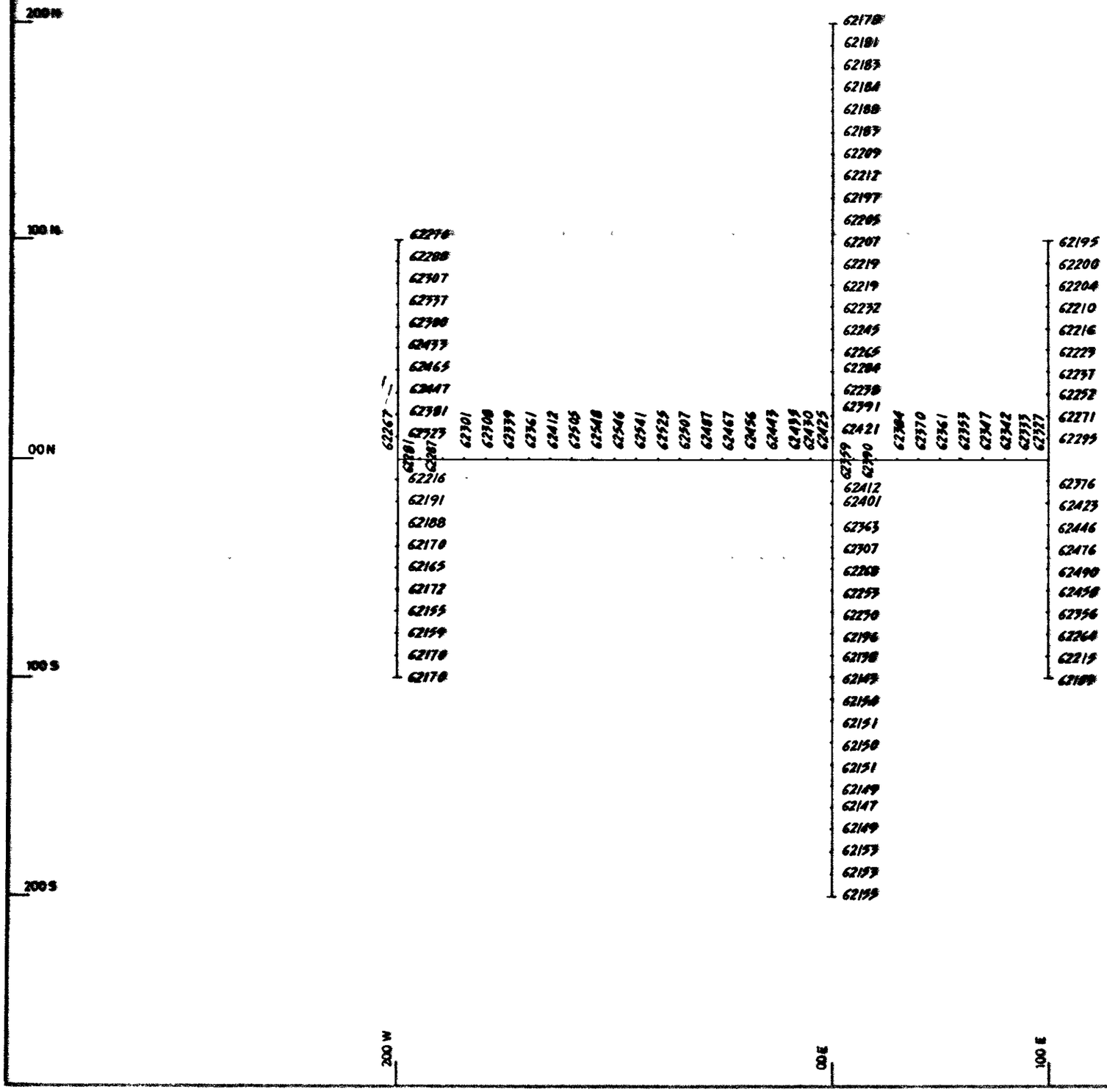
0 50 100M

The Shell Company of Australia Limited METALS DIVISION	
E.L. 49/80 MARRAWAH NORTH EAST AEROMAGNETIC ANOMALY SOIL GEOCHEMISTRY Sn, W, As.	2584
Scale 1:2000	
FIG No	REPORT No
ENCL No	DRG No D/PW44/020
DATE 10-5-82	AUTHOR W D SMYTH
DRAWN H L H.	OFFICE DEVONPORT

82-1872



673065



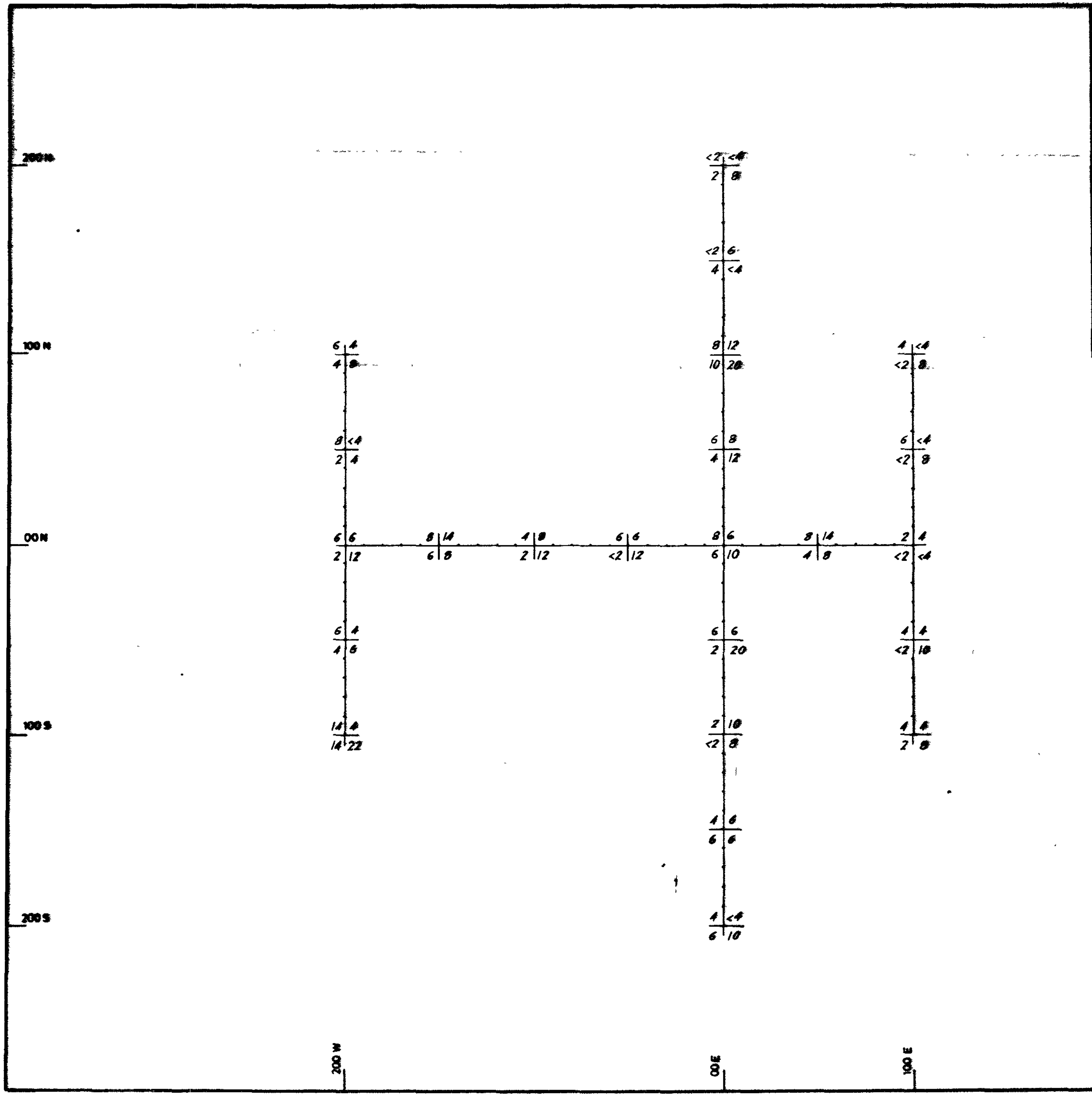
The Shell Company of Australia Limited
METALS DIVISION

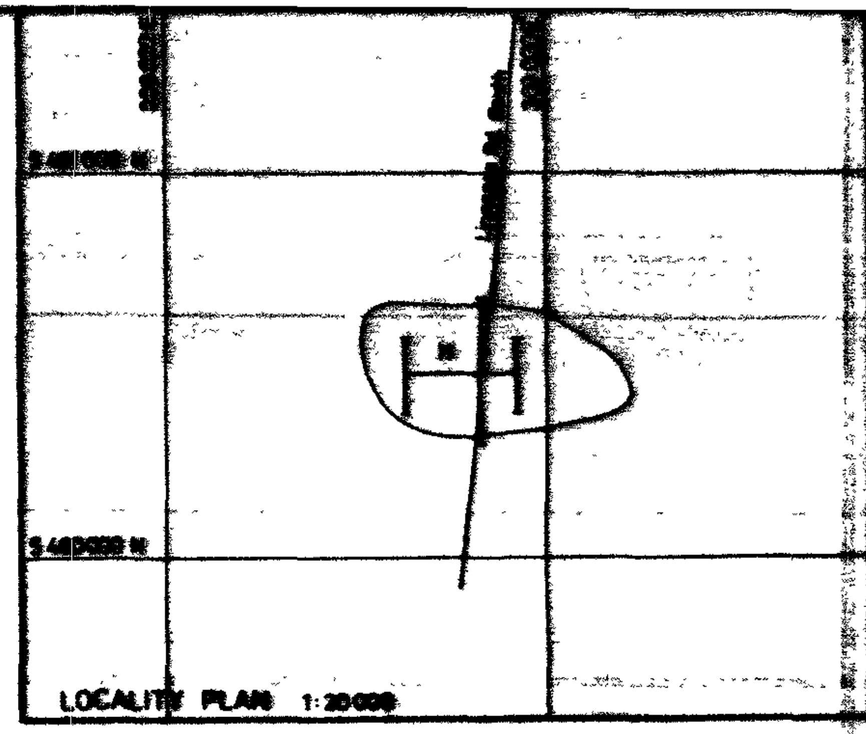
E.L. 49/8 MARRAWAH
LINNANES RD. SOUTH
AEROMAGNETIC ANOMALY
GROUND MAGNETICS

2585

82-1872

SCALE 1: 2000	DATE 10-5-82
AUTHOR W.D. SMYTH	DRAWN H.L.H.
OFFICE DEVONPORT	REP No.
DRG No. D/PW44/011	FIG.No





5 cm

Cu	Pb
Zn	Ni

Analyses in ppm.

673066

0 50 100M

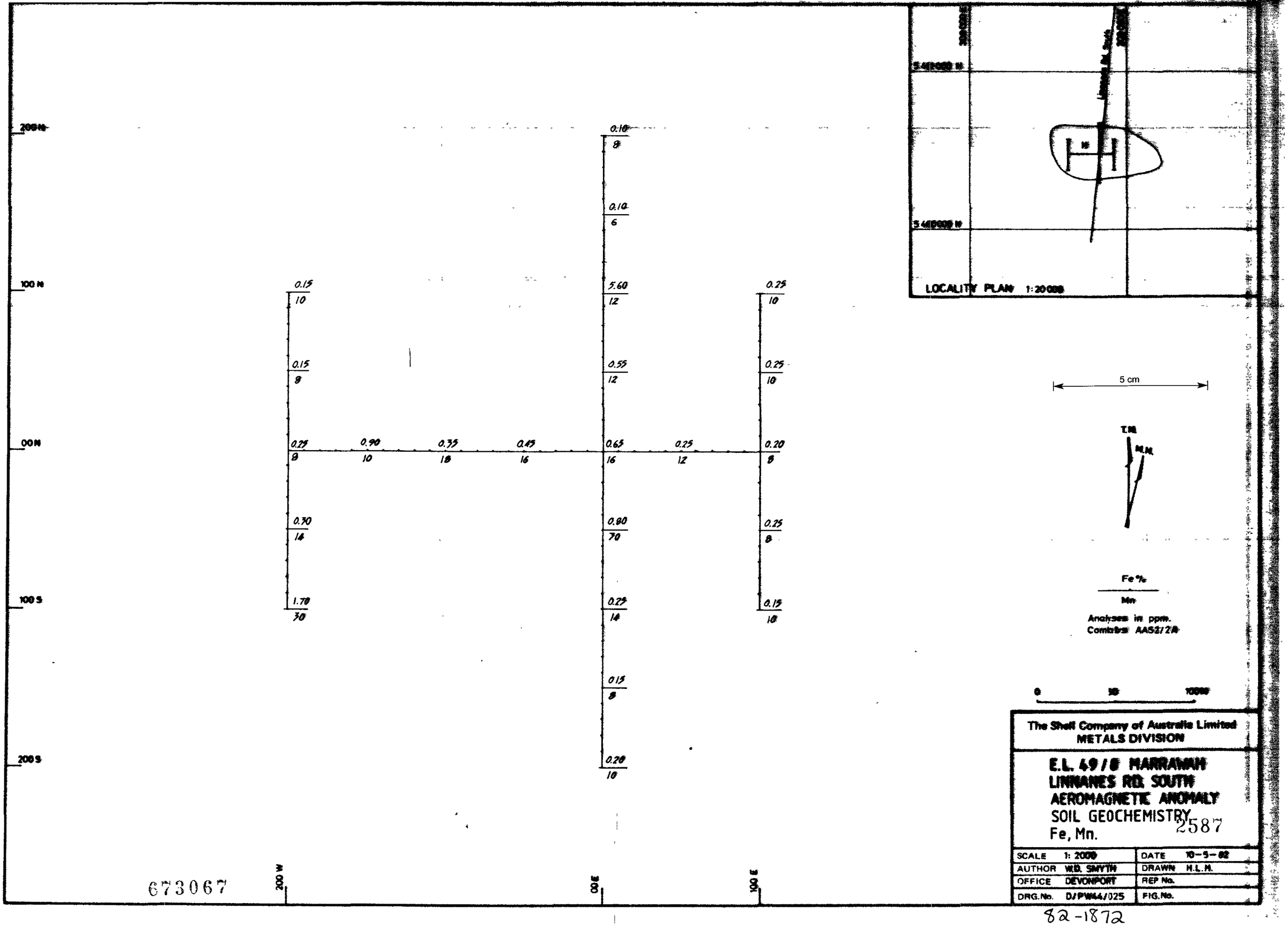
The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/8 MARRAWAH
LINNANES RD. SOUTH
AEROMAGNETIC ANOMALY
SOIL GEOCHEMISTRY
Cu, Pb, Zn, Ni.

2586

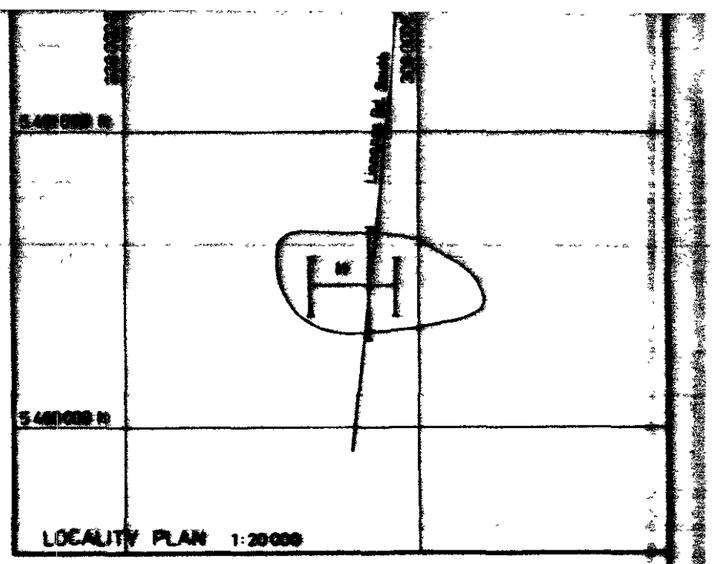
SCALE	1: 2000	DATE	10-5-82
AUTHOR	W.B. SMYTH	DRAWN	H.L.H.
OFFICE	DEVONPORT	REF No.	
DRG.No.	D/PW44/024	FIG.No.	

82-1872



673067

82-1872



5 cm

T.N.
M.N.

Sn | W
As |

Analyses in ppm.
Comlabs XRF 1

673068

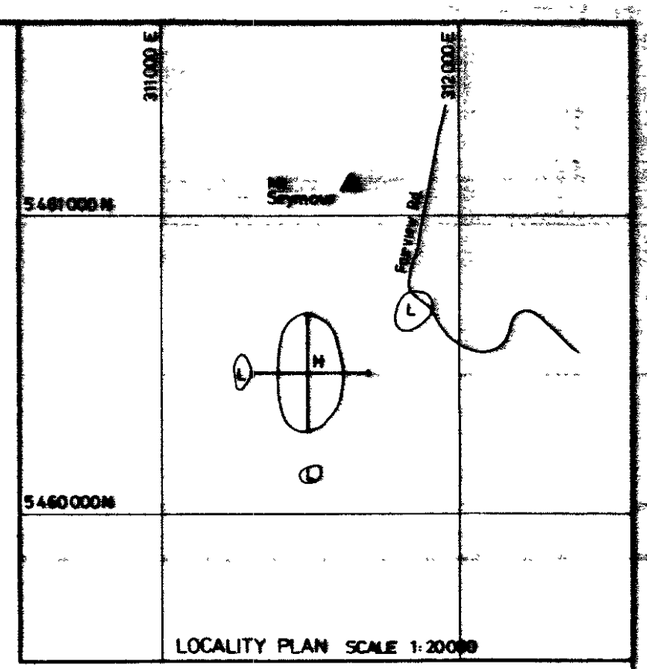
0 50 100m

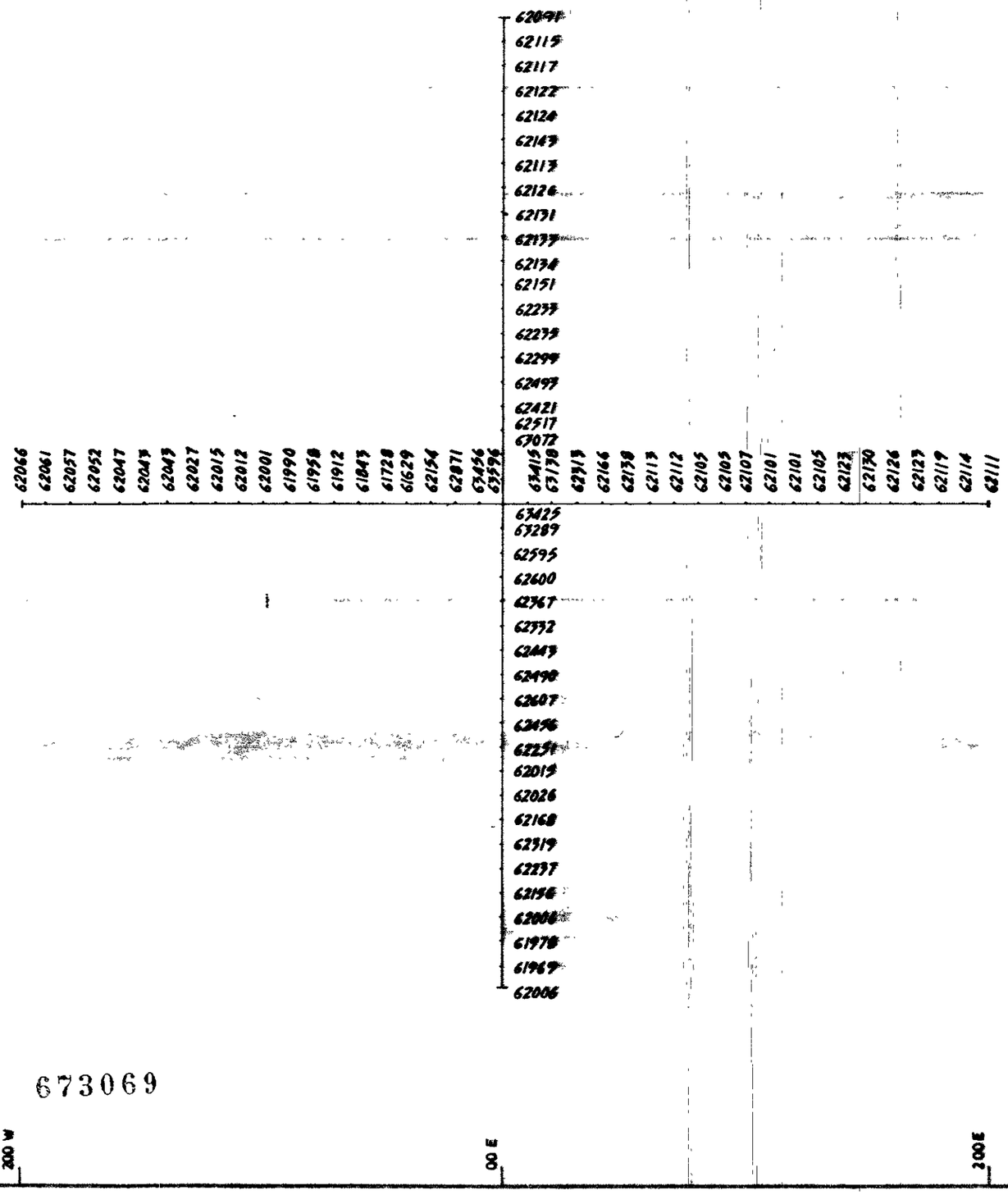
The Shell Company of Australia Limited
METALS DIVISION

E.L. 4918 NARRAWAN
LINNANES RD. SOUTH
AEROMAGNETIC ANOMALY
SOIL GEOCHEMISTRY
Sn, W, As. 2588

SCALE 1: 2000	DATE 10-5-82
AUTHOR W.D. SMYTH	DRAWN H.L.H.
OFFICE DEVONPORT	REP No.
DRG. No. D/PW64/026	FIG. No.

82-1872





5 cm

Proton precession magnetometer
Sensor height 2.5 M

0 50 100M

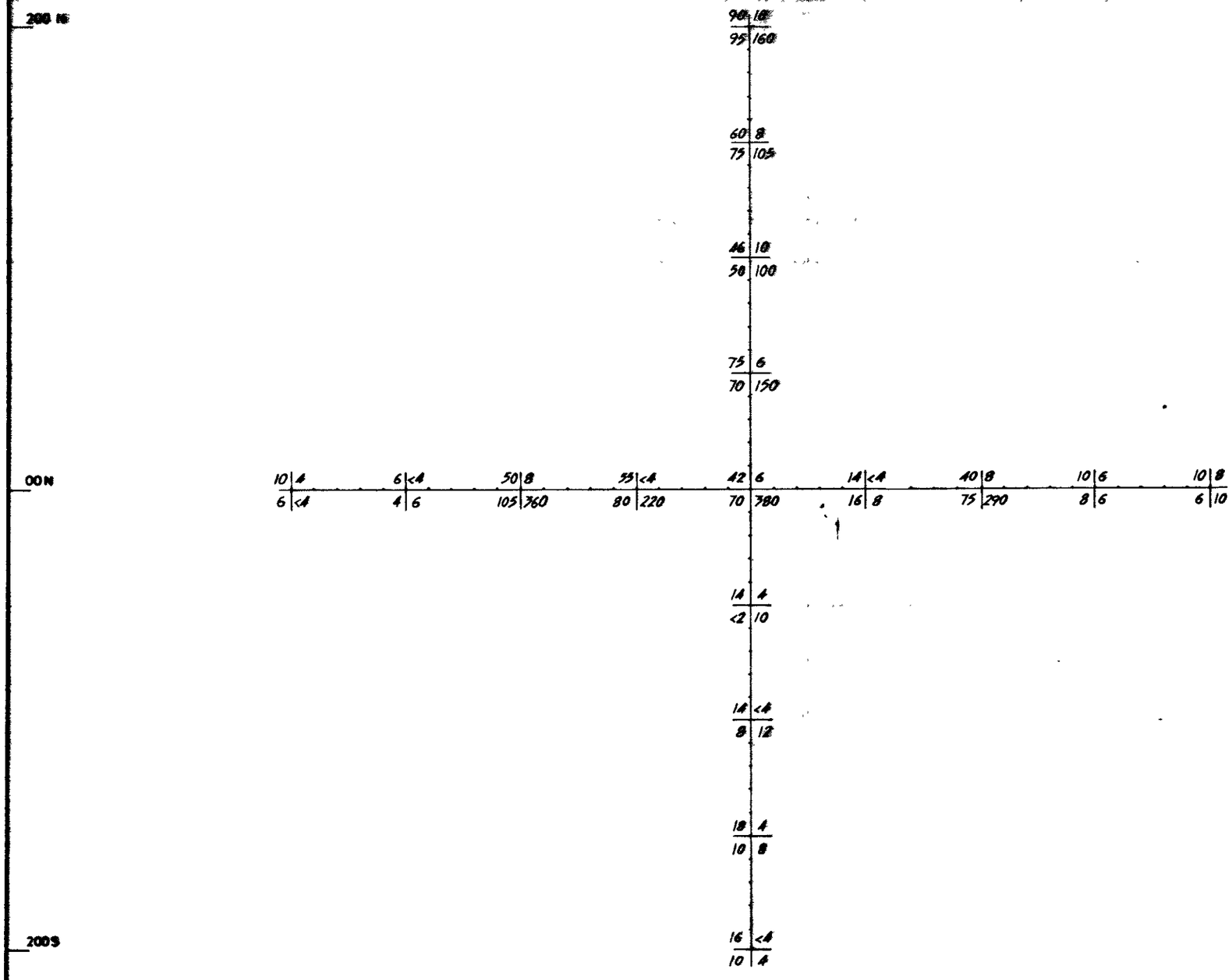
673069

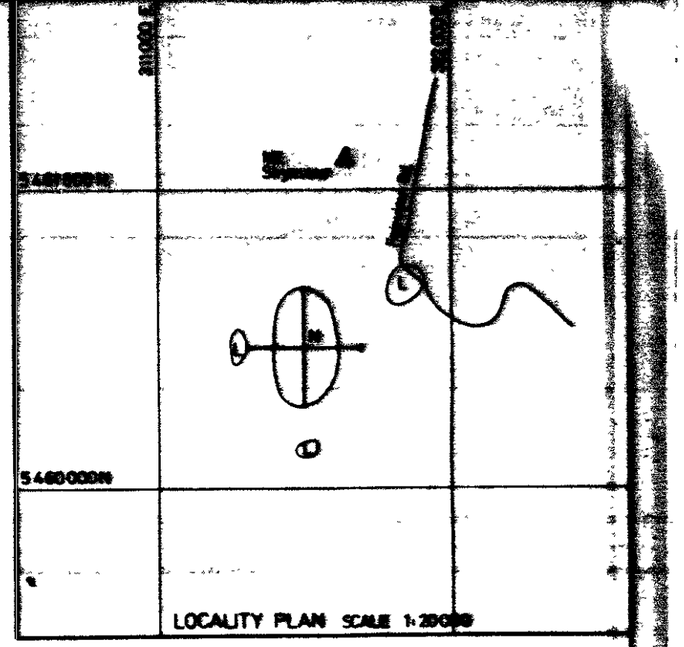
The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/80 MARRAWAH
SOUTH SEYMOUR
AEROMAGNETIC ANOMALY
GROUND MAGNETICS

82-1872 2589

SCALE	1: 2000	DATE	10-5-82
AUTHOR	W.D. SMYTH	DRAWN	H.L.H.
OFFICE	DEVONPORT	REP No.	
DRG. No.	D/PW44/010	FIG. No.	





5 cm

T.N.
M.N.

Cu | Pb
Zn | Ni

Analyses in ppm.
Comlabs AAS-1

0 50 100M

The Shell Company of Australia Limited
METALS DIVISION

E.L. 49/80 MARRAWAH
SOUTH SEYMOUR
AEROMAGNETIC ANOMALY
SOIL GEOCHEMISTRY 2590
Cu, Pb, Zn, Ni.

SCALE	1: 2000	DATE	10-5-82
AUTHOR	W.D. SMYTH	DRAWN	H.L.M.
OFFICE	DEVONPORT	REP No.	
DRG.No.	D/PW64/021	FIG.No.	

673070

82-1872

200 N

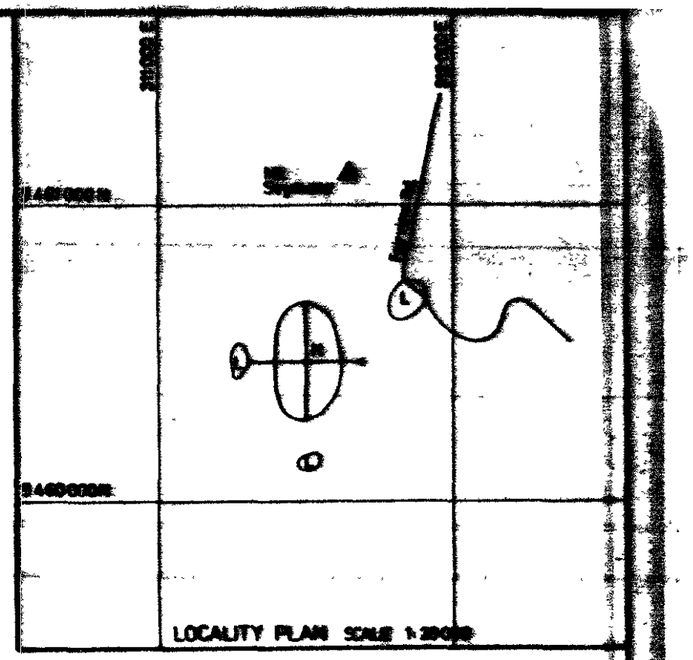
100 N

200S

0.35	0.38	6.70	5.60	6.80	0.45	6.10	0.25	0.35
20	18	320	90	120	12	135	14	18

10.0	3.70	3.90	6.90	0.40	0.35	0.35	0.30
540	1100	70	140	24	19	18	16

200 W 100 E 200 E



5 cm

TN
M.N.

Fe %
Mn

Analyses in ppm
Comlabs AAS2/2

0 50 100M

The Shell Company of Australia Limited
METALS DIVISION

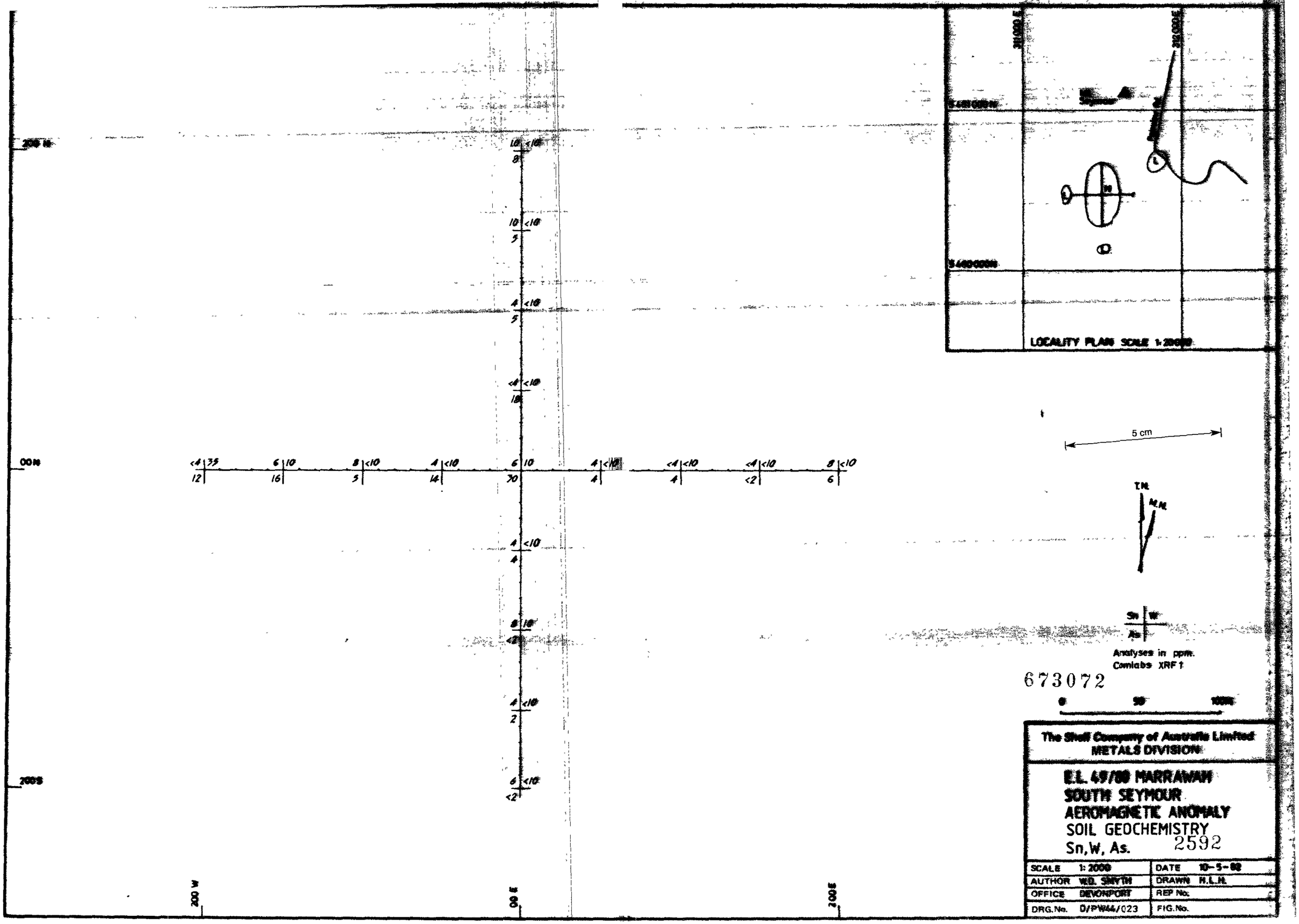
E.L. 49/80 MARRAWAH
SOUTH SEYMOUR
AEROMAGNETIC ANOMALY
SOIL GEOCHEMISTRY
Fe, Mn.

2591

SCALE 1: 2000	DATE 10-5-82
AUTHOR W.D. SMYTH	DRAWN H.L.N.
OFFICE DEVONPORT	REP.No.
DRG.No. D/PWM4/022	FIG.No.

673071

82-1872


200 N
10 <10
8
10 <10
5
4 <10
5
<4 <10
18
<4 35 6 10 8 <10 4 <10 6 10 4 <10 <4 <10 <4 <10 8 <10
12 16 5 14 30 4 4 <2 6
4 <10
4
8 10
<2
4 <10
2
6 <10
<2
000N
200S
200 W
000E
200E
LOCALITY PLAN SCALE 1:20000
5 cm
TN
M.N.
Sn W
As
Analyses in ppm.
Comlabs XRF 1
673072
0 50 100M
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METALS DIVISION
E.L. 49/80 MARRAWAH
SOUTH SEYMOUR
AEROMAGNETIC ANOMALY
SOIL GEOCHEMISTRY
Sn, W, As. 2592
SCALE 1: 2000
DATE 10-5-82
AUTHOR W.D. SMYTH
DRAWN H.L.H.
OFFICE DEVONPORT
REP No.
DRG.No. D/PW44/023
FIG.No.

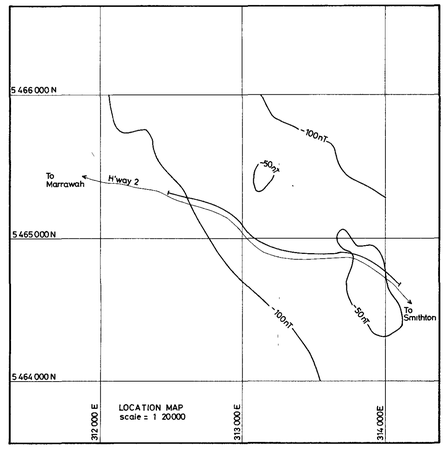
82-1872

E00 E100 E200 E300 E400 E500 E600 E700 E800 E900 E1000 E1100 E1200 E1300 E1400 E1500 E1600 E1640

62135 62064 62108 62099 62110 62019 62126 62154 62070 62881 62098 62074 62081 62086 62086 62081 62074 62104 62077 62063 62115 62095 62134 62146 62116 62135 62124 62119 62104 62129 62112 62115 62136 62194 62126 62156 62117 62273 62245 62141 62162 62136

61959 62095 62100 62094 62108 62098 62125 62136 61948 62118 62088 62088 62071 62071 62064 62077 62106 62085 62073 62136 62106 62136 62117 62147 62121 62158 62118 62093 62105 62150 62116 62126 62141 62129 62180 62132 62089 62230 62136 62136 62146

Uncorrected results



5 cm

Proton Precession Magnetometer
Sensor Height 2 5M

673073

0 100 200M

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METALS DIVISION

E.L.49/80 MARRAWAH
ROAD TRAVERSE – H'WAY 2
EASTERN MAGNETIC HIGH
GROUND MAGNETICS

2593

SCALE 1 2500	DATE 15–7–82
AUTHOR W D SMYTH	DRAWN H.L SMYTH
OFFICE DEVONPORT	REP No
ENCL No	DRG No D/PW44/028

82-1872