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MICROFILMED

INDUCED POLARISATION AND
MAGNETOMETER SURVEYS

VOYAGER 1 & 5
ELLIOTT BAY, TASMANIA

S. T. Mudge

E. L. 27/76

September 1978.

OPEN FILE

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ACCOMPANYING DRAWINGSDRAWING NUMBER

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3712 S/A	Pseudosections of Dipole-Dipole Apparent Resistivity
3713 S/A	Pseudosections of Dipole-Dipole IP Apparent Chargeability (M_{232})
3714 S/A	Pseudosections of Dipole-Dipole IP Apparent Metal Factor (M_{232})
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INTRODUCTION

VOYAGER 1 (previously known as Pender's Prospect) and VOYAGER 5 are located in E.L. 27/76 (Elliott Bay) in south-west Tasmania.

The area is held under licence by Geopeko as part of a base metal exploration tenement.

The prospects lie between Elliott Bay and the Lewis River. VOYAGER 1 is on the coastal headland, about 2.5kms north of Low Rocky Point. VOYAGER 5 is about 1km north-east of VOYAGER 1.

The VOYAGER 1 prospect originated from favourable geological and geophysical results obtained from the 1977 reconnaissance survey of the area.

A combined aeromagnetic and electromagnetic (AEM) survey was flown over the area in 1975 (Georex-Lewis River area). Two AEM anomalies were detected in the vicinity of the VOYAGER 1 prospect, numbers 1 and 7. A magnetic anomaly was also detected north of AEM 7. The magnetic anomaly is VOYAGER 5.

An attempt was made in 1977 to locate AEM 7 using very low frequency-EM (VLF-EM). No significant anomaly was detected. The AEM was thought to be due to the granite contact.

The 1977 surveys included VLF-EM, induced polarisation (IP) and self-potential (SP) surveys over the old Pender's Prospect area, Deakin 1977. Encouraging results

were obtained from these surveys.

During March 1978 IP and magnetometer surveys were conducted on a wide spaced (200m) grid. The grid covers the area from the Lewis River south to a point about 1km north of Low Rocky Point. The grid is bounded on the west by the ocean. It includes the VOYAGER 1 and 5 prospects.

Several traverses of VLF-EM were also conducted in order to evaluate the method in this environment.

The results of these surveys are the context of this report.

GEOLOGY

The prospects are located on a belt of north-south striking quartz porphyries. These rocks exhibit a steep westerly dip and are believed to be the southern portion of the Cambrian Mt. Read volcanics.

A vein, about 2 metres wide, containing magnetite, pyrite, chalcopryite, massive chlorite and quartz outcrops on the headland at VOYAGER 1. The vein strikes at about 45° , the outcrop is near the western end of line 11 000N. An old shallow shaft is associated with the outcrop.

The VOYAGER 5 prospect is located near the quartz porphyry-granite contact. Previous investigations in the area (Lyell-EZ and BHP) had not established the source material of the magnetic anomalies. They may be due to magnetite found in the mineralised vein outcropping at VOYAGER 1.

There is extensive rock outcrop along the ocean headland. The area is otherwise covered by a shallow layer of peat and a button grass plain.

A massive sulphide deposit similar to those found elsewhere in the Mt. Read volcanics is the exploration model.

MAGNETICS

A magnetometer survey was conducted on lines 9 600N to 12 400N inclusive.

The survey was done to locate and define the VOYAGER 5 aeromagnetic anomaly, and also to determine the extent of any magnetic character associated with the outcropping mineralisation at VOYAGER 1.

A Geometrics G816 total field proton precession magnetometer was used for the survey. Readings were taken at 25m intervals.

The baseline (10 000E) was surveyed at 50m intervals. Station 10 000E 11 000N was reoccupied to apply drift corrections.

Profiles of total magnetic intensity are shown in Drawings 3715 S/A and 3716 S/A. Contours are shown in Drawing 3994 S/A.

The VOYAGER 5 anomaly was detected between lines 11 600N and 12 400N, bounded at the east by 10 500E and to the west by 9 900E. The ground survey has shown this prominent aeromagnetic anomaly to be a series of magnetic highs of about 1000nT amplitude. The source may be an irregular shaped body striking approximately north-west or a series of small magnetic veins.

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These are several anomaly zones of 1000nT amplitude exhibiting a generally north-south lineation. These appear to have little correlation with IP results.

The results of the survey are shown diagrammatically in Drawing 3995 S/A.

As the VOYAGER 5 anomaly is somewhat irregular in character and as the survey lines are wide spaced, it is inappropriate at this stage to apply interpretation techniques to the magnetic results.

INDUCED POLARISATION

A dipole-dipole IP survey was conducted on lines 10 800N to 12 200N inclusive. A Hunttec 2.5kw 2 second time domain transmitter was used in conjunction with a Scintrex IPR-8 receiver.

The survey was aimed at determining the extent of the mineralisation exposed at the shaft on VOYAGER 1, and also to test the magnetic anomaly at VOYAGER 5.

The dipole length was 50m, considered a suitable compromise between resolution and depth extent sought.

The dipole arrays for each survey line were centred as follows:-

Line 10 800N	at	9 450E and 9 800E
Line 11 000N	at	9 450E and 9 800E
Line 11 200N	at	9 400E and 9 700E
Line 11 400N	at	9 450E and 9 800E
Line 11 600N	at	9 450E and 9 800E
Line 11 800N	at	9 550E, 9 900E and 10 250E
Line 12 000N	at	9 650E, 10 000E, 10 350E and 10 700E
Line 12 200N	at	9 700E and 10 050E

The results are presented as pseudosections of apparent resistivity, chargeability and metal factor in Drawings 3712 S/A, 3713 S/A and 3714 S/A.

Chargeabilities are those for the M_{232} portion of the Scintrex IPR-8 decay curve.

Signal-to-noise ratios were generally high.

No anomalies were detected on lines 10 800N and 11 000N. The low values of chargeability east of about 9 800E are attributed to the granite. It is from the chargeability data that the interpreted granite contact has been located across the grid, see Drawing 3995 S/A.

Small IP anomalies were detected in the vicinity of 9 500E on lines 11 200N to 11 800N inclusive. This group of anomalies is attributed to the mineralisation that outcrops at the old shaft. The overall correlation between the IP and magnetic results in this zone is poor.

The best developed IP anomaly is at 10 150E 12 000N. The anomaly is coincident with a 1000nT magnetic anomaly of VOYAGER 5. The IP anomaly is of little importance as it indicates a source of small physical dimensions. No IP anomaly was detected on lines 11 600N, 11 800N and 12 200N over the VOYAGER 5 magnetic anomaly.

The survey did not extend south of line 10 800N. Geological results indicated that the southern portion of the grid was on the granite.

VLF-EM

Two traverses of VLF-EM were conducted on lines 11 400N and 9 500E. Line 11 400N was surveyed to evaluate the VLF-EM in locating the granite contact and the mineralisation (IP anomaly) at 9 450N.

Line 9 500E (orientated north-south) was surveyed to correlate the VLF response detected during the 1977 reconnaissance survey with the IP anomalies discussed previously.

A Geonics EM16 VLF receiver was used in conjunction with the signal from the North West Cape (NWC) transmitter. NWC is the only transmitter having sufficient signal strength for survey use in the area. Readings were taken at 25m intervals. Profiles of vertical in-phase and quadrature components are shown in Drawing 3711 S/A.

Plotting of the profiles for line 11 400N is such that an easterly dip of the in-phase component indicates the presence of a conductor. A northern dip applies for line 9 500E. Orientation of the receiver with respect to the primary field is also shown.

The traverse on line 9 500E detected the anomalies of the 1977 reconnaissance survey. The response obtained indicates the presence of conductors at about 11 475N and 11 750N. These anomalies probably indicate the position of the mineralisation between the IP anomalies.

The response obtained on line 11 400N exhibits two poorly defined anomalies at 9 600E and 9 975E. The correlation between these results and the IP anomalies is poor.

The strong in-phase response obtained on line 9 500E has shown that the method may prove useful for locating near surface conductors in this environment.

VERTICAL ELECTRICAL SOUNDING

Schlumberger array vertical resistivity sounding was expanded along line 9 600E at 11 600N. The sounding was conducted to determine the true resistivity of the basement rocks and their probable depth extent. Also to assist in determining the applicability of the VLF-EM method in this environment.

The Huntec 2.5kw IP transmitter was used as the current source. A Fluke 8020A DVM was used to measure the potentials. The sound curve is shown in Drawing 3710 S/A.

Interpretation has indicated a top layer resistivity of 150 ohm-m and layer thickness of 11m, a second layer 400m thick of 1000 ohm-m and a third layer of about 10 ohm-m. The interpreted layer thickness may be excessive as the sounding was unintentionally centred over the low resistivity mineralised zone. However, the sounding does indicate that the volcanic unit has a depth extent of about 400m.

The basement rock resistivity is high (1000 ohm-m) compared to values obtained from the IP survey, about 350 ohm-m (true resistivity). This is attributed to anisotropy. The sounding was expanded along strike whereas the IP survey was normal to strike.

The resistivities are by no means low, thus not precluding the use of VLF-EM.

CONCLUSIONSMagnetics

1. The VOYAGER 5 magnetic anomaly appears to be a north-west orientated zone of magnetic highs.
2. There is little correlation between magnetic and IP results.

IP

1. The IP survey has located the extent of the mineralisation outcropping at the old Pender's Prospect.
2. The IP anomalies indicate the polarisable source to be of small dimensions. As such, of little importance.
3. A small but well developed IP anomaly was detected at VOYAGER 5. It also appears to have little extent.
4. The position of the granite contact has been determined from the IP results.

VLF-EM

1. Strong in-phase VLF-EM anomalies were detected over the zone of the IP anomalies.

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2. The high resistivities of the environment and the good correlation between VLF and IP anomalies indicate that the VLF-EM method may prove useful for further work in the area.

RECOMMENDATIONS

1. The narrow vein of mineralisation has little extent and shows little correlation with magnetic results. No further geophysics is warranted on this area of the VOYAGER 1 prospect.
2. Unless favourable geological and geochemical results are obtained from the VOYAGER 5 magnetic anomaly, no further geophysics is recommended for the prospect.
3. Further geophysical surveys over the magnetic anomalies on the southern end of the grid are also dependent upon geological and geochemical results.

APPENDICESIP Metal Factors

Metal factors for the IP survey were calculated using:-

$$MF = \frac{M_{232}}{\rho_a} \times t \times 2000 \left[\Omega^{-1} \text{ m}^{-1} \right]$$

where

M_{232} = M_{232} portion of the Scintrex IPR-8 decay curve $[\text{mV}^{-1}]$

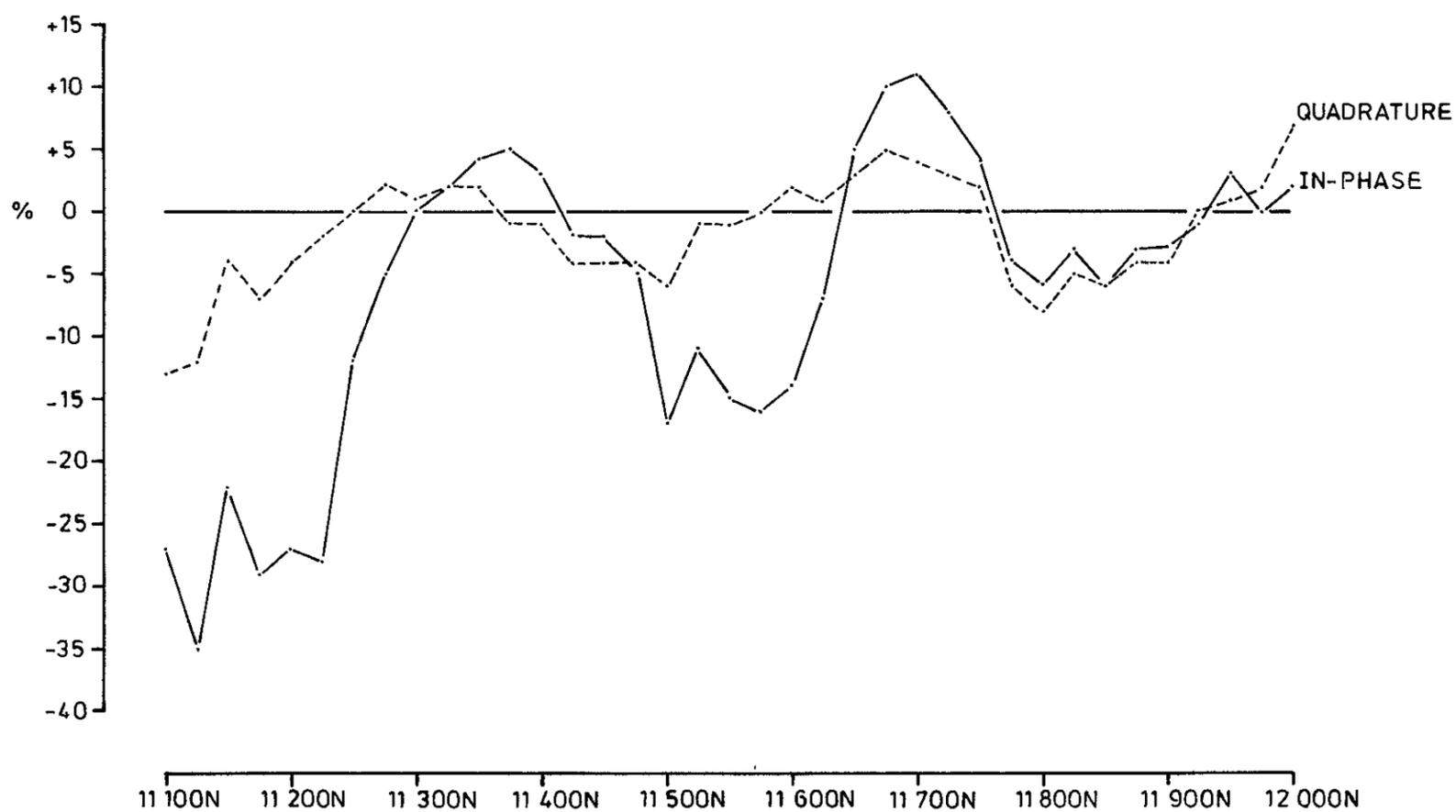
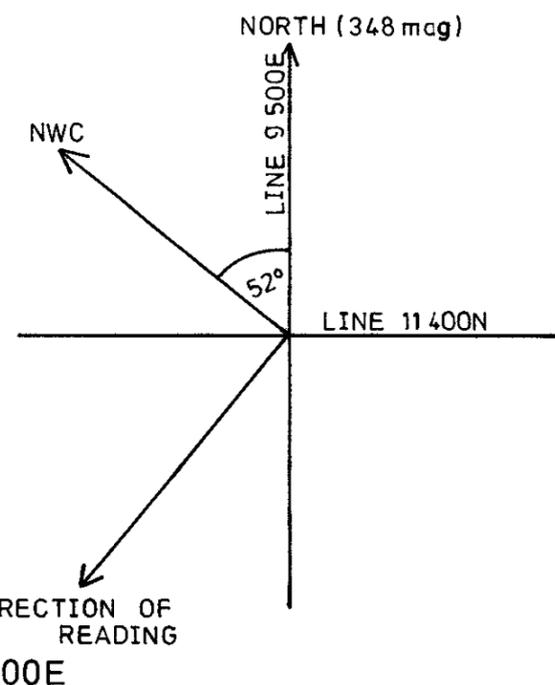
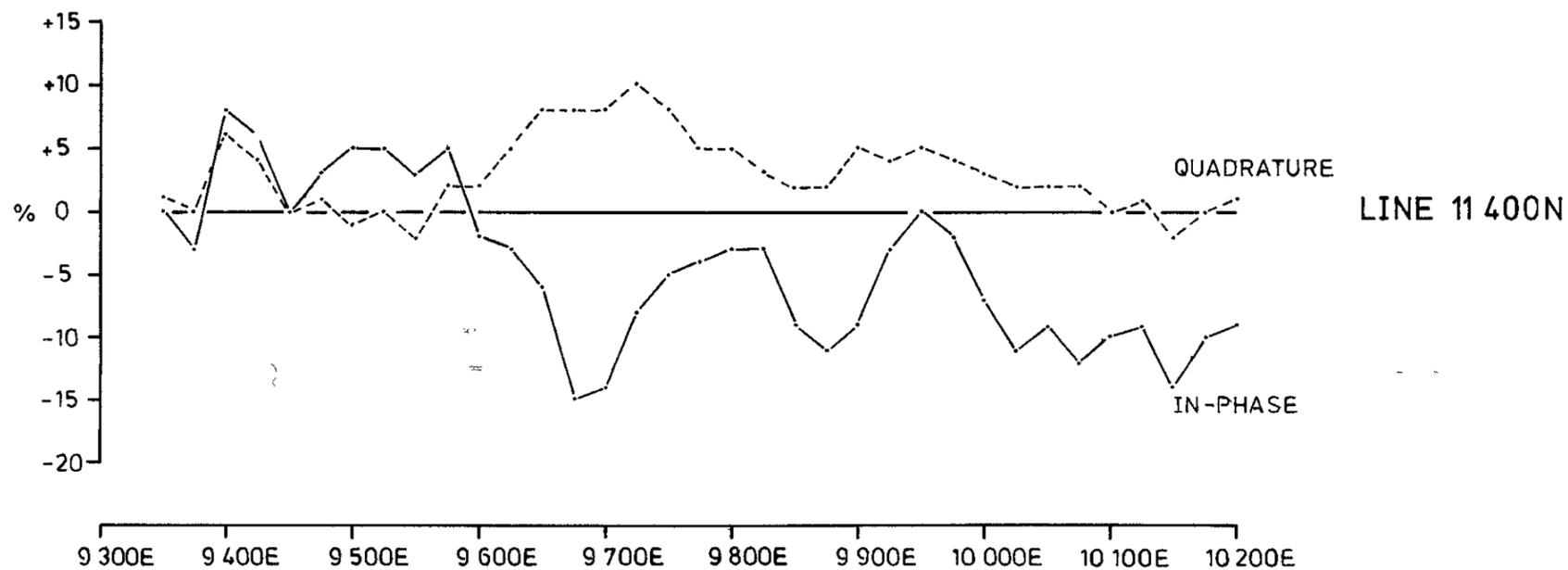
ρ_a = apparent resistivity $[\Omega\text{m}]$

t = integration period for the Scintrex IPR-8 M_{232} component, 520ms.

2000 is a scaling factor to obtain the units $\Omega^{-1} \text{ m}^{-1}$.

REFERENCES

- DEAKIN, R. C. 1977: Geophysical Progress Report on ELLIOTT BAY, E.L. 27/76 Tasmania, (L.A. Richardson & Assoc. Company Report)
- GEOEX PTY. LTD. 1975: Report on Helicopter magnetic and electromagnetic survey in the LEWIS RIVER AREA, Tasmania (for BHP Company Ltd.)



Note:- Transmitter -North West Cape

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5 cm

GEOPEKO LTD.
Geophysical Surveys.

Plan No 3711 S/A 002

Instrument EM 16

Observer P Muir

Scale Fac +

Datum level = 0%

Base Peg

Date

April 1978

Hor Scale 1:5 000

Vert Scale 1cm=5%

Cont Int

AREA

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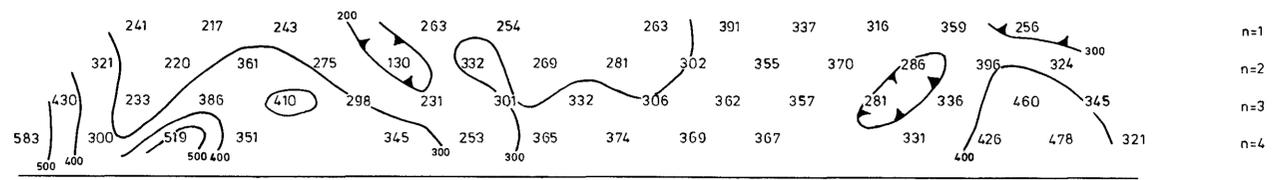
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Elliott Bay-Tasmania

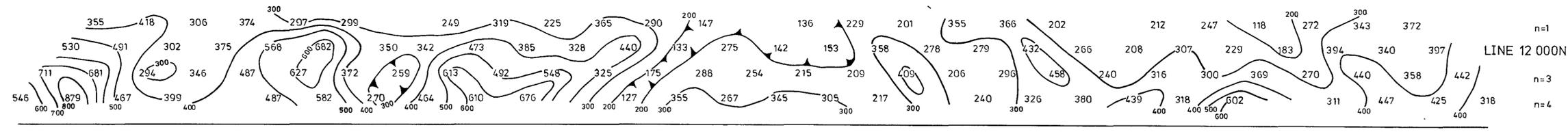
VOYAGER 1

Profiles of VLF-EM

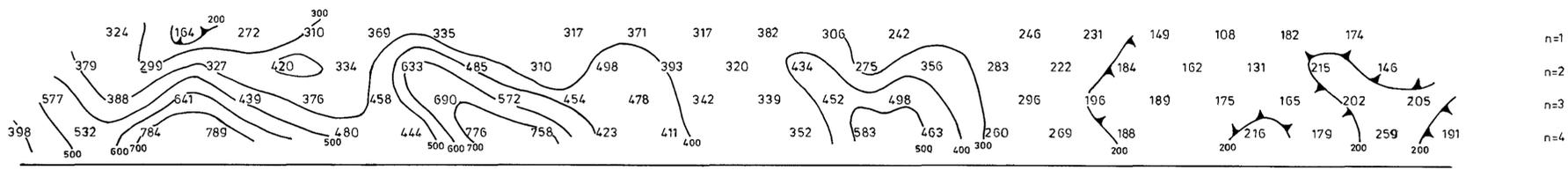




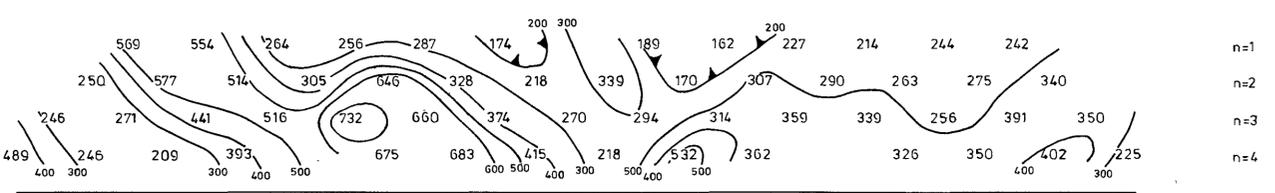
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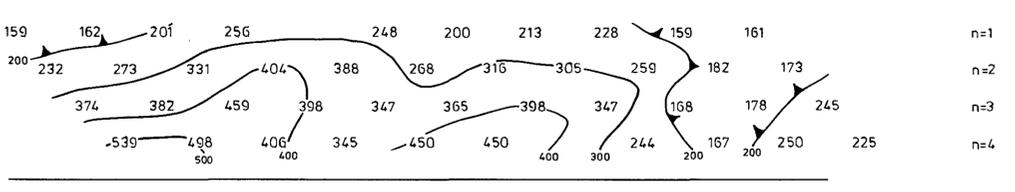
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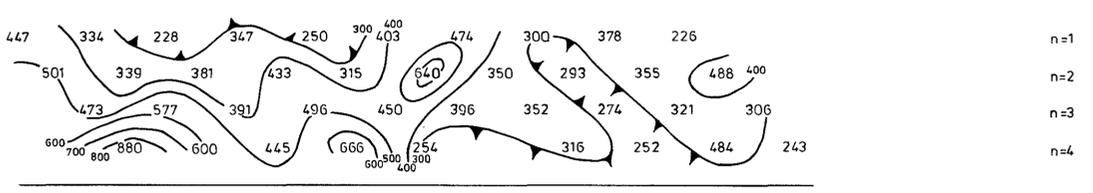
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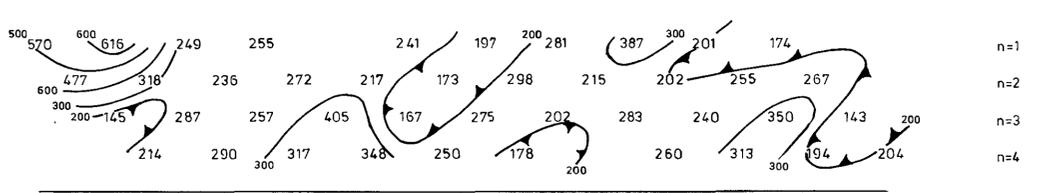
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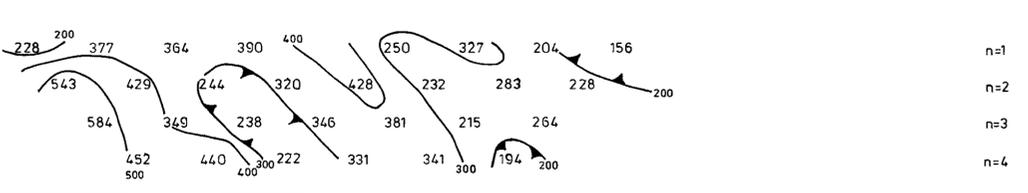
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LINE 11 200N



LINE 11 000N



LINE 10 800N

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5 cm

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GEOPEKO LTD.
Geophysical Surveys
Plan No 3712 S/A

Note - DIPOLE length = 50m

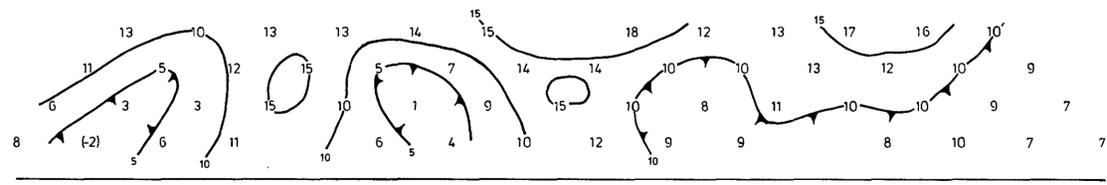
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Date March 1978

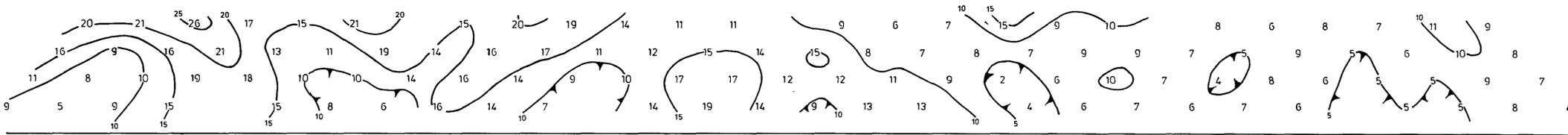
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AREA
PROSPECT
PLAN SHOWS

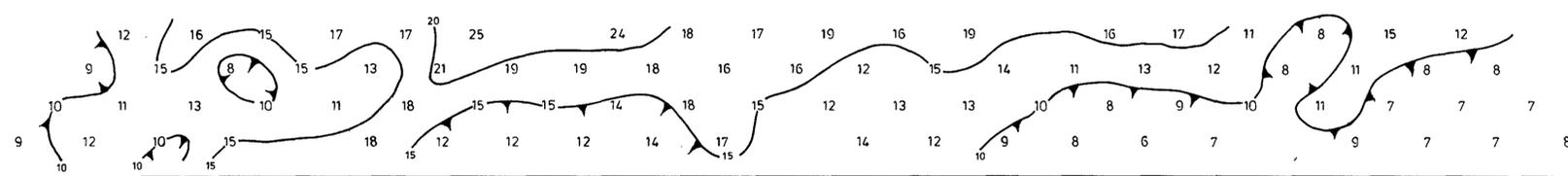
Elliott Bay - Tasmania 003
VOYAGER 1
Pseudosections of Dipole-Dipole Apparent Resistivity (ρ_a)



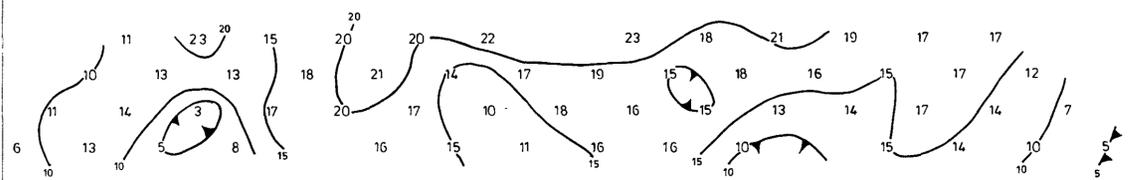
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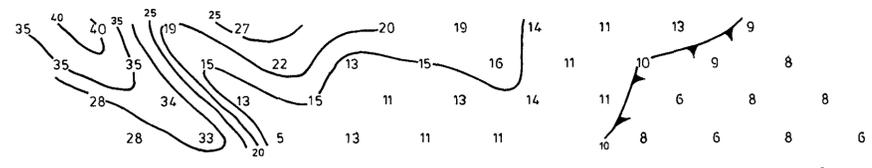
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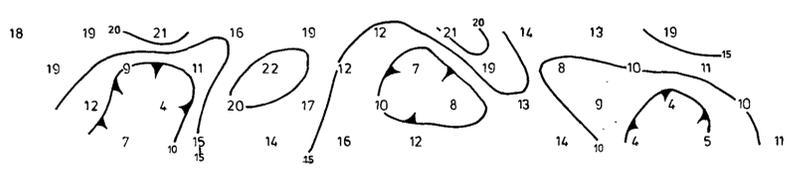
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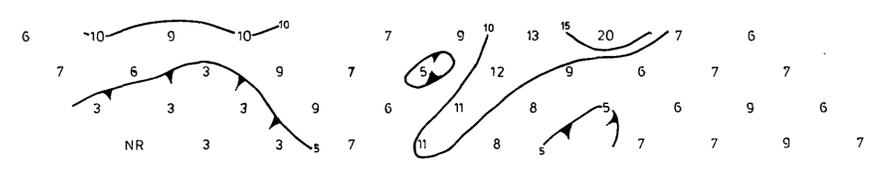
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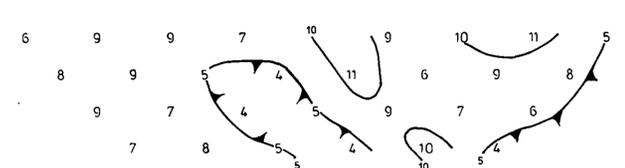
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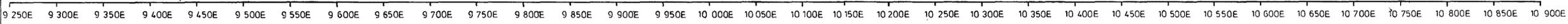
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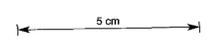
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GEOPEKO LTD.
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Plan No 3713 S/A

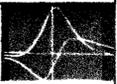
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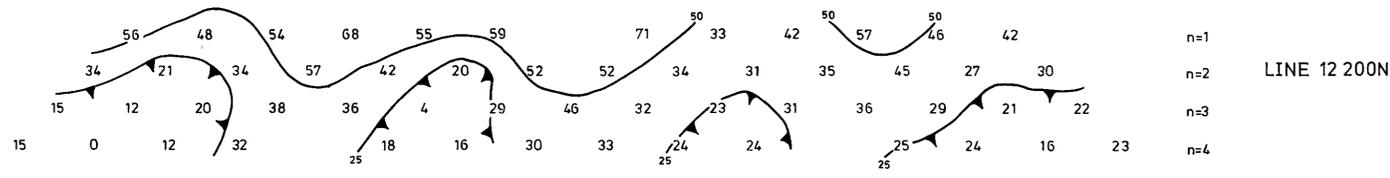
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Date March 1978

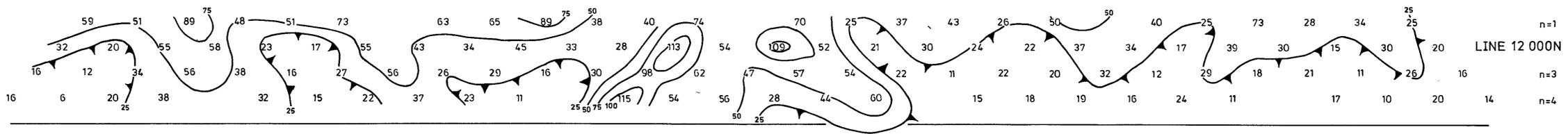
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Cont Int 5mVV⁻¹

AREA Elliott Bay-Tasmania 004
PROSPECT VOYAGER 1
PLAN SHOWS Pseudosections of Dipole-Dipole IP(Apparent Chargeability-M₂₃₂)

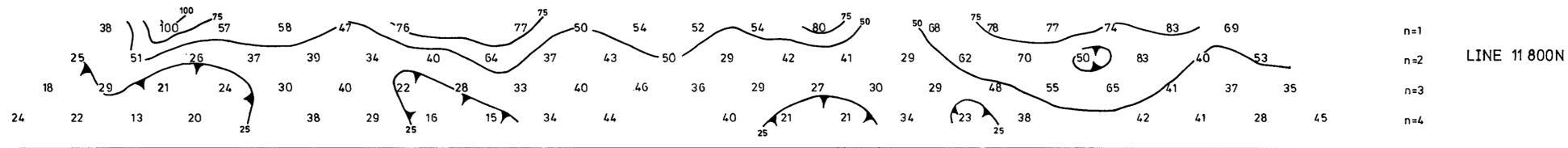




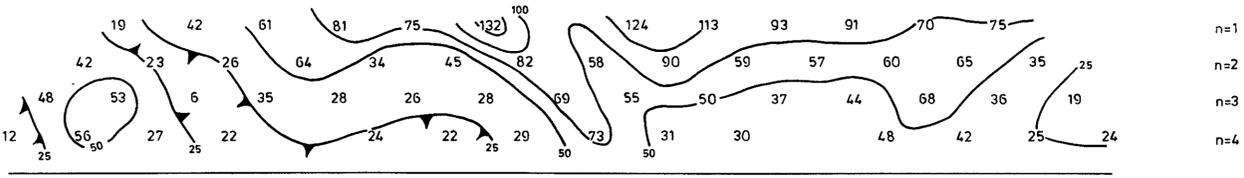
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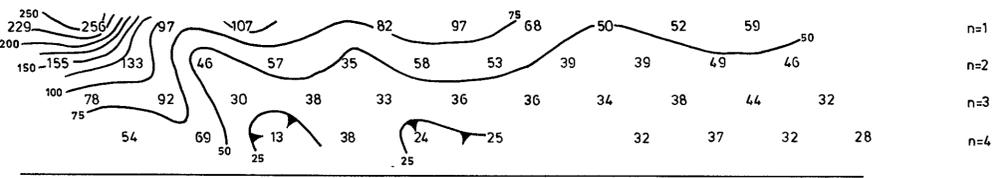
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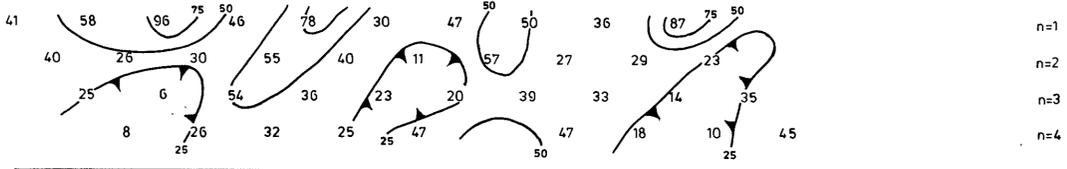
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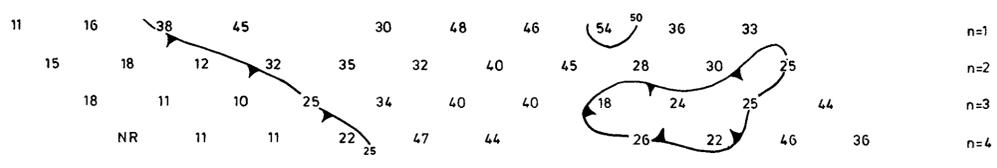
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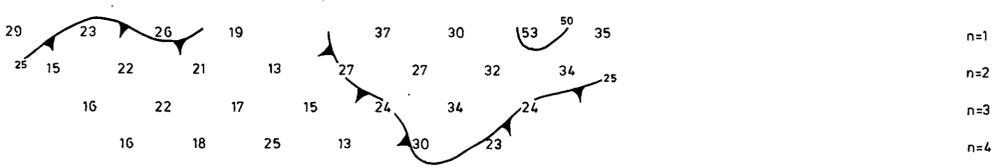
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LINE 10 800N
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5 cm

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GEOPEKO LTD
Geophysical Surveys
Plan No 3714 S/A

Note - DIPOLE length=50m

IPR-8
S.Mudge, P.Muir

March 1978

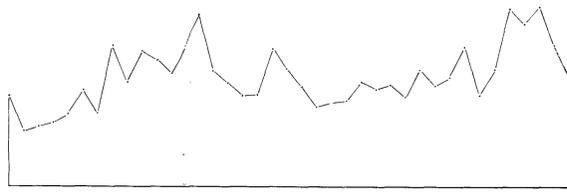
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AREA
PROSPECT
PLAN SHOWS
Elliott Bay-Tasmania
VOYAGER 1
Pseudosections of Dipole-Dipole IP (Metal Factors M_{232})

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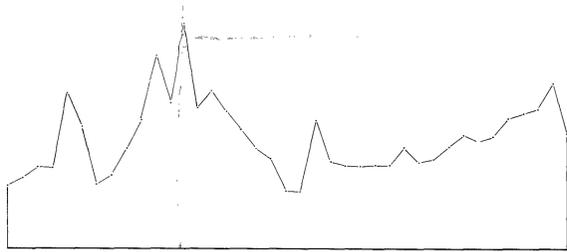


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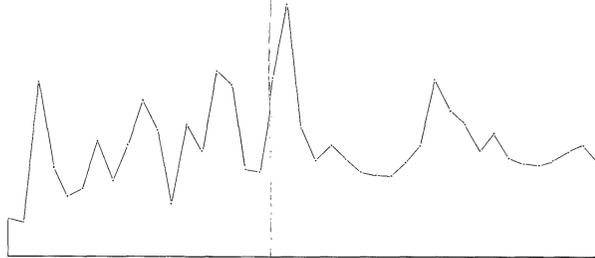
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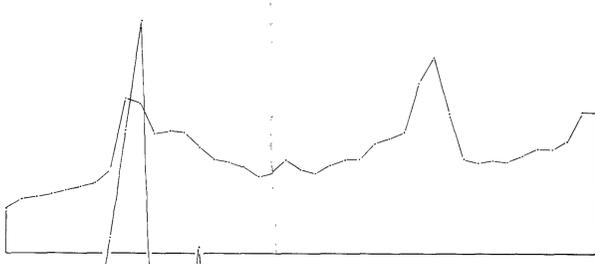
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LINE 10 400N

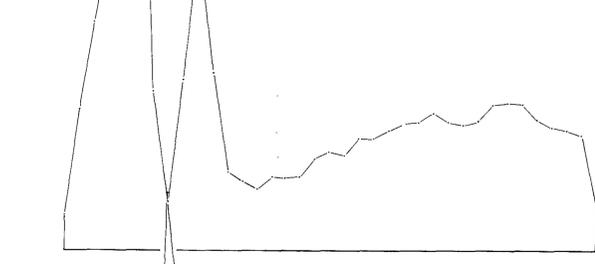
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nT -
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-
62 800 -



LINE 10 200N

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- 63 200
- nT
- 63 000
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- 62 800

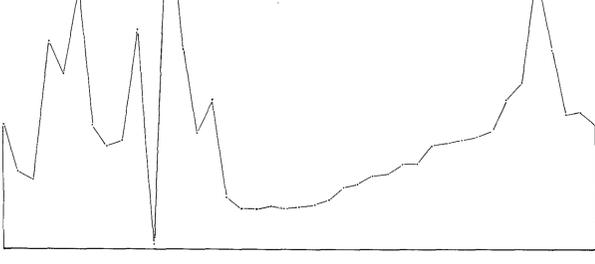
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nT -
63 000 -
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62 800 -



LINE 10 000N

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- 63 400
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- nT
- 63 000
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- 62 800

63 400 -
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63 200 -
nT -
63 000 -
-
62 800 -



LINE 9 800N

- 63 400
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- 63 200
- nT
- 63 000
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- 62 800

63 400 -
-
63 200 -
nT -
63 000 -
-
62 800 -



LINE 9 600N

9 000E 9 100E 9 200E 9 300E 9 400E 9 500E 9 600E 9 700E 9 800E 9 900E 10 000E 10 100E 10 200E 10 300E 10 400E 10 500E

222023

Sheet 1
Sheet 2

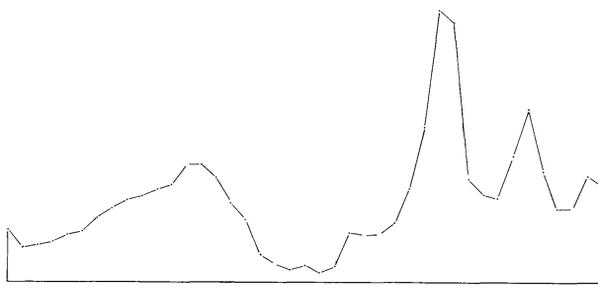
5cm

1:2500

GEOPEKO LTD
Geophysical Surveys
Plan No. 3715 S/A

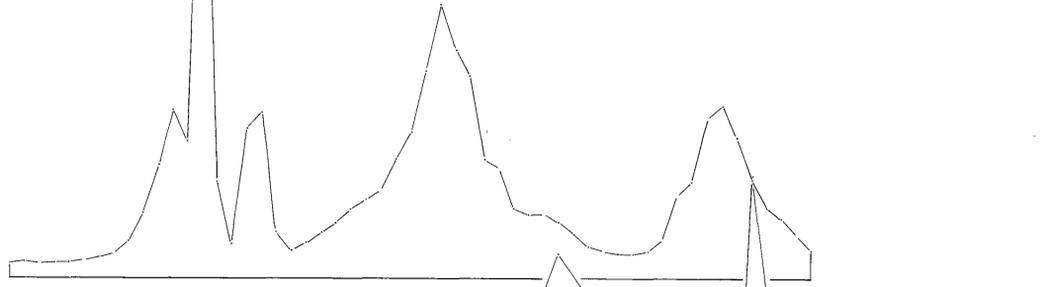
Instrument	G 816	Datum	62 800nT	Hor. Scale	1:5000	AREA	Elliott Bay- Tasmania	006
Observer	S.Mudge, P.Muir	Base Peg	10 000E/11000N	Ver. Scale	1cm=100nT	PROSPECT	VOYAGER 1	
Scale Factor		Date	February 1978	Cont. Int.		PLAN SHOWS	Profiles of Total Magnetic Field Intensity-Sheet 2 of 2	

63 800-
-
63 600-
-
63 400-
-
63 200-
nT
63 000-
-
62 800-



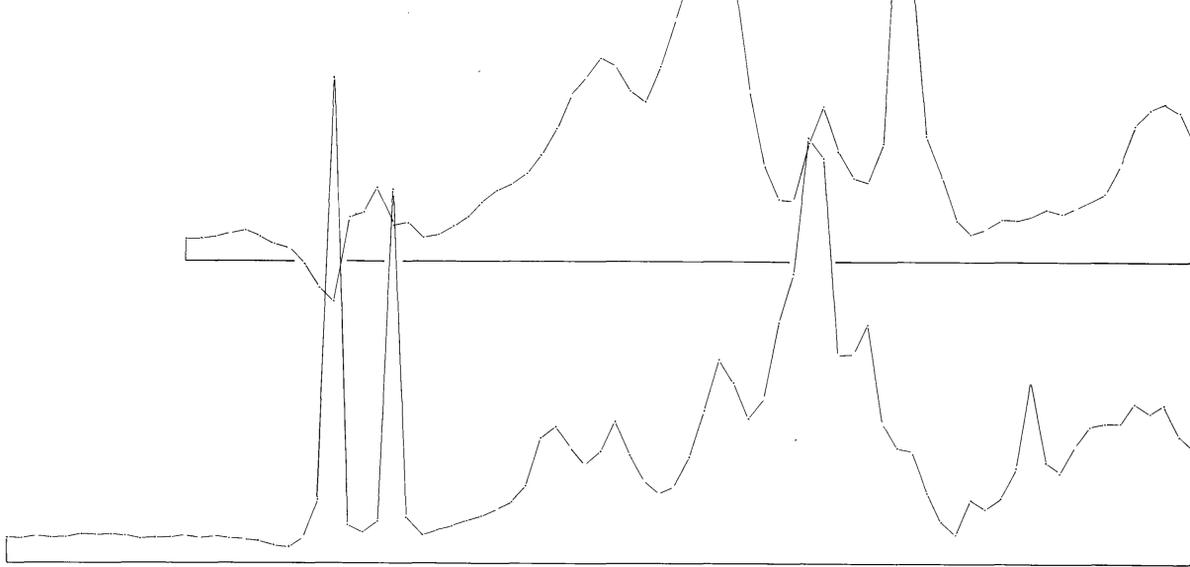
-63 800 LINE 12 400N

64 200-
-
64 000-
-
63 800-
nT
63 600-
-
62 800-



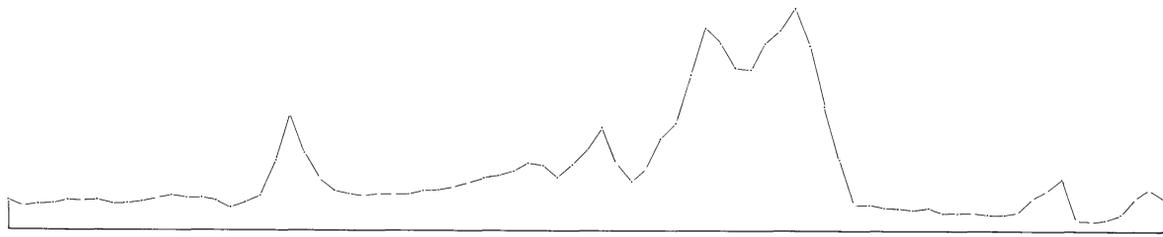
-63 800 LINE 12 200N

63 400-
-
63 200-
nT
63 000-
-
62 800-



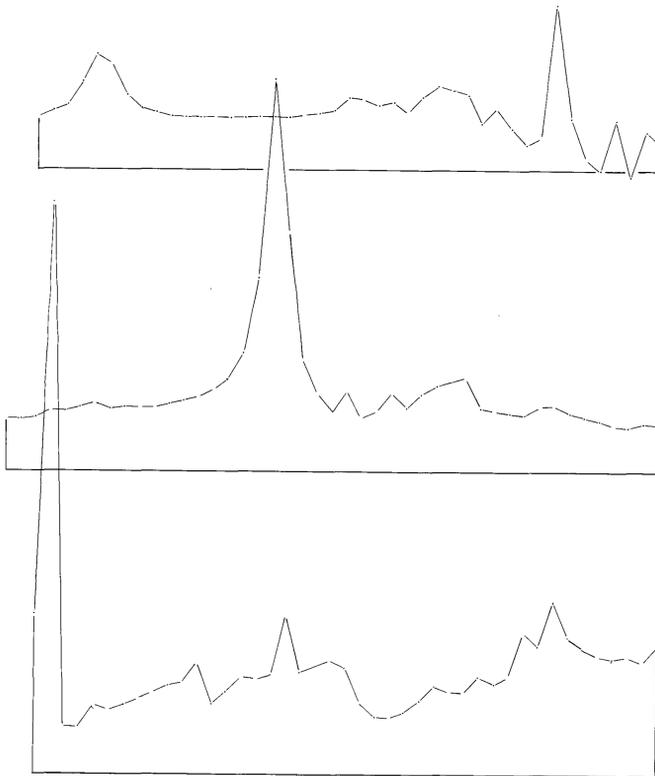
-63 800 LINE 12 000N

63 600-
-
63 400-
-
63 200-
nT
63 000-
-
62 800-



-62 800 LINE 11 600N

64 200-
-
64 000-
-
63 800-
nT
63 600-
-
63 400-
-
63 200-
nT
63 000-
-
62 800-



-63 800 LINE 11 400N

63 600-
-
63 400-
-
63 200-
nT
63 000-
-
62 800-



-63 800 LINE 11 200N

9 000E 9 100E 9 200E 9 300E 9 400E 9 500E 9 600E 9 700E 9 800E 9 900E 10 000E 10 100E 10 200E 10 300E 10 400E 10 500E 10 600E 10 700E 10 800E 10 900E 11 000E

222024

Sheet 1
Sheet 2

5 cm

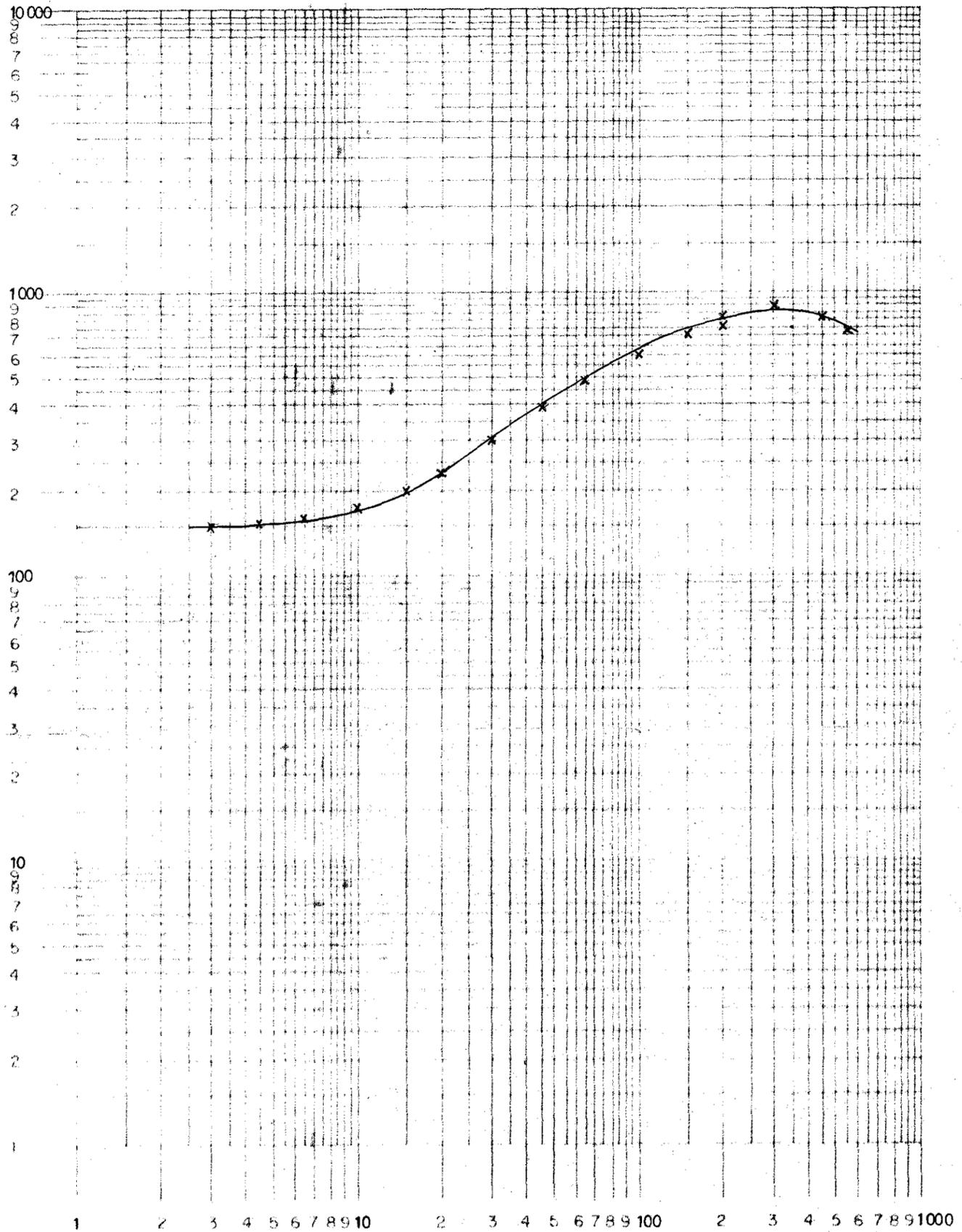
78-1304

GEOPEKO LTD
Geophysical Surveys
Plan No. 3716 S/A

Instrument	G815	Duration	62 800nT	Map scale	1:5 000
Observer	S.Mudge, P.Muir	Base Peg	10 000E/11 000N	Chart scale	1cm=100nT
Scale Factor		Date	February 1978	cont. no.	

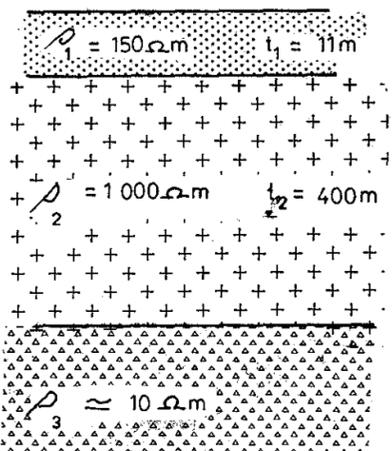
AREA Elliott Bay-Tasmania 007
PROSPECT VOYAGER 1
PLAN SHOWS Profiles of Total Magnetic Field Intensity - Sheet 1 of 2

ρ_a
(Ohm Metres)



AB/2
(Metres)

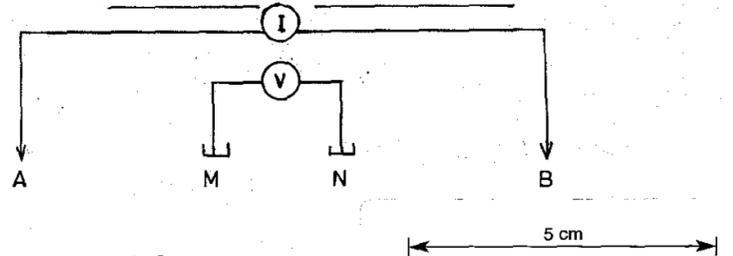
INTERPRETATION



LEGEND

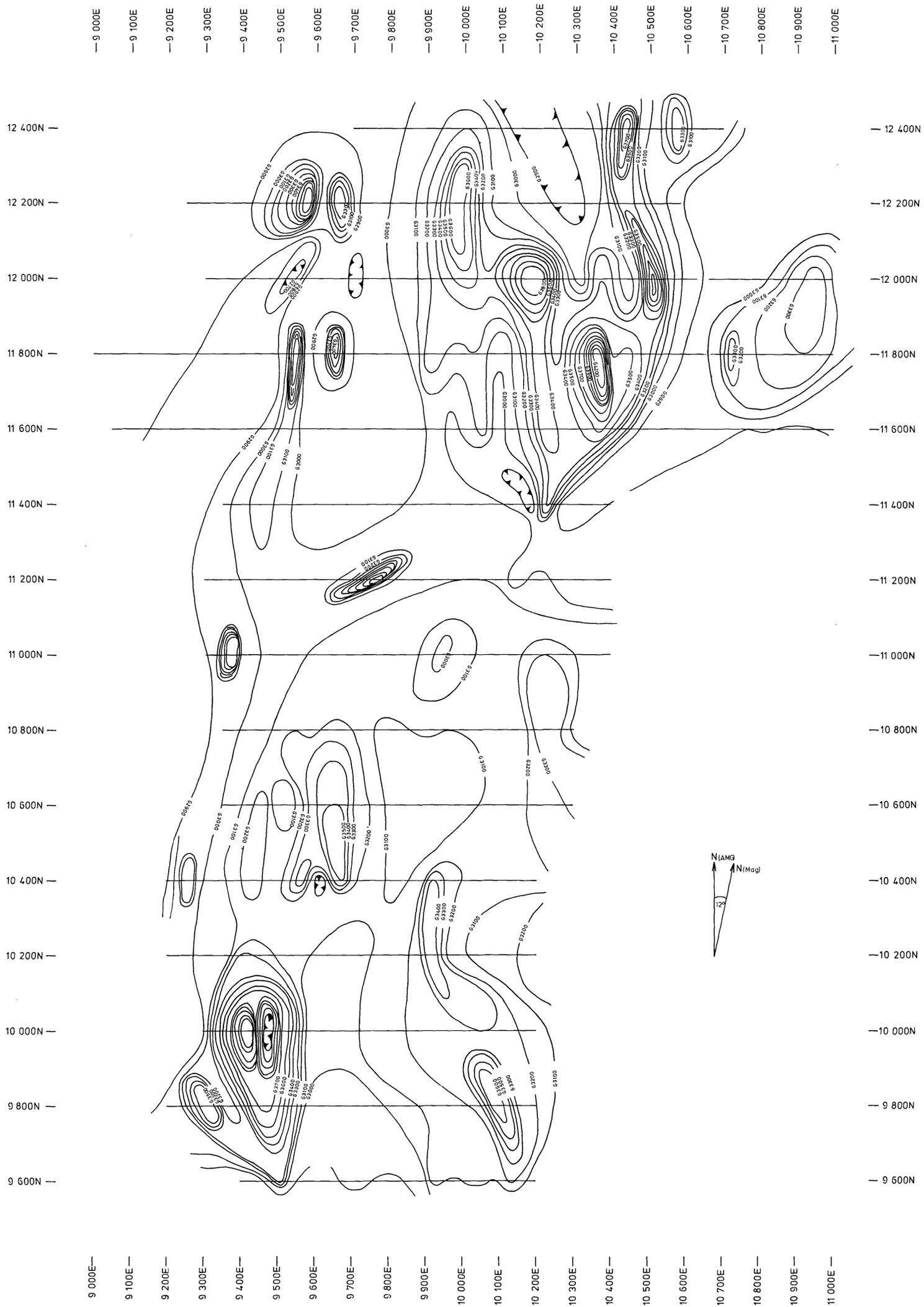
- x Observed field curve.
- Standard curve for interpreted model.

ELECTRODE CONFIGURATION



222025 78-1304

REVISION		GEOPEKS LIMITED	
		ELLIOTT BAY TASMANIA	
		VOYAGER 1	
		VERTICAL ELECTRICAL SOUNDING 001	
		SCHLUMBERGER ARRAY	
LINE 9 600E		S. MUDGE	
EXPANDED AT 11 600N		APRIL 1978	
SCALE	GEOLOGICAL	DATE	
CHECKED:	DRAWN:	DRG No 3710 S/A	

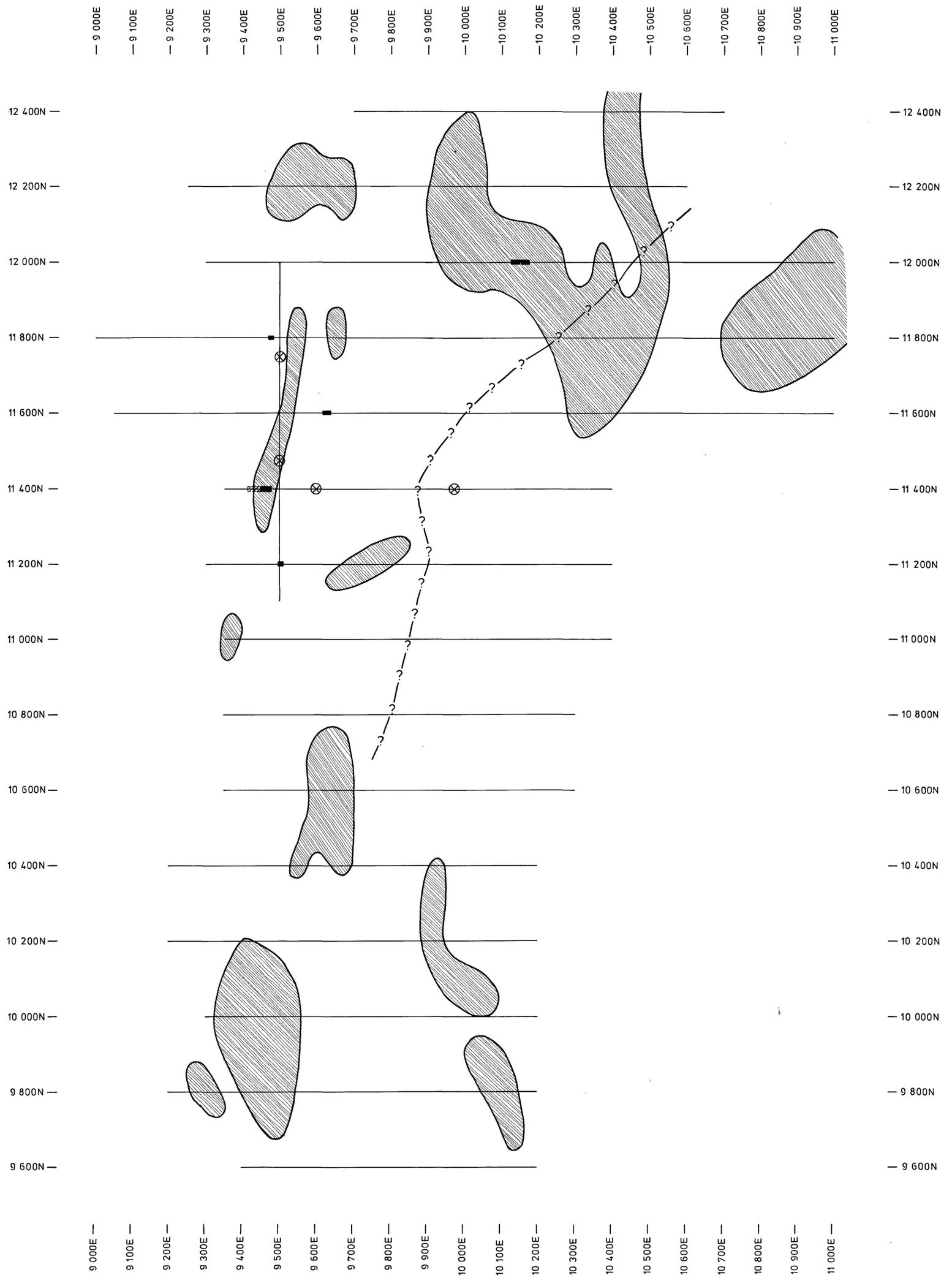


222026

78-1304

5 cm

Instrument	G 816	Observer	S Mudge P Muir	Base Peg	10 000E 11 000N	Hor. Scale	1:5 000	AREA	Elliott Bay - Tasmania	008
Scale	1:5 000	Date	February 1978	Cont. Int.	100 nT	PLAN SHOWS	Contours of Total Magnetic Field Intensity	PROSPECT	VOYAGER 1&5	

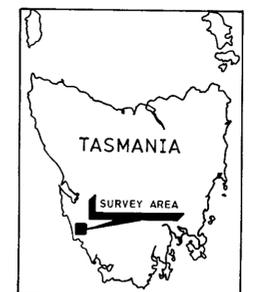
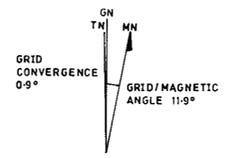
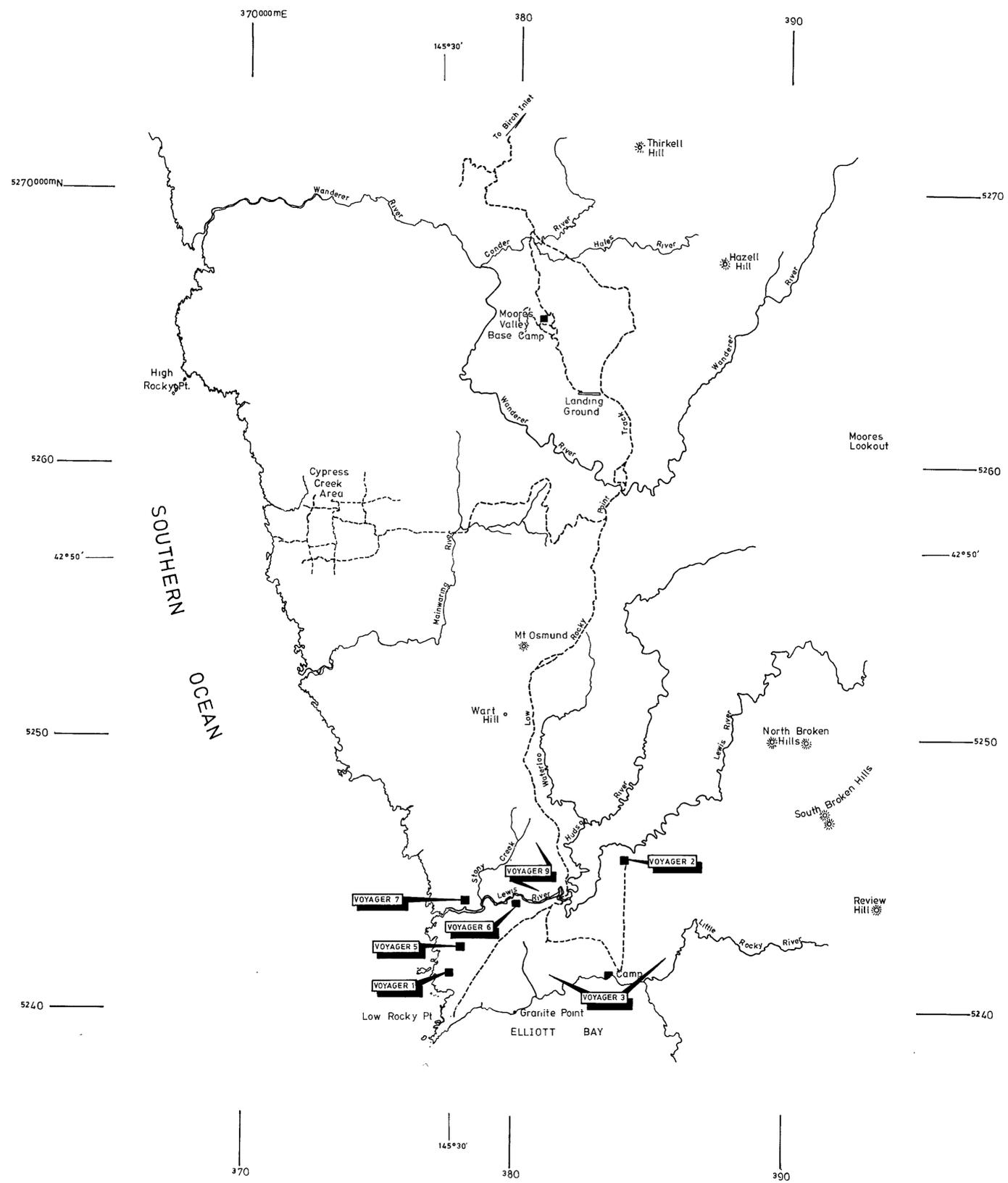


KEY

- ?-?-? Interpretated Granite Contact
- ⊗ VLF-EM:- Interpretated Centre of Conductor
- ▨ Magnetic Anomaly
- ▬ IP:- Polariseable Zone

5 cm 78-1304 222027

Instrument		Datum		Hor. Scale	1:5 000	AREA	Elliott Bay - Tasmania	009
Observer	S. Mudge	Base Peg		Vert. Scale		PROSPECT	VOYAGER 1 & 5	
Scale Factor		Date	February 1978	Cont. Int.		PLAN SHOWS	Diagrammatic Interpretation Summary	



5 cm

78-1306 222018

GEOPEKO LTD
Geophysical Surveys
Plan No. 3964 S/A

Instrument		Column		Map Scale	1:100 000	AREA	Elliott Bay - Tasmania	010
Observer	S. Mudge	Base Peg		Vert. Scale		PROSPECT	VOYAGER PROSPECTS	
Scale Factor		Date	September 1978	Cont. In.		PLAN SHOWS	Location Diagram	