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GEOPHYSICAL SURVEYS

VOYAGER 2

ELLIOTT BAY, TASMANIA

S. T. Mudge

August 1978

OPEN FILE

CONTENTS

	<u>PAGE NUMBER</u>
INTRODUCTION	1
GEOLOGY	2
INDUCED POLARISATION	3
VLF-EM	6
MAGNETICS	8
SELF POTENTIAL	9
VERTICAL ELECTRICAL SOUNDING	10
SUMMARY OF RESULTS	11
CONCLUSIONS	13
RECOMMENDATIONS	14
APPENDICES	15
REFERENCES	16

ACCOMPANYING DRAWINGS

DRAWING NUMBER

- 3697 S/A Vertical Electrical Sounding
- 3698 S/A Profiles of Total Magnetic Field Intensity
- 3699 S/A Profile of Self Potential
- 3700 S/A Pseudosections of dipole-dipole IP Apparent Chargeability (M_{233})
- 3701 S/A Pseudosections of dipole-dipole IP Apparent Resistivity
- 3702 S/A Profiles of VLF-EM
- 3703 S/A Pseudosections of dipole-dipole IP Apparent Metal Factor (M_{233})
- 3964 S/A Voyager Prospects - Location Diagram
- 3965 S/A Diagrammatic Interpretation Summary

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INTRODUCTION

VOYAGER 2 (previously known as the Lewis River Prospect) is 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 prospect is on the southern bank of a right-angled bend in the Lewis River, about 2.5 km north-east of the Lewis River bridge. It is bounded at the north and west by the river. Its location is shown in Drawing No. 3964 S/A.

The prospect was developed following favourable geochemical 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 (Geoex - Lewis River Area). Two AEM anomalies were detected in the vicinity of the VOYAGER 2 prospect. These AEM anomalies were numbered 16 and 25.

An attempt was made in 1977 to locate AEM 25 using very low frequency-EM (VLF-EM). A significant VLF anomaly was detected and thought to be AEM 25.

During March 1978 an induced polarisation (IP) survey was conducted on a wide spaced (200m) grid. VLF-EM and self potential (SP) surveys were also conducted to evaluate these methods in this environment.

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

GEOLOGY

The prospect is located on a belt of north-south striking acid pyroclastics quartz porphyries. They are believed to be the southern portion of the Cambrian Mt. Read volcanic suite.

Several narrow north-south striking veins of sulphide mineralisation outcrop. They exhibit a steep westerly dip. Some old diggings (shallow pits) are associated with them.

There are large areas of outcrop on the prospect, but it is otherwise covered by a shallow layer of peat and button grass plain. Dense forest lies to the north and west of the grid, Lewis River valley.

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

INDUCED POLARISATION

A dipole-dipole IP survey was conducted on lines 9 200N to 10 400N inclusive. A Scintrex 1.5kw 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 mineralised veins exposed at the old diggings, near 10 000N 10 000E.

Line 10 000N was extended west to 9 000E to cover the area of AEM 25. Line 9 200N was extended east to 11 100E in order to locate AEM 16.

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

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

Line 9 200N	at	10 250E and 10 600E
Line 9 400N	at	10 250E
Line 9 600N	at	10 150E
Line 9 800N	at	10 150E
Line 10 000N	at	9 350E, 9 700E and 10 050E
Line 10 200N	at	10 000E
Line 10 400N	at	9 950E

The results are presented as pseudosections of apparent resistivity, chargeability and metal factor. Chargeabilities are those for the M_{232} portion of the Scintrex IPR-8 decay curve. Profiles are shown in Drawing Nos. 3700 S/A, 3701 S/A and 3703 S/A.

Signal-to-noise ratios were generally high.

No significant anomalies were detected on line 9 200N and 9 400N. The low values of resistivity east of 10 650E on line 9 200N may be associated with AEM 16. This zone does not exhibit a high chargeability. The survey has not adequately covered the area of AEM 16.

Lines 9 600N and 9 800N exhibit strong metal factor anomalies west of 10 150E. Both anomalies have associated resistivity lows and high chargeabilities. The causative body has some depth extent. The surveys require extension to the west to provide better definition of the anomalies.

Line 10 000N shows two small metal factor anomalies at 10 075E and 10 175E. They have associated chargeability highs and are located close to the known sulphide mineralisation. The anomalies indicate that this polarisable zone is of small physical dimensions.

A broad zone of low resistivity was detected between 9 200E and 9 600E, the plotted position of AEM 25. The zone has a near surface expression. Chargeabilities are also very low. The resistivity anomaly (and thus AEM 25) are probably due to a zone of high electrical conductivity in the soil.

Lines 10 200N and 10 400N exhibit strong metal factor anomalies between 10 000E and 10 100E. Both anomalies have associated resistivity lows and high chargeabilities. East of about 9 950E the survey lines

are located on the side of a steep slope and there could be a topographic contribution to the anomalies.

The survey has located a narrow (less than about half a dipole length) linear polarisable zone striking north-south along about line 10 050E. Lines 9 200N and 9 400N may require surveying further to the west to detect any further southern extent of this zone.

A summary of these results is included in the diagrammatic summary, Drawing No. 3965 S/A.

VLF-EM

Two traverses of VLF-EM were carried out on lines 9 200N and 10 000N. Line 10 000N was surveyed to establish the relationship between the IP anomalies at 10 075E and 10 175E and the VLF anomaly detected during the 1977 reconnaissance survey. The reconnaissance line is roughly parallel and several metres to the north of line 10 000N.

This VLF traverse was also extended to 9 000E in order to locate AEM 25. Line 9 200N was surveyed to locate AEM 16.

A Geonics EM 16 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 No. 3702 S/A.

Plotting of the profiles is such that an easterly dip of the in-phase component indicates the presence of a conductor. Orientation of the receiver with respect to the primary signal is shown.

The traverse on line 10 000N detected the anomaly of the 1977 reconnaissance survey. The response obtained indicates the presence of two narrow near spaced conductors centred at about 10 050E and 10 200E, coincident with the IP anomalies.

No significant VLF anomaly was detected between 9 200E and 9 600E, the zone of low resistivity and the plotted position of AEM 25. The anomaly at 9 050E appears to be related to the Lewis River. The line crosses the river here.

The strong in-phase response at 10 400E indicates the presence of a conductor at about 10 450E, east of the survey line.

The traverse on line 9 200N exhibits a relatively strong amplitude at 11 000E. This indicates the presence of a conductor at about 11 100E, possibly AEM 16. The IP survey showed that this area also has a low resistivity.

The weak in-phase response at 10 450E is considered of little importance as it has no IP response.

The traverse of line 10 000N has confirmed the good correlation between the IP anomalies and the VLF reconnaissance survey results. It has also indicated that VLF-EM is capable of detecting near surface mineralisation in this environment.

MAGNETICS

A magnetometer survey was conducted on lines 9 200N to 10 400N inclusive as a matter of routine. A Geometrics G816 total field proton precession magnetometer was used, readings taken at 50m intervals.

Profiles are shown in Drawing No. 3698 S/A. The survey did not extend west of 9 700E on line 10 000N or east of 10 600E on line 9 200N.

No anomalies were detected. There is no magnetic response associated with the outcropping mineralisation.

SELF POTENTIAL

A single traverse SP survey was conducted on line 10 000N, between 9 100E and 10 400E. The survey was done to determine if the outcropping sulphide mineralisation (and IP anomaly) had an associated SP anomaly.

A Fluke 8020A DVM was used with a pair of non-polarising copper in copper sulphate electrodes. Readings were taken at 50m intervals with respect to a base established at 9 700E. The profile is shown in Drawing No. 3699 S/A.

No anomaly was detected. This indicates that either the environment or mineralisation style is not suited, to the SP method, or that insufficient sulphide mineralisation is present for the development of a significant SP anomaly.

VERTICAL ELECTRICAL SOUNDING

A Schlumberger array vertical resistivity sounding was expanded along line 10 000E at 9 700N. The sounding was conducted to determine the true resistivity of the basement rocks, and to assist in determining the applicability of the VLF-EM method in this environment.

The Scintrex 1.5kw IP transmitter was used as the current source. A Fluke 8020A DVM was used to measure the potentials.

The sounding curve is shown in Drawing No. 3697 S/A. The discontinuities in the curve are most probably due to lateral inhomogeneities. As such, interpretation in terms of layer thickness is considered inappropriate.

The curve shows a true resistivity of about 1800 ohm-m for the outcropping rocks at 9 700N 10 000E. This value is high compared to values obtained in the IP survey, about 270 ohm-m. This is attributed to local variations in geology.

SUMMARY OF RESULTSIP

1. The IP survey has located a narrow (less than half a dipole length) north-south striking polarisable zone along line 10 050E.
2. The most encouraging anomalies are on lines 9 600N and 9 800N. Extensions of these lines to the west is required to adequately define the anomalies.
3. No significant anomaly was detected in the area of AEM 25. Near surface resistivities are low in this area, possibly the cause of the airborne anomaly.
4. AEM 16 was not adequately tested by the survey.

VLF-EM

1. The anomaly on line 9 200N at 11 100E may be related to AEM 16.
2. No significant anomaly was detected in the vicinity of AEM 25.
3. A significant anomaly was detected in association with the IP anomalies on line 10 000N.

Magnetics

1. No magnetic anomalies were detected, confirming the results of the airborne survey.

Resistivity

1. The exposed rocks at 9 700N 10 000E have true resistivity of about 1800 ohm-m.
2. The values obtained in the IP survey (normal to strike) are of the order of 270 ohm-m.
3. The large contrast in measured resistivities (with respect to strike) is attributed to anisotropy.

SP

1. No SP anomaly was detected over the area of known sulphide mineralisation.

CONCLUSIONS

The IP survey has been successful in mapping the extent of the mineralisation across the grid. A significant VLF anomaly was detected in association with this mineralised zone indicating that this method is suitable for any further work in the area.

The insignificant IP and VLF response of AEM 25 indicates this anomaly is of little importance.

The VLF survey on line 9 200N may have detected AEM 16. It has not been located and recommendations are made for further work in that area, pending favourable geological results.

Recommendations have also been made for the extension of line 9 200N west to locate any southern extent of the linear IP anomaly. This extension would also be subject to favourable geological results.

RECOMMENDATIONS

If the combined results of geology, geochemistry and geophysics indicate that further work is warranted on the prospect, it is recommended that line 9 200N be extended west. An extension of the VLF-EM survey along this line should be capable of detecting any southern extent of the linear IP anomaly.

No further work is recommended on AEM 25 as it exhibited no significant IP response.

AEM 16 has not been adequately tested by the IP survey. If the geological results in the area are encouraging, it is recommended that the IP survey on line 9 200N be extended east to test AEM 16.

APPENDICESIP Metal Factors

Metal factors for the IP survey were calculated using:-

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

where

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

ρ_a = apparent resistivity $[\Omega m]$

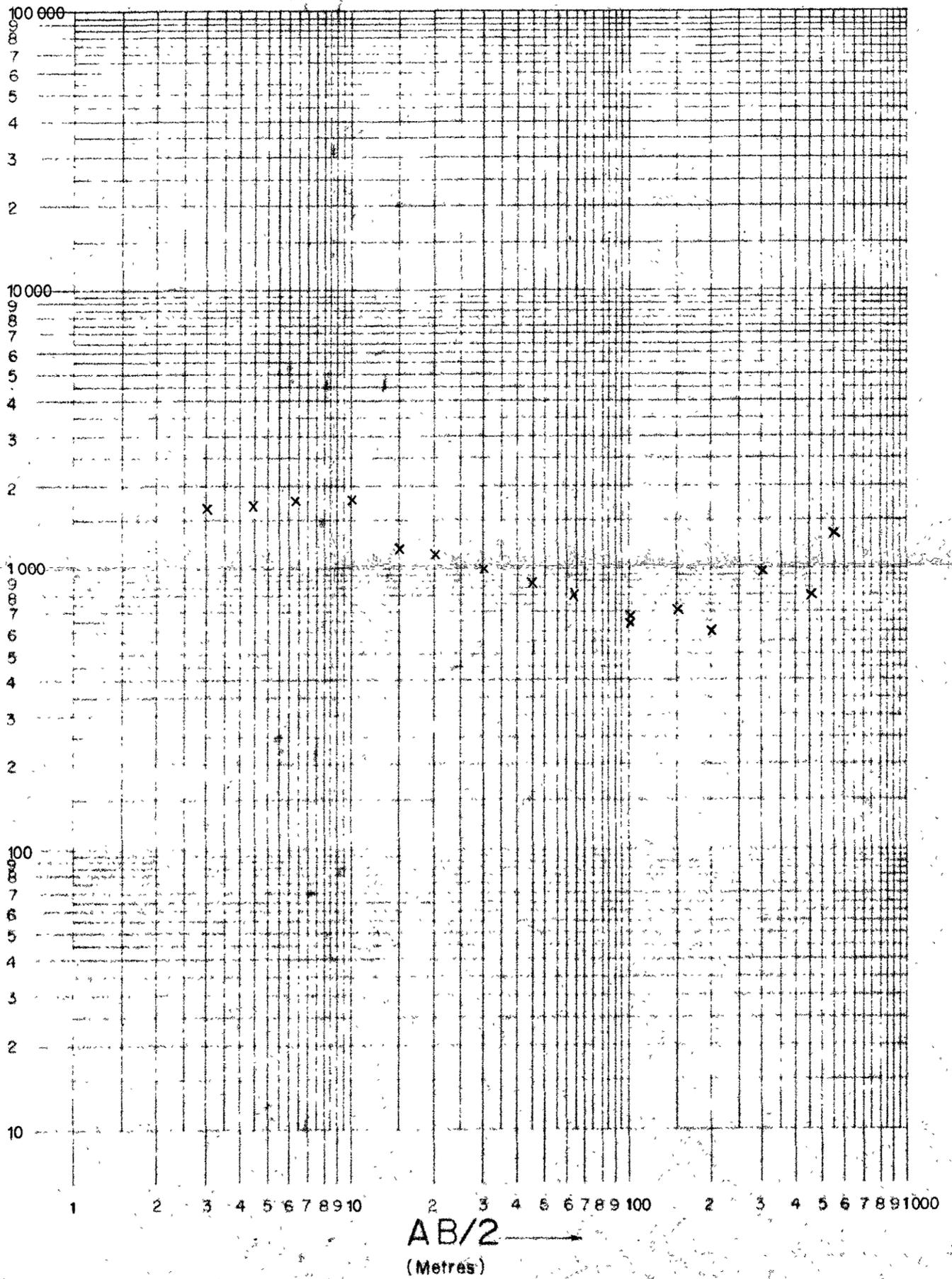
t = integration period for the Scintrex IPR-8 M_{232} component, 520ms.

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

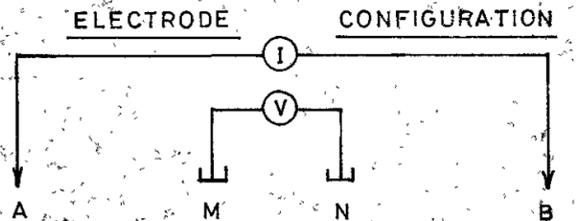
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- DEAKIN, R. C. 1977: Geophysical Progress Report on ELLIOTT BAY, E.L. 27/76 Tasmania, (L. A. Richardson & Assoc. company report)
- GEOEX PTY. LTD. 1975: Report on Helicopter magnetic and electromagnetic survey in the LEWIS RIVER AREA, Tasmania (for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

ρ_a
(Ohm Metres)

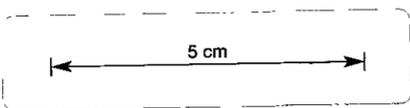


LEGEND
X Observed field curve.

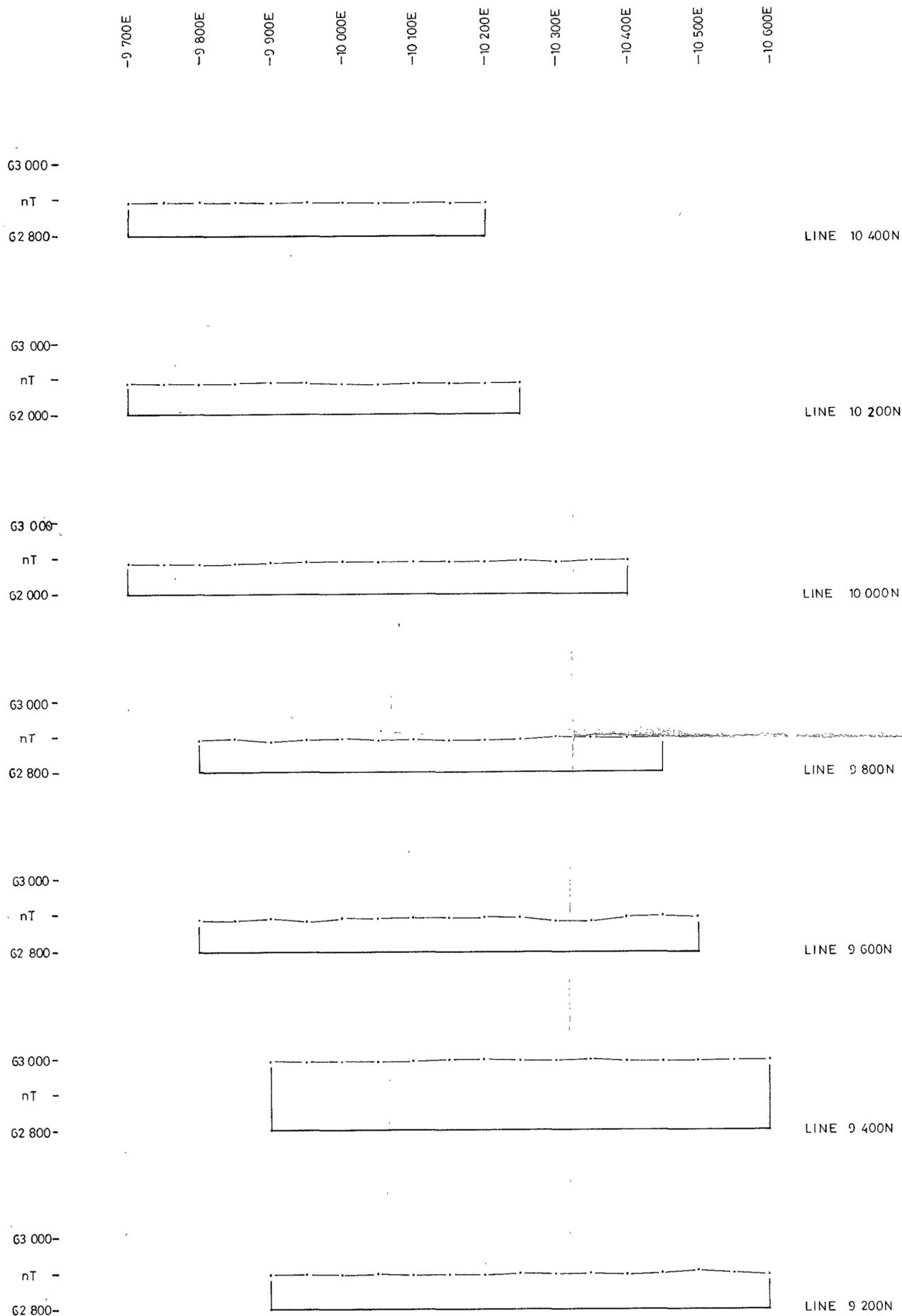


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REVISION	GEOFFKO LIMITED		
	ELLIOTT BAY TASMANIA		001
	VOYAGER 2		
	VERTICAL ELECTRICAL SOUNDING		
	SCHLUMBERGER ARRAY		
	LINE 10 000E	S MUDGE	
	EXPANDED AT 9 700N	APRIL 1978	
SCALE	GEOL	DATE	
CHECKED.	DRAWN	DRG No. 3697 5/A	

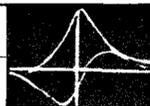


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GEOPEKO LTD.
Geophysical Surveys.
Plan No. 3698 S/A

Instrument	G 81G	Datum	G2 800nT	Hor Scale	1: 5000
Observer	S Mudge P Muir	Base Peg		Vert Scale	1 cm to 100nT
Scale Fact		Date	Feb. 1978	Cont Int	

AREA Elliott Bay - Tasmania
PROSPECT VOYAGER 2 002
PLAN SHOWS Profiles of Total Magnetic Field Intensity



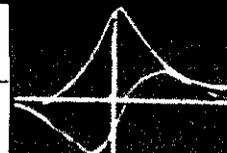


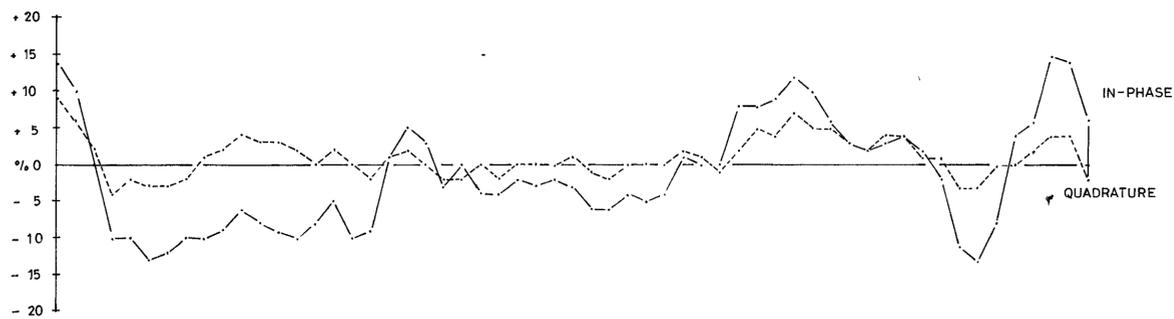
5 cm

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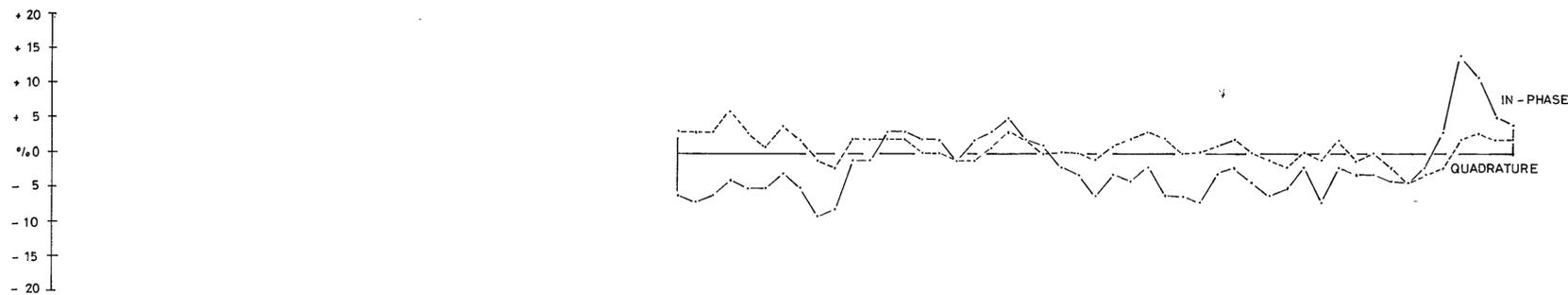
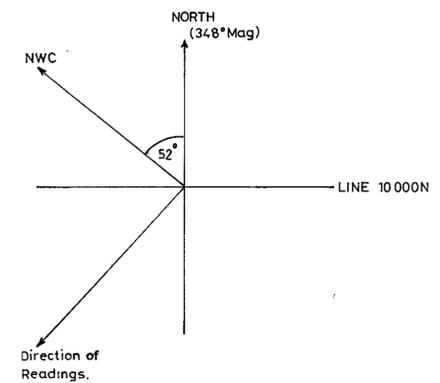
78-1297

GEOPEKO LTD. 003 Geophysical Surveys. Plan No. 3699 S/A	Instrument	FLUKE 8020A	Datum Level	-20 mV	Hor Scale	1:5000	AREA	Elliott Bay-Tasmania
	Observer	S. Mudge P. Muir	Base Peg	9 700 E	Vert Scale	1 cm to 20 mV	PROSPECT	VOYAGER 2
	Scale Fact		Date	March 1978	Cont Int		PLAN SHOWS	Profile of Self Potential





LINE 10 000N



LINE 9 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 11 100E

5 cm

229025

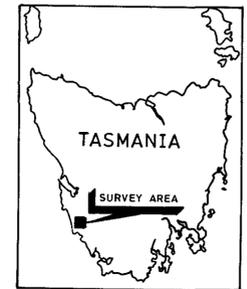
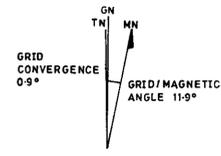
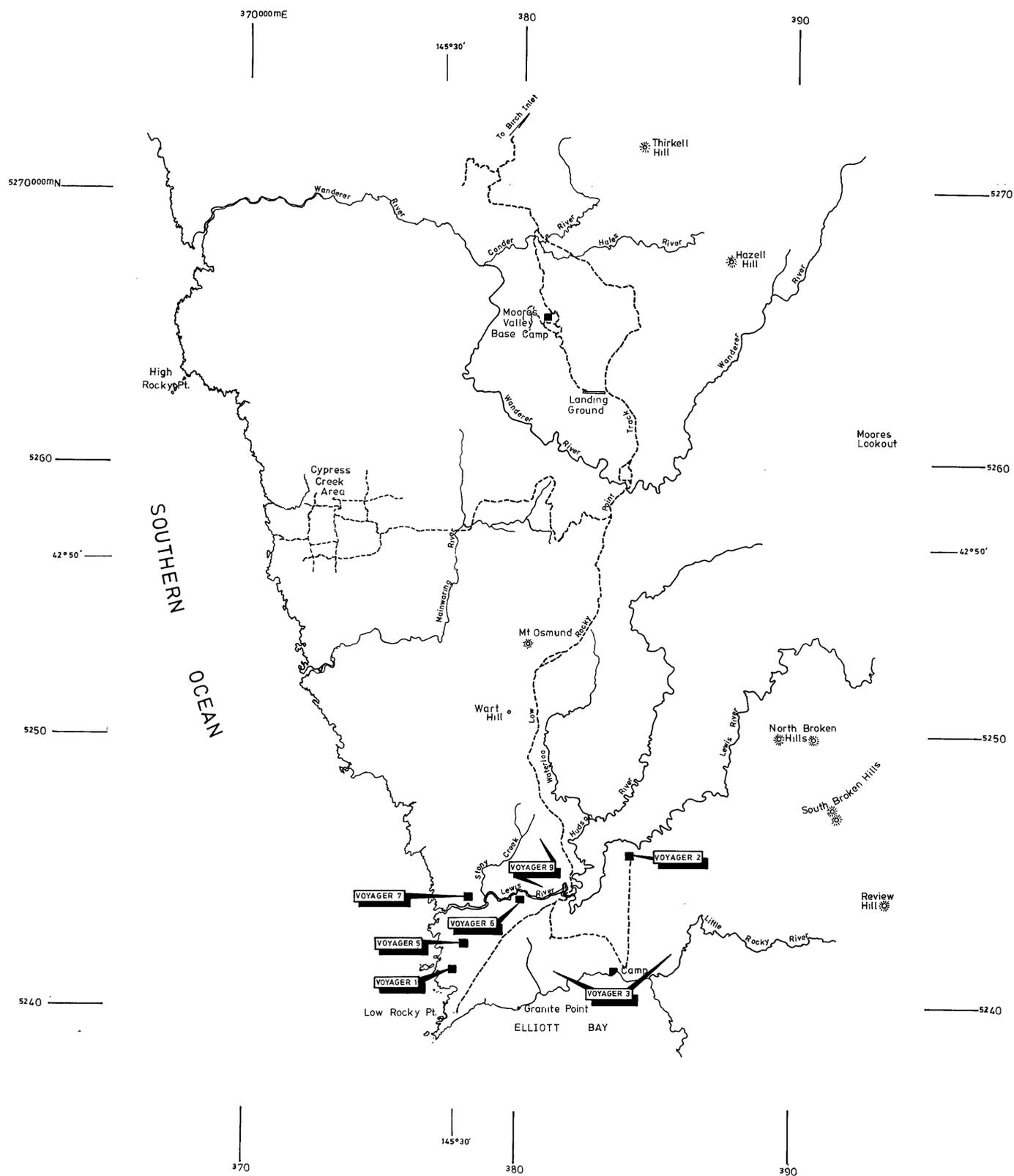
GEOPEKO LTD.
Geophysical Surveys.
Plan No 3702 S/A

Transmitter - NORTH WEST CAPE

Instrument	EM 16	Datum	0 %	Hor Scale	1: 5 000
Observer	P. Muir	Base Peg		Vert Scale	1 cm to 5 %
Scale Fact		Date	March 1978	Cont Int	

AREA	Elliott Bay - Tasmania	79-1297
PROSPECT	VOYAGER 2	006
PLAN SHOWS	Profiles of VLF - EM	



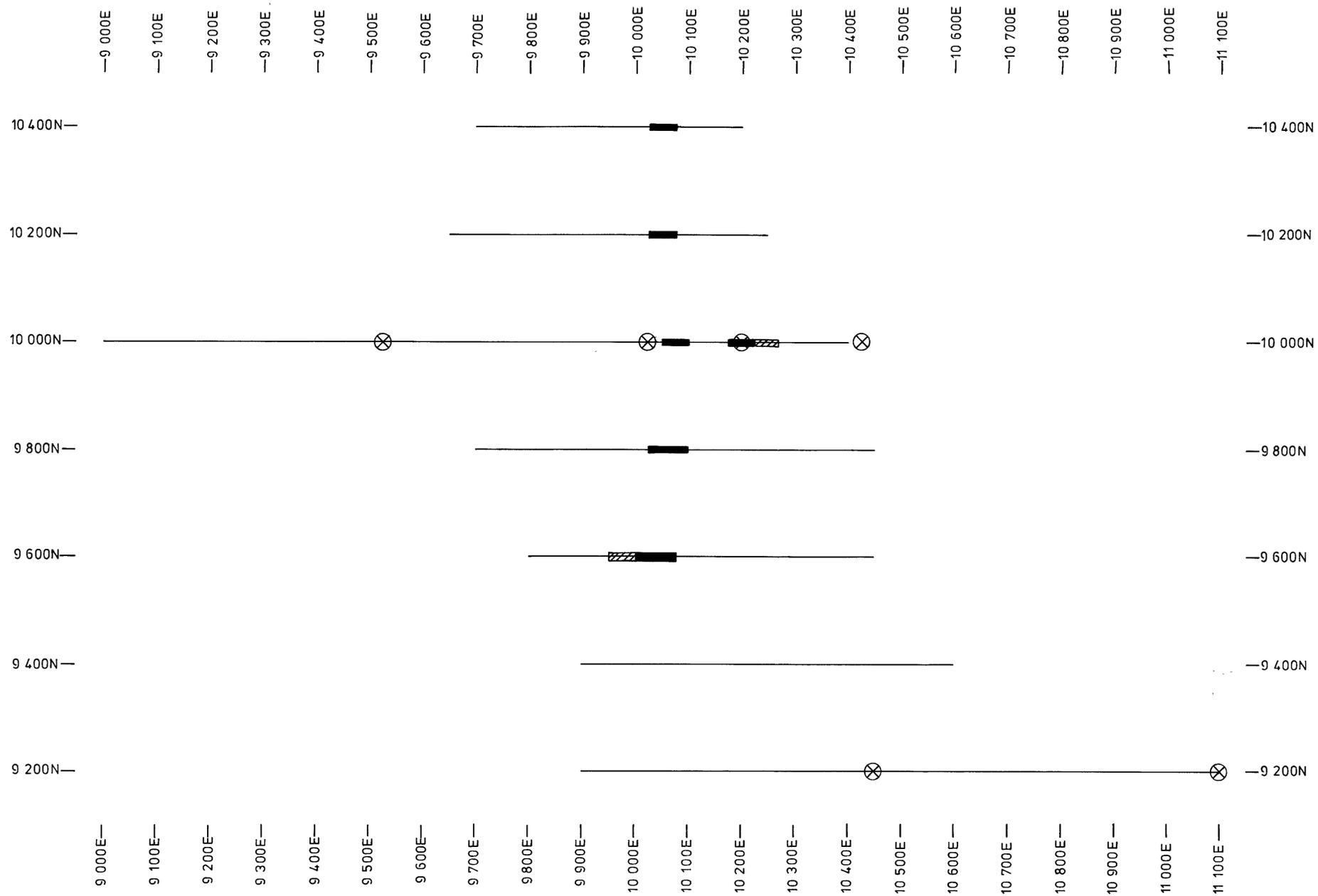


229027 78-297

GEOPEKO LTD
Geophysical Surveys
Plan No. 3964 S/A

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





Key

VLF-EM:- Interpreted Centre of Conductor ⊗
 IP:- Polarisable Zone ■

5 cm

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GEOPEKO LTD
 Geophysical Surveys
 Plan No. 3965 S/A

Instrument		Datum		Hor. Scale	1:5 000	AREA	Elliott Bay - Tasmania
Observer	S. Mudge	Base Peg		Vert. Scale		PROSPECT	VOYAGER 2
Scale Factor		Date	March 1978	Cont. Int.		PLAN SHOWS	Diagrammatic Interpretation Summary

