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EL 27/76.

INDUCED POLARISATION SURVEY
VOYAGER 3
ELLIOTT BAY TASMANIA

by

S. T. Mudge

August, 1978.

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233002

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INTRODUCTION

VOYAGER 3 (previously known as the Drake Creek Prospect) is located on the northern shore of Elliott Bay in E.L. 27/76 (Elliott Bay) in south-west Tasmania. Its location is shown in Drawing 3964 S/A.

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

The prospect originated from favourable geological results obtained from the 1977 reconnaissance survey of the area.

Several airborne electromagnetic (AEM) anomalies of the Geoex 1975 airborne survey (Lewis River Area) lie within the prospect. An attempt was made to locate AEM 3 with very low frequency EM (VLF-EM) during March 1977. The anomaly was not located, Deakin 1977.

Reconnaissance IP and magnetometer surveys were conducted over the area in February 1978. 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 with intercalated quartz feldspar porphyries. These rocks are believed to be the southern portion of the Cambrian Mt. Read volcanic suite.

The prospect lies between two granites, of either Upper Cambrian or Silurian age. The eastern granite contact is near Little Rocky River, the western contact being near Drake Creek.

The area is flat and covered by several metres of peat. It is mostly a button grass plain. Dense forest covers the western end of the survey lines near Drake Creek.

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

INDUCED POLARISATION AND MAGNETICS

A dipole-dipole induced polarisation (IP) survey was initiated to cover the area between the two granites. The survey was aimed at locating any sulphide mineralisation in the area.

The survey was initially conducted on two 400m spaced east-west survey lines, both crossing the granite contacts. Favourable results of line 9 600N lead to the addition and subsequent survey of line 9 400N. Line 10 000N is the northern most line.

A 100m dipole length was used, considered a suitable compromise between target size sought and survey distance. A Huntec 2.5kw 2 second time domain transmitter was used in conjunction with a Scintrex IPR-8 receiver. Signal-to-noise ratios were generally high.

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.

Magnetometer surveys were also conducted as a matter of routine. A Geometrics G836 Unimag total field proton precession magnetometer (10nT resolution) was used. Readings taken at 50m intervals.

Line 10 000N

The line was surveyed between 7 800E and 12 800E with seven overlapping arrays centred at 8 200E, 8 900E, 9 600E, 10 300E, 11 000E, 11 700E and 12 400E. Results are shown in Drawings 3728 S/A and 3729 S/A.

Two anomalous zones were detected:

1. between 9 000E and 9 400E. The zone has a poorly defined resistivity low associated with it. The source has depth extent and a near surface expression in the vicinity of 9 200E

and 2. between 9 900E and 10 100E. This zone is only weakly polarisable and small in extent. Its importance is enhanced by its close association with a 150nT magnetic anomaly. This anomaly was detected by the Geoex airborne survey, its source lying further north of line 10 000N. The weak IP response may well indicate a polarisable magnetic body.

The high resistivities and low metal factors east of 11 400E are probably due to the granite.

The resistivity low at 8 700E might well explain AEM 10. It has no associated chargeability anomaly.

Line 9 600N

The line was surveyed from 7 500E to 12 200E with seven overlapping arrays centred at 7 600E, 8 300E, 9 000E, 9 700E, 10 400E, 11 100E and 11 800E. Results are shown in Drawings 3738 S/A and 3739 S/A.

Several anomalous zones were detected:

1. between 8 700E and 9 000E. The zone has a low resistivity associated with it. The source has depth extent and a near surface expression at about 8 850E. It is located close to AEM 3.

and 2. between 7 900E and 8 000E. The zone has a poorly defined resistivity low and a weak chargeability high associated with it. The source is at depth. It is located close to the granite contact (Drake Creek), at about 7 850E.

and 3. between 9 850E and 10 050E. The zone has a well defined resistivity low associated with it. The source has depth extent and a near surface expression at about 10 000E.

The low resistivities and metal factors west of 7 900E are attributed to the granite. The high values of resistivity east of 11 400E are probably due to granite also.

The magnetic survey detected no significant anomalies.

Line 9 400N

This line was added to the survey to investigate the extent of the polarisable source detected on line 9 600N between 8 700E and 9 000E.

The line was surveyed between 7 900E and 9 100E with two overlapping arrays centred at 8 000E and 8 700E. East of 8 600E the line crosses a sandy beach which accounts for the noisy data obtained. The low values of resistivity for this portion of the line are attributed to the salt content of the beach.

The chargeabilities show a broad polarisable zone west of 8 400E. It is emphasised that the IP interpretation of this survey line is also subject to the effects of the low resistivities east of 8 600E and the topographic effects of the Drake Creek valley, between 7 900E and 8 100E.

The 500nT magnetic anomaly lies on the granite contact (Drake Creek) at 8 000E. The anomaly was not detected on line 9 600N; it appears to have limited extent to the north. It was detected by the Geoex airborne survey.

The IP survey requires extending to the west to adequately test this zone.

VERTICAL ELECTRICAL SOUNDING

A Schlumberger array vertical resistivity sounding was expanded at 10 000E along line 9 600N (normal to strike). The sounding was conducted to determine the true resistivity of the sequence and its depth extent.

A Huntec 2.5 kw 2 second time domain IP transmitter was used as the current source. A Fluke 8020A DVM was used to measure potentials. The sounding curve is shown in Drawing 3966 S/A.

Interpretation indicates that the overlying peat has a resistivity of 155 ohm-m and a layer thickness of about 2 metres. The volcanic units have a resistivity of 250 ohm-m and a depth extent of at least 500m.

DISCUSSION

The IP surveys have located several anomalies. The magnetic surveys have located two airborne anomalies. Recommendations have been made for further work on these anomalies.

AEM 3 may be associated with the IP anomaly at 8 850E on line 9 600N. AEM 10 might also be explained by the resistivity low at 8 700E on line 10 000N.

Further work between the present survey lines will depend upon the results of geology and geochemistry over the anomalous areas.

Recommendations have been made to test the VLF-EM method in view of possibly using it for any future work on the prospect.

CONCLUSIONS

1. Significant IP anomalies were detected at 9 600N 8 850E, 9 600N 10 000E and 10 000N 9 200E. They indicate polarisable sources with a near surface expression.

2. A broad magnetic anomaly of about 150nT was detected on line 10 000N. A small associated IP response may indicate a polarisable magnetic body. The anomaly was detected by the Geoex airborne survey.

3. A magnetic anomaly of 500nt was detected on the western granite contact. It may be related to the IP response on line 9 400N. This anomaly was also detected by the Geoex survey.

4. The peat overburden has a resistivity of about 155 ohm-m, the volcanic rocks have a resistivity of 250 ohm-m.

RECOMMENDATIONS

1. The magnetic anomaly on line 10 000N should be gridded with a 50m x 50m grid and a detailed ground magnetic survey conducted. A dipole-dipole IP survey should also be conducted over the anomaly.

2. Surveys are required between the present survey lines to establish the relationship between the IP anomalies west of 10 000E. This work should only be carried out if geochemical results are favourable.

3. Extend line 9 400N west to further investigate the magnetic anomaly at 8 000E. This extension should also be subject to the geological results of the Drake Creek area.

4. The environment appears suitable for using VLF-EM to locate near surface conductors. A trial survey on line 9 600N (west of 10 000E) would be a suitable test for the method.

APPENDICES

IP 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 $\left[mVV^{-1}\right]$

ρa = apparent resistivity $\left[\Omega m\right]$

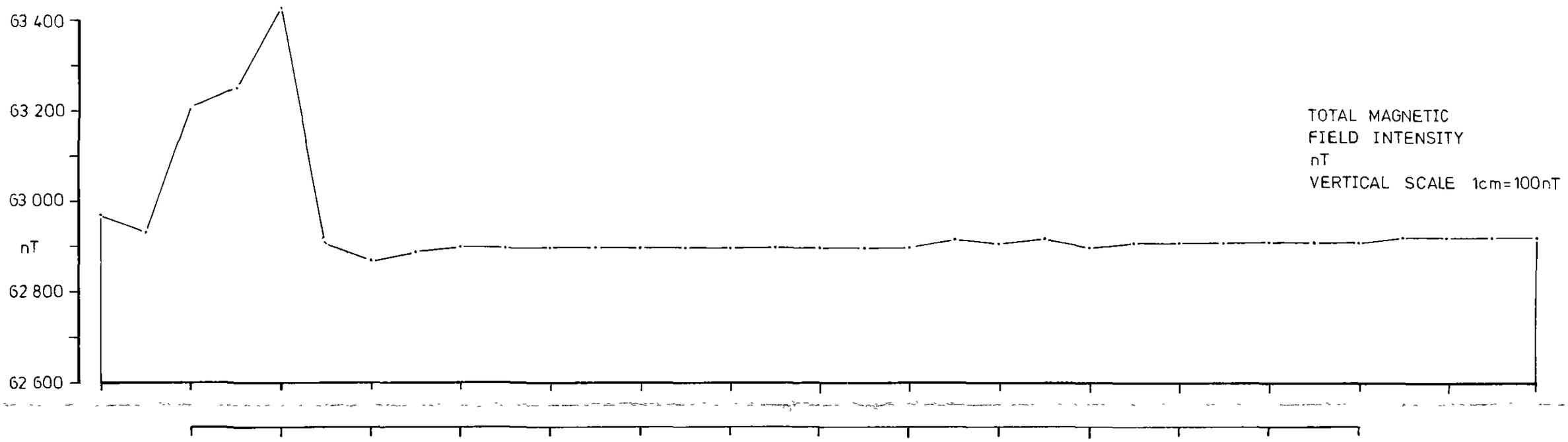
t = integration period for the Scintrex IPR-8 M_{232} component, 520ms.

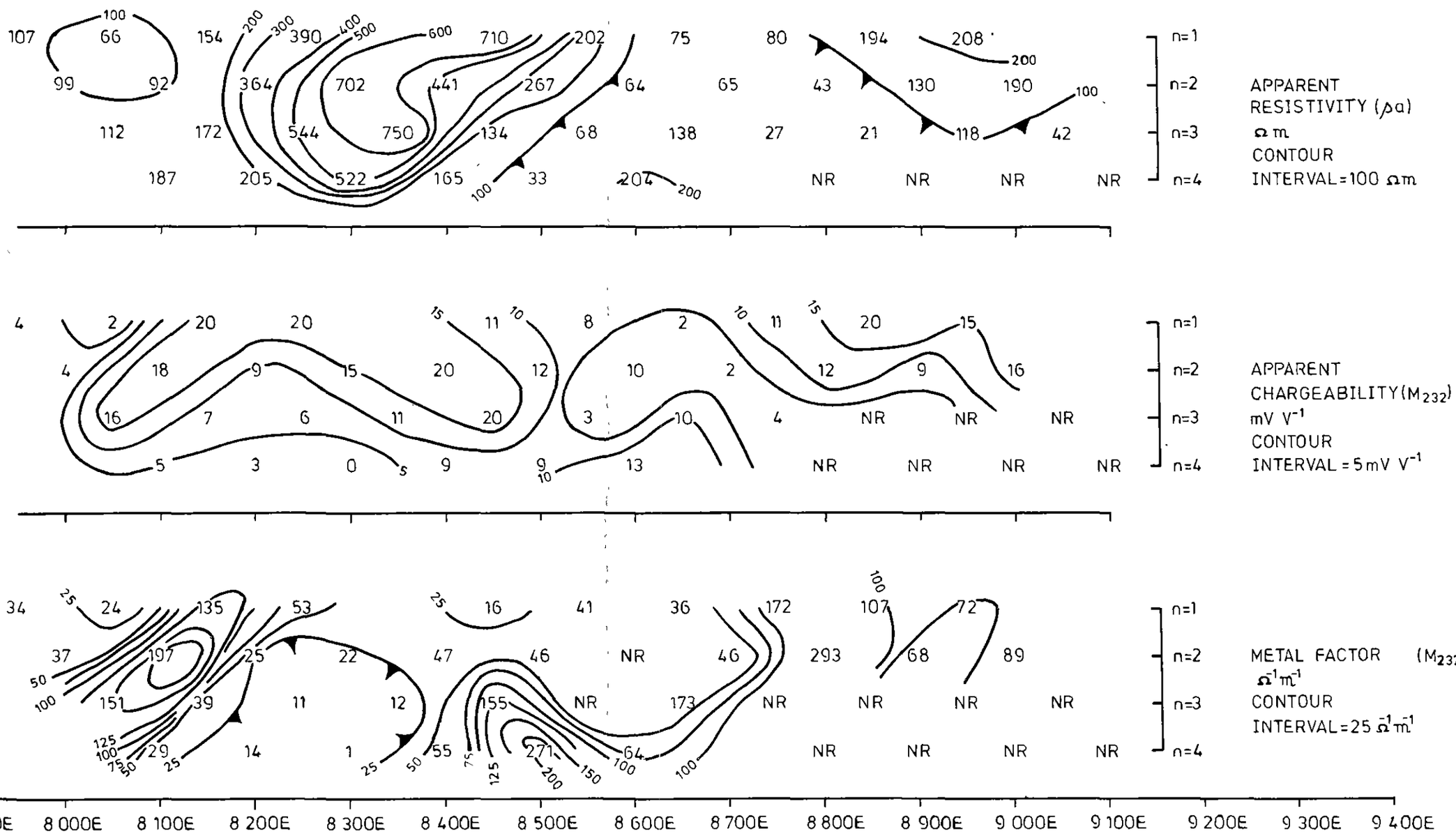
2000 is a scaling factor to obtain the units $\Omega^{-1} m^{-1}$.

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.)





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Note - Dipole length 100m

5 cm

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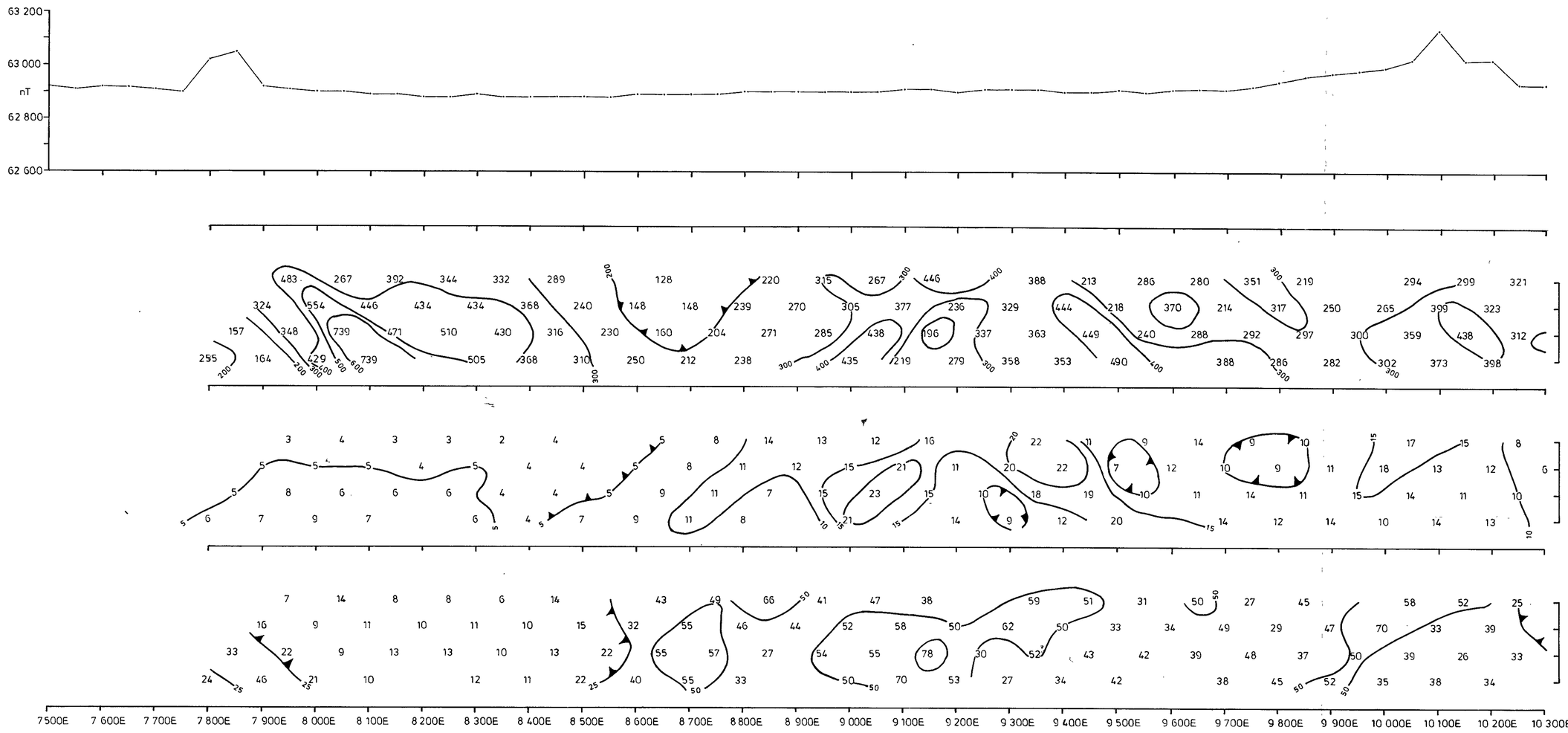
GEOPEKO LTD Geophysical Surveys	Instrument	IPR-8, G836	Datum		Hor Scale	1 5 000	AREA	Elliott Bay-Tasmania
	Observer	S.Mudge T Lamberton	Base Peg		Vert Scale		PROSPECT	VOYAGER 3 LINE 9 400N
Plan No 3727 S/A	Scale Fact		Date	Feb 1978	Cont Int		PLAN SHOWS	Pseudosection of Dipole-Dipole IP/Resistivity



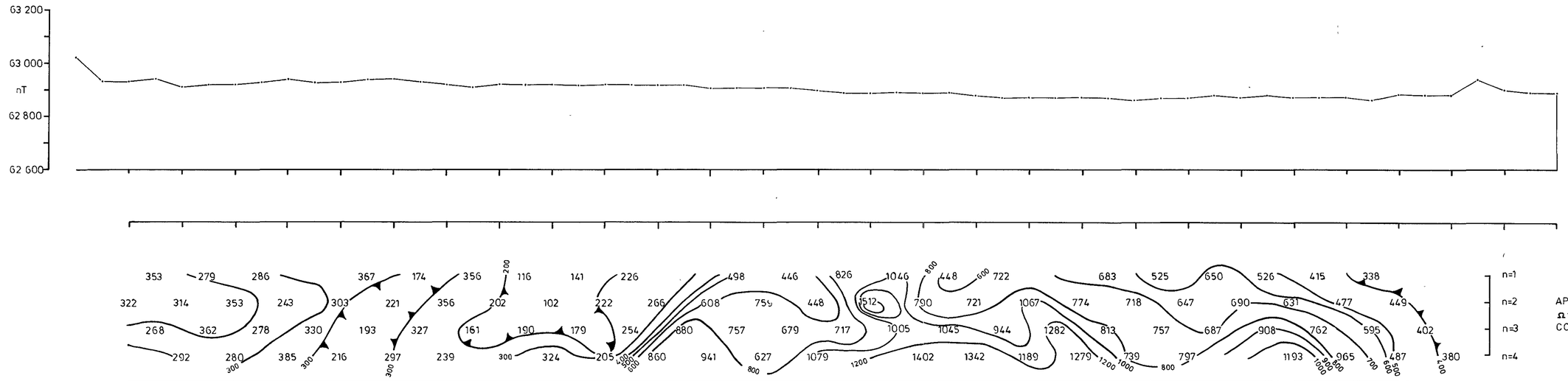
5 cm

Sheet 1 | Sheet 2

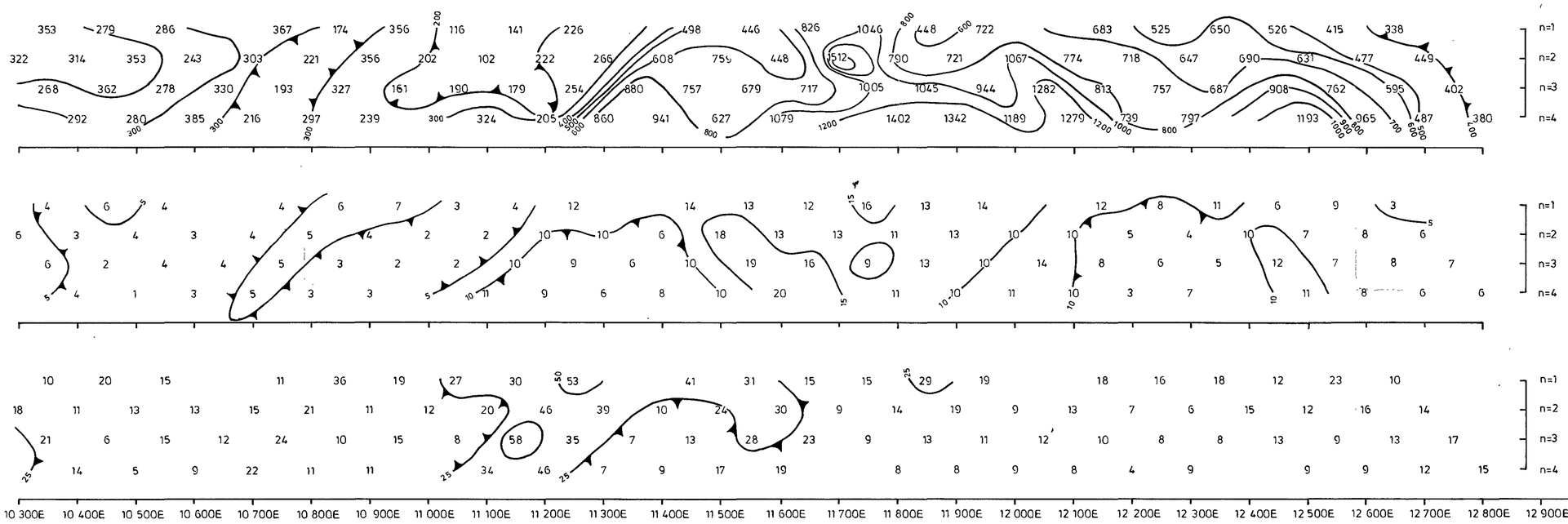
78-1293

233017

GEOPEKO LTD. Geophysical Surveys. Plan No 3728 S/A	Note -Dipole length 100m	Instrument: IPR-8, G836 Observer: S.Mudge, T.Lamberton Scale Fact:	Datum: Base Peg: Date: February 1978	Hor Scale: 1:5 000 Vert Scale: Cont Int:	AREA: Elliott Bay - Tasmania 002 PROSPECT: VOYAGER 3 LINE 10 000N PLAN SHOWS: Pseudosections of Dipole-Dipole IP/ Resistivity, Profiles of Total Magnetic Field Intensity - Sheet 1 of 2			



TOTAL MAGNETIC FIELD INTENSITY
nT
VERTICAL SCALE 1cm=100nT



APPARENT RESISTIVITY
Ω m
CONTOUR INTERVAL=100Ω m

APPARENT CHARGEABILITY M_{232}
mV V^{-1}
CONTOUR INTERVAL=5mV V^{-1}

METAL FACTOR
Ω^{-1}m^{-1}
CONTOUR INTERVAL= 25 Ω^{-1}m^{-1}

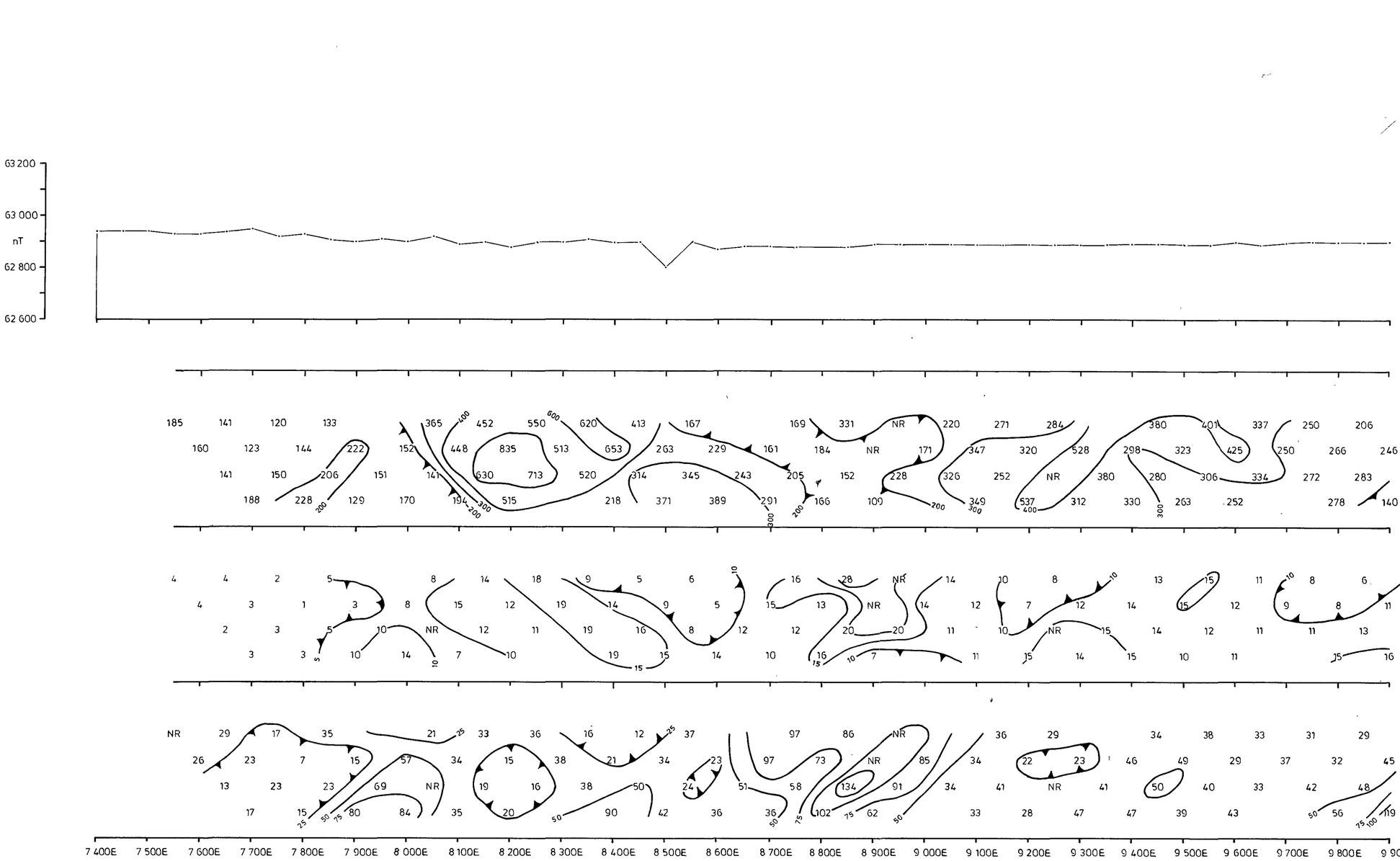
233018

Sheet 1 | Sheet 2

5 cm

78-0293

GEOPEKO LTD. Geophysical Surveys Plan No. 3729 S/A	Note:- Dipole length 100m	Instrument	IPR-8, G 836	Datum		Hor Scale	1:5000	AREA	Elliott Bay- Tasmania 003
		Observer	S Mudge T Lamberton	Base Peg		Vert Scale		PROSPECT	VOYAGER 3 LINE 10 000N
		Scale Fact		Date	Febuary 1978	Cont Int		PLAN SHOWS	Pseudosections of Dipole-Dipole IP/Resistivity; Profiles of Total Magnetic Field Intensity - Sheet 2 of 2



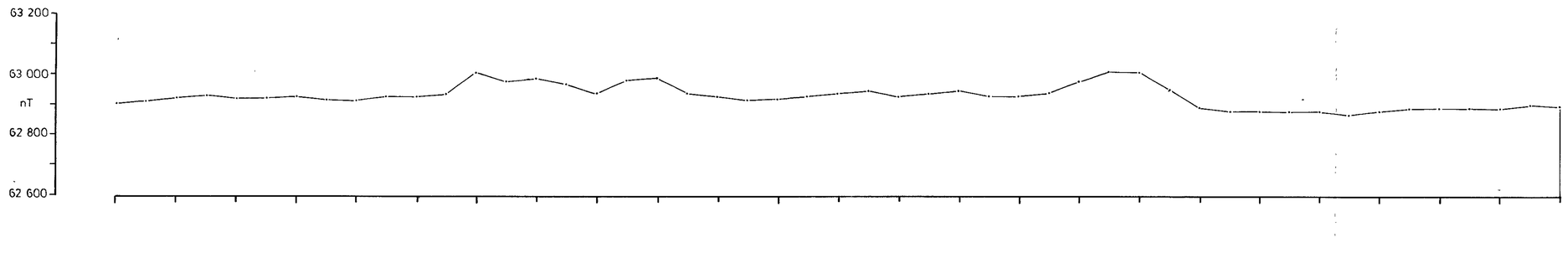
5 cm

Sheet 1 | Sheet 2

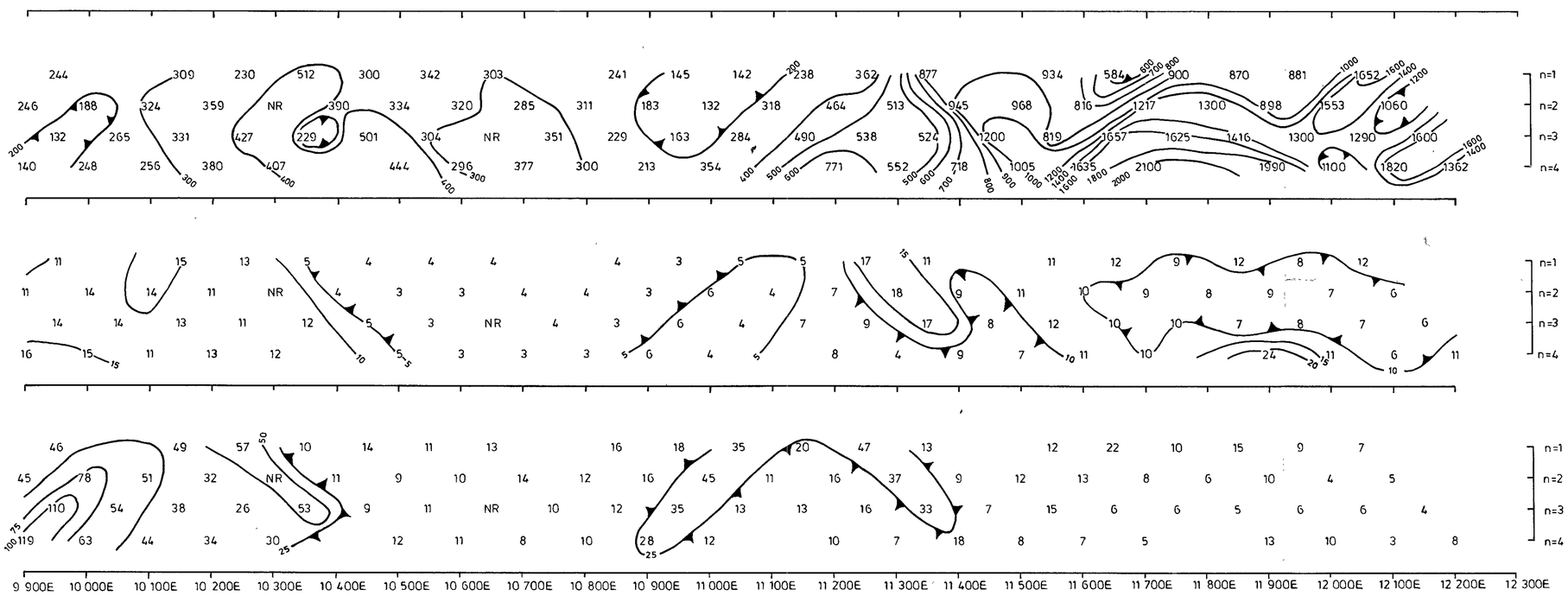
233019

78-1293

GEOPEKO LTD. Geophysical Surveys. Plan No 3738 S/A	Note:- Dipole length 100m	Instrument: IPR-8; G836 Observer: S.Mudge, T.Lamberton Scale Fact:	Datum: Base Peg: Date: February 1978	Hor Scale: 1:5 000 Vert Scale: Cont Int:	AREA: Elliott Bay - Tasmania 004 PROSPECT: VOYAGER 3 - LINE 9 600N PLAN SHOWS: Pseudosections of Dipole-Dipole IP/ Resistivity Profiles of Total Magnetic Field Intensity - Sheet 1 of 2.	



TOTAL MAGNETIC FIELD INTENSITY
nT
VERTICAL SCALE 1cm=100nT



APPARENT RESISTIVITY (ρa)
Ωm.
CONTOUR INTERVAL= 100 Ωm

APPARENT CHARGEABILITY (M_{232})
$mV\ V^{-1}$
CONTOUR INTERVAL=5 $mV\ V^{-1}$

METAL FACTOR (M_{232})
$\Omega^{-1} m^{-1}$
CONTOUR INTERVAL= 25 $\Omega^{-1} m^{-1}$

Sheet 1 | Sheet 2

5 cm

233020

78-1293

GEOPEKO LTD. Geophysical Surveys Plan No 3739 S/A	Note:- Dipole length 100m	Instrument: IPR-8; G836 Observer: S. Mudge, T. Lamberton Date Run:	Datum: Base Peg: Date: February 1978	Hor Scale 1:5 000 Vert Scale: Cont Int:	AREA PROSPECT PLAN SHOWS	Elliott Bay - Tasmania VOYAGER 3 - LINE 9 600N Pseudosections of Dipole-Dipole IP/ Resistivity Profiles of Total Magnetic Field Intensity - Sheet 2 of 2

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10 000 9 8 7 6 5 4 3 2

1000 9 8 7 6 5 4 3 2

100 9 8 7 6 5 4 3 2

10 9 8 7 6 5 4 3 2

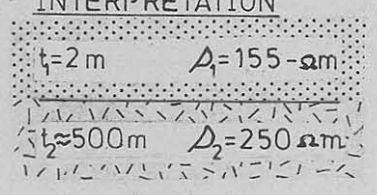
1

ρ_a (Ohm Metres)

1 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 100 2 3 4 5 6 7 8 9 1000

AB/2 (Metres)

INTERPRETATION

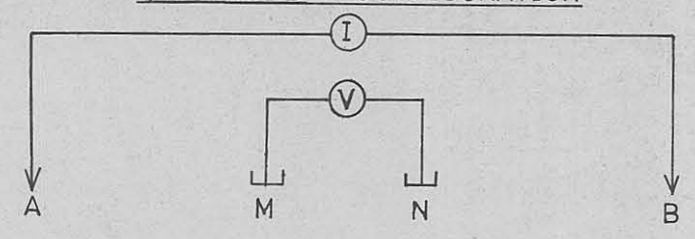


LEGEND

× Observed field curve

) Standard curve for interpreted model

ELECTRODE CONFIGURATION



5 cm

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233021

REVISION		CHOPEKO LIMITED		
		ELLIOTT BAY TASMANIA VOYAGER 3		006
		VERTICAL ELECTRICAL SOUNDING SCHLUMBERGER · ARRAY		
		LINE 9 600N CENTRE 10 000E		S.MUDGE MARCH 1978
		SCALE	GEOL	DATE
		CHECKED	DRAWN	DRG No 3966 S/A

370000mE
380
390
145°30'
To Birch Inlet
Thirkell Hill
5270000mN
5270
Wanderer River
Conder River
Hales River
Hazell Hill
Moores Valley Base Camp
High Rocky Pt.
Landing Ground
Wanderer River
Track
Moores Lookout
5260
Cypress Creek Area
Point
River
Mainwaring
Mt Osmund
Rocky
SOUTHERN OCEAN
Wart Hill
Low
Lewis River
North Broken Hills
5250
South Broken Hills
Hudson River
Stony Creek
VOYAGER 9
VOYAGER 2
VOYAGER 7
Lewis River
Review Hill
VOYAGER 6
Little Rocky River
VOYAGER 5
Camp
VOYAGER 1
VOYAGER 3
5240
Low Rocky Pt.
Granite Point
ELLIOTT BAY
GN
TN
MN
GRID CONVERGENCE 0·9°
GRID/MAGNETIC ANGLE 11·9°
TASMANIA
SURVEY AREA
370
380
390
145°30'
5 cm
233022
48-1293

GEOPEKO LTD Geophysical Surveys Plan No. 3964 S/A		Instrument		Datum		Hor Scale	1:100 000	AREA	Elliott Bay - Tasmania 007
		Observer	S. Mudge	Base Peg		Vert Scale		PROSPECT	VOYAGER PROSPECTS
		Scale Factor		Date	September 1978	Cont Int		PLAN SHOWS	Location Diagram