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AGNIE GÉNÉRALE DE GÉOPHYSIQUE

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McINTYRE MINES (AUSTRALIA) PTY. LTD.

GEOPHYSICAL SURVEYS

NEAR ZEEHAN (TASMANIA).

RECEIVED

- MARIPOSA
- ANOMALY No. 1

December 1970

February 1971

Missions No. 501-18-86 - 89

C.G.G.

26-28 Manning Street, SOUTH BRISBANE.

ABSTRACT

The geophysical survey carried out by C.G.G. for McIntyre Mines near Zeehan (Tasmania) in December 1970 and February 1971 included I.P., Resistivity, E.M. GUN and S.P. measurements.

On the Mariposa Grid, 5 main anomalies were detected, they are located along two parallel positive Apparent Chargeability axes. A1 is due to the known galena mineralization mined in the past, A2 is due to a galena-sphalerite mineralization. The main anomaly, A13, is more than 1000 feet long. The mineralizations are perhaps associated with a synclinal structure and are therefore possibly buried beneath the barren outcropping sandstones.

Polarizable bodies are generally resistant, I.P. is the only effective method.

No outstanding anomaly was detected on Anomaly No. 1 Grid.

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INTRODUCTION

From the 3rd to the 20th December 1970 and from the 16th to the 24th of February 1971, COMPAGNIE GENERALE DE GEOPHYSIQUE carried out geophysical surveys near Zeehan (Tasmania) for McINTYRE MINES (AUSTRALIA) PTY. LTD.

Two areas were surveyed, the Mariposa Grid and the Anomaly No. 1 Grid.

At Mariposa, lead silver ore was mined at the beginning of the century. The mineralization is located in the Cambrian Gordon Limestone. Anomaly No. 1 is a lead geochemical anomaly on the western slopes of Mount Dundas. Cambrian shales outcrop within the anomalous area.

Rather narrow steeply dipping mineralizations were expected. Galena orebodies generally do not have an electrical continuity in spite of the fact that galena crystals have a metallic conductivity; consequently it was expected that a gradient array time domain I.P. coverage would be the most effective geophysical tool. It seemed worthwhile to test electromagnetism; when E.M. works, it offers the advantage of being much less expensive than I.P.

1. FIELD AND GEOPHYSICAL CONDITIONS :

1-1. Location - Access - Terrain Conditions :

Mariposa Grid :

The area is located along the Murchison Highway between Zeehan and Queenstown (see Fig. 1). The surveyed area itself is hilly and covered by thick bush. A bulldozed track runs across the area.

Anomaly No. 1 Grid :

Anomaly No. 1 is located on the western slopes of Mount Dundas. Slopes are steep and covered by timber. The surveyed area lies 3 miles from the Murchison Highway. The last mile is a very steep bulldozed track not accessible, even to four wheel drive cars, when the soil is wet.

1-2. Electrical Conditions :

On both areas, the bedrock lies less than 30 feet beneath the overburden. The north eastern corner of the Mariposa Grid is swampy, the thickest overburden on Anomaly No. 1 is made of screes.

The resistivity of the overburden was higher than 100 ohm-m, measured ohmic drops were always above 10 mV for currents of 1 to 4 amp.

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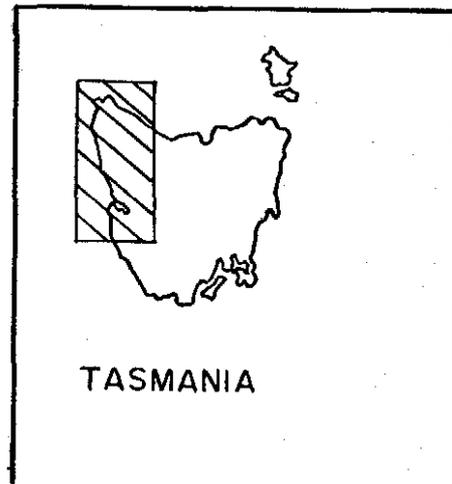
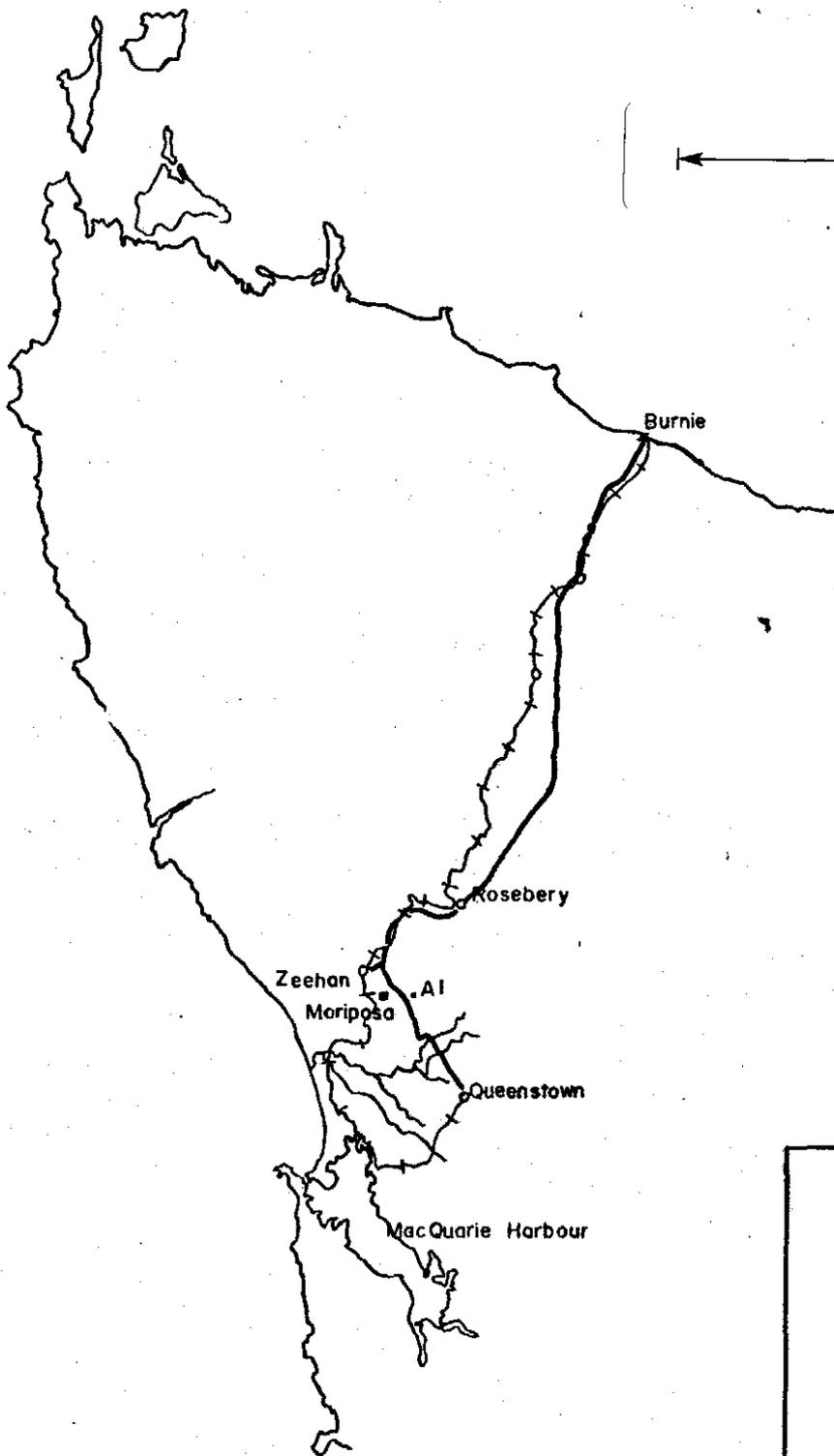
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Fig 1

LOCATION MAP

Scale: 1/1,267,200

5 cm



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2. FIELD OPERATIONS AND STATISTICS :

2-1. Field Operations :

Field operations were carried out by two technicians and two field assistants. In December, four and half days were lost because of rain.

At Mariposa, two 6560 foot current lines were used for the I.P. gradient array coverage. On Anomaly No. 1, access was the main problem. It was decided to use a light 25W Scintrex transmitter instead of the 7.5 KVA Hunttec transmitter. A 300 foot current line was used with two 50 foot potential dipoles in the centre third of the line. A test carried out with different current electrode separations showed that the shallowness of the bedrock enabled the use of such a short array.

2-2. Statistics :

2-2-1. Composition of the Crew ;

December 1970 :

- One Party Chief : G. CLARIDGE
- One Operator : P. BAXTER

February 1971 :

- One Party Chief : L. HEMMING
- One Operator : M. MIRALLES

In both cases, McIntyre Mines supplied two Helpers.

2-2-2. Equipment :December 1970 :

- One Scintrex IPR7 receiver
- One 7.5 KVA Hunttec I.P. transmitter
- One Schlumberger resistivity set
- Three 1W Tokai transceivers

February 1971 :

- One Scintrex IPR7 receiver
- One CGG 2.5 KVA Universal I.P. transmitter
- Three 1W Tokai transceivers

In both cases, a vehicle was supplied by McIntyre Mines.

2-2-3. Measurement Output :Mariposa Grid :December 1970 :

- One Electrical Sounding
- 292 stations : Apparent Chargeability, Apparent Resistivity and S.P.

February 1971 :

- 311 stations : Apparent Chargeability, Apparent Resistivity and S.P.

Total length of profiles : 59300 feet.

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Anomaly No. 1 Grid :

- E.M. GUN : 64 measurements
- Apparent Chargeability : 46 measurements
- Apparent Resistivity : 46 measurements
- S.P. : 46 measurements

Duration of the December 1970 survey : 18 days

Duration of the February 1971 survey : 9 days

3. MARIPOSA GRID :

3-1. Apparent Resistivity :

The Electrical Sounding (see Fig. 2) shows that the overburden, even over the swampy area, is thin and not very conductive (10 feet = 25 ohm-m).

The whole area appears as a N.S. resistant strip about 1000 feet wide, two resistant axes follow the edges of the resistant strip (see Plates 1, 2, 5 and 6).

Interruptions and offsets of resistant and conductive axes and of Apparent Resistivity gradients show up 6 transverse electrical discontinuities.

The strong Apparent Resistivity gradient in the north western corner of the surveyed area, (see Plate 1), most probably coincides with a geological limit.

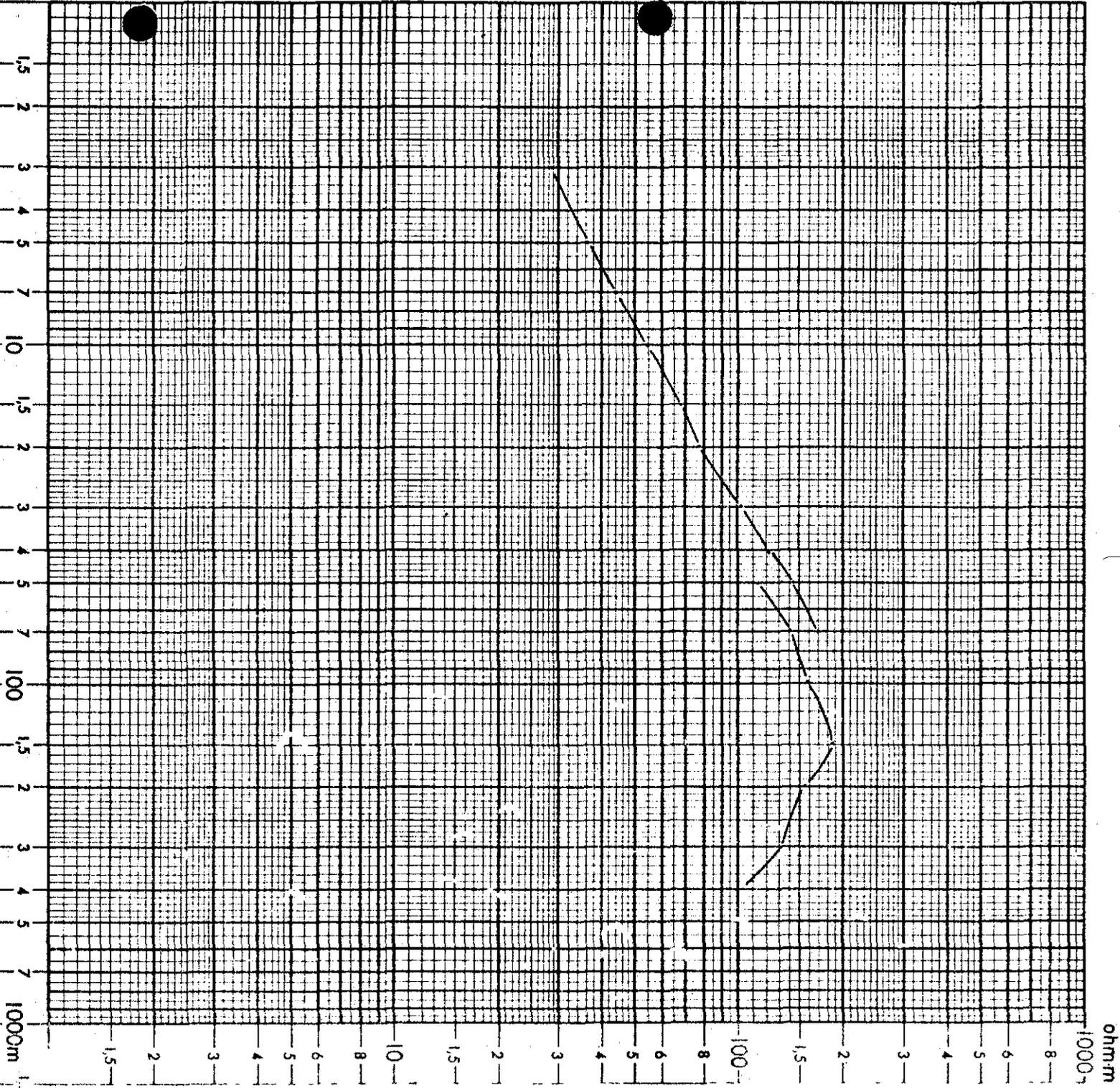
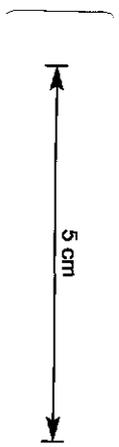
The contact of the Crotty Sandstone and the Gordon Limestone does not appear very clearly, it may follow a conductive axis in the middle of the structure.

3-2. Apparent Chargeability :

Apparent Chargeabilities vary between 8 and 40 milliseconds.

The most striking feature of the Apparent Chargeability maps, (see Plates 3 and 4), is the existence of two parallel N-NW positive axes. All anomalies are located along these axes.

Fig.2. MARIPOSA GRID
ES (400 - 331)



Profiles 398N and 374N have been plotted on Figure 3. The two axes are visible. Old workings and outcrops show that the eastern axis coincides with mineralized Gordon Limestone or with apparently barren limestone which probably contains either a very low grade sulfide mineralization or graphitic particles.

No outcrops have been seen on the western axis.

The Apparent Chargeability level between the axes is high (see Fig. 3), higher than it would be expected on the barren Crotty Sandstones which outcrop on profile 398N (see Fig. 3). However, Apparent Chargeability gradients are weaker and polarizable bodies are therefore deeper than along the two main axes (see Plates 5 and 6).

The two external I.P. axes are generally associated with resistant axes, a fact which suggests that they coincide with geological strata.

Some of the I.P. anomalies situated between the external axes are obviously not independent of anomalies located along the axes. The southern extension of Anomaly A1 coincides with the eastern external axis on profile 406N, from there it branches southwestward.

At Anomaly A11, two positive I.P. axes have a similar position.

The position of negative axes at Anomalies A1 and A2 indicate that the polarizable bodies dip eastward. The geological strata have a 60° westward dip. Anomalies A12 and A13 have a conformable dip.

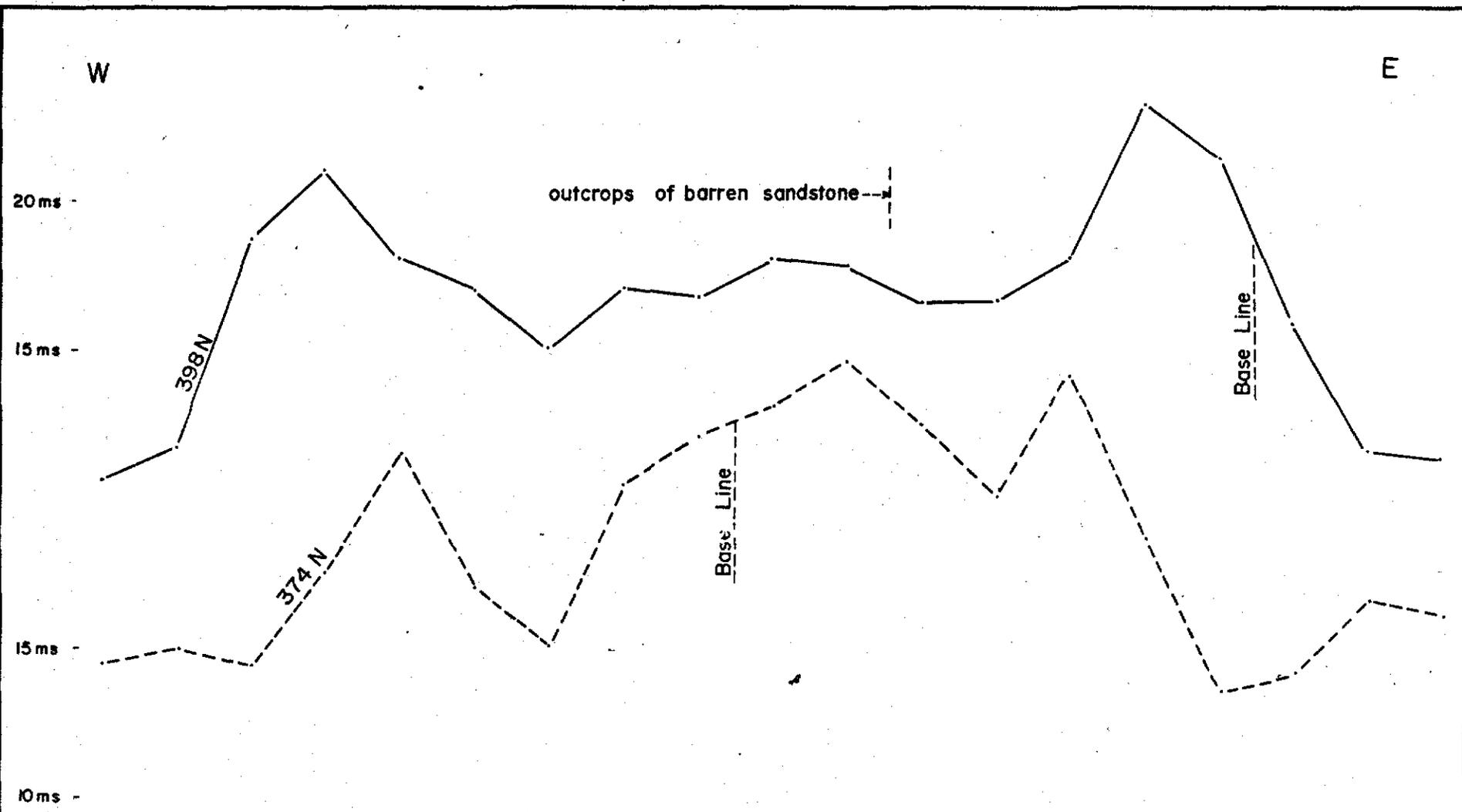


Fig. 3. CORRELATIONS BETWEEN PROFILES 398N AND 374 N

The main anomalies are :

A1 : extends over the old workings, deepens to the south. A1 is located within a rather conductive zone but the extension of the conductive zone is larger than A1, thus the lower resistivity is not due to the galena mineralization.

A2 : a strong anomaly along the eastern I.P. axis. Bulldozer work carried out after the December survey on line 388N discovered a galena sphalerite mineralization.

A3 : southern extension of A1.

A4 : northern extension of A1.

A5 : the northeastern end of the eastern I.P. axis. The I.P. axis coincides with a resistant axis.

A6 : part of the western I.P. axis.

A7 : part of the western positive I.P. axis.

A8 : northwestern end of the western I.P. axis.

A9 : part of the eastern I.P. axis; it follows a resistant axis.

A10 : part of the eastern I.P. axis.

A11 : a 24ms anomaly located on the eastern I.P. axis; a second axis has a southwestern orientation. The positions of both axes are similar to the positions of A1 and A10 near the old workings. The southwestward axis is parallel to electrical discontinuity F5.

A12 : the southeastern end of the eastern I.P. axis, the negative axis associated with the positive axis indicates that the polarizable body dips westward.

A13 : a strong anomaly along the southwestern end. It is more than 1000 feet long and extends further than the southern limit of the surveyed area. The polarizable body has an horizontal width of 200 feet; it dips westward. It extends over resistant and conductive zones. The polarizable body is at a shallow depth (less than 30 feet).

A14 : a northern extension of A13.

A15 : a small anomaly east of the western external I.P. axis. The polarizable body is about 60 feet deep.

A16 : an isolated anomaly outside the Mariposa structure, the I.P. axis coincides with a resistant axis.

N.B. : widths and depths indicated on Plates 5 and 6 were determined with bilogarithmic master curves similar to master curves used for magnetic interpretation.

3-3. Self Potential :

No significant S.P. anomaly was detected, all negative anomalies are obviously due to the relief. The lack of S.P. anomalies is not surprising since the Apparent Resistivity measurements show that the polarizable bodies are not conductive.

3-4. Conclusions and Recommendations :

The I.P. survey detected five main anomalies :

- A1 which coincides with old workings and a galena mineralization.
- A2 : bulldozer work subsequent to the first I.P. survey discovered a shallow galena-sphalerite mineralization.
- A11 : a biaxial anomaly south from A2; it seems similar to A1 and A8, its cause is unknown.
- A13 : A13 is due to a shallow polarizable body, its horizontal width is 200 feet, it is more than 1000 feet long and extends southward further than the limit of the surveyed area.
- A15 : a non-outcropping polarizable body about 60 feet deep, 200 feet wide, 250 feet long.

It seems worthwhile to point out that the above anomalies appear as strong, sometimes unconfusable (A1, A2) anomalies located along two weak positive conformable Apparent Chargeability axes.

The parallelism of the Apparent Chargeability axes and the high level of the Apparent Chargeability between the axes even where barren sandstone outcrops fit the following hypothesis : the Gordon Limestone, generally weakly mineralized, is synclinal beneath the Crotty Sandstone, the weakly mineralized, or perhaps graphitic, limestone gives rise to the weak I.P. axes,

locally strong enrichment of conductive sulfides, probably galena give rise to high amplitude I.P. anomalies. I.P. anomalies located between the western and eastern external I.P. axes may be due to deeper mineralization situated beneath the barren sandstone.

We recommend carrying out the following exploration works :

1. determination of the causes of A11, A13 and A14;
these are very shallow polarizable bodies, trenches should be sufficient as on A2.
2. verification of the synclinal hypothesis : we recommend
 - carrying out a detailed geological mapping
 - drilling two vertical holes, one on station 374N/332.5E, one on 396N/324.5E.

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4. ANOMALY No. 1 :

On Anomaly No. 1 Grid, a most important problem was the surveying, line spacing is variable and there is no coherent system of station numbering, consequently profiles are presented separately on plates but the numbers read on the pegs are indicated.

4-1. E.M. GUN Measurements : (see Plate 7)

The lead geochemical anomaly has been intersected by 5 profiles.

No outstanding anomaly was detected. Anomalies detected on Profiles 12 to 16 are located downslope from the geochemical anomaly.

4-2. I.P. and Resistivity Measurements : (see Plate 8)

The lower Apparent Resistivities detected at the western end of the profiles coincide with E.M. GUN anomalies.

On the profile located at 100 feet north from line 18, there is an anomalous chargeability zone 500 feet wide. It coincides with the geochemical anomaly.

On line 14, the same feature is less obvious but a narrow anomaly exists on peg 1506.

There is no S.P. anomaly and no correlation with E.M. or resistivity.

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4-3. Conclusions and Recommendations :

No outstanding anomaly was detected by any of the four methods, (E.M. GUN, S.P., Resistivity, I.P.), tested on Anomaly No. 1. A wide I.P. anomaly coincides with the geochemical anomaly on one profile. The geochemical anomaly is probably due to a low grade sulfide mineralization.

In order to determine the true nature of the mineralization, we would recommend digging costeans down to the shallow bedrock.

- on line 14 : 100 feet on both sides of peg 1506.
- on the line located at 100 feet north from line 18 :
between peg 1302 and peg 1312.

The Chief Geophysicist

G. OMNES

Brisbane, 8th April, 1971.

GEOPHYSICAL SURVEY AT MARIPOSA (TASMANIA)

APPARENT RESISTIVITY

SCALE 1" = 100'

Current Line AB = 6560 ft

Potential Dipole MN = 100 ft

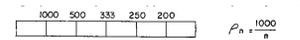
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LEGEND

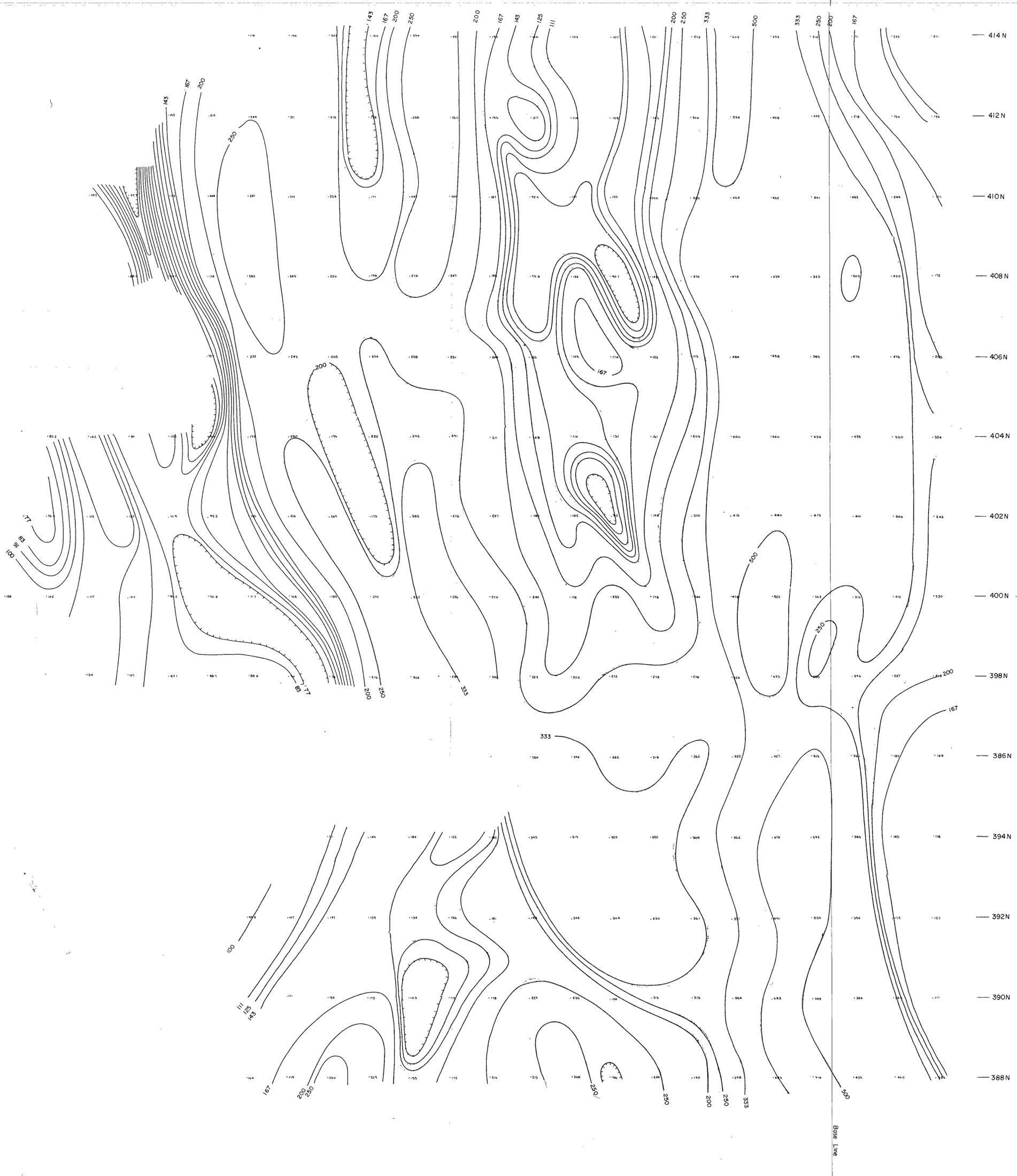
Apparent resistivity in ohm m

Apparent resistivity scale



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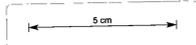
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1101 GEOPHYSICAL SURVEY AT MARIPOSA (TASMANIA)

APPARENT RESISTIVITY

SCALE 1" = 100'

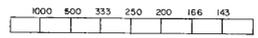
Current Line AB = 6560 ft
Potential Dipole MN = 100 ft
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LEGEND

Apparent resistivity in ohm.m

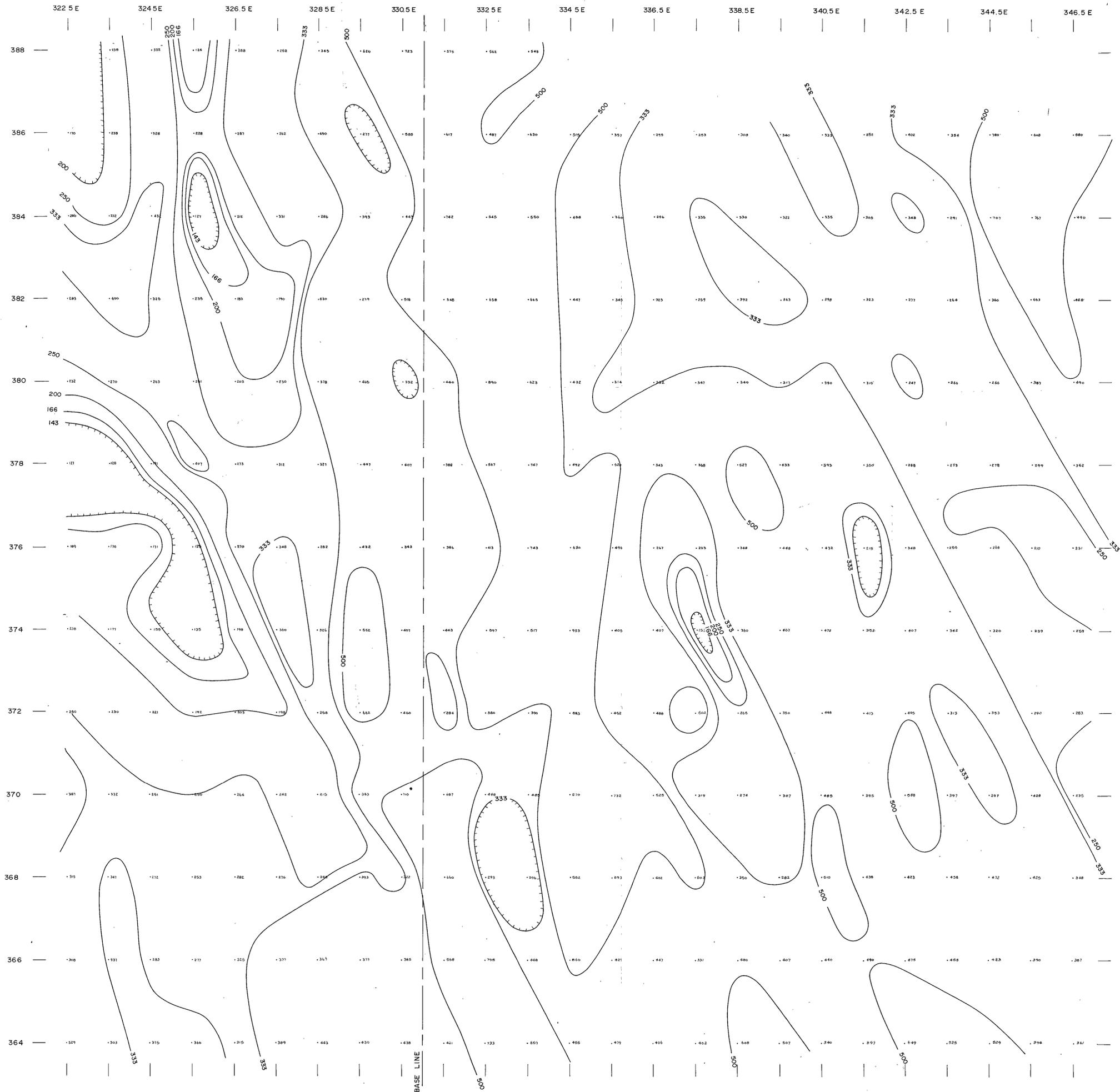
Apparent resistivity scale



$$\rho_a = \frac{1000}{n}$$

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GEOPHYSICAL SURVEY AT MARIPOSA (TASMANIA)

APPARENT CHARGEABILITY

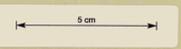
SCALE 1" = 100'

Current Line AB = 6560 ft.
Potential Dipole MN = 100 ft.
Integration from 450 to 1150ms after cut off

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LEGEND

--- Apparent chargeability in ms



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T. N.



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GEOPHYSICAL SURVEY AT MARIPOSA (TASMANIA)

APPARENT CHARGEABILITY

SCALE 1" = 100'

Current Line AB = 6560 ft.
Potential Dipole MN = 100 ft.
Integration from 450 to 1150m after cut off

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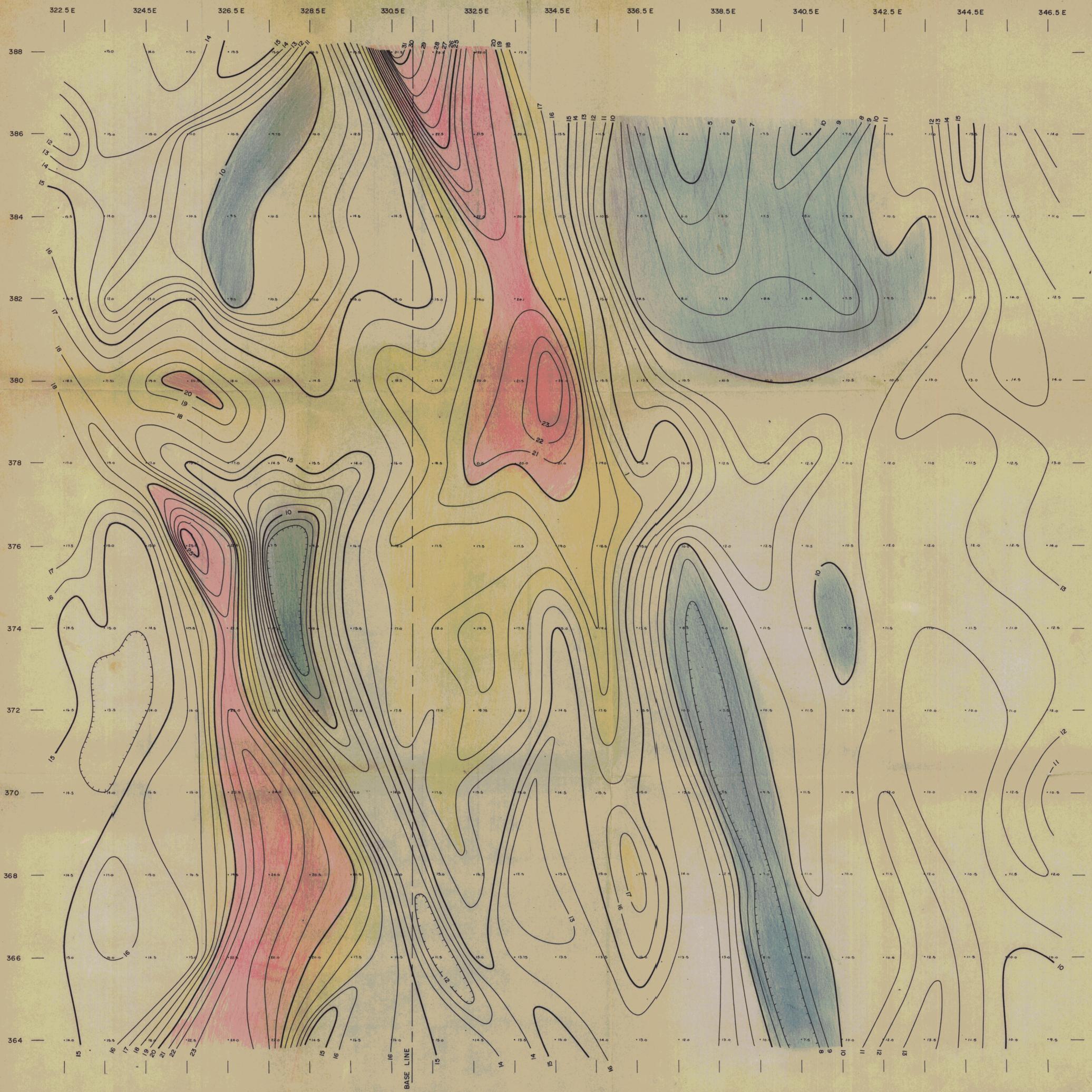
LEGEND

Apparent chargeability in ms



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T.N.



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GEOPHYSICAL SURVEY AT MARIPOSA (TASMANIA)



COMPREHENSIVE MAP

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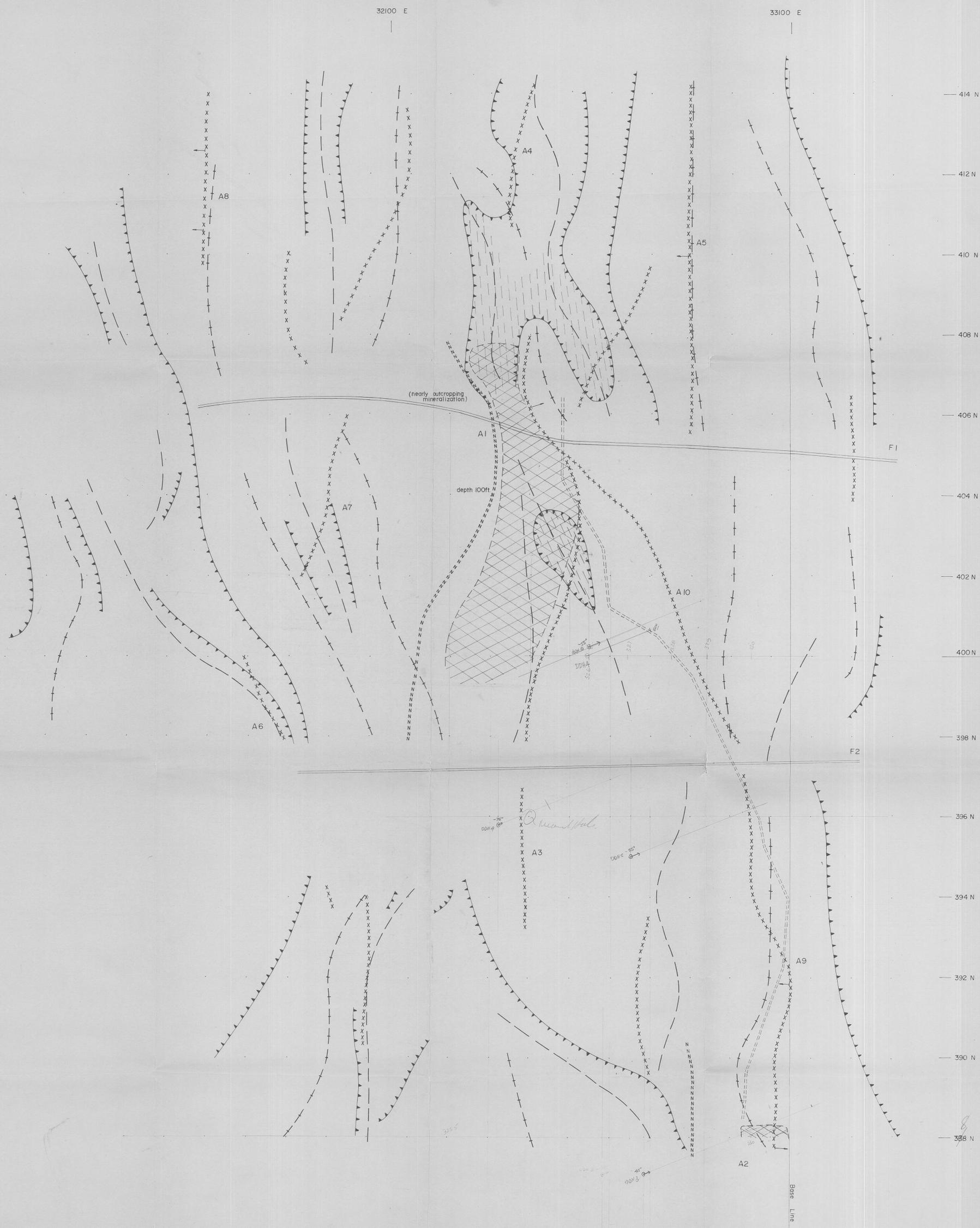
SCALE 1" = 100'

LEGEND

- Conductive axis
- Resistant axis
- Apparent resistivity gradient
- Positive IP axis
- Negative IP axis
- Conductive zone
- Polarizable body
- Dip
- Electrical discontinuity

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— 414 N
— 412 N
— 410 N
— 408 N
— 406 N
— 404 N
— 402 N
— 400 N AB line = 2000m
— 398 N
— 396 N
— 394 N
— 392 N
— 390 N
— 388 N



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GEOPHYSICAL SURVEY AT MARIPOSA (TASMANIA)

for McIntyre Mines

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COMPREHENSIVE MAP



SCALE 1" = 100'

LEGEND

- Conductive axis
- Resistant axis
- Apparent resistivity gradient
- Positive IP axis
- Negative IP axis
- Conductive zone
- Polarizable body and depth (60ft)
- Dip
- Electrical discontinuity

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GEOPHYSICAL SURVEY ON MT. DUNDAS (TASMANIA) ANOMALY No. 1 GRID

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EM GUN PROFILES IMAGINARY COMPONENT

SCALE 1" = 200'

LEGEND

Distance between vertical coils : 100 ft.

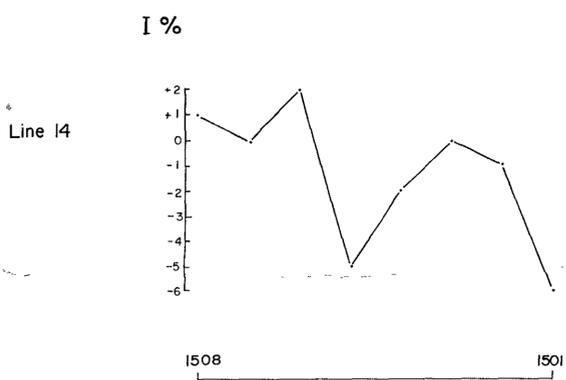
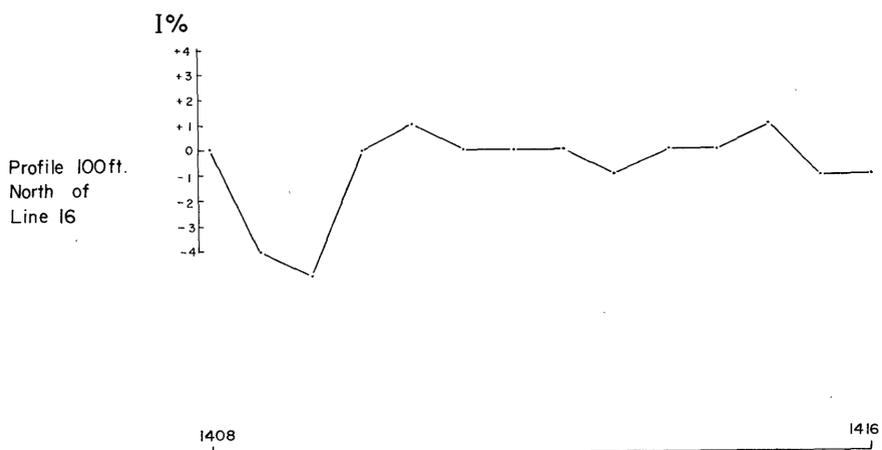
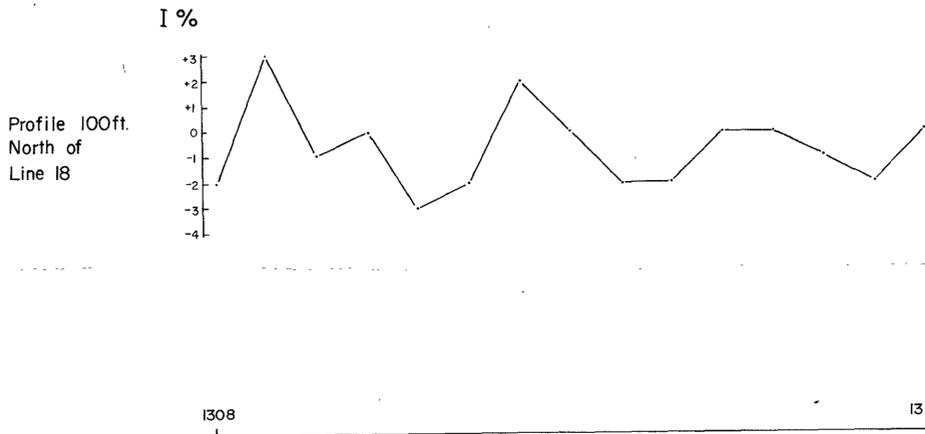
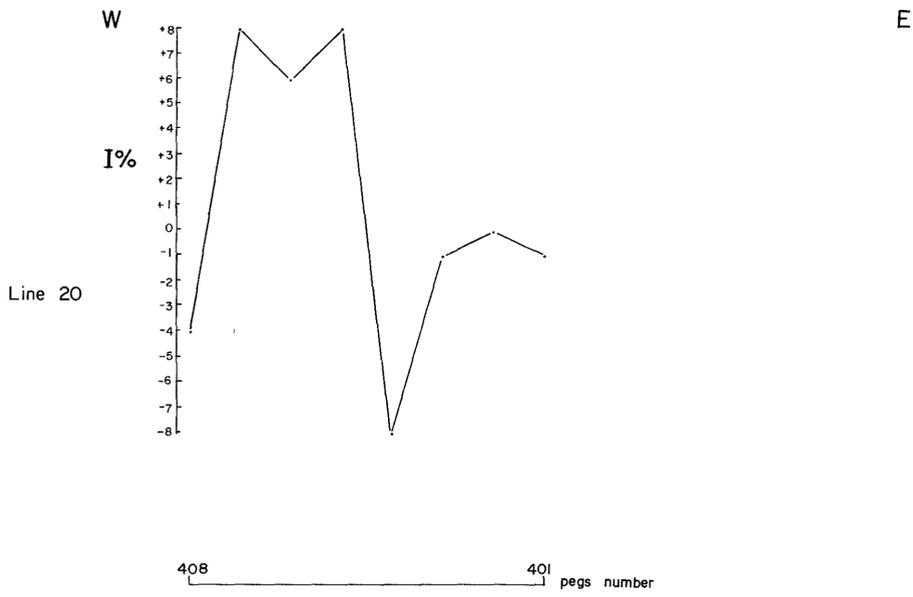
Frequency : 440 Hz



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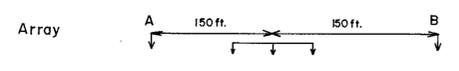
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**GEOPHYSICAL SURVEY
ON MT. DUNDAS (TASMANIA)
ANOMALY No. 1 GRID**

**APPARENT RESISTIVITY
APPARENT CHARGEABILITY
SELF POTENTIAL PROFILE**

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SCALE 1" = 00'



AB = 300ft. MN = 50ft.

Time on: 2 seconds Time off: 2 seconds

Integration from 450ms to 1150 ms after cut off

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