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A REPORT ON

GRADIENT ARRAY

ELECTRICAL INDUCED POLARIZATION RECONNAISSANCE SURVEY

OVER THE MADAME HOWARD GRID

HENTY-YOLANDE AREA E.L. 41/71

QUEENSTOWN, WEST COAST TASMANIA

ON BEHALF OF

THE MOUNT LYELL MINING AND RAILWAY COMPANY LTD.

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BY

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Plate 1 - Data Profiles

**SCINTREX PTY. LTD.**

Formerly

**SEIGEL ASSOCIATES AUSTRALASIA PTY. LTD.**

GEOPHYSICAL CONSULTANTS AND CONTRACTORS

S U M M A R Y

A gradient array electrical induced polarization survey over the Madame Howard grid has defined a number of weak to moderate anomalies, and one substantial induced polarization anomaly of primary interest. The source in every case is considered to be disseminated sulphides, as no variation in the apparent resistivity was noted over any zone.

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INTRODUCTION

At the request of Mr. K. Reid, Chief Geologist of the Mount Lyell Mining and Railway Company Ltd., Scintrex Pty. Ltd. executed a gradient array electrical induced polarization survey over the Madame Howard grid, near Queenstown, West Coast Tasmania.

The field party was under the direction of Scintrex party leader Mr. B. Ekstrom, with on site geophysical advice being provided by Scintrex Staff Geophysicist Mr. G.J. Elliott B.App.Sc(Geophys). Such additional technical direction as was required was provided by Dr. J.G. Linford, Scintrex Chief Geophysicist, while Mr. K. Wells undertook the geological direction of the survey crew. The survey was carried out on some 4½ production days between the 12th and 16th December, 1974 (See Appendix P)

Gradient Array Electrical Induced Polarization Method

More comprehensive descriptions of the the above method are contained in previous survey reports on the Mt. Lyell area. What follows is a brief summary of the major factors.

In the case of the gradient array, positional information is excellent, but depth estimates rely on profile shape and then only give a "maximum depth". An additional inhibiting factor of course is resolution of the potential dipole used. In this survey the minimum potential dipole employed was 100 feet, thus it is not possible to resolve the depth better than "within 50 feet". Thus many of the 50 feet determinations may in fact either outcrop, or lie within a few feet of surface. The plotted position of the data represents a summation of the characteristics of the material immediately below that point between the potential dipoles.

Similarly the width of bodies is not easy to determine for narrow zones having a width less than half the dipole spacing used. These estimated maximum widths are educated guesses at best. However, the wider zones are resolved more accurately.

The attitude of a chargeable zone can only really be gauged with any precision in the centre of the gradient array and providing the body has strongly contrasting resistivity and

chargeability characteristics to the enclosing rock units.

All field measurements were taken between slope distances along lines. This will, in steep areas, produce errors in the calculated apparent resistivity data, however, these errors will be arithmetic, and as significant changes in resistivity are logarithmic, this source of error is not significant.

In assessing the position of the source in areas of extreme terrain, it does not lie vertically below the plotted position of the anomaly, but normal to the "local slope". All positions in the text refer to source positions normal to the local slope.

Each current dipole block should be considered separately.

As would be expected, the continuity along strike is generally good, especially in the chargeability data. However "end on" current dipole blocks cannot be expected to give identical data due to the different base levels of the current dipoles, and, in zones close to the current poles, the data will not sample identical volumes on the overlap between current dipoles. This phenomenon will result in more extreme divergence of data as the current dipole is approached. However, these factors are entirely predictable.

DISCUSSION OF RESULTS

The data profiles are displayed on Plate 1 at a horizontal scale of 1 inch = 200 feet, while the vertical scales employed are 1 inch = 10 milliseconds for chargeability and 1 logarithmic cycle = 2 inches for resistivity with the latter being expressed in ohm-metres.

The current dipoles employed to energise the search area were as follows:

<u>Electrodes</u>	<u>Lines</u>	<u>Dipole</u>
7.5E and 22.5W on line 6S	00, 6S	3000 feet
35.5W and 4.5E on line 6S	00, 6S	4000 feet
5.5W and 35.5W on line 18S	12S, 18S, 24S	3000 feet
10E and 20W on line 18S	12S	3000 feet
10.5E and 19.5W on line 18S	18S, 24S	3000 feet
2.5E and 27.5W on line 30S	30S, 36S	3000 feet
12.5E and 17.5W on line 30S	30S, 36S	3000 feet

The potential dipole employed on all lines was 100 feet.

Nowhere was electromagnetic coupling significant, therefore the L/M ratio has not been displayed.

The data has been displayed in profile form only, as both the apparent chargeability and apparent resistivity recorded on this survey show relatively little relief, and are therefore not amenable to contour display.

The average resistivities recorded in the area range from about 1000 ohm-metres to 3000 ohm-metres, but extremes of 300 and 6000 ohm-metres were recorded. The background chargeability for the area of about 10 milliseconds  $\pm$  2 milliseconds is considered normal for the region. The induced polarization anomalies are generally of moderate amplitude only.

Each line is separately described below.

Line 00: Two induced polarization anomalies of some 5 milliseconds each, were recorded at 2850W and between 350W and 550W respectively. Neither are considered of major significance. The former is associated with a sharp decrease in the apparent resistivity, however, its position on the current dipoles necessitates additional work to confirm its interest should it be in a geological or geochemical area of interest. The anomaly at 500W on the other hand shows only a very minor decrease in apparent resistivity and the source therefore is minor disseminated sulphides (or graphite). The depths to source are difficult to gauge but are not deeper than 150 feet, and may in fact be considerably shallower. Additional work would be required to resolve this.

Line 6S: A well defined anomaly of some 6 milliseconds above the 9 - 10 millisecond background was located centred at 250W. The maximum depth to source is about 100 feet. The

anomaly occurs on a 30% dip in resistivity to the east but the absolute values of 2000 ohm-metres clearly infer a disseminated source. The width of the zone is less than the potential dipole used, namely 100 feet.

A second moderate response of 6 milliseconds was recorded between 2350W and 2550W, with its maximum value at about 2500W. Unlike the above described anomaly, this response does not have a sharp well defined form, therefore it is either deep (about 200 feet) or more likely, has a shallow source and a gradual increase in sulphide (or graphite) content towards the centre of the anomaly. A disseminated sulphide source is considered the most likely cause of this anomaly.

Line 12S: Between 2050W and 2150W a well defined anomaly of 10 milliseconds above background was defined from a source interpreted to be about 100 feet in width, and having a maximum depth of 100 feet. There is absolutely no change in apparent resistivity over this body, therefore the inference is that the source is predominantly disseminated sulphide in nature.

There are no other significant anomalies on this line.

Line 18S: A narrow but well defined and significant response of about 6 milliseconds was recorded at 1970W. The depth and width are less than 60 feet, and the source is considered to be

disseminated sulphides. The inferred dip is steep to the east.

A second anomaly of lesser significance was defined at 1250W from a disseminated source at a maximum depth of about 150 feet.

Line 24S: At 1320W a minor anomaly of some 5 milliseconds above the 10 millisecond background was recorded from a source interpreted to be disseminated. This occurs on the current dipole to the west, however, on the overlap, the anomaly was not repeated. This could be due to an edge effect, therefore should it be considered significant, additional work is recommended over this section of the line. This anomaly may be related to that recorded at 1250W on line 18S.

Line 30S: No significant anomalies.

Line 36S: No significant anomalies.

#### CONCLUSIONS AND RECOMMENDATIONS

- 1 - The apparent resistivity and apparent chargeability backgrounds in the area are considered normal for the region.
- 2 - The induced polarization data is not affected by electromagnetic coupling.

- 3 - The anomalies, for the most part, are of limited amplitude and are all considered to be due to disseminated sulphide sources.
- 4 - The resistivity data does not permit the strike and limit of any rock unit to be identified, as there were no major variations.
- 5 - The induced polarization anomalies defined on the present survey cannot be unambiguously traced between survey lines as the form changes from line to line and they don't have any distinctive associated apparent resistivity feature in common. However, the following trend does suggest an alignment.
- |     |    |       |
|-----|----|-------|
| 00S | at | 2850W |
| 6S  | at | 2500W |
| 12S | at | 2100W |
| 18S | at | 1970W |
- 6 - The most significant anomaly located on the present survey, as judged from geophysical criteria only, was that defined between 2050W and 2250W on line 12S. Should the trend suggested in 5 above be confirmed, investigation of it is recommended on line 12S.
- 7 - As always the geological setting of a geophysical anomaly

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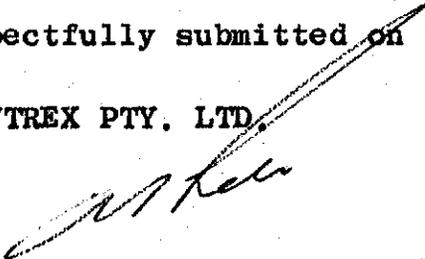
and the geochemical response of that anomaly is more significant than the actual dimensions of the anomaly. Therefore careful evaluation of each of the anomalies is suggested prior to any investigation by drilling.

We will be pleased to recommend diamond drill holes on any of the anomalies located in this survey after your geological evaluation of their economic potential is complete.

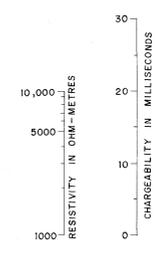
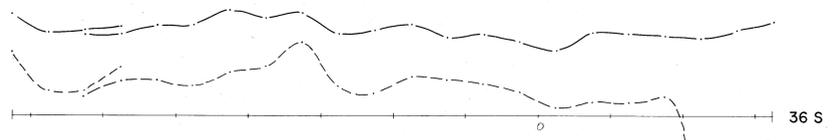
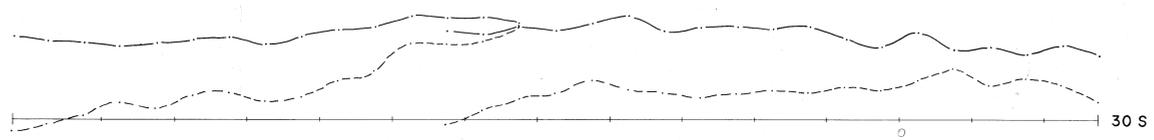
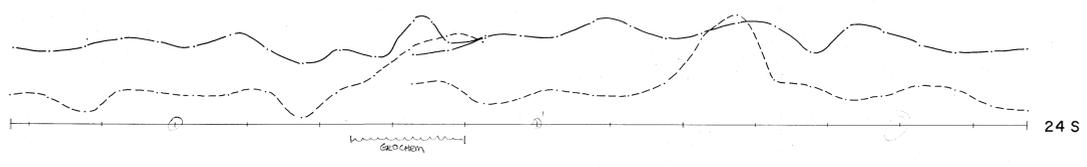
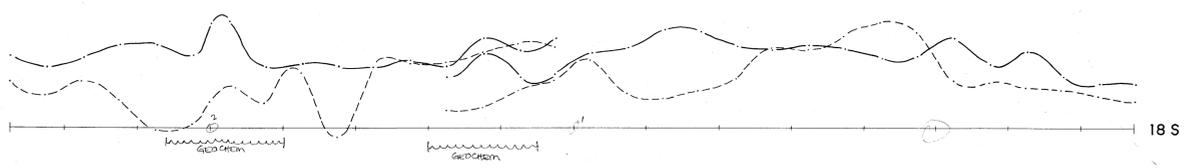
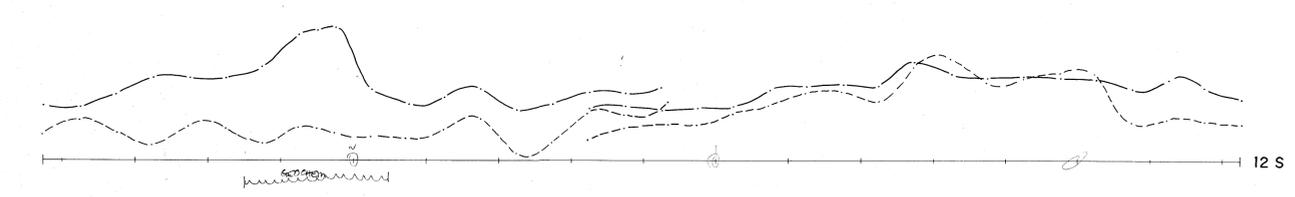
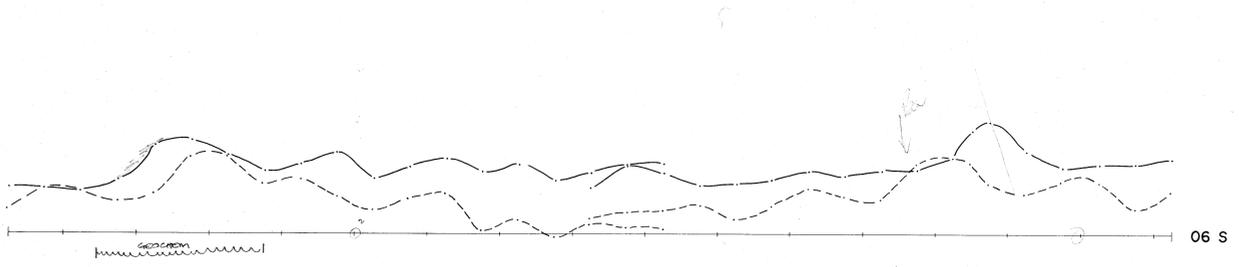
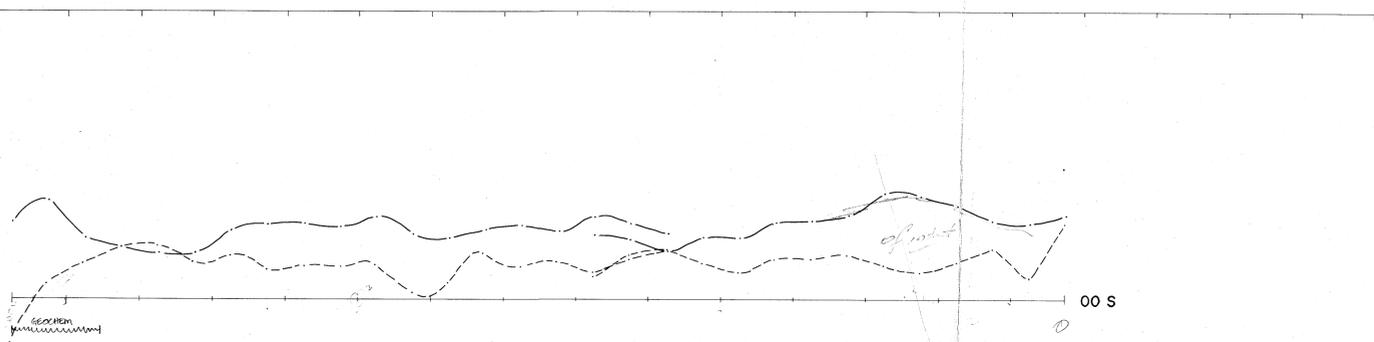
We look forward to discussing the above data with you in the near future.

Respectfully submitted on behalf of:

SCINTREX PTY. LTD.

  
A.W. HOWLAND-ROSE, MSc, DIC, AMAusIMM, FGS.

GEOPHYSICIST



**LEGEND**

CHARGEABILITY,  $t^1 = 10$  milliseconds  
 Base level = 0  
 Symbol = ————

RESISTIVITY,  $2^2 = 1$  logarithmic cycle  
 Base level = 1000 ohm-metres  
 Symbol = - - - - -

**THE MOUNT LYELL  
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**MADAME HOWARD GRID  
 WEST COAST, TASMANIA**

**ELECTRICAL INDUCED POLARIZATION SURVEY  
 DATA PROFILES**

327014



SURVEYED & COMPILED BY:-  
**SCINTREX PTY. LTD.**

NOVEMBER, 1974

