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SPL 129



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MINERAL EXPLORATION AND ENGINEERING CONSULTANTS

BUGGS LANE ELLIOTT TASMANIA 7325 PHONE 004-363143

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A REPORT ON GEOPHYSICAL SURVEYS OVER THE GLOBE WORKINGS,  
HEEMSKIRK GRANITE, SPL 129

for

**OPEN FILE**

RENISON LTD.

by

**MICROFILMED**

Dr. J.R. BISHOP

RN/MG82/04

March 1982

AMG REFERENCE POINTS ADDED

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SUMMARY

The Globe workings consist of three adits and a shaft located in the south east corner of the Heemskirk Granite. The mineralisation consists of base metal sulphides as well as cassiterite: significant silver values have also been recorded.

A gradient array IP survey was conducted over the Globe Grid by Scintrex in November, 1980. This was extended to the south in November 1981 by a second survey. Agreement between the two surveys (where they overlap) is poor, since, it is assumed, the southern current electrode of the earlier survey was placed in chargeable material. Contour plans of chargeability and resistivity have been compiled for this report using the later survey as a standard, since this data is considered to be the more reliable. The plans have also incorporated information from a similar survey of the East Heemskirk Grid where it overlaps the Globe Grid. The chargeability plan shows that the area around the workings is moderately anomalous (at 30+ mv/v), however the strongest responses (40+ mv/v) are to the south east. The workings coincide with the lowest recorded resistivities (<1000 ohm-m), but the area of high chargeabilities in the south east is associated with high resistivities (2000 - 3000 ohm-m).

Dipole-dipole surveys were carried out on six lines in Nov. - Dec. 1981, and broadly similar results to the gradient array surveys can be seen in contour plans of the chargeability and resistivity. Interpretation of the dipole-dipole pseudosections suggests a chargeable and resistive tabular body beneath lines 160E to 320E, at a depth below surface of less than 20m.: the thickness is 20m. to 40m. and the width varies from 90m. to 180m.

Because of the association of high chargeabilities with high resistivities, metal factors were calculated for the dipole-dipole data. In contour form, these show the most anomalous area to be beneath, and to the east of, the entrance to the main adit. Both the areas of high chargeability and high metal factor should be investigated (specific drill holes are listed at the end of this report).

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The dipole-dipole contour plans of chargeability and metal factor suggest that the anomalous area continues south past the limits of the survey. This is not evident on the gradient array IP figures, however I believe that the former is more representative of the bulk properties of the rock and is less influenced by near-surface variations. Thus further work may be warranted, but only if the results from the recommended drill holes are sufficiently encouraging.

While significant amounts of base metal or silver mineralisation may occur at the Globe, tin has been Renison's primary target on the granite. It is emphasised that no geophysical methods directly respond to cassiterite, the likely form of the tin, and furthermore, the tin may not be intimately associated with the sulphides. Cannard (1981) noted that there appeared to be (at least) two phases of mineralisation; one localising the sulphides, the other the tin.



## AIM AND INTRODUCTION

The old Globe mine is situated in the south east corner of the Heemskirk Granite, within SPL 129 (see Figure 1). Although Renison's exploration on the granite has been directed at tin, the Globe also contains silver and base metal mineralisation (Blissett (1962), Cannard (1981)).

Renison's first investigations of the Globe were by Ross (1979) and Roberts (1980a). It was noted that there were apparent similarities with the polymetallic Sweeney's deposit 2.5 km. to the SW, and since Sweeney's had given an excellent response to an IP survey, a similar survey was recommended by Roberts for the Globe.

A small gradient array IP survey was carried out over the workings in Nov. 1980 and this was extended by a further survey in Nov. 1981. Six lines of dipole-dipole IP were also read during this latter survey. Also relevant to the Globe is part of an IP survey of the East Heemskirk Grid, some lines of which overlap the Globe Grid. A magnetic survey was carried out by Cannard as part of a detailed exploration program over the mine (Cannard, 1981).

For this report, I have integrated and interpreted the data from all surveys and have recommended a number of drill targets. Further surveys are also recommended to define anomalous areas south of the mine.

## GEOLOGICAL TARGET

Four styles of mineralisation have been recognised on the Heemskirk Granite (Roberts, 1980b), and the Globe has many similarities with Sweeney's, the polymetallic sulphide type deposit. Like Sweeney's, the Globe contains base metal mineralisation and has a halo of argillic alteration: greisen veins are also present. However Sweeney's probably contains more sulphide (at 10% S) than does the Globe.

The Globe Grid was mapped by Cannard who produced a 1:500 scale map (see Figure 2). Cannard (1981) made the following observations: the Globe occurs within 'red' granite near the site of intruded fine grained 'white' granite. There is a large exposure of quartz-tourmaline alteration in

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the adits, but little surface expression of it. A halo of argillic alteration surrounds the quartz tourmaline. Cannard also noted "that the tin mineralisation (probably cassiterite) and the silver, lead, zinc mineralisation are distinct, though overlapping, and probably indicate at least two phases of mineralisation".

The presence of sulphides at the Globe meant that geophysics might be a useful tool for outlining the extent of the mineralisation. This had previously been tried over Sweeney's where a gradient array IP survey had produced a 65+ mv/v chargeability anomaly (Howland-Rose, 1977). Despite the good geophysical response, Sweeney's has been an extremely difficult target to define; from eighteen holes, only seven intersected mineralisation, and its shape is still unresolved. However no dipole-dipole IP surveys have been conducted over Sweeney's and it is argued in this report that such surveys considerably aid the interpretation of a target's depth and shape.

Although geophysical surveys may successfully define mineralisation, tin in the form of cassiterite makes no contribution and thus there may be no correlation between sulphides and tin content. Although this does not appear to be the case at Sweeney's, it may be important at the Globe, since Cannard (1981) has suggested that the tin has been emplaced by a different phase of mineralisation to that which localised the sulphides.

GEOPHYSICAL SURVEYS

On the type deposit, Sweeney's, good chargeability and moderate resistivity responses have been obtained from a gradient array IP survey. In contrast, tests of EM (using Crone's PEM equipment) were unsuccessful (Wells, 1978), and no diagnostic results were obtained from measurement of core with a gamma-ray spectrometer (Wells, 1977). A magnetic survey of Sweeney's was affected by ferrous debris, but a generally flat response was obtained. A test SP survey over another sulphide occurrence on the granite (area 1 of the Agnew Grid) indicates that this method may be most useful (Bishop, 1982, in prep.), however this may not apply to such deposits as the Globe, where lower concentrations of sulphides are indicated. Thus the IP method is the most applicable and the technique that has evolved from several programs on the granite is to (1) conduct a

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reconnaissance gradient array survey and (2) follow up by covering the most anomalous areas with dipole-dipole IP surveys.

IP and magnetic surveys have been conducted over the Globe: the former outlined a well-defined anomalous area, while the latter, at least locally, was not so diagnostic.

Gradient Array Induced Polarisation:

A gradient array IP survey was carried out over the Globe by Scintrex in Nov. 1980: eight lines were read and the coverage is listed in Table 1. Street (1981) presented the results as contours at 1:500 scale and stated that although the resistivity results showed little, the chargeabilities over the area were generally high, particularly in the southern part of the survey: this he considered was likely to be due to the southern electrode's emplacement in chargeable material. Since the anomalous area was not closed off to the south, and because of the possibly misleading results, Street recommended that the survey be repeated, using the same 10m. dipole spacing, but covering a larger area. A second survey (coverage listed in Table 2) was conducted in Nov. 1981; it did not cover the area of the earlier survey, but there was considerable overlap: the survey extended the coverage to the south of the workings (see Figure 3). The results have been presented by Howland-Rose (1982) as contour plans at a stated 1:1000 scale (actually nearer 1:800). They have been plotted, with the previous survey's results, on to Renison's composite profiles at a scale of 1:500 (Figures 4 to 12): these show that the chargeabilities and resistivities from the southern section of the first survey are at least 30% too high. From both surveys, the profiles show a series of rather moderate chargeability anomalies, none being better than twice background.

Part of a gradient array IP survey over the East Heemskirk Grid (EHG) overlaps the Globe Grid and I have used the results, with those of the 1980 and 1981 Globe surveys, to construct chargeability and resistivity contour plans at a scale of 1:1000. The contouring has been based on the 1981 survey, and so about 30% was (mentally) subtracted from the 1980 values when drawing in the contours. (The East Heemskirk values were comparable to those of the 1981 survey.)

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The chargeability contours (Figure 13) show that although the area around the old workings is moderately anomalous (30+ mv/v), there are larger anomalies 80 to 150m. to the south east (40+ mv/v). However the lowest resistivities (<1000 ohm-m) are over the old workings which suggests that they (the workings) are in the area of greatest alteration. The high chargeabilities in the south east of the survey are coincident with high resistivities (2000 to 3000 ohm-m); why this may be so is considered in the Discussion.

Dipole-Dipole Induced Polarisation:

Dipole-dipole IP surveys were carried out on lines 00N, 120E, 160E, 240E and 320E of the Globe Grid and 2750N of the East Heemskirk Grid between Nov. and Dec. 1981. The dipole spacing was 30m. and readings were made to n = 5. The results are shown in the composite profiles and in Figures 19 to 24 where the metal factor parameter has also been plotted.

These pseudosections show a definite increase in chargeabilities to the east with the broadest volume at 240E: resistivities also increase to the east. These trends are clearly shown in the contour plans of the chargeabilities and resistivities\* (Figures 17 and 18 respectively). The former shows the highest response to the south east of the workings, in rough agreement with the gradient array chargeabilities (the dipole-dipole data shows a much broader response because (a) the data has been averaged and (b) there is less dipole-dipole coverage). In contrast to the gradient array results, Figure 17 suggests that the sulphide content (i.e. chargeable material) drops off sharply westwards through the workings

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\* A procedure for contouring of dipole-dipole data has been described by Fraser (1981). The algorithm produces one value from a triangular shaped averaging window for any number of levels.

$$\text{plotted value 'X'} = \frac{1}{2} \left[ A_1 + \frac{(B_1+B_2)}{2} + \frac{(C_1+C_2+C_3)}{3} + \frac{(D_1+D_2+D_3+D_4)}{4} \right]$$



between lines 160E and 120E. The averaged dipole-dipole resistivity data (Figure 18), like the gradient array data, shows low values over the workings with high values to the east, coincident with high chargeabilities. The lowest resistivity value is at the southernmost data point on line 120E: this should be verified (by another survey centred at (say) 120E/120S), and if genuine, fully defined by extending the coverage on several lines to the south of the present survey limit.

Although the dipole-dipole contour presentation is useful for determining broad trends and perhaps for locating the bulk of any mineralisation, it should not be used for siting drill targets and cannot be used for any detailed interpretation. For these purposes, one must refer to the pseudosections. An inspection of the chargeability pseudosections for lines 160E, 240E and 320E suggests a roughly tabular chargeable 'body' beneath the lines: its width varies from approximately 180m. on lines 160E and 240E to 90m. on line 320E: its thickness is perhaps between 40 and 60m. and the top of the body may be up to 20m. from the surface (since the high values are still open at  $n = 1$ , the minimum depth cannot be determined). This interpretation is supported by the data on cross lines 00N and 2750N. Diagrams of the interpretation are shown on Figure 25. The intrinsic chargeability of the body is probably between 50 and 60 mv/v).

#### Magnetics:

A magnetometer survey of the area north of line 2750N (EHG) was carried out by Cannard: the total field was measured at a station spacing of 10m. and the results contoured at 1:500 scale (see Figure 16, Roberts, 1981). There was little variation over the area surveyed except in the north western corner, on line 40E, where "a significant positive anomaly ... is related to magnetite alteration of the granite" (Cannard, 1981). The magnetic coverage should be increased to include the southern extensions to the grid, and possibly the magnetite area should be better defined (by closer stations and infill lines) since some targets on the Federation grid were magnetic (see below).

In the light of Cannard's survey, the following general points are made about conducting a magnetic survey:

- (1) A base station was established for the diurnal correction, however its

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location and given value were apparently not recorded; hence any extensions to the grid must be tied in to the first survey by repeating a section of a line. Base stations should be established (in a magnetically quiet area) as permanent places with the fixed value recorded at the site. It is then an easy matter to tie in all surveys in any given area.

(2) Where 'significant' anomalies occur, particularly if only over one or two stations, in-fill readings should be taken.

The following specific points may be made about the survey over the Globe: (1) The 'low' immediately to the south of the anomaly referred to above has not been contoured. It is probably genuine and suggests a very local source. (2) The negative value at 80N on 00E referred to by Cannard (1981) is not evident on the map: the absolute (recorded) value is in keeping with the surrounding readings, and it is probably not genuine.

It is possible that the flat magnetic response over the Globe is due to alteration; if this is so, one use for a magnetic survey would be in defining the limits of the area of 'quiet' response; thus the coverage would need to be extended in all directions. Elsewhere on the granite, e.g. at Waxman and Weston's (Bishop, 1981), tin mineralisation is associated with an isolated magnetic anomaly. However the small intense response on the Globe is about five times as strong as that over Waxman and Weston's, and thus there is little similarity between the two.

DISCUSSION

Both the gradient array and dipole-dipole surveys have outlined anomalous areas on the Globe Grid. Before recommending drill targets based on the results of these two modes of IP surveying, some comparative comment is appropriate. The gradient array surveys were successful in that chargeable areas were defined, and an area of (relatively) low resistivity probably defines the most altered area. The dipole-dipole surveys have done the job better in as much as the chargeability anomalies are at least two, typically four, and as much as ten, times background, and the resistivities may be as low as one

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third background; but these have been at a greater cost in both time and money. The gradient array results appear to have responded more readily to near-surface changes in mineralisation, and they do not permit the semi-quantitative interpretation of the dipole-dipole array (e.g. the tabular-shaped body described above). The dipole-dipole array appears to better reflect the bulk properties of the rock and this is emphasised by the contouring algorithm.

The dipole-dipole chargeability contours (Figure 17) suggest that the greatest concentration of sulphides lies between lines 240E and 320E, however the resistivity results from these surveys suggest that the greatest amount of alteration, manifested by a lowering of values, has taken place around the workings. Since alteration and mineralisation are usually more closely associated, it has been suggested (at meetings with Renison geologists) that the area of both high chargeability and resistivity may be a more resistive alteration, e.g. silicification and tourmalinisation plus sulphides. Bishop (1982) suggested such a cause for some of the anomalies on the Agnew Grid. Since the Globe workings are strongly tourmalinised and are in an area of low resistivity, an alternative explanation may be required. Another interpretation (and one that applies also to the Agnew Grid) is given below.

An area of higher chargeabilities may not necessarily contain a higher percentage of chargeable material (sulphides). In a more resistive rock (i.e. one which has a limited porosity, this being the most important variable determining a rock's resistivity), a greater proportion of the current (from an IP survey) will pass through the sulphide grains which occupy areas of the pore spaces, than in a rock with the same percentage of sulphides but with a higher porosity; thus the more resistive rock will record a higher IP effect. This may be even more pronounced in an impermeable rock where most of the sulphides are in fracture planes: for such a rock nearly all electric current would be restricted to the planes and would pass through the sulphides. Thus the Globe may be a central zone of altered rocks (the workings) which contain disseminated sulphides and in the relatively unaltered rocks to the south east, the mineralisation is restricted to joints or fractures within the rock: for the reasons given above, this latter area records a higher chargeability. This is necessarily a simplistic

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explanation and it is to be expected that the true situation would be more complex, perhaps a combination of the two possibilities discussed above.

In an attempt to overcome the effect of a host rock's resistivity, the metal factor was devised (e.g. Madden and Cantwell, 1967). This parameter, defined as  $\frac{\text{percent frequency effect or chargeability}}{\text{resistivity}} \times 1000$

normalises the IP effect for the variations caused by changes in the resistivity. Figure 26 gives the metal factors for the averaged (contoured) dipole-dipole IP values. This shows the highest values much closer to the workings and the area of high chargeabilities is much reduced in interest. The figure suggests that the anomalous area continues to the south, however the southernmost value on line 120E, the highest metal factor calculated, would need to be verified by another survey. But this is 'required' by the high value contours open to the south. (Metal factors for the gradient array surveys have not been calculated, but a similar result would be obtained.)

An examination of the metal factor pseudosections (Figures 19 to 24) shows that the tabular body interpreted from the chargeabilities has become a series of small 'highs', particularly on lines 240E and 320E. Line 160E shows some substance to the anomaly, as does the southern half of line 120E. Although it is emphasised that the representations of the dipole-dipole IP are pseudosections, and do not accurately represent a cross-section below the survey, it is interesting to note that on line 120E, adit 1 is in an area of moderate chargeabilities and metal factors (both <30 units). On 160E, it is directly above the most anomalous part of the metal factor pseudosection, which, having its maximum value (>90) at n = 2, suggests that a concentration of mineralisation is buried beneath adit 1 (the highest chargeabilities are offset 75m. to the south). Like line 120E, the strong metal factor values and good chargeabilities on the southern edge of the survey, indicates that the coverage should be extended to the south. On line 240E, the anomalous area (for both metal factor and chargeability) is contained within the survey limits: the metal factor emphasises small zones (90+ and 70+) within the generally uniform high response of the chargeability pseudosection. Line 320E has high chargeabilities

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(max. 70 mv/v), however the high resistivities (1000 to 2000 ohm-m) means that the metal factors are reduced to 50-60 units (siemen-m): two separate areas have been outlined, either side of the chargeability maximum. On Line 00N, the chargeability and resistivity anomalies are, atypically, near coincident, thus resulting in a very strong metal factor (max. value 142). Line 2750N has the highest chargeabilities (75+ mv/v) however like 320E, the high resistivities significantly reduce the metal factor. It is emphasised that all three parameters, resistivity, chargeability and metal factor, must be considered when planning a geophysically based drill target.

CONCLUSIONS AND RECOMMENDATIONS

The gradient array IP surveys over the Globe showed the site of the old workings to have moderate chargeability responses, but the best anomalies (40+ mv/v) were to the south east of the workings in an area of high resistivity (2000 - 3000 ohm-m): the lowest resistivities were recorded over the workings. This response pattern is also evident from the contouring of the dipole-dipole IP results. For both array types, the areas of maximum response are incompletely defined and further work is recommended below to outline any southern extension of the anomalous area.

The dipole-dipole pseudosections for lines 160E, 240E and 320E suggest a tabular chargeable body varying between 90m. and 180m. wide (i.e. from 5 to 6 dipole units) and 20m. to 40m. thick at a depth below surface of no more than 20m. Drill targets to intersect more anomalous areas of this body are recommended below.

It was pointed out in the previous section that the higher chargeabilities to the south east may be due to a channelling of a higher percentage of the IP current through the sulphides, rather than to a higher concentration of sulphides. That is, the areas of lower (recorded) chargeabilities within areas of lower resistivity may be more prospective. To help assess this, the metal factor parameter was calculated from the dipole-dipole pseudosections. The metal factor contour plan shows the most prospective area beneath and east of the entrance to adit 1. Drill

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holes into this area are recommended below. Investigation of both areas is also recommended on the grounds that the tin mineralisation may or may not be intimately associated with sulphides. That is, the areas of lower resistivities may be lower in sulphides, but possibly richer in tin.

Recommended drill holes (see Figures 19 to 24):

<u>Collar(line/stn.)</u>	<u>grid bearing</u>	<u>dip</u>	<u>min. length</u>
(1) Chargeability anomalies:			
2750N/390W	west	55°	150m.
320E/60S	north	55°	75m.
(2) Chargeability and metal factor anomalies:			
00N/210E	west	40°	120m.
240E/75S	north	45°	150m.
(3) Metal factor anomalies:			
160E/60S	north	50°	120m.

Recommended dipole-dipole IP surveys:

(only warranted if sufficient encouragement from above drilling)

<u>line</u>	<u>coverage</u>	<u>centre stn\</u>	<u>dipole spacing</u>
120E	45S - 255S	150S	30m.
2700E	100E - 310E	210E	30m.
80E	165S - 45N	60S	30m.

*J.R. Bishop*

J.R. Bishop  
March, 1982

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TABLE 1(a) Gradient array IP survey over the Globe

Survey by: Scintrex  
 Date: Nov. 1980  
 Dipole spacing: 10m.  
 IP receiver: IPR-8, 2 sec. pulse

<u>line</u>	<u>Current electrodes</u> coverage
<u>290N and 250S on 160E</u>	
00E	25S to 155N
40E	35S to 125N
80E	45S to 115N
120E	65S to 85N
160E	75S to 85N
200E	85S to 85N
240E	85S to 85N
320E	5N to 165N

(b) Extensions to the gradient array coverage over the Globe

Survey by: Scintrex  
 Date: Nov. 1981  
 Dipole spacing: 10m.  
 IP receiver: IPR-10, 2 sec. pulse

<u>line</u>	<u>Current electrodes</u> coverage
<u>350S and 250N on 160E</u>	
80E	125S to 5N
120E	155S to 25N
160E	155S to 35N
200E	185S to 5N
240E	185S to 5N
320E	85S to 85N

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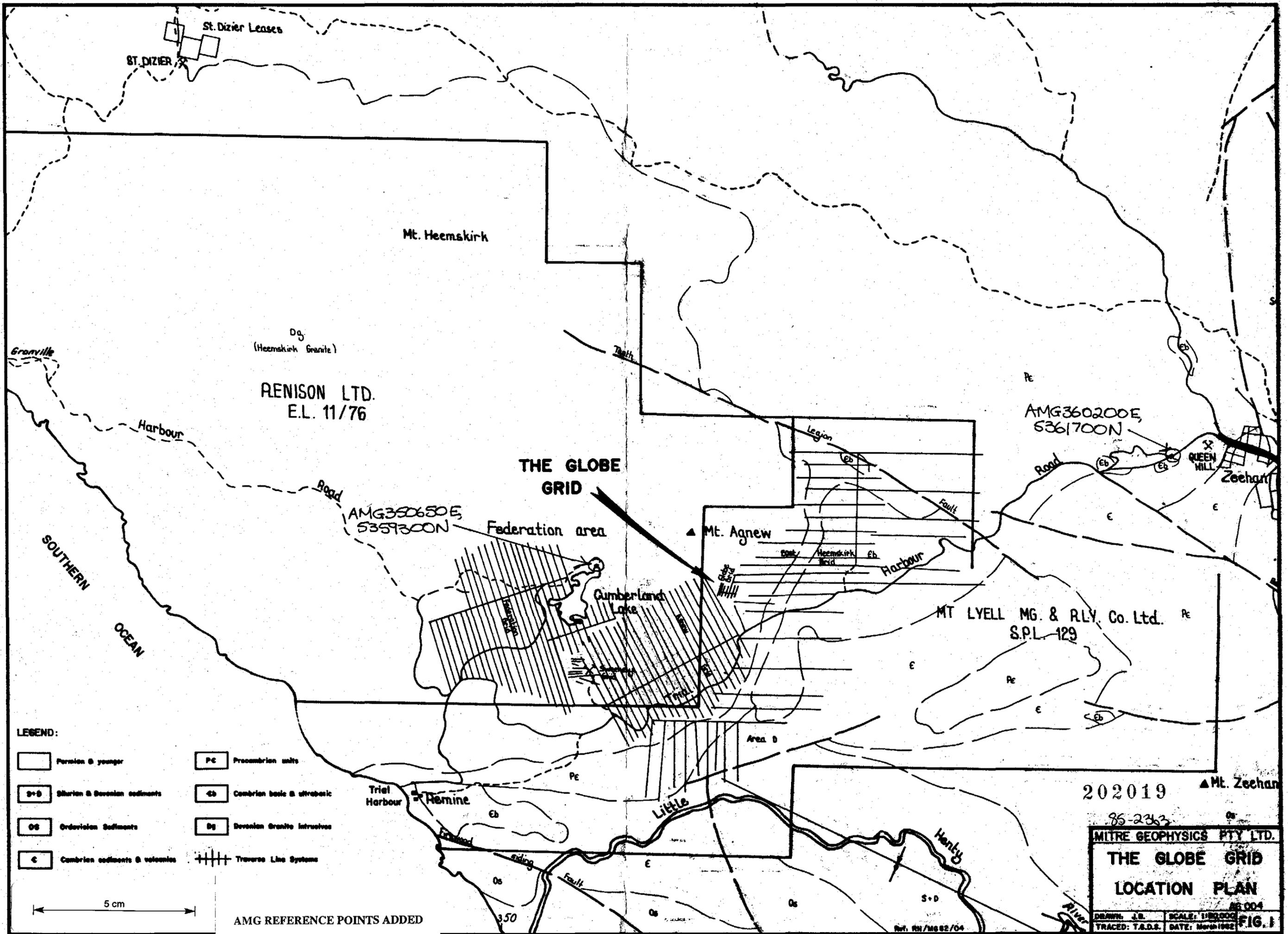
TABLE 2

Dipole-dipole surveys over the Globe

Surveys by: Scintrex  
 Date: Nov. - Dec. 1981  
 Dipole spacing: 30m. (read to n=5)  
 IP receiver: IPR-10, 2 sec. pulse

<u>line</u>	<u>coverage</u> *
00N	25E to 235E
120E	135S to 75N
160E	135S to 75N
240E	195S to 15N
320E	105S to 75N
2750N (E.H. Grid)	575W to 365W

\* Coverage is defined as the interval between which all readings (n = 1 to n = 5) have been taken.



St. Dizier Leases  
ST. DIZIER

Mt. Heemskirk

Dg  
(Heemskirk Granite)

RENISON LTD.  
E.L. 11/76

THE GLOBE  
GRID

AMG350650E,  
5359300N

Federation area

Mt. Agnew

AMG360200E,  
5361700N

MT LYELL M.G. & R.L.Y. Co. Ltd.  
S.P.L. 129

QUEEN  
MILL  
Zeehan

LEGEND:

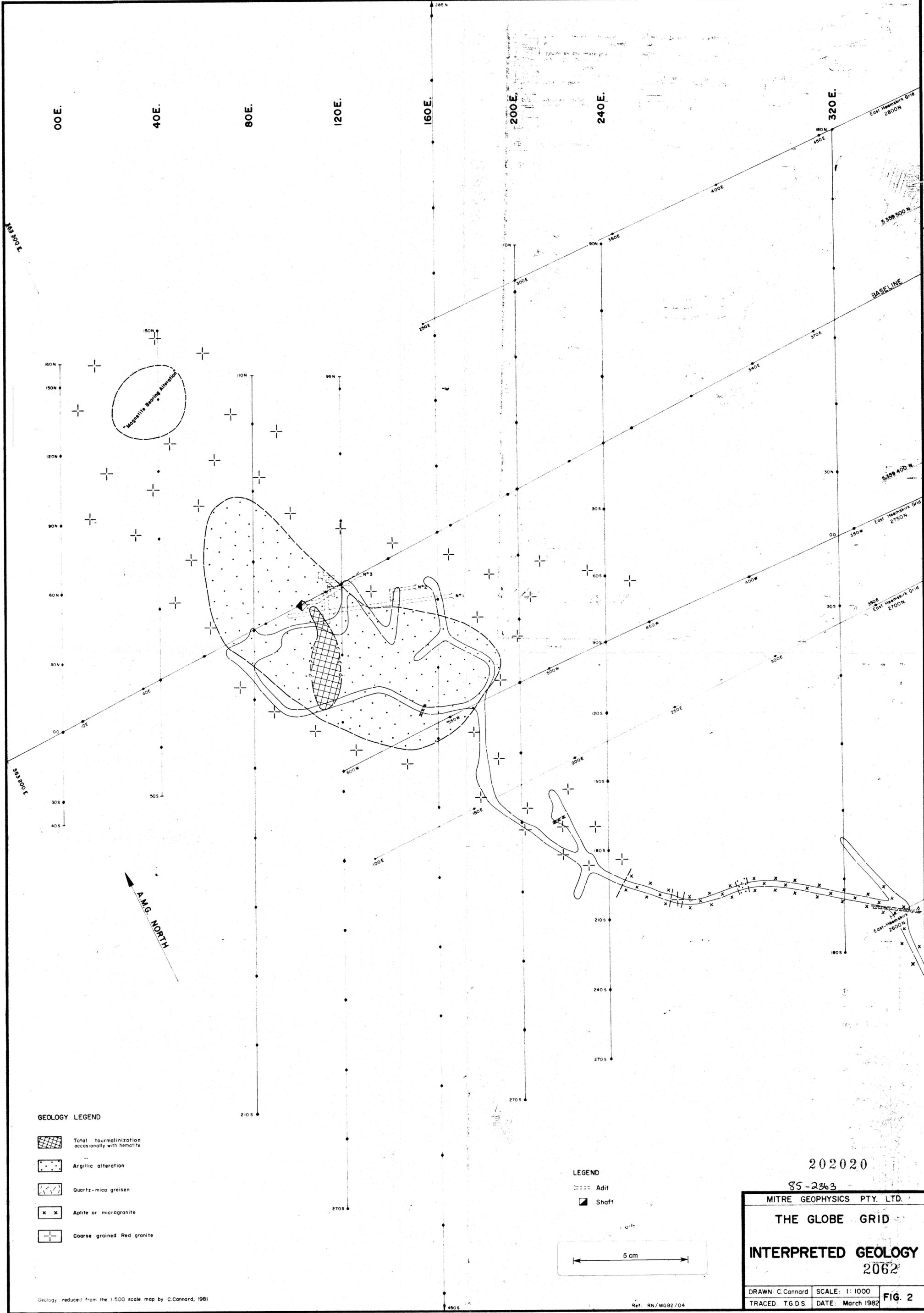
- |                                |                             |
|--------------------------------|-----------------------------|
| Permian & younger              | Precambrian units           |
| Silurian & Devonian sediments  | Cambrian basic & ultrabasic |
| Ordovician Sediments           | Devonian Granite intrusives |
| Cambrian sediments & volcanics | Transverse Line Systems     |

5 cm

AMG REFERENCE POINTS ADDED

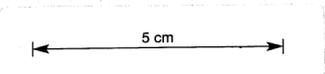
202019 ▲ Mt. Zeehan  
85-233  
MITRE GEOPHYSICS PTY LTD.  
**THE GLOBE GRID**  
**LOCATION PLAN**  
AS 004  
DRAWN: J.B. SCALE: 1:10000  
TRACED: T.A.D.S. DATE: March 1982 **FIG. 1**

Ref. RH/M682/04



- GEOLOGY LEGEND**
-  Total tourmalinization occasionally with hematite
  -  Argillic alteration
  -  Quartz-mica greisen
  -  Aplite or microgranite
  -  Coarse grained Red granite

- LEGEND**
-  Adit
  -  Shaft



20200  
85-2363

MITRE GEOPHYSICS PTY. LTD.

**THE GLOBE GRID**

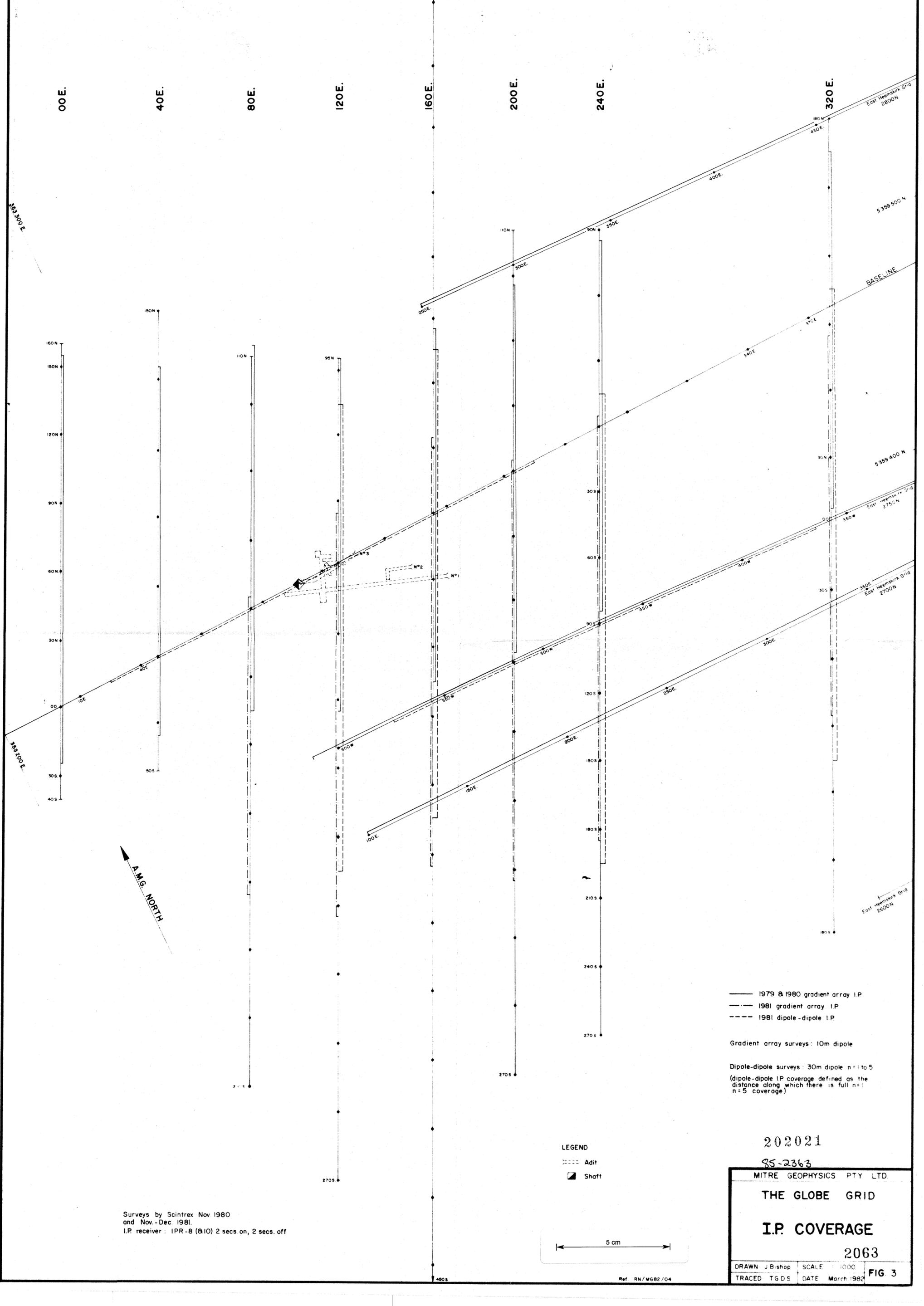
**INTERPRETED GEOLOGY**  
2062

DRAWN: C.Cannard	SCALE: 1: 1000
TRACED: T.G.D.S.	DATE: March 1982

**FIG. 2**

Geology reduced from the 1:500 scale map by C.Cannard, 1981

Ref. RN/MG82/04



Surveys by Scintrex Nov 1980  
and Nov.-Dec. 1981.  
I.P. receiver : IPR-8 (810) 2 secs on, 2 secs. off

LEGEND  
 - - - - - Adit  
 ■ Shaft

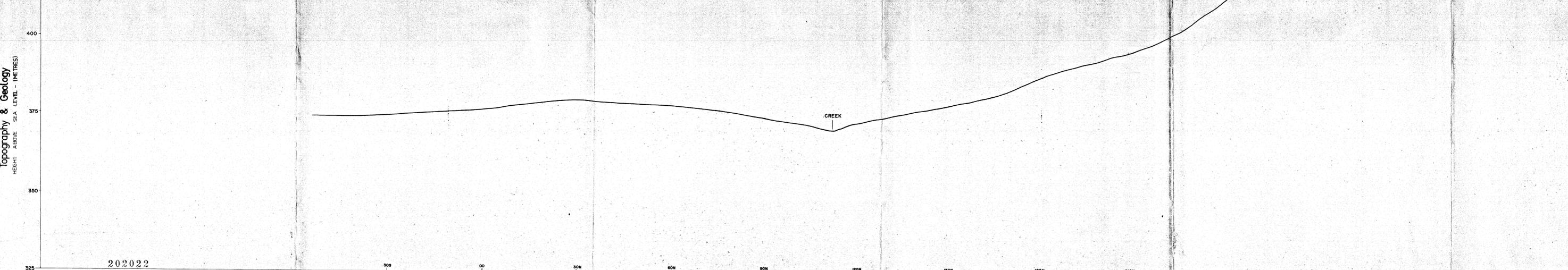
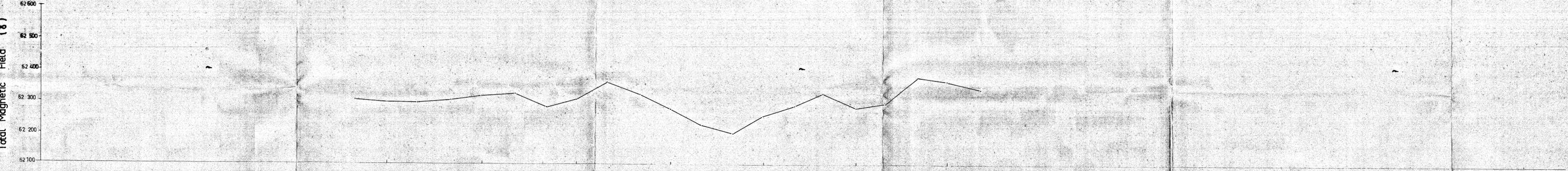
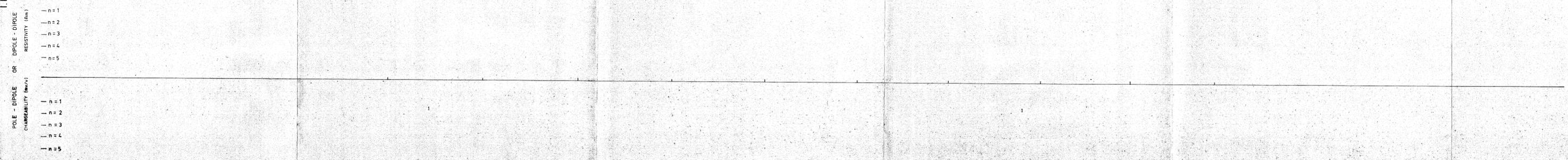
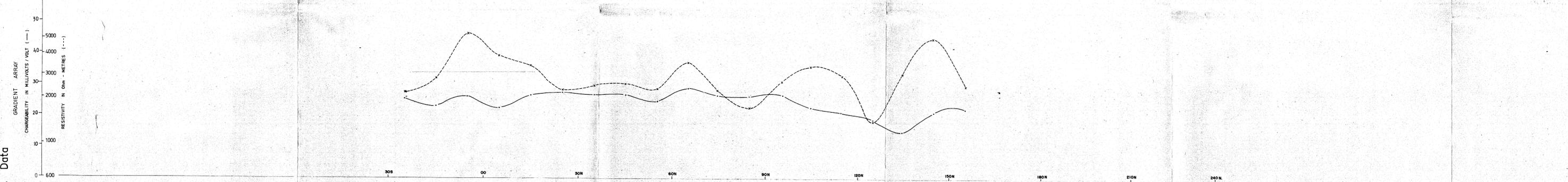
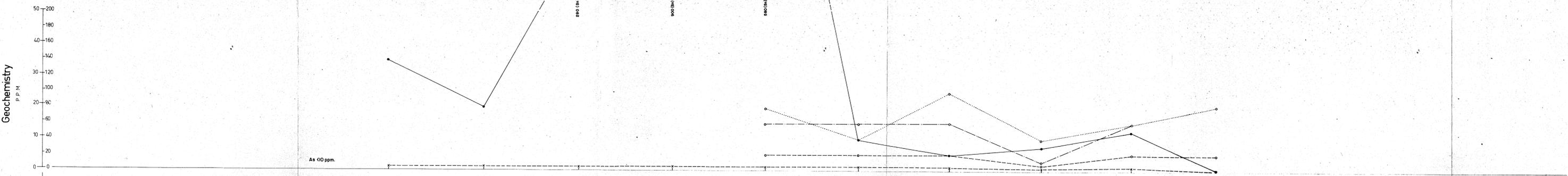
5 cm

— 1979 & 1980 gradient array I.P.  
 - - - 1981 gradient array I.P.  
 - - - 1981 dipole-dipole I.P.

Gradient array surveys: 10m dipole

Dipole-dipole surveys: 30m dipole n=1 to 5  
 (dipole-dipole I.P. coverage defined as the distance along which there is full n=1 to n=5 coverage)

202021  
 SS-2363  
 MITRE GEOPHYSICS PTY LTD  
 THE GLOBE GRID  
 I.P. COVERAGE  
 2063  
 DRAWN J.Bishop SCALE 1:1000  
 TRACED TGDS DATE March 1982  
 Ref. RN/MG82/04



202022 55-2363

**RENISON LIMITED**

**GLOBE MINE GRID S.P.L. 129**

**LINE OOE. 2064**

SECTION LOOKING W

SCALE 1:500 METRES

**PLAN 4**

<b>DRAWN</b>	G.P.S.
<b>TRACED</b>	T.G.D.S.
<b>DATE</b>	Feb. 1982
<b>SCALE</b>	1:500
<b>DRAWING No.</b>	

**I.P. DATA**  
CHARGEABILITY & RESISTIVITY  
S Anomaly letter number

**MAGNETICS**

**GEOCHEMISTRY**  
Sn  
Cu  
Pb  
Zn  
As (10ppm)

**GEOLOGY**

Quartz and feldspar and/or tourmaline  
Total tourmalinization, occasionally with hematite  
Hydrothermal  
Breccias  
Collapse

**ALTERATION**  
White alteration  
Dykes

**ALTERATION**  
Argillic alteration  
"Green" alteration (sericitized granite) generally with hematite or pyrite  
Quartz - mag greisen  
Area of tourmaline nodules

**LEGEND**  
ROCK TYPES

Apilite or megacrinite  
Fine grained  
Medium grained  
White granite  
Porphyritic granite  
Medium grained  
Coarse grained  
Red granite

Major lineament  
Fault  
Definite  
Approximate  
Inferred  
Geological boundaries

5 cm

I.P. Data

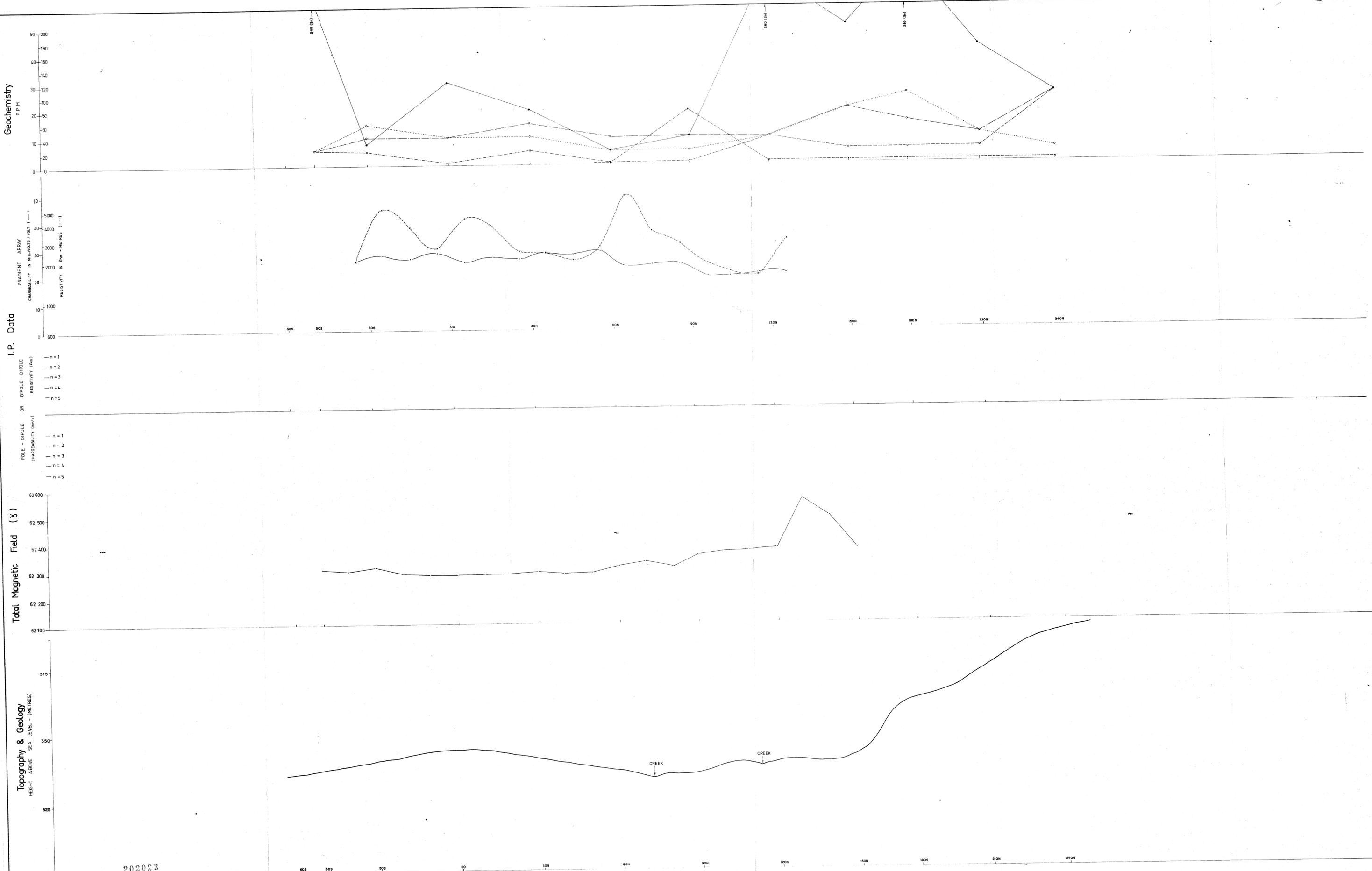
GRADIENT ARRAY  
CHARGEABILITY IN MILLIVOLTS/VOLT (---)  
RESISTIVITY IN Ohm-METRES (-.-.-)

DIPOLE - DIPOLE  
RESISTIVITY (Ohm)  
n = 1  
n = 2  
n = 3  
n = 4  
n = 5

POLE - DIPOLE  
OR  
CHARGEABILITY (mV/V)  
n = 1  
n = 2  
n = 3  
n = 4  
n = 5

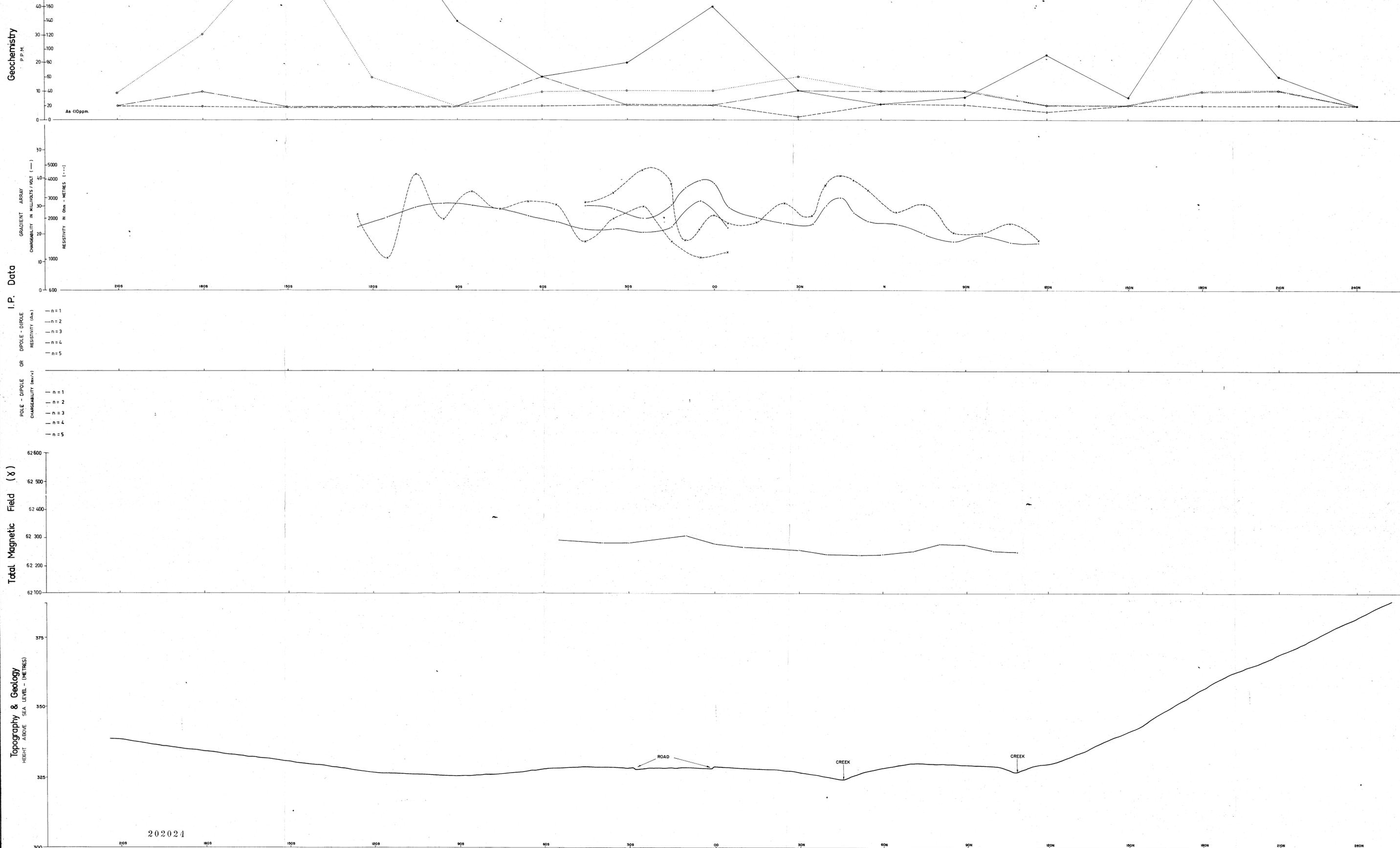
Total Magnetic Field (γ)

Topography & Geology  
HEIGHT ABOVE SEA LEVEL - (METRES)

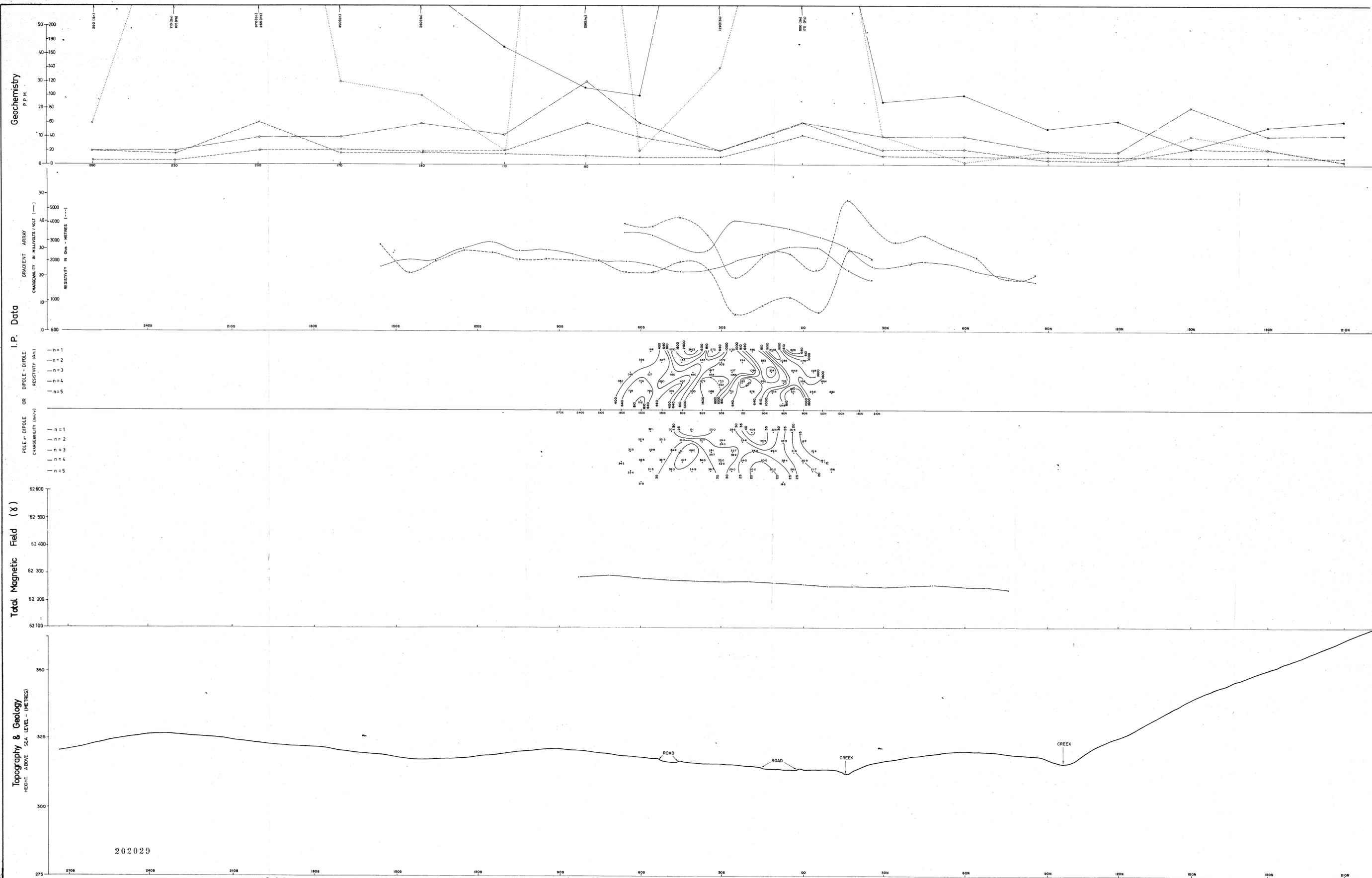


202023  
95-2263  
REINSON LIMITED  
GLOBE MINE GRID S.P.L.129  
LINE 40E.  
SECTION LOOKING W  
SCALE 1:500 METRES  
DRAWN G.P.S.  
TRACED T.G.D.S.  
DATE Feb.1982  
SCALE 1:500  
DRAWING No. 2063  
PLAN 5

<b>I.P. DATA</b> CHARGEABILITY & RESISTIVITY S Anomaly Letter number	<b>MAGNETICS</b>	<b>GEOCHEMISTRY</b> ● Sn ○ Cu ○ Pb ○ Zn x As	<b>GEOLOGY</b> ▨ Quartz and fapor and/or tourmaline ▧ Total neutralization, occasionally with hematite ▲ Hydrothermal ▽ Collapse	<b>ALTERATION</b> White Alteration Zones Breccias	<b>ALTERATION</b> Argillic alteration "Green" alteration (sericitized granite) generally with hematite or pyrite Quartz - mica greisen Area of tourmaline nodules	<b>LEGEND</b> ROCK TYPES □ Aplite or microgranite □ Fine granite □ Medium grained □ Porphyritic granite □ Medium grained □ Coarse grained □ White granite □ Red granite	<b>LEGEND</b> Major lineament F Fault Deline --- Approximate Geological boundaries -> Inferred
--	------------------	---	--	---	---	--	---



<b>RENISON LIMITED</b> DRAWN: G.P.S. TRACED: T.G.D.S. DATE: Feb. 1982 SCALE: 1:500 DRAWING No. 2066 PLAN 6		<b>I.P. DATA</b> CHARGEABILITY & RESISTIVITY S Anomaly letter number	<b>MAGNETICS</b> 5 cm	<b>GEOCHEMISTRY</b> Sn Cu Pb Zn As (10ppm)	<b>GEOLOGY</b> Quartz and feldspar and/or tourmaline Total tourmalinization, occasionally with hematite Hydrothermal Collapse Breccias White Alteration "dykes"	<b>ALTERATION</b> Argillic alteration "Green" alteration (sericitized granite) generally with hematite or pyrite Quartz - mica greisen Area of tourmaline nodules	<b>LEGEND</b> <b>ROCK TYPES</b> Aplite or microgranite Fine grained Medium grained Porphyritic granite Medium grained Coarse grained Red granite	<b>Geological boundaries</b> Major lineament Fault Definite Approximate Inferred
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**RENISON LIMITED**  
**GLOBE MINE GRID S.P.L. 129**  
**LINE 120E. 2067**  
 SECTION LOOKING W 85-2363  
 SCALE: 1:500 METRES  
 0 10 20 30

DRAWN GPS  
 TRACED T.G.O.B.  
 DATE Feb. 1982.  
 SCALE 1:500  
 DRAWING No. PLAN 7

**I.P. DATA**  
 CHARGEABILITY & RESISTIVITY  
 Gradient Array  
 S Anomaly letter number

**MAGNETICS**  
 5 cm

**GEOCHEMISTRY**  
 Sn  
 Cu  
 Pb  
 Zn  
 As  
 W

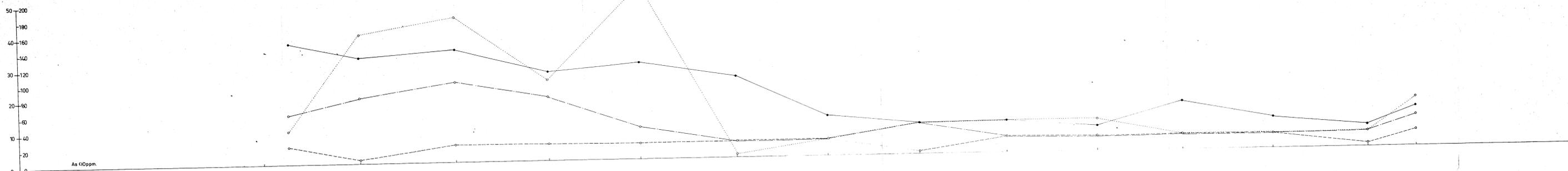
**GEOLOGY**  
 Quartz and feldspar and/or tourmaline  
 Total tourmalinization, occasionally with hematite  
 Hydrothermal breccias  
 Collapse

**ALTERATION**  
 Argillic alteration  
 "Green" alteration (sericitized granite) generally with hematite or pyrite  
 Quartz - mica greisen  
 Area of tourmaline nodules

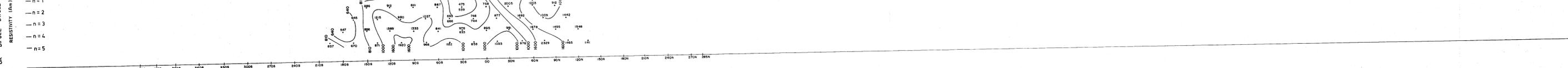
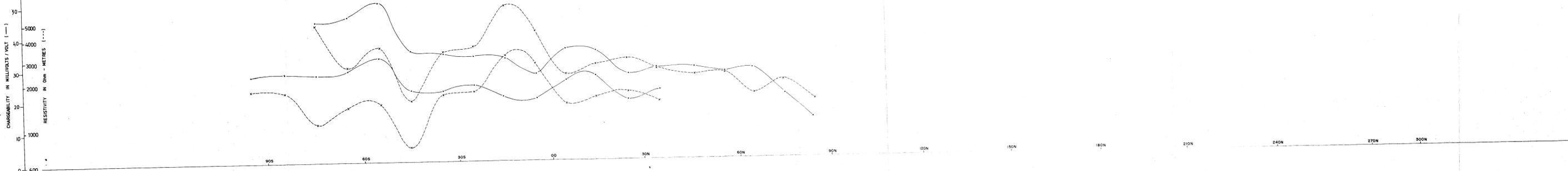
**LEGEND**  
**ROCK TYPES**  
 Aplite or megacrinite  
 Fine grained  
 Medium grained  
 Porphyritic granite  
 Medium grained  
 Coarse grained  
 White granite  
 Red granite

Major lineament  
 Fault  
 Definite  
 Approximate  
 Inferred  
 Geological boundaries

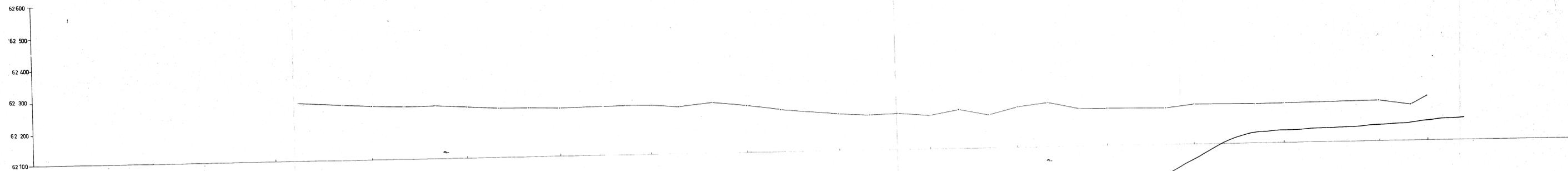
Geochemistry



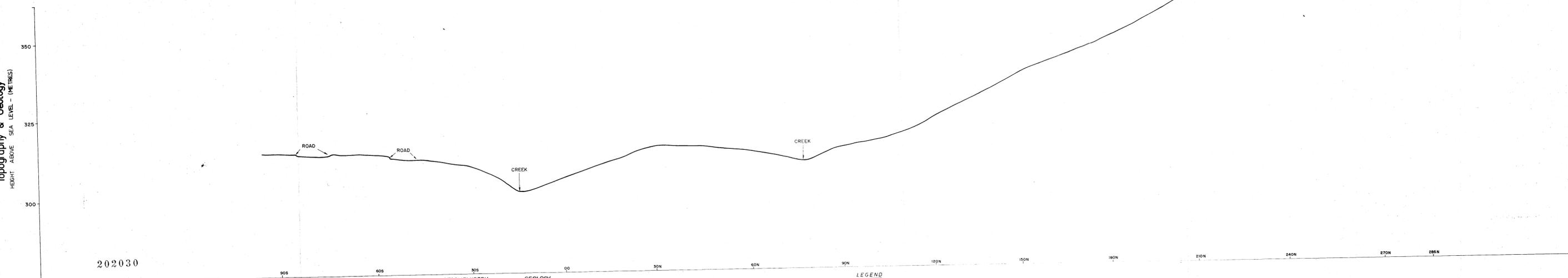
I.P. Data



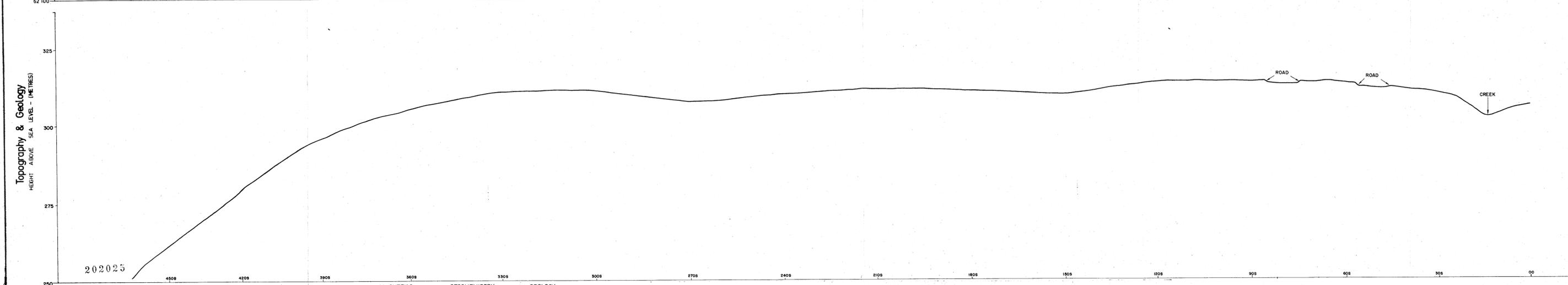
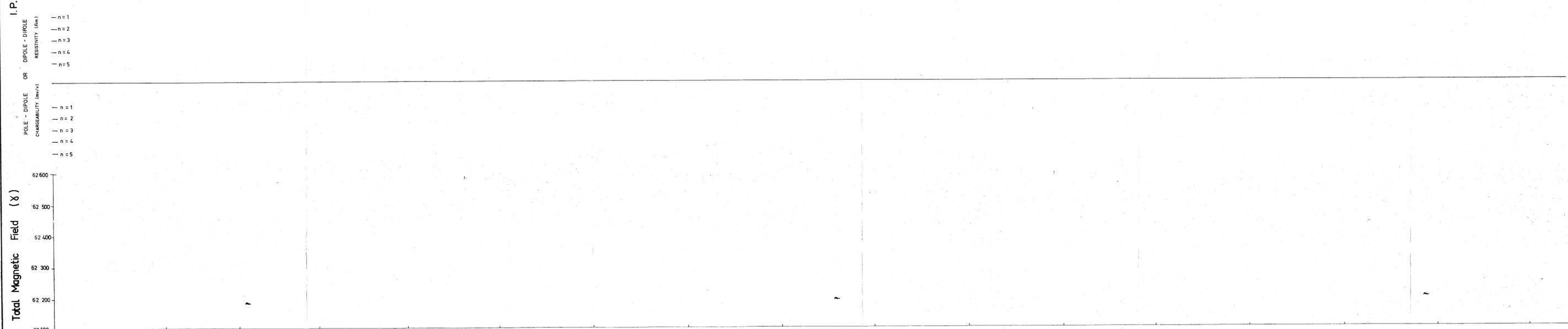
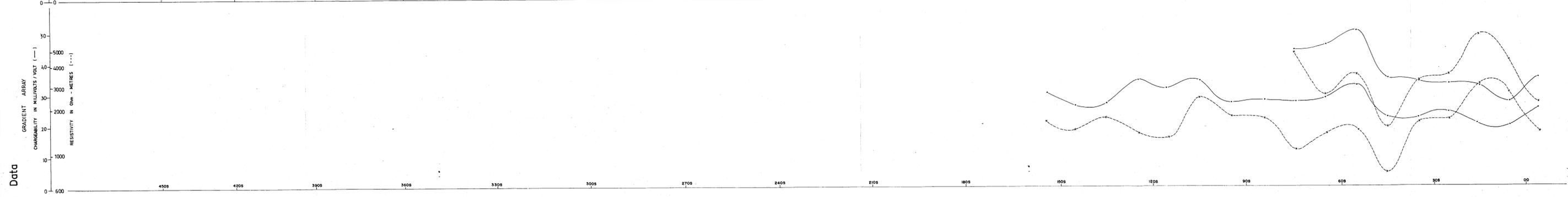
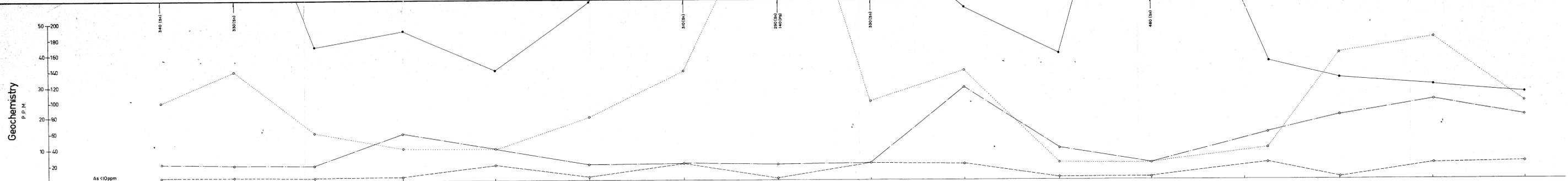
Total Magnetic Field (γ)



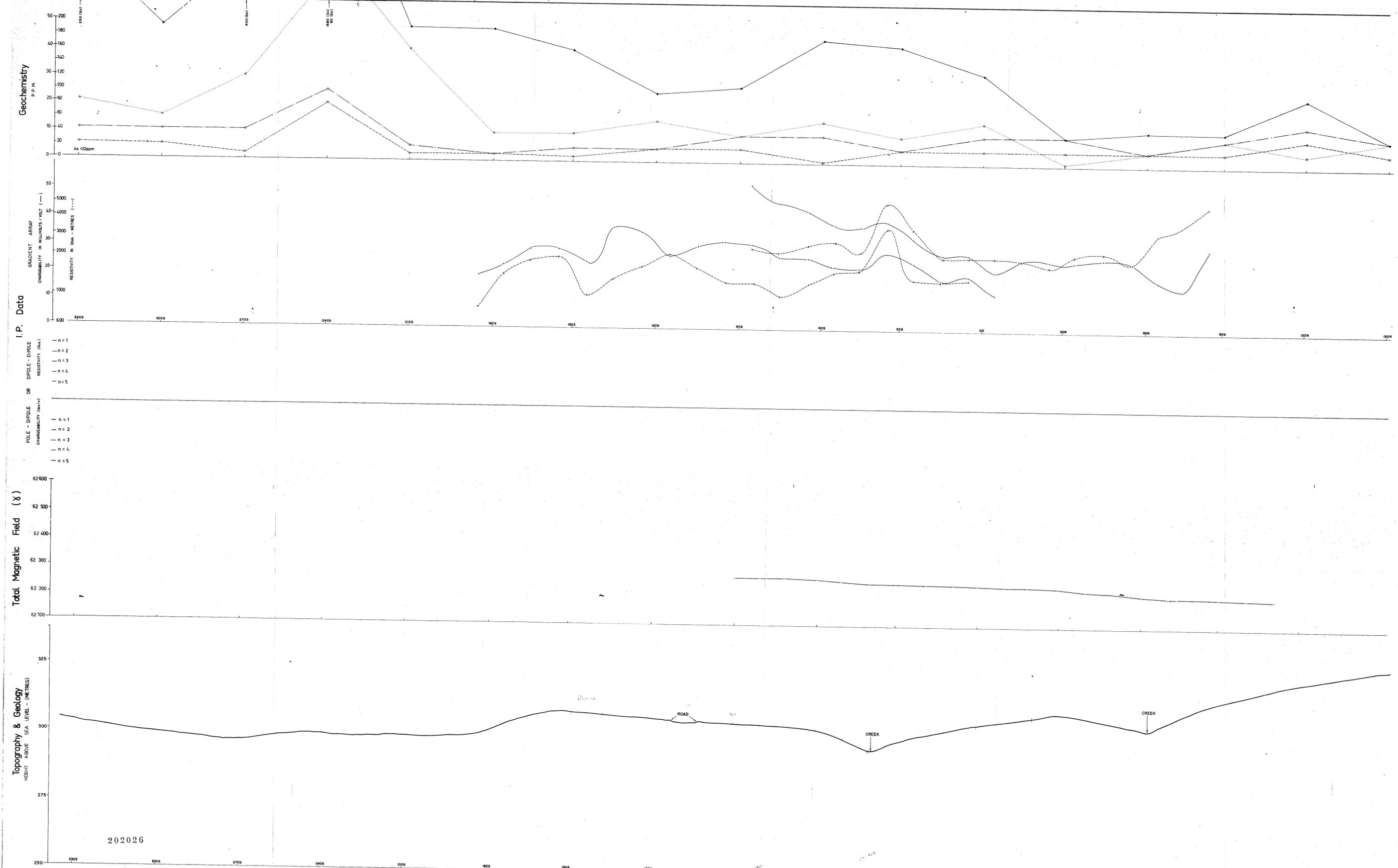
Topography & Geology



<b>RENISON LIMITED</b> <b>GLOBE MINE GRID S.P.L. 129</b> <b>LINE 160E. (NTH.) 2068</b> SECTION LOOKING W 35-2363 SCALE 1:500 METRES PLAN 8		DRAWN G.P.S. TRACED T.G.B.S. DATE Feb. 1982 SCALE 1:500 DRAWING No.	<b>I.P. DATA</b> CHARGEABILITY & RESISTIVITY --- Gradient Array S Anomaly letter number	<b>MAGNETICS</b> --- Contour --- Contour	<b>GEOCHEMISTRY</b> ● Sn ○ Cu ○ Pb ○ Zn x As (10ppm)	<b>GEOLOGY</b> ▨ Quartz and feldspar and/or tourmaline ▩ Total tourmalinization, occasionally with hematite ▲ Hydrathermal ▼ Collapse Breccias	<b>ALTERATION</b> Argillic alteration 'Green' alteration (sericized granite) generally with hematite or pyrite Quartz - mica greisen Area of tourmaline nodules White alteration zones	<b>LEGEND</b> ROCK TYPES □ Porphyritic granite □ Medium grained □ Coarse grained □ Aplite or megacrysts □ Fine grained □ Medium grained □ White granite □ Red granite	--- Major lineament F Fault --- Definite --- Approximate --- Inferred --- Geological boundaries
---	--	---	--	--	---	---	---	--	--



<b>RENISON LIMITED</b> <b>GLOBE MINE GRID S.P.L. 129</b> 2069 LINE 160E. (STH.) SECTION LOCKING W 35-2333 SCALE 1:500 METRES PLAN 9		DRAWN G.P.S. TRACED T.G.D.S. DATE Feb 1982 SCALE 1:500 DRAWING No.	<b>I.P. DATA</b> CHARGEABILITY & RESISTIVITY — Gradient Array S Anomaly letter number	<b>MAGNETICS</b> — Anomaly letter number	<b>GEOCHEMISTRY</b> ● Sn ○ Cu △ Pb ▲ Zn ▼ As (10ppm)	<b>GEOLOGY</b> ▨ Quartz and fopaz and/or tourmaline ▩ Total tourmalinization, occasionally with hematite ▲ Hydrothermal ▼ Collapse Breccias	<b>ALTERATION</b> Argillic alteration "Green" alteration (sericitized granite) generally with hematite or pyrite Quartz - mica green Area of tourmaline nodules	<b>LEGEND</b> <b>ROCK TYPES</b> □ Aplite or microgranite □ Fine grained □ Medium grained □ Paraphyritic granite □ Medium grained □ Coarse grained □ White granite □ Red granite	— Major lineament F Fault --- Deline - - - Approximate - - - Inferred } Geological boundaries
--	--	--	--	---	---	--	---	--	--



RENISON LIMITED  
 GLOBE MINE GRID S.P.L. 129  
 LINE 200E. 2070  
 SECTION LOOKING W. 85-2363  
 SCALE 1:500 METRES  
 0 10 20 30

DRAWN G.P.S.  
 TRACED T.G.S.  
 DATE Feb 1982  
 SCALE 1:500  
 DRAWING No.  
 PLAN 10

I.P. DATA  
 CHARGEABILITY & RESISTIVITY  
 — Gradient Array  
 S Anomaly letter number

MAGNETICS  
 — Total Magnetism  
 — Anomaly letter number

GEOCHEMISTRY  
 Sn  
 Cu  
 Pb  
 Zn  
 As (10ppm)

GEOLOGY  
 Quartz and feldspar and/or tourmaline  
 Total tourmalinization, occasionally with hematite  
 Hydrothermal  
 Collapse  
 Breccias  
 White alteration  
 Dykes

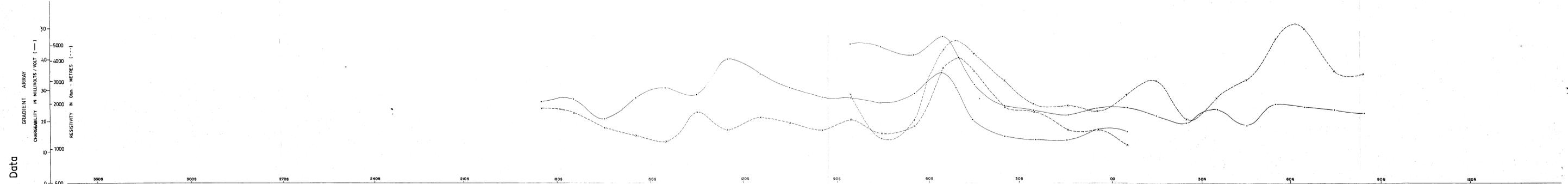
ALTERATION  
 Argillic alteration  
 "Green" alteration (sericitized granite) generally with hematite or pyrite  
 Quartz - mica greisen  
 Area of tourmaline nodules

LEGEND  
 ROCK TYPES  
 X X Aplite or microgranite  
 X X Fine grained  
 X X Medium grained  
 Porphyritic granite  
 Medium grained  
 Coarse grained  
 Red granite

Major lineament  
 F Fault  
 Deline  
 Approximate  
 Inferred  
 Geological boundaries

Geochemistry

P.P.M.

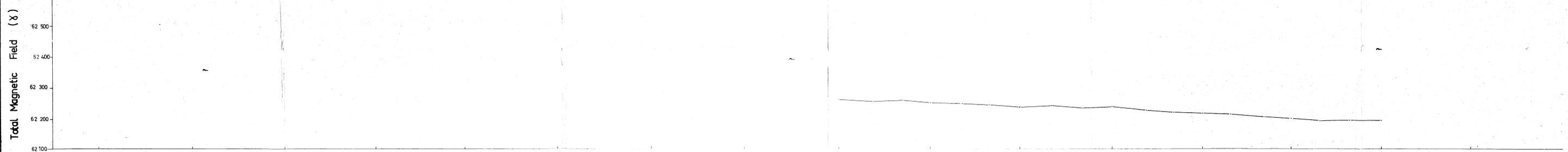


I.P. Data

GRADIENT ARRAY

CHARGEABILITY IN MILLIVOLTS / FOOT (—)

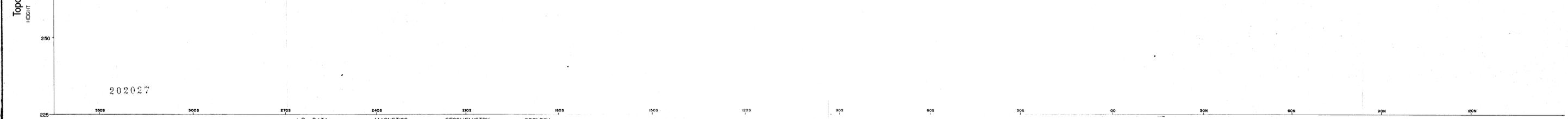
RESISTIVITY IN Ohm - METRES (---)



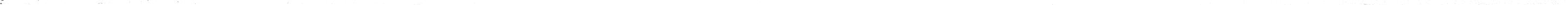
POLE - DIPOLE

RESISTIVITY (Ohm)

CHARGEABILITY (mV/V)



Total Magnetic Field (x)



202027

RENISON LIMITED  
 GLOBE MINE GRID S.P.L.129  
 LINE 240E. 2071  
 SECTION LOOKING W 35-2863

DRAWN G.P.S.  
 TRACED T.G.D.S.  
 DATE Feb. 1992  
 SCALE 1:500  
 DRAWING No.  
 PLAN II

I.P. DATA  
 CHARGEABILITY & RESISTIVITY  
 Gradient Array  
 S Anomaly letter number

MAGNETICS  
 Scale bar: 5 cm

GEOCHEMISTRY  
 Sn  
 Cu  
 Pb  
 Zn  
 As

GEOLOGY  
 Quartz and feldspar and/or tourmaline  
 Total tourmalinization, occasionally with hematite  
 Hydrothermal alteration  
 Collapse

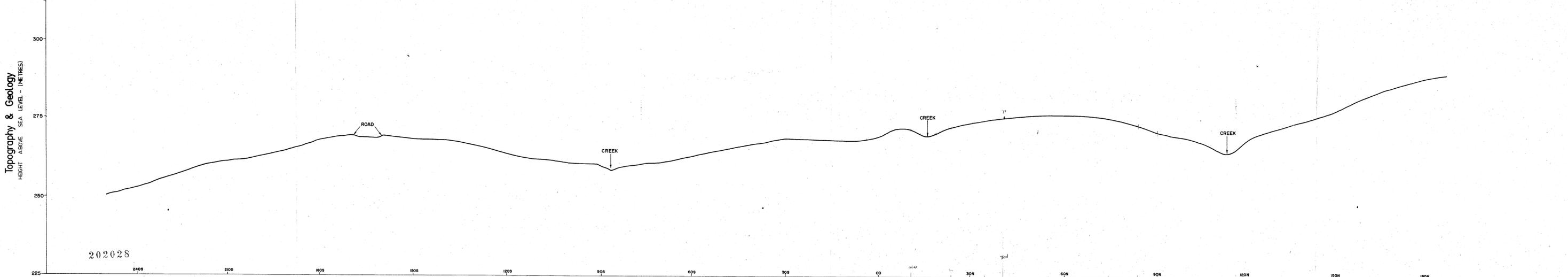
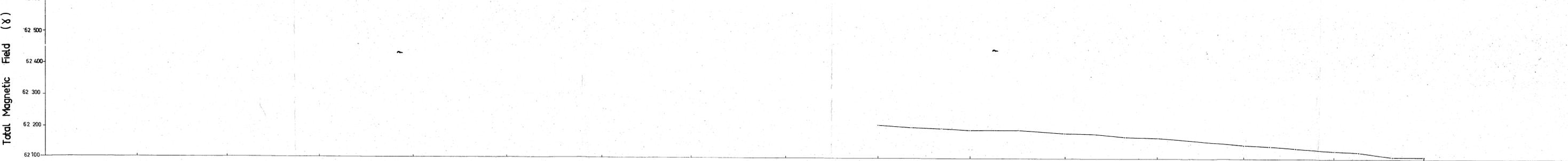
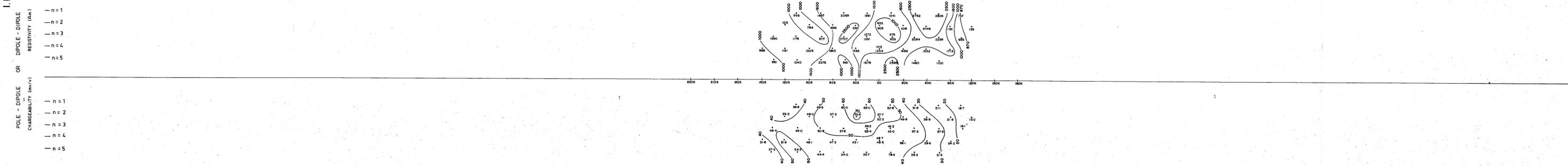
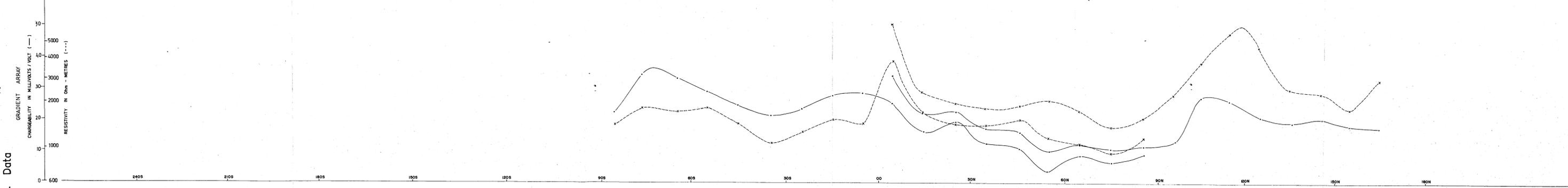
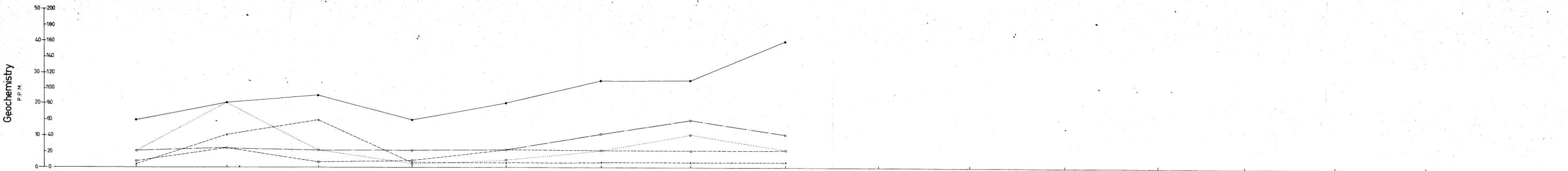
ALTERATION  
 Argillic alteration  
 "Green" alteration (sericitized granite) generally with hematite or pyrite  
 Quartz - mica greisen  
 Area of tourmaline nodules

LEGEND  
 ROCK TYPES  
 Aplite or megacrinite  
 Fine grained white granite  
 Medium grained white granite

Porphyritic granite  
 Medium grained red granite  
 Coarse grained red granite

Major lineament  
 Fault  
 Definite  
 Approximate  
 Inferred

Geological boundaries



202028

REXON LIMITED  
 GLOBE MINE GRID S.P.L. 129  
 LINE 320E. 2072  
 SECTION LOOKING W 85-2563

DRAWN G.P.S.  
 TRACED T.G.D.S.  
 DATE Feb. 1982  
 SCALE 1:500  
 DRAWING No.  
 PLAN 12.

I.P. DATA  
 CHARGEABILITY & RESISTIVITY  
 Gradient Array  
 S. Anomaly Letter number

MAGNETICS  
 5 cm

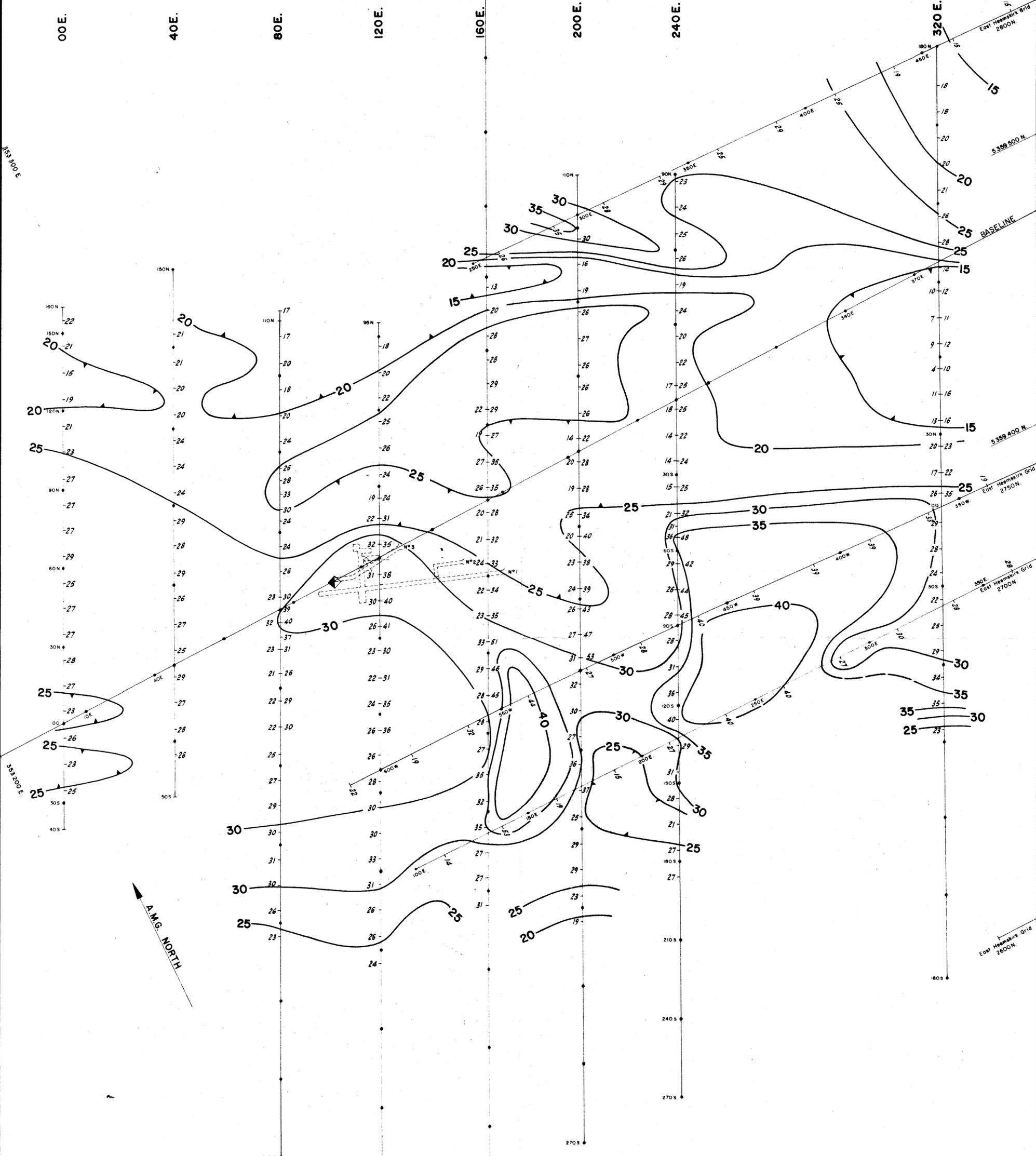
GEOCHEMISTRY  
 Sn  
 Cu  
 Pb  
 Zn  
 As

GEOLOGY  
 Quartz and fopaz and/or tourmaline  
 Total tourmalinization, occasionally with hematite  
 Hydrothermal  
 Collapse

ALTERATION  
 Argillic alteration  
 "Green" alteration (sericitized granite) generally with hematite or pyrite  
 Quartz-mica greisen  
 Area of tourmaline nodules

LEGEND  
 ROCK TYPES  
 Aplite or megacrinite  
 Fine grained White granite  
 Medium grained White granite  
 Porphyritic granite  
 Medium grained Red granite  
 Coarse grained Red granite

Major lineament  
 Fault  
 Definite  
 Approximate  
 Inferred  
 Geological boundaries

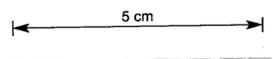


This map has been compiled from three surveys: East Heemskirk, 1979; Globe, 1980; Globe, 1981. The 1981 survey has been used as the standard for contouring (the Globe 1980 values are at least 30% higher, but those from the East Heemskirk survey are comparable).

Chargeability Contours  
(mv/v)  
15, 20, 25, 30, 35, 40.

LEGEND  
--- Adit  
■ Shaft

202033



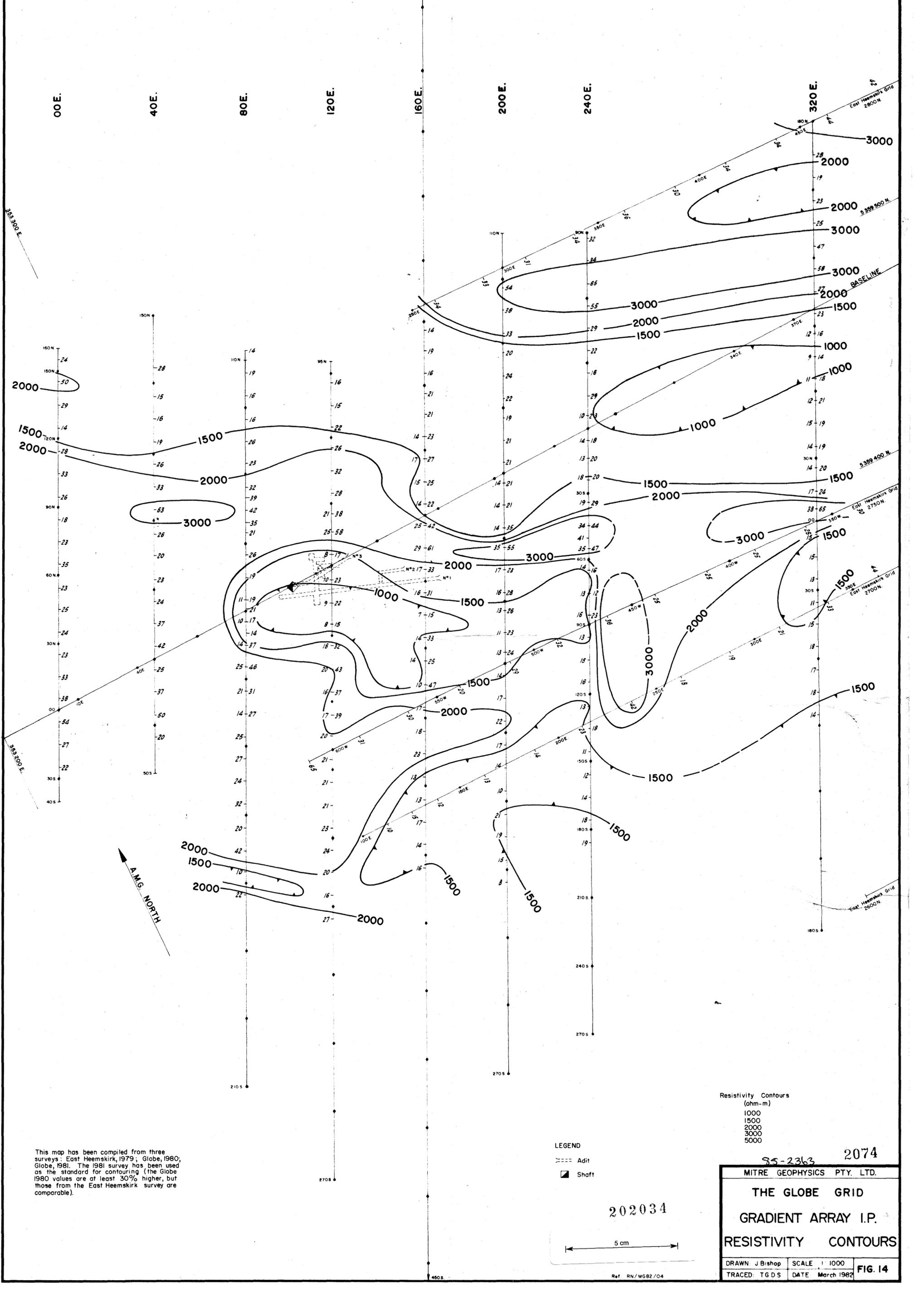
Ref. RN/MG82/04

85-2363

MITRE GEOPHYSICS PTY LTD

**THE GLOBE GRID**  
2073  
**GRADIENT ARRAY I.P.**  
**CHARGEABILITY CONTOURS**

DRAWN J Bishop	SCALE 1:1000	<b>FIG 13</b>
TRACED T.G.D.S.	DATE: March 1982	



This map has been compiled from three surveys: East Heemskirk, 1979; Globe, 1980; Globe, 1981. The 1981 survey has been used as the standard for contouring (the Globe 1980 values are at least 30% higher, but those from the East Heemskirk survey are comparable).

Resistivity Contours  
(ohm-m)  
1000  
1500  
2000  
3000  
5000

LEGEND  
--- Adit  
■ Shaft

202034

5 cm

Ref. RN/MG82/04

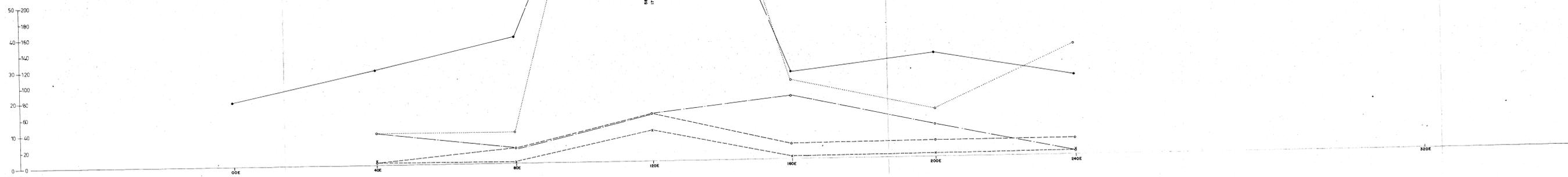
85-2363 2074

MITRE GEOPHYSICS PTY. LTD.

**THE GLOBE GRID**  
**GRADIENT ARRAY I.P.**  
**RESISTIVITY CONTOURS**

DRAWN: J Bishop	SCALE: 1:1000	FIG 14
TRACED: TG DS	DATE: March 1982	

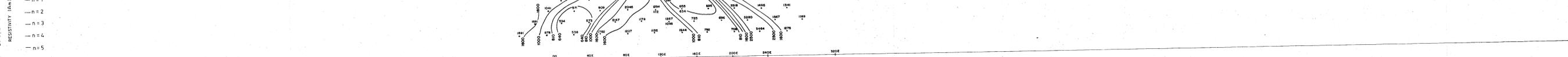
Geochemistry



I.P. Data



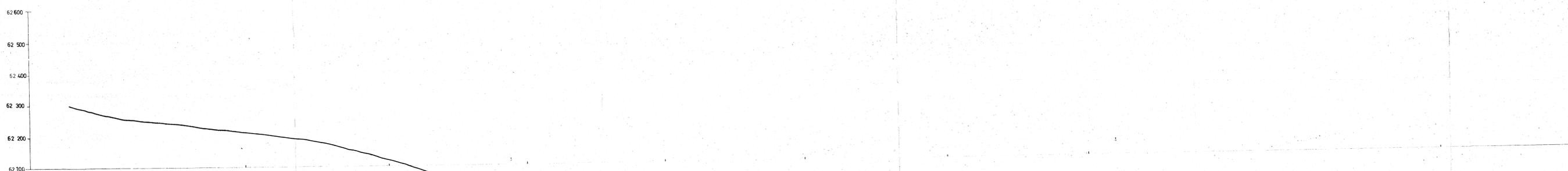
OR DIPOLE - DIPOLE



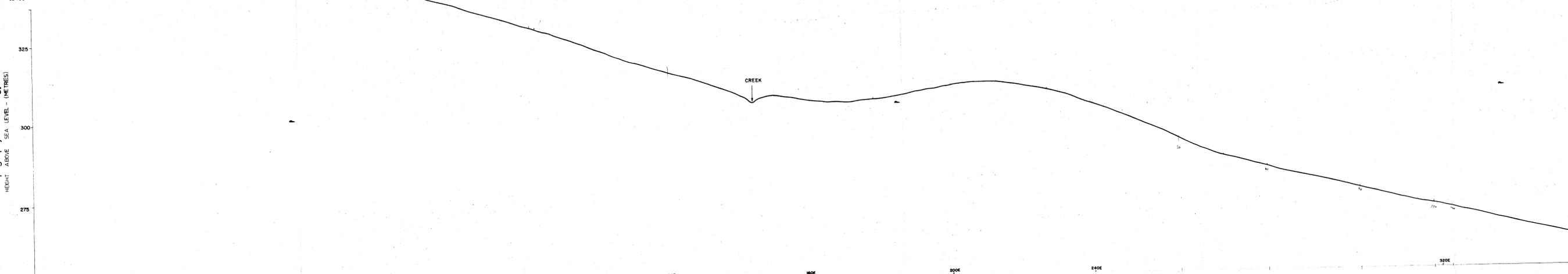
OR DIPOLE - DIPOLE



Total Magnetic Field (x)



Topography & Geology



202031

REXON LIMITED 2075

GLOBE MINE GRID S.P.L. 129

BASE LINE OON.

SECTION LOOKING N. 85-2363

SCALE 1:500 METRES

PLAN 15

DRAWN	GPS
TRACED	T.G.D.S.
DATE	Feb. 1982
SCALE	1:500
DRAWING No.	

I.P. DATA  
CHARGEABILITY & RESISTIVITY  
Gradient Array  
S Anomaly, letter number

MAGNETICS  
Total Magnetic Field

GEOCHEMISTRY  
Cu  
Pb  
Zn  
As

GEOLOGY  
Quartz and feldspar  
Topography  
Hydrothermal  
Collapse

ALTERATION  
White  
Green  
Quartz-mica  
Area of tourmaline nodules

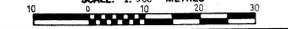
ARGILLIC ALTERATION  
"Green" alteration  
Quartz-mica green  
Area of tourmaline nodules

ROCK TYPES  
Apatite or microgranite  
Fine grained  
Medium grained

Porphyritic granite  
Medium grained  
Coarse grained

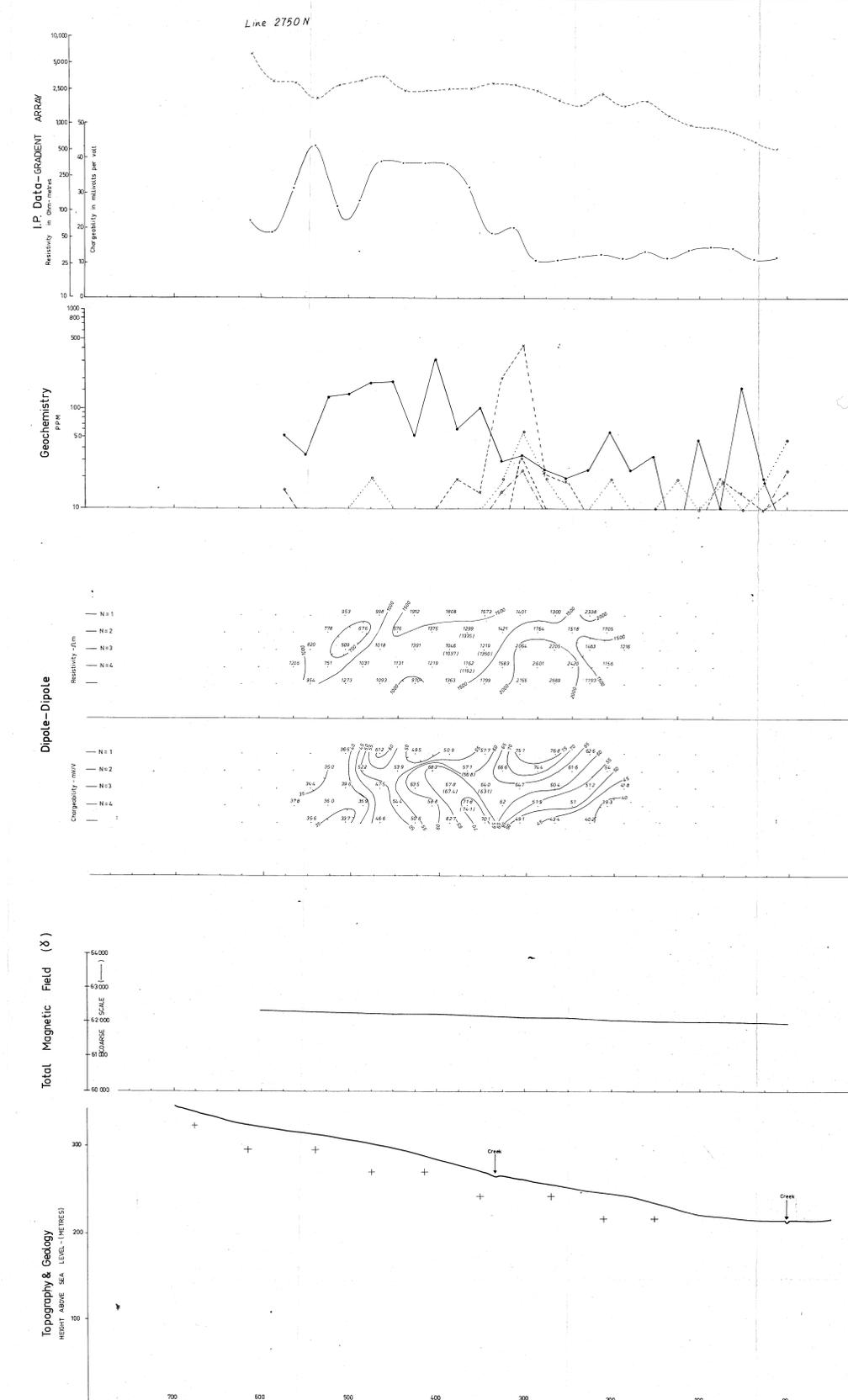
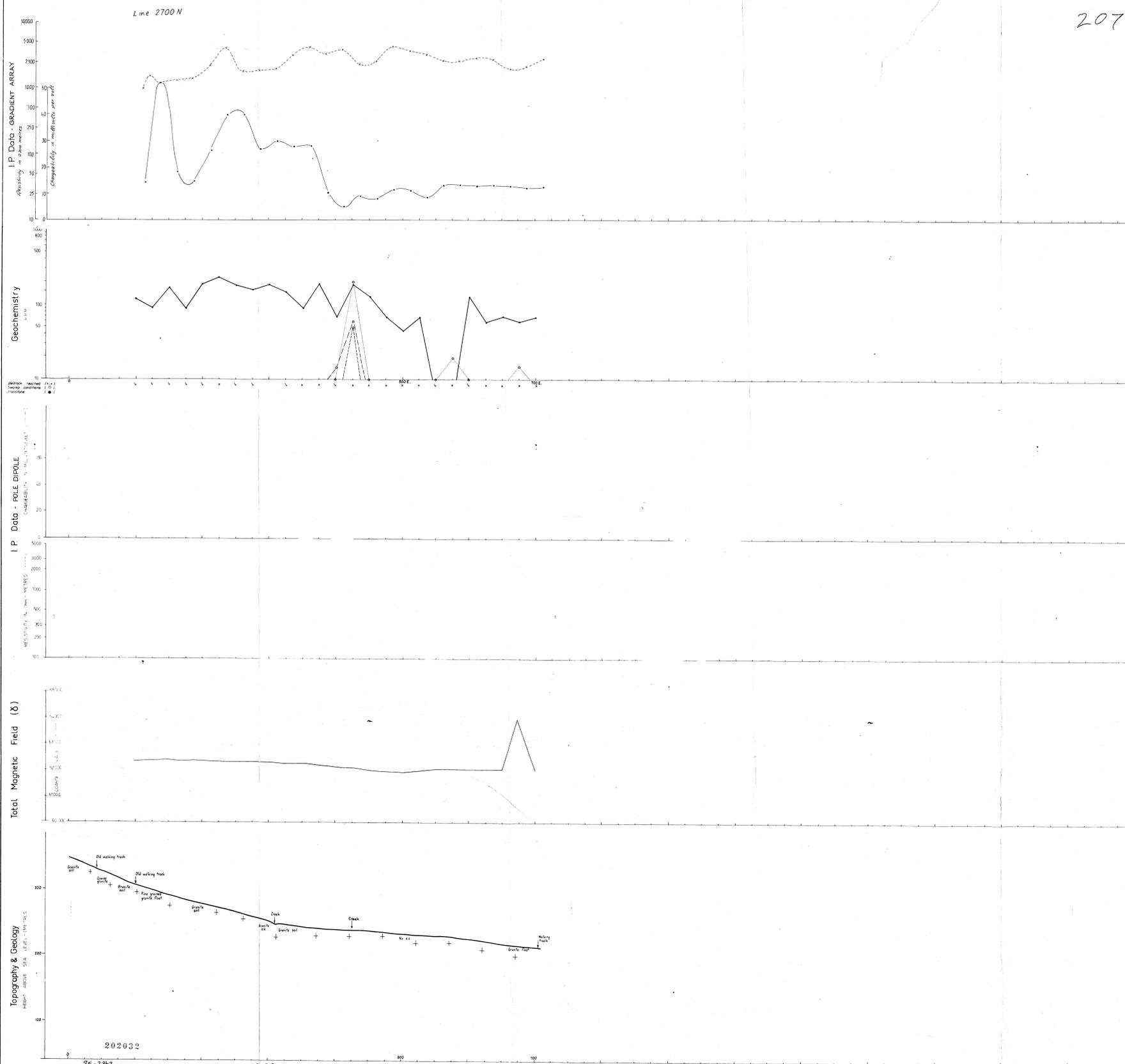
Basal granite  
Fault  
Approximate  
Interred

Geological boundaries

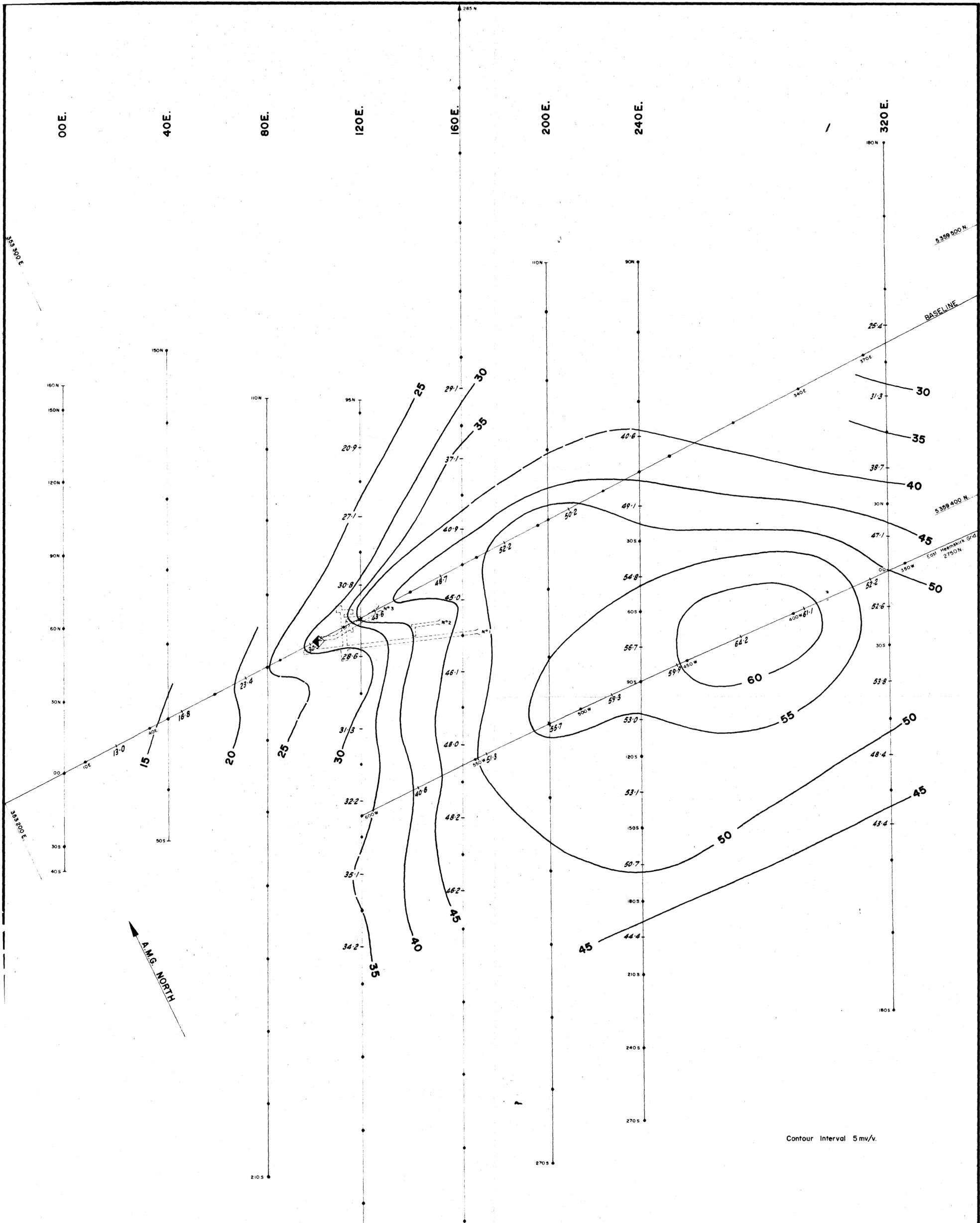


2076

2076



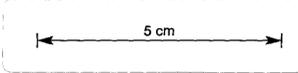
RENISON LIMITED 2076		DRAWN: Z. G. W.	IP DATA		MAGNETICS		GEOCHEMISTRY		IP DATA		GEOLOGY	
EAST HEEMSKIRK GRID SPL 129		TRACED: T. G. S.	CHARGABILITY & RESISTIVITY		RESISTIVITY - DIPOLE		RESISTIVITY - DIPOLE		CHARGABILITY & RESISTIVITY		RESISTIVITY - DIPOLE	
LINE 2750K-LINE 2700 N.		DATE: 2007/09	POLE - DIPOLE		RESISTIVITY - DIPOLE		RESISTIVITY - DIPOLE		CHARGABILITY & RESISTIVITY		RESISTIVITY - DIPOLE	
100 E. 100 E.		SCALE: 1:2500	----- N=1		----- N=1		----- N=1		CHARGABILITY & RESISTIVITY		RESISTIVITY - DIPOLE	
SCALE: 1:2500 METRES		DRAWING No.	----- N=2		----- N=2		----- N=2		CHARGABILITY & RESISTIVITY		RESISTIVITY - DIPOLE	
FIG. 16		REP: BN/MSR/04	----- N=3		----- N=3		----- N=3		CHARGABILITY & RESISTIVITY		RESISTIVITY - DIPOLE	
			----- N=4		----- N=4		----- N=4		CHARGABILITY & RESISTIVITY		RESISTIVITY - DIPOLE	



NOTE: The data points on the baseline are idealised and have not been plotted with reference to the crosslines' positions.

LEGEND  
 - - - - Adit  
 ■ Shaft

202035



Contour algorithm after Fraser (1981) 85-2363

MITRE GEOPHYSICS PTY. LTD.

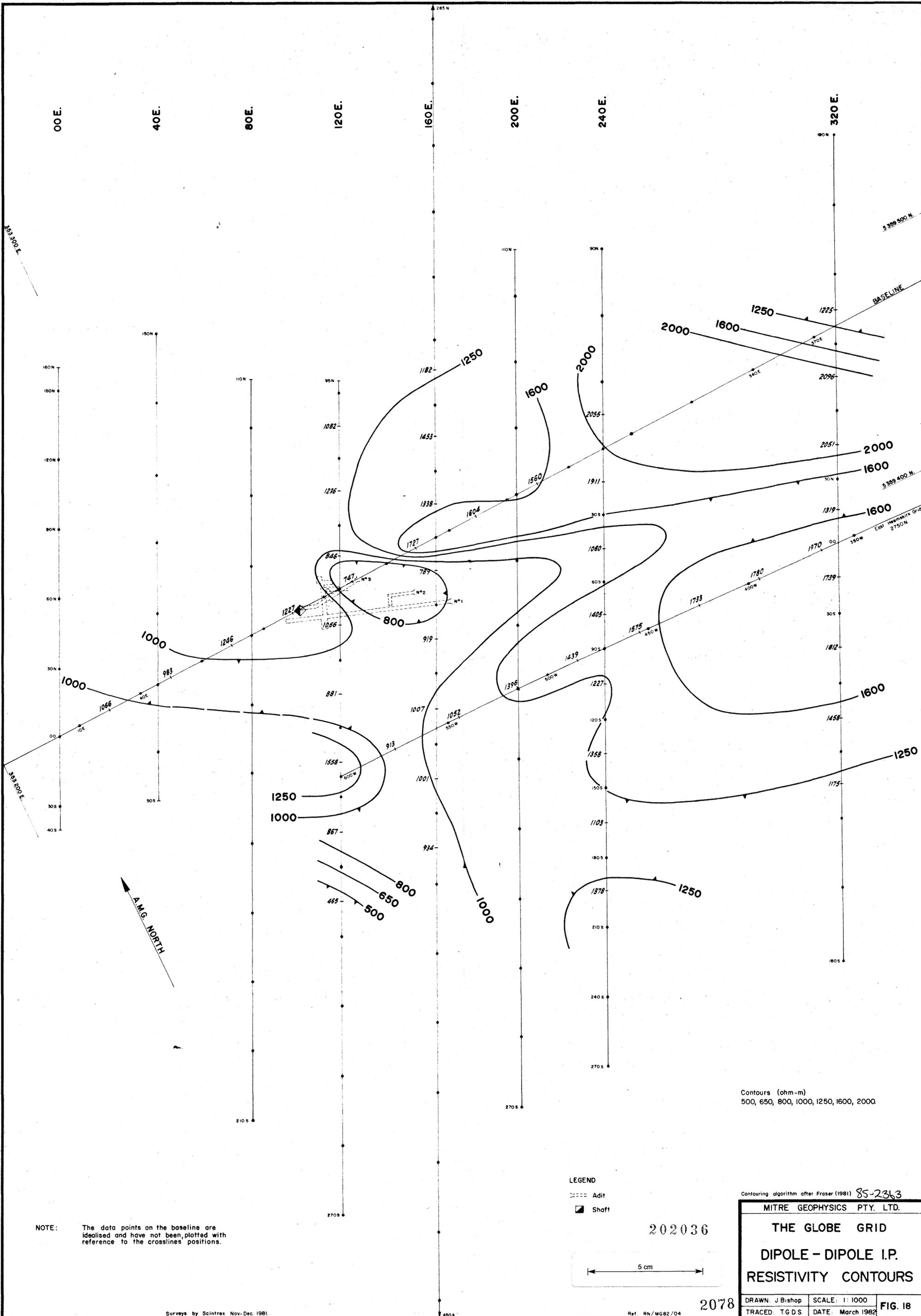
**THE GLOBE GRID**

**DIPOLE - DIPOLE I.P.**

**CHARGEABILITY CONTOURS**

DRAWN J Bishop	SCALE: 1: 1000	FIG 17
TRACED TGDS	DATE: March 1982	

2077



NOTE: The data points on the baseline are idealised and have not been plotted with reference to the crosslines positions.

Contours (ohm-m)  
500, 650, 800, 1000, 1250, 1600, 2000.

LEGEND  
 - - - - Adit  
 ■ Shaft

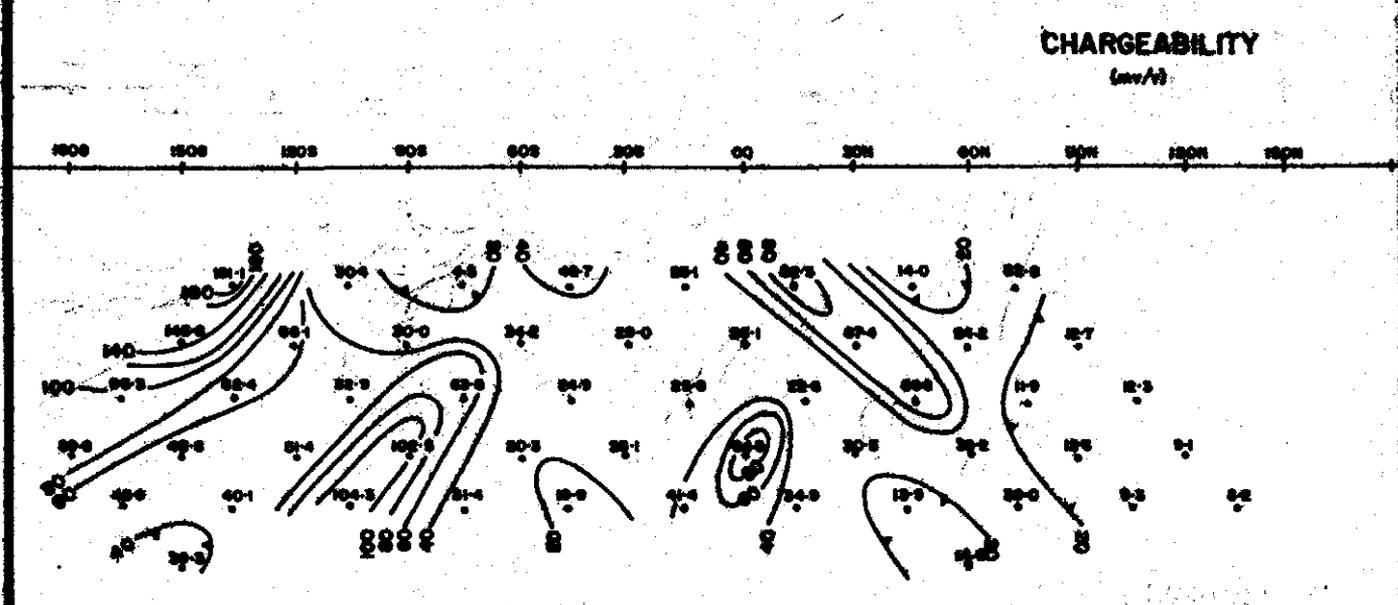
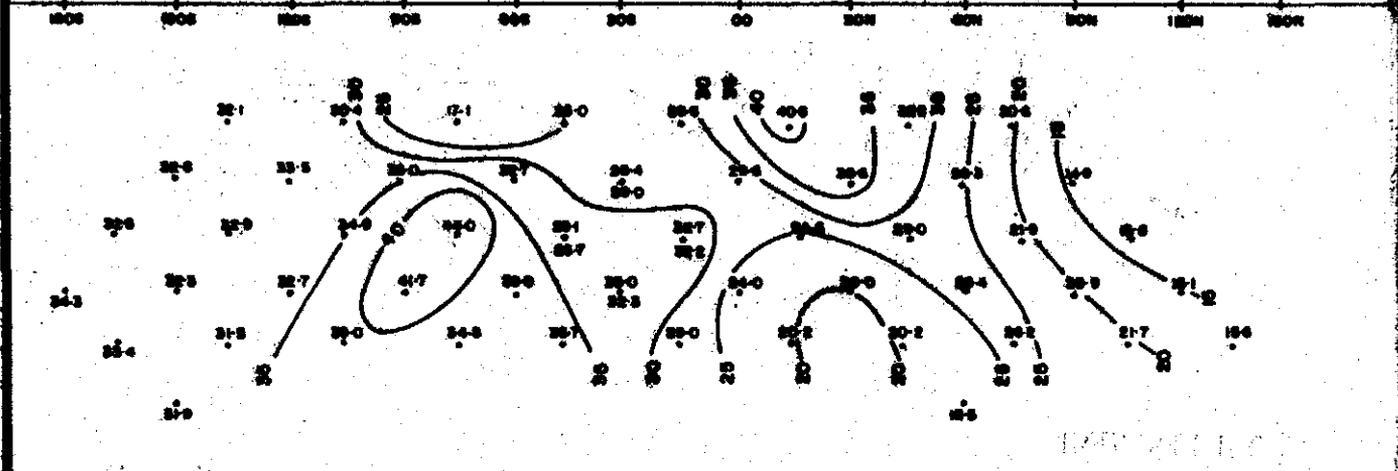
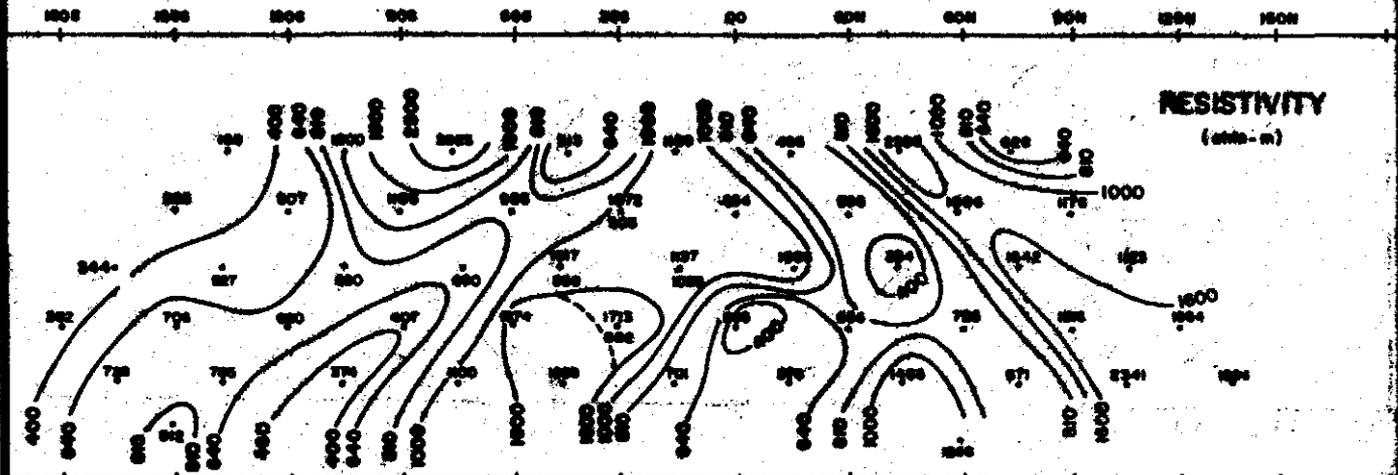
202036  
 5 cm

Contouring algorithm after Fraser (1981) 85-2313

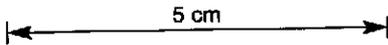
MITRE GEOPHYSICS PTY. LTD.  
**THE GLOBE GRID**  
**DIPOLE - DIPOLE I.P.**  
**RESISTIVITY CONTOURS**

2078  
 DRAWN: J Bishop SCALE: 1:1000  
 TRACED: T.G.D.S. DATE: March 1982 FIG. 18

018



202037



Survey by : Seintrex  
 Date : Nov.-Dec., 1981  
 IP receiver : IPR-10 (2 sec. pulse)  
 Dipole spacing : 30m

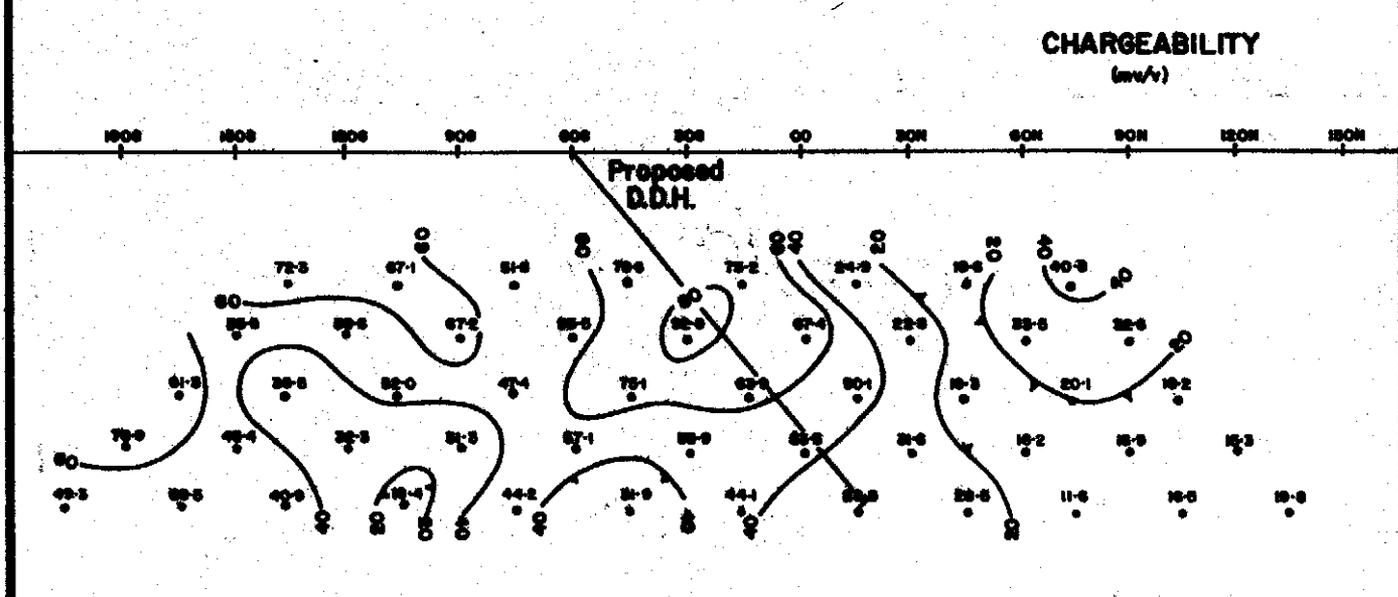
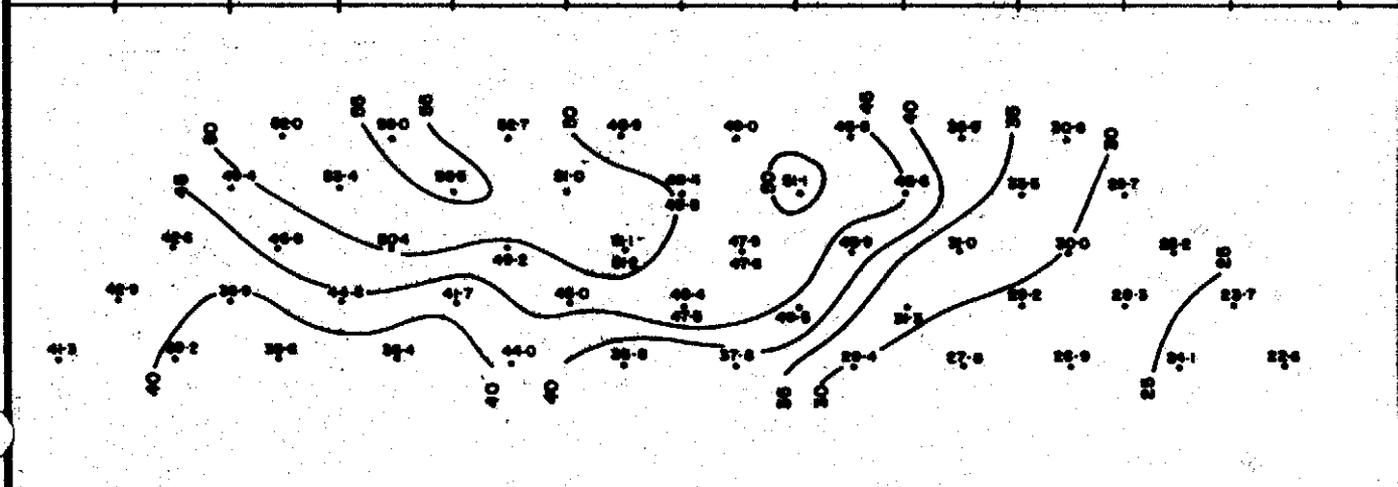
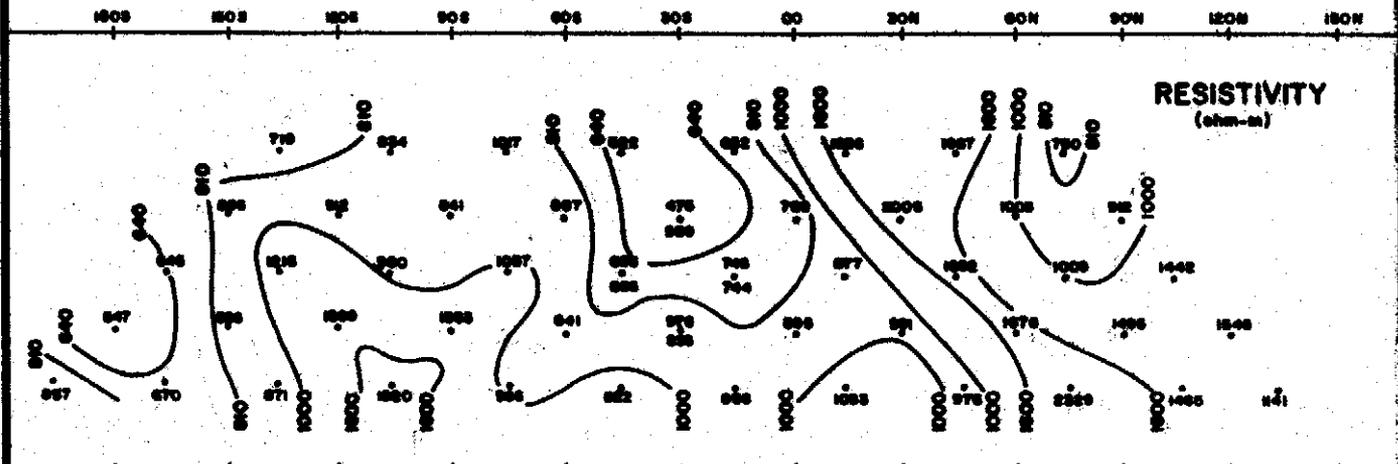
Ref. 101/100 02/04

85-2363 64 20  
**MITRE GEOPHYSICS PTY. LTD.**  
**GLOBE GRID**  
**I.P. PSEUDOSECTION**  
**LINE 1205**

Drawn by Seintrex	Scale 1:2000
Traced by T.M.S.	Date March 1982

**FIG. 19**

019



5 cm

Survey by : Scintrex  
 Date : Nov.- Dec., 1981  
 IP receiver : IPR-10 (2 sec. pulse)  
 Dipole spacing : 30m

202038

85-2363 GM321

**MITRE GEOPHYSICS PTY. LTD.**  
**GLOBE GRID**  
**I.P. PSEUDOSECTION**  
**LINE 160E**

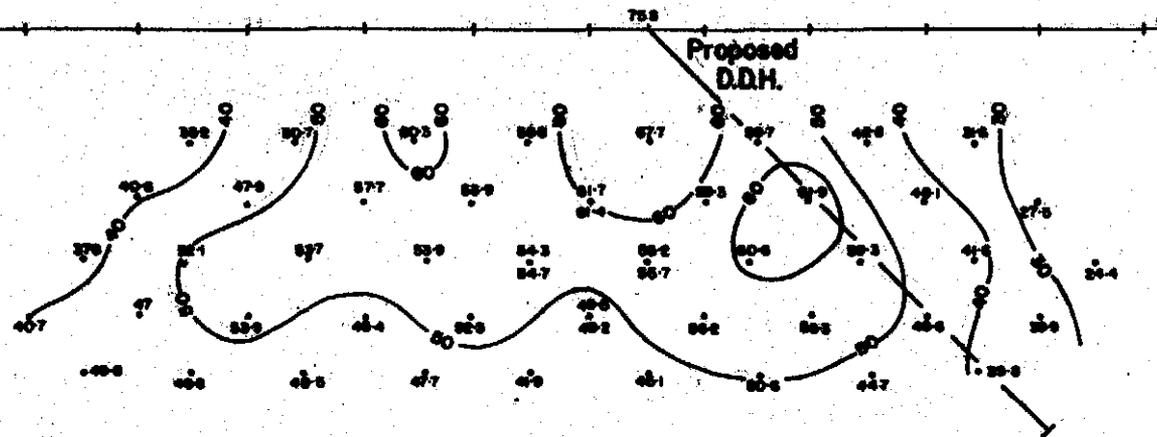
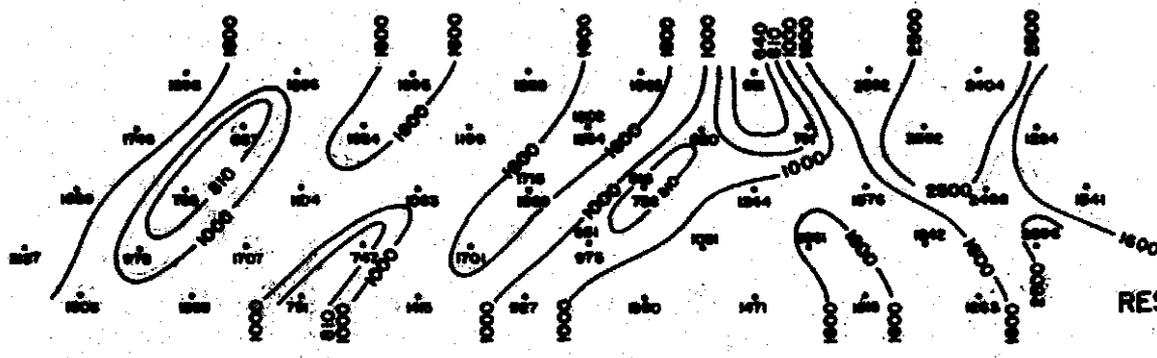
Drawn by Scintrex Scale: 1:2000  
 Traced by T.A.S. Date March 1982

FIG. 20

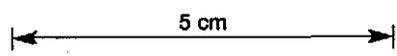
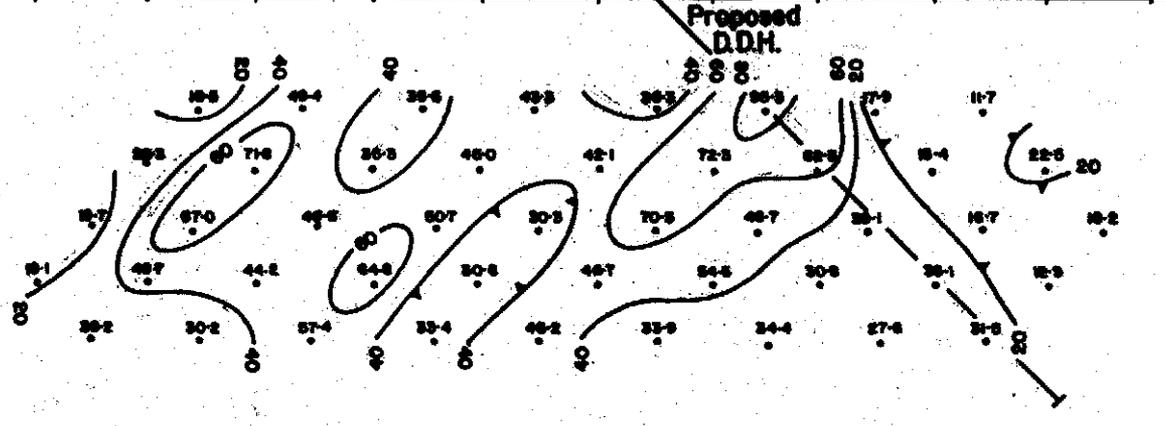
NSI, RN/MS SE/04

020

240E 210E 180E 150E 120E 90E 75E 60E 30E 00 30W 60W 90W



240E 210E 180E 150E 120E 90E 75E 60E 30E 00 30W 60W 90W



Survey by : Schlötrex  
 Date : Nov.-Dec., 1961  
 IP receiver : IPR-10 (2 sec. pulse)  
 Dipole spacing : 30m

202039

Ref. RM/M/04

85-2363 841 292

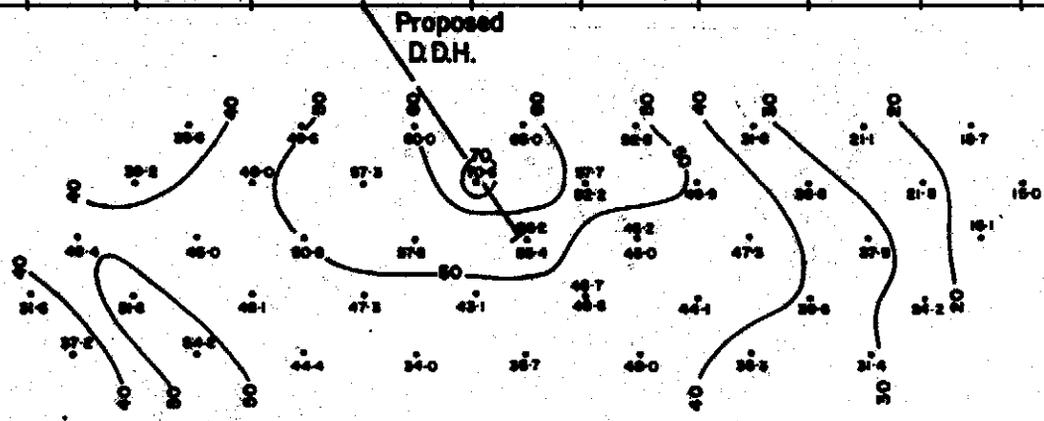
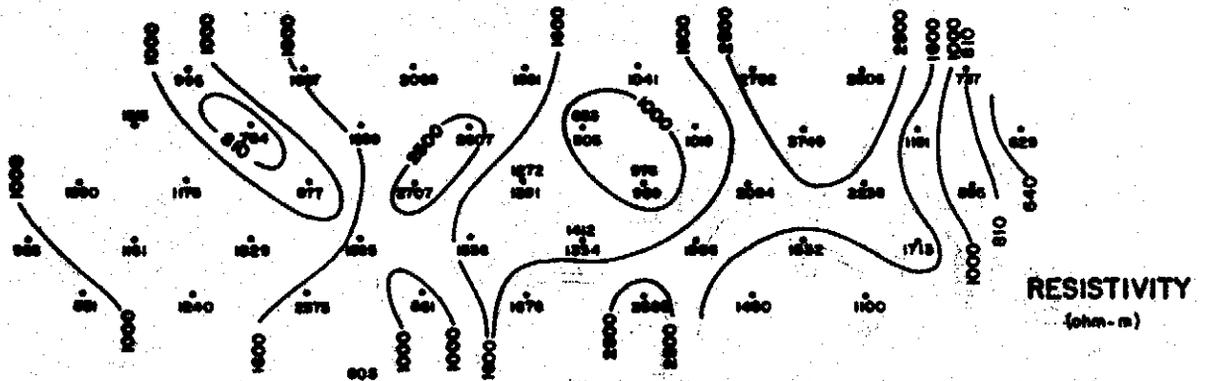
**WIRE GEOPHYSICS PTY. LTD.**  
**GLOBE GRID**  
**I.P. PSEUDOSECTION**  
**LINE 240E**

Drawn by Schlötrex Scale 1:5000  
 REPRODUCED BY C.G.S. Data. MARCH 1971

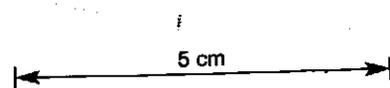
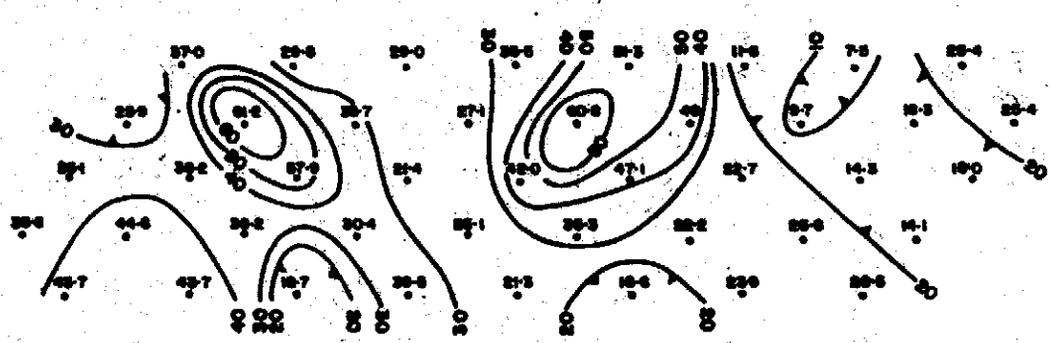
**FIG. 21**

021

150E 150E



150E 150E



Survey by : Scintrex  
 Date : Nov - Dec, 1981  
 IR receiver : IPR - 10 (2 sec. pulse)  
 Dipole spacing : 30m

202040

Ref EN/100 02/04

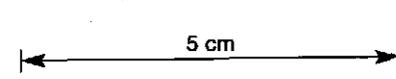
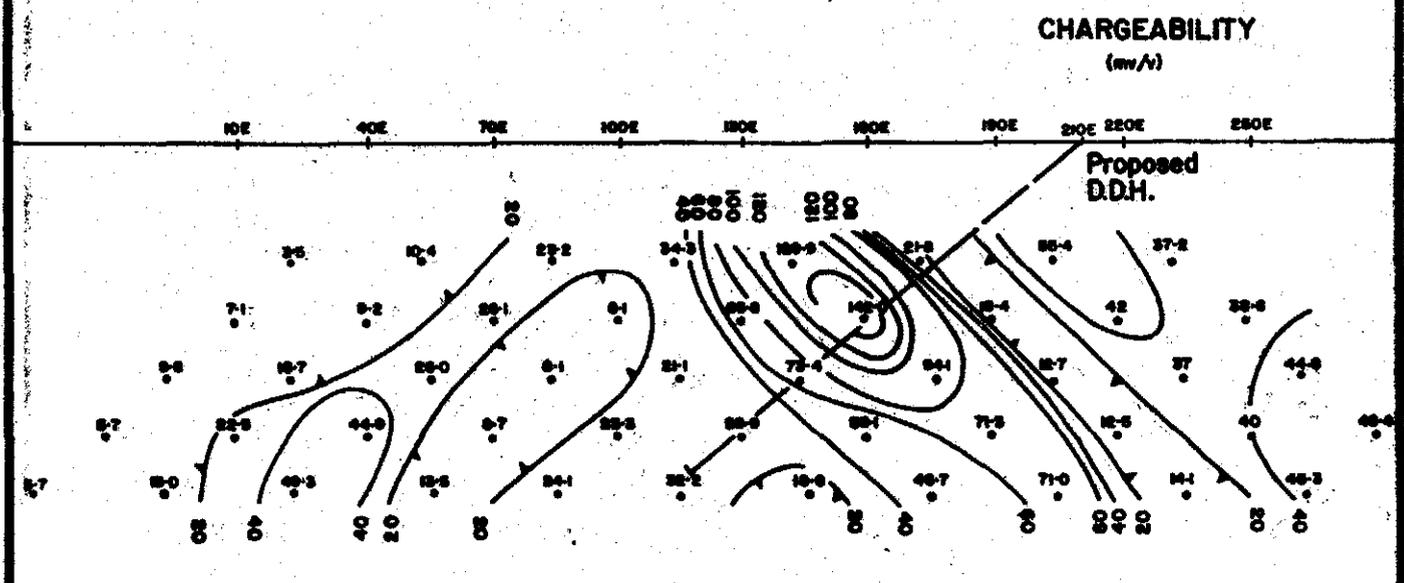
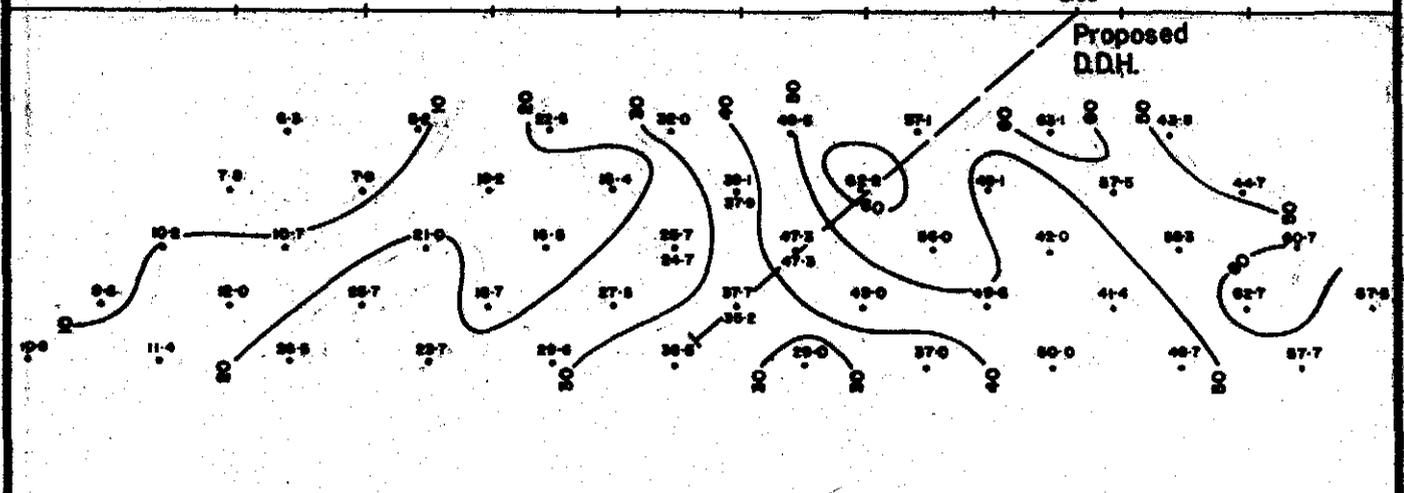
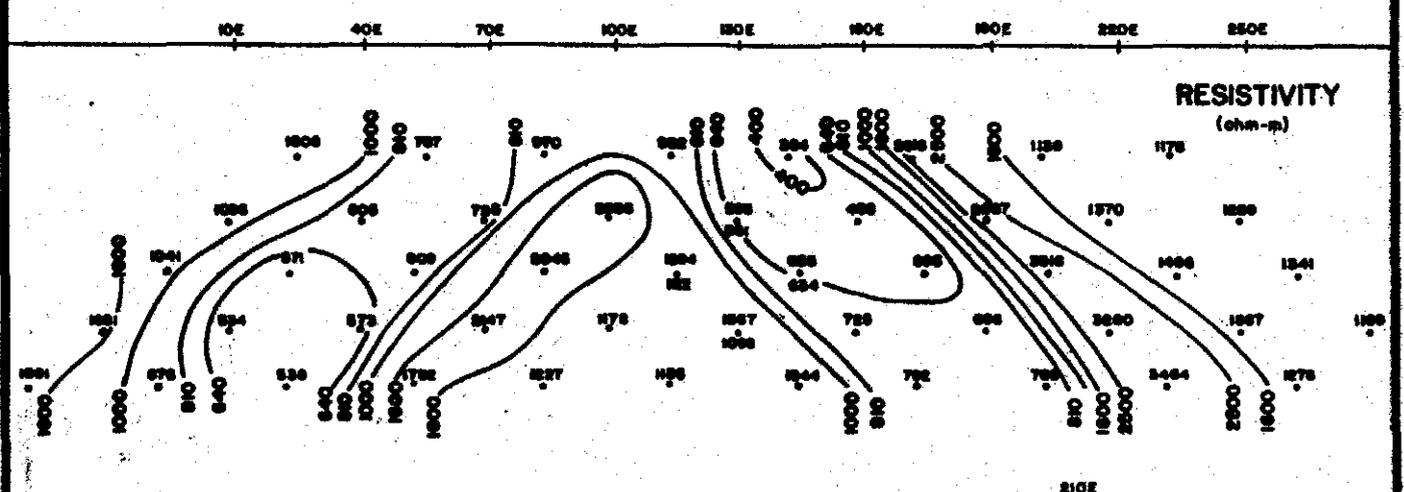
85-2363 G.M. 320

**MITRE GEOPHYSICS PTY. LTD.**  
**GLOBE GRID**  
**I.P. PSEUDOSECTION**  
**LINE 320E.**

Drawn by Scintrex Scale: 1:2000  
 Traced by L.S.D. Date: March 1982

**FIG.22**

022



Survey by : Schlrex  
 Date : Nov.- Dec., 1981  
 IP receiver : IPR-10 (2 sec.pulse)  
 Dipole spacing : 30 m

202041

Ref 88/108 82/04

85-2363 G.M. 382

**MITRE GEOPHYSICS PTY. LTD.**  
**GLOBE GRID**  
**I.P. PSEUDOSECTION**  
**LINE 00N.**

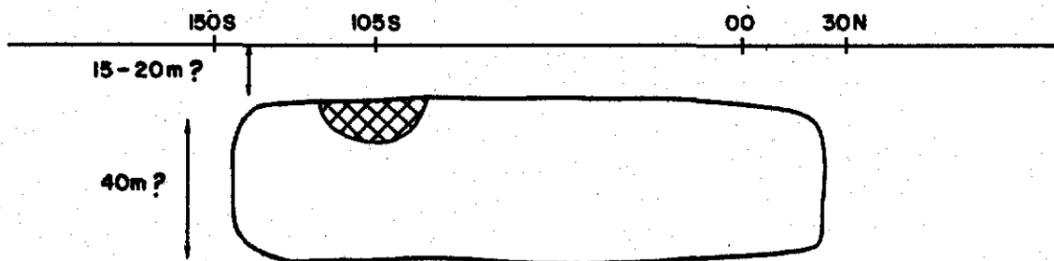
Drawn by Schlrex Scale: 1:5000  
 Traced by C.M.S. Date: March 1982

**FIG. 23**

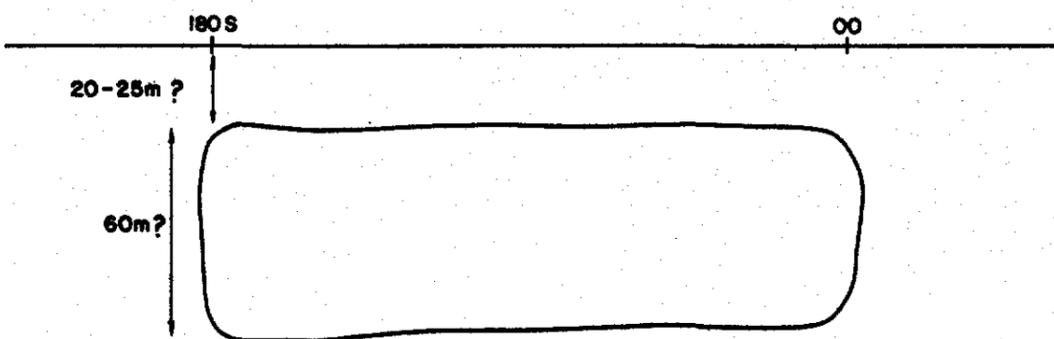


No well defined response

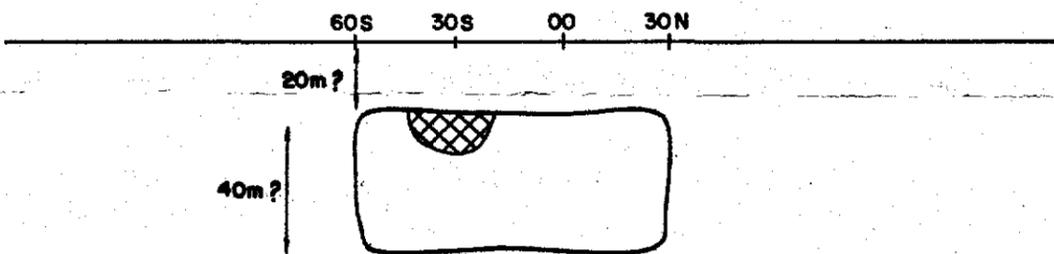
Line 120 E



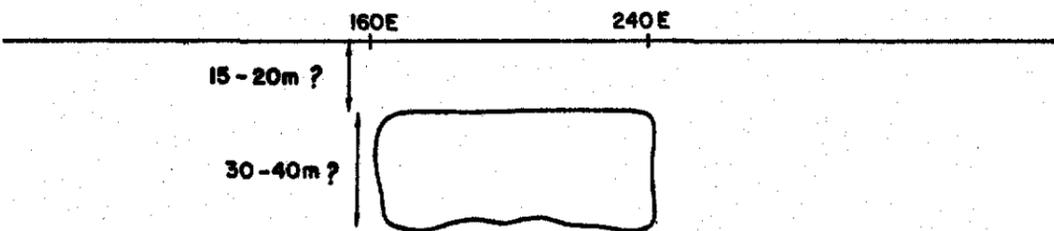
Line 160 E



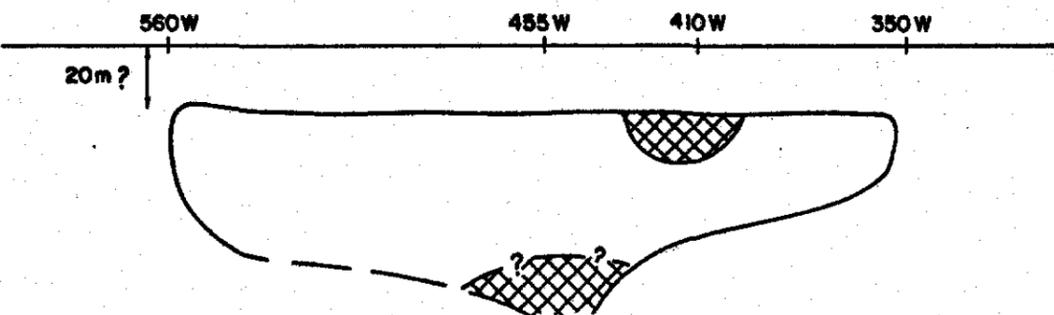
Line 240 E



Line 320 E



Line 00 N



Line 2750 N (E.H.G.)

The dipole-dipole IP surveys over the Globe suggest a chargeable body with the above approximate dimensions. Areas of hatching indicate a higher concentration of chargeable material.

5 cm

202043

2079

85-2363

GM.317

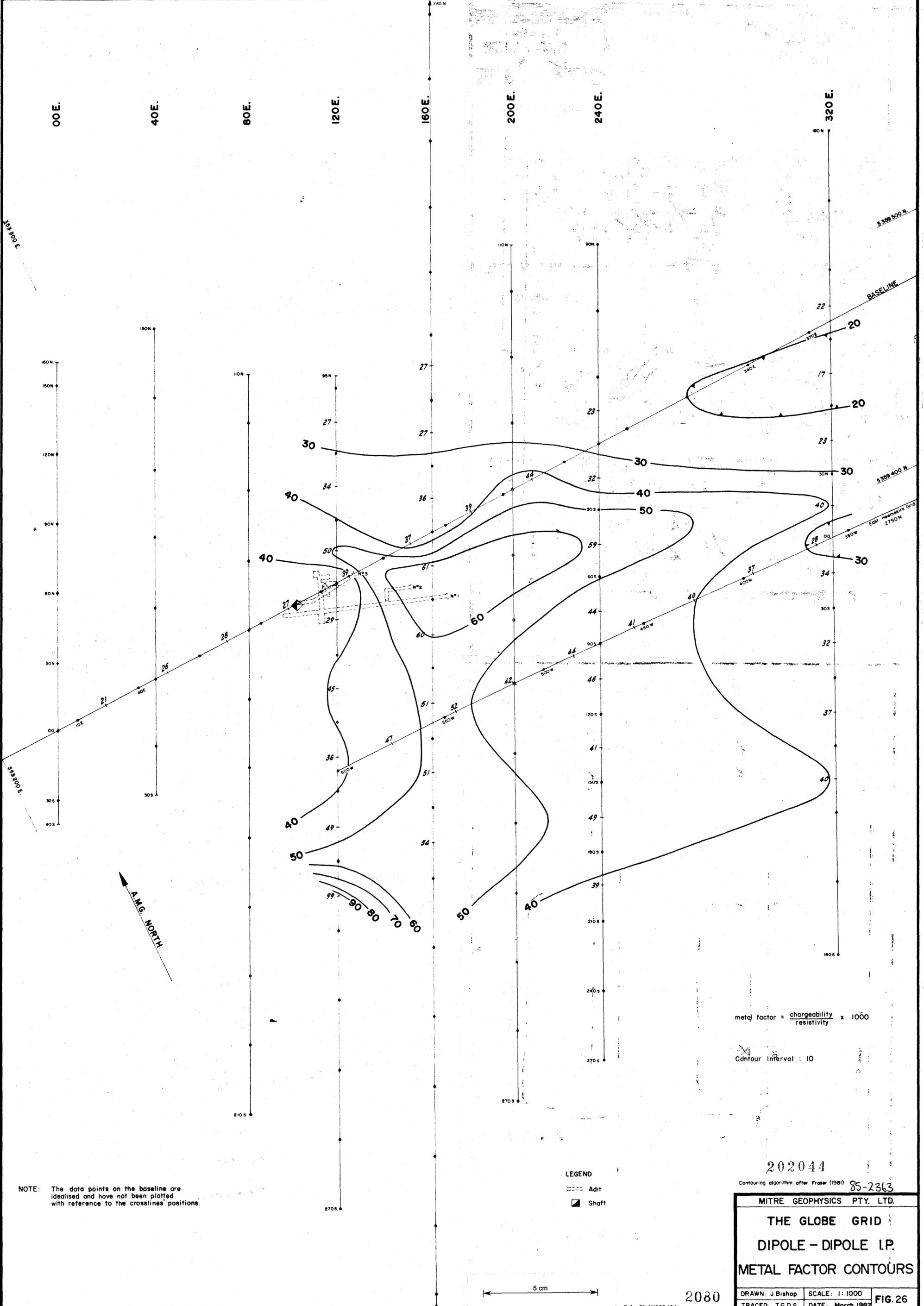
MITRE GEOPHYSICS PTY. LTD.

GLOBE GRID

Interpretation of

Dipole-dipole Chargeability

DRAWN: J.Bishop SCALE: 1:2000 DATE: April 82 FIG.25  
TRACED: T.S.D.S.



NOTE: The data points on the baseline are idealised and have not been plotted with reference to the crosslines positions.

metal factor =  $\frac{\text{chargeability}}{\text{resistivity}} \times 1000$   
 Contour Interval : 10

LEGEND  
 --- Adit  
 ■ Shaft

5 cm

202044  
 Contouring algorithm after Fraser (1981) 85-2363  
 MITRE GEOPHYSICS PTY. LTD.  
**THE GLOBE GRID**  
**DIPOLE - DIPOLE I.P.**  
**METAL FACTOR CONTOURS**

DRAWN: J Bishop	SCALE: 1:1000	FIG. 26
TRACED: T.G.D.S.	DATE: March 1982	