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THE MOUNT LYELL MINING AND RAILWAY COMPANY LIMITED

OPEN FILE

EXPLORATION LICENCE 9/66

ANNUAL REPORT

1979-80

MICROFILMED

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1. INTRODUCTION

Exploration programmes to locate economic Cu-Pb-Zn-Ag-Au deposits in the Cambrian Mt. Read Volcanics continued on E.L. 9/66 during the 1979-80 year (28.6.79-25.6.80). Detailed exploration including 5 diamond drill holes (total 1712 m) continued on the White Spur, Howard's Anomaly, Henty River and Beatrice grids. Reconnaissance programmes were conducted in the Henty-Yolande, Lynch Creek and West Tyndall areas, and minor detailed exploration continued on the Lake Selina, Red Hills and Henty Fault Zone grids (see Figures 1 and 2, Table 1).

The only significant mineralisation located during the year was at Howard's Anomaly, where DDH HA4 intersected 35 m of 34 g/t Ag as finely disseminated freibergite in a carbonate-hematite bearing tuffaceous unit. Re-assaying of DDH HA3, drilled in 1975 800 m north of HA4, indicated 49 m of 8 g/t Ag.

Exploration expenditure during 1979-80 was \$452 308 comprising \$274 358 (61%) on the Mt. Tyndall area and \$177 950 (39%) on the Sedgwick-Darwin area. Expenditure on E.L. 9/66 since 1967 totals \$2 676 275 to 25th June, 1980. Diamond drilling comprised 21% of the 1979-80 exploration expenditure and was completed at a unit drilling cost of \$56.36/m. Helicopter usage totalled 48 hours 52 minutes at an all-inclusive unit cost of \$536/hour.

Exploration proposed for the 1980-81 year includes both the evaluation of new and partly tested targets by diamond drilling, and the location and definition of anomalous zones by reconnaissance surveys. Proposed diamond drilling totals 8 holes (2761 m) comprising 31% of the exploration budget. Proposed expenditure for the 1980-81 programme is \$584 364. See Figure 3 and Sections 3, 4 and 5).

2. EXPLORATION COMPLETED 1979-80

2.1 RED HILLS GRID

2.1.1 Gravity Survey

Three lines of gravity were read by Scintrex Pty. Ltd. in February, 1980, using a Worden extended range gravity meter from the University of Tasmania. Readings were taken at 100' station spacing and the relative levels along each line were surveyed by Mt. Lyell surveyors to an accuracy of ± 0.1 mm. Each line was treated as a separate survey and the gravity data was corrected for drift, free air and Bouger corrections to an arbitrary base level on each line. No terrain correction was applied to the data, as for the purpose of the survey it was assumed that short sections of single lines would be equally affected by distant mountains or valleys. An assumed density of 2.67 gm/cc was used in the calculations (Scintrex Report Tas-073E). No latitude correction was applied to the data.

The purpose of this and associated similar surveys on the White Spur (2 lines) and Lake Selina (1 line) grids was to evaluate the effectiveness of gravity to discriminate between I.P. anomalies due to massive or semi-massive sulphides (S.G. 2.9 and greater) and I.P. anomalies due to graphite and other non-sulphide sources (S.G. around 2.7).

At Red Hills the following lines were read:

<u>Line</u>	<u>Interval (ft.)</u>
8S	00-1800E
72S	500E-2600E
86S	100E-1500E

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TABLE 1

Exploration Completed 1979-80

	ACCESS			GEOCHEMISTRY			GEOPHYSICS				DIAMOND DRILLING	
	Track Cutting (km)	Track Re-Clearing (km)	4WD Access Tracks (km)	Soil Samples	Stream Sediments	Rock Chip Samples	Gravity (km)	Induced Polarisation (km)	Ground Magnetics (km)	Dighem E.M. Survey (km)	No. Holes	Metres
Red Hills							0.98					
Henty Fault Zone	5.71	2.56										
White Spur			0.2	100		210	1.10		2.0		1	203
Selina-Dora						14	0.36			40		
Howard's Anomaly	4.48	14.05		703		138		12.6	1.3		1	403
Henty River	2.50		2.9	100		20		3.7	3.7		1	617
Beatrice	3.57			1024	54	19		1.7	5.3		2	489
Lynch Creek		2.13								24		
Henty-Yolande										370		
Jukes-Darwin	1.15			23		1						
TOTALS	17.41	18.74	3.1	1950	54	402	2.44	18.0	12.3	474	5	1712

The only anomaly was located on Line 86S at 500W where a 0.4 milligal high occurs in an area of glacial boulder till north of Lake Westwood and is on strike from black shales near the collar of DDH RH11. Further evaluation of this anomaly will be carried out.

2.2 HENTY FAULT ZONE GRID (A. C. Walter)

2.2.1 Access

Track clearing and cutting was done for an applied potential geophysical survey over the sulphide lens exposed in the L49N, 1450E costean.

Lines 47N, 48N, 49N, 50N and 51N were cleared and repegged approximately 800' (250 m) east and west of the assumed strike extension of the sulphide lens. Total 2.9 km, see Table 2. Intermediate lines totalling 6.0 km were cut to reduce the line spacing to 100' (30 m) near the L49N costean, and to 250' (75 m) at the extremities of the survey area. A N-S sub-baseline 1150' (350 m) long was cut from L46.5N, 1900E to L49N, 1600E.

Line clearing was also done on the eastern ends of lines 52N and 53N preparatory to a small gradient array survey.

TABLE 2

Henty Fault Zone - Track Cutting and Applied Potential Details

LINE	INTERVAL CUT	INTERVAL RE-CLEARED	INTERVAL READ
46.5N	1200E-2700E		-
47 N		1100E-2400E	1200E-2500E
47.5N	1100E-2400E		1100E-2400E
48 N		800E-2400E	800E-2400E
48.3N	800E-2400E		900E-2400E
48.5N	800E-2400E		800E-2400E
48.9N	800E-2400E		800E-2400E
49 N		700E-2400E	800E-2250E
49.1N	600E-2400E		650E-2050E
49.2N	500E-2400E		550E-2075E
49.3N	500E-2300E		500E-2100E
49.5N	700E-2400E		700E-2150E
50 N		700E-2600E	900E-2450E
50.3N	300E-2200E		300E-2200E
50.5N	600E-2700E		600E-2400E
51 N		800E-2700E	-
TOTALS	5.73 line-km	2.56 line-km	6.58 line-km

1. Applied Potential Survey.

An applied potential survey was carried out to define the possible strike extensions of a semi-massive sulphide lens exposed in a costean on L49N, 1450E. The original 1973 survey (Tas-016) indicated that the mineralisation was conductive (~600 ohm-metres), and thus applied potential would be a suitable search technique.

Two diamond drill holes have tested this sulphide occurrence, HFZ5 and HFZ6, and both intersected sulphide-rich zones corresponding to the costean exposure. Unfortunately both drill holes are now blocked, thus preventing the downhole emplacement of the current electrode within the sulphide zone - the normal procedure for an applied potential survey.

Consequently, the energising electrode was placed in the sulphides on surface. It should be noted that the sulphides have undergone little or no weathering and could therefore be expected to retain the electrical properties of fresh (downhole) sulphide material.

The survey was successfully completed by Scintrex Pty. Ltd. over 9½ operator days. Further details of electrode placement, method and equipment are given in the contractor's report Tas-073B (Howland-Rose, 1980), together with results and conclusions. See Table 2.

The applied potential data (Figure 4) indicates that the conductive sulphides extend from L47.5N to L49.1N, i.e. 800' (250 m), assuming some internal resistance within the sulphide body. (This is reasonable since the sulphides are semi-massive in a siliceous host rock.)

The secondary potential data (Figure 5), which is influenced by the polarizability of the conductive body, suggests that the body has a strike length of 500' (150 m) from L48.3N to L49.1N.

A comparison of the theoretical and measured current paths (Figure 6) provides a picture of the strike extent and direction of the sulphide body, and suggests a westerly dip.

Thus the sulphide lens probably extends from L47.5N to L49.1N, about 800' (250 m). This lens has been tested by one costean and two diamond drill holes: HFZ5 (L49N) and HFZ6 (L48N).

The proximity of the east-dipping Henty Fault and the possible unconformity between the mineralised tuff sequence and younger unmineralised tuffs and lavas (?Tyndall Group) severely restricts the depth extent of this sulphide lens.

The maximum assay values from this sulphide occurrence are:

L49N 1450E costean: 3.0 m of 1.65% Cu, 4.0% Pb, 0.47% Zn, 170 g/t Ag, 30.3% S.

DDH HFZ6: 0.6 m of 1.11% Cu, 4.00% Pb, 7.00% Zn, 85 g/t Ag, 2 g/t Au, 15.7% S.

These results are encouraging, however neither soil geochemistry nor I.P. geophysics on adjacent lines suggest an increase in grade or width of this sulphide lens. It should be recognised, however, that soil geochemistry may not be an effective indicator in this area, due to the presence of extensive glacial overburden.

It is considered that this sulphide occurrence has been adequately tested.

2. Gradient Array I.P. Survey

A small gradient array survey was conducted on the eastern ends of L52N (1500E-2800E) and L53N (2000E-3600E) to evaluate a high chargeability-low resistivity zone detected in the 1973 gradient array I.P. survey (Howland-Rose, 1973).

No anomalous values were recorded by the repeat survey. The 1973 "false" anomalous values are interpreted as having resulted from the eastern current electrode being located too close to the reading positions on the end of these lines (the extremity of the gradient array block). See Scintrex Report Tas-073B.

References:

Howland-Rose, A. W. (1973): A Report on Induced Polarization Surveys over the Mt. Tyndall Grid Queenstown area, N.W. Tasmania, Scintrex Report Tas-016.

Howland-Rose, A. W. (1980): Comments on an Applied Potential Survey, Henty Fault Zone near Queenstown, Tasmania, Scintrex Report Tas-073B.

2.3 WHITE SPUR GRID (A. C. Walter)

2.3.1 Introduction

Exploration was centred on the western section of the grid, and was mainly concerned with the planning and drilling of DDH WSP2 (collar L37.5N, 2650W; length 203.0 m), and with seeking an explanation for a major ground magnetic anomaly (centred at L36N, 1700W).

In addition, mapping and rock chip sampling of the grid area was completed, and a small orientation gravity survey was conducted on L34.5N and L36N.

A brief assessment of the exploration programmes to date on this grid is given.

2.3.2 Access

A drill site and 200 m access for DDH WSP2 were constructed by bulldozer. No additional line cutting was carried out during the year.

2.3.3 Geochemistry

1. Rock Chip Geochemistry

Rock chip samples were collected as part of the field mapping programme, and were assayed for Cu, Pb, Zn, Ag, Mn and S with special samples (e.g. iron oxide coatings, Mn wad) being analysed for Fe, Co, Ba and Ni as well (Figure 7). Refer to Appendices A and B for rock chip assay data for western and eastern sections of the White Spur grid respectively.

A wide range of rock types were assayed. Several Fe- or Mn-rich samples gave high base metal values, but no samples gave any direct indication of significant base metal sulphide mineralisation.

Table 3 presents the mean ($\bar{x}$) and standard deviation (s) of the assay data for Cu, Pb, Zn and Mn for the common lithology types. Anomalous assays ($> \bar{x} + 2s$) are presented in Table 4.

2. Soil Geochemistry

Repeat soil sampling was done over the EIP anomaly centred on

L37.5N, 3200W (the up-dip extension of DDH WSP2 target). Lines sampled were L37.5N (2700W-3600W), L38N (2900W-3700W) and L38.5N (3300W-4000W). A low-order Pb anomaly was confirmed, and appeared to be derived from black shale sub-crop (240 ppm Pb at L37.5N, 3250W; 220 ppm Pb at L38N, 3450W).

Repeat sampling was done on L36N, 1600W-1900W at 25' intervals, with negative results.

2.3.4 Geophysics

1. I.P. Surveys

A pole-dipole survey was completed using a 50' dipole spacing on L37.5N, 2800W-3400W, over the proposed DDH WSP2 target zone (anomaly W18, Howland-Rose 1978). The survey confirmed that the prospective shale unit dips east and extends from surface to >250' (80 m) depth (Figure 8). The unit shows decreasing resistivity down-dip.

A dipole-dipole survey was carried out on L36N, 1300W-2000W to further evaluate the source of I.P. anomaly W15 (Howland-Rose 1977), which is flanked to the west by a major >200 γ magnetic anomaly.

The results suggest a chargeable source occurring at depth within a west dipping moderately chargeable zone. The precise location is difficult to determine, but may be near L36N 1600W-1700W (Figure 9).

The initial gradient array I.P. survey (1977) indicates a major chargeability/resistivity anomaly centred at L36N 1500W with a smaller chargeability anomaly at 1850W. The major anomaly (W15) is reasonably explained by the pyritic shales that are exposed in the L36N costean (Walter 1978).

2. Magnetics

A low-order, but distinct elongate total intensity aeromagnetic anomaly is coincident with the zone of I.P. anomalies between L33.5N, 1500W and L36N, 1500W. This zone extends about 7500' (2-3 km) and trends NNW approximately conforming to the regional strike of the black shale-volcanoclastic sandstone lithologies.

Refer to Sheets 9 and 11; Geoex Pty. Ltd. Aeromagnetic Survey, Mt. Black-Tasmania Project, for the Electrolytic Zinc Company of Australasia Limited, 1978 (Mt. Lyell Company Exploration Department file Sheet Numbers 2/427 and 3/413).

The magnetic anomaly peak occurs at about L35N 800W and has an above-background value of +100 γ . This position is about 500' (150 m) south of the L36N costean, and about 400' (120 m) north of DDH WSP103. Minor disseminated pyrrhotite in black shale has been logged in WSP103.

Line 36N was initially surveyed with a total field ground magnetometer in 1977 (Howland-Rose 1977). Results showed a strong anomaly with an estimated maximum width of about 800' (250 m) and a maximum depth to source of about 200' (60 m) centred at L36N, 1700W.

Howland-Rose (1977) suggests that the source of I.P. anomaly W15 "contains some magnetite (or other magnetic material), but is not uniquely outlined by it", implying that the sources of the chargeability, resistivity and magnetic anomalies, although not coincident, "are part of the same geological event".

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TABLE 3

White Spur Grid - Western Section - Rock Chip Geochemical Means

Lithology	Cu		Pb		Zn		Mn		No. of Samples
	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	
Black Shale	80	35	100	117	50	26	115	136	32
Tuffac. Shale	101	42	56	87	90	38	484	474	32
Crystal Tuff Agglom.	49	37	70	131	63	52	281	445	23
Volcanoclastic Sandstone	98	33	74	91	118	72	395	318	15
Vitric Tuff	140	82	278	300	282	374	405	605	4*
Felsic Lava	65	40	35	13	20	10	140	125	3*

$\bar{x}$ = arithmetic mean

s = deviation

* too few analyses to be statistically valid.

TABLE 4

White Spur Grid - Western Section - Anomalous Rock Chip Samples

Sample No.	Cu	Pb	Zn	%S	Location	Lithology
One element $> \bar{x} + 2s$						
28244	<u>160</u>	75	35	0.05	L27.5N 2350E	Black pyritic shale
28189	75	<u>660</u>	80	0.02	L42.5N 3000W	Black shale
	<u>490</u>	60	110		Costean L36N 1470W	Black pyritic shale
28146	<u>190</u>	55	<u>130</u>		L37.5N 2490W	Tuffaceous shale
28184	130	<u>500</u>	120	0.11	L42.5N 2900W	Dark grey tuffac. shale
28205	80	60	<u>180</u>		L39N 3130W	Grey tuffaceous shale
28145	45	200	<u>330</u>		L37.5N 2300W	Mgr volc cl sst
	<u>190</u>	50	140		Costean L36N 1810W	F-mgr volc cl sst
	<u>1270</u>	25	115		Costean L36N 1550W	Mgr volc cl sst
28158	100	<u>360</u>	140		L42.5N 2500W	Mgr volc cl sst
28144	<u>160</u>	25	100		L36.5N 1450W	Mgr qtz felds xl lith tuff
28223	35	<u>300</u>	145		L37N 00	Felds xl lith agglom
28236	30	<u>600</u>	150		L38N 1200W	Agglom
28242	<u>150</u>	<10	40	0.35	L27.5N 2650E	Mgr felds xl tuff
28239	40	80	<u>180</u>		L36.5N 1350W	Felds xl chl tuff
28119	140	<u>545</u>	<u>840</u>		L39N 300E	Fgr alt vitric tuff
28226	25	<u>530</u>	52	1.69	L39N 350E	Fgr silic tuff

A detailed follow-up ground magnetic survey was done between L36.25N and L35N in the anomalous area, including L36N 1300W-1900W, reading at 10' intervals (Figure 10). The results suggest that the major anomaly is composed of several small shallow magnetic sources within a broader anomalous zone.

A contour plan (Figure 11) of the detailed magnetometer survey suggests that there are several lenses of higher magnetic content within the rock sequence in this area.

The extent and trend of the aeromagnetic total field anomaly are strikingly confirmed by the ground magnetic survey results (Figure 12) with distinct maxima of $>250 \gamma$ above background on L36N 1700W, L35N 800W, and L33.5N 1250W.

The dominant lithologies in the magnetically anomalous areas are black shales, tuffaceous grey shales and fine-medium grained volcanoclastic sandstones. The rocks are variably pyritic on surface, and are commonly leached in appearance.

A Scintrex SM-5 susceptibility meter was used to test for any magnetic material in the L36N costean rocks, taking readings at 10' intervals against the costean walls. No magnetic component was detected.

It is likely that any magnetite in the shales and sandstones would have survived weathering, as occurs elsewhere in the region. The depth of weathering in the area is about 40' (12 m), e.g. DDH WSP 103. Thus it is reasonable to assume that any pyrrhotite has been weathered from the costean rocks (weathering is known to remove pyrrhotite from rocks, whereas pyrite commonly survives). It therefore seems probable that pyrrhotite is the magnetic component in the rocks and is the cause of the magnetic anomalies.

The discrepancy in position of the magnetic anomaly peaks and the chargeability peaks is not significant. It is likely that chargeability anomaly W15 is made up of several smaller amplitude peaks. In addition, the chargeability and resistivity will be strongly influenced by the pyrite content of the sediments. Pyrite is common in these rocks and occurs in thin semi-massive bands (+ dolomite? -sericite) to 1 cm thickness, and as abundant discrete disseminated grains and crystals.

DDH WSP103 (drilled by RTAE in 1960) tested a similar combination of anomalies on Mt. Lyell grid L34.5N 800W, about 800' (260 m) south of the L36N 1700W magnetic anomaly (Figure 13).

The I.P. chargeability/resistivity anomalies on L34.5N are probably explained by pyrite-pyrrhotite occurring in black-grey shales. The magnetic anomalies may be explained by disseminated pyrrhotite within the shale and sandstone units.

On L34.5N and on other grid lines, the most easterly anomaly of this zone may be accentuated by the contact between strongly contrasting rock types - shales and rhyolites.

A similar combined I.P. - total field magnetic anomaly occurs on L33.5N 1150W (Howland-Rose 1977, 1978) within a laminated black pyritic shale horizon within the sedimentary sequence. Rock chip sampling and soil sampling over the area have failed to find any encouraging indication of significant base metal mineralisation.

The combined anomalies are probably caused by disseminated and banded pyrite and pyrrhotite occurring within black shales.

3. Gravity Survey

Two lines of gravity were read in February, 1980 with survey

details as for the Red Hills survey. Lines 34.5N (300W-1300W) and 36N (1100W-2600W) were read at 100' station spacing over I.P. anomalies associated with the Western tuff-shale sequence. The line 36N profile also covered a co-incident magnetic anomaly. No significant gravity anomalies were located, although a broad 0.1 milligal anomalous zone corresponded to the magnetic anomaly from 1500W to 1800W on line 36N. On line 34.5N, single station 0.4 milligal anomalies were located at 500W and 800W. These anomalies appear to be associated with black shales intersected in R.T.Z. diamond drill hole WSP 103 drilled in 1962.

2.3.5 Diamond Drilling

1. Introduction

One diamond drill hole WSP2, was drilled from 5th December to 12th December, 1979, by Associated Diamond Drillers. Hole length was 203.0 m, drilled at a direct unit cost of \$55.95/metre.

The drilling crew worked a 10 hour day shift travelling from Queenstown each day, and achieved an average penetration rate of 29 m/shift using a Mindrill F52 drilling rig.

2. DDH WSP2

Collar: L37.5N 2650W
R.L.: 595 m A.S.L.
Bearing: 264° magnetic
Inclination: -50°
Length: 203.0 m
Commenced: 5th December, 1979
Completed: 12th December, 1979

The hole was drilled to evaluate the source of the I.P. chargeability/resistivity anomaly on L37.5N 3200W (gradient and pole-dipole array surveys) (Figure 8). The target zone occurs on the strongest part of a major I.P. anomaly zone extending from L36.5N to L38.5N (500 m strike length) which probably corresponds with an RTAE (1960) Turam and gravity anomaly zone (Zones 2 and 4). A low-order Pb soil geochemical anomaly occurs on L37.5N 3150W (410 ppm Pb c.f. 40 ppm Pb background) over sub-cropping grey-black shales.

A second aim of this drill hole was to compare the source of this I.P. anomaly with numerous other I.P. anomalies that occur in the western section of the White Spur grid.

Lithology Summary:

- 0-17.0 m: Rubble; glacial material and very weathered locally-derived sediment.
- 17.0-104.3 m: Fine-medium grained volcanoclastic sandstone with bands of shale, and coarse grained volcanoclastic sandstone. Minor calcite and pyrite throughout, pyrite locally abundant in thin bands. Consistent uphole younging facings from a variety of sedimentary structures.
- 104.3-129.2 m: Black pyritic shale with bands of medium grained dolomitic-pyritic volcanoclastic sandstone. Minor, slightly graphitic, zones. Pyrite content is variable - up to 20% pyrite in thin bands, average for unit is about 3-4% pyrite. Very minor chalcopyrite, pyrrhotite, galena, and sphalerite observed in thin section (Amdel Report 3/70/0 - GS 3690/80 March, 1980).
- 129.2-140.6 m: Fine grained rhyolitic lava? Rare pyrite and pyrrhotite grains. Minor flow banding and brecciation.
- 140.6-153.4 m: Medium grained feldspar (quartz) crystal (lithic) ash flow tuff. Rare pyrite and pyrrhotite grains.

153.4-174.7 m: Medium grained feldspar quartz crystal lithic tuff. Rare pyrrhotite, pyrite, and sphalerite blebs and smears.

174.7-203.0 m: Medium grained and coarse grained feldspar (quartz) crystal lithic tuff. Occasional pyrrhotite and pyrite blebs.

Assay Summary

104.3-106.0 m: 1.7 m of 0.01% Cu, 0.04% Pb, 0.15% Zn, 4.0% pyrite.

104.3-129.2 m: Black shale unit (source of EIP anomaly) 24.9 m averaging 123 ppm Cu, 68 ppm Pb, 272 ppm Zn, 2 ppm Ag, 0.1 ppm Au, 5 ppm Sn, 10 ppm As, 3.5% pyrite.

147.0-149.0 m: 2.0 m of 0.01% Cu, 0.03% Pb, 0.11% Zn.

3. Results

The source of the I.P. and soil geochemical anomalies is a pyritic black shale horizon from 104.3-129.2 m (Figure 8). No significant base metals occur within this unit, or elsewhere in the tested sequence.

Facings from a variety of sedimentary structures are common in the uphole sandstone-shale sequences and consistently give an uphole (east) facing. This data supports the surface geology evidence for broad fold structures in the area, with the rocks intersected in WSP2 forming the east dipping limb of a shallow syncline.

The WSP2 sequence forms part of a recurring sequence in the western section of the White Spur grid area, i.e. from oldest to youngest (bottom to top of the drill hole): quartz feldspar crystal agglomerate; coarse-fine grained feldspar quartz crystal ash flow tuffs; rhyolitic lavas; black shale; fine-coarse grained volcanoclastic sandstones (Reid et al 1979).

Downhole I.P. logging of WSP2 from 30-200 m confirmed that the black pyritic shales are the source of the surface I.P. chargeability/resistivity anomaly.

This black shale unit has a relatively low average downhole chargeability response, and this may account for the rapid fall-off to the east of the surface gradient array chargeability to quite low values (35 mV/V) east of the main >65 mV/V chargeability peak, despite the relatively shallow depth of the chargeable source (250' (7.5 m) below surface 300' (90 m) east of the main chargeability peak).

It is suggested that the gradient array survey at 100' electrode spacing is effectively "seeing" anomalous material to a depth of only about 200' (60 m).

Magnetic susceptibility readings of drill core were taken at selected intervals using a Scintrex SM-5 susceptibility meter. No significant magnetic material is apparent.

2.3.6 White Spur Grid - Western Section - Conclusions

The western section of the White Spur grid is composed of a distinctive volcano-sedimentary sequence. The area has been mapped several times and the geology of this small part of the Mt. Read Volcanics is relatively well known.

Gradient array EIP, ground magnetics, and soil geochemical surveys on a line spacing of <400' (120 m) have been effectively carried out over the area.

Two diamond drill holes, WSP103 (1960) and WSP2 (1979) have adequately tested two anomaly types within the shale-volcanoclastic sandstone sequence with discouraging results.

There are several strong I.P. and magnetic anomalies in this area that remain untested by either costeaning or diamond drilling. However, they can be reasonably explained by a combination of pyrite and/or pyrrhotite, occurring within shales or volcanoclastic sandstones. Total sulphide content is probably <10% pyrite equivalent for any of the anomalies.

The rock chip and soil geochemistry both give low base metal values over this area (in absolute and anomaly terms), and offer little encouragement for significant base metal mineralisation.

The known major base metal volcanogenic sulphide deposits within the Mt. Read Volcanics occur closely associated with felsic-intermediate pyroclastics and lavas. The area discussed in the preceding sections of this report is a dominantly sedimentary phase of the volcanic sequence. Therefore, in this area at least, the prospective potential of this environment may be regarded as low.

Consequently, this western sedimentary sequence does not warrant further testing unless there is new and strong geochemical or geological evidence to suggest otherwise.

2.3.7 White Spur Grid - Central Section

The central section is defined here as the elongate block with corners at approximately L28N 2500E; L28N 6000E; L43N 500E; L43N 4500E.

The geology of this central section is poorly known. However, it is reasonable to assume that no large outcropping economic base metal sulphide deposits exist in the area, as these would most probably have been located by prospectors, or more recent geologists, or by the recent (post 1976) reconnaissance geophysical and geochemical surveys.

The most comprehensive mapping to date has recently been completed by Dr. K. Corbett (Geological Survey of Tasmania); refer to Mt. Lyell Company Exploration Dept. file Sheet No. 2/107. Rock types are dominantly feldspar crystal vitric tuffs, including brecciated and agglomeratic types and ash flows. These lithologies are similar to those associated with the Hercules and to a lesser extent the Rosebery orebodies. This area is broadly on strike from the Hercules Pb-Zn-Ag deposit, and is considered to have moderate potential for significant base metal mineralisation.

Mapping of the area (creeks, tracks and grid lines) with special attention to alteration zones and fine grained units is required for further assessment of this central section.

Detailed rock chip sampling for lithochemical studies would assist in treating possible mineralised horizons. The reconnaissance geochemical soil sampling programme should be completed, with closer sample spacing over the zones of interest already located by the reconnaissance I.P. gradient array survey (Howland-Rose, 1977).

A brief re-appraisal of the I.P. data was made with the view of locating deeper (>100 m) conductive bodies. Chargeability is probably not effective for seeking "deep" bodies because of near-surface effects clouding the response from any deeper polarizable body. Resistivity, however, may be able to locate deeper conductive bodies although the response may be subdued and the absolute values relatively high due to "dilution" from near surface and adjacent material within the sampled volume.

Several broad low resistivity zones are listed in Table 5. The zones designated high priority should be surveyed with pole-dipole or dipole-dipole I.P., using 300' dipole spacing, reading every 100' to n = 6. These zones also warrant detailed mapping, and soil and rock chip sampling.

TABLE 5

White Spur Grid - Central Section - Low Resistivity Zones

Location	Comments
L28N 5800E	High priority
L33N 3100E	
L33N 4300E	
L34N 2400E	
L34N 4500E	Very strong positive magnetic anomaly
L37N 5700E	Moderate positive magnetic anomaly; high priority
L40N 200E	Moderate negative magnetic anomaly; high priority
L40N 2300E	
L40N 3300E	
L42N 2500E	

Total field ground magnetic surveys are also capable of "seeing" to depths >100 m, and mapping and sampling should be done over anomalies to seek their cause.

References:

Amdel (1980): Petrology Report No. GS 3690/80: "Description of Volcanic and Associated Rocks and some Secondary Manganese and Hematite" March, 1980.

Howland-Rose, A. W. (1977): A Report on Gradient Array Reconnaissance EIP and Total Field Magnetometer Surveys over the White Spur Grid E.L. 9/66 near Queenstown, West Coast Tasmania, Scintrex Report Tas-035C.

Howland-Rose, A. W. (1978): A Report on Additional Geophysical Surveys over the White Spur Grid E.L. 9/66 near Queenstown Tasmania, Scintrex Report Tas-054B.

Reid, K. O., et al (1979): E.L. 9/66 Annual Report 1978/79, Mt. Lyell Company Report.

Walter, A. C. (1978): E.L. 9/66 Annual Report 1977/78, Mt. Lyell Company Report.

2.4 SELINA-DORA AREA (M. J. Hutton)

2.4.1 Introduction

The Selina-Dora area covers a belt of Cambrian volcanics and sediments between the Tyndall Range (to the west), the Sticht Range (east), Anthony River gorge (north) and Lake Spicer (south) (Fig. 2). Topographic features within the area are Lake Selina, Lake Rolleston, Walford Peak and Lake Dora. Due to Pleistocene glaciation most of the area is reasonably flat and covered by button grass and low scrub.

The area received attention from prospectors at the turn of the century following the discovery of copper mineralization near Lake Dora. The Mount Lyell Mining and Railway Company Limited sampled the old workings in the 1930's with disappointing results. In 1957-58 Rio Tinto Australian Exploration carried out soil geochemical and geophysical surveys over the Dora area but concluded that the area did not warrant further work. Mt. Lyell carried out exploration over the entire area from 1969 to 1973 with geophysical and geochemical surveys leading up to the drilling of seven diamond drill holes.

The exploration of the Selina-Dora area to date has essentially comprised a first-pass evaluation. Two zones, the NE sector of the Selina area and the area between lakes Dora and Spicer, have yet to be evaluated with routine geochemical and geophysical surveys and several previously recorded anomalous zones are thought to still have considerable exploration potential.

During 1979-80 data from the previous exploration programmes were reviewed and re-evaluated. Drill core samples from DDH's LS4, LS5 and LS6 were assayed for Ag, Au, Mo, As and Sn. Selected samples were forwarded to Amdel for petrographic determination of silver-bearing minerals. Fifteen rock chip samples were also submitted for assay. A 40 line-km Dighem II airborne E.M. survey was flown over the Selina area to test for extensions to the pyrite body and to detect conductive bodies in the NE sector. A gravity test survey was conducted along line 120N over the pyrite zone.

2.4.2 Previous Work

1. RTAE

Rio Tinto carried out an exploration programme over the Lake Dora area during the 1957-58 field season following the detection of an aeromagnetic high immediately west of Lake Dora. The programme comprised gridding, geological mapping, soil geochemistry, ground magnetics, Turam ground E.M., self-potential and gravity profiling.

(i) Gridding

RTAE pegged a baseline bearing 335° True and 16 traverse lines, 400 feet apart and with stations at 100 feet intervals. This grid covered an area of approximately 1 mile $\times$ $\frac{1}{2}$ mile on the western side of Lake Dora. A sub-baseline, 2 500 feet west of the main baseline, and intermediate lines 200 feet apart were pegged to the NW of the original grid following the discovery of an E.M. anomaly.

(ii) Geology

Volcanic rocks exposed between Lake Spicer and Lake Rolleston were interpreted to be extrusive porphyritic lavas, ash tuffs, coarse pyroclastics and agglomerates. The overlying Dora Conglomerate, a boulder conglomerate similar to the Jukes Conglomerate, interfingers with the volcanics and derived sediments. Together they occur in a

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south-plunging anticline with overlying Owen Conglomerate facies to the west and east.

The old Dora workings occur in three main mineralized shear zones consisting of quartz and quartz-chlorite schists with magnetite and hematite veins. The mineralization was reported to consist of pyrite, chalcopyrite, sphalerite and erythrite. The area of the E.M. anomaly is covered by peaty swamps but regional interpretation suggested that the source could be pyrite-chalcopyrite in sheared volcanics just below the contact with the Dora Conglomerate and possibly affected by a regional fault.

(iii) Soil Geochemistry

A systematic geochemical survey was carried out along the geophysical grid, presumably at 100' intervals. Details of the survey are not known but it is believed that RTAE adopted field dithizone assaying and recorded "high", "medium" and "low" anomalous values of total base metal content, as was used at Howard's Anomaly (Drake, 1979). The results are suspect due to the abundance of peaty soils and swamps but 7 main anomalous zones were reported (Figure 14).

Area A: A swampy area 1500' x 800' corresponding with the E.M. Anomaly. A correlation was suggested between soil anomalies and a major regional fault.

Area B: A line of anomalies in the SW of the gridded area.

Area C: Distinctive Cu anomalies in an area 1000' x 1000' at the southern end of Michael Tarn.

Area D: A linear belt extending 3600' along a shear zone between Michael Tarn and Lake Dora.

Area E: A group of high anomalies in an area 2200' x 1000' NW of Lake Dora.

Area F: A group of anomalies corresponding with a mapped mineralized zone north of the E.M. Anomaly.

Area G: Low to high anomalies closely corresponding with a small E.M. anomaly along the SW flank of Lake Dora.

(iv) Geophysics

Ground Magnetism:

Two areas were covered by vertical field fluxgate magnetometry: the peak aeromagnetic anomaly west of Lake Dora and south of Michael Tarn, and the major E.M. Anomaly. The ground magnetic anomalies were highly localised and probably due to veins and disseminated magnetite in near-surface rocks.

Turam Ground E.M.:

The Turam E.M. survey employed a grounded cable along the baseline and a mobile receiver connected to two horizontal loops. Values of ratio of signal amplitude and phase difference were recorded at a frequency of 440 Hz. Station intervals were 100' for the main grid and 50' for the intermediate grid over the major E.M. Anomaly. The anomaly "is of good order and quality, dips west at about 50-60 degrees, and is relatively shallow at less than 50 feet, possibly less than 25 feet" (Bonniwell, 1958). The anomaly lies NW of Michael Tarn on the axis of the main aeromagnetic ridge at its intersection with an inferred line of faulting.

Self-Potential:

Several reconnaissance self-potential lines were run, including one over the E.M. Anomaly but results were consistently featureless.

Gravity:

Seven grid lines over the E.M. Anomaly were covered by Worden gravimeter surveys and the observed values corrected for combined free-air and Bouger effects on the assumption that the density of surface rocks was 2.65 g/cc. A regional gradient increase to the south of 0.98 mgal/1000' was recognised and removed to empirically determine the residual gravity anomaly. The residual gravity contour plan indicated that the conductor is associated with a negative gravity anomaly which was interpreted to indicate a source material of clay, graphite or minor mineralization in the shear planes of a zone of bedrock weakness. No further work was recommended.

2. Mt. Lyell

Mt. Lyell's exploration programme was carried out between 1969 and 1973, and was concluded after the drilling of DDH LS7. The programme involved road construction, gridding, geological mapping, soil and stream sediment geochemistry, EIP geophysics, ground magnetics, air-borne E.M. and diamond drilling. The area that was looked at stretched from Lake Dora to the Anthony River gorge. A year-by-year summary of the programme is given in Table 6.

For the purpose of presentation of data the gridded area has been split into three:

Selina - from line 80N to the north (Figure 15).

Rolleston - line 72N to line 56S, inclusive (Figure 16).

Dora - from line 64S to the south (Figure 17).

(i) Road Construction and Gridding

Approximately 18 km of roadworks were constructed to give access to the area. The road terminates at the Anthony River gorge in the north and Lake Spicer in the south.

The grid baseline was laid out between Lake Dora and Anthony River, a distance of 28 800' (about 8 780 m). A sub-baseline, offset 3000' east of the main baseline, was laid out in the northern (Selina) section of the grid. Forty-two traverse lines were laid out 800' apart along the baseline. 266 000' (81 080 m) of traverse lines, of which 131 000' (39 930 m) had to be cut by contractors, were pegged at 100' intervals in 1969-70. A further 25 800' (7 860 m) were pegged in 1970-71.

(ii) Geology

The Dora and Rolleston areas were mapped in 1969-70 and the Selina area was mapped in 1970-71. The following stratigraphic units were recognised:

- Quaternary - glacial moraine, alluvium
- Ordovician - Owen Conglomerate
- Cambro-Ordovician - Jukes Conglomerate
- Cambrian - Dora Conglomerate
 - Murchison Granite
 - Mt. Read volcanics
 - Success Creek Group correlate
- Precambrian - quartzites and schists

TABLE 6

SELINA-DORA WORK COMPLETED

Year	Company	SELINA					ROLLESTON					DORA				
		Access	Geology	Geochem	Geophys	Drill.	Access	Geology	Geochem	Geophys	Drill.	Access	Geology	Geochem	Geophys	Drill.
1957-58	RTAE											T	X	S	Eg M G	
1969-70	Mt. Lyell	R T					R T	X	S C D	Ip M	LS1	R T	X	S	I P M	
1970-71	Mt. Lyell	R	X	S D	Ip M	LS4	T		D	Ig	LS2 LS3					
1971-72	Mt. Lyell			SS D		LS5 LS6										
1972-73	Mt. Lyell			D	Ea	LS7										
1979-80	Mt. Lyell			C D	Ea G											

R = Road construction
T = Track cutting

S = Soils
SS = Stream sediments
C = Rockchips
D = Drill core

E = E.M. (g = ground; a = airborne)
M = Magnetics
I = I.P. (P = pole-dipole; g = gradient array)
G = Gravity

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The sediments which occur on the eastern flank of the area, between the volcanics and the Precambrian quartzites, were correlated with the Owen Conglomerate by Newnham (1970) on the basis of similar lithologies. This led to the interpretation of an overturned south-plunging anticline in the Lake Dora area. However, mapping along Anthony River in 1970-71 revealed an almost continuous section of basal conglomerates grading westwards, up sequence, into sandstones, shales and volcanics (McKibben, 1971). Therefore the sediments were given a Lower Cambrian position and correlated with the Success Creek Group.

Volcanic rocks in the Dora area were reported to be extrusive quartz, quartz-feldspar and quartz-feldspar-hornblende porphyries of rhyolitic to dacitic composition. Intense shearing, trending 320° - 340° , had altered the volcanics to quartz-chlorite schists. A massive quartz-feldspar-hornblende porphyry (? intrusive) was distinguished from the foliated volcanics. This rock was mapped in the vicinity of RTAE's E.M. Anomaly. Small lenses of volcanoclastic conglomerate and greywacke within the volcanics provided bedding readings which consistently dipped steeply towards the west.

In the Selina area acid volcanics consisting of rhyolites, dacites, kerato phyres and pyroclastics were mapped in 1970-71. McKibben (1971) reported varying degrees of shearing and alteration, producing quartz-chlorite and quartz-sericite schists. Disseminated and veinlet pyrite-(chalcopryrite)-(magnetite)-(galena)-(sphalerite) was found in the schists. Near line 120N molybdenite films were reported to occur on schistosity planes in a costean. DDH's LS5 and LS6 were terminated in a massive unmineralized "quartz-feldspar porphyry" (McKibben, 1972) which was later interpreted to be equivalent to the Cambrian Murchison Granite (Wells, 1975).

Drilling in the Selina area intersected a zone of pyrite mineralization over 1 200' (365 m) long and up to 500' (150 m) wide, which appeared to decrease to the north and split into several lenses. DDH LS7 was drilled to test the extension of the zone to the south but intersected a faulted contact with the Owen Conglomerate whose surface expression was buried under glacial cover.

Reconnaissance mapping along Anthony River to the NE of Selina was carried out in 1971-72. A sequence of acid tuffs and lavas contained minor pyrite-galena-chalcopryrite-magnetite at a similar stratigraphic level to the Selina pyrite zone. Intrusions of Murchison Granite were exposed in a creek west of the Anthony River gorge.

Overlying the volcanics in the Dora area is the Dora Conglomerate which was distinguished from the Jukes Conglomerate by the lack of hematite and less quartz pebbles (Newnham, 1970). The Dora Conglomerate consistently dips 60° towards the west. There was no mention of it being recognised in the Selina area.

The purplish, hematitic Jukes Conglomerate was found to be always present at the base of the Owen Conglomerate and therefore they were thought to be conformable. In the Dora-Rolleston area it reaches a thickness of about 50' but in the central northern part of the Selina area an extensive area of Jukes Conglomerate, unconformably overlying volcanics, was found to be over 300' thick.

N-S trending fold structures were easily discerned in the Owen Conglomerate but bedding in the volcanics and underlying sediments consistently dips towards the west. On the western margin of the Rolleston area McKibben (1971) interpreted a series of tightly folded synclinal structures with steep eastern limbs, and inferred that the swampy section of the valley may be underlain by Gordon Limestone.

(iii) Geochemistry

Stream Sediments:

Stream sediment samples were collected during the 1972 reconnaissance of the NE corner of the Selina area. Assays range up to 63 ppm Cu, 445 ppm Pb and 246 ppm Zn but the location of the sampling points is not known. McKibben (1972) stated that anomalous values corresponded to part of the zone of mineralization found during the survey.

Soils:

Soil sampling was conducted along lines 144S to 144N between 1969 and 1971. In most cases the samples were taken immediately above bedrock but there is no record of sample descriptions in existence. Both Newnham (1970) and McKibben (1971) concluded that the sampling was generally ineffective due to the widespread cover of glacial moraine, scree and peaty swamps, all of which were not sampled, and the poor development of residual soils, which were sampled at 50' intervals. Samples were assayed for Cu, Pb and Zn by AAS at Mt. Lyell and Renison but because of factors such as non-uniformity of samples the results were not statistically evaluated for anomalous thresholds. Instead arbitrarily chosen limits defined first, second and third order anomalies. There does not appear to be any strong zone of anomalies, and high assay values are scattered throughout the area (Figures 18 to 20).

Mercury Vapour:

A mercury vapour soil gas test was conducted along line 128N, over the IP anomaly, in 1973. The test failed to detect the mineralized zone.

Trace Element Study:

J. L. Walshe's study of Co-Ni distributions in the Selina pyrite zone showed decreasing Co and Ni contents from DDH LS6 southwards to LS4, which was paralleled with the Prince Lyell situation. However, the study also indicated that, although high cobalt (> 1000 ppm) in pyrite is an indication that copper was present in the mineralizing solution, the cobalt and copper will not necessarily be deposited in the same place.

(iv) Geophysics

Ground Magnetics:

Mt. Lyell personnel conducted magnetometry surveys over the Selina-Dora grid area using McPhar M700 vertical fluxgate magnetometers. The results were interpreted and plotted on 1:6000 scale plans by C.G.G. in 1970 and 1971. During the 1972-73 field season the western half of the Selina grid area was surveyed using Geometrics G816 proton precession magnetometers but the results have not been plotted.

The general magnetic trend is N-S, parallel to the regional strike, with occasional offsets due to inferred E-W faults. Anomalies are due to conformable strata and lenses containing magnetite and/or pyrrhotite mineralization.

Induced Polarization:

C.G.G. undertook double asymmetrical pole-dipole EIP over most of the Selina-Dora grid area. Figure 21 shows the electrode configuration used in 1969-70 (lines 144S-88N) and the configuration used in 1970-71 (lines 88N-160N). Electrical soundings were undertaken prior to the surveys to ensure that adequate ground penetration beneath the glacial cover was obtained. A detailed gradient array survey, with a 50' potential dipole spacing, was also conducted over the grid extension to the NW of Lake Rolleston.

Three types of anomalies were distinguished:

- (a) IP anomalies located in resistant areas associated with magnetic anomalies (A1, A2, A9, A10, A12).
- (b) IP anomalies located in resistant areas but not associated with magnetic anomalies (A11, A13, A14, A15, A17 and the southern ends of A1 and A2).
- (c) IP anomalies associated with conductive anomalies and SP anomalies but not with magnetic anomalies (A3, A4, A5, A6, A7, A8 and A16).

Group (a) anomalies are probably due to pyrite-magnetite-pyrrhotite mineralization. Group (b) anomalies may be due to disseminated sulphides. Group (c) anomalies are probably due to graphite in black shales. The low-order anomalies detected in the gradient array survey may be due to graphite in Gordon Limestone or clays in the glacial moraine.

Most anomalies have a conformable N-S trend. The strongest anomaly, A1, is over 3 000 m long, stretching from line 40N to 136N before splitting up under the Jukes Conglomerate cover. The maximum amplitude and width were recorded on line 120N. Disseminated to semi-massive pyrite-magnetite mineralization is the source of this anomaly.

Self Potential:

Self potential anomalies were recorded along the eastern flank of the grid area and on line 136N between 2 450'W and 2 250'W. The complex shapes of the eastern anomalies suggest a graphite source. The anomaly on line 136N is probably due to outcropping pyrite.

Turair:

Twenty-four line-km of a Turair airborne E.M. survey were flown over the Selina area in 1973. Signal amplitudes were very high due to a small transmitter loop and resistive ground. Extremely weak distortions within the noise level of the system were recorded (Figure 18).

Drill Core Testing:

Drill core from the Selina area and the Cape Horn orebody were bench tested for magnetic susceptibility, conductivity and chargeability by Scintrex in 1972-73. Results showed that pyrite mineralization was not, in itself, conductive. However significant conduction was generally recorded in association with copper mineralization.

(v) Diamond Drilling

Between April, 1970 and January, 1973, seven diamond drill holes were drilled to test for mineralization associated with Anomaly A1. Details of the holes are given in Table 7.

The holes intersected a zone of strong to moderate pyrite mineralization with minor magnetite, hematite, chalcopyrite, galena and sphalerite. Assay results are summarized in Table 8. Cu-Pb-Zn assays were insignificant.

LS1, LS3 and LS7 passed into Owen Conglomerate facies. LS4 was stopped in pyrite mineralization due to drilling difficulties. LS2, LS5 and LS6 were stopped in volcanics containing minor pyrite. The pyrite-magnetite mineralization was thought to be sufficient to account for the geophysical anomalies.

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TABLE 7

SELINA DIAMOND DRILL HOLES 1970-73

<u>Number</u>	<u>Collar</u>	<u>True Bearing</u>	<u>Collar Inclination</u>	<u>Length</u>
LS1	72N/ 100E	255°	-45°	711' (217 m)
LS2	64N/ 800W	? 084°	-55°	776' (237 m)
LS3	48N/ 390W	? 281°	-57°	922' (281 m)
LS4	120N/2250W	274°	-58°	1059' (323 m)
LS5	128N/2900W	074°	-54°	902' (275 m)
LS6	136N/2700W	085°	-52°	1000' (305 m)
LS7	112N/1990W	265°	-70°	1347' (411 m)

TABLE 8

SELINA DDH MINERALIZATION

<u>Number</u>	<u>Line</u>	<u>Downhole Width</u>	<u>Mineralization</u>	<u>Remarks</u>
LS6	136N	740' (226 m)	6.2% Pyrite	Not assayed: 385-625' 685-740'
LS5	128N	637' (194 m)	9.6% Pyrite	Not assayed: 315-445'
LS4	120N	612' (187 m)	12.8% Pyrite	Hole stopped in mineralization
LS7	112N	65' (20 m)	10.2% Pyrite	Mineralization in volcanics on E side of faulted contact with Owen Conglomerate
LS1	72N	45' (14 m)	5.1% Pyrite	
LS2	64N	211' (64 m)	0.9% Pyrite	
LS3	48N	702' (214 m)	0.6% Pyrite	

2.4.3 Exploration Completed 1979-80

1. Geology

Brief surveys were made of mineralization exposed in two costeans near Rolleston line 48N/900'E and in old mine dumps at approximately 124N/2900'W and 96N/2900'W in the Selina area.

In the Rolleston costeans highly chloritised crystal-lapilli tuffs (? + brecciated lavas) contain minor (< 1%) disseminated pyrite and traces of chalcopyrite, galena and sphalerite. The exposed mineralization does not appear to be sufficient to account for IP Anomaly A2. Between the costeans and the LS3 drill site (48N/390'W) well-foliated medium-grained lapilli-vitric-crystal tuffs outcrop.

The mine dump at Selina 124N/2 900'W contained fine-grained chloritised tuffs and chlorite-sericite schists with massive to disseminated magnetite-pyrite mineralization. At 96N/2 900'W grey-green tuffs and buff-pink lavas contained disseminated pyrite-galena mineralization. Disseminated pyrite was also found in road exposures between these two localities. These occurrences are part of the mineralized zone which produced IP Anomaly A1.

2. Geochemistry

Rock Chips

Fourteen rock chip samples collected during 1979-80 were assayed at Mt. Lyell for Cu, Pb, Zn, Ag, Mn + Co, S, Au, Ba, Mo, Fe (Appendix C). Eight samples came from the Selina area, five from Rolleston and one from Dora.

The five Rolleston costean samples gave maximum values of 180 ppm Cu, 650 ppm Pb, 270 ppm Zn and 0.4% S. All were < 2 ppm Ag. A sample from the mine dump near Selina 96N/2900'W contained 0.4% Pb, 4 ppm Ag and 0.2% S. Two pyritic samples from the mine dump near Selina 124N/2 900'W assayed 3.0% S, 2 ppm Ag and 9.0% S, 2 ppm Ag.

In all samples assayed there was a close correlation between sulphur and cobalt. This association is significant for exploration purposes as Co in soils may be of use to detect pyritic mineralization.

3. Geophysics

(i) Dighem

A 40 line-km Dighem II airborne E.M. survey was flown in March, 1980, over the Selina pyrite zone, and the volcanics and sediments to the east to detect and locate conductive bodies. The area was magnetically active but generally resistive. Three weak conductors were detected (Figure 18).

Anomaly 112A - A surface response which is probably due to swamps.

Anomaly 128A - A shallow response from the Selina pyrite body near the LS5 drill site. It coincides with a magnetic body.

Anomalies 104A to 184A - A long thin non-magnetic conductor trending N-S along the eastern edge of the area. The source may be either Lower Cambrian black shales or Precambrian graphitic schists. The conductor is generally found on the eastern side of a resistivity low.

(ii) Gravity

A single line gravity survey was conducted along line 120N/3 200W-

2 000W over the pyrite body, by Scintrex in February, 1980. Gravity readings were taken with a Worden extended range gravity meter.

The data were adjusted for drift, free air and Bouger corrections to an arbitrary base level. For calculation of the Bouger anomaly a density of 2.88 g/cc was used. This density is believed to be close to that of the pyritic rhyolites intersected by DDH LS4.

A broad gravity high was recorded across the entire line (Figure 22) with two probable sources at 2 800W and 2 500W. These locations approximate the extent of pyritic mineralization encountered in LS4. However, the two discrete sources have been interpreted to be at a shallower depth than the material in the drill hole.

The lower gravity response over the eastern end of the line is due in part to the lower density of unmineralized rhyolites (about 2.7 g/cc) and also to the lack of terrain correction.

4. Diamond Drilling

(i) Drill Core Assays

Sections of DDH's LS4, LS5 and LS6 were assayed for Ag, Au, Sn, As and Mo. Significant Ag and Au assays are given in Table 9. Maximum assays for Sn, As and Mo were 35 ppm, 590 ppm and 200 respectively. These are not considered to be significant.

Overall Ag values showed an increase towards the north (i.e. LS4 - LS5 - LS6) even though the grade of pyrite mineralization decreases from 12.8% (average) in LS4 to 6.1% in LS6.

(ii) Petrography

Three samples of drill core from LS5 (835' and 839') and LS6 (249') were submitted to Amdel for petrographic determination of silver-bearing minerals (Amdel report 3/70/0).

In LS5/835' silver was located in small grains of tetrahedrite. Analysis by electron-probe showed that one grain contained about 6% Ag.

In LS5/839' silver was again located in small grains of tetrahedrite. Some grains were found to contain about 10-20% Ag. One large tetrahedrite grain contained an inclusion of silver sulphide, probably argentite. No detectable silver could be found in galena grains. A few tiny flecks of molybdenite were found in one polished section.

In LS6/249' silver was found by electron-probe analysis to be in solid solution in tiny galena grains. Silver contents were about 0.5-1%. No tetrahedrite could be found in the section.

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TABLE 9

SELINA DIAMOND DRILL CORE ASSAYS - Ag AND Au

<u>Hole</u>	<u>Interval</u>	<u>Metres</u>	<u>ppm Ag</u>	<u>ppm Au</u>	<u>Method</u>	
					<u>Fire</u>	<u>AAS</u>
LS4	413'-430'	5.2	3.4	0.2	X	
	675'-680'	1.5	3	n.a.		X
LS5	655'-675'	6.1	9.3	0	X	
	(660'-670')	(3.0)	(17.5)	n.a.		X
	685'-690'	1.5	11	n.a.		X
	705'-710'	1.5	10	n.a.		X
	805'-815'	3.0	10	n.a.		X
	815'-845'	9.1	14.6	0	X	
LS6	235'-245'	3.0	9.5	n.a.		X
	245'-260'	4.6	54.5	< 0.1	X	
	830'-835'	1.5	12	n.a.		X
	900'-925'	7.6	16.2	n.a.		X

n.a. = not assayed

2.5.1 Introduction

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Exploration was focussed on the area between L19N and L25N (Figure 2) as recommended by Drake in Reid et al, 1979. Details of the work done is presented in Table 10.

Line cutting and clearing was carried out to reduce the grid spacing to approximately 300' (90 m).

Soil sampling at 50' spacing was done over the grid area, with follow-up sampling at 25' spacing over zones of high geochemical response.

A gradient array I.P. survey was conducted over all grid lines, with follow-up pole-dipole array I.P. being done on anomalous zones and zones of geochemical interest. Dipole spacings varied to suit the particular purpose of these one-line surveys.

A small detailed magnetic survey was done on lines adjacent to L20.2N to trace out the magnetic zone associated with the haematite-barite rocks at 1050W.

Pits were dug at L23.7 3200W, L20.2N 1050W and L22N 1450W where strongly anomalous soil geochemical values were obtained. Only the last-mentioned pit was successful in reaching bedrock.

Geological mapping of the area was completed. Rock chip sampling was done wherever possible to complement the soil geochemical data.

One diamond drill hole, HA4 (403.1 m), was drilled to test the combined Pb-Zn-Ba soil/rock chip - weak I.P. chargeability anomaly on L20.2N 1050W. The chargeability anomaly was explained by a 14.2 m wide horizon of laminated tuffaceous shale containing approximately 3% pyrite. The geochemical anomaly appeared to be explained by scavenging of base metals by the Mn-rich weathered equivalent of a carbonate-haematite rich tuff breccia intersected from 82.1-115.0 m in the drill hole.

The drill hole intersected a silver-bearing zone from 172.0-216.0 m (true width 33.7 m), which includes 10 m (true width 7.5 m) of 112 g/t Ag (3.6 oz/ton), and 2 m (true width 1.5 m) of 410 g/t Ag (13 oz/ton) from 206.0-208.0 m. The silver occurs as finely disseminated freibergite in haematite-calcite-barite rich exhalative-tuff deposits.

The majority of the I.P. anomalies occur within intermediate crystal lithic and crystal tuffs and are probably explained by disseminated sulphides (~10% pyrite equivalent) within these rocks.

A silver bearing horizon (within Unit IV, Figure 23) has been identified by soil geochemistry (Ag-Ba anomalies), rock chip geochemistry (Ag+ minor base metals), and diamond drilling (HA3, HA4); refer to Figure 24.

The silver has been found in a variety of rock types including chlorite-magnetite tuffaceous sandstone, fine grained siliceous (pyritic) tuffs, chlorite-sericite manganiferous crystal lithic tuffs, quartz-jasper-chlorite-haematite veins, haematite-calcite medium-coarse grained tuffs (including HA3), and fine grained haematite-calcite-barite tuffaceous exhalative (HA4).

The silver bearing zone has a strike length of >1000 m and may be open to the north and south where the host sequence is overlain by younger rocks (Late Cambrian Tyndall Group agglomerates) and Pleistocene glacial moraines (Figure 23). This zone warrants further detailed work and diamond drilling to fully assess the potential for an economic silver deposit.

2.5.2 Access

Line re-clearing and track cutting was done to reduce the grid line spacing to 300' (90 m) or less. Five new lines were cut and several existing lines were extended (total 3.9 km). Both contractors (Dart and Freeman) and Mt. Lyell employees were involved in this work which is detailed in Appendix D.

TABLE 10

Howard's Anomaly Exploration Details 1979-80

Line No.	Soil Geochemistry Interval	Gradient Array I.P. Interval	Pole-dipole I.P. Interval	Ground Magnetics Interval
L19N	300W-1100W	100W-2500W		
19.4N	500W-1400W	500W-2500W		
19.7N	600W-1400W	600W-2600W		650W-1450W
20N	600W-2500W	700W-3000W	900W-2500W	800W-1500W
20.2N	600W-2400W	700W-2600W	950W-1500W	700W-1700W
20.6N	700W-2300W	700W-2400W	850W-1400W	700W-1700W
21N	700W-2500W	700W-3000W		1000W-1700W
21.3N	800W-2000W	900W-3100W	1650W-2250W	
21.6N	1100W-2700W	1100W-2700W		
21.9N	800W-3100W	800W-3100W		
22N	1100W-3500W	1100W-3500W	1500W-2100W	
22.2N	1400W-3400W	1300W-3400W		
22.5N	1400W-3000W	1400W-3000W		
23N	2100W-3500W	1200W-3300W	1500W-3150W	
23.4N	1300W-3700W	1700W-4000W	2100W-3000W	
23.7N	1500W-3900W	1500W-4000W	2300W-3700W	
24N	1500W-4600W	1300W-4200W		
24.5N	2600W-4200W	2600W-4200W	3150W-3850W	
25N	2000W-4600W	1400W-4600W		
TOTALS	703 Samples	12.6 line-km		1.3 line-km

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An attempt was made to clean out the costean on L20.6N-L21N and its approach road. This work was abandoned because the small bulldozer (Caterpillar D5) could not handle the extremely sloppy conditions.

Bradshaw's Road was upgraded by bulldozer in several sections between L22N and the Zeehan Highway.

A drill site for HA4 was constructed with a 400' (120 m) access track. All bulldozer work was carried out by C. A. Bradshaw and Sons using a Caterpillar D5 bulldozer.

2.5.3 Geochemistry

1. Soil Geochemistry - Introduction

Lines 19N to 25N were sampled at 50' spacing and the dried -80# fraction was analysed by AAS for Cu, Pb, Zn, Ag, Mn and "soluble Ba". In selected anomalous areas fill-in sampling at 25' intervals was done. Contour plans of -80# Cu, Pb, Zn, Mn, Ag and Ba are shown in Figures 25 to 29 respectively.

Barite is insoluble in the routine perchloric/nitric acid digestion for soils, but some weakly-bonded Ba ions are soluble. Ba determinations using this routine digestion are termed 'soluble Ba', and the Ba ions are probably derived from psilomelane or from Ba ions scavenged by Mn oxides and clays. Soluble Ba was analysed initially in an attempt to trace the strike extensions, of the Mn-rich haematite-barite occurrence on L20.2N 1050W by soil sampling. It was found that there is a linear trend in soluble Ba roughly corresponding with Unit IV and that this trend is paralleled by Mn-rich soils (Figures 28 and 29). Mn oxides also scavenge Pb and Zn and possibly Ag (Amdel 1980). This probably accounts for the Ba-Ag, Ba-Pb and Ba-Zn associations that occur in parts of the grid area.

In drill core and surface rock samples there is sometimes a correlation between barite (and/or soluble Ba) and Ag. The scavenging action of Mn oxides may permit a soil geochemical method for detecting small amounts of Ag and Ba in the underlying rocks. It is recommended that routine analysis of soils for Mn, Ba and Ag be continued in the Howard's Anomaly area; and that the Ag detection limit be lowered to 0.1 ppm Ag.

All but two of the major soil anomalies occur over residual soils (Table 11), and these two anomaly zones are partly due to Mn oxide scavenging. These observations aroused the suspicions that the glacial cover may be masking underlying bedrock anomalies, and that the existing soil geochemical anomalies are more apparent than real as they may merely be residual soil windows within the widespread glacial cover (Figure 7).

It is probable that some of the contouring trends of the soil sampling results are influenced by glacial soil/residual soil boundaries.

The log-probability plot for Zn in residual soils (Figure 30) suggests that two populations are present, and consequently values > 500 ppm Zn may reflect zinc sulphide mineralisation. It is reasonable to assume that the same basic argument applies for Cu and Pb soil geochemistry, although anomaly levels are lower.

The log-probability plot for Zn in glacial soils (Figure 30) shows a different curve slope to the plot of the Zn residual soil results. This suggests that there is interference to the soil geochemistry due to the glacial cover.

TABLE 1

Howard's Anomaly Soil Geochemical Anomalies

Line No.	Interval ft W	Type	Maximum Values (ppm)						Rating	Lithology
			Cu	Pb	Zn	Mn	Ag	Ba Sol		
L19.7N	1200-1400	Pb	63	900	135	700	< 2	<100	Mod.	Felds xl-lith tuff
20N	1850-2000	Pb	43	660	200	435	< 2	<100	Mod.	Andesitic py agglom
	2200-2300	Cu	380	40	235	400	< 2	<100	Mod.	Andesitic xl-lith tuff
20.2N	1000-1100	Pb-Zn-Ba	68	6900	500	2.8%	< 2	2200	v. strong	*Carbonate-tuff breccia
20.6N	950-1150	Pb	95	830	225	1500	< 2	400	Strong	*Carbonate-tuff breccia
21.3N	1550-1750	Cu	260	130	330	2500	< 2	<100	Mod.	Felds xl-lith tuff
21.6N	1150-1250	Cu	159	190	244	1800	< 2	<100	Low	Haem. lith tuff-seds
	2200-2400	Cu-Zn-Ba-Ag	200	130	790	660	2	150	Mod.	Felds xl-lith tuff
21.9N	2300-2450	Cu-Zn-Ba	172	330	410	385	< 2	180	Low	Felds xl-lith tuff
22N	2700-3200	Cu-Pb	195	580	176	800	< 2	<100	Mod.	Felds xl-lith tuff
21.9N	1100-1150	Pb-Zn	22	1400	1600	6600	< 2	<100	v. strong	Haem lith xl tuffs
22N	1425-1600	Cu-Pb-Zn-Ba-Ag	740	2.0%	2400	5.8%	17	2000	v. strong	Haem-chl lith xl tuffs
22.2N	1900-2200	Pb-Zn-Ba	21	460	5200	1100	< 2	600	v. strong	Haem-chl lith xl tuffs
22.5N	1550-1700	Pb-Ba	24	1150	340	400	< 2	5700	Strong	Haem-chl lith xl tuffs
23N	2100-2250	Cu	220	70	154	2100	< 2	<100	Mod.	Felds hb xl-lith tuff
	3000-3250	Zn	106	80	590	1500	< 2	<100	Mod.	Felds hb xl-lith tuff
23.4N	2900-3400	Ba	29	80	50	150	< 2	280	Mod.	*Felds hb xl-lith tuff
23.7N	3100-3300	Zn-Ba-Ag	25	230	1.0%	17.5%	2	3300	v. strong	*Felds hb xl-lith tuff?
24N	3200-3250	Zn-Ba	24	120	800	3.4%	< 2	200	Mod.	*Py felsic tuffs?
23.4N	1450-1650	Ba	11	50	86	220	< 2	300	Mod.	F gr alt tuffs
23.7N	1650-1850	Ba-Ag	41	90	225	1980	3	140	Strong	Haem xl-lith tuffs?
24.5N	2650-2900	Ba	11	10	166	490	< 2	400	Strong	Haem xl-lith tuffs?
	3600-3750	Ba	13	20	67	150	< 2	150	Mod.	Felds hb xl-lith tuff?
24N	3600	Pb	50	210	45	50	< 2	<100	Mod.	*Felds hb xl-lith tuff?

* indicates A horizon soils over glacials

) indicates same anomaly

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Over much of the grid area the glacial cover is relatively thin (< 2 m), and it is reasonable to expect some upward movement of metal ions through the glacials.

The anomaly level of the glacial soil Zn results cannot be meaningfully determined from the log-probability plot.

Table 12 shows the mean, standard deviation and anomaly level (approximately $\bar{x} + 2s$) for glacial soils for Cu, Pb and Zn. High values attributed to Mn scavenging have not been included.

TABLE 12

Howard's Anomaly
Anomaly Levels for Cu, Pb, Zn in glacial soils

	$\bar{x}$ ppm	s ppm	Anomaly Level ppm
Cu	45	74	200
Pb	71	77	230
Zn	27	39	105

It appears that Cu is little affected by a moderately thin glacial cover. However, Zn levels seem to be severely modified by an overlying cover of glacial material, e.g. the anomaly level of residual soil Zn is 500 ppm, c.f. 105 ppm Zn in glacial soils. The effect of a glacial cover on Pb soil geochemistry is probably intermediate between Cu and Zn.

2. Soil Geochemistry - Results

The main Zn soil anomalies all occur in areas of high Mn content (Table 11; Figure 27). The highest value of 1.00% Zn (L23.7N 3200W) occurs in Mn rich soil (17.5% Mn) overlying well bedded Pleistocene glacial-lacustrine deposits immediately south of Newton Creek. This zone was resampled at 25' intervals, and then pitted to a depth of 1.8 m (Figure 31).

The Zn anomaly is probably partly due to the scavenging effect of Mn oxides; however, the Zn values persist at depth without significant Mn values (e.g. 0.52% Zn, 270 ppm Mn, 360 ppm Co, at 1.8 m depth). The high Co value may indicate some complexing or scavenging by clay minerals within the glacial horizon. Notwithstanding the above comments, there is still no explanation for the source of the Zn or Mn, and further gridding and soil sampling is recommended in order to determine the source of the anomalous metal concentrations.

A strong Zn-Pb soil anomaly zone occurs from L21.9N to L22.5N just east of Tyndall Creek with a strike length of 700' (200 m). The associated high Mn values suggest that some scavenging may have occurred. The Ag values on L22N 1450W (17 ppm Ag) and 1525W (2 ppm Ag) further enhance the significance of this zone, which may be the northern extension of the silver-bearing zone intersected in DDH HA4.

Soil sampling at 25' spacing was done on L22N 1350W-1650W to more closely define the area of maximum Pb-Zn-Ag soil response. Two pits were consequently dug to bedrock to determine the source of the soil anomaly (Figure 32).

A weak Cu-Pb-Zn soil anomaly extending from L20.2N 1850W to L21.9N 2450W with a strike length of 1500' (450 m) occurs within variably pyritic andesitic feldspar crystal agglomerates in the SW section of the area. This zone has been previously tested, firstly by costeaning on L20.6N and L21.9N (1969) and subsequently by DDH HA2 (1972) in which minor base metals were intersected within the pyritic agglomerate (45'-75': 10.7% Py, 0.23% Zn, 2 g/t Ag; 355'-370': 10.4% Py, 0.16% Cu, 3 g/t Ag; 370'-380': 3.3% Py, 0.11% Pb, 0.31% Zn, 3 g/t Ag).

On L23.4N, L23.7N and L24.5N several soluble Ba anomalies occur without any significant base metal association. It is notable that Mn values are also low, suggesting that scavenging is not significant and Ba may be derived from barite in the bedrocks. Consequently these zones may have potential to host HA4-type silver mineralisation.

3. Rock Geochemistry

Rock chip samples were collected from outcrops during routine mapping traverses. In addition, rock chip samples were collected from pits dug to evaluate the source of soil geochemical anomalies, and from several old costeans. Samples were analysed routinely for Cu, Pb, Zn, Ag and Mn by AAS following a perchloric/nitric acid digestion. Some samples were also analysed for S, soluble Ba, total Ba, Co, Fe and Au. Rock chip analyses and sample locations are presented in Figure 33 and the assay data is tabulated in Appendix E.

The only significant rock chip anomalies detected occurred as an elongate zone of sporadic Ag values adjoining Tyndall Creek and extending from the pits on L20.2N near DDH HA4 to the costean just north of L23.4N near DDH HA3, a distance of 750 m. Within this zone, anomalous values are grouped in three areas:-

- (i) in the south, from pits on L20.2N to outcrops of hematitic tuff with minor pyrite bands on the western bank of Tyndall Creek at L21N where values range up to 78 g/t Ag (30795).
- (ii) in the centre, where pits dug on L22N following up anomalous soil Ag values up to 17 g/t Ag detected sporadic values up to 35 g/t Ag in chloritic felspar crystal tuff with minor hematite and Mn oxides
- (iii) in the north, between L23N and the old costean just north of L23.4N where scattered outcrops of felspar crystal tuff with variable sericite and pyrite assayed up to 15 g/t Ag, and a 10' chip sample from the costean assayed 19 g/t Ag in manganese-rich lithic tuff; a single Mn-rich sample of sericitic lithic tuff with minor disseminated magnetite and pyrite assayed 230 g/t Ag (24533).

Pits L20.2N 1050W

High Pb-Zn and Ag assay values were obtained by resampling of the "haematite barite occurrence" (Reid et al 1979) on L20.2N 1050W. Three pits dug by RTAE in 1960 were deepened to try and obtain fresh bedrock. This was unsuccessful despite blasting to a depth of 2 m in Mn wad material. Further sampling of Mn-Fe oxide material, and haematite-barite float was done. Maximum assay values were:

Mn wad: 560 ppm Cu; 2.00% Pb; 0.28% Zn; 6 ppm Ag; 5.0% Ba (total)
 Haematite-barite float: 213 ppm Cu; 1400 ppm Pb; 65 ppm Zn; 26 ppm Ag; 33.0% Ba (total).

Petrography by Amdel (1980) on a Mn oxide sample (30719) indicated "the sample is now composed predominantly of secondary supergene manganese oxide minerals..... The reported presence of 5% Ba suggests that at least some of the manganese oxide is psilomelane $(\text{Ba}, \text{H}_2\text{O})_2 \text{Mn}_5\text{O}_{10}$, and the presence of 2% Pb may indicate that some manganese oxide is coronadite $(\text{Pb}, \text{Mn}) \text{Mn}_6\text{O}_{14}$. The Zn and Ag are almost certainly present in solid solution in the manganese oxides and, as manganese oxide is a great scavenger of such elements, there is no means of determining their place of origin.

"Relict textures suggest that at least some of the manganese oxide... replaced medium grained carbonate."

Two samples of haematite-barite float were also described by Amdel (1980): Sample 30720:

"... haematite and barite ... are secondary in that they have replaced an earlier rock or have filled leached voids.... there is some evidence ... that at least some of the barite could have replaced carbonate and ... that the haematite first accumulated along cleavage planes in carbonate.

"It is not possible to determine whence the barite came."

Sample 30908:

"... haematite with very minor quartz. ... It is almost certain ... that the haematite has replaced a pre-existing rock. A few small inclusions (in haematite) could be galena ... could indicate that the rock is a lead gossan."

There is no firm indication of the location of the bedrock source of the haematite-barite rock.

This zone of high Pb-Zn-Ag soil and rock chip geochemistry, and the adjacent EIP chargeability and resistivity anomalies were the target for DDH HA4. The results are discussed in Section 2.5.5 (Diamond Drilling).

Pits L22N 1450W and 1430W

Following detailed 25' spaced soil geochemical sampling between L22N 1350W-1650W, two pits were dug to enable sampling of bedrock (Figure 32).

The bedrock encountered was weathered well foliated partly banded fine grained chlorite-sericite $\pm$ haematite feldspar crystal (lithic) tuffs with variable manganese oxide concentrations in bands and masses.

Manganese oxide appears to have scavenged base metals to some extent with maximum Cu, Pb and Zn values occurring in Mn-rich samples:

e.g. 510 ppm Cu; 1.10% Pb; 0.58% Zn occur in samples of $> 0.90\%$ Mn. Samples from pit 1430W all contain $< 0.10\%$ Mn with maximum values of 110 ppm Cu; 0.46% Pb; 0.25% Zn; 35 g/t Ag.

This Ag-Pb-Zn occurrence lies within a Ag-Ba trend that extends from L20.2N to L23.7N. Further work is warranted on L22N to try and determine the width and mineralogy of the Ag-Pb-Zn zone.

The depth to unweathered rock is critical in deciding on the usefulness of costeaning. It is recommended that the existing pits be deepened by blasting to see if fresh rock is close enough to surface to justify costeaning.

On L22N, on surface, the eastern boundary of the Ag zone appears to be the contact with Tyndall Group(?) agglomerates. These younger rocks may be covering further Ag mineralisation to the east of this contact. This cannot be reasonably tested except by diamond drilling. In view of this, costeaning of this zone may be unnecessary if it warrants drilling based on available information.

"L23N Costean"

This costean was excavated in 1971/72 and is located approximately 100' north of L23.4N 1800W (Figure 33). The costean was sampled in February, 1979, by N. Marshall (Geochemical Consultant).

Base metal values in the fine-coarse grained haematitic lithic tuffs are generally low (all < 600 ppm Cu, Pb and Zn), but several samples showed high Ag values. The maximum value was a 10' chip sample from 30' to 40' which assayed:

95 ppm Cu; 420 ppm Pb; 235 ppm Zn; 19 g/t Ag; 4.10% Mn; < 0.1% S; 3.10% Fe; 15 ppm Co; 370 ppm soluble Ba.

The high Mn content suggests the possibility of some scavenging of Ag by manganese oxides, in this and other samples.

2.5.4 Geophysics

1. Induced Polarisation Surveys

Scintrex Pty. Ltd. carried out gradient array and follow-up pole-dipole I.P. surveys over the Howard's Anomaly grid from November, 1979 to January, 1980. Details and interpretation of the surveys are presented in Scintrex Report Tas-073A. Survey coverage is listed in Table 10 and anomalies are detailed in Table 13. Gradient array chargeability and resistivity contour plans are shown as Figures 34 and 35.

These surveys located a total of 14 chargeability anomalies, 9 underlain by andesitic crystal-lithic tuffs in the central and western sections of the grid, and 5 underlain by the sequence of hamatitic lithic tuffs/carbonates/shales to the east. Low resistivity zones are coincident with some of these anomalies.

Chargeability Anomalies

Zone A: Source masked by extensive glacial cover. A weak Pb soil geochemical anomaly occurs in A-horizon soils SE of this anomaly on line 24N.

Zone B: Source masked by extensive glacial cover, but may be indicated by a single outcrop of pyritic fine to medium grained quartz-felspar crystal tuff on line 24.5N near 3350W containing 3% finely disseminated pyrite (30948, 30949). No associated base metal values or soil geochemical response.

Zone C: On strike to SSE of Zone B, weak associated Cu-Pb-Zn soil geochemical anomaly.

Zone D: Very weak anomaly on strike from Zone C.

Zones E and F: Weak associated Cu-Pb-Zn-Ba soil geochemical anomalies. Inconclusively tested by costeaning in 1969. Further evaluation required.

Zone G: Underlain by andesitic felspar crystal lithic tuffs. Lack of soil geochemical response suggests that minor disseminated pyrite is likely source.

Zone H: Tested by costeaning in 1969 and diamond drilling in 1971 (DDH HA1, HA2) between lines 19.4N and 19.7N. Also costeaned in 1969 on line 20.6N. Source of I.P. anomaly in DDH HA2 indicated by 5 m of 10% disseminated and veinlet pyrite in chloritised andesitic agglomerates. No further testing required.

Zone I: Two weak anomalies east of Zone H.

Zone V: Weak anomaly on eastern end of line 24.5N near contact of andesitic and hematite-carbonate sequences. No associated soil geochemical response in residual soils.

Zone W: Weak anomaly to north of DDH HA3. May reflect silver zone in DDH HA3 as has associated weak Zn-Ag soil geochemical anomaly on lines 23.7N and 24N. Host lithology is hornblende-felspar crystal-lithic tuff.

Zone X: An elongate anomaly parallel to and just east of Tyndall Creek extending from lines 22N to 23.4N. Anomaly peak on line 23N tested by DDH HA3 in 1975. This hole did not appear to intersect any likely source to this sharp near-surface anomaly. Recent field mapping located outcrops of pyritic tuffs on the drill section which are the likely source of the chargeability anomaly. This anomaly is in part co-incident with the hematite-carbonate unit and may reflect finely disseminated sulphides in that unit.

Zones Y and Z: Weak anomalies in the SE section of the grid co-incident with Tyndall Creek. Zone Y tested on line 20.2N by DDH HA4 (see Section 2.5.5).

Low Resistivity Zones

Two elongate NNW-trending less resistive zones generally less than 2000 ohm-metres, extend through the western section of the grid and co-incide with Tyndall Creek respectively. The former zone is underlain by andesitic felspar- and felspar-hornblende crystal-lithic tuffs and is co-incident with the zone containing chargeability anomalies A, B, E, F and H. It includes conductive zones at line 23.4N, 3250W (200 ohm-metres) and line 25N, 4350W (990 ohm metres) respectively open to the south and north, and requiring further evaluation.

The latter zone, co-incident with Tyndall Creek, appears to be associated with the contact between the andesitic sequence and the hematite-carbonate sequence. Although this zone coincides with a Landsat lineament and a R.T.Z. Turam anomaly, no source, for the low resistivity zone was detected in DDH HA4 on line 20.2N.

2. Magnetic Surveys

A detailed ground magnetic survey was carried out around the hematite-barite pits at line 20.2N, 1050W, on lines 19.7N, 20N, 20.2N, 20.6N and 21N. The survey located several narrow magnetic anomalies which reflect zones of increased magnetite content in tuffaceous sediments in the eastern section of the intermediate crystal tuff sequence, as occur in the upper section of DDH HA4. Further detailed ground magnetics is required to locate magnetic marker horizons in the Tyndall Creek area.

A review of the 1974-75 proton precession ground magnetic survey which covered lines 19N, 20N, 21N, 22N, 23N, 24N and 25N, indicates a 15° divergence in trend of magnetic anomalies in the older volcanics (NW) compared to magnetic anomalies in the Tyndall Group lithologies (NNW). This suggests that the contact between these two sequences is either faulted or unconformable. Geological evidence suggests that a low angle unconformity is the more likely.

TABLE 13

Howard's Anomaly I.P. Anomaly Summary

1. Chargeability Anomalies

Location	Chargeability Total B'ground mV/V		Resistivity ohm-m	Depth to source; max ft	Strike Length Zone ft	Possible source-lithology
L24.5N 3650W*	41	20	4000	30-50	800	Ax Felds hb xl chl tuff
3850W	36	20	3000	30-50	800	Ax Felds hb xl chl tuff
L24N 3125W	39	20	3300	30-50	1000	Bx F-mgr felds qtz xl ser (py) tuff (3% py)
L23.4N 2600W	36	20	4000	150	400	C Felds hb xl chl tuff
L22N 3000W*	32	20	1600	150	400	Ex Felds hb xl lith chl tuff
L21.9N 2250W*	50	20	620	200	600	Fx Felds hb xl lith chl tuff
L22N 2150W	35	20	3900	150	800	G Felds xl lith tuff
L19.7N 1750W	41	16	1900	300	1300	Hx Py felds xl agglom
L24.5N 2750W*	30	20	5500	200	200?	V Haem-chl felds xl tuff?
L23.7N 1650W*	28	16	6000	200	600	Wx Alt tuff?
L23N 1750W	45	20	5300	30-50	1200	Xx Haem lith tuff? or fgr ser (py) tuff
L20.2N 1050W* (pole-dipole)	23	15	5100	50	900?	Y Haem-carbonate breccia?

2. Resistivity Anomalies

L25N 4350W	950	+200	Felds-hb porph lva/tuff
L23.4N 3250W*	210	+1200	x Felds hb xl lith tuff
L22.5N 1850W	770	300	x F gr ser haem tuff
L22N 2750W*	630	1600?	x Felds hb xl (lith) tuff
L20.2N 950W	1600	200	? breccia or xl tuff
L19.4N 1750W	1100	200	Py felds xl agglom?
L19.4N 650W	500	+500	x ?Qtz felds xl agglom

* associated soil geochemical anomaly

x "most significant" EIP response

2.5.5 Diamond Drilling

One diamond drill hole (HA4, 403.1 m) was completed by Associated Diamond Drillers to test the source of a combined soil geochemical (Pb-Zn-Mn-Ba)/chargeability (anomaly Y)/magnetic anomaly co-incident with the hematite-barite pits on line 20.2N around 1000W. The hole was initially terminated at 217.2 m after intersecting a sequence of variably hematitic and calcitic felsic to andesitic crystal (felspar)-lithic tuffs carrying only minor sulphides. The source of the chargeability anomaly was a unit of pyritic tuffaceous shale from 54.7 m to 68.9 m averaging 3% finely disseminated pyrite. The only other significant sulphide in the hole was a 3 cm band of sphalerite-galena-pyrite at 137.3 m in chloritic medium grained felspar crystal-lithic tuff (Figure 37).

Magnetic susceptibility testing of the core indicated that the hole failed to intersect the source of the magnetic anomaly. The lack of base metal sulphides and barite in the hole suggests that the soil geochemical anomaly may be of hydromorphic origin, and that the hematite-barite material near the pits may have been transported from elsewhere.

Routine assaying of the complete hole (to 217.2 m) indicated significant silver values in apparently barren hematitic-calcitic crystal lithic tuffs (35 m of 34 g/t Ag by fire assay) towards the end of the hole. Consequently the hole was re-commenced and extended to 403.1 m through a similar hematitic-calcitic sequence. No silver was present in the section 217.2-403.1 m.

DDH HA4

Collar Location: 60' south of line 20.2N, 1250W
 Collar R.L. : 508 m A.S.L.
 Bearing : 75° magnetic
 Inclination : -50°
 Hole Length : 403.1 m
 Commenced : 20th February, 1980
 Completed(1) : 27th February, 1980
 Re-commenced : 2nd May, 1980
 Completed(2) : 7th May, 1980

Summary of HA4:

0	- 68.9 m :	Glacial sands and overburden
5.5	- 54.7 m :	F.g. to m.g. felspar crystal-lithic tuff, variably chloritic, calcitic
54.7	- 68.9 m :	F.g. pyritic tuffaceous shale
68.9	- 78.8 m :	F.g. and m.g. calcitic-chloritic crystal-lithic tuff
78.8	- 82.1 m :	Banded calcitic tuff
82.1	-115.0 m :	Mixed unit of calcitic-hematitic volcanic breccia
115.0	-123.3 m :	M.g. hematitic felspar crystal-lithic tuff
123.3	-154.45 m :	M.g. chloritic felspar crystal-lithic tuff incl 3 cm conformable Sp-Gn-Py band at 137.3 m
154.45m	-160.2 m :	M.g. sericitic crystal-lithic tuff
160.2	-220.3 m :	F.g. to c.g. hematitic-calcitic (crystal)-lithic tuff
220.3	-231.3 m :	Banded calcite
231.3	-256.5 m :	M.g. and c.g. calcitic-hematitic lithic-crystal tuffs; variable magnetite content, some carbonate banding
256.5	-268.3 m :	Banded hematitic-calcitic lithic tuffs
268.3	-293.15 m :	M.g. and c.g. chloritic-calcitic lithic-felspar crystal tuffs; variable hematite
293.15	-306.2 m :	Banded calcitic-hematitic lithic tuffs; variable magnetite
306.2	-335.2 m :	Banded hematite-calcite-sericite f.g. to c.g. lithic tuffs

- 335.2 -342.5 m : M.g. to c.g. lithic-felspar crystal tuffs; variable magnetite
 342.5 -364.1 m : Mixed unit of chlorite-hematite-magnetite-calcite tuffaceous sediments and lithic tuffs
 364.1 -382.45 m : Banded calcitic tuffs and calcitic-hematitic lithic tuffs with extensive faulting.
 382.45 -400.1 m : Banded calcitic lithic vitric tuffs
 400.1 -403.1 m : C.g. hematitic lithic-vitric-crystal tuffs

DDH HA4 Assays and Mineragraphy:

The complete hole was split and assayed in lengths averaging 2.0 m at Mt. Lyell for Cu, Pb, Zn, Ag, Mn and S. In addition 6 m bulk samples were analysed by Amdel for As, Au, Ba, Na and Sb.

Significant assays are tabulated below:

Interval	Length	Cu %	Pb %	Zn %	Ag(g/t)	Au(g/t)	S%
123.3-182.2 m	58.9 m	0.01	0.03	0.13	3.8 *	0.1	0.15
including 136.0-138.0 m	2.0 m	0.02	0.18	<u>1.46</u>	2	n.d.	0.90
182.2-217.2 m	35.0 m	0.01	0.02	0.05	34 *	0.1	0.32
including 206.0-208.0 m	2.0 m	0.03	0.01	0.03	<u>410</u> *	0.1	2.30

* silver determinations by fire assay

The only element showing any correlation with Ag was Ba which indicated an average content of 2.5% barite over the interval 182.2 m to 217.2 m, with a maximum of 7.5% barite over the interval 206.0-212.0 m.

To determine the mineralogy of the silver values, three sticks of split BQ drill core averaging 10 cm long were forwarded to Amdel for detailed mineragraphy and electron microprobe analysis. The sticks were selected from the intervals 204.0-206.0 m (93 g/t Ag) and 206.0-208.0 m (410 g/t Ag) by analysing shavings from each stick in these intervals to locate the highest grade sticks. Each of the three sticks assayed in the range 1500 to 1750 g/t Ag. Results of the study are reported in Amdel report GS 5395/80 and indicate that most of the silver occurs in silver-bearing tetrahedrite or freibergite, with minor amounts of pyrargyrite and native silver. No other sulphide minerals are present, apart from trace galena and sphalerite in one sample. Freibergite averages 1-2% by volume in each sample, and occurs as individual crystals 20-100 microns in size, with rare aggregates up to 400 microns. Single grains analysed contain 15-36% Ag. The silver minerals have recrystallised late and occur disseminated through the hematite-calcite-barite host, mainly filling interstices between crystals or filling micro-fractures. Magnetite was oxidised to hematite, and late barite veins were deformed before the silver minerals recrystallised.

Two suites totalling 16 samples from DDH HA4 were described petrologically by Amdel and indicated that the volcanic sequence intersected by the hole is mainly andesitic in composition and includes some ash-flow tuffs (see Amdel reports GS 4883/80 and GS 587/81).

2.5.6 Geology

The sequence at Howard's Anomaly comprises andesitic lavas and tuffs in the western section of the grid, overlain to the east by a 100-200 m thick unit of hematitic-calcitic-chloritic lithic tuffs and minor chloritic-hematitic sediments with variable magnetite and calcite. This unit is overlain by an east-dipping sequence of Tyndall Group felsic lavas, tuffs and agglomerates and minor volcaniclastic sandstones. The contact at the base of the Tyndall Group is interpreted to be a low-angle unconformity.

Figure 23 presents the interpretive geology and the detail outcrop geology is shown in Figure 38. The characteristics of the various units are discussed below:

Unit 1: Andesitic felspar-hornblende porphyritic lavas and intrusives. The eastern boundary of this unit is taken from previous 1970-75 mapping.

Unit 2: Andesitic felspar-hornblende crystal- and crystal-lithic tuffs. This unit lacks primary layering or banding, and is devoid of lavas or intrusives. Induced Polarisation anomalies A, B, C, E and F are associated with this unit, which is locally sericitised and pyritised near Anomaly B near Newton Creek.

Unit 3: Andesitic felspar crystal-lithic tuffs, locally chloritic. Similar to Unit 2 but lacks hornblende. Associated I.P. Anomalies D, G and I. Includes a pyritic agglomerate lens between lines 19N and 20.6N which is the source of I.P. Anomaly H and was intersected by DDH HA1 and HA2.

Unit 4: Hematitic-calcitic-chloritic lithic and felspar crystal-lithic tuffs; chloritic-hematitic sediments with variable magnetite and calcite; local occurrences of barite; minor shales. This unit hosts the silver mineralisation in DDH HA3 and HA4 and is typically a mixture of the above facies with no continuous marker horizons. Further ground magnetic surveys may assist in the delineation of magnetic horizons within this unit.

The unit is characterised by the presence of calcitic facies members which crop out poorly, and iron oxide facies (hematite/magnetite) members which crop out along Tyndall Creek.

Unit 5: Tyndall Group felsic pink to green felspar-quartz crystal-lithic tuffs and agglomerates. Characterised by colour, quartz-felspar porphyritic, fine grained groundmass. Occasionally banded and commonly splotchy in appearance.

Unit 6: Tyndall Group flow-banded and autobrecciated felsic lavas and fine to coarse grained felsic tuffs. Commonly banded with a pale bleached weathered surface. Characterised by presence of quartz phenocrysts.

Unit 7: Tyndall Group fine to coarse grained volcaniclastic sandstones.

Jasper fragments were noted at several locations during the geological mapping programme and may represent material from one or more jaspilitic marker horizons in the volcanic pile:

- (i) fragments in agglomerate in DDH HA2
- (ii) fault material on line 21N at 1250W
- (iii) fault material on line 23.7N at 2800W just east of a quartz flow
- (iv) remobilised veinlets and bedded jasper in DDH HA4 around 237 m.

2.5.7 Conclusions

The result of DDH HA4 indicates the potential for carbonate-hematite sequences in the Mt. Read Volcanics to host disseminated silver mineralisation, previously an unknown deposit-type in the region. Further exploration along strike from the HA4 occurrence using conventional techniques may be inconclusive as the silver mineralisation has no identified magnetic or I.P. signature, and soil geochemistry failed to locate any silver anomalies over the HA4 section. The only direct surface indication of the silver zone was anomalous silver values in apparently barren hematitic rock chip samples from exposures along Tyndall Creek (lines 20.2N-21N), from pits dug on line 22N at 1430W and 1450W, and from the area from the HA3 drill section to the costean north of line 23-4N.

The lack of silver anomalies in the soils in part reflects the glacially transported origin of most of the soils of the area, but also suggests that silver may be leached from the surface soils. The silver-bearing mineral in DDH HA4, freibergite, has the formula $(\text{Cu}, \text{Ag})_{12} \text{Sb}_4 \text{S}_{13}$, suggesting that Cu and Sb may be useful indicator elements for defining further drill targets along strike from HA4. However assaying of 6 m bulk samples from HA4 failed to suggest any association between high Ag values and high Cu or Sb values.

The silver mineralisation occurs as finely disseminated sulphides in a carbonate exhalite unit that has formed in an oxidising environment during the final stages of volcanism. The silver may have been mobilised from other polymetallic sulphide deposits occurring deeper in the volcanic pile.

Re-assaying of DDH HA3 (drilled in 1975, see Figure 36) indicated 8.4 g/t Ag over 160' (49 m) from 180' to 340' including 5' of 35 g/t Ag from 335' to 340'. Most of the silver values occur in welded felsic ash-flow tuffs overlying the calcitic-hematitic tuffs which host the silver mineralisation in DDH HA4, 600 m south. Thus on a regional scale the silver-bearing zone appears to transgress stratigraphy at a low angle between HA3 and HA4.

2.6 HENTY RIVER GRID (R. M. D. Meares)

2.6.1 Introduction

Exploration completed during 1979-80 included geological, geochemical and geophysical surveys over the western extension to the grid covering the western margin of the andesitic sequence, and the drilling of DDH HR3 (616.7 m) to test a combined I.P.-magnetic-soil geochemical anomaly on line 7N. The hole intersected minor disseminated and veinlet pyrite-sphalerite mineralisation within strongly altered porphyritic andesite lavas and agglomerates, averaging 0.24% Zn over 52.7 m (543.6-596.3 m). In addition, a 2.9 km four-wheel-drive access track was established from near Howard's Road to the proposed DDH HR4 drill site on line 9N, to be used in 1980-81.

Details of track cutting, soil geochemical and geophysical programmes completed during 1979-80 are presented in Table 14.

2.6.2 Access

A total of 2.5 km of contract track cutting was completed, comprising 2.15 km to extend the grid from lines 5N to 11N approximately 250 m west to cover the western margin of the favourable andesitic sequence, and 350 m to extend the baseline on the eastern river bank (3200E) from lines 6N to 9N (see Table 14, Figure 39). A new grid line on the western side of the gorge, line 7.5N, was established to provide additional data between lines 7N and 8N.

A combined campsite-helipad-drill site was hand-cleared on the western river bank between lines 7.5N and 9N for the drilling of DDH HR3 and a 2-man flying fox was established across the Henty River immediately north of line 9N (Figure 39). The time taken to clear the area of the campsite etc. was 17.5 man days.

In preparation for the drilling of proposed DDH HR4 during 1980-81, a 2.9 km 4WD access track was bulldozed from a track leading south of Howard's Road near the western end of line 10N on the West Tyndall grid, to the drill site on the western rim of the gorge on line 9N at 2240E. The track encountered very unfavourable ground conditions which were worsened by adverse weather. The track took 50 working days to establish at an average advance of 60 m/day. Total cost was \$12 617 at a unit cost of \$4 351/km.

TABLE 14

Henty River Grid Exploration Details 1979-80

LINE NUMBER	TRACK CUTTING		SOIL GEOCHEMISTRY		GRADIENT ARRAY I.P. AND GROUND MAGNETICS	
	INTERVAL	LENGTH	INTERVAL	NO. OF SAMPLES	INTERVAL	LENGTH
11N	2025E-2300E	275 m	2025E-2300E	12	2025E-2400E	375 m
10N	2100E-2400E	300 m	2100E-2400E	13	2100E-2700E	600 m
9N	2200E-2500E	300 m	2200E-2500E	13	2200E-2700E	500 m
8N					2300E-2700E	400 m
7.5N	2325E-3000E	675 m	2350E-3000E	35	2300E-3000E	700 m
7N	2400E-2600E	200 m	2400E-2600E	9	2400E-2800E	400 m
6N	2400E-2600E	200 m	2400E-2600E	9	2400E-2800E	400 m
5N	2400E-2600E	200 m	2400E-2600E	9	2400E-2700E	300 m
Eastern Baseline '3200E'	6N-9N	350 m			Also dipole-dipole L7N: 2600E-2800E L10N: 2450E-2700E	
TOTALS		2.5 km		100		3.67 km

2.6.3 Geology and Mineralisation

Outcrop mapping was completed on the western grid extension, along the banks of the Henty River, and detail mapping and rock chip sampling traverses were completed along creeks 24233 and 24207, respectively between lines 6N and 7N, and lines 9N and 10N. The only additional geological information to result from these programmes, was the location of a 50 m thick lens of basaltic andesite on the western contact of the andesitic sequence extending from lines 5N to 11N.

A comprehensive review of the geology of the grid north of line 3S is presented in the James Cook University of N. Queensland M.Sc. Thesis by R. M. D. Meares titled "Geology, Mineralisation and Alteration of the Southern Henty Gorge Lead-Zinc Prospect, Western Tasmania".

Prospecting along line 7N to evaluate the source of a combined geochemical-I.P. anomaly centred at 2700E, located a mineralised floater of medium grained andesitic-lithic tuff, with disseminated pyrite-galena-sphalerite at 2677E (Sample 24461: 140 ppm Cu, 1150 ppm Pb, 6200 Zn, 4 ppm Ag). Further prospecting failed to locate any nearby mineralised outcrops, although traversing of creek 24233 located a small outcrop of altered f.g. andesitic tuffaceous siltstone with disseminated pyrite and galena veinlets just north of line 6N, 2750E.

See Figure 39 for outcrop geology and Figure 40 for interpretive geology.

2.6.4 Geochemistry

1. Soil Geochemistry

Routine soil geochemical sampling was completed on the western grid extension. No anomalies were located (Figure 41, Table 14).

2. Rock Chip Geochemistry

During 1979-80, a total of 20 rock chip samples collected during geological mapping traverses were analysed for Cu, Pb, Zn, Ag, Mn and S. For sample locations see Figure 42 and see Appendix F for assay details.

2.6.5 Geophysics

Scintrex Pty. Ltd. carried out an EIP gradient array survey over the western grid extension and line 7.5N using the same current electrode positions as for the original 1978-79 survey. A ground magnetic survey of the same area was also carried out, and two single line pole-dipole surveys using a 25 m dipole and reading to N=5 were completed on lines 7N and 10N to assist drill target definition (see Table 1). These surveys were conducted from 23rd-25th October, 1979, and from 19th-26th November, 1979.

No new anomalies were located during these surveys. Figures 43, 44 and 45 show contoured chargeability, resistivity and ground magnetics for the complete grid. Figure 46 shows a compilation of the geochemical and geophysical anomalies.

2.6.6 Diamond Drilling

1. Introduction

One diamond drill hole (DDH HR3, 616.7 m) was completed during 1979-80 to test the source of a combined I.P.-ground magnetic-Pb, Zn, Ag, Mn soil geochemical anomaly centred on line 7N at 2700E. The anomaly is underlain by andesitic tuffs, lavas and agglomerates,

broadly stratigraphically equivalent to that section of the andesitic sequence which hosted the galena-sphalerite mineralisation in DDH HR2. A mineralised floater located on line 7N in the area of the anomaly enhanced the significance of the anomaly (Section 2.6.3).

The hole was drilled by Associated Diamond Drillers using a Mindrill 10L rig, which together with all the ancillary drilling equipment and fuel, was flown into and out of the river-bank drill site by a Hookway Aviation AS350B Ecureuil (Squirrel) helicopter. Flying time to move all the drilling equipment from the Howard's Road helipad to the HR3 drill site was 7 hours, while it took 9 hours to fly all the drilling equipment from HR3 direct to the DDH MS5 drill site on Mt. Sedgwick (Beatrice grid). Supply runs during the drilling of HR3 totalled 5½ flying hours.

2. DDH HR3

Collar Location: 25 m south of line 8N, 3000E (west bank)
 Collar R.L. : 136 m A.S.L.
 Bearing : -55°
 Inclination : 253° magnetic
 Hole Length : 616.7 m
 Commenced : 16th December, 1979
 Completed : 23rd January, 1980

Planned hole length was 500 m but as the sequence dipped more steeply than anticipated, the hole was continued to 616.7 m to adequately test the target. The hole intersected 472.7 m of hematitic tuffaceous siltstones before entering the andesitic sequence. The only mineralisation was minor disseminated and veinlet pyrite-sphalerite mineralisation within strongly altered porphyritic (felspar) andesite lavas and agglomerates from 566.0 to 596.3 m. Trace amounts of pyrite, galena, sphalerite and chalcopyrite occurred elsewhere in the andesitic units in the hole.

Figure 47 shows the HR3 drill profile and assay tabulation. Eleven thin sections of lithologies from the drill hole are described in Amdel Report GS 5719/80 "Description of some volcanic rocks and associated sediments from DDH HR3".

Summary Log of HR3:

0 - 4.2 m : Alluvial and colluvial overburden
 4.2-472.7 m : Hematitic tuffaceous siltstones, minor shales and sandstones; minor andesitic tuff lenses
 472.7-478.3 m : Andesitic tuffaceous siltstone
 478.3-485.6 m : Hematitic tuffaceous siltstone
 485.6-502.5 m : Altered fine grained andesitic tuff; trace Py, Sp, Cpy
 502.5-522.1 m : Interbedded grey siltstones and shales; trace Py
 522.1-533.0 m : Andesitic tuffaceous siltstone; trace Py
 533.0-540.3 m : Interbedded pyritic siltstones and grey sandstones; minor Py
 540.3-543.6 m : Felspar porphyritic andesite lava; trace Py
 543.6-548.9 m : Altered andesite agglomerate
 548.9-557.7 m : Felspar porphyritic andesite lava; trace Py
 557.7-566.0 m : Coarse grained andesitic lithic tuff; trace Py, Sp, Gn
 566.0-583.2 m : Felspar porphyritic andesite lava and andesitic lithic tuff; minor Py, Sp, Gn, Cpy
 583.2-596.3 m : Altered andesite agglomerate; minor Py, Sp
 596.3-606.0 m : Amygdaloidal andesite lava; trace Py, Sp
 606.0-616.7 m : Andesite lava

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HR3 Assays

The complete drill hole (6.1 m - 616.7 m) was split and assayed by A.A.S. for Cu, Pb, Zn, Ag and Mn. Bulk samples varying from 50 m in the hematitic siltstones to 10 m in the andesitic sequence were assayed for Au and S.

The only significant intersection was 52.7 m of 0.24% Zn from 543.6 m to 596.3 m, reflecting the disseminated sphalerite in the andesitic sequence.

2.7.1 Introduction

Exploration on the Beatrice grid during 1979-80 involved routine soil sampling and follow-up EIP geophysics over the eastern half, and two diamond drill holes in the western half: one in the Mt. Sedgwick Anomaly Zone and the other in the Sedgwick Porphyry Complex (Table 15).

Drilling revealed that the high chargeability anomalies in the NW sector underlain by barren porphyritic quartz-feldspar crystal tuffs are due to interlayered graphitic black shales which, for the most part, do not outcrop. No significant mineralization was encountered in either hole.

Soil sampling over the eastern half of the grid detected two zones of low-order anomalies: on the western flank of the prominent Darwin-type rhyolite body, and in the extreme NE sector of the grid. Both zones are associated with low-order stream sediment anomalies but no significant mineralization has yet been found in outcrop.

2.7.2 Access

Roadworks during 1979-80 involved maintenance of the road into the Mt. Sedgwick Anomaly Zone and preparation of the MS4 drill site and access road (about 200 m of new roads). The drill site was placed short of line 1800N because of a protruding shelf of hard rock. An application for permission to construct a road up to the MS5 drill site was rejected by the Mines Department on environmental grounds.

Grid lines 1200N, 1800N and 2000N were extended westwards to allow coverage over the belt of volcanics between the Sedgwick Porphyry Complex and the Tyndall Group. The extensions were as follows:

1200N	1980W-2190W	210 m
1800N	2070W-2400W	330 m
2000N	2220W-2400W	180 m

To allow greater flexibility in the eastern soil sampling programme an access track was cut from the end of the Comstock Road to line 2000N/900E. The total distance was 2 900 m of which the first 800 m traversed button grass flats and was merely marked with 1.5 m grid pegs.

Helicopter support was utilized in the eastern soil sampling programme to drop off personnel and to pick up samples from the less accessible lines. Two landing sites were cleared on a low ridge at the eastern end of the grid.

2.7.3 Geology1. Introduction

Geological mapping was carried out in association with the eastern soil sampling programme (Figure 48). More detailed mapping was carried out to assist in the determination of drilling targets in the northern part of the Mt. Sedgwick Anomaly Zone and in the Sedgwick Porphyry Complex. Detailed mapping was also employed in evaluating geochemical anomalies along Baseline Creek and IP anomalies in the SE sector of the grid.

2. Eastern Sector

The most prominent feature of the eastern half of the grid is the large orange-coloured knob of Darwin-type rhyolite which peaks at

049

TABLE 15
BEATRICE GRID EXPLORATION SUMMARY 1979-80

LINE NUMBER	TRACK CUTTING		SOIL GEOCHEMISTRY		GEOPHYSICS *	
	INTERVAL	LENGTH	INTERVAL	NO. OF SAMPLES	INTERVAL	LENGTH
2000 N	2400W-2220W	180 m	2400W-2220W	6	M: 2400W- 600W	1800 m
			720W-2340E	102	G: 2410W-1650W	760 m
1800 N	2400W-2070W	330 m	2400W-2070W	11	M: 2400W- 870W	1530 m
			600W-2190E	93	G: 2400W-1440W	960 m
					P: 2400W- 720W	1680 m
1600 N			450W-2220E	90	M: 2250W-1200W	1050 m
1400 N			600W-2400E	100	M: 2400W-1500W	900 m
1200 N	2190W-1980W	210 m	2190W-1980W	12		
			450W-2430E	97		
1000 N			450W-2400E	96		
800 N			450W-1860E	77		
600 N			450W-1800E	75	D: 570E-1530E	960 m
400 N			450W-1380E	61	D: 870E-1500E	630 m
200 N			450W-1050E	50		
00			810W- 750E	53		
Western access track					P: 1000N-2240N	1240 m
Eastern access track	Comstock Ck - 2000 N	2850 m				
Stream sediments				54		
Downhole					MS4: 16-348 m	332 m
logging					MS5: 16-134 m	118 m
MSAZ Soil Profiles				47		
TOTAL LENGTH		3.57 km	TOTAL	1024	TOTAL LINE LENGTH	11.51 km

* G = Gradient array; D = Dipole-dipole array; P = Pole-dipole array
M = Ground magnetics

LB 1800N/180E. This unit is characterised by a hard, massive pink fine-grained rhyolite with magnetite-hematite and quartz-chlorite veins. Joints, fractures and veining give the rock a blocky fracture. Where these structures are more intense the rock has a brecciated appearance. The unit has undergone silicification and mild chloritisation. Both forms of alteration and the intensity of veining appear to decrease eastwards.

Flanking the rhyolite unit to the west and south are green lapillivitic tuffs, which were probably ash-flows, and minor cherty lavas. The tuffs contain clasts of fine-grained volcanics, grey chert and dark green pumice fiamme. The clasts have been elongated parallel to a distinct foliation which strikes roughly NW. Movement along the foliation has produced broad folds with wavelengths of about 2 m.

East of both of the above-mentioned units are fine-grained tuffs with small pumice fragments. This unit is not well-defined due to a lack of suitable outcrop and its contacts with other rock units are only inferred. At LB 1800N/1935E the tuffs contain disseminated fine-grained pyrite and veinlets of pyrite-galena-sphalerite. About 50 m south an outcrop in a creek bed contains a 2 m wide band of brecciated grey tuffaceous shale with joint coatings of galena-pyrite.

The above unit is faulted against coarse lithic tuffs and agglomerates on its eastern contact. These rocks are probably the correlates of a similar unit mapped at the base of the Tyndall Group in the NW sector of the grid. A similar rock also occurs in the central eastern portion of the grid surrounded by glacial moraine which has hidden its contacts with nearby volcanics. Although the glacials can contain large boulders this occurrence is almost definitely outcrop because of the lack of other lithologies, such as Owen Conglomerate and Jurassic dolerite, in the immediate vicinity. If these agglomerates are part of the Tyndall Group, as is interpreted, the latter occurrence indicates a complex structure which is not easily determinable because of the widespread glacial cover. However, several creeks in the area define photolineaments which may be faults.

3. Sedgwick Porphyry Complex

Diamond drill hole MS5 was drilled into the Sedgwick Porphyry body to determine the source of chargeability anomalies closely associated with it. The hole intersected an interlayered sequence of rhyolitic quartz-feldspar crystal tuffs and graphitic black shales (see Section 2.7.6, Diamond Drilling), the latter being the likely source of the geophysical anomalies. Minor disseminated pyrite occurs in the shales and in the altered contact zones between the two rock types.

Shales associated with the porphyry outcrop along the faulted western margin of the main porphyry body (at LB 1790N/2005W), in Itat Creek and on the ridge between the Itat Creek and Baseline Creek valleys.

4. SE IP Anomaly Zone

Chargeability anomalies were detected on the eastern ends of lines 600N, 400N, 200N and 00 during the 1977 routine gradient array survey. The zone is largely covered with glacial moraine and the source of the anomalies is unknown. However, a geophysical survey conducted over the Comstock Valley by the BMR in 1965 recorded IP and E.M. anomalies associated with Gordon Limestone which may continue under the SE portion of Beatrice grid.

Outcrops in this zone are restricted to a small hill of quartz sandstone south of LB 400N/1270E and a small patch of Owen Conglomerate in a creek bed at LB 550N/680W. Both occurrences enhance the probability of Gordon Limestone being the source of the anomalies.

5. Miscellaneous

The geology of some areas of the grid is poorly understood because of lack of outcrop, due in part to glacial cover. Two zones of interest which require more thorough mapping are in the SW and NE sectors of the grid.

On an old logging track at LB 470N/1620W a lens of black shale outcrops. IP and soil anomalies are associated with this unit. No other outcrops have as yet been found in the vicinity.

Disseminated and veinlet pyrite-galena-sphalerite mineralization has been found in vitric tuffs at LB 1800N/1935E. IP and soil anomalies occur in the vicinity but the relationship between this unit and surrounding lithologies is yet to be established.

6. Structure

An interpretation of the structure of the Beatrice grid area is hindered by glacial cover, the lack of bedding in the massive volcanic units and the complexity which is commonly associated with felsic volcanic terrains.

Owen Conglomerate to the north and west of the grid area define the regional structure of broad folds with axes trending approximately NNW. The Comstock Valley to the south of the grid is probably a graben structure down thrown along E-trending faults.

The structure of the grid area is more complex and difficult to interpret. Several creeks define major NNE to NNW-trending faults and minor E-trending faults (Figure 48).

Bedding readings mostly trend between NW and NE with moderate to steep dips. In general the rock units strike NNE.

Foliations within the volcanics and cleavage in the shales consistently strike NW to N with steep dips.

2.7.4 Geochemistry

1. Introduction

During 1979-80 205 stream sediment, 1 065 soil, 19 rock chip and 138 drill core assays were received for samples taken from the Beatrice grid. Routine soil and stream sediment sampling was undertaken over the eastern half of the grid. The western extensions of lines 1200N, 1800N and 2000N were also sampled. Detailed soil and rock chip sampling was undertaken around the MS4 drill site to further evaluate the geochemical anomaly zone.

Assay results have defined two low-order geochemical anomaly zones which correspond with the upper half of Baseline Creek and the extreme NE sector of the grid (Figures 50 to 53). Neither zone, however, is as strong as the Mt. Sedgwick Anomaly Zone which contains low-grade disseminated sphalerite-galena-pyrite mineralization.

Several soil and rock chip samples from the Mt. Sedgwick Anomaly Zone were sent away for Hg assays. This is part of an orientation programme to assess the viability of Hg assays as an exploration tool and is dealt with in a separate section of this report.

2. Stream Sediments

Stream sediment samples were collected during the eastern soil sampling programme. Three fractions were assayed:

-80# Total extraction (Tx);
 -80# Cold extraction (Cx);
 and -20# +80# Hydroxylamine/HCl digestion (H/H).

Assay results are given in Appendix G and shown on Figures 51 to 53. Figures 54 to 56 show the distributions of Tx values for all Beatrice stream sediments including 1975-76 samples.

Two zones of low-order anomalies were detected:

- (i) along Baseline Creek
- (ii) in the NE sector of the grid.

Both anomalies, however, fall short of the response from Itat Creek and H/H ratios generally do not support the Tx anomalies. Maximum values from each zone are given in Table 16 with maximum values from Itat Creek and overall mean values also shown for comparison.

Ten panned concentrate samples were taken from Baseline Creek to pinpoint any mineralized sources for the long train of stream sediment anomalies (see Appendix G). Three fractions were assayed:

-20# + 50#;
 -50# + 80#;
 and -80# (all Tx).

Results show no marked variation between samples nor between the three fractions although the -80# fractions generally show higher assays than the coarser fractions.

The panned concentrate values are significantly lower than corresponding stream sediment -80# Tx values. This suggests that in stream sediments base metals are primarily transported as ions adsorbed onto clays and perhaps organic humus particles, both of which are removed by panning. The Baseline Creek stream sediment anomalies, therefore, are derived from the high soil values and not from outcropping mineralization. In fact the only sulphide mineralization found in outcrops along Baseline Creek was minor disseminated fine-grained pyrite at LB 1800N/300W, the location for stream sediment sample number 22998.

3. Soils

Eastern Programme:

The soil sampling programme over the eastern part of the Beatrice grid was completed in 1979-80. Samples were taken at 30 m intervals along grid lines 200 m apart. The C horizon was sampled wherever possible, but in areas of glacial cover the A₁/B horizon was sampled.

To assist in the delineation of anomalous zones soil assays were averaged over areas of approximately 33445 m² and the mean values were contoured (for further explanation see Appendix H). Figures 51 to 53 show the contoured soil values for Cu, Pb and Zn along with worm trails of stream sediment -80# Tx values.

Two low-order anomaly zones have been detected:

- (i) the upper half of the Baseline Creek valley;
- (ii) the extreme NE corner of the grid.

In both areas high soil assays are scattered amongst "background" values. This contrasts with the Mt. Sedgwick Anomaly Zone in which soil assays are consistently well above background (figure 50). Maximum values for each zone are given in Table 17 with maximum values from the M.S.A.Z. and overall mean values also shown for

053

TABLE 16
BEATRICE STREAM SEDIMENT GEOCHEMISTRY - ANOMALY ZONES

METHOD	ELEMENT	BASELINE CK*	NE SECTOR*	ITAT CK*	MEAN
-80# Tx	Cu	106	135	185	44
	Pb	414	700	1500	166
	Zn	248	370	1130	75
-80# Cx	Cu	80	120	142	26
	Pb	340	530	1200	113
	Zn	160	235	440	20
-80# Tx-Cx	Cu	26	54	50	13
	Pb	120	170	450	53
	Zn	91	135	340	49
-20# + 80# H/H Ratios	Cu/Mn x 10 ³	2.27	0.73	1.43	0.25
	Pb/Fe x 10 ³	49	28	1308	41
	Zn/Mn + Fe x 10 ³	11.7	7.0	25.8	3.9
	Zn/Co x 10	72	21	87	17

* Maximum values in ppm

TABLE 17
BEATRICE SOIL GEOCHEMISTRY - ANOMALY ZONES

ELEMENT	BASELINE CK*	NE SECTOR*	MSAZ*	MEAN
Cu	350 (B)	159 (A) 74 (B)	1 010 (A) 210 (B)	18
Pb	1400 (A) 2200 (BC)	440 (B)	11 000 (AB) 7 300 (B)	46
Zn	1550 (AB) 415 (B)	712 (C)	1 900 (AB) 760 (BC)	17

* Maximum values in ppm

Letters in parentheses denote soil horizon

comparison. Soil contour plans (Figures 51 to 53) also clearly show that the M.S.A.Z. is much larger and stronger than the two eastern zones.

Western Extensions:

The western extensions of lines 1200N, 1800N and 2000N were sampled at 30 m intervals with intermediate 15 m samples collected on line 1200N/2070W-2190W over geophysical anomalies. Maximum values came from an AB horizon sample from LB 1200N/2115W:

130 ppm Cu, 1 500 ppm Pb, 95 ppm Zn.

M.S.A.Z. Detail:

Several soil profiles in the Mt. Sedgwick Anomaly Zone were sampled to ascertain base metal distributions within the profiles. Both -80# Tx and -80# Cx values were obtained. Apart from concentration of Cu and Pb in the A horizon relative to the B horizon there was no general uniformity in the metal distributions between the profiles. In most cases, however, B and C horizon assays were lower in Cu-Pb-Zn than the underlying bedrock. Results are given in Appendix I. Further orientation work in other areas should be undertaken to determine which soil horizon is most representative of underlying bedrock values.

4. Rock Chips

Nineteen rock chip samples submitted in 1979-80 were assayed for Cu, Pb, Zn, Ag, Mn + Fe, S (see Appendix J).

Eleven samples came from pits and road exposures in the M.S.A.Z. as part of the detailed evaluation of the area around the MS4 drill site. Outcrops of mineralized vitric tuffs in the drill site access road assayed up to 0.11% Cu, 2.3% Pb, 2.15% Zn and 55 ppm Ag. The rock and mineralization is similar to those exposed in the eastern road between lines 1400N and 1600N.

The mineralized tuff from LB 1800N/1935E assayed 95 ppm Cu, 470 ppm Pb, 0.44% Zn and < 2 ppm Ag. Other rock chip samples from the eastern half of the grid gave insignificant assay values.

5. Drill Core

The entire lengths of drill core from MS4 and MS5 were sampled and assayed for Cu, Pb, Zn, Ag, Mn and S. Significant assay results are given in the section on diamond drilling.

2.7.5 Geophysics

1. Introduction

Geophysical surveys were carried out over the Beatrice grid during 1979-80 by Scintrex, including:

- (i) Ground magnetics - LB 2000N/2400W-600W
 - LB 1800N/2400W-870W
 - LB 1600N/2250W-1200W
 - LB 1400N/2400W-1500W
- (ii) Detailed gradient array - LB 2000N/2410W-1650W
 - LB 1800N/2400W-1440W
- (iii) Pole-dipole array - LB 1800N/2400W-720W; a = 30 m
 - Western access track, line 1000N to line 2000N; a = 20 m

- (iv) Dipole-dipole array - LB 600N/570E-1530E; a = 30 m
 - LB 400N/870E-1500E; a = 30 m
 - LB 600N/750E-1410E; a = 60 m
- (v) Downhole three-array - MS4/348 m-16 m; a = 2 m, 20 m
 - MS5/134 m-16 m; a = 2 m
 (both holes logged by M. Hutton)

2. Ground Magnetics

Sections of the grid extended towards the NW since 1977 were surveyed in December, 1979, using proton precession magnetometers which recorded the total magnetic field.

Line profiles of the magnetic data are reasonably flat apart from line 1800N/1500W-1320W which fluctuates over a range of 320 gammas. This is a steep section of the line over pink quartz-feldspar crystal tuffs of the Sedgwick Porphyry Complex. The likely source is disseminated magnetite in the Porphyry.

3. Detailed Gradient Array

The NW extensions of lines 1800N and 2000N were surveyed using gradient array with a 10 m potential dipole spacing and with current electrodes at approximately LB 1800N/2700W and LB 1800N/900 W.

On line 1800N chargeabilities have a background of about 40 mV/V between 2030W-1600W and about 5 mV/V between 2400W-2030W. Chargeability peaks occur at 1805W (57 mV/V), 2015W (61.3 mV/V) and 2265W (27.8 mV/V) (Figure 57).

On line 2000N a similar profile is encountered with chargeability backgrounds of about 35 mV/V between 2290W-1700W and 5 mV/V between 2410W-2290W. The highest chargeability recorded was 46 mV/V at 2095W (Figure 57).

The high background sections of these lines are due to pyritic graphitic shales interlayered with the Sedgwick Porphyry crystal tuffs. The low background sections overlie coarse lapilli tuffs and agglomerates. The peak at LB 1800N/2265W is probably due to a shale lens which continues south to LB 1200N/1995 and which may correlate with the shale outcropping at LB 470N/1620W.

4. Pole-Dipole Array

Two lines of pole-dipole were surveyed to assist in defining drilling targets and to resolve the mysterious high chargeabilities associated with the Sedgwick Porphyry. Line 1800N/2400W-720W was read using a dipole spacing of 30 m and "n" values of 1 to 6. The western access track was read from LB 1000N/870W to LB 2100N/1700W using a dipole spacing of 20 m and "n" values of 1 to 6. On this track grid lines 1000N to 2000N were crossed at the following stations:

<u>Grid Line</u>	<u>Survey Station</u>
LB 1000N	1000
LB 1200N	1230
LB 1400N	1460
LB 1600N	1700
LB 1800N	1980
LB 2000N	2140

The results of these surveys are presented as pseudosections in Figures 58 and 59.

On line 1800N high chargeabilities at 1980W and 1005W are due to

surface exposures of black shales. Between these points the shales appear to lie under a surface layer of low chargeability Sedgwick Porphyry, but come close to the surface at 1800W.

The pseudosection of the access track also shows a distinct layering in the chargeabilities. The low resistivities between 2150 and 2200 may be due to Jurassic dolerite or a shear zone.

5. Dipole-Dipole Array

Dipole-dipole surveys in the SE corner of the grid were utilised to resolve chargeability anomalies recorded during the 1977 routine gradient array survey. Lines 600N/570E-1530E and 400N/870E-1500E were initially surveyed using a 30 m dipole spacing, $n = 1$ to 6. Later, line 600N/750E-1410E was resurveyed using a 60 m dipole spacing, $n = 1$ to 6, to test the zone at a greater depth. Results of these surveys are shown as pseudosections in Figure 60.

All three pseudosections show a distinct layering of both chargeabilities and apparent resistivities for the zones of gradient array anomalies. The line 600N, $a = 60$ m pseudosection shows an apparent dip to the west but this is more likely to be due to a shallow angle between the grid line and the strike of the source material.

The most likely source of the anomalies is Gordon Limestone, which produced E.M. and IP anomalies during the 1965 BMR geophysical survey over the Comstock Valley. The limestone contains carbonaceous material and lies under Comstock Valley as either an E-plunging syncline or a downthrown graben structure.

6. Downhole Three-Array

Downhole logging is dealt with in section 2.7.6 of this report.

2.7.6 Diamond Drilling

1. Drilling

Two diamond drill holes were drilled by Associated Diamond Drillers in the western half of Beatrice grid during 1979-80. The total of 489 m was drilled at an average cost of \$57.96/metre. An additional cost of \$6 631 was for 13 hours 50 minutes helicopter hire in moving drilling and camping equipment from the Comstock mine area to the MS5 drill site and to the camp site at LB 1800N/2250W.

MS4: Collar - LB 1760N/825W
R.L. - 795 m
Bearing - 306° True
Inclination - -59°
Length - 350 m
Machine - Mindrill F52
Commenced - 2.11.79
Completed - 23.11.79
Drill Profile Section - 10/502, Figure 61.

This hole was designed to test the northern extension of mineralization encountered in MS1 and in road exposures between lines 1600N and 1800N. The hole encountered a sequence of tuffs and shales before entering massive quartz-feldspar crystal tuffs of the Sedgwick Porphyry Complex. This unit was entered earlier than expected which indicated that the Porphyry is not bounded by the Itat Creek shear zone.

Summary:

0.0-9.0 m: Scree

9.0 - 20.0 m: Weathered black shales
 20.0 - 23.0 m: Light green vitric-lapilli tuffs
 23.0 - 24.0 m: Grey shale
 24.0 - 28.8 m: Light green/grey vitric ash tuff
 28.8 - 44.0 m: Pyritic black shale
 44.0 - 52.4 m: Light green fine to coarse vitric ash tuffs with minor grey shales
 52.4 - 58.3 m: Grey calcareous shale with minor light green coarse ash tuff
 58.3 - 99.5 m: Light green to light brown lapilli-vitric tuffs, minor coarse ash tuffs
 99.5 - 101.0 m: Shear zone
 101.0 - 105.6 m: Green vitric ash tuff
 105.6 - 117.7 m: Pyritic black graphitic shales
 117.7 - 154.0 m: Interbedded grey-green siliceous ash tuffs and grey pyritic shales
 154.0 - 160.75 m: Coarse to fine pale green siliceous vitric ash tuff
 160.75 - 187.9 m: Pyritic black graphitic shales
 187.9 - 298.3 m: Quartz-feldspar crystal tuffs (Sedgwick Porphyry)
 298.3 - 300.0 m: Black shales
 300.0 - 350.0 m: Quartz-feldspar crystal tuffs (Sedgwick Porphyry)

Assays:

24.0 - 28.8 m: 4.8 m @ 0.232% Pb, 0.817% Zn, 3 ppm Ag
 144.0 - 150.0 m: 6.0 m @ 0.023% Cu, 0.256% Pb, 0.743% Zn, 2.7 ppm Ag

MS5: Collar - LB 1800N/1765W

R.L. - 965 m
 Bearing - 296° True
 Inclination - -60°
 Length - 139 m
 Machine - Mindrill 10L
 Commenced - 1.2.80
 Completed - 11.2.80
 Drill Profile Section - 10/506, Figure 62.

The purpose of this hole was to test the source of the high IP chargeabilities which were spatially associated with the Sedgwick Porphyry. Drilling and camping equipment were flown in from Comstock by helicopter after an application for road access was rejected by the Mines Department. The source of the anomalies was found to be black shales interlayered with the Porphyry.

Summary:

0.0 - 31.5 m: Grey quartz-feldspar crystal tuffs (Sedgwick Porphyry)
 31.5 - 39.1 m: Brecciated black shales
 39.1 - 39.6 m: Altered light green quartz-feldspar crystal tuff (Sedgwick Porphyry)
 39.6 - 62.4 m: Finely interlaminated black shales and grey calcareous siltstones
 62.4 - 105.8 m: Grey quartz-feldspar crystal tuffs (Sedgwick Porphyry)
 105.8 - 139.0 m: Black shales

Assays:

No drill core section assayed >1% combined Cu-Pb-Zn.
 Best section:
 105.8 - 109.0: 3.2 m @ 0.012% Cu, 0.145% Pb, 0.660% Zn.

2. Downhole DIP

Both drill holes were logged by M. Hutton using a Scintrex IPC7-25W transmitter and a Scintrex IPR-8 receiver with a downhole three-array. MS4 was logged using "a" spacings of 2 m and 20 m whilst MS5 was only logged with an a = 2 m spacing.

The $a = 20$ m spacing in MS4 detected a high chargeability zone from 275-338 m which was not recorded on the $a = 2$ m log, nor which can be accounted for from the drill core. The likely explanation for this is a surface unit of black shales which would have also produced the chargeability anomalies of the ground IP surveys. Apart from this aspect the downhole logging recorded values that could be expected from the drill core.

The IP results are shown in Figures 63 and 64.

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2.8 LYNCH CREEK GRID (R. M. D. Meares)

2.8.1 Introduction

To further evaluate the environment containing the old King River gold mine on Lynch Creek, 4 km south of Queenstown, a limited Dighem airborne E.M. survey was conducted in early March, 1980, and a 2-line dipole-dipole I.P. survey was carried out in June, 1980, along two re-cleared grid lines of the old Cyprus Mines Lynch Creek grid. No significant anomalies were located in either survey, however the I.P. survey indicated that the area was mantled by a relatively conductive surface layer, possibly deeply weathered clay. Further geological and geochemical surveys will be carried out in 1980-81.

2.8.2 Access

Grid lines 130N and 135N of the Cyprus Mines grid were re-cleared and re-pegged at 25 m intervals with the baseline nominally 2500E. Line 135N crosses the King River open-cut and line 130N passes close to an old shaft 150 m to the south.

2.8.3 Geophysics

1. Dighem Survey

Four lines averaging 6 km long at a line spacing of 200 m were flown by Dighem Limited on 5th March, 1980. No significant anomalies were located. See separate Dighem report.

2. Dipole-Dipole I.P. Survey

A limited dipole-dipole survey was conducted by Scintrex Limited from 3rd-6th June, 1980, using a 25 m dipole and reading to N=6. Lines 130N (2450E-3025E) and 135N (2475E-2975E) were read. No significant anomalies were located.

2.9 HENTY-YOLANDE AREA

2.9.1 Introduction

The Henty-Yolande area extending from Pearl Creek in the south to the headwaters of the Langdon River in the north, and from the E.L. boundary in the west to the line of the Lake Margaret road in the east has been poorly explored in the past. The eastern part of the area is underlain by felsic to intermediate pyroclastics and minor shales, intruded by conformable sills of quartz-felspar porphyry. These sequences pass to the west into a sedimentary facies including shales, siltstones and minor tuffaceous sediments. Known mineral occurrences include the Madam Howard barite deposit, the Sisters Hills ironstones, and numerous small base metal and gold occurrences.

A two-phase reconnaissance programme has commenced to define areas and sequences in the Henty-Yolande area that have potential to host economic mineralisation. The first phase of this programme, a Dighem airborne E.M. survey was flown in March, 1980, and the second phase, a stream sediment sampling programme, will be carried out during 1980-81.

2.9.2 Dighem Survey

A 370 line-km Dighem survey was flown over the area along 53 E-W flight lines at a nominal line spacing of 150 m. The all-inclusive cost of the survey was \$76/line-km. Although no significant E.M. anomalies were detected by the survey, the airborne magnetics flown during the survey assisted in the geological interpretation of the area. Further interpretation of the results of the survey is currently in progress. The line profiles and contoured data is presented in the contractor's report.

2.10.1 Bird River Ironstone (M. J. Hutton)1. Introduction

The access track from the Kelly Basin Road was extended from 625 m to 1 775 m (Figure 65). The section between 1 200 m and 1 775 m traversed a low saddle which is mentioned in T. B. Moore's (1913) reports as being the location for the ironstone discovery. This section was soil sampled at 25 m intervals.

2. GeochemistrySoils:

Soil samples between 1 200 m and 1 775 m came mostly from the B and C horizons. Background assays were about 10 ppm Cu, 20 ppm Pb and 15 ppm Zn (Figure 65). A low-order Zn anomaly was detected at 1 475 m (64 ppm Zn in C horizon).

Rocks:

A grey shale sample from 1 300 m assayed 55 ppm Cu, 30 ppm Pb and 60 ppm Zn.

3. Geology

The area is thickly forested and outcrops are few. Small creeks draining south from the saddle expose a few outcrops of grey to black shales and minor sandstones. A high ridge to the east of the saddle has shed quartzite float which resembles the Silurian Crotty Sandstone.

A search of the saddle area failed to locate any trenches or ironstone float. However, a tree near 1 500 m bore two old crosses cut deep into the trunk. This, together with the nearby soil anomaly, probably indicates the approximate location of the ironstone formation on the saddle.

4. Conclusions

Despite the non-appearance of ironstone on the low saddle, the high soil assays near the Kelly Basin Road (Hutton, 1979) and the ironstone in the trench at 135 m should warrant further exploration which, initially, should involve soil sampling, ground magnetics and EIP over a grid from the Kelly Basin Road extending NW to the saddle.

REFERENCES

- Hutton (1979) - Bird River Ironstone in Annual Report
E.L. 9/66 1978-79. The Mount Lyell Mining and Railway Co. Ltd.
- Moore (1913) - Fortnightly reports to General Manager, The Mount Lyell Mining
and Railway Co. Ltd. (10-3-1913, 24-3-1913)

2.11 EXPLORATION EXPENDITURE 1979-80

Total expenditure for the 1979-80 year on E.L. 9/66 was \$452 308 comprising \$274 358 (61%) on the Mt. Tyndall area and \$177 950 (39%) on the Sedgwick-Darwin area. Expenditure on E.L. 9/66 since 1967 totals \$2 676 275 to 25th June, 1980.

Details of expenditure for the E.L. 9/66 1979-80 programme are shown in Table 18.

TABLE 18

E.L. 9/66 Exploration Expenditure 1979-80

	<u>Cost Category</u>	<u>Expenditure</u>	<u>%</u>
1.	Salaries and Wages	\$ 97 801	21.6
2.	Burden Charges	30 604	6.8
3.	Materials	22 379	5.0
4.	Access	55 561	12.3
5.	Geophysics	97 718	21.6
6.	Geochemistry	17 051	3.7
7.	Diamond Drilling	96 266	21.3
8.	General Costs	8 724	1.9
9.	Equipment and Facilities	14 586	3.2
10.	Indirect Charges *	11 618	2.6
	TOTAL	452 308	100.0

* Indirect charges include $6\frac{1}{2}\%$ of items 1, 2, 3, 6 (Mt. Lyell lab only), 9.

Expenditure by the various joint venture partners on E.L. 9/66 during 1979-80 is as follows:

Getty Oil	\$235 934
Mt. Lyell	\$148 972
C.G.F.A.	\$ 67 402

3. EXPLORATION PROGRAMME 1980-81

3.1 INTRODUCTION

The principal features of the 1980-81 exploration programme are shown in Figure 3 and include:

1. Continued testing of selected target zones by diamond drilling:
 - Howard's Anomaly silver zone
 - Henty River lead-zinc zone
2. Definition and testing of new targets by diamond drilling:
 - Selina-Dora belt
 - Howard's Anomaly area
 - West Tyndall area
3. Further evaluation of geophysical and geochemical anomalies in favourable environments on the Basin Lake, Beatrice and Lynch Creek grids.
4. Reconnaissance stream sediment sampling, and follow-up of resultant anomalies and Dighem airborne E.M. anomalies, in the Henty-Yolande area.

As in previous seasons, the allocation of expenditure and drill holes to specific projects as outlined in this programme will depend on progressive exploration results. To allow flexibility, additional alternative projects are listed.

The total budget estimate for 1980-81 is \$584 364. The proportional expenditures for each joint venture partner for the two halves of the 1980-81 year are as follows:

	<u>26.6.80-7.1.81</u>	<u>8.1.81-24.6.81</u>	<u>Full Year</u>
G.O.D.L.	\$ 90 073	\$ 143 671	\$ 233 744
C.G.F.A.	52 270	92 904	145 174
MT. LYELL	82 842	122 604	205 446
	<u>\$ 225 185</u>	<u>\$ 359 179</u>	<u>\$ 584 364</u>

The main features of the proposed programme are summarised in Tables 19 and 20, while tabulations of the budget estimates for the Mt. Tyndall area (E.L. 9/66A), the Sedgwick-Darwin area (E.L. 9/66B), and the complete programme, are presented in Tables 21, 22 and 23. Table 24 shows the unit costs used in the budget estimates.

3.2 MT. TYNDALL AREA, E.L. 9/66A, EXPLORATION PROGRAMME

Major integrated exploration programmes including diamond drilling will be conducted in the Howard's Anomaly, Selina-Dora, and West Tyndall areas. In addition the Henty River diamond drilling programme will be completed in Period 2, and old I.P. anomalies on the Henty Fault Zone grid will be followed up. A total budget of \$483 912 is proposed, of which diamond drilling expenditure comprises 37%.

3.2.1 Howard's Anomaly Area

(i) Silver-bearing zone:

This zone will be followed up initially by detail geological mapping, soil and rock geochemistry, and ground magnetics. Targets identified will be costeamed and 2 diamond drill holes totalling 800 m have been programmed (HA5, HA6). Re-assaying and re-logging of D.D.H. T1, B11 and BL2 on strike to the south of this

zone will also be completed.

(ii) Central section:

Several I.P. and soil geochemical anomalies located during the 1979-80 season between lines 19N and 25N require further evaluation and testing. This programme will include further detail geological mapping, soil and rock geochemistry, re-sampling of old costeans, and limited dipole-dipole I.P. surveys. Re-logging and re-assaying of D.D.H. HA1 and HA2 will be carried out. Depending on results of these programmes, one diamond drill hole (HA7, 200 m) will test a target in this zone, or will be used in programmes (iii) or (iv) below.

(iii) R.T.Z. Turam anomaly:

This anomaly located on the eastern ends of lines 23N and 24N, adjoining the Great Lyell Fault, will be evaluated with ground magnetics, soil and rock geochemistry, and limited dipole-dipole I.P. surveys.

(iv) Northern and southern sections:

Follow-up of old 1968-70 soil geochemical and I.P. anomalies on the northern (lines 26N-38N) and southern sections (lines 6N-18N) of the East Tyndall grid will be carried out. Initially the old 400 m spaced grid lines will be re-cleared and re-pegged and will be surveyed with geological mapping, soil and rock geochemistry, and more detailed dipole-dipole I.P. as required. Resultant anomalies will be followed up by cutting 100 m spaced intermediate grid lines and detailed geological, geochemical and geophysical surveys. D.D.H. T2 and T3 will be re-assayed and re-logged. An early focus for this programme will be the Tyndall mine - Line 30N pit zone.

3.2.2 Selina-Dora Belt

The recent review of R.T.Z. (1958) and Mt. Lyell (1969-73) exploration programmes in this belt indicated four separate programmes for this season. Depending on the targets that are generated, 2 diamond drill holes totalling 700 m (LS8, LS9) have been allocated.

(i) Anthony River area:

At the northern end of the belt, a stream sediment sampling programme in tributaries of the Anthony River in 1971-72 located several anomalous drainages. These will be followed up using stream sediment and rock geochemistry.

(ii) Northern grid extension:

The Selina pyrite zone is open to the north and has been shown to contain locally significant silver values. The northern strike extension will be evaluated using detail geological mapping, soil and rock geochemistry, and gradient array and dipole-dipole I.P. surveys. The programme of re-assaying and re-logging D.D.H. LS1-7 will continue.

(iii) Selina-Dora grid:

Untested geochemical and geophysical anomalies indicated during the 1969-73 programmes will be followed up using the approach indicated in Section 2.2.1 (iv). This programme will include mapping and sampling the various mineral occurrences in this zone, as well as evaluation of the source of a Turam anomaly located west of Lake Dora by R.T.Z. in 1958.

(iv) Southern grid extension:

The Selina-Dora grid will be extended 3 km from Lake Dora to Lake Spicer. Routine programmes including geological mapping, soil and rock chip geochemistry, ground magnetics, and gradient array and dipole-dipole I.P. surveys will be completed.

3.2.3 Henty River Grid

Diamond drilling of the combined soil geochemical/ground magnetic/I.P. anomaly on line 10N underlain by the eastern margin of the andesitic sequence is in progress. D.D.H. HR4 was stopped at 310.6 m due to excessive deflection. D.D.H. HR5 (450 m) is in progress to test this target. A negative result in this hole will complete the current programme on the Henty River grid.

3.2.4 West Tyndall Grid

This block of Cambrian sediments lies immediately north of the Henty River grid and is bounded to the east by the Henty Fault, and to the west and north by a branch of that fault. It was covered by routine 400 m spaced grid line geological, geochemical and geophysical surveys in 1968-70. The significance of several strong magnetic anomalies along the eastern margin of this block has recently been enhanced by the location of dolomitic sections of the sedimentary sequence. Consequently the environment has potential to host Renison-type tin deposits and possibly Carlin-type gold deposits. The proposed exploration programme will initially focus on work on the old grid lines, with more detailed follow-up as required, using geological, geochemical, ground magnetic and I.P. techniques. One diamond drill hole (TW1, 300 m) has been allocated.

3.2.5 Henty Fault Zone Grid

Untested gradient array I.P. anomalies located in 1973 on the western ends of lines 60N and 61N, on the eastern slopes of Mt. Read, will be confirmed and followed up as required.

3.3 SEDGWICK-DARWIN AREA, E.L. 9/66B, EXPLORATION PROGRAMME

A limited programme including follow-up of geophysical and geochemical anomalies on the Basin Lake, Beatrice and Lynch Creek grids has been planned. In addition the reconnaissance programme in the Henty-Yolande area, commenced last season with a Dighem airborne E.M. survey, will be completed this season with a stream sediment sampling survey. No diamond drilling has been programmed, and the total budget estimate is \$100 452.

3.3.2 Basin Lake Grid

A broad, untested, magnetic anomaly near the eastern ends of lines 30S, 36S and 42S is overlain by glacials and appears to

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lie on strike from the carbonate-hematite unit intersected in D.D.H. BL2, 400 m south. This anomaly will be followed up with further ground magnetic and dipole-dipole I.P. surveys.

3.3.3 Beatrice Grid

Limited detailed geological mapping, and soil and rock geochemical surveys will further evaluate soil geochemical anomalies in the eastern section of the grid. These anomalies do not appear to be significant and no drilling has been planned.

3.3.4 Lynch Creek Grid

Follow-up geological mapping, and soil and rock geochemical surveys will further evaluate the sources of Dighem E.M. anomalies and low resistivity I.P. zones near the King River gold mine.

3.3.5 Henty-Yolande Area

A stream sediment sampling programme will be completed, and together with the Dighem E.M. data, will delineate areas requiring follow-up. A limited programme of small grids with routine geological, geochemical and geophysical surveys is planned. This follow-up work will include the evaluation of known mineral occurrences, and detailed geological mapping and soil geochemical surveys on the Madame Howard grid.

3.4 ADDITIONAL PROJECTS

General continuing projects and specific projects which could be substituted for some of the above programmes, as required, include the following:

- (i) Compilation of precious metal occurrences and evaluation of selected occurrences and zones
- (ii) Follow-up of Pickands Mather (1966-67) stream sediment anomalies
- (iii) Bird River ironstone
- (iv) Lake Margaret ironstone float - Lake Mary area
- (v) Follow-up of areas at Red Hills and Jukes-Darwin resulting from research work by C. Eastoe
- (vi) Follow-up low resistivity zones in central section of White Spur grid
- (vii) 1:50,000 regional map compilation
- (viii) Establishment of set of 1:5,000 base maps for complete licence area
- (ix) Re-assaying of old diamond drill holes.
- (x) Dighem survey in Queenstown-King River area, approximately 300 line-km.

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4. EXPLORATION BUDGET 1980-814.1 BUDGET ESTIMATES AND COMMENTS

The budget estimates shown in Tables 21, 22 and 23 have been phased according to the cost period in which the expenditure is expected, rather than when the work is scheduled. Specific details of individual programmes are shown in Table 20.

4.1.1 Manpower Costs

The exploration programme is based on the availability of three full-time geologists and one part-time geologist (approximately 50%), one draftsman, one field foreman, and 2 full-time field assistants. Temporary field assistants will be employed during the summer season as follows: 1 (Periods 4, 5), 2 (Period 6), 3 (Periods 7-9), 1 (Periods 10, 11). Period variations in salaries and wages, and burden charges between the two sections of E.L. 9/66 reflect assumed manpower allocations. The estimated expenditure on salaries and wages of \$114 400, allows for leave entitlements covered by the burden charges.

In accordance with Section 2, Paragraph 2 of the Joint Operations Accounting Procedure, the basis of burden charges on salaries and wages is as follows:

BURDEN 1 (directly related to basic earnings; wages + Mount Lyell allowance):

	Geologist (%)	Foreman (%) Field Assistant	Draftsmen (%)	Temporary Field Assistants (%)
Annual Leave (A)	8.0	9.4	9.4	8.3
Statutory Holidays (A)	4.0	4.0	4.0	4.0
Long Service Leave (B)	1.7	1.7	1.7	-
Superannuation (B)	17.5	17.5	17.5	-
TOTAL	31.2	32.6	32.6	12.3

BURDEN 2 (directly related to total earnings):

Pay Roll Tax (A)	5.0	5.0	5.0	5.0
Workers Comp. (A)	6.9	6.9	3.0	6.9
TOTAL	11.9	11.9	8.0	11.9

4.1.2 Materials

The estimated cost of materials (\$23 000) is based on costs incurred in 1979-80, and includes \$3 500 for maintenance on Rolleston Camp.

4.1.3 Access

The budget allocation of \$45 550 covers contract track-cutting; bulldozer hire for costeans, drill site preparation and drill rig shifts; and Bell Jetranger helicopter charter.

4.1.4 Geophysics

Geophysical estimates of \$79 048 include payments to contractors for I.P. and ground magnetic surveys, and hire of equipment for the I.P. logging of drill holes. In addition, \$15 000

has been allocated for the services of geophysical consultant Dr. J. Bishop at the following rates:
E.L. 9/66A - \$1 000 each for Periods 3-7 and 10-13, and \$2 000 for Periods 8 and 9.
E.L. 9/66B - \$500 each for Periods 6, 7, 10 and 11.

4.1.5 Geochemistry

Geochemical estimates of \$31 860 cover analyses of soils, rocks, stream sediments, and drill cores, at the Mt. Lyell and outside laboratories. Also included is an allocation of \$750 per period for petrographic, mineragraphic and electron micro-probe analyses as required.

4.1.6 Diamond Drilling

Eight holes totalling 2761 m at a direct cost of \$179 465 have been planned. This allocation includes \$49 465 for D.D.H. HR4 and HR5 which were programmed for last season but did not commence until Period 13, 1979-80.

4.1.7 General Costs

Exploration licence renewal fees total \$9 976.

4.1.8 Equipment and Facilities

An estimated \$14 640 has been allocated to cover the cost of Company housing, and vehicle fuel and servicing. Mount Lyell accommodation charges of \$140 per man per period will be charged according to actual manpower allocation.

A charge of 10¢ per kilometre will be made on joint venture vehicles to cover the cost of fuel and routine servicing. Vehicle maintenance, tyres, registration and insurance costs will be direct charges under the materials cost centre.

4.1.9 Map Compilation

Direct charges for photogrammetric services and materials for the 1:5,000 scale map series have been estimated at \$15 000.

4.1.10 Indirect Charges

An indirect charge of 6.5% is levied on the following cost centres: salaries and wages, burden charges, Mount Lyell laboratory analytical costs, materials, and equipment and facilities (in accordance with Section 2. 11A of the Joint Venture Operations Accounting Procedure).

4.2 ACCOUNTING CLASSIFICATIONS

In order to conform with Mt. Lyell's internal cost reporting system and to facilitate supervision and reporting on individual joint venture areas, the following accounting procedures and classifications have been adopted:

<u>Area</u>	<u>Responsibility Number (prefix)</u>
Mt. Tyndall E.L. 9/66A	285
Sedgwick-Darwin E.L. 9/66B	290

<u>Cost Account Suffix No.</u>	<u>Cost Centre</u>	<u>Description</u>
100	LABOUR	Wages - ordinary.
101		Wages - overtime.
105		Salaries - ordinary.
106		Salaries - overtime.
191	BURDEN	Includes payroll tax, annual leave, public holidays, workers' compensation, long service leave, superannuation, sick and accident fund.
120	MATERIALS	Includes field operating expenses, consumables.
181	ACCESS	Includes contract services for track cutting, access road construction, site preparation, helicopter hire.
182	GEOPHYSICS	Contract services, consultants charges, equipment hire.
183	GEOCHEMISTRY	Geochemical and assay charges, consultants, petrographic and mineragraphic services.
185	DIAMOND DRILLING	Contract drilling services.
186	GENERAL COSTS	Includes Exploration Licence rentals, legal expenses etc. as set out under Section 2, paragraph 1.6 and 8 of the Joint Venture Operations Accounting Procedure.
187	EQUIPMENT AND FACILITIES	Includes vehicle hire, accommodation expenses.
189	MAP COMPILATION	Contract photogrammetric services and materials.

5. E.L. 9/66 FIVE YEAR EXPLORATION PROGRAMME 1980-1985

YEAR	DATA EVALUATION	RECONNAISSANCE	DETAIL	DRILLING
1980-81	Henty Fault Zone - Mt. Read W. Sedgwick - Basin Lake	Anthony River Henty-Yolande	Howard's Anom. Selina-Dora West Tyndall	Howard's Anom. Selina-Dora West Tyndall Henty River
1981-82	Jukes-Darwin White Spur	Queenstown - King River	Howard's Anom. Selina-Dora West Tyndall Henty-Yolande E. end Mt. Lyell	Howard's Anom. Selina-Dora West Tyndall Henty-Yolande
1982-83	Red Hills	L. Beatrice - L. Spicer	Henty Fault Zone - Mt. Read Jukes-Darwin Henty-Yolande Queenstown - King River	Henty Fault Zone - Mt. Read Henty-Yolande E. end Mt. Lyell
1983-84			Jukes-Darwin W. Sedgwick - Basin Lake Red Hills Queenstown - King River	Jukes-Darwin Red Hills Queenstown - King River
1984-85			Testing of blind and second-order anomalies	Jukes-Darwin Red Hills Queenstown - King River

PERIOD ENDING		1 23.7.80	2 20.8.80	3 17.9.80	4 15.10.80	5 12.11.80	6 10.12.80	7 7.1.81	8 4.2.81	9 4.3.81	10 1.4.81	11 29.4.81	12 27.5.81	13 24.6.81
MT. TYNDALL AREA	1. HOWARD'S ANOMALY 1. TRACK CUTTING 2. GEOLOGY/GEOCHEMISTRY 3. GEOPHYSICS 4. BULLDOZER 5. DIAMOND DRILLING						13 Km OLD LINES		FILL-IN					
						SILVER ZONE	OLD	LINES	MAG	FILL-IN	L.P. MAG			
						COSTEANS		OLD-LINES	RIG	SITES				
									HAS		HAS	HAT		
MT. TYNDALL AREA	2. SELINA-DORA 1. TRACK CUTTING 2. GEOLOGY/GEOCHEMISTRY 3. GEOPHYSICS 4. BULLDOZER 5. DIAMOND DRILLING					17 Km SPICER-NEW GRID	25 Km SELINA		DORA-SPICER					
							SELINA		L.P.	SPICER				
						ROAD REPAIRS	SPICER		SELINA	SPICER				
									SITES		LSB	LSQ		
MT. TYNDALL AREA	3. HENTY RIVER 1. DIAMOND DRILLING 2. BULLDOZER	HR4	HR5											
			RIG											
MT. TYNDALL AREA	4. WEST TYNDALL 1. TRACK CUTTING 2. GEOLOGY/GEOCHEMISTRY 3. GEOPHYSICS 4. BULLDOZER 5. DIAMOND DRILLING								10 Km OLD LINES	10 Km FILL-IN				
										OLD L	FILL-IN			
										OLD L	FILL-IN			
										MAG/I.P.	MAG/I.P.	SITE		
												TWI		
SEDGWICK-DARWIN AREA	5. HENTY FAULT ZONE 1. GEOPHYSICS											IP		
									MAG/I.P.					
SEDGWICK-DARWIN AREA	6. BASIN LAKE 1. GEOPHYSICS													
SEDGWICK-DARWIN AREA	7. BEATRICE 1. GEOLOGY/GEOCHEMISTRY													
SEDGWICK-DARWIN AREA	8. LYNCH CREEK 1. GEOLOGY/GEOCHEMISTRY													
SEDGWICK-DARWIN AREA	9. HENTY-YOLANDE 1. HELICOPTER 2. TRACK CUTTING 3. GEOLOGY/GEOCHEMISTRY 4. GEOPHYSICS													
SEDGWICK-DARWIN AREA	10. JUKES-DARWIN													

TABLE 20

E.L. 9/66 EXPLORATION PROGRAMME BY TECHNIQUES

PROJECT		ACCESS				GEOLOGY		GEOCHEMISTRY (No. Samples)				GEOPHYSICS (km)				DIAMOND DRILLING	
		LINE RE-CLEARING(km)	NEW GRID LINES (km)	BULLDOZER(days)	HELICOPTER(hrs)	REGIONAL	DETAIL	SOILS	STREAM SEDS	ROCKS	DRILL CORE	GROUND MAGNETICS	GRADIENT ARRAY I.P.	DIPOLE-DIPOLE I.P.	COSTEANS	NO. OF HOLES	TOTAL METRES
MT. TYNDALL AREA	1. HOWARD'S ANOMALY	-	1.5	20	-		✓	200	-	100	300	5.0	-	-	2	2	800
	(i) Silver Zone	-	-	-	-		✓	200	-	50	-	2.0	-	2.0	-	-	-
	(ii) Central Section	1.0	-	-	-	✓	✓	200	-	-	-	-	-	-	-	-	-
	(iii) N & S Sections	13.0	10.0	5	-	✓	✓	600	-	100	150	10.0	-	5.0	-	1	200
	2. SELINA-DORA	-	-	-	-	-	✓	-	120	20	-	-	-	-	-	-	-
	(i) Anthony River	-	-	-	-	-	✓	-	-	30	-	-	24.0	1.5	-	-	-
	(ii) North Extension	10.0	-	15	-	-	✓	1200	-	40	300	-	3.0	1.5	-	2	700
SEDGWICK - DARWIN AREA	(iii) Central Section	10.0	-	-	-	-	✓	1100	-	50	-	-	16.4	1.5	-	-	-
	(iv) South Extension	5.0	17.0	-	-	-	✓	900	-	-	-	16.4	16.4	1.5	-	-	-
	3. HENTY RIVER	-	-	3	-	-	-	-	-	-	300	-	-	-	-	2	761
	4. WEST TYNDALL	10.0	10.0	20	-	✓	✓	800	50	100	150	20.0	10.0	2.0	-	1	300
	Subtotal	49.0	38.5	63	-			5000	170	490	1200	53.4	53.4	13.5	2	8	2761
SEDGWICK - DARWIN AREA	1. BASIN LAKE	-	-	-	-	-	-	-	-	-	-	4.0	-	1.5	-	-	-
	2. BEATRICE	-	-	-	-	-	✓	50	-	20	-	-	-	-	-	-	-
	3. LYNCH CREEK	-	-	-	-	-	✓	60	-	20	-	-	-	-	-	-	-
	4. HENTY-YOLANDE	-	10.0	-	20	✓	✓	300	400	50	-	10.0	10.0	-	-	-	-
	Subtotal	-	10.0	-	20			410	400	90	-	14.0	10.0	1.5	-	-	-
E.L. 9/66 TOTAL		49.0	48.5	63	20			5410	570	580	1200	67.4	63.4	15.0	2	8	2761

TABLE 21

BUDGET ESTIMATES MT. TYNDALL AREA E.L. 9/66A 1980-81 (REVISED 24.11.80)

COST PERIOD ENDING	1 23.7.80	2 20.8.80	3 17.9.80	4 15.10.80	5 12.11.80	6 10.12.80	7 7.1.81	8 4.2.81	9 4.3.81	10 1.4.81	11 29.4.81	12 27.5.81	13 24.6.81	Total	%
1. SALARIES AND WAGES	6592	6592	5768	4280	6300	6832	6048	9234	9234	4600	6624	6720	6720	85544	17.7
2. BURDEN CHARGES	3280	3280	2870	2100	3080	3360	3040	4500	4500	2250	3280	3360	3360	42260	8.7
3. MATERIALS	800	800	1400	1000	1750	1750	1600	1800	1800	1000	1600	800	800	16900	3.5
4. ACCESS			3050	2600		10500		8750	3500	1750		3500		33650	7.0
5. GEOPHYSICS			1000	1000	1000	1000	1000	23000	2000	1000	1000	35568	1000	68568	14.2
6. GEOCHEMISTRY	550	550	1500	4350	2450	2450	1500	2450	3400	3400	1500	1500	1500	27100	5.6
7. DIAMOND DRILLING	20215	29250								21000	43000	43000	23000	179465	37.1
8. GENERAL COSTS	3500							1493						4993	1.0
9. EQUIPMENT AND FACILITIES	880	880	880	500	840	910	720	1170	1170	600	752	880	880	11062	2.3
10. MAP COMPILATION		200	600	1000	1200									3000	0.6
11. INDIRECT CHARGES	750	750	715	760	900	960	800	1210	1270	735	860	830	830	11370	2.3
PERIOD TOTAL	36567	42302	17783	17590	17520	27762	14708	53607	47874	58335	58616	76158	15090	483912	100.0
Y.T.D. TOTAL	36567	78869	96652	114242	131762	159524	174232	227839	275713	334048	392664	468822	483912		
G.O.D.L. 40%	14627	16920	7113	7036	7008	11104	5884	21443	19150	23333	23446	30464	6036	193564	
C.G.F.A. 30%	10970	12691	5335	5277	5256	8329	4412	16082	14362	17501	17585	22847	4527	145174	
MT. LYELL 30%	10970	12691	5335	5277	5256	8329	4412	16082	14362	17501	17585	22847	4527	145174	

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BUDGET ESTIMATES SEDGWICK-DARWIN AREA E.L. 9/66B 1980-81 (REVISED 24.11.80)

COST PERIOD ENDING	1 23.7.80	2 20.8.80	3 17.9.80	4 15.10.80	5 12.11.80	6 10.12.80	7 7.1.81	8 4.2.81	9 4.3.81	10 1.4.81	11 29.4.81	12 27.5.81	13 24.6.81	Total	%
1. SALARIES AND WAGES	1648	1648	2472	4280	2700	2928	1512	1026	1026	4600	1656	1680	1680	28856	28.7
2. BURDEN CHARGES	820	820	1230	2100	1320	1440	760	500	500	2250	820	840	840	14240	14.2
3. MATERIALS	200	200	600	1000	750	750	400	200	200	1000	400	200	200	6100	6.1
4. ACCESS										4200		7700		11900	11.8
5. GEOPHYSICS						500	500	3280		500	500	5200		10480	10.4
6. GEOCHEMISTRY	200	200	440	420	400	800	200	200	200	1100	200	200	200	4760	4.7
7. DIAMOND DRILLING															
8. GENERAL COSTS	1500							3483						4983	5.0
9. EQUIPMENT AND FACILITIES	220	220	220	500	360	390	180	130	130	600	188	220	220	3578	3.6
10. MAP COMPILATION		800	2400	4000	4800									12000	11.9
11. INDIRECT CHARGES	180	180	310	525	345	400	185	120	120	610	200	190	190	3555	3.6
PERIOD TOTAL	4768	4068	7672	12825	10675	7208	3737	8939	2176	14860	3964	16230	3330	100452	100.0
Y.T.D. TOTAL	4768	8836	16508	29333	40008	47216	50953	59892	62068	76928	80892	97122	100452		
G.O.D.L. 40%	1907	1627	3069	5130	4270	2883	1495	3575	870	5944	1586	6492	1332	40180	
MT. LYELL 60%	2861	2441	4603	7695	6405	4325	2242	5364	1306	8916	2378	9738	1998	60272	

007073

TABLE

TOTAL BUDGET ESTIMATES E.L. 9/66 (A+B) 1980-81 (REVISED 24.11.80)

073

COST PERIOD ENDING	1 23.7.80	2 20.8.80	3 17.9.80	4 15.10.80	5 12.11.80	6 10.12.80	7 7.1.81	8 4.2.81	9 4.3.81	10 1.4.81	11 29.4.81	12 27.5.81	13 24.6.81	Total	%
1. SALARIES AND WAGES	8240	8240	8240	8560	9000	9760	7560	10260	10260	9200	8280	8400	8400	114400	19.6
2. BURDEN CHARGES	4100	4100	4100	4200	4400	4800	3800	5000	5000	4500	4100	4200	4200	56500	9.7
3. MATERIALS	1000	1000	2000	2000	2500	2500	2000	2000	2000	2000	2000	1000	1000	23000	3.9
4. ACCESS			3050	2600		10500		8750	3500	5950		11200		45550	7.8
5. GEOPHYSICS			1000	1000	1000	1500	1500	26280	2000	1500	1500	40768	1000	79048	13.5
6. GEOCHEMISTRY	750	750	1940	4770	2850	3250	1700	2650	3600	4500	1700	1700	1700	31860	5.5
7. DIAMOND DRILLING	20215	29250							21000	43000	43000	23000		179465	30.7
8. GENERAL COSTS	5000							4976						9976	1.7
9. EQUIPMENT AND FACILITIES	1100	1100	1100	1000	1200	1300	900	1300	1300	1200	940	1100	1100	14640	2.5
10. MAP COMPIATION		1000	3000	5000	6000									15000	2.6
11. INDIRECT CHARGES	930	930	1025	1285	1245	1360	985	1330	1390	1345	1060	1020	1020	14925	2.6
PERIOD TOTAL	41335	46370	25455	30415	28195	34970	18445	62546	50050	73195	62580	92388	18420	584364	100.0
Y.T.D..TOTAL	41335	87705	113160	143575	171770	206740	225185	287731	337781	410976	473556	565944	584364		
G.O.D.L.	16534	18547	10182	12166	11278	13987	7379	25018	20020	29277	25032	36956	7368	233744	40.0
C.G.F.A.	10970	12691	5335	5277	5256	8329	4412	16082	14362	17501	17585	22847	4527	145174	24.9
MT. LYELL	13831	15132	9938	12972	11661	12654	6654	21446	15668	26417	19963	32585	6525	205446	35.1

007074

TABLE 24

EXPLORATION UNIT COSTS - 1980/81 BUDGET

EXPLORATION METHOD	UNIT COST	PRODUCTIVITY
1. <u>TRACK CUTTING</u>		
(i) line cutting	\$300/km	700 m/crew/day
(ii) drill site clearing	\$80/man/day	9-21 man days
2. <u>GEOCHEMICAL ANALYSES</u>		
(i) soils, stream sediments	\$1.50/sample	) Cu, Pb, Zn, Mn, Ag Cu, Pb, Zn, Mn, S, Ag, Au
(ii) rock chips	\$4.50/sample	
(iii) drill core	\$6.50/sample	
(iv) water samples	\$13.00/sample	
3. <u>GEOPHYSICS</u>		
(i) ground magnetics	\$70/km)	2 km/operator/day
(ii) gradient array I.P.	\$450/km) direct	1 km/crew/day
(iii) dipole-dipole I.P.	\$2000/km) field	300 m/crew/day (minimum)
(iv) drill hole logging	\$450/hole) cost	1 hole/day
4. <u>DIAMOND DRILLING</u>	\$65/m (direct drilling cost)	15 m/shift
5. <u>BULLDOZING</u>		
(i) drill sites, costeans	D6-\$35/hr; D7-\$45/hr	20 hrs/drill site, costean
(ii) road construction	\$6 000/km-steep terrain \$3 000/km-flat terrain	50 m/day 150 m/day
6. <u>HELICOPTER</u>		
(i) Bell Jetranger	\$420/hr	) complete drill rig or) camp shift 5-6 hrs
(ii) Squirrel 350B	\$550/hr	
7. <u>PETROLOGY</u>	\$35/sample	

APPENDIX A

WHITE SPUR GRID - WESTERN SECTION - ROCK CHIP GEOCHEMISTRY

Sample No.	Cu ppm	Pb ppm	Zn ppm	Ag g/t	Mn ppm	S %	Location	Lithology
28118	205	37	114	1	1310		L40N,1650E	F gr alt silic tuff
28119	140	545	840	3	120		L39N,300E	F gr alt vitric tuff
28120	85	75	55	< 1	20		L35N,670W	M gr volc cl sst
28121	150	40	17	< 2	< 10		L32N,1600W	M gr volc cl sst
28122	50	35	100	< 2	1680		L34N,1400W	Tuffaceous shale
28142	150	60	40	< 2	1350		L36.25N,1250W	Tuffaceous shale
28143	170	50	55	< 2	560		L36.25N,1700W	Tuffaceous shale
28144	160	25	100	< 2	580		L36.5N,1450W	M gr qtz felds xl-lith tuff
28145	45	200	330	< 2	100		L37.5N,2300W	M gr volc cl sst
28146	190	55	130	< 2	270		L37.5N,2490W	Tuffaceous shale
28147	150	30	70	< 2	150		L37.5N,3100W	Tuffaceous shale
28148	90	30	120	< 2	150		L38.5N,2370W	F gr vitric tuff
28149	150	30	150	< 2	700		L38.5N,2930W	Tuffaceous shale
28150	160	40	100	< 2	660		L38.5N,3150W	Tuffaceous shale
28151	150	45	120	< 2	660		L39N,3100W	Tuffaceous shale
28152	150	50	160	< 2	1330		L39N,3185W	Tuffaceous shale
28153	430	100	530	3	60		L39N,3850W	Vein quartz + boxworks?
28154	100	25	50	< 2	110		L39N,3990W	Tuffaceous shale
28155	130	30	100	< 2	580		L39.5N,2725W	M gr volc cl sst
28156	130	25	90	< 2	330		L40.5N,2500W	Carbonaceous shale
28157	110	50	30	< 2	170		L40.5N,3000W	Tuffaceous shale
28158	100	360	140	< 2	220		L42.5N,2500W	Volc cl sst sh
28160*	90	240	50	< 2	10		L30N,700W	Fe coating on rock
28161	75	90	25	< 2	50	0.46	L30N,100W	Black shale
28162	100	30	75	< 2	130	0.31	L30.5N,2150W	Tuffaceous shale
28163	50	10	30	< 2	280		L28N,400W	C gr qtz feldspar xl-lith tuff
28164	100	80	15	< 2	30	0.05	L30N,1400W	Black shale
28165*	50	130	15	< 2	< 10		L27.5N,00	Fe oxide "bomb" in agglom
28166*	80	3200	280	8	3.2%		L29N,00	Mn-Fe oxide wad on partings
28167	80	30	20	< 2	270		L28N,500W	M gr qtz feldspar porphyritic rhyolite
28168	50	20	45	< 2	300		L34N,2000E	Feldspar phyric ser tuff
28169	45	20	50	< 2	230		L31N,00	Tuffaceous shale
28170	90	50	80	< 2	200		L30N,1700W	Tuffaceous shale
28171	75	50	45	< 2	100	0.13	L27.5N,2300E	Black shale
28172	45	< 10	10	< 2	50		L30.5N,2270W	M grained feldspar qtz xl tuff
28173	65	50	15	< 2	10		L29N,1400W	M grained feldspar xl tuff
28174	100	50	30	< 2	270	0.29	L31.5N,1150W	Black shale
28175	40	10	30	< 2	340		L31N,1350W	C grained feldspar qtz xl lith tuff

Sample No.	Cu ppm	Pb ppm	Zn ppm	Ag g/t	Mn ppm	S %	Location	Lithology
28176	110	40	140	< 2	320		L41N,3500W	Tuffaceous shale
28177	85	80	80	< 2	250		L42N,3250W	Tuffaceous shale
28178	80	30	60	< 2	30	1.06	L36.5N,3030W	Black pyritic shale
28179	55	20	25	< 2	20	0.28	L36.5N,3030W	Black shale
28180	75	60	20	< 2	< 10	0.36	L36.5N,3030W	Black shale
28181	70	50	40	< 2	20	0.03	L36.5N,3030W	Black shale
28182	100	50	60	< 2	140	0.29	L36.5N,3030W	Tuffaceous shale
28183	60	40	50	< 2	300	0.05	L36.5N,3030W	Black shale
28184	130	500	120	< 2	< 10	0.11	L42.5N,2900W	Black shale
28185*	110	130	140	< 2	< 10		L42.5N,3000W	Quartz vein
28186	115	80	100	< 2	40	1.97	L42.5N,3000W	Black shale
28187	50	250	80	< 2	< 10	0.13	L42.5N,3000W	Black shale
28188	60	60	80	< 2	< 10		L42.5N,3000W	M grained volcanic cl sst
28189	75	660	80	< 2	< 10	0.02	L42.5N,3000W	Black shale
28190	170	40	100	< 2	880	0.01	L39.5N,3350W	Tuffaceous shale
28191	120	20	100	< 2	480		L40N,3150W	Tuffaceous shale
28192	120	80	180	< 2	520		L39.5N,3450W	F grained volcanic cl sst
28193*	120	160	300	< 2	9000		L39.5N,3450W	Mn wad
28194	110	30	110	< 2	400		L38.5N,1950W	Tuffaceous shale
28195	30	20	65	< 2	210		L39N,1950W	Agglom-qtz feldspar xl lith tuff
28196	80	< 10	50	< 2	320	0.22	L39.5N,2200W	Tuffaceous shale
28197	90	50	40	< 2	250	0.78	L39.5N,2400W	Black shale
28198	65	180	80	< 2	160	0.07	L41.5N,3700W	F grained volcanic cl sst shale
28199	95	20	100	< 2			L39N,2800W	Tuffaceous shale
28200	95	30	120	< 2	300	0.01	L39.5N,2850W	Tuffaceous shale
28201	60	10	60	< 2	< 10		L36.25N,1000W	Tuffaceous shale
28202	65	140	75	< 2	100	0.57	L36.5N,1450W	Black shale
28203	40	10	80	< 2	380		L36.25N,2150W	M grained volcanic cl sst
28204	80	20	90	< 2	510		L36N,2200W	Tuffaceous shale
28205	80	60	180	< 2	650		L39N,3130W	Tuffaceous shale
28206	65	30	40	< 2	20	0.11	L32N,00	Laminated black shale
28207	55	40	35	< 2	10		L32.5N,350E	Agglom - feldspar xl lith
28208	45	110	20	< 2	20		L33N,050E	Tuffaceous shale
28209	40	140	10	< 2	< 10	0.01	L33N,050E	Dark tuffaceous shale
28210*	40	50	45	< 2	3200		L33.5N,050E	Fe-Mn oxide coating
28211	35	10	35	< 2	220	0.12	L33.5N,100W	M grained feldspar phylic lava?
28212	25	70	110	< 2	70		L34N,200E	Sericitic feldspar xl tuff?
28213	40	140	50	< 2	70	0.70	L34N,100E	Black pyritic shale
28214	25	10	20	< 2	50	0.01	L33.5N,250W	Feldspar xl tuff - breccia
28215	50	70	80	< 2	10		L32N,00	Tuffaceous shale
28216	55	100	65	< 2	200	0.51	L32.5N,470W	Black shale
28217	60	80	100	< 2	60	0.62	L32.5N,500W	Black shale

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Sample No.	Cu ppm	Pb ppm	Zn ppm	Ag g/t	Mn ppm	S %	Location	Lithology
28218	25	10	15	< 2	10		L32.5N,600W	Feldspar xl-lith agglom
28219	75	40	40	< 2	200	0.45	L33N,1300W	Black shale
28220	115	20	75	< 2	430		L33N,1500W	M grained volc cl sst
28221	55	30	70	< 2	400	< 0.01	L32.5N,1800W	Tuffaceous shales - sst
28222	85	40	85	< 2	470		L32.5N,1400W	Tuffaceous shale
28223	35	300	145	< 2	70		L37N,00	Feldspar xl-lith agglom
28224	25	30	55	< 2	200		L38N,1150W	M grained feldspar xl tuff
28225	15	< 10	< 5	< 2	< 10		L37N,300W	Tuffaceous shale
28226	25	530	520	5	40	1.69	L39N,350E	F grained silic tuff
28227	25	110	140	< 2	140	0.05	L39N,250E	Fe oxide stained agglom
28228	30	100	60	< 2	2100		L39N,250E	Mn oxide stained agglom
28230	20	50	10	< 2	20		L39N,00	Rhyolite?
28231	25	40	20	< 2	90	0.03	L42N,400W	Black shale
28232	45	170	35	< 2	70	0.01	L42N,450W	Black shale
28233	80	230	40	< 2	10	2.16	L43N,1000W	Pyritic black shale
28234	30	150	35	< 2	50	0.05	L43N,1000W	Black shale
28235	50	90	85	< 2	120	< 0.01	L43N,1000W	Black shale
28236	30	600	150	< 2	790		L38N,1200W	Agglom sulphide fragments?
28237	20	40	30	< 2	40		L32N,00	C grained felds xl-lith tuff
28238	30	20	105	< 2	500	0.17	L35N,650E	F-m grained felds xl-lith tuff
28239	40	80	180	< 2	200		L36.5N,1350W	Felds xl chlorite i/med tuff
28240	110	45	60	< 2	240	0.04	L27.5N,2300E	Tuffaceous black shale
28241*	105	40	55	< 2	310		L27.5N,2350E	Fe coating
28242	150	< 10	40	< 2	320	0.35	L27.5N,2650E	M grained felds xl tuff
28243	140	65	30	< 2	90	0.22	L27.5N,2400E	Black shale
28244	160	75	35	< 2	100	0.05	L27.5N,2350E	Black shale
28245	110	65	25	< 2	30	0.73	L27.5N,2300E	Black shale
28246	100	45	105	< 2	950		L36.5N,3000E	M grained volcanic cl sst
28247	95	25	30	< 2	130		L39N,4000W	F grained qtz phyric rhyolite
28248*	190	110	95	< 2	40		L39N,4000W	Qtz vein + Fe oxides
28249	110	40	100	< 2	800	0.02	L36.5N,3000W	F grained volcanic cl sst
28250	80	30	115	< 2	1850	0.01	L36.5N,3000W	Tuffaceous shale
28251	60	50	105	< 2	600	0.04	L36.5N,3000W	Tuffaceous shale
28252	65	35	105	< 2	640	0.02	L36.5N,3000W	Tuffaceous shale
28253	120	45	155	< 2	430		L36.5N,3000W	M grained volcanic cl sst
28254	115	30	150	< 2	370		L36.5N,3000W	M grained volcanic cl sst
28255	119	30	105	< 2	820		L32N,2100W	F-m grained volcanic cl sst
28256*	93	100	22	< 2	20		L27.5N,00	Fe oxide coating
28257	60	30	18	< 2	10		L28.0N,00	C grained felds xl-lith tuff
28258	88	20	15	< 2	< 10		L27.5N,00	M grained qtz felds xl-lith tuff
28259*	132	1000	1650	6	2.5%		L29.5N,00	Shale fragments in agglom
24145	21	20	56	< 2	265		L35N,600W	C grained felds xl-lith tuff

* other elements analysed - see end of list

Sample No.	Cu ppm	Pb ppm	Zn ppm	Ag g/t	Mn ppm	S %	Location	Lithology
<u>Costean Samples L36N:</u>								
150	30	140	< 5	280			1440-1450W	Black pyritic shale
125	40	65		170			-1460W	
150	100	90		170			-1470W	
490	60	110		340			-1480W	
120	35	90		310			-1490W	Grey shale
140	45	105		380			-1500W	
125	25	110		450			-1510W	
165	25	105		450			-1520W	
90	20	85		370			-1530W	M grained volcanic cl sst and felds xl tuffs
75	20	95		400			-1540W	
1270	25	115		430			-1550W	
105	20	110		460			-1560W	
130	25	110		440			-1570W	Grey and black shales
110	15	110		380			-1580W	
80	100	110		470			1630-1640W	
110	80	105		400			-1650W	
90	20	150		370			-1660W	F-m grained volcanic cl sst and tuffac shales
80	20	110		510			-1670W	
170	30	110		510			-1680W	
140	30	120		640			-1690W	
100	20	100		440			-1700W	Tuffaceous shale
140	35	110		300			-1710W	
130	30	110		370			-1720W	
120	20	90		250			-1730W	
90	20	90		370			-1740W	F-m grained volcanic cl sst
110	15	100		430			-1750W	
100	40	105		400			-1760W	
140	15	100		400			-1770W	
140	15	95		380			-1780W	M-c grained volcanic cl sst
90	20	125		460			-1790W	
110	30	125		360			-1800W	
190	50	140		160			-1810W	
140	40	125		260			-1820W	F-m grained volcanic cl sst
130	30	130		310			-1830W	
150	40	150		270			-1840W	
170	20	115		220			-1850W	
120	15	120		260			-1860W	

N. Marshall L36N Costean sampling February, 1979:

Sample No.	Cu ppm	Pb ppm	Zn ppm	Ag g/t	Mn ppm	S %	Fe %	Co ppm	Ba ppm	Location	Lithology
24507	95	50	110	<2	120	<0.1	2.75	13	<50	1610W	Tuffac shale
24508	140	35	70	<2	350		3.9	10	<50	1610W	Black shale
24509	130	35	115	<2	470		5.1	18	<50	1610W	Weath shale
24510	100	40	110	<2	580		6.0	23	<50	1610W	Black shale
24511	135	15	90	<2	300	0.1	4.0	29	<50	1520W	F grained volcanic cl sst
24512	160	65	70	<2	300	0.6	4.3	40	<50	1520W	Black shale
24513	135	35	150	<2	310	1.1	2.7	27	<50	1450W	Black pyritic shale

Addition Analyses:

Sample No.	Fe %	Co ppm	Ba ppm	Ni ppm
28160	22.0	20	<100	
28165	13.0	30	<100	
28166	6.2	100	4200	
28185			<100	
28193	8.5	220	<100	
28210	7.9	70	<100	
28241	11.6	20		
28248	8.5	10		
28256	7.2	<10		
28259		40		60

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APPENDIX BWHITE SPUR GRID - EASTERN SECTION - ROCK CHIP GEOCHEMISTRY

Sample No.	Cu ppm	Pb ppm	Zn ppm	Ag	Mn ppm	S %	Location	Lithology
28101	33	216	530	< 2	165		L41N,4300E	C grained felds xl-lith tuff
28102	33	158	340	2	426		L41N,4300E	C grained felds xl-lith tuff
28103	13	44	132	< 2	18		L41N,3650E	F grained ser tuff
28112	18	75	300	< 2	7.0%		L40N,4160E	F grained ser tuff
28118	205	37	114	< 2	1310		L40N,1650E	F grained silic tuff
28123	68	45	33	< 2	110		L37N,5020E	Felds qtz xl-lith ash flow agglom
28124	83	65	74	< 2	80		L37N,5540E	Black shale
28125	61	112	92	< 2	640		L39N,5900E	Laminated grey/black shale
28126	98	74	233	< 2	230		L38N,4600E	Weath tuffac shale
28127	62	34	255	< 2	320		L38N,4640E	Weath tuffac shale
28128	109	60	390	< 2	1010		L39N,5250E	Tuffaceous shale
28129	49	27	83	< 2	490		L39N,5250E	Tuffaceous shale
28130	58	600	115	< 2	320		L39.5N,5200E	Tuffaceous shale
28131	88	114	75	< 2	50		L39N,4800E	Tuffaceous shale
28132	23	19	28	< 2	80		L40N,6200E	M grained basalt
28133	256	200	260	< 2	150		L39.5N,4740E	Tuffaceous shale
28134	103	67	220	< 2	250		L39.5N,4740E	Tuffaceous shale
28135	40	123	68	< 2	670		L40N,5350E	Tuffaceous shale
28136	35	15	34	< 2	50		L40N,5580E	F grained ser tuff
28137	43	25	49	< 2	170		L39N,4440E	M grained felds xl-lith tuff
28138	31	362	114	< 2	40		L40N,4650E	Tuffac shale
28139	33	290	67	< 2	60		L40N,4630E	Tuffac shale
28140	36	114	77	< 2	330		L40.5N,4500E	Agglomerate
28141	71	380	269	< 2	550		L41N,4400E	Tuffaceous shale

Costean Samples L39N:

100	40	210	< 2	370	4720-4730E	4720-4980E: Laminated
40	40	140	< 2	365	-4740E	tuffaceous shales
40	45	90	< 2	205	-4750E	
40	30	95	< 2	365	-4760E	
40	80	45	< 2	150	-4770E	
40	70	90	< 2	260	-4780E	
30	20	120	< 2	440	-4790E	
40	30	80	< 2	290	-4800E	
60	60	90	< 2	320	-4810E	
110	40	100	< 2	320	-4820E	
70	30	110	< 2	400	-4830E	
50	10	90	< 2	390	-4840E	

Sample No.	Cu ppm	Pb ppm	Zn ppm	Ag	Mn ppm	S %	Location	Lithology
	30	30	100	<2	420		-4850E	
	40	40	150	<2	460		-4860E	
	30	45	110	<2	360		-4870E	
	140	45	95	<2	240		-4880E	
	60	40	160	<2	420		-4890E	
	170	60	290	<2	400		-4900E	
	170	70	240	<2	210		-4910E	
	60	60	70	<2	50		-4920E	
	50	50	65	<2	35		-4930E	
	100	30	50	<2	30		-4940E	
	40	140	70	<2	60		-4950E	
	50	120	65	<2	70		-4960E	
	80	125	85	<2	65		-4970E	
	40	110	30	<2	30		-4980E	
	40	60	75	<2	95		-4990E	4980-5160E: felds xl
	40	50	170	<2	230		-5000E	lith chl m gr tuffs
	20	40	265	<2	800		-5010E	
	40	30	260	<2	700		-5020E	
	70	40	365	<2	850		-5030E	
	60	65	330	<2	600		-5040E	
	40	80	370	<2	720		-5050E	
	90	80	375	<2	520		-5060E	
	70	95	265	<2	390		-5070E	
	30	60	215	<2	580		-5080E	
	50	65	320	<2	670		-5090E	
	20	35	250	<2	350		-5100E	
	30	40	250	<2	580		-5110E	
	30	45	240	<2	290		-5120E	
	30	45	280	<2	350		-5130E	
	40	45	290	<2	360		-5140E	
	70	70	355	<2	520		-5150E	
	50	65	255	<2	300		-5160E	

N. Marshall Sampling February, 1979:

Sample No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	S %	Fe %	Co ppm	Ba ppm	Location	Lithology
24514	70	45	85	<2	280	<0.1	3.0	15	<50	L39N,4830E	Lam f gr tuff
28515	65	350	360	<2	340	<0.1	4.2	14	<50	L39N,5065E	Chl m gr felds xl tuff
28516	75	220	250	<2	540	<0.1	15.0	33	<50	L39N,5065E	Fe-Mn oxide joint fill
28518B	90	290	310	<2	7500	<0.1	5.0	430	<50	L39N,5080E	Mn wad
24519	55	130	340	<2	370	<0.1	4.5	17	<50	L39N,5080E	Xl tuff
24520	40	25	90	<2	680	<0.1	3.75	14	<50	L39N,5100E	F gr tuff-siltstone
24521	115	35	590	2	920	<0.1	7.4	26	<50	L39N,5100E	Xl tuff

APPENDIX C

SELINA-DORA ROCK CHIPS 1979-80

SAMPLE	LOCATION*	LITHOLOGY	Pb	Zn	Ag	Mn	Co	S	Au	Ba	Mo
27301	S 124N/2900W	Pyritic chloritic schist	100	60	220	2	500	280	3.5%	0	300
27302	S 160N/2000W	Xl-lithic tuff	40	40	30	< 2	100		0.5%		
27303	S 160N/1500W	Mn-oxide	560	100	630	< 2	17%		0		
27304	S 160N/1500W	Mn-oxide wad	110	150	75	< 2	5.4%			1000	
27305	S 178N/1100W	Pyritic chloritic schist	110	90	280	3	3200		0.3%		
27306	D 118S/500E	Ironstone float	15	30	160	< 2	1.0%	75			Fe 46%
27307	R CST1/195'	Chloritic xl-lapilli tuff	180	30	170	< 2	890	30	0.1%		
27308	R CST1/135'	Chloritic xl-lapilli tuff	50	120	270	< 2	1550	60	0.4%		
27309	R CST1/090'	Chloritic xl-lapilli tuff	80	650	190	< 2	870	70	0.4%		
27310	R CST2/235'	Chloritic volcanic	40	20	130	< 2	650	10	0.1%		
27311	R CST2/105'	Chloritic ? tuff	50	40	80	< 2	450	10	0.1%		
27312	S 96N/2900W	F.g. xl tuff c̄ py-gln	70	4000	240	4	1900	50	0.2%		
27314	S 124N/2900W	Massive mte-py	190	70	170	2	440	230	3.0%		
27315	S 124N/2900W	Mte-py in schist	110	100	200	2	570	550	9.0%		

* S = Selina, R = Rolleston, D = Dora

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APPENDIX D

HOWARD'S ANOMALY 1979-80 TRACK CUTTING

Line	Interval (feet)	Operation	Operator
L12N	1700-3500E	Cleared	Mt. Lyell
L14N	800-2300E	Cleared	Mt. Lyell
L15N	0-1300W	Cleared	Mt. Lyell
	0-600E	Cut	Mt. Lyell
L16N	1400W-900E	Cleared	Mt. Lyell
L17N	0-1700W	Cleared	Mt. Lyell
	0-400E	Cut	Mt. Lyell
L18N	2000W-300E	Cleared	Mt. Lyell
L19N	0-2500W	Cleared	Mt. Lyell
L19.4N	500W-2500W	Cut	Contractor
L19.7N	600W-3000W	Cleared	Mt. Lyell
	(formerly L20N + 200'S)		
L20N	0-2400W	Cleared	Mt. Lyell
L20.2N	600W-2700W	Cleared	Mt. Lyell
	(formerly L20N + 200'N)		
L20.6N	700W-2400W	Cut	Contractor
L21N	0-2600W	Cleared	Mt. Lyell
L21.3N	800W-3100W	Cut	Contractor
L21.6N	1000W-2700W	Cleared	Mt. Lyell
	(formerly L22N + 400'S)		
L21.9N	800W-3100W	Cleared	Mt. Lyell
	(formerly L22N + 200'S)		
L22N	0-2800W	Cleared	Mt. Lyell
L22.2N	1400W-3300W	Cleared	Mt. Lyell
	(formerly L22N + 200'N)		
L22.5N	1400W-3000W	Cleared	Mt. Lyell
	(formerly L22N + 400'N)		
L23N	100W-3300W	Cleared	Mt. Lyell
L23.4N	1300W-4000W	Cut	Contractor
L23.7N	2000W-2700W	Cleared	Mt. Lyell
	1400W-2000W	Cut	Contractor
	2700W-4000W	Cut	Contractor
	(formerly L24N + 200'S)		
L24N	400W-3600W	Cleared	Mt. Lyell
L24.5N	2600W-4200W	Cut	Contractor
L25N	800W-3100W	Cleared	Mt. Lyell
	3100W-4600W	Cut	Mt. Lyell
L26N	800W-4300W	Cleared	Mt. Lyell

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APPENDIX E

HOWARD'S ANOMALY ROCK CHIP ASSAY DATA

1. Part I L20.2N 1000-1100W Surface and Pit Samples

Sample No.	Lithology	Cu ppm	Pb ppm	Zn ppm	Mn ppm	Ag g/t	Au g/t	S %	Ba(sol)	Ba(total)	Fe	Co ppm
x30719	Mn wad	380	3150	2200	40.0%	0.7	<0.1		1.3%	5.0%	12.7%	
x30720	Haem-barite	190	300	30	2400	26	<0.1		5200	33.0%	10.4%	
30721	Mn wad	560	9100	2800	25.0%	5	<0.1		3.4%	3.2%	26.0%	
30774	Mn wad	300	1.60%	1300	15.5%	4			2600		37.0%	130
30775	Haem-barite	85	1400	30	1500	2			800		36.0%	15
30776	Mn wad	390	1.10%	1850	38.5%	4			8000		8.7%	70
30905	Mn wad	205	9000	1800	36.0%	6			2.0%		18.0%	135
30906	Haem-barite	69	680	50	2400	<2			<100		21.5%	16
30907	Mn wad	100	2.0%	2600	50.0%	<2	<0.1		1.6%		3.4%	46
x30908	Haematite	213	940	40	3100	<2	nil		2500		17.5%	
30909	Haematite	64	700	65	7800	<2			250		16.5%	
30910	Mn wad	180	6700	2300	47.0%	4			3.0%		7.0%	135

2. Part II L22N 1450W Pit

Sample No.	Lithology	Cu	Pb	Zn	Mn	Ag	S%	Fe%	Ba(sol)	Co
30924	Chl felds xl tuff	1100	2400	3700	1720	2	1.1			
30942	Chl-ser felds xl tuff	81	1700	3400	2450	<2	<0.1		150	25
30943	Chl ser felds xl tuff	122	540	5800	9200	2	<0.1		460	45
30944	Weath chl ser felds xl tuff-Mn	347	610	4000	18000	<2		8.3	200	35
30945	Weath chl ser felds xl tuff-Mn	510	1.10%	2700	56000	5		5.1	900	50
30946	Chl-ser felds xl tuff	87	1900	2200	2350	<2	0.9		5000	15
30947	Chl felds xl tuff	80	1250	3600	1950	<2			2200	20
30950	Mn + chl felds xl tuff	480	6500	5500	40000	8			1000	
30951	Mn + chl felds xl tuff	70	1550	2000	3600	<2			<100	
30952	Mn + chl felds xl tuff	110	1250	3500	5500	<2	<0.1		150	

L22N 1430W Pit

30953	Ser f gr tuff	60	140	1000	600	<2			<100	
30954	Ser f gr tuff	90	4200	2500	1000	35			<100	
30955	Ser f gr tuff	110	3700	1500	600	<2			<100	
30956	Ser f gr tuff	45	4600	2500	1000	<2	0.2		1400	

3. Part III "L23N Costean" (approximately 100' north of L23.4N 1700W)
Collected by N. Marshall February, 1979

Sample - E end of Costean	Cu	Pb	Zn	Ag	Mn	S	Fe %	Co	Ba(sol)	F-c gr haem lith tuff except where otherwise noted.
0-10'	85	20	12	< 2	60	<0.1	1.03	<5	<50	
10'-20'	65	20	100	<2	540	0.1	4.80	17	<50	
20'-30'	60	25	35	<2	180	<0.1	1.92	<5	<50	
30'-40'	95	420	235	19	4.10%	<0.1	3.10	15	370	
40'-50'	35	65	65	2	8200	<0.1	6.40	12	<50	
50'-60'	50	90	190	2	4.90%	<0.1	3.80	18	150	
60'-70'	25	90	20	<2	650	<0.1	3.20	5	<50	
70'-80'	30	65	34	<2	800	<0.1	5.10	8	<50	
39'	65	250	350	17	7.80%	0.1	5.00	33	600	Mn wad
39'	100	120	42	8	1380	<0.1	3.00	14	80	
44'	120	530	95	3	9.40%	<0.1	6.90	74	110	Mn wad
44'	35	65	125	<2	4300	<0.1	12.50	23	<50	
x24533	500	1150	480	230	10.0%	<0.1	5.70	26	200	"from near the 30'-40' zone"
L19N120W	50	55	135	<2	1900	<0.1	5.10	20	<50	Felsic agglom
L19N180W	25	450	120	<2	1000	<0.1	4.60	20	<50	Felsic agglom

4. Part IV Other Samples

Sample No.	Cu	Pb	Zn	Ag	Mn	S	Location	Lithology
30750	46	30	90	< 2	450		L20.2N850W	Fol haem c grained ser agglom
30751*	87	280	290	5	820	0.4	L25N2915W	M grained pyritic lithic tuff
30752	30	30	180	< 2	330		L25N2820W	I/med m grained felds xl tuff
30753	22	30	160	<2	350		L25N2820W	I/med felds xl lith haem tuff
30754	36	40	65	<2	160		L25N1450W	M grained qtz felds xl lith felsic tuff
30755	58	60	210	<2	1060		L25N2900W	Chl felds qtz xl lith tuff
30756	29	50	40	<2	150		L25N3225W	Felds (qtz-hb) xl lith tuff
30757	30	10	45	<2	360		L25N2100W	Chl felds xl tuff
30758	24	40	460	<2	1540		L21.9N3080W	Haem-chlorite felds xl lith tuff
30759	46	20	115	<2	1050		L22N1710W	I/med felds xl tuff
30760	24	10	250	<2	1070		L22N1725W	I/med felds hb xl tuff
30761	27	20	180	<2	790		L22N1770W	I/med felds hb xl tuff
30762*	54	50	90	<2	1300		L23N1700W	Bog vion - limonite
30763*	53	70	250	<2	600		L23N1700W	Haem ser f-m grained lith xl tuff
30764	60	220	70	<2	400		L23N1700W	Felds xl felsic tuff - Fe stains
30765	51	30	160	<2	50		L23.4N1640W	F grained ser tuff
30766	205	600	590	15	4200	0.2	L23.4N1640W	F grained felds xl ser py tuff
30767	90	1060	250	14	50	1.6	L23N1700W	M grained felds xl tuff and ser py tuff
30768	80	110	210	2	6000		L23.4N1640W	M grained felds xl tuff
30769*	40	90	140	<2	1.30%		L23.4N1710W	M-c grained haem lith tuff

Sample No.	Cu	Pb	Zn	Ag	Mn	S	Location	Lithology
30770	85	30	75	<2	300		L22N2450W	Chl felds xl tuff
30771*	270	20	140	<2	3200		L20.6N900W	Haem m-c grained lith tuff
30772*	50	10	70	<2	100		L20.6N900W	Haem ser felds xl lith tuff
30773*	130	60	240	<2	1700		L20.6N900W	Welded lith xl tuff
30777	70	80	130	<2	2000		L20.6N700W	Chl/felds lith xl tuff
30778*	650	340	560	8	3.60%		L20.6N1110W	Ser lith tuff - Fe oxides
30779	80	60	410	<2	1800		L20.6N2050W	Chl felds xl tuff
30780	85	100	240	<2	1600		L20.6N2100W	Chl feldsp felds xl tuff
30781	150	40	300	<2	1000		L20.6N2200W	Chl felds xl tuff
30782	80	200	320	<2	1200		L20.6N2250W	Chl felds xl tuff
30783	50	<10	100	<2	230		L19.7N1250W	F-m grained chl felds xl tuff
x30784	140	30	20	<2	630		L20.2N650W	Felds qtz porph
30785	80	10	65	<2	800		L20.2N650W	Chl m-c grained felds xl lith tuff
x30786	130	10	80	<2	800		L20.2N2230W	Hb felds porph lava
30787	70	10	45	<2	500		L20N620W	Felds chl tuff
30788	75	20	20	<2	200		L20N650W	Qtz felds porph lava?
x30789	70	<10	40	<2	400		L21N720W	I/med chl felds xl tuff?
30790	50	20	80	<2	500		L21N820W	F-m grained felds xl tuff
30791	80	<10	25	<2	160	<0.1	L21N1010W	Chl py felds xl tuff
30792	95	<10	25	<2	190		L21N1020W	Chl py felds xl tuff
30793	65	10	65	<2	260		L21N1200W	Haem ser lith tuff
30794*	290	800	275	23	2.80%		L21N1290W	Haem ser tuff - sed
30795*	160	310	130	78	1200	1.9	L21N1290W	Ser haem fine-medium grained tuff - sed
30796*	140	10	115	<2	430		L21N1400W	Chl fine-medium grained felds xl tuff-sed
30797	32	20	210	<2	600		L23.7N1850W	Felds hb xl tuff
30798	35	10	165	<2	500	<0.1	L23.7N1850W	Fault vein: chl qtz
30799*	118	100	105	<2	6.10%		L23.7N1900W	Mn wad
30800	205	20	80	<2	530		L23.7N2770W	I/med felds xl tuff - haematite
30901	70	20	55	<2	1150		L23.7N2780W	Jasper in felds xl tuff
30902	115	10	110	<2	420		L23.7N2790W	Haem chl felds hb qtz xl tuff
30903	105	190	345	<2	1200		L23.7N2790W	I/med felds xl tuff
30904*	145	80	115	<2	6.80%		L23.7N1850W	Mn wad
30911	66	170	120	<2	4100		L20.6N1100W	M grained felds xl tuff
30912	67	120	135	<2	4600		L20.6N900W	I/med m grained felds xl tuff
30913	65	80	650	<2	6400		L20.6N900W	Chl felds xl tuff - sed
30914*	335	120	270	<2	3800		L21N1200W	Banded i/med tuff - haem - sed
x30915*	31	60	215	<2	1000		L21N1300W	Banded i/med tuff - haem - sed
30916*	51	360	35	24	1700		L21N1250W	Fault vein: qtz chl jasper
30917	23	20	25	<2	900		L19.4N700W	Qtz felds xl tuff
30920	118	<10	69	<2	320		L21.6N1115W	F grained chl (haem) tuff
30921	83	<10	137	<2	320		L21.6N1110W	F-m grained felds
30922	154	<10	211	<2	760		L20.6N2100W	Felds chl xl lith tuff

Sample No.	Cu	Pb	Zn	Ag	Mn	S	Location	Lithology
30923	525	20	36	<2	40	<0.1	L22N2400W	Felds chl xl tuff
30925	640	20	120	<2	1060	<0.1	L22N1750W	I/med hb-felds xl tuffs
30926	143	20	330	<2	1380		L22N1915W	I/med hb-felds xl tuffs
30927	232	20	110	<2	690	<0.1	L22N3540W	I/med hb-felds xl tuffs
30928	84	10	110	<2	390		L22N3550W	I/med hb-felds xl tuffs
30929	32	20	60	<2	780		L22.5N1500W	Chl felsic m grained felds xl tuff
30930	141	20	70	<2	680		L23N2140W	Hb-chl felds xl tuff
30931	66	30	405	<2	830		L23N2780W	Hb-chl felds xl tuff
30932	212	70	104	<2	600	0.9	L234N1500W	Grey shale - minor py
30933	67	<10	550	<2	4600	<0.1	L23.4N2810W	Hb-felds xl tuff
30934*	46	30	170	<2	1.03%		L23.7N3225W	Fe/Mn oxide coating
30935*	34	10	3000	<2	1.93%		L23.7N3200W	Mn module - pit
30936	113	<10	43	<2	660	<0.1	L24N1400W	Felsic felds-hb xl tuff
30937	37	<10	95	<2	600		L24N1450W	Felds-chl xl -f tuff
30938	200	<10	98	<2	740	<0.1	L24N1750W	Felds chl xl tuff
30939	147	140	193	<2	150	1.6	L24N3150W	Ser felds xl py tuff
30940	38	10	184	<2	1200	<0.1	L24N3160W	Chl felds (hb) xl tuff
30941	44	70	17	<2	210	<0.1	L25N3250W	Ser chl felds xl tuff
30948	41	140	133	<2	980	<0.1	L24.5N3350	Felds xl tuff - felsic
30949	42	140	88	<2	160	0.2	L24.5N3330W	Felds xl tuff - felsic
30957*	45	100	150	<2	1000	<0.1	L20N700W	Qtz felds xl agglom
30958*	75	130	120		4200	0.2	L20N700W	Sulphide frag in agglom - weath
30959*	55	30	75	<2	1600	0.1	L20N700W	Qtz felds xl chl agglom
30964*	45	30	110	<2	600	<0.1	L20.2N700W	Feld qtz xl agglom
30965*	100	40	65	<2	400	<0.1	L20.6N900W	Ser chl (haem) felds xl tuff
30966*	75	20	150	<2	1000	<0.1	L20.6N900W	Chl, felds xl lith tuff
30967	40	<10	110	<2	1100	<0.1	L24.5N2600W	I/med haem felds xl lith tuff
30968	25	<10	125	<2	700	<0.1	L25N2800W	Haem felds xl lith tuff
30969	25	<10	150	<2	670	<0.1	Newton Ck	Haem chl felds xl lith tuff
30970	85	40	55	<2	400	0.3	Newton Ck	Grey black shale
30971	15	<10	70	<2	1400	<0.1	Newton Ck	Felsic chl f grained mixed tuff
30972	35	<10	70	<2	700	<0.1	Newton Ck	Chl lith felds xl tuff
30973	30	<10	45	<2	300	<0.1	Newton Ck	F grained felds porph lava
30974	20	<10	85	<2	450	<0.1	Newton Ck	F grained felds porph tuff
30975	20	<10	30	<2	100	<0.1	Newton Ck	F grained felds porph tuff

* additional analyses

No.	Co	Ba(sol)	Fe %	Au
30751	10			
30762	20	<100	37.0	
30763		<100		
30769		<100		
30771		<100		
30772		<100		
30773		<100		
30778		300		
30794	< 10	<100	6.3	
30795	< 10	<100	6.5	
30796		<100		
30799	300	1800	6.6	
30704	235	1600	5.0	
30914	36	<100	25.0	Nil
30915	52	<100	32.0	< 0.1
30916	< 5	1000	25.0	Nil
30934	50	<100	13.4	
30935	125	<100	52.0	
30957		<100		
30958	70	<100	44.0	
30959		<100		

Mn coated pebbles - hydroxylamine leach
20 gms/40 ml

30918 <0.01 Cu; <0.01 Pb; 0.02 Zn; 0 Ag; 0.11 Mn; 35 Fe; <0.01 Co
30919 <0.01 Cu; 0.15 Pb; 1.74 Zn; 0 Ag; 510 Mn; 12 Fe; 1.60 Co

x 30719 Petrology description available

APPENDIX F

HENTY RIVER - ROCK CHIP GEOCHEMISTRY

Sample No.	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Mn ppm	S%	Location	Lithology
24457	58	30	180	< 2	420	n.d.	7N/2770E	bedded m.g. andesitic tuff
24458	100	180	550	< 2	2000	n.d.	7N/2730E	m.g. andesitic tuff
24459	53	2500	610	3	3700	n.d.	7N/2695E	m.g. andesitic tuff
24460	47	820	560	5	2650	n.d.	7N/2682E	f.g. andesitic tuff
24461	140	1150	6200	4	5600	n.d.	7N/2677E	m.g. andesitic tuff + <u>Gn</u> , <u>Sp</u>
24462	54	50	210	< 2	1100	n.d.	9N/2425E	c.g. andesite lava
24463	125	60	210	< 2	2100	n.d.	6N/2448E	m.g. andesite lava
24464	28	10	30	< 2	100	n.d.	9N/2275E	felsic tuff
24465	92	75	220	< 2	1600	n.d.	11N/2285E	c.g. andesite lava
24466	76	35	200	< 2	1900	n.d.	10N/2350E	c.g. andesite lava
24467	164	10	195	< 2	1850	< 0.1	10N/2400E	m.g. andesite lava
24468	134	20	120	< 2	730	< 0.1	10N/2425E	c.g. andesite lava
24469	111	50	87	< 2	220	< 0.1	10N/2480E	c.g. andesite lava
24470	145	110	670	< 2	3400	< 0.1	10N/2512.5E	m.g. andesitic tuff
24471	133	20	370	< 2	2200	< 0.1	10N/2520E	m.g. andesitic tuff
24472	87	10	215	< 2	1600	0.1	Creek 24207	f.g. grey shale
24473	116	20	265	< 2	1100	0.2	Creek 24207	f.g. grey shale + <u>Py</u>
24474	115	190	780	< 2	1400	0.3	Creek 24207	f.g. grey shale + <u>py</u>
24475	153	< 10	125	< 2	920	< 0.1	Creek 24207	c.g. andesite lava
24476	54	10	220	< 2	1600	< 0.1	Creek 24207	c.g. andesite lava

n.d. indicates not determined

090

23846-070

Fig 41, # 50-56
1-2

007091 84

909-11
30027-30076

APPENDIX G - BEATRICE STREAM SEDIMENTS 1979-80

Sample	Location	-80# Tx						-80# Cx					
		Cu	Pb	Zn	Mn	Fe %	Co	Cu	Pb	Zn	Mn	Fe %	Co
SS 77	1800N/975E	65	390	83	1.3%	4.5	41	57	300	28	5500	1.1	13
7278	1800N/1115E	74	300	105	7500	5.2	25	65	210	59	3600	1.7	9
7179	1800N/1280E	135	500	190	2.06%	4.7	94	120	380	124	1.13%	1.1	47
7080	1800N/1345E	125	350	370	1.65%	4.6	69	97	210	235	6900	1.0	34
6981	1800N/1745E	135	360	265	4500	3.0	33	81	280	130	3000	0.6	20
6882	1800N/1890E	24	90	25	340	1.2	2	20	50	2	140	0.3	2
6783	1600N/2110E	50	700	56	6600	2.1	27	37	530	15	2400	0.6	6
6684	1600N/2100E	22	160	29	1100	1.6	7	15	90	2	350	0.3	2
6585	1600N/2025E	40	220	44	2400	2.3	13	29	130	10	900	0.6	2
6486	1600N/1985E	72	330	111	4000	2.7	18	46	200	35	1800	0.5	6
7787	1600N/1905E	46	200	37	850	2.0	10	29	110	6	400	0.4	2
5288	1400N/2220E	60	440	69	5500	2.6	23	42	320	19	2300	0.6	7
5389	1410N/2190E	54	200	32	1200	1.9	8	38	130	8	530	0.4	2
5490	1410N/2185E	58	200	71	4600	2.0	17	56	140	32	1500	0.4	2
2591	1400N/025E	42	210	95	5200	2.2	20	48	180	69	2500	0.52	6
2692	1200N/100E	72	400	165	1.2%	3.6	40	54	300	75	4700	0.76	10
4593	1200N/775E	94	75	120	270	4.35	10	30	35	5	90	0.65	2
2794	1000N/225E	46	200	104	6900	2.19	19	32	140	41	3700	0.66	10
4395	1000N/690E	41	70	37	170	1.88	5	24	30	9	110	0.56	2
4496	1000N/805E	48	80	63	150	2.97	5	24	30	6	90	1.07	2
2897	800N/105W	31	120	25	2900	1.84	12	22	80	8	1750	0.79	7
4298	800N/390E	106	410	248	2.05%	3.10	43	80	290	160	1.2%	1.02	20
4199	800N/735E	33	60	27	120	1.10	2	21	20	10	30	0.33	2
40100	800N/910E	43	130	64	2500	2.02	28	25	70	18	2000	0.58	25
29101	600N/105E	31	90	33	720	2.86	9	16	40	6	400	0.67	2
35102	600N/615E	80	380	144	1.40%	2.80	33	62	280	80	8200	0.91	20
36103	600N/820E	26	30	17	30	0.52	2	20	20	7	5	0.20	2
37104	600N/1085E	22	50	29	250	1.04	5	11	20	5	200	0.30	2
38105	400N/1800E	85	340	237	8900	2.87	33	59	220	146	5200	1.14	15
30106	400N/225E	23	50	26	250	2.00	5	13	30	6	170	0.56	2
34107	400N/935E	61	330	120	9900	2.64	27	47	230	52	5300	0.60	10
31108	200N/340E	15	30	18	50	0.19	2	13	10	10	10	0.03	2
76109	200N/375E	22	50	21	160	1.54	2	14	30	11	70	0.40	2
51110	1200N/2165E	54	340	96	6100	2.91	34	32	240	27	3600	0.80	15
49111	1200N/1605E	110	130	64	360	2.92	10	53	50	18	320	0.72	2
48112	1200N/1320E	37	100	86	1500	2.72	19	17	60	15	1080	0.66	10
50113	1000N/1560E	25	80	65	900	2.26	13	8	30	10	570	0.45	2
32114	00/480E	17	40	13	50	0.70	2	8	5	2	20	0.17	2
39115	800N/1830E	26	80	53	930	2.27	11	13	50	7	810	0.60	6
75116	2000N/590E	28	160	42	1800	1.77	12	18	130	13	1380	0.62	2
74117	2000N/840E	31	110	43	300	2.77	6	20	70	21	170	1.28	2
47118	1230N/940E	64	70	81	170	3.17	7	32	40	9	110	0.96	2
46119	1200N/840E	29	60	44	200	1.89	2	13	20	5	120	0.57	2
120	1740N/1950E	NOT ASSAYED						NOT ASSAYED					
59121	1400N/510E	90	100	76	640	3.2	11	27	50	6	220	0.51	5
58122	1400N/720E	70	90	108	190	2.9	5	27	60	11	40	0.54	5
57123	1400N/1080E	34	80	25	1000	2.0	32	23	60	6	620	0.85	13
56124	1400N/1130E	40	200	68	4700	3.2	32	21	150	19	2300	1.00	12
55125	1400N/1660E	22	80	47	180	2.0	5	10	40	7	70	0.49	5
60126	1600N/1135E	80	340	73	8500	3.5	43	54	300	26	4600	1.50	20
61127	1600N/1230E	23	70	43	580	1.8	5	13	60	8	450	0.60	5
62128	1600N/1895E	45	150	34	900	1.5	13	24	120	6	420	0.44	5
63129	1600N/1985E	55	240	107	3500	1.9	19	32	180	37	1800	0.40	5
3322130	1800N/300W	40	400	40	4600	2.3	20	30	340	20	3400	1.15	10
23131	1800N/100W	30	120	90	2500	2.2	10	20	70	15	1300	0.60	2
Logarithmic mean (all samples 1975-80)		44	166	75	1434	2.1	12	26	113	20	712	0.5	5

Values expressed in ppm except where otherwise stated.

APPENDIX G - BEATRICE STREAM SEDIMENTS 1979-80

Sample Location		-20# + 80# Hydrox/HCl						H/H Ratios			
		Cu	Pb	Zn	Mn	Fe	Co	Cu/Mnx10 ³	Pb/Fex10 ³	Zn/Mn+Fex10 ³	Zn/Cox10
SS 77	1800N/975E	-	0.13	0.43	327	25	0.73	-	5	1.2	6
78	1800N/1115E	-	0.10	1.07	413	26	0.93	-	3	2.4	11
79	1800N/1280E	-	0.13	0.97	733	15	1.71	-	9	1.3	6
80	1800N/1345E	-	0.10	1.90	933	8	1.45	-	8	2.0	13
81	1800N/1745E	-	0.13	2.28	313	12	1.07	-	11	7.0	21
82	1800N/1890E	0.03	0.40	0.37	37	33	0.31	0.73	12	5.3	12
83	1600N/2110E	-	0.87	0.87	380	31	0.96	-	28	1.5	7
84	1600N/2100E	0.01	0.60	0.60	100	27	0.60	0.13	22	2.3	5
85	1600N/2025E	-	0.33	0.49	347	29	1.40	-	12	1.3	4
86	1600N/1985E	-	0.27	1.15	307	20	0.93	-	13	3.5	12
87	1600N/1905E	0.01	0.53	0.40	87	26	0.75	0.08	21	3.6	5
88	1400N/2220E	-	0.53	0.80	340	30	1.09	-	17	2.2	7
89	1410N/2190E	0.01	0.47	0.51	80	29	0.59	0.08	16	4.7	9
90	1410N/2185E	-	0.10	1.01	433	16	0.73	-	4	2.3	14
91	1400N/025E	0.05	0.88	1.40	290	45	0.50	0.17	20	4.2	28
92	1200N/100E	0.04	0.58	1.85	820	35	1.30	0.05	17	2.2	14
93	1200N/775E	0.08	0.45	0.16	20	72	0.15	4.00	6	1.7	11
94	1000N/225E	-	0.54	1.92	1050	37	0.85	-	15	1.8	23
95	1000N/690E	0.05	0.58	0.27	11	34	0.13	4.55	17	6.0	21
96	1000N/805E	0.10	0.71	0.34	10	83	0.06	10.00	9	3.7	57
97	800N/105W	0.03	0.76	0.75	425	92	0.77	0.07	8	1.5	10
98	800N/390E	-	0.66	3.25	860	38	0.79	-	17	3.6	41
99	800N/735E	0.12	0.71	0.41	10	23	0.08	12.00	31	12.5	51
100	800N/910E	0.14	1.17	0.39	43	36	0.30	3.26	32	4.9	13
101	600N/105E	0.15	1.38	0.28	42	76	0.11	3.57	18	2.4	26
102	600N/615E	-	0.60	2.34	900	47	0.84	-	13	2.5	28
103	600N/820E	0.17	0.97	0.50	6	21	0.07	28.33	47	18.8	71
104	600N/1085E	0.16	1.69	0.30	37	39	0.37	4.32	44	4.0	8
105	400N/1800E	0.02	0.60	4.20	320	38	0.58	0.06	16	11.7	72
106	400N/225E	0.11	0.97	0.37	17	62	0.09	6.47	16	4.7	41
107	400N/935E	-	0.92	1.62	600	46	0.71	-	20	2.5	23
108	200N/340E	0.09	0.80	0.37	6	12	0.06	15.00	68	20.9	62
109	200N/375E	0.17	1.20	0.34	10	62	0.06	17.00	19	4.7	57
110	1200N/2165E	0.05	2.20	0.77	235	60	0.69	0.21	37	2.6	11
111	1200N/1605E	0.08	0.53	0.75	45	76	0.37	1.85	7	6.2	21
112	1200N/1320E	0.05	0.86	0.54	185	52	0.68	0.27	17	2.3	8
113	1000N/1560E	0.07	1.20	0.30	58	44	0.36	1.21	27	2.9	8
114	00/480E	0.16	0.93	0.14	1	27	0.04	160.00	34	5.0	35
115	800N/1830E	0.07	1.14	0.24	48	47	0.40	1.46	24	2.5	6
116	2000N/590E	0.05	2.25	0.44	155	70	0.73	0.32	32	2.0	6
117	2000N/840E	0.10	1.23	0.28	8	119	0.03	12.50	10	2.2	93
118	1230N/940E	0.09	0.66	0.26	5	47	0.06	18.00	14	5.0	43
119	1200N/840E	0.07	0.82	0.15	18	46	0.24	3.89	18	2.3	6
120	1740N/1950E	NOT ASSAYED						-	-	-	-
121	1400N/510E	0.10	1.00	0.44	110	42	0.52	0.91	24	2.9	9
122	1400N/720E	0.05	0.60	0.78	6	33	0.11	8.33	18	20.0	71
123	1400N/1080E	-	0.37	0.60	103	82	2.46	-	5	3.2	2
124	1400N/1130E	0.01	0.57	0.80	134	68	0.79	0.08	8	4.0	10
125	1400N/1660E	0.01	0.44	0.60	13	48	0.10	0.77	9	9.8	60
126	1600N/1135E	-	0.57	0.84	370	71	1.40	-	8	1.9	6
127	1600N/1230E	-	0.26	0.66	60	55	0.42	-	5	5.7	16
128	1600N/1895E	0.02	1.56	0.30	90	40	0.89	0.22	39	2.3	3
129	1600N/1985E	-	1.05	1.98	360	39	1.34	-	27	5.0	15
130	1800N/300W	-	2.00	0.75	250	57	1.08	-	35	2.4	7
131	1800N/100W	0.50	2.70	1.50	220	55	0.40	2.27	49	5.5	38
Logarithmic mean (all samples 1978-80)		0.04	1.38	1.02	137	39	0.58	0.25	41	3.9	17

Values expressed as ppm in solution
20 g/40 ml.

- = < 0.01

Too old

092

APPENDIX G - BEATRICE STREAM SEDIMENTS 1979-80

23222
23

FRACTION	SAMPLE	LOCATION	PANNED CONCENTRATES					
			Cu	Pb	Zn	Mn	Fe %	Co
-80#	22998	1800N/300W	7	40	25	300	1.13	-
	22999	1800N/100W	6	30	60	230	1.73	-
	24 23000	1600N/075W	9	50	60	310	2.86	-
	25 22801	1400N/025E	10	50	65	370	2.40	-
	26 22802	1200N/100E	20	60	70	570	2.34	-
	27 22803	1000N/220E	11	50	60	670	2.83	-
	42 22997	800N/390E	24	50	60	610	2.02	-
	35 22996	600N/615E	42	50	60	640	1.97	-
	24 22995	400N/935E	58	60	55	740	1.86	-
	23 22994	260N/1110E	13	40	45	240	1.54	-
-50#+80#	22998	1800N/300W	-	30	20	160	1.05	-
	22999	1800N/100W	5	30	50	160	1.97	-
	23000	1600N/075W	6	40	50	220	2.27	-
	22801	1400N/025E	7	40	50	240	2.17	-
	22802	1200N/100E	12	50	60	320	2.40	-
	22803	1000N/220E	8	60	45	420	2.54	-
	22997	800N/390E	17	40	55	560	2.06	-
	22996	600N/615E	12	40	45	350	2.33	-
	22995	400N/935E	10	30	40	310	1.80	-
	22994	260N/1110E	9	20	30	180	1.27	-
-20#+50#	22998	1800N/300W	-	20	20	160	1.06	-
	22999	1800N/100W	5	20	40	140	1.43	-
	23000	1600N/075W	7	30	35	200	1.60	-
	22801	1400N/025E	8	30	45	240	1.77	-
	22802	1200N/100E	13	40	60	600	1.88	-
	22803	1000N/220E	10	40	50	480	1.89	-
	22997	800N/390E	20	50	70	620	1.77	10
	22996	600N/615E	17	40	50	690	1.97	-
	22995	400N/935E	15	50	45	780	1.72	-
	22994	260N/1110E	9	30	30	250	1.32	-

Values expressed in ppm unless otherwise stated
- = < 5 ppm

APPENDIX H - BEATRICE SOIL BLOCK AVERAGES

In order to delineate zones of high soil geochemistry the assay data from the Beatrice grid were averaged using a method that is referred to as block averaging.

The Beatrice soil geochemistry plan was overlain with a diamond-shaped grid pattern. Each diamond block had a long axis of 400 yards and a short axis of 200 yards giving it an area of 40 000 yards², or approximately 33 445 m². The long axis was oriented N-S to take into account the general strike of the rock units.

All samples which fell within a certain block were averaged, no distinction was made between samples from different horizons. The logarithmic mean assay values were plotted at the centre of each block and contoured.

In general zones with consistently high assays will stand out against background. Zones with one or two high values will only show a slight increase above background. However, some blocks containing a high proportion of A horizon samples, such as those over glacial moraine, can have high mean values and care must be taken to check isolated highs.

The soil contour plans (Figures 51 to 53). clearly delineate the extent and amplitude of the Mt. Sedgwick Anomaly Zone and other smaller anomalous zones near Baseline Creek and in the NE corner of the grid.

APPENDIX I - BEATRICE M.S.A.Z. SOIL PROFILES

LOCATION	SAMPLE	DEPTH cm	DESCRIPTION	-80# TOTAL DIGESTION					
				Cu	Pb	Zn	Mn	Fe %	Co
1160N/900W	A	5	Leaf litter, moss	45	170	23	-	.13	-
	B	60	Lt br clay + cobbles	8	20	7	-	.15	-
	C	115	Dk br clay + Mn-Fe-Ox	12	45	33	40	.39	-
	D	130	Lt br-gn clay	9	35	58	80	.72	-
	E	140	Br Fe-Ox seepage	10	75	66	200	2.45	-
	F	170	Br clay + boulders Glacials	9	50	58	260	.94	-
1395N/865W	A	5	Leaf litter, humus	16	100	20	30	.30	-
	B	20	Lt gy-gn clay + roots	7	85	23	30	.38	-
	C	50	Sand, gravel, clay Glacials	16	110	39	50	.64	-
1700N/780W	A	5	Dk br moss, humus	205	1100	64	190	.33	-
	B	15	Gy-br clay + humus	94	770	48	50	.37	-
	C	40	Pale br clay + r.f.	25	270	33	40	.62	-
	D	60	Pale br clay + r.f.	19	380	30	40	1.32	-
	E	100	Lt br clay + bedrock	58	1800	370	1650	9.40	-
	F	130	Bedrock F.g. vitric tuff	80	2200	1600	2450	6.30	-
1770N/810W	A	5	Leaf litter, humus	58	470	48	130	1.68	-
	B	10	Gy-br clay + r.f.+ roots	35	380	37	50	1.38	-
	C	30	Lt br clay + r.f.	28	610	100	370	4.60	-
	D	90	Pale br clay + r.f.	23	290	100	80	1.70	-
	F	170	Bedrock	80	400	530	1380	9.20	-
	G		Mn-Ox on outcrop F.g. vitric tuff overlain by scree	280	3300	1500	7.4%	4.70	300
1760N/870W	A	5	Roots, leaf litter	320	800	75	420	.94	-
	B	30	Br-og clay	40	1100	95	4100	5.50	40
	C	70	Br-og clay	33	730	200	530	5.90	15
	D	150	Lt br clay + r.f. Scree +? glacials	16	360	115	250	1.70	-
1805N/890W	A	5	Bk clay + humus	250	2100	220	3600	4.00	20
	B	30	Br-og clay	110	1900	260	4200	8.80	30
	C	70	Lt br clay + r.f. Scree +? glacials	180	1900	460	800	5.90	15
1740N/870W	A	5	Humus, roots	320	2200	240	2200	.80	10
	B	15	Dk br clay + humus	180	2150	700	8300	1.93	45
	C	40	Br clay + r.f.	200	3550	860	1.9%	2.50	90
	D	90	Bedrock F.g. tuff + shale	140	1000	1650	2460	3.50	-

- = < 10 ppm Mn, < 5 ppm Co

095

007096

99

APPENDIX I - BEATRICE M.S.A.Z. SOIL PROFILES (Cont)

LOCATION	SAMPLE	DEPTH cm	DESCRIPTION	-80# TOTAL DIGESTION					
				Cu	Pb	Zn	Mn	Fe %	Co
1795N/825W	A	5	Leaf litter, humus	270	950	55	140	.83	-
	B	20	Br-og clay	24	420	36	140	2.30	-
	C	50	Og/gy clay + boulders	11	360	38	60	2.50	-
	D	130	Lt gy clay + boulders	38	500	370	80	1.12	-
	E	210	Bedrock F.g. vitric tuff overlain by scree	105	730	660	450	2.10	-
1800N/780W	A	5	Humus, leaf litter	150	650	55	120	.37	-
	B	15	Gy-br clay	50	240	25	120	.30	-
	C	40	Pale br clay + r.f.	12	120	14	20	.30	-
	D	70	Lt br/og clay + bedrock	12	80	12	20	1.22	-
	E	85	Bedrock F.g. vitric tuff	53	100	240	1430	12.00	-
1800N/750W	A	5	Leaf litter + humus	300	1100	64	240	.43	-
	B	15	Gy clay	60	540	35	120	1.11	-
	C	60	Br-og clay + r.f.	65	850	125	1700	4.50	-
	D	120	Br-og clay + r.f.	53	1000	160	2700	4.90	45
	E	160	Bedrock Weathered black shale	88	2800	460	1330	6.50	-
1800N/725W	A	5	Humus + leaf litter	170	620	40	280	.84	-
	B	20	Lt br clay + r.f.	50	330	30	460	1.31	-
	C	70	Lt br clay + r.f.	44	260	115	770	2.10	10
	D	100	Lt br clay + bedrock Weathered black shale	67	170	690	1320	1.70	-
1800N/660W	A	5	Moss, roots, litter	170	440	35	60	.22	-
	B	15	Lt br clay + r.f.(quartz)	26	160	22	30	.16	-
	C	30	Pale br/og clay + r.f.	13	70	18	20	.80	-
	D	45	Bedrock Black shale	60	190	150	160	3.80	-

- = < 5 ppm Co

APPENDIX J - BEATRICE ROCK CHIP ASSAYS 1979-80

SAMPLE	LOCATION	LITHOLOGY	Cu	Pb	Zn	Mn	Fe %	Ag	S %
22972	1800N/1935E	Vitric-?lapilli tuff	95	470	4400	150	2.1	< 2	
22944	1260N/1200E	Chloritised tuff	98	20	105	400	3.9	< 2	
22973	1680N/780W	Vitric tuff	105	2.3%	1.65%	490	5.5	14	
22974	1700N/780W	Vitric tuff	1100	1.1%	2.15%	120	3.6	55	
22975	2100N/870W	Qtz-Fe-ox vein	70	390	560	1.8%	55.0	3	
22976	1700N/780W	Vitric tuff	80	2200	1600	2450	6.3	3	
22977	1740N/870W	Vitric tuff	140	1000	1650	2460	3.5	< 2	
22978	1770N/810W	Vitric tuff	80	400	530	1380	9.2	2	
22979	1800N/660W	Black shale	60	190	150	160	3.8	< 2	
22980	1800N/725W	Vitric tuff	67	170	690	1320	1.7	< 2	
22981	1800N/750W	Black shale	88	2800	460	1330	6.5	5	
22982	1800N/780W	Vitric tuff	53	100	240	1430	12.0	< 2	
22983	1795N/825W	Vitric tuff	105	730	660	450	2.1	< 2	
22984	MS4/0.1 m	Black shale & tuff	70	150	2150	1800		< 2	0.1
22985	MS4/8.0 m	Pyritic black shale	55	1500	710	2800		< 2	1.4
22986	1700N/1950E	Pyritic tuff	370	40	100	1180		< 2	1.8
22987	2040N/1650W	Jurassic dolerite	108	20	25	600		< 2	
22988	1400N/080W	Vitric tuff	48	110	160	900		< 2	
22989	1400N/210E	Chloritised ?tuff	395	210	235	1200		2	

Assay values are in ppm unless otherwise stated.

007097

097

007098

Pieman

River

ROSEBURY

RENISON BELL

▲ Mt. Murchison

ZEEHAN

Mt. Tyndall

Mt. Geikie

Mt. Sedgwick

E.L.9/66

Mt. Lyell

Gormanston

▲ Mt. Owen

QUEENSTOWN

Mt. Huxley

Mt. Jukes

Mt. Darwin

STRAHAN

Henly

River

King

River

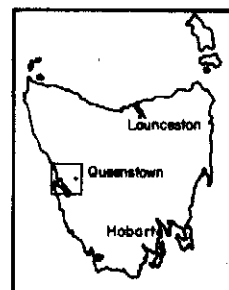
MACQUARIE

HARBOUR

5 cm

42°00'

T.N.



0 5 10
Kilometres

MT. LYELL-G.O.D.L. JOINT VENTURE

E.L. 9/66
LOCALITY MAP

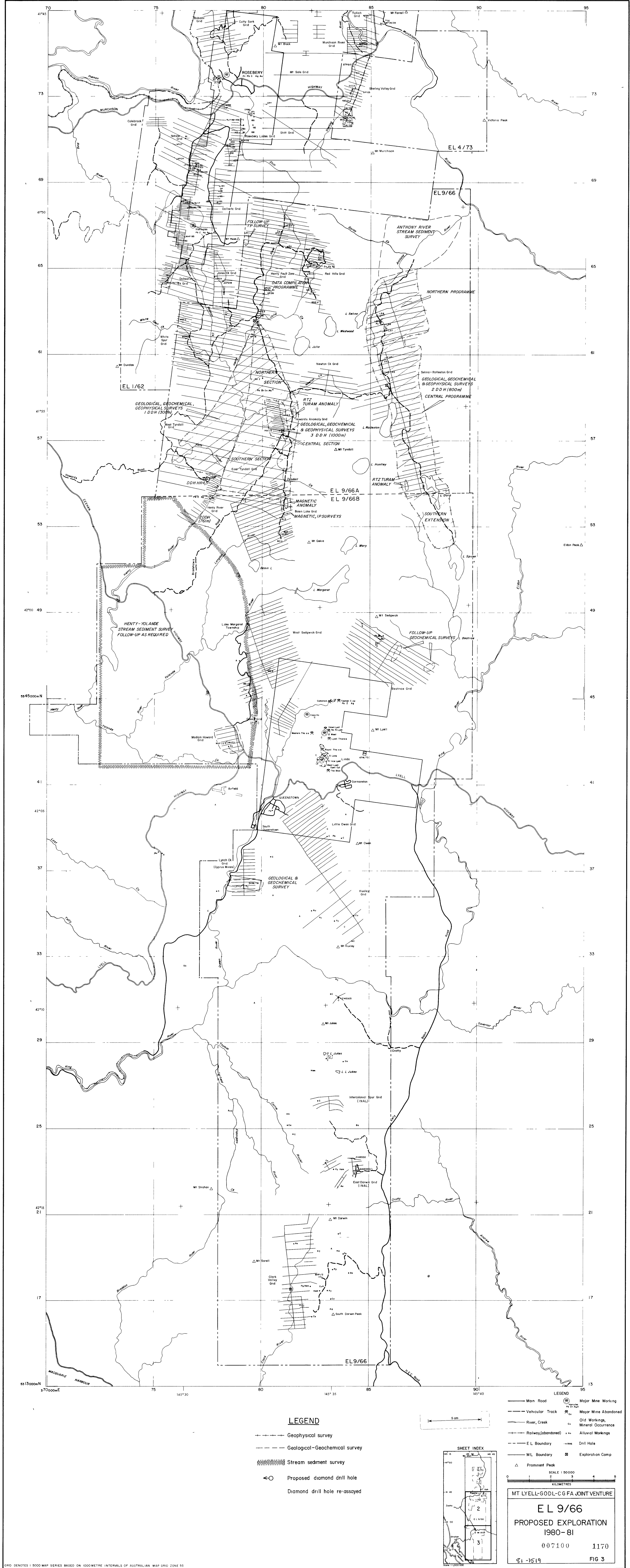
81-1519

Date 1-3-1979 Scale 1:250,000

FIG. 1

145°30'

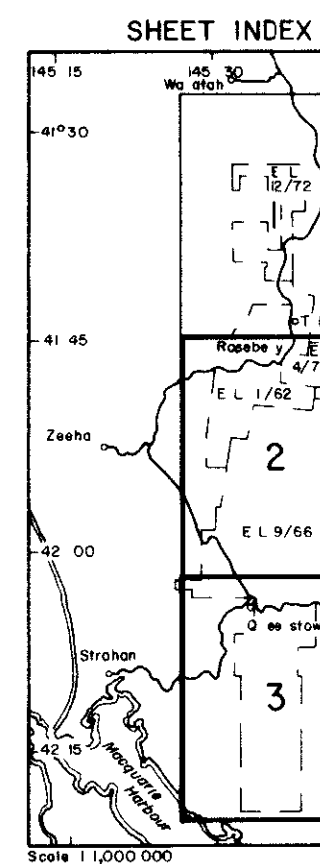
8475



LEGEND

- Geophysical survey
- Geological-Geochemical survey
- Stream sediment survey
- Proposed diamond drill hole
- Diamond drill hole re-assayed

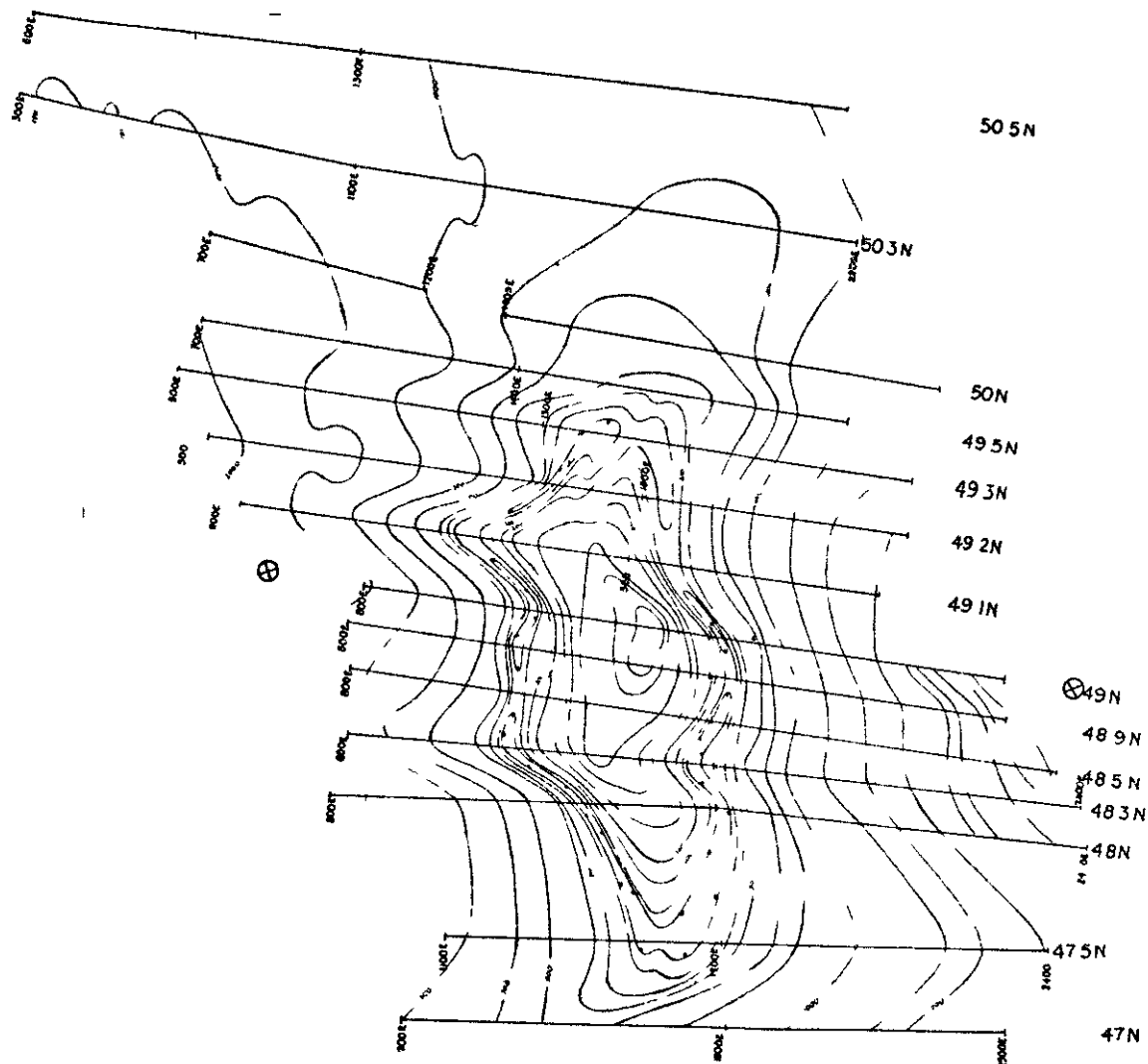
5 cm



- Main Road
- Vehicular Track
- River, Creek
- Railway (abandoned)
- E.L. Boundary
- M.L. Boundary
- Prominent Peak
- Major Mine Working
- Major Mine Abandoned
- Old Workings, Mineral Occurrence
- Alluvial Workings
- Drill Hole
- Exploration Camp

SCALE 1:50,000
KILOMETRES

MT LYELL-GODL-C G FA JOINT VENTURE
E L 9/66
PROPOSED EXPLORATION
1980-81
007100 1170
81-1519 FIG 3



MT LYELL MINING & RAILWAY COMPANY LTD

HENTY FAULT NR QUEENSTOWN TAS

APPLIED POTENTIAL SURVEY

V_p CONTOUR PLAN

SURVEYED & COMPILED BY
SCINTREX

NOVEMBER 1979

SCALE 1:5000

Job No TAS 073 B

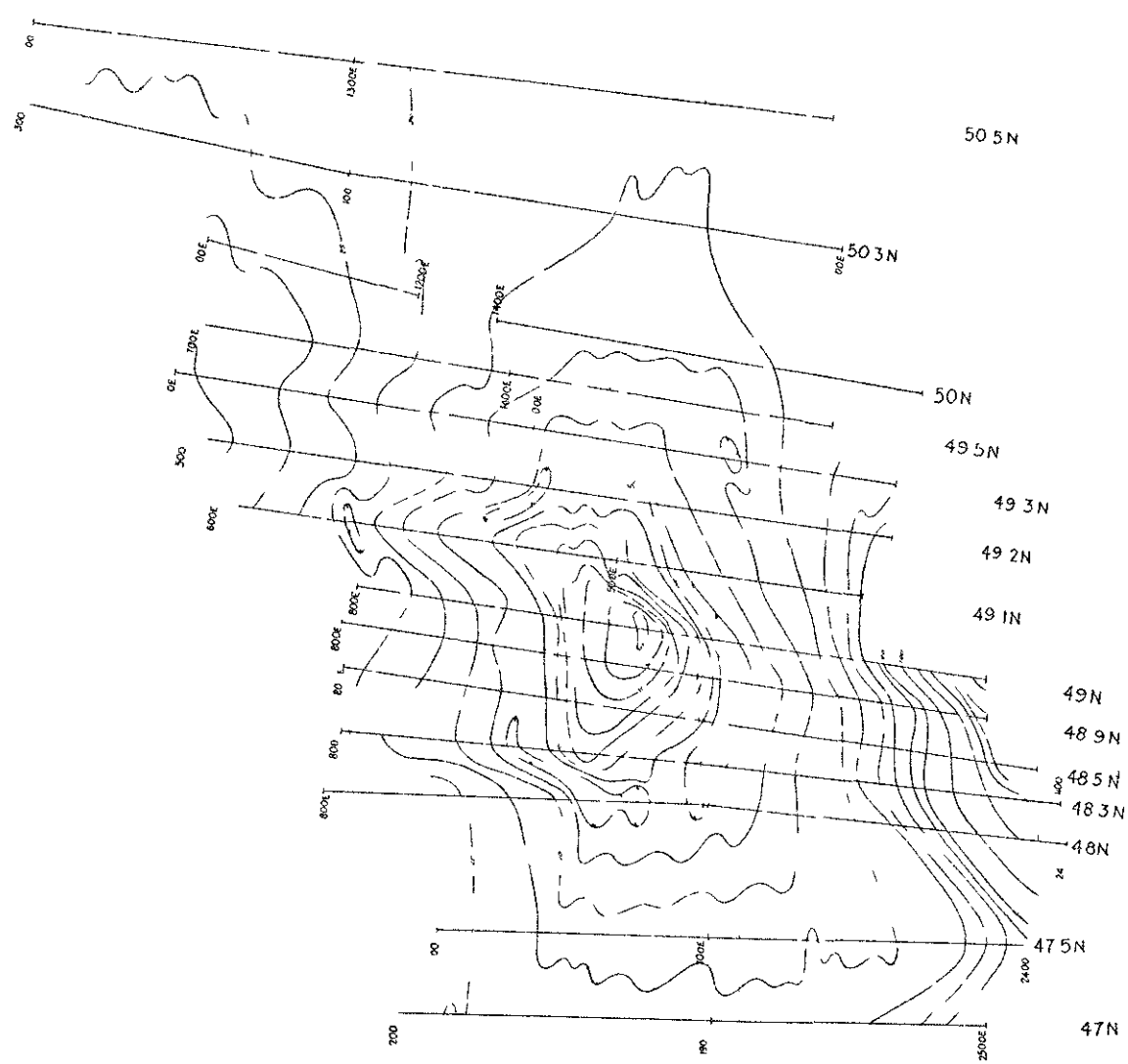
PLATE 1

FIG 4

81-1519

099

007102



MT LYELL MINING & RAILWAY COMPANY LTD

HENTY FAULT
R QUEENSTOWN TA

APPLIED POTENTIAL SURVEY

Vs
CONTOUR PLAN

SURVEYED & COMPILED BY
SCINIREX



NOV MB R 1979

SCALE 1:5000

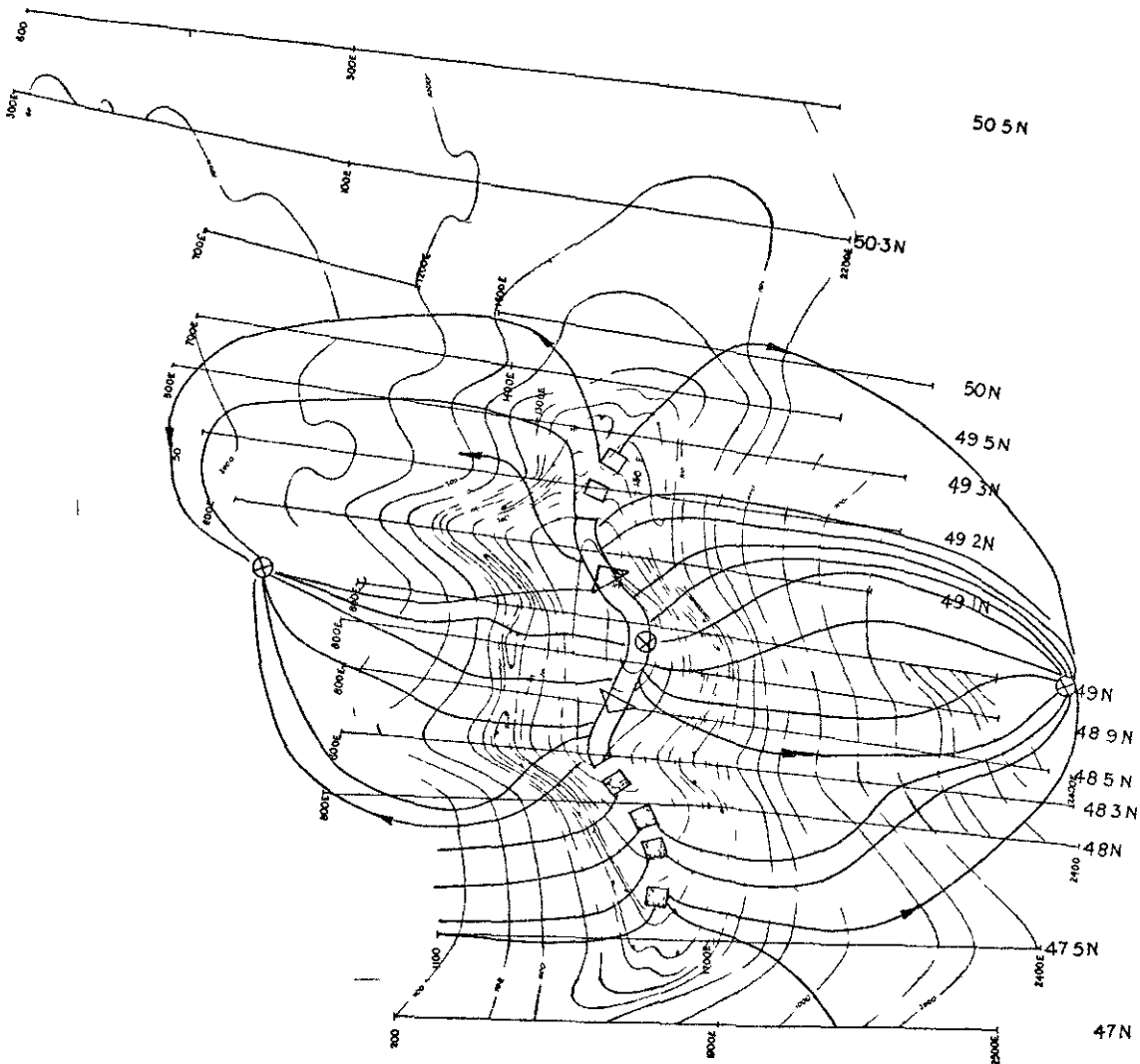
Job N TAS 073B

PLATE 3

5 cm

81-1519

FIG 5



- ⊗ ELECTRODE POSITIONS
 ■ INTERPRETED POSSIBLE EXTREMITIES
 OF MORE RESISTIVE SECTION OF
 SAME BODY
 □ INTERPRETED EXTENT OF MAIN BODY
 → CURRENT PATH

MT LYELL MINING & RAILWAY COMPANY LTD

HENTY FAULT
NR QUEENSTOWN TAS

APPLIED POTENTIAL SURVEY

INTERPRETATION PLAN

SURVEYED & COMPILED BY
SCINTREX



NOVEMBER 1979

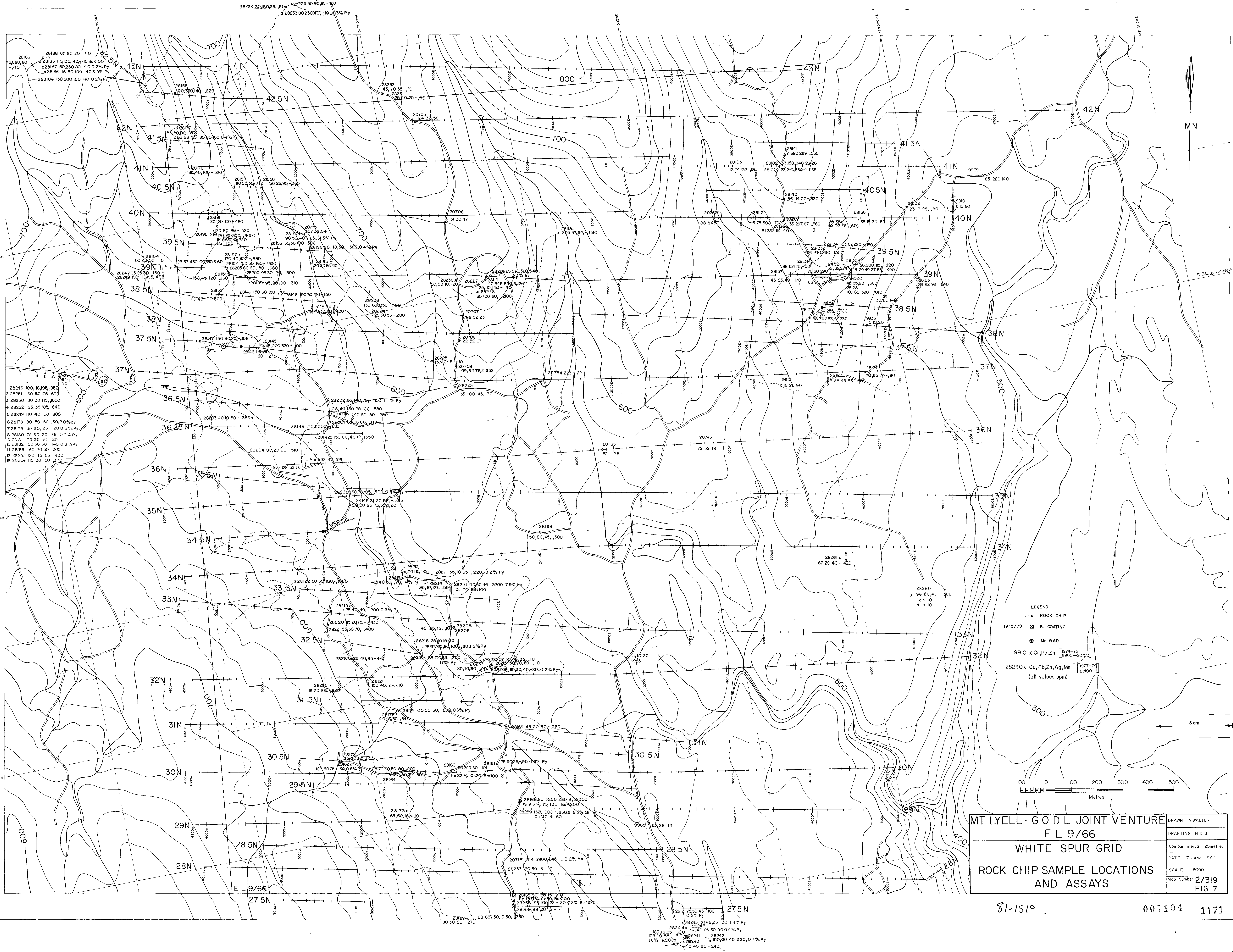
SCALE 1 5000

Job N° TAS 073 B

PLATE 1

5 cm

FIG 6



CHARGEABILITY mV/V

CHARGEABILITY

GROUND MAGNETICS

RESISTIVITY

RESISTIVITY - ohm-metre

SILVER < 2 ppm

COPPER - LEAD - ZINC
PARTS PER MILLION

MANGANESE
PARTS PER MILLION

MANGANESE

ZINC

LEAD

COPPER

DRILLING ASSAYS

metres	TO	Co	Fe	Zn	As	%
50	74	30	124	0.01	880	
60	87	30	86	0.02	970	
70	71	140	840	0.01	240	
80	90	60	112	0.01	910	
90	95	100	104	0.01	780	
92	101	100	104	0.01	890	
94	805	20	105	0.02	750	
96	103	10	107	0.04	710	
98	360	0	98	0.03	820	
100	92	0	90	0.02	860	
102	166	60	91	0.02	930	
1043	94	50	29	0.08	100	
106	114	360	250	0.03	120	
108	102	80	150	0.02	750	
110	152	20	150	0.04	680	
112	131	10	109	0.01	660	
114	181	50	222	0.02	590	
116	115	0	168	0.02	490	
118	233	10	176	0.01	460	
120	138	70	187	0.01	480	
122	104	20	103	0.01	440	
124	128	30	166	0.01	540	
126	130	10	124	0.01	410	
128	95	70	181	0.01	470	
1292	78	40	136	0.01	500	
131	92	20	81	0.01	490	
133	52	60	158	0.01	410	
135	30	0	33	0.02	430	
137	30	10	49	0.01	330	
139	51	0	56	0.02	290	
1406	58	0	44	0.01	280	
143	33	60	160	0.02	350	
145	82	400	900	0.01	300	
147	33	260	590	0.01	340	
149	143	310	1100	0.02	290	
151	29	120	370	0.01	430	
1534	44	40	68	0.01	450	
155	51	60	64	0.01	350	
157	32	30	91	0.01	430	
159	61	80	300	0.01	400	
161	45	140	235	0.01	440	
163	48	180	540	0.01	430	
165	19	300	550	0.01	430	
167	30	100	386	0.01	470	
169	8	100	185	0.02	460	
171	54	110	325	0.01	440	
173	20	50	82	0.01	420	
174.7	102	50	53	0.01	430	
177	59	50	31	0.02	480	
179	17	60	160	0.01	400	
181	26	40	58	0.03	450	
185	18	90	132	0.01	390	
186	19	30	74	0.02	510	
189	33	440	70	0.02	450	
191	27	330	440	0.02	470	
193	73	170	230	0.01	420	
195	29	40	46	0.02	400	
197	100	20	44	0.03	440	
199	18	20	33	0.01	410	
201	21	20	47	0.01	410	
2015	28	30	34	0.01	490	

NB ALL Ag ASSAYS LESS THAN 2 ppm

BULK ASSAYS

metres	TO	g/t	g/t	g/t	g/t	%
104.3	02	0.01	0.01	0.01	0.01	
109.2	02	0.01	0.01	0.01	0.01	
140.6	02	0.01	0.01	0.01	0.01	
153.4	02	0.01	0.01	0.01	0.01	
174.7	02	0.01	0.01	0.01	0.01	
2010	02	0.01	0.01	0.01		



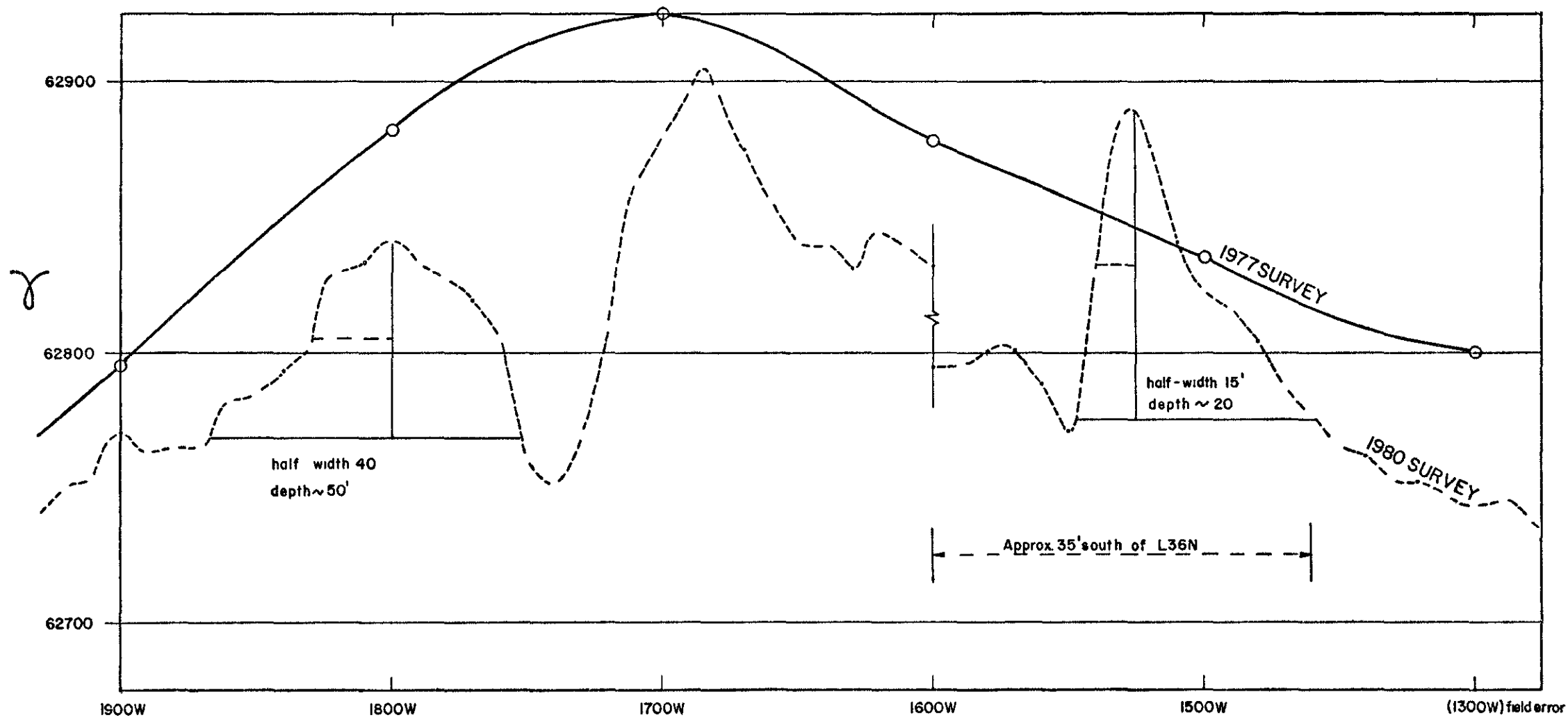
81-1519

FIG 9

WHITE SPUR GRID
LINE 36 N
DIPOLE-DIPOLE ARRAY

DRAFTSMAN P.J.R

SCINTREX REPORT TAS-073D



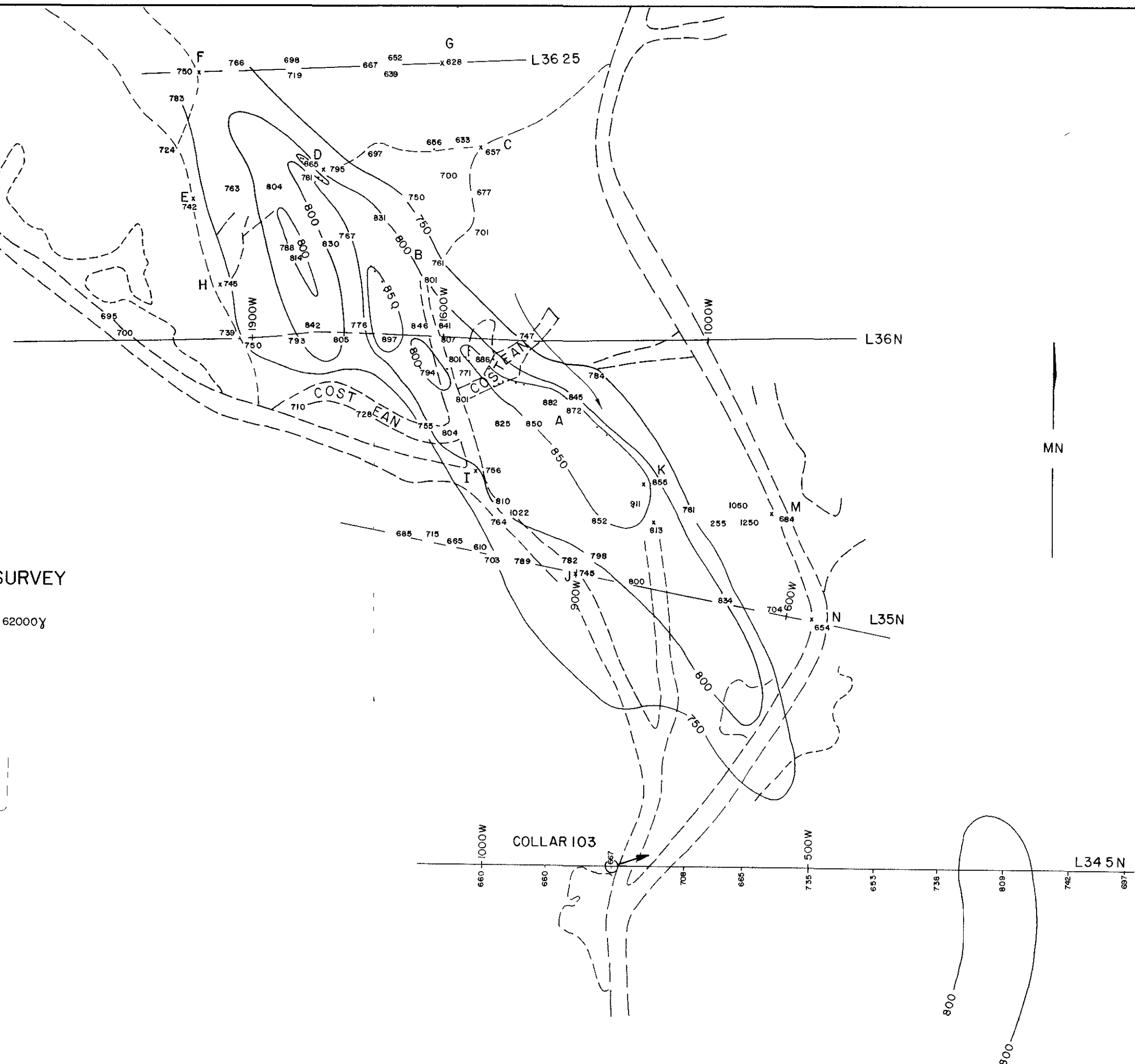
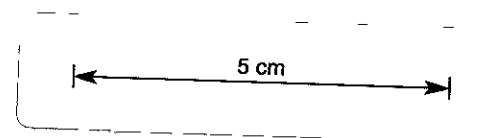
WHITE SPUR GRID
L36N
1300W - 1900W
GROUND MAGNETIC PROFILE

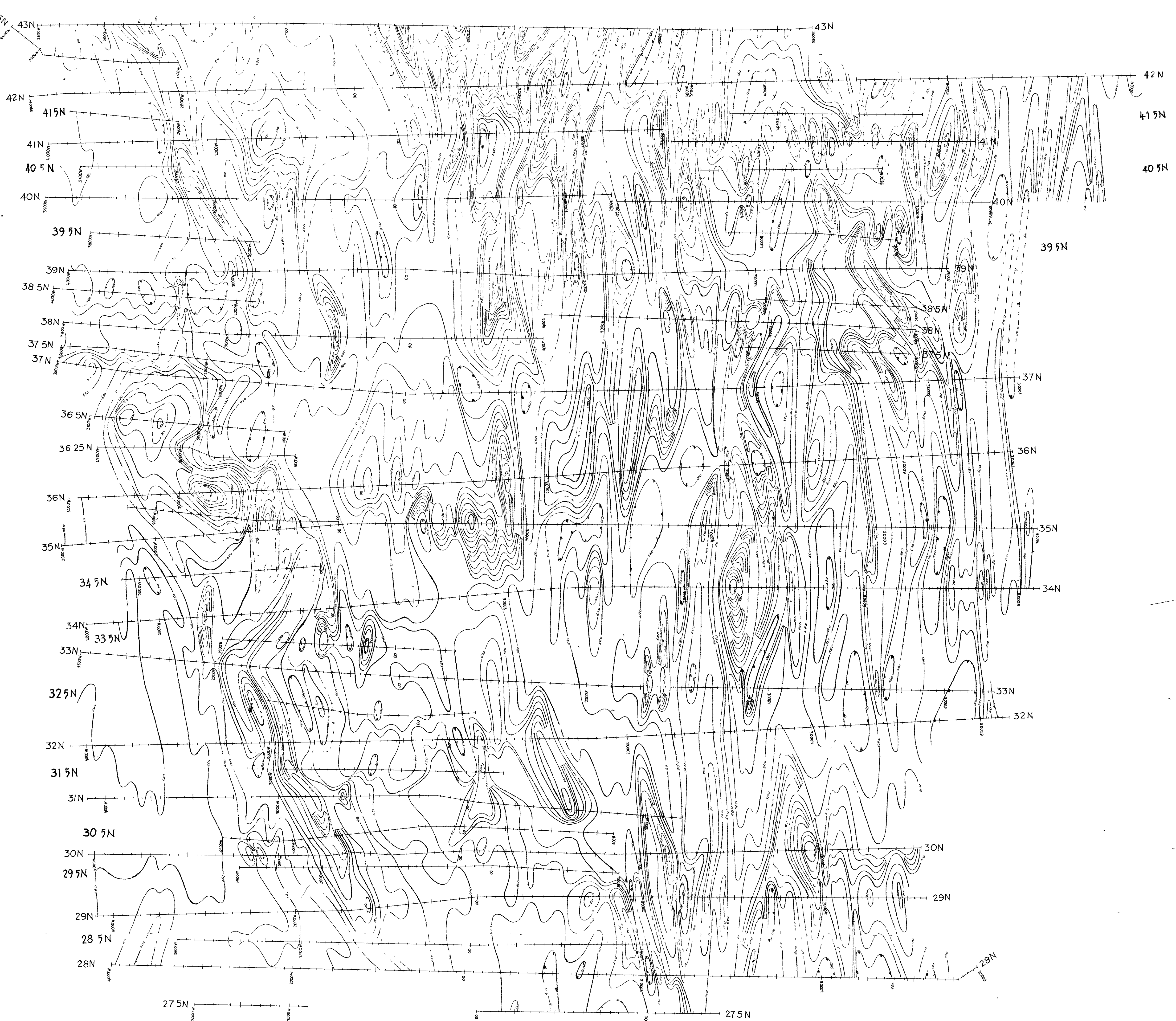
FIG 10

81-1519

007107

L34 5 N VALUES FROM SCINTREX 1979
SURVEY OTHER VALUES FROM DETAILED
SURVEY MT LYELL 1980
APPROX SCALE 1 = 150
C 1 - 50%



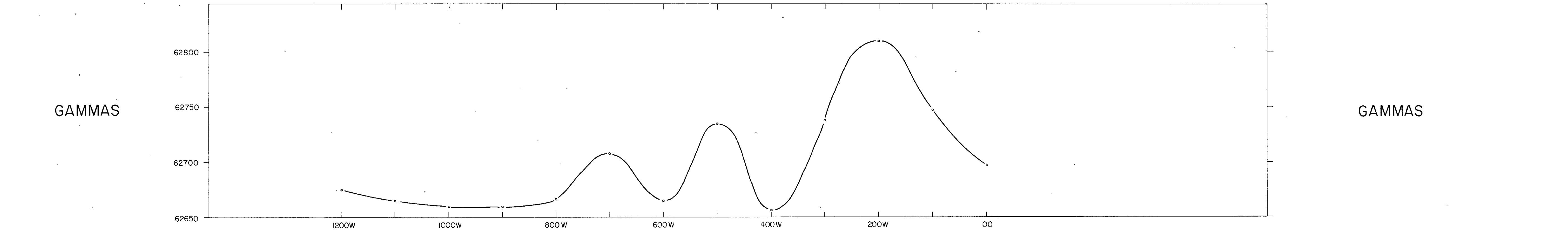


MOUNT LYELL MINING & RAILWAY COMPANY LTD
WHITE SPUR GRID
NR QUEENSTOWN - TASMANIA
TOTAL MAGNETIC FIELD
CONTOUR PLAN
BASE 62,000 GAMMA

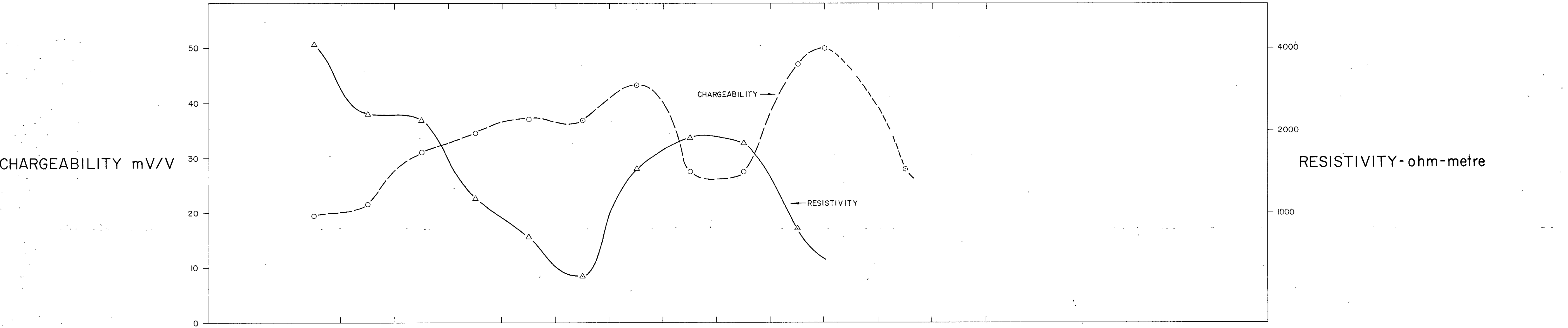
SURVEYED & COMPILED BY
SCINTREX
1975 - 1978 1977
SCALE 1:6000

JOB NO TAS-062
-094-
-035
SH 1611 PLATE
MAP NUMBER 2/434

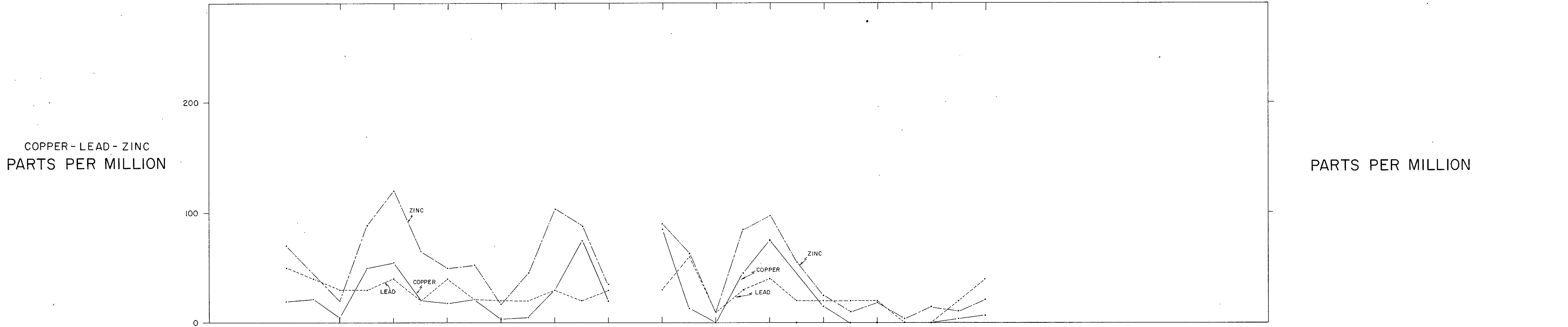
GROUND MAGNETICS



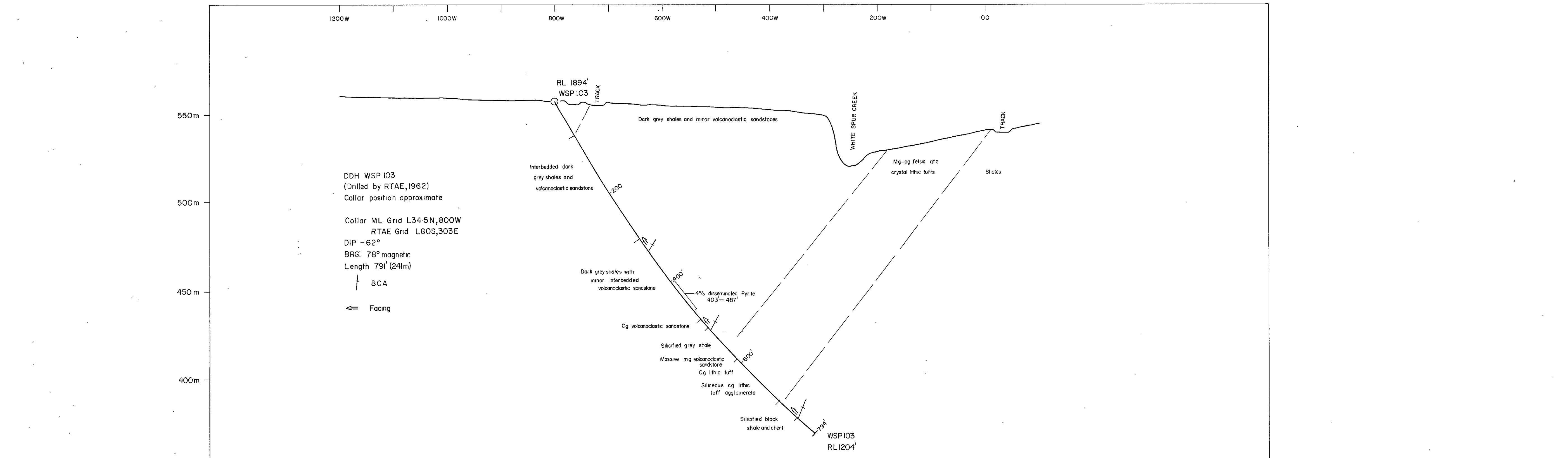
EIP GRADIENT ARRAY



SOIL GEOCHEMISTRY

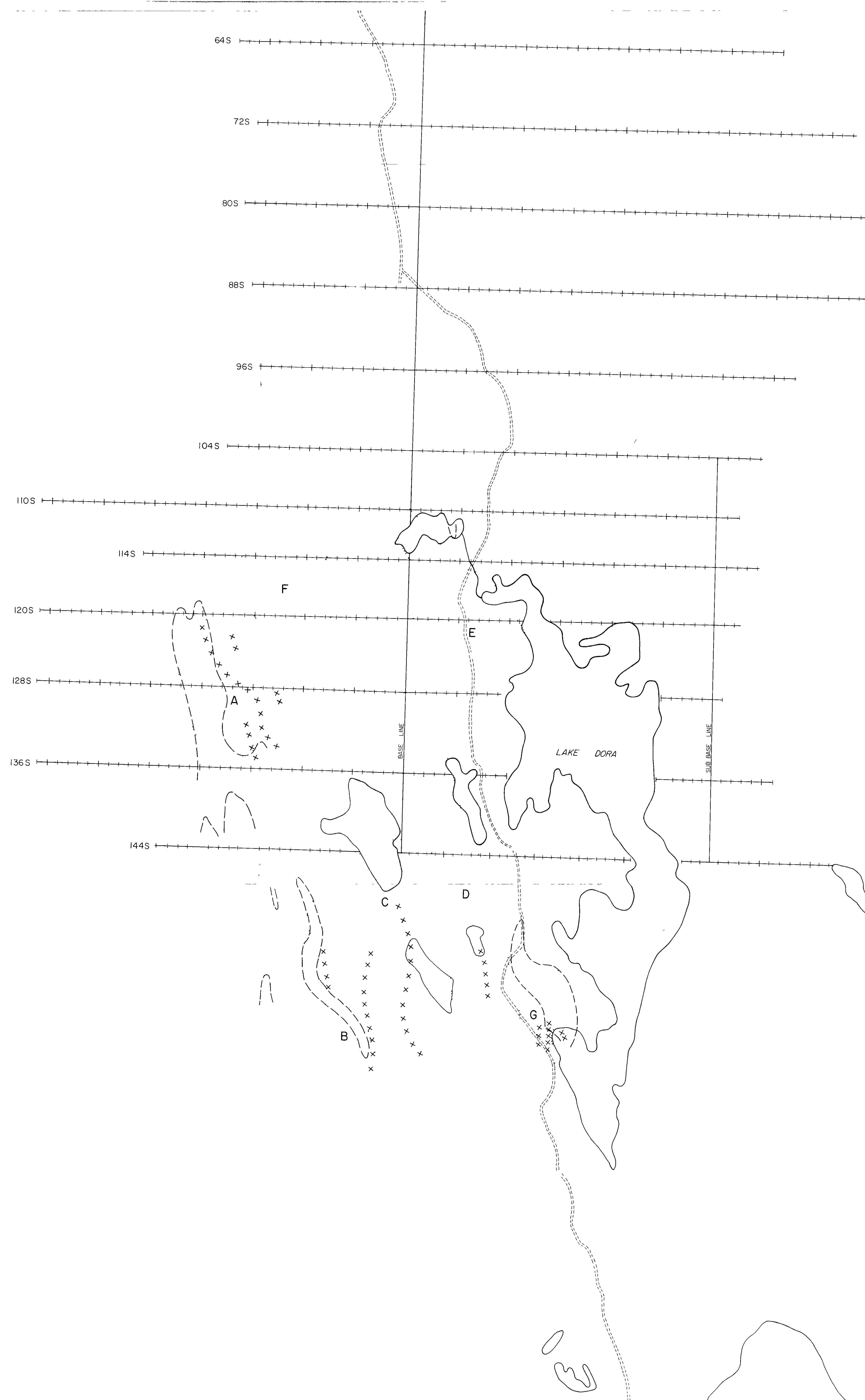


DRILLING PROFILE LINE 34.5N



007110
5 cm

MT. LYELL - G.O.D.L. JOINT VENTURE E.L. 9/66		Revision
WHITE SPUR GRID 1175		
DRILLING PROFILE LINE 34.5N		
DDH WSP103		
EIP, SOIL, GEOCHEMISTRY & GROUND MAGNETIC DATA BY MT LYELL DRILL LOG FROM RTAE 1962, STEVENS-HOARE 1975		Map Number 2/508
Scale 1" = 100' 1/1200	Date 26-6-1980	
Drawn by A. WALTER	Draftsman H.D.J.	FIG: 13



GEOCHEMISTRY

SOIL ANOMALIES

GEOPHYSICS

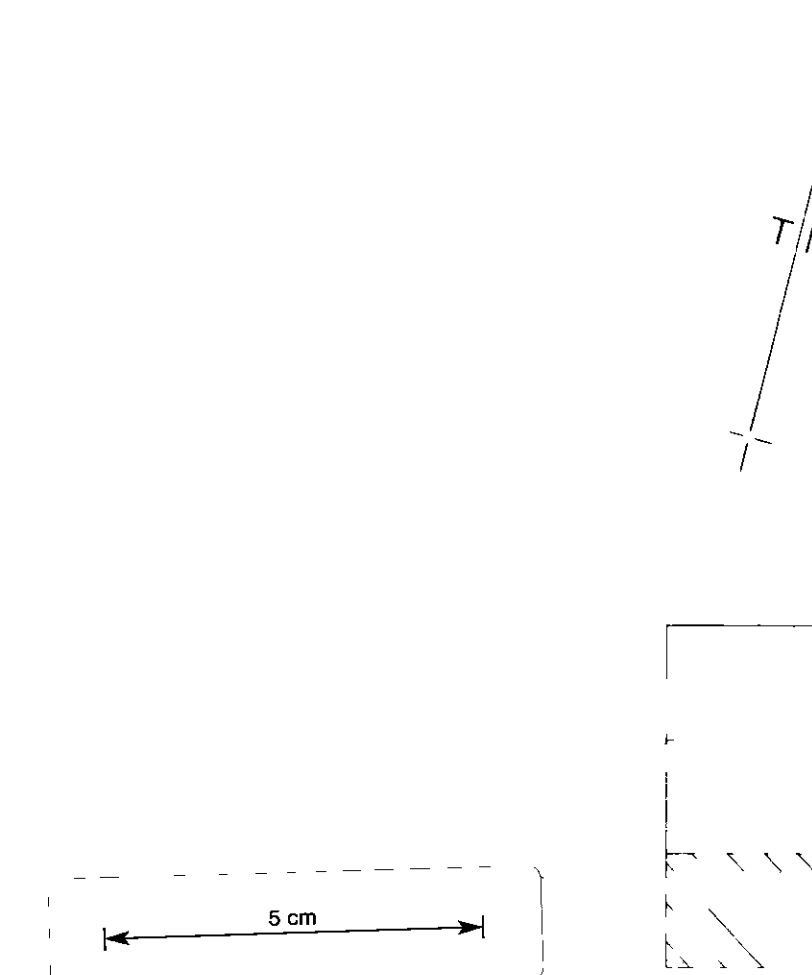


TURAM PHASE/RATIO



GROUND MAGNETICS AXIS

NB RTAE grid not shown



SHEET 3 OF 3

00111

MT LYELL - G O D L JOINT VENTURE

E L 9/66

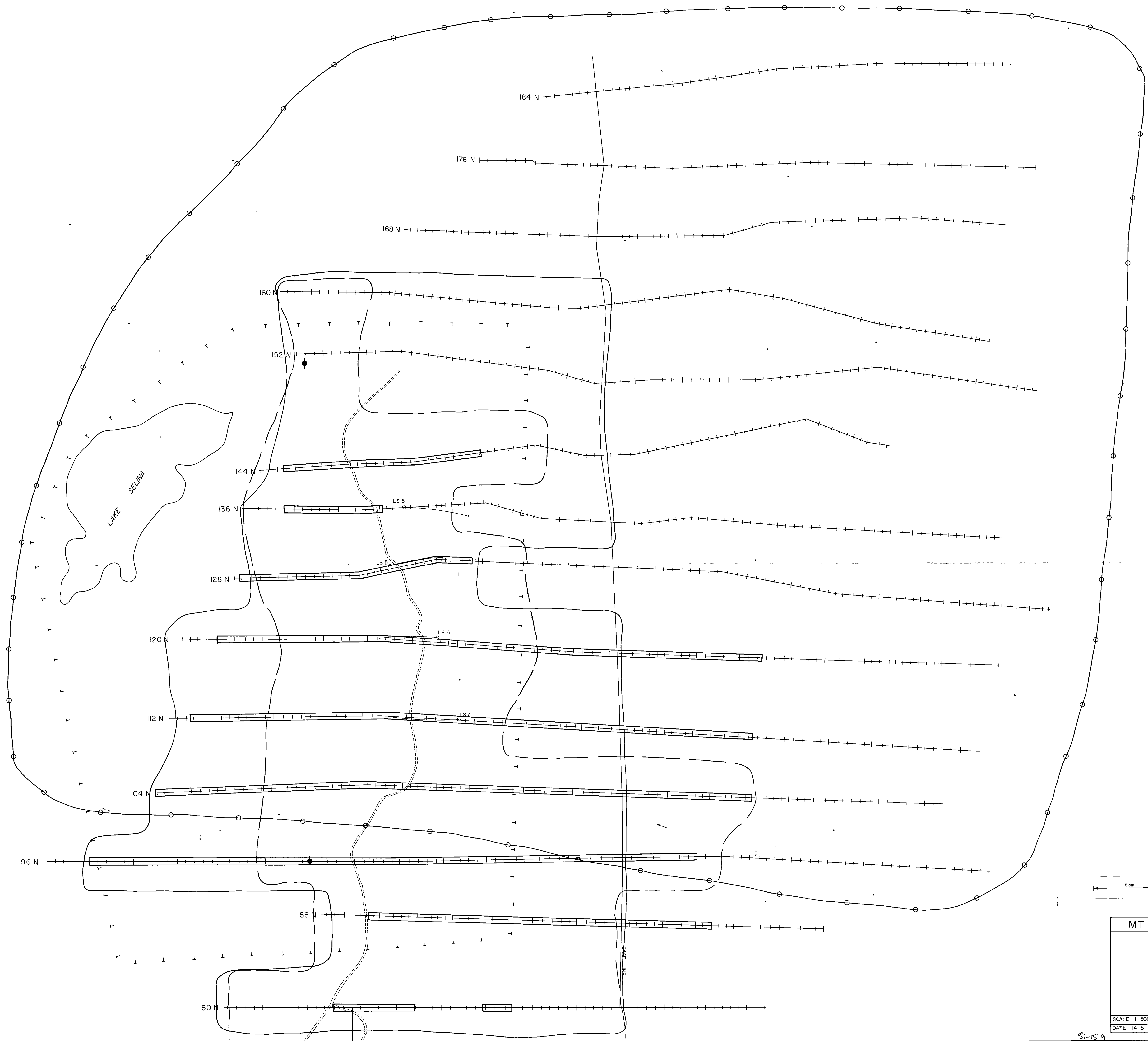
DORA GRID

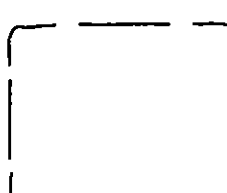
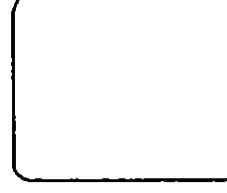
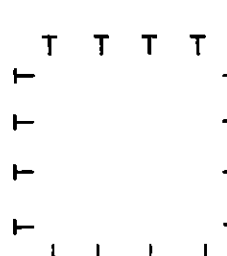
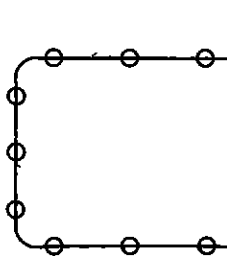
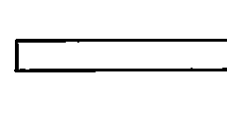
RTAE ANOMALIES

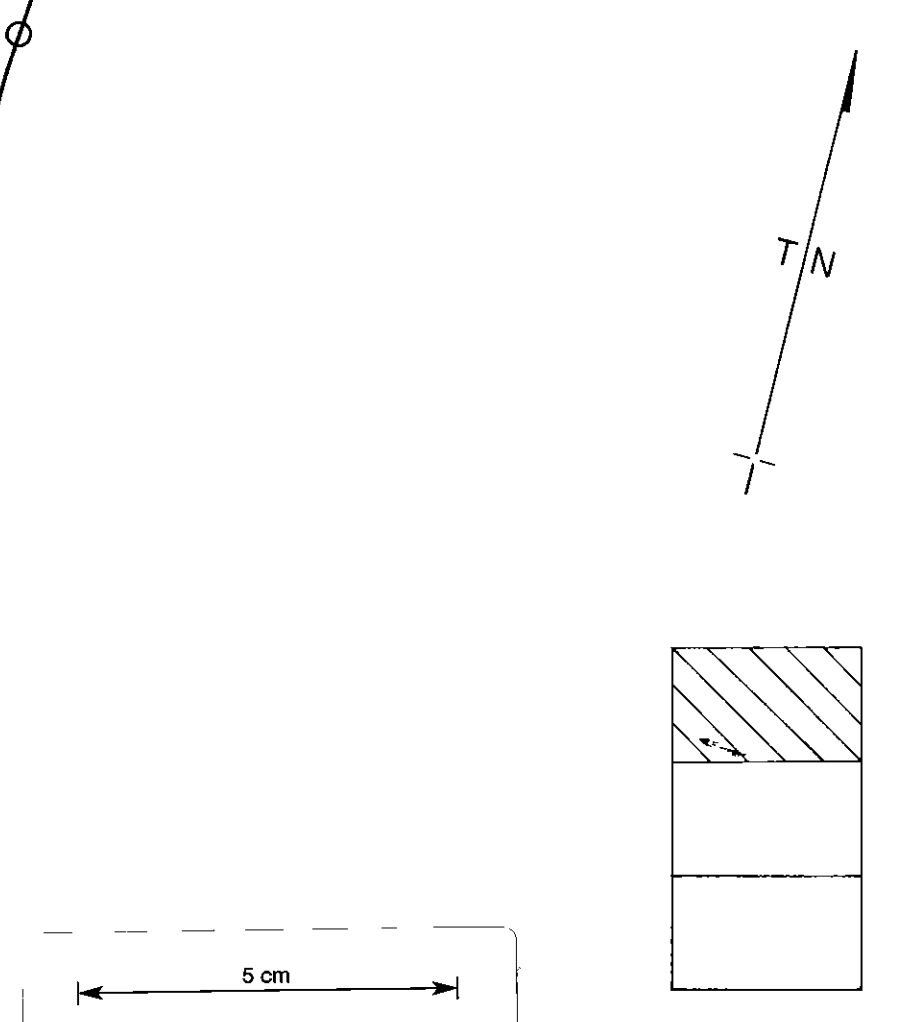
1176

SCALE 1:5000 MAP No 8/402
DATE 14-5-1980 DRAFTSMAN P J R FIG 14

31-1519



-  EIP
-  ELECTRICAL SOUNDINGS
-  MAGNETICS
-  TURAIR
approx loop position
-  DIGHEM
-  SOIL SAMPLING
-  DIAMOND DRILL HOLE
-  PEG SPACING-100'



SHEET 1 OF 3

007112

MT LYELL - G O D L JOINT VENTURE

EL 9/66

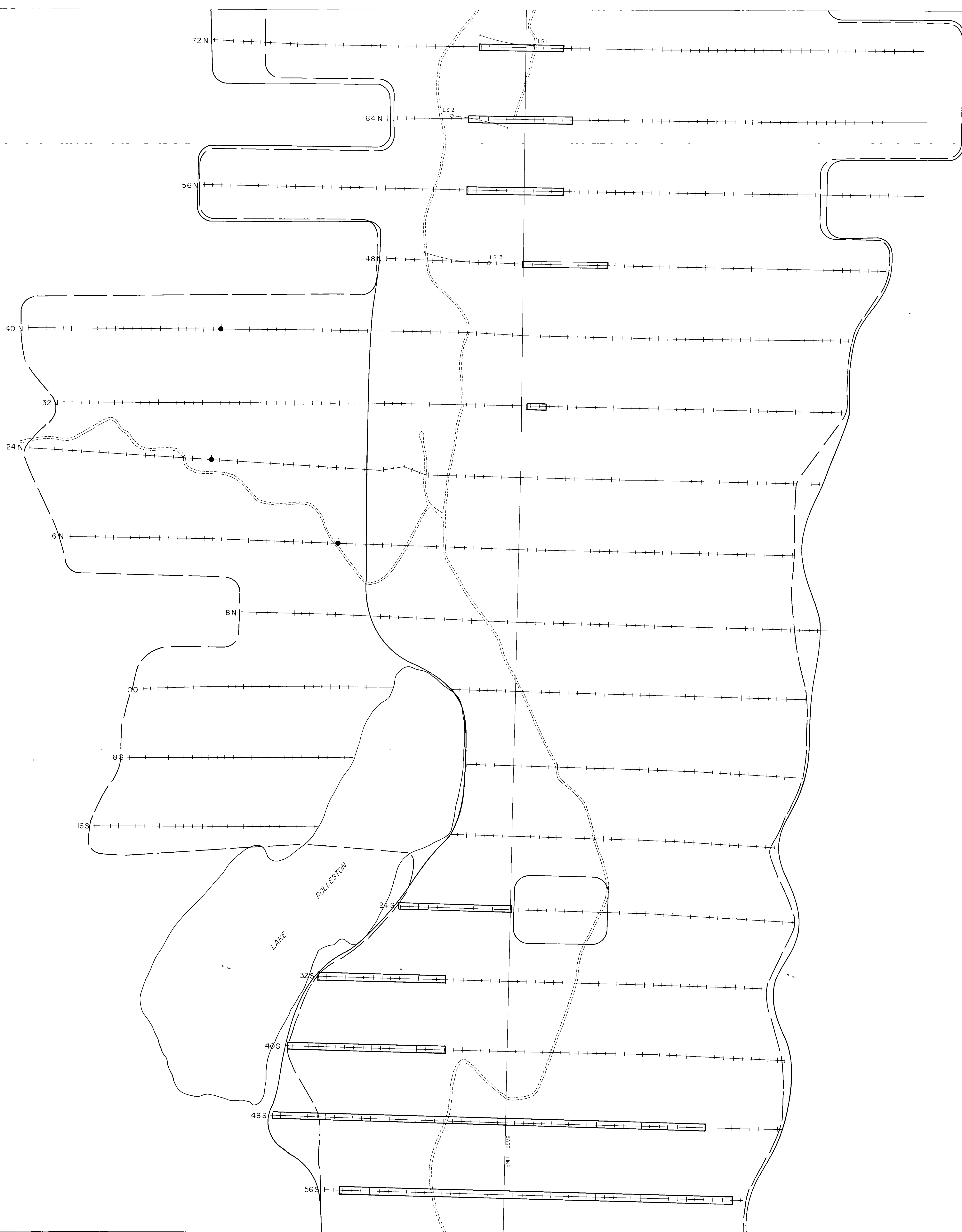
SELINA GRID

1969-80

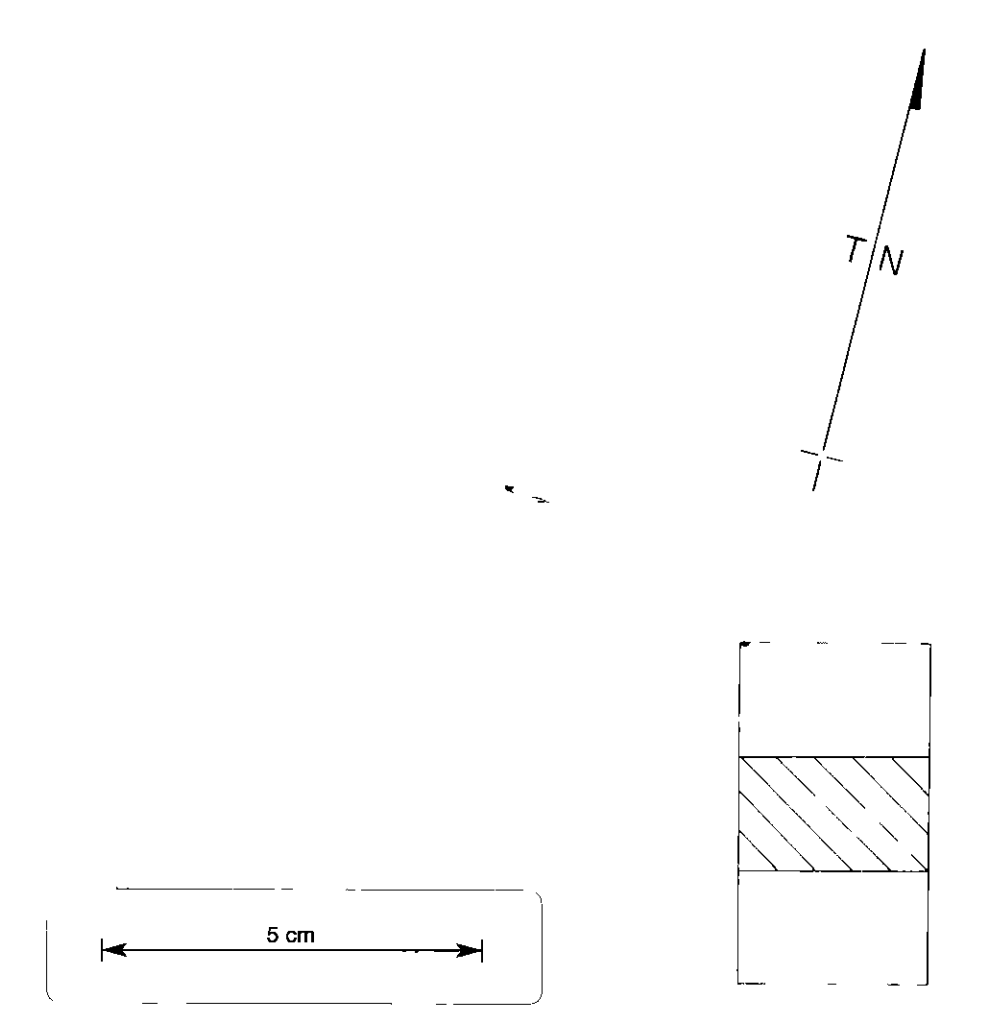
WORK COMPLETED

11/7

SCALE 1:5000	DRAWN M.J.H.	MAP No 6/009
DATE 14-5-1980	DRAFTSMAN P.J.R.	FIG 15



- EIP
- ELECTRICAL SOUNDINGS
- MAGNETICS
- SOIL SAMPLING
- DIAMOND DRILL HOLE
- PEG SPACING-100'



SHEET 2 OF 3

007112

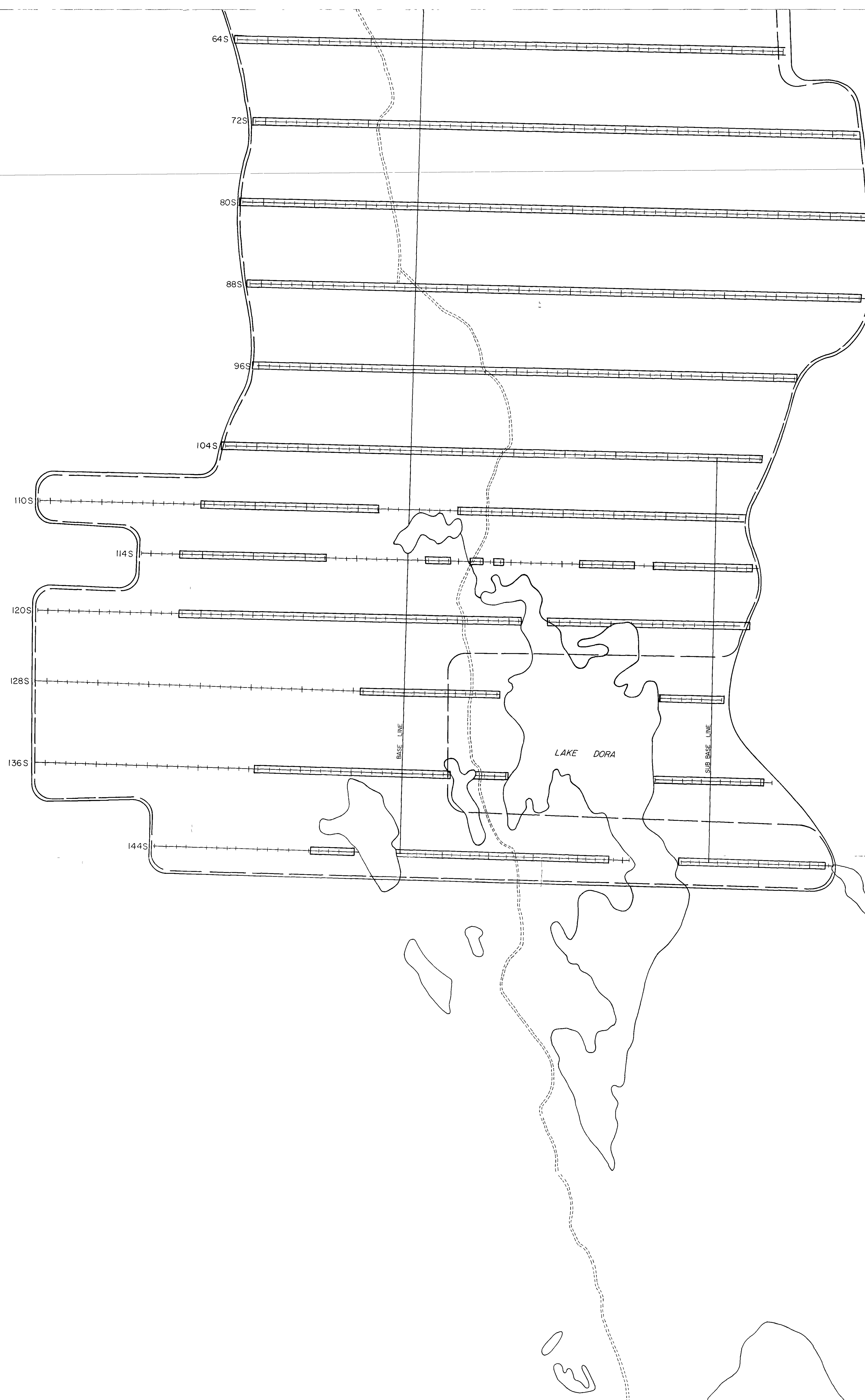
MT LYELL - G O D L JOINT VENTURE
E L 9/66

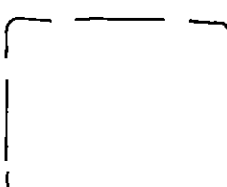
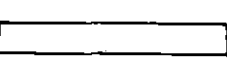
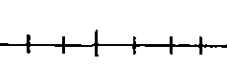
ROLLESTON GRID
1969-80
WORK COMPLETED

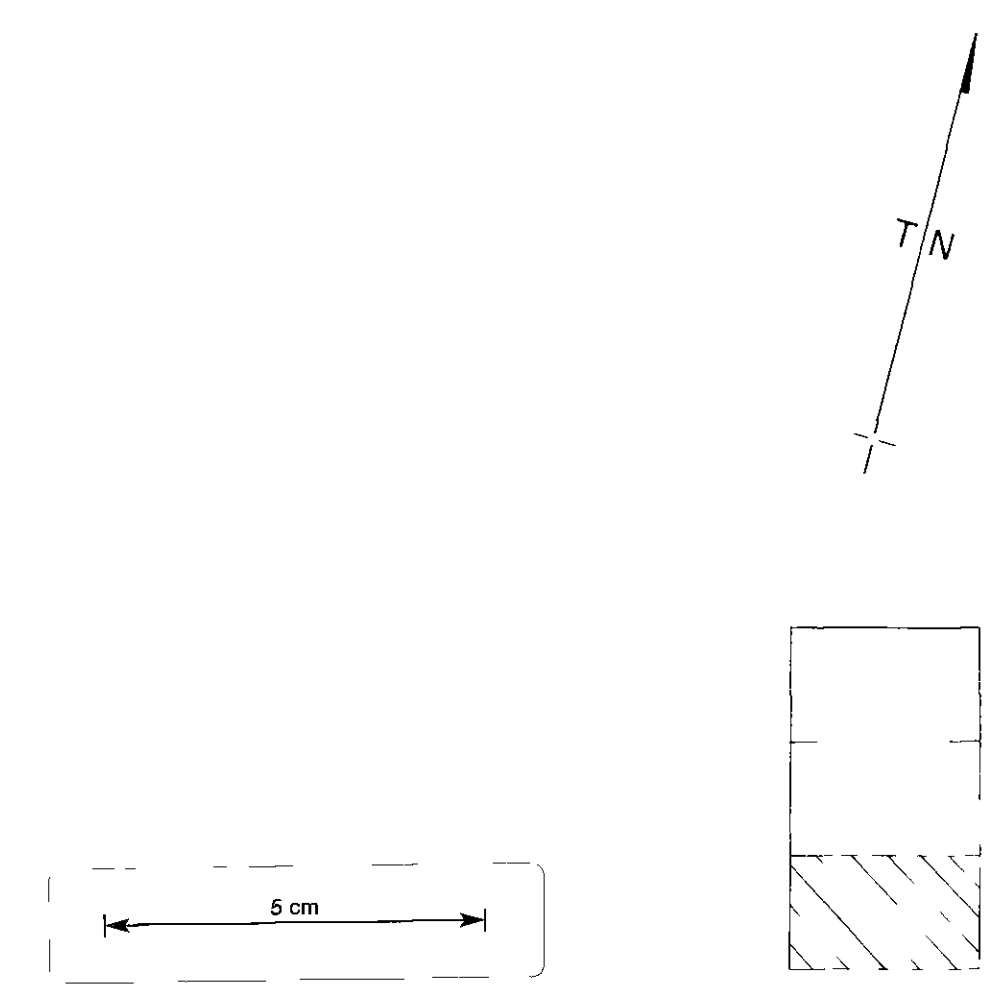
1178

SCALE 1:5000	DRAWN M.J.H.	MAP No 77006
DATE 14-5-1980	DRAFTSMAN P.J.R.	FIG 16

81-1519



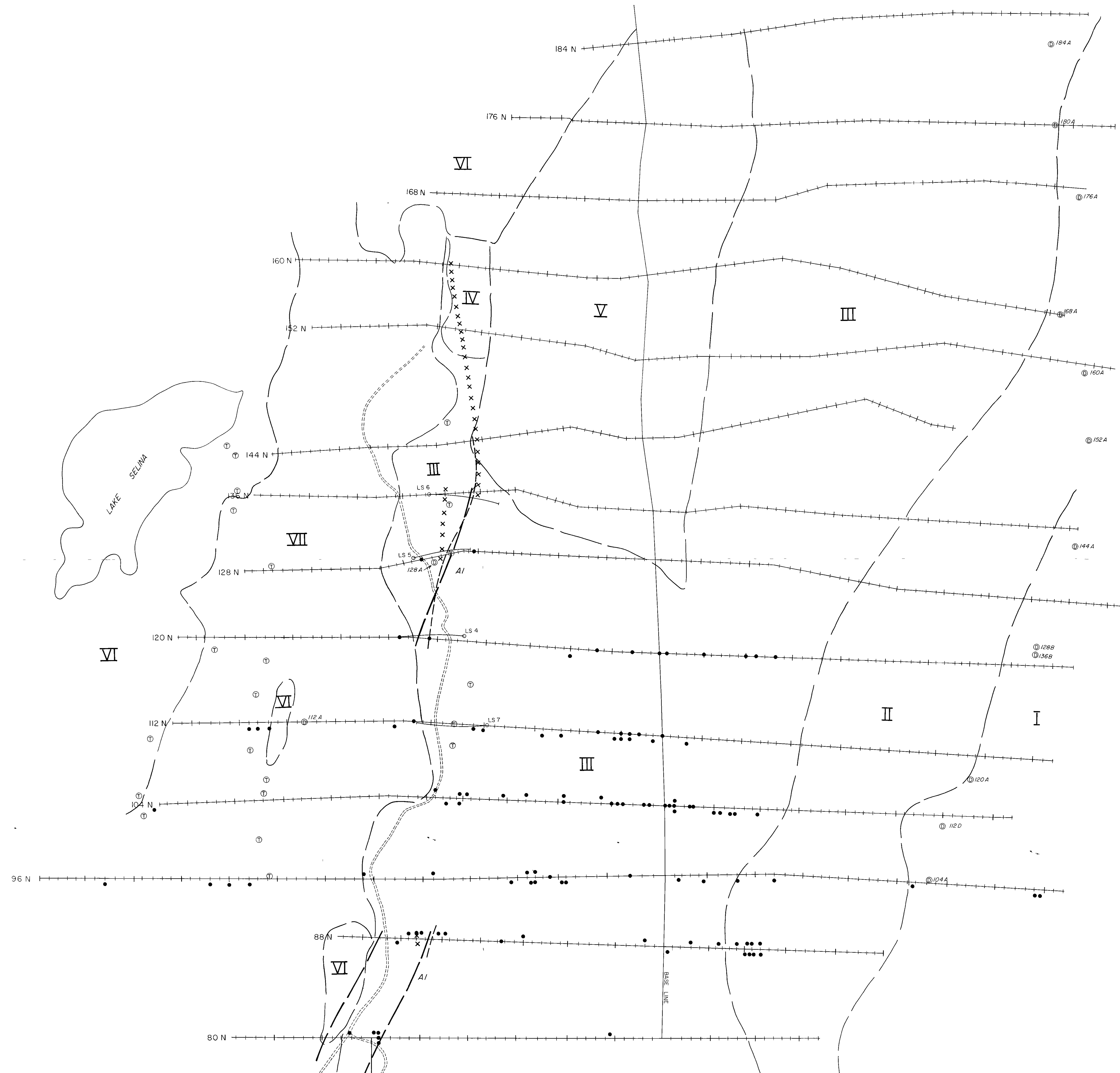
-  EIP
-  MAGNETICS
-  SOIL SAMPLING
-  PEG SPACING-100'



SHEET 3 OF 3 007111

MT LYELL-G O D L JOINT VENTURE		
E L 9/66		
DORA GRID		
1969-80		
WORK COMPLETED		
SCALE 1:5000	DRAWN M J H	MAP No 87009
DATE 14-5-1980	DRAFTSMAN P J R	FIG 17

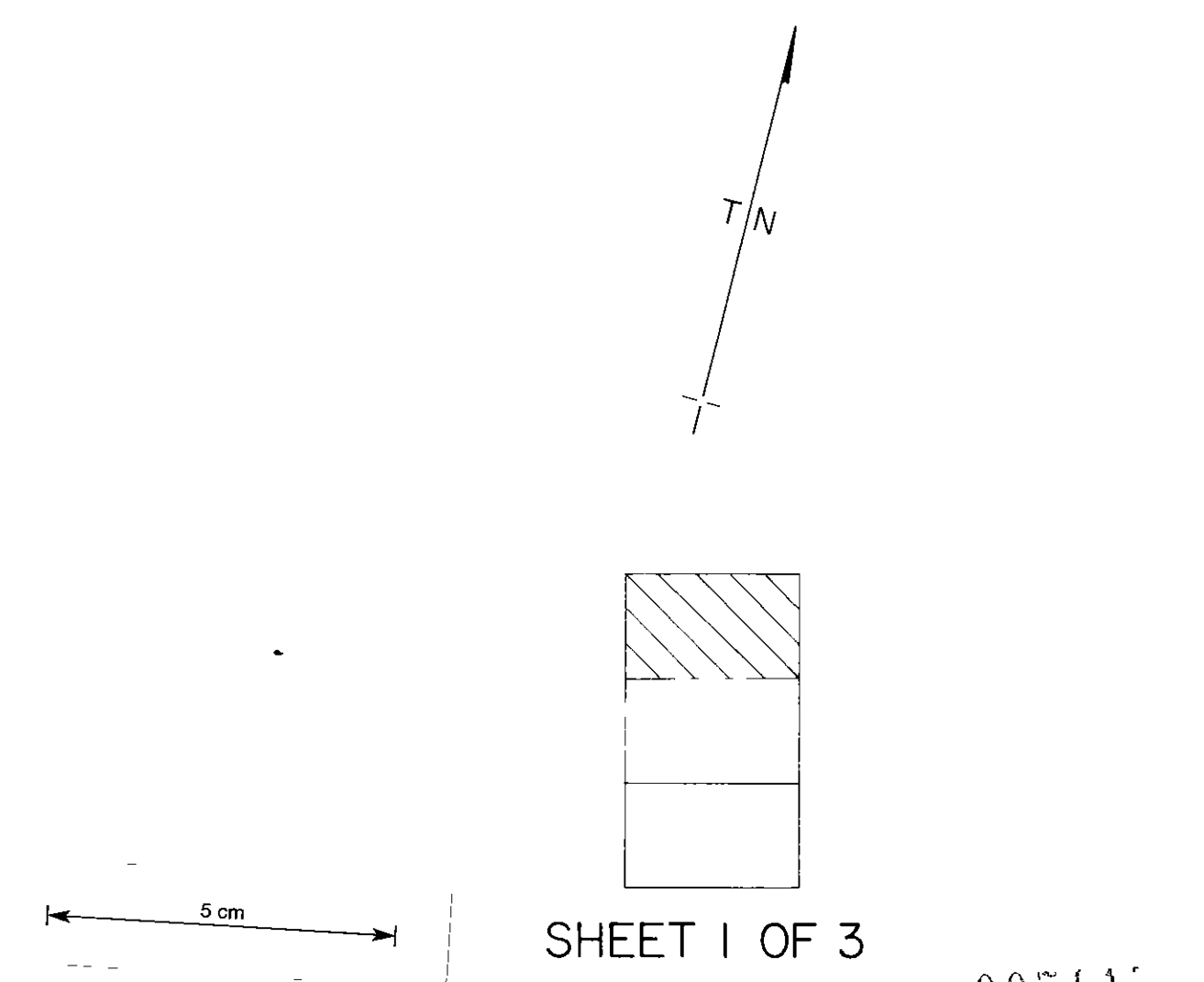
81-1519



- GEOLOGY**
- PLEISTOCENE **VII** MORaine
 - ORDOVICIAN **VI** OWEN CONGLOMERATE
 - UPPER CAMBRIAN **V** JUKES CONGLOMERATE
 - CAMBRIAN **IV** CHERT
 - III** VOLCANICS
 - LOWER CAMBRIAN **II** SEDIMENTS
 - PRECAMBRIAN **I** QUARTZITES & SCHISTS

- GEOPHYSICS**
- x x x x x MAGNETIC AXIS
 - CHARGEABILITY AXIS
 - - - CONDUCTIVITY AXIS
 - ① TURAIR ANOMALY approx position
 - ② DIGHEM ANOMALY approx position

- GEOCHEMISTRY**
- Cu ≥ 150 ppm
 - Pb ≥ 250 ppm
 - Zn ≥ 300 ppm
 - DIAMOND DRILL HOLE
 - PEG SPACING—100'



SHEET 1 OF 3

MT LYELL - G O D L JOINT VENTURE
E L 9/66

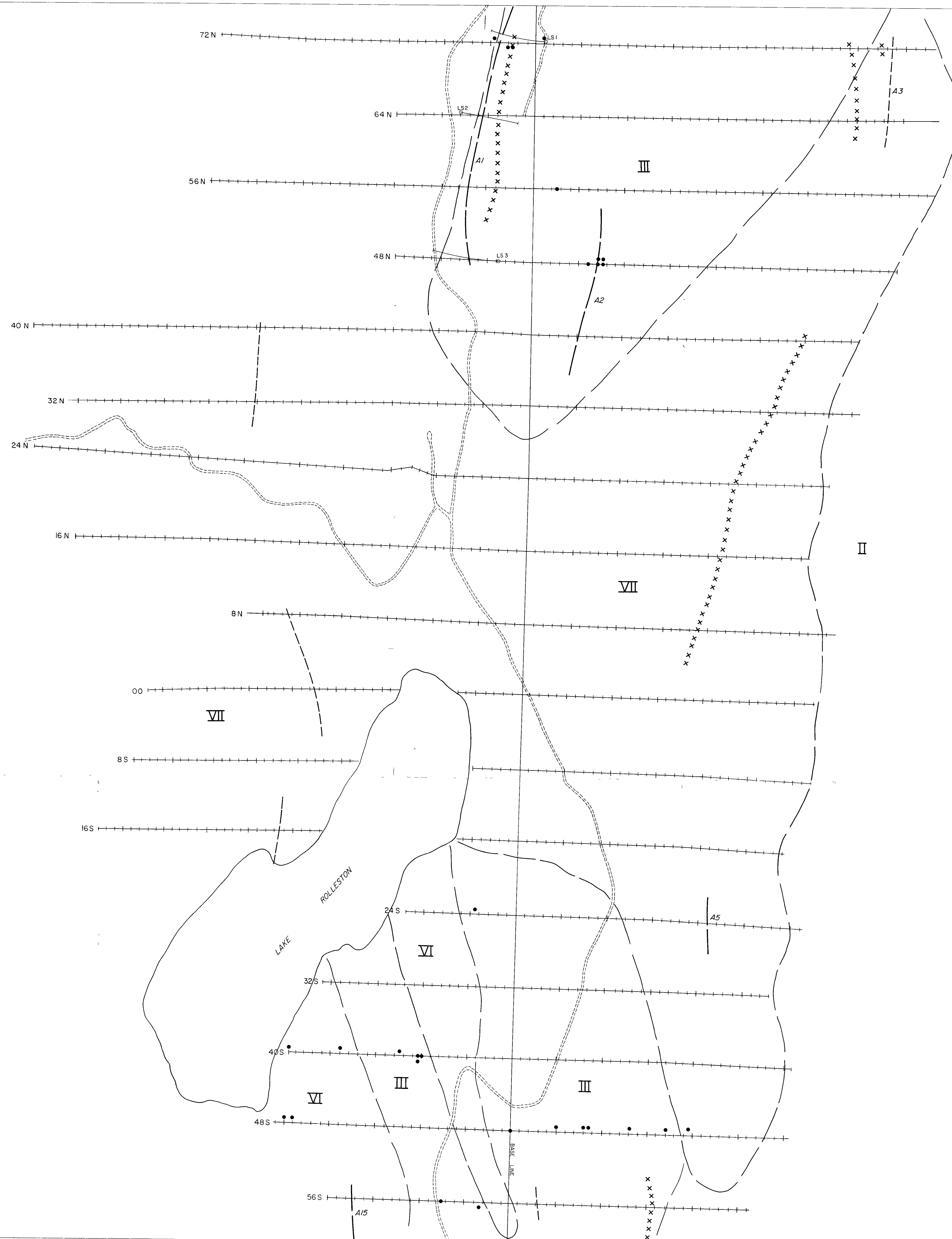
SELINA GRID

ANOMALY COMPILATION

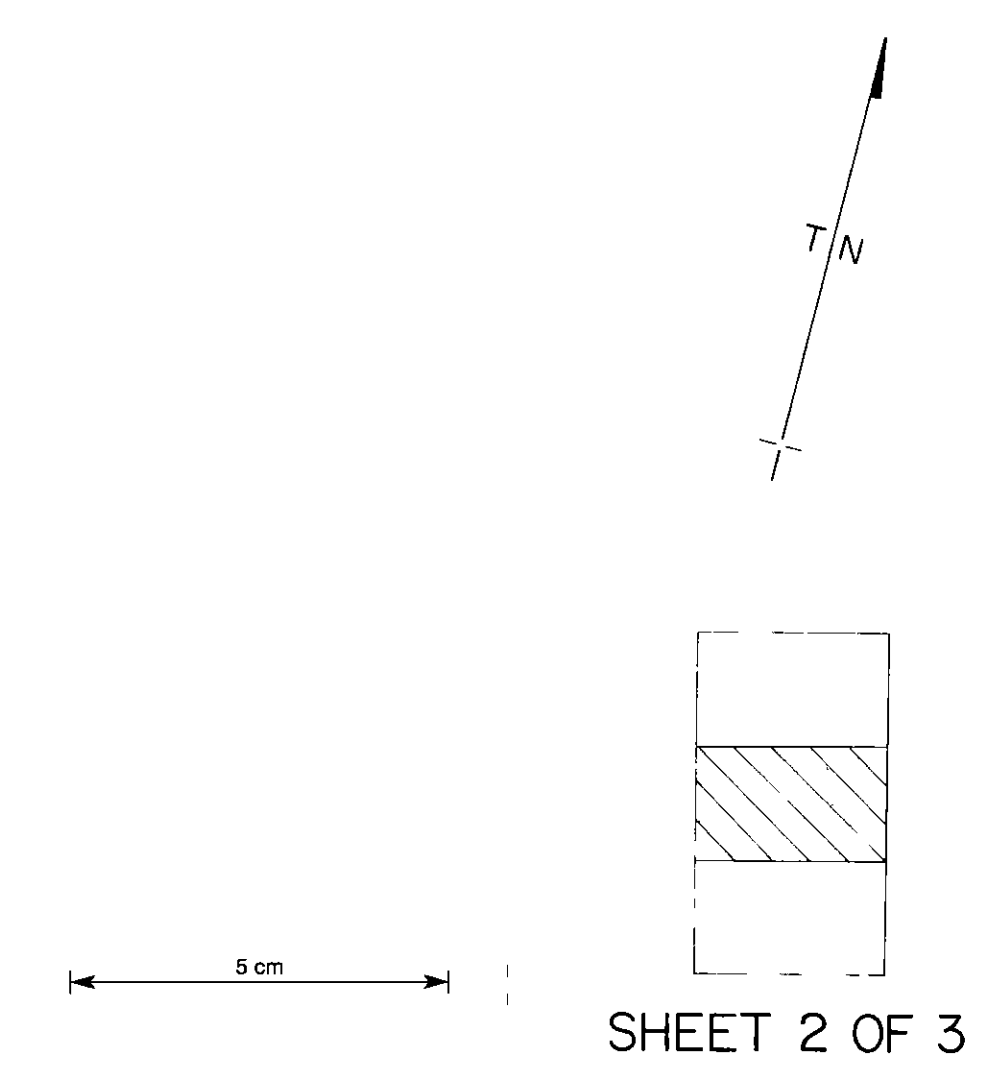
1180

SCALE 1:5000 DRAWN M J H MAP No 6/407
DATE 14-5-1980 DRAFTSMAN P J R FIG 18

51-1519



- GEOLOGY**
- PLEISTOCENE **VII** MORaine
- ORDOVICIAN **VI** OWEN CONGLOMERATE
- CAMBRIAN **III** VOLCANICS
- LOWER CAMBRIAN **II** SEDIMENTS
- GEOPHYSICS**
- x x x x x MAGNETIC AXIS
- CHARGEABILITY AXIS
- - - - - CONDUCTIVITY AXIS
- GEOCHEMISTRY**
- Cu ≥ 150 ppm
- Pb ≥ 250 ppm
- Zn ≥ 300 ppm
- ——— DIAMOND DRILL HOLE
- +++++ PEG SPACING-100'



SHEET 2 OF 3

007116

MT LYELL - G O D L JOINT VENTURE

EL 9/66

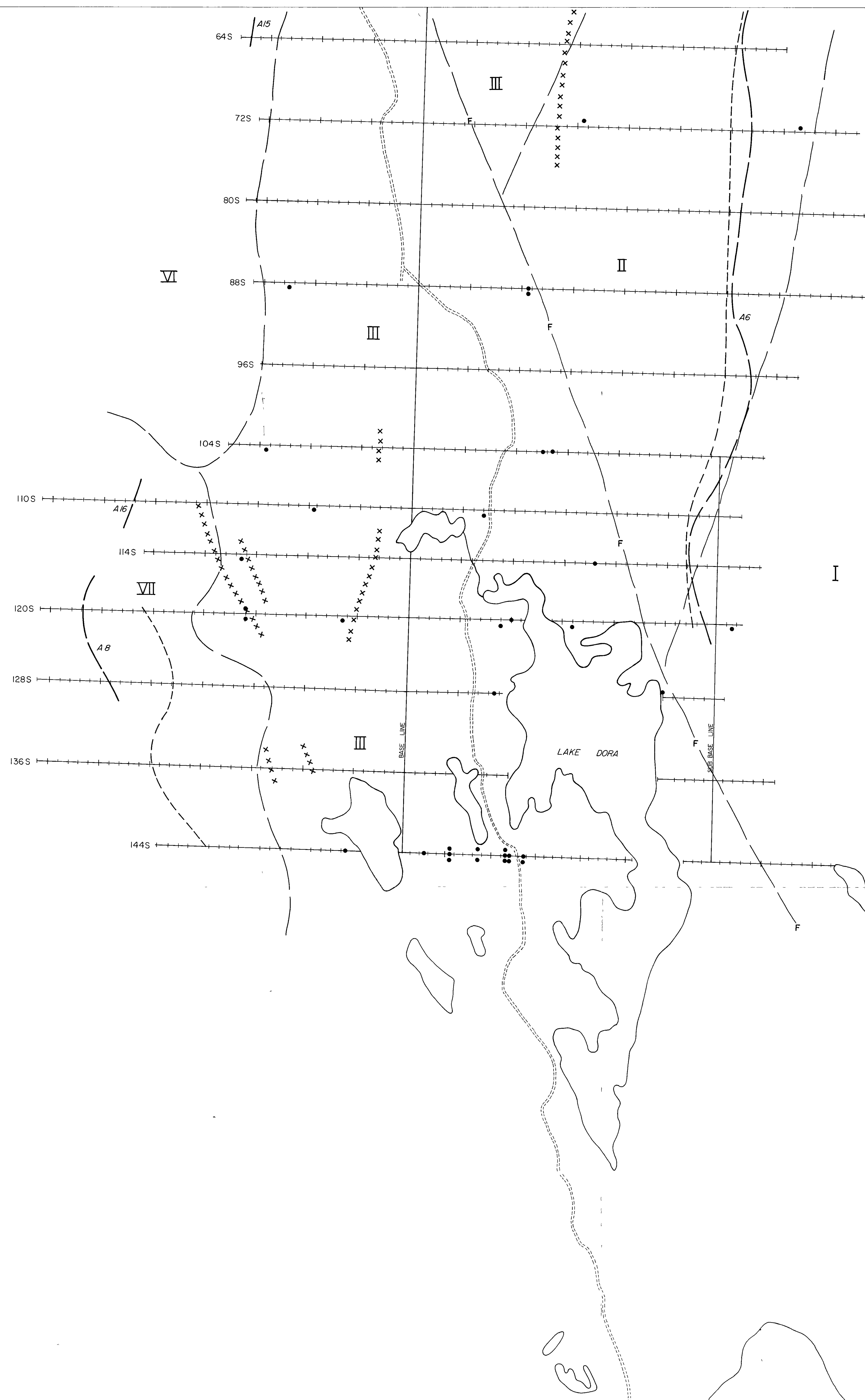
ROLLESTON GRID

ANOMALY COMPILATION

1121

SCALE 1:5000	DRAWN M J H	MAP No 7/403
DATE 14-5-1980	DRAFTSMAN P J R	FIG 19

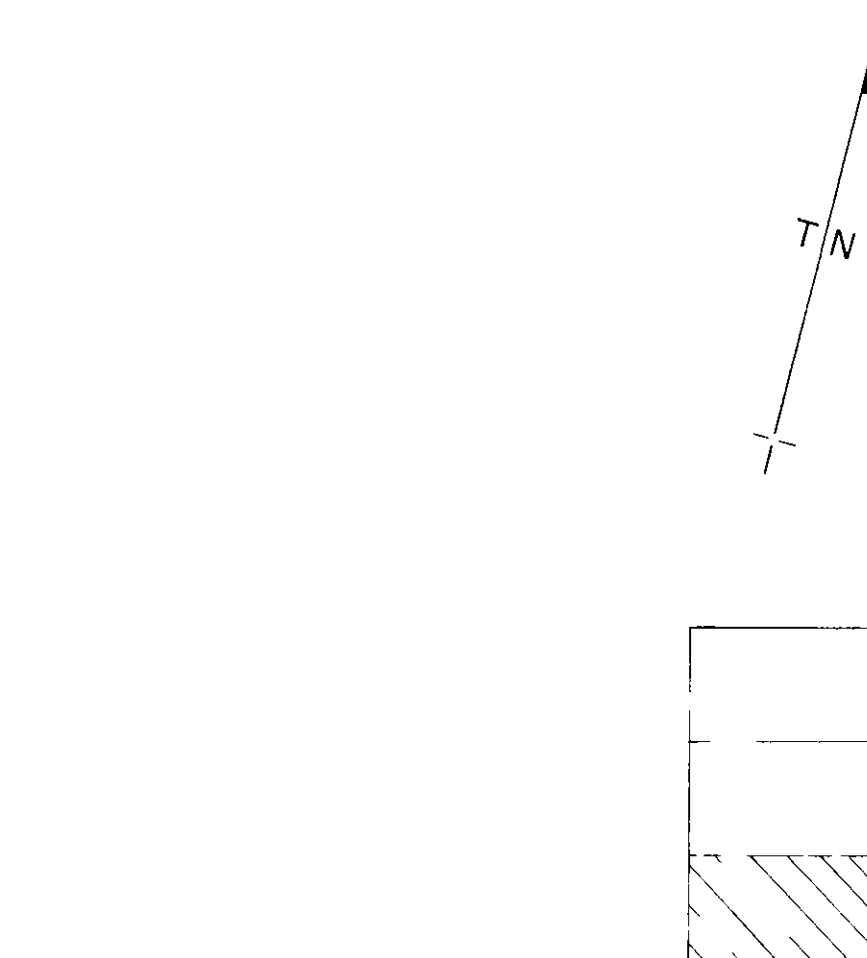
81-1519



- GEOLOGY**
- F — INFERRED FAULT
- PLEISTOCENE **VII** MORaine
- ORDOVICIAN **VI** OWEN CONGLOMERATE
- CAMBRIAN **III** VOLCANICS & VOLCANOCLASTIC SEDIMENTS
- LOWER CAMBRIAN **II** SEDIMENTS
- PRE CAMBRIAN **I** QUARTZITES & SHISTS

- GEOPHYSICS**
- x x x x x MAGNETIC AXIS
- — — CHARGEABILITY AXIS
- - - - - CONDUCTIVITY AXIS

- GEOCHEMISTRY**
- Cu ≥ 150 ppm
- Pb ≥ 250 ppm
- Zn ≥ 300 ppm
- +++++ PEG SPACING—100'



SHEET 3 OF 3

MT LYELL - G O D L JOINT VENTURE		
E L 9/66		
DORA GRID		
ANOMALY COMPILATION		
1182		
SCALE 1:5000	DRAWN M J H	MAP No 8/401
DATE 14-5-1980	DRAFTSMAN P J R	FIG 20

81-1519

81-1519

103

007118

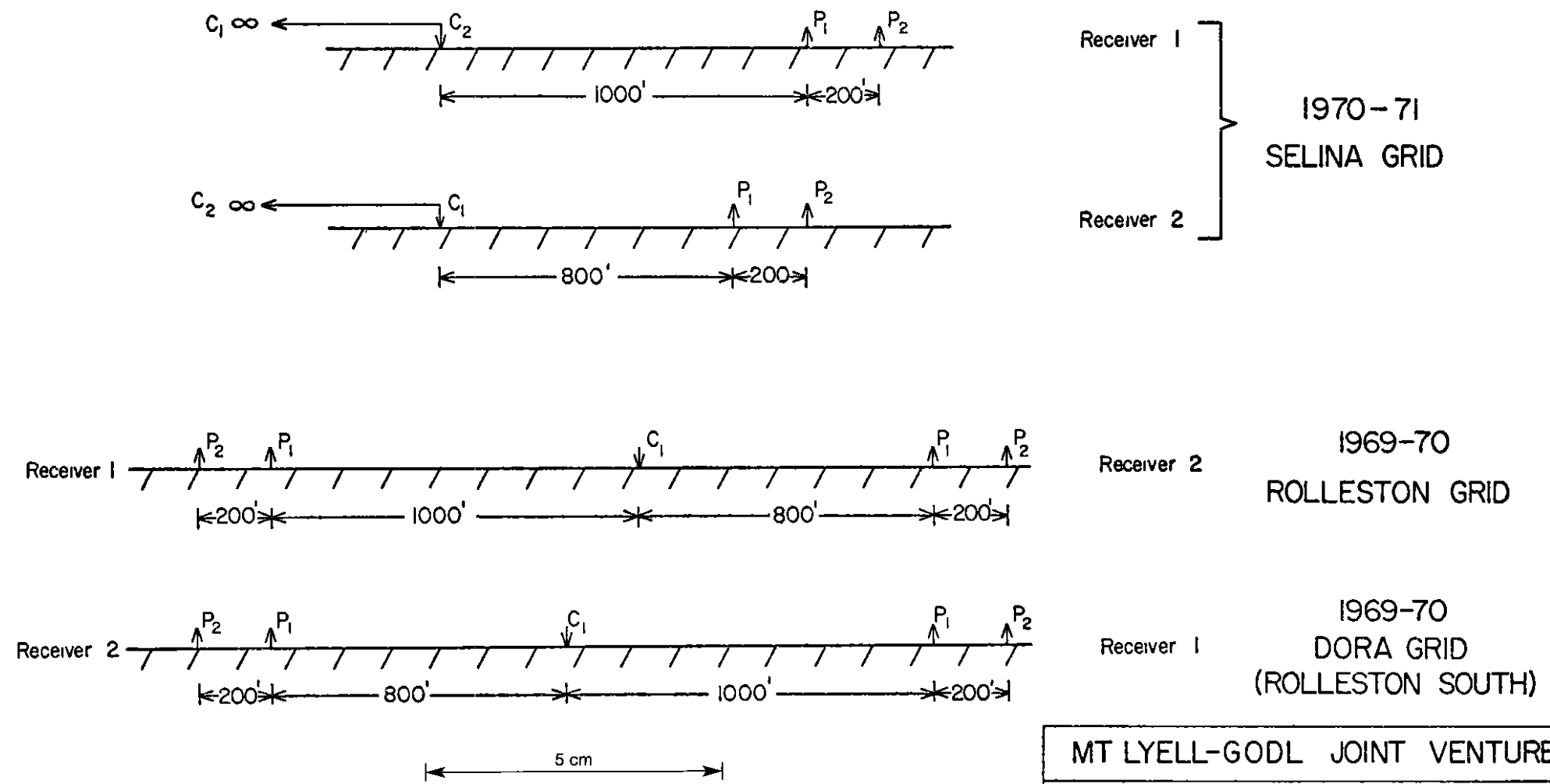
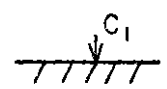
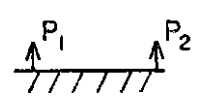


FIG 21



Current electrode

$a = 200'$



Potential electrodes

$n = 5$

Receiver 1

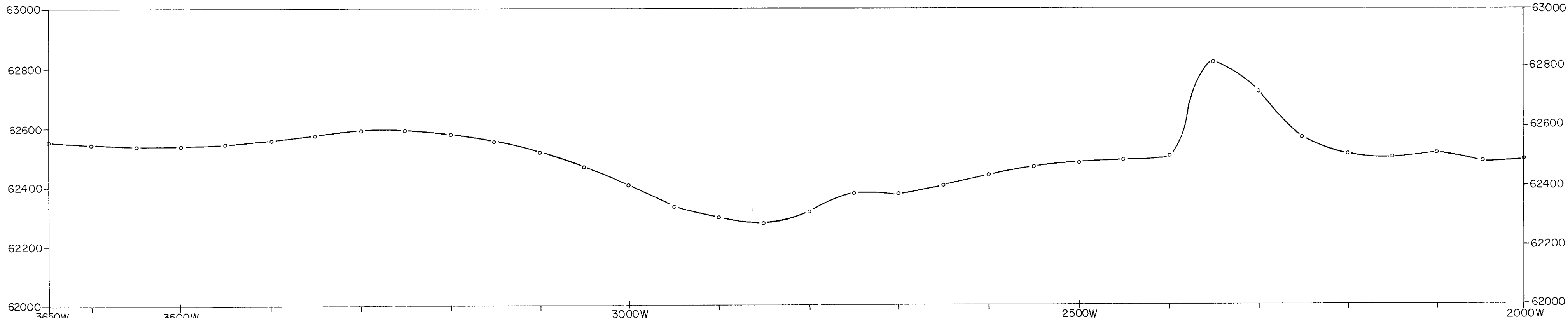
$n = 4$

Receiver 2

MT LYELL-GODL JOINT VENTURE		
SELINA-DORA AREA		
POLE - DIPOLE SURVEYS		
ELECTRODE CONFIGURATIONS		
SCALE 1:5000	DRAWN M HUTTON	
DATE 1-9-80	DRAFTSMAN PRIMER	

GROUND MAGNETICS

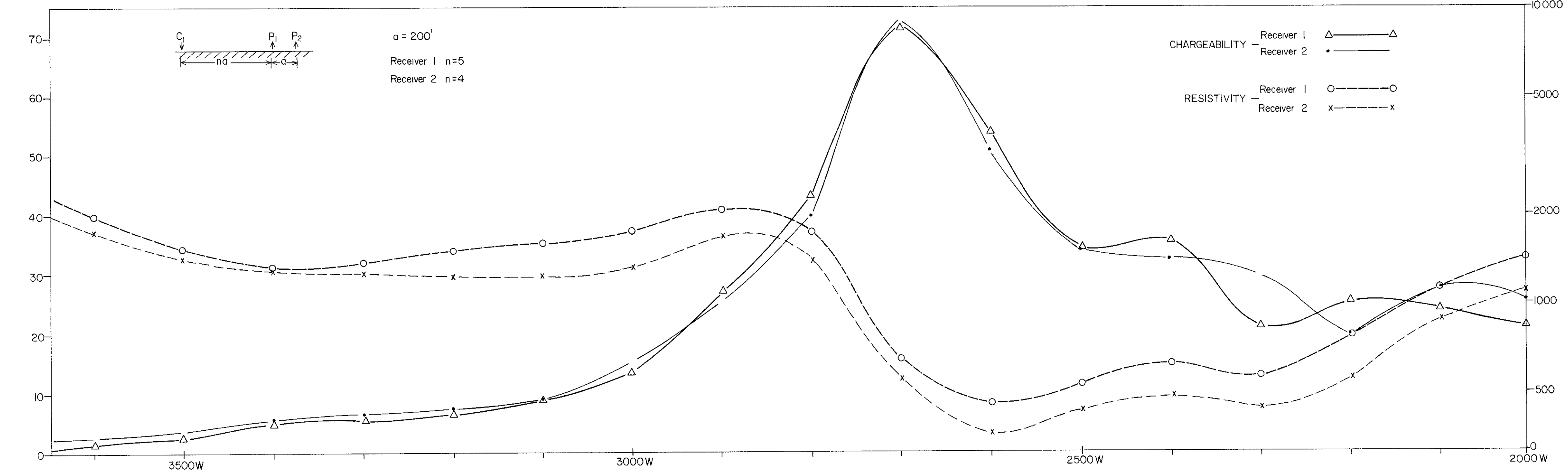
GAMMAS



GAMMAS

EIP POLE-DIPOLE ARRAY

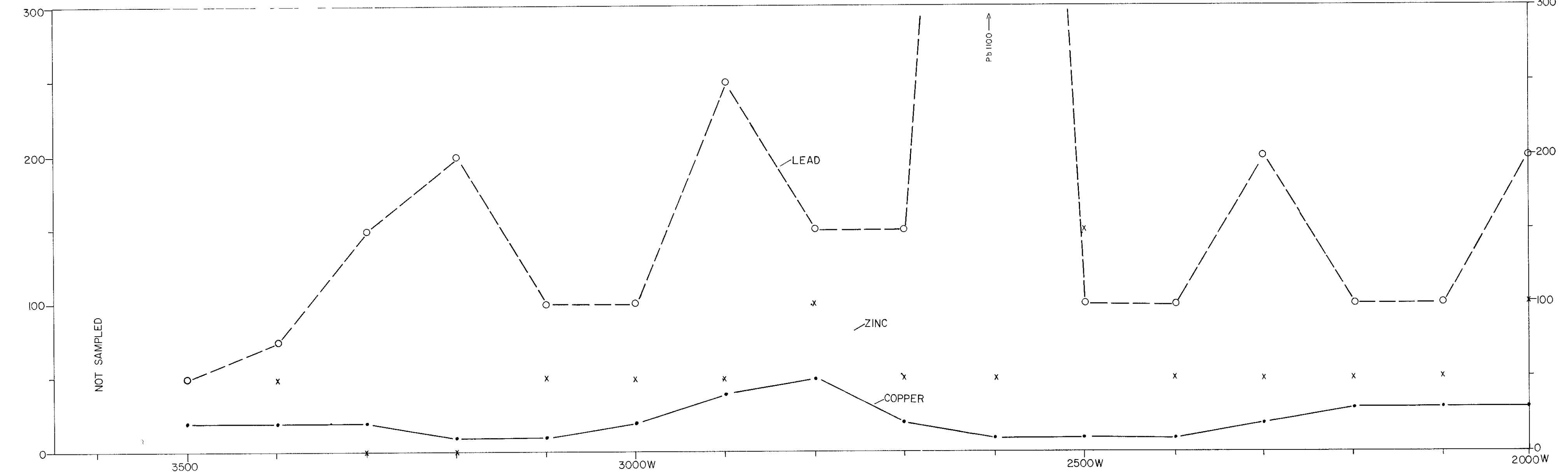
CHARGEABILITY ms
(1ms = 1.4mV/V)



RESISTIVITY- ohm-metre

SOIL GEOCHEMISTRY

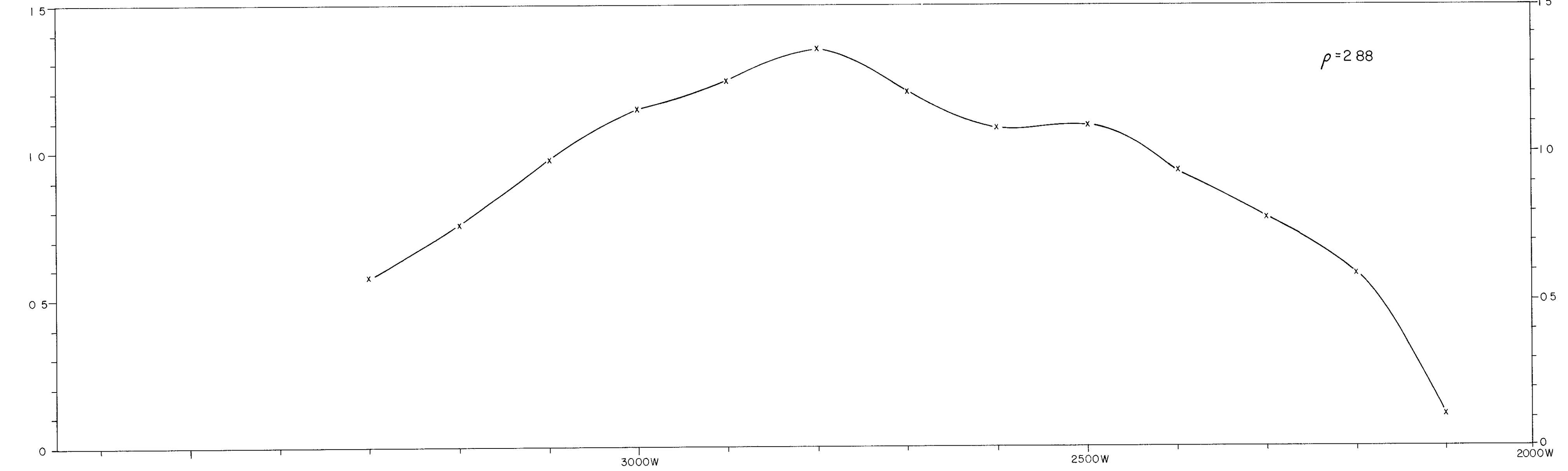
PARTS PER MILLION



PARTS PER MILLION

BOUGER GRAVITY

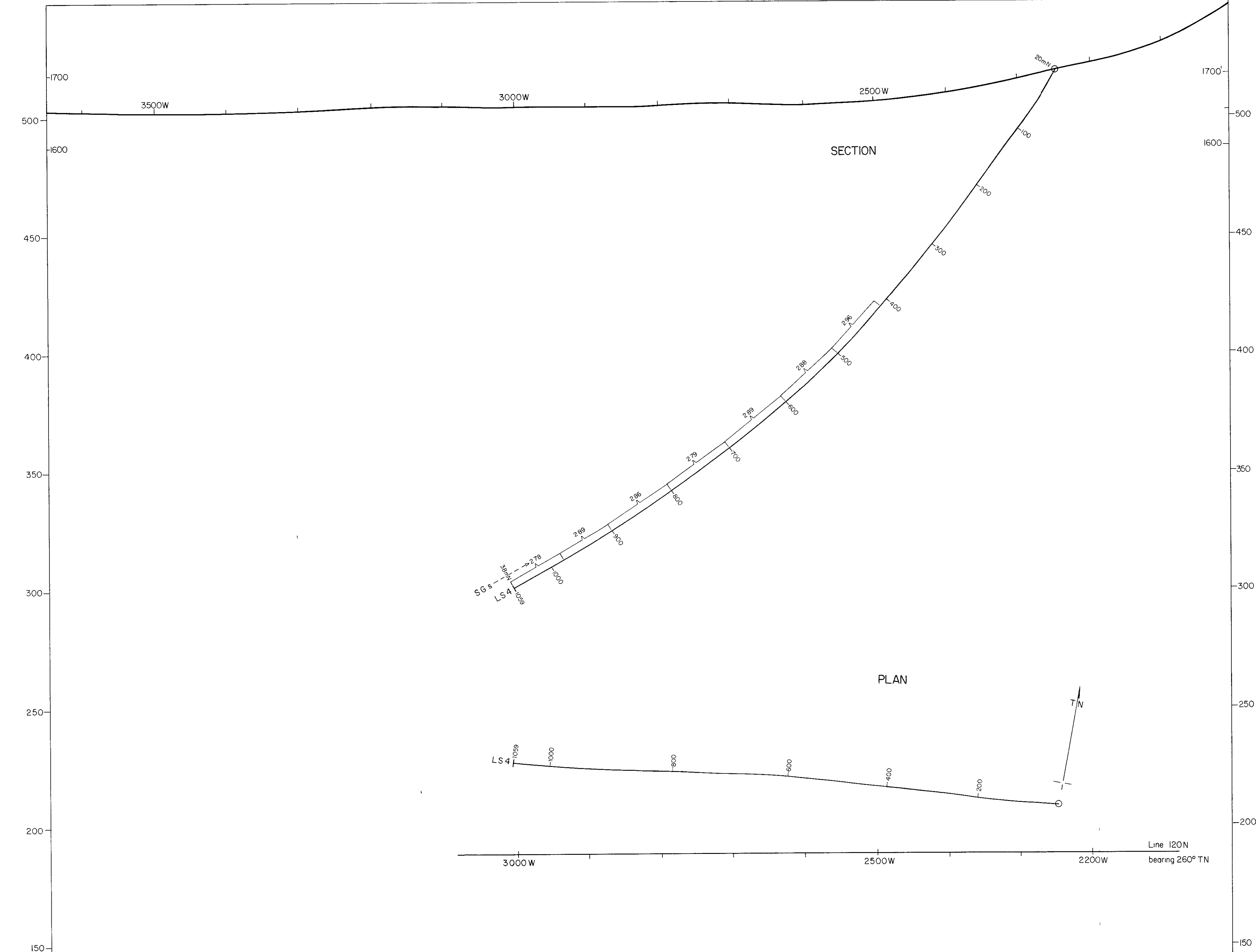
MILLIGALS



MILLIGALS

DRILLING PROFILE LINE 120N

METRES



METRES

MT LYELL - G O D L JOINT VENTURE E L 9/66		Revision
SELINA GRID LINE 120 N DRILLING PROFILE DDH LS 4 1183		
Scale 1:1000	Date 27-8-80	Map Number 6/506
Drawn by M HUTTON	Draftsman P PRIMMER	FIG 22

5 359000 m N

5 358000 m N

5 357000 m N

LEGEND

49 I

Intermediate feldspar-hornblende porphyritic lavas and intrusives

48 II

Intermediate feldspar hornblende crystal and crystal lithic chloritic tuffs

47 III

Andesitic feldspar crystal- lithic tuffs ± chlorite Δ pyritic agglomerate

44 IV

Haematitic fine-coarse grained lithic (crystal) tuffs, fine-medium grained chloritic -haematitic sediments ± magnetite, minor feldspar crystal tuffs ± pyrite ± haematite, minor shales 67 (banded carbonates-exhalative deposits, from DDH HA4)

Zone of strong foliation

8 V

Felsic pink-green feldspar quartz crystal lithic tuffs and agglomerates, feldspar quartz porphyry

11 VI

Flow banded and autobrecciated rhyolites, fine coarse grained felsic tuffs

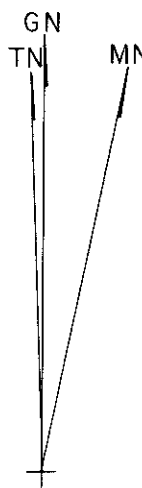
31 VII

Fine-coarse grained volcanoclastic sandstones

TYNDALL GROUP

380 000 m E

381 000 m E



007120

5 cm

81-1519

MT LYELL-G O D L JOINT VENTURE
E L 9/66

HOWARD'S ANOMALY
INTERPRETIVE GEOLOGY

1184

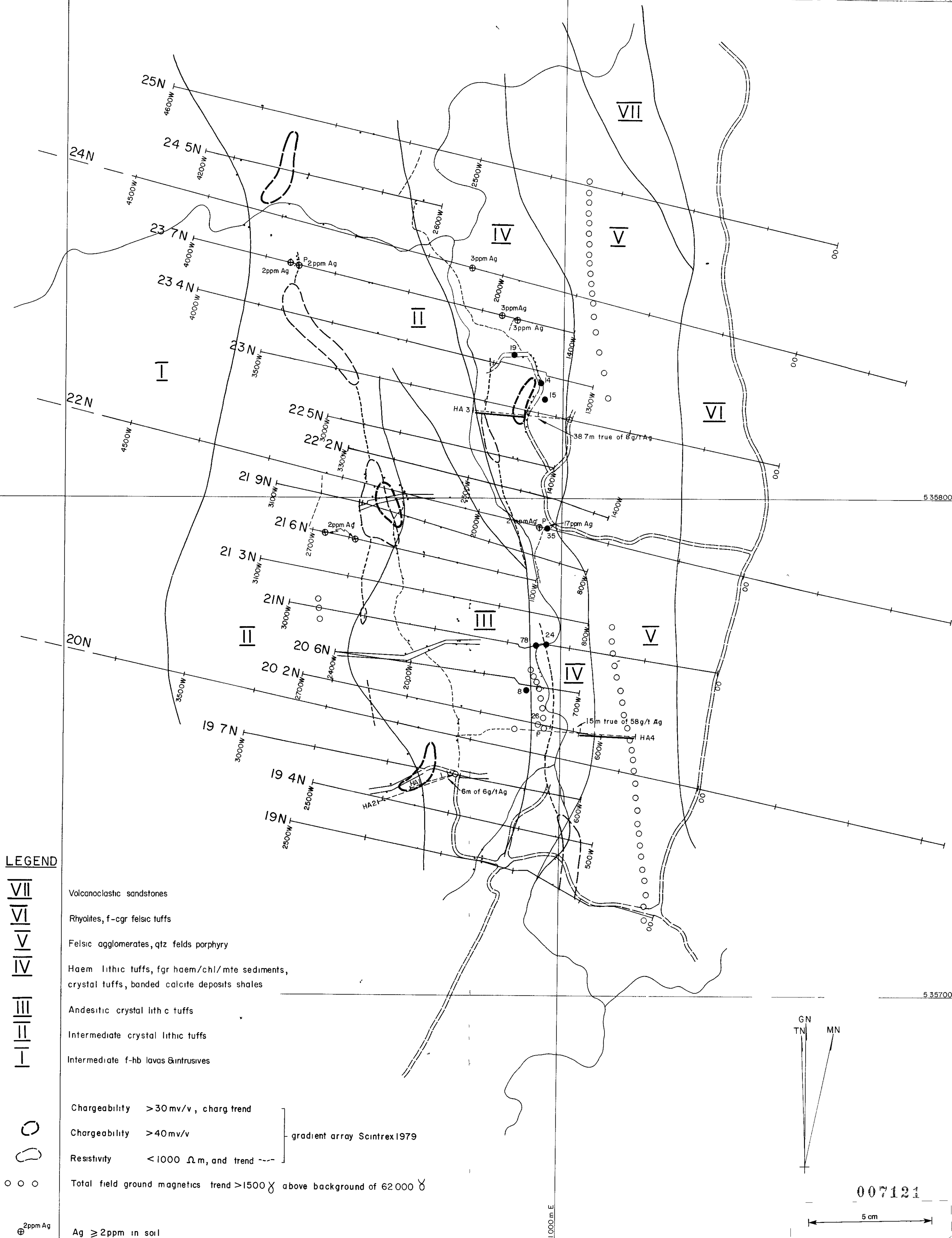
DRAWN A WALTER

DRAFTING H O J

DATE JUNE 1980

SCALE 1 5000

2 / 207
FIG 23



81-1519
 MT LYELL-GODOL JOINT VENTURE
 EL 9/66

HOWARD'S ANOMALY ANOMALY COMPILATION

GEOPHYSICS
 GEOCHEMISTRY

DIAMOND DRILLING
 GEOLOGY

DRAWN A WALTER

DRAFTING H D J

DATE JUNE 1980

SCALE 1:5000

2/440

FIG 24



○ 55 ppm Cu
○ 150 ppm Cu

5 cm

+++++ DENOTES A HORIZON SOIL SAMPLE

-TN-

22N
RESAMPLED AT 25 INTERVAL
1350W
INSERT (X2)

MT LYELL-GODL JOINT VENTURE		DRAWN A WALTER
EL 9/66		DRAFTING H D J
HOWARD'S ANOMALY		DATE JUNE 1980
SOIL GEOCHEMISTRY		SCALE 1 5000
COPPER		2 / 328
		FIG 25

81-1519 2/2

007122



- 100 ppm Pb
- 200 ppm Pb
- 300 ppm Pb
- 500 ppm Pb

5 cm

DENOTES A HORIZON SOIL SAMPLE

-TN-

81-1519 2/2		007123	
MT LYELL-GODL JOINT VENTURE		DRAWN A WALTER	
EL 9/66		DRAFTING H D J	
HOWARD'S ANOMALY		DATE JUNE 1980	
SOIL GEOCHEMISTRY		SCALE 1:5000	
LEAD		2/327	
		FIG 26	



5 cm

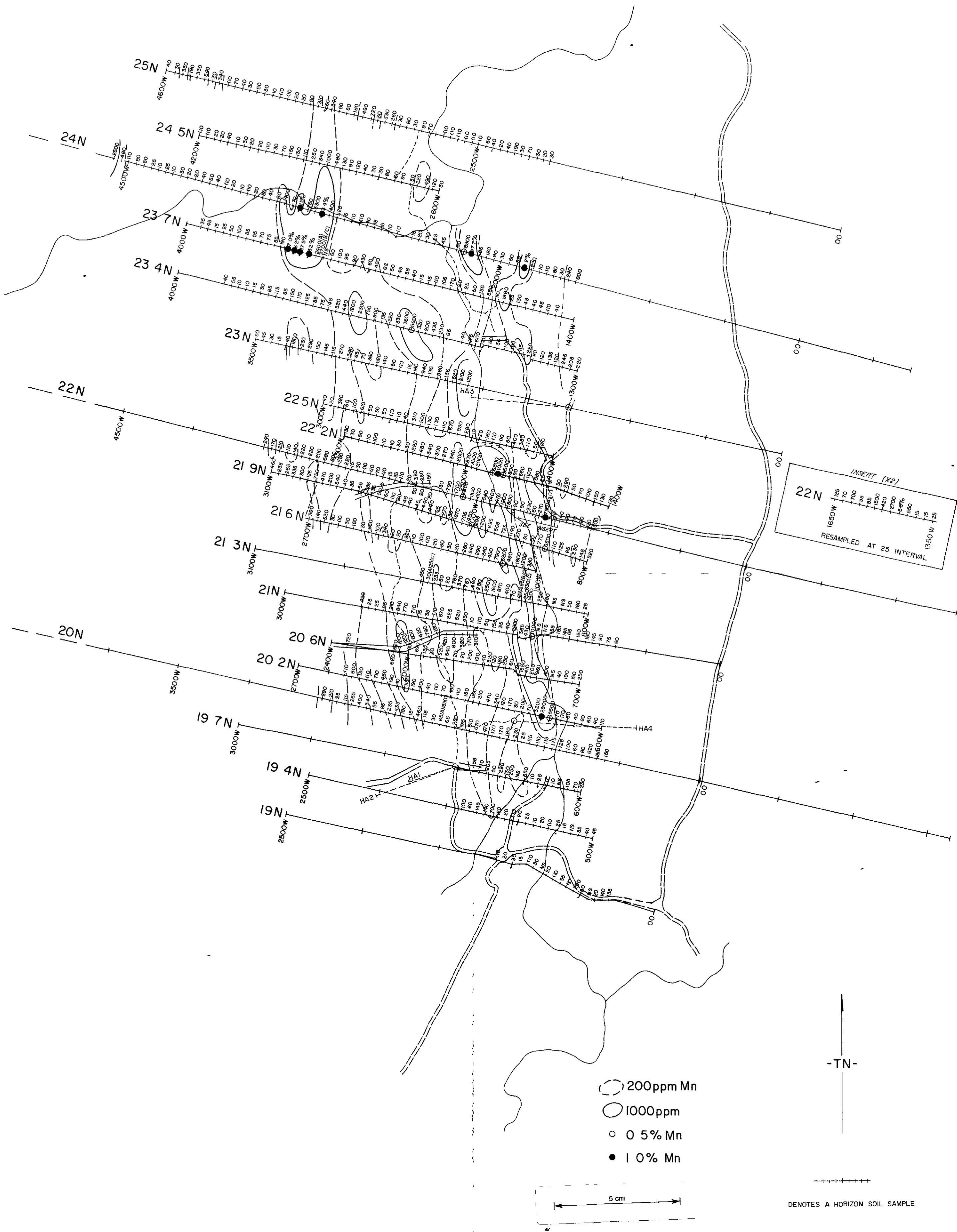
+++++ DENOTES A HORIZON SOIL SAMPLE

○ > 100 ppm Zn
○ > 200 ppm Zn
○ > 300 ppm Zn
○ > 500 ppm Zn

-TN-

INSERT (X2)
22N
1650W
RESAMPLED AT 25 INTERVAL
1350W

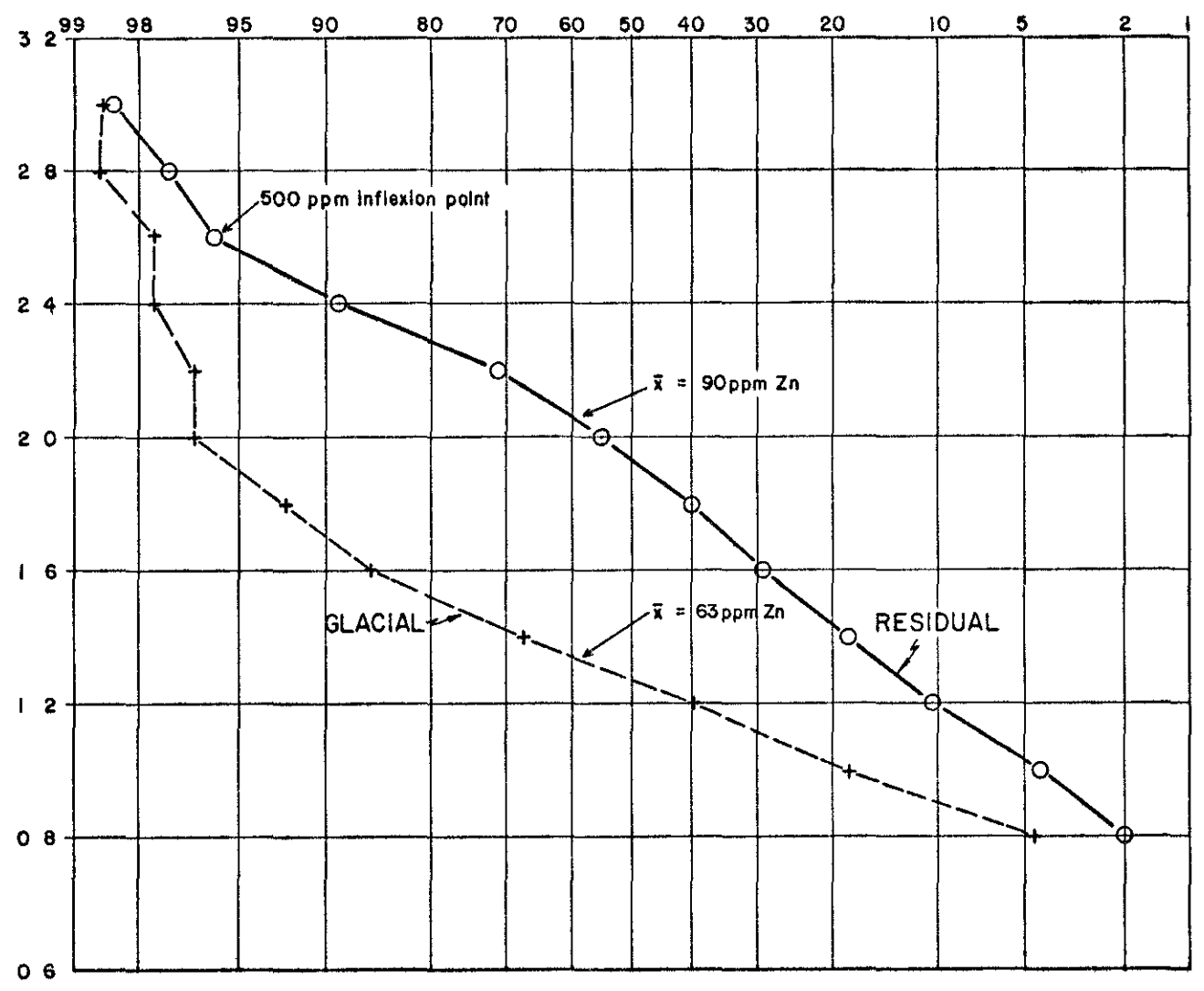
MT LYELL-GOLD JOINT VENTURE		007121
EL 9/66		
HOWARD'S ANOMALY		
SOIL GEOCHEMISTRY		
ZINC		
DATE JUNE 1980	SCALE 1:5000	2/329
FIG 27		



81-1519 212		007125
MT LYELL-GODL JOINT VENTURE		DRAWN A WALTER
E L 9/66		DRAFTING H D J
HOWARD'S ANOMALY		DATE JUNE 1980
SOIL GEOCHEMISTRY		SCALE 1 5000
MANGANESE		2/330 FIG 28



81-1519 2/2		007126
MT LYELL-G O D L JOINT VENTURE		DRAWN A WALTER
E L 9/66		DRAFTING H D J
HOWARD'S ANOMALY		DATE JUNE 1980
SOIL GEOCHEMISTRY		SCALE 1 5000
SILVER & BARIUM (SOL)		2/331 FIG 29

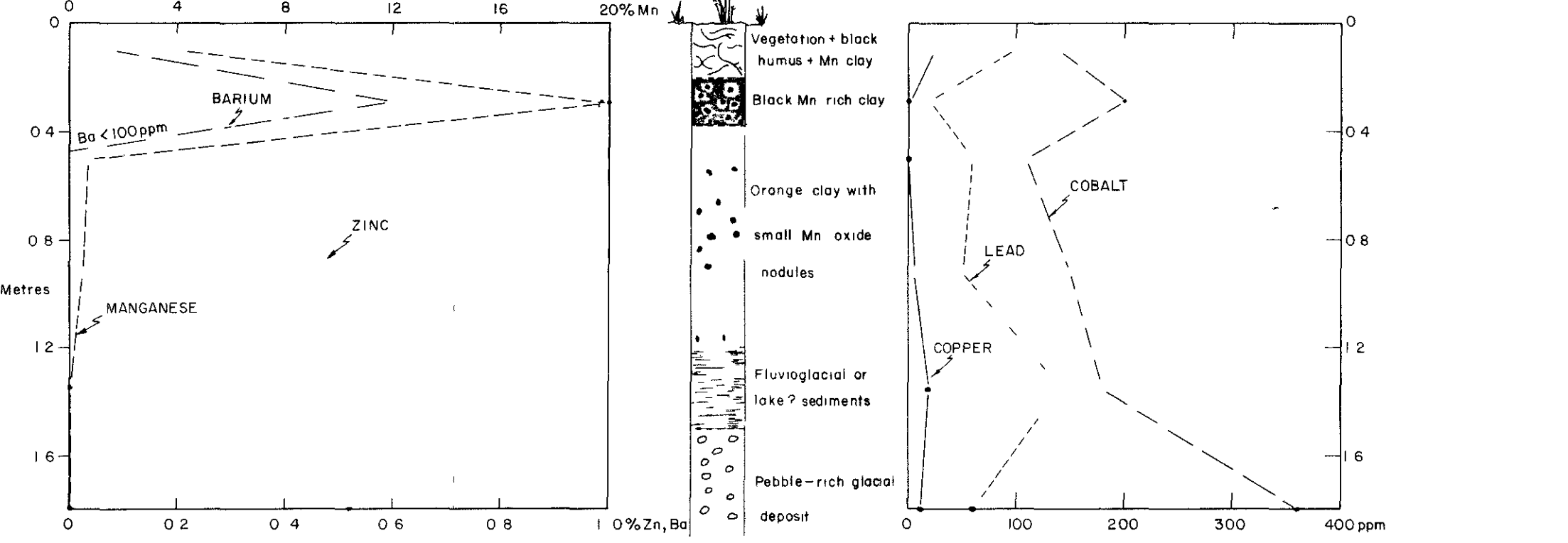
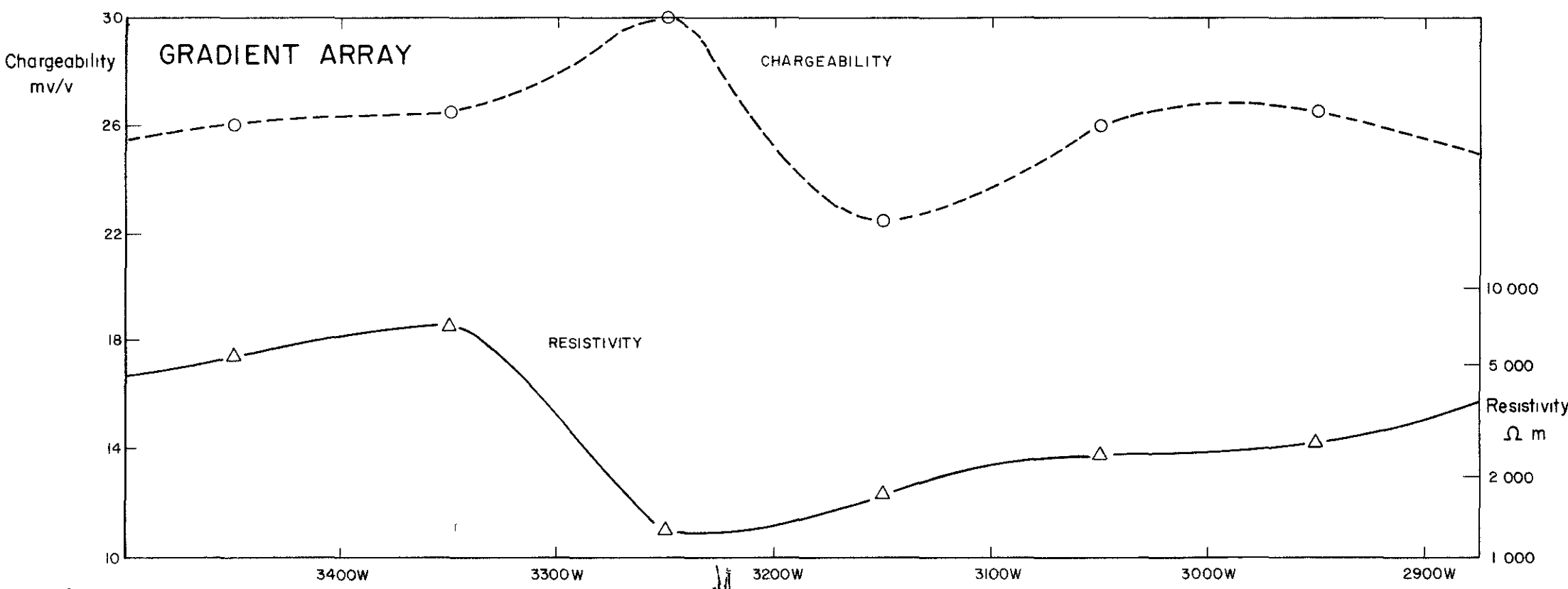
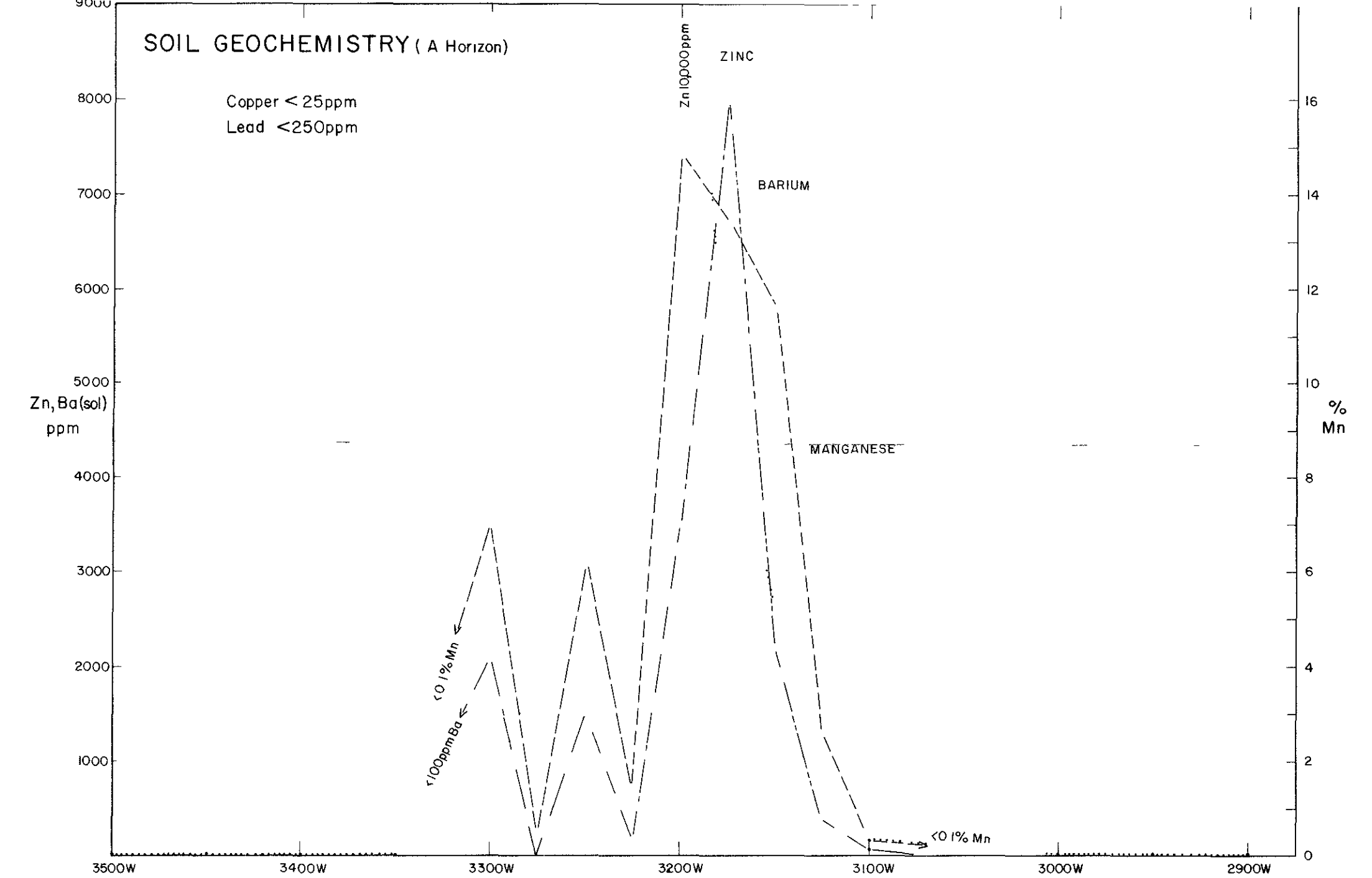


HOWARDS ANOMALY
LOG-PROBABILITY PLOT OF Zn
IN RESIDUAL AND GLACIAL SOILS

81-15192h

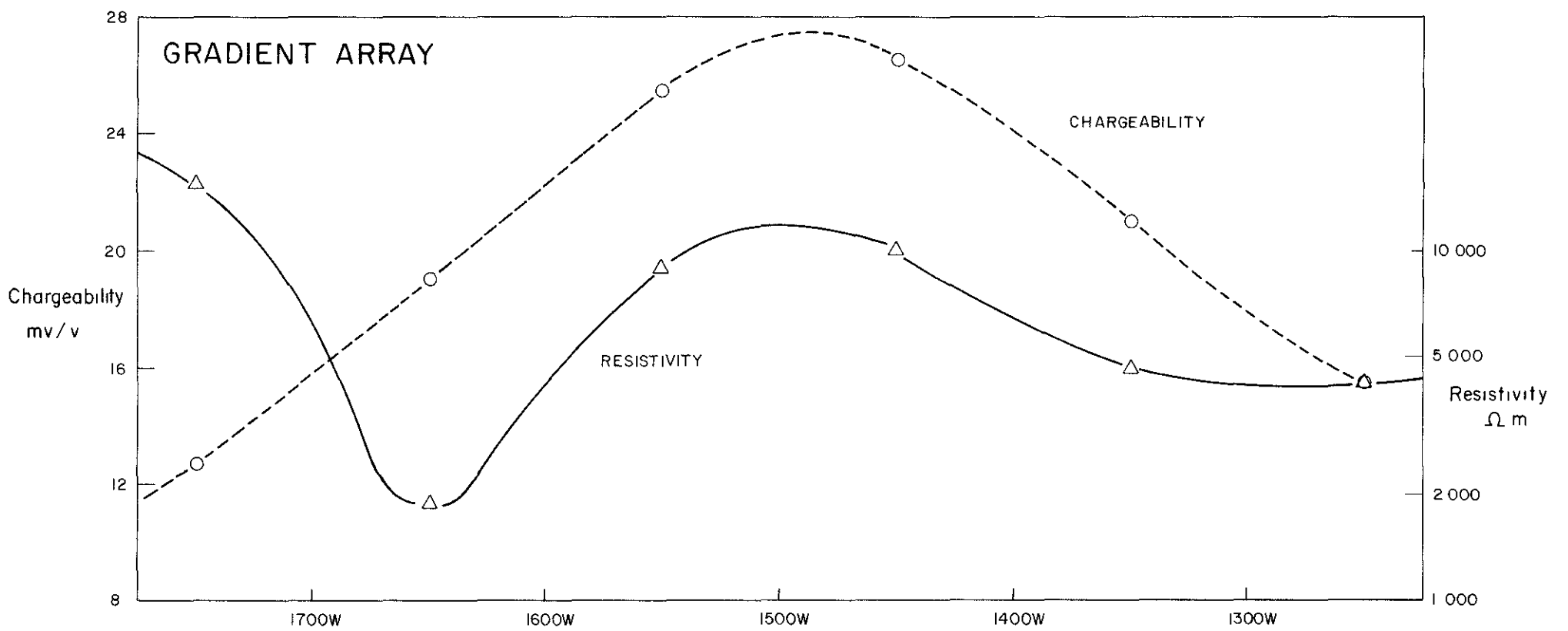
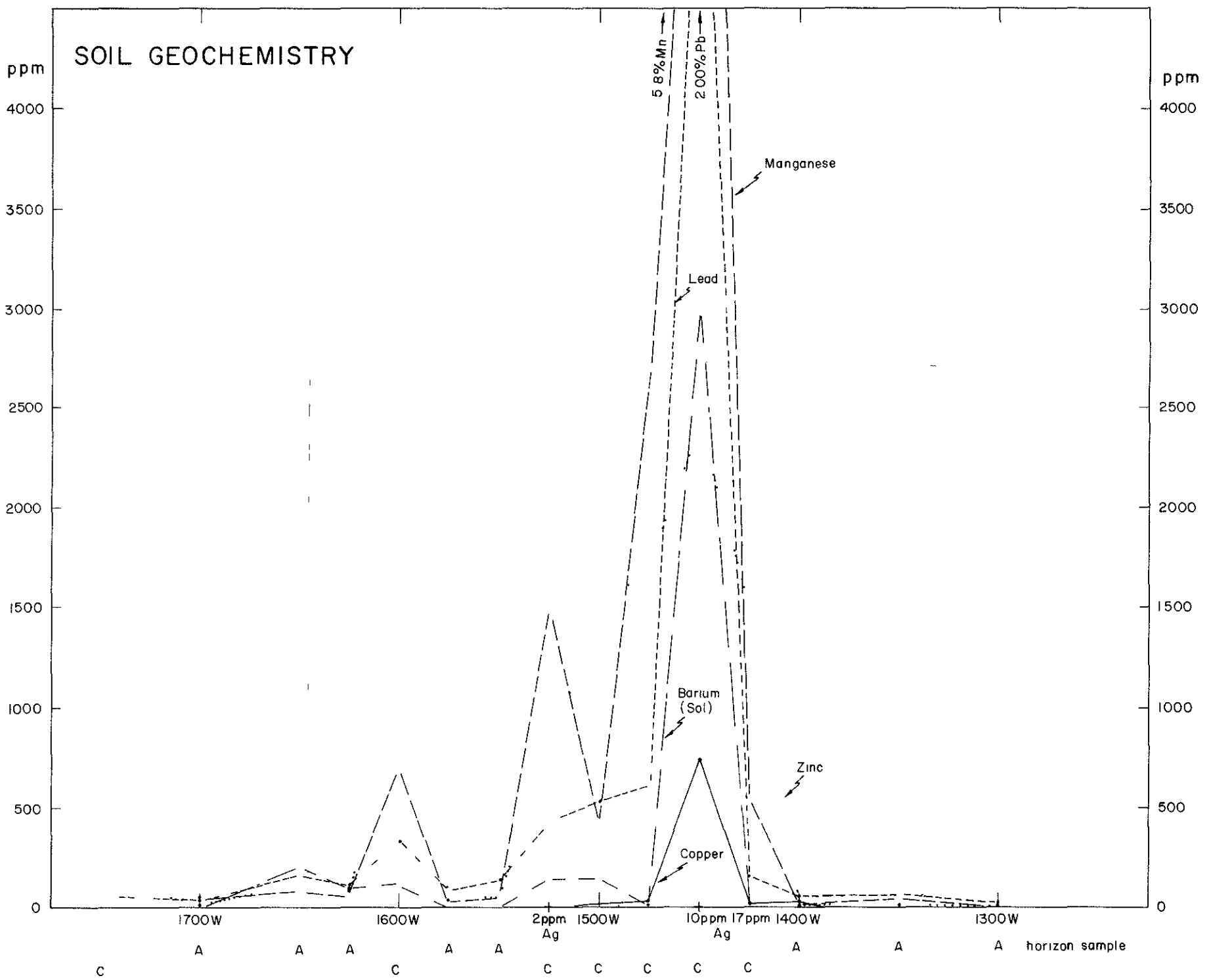
007127

FIG 30



PIT PROFILE L237N 3200W

81-1519 2h



PIT PROFILE
L22N 1450W

HORIZON	Cu	Pb	Zn	Ag	Mn	Sol Ba
A	22	300	60	3	60	<100
B + GLACIALS	14	500	90	<2	80	<100
B	20	900	300	3	200	200
C	50	1350	1550	4	1200	400
ROCK CHIPS	480	6550	5500	8	4.0%	1000
CLAY FROM ROCK CHIPS	75	1850	1450	3	1900	300
ROCK CHIP	70	1550	2000	<2	3600	<100
	110	1250	3500	<2	5500	<0.1% S
AVG	210	0.29%	0.36%	2	--	--
L22N1430W	AVG 75	0.31%	0.19%	9	--	--

007129 HOWARD'S ANOMALY
L22N 1450W
PIT PROFILE

81-1519 2/2

1192

FIG 32

Sample	Cu	Pb	Zn	Ag	Mn
30750	46	30	90	(2	450
30751 *	87	280	290	5	820
30752	30	30	180	(2	330
30753	22	30	160	(2	350
30754	36	40	65	(2	160
30755	58	60	210	(2	1060
30756	29	50	40	(2	150
30757	30	10	45	(2	360
30758	24	40	460	(2	1540
30759	46	20	115	(2	1050
30760	24	10	250	(2	1070
30761	27	20	180	(2	790
30762 *	54	50	90	(2	1300
30763 *	53	70	250	(2	600
30764	60	220	70	(2	400
30765	51	30	160	(2	50
30766	205	600	590	15	4200
30767	90	1060	250	14	50
30768	80	110	210	2	6000
30769 *	40	90	140	(2	1 30%
30770	85	30	75	(2	300
30771 *	270	20	140	(2	3200
30772 *	50	10	70	(2	100
30773 *	130	60	240	(2	1700
30777	70	80	130	(2	2000
30778 *	650	340	560	8	3 60%
30779	80	60	410	(2	1800
30780	85	100	240	(2	1600
30781	150	40	300	(2	1000
30782	80	200	320	(2	1200
30783	50	10	100	(2	230
30784	140	30	20	(2	630
30785	80	10	65	(2	800
30786	130	10	80	(2	800
30787	70	10	45	(2	500
30788	75	20	20	(2	200
30789	70	10	40	(2	400
30790	50	20	80	(2	500
30791	80	10	25	(2	160
30792	95	10	25	(2	190
30793	65	10	65	(2	260
30794 *	290	800	275	23	2 80%
30795 *	160	310	130	78	1200
30796 *	140	10	115	(2	430
30797	32	20	210	(2	600
30798	35	10	165	(2	500
30799 *	118	100	105	(2	6 10%
30800	205	20	80	(2	530
30901	70	20	55	(2	1150
30902	115	10	110	(2	420
30903	105	190	345	(2	1200
30904 *	145	80	115	(2	6 80%
30911	66	170	120	(2	4100
30912	67	120	135	(2	4600
30913	65	80	650	(2	6400
30914 *	335	120	270	(2	3800
30915 *	31	60	215	(2	1000
30916 *	51	360	35	24	1700
30917	23	20	25	(2	900
30920	118	10	69	(2	320
30921	83	10	137	(2	320
30922	154	10	211	(2	760
30923	525	20	36	(2	40
30925	640	20	120	(2	1060
30926	143	20	330	(2	1380
30927	232	20	110	(2	690
30928	84	10	110	(2	390
30929	32	20	60	(2	780
30930	141	20	70	(2	680
30931	66	30	405	(2	830
30932	212	70	104	(2	600
30933	67	10	550	(2	4600
30934 *	46	30	170	(2	1 03%
30935 *	34	10	3000	(2	1 93%
30936	113	10	43	(2	660
30937	37	10	95	(2	600
30938	200	10	98	(2	710
30939	147	140	193	(2	150
30940	38	10	184	(2	1200
30941	44	70	17	(2	210
30948	41	140	133	(2	980
30949	42	140	88	(2	160
30957 *	45	100	150	(2	1000
30958 *	75	130	120	(2	4200
30959 *	55	30	75	(2	1600
30964 *	45	30	110	(2	600
30965 *	100	40	65	(2	400
30966 *	75	20	150	(2	1000
30967	40	10	110	(2	1100
30968	25	10	125	(2	700
30969	25	10	150	(2	670
30970	85	40	55	(2	400
30971	15	10	70	(2	1400
30972	35	10	70	(2	700
30973	30	10	45	(2	300
30974	30	10	75	(2	450
30975	20	10	10	(2	100

* Additional analyses

Sample	Co	Ba(sol)	Fe%	Au
30751	10			
30762	20	<100	37.0	
30763		<100		
30769		<100		
30771		<100		
30772		<100		
30773		<100		
30778		300		
30794	10	<100	6.3	
30795	10	<100	6.5	
30796		<100		
30799	300	1800	6.6	
30904	235	1600	5.0	
30914	36	<100	25.0	nll
30915	52	<100	32.0	0.1
30916	5	1000	25.0	nll
30934	50	<100	13.4	
30935	125	<100	52.0	
30957		<100		
30958	70	<100	44.0	
30959		<100		

L 23 N Costean-Sampled N Marshall Feb 1979

Sample	Cu	Pb	Zn	Ag	Mn	S%	Fe	Co	Ba(sol)
0-10	85	20	12	(2	60	(0.1	103	45	450
10-20	65	20	100	(2	540	0.1	4.8	17	450
20-30	60	25	35	(2	180	0.1	1.92	15	370
30-40	95	420	235	19	41%	0.1	3.0	15	370
39	65	250	350	17	7.8%	0.1	5.0	33	600
44	120	530	95	3	9.4%	0.1	6.9	74	110
44	35	65	125	(2	4300	0.1	125	23	450
50-60	50	90	190	2	4.9%	0.1	3.8	18	150
60-70	25	90	20	(2	650	0.1	3.20	5	450
70-80	30	65	34	(2	800	0.1	5.1	8	150
24533	500	1150	480	230	10%	0.1	5.7	26	200

L 22 N 1450W Pit samples

Type	Sample	Cu	Pb	Zn	Ag	Mn	% Fe	Co	Ba
Float	30924	1100	2400	3700	2	1720	1.1%	25	150
e/c?	30942	81	1700	3400	-	2450	0.1%	45	460
e/c?	30943	122	540	5800	2	9200	0.1%	35	200
Mn float	30944	347	610	4000	1.8%	5.3%	51%	50	900
Mn float	30945	510	11%	2700	5	56%	51%	50	900
Float	30946	87	1900	2200	2350	0.9%	15	500	2200
Float	30947	80	1250	3600	1950	4.0%	1000	1000	1000
e/c	30950	480	6500	5500	8	4.0%	0.36%	0.01%	150
e/c	30951	70	1550	2000	0	36%	0.01%	0.25	1400
e/c	30952	110	1250	3500	0	55%	0.01%	0.25	1400

1430W Pit samples

Sample	Cu	Pb	Zn	Ag	Mn	% Fe	Co	Ba
55-60	30953	60	140	1000	(2	0.6%	-	<100
60-120	30954	90	4200	2500	35	0.1%	-	<100
140	30955	110	3700	1500	(2	0.6%	-	<100
150	30956	45	4600	2500	(2	0.1%	0.25	1400

L 202 N 1000-1100W

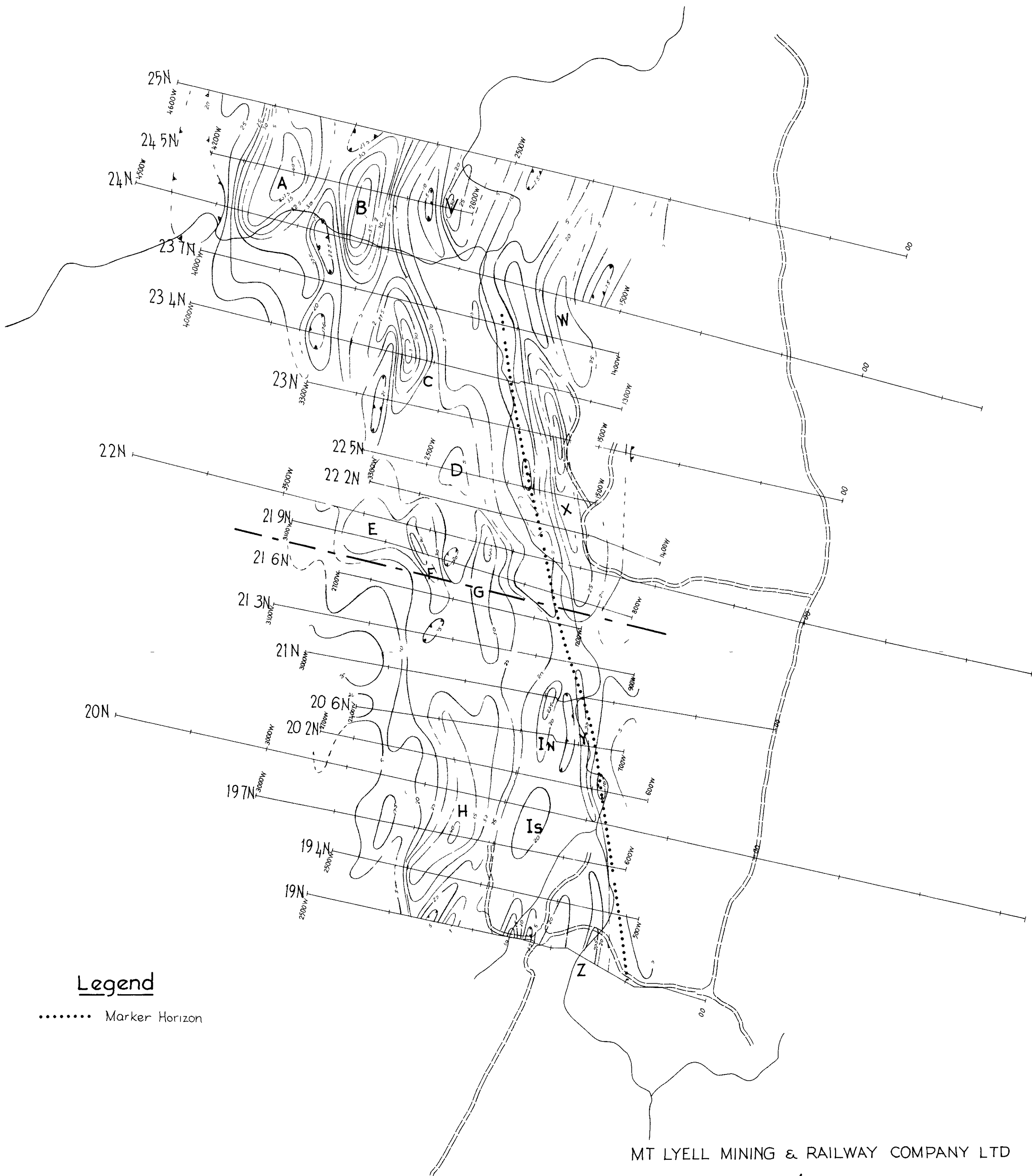
Sample	Cu	Pb	Zn	Ag	Mn	%Fe	Co	Ba
30719	380	3150	2200	0.7	40.0	12.7	50	
30720	190	300	30	25	0.24	104	33	
30721	560	900	2800	5	250	260	32	
30774	300	1.6	1300	4	15.5	370	130	2600
30775	85	1400	30	2	0.15	360	15	800
30776	390	11%	1850	4	385	8.7	70	8000
30905	205	9000	1800	6	35.0	180	135	2.0
30906	69	680	50	(2	0.24	215	16	1100
30907	100	20%	2600	(2	500	3.4	46	1600
30908	213	940	40	(2	0.31	175	2600	250
30909	64	700	65	(2	0.78	165	250	135
30910	180	6700	2300	4	47.0	70	135	3.0

NB All assays in ppm unless another unit is shown
• 30915 Petrology description available

007130

MT LYELL-GOLD JOINT VENTURE
E L 9/66
HOWARD'S ANOMALY
ROCK CHIP ASSAYS
& SAMPLE LOCATIONS

DRAWN A WALTER
DRAFTING H D J
DATE JUNE 1980
SCALE 1:5000
2 / 326
FIG 33



Legend

..... Marker Horizon

MT LYELL MINING & RAILWAY COMPANY LTD

HOWARD'S ANOMALY

NR QUEENSTOWN - TAS

GRADIENT ARRAY EIP SURVEY

CHARGEABILITY CONTOUR PLAN

SURVEYED & COMPILED BY
SCINTREX



NOVEMBER 1979

SCALE 1:5000 ft

Job N° TAS-073A

PLATE 1

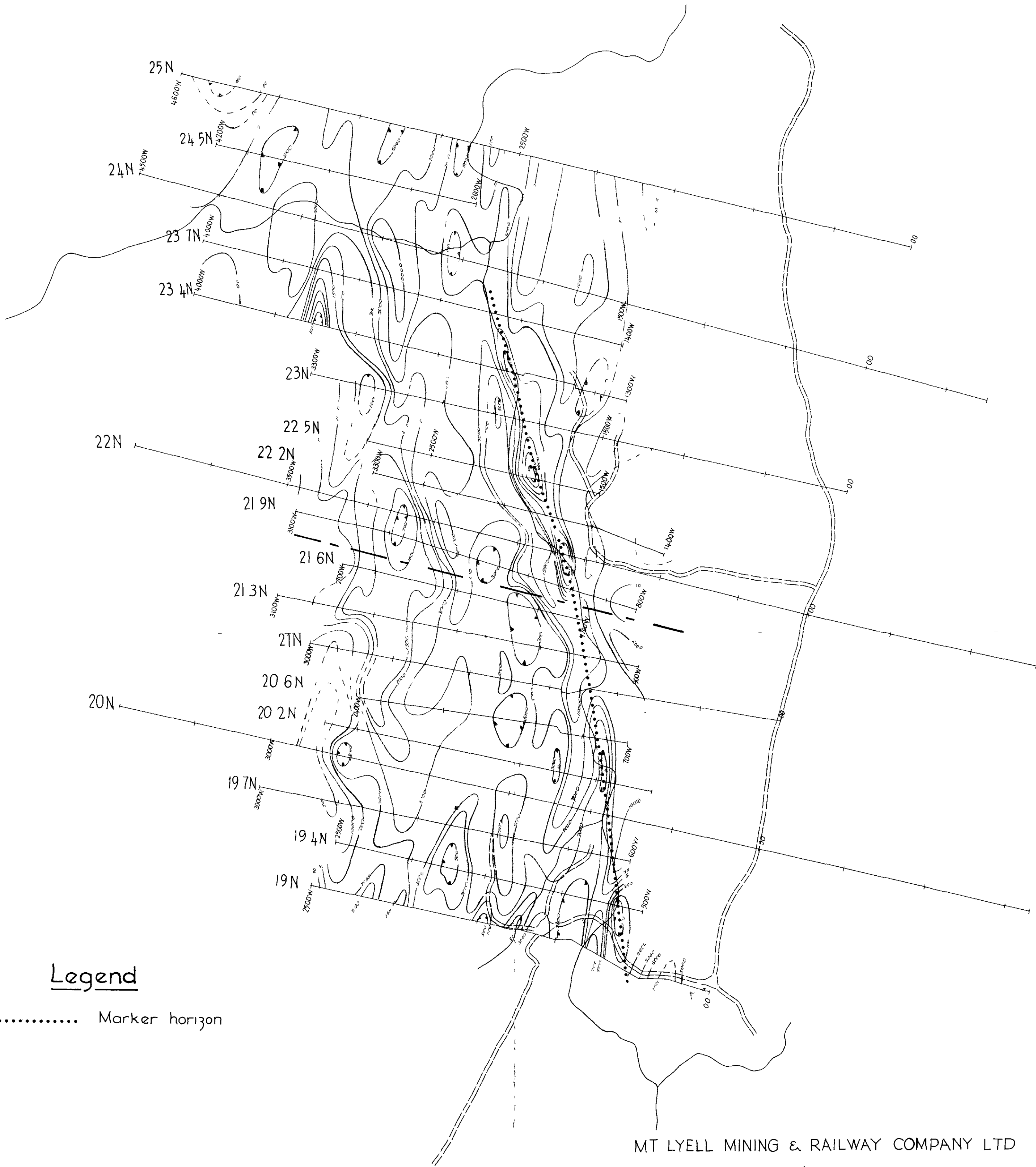
MAP NUMBER 2/438

81-1519 2/2

FIG 34

007131

1194



Legend

..... Marker horizon

MT LYELL MINING & RAILWAY COMPANY LTD

HOWARD'S ANOMALY NR QUEENSTOWN - TAS

GRADIENT ARRAY EIP SURVEY

RESISTIVITY CONTOUR PLAN

SURVEYED & COMPILED BY
SCINTREX



NOVEMBER 1979

SCALE 1:5000 ft

5 cm

Job No TAS-073A

PLATE 2

MAP NUMBER 2/439

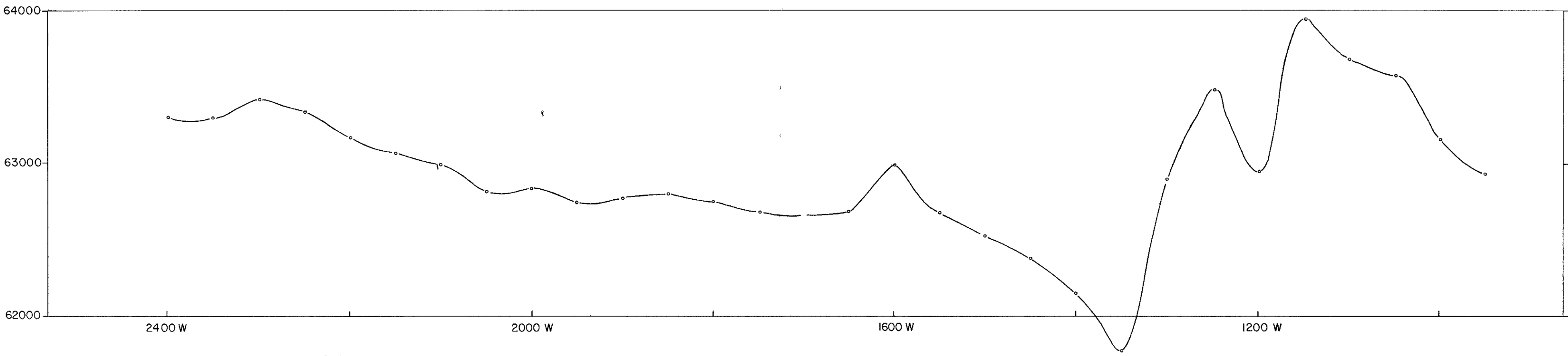
81-1519 2h

FIG 35

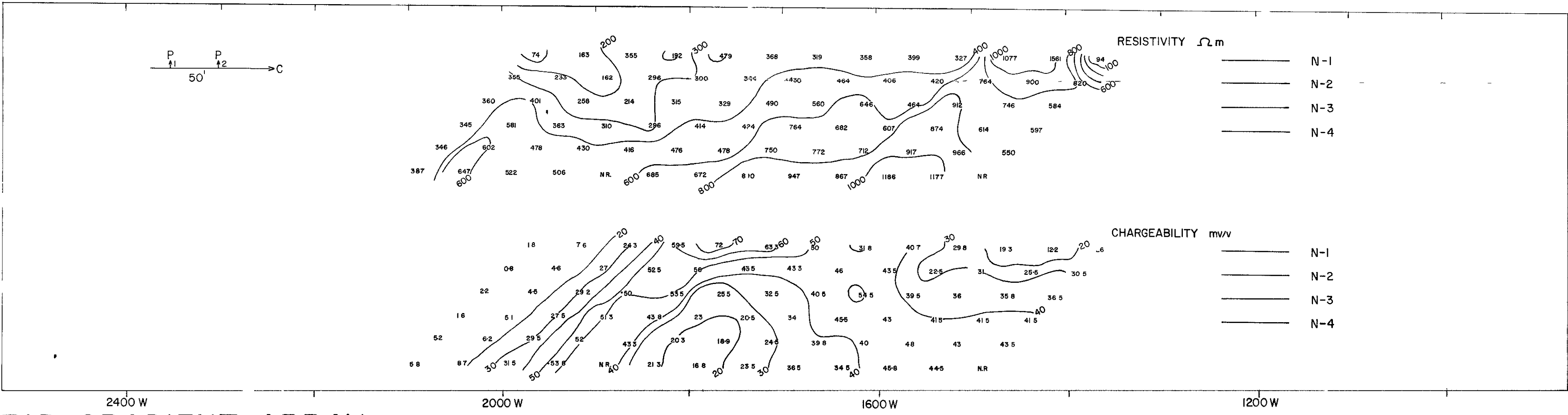
007132

1195

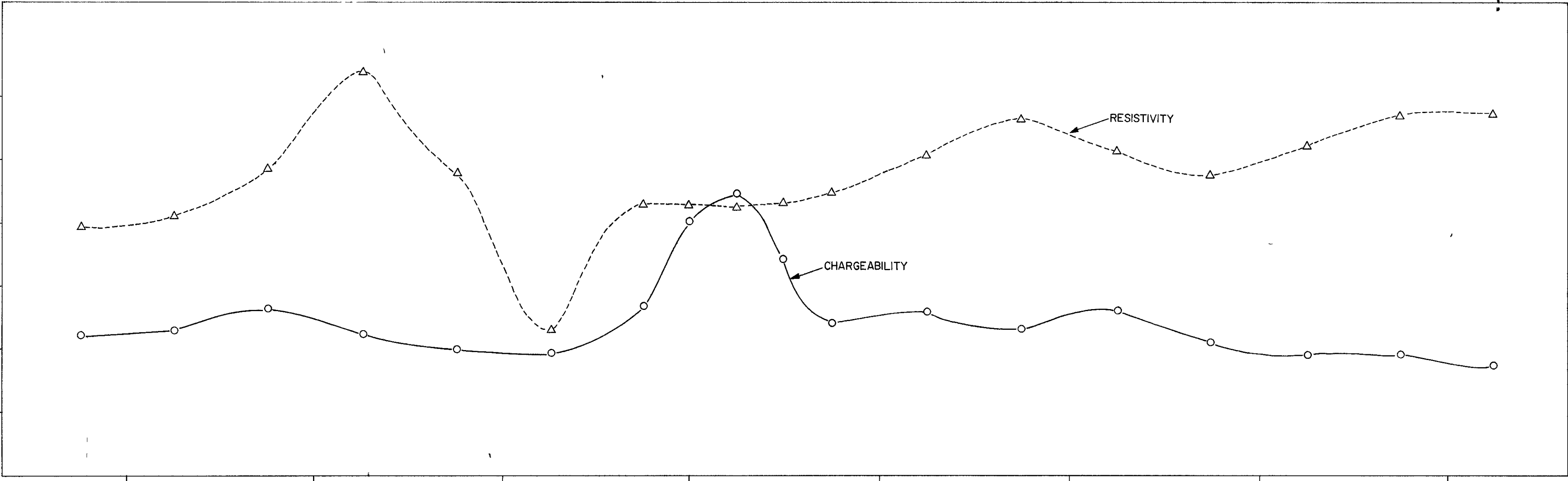
TOTAL MAGNETIC FIELD



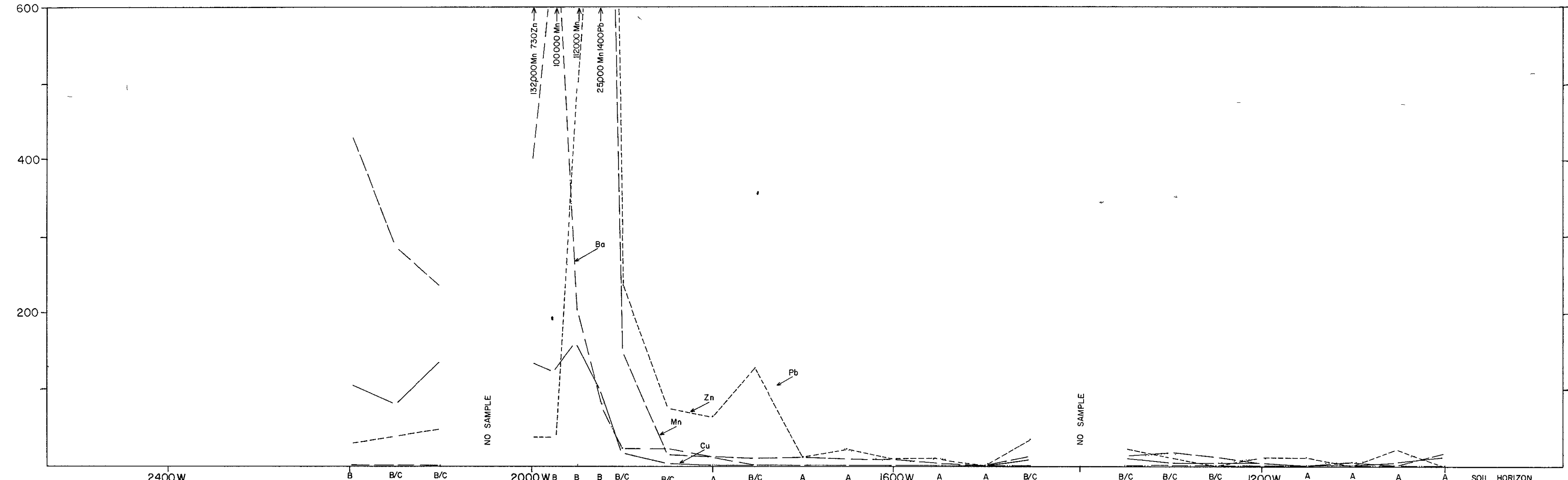
EIP POLE-DIPOLE ARRAY



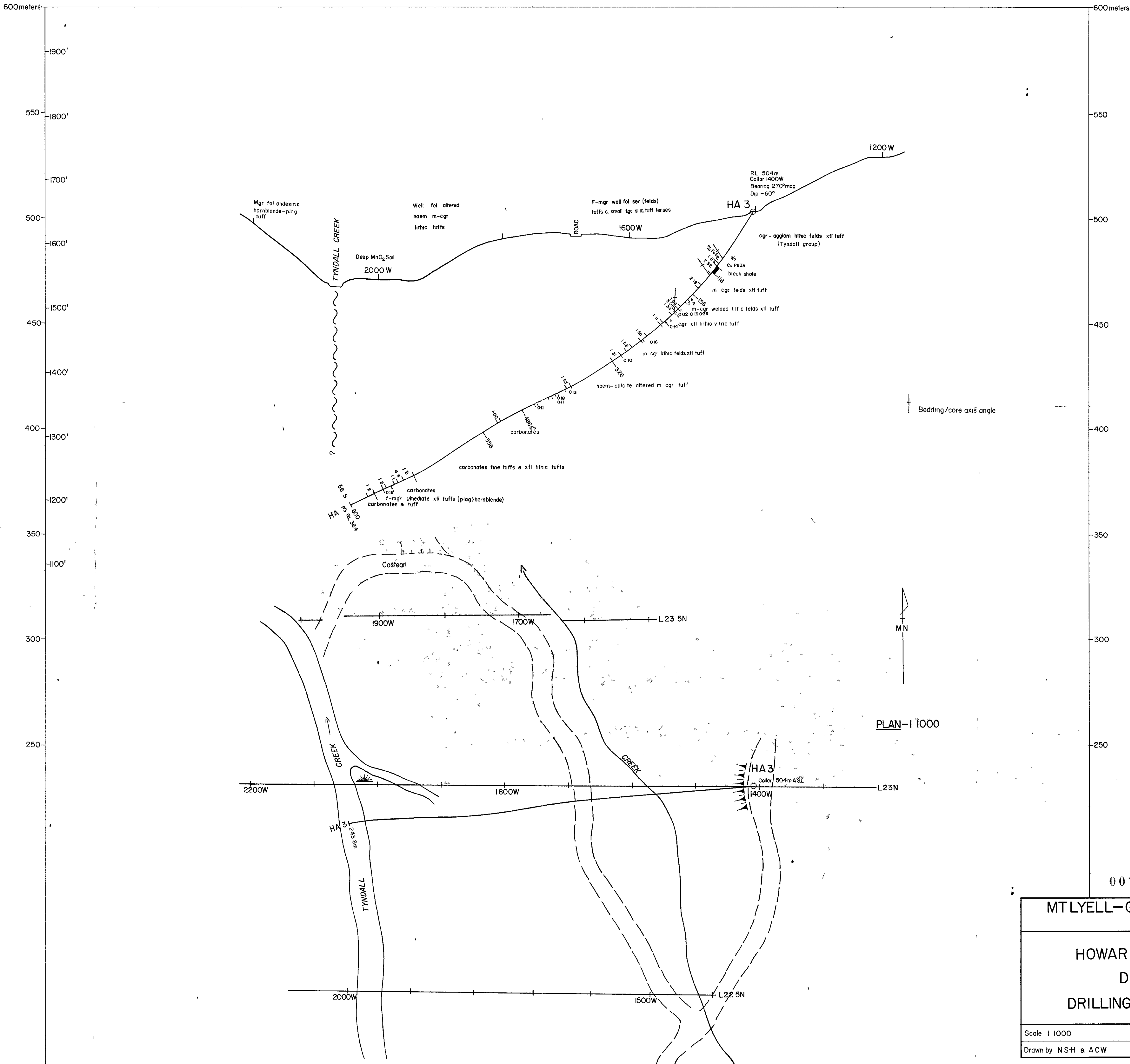
EIP GRADIENT ARRAY



SOIL GEOCHEMISTRY



DRILLING PROFILE LINE 23N (imperial) Orientation 270°mag



007133

MTLYELL-GODL JOINT VENTURE
EL 9/66

HOWARDS ANOMALY ZONE
D D H HA 3
DRILLING PROFILE LINE 23N

Scale 1:1000 Date 19 11 1979
Drawn by NSH & ACW Draftsman PJR

MAP NUMBER 2/203
FIG 36

GAMMAS

Figure 1 is a line graph showing the variation of resistivity and chargeability with depth (m) for the 1967-68 season. The x-axis represents depth in meters (0 to 100), and the y-axis represents both resistivity and chargeability (0 to 100). Resistivity is plotted with a solid line and open triangles, while chargeability is plotted with a dashed line and open circles. Both curves show significant fluctuations, with resistivity peaking around 20m and 80m depth, and chargeability showing a sharp peak around 40m depth.

RESISTIVITY- ohm-metre

PARTS PER MILLION
(Mn)

A }
B } SOIL HORIZON
C }
T - TRANSPORTED SOIL

HA 4

SECTION

RESISTIVITY

CHARGEABILITY

TYNDALL GROUP

HA 4

PLAN

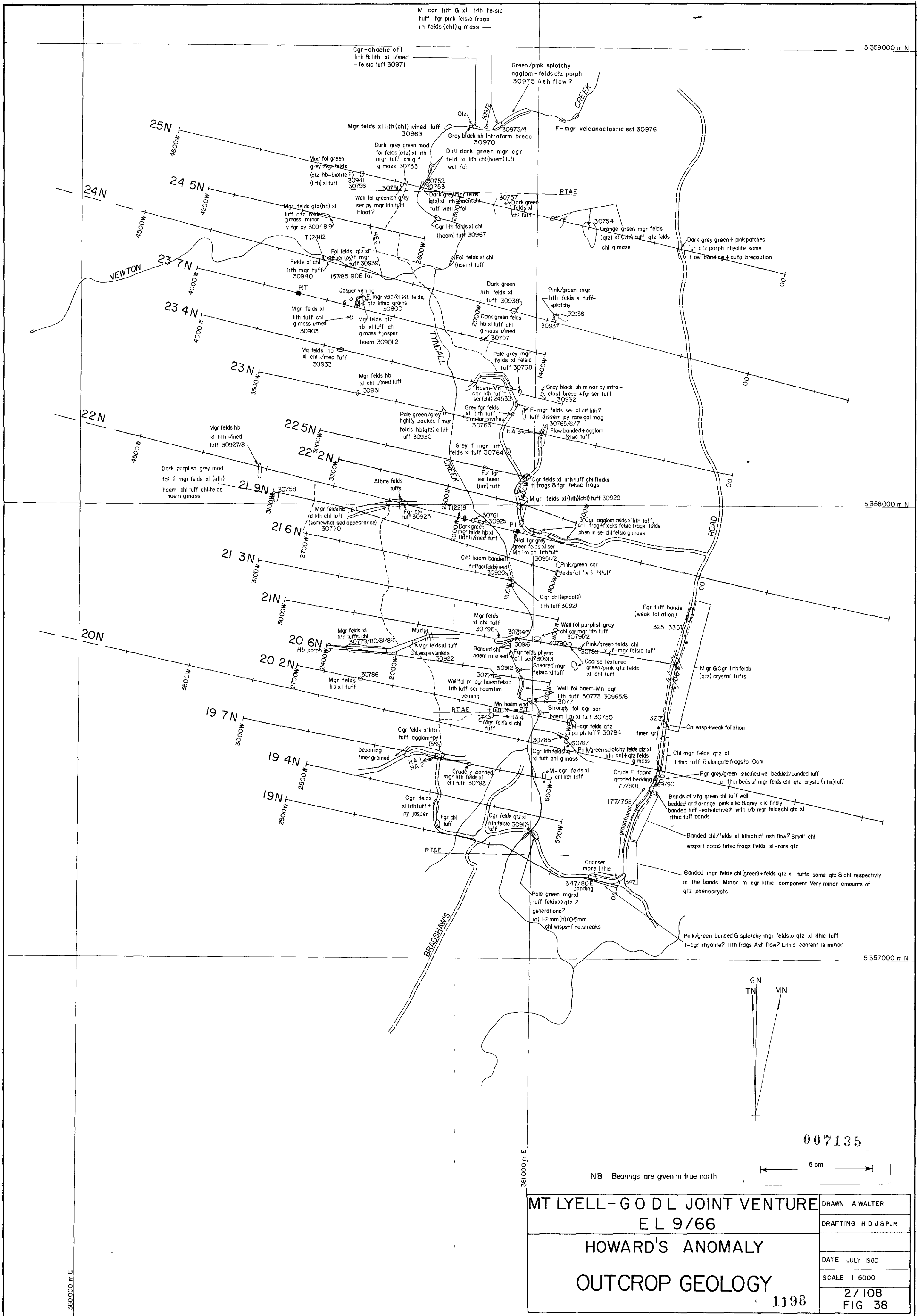
MT LYELL HOPE DRILL

Scale 1:100

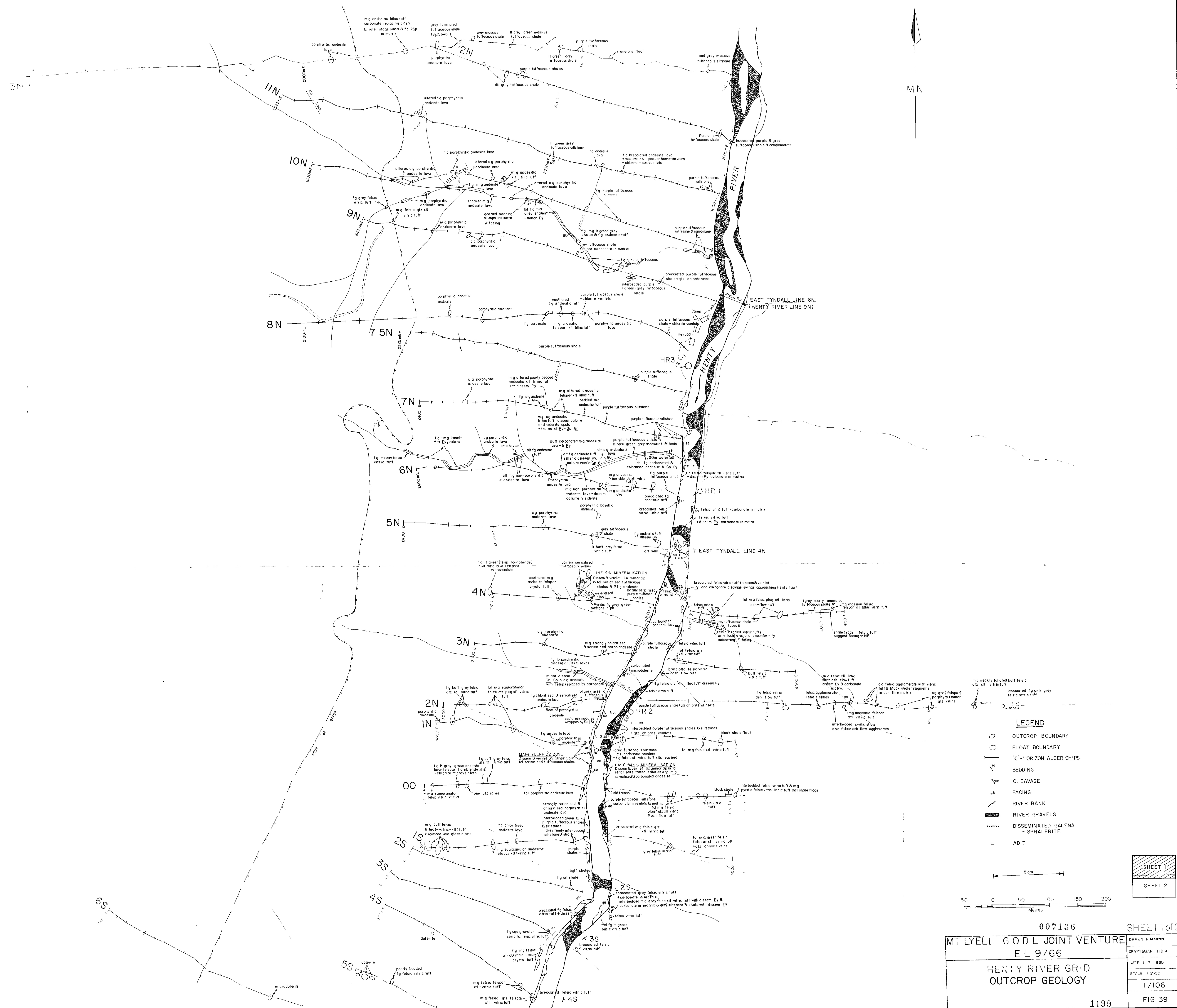
Drawn by A.O.

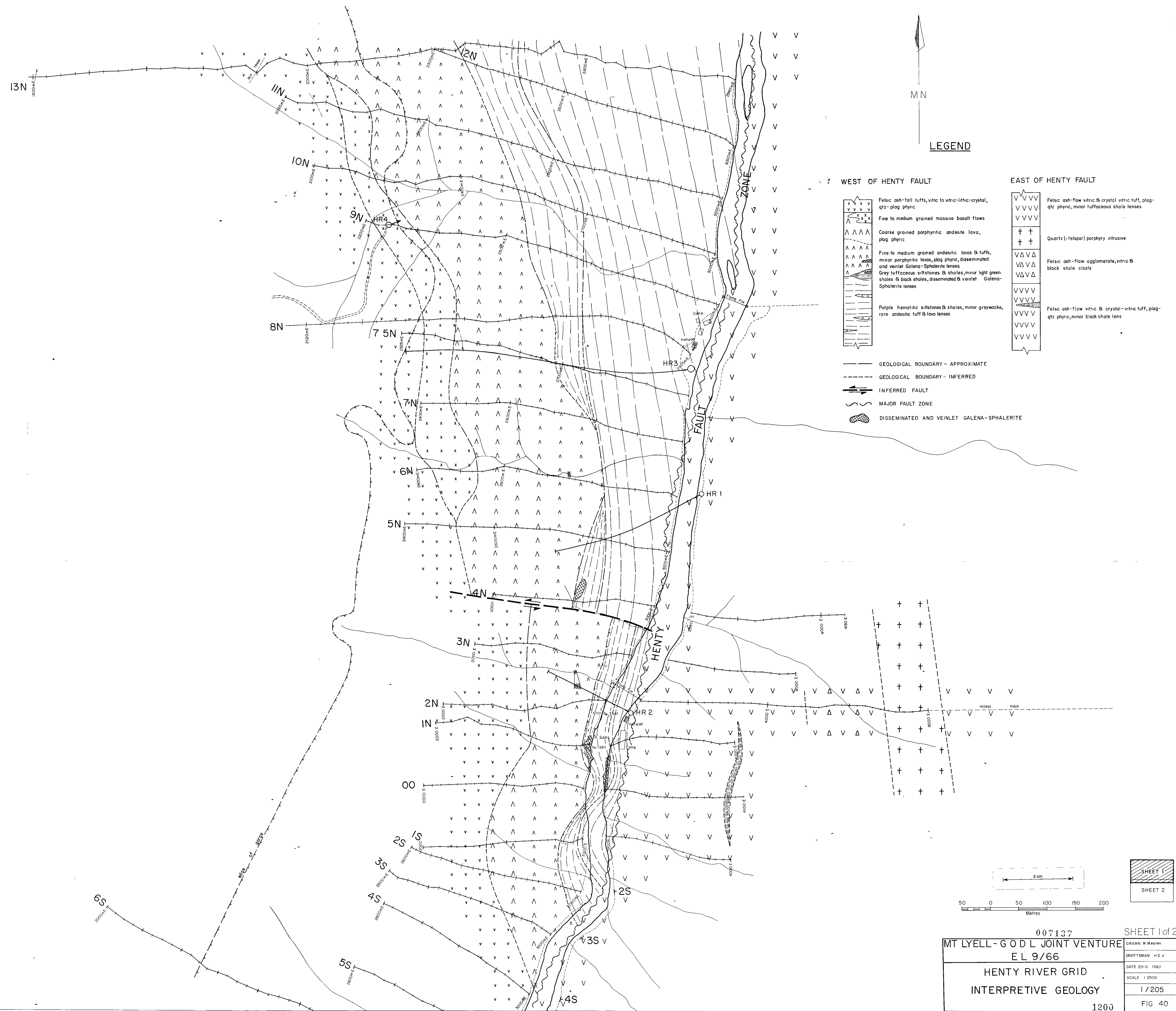
007134

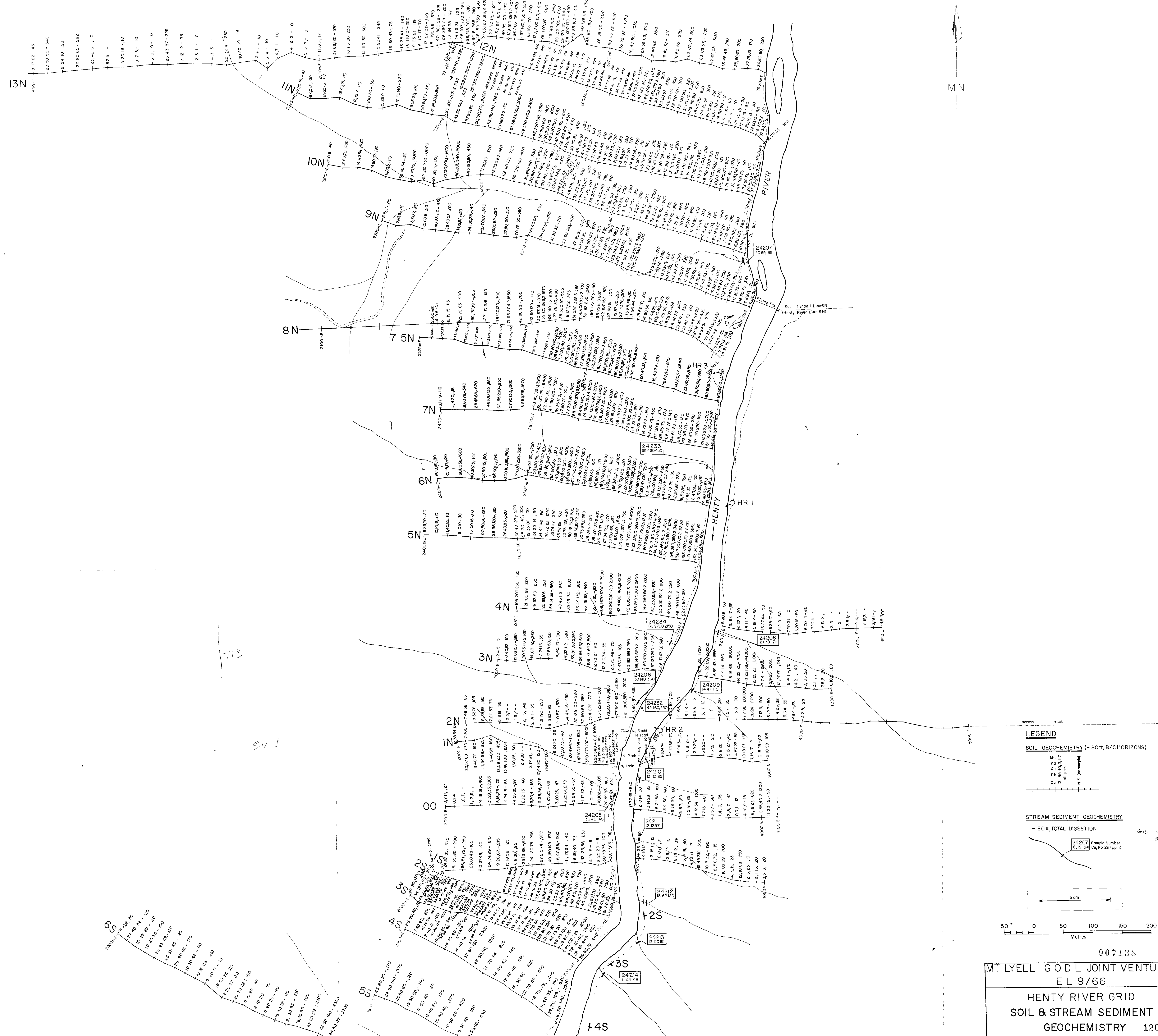
MT LYELL - G O D L JOINT VENTURE E L 9/66		Revision JULY '80
HOWARDS ANOMALY ZONE DRILLING PROFILE LINE 202 N DDH HA 4		
Scale 1 1000 Date 15/1/80		Map Number 2/507
Drawn by A C W Draftsman H D J		FIG 37



MT LYELL-GODOL JOINT VENTURE EL 9/66		DRAWN A WALTER
HOWARD'S ANOMALY		DRAFTING H D J & P J R
OUTCROP GEOLOGY		DATE JULY 1980
1198		SCALE 1:5000
		27/108 FIG 38









007139 SHEET 1 of 2

MT LYELL-GOD L JOINT VENTURE
EL 9/66

HENTY RIVER GRID
ROCK CHIP GEOCHEMISTRY
AND PETROLOGY LOCATIONS

1202

FIG 42

LEGEND

24139 75 89 300 10000 number
Cu Pb Zn (ppm)

24142 Petrology sample

OUTCROP BOUNDARY

FLOOD BOUNDARY

500m

50 0 50 100 150 200
Metres

SHEET 1
SHEET 2

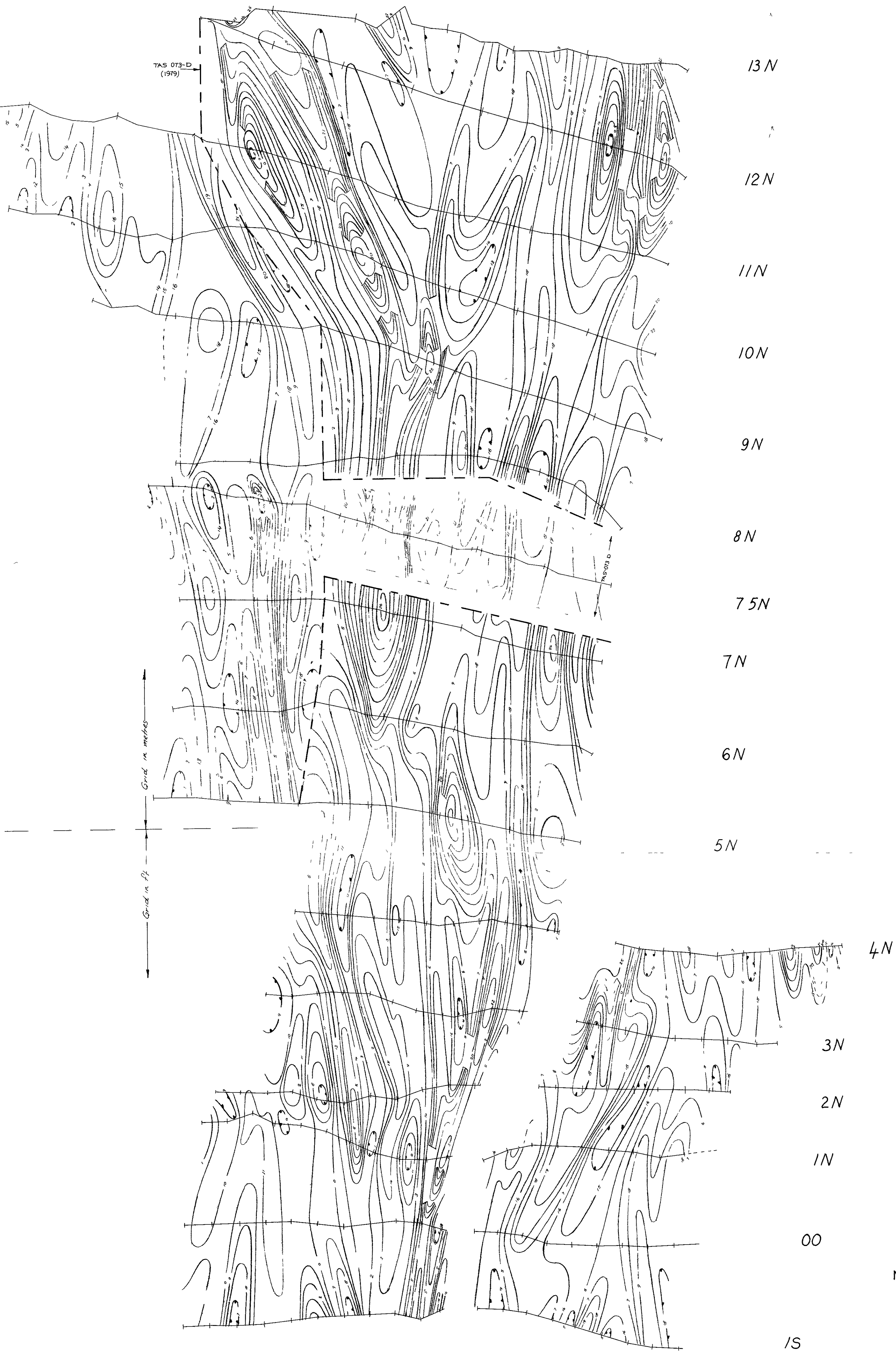
DRAWN R Meares

DATE 1 7 1960

SCALE 1:2500

1/318

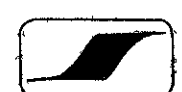
FIG 42



MOUNT LYELL MINING & RAILWAY COMPANY LTD
WEST HENTY GRID
NR. QUEENSTOWN - TASMANIA

GRADIENT ARRAY EIP SURVEY
CHARGEABILITY CONTOUR PLAN
(mV/V)

SURVEYED & COMPILED BY
SCINTREX



JUNE 1978 (TAS-054)
NOV '78 & JAN '79 (TAS-062)
NOVEMBER 1979 (TAS-073-D)

SCALE 1:2500

5 cm

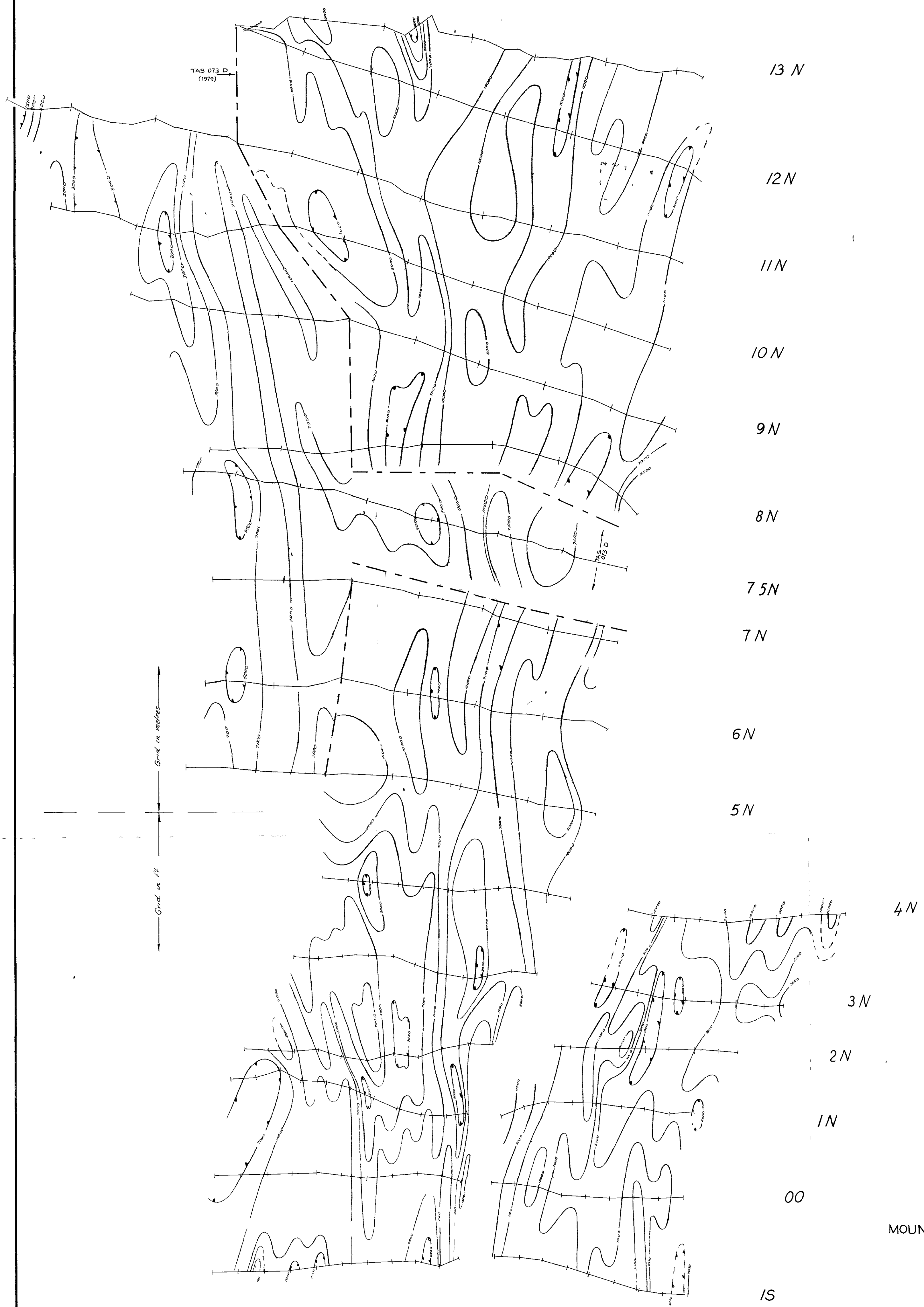
Job N° TAS-062 (-054)-(073D) Sh 1 of 1 PLATE 1
MAP NUMBER 1/413

81-1519 2/2

001110

FIG 43

1203



MOUNT LYELL MINING & RAILWAY COMPANY LTD
WEST HENTY GRID
NR. QUEENSTOWN - TASMANIA

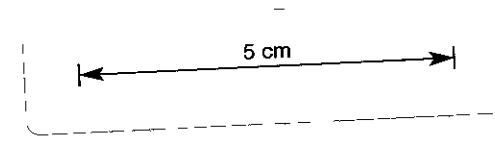
GRADIENT ARRAY EIP SURVEY
RESISTIVITY CONTOUR PLAN

SURVEYED & COMPILED BY
SCINTREX



JUNE 1978 (TAS-054)
NOV 78 & JAN 79 (TAS-062)
NOVEMBER 1979 (TAS-073-D)

SCALE 1:2500



Job No TAS-062 (054)(073D) Sht 1 of 1

PLATE 2

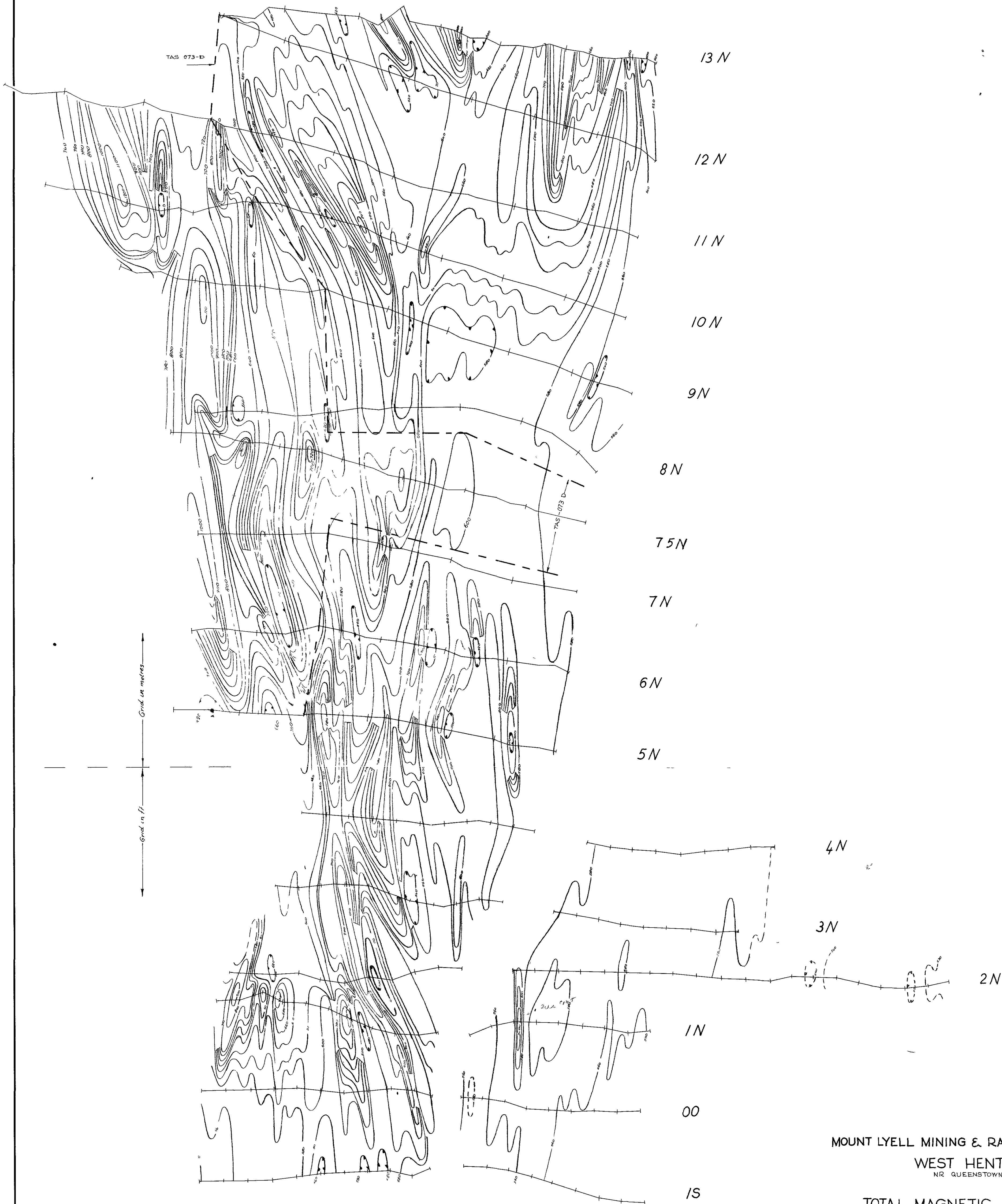
007141

MAP NUMBER 1/412

1204

81-1519 2/2

FIG 44



MOUNT LYELL MINING & RAILWAY COMPANY LTD
WEST HENTY GRID
NR QUEENSTOWN - TASMANIA

TOTAL MAGNETIC FIELD SURVEY
CONTOUR PLAN

SURVEYED & COMPILED BY
SCINTREX



JANUARY 1979
NOVEMBER 1979 (TAS-073 D)

SCALE 1:2500

Job No TAS 062 (073D)

Sht 1 of 1

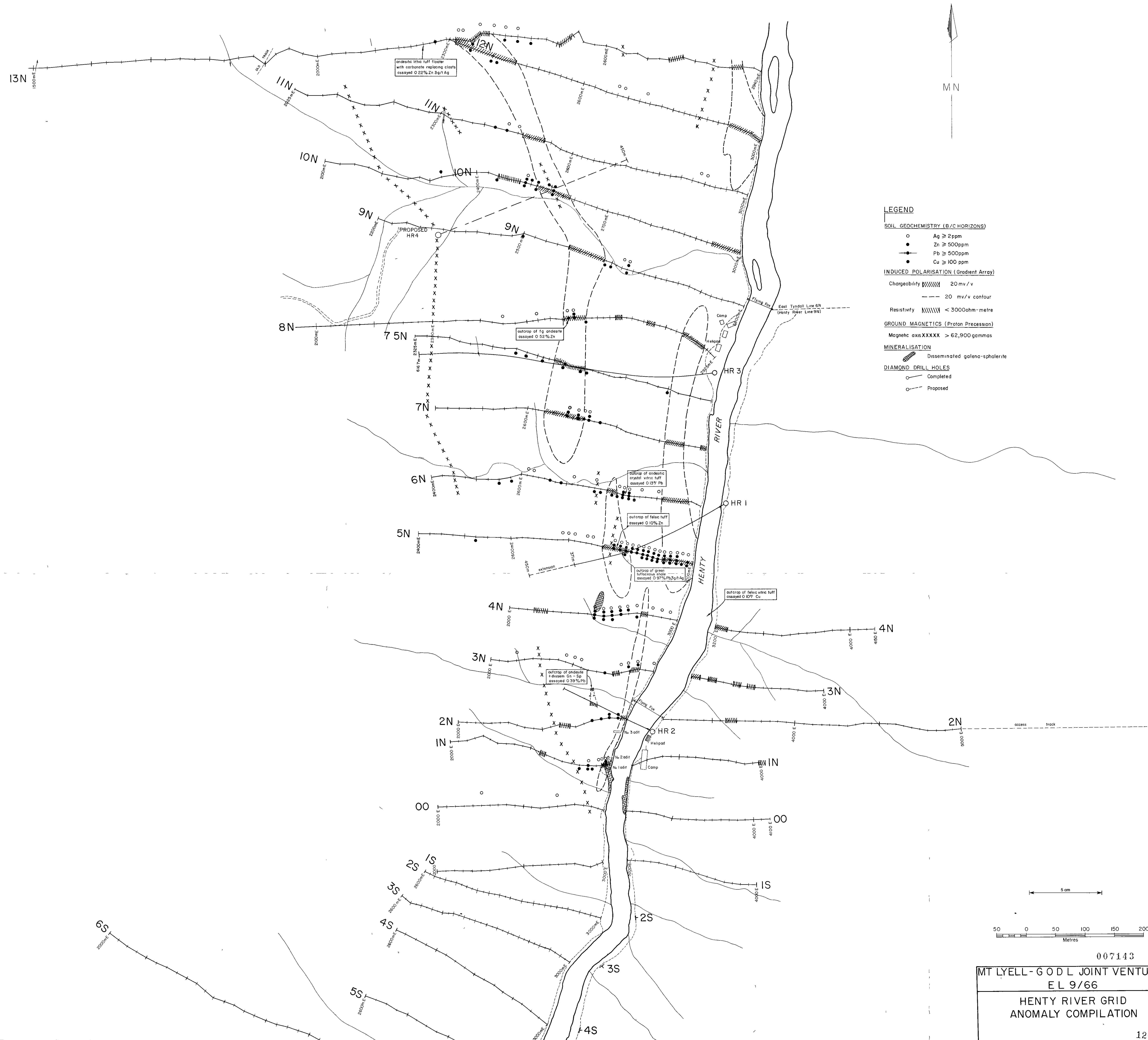
PLATE 3

MAP NUMBER 1/414

007142

FIG 45 1205

81-1519 2/2



GROUND MAGNETICS

GAMMAS

GAMMAS

EIP GRADIENT ARRAY

CHARGEABILITY mV/V

RESISTIVITY - ohm-metre

SOIL GEOCHEMISTRY

COPPER - LEAD - ZINC
PARTS PER MILLION

MANGANESE
PARTS PER MILLION

DRILLING PROFILE LINE 7N(metres)

ORIENTATION 280°(magnetic)

SEA LEVEL 0 0

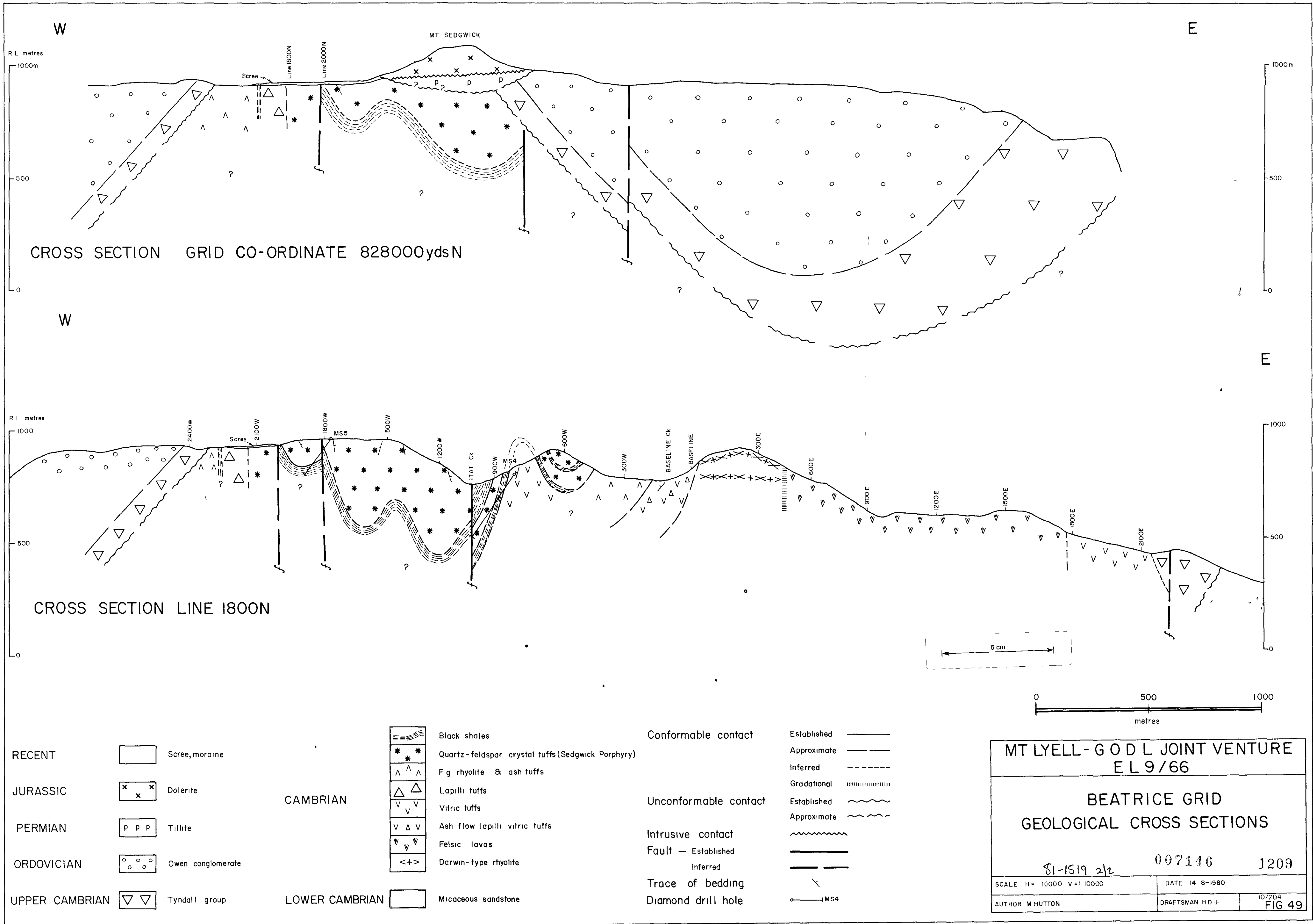
SEA LEVEL

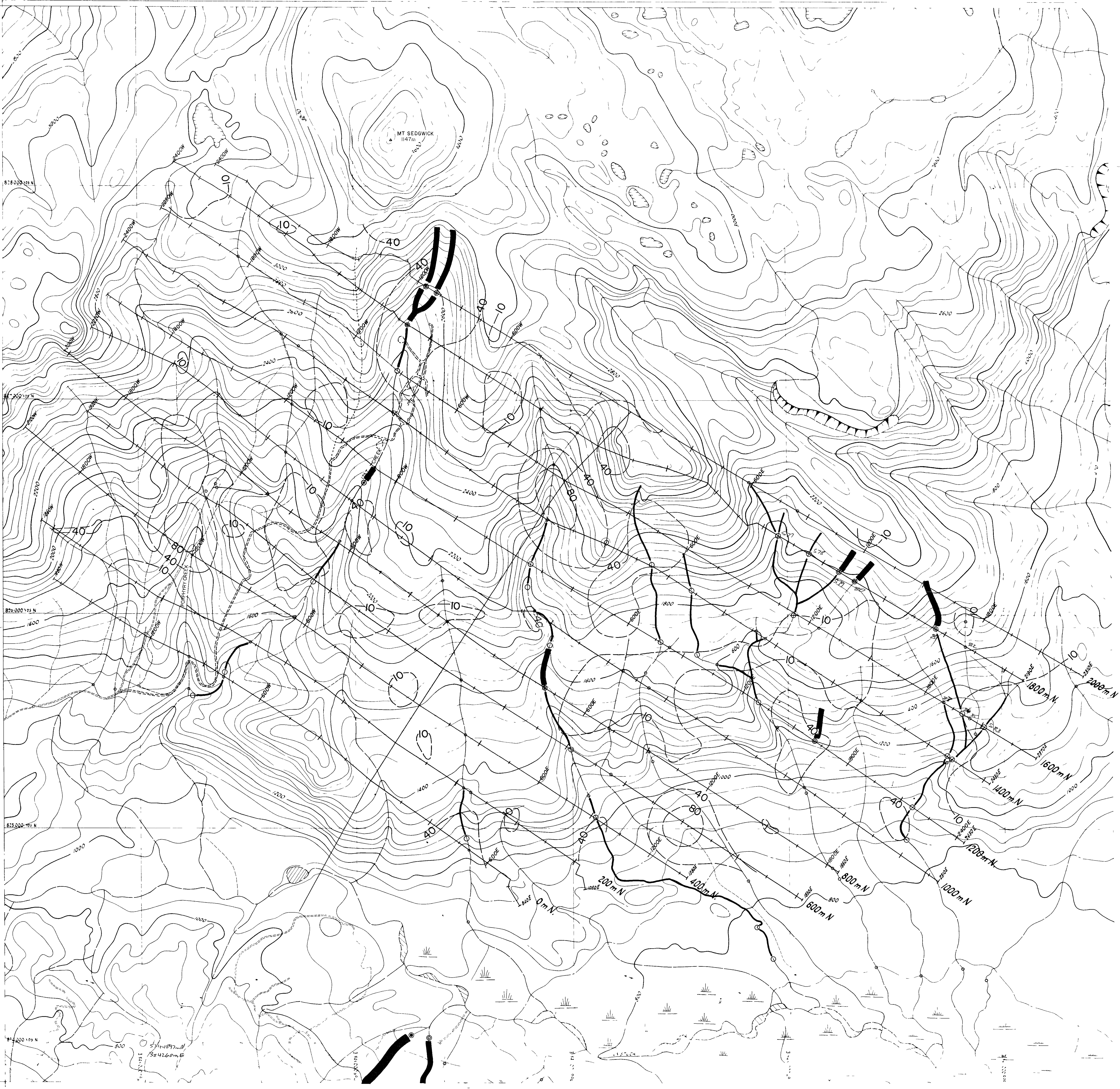
00°141

5 cm

MT LYELL - G O D L JOINT VENTURE E L 9/66		Revision
HENTY RIVER GRID DRILLING PROFILE LINE 7N DD H HR3		
1207		Map Number 1207
Scale 1 1000	Date 22 September 1979	
Drawn by R Meares	Draftsman H D J	FIG 47

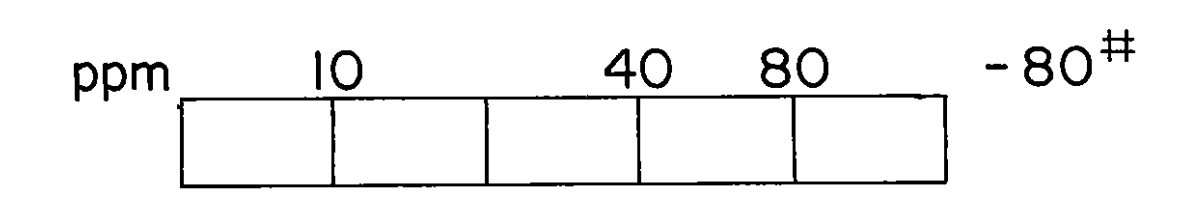
91-1519 2h



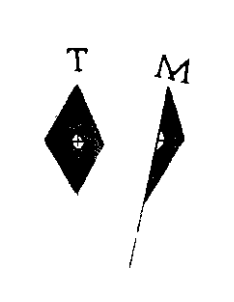
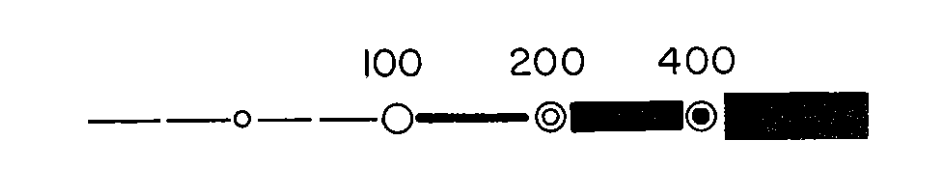


SOIL GEOCHEMISTRY BLOCK AVERAGES

Contour Intervals

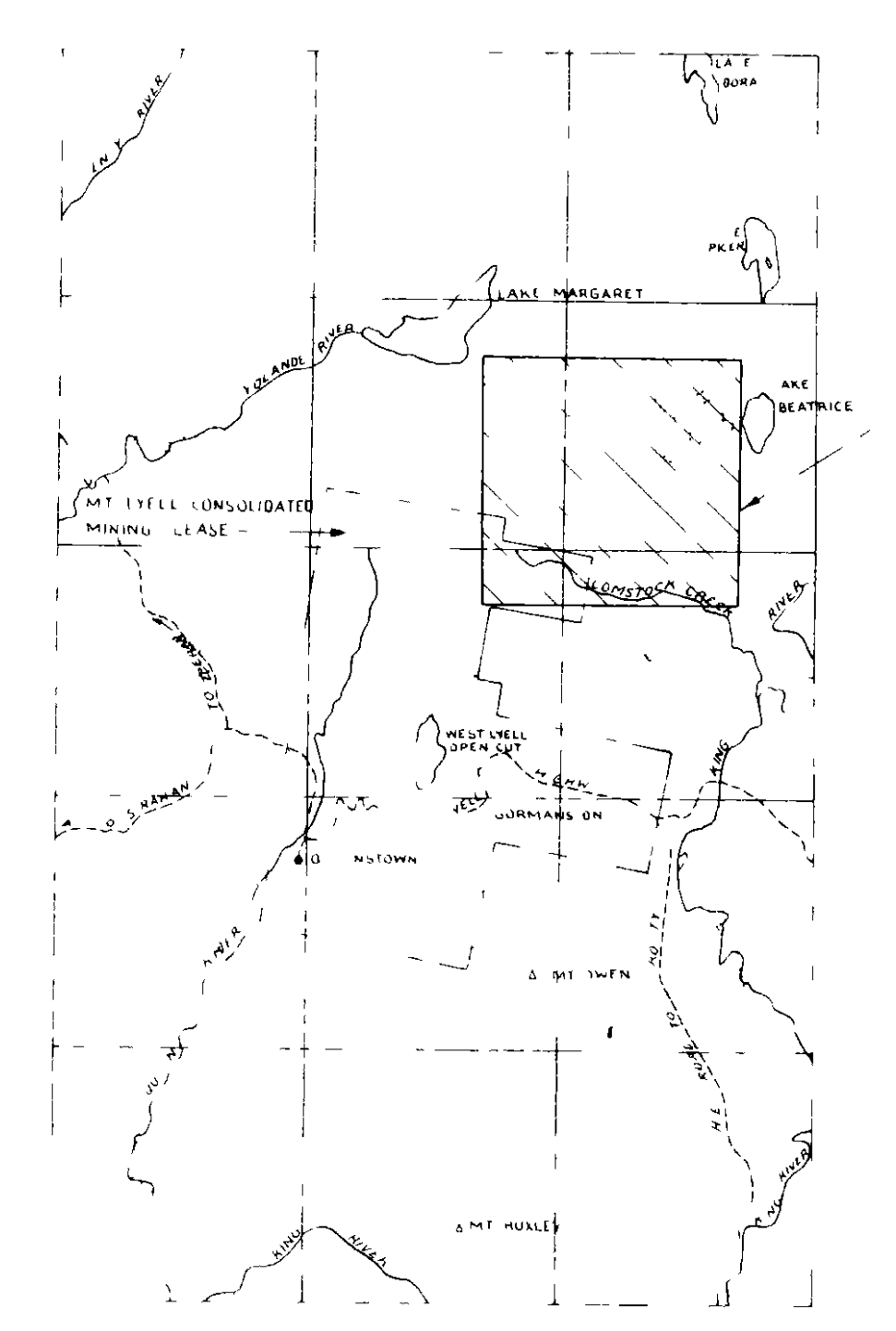


STREAM SEDIMENTS _ppm_ -80#



N

LOCATION



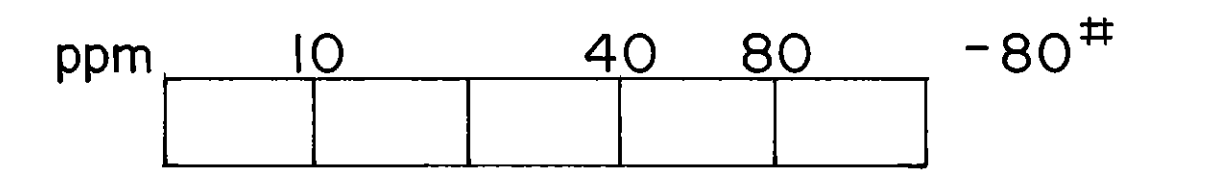
007118

THE MOUNT LYELL M & R COY LTD GEOLOGICAL DEPARTMENT		DRAWN M HUTTON
EL 9/66		TRACED
BEATRICE GRID		CHECKED
SOIL & STREAM SEDIMENT		DATE
GEOCHEMISTRY - Cu 1211		SCALE
		10 / 308
		FIG 51

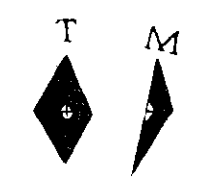
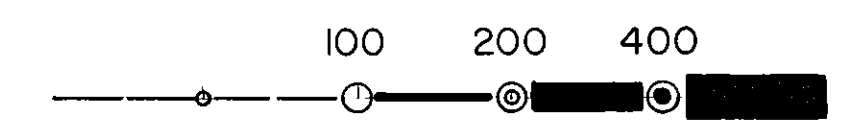


SOIL GEOCHEMISTRY BLOCK AVERAGES

Contour Intervals

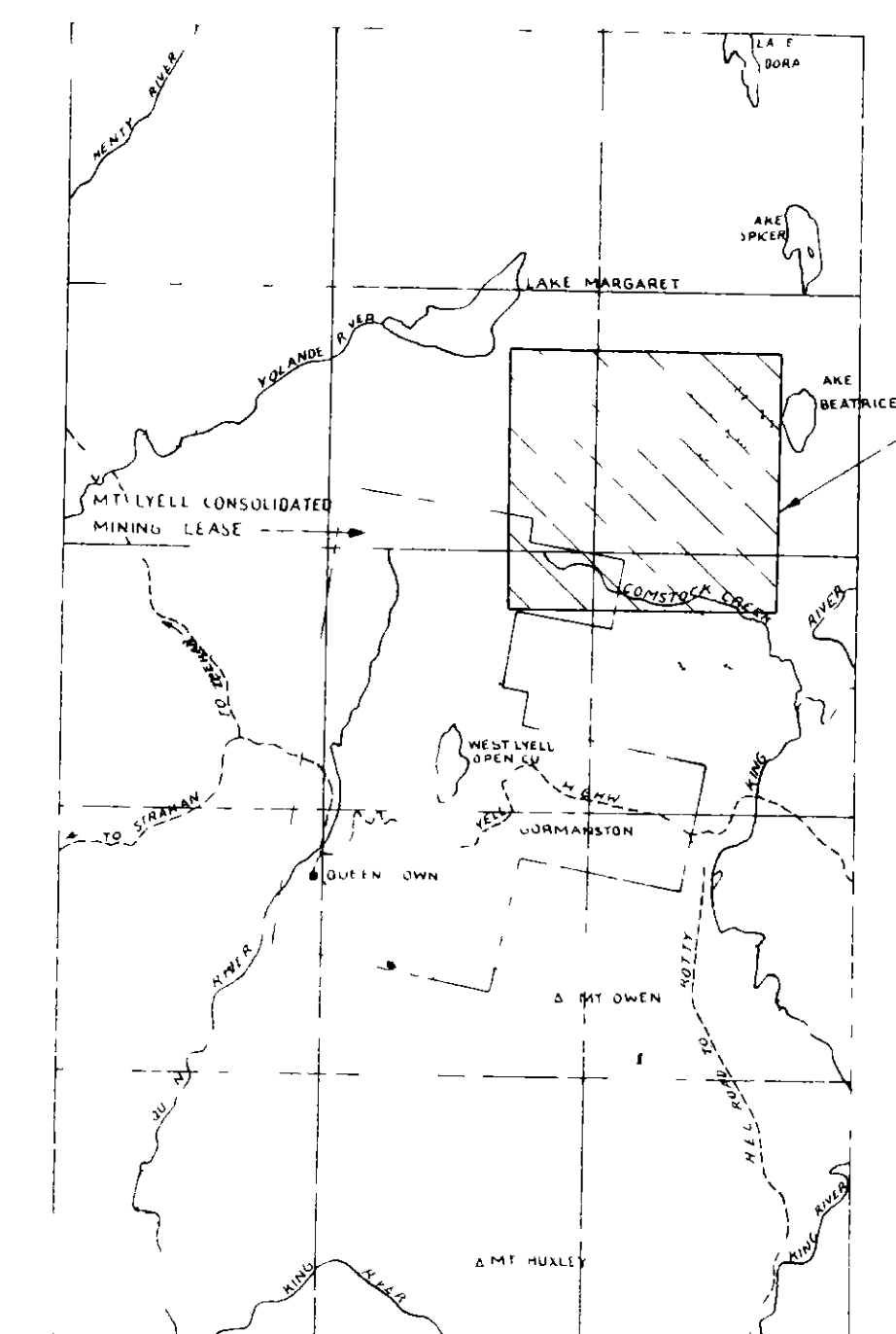


STREAM SEDIMENTS - ppm - 80#



N

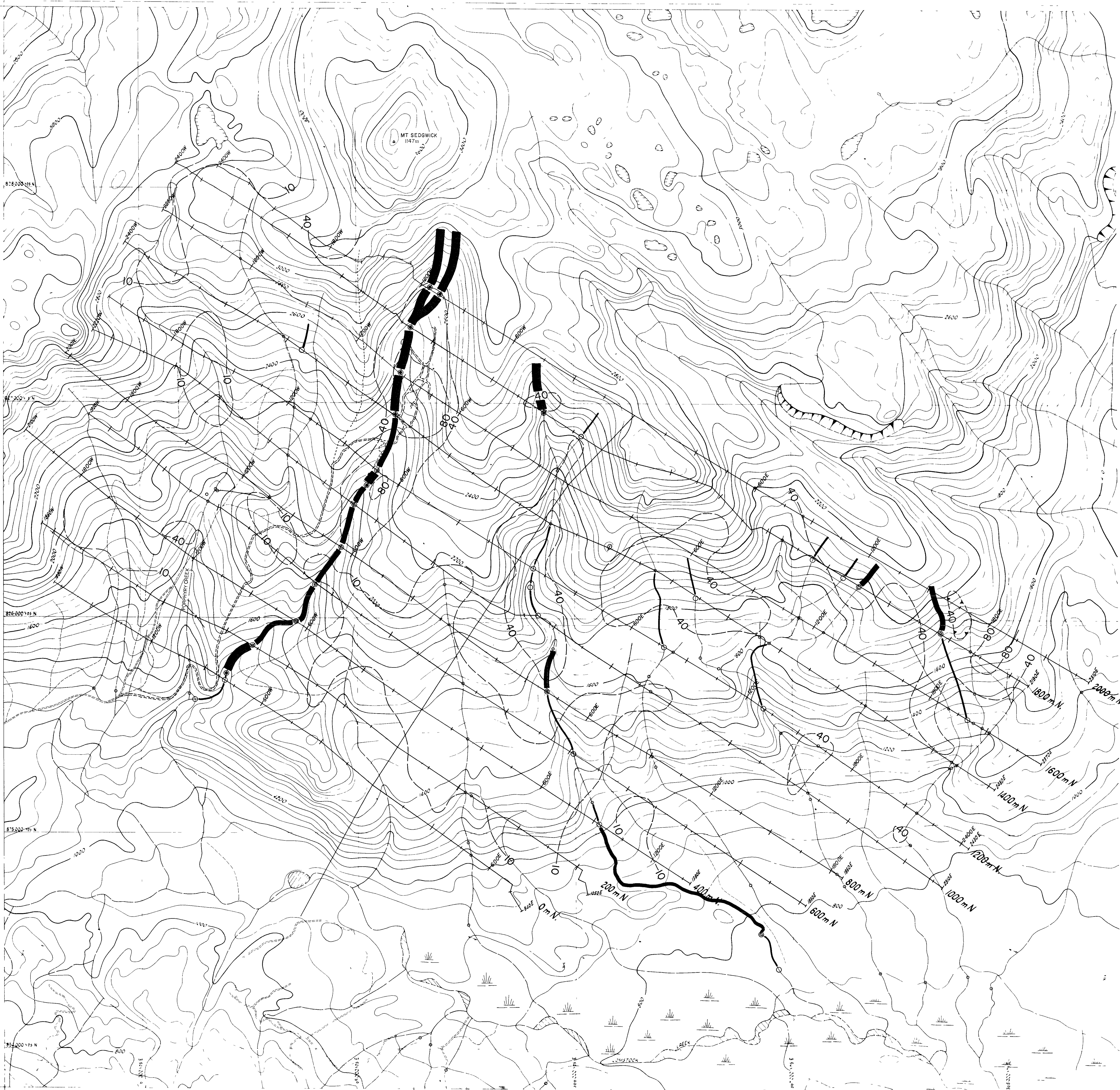
LOCATION



007149

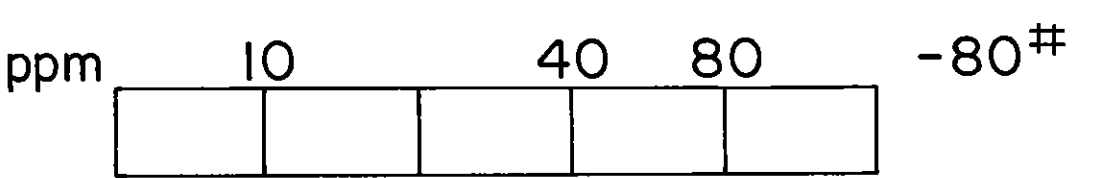
5 cm GIS Survey No 121 ± 10% (22222 - 23276)

THE MOUNT LYELL M & R COY LTD		DRAWN M HUTTON TRACED CHECKED DATE SCALE 1:5000 MAP NUMBER 10/307
GEOLOGICAL DEPARTMENT		
EL 9/66		
BEATRICE GRID		
SOIL & STREAM SEDIMENT		
GEOCHEMISTRY - Pb 1212		FIG 52

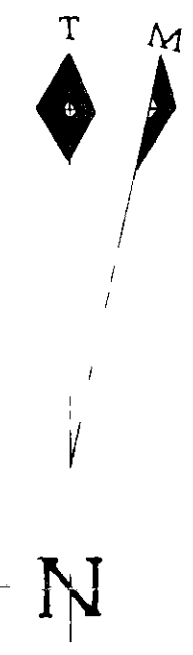
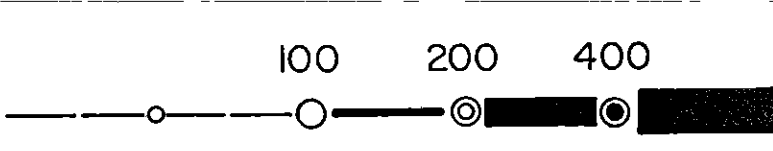


SOIL GEOCHEMISTRY BLOCK AVERAGES

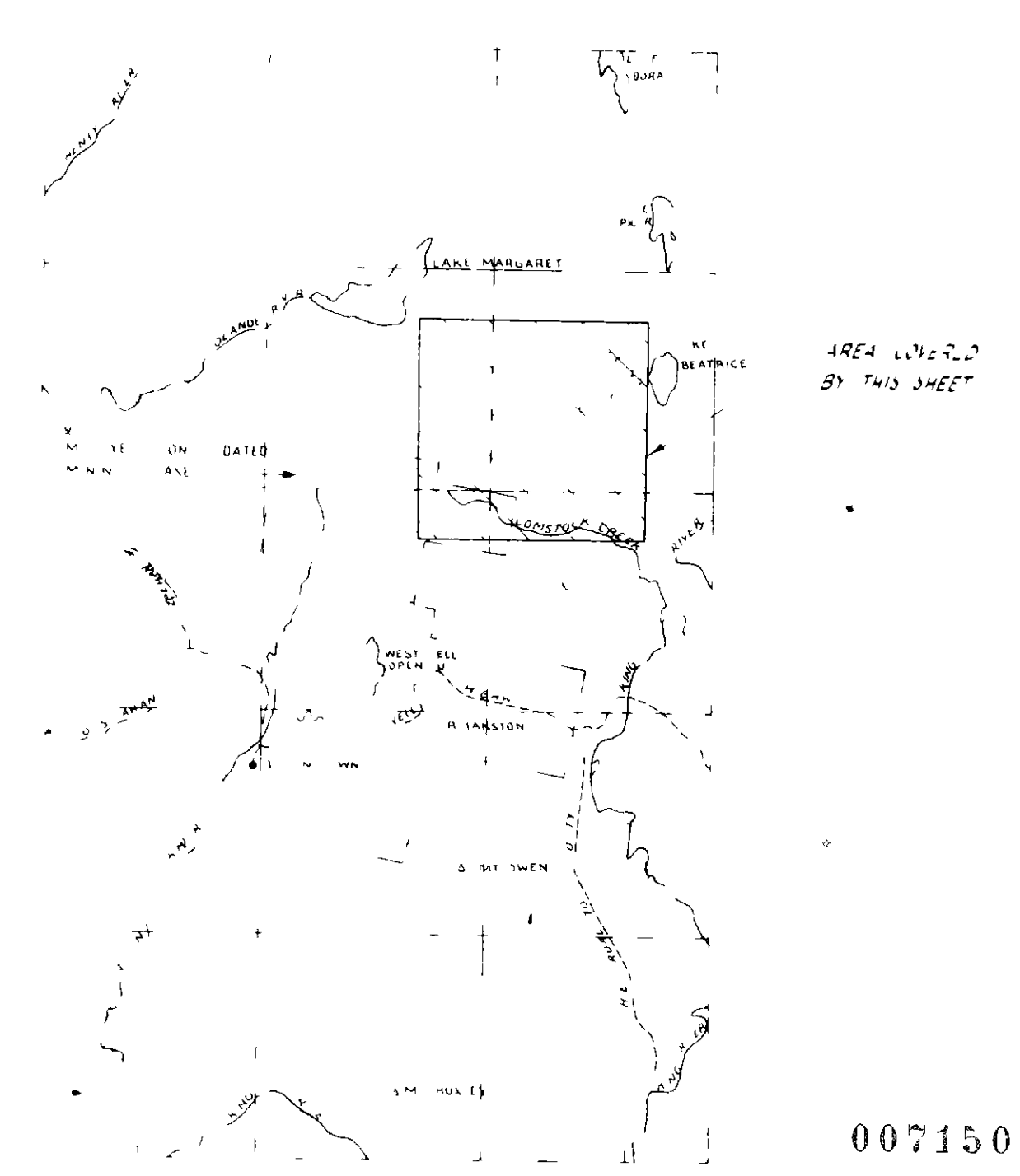
Contour Intervals



STREAM SEDIMENTS ppm - -80#



LOCATION



81-1519 212	
THE MOUNT LYELL M & R COY LTD GEOLOGICAL DEPARTMENT	
EL 9/66 BEATRICE GRID SOIL & STREAM SEDIMENT GEOCHEMISTRY - Zn 1213	
DRAWN M HUTTON TRACED CHECKED DATE SCALE 1:50,000 10/309 FIG 53	

BEATRICE
STREAM SEDIMENTS
-80# Tx
Cu

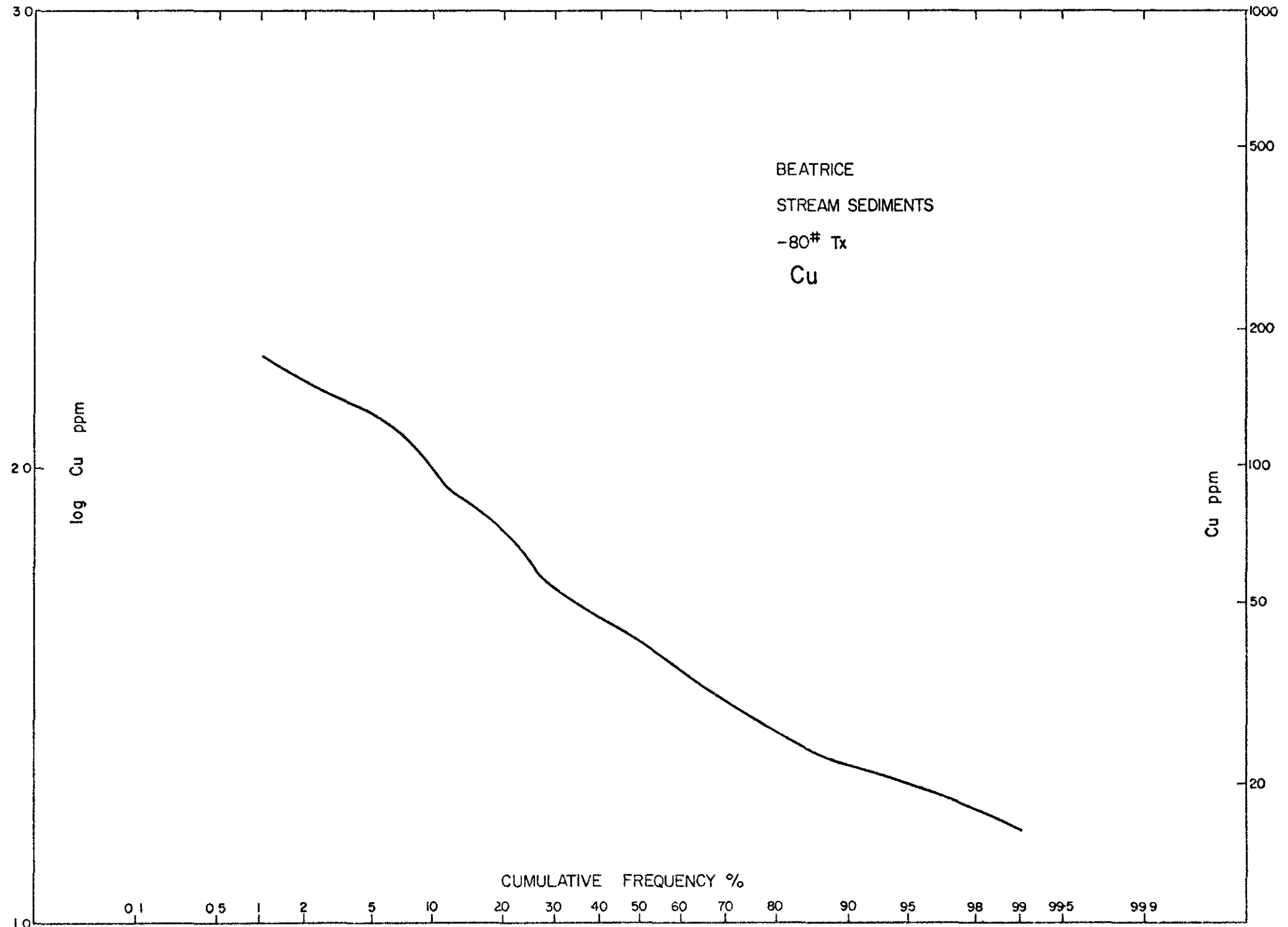


FIG 54

81-1519-2/2

81-1519 2/2

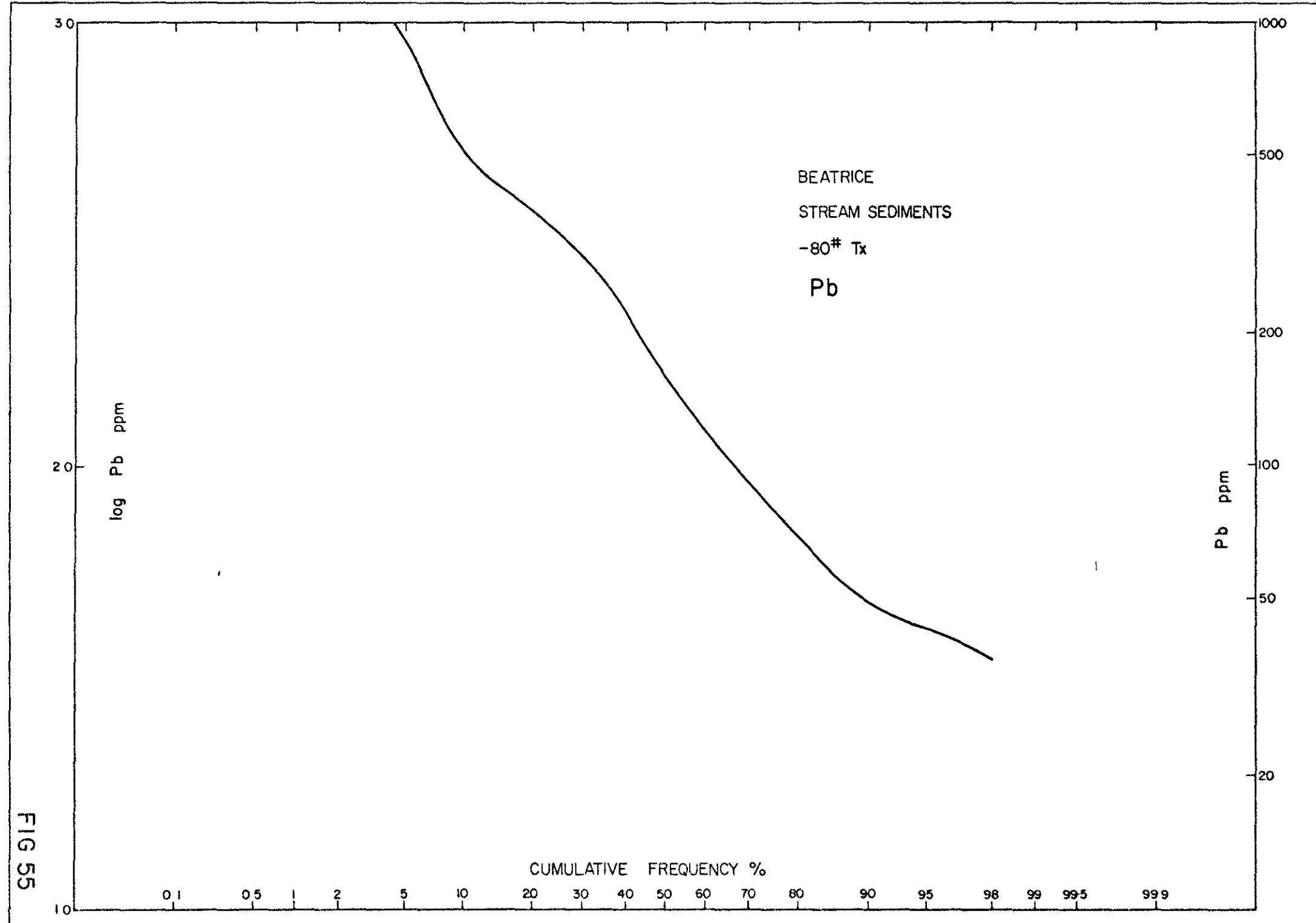


FIG 55

007152

106

107

007153

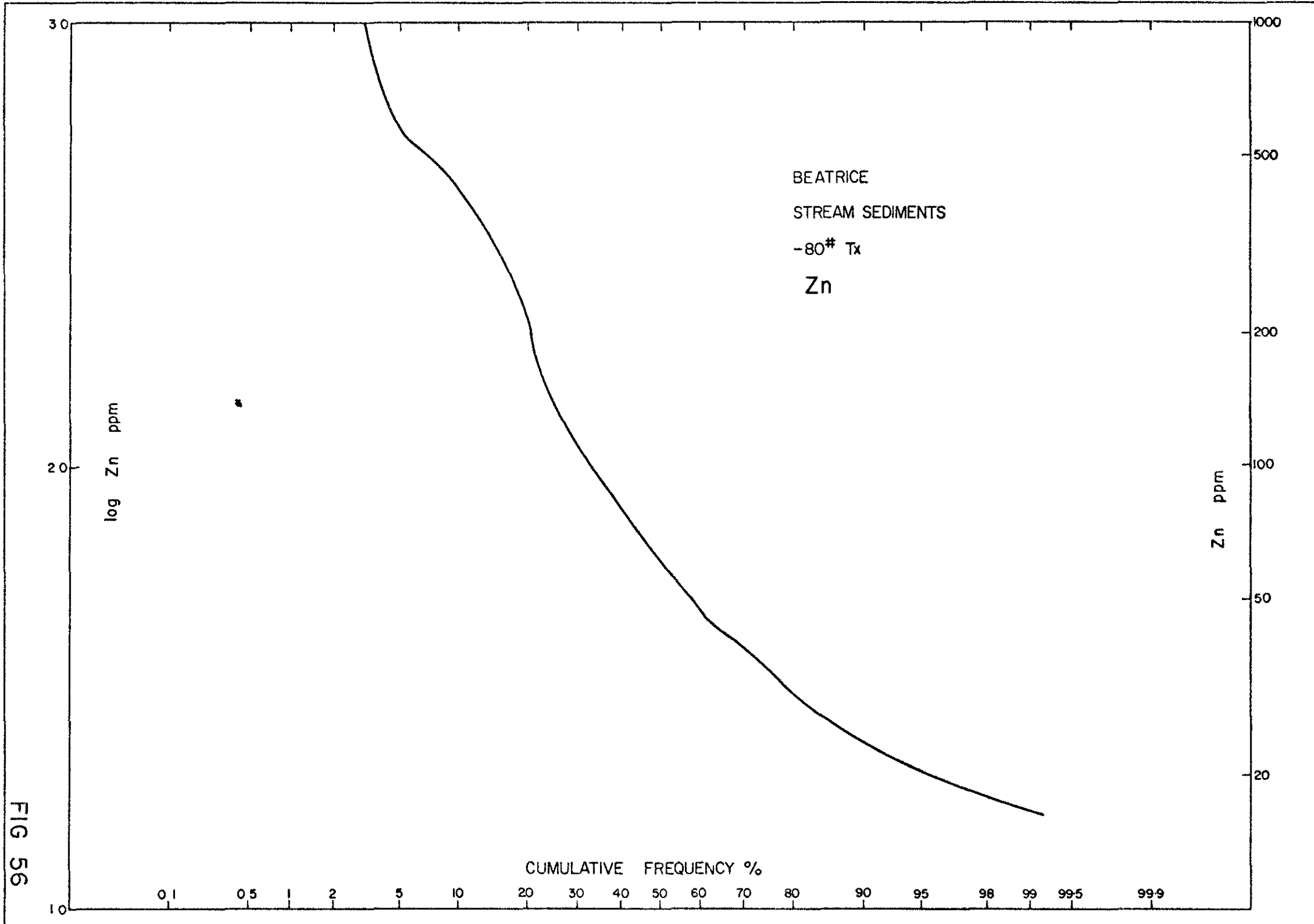
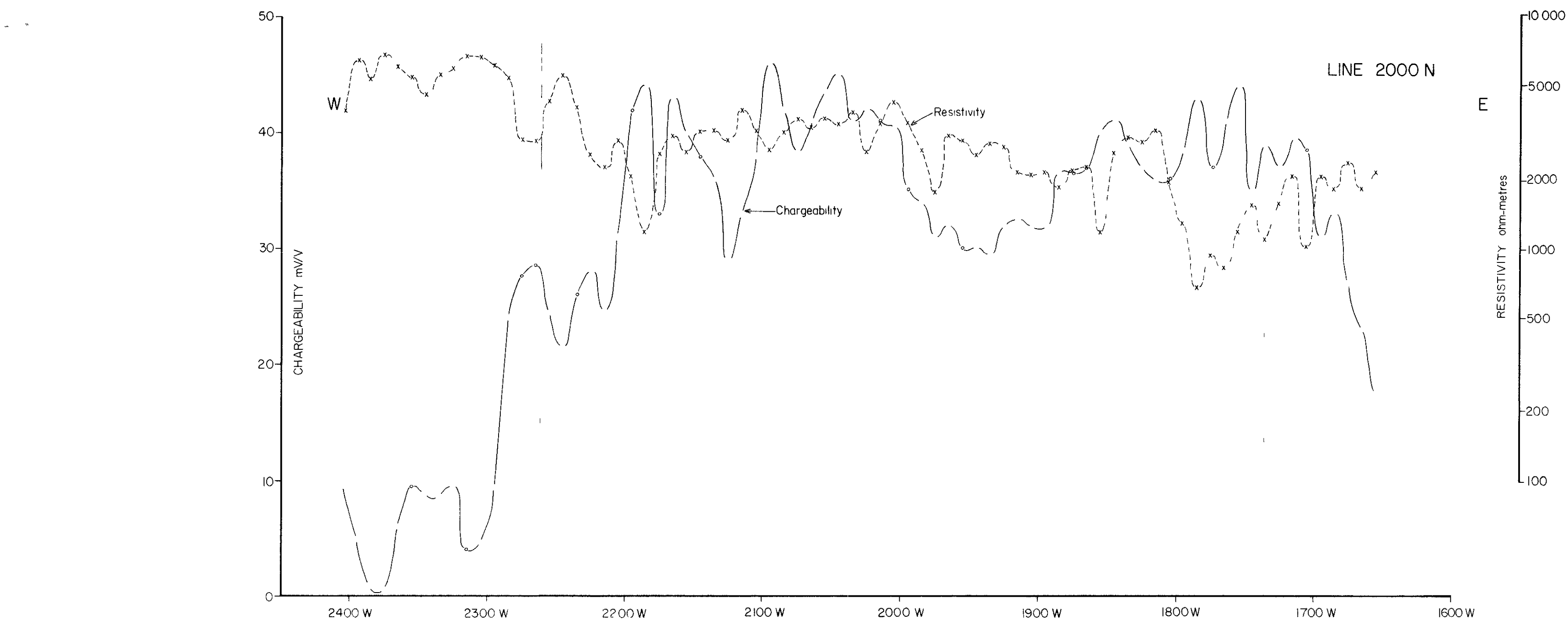


FIG 56

81-1519 2/2



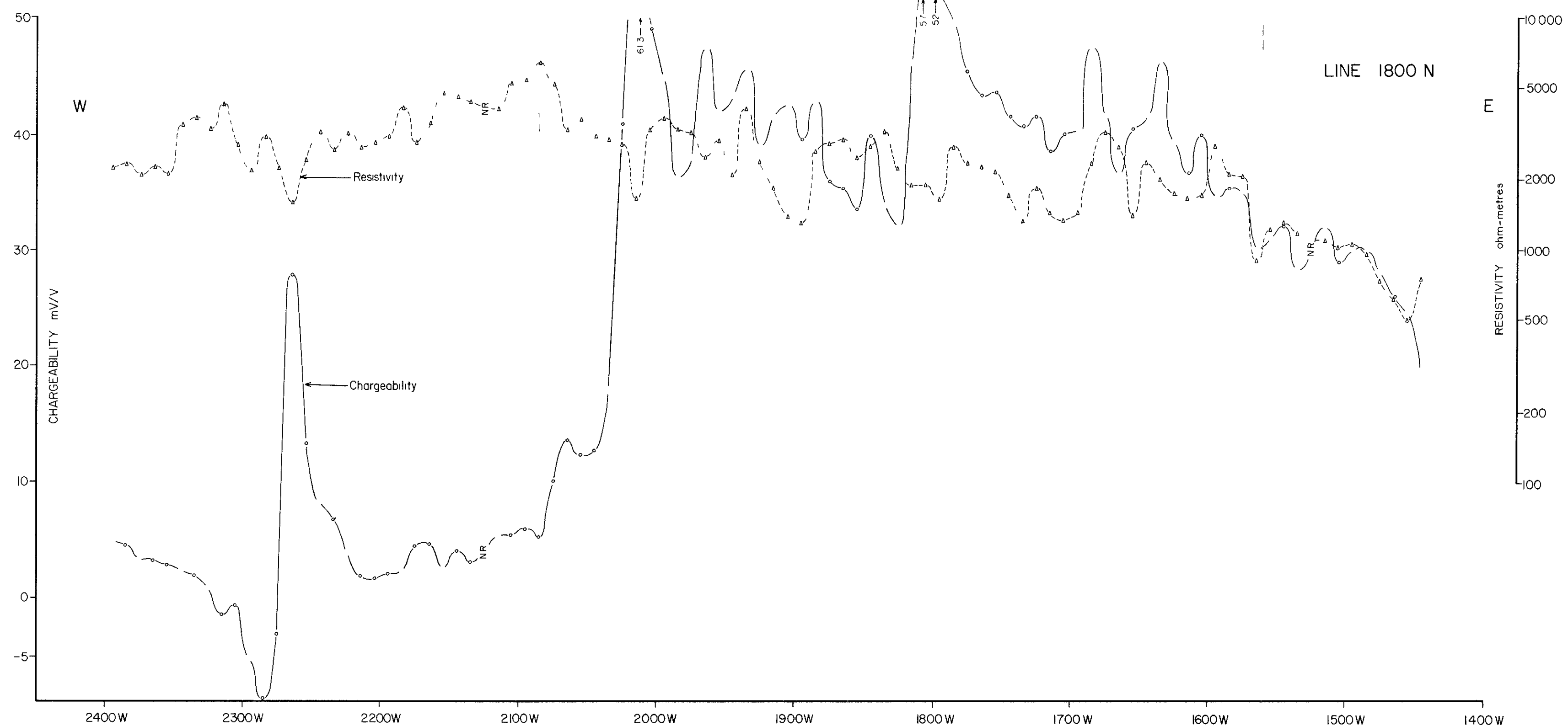
Chargeability scale
10 cm = 30 mV/V

Resistivity scale
6.67 cm = 1 log cycle

Current electrode positions

C₁ at 1800N / 2700W

C₂ at 1800N / 900 W



Potential dipole spacing

P₁ - P₂ = 10 m

Station interval = 10 m

Transmission cycle = 4 sec

Chargeability recorded on
one slice of Scintrex IPR-8
receiver

007154

5 cm

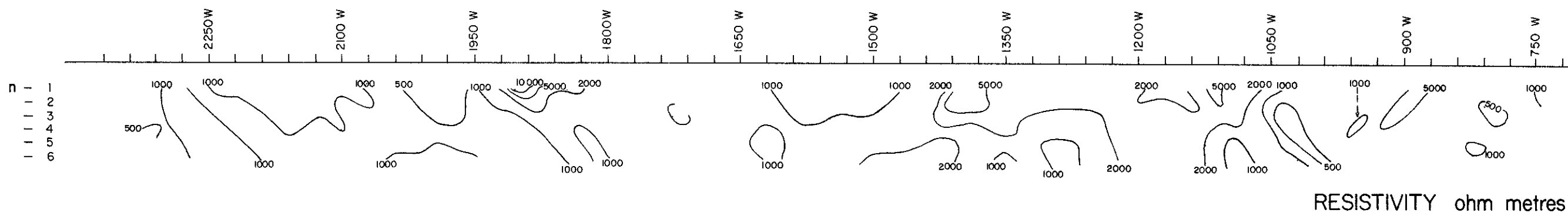
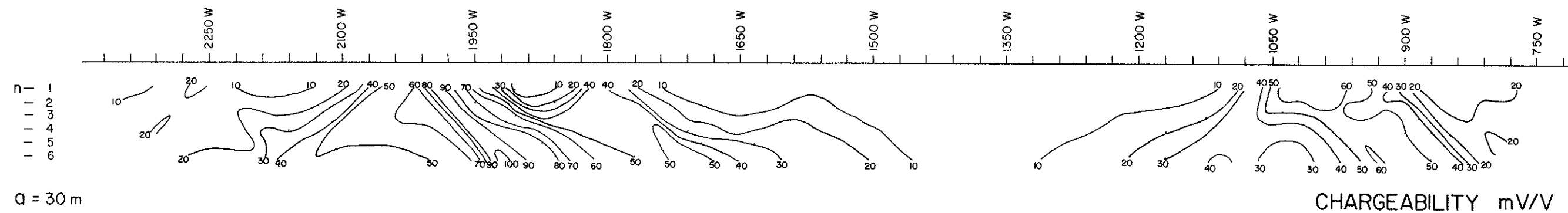
MT LYELL-GOD L JOINT VENTURE

BEATRICE GRID
DETAILED GRADIENT ARRAY
LINE PROFILES 1800N & 2000N

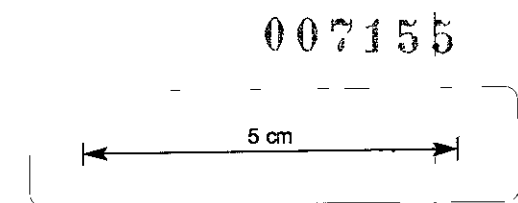
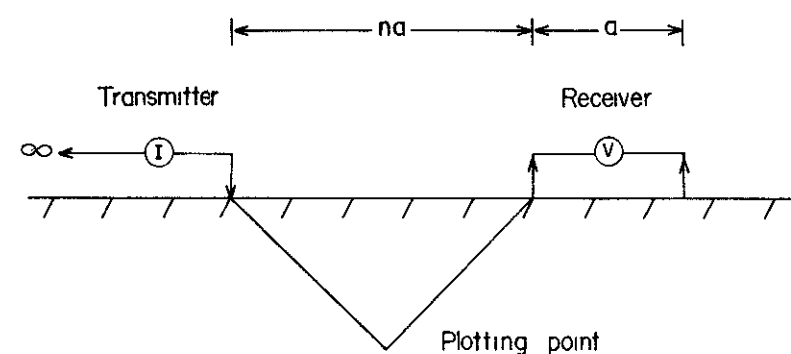
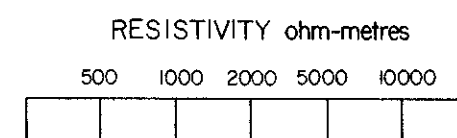
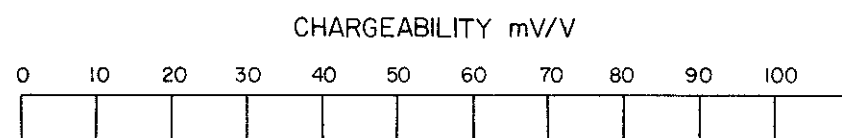
SCALE 1:2500
DATE 13-6-80

DRAWN M HUTTON
DRAFTSMAN PRIMMER

FIG 57



CONTOUR INTERVALS



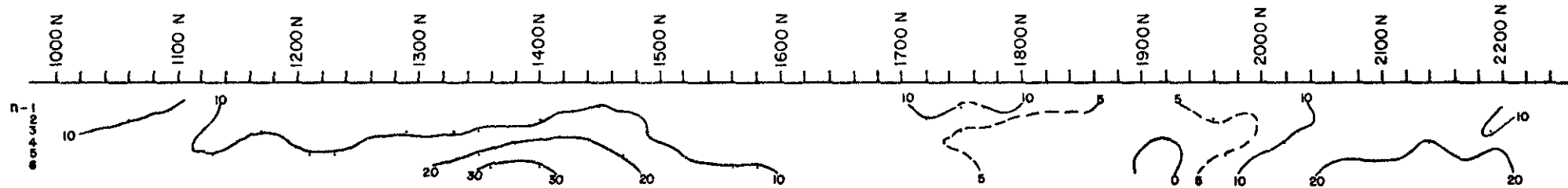
MT LYELL-GODL JOINT VENTURE		
BEATRICE GRID		
POLE-DIPOLE EIP SURVEY		
LINE 1800 N		
PSEUDOSECTIONS		1215
SCALE 1:5000	DRAWN M HUTTON	FIG 58
DATE 9-9-80	DRAFTSMAN PRIMER	

81-159 2/2

81-1519

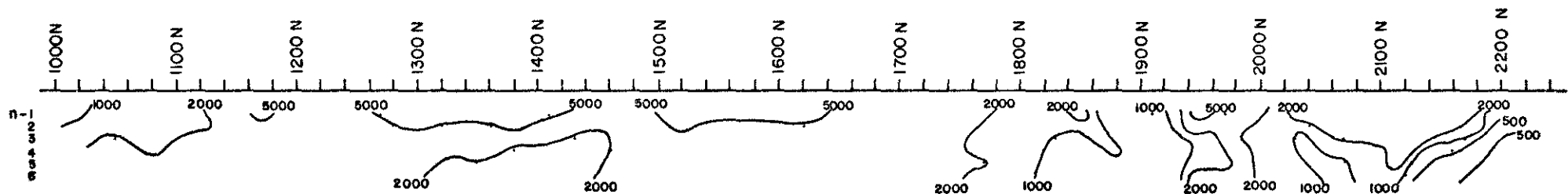
2/2

108



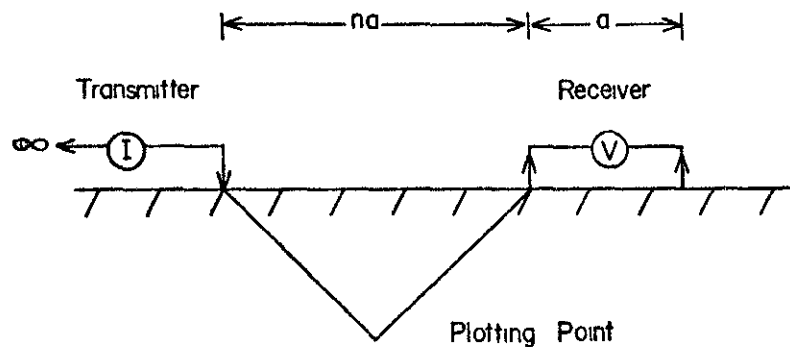
$a = 20m$

CHARGEABILITY mV/V



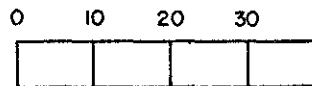
RESISTIVITY ohm-metres

CONTOUR INTERVALS

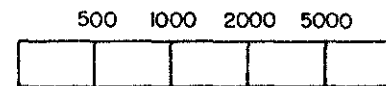


POLE-DIPOLE ARRAY

CHARGEABILITY mV/V



RESISTIVITY ohm-metres



MT LYELL-GODL JOINT VENTURE

BEATRICE GRID
POLE-DIPOLE EIP SURVEY
WESTERN ACCESS TRACK
PSEUDOSECTIONS

SCALE 1:5000

DRAWN M HUTTON

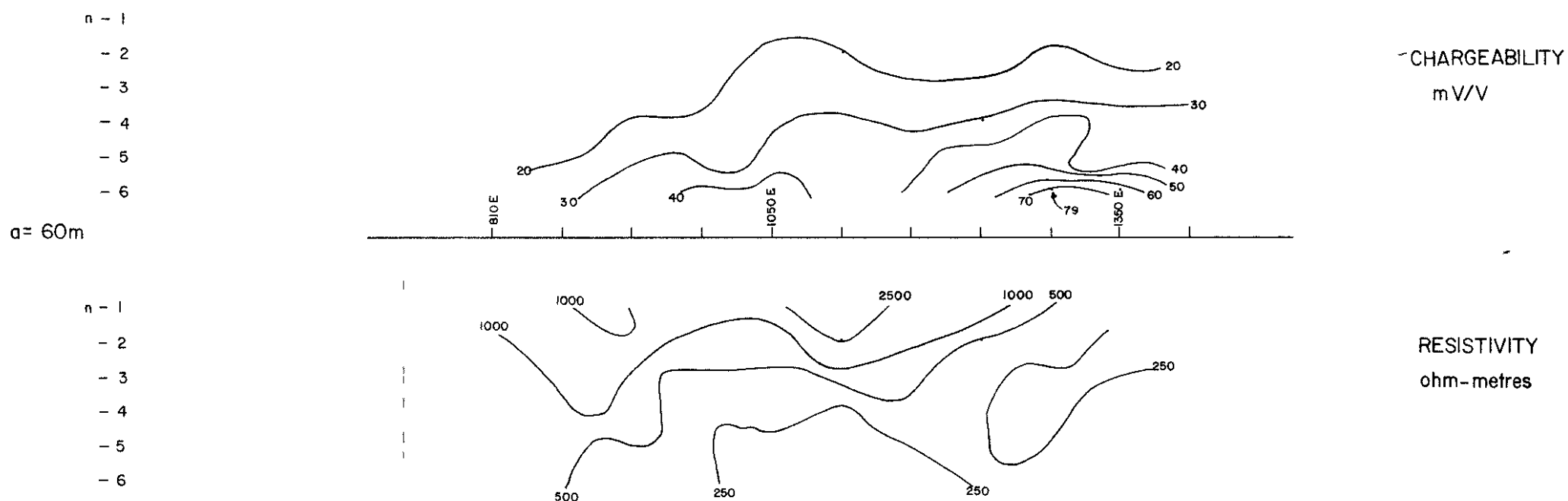
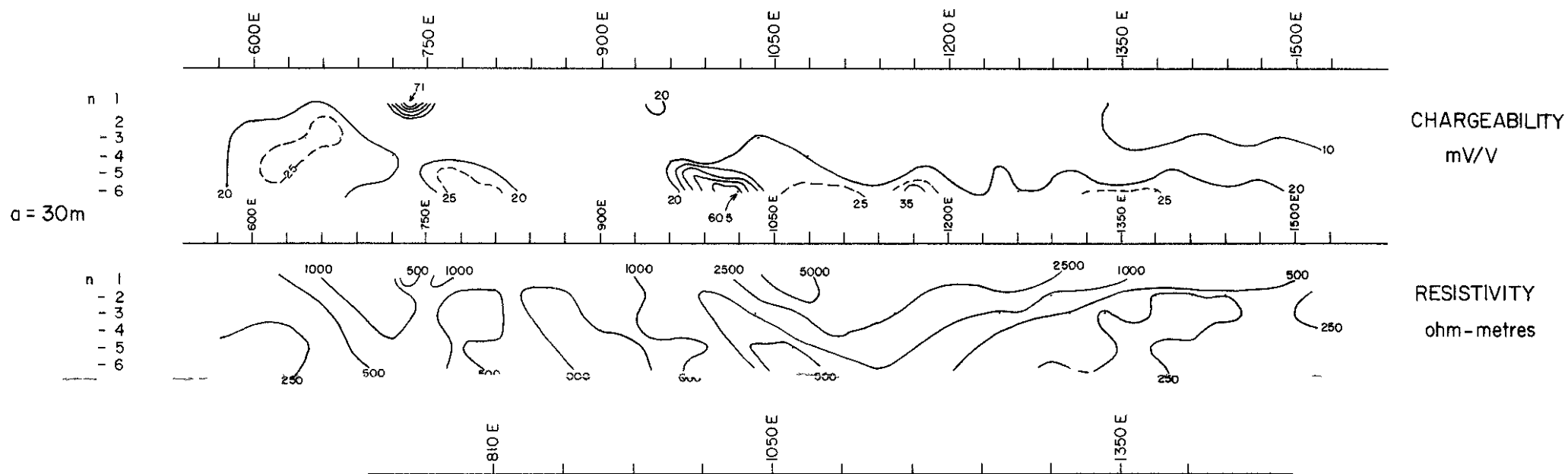
DATE 1-9-80

DRAFTSMAN PRIMMER

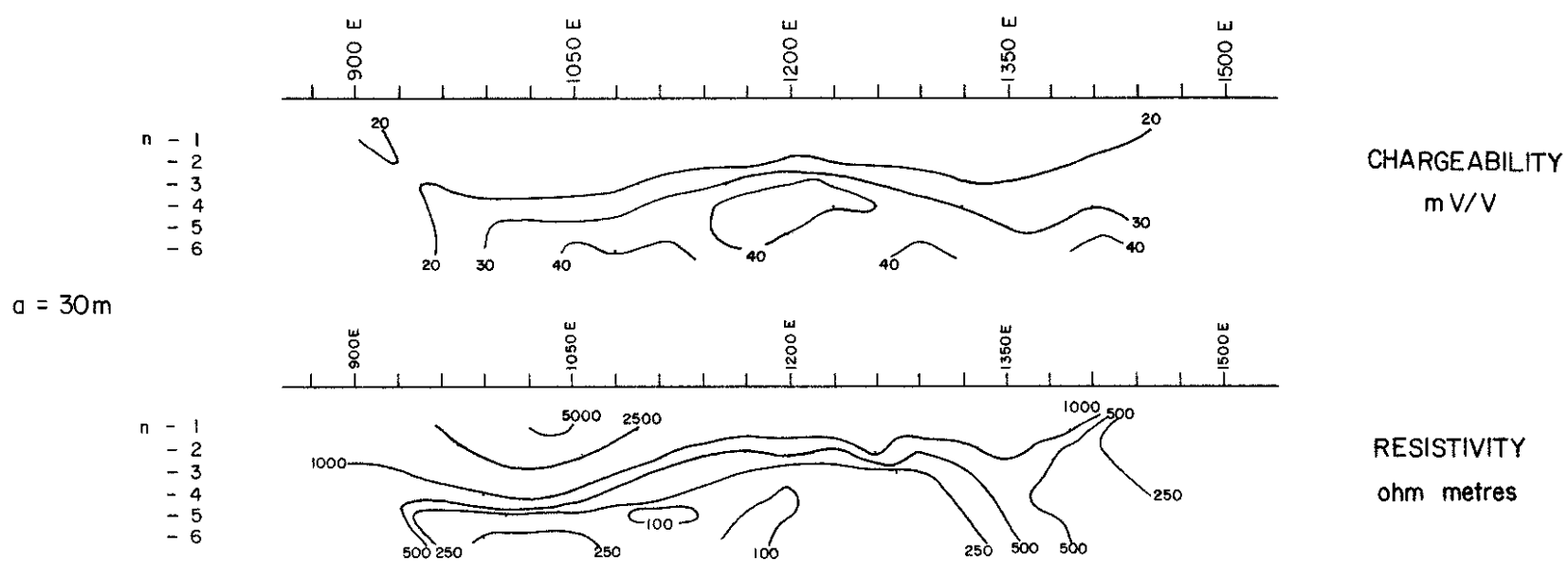
FIG 59

007156

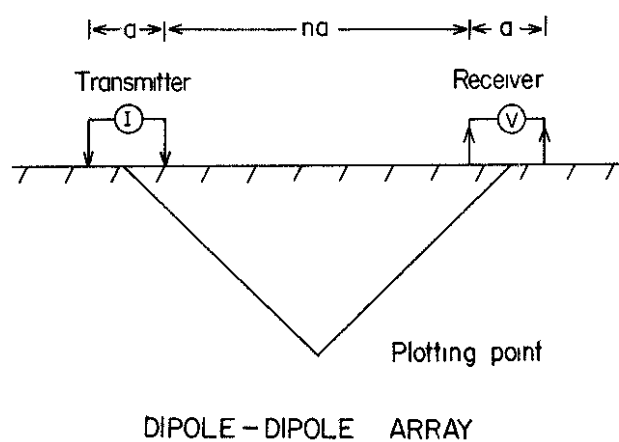
5 cm



LINE 600N

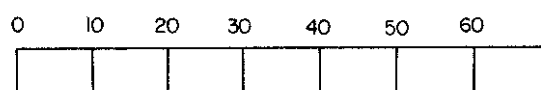


LINE 400N



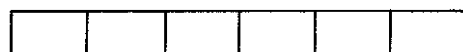
CONTOUR INTERVALS

CHARGEABILITY mV/V



RESISTIVITY ohm - metres

250 500 1000 2500 5000



007157

5 cm

MT LYELL-GQDL JOINT VENTURE

BEATRICE GRID
DIPOLE-DIPOLE EIP SURVEY
LINES 400N & 600N
PSEUDOSECTIONS 1216

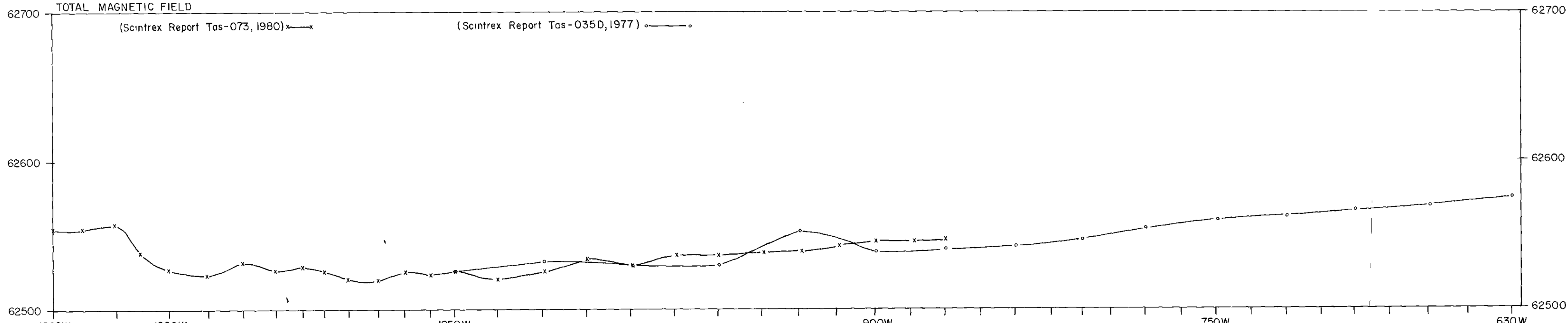
SCALE 1:5000
DATE 1-9-80

DRAWN M HUTTON
DRAFTSMAN PRIMMER

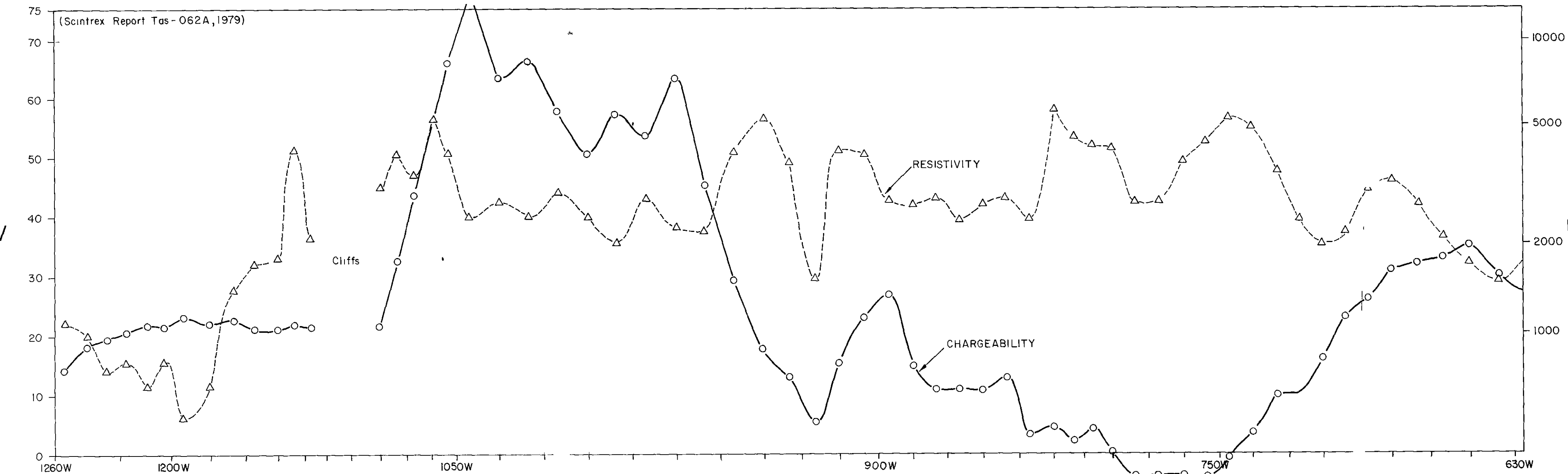
FIG 60

81-1519 2/2

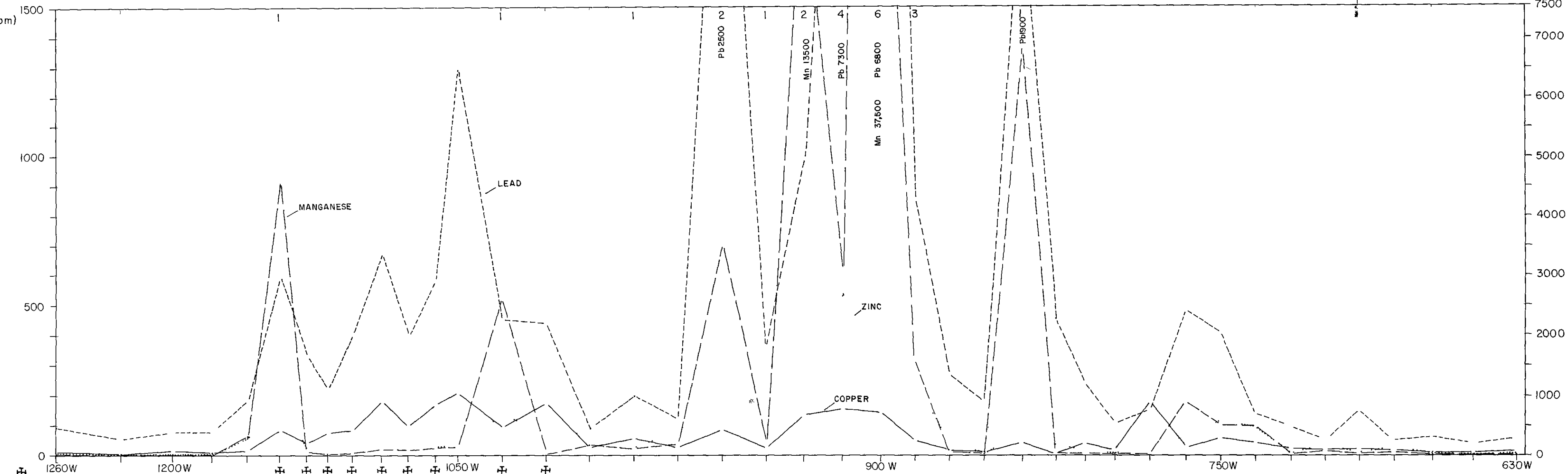
GROUND MAGNETICS



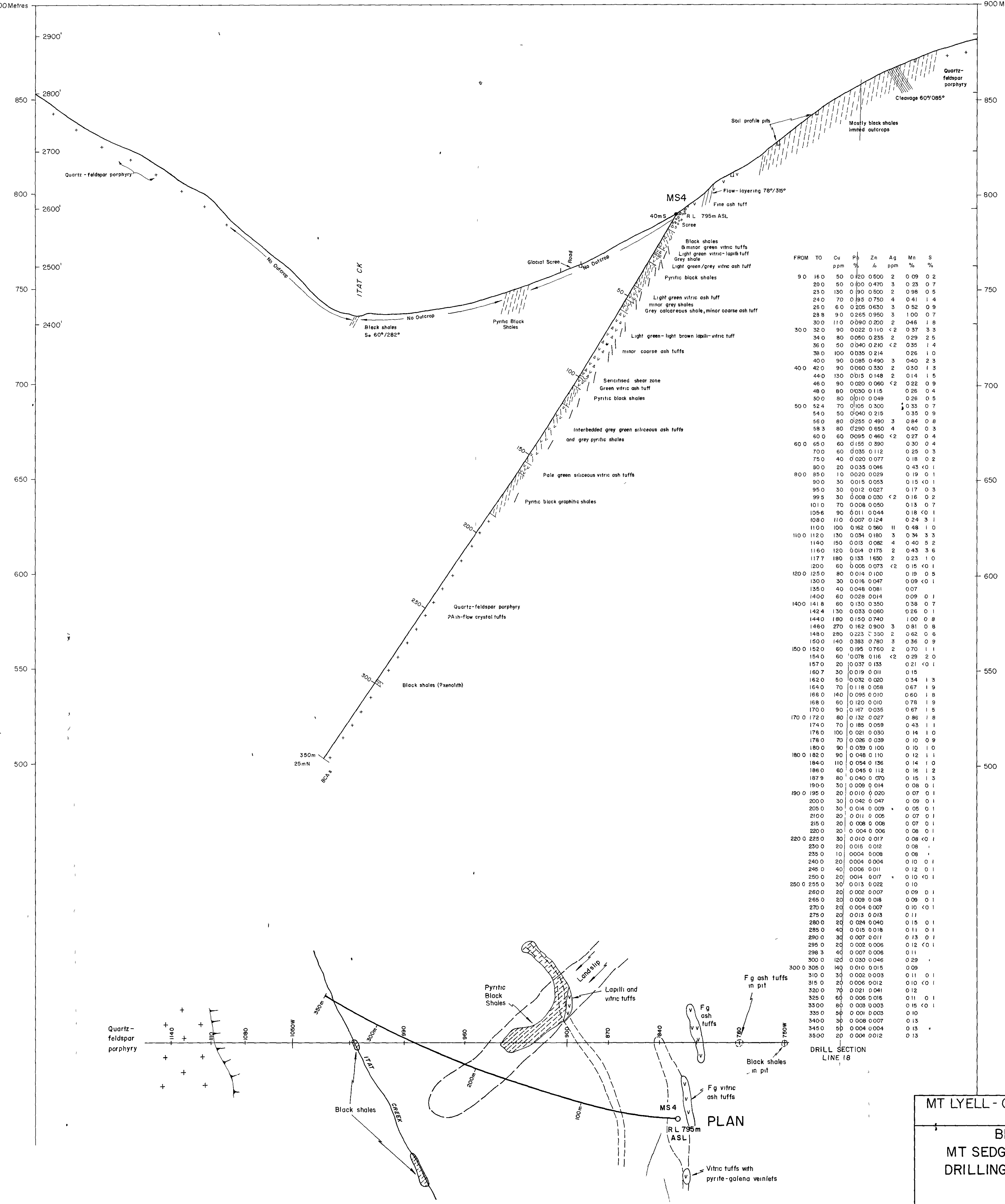
EIP GRADIENT ARRAY



SOIL GEOCHEMISTRY



DRILLING PROFILE LINE 18N

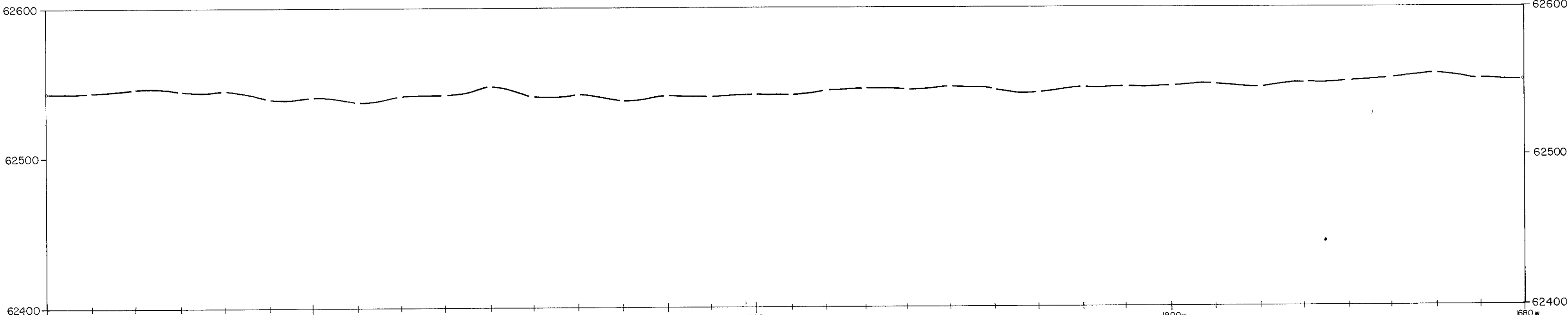


MT LYELL - G O D L JOINT VENTURE
E L 9/66
BEATRICE GRID
MT SEDGWICK ANOMALY ZONE
DRILLING PROFILE LINE 18N
DDH, MS4
1217

Scale 1:1000 Date 24.10.1979
Drawn by M HUTTON Draftsman H D J

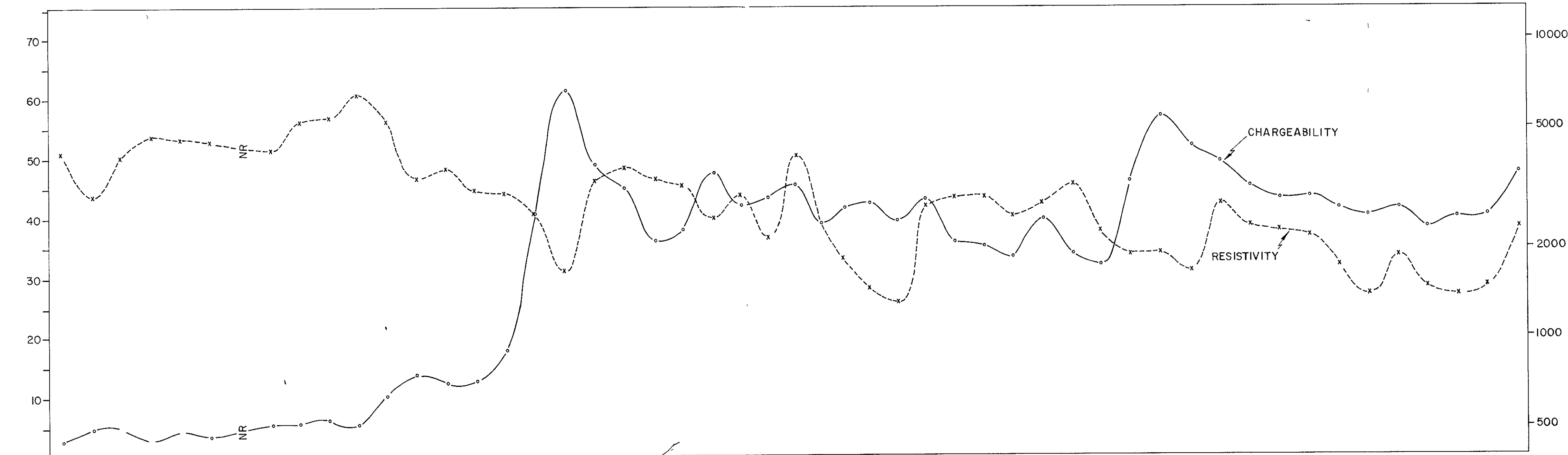
Revision
FIG 61

GROUND MAGNETICS



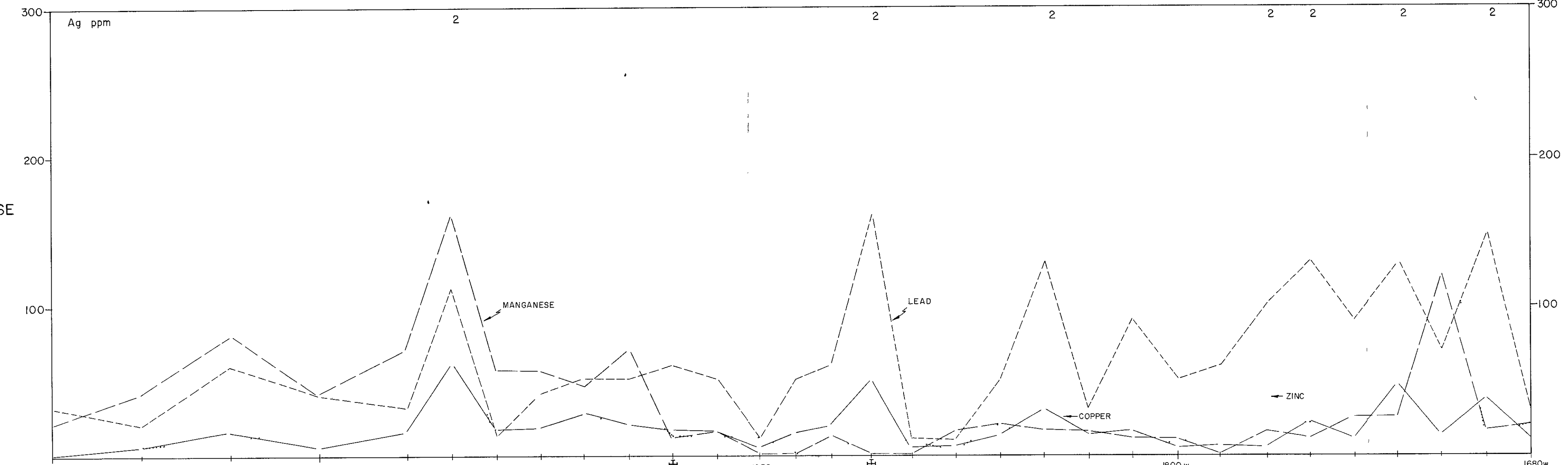
EIP GRADIENT ARRAY

CHARGEABILITY mV/V

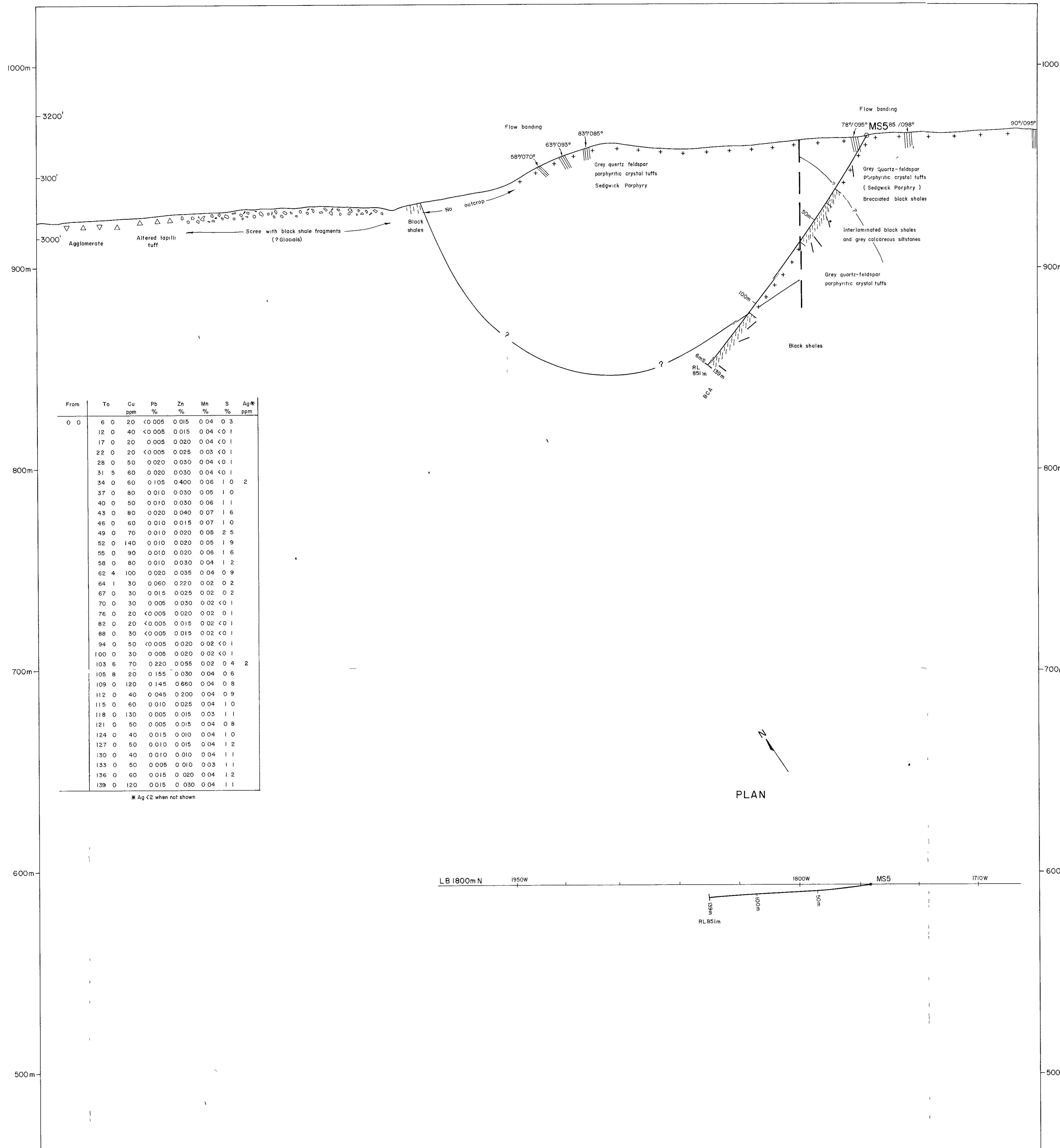


SOIL GEOCHEMISTRY

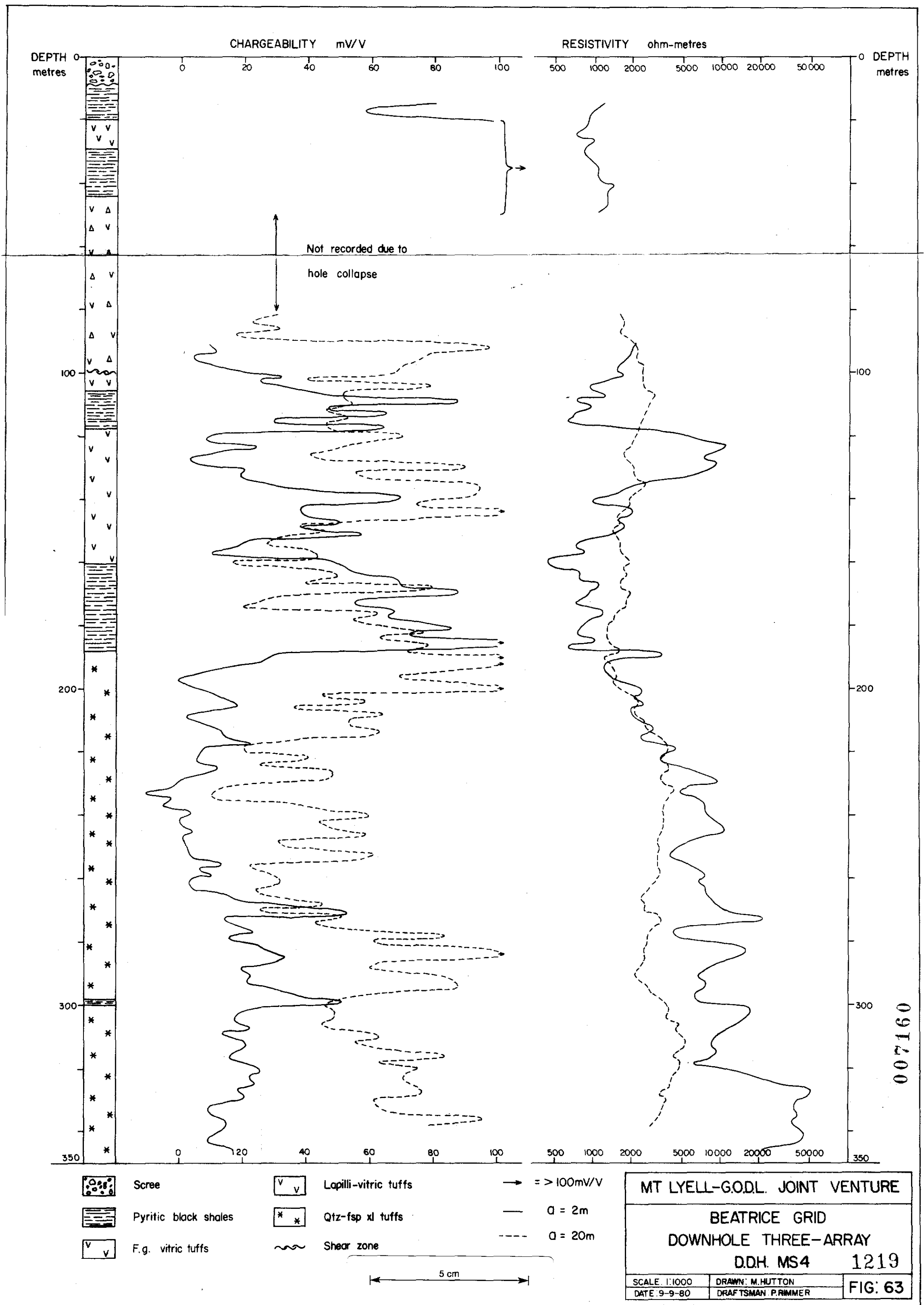
COPPER, LEAD, ZINC & MANGANESE PARTS PER MILLION



DRILLING PROFILE LINE 18N



From	To	Cu	Pb	Zn	Mn	S	Ag
0	0	0	0	0	0	0	0
6	0	20	0.005	0.015	0.04	0.3	
12	0	40	0.005	0.015	0.04	0.1	
17	0	20	0.005	0.020	0.04	0.1	
22	0	20	0.005	0.025	0.03	0.1	
28	0	50	0.020	0.030	0.04	0.1	
31	5	80	0.020	0.030	0.04	0.1	
34	0	60	0.105	0.400	0.06	1.0	2
37	0	80	0.010	0.030	0.05	1.0	
40	0	50	0.010	0.030	0.06	1.1	
43	0	80	0.020	0.040	0.07	1.6	
46	0	60	0.010	0.015	0.07	0.1	
49	0	70	0.010	0.050	0.05	2.5	
52	0	140	0.010	0.020	0.05	1.9	
55	0	90	0.010	0.020	0.06	1.6	
58	0	80	0.010	0.030	0.04	1.2	
62	4	100	0.020	0.035	0.04	0.9	
64	1	30	0.060	0.250	0.02	0.2	
67	0	30	0.015	0.025	0.02	0.2	
70	0	30	0.005	0.030	0.02	0.1	
76	0	20	0.005	0.020	0.02	0.1	
82	0	20	0.005	0.015	0.02	0.1	
88	0	30	0.005	0.015	0.02	0.1	
94	0	50	0.005	0.020	0.02	0.1	
100	0	30	0.005	0.020	0.02	0.1	
103	6	70	0.220	0.055	0.02	0.4	2
105	8	20	0.155	0.030	0.04	0.6	
109	0	120	0.145	0.660	0.04	0.8	
112	0	40	0.045	0.200	0.04	0.9	
115	0	60	0.010	0.025	0.04	1.0	
118	0	130	0.005	0.015	0.03	1.1	
121	0	50	0.005	0.015	0.04	0.8	
124	0	40	0.015	0.010	0.04	1.0	
127	0	50	0.010	0.015	0.04	1.2	
130	0	40	0.010	0.010	0.04	1.1	
133	0	50	0.005	0.010	0.03	1.1	
136	0	50	0.015	0.020	0.04	1.2	
139	0	120	0.015	0.030	0.04	1.1	



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81-1519 2/2

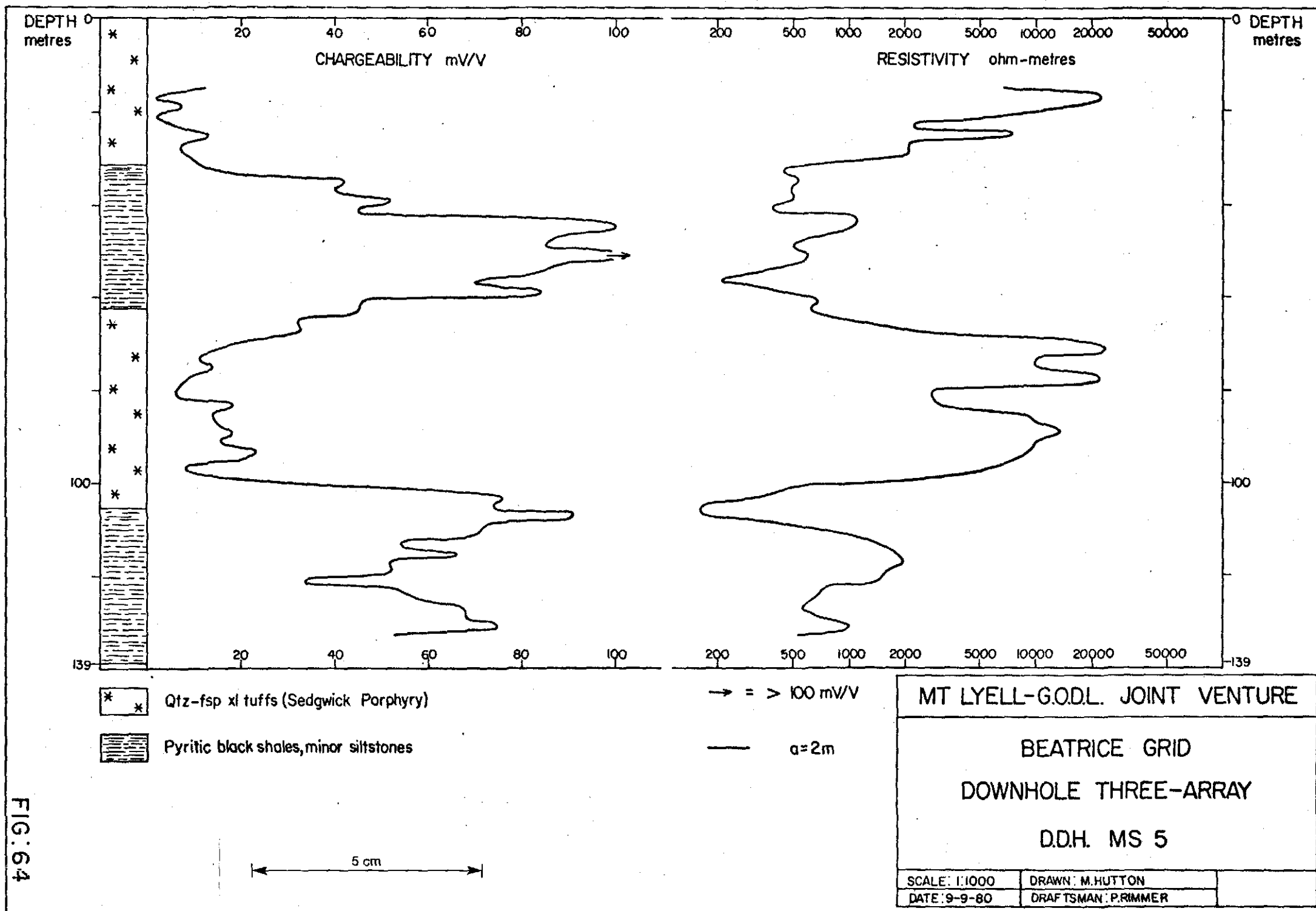
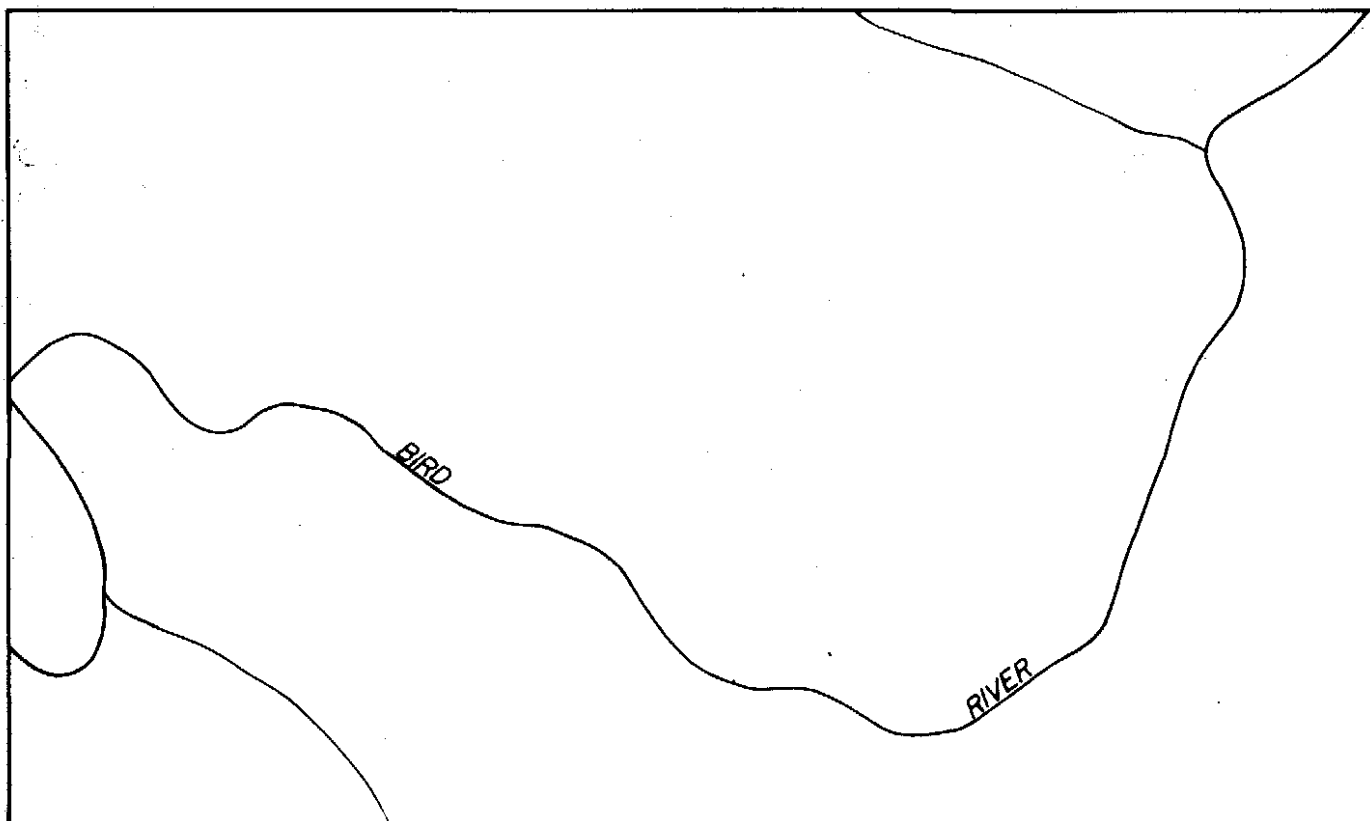


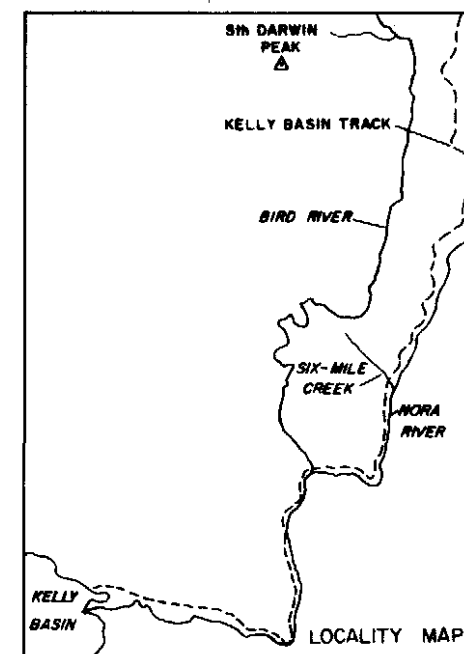
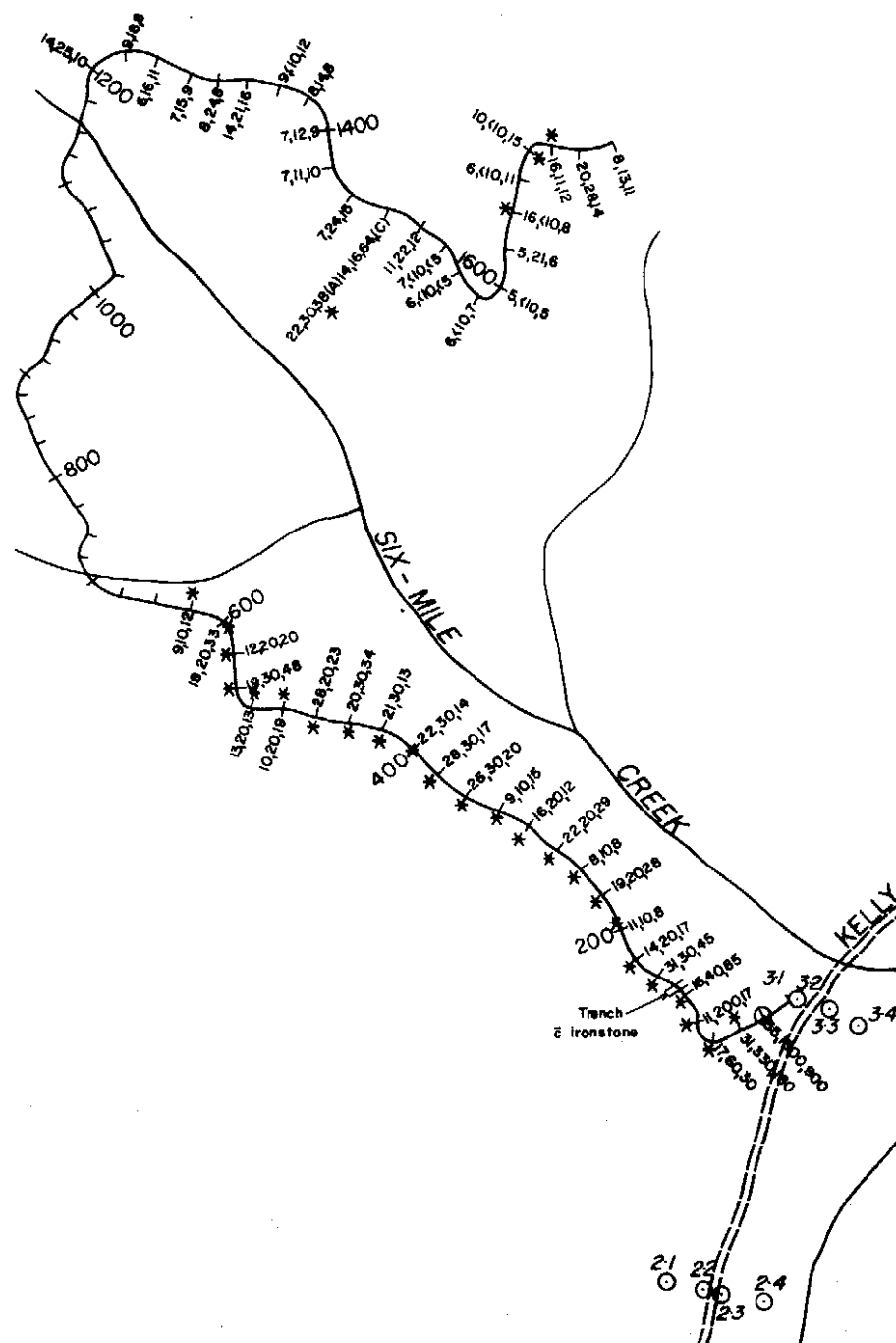
FIG: 64

100

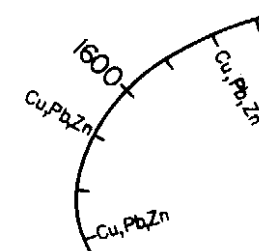
007161



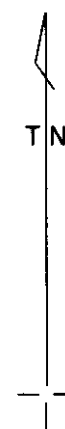
KBT Soil Profiles				
Site	Depth (cm)	Cu	Pb	Zn
2.1	5 *	10	100	40
	25	6	150	20
2.2	5 *	18	40	70
	25	9	80	115
2.3	10 *	15	20	60
	20	17	60	110
2.4	10 *	21	20	20
	20	20	160	400
3.1	5 *	16	350	190
	10	23	1070	800
	20	25	1300	930
	40	28	1150	900
	60	29	1050	830
3.2	5 *	14	230	180
	25	15	110	210
3.3	10 *	30	120	170
	20	15	70	140
3.4	5 *	14	90	130
	20	22	500	440
	30	16	500	280
4.1	10 *	8	<10	5
	20	13	<10	<5
4.2	5 *	5	<10	<5
	30	3	<10	<5



2.2
○ SOIL PROFILE SITES



PEG SPACING 25m



* = A HORIZON SAMPLE

007162

MT LYELL MINING & RAILWAY Co. Ltd.

BIRD RIVER IRONSTONE

TBM TRACK 1220

SOIL GEOCHEMISTRY -80#

SCALE: 1:5000
DATE: 13-8-80
DRAWN: M. HUTTON
DRAFTSMAN: P. PRIMER

FIG: 65

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