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PROGRESS REPORT ON QUEEN HILL AREA

CONSOLIDATED LEASING 12M/73 AND

SURROUNDING EXPLORATION

LICENCE 47/71, TASMANIA

MICROFILM

For 6 months ending 30th June, 1977.

77/1217

OPEN FILE

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	1600N	
	1700N	
	1800N	
	1900N	

SUMMARY

A four-hole diamond drilling programme to define the gross dimensions of the Severn mineralisation intersected in hole G.39 in March 1976, was completed in the period January-May, 1977. These holes, totalling 1747.2 metres, were sited 100 metres north, 100 metres south, 40 metres up-dip and 100 metres down-dip respectively from the tin mineralisation in G.39.

The holes along strike to north and south intersected very limited intervals of pyritised sediments and showed no significant tin values.

Of the holes in section with the high-grade interval in G.39, the hole above (G41) showed only limited (20%) development of pyrite-pyrrhotite over 7.5m containing an isolated interval of 0.5m at 5.95% Sn. The deepest hole, G.43, down-dip from the discovery intersection showed two isolated intervals, 4m at 0.89% Sn and 1m at 2.6% Sn within sediments containing 10 to 20% pyrite-pyrrhotite. An interval of 130m containing about 10% sulphide averaged 0.13% Sn. Silicified dolomite in the bottom of the hole averaged 25% pyrite over 35m, but tin values were low.

The drilling in this year's programme showed that the Severn mineralisation may be more restricted in distribution than was originally anticipated from G.39 results, and that cassiterite is erratically distributed even in sections showing strong sulphide development. Drilling to date has only proved gross limits to the distribution of mineralisation, further close-spaced drilling may be necessary in the future.

The 1978 programme will be primarily aimed at locating further magnetic tin-bearing sulphide bodies of the Severn type, preferably of greater size. An airborne magnetic survey, delayed in 1976-77 because of the difficulty in acquiring a contractor, is scheduled to cover Queen Hill and Heemskirk E.L.'s late this year. Targets generated by this survey will be followed-up during the summer months. Some I.P. surveys are planned to search for non-magnetic sulphide bodies.

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INTRODUCTION

In December 1976 agreement was reached between Gippsland Minerals N.L. and Abminco N.L. on the terms for further joint venture work on the Queen Hill, Heemskirk and St.Dizier properties. (E.L.'s 47/71, 13/76, 22/73 respectively). Active work on the Queen Hill properties was recommenced in January 1977.

The programme was designed to follow up intersections achieved by testing a magnetic anomaly with one diamond drill hole on encouraging tin early in 1976. In this hole G.39, pyrrhotite-pyrite mineralisation carrying cassiterite was intersected over 111 metres within which there is a 5.65 metre section averaging 1.95% Sn. This mineralised body is referred to as the "Severn" body to distinguish it from the Queen Hill body.

This report summarises the programme carried out and discusses the results.

1977 PROGRAMME

The 1977 programme predominantly involved drilling of four diamond drill holes totalling 1747.2 metres to test the vertical and strike extent of cassiterite-sulphide mineralisation intersected in DDH G.39. A new grid was laid out to provide control for the drilling programme. Orientation programmes, comprising surface and down hole induced polarisation pulse EM, and bedrock geochemistry were carried out. These aspects are discussed separately under their respective headings.

An airborne magnetic survey planned for early summer was not flown due to unavailability of the contractor.

SURVEY

Before the commencement of the current drilling programme, it was decided to establish a new grid orientation which would be approximately at right angles to strike and also parallel to previous drill sections on Queen Hill. The grid used over the past four years is based on the State Metric Grid and,

SUMMARY OF DIAMOND DRILLING SEVERN ANOMALY

ZEEHAN, TASMANIA

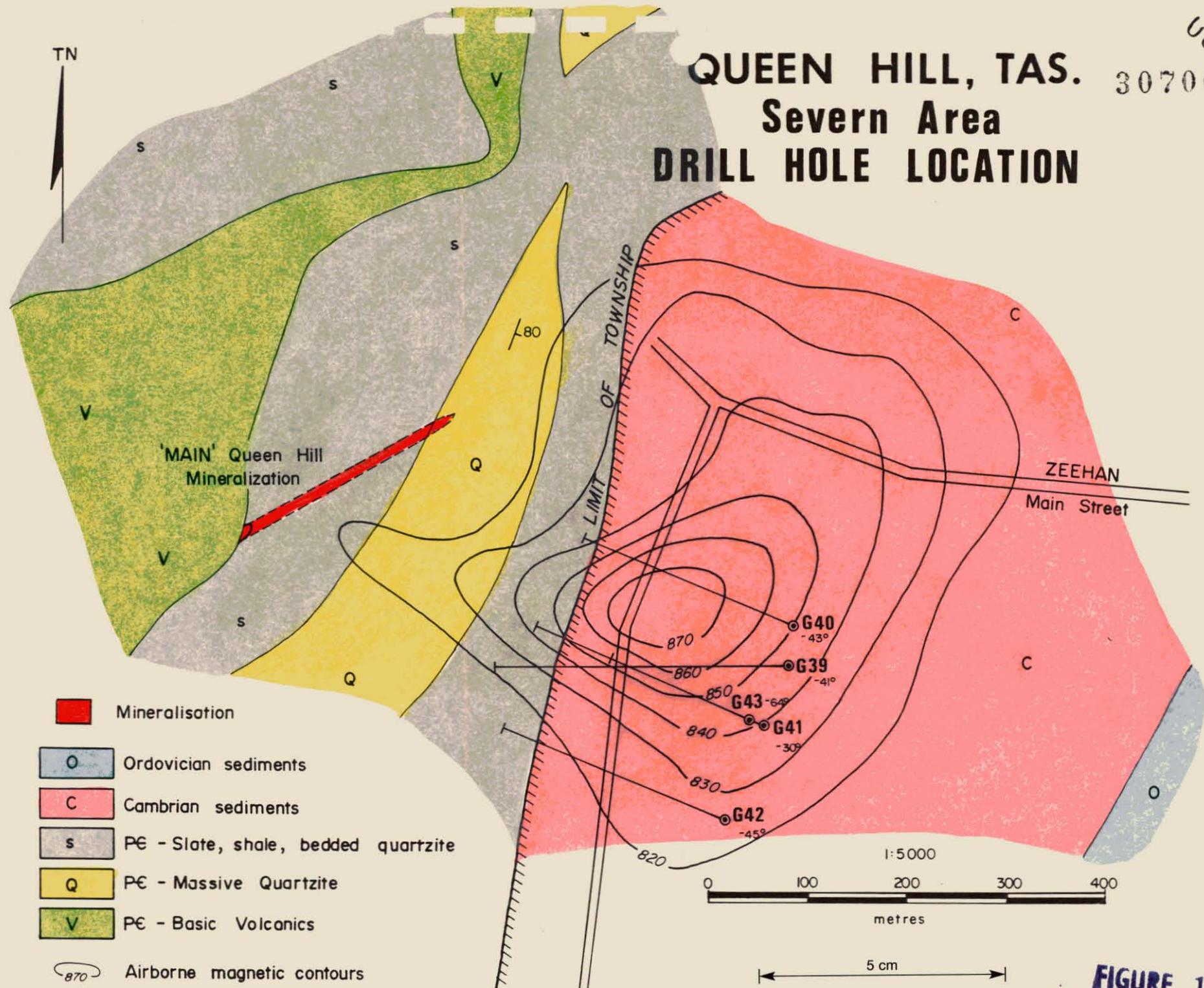
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Hole No.	Co-ordinates		Bearing (deg.mag)	Incl. (deg.)	Date Comm.	Date Compl.	Depth (m)	Significant Intersections	Comments
	N	E							
G.39	9971.5	9990.5	258	-41	11.2.76	15.3.76	364.2	221.6-227.25 (5.65) 1.95% Sn 135.0-246.0 (111.0) 0.25% Sn	Old grid co-ordinate 1640N, 1173E. High grade mineralisation is in volcanic rock.
G.40	10000	9986.5	282	-43	27.1.77	10.3.77	310.0	No significant intersections. Highest assay.	G.40A was redrilled from 238.0m in G40 to 324.7m
G.40A				-48.5	11.3.77	18.3.77	86.7	285.7-286.0 (0.3) 0.56% Sn	
G.41	9900	10000	282	-30	7.2.77	22.3.77	292.5	No substantial intersections. Isolated assay. 156.3-156.8 (0.5) 5.95% Sn.	
G.42	9800	9998	282	-45	23.3.77	23.5.77	335.3	No mineralisation intersected.	
G.43	9900	9986	282	-64	27.3.77	29.4.77	358.5	242.0-243.0 (1.0) 2.60% Sn 270.0-274.0 (4.0) 0.89% Sn incl. 2m at 1.31% Sn.	

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QUEEN HILL, TAS. Severn Area DRILL HOLE LOCATION



- Mineralisation
- O Ordovician sediments
- C Cambrian sediments
- s PE - Slate, shale, bedded quartzite
- Q PE - Massive Quartzite
- V PE - Basic Volcanics

Airborne magnetic contours

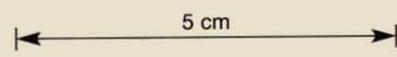
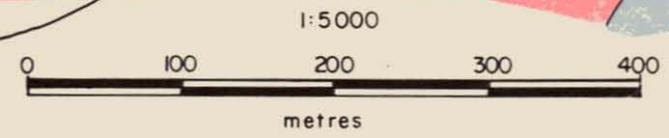


FIGURE 1

although its coverage of the area is good, its orientation is incompatible with the current drill sections. The relationship between the two grids is shown on the 1:500 surface plans (Plate QH 77/a, 77/b).

The new grid was set out using theodolite and chain. The base line is 10000E and pegged at 25 metre intervals while cross lines are 100 metres apart and pegged at the same intervals.

Cultural, limited topographic, and geological information was collected using theodolite and survey staff. Topographic information was added at a later date from a map, supplied by Renison Ltd., which is contoured at one metre intervals.

DIAMOND DRILLING

A four hole drill programme to define the gross dimensions of the Severn mineralisation began in January 1977 (see Table 1). Holes were sited 100 metres north (G.40) 100 metres south (G.42) 40 metres up-dip (G.41) and 100 metres down-dip (G.43) from the tin mineralisation in G.39. (See Figure 1, Plate 1 for locations).

Diamond drill logs for all holes are in Appendix 1 and cross-sections are attached as Plates QH 79,80 and 82.

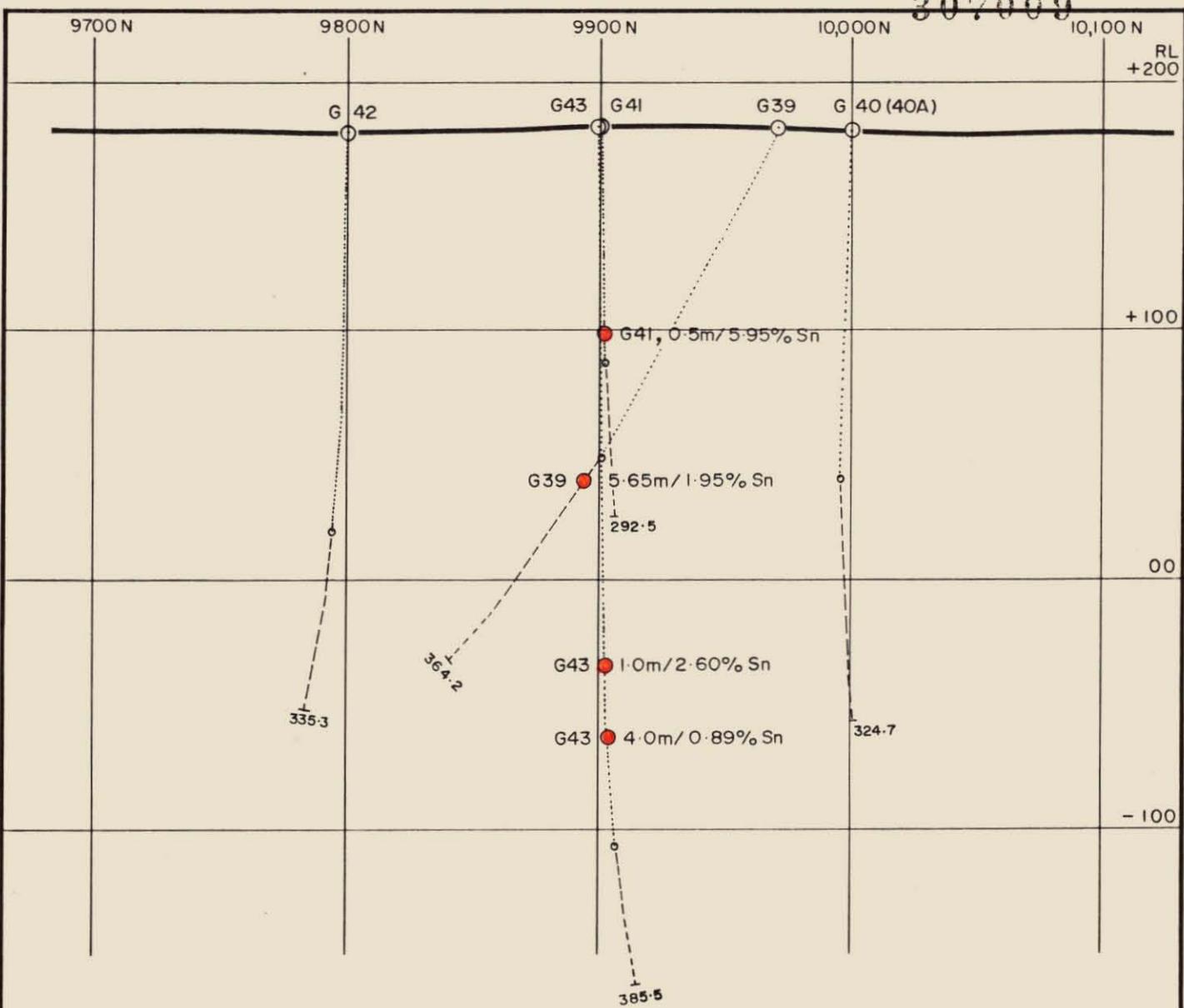
Ground conditions were very poor in the first 150 metres of each hole resulting in very low rates of advancement. Below 150 metres drilling progress was generally good.

DDH G.40 (Section 10000N) was drilled to test strike extension of the "Severn" mineralisation 100 metres north of the G.39 intersection.

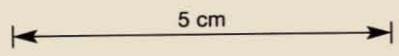
The hole did not intersect a significant interval of sulphide mineralisation nor did it encounter any pyrrhotite. (Pyrrhotite was particularly common over approx. 100 metres in G.39). Disseminated pyrite showed strongest development from 291.7 to 298.0m (6.3) with 15% and from 213.4 to 215.1m (1.7) with 50%. Highest individual tin assay was 0.56% Sn over 0.3 metres from 285.7 to 286.0 m.

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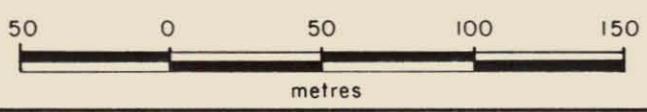
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● Cassiterite sulphide intersection



○ Projected from behind section
 ○ Projected from in front of section



Abminco Exploration **FIGURE 2**

Drawn:	NORTH WEST TASMANIA QUEEN HILL, SEVERN AREA Longitudinal Projection Reference Plane 9850 E, Looking West	Location code K55/5/50
Traced: JJB		Date: Aug 1977
Checked:		Scale: 1:2500
Revised by: Date:		Plate N ^o QH 83

Cross section 10000N shows that a similar sequence of rocks was drilled in G.40 as in the discovery hole except that the dolomitic sequence in G.40 is thinner. The thickness from the top of the massive quartzite (coloured yellow) to the top of the upper intermediate lava is 50 metres on section 10000N and 80 metres on section 9900N.

DDH G.41 (Section 9900N)

This hole was designed to test the near surface extent of the Severn mineralisation. Magnetic interpretation suggested that the depth to top of magnetic source was a little less than 100 metres and this drill hole was designed to reach the target position at approximately 110 metres vertically below surface.

Because of the land tenure situation the hole was drilled at a collar angle of 30° , that is the collar was located east of the desired position.

Although this hole reached the target position only 40 metres above the G.39 mineralisation, the amount of sulphide intersected was considerably less ($\sim 20\%$ sulphide over 7.5 metres as against 8% over 110 metres). Within this 7.5 metre interval (153.0 - 160.5) there was an isolated assay of 5.95% Sn over 0.5 metres (156.3-156.8). Remaining values were less than 0.3% Sn.

The relationship of this hole to others is shown on Section 9900N and on the longitudinal projection (Plate QH79, Figure 2).

DDH G.42 (Section 9800N)

Only trace amounts of sulphide, as pyrrhotite, were intersected in this hole.

The significant feature of this drill hole was the general lack of dolomitic sediments intersected, when compared with the sequence on section 9900 north. The sequence of rocks drilled shows very little variation and boundaries shown on the cross section generally divide zones where relative abundance of rock types change, the exception being the quartzite, dolomite and black shale unit.

No interpretation has been attempted on Section 9800N because of 1) scarcity of surface information and 2) distance between drill holes.

The dolomite unit intersected on 10000N and 9900N above the massive quartzite do not persist through to section 9800N. The reason for this lithological variation is not yet understood.

DDH G.43 (Section 9900N)

This hole was designed to test the down dip extent of the Severn mineralisation. It was completed in massive quartzite at a depth approximately 100 metres less than planned because of the folding and/or faulting (see section 9900N). It intersected 130m (189-319m) containing an average of 10% pyrite/pyrrhotite with low grade tin values which averaged 0.13% Sn, excluding the two best higher grade intersections of 1.0 metres at 2.6% Sn and 4.0m at 0.89% Sn.

GEOLOGY

The surface geology of the Severn area is not well known because of the cultural modifications to the area and the general lack of outcrop. As a result the geological observations and interpretations are based largely on observations of drill core.

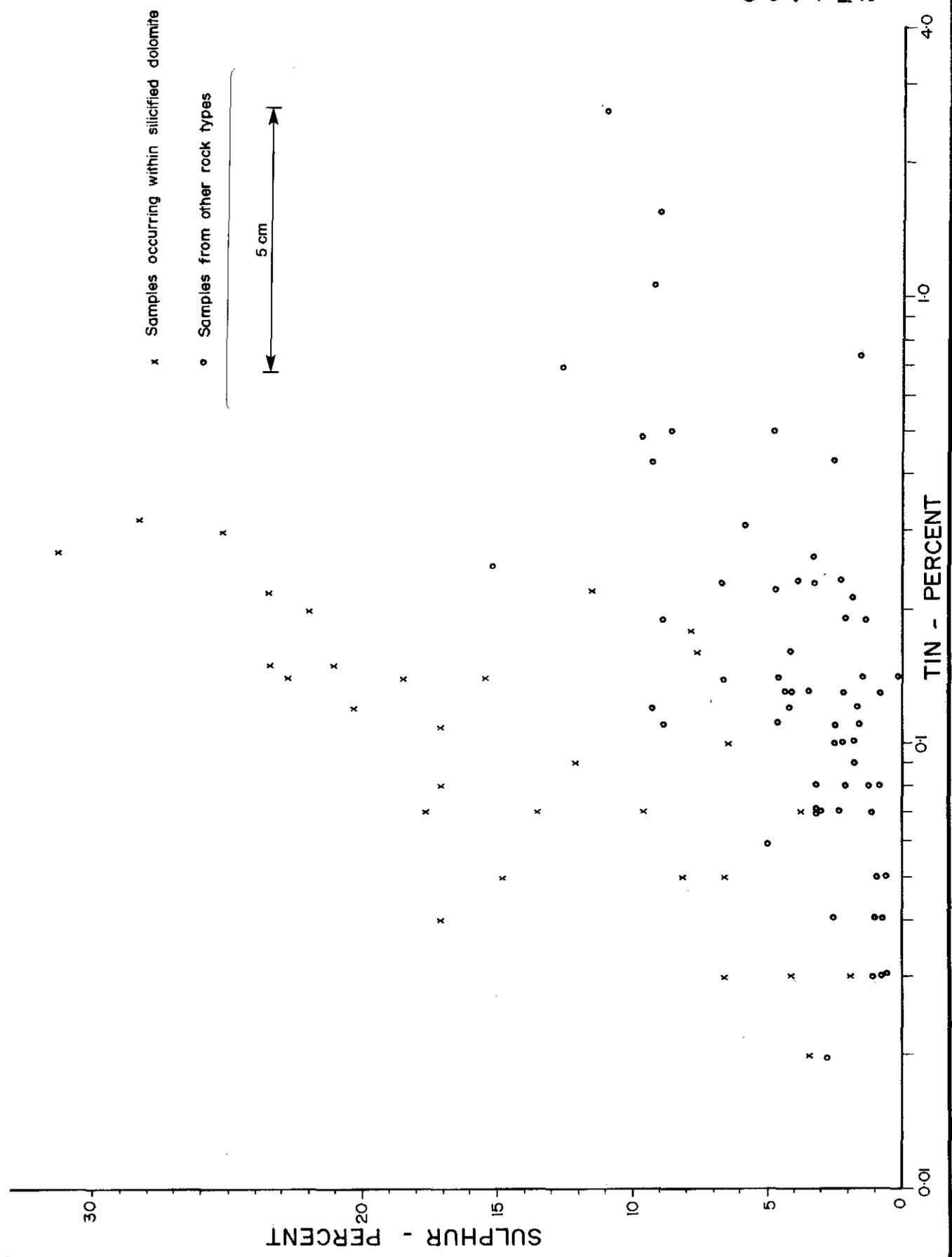
The stratigraphic succession in the Severn area is best established with reference to section 9900N.

At the base of the sequence is a massive quartzite unit which is characteristically a pale grey saccharoidal rock, lacking bedding but heavily jointed. This rock unit forms the base to dolomitic sequence and is an easily recognisable rock in which to terminate drill holes. It is exposed on the crest of Queen Hill.

Up sequence and East from the quartzite is a dolomite which occasionally contains interbeds of dolomitic mudstone and siltstone. This dolomite unit is otherwise extremely homogeneous, being pale grey to pale brown in colour. In DDH G.39 it contains minor alteration veinlets of dolomite, and in DDH G.43 is completely silicified and heavily pyritised.

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Abminco Exploration **FIGURE 3**

Drawn:	DCS
Traced:	R.K.Y.
Checked:	
Revised by:	Date

NORTH WEST TASMANIA
 QUEEN HILL
 Graph showing relationship between tin and sulphur for DDH G43 'Severn' Zeehan

Location code:	
Date:	July 1977
Scale:	
Plate No	QH 78

The next rock unit up sequence is a chaotic sequence of mudstone and siltstone, predominantly dolomitic. The bulk of the sequence appears to have been deposited in unstable basin condition, slumping being evident throughout. Because of the disruption to bedding, correlation of beds between drill holes is not possible. Within this sequence a rock type which can be correlated from hole to hole is tentively identified as a carbonate altered intermediate lava. Confirmation is to be obtained by thin section examination. This carbonate-rich sequence is host to most of the tin mineralisation encountered to date in drilling at Severn.

Above this sequence is a series of interbedded sandstones, greywackes, mudstones and shales, that have been extensively sheared and are also very deeply weathered and clay rich. It is this sequence which has caused the slow drilling rates in the upper part of each hole. These rocks are generally unmineralised, the exception being several narrow high-grade pyrite-galena-sphalerite veins.

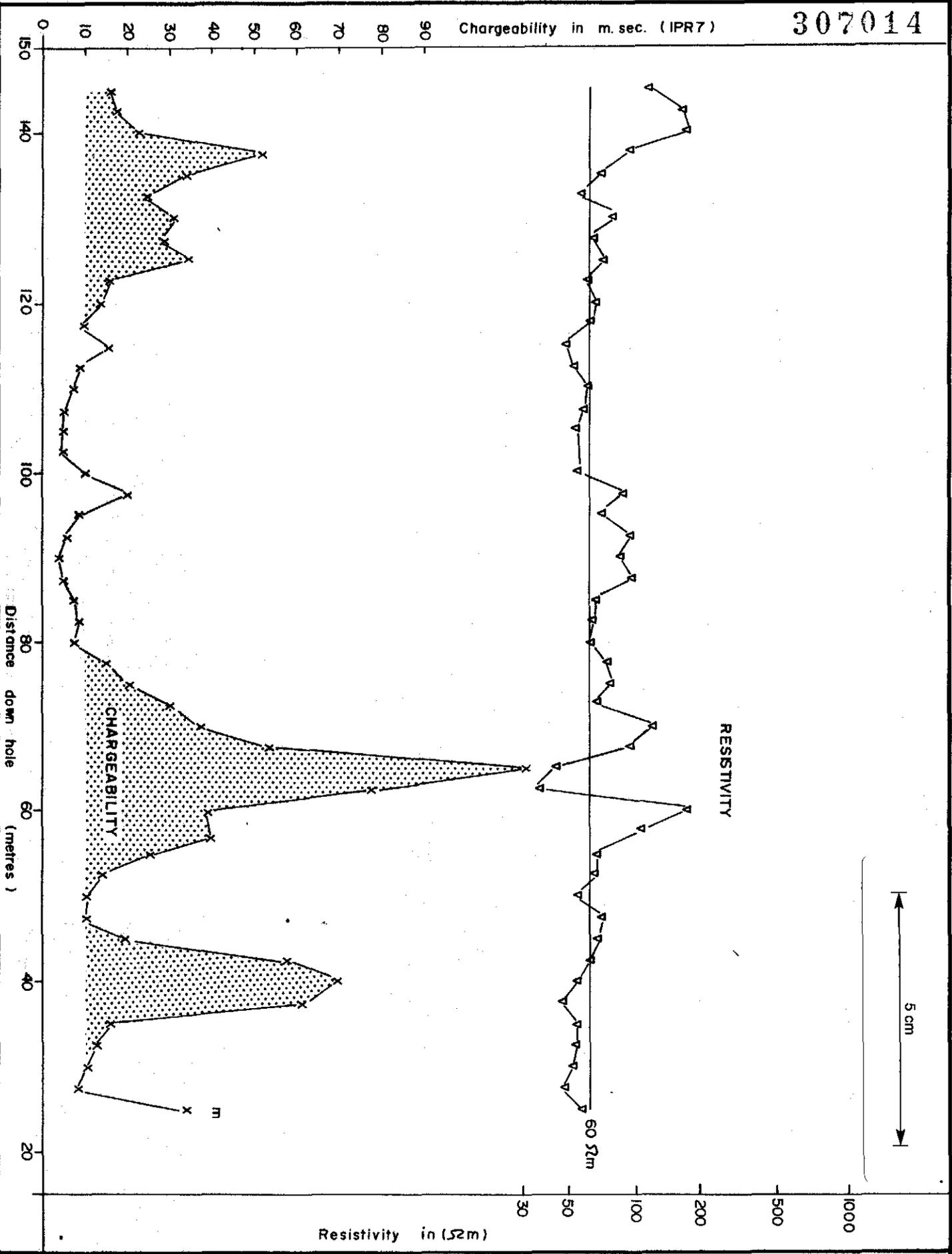
MINERALISATION

The grade of tin mineralisation encountered in this drilling programme was less than that in the discovery hole. The best intersection was 4.0m of 0.89% Sn from 270 to 274m in G.43. As this intersection occurs in a different stratigraphic position to the ore grade intersection in G.39, the two cannot be correlated. None of the mineralisation appears to have strong stratigraphic control but this may be a function of the fact that there is so much carbonate available for replacement that ore localisation is not specific. Pyrite and pyrrhotite throughout occur both as stringer mineralisation and as disseminations. Stringer orientation is sub-vertical. Little massive mineralisation is developed.

The most consistently sulphide rich section is the silicified dolomite in G.43 where pyrite content averages 25% over 35 metres. No pyrrhotite is present in this section. Samples from the silicified dolomite tend to fall in a particular group (See Figure 3) i.e. high-sulphide, low tin. Whether this is significant from an exploration viewpoint is debatable, but it is possible that, even in an overall view, there may be a poor correlation between tin and sulphide content.

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Abminco Exploration **FIGURE 4**

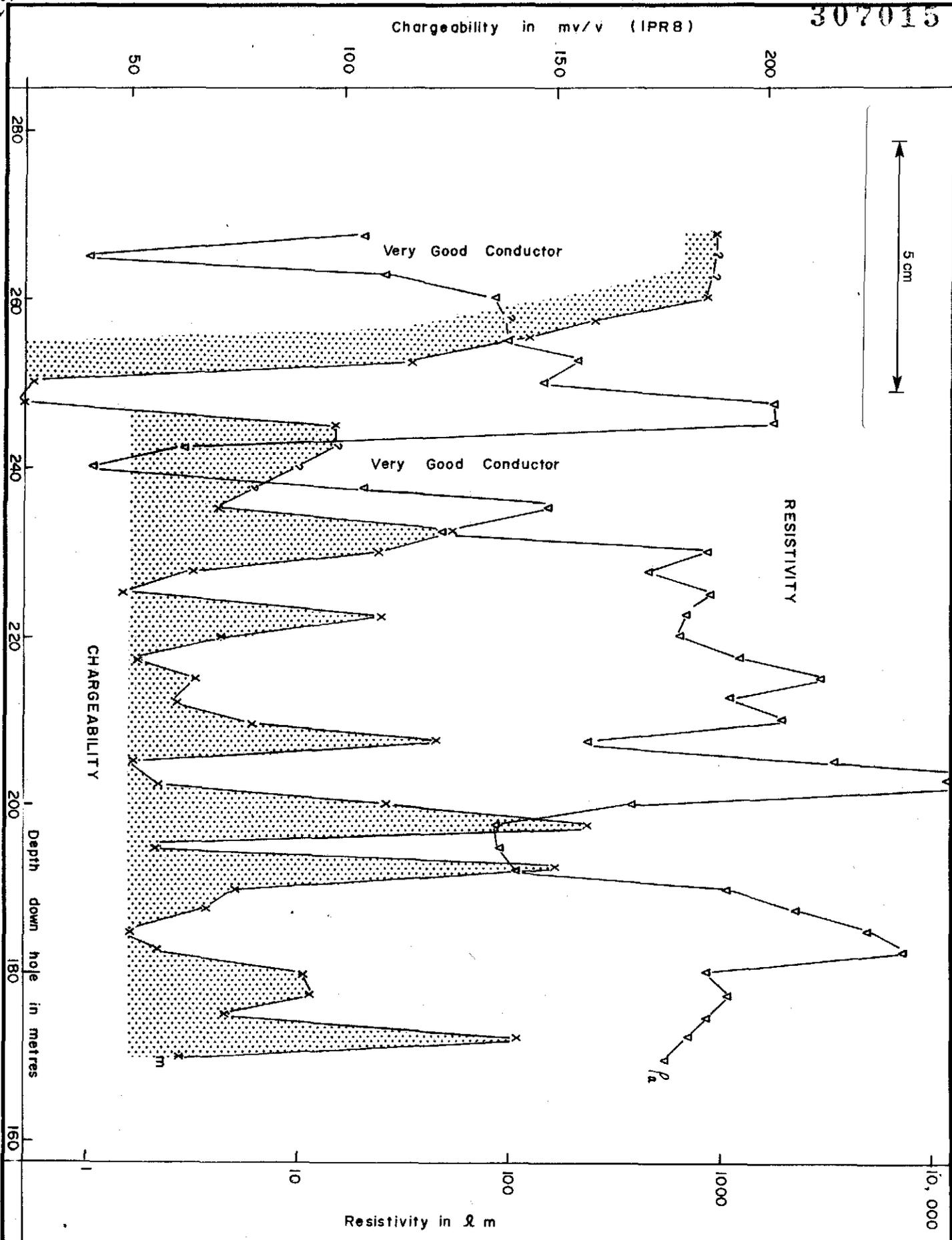
Drawn:	D.C.S.
Traced:	R.J.E.
Checked:	
Revised by:	Date:

TASMANIA
QUEEN HILL AREA (SEVERN)
 Down hole I.P. survey - DDH G 40
 $C_1 - P_1 - P_2 = 25\text{ m}$

Location code:	K55/5/50
Date:	July, 1977
Scale:	As shown
Plate No	QH B1 a

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Abminco Exploration

FIGURE 5

Drawn:	D.C.S.
Traced:	R.J.E.
Checked:	
Revised by:	Date:

TASMANIA
 QUEEN HILL AREA (SEVERN)
 Down hole I.P. survey - DDH G43
 C₁ - P₁ - P₂ = 25 m

Location code:	K55/5/50
Date:	July, 1977
Scale:	As shown
Plate No	QHBI b

015

Geological logging confirmed previous observations that there are very few gangue minerals introduced with the sulphide cassiterite mineralisation. Minor quartz, carbonate and traces of fluorite are present and traces of tourmaline have been noticed on fractures.

Investigations on the nature of the cassiterite and its association are planned.

GEOPHYSICS

Geophysical surveys, I.P. and Crone E.M., were carried out over the Severn area near Queen Hill for orientation. Interpretation of the results of these surveys is contained in an intercompany memo dated May 30, 1977, a copy of which is included in this report as Appendix II.

A down hole I.P. programme was conducted on two holes in the Severn area - G.40 and G.43. The readings could not be taken over the entire length of the holes, because of :

- . hole collapse in G.40, at 145 metres, and
- . casing to 170 metres and a plug at 276 metres in G.43.

The purpose of the programme was to derive electrical parameters for rocks and mineralisation and determine if induced polarisation is a useful exploration tool in this environment. The initial interpretation of the down hole data suggests that sulphide mineralisation can be readily distinguished from the enclosing rocks despite their graphitic nature.

Three distinct peaks can be observed on the chargeability profile at 40, 65 and 137 metres in DDH G.40. The first two correspond to massive galena-sphalerite-pyrite veins while the third corresponds to pyrite stringers with traces of sphalerite.

A complete assessment of the results of this survey will be made to enable results of future IP surveys to be quantified.

GEOCHEMISTRY

An orientation bedrock geochemical survey over the Severn area is currently being undertaken. Results are not yet available.

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The purpose of the programme is to determine the geochemical response at surface of the tin mineralisation intersected in drill holes, in particular to determine if there is a recognisable primary dispersion halo.

To date (end of June) approximately 60 samples have been collected over most of the area covered by the ground magnetic survey. Samples were collected at 50 metre intervals along lines but this may be infilled later depending on results.

Samples will be reduced by splitting, but not sieved and will be analysed by XRF for tin and by AAS for Cu,Pb and Zn. Fluorine analysis is being considered.

CONCLUSIONS AND RECOMMENDATIONS

The drilling in this year's programme showed that the Severn mineralisation may be more restricted in distribution than was originally anticipated from G.39 results, and that cassiterite is erratically distributed even in sections showing strong sulphide development. Drilling to date has only proved gross limits to the distribution of mineralisation. Assuming a major stratiform distribution, at R.L.O. at least, the mineralisation is restricted to a strike length of less than 200 metres. The true disposition of the mineralisation could only be determined by further close-spaced drilling which may be necessary in the future. Structural complications may be expected, judging by the difficulties encountered to date in correlating stratigraphic units between drill holes.

In the 1978 programme, it is planned to change emphasis from the Severn magnetic anomaly and to direct the effort towards locating further magnetic tin-bearing sulphide bodies of the Severn type, preferably of greater size.

An airborne magnetic survey, delayed in 1976-77 because of the difficulty in acquiring a contractor, is scheduled to cover Queen Hill and Heemskirk E.L.'s late this year. Targets generated by this survey will be followed-up during the summer months. Some I.P. surveys are planned to search for non-magnetic sulphide bodies.

Submitted by: D.C. Simpson
D.C. Simpson
Geologist
Endorsed by: K.R. Yates
K.R. Yates
Chief Geologist

APPENDIX I

DIAMOND DRILL LOGS

G,40

G.41

G.42

G.43

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Queen Hill

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HOLE No G40DATE 17/3/77

				INITIAL ANALYSIS:									CHECK LAB:				
SAMPLE NO	FROM (M)	TO (M)	TW (cm)	REMARKS	% Sn		% S	% Zn		% Fe	ppm Ag	ppb Au	ppm Au	INT.	% Cu	% Pb	% Zn
					AAS	XRF		AAS	XRF	TIT	AAS	AAS	FIRE				
88930	213.40	214.30	90			0.165											
931	214.30	215.10	80			0.21											
88935	291.70	292.40	70			0.10											
936	292.40	292.80	40			0.41											
937	292.80	293.70	90			0.65											
938	293.70	295.00	130			0.155											
939	295.00	296.00	100			0.155											
940	296.00	297.10	110			0.046											
941	297.10	298.00	90			0.036											

6.3m @ 7.65% S or \approx 15% Fe sulphide.

020

Feature: Bedding Shearing
 Foliation Fault
 Fragment size & shape Vein c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

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CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	7.7	Not cored						
	10	7.7 - 63.5 Interbedded mudstones, sandstones and shales						
	20	Thinly laminated to massive weathered and partly leached sequence. Sandstones generally massive, greenish-grey and contains minor carbonate (probably dolomite or ankerite). Mudstones are pale grey to buff often showing slump and tectonic brecciation. Carbonate veining, occasionally with quartz present, is common throughout.						
	30	32.9-34.8 is very graphite rich and broken Core bedding angles variable at 12m - 30° 20m - 0°, 53m - 20°. Core overall fractured, weathered.						
	40							38.8 - 39.10 and 39.6 - 39.8 Coarse grained pyrite-sphalerite-galena vein with introduced buff coloured carbonate
	50							



Feature: Bedding Shearing
 Foliation Fault
 Fragment size & shape Vein
 c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307022

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE COMMON ABUNDANT MASSIVE	DEPTH m	MINERALIZATION
	60	Carbonate veins particularly abundant around 58-61 metres.				
	63.50					
	64.9	Pyrite lode Coarse-gr. pyrite 80% with minor galena sphalerite in veinlets 0.5-2 cms wide. Minor carbonate veins & rare quartz veins. Some internal slivers of shale and mudstone. Faint foliation 30-45 degrees to C.A.				
	64.9-122.0	Interbedded mudstones, sandstones, shales and greywackes.				
	70	Sandstones are fine grained and massive often speckled white from weathered mudstone fragments. Fragments tend to be relatively unrounded and elongate. Quartz grains in sandstones are angular. Sandstones have some kaolin content.				
	72.0-74.0	is crossed by abundant quartz carbonate veins and two sphalerite veins. Soft sediment slumping is apparent in the mudstone sections.				Sphalerite veins 72.5 and 73.45 with minor galena and pyrite.
	80	Post consolidation spearing generally 30° to C.A. also evident.				
	90	Core bedding angles generally low 10-20 ^o Shear zones common in shaley sections where minor graphite is present. Talc present on some shear planes.				
	100					



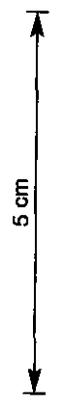
022

Feature: Bedding  Shearing 
 Foliation  Fault 
 Fragment size & shape  Vein 
 c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307023

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE COMMON ABUNDANT MASSIVE	DEPTH m	MINERALIZATION
	110					
	120					
	122.0					
	122.0-141.9	<p><u>Black shales, mudstones and sandstones</u></p> <p>The bulk of this section is both slumped and sheared. Black shales pre-dominate at start of section, bedding often chaotic, carbonate veining common throughout.</p> <p>Bedding where preserved is 10-20° to C.A. Shearing developed locally often at low angles to core axis usually sub-parallel to bedding.</p>				Trace of pyrite vein as stringers developed occasionally Trace sphalerite at 135.5
	130					
	140					
	141.9					
	141.9-213.7	<p>As above but less black shale. Core often broken, e.g. 166, 172, 180, (possibly fault) 185, 188, 200-208.</p>				
	150					



023

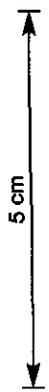
Feature: Bedding  Shearing 
 Foliation  Fault 
 Fragment size & shape  Vein  c carbonate
 q quartz

Mineralization:

Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

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CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	160								
	170								
	180								
	190								
	200								



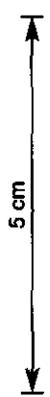
024

Feature: Bedding Shearing
 Foliation Fault
 Fragment size & shape Vein
 c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307025

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	210								
	213.7								
	215.2	Pyrite lode. Pyrite content covered ~20% locally up to 60%. Pyrrhotite is not present visually although some sections give slight magnetic response. Host rock appears to be a silicified shale/mudstone. Vein 3cm wide of arsenopyrite at 213.8. Vein roughly foliated 30-35 degrees to C.A.							Network of veinlets of pyrite developed at 210.5-213.7
	215.2-220.9	Sandstones, shales mudstones and volcanic material. Chaotic sequence of above material probably related to unit below. Sequence is slumped & sheared containing abundant carbonate veins.							Trace disseminated pyrite developed in shaley sections.
	220.9	Fine gr. intermediate (or basic) lava. Greenish colouration throughout. Pinkish carbonate developed to ~5%. Visual estimate of composition: Chlorite 50% Feldspar 30%, amphibole(?) 15%, carbonate 5%.							Trace disseminated pyrite developed locally TS 88932 222.80
	222.9	Grey mudstones & siltstone. Massive rocks with occasional dark clots of 1-2mm diameter. This section has a positive dolomite test est. 1-5%							Trace disseminated pyrite also as stringers.
	224.5								
	224.55-229.0	as for 220.9-222.9 but with crude foliation developed around 45° to C.A.							
	229.0								
	230	229.0-233.10 Transition zone from above to next section. (i.e. a mixture of laval and sedimentary material.)							
	233.10								
	233.10-254.0	Grey mudstones, sandstones siltstones and shales A massive unit with little bedding developed. Section from 247-253 very badly broken.							
	240	Vein carbonate (calcite) developed locally.							
	240								
	245								Pyrite veins developed locally eg at 245m.
	247.6-249	Possible fault zone							
	250								



025

Feature: Bedding  Shearing 
 Foliation  Fault 
 Fragment size & shape  Vein 
 c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307026

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE COMMON ABUNDANT MASSIVE	DEPTH m	MINERALIZATION
	254.0					
	254.0-270.0	<p>Interbedded siltstone and black shales with minor sandstone.</p> <p>Generally a well bedded sequence often thinly laminated (eg 1-2mm). Bedding often disrupted by soft sediment slumping.</p> <p>A faint foliation (cleavage) is developed parallel to bedding which averages 45° to C.A.</p> <p>Rhythmic banding and graded beds show top of sequence up hole.</p>				Traces of pyrite usually as thin veinlets occasionally as small disseminated near veinlets.
	270					
	270.0-275.5	<p>Black shales, mudstones and siltstones. The bulk of this section is slumped and disrupted (i.e. soft sediment deformation) and sheared. Cleavage generally parallel to bedding. Bedding where undistorted is ~60° to CA. Occasional carbonate blebs.</p>				Veinlets of pyrite 1-5mm wide.
	275.5					
	275.5-281.9	<p>Dolomite and dolomitic mudstone</p> <p>Fine brown-grey massive dolomite with interbedded dolomitic mudstones. Network of fine grey-black veinlets - tentatively identified as graphite. TS. 88933 from 278.8m</p> <p>Bedding 45° to CA.</p>				Trace pyrite and sphalerite in veinlets.
	280					
	281.9					
	281.9-292.0	<p>Interbedded siltstones, mudstones and quartzite.</p> <p>A mid-grey massive sequence with only minor bedding visible. Occasional quartz and/or carbonate veinlets with traces of pyrite. Quartzite sections tend to be fractured.</p>				Minor pyrite-veinlets.
	290					
	292.0					
	292.0-310.05	<p>Massive quartzite</p> <p>A pale grey saccharoidal quartzite often containing minor disseminated and vein carbonate.</p>				292.0-299.0 contains disseminated and vein pyrite locally up to 30% usually ~5%. Pyrite is often framboidal.
	300					

5 cm

026

Feature: Bedding  Shearing 
 Foliation  Fault 
 Fragment size & shape  Vein 
 c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307027

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE CONTINUITAS MASSIVE	DEPTH m	MINERALIZATION
		Traces of muscovite (sericite?) visible locally but rock is generally not micaceous				
		Some internal siltstone e.g. 299-301				Small veinlets of galena, carbonate also present 307-310.
	310.5	END OF HOLE				
		See G40A log.				

5 cm

Feature: Bedding  Shearing 
 Foliation  Fault 
 Fragment size & shape  Vein  c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307030

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	200								
	210								
	220								
	230								
		238 metres, Start of hole.							
	240	238.0-256.05 Grey mudstone and siltstone. A massive unit mid to dark grey containing minor very fine grained pyrite. (Possibly bedded.) Abundant calcite veining esp. at 244 and 249 Bedding here developed 60° to CA.							Common very fine grains pyrite.
	250	248.80-249.90 Possible tuff, fine grained greenish grey rock.							TS for ident. 88934 from 249.1

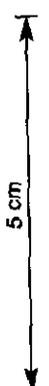


Feature: Bedding Shearing
 Foliation Fault
 Fragment size & shape Vein carbonate
 quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307031

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	256.05								
	256.05-268.70	Laminated siltstones and shales. Thinly bedded section generally free from slumping and "chaotic" texture. Graded bedding give top of sequence up hole.							
	268.7								
	268.7-274.4	Slumped black shales, mudstones and siltstones. Cumulated and disrupted sequence.							Minor pyrite as blebs and syngenetic "beds" also as cross-cutting veinlets.
	274.4								
	274.4-282.0	Dolomite and dolomitic siltstone. Poorly bedded to massive sequence of greenish grey rocks with increase in clastic component towards base. Contact with lower unit is faulted 30° to CA.							
	282.0								
	282.0-290	Quartzite Light grey to dark grey massive quartzite showing bedding locally. Throughout are developed siltstone and shale which when weathered possess a yellow tarnish. Quartzite is often broken and fractured. Parts of the quartzite contain minor sericite.							Disseminated pyrite and framboids to 2mm developed locally to around 1-2%. Also narrow veinlets of pyrite.
	290								
	300	Quartz and/or carbonate veins developed locally.							
	324.7	E.O.H.							



033

Feature: Bedding Shearing
 Foliation Fault
 Fragment size & shape Vein
 c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307034

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
		0-2m Not cored							
		(2-10 shale/mudstone.) <u>2.0-103 - Interbedded shales, sandstones and mudstones.</u> The sandstones are equigranular and porous but with a small (~10%) clay content.							
	10	(10-13 sandstone.) Many elongate black particles ~0.5-1mm are characteristic. Rock fragments are also present. (greywacke?) (13-19 shale mudstone) The shales and mudstones are light grey through to black sometimes showing good bedding which is 35° at 23m.							
	20	(19-23 sandstone) The major sandstone and shale/mudstone units are shown in brackets.							
		(23-33 sandstone and mudstone)							24.3-25.0 Pyrite-galena sphalerite vein. pyrite 50%, galena 10%, sphalerite 10%. Remainder carbonate probably dolomite Vein material is fractured. Cavities would make up 5% of vein.
	30	(33-36 sandstone)							
		(36-42 sandstone and mudstone/shale)							
	40	(42-46.5 sandstone and minor mudstone)							
		(46-48 mudstone)							
		(48-49.5 sandstone)							
	50	(49.5-66.5 mudstone)							



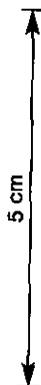
034

Feature: Bedding  Shearing 
 Foliation  Fault 
 Fragment size & shape  Vein  c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307035

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	60	Carbonate veinlets developed locally. Sandstone often contains minor disseminated carbonate (dolomite). Minor talc-kaolin developed on slip planes. <u>Note:</u> Core from mineralised vein at 27, 28 and 30m.							
		Core bedding angles @ 64m 60° 68m 40° 74m 35° (66.5-67.5 sandstone) (67.5-71.0 mudstones)							
	70	(71.0-75 sandstone)							
	80								
	90								
	100								



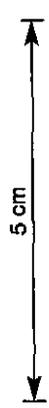
035

Feature: Bedding  Shearing 
 Foliation  Fault 
 Fragment size & shape  Vein 
 c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307036

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	103m								
	103.0-184.7	<p><u>Dark grey siltstone and mudstones</u></p> <p>A sequence of slumped and sheared rocks with minor disseminated pyrite. Also evident are pyrite clasts and siltstone fragments containing disseminated pyrite.</p> <p>No bedding presumed shearing direction is 50° to core direction.</p> <p>Minor quartz veining developed locally, e.g. 113.6. CBA 115 60-70° Much of the core is very broken and clayey.</p>							Pyrite carbonate vein at 106.8 to 107.6. Pyrite.
	110								
	120								
		CBA 127m 60-70°							
	130								
	140								
	150								



036

Feature: Bedding  Shearing 
 Foliation  Fault 
 Fragment size & shape  Vein  c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307037

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
		CBA 151m 60° 153-160 section mineralised by pyrite-pyrrhotite. 25% Carbonate or quartz/carbonate veinlets are commonly developed. CBA 169m 40-60°							
	160								
	170								
	180								
	184.7								
	184.7-193.0	Siltstones, mudstones and sandstone massive carbonate veins.							
	190								
	193.0								
	193.0-202.8	Intermediate lava with some sediment near top CBA 55° Fine grained with 10-15% carbonate.							
	200								



037

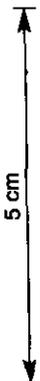
Feature: Bedding Shearing
 Foliation Fault
 Fragment size & shape Vein
c carbonate
q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307038

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	202.8								
	202.8-205.0	Black shale, mudstone and siltstone - many angular fragments.							
	205.0	CBA 45°							
	205.0-216.7	Pale brown dolomitic mudstone, siltstone.							
	210	CBA 50-60° Carbonate veining common.							
	216.7								
	216.7-220.5	Fine grained intermediate lava.							
	220	220.5							
	220.5-235.8	Black shale mudstone and siltstone. Carbonate veinlets common.							
	230								
	235.8								
	235.8-241.3	Black pyritic shales.							
	240	CBA 60° Pyrite introduced along beds.							
	241.3								
	241.3-250.6	Black shale, mudstone siltstone and dolomite. (Mudstones often dolomitic)							
	250	CBA 60-70°							

Mineralisation
 Pyrite - > 30%
 234.3-235.8 coarse grained. Some clayey patches possibly fault zone.



038

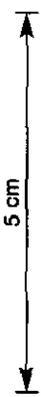
DRILL LOG

Feature: Bedding Shearing
 Foliation Fault
 Fragment size & shape Vein c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307039

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	255.6								
	260	255.6-282.7 Dolomite generally massive with some interbedded quartzite. CBA 60-70 Quartz at 262, 263, 265, 266 (271-274) interbedded quartzite and dolomite.							
	270								
	280								
	282.7								
	290	282.7-292.5 Massive quartzite. Blotchy quartzite - dark grey and whitish. Last 5 metres very broken.							
	292.5	END OF HOLE							



Feature: Bedding Shearing
 Foliation Fault
 Fragment size & shape Vein
 c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307041

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
		not cored			
		Pale grey to buff bleached mudstones siltstones and sandstone. Sections extremely broken and weathered. Minor thin carbonate veinlets present locally.			Nil
	50	Light to dark grey mudstones, siltstones and sandstones as above but unbleached. Section is very broken and little structural information is available. Some of the sandstones are kaolinitic. Lower boundary probably faulted.		50	
	100	Slumped and sheared black shales and siltstones with 'chaotic' carbonate blebs.			Disseminated pyrite to 5% occurs locally. Occasional blebs of clastic pyrite.
	150	Light to dark grey mudstones, siltstone and sandstones often slumped and brecciated. Traces of carbonate as thin veinlets. Section from 147-170 very badly broken and weathered, possibly a fault zone. Relatively coarse grained carbonate is developed in veinlets around 160-164m. Some mudstones are almost black and often pyritic. Sandstone content decreases toward base of section.			Minor disseminated pyrite to 5% occurs locally.
		M.g. sandstone-light greeny grey*			Tr. sph at 163 in carbonate vein.
		Light to dark grey mudstone and siltstone becoming carbonate rich toward end			Carbonate-sph veins total 10cm at 176m
	200	Thinly bedded grey shales* and siltstones often slump folded and brecciated. Bedding is generally much better developed than in previous section. Bedding angle variable but usually low i.e. 10-40°. Sandstone unit developed 222.6 to 223.9. Shales often develop slaty cleavage which is usually graphitic. Last 2 metres is black shale. A thin unit slightly kaolinitic with occ. carbonate vein no bedding observed.			Tr. py. as disseminated and veinlets.
					Py. up to 60% in veins from 239-240.5



041

Feature: Bedding Shearing
 Foliation Fault
 Fragment size & shape Vein
 c carbonate
 q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307042

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
		Pale grey to white siltstones, and shales. generally poorly bedded or slumped. Rare carbonate veinlets.			Nil
	300	Massive quartzite - pale grey saccharoidal rock showing occasional bedding. Interbeds of greenish grey micaceous siltstone also - esp. 298-301. Carbonate speckled throughout last 15m. Dark bands towards base due to increase in graphite content.			Rare py veinlets source of which are associated with carbonate.
		Dolomitic siltstone-pale kakhi			Tr. dissem. & vein py*
		Black slate - slumped and sheared with pyrite chlorite veinlets over 328-330			
	350	335.3m E.O.H.			

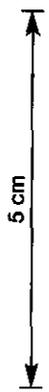


Feature: Bedding Shearing sst
 Foliation Fault shale
 Fragment size & shape Vein carbonate
 quartz contact

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307048

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE COMMON MASSIVE	DEPTH m	MINERALIZATION
		NOT CORED				
	10	<p><u>Interbedded sandstones and shales</u></p> <p>A sequence of thinly bedded rocks - generally less than one metre thick. Shales are pale grey to dark grey.</p> <p>Sandstones locally grade into siltstones. The bulk of these rocks are "dirty" containing rock fragments, e.g. @ 21m</p> <p>Core is generally decomposed and broken (hence little structural information available).</p> <p>Locally carbonate is developed as a rock forming mineral. (Probably calcite.)</p> <p>Minor carbonate veinlets developed throughout.</p>			10	
	20				20	Py, sph, ga, carbonate vein 40 to C.A.
	30				30	
	40				40	
	50				50	



048

DRILL LOG

Feature:

Bedding



Shearing



Foliation



Fault



Fragment
size & shape



Vein



carbonate
quartz

Mineralization:

Trace

1-5%

Common

5-15%

Abundant

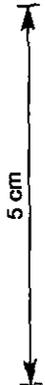
15-60%

Massive

> 60%

307049

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
	60	<p><u>Interbedded sandstones and shales</u></p> <p>This sequence is similar to that above except it is a little less decomposed. It is just as broken.</p> <p>Much of the sequence shows slump features.</p>		60	
	70			70	
	80			80	
	90			90	
	100			100	



Feature: Bedding Foliation Fragment size & shape	Shearing Fault Vein	Shale sst carbonate c quartz q	Mineralization: Trace 1-5% Common 5-15% Abundant 15-60% Massive > 60%
--	--	---	--

307050

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE COMMON ABUNDANT MASSIVE	DEPTH m	MINERALIZATION
	110				110	
	120				120	Nil
	130				130	
	140				140	
	150	Interbedded dolomitic mudstones and silt-stones. This section is generally poorly bedded although locally bedding is well developed e.g. 158.5-160			150	Py. veins developed between 146-148.

5 cm

U50

DRILL LOG

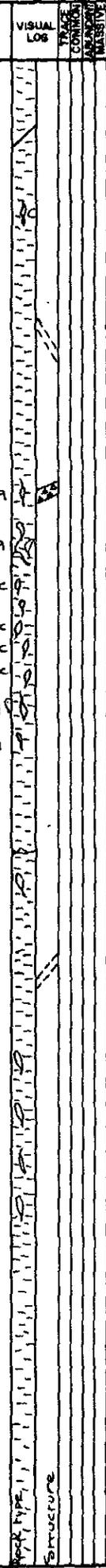
Hole No G43

Page No 4

Feature:	Bedding 	Shearing 	 mudstone	Mineralization:	Trace	1-5%
	Foliation 	Fault 	 breccia (fault)		Common	5-15%
	Fragment size & shape 	Vein 	 carbonate		Abundant	15-60%
			 quartz		Massive	> 60%

307051

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	DEPTH m	MINERALIZATION
		where it is 30°			Py. veins developed between 152 and 156.5. av. 20% of rock
	160	Abundant carbonate is present throughout, both as a rock forming mineral, where it is often crystalline, and as vein material, where it is associated with quartz. Many of the carbonate-quartz vein are sub-parallel to the core axis, however a lot are irregular.		160	
		Parts of this sequence appear to be tuffaceous (T.S. confirmation needed)			
	170	88963 - 160 metres 88964 - 88965 - 176 metres 88966 - 185.5		170	
	180			180	
	190			190	Pyrite veinlets tested around 30% of rock 189-190 Tr. po
	200			200	Framboidal dissem. and vein pyrite occur to ~30% from 196-



051

Feature: Bedding Shearing
 Foliation Fault
 Fragment Vein
size & shape c carbonate
q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307052

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE COMMON ABUNDANT MASSIVE	DEPTH m	MINERALIZATION
	210	<p>Grey dolomitic mudstones and siltstones as for previous sequence except that slumping and chaotic features appear to be more common. Over approximately the next 100m many veinlets cross the core. These veinlets have a crude orientation approx 30° to the core axis. Wallrock alteration is often evident adjacent to them. This is shown by a slight darkening of the rock rather than development of recognisable alteration products. (These veins are often mineralised - see mineralisation)</p>			210	<p>Mineralisation occurs as veinlets (see left) containing carbonate, quartz, pyrite, pyrrhotite. It occurs both as veinlets and as disseminations (generally close to veinlets).</p>
	220	<p>Slump features include sedimentary breccias and swirl structures. Many disconnected fragments of one rock type in the other are mineralised. The siltier phases appear to be better hosts than the mudstone phases for disseminated mineralisation.</p>			220	<p>Pyrite is usually as fine grained aggregates but is sometimes coarser grained in veinlets. Framboidal pyrite occurs locally, e.g. 215m, 245.2m.</p>
	230				230	
	240	<p>The siltstones and mudstones are often sericitic and the dark colour (in part) is possibly due to the presence of graphite. Composition is not easily visible because of fine grain size.</p> <p>Bedding is generally not developed.</p>			240	
	250				250	

5 cm

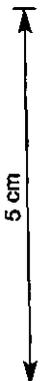
052

Feature: Bedding Shearing
 Foliation Fault
 Fragment size & shape Vein
c carbonate
q quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307053

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	TRACE COMMON ABUNDANT MASSIVE	DEPTH m	MINERALIZATION
	260	Dolomitic mudstone and siltstone as above.			260	
	270				270	
	280				280	
	290	<p><u>Silicified Dolomite</u></p> <p>This section is a pale grey to brown dolomite variably silicified and mineralised. It is often well-bedded with core bedding angles in the range 30-45°.</p> <p>The rock is almost entirely silicified and only patches of the original dolomite exist.</p>			290	Medium to coarse grained pyrite.
	300				300	



053

DRILL LOG

Hole No **G43**

Feature: Bedding Shearing
 Foliation Fault
 Fragment Vein carbonate
 size & shape quartz

Mineralization: Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

307054

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOS	MINERALIZATION
	310			Abundant coarse-grained pyrite occurs through this section as replacement of dolomite and also in veinlets. Locally quartz and minor fluorite are introduced with pyrite.
	320			
	330	<u>Fine grained massive quartzite.</u> This is typically a fine-grained light grey saccharoidal quartzite of homogeneous composition. Locally thin bands of darker quartz are developed probably due to the presence of graphite. Bedding is not visible. Minor disseminated carbonate occurs at the end of the section.		Disseminated pyrite often as framboids occurs throughout possibly replacing carbonate grains. Vein pyrite also occurs in association with quartz and talc.
	340			
	350			

5 cm

054

Feature: Bedding  Shearing 
 Foliation  Fault 
 Fragment  Vein 
size & shape  carbonate
 quartz

Mineralization:
307055

Trace 1-5%
 Common 5-15%
 Abundant 15-60%
 Massive > 60%

CORE REC'D	DEPTH m	GEOLOGY	VISUAL LOG	CONTAMINATED	DEPTH m	MINERALIZATION
		358.5 metres E.O.H.				
	360				360	

5 cm



APPENDIX II

Geophysical Programme Queen Hill 1977

S.S.Webster

May 30, 1977.

056

307057

ABMINCO

MEMORANDUM

Date	May 30, 1977	Ref	
To	Project Geologist, D.C. Simpson	From	S.S. Webster
At	Zeehan	At	Adelaide
Copies to		Keep	

Subject Geophysical programme, Queen Hill, 1977

An orientation geophysical programme was conducted over the Queen Hill (Severn) grid in February 1977, to ascertain which techniques could best assist in ore delineation. The magnetic technique could not be further exploited due to local interference from the town environment.

The survey comprised 5 Induced Polarisation (IP) traverses utilising 50 metre spreads, the maximum permitted with due safety. Six traverses were conducted with the new Crone Pulse-Electromagnetic instrument to search for conductive mineralisation. Down-hole IP logging is to be attempted during the current drill programme, in order to ascertain physical properties of mineralisation and rock types, which may assist interpretation.

Results IP. The Induced Polarisation (IP) and resistivity data are very disturbed, making anomaly resolution very difficult. The variations are due to several sources:

- 1) local interference due to cultural features, such as fences, roads, power lines and houses;
- 2) rock type inhomogenetics, such as faulting, and the variable graphite content of rocks as evident in the drill holes to the north and south of the discovery section;
- 3) the effects of the Queen Hill terrain, are difficult to gauge, as observed in the attached modeling data. It is evident that these effects are observed in the data on line 1800N beneath 750E (crest) and 1000E (base of hill).

However, the following interpretation points can be readily observed:

- a) a marked resistivity contact occurs on all lines at (approximately) 950E, with high resistivity values to the west ($>75 \Omega m$) and lower values to the east ($<50 \Omega m$). On line 1800N there is a strong resistivity low beneath 900E ($<20 \Omega m$), but this could partially be due to terrain.
- b) to the east of this resistivity contact on most lines is a broad frequency effect high (5 to 10%), which overlaps with the resistivity low to give a persistent metal factor anomaly.

Several interpretations are possibly derived from this data, however, these would best be left until electrical parameters of rocks and mineralisation are derived from the drill hole logging programme.

Pulse E.M.

The Pulse EM data does not show an anomaly in the vicinity of the IP anomalies

057

307058

ABMINCO

MEMORANDUM

Date May 30, 1977

Ref

To DCS

From SSW

At

At

Copies to

Keep

Subject Queen Hill / Page 2

mentioned above. However, a shallow EM anomaly is observed on all lines in the vicinity of 1100E to 1150E. On line 1800N this is in agreement with a marked shallow resistivity low. Several cultural features (fences, roads, etc) also occur in this vicinity, and these may be the source of this EM indication. These anomalies will have to be checked to ascertain if they could be related to sulphide mineralisation.

Conclusion

The full interpretation of this orientation survey must be deferred until the down hole surveys can be conducted. These results are needed to allow quantitative assessment of the likely response of the spurious sources known to occur in the area. Once these parameters have been assessed it will be possible to ascertain if the tin bearing sulphide mineralisation can be detected by standard geophysical survey techniques. This will enable exploration to be extended into areas where non-magnetic mineralisation maybe present or unable to be detected due to cultural interference.

S.S. Webster

McPHAR GEOPHYSICS LIMITED

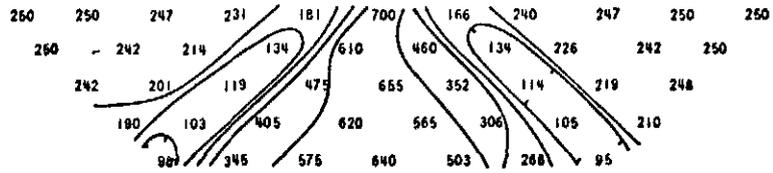
307059

Theoretical Induced Polarization and Resistivity Studies

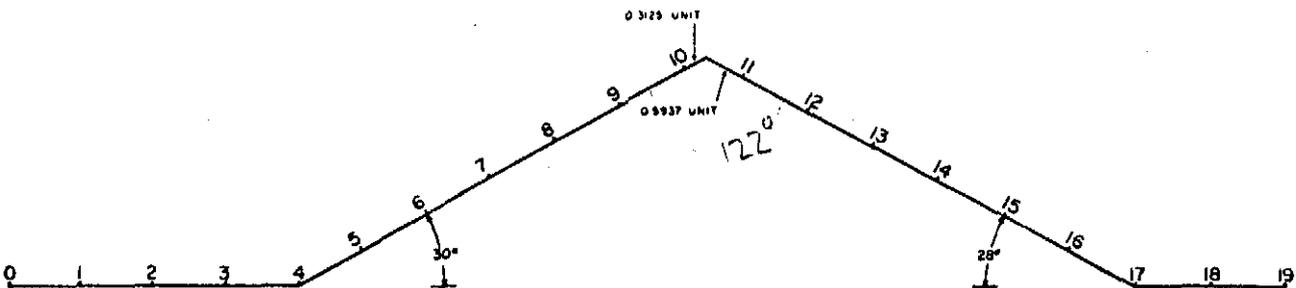
Scale Model Cases



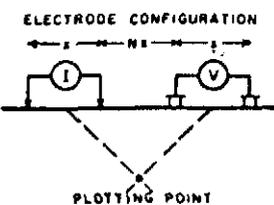
- N-1 _____
- N-2 _____
- N-3 _____
- N-4 _____
- N-5 _____
- N-6 _____



$(P/2\pi)\alpha$



$(P/2\pi)_1 = 250$



CASE
T-h30°-250-1

5 cm



059

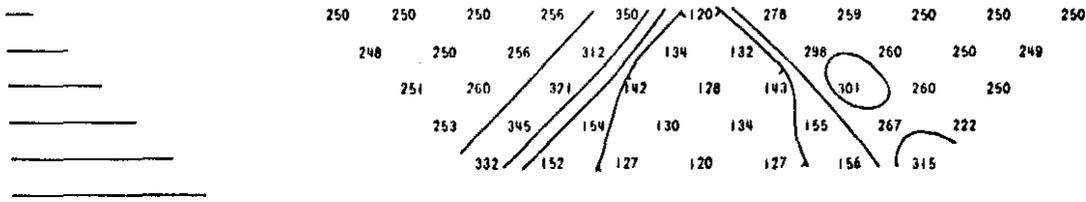
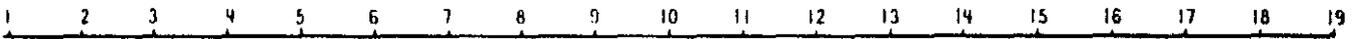
307060

93

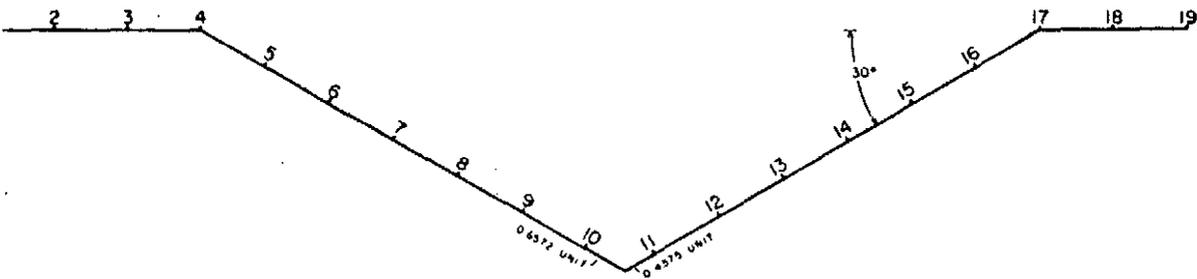
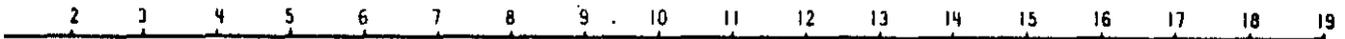
McPHAR GEOPHYSICS LIMITED

Theoretical Induced Polarization and Resistivity Studies

Scale Model Cases

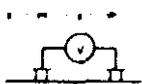


(P/2π)α

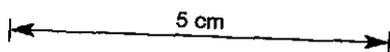


$I = 250$

CONFIGURATION



V POINT



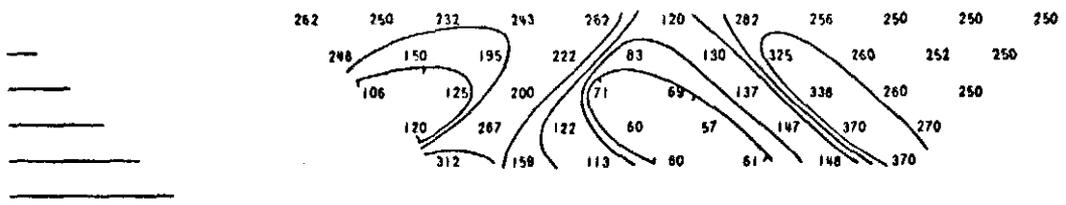
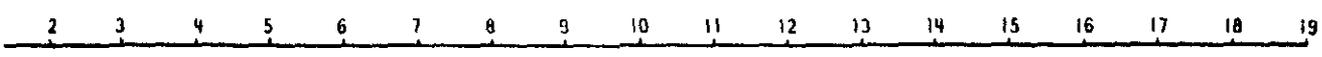
CASE
T-v30°-250-1

060

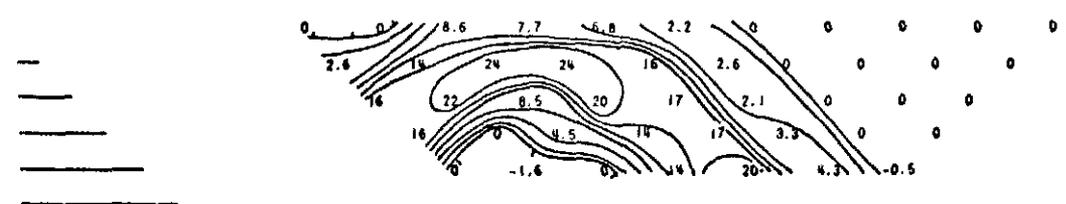
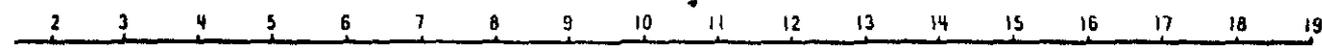
McPHAR GEOPHYSICS LIMITED

Theoretical Induced Polarization and Resistivity Studies

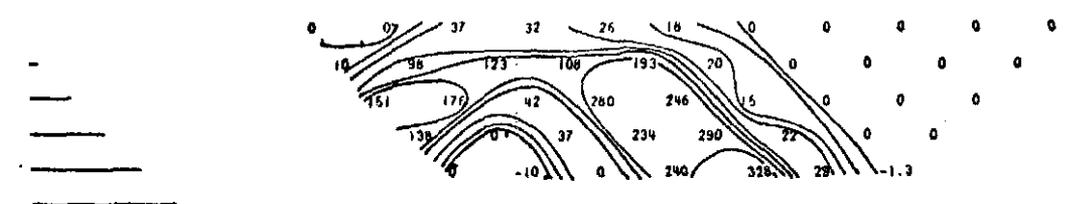
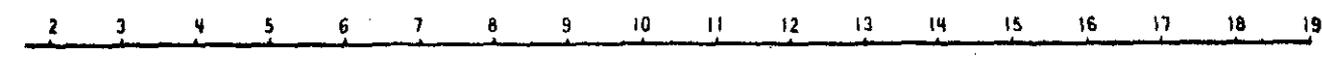
Scale Model Cases



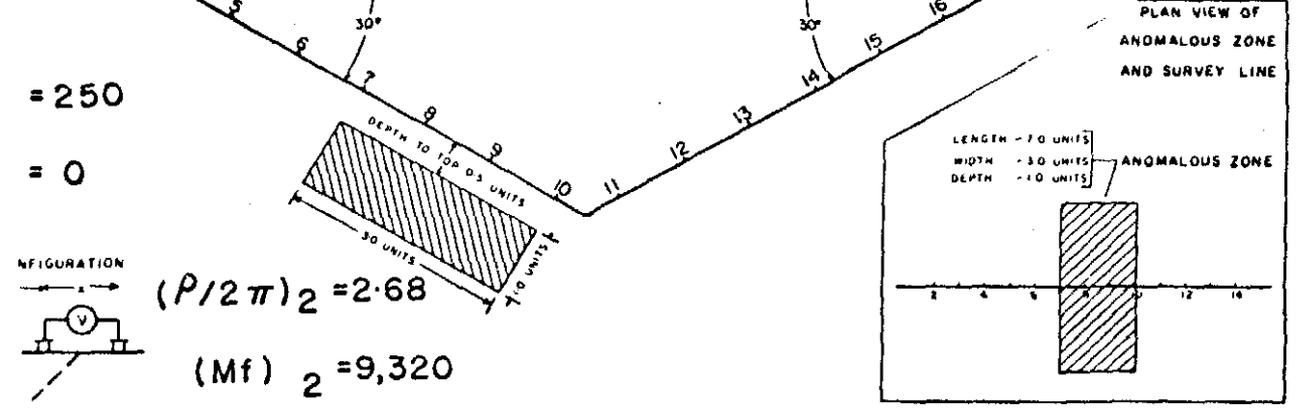
$(P/2\pi)\alpha$



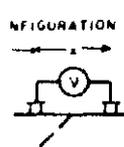
$(fe)\alpha$



$(Mf)\alpha$



$\rho = 250$
 $\rho = 0$



$(P/2\pi)_2 = 2.68$
 $(Mf)_2 = 9,320$
 $(fe)_2 = 25\%$

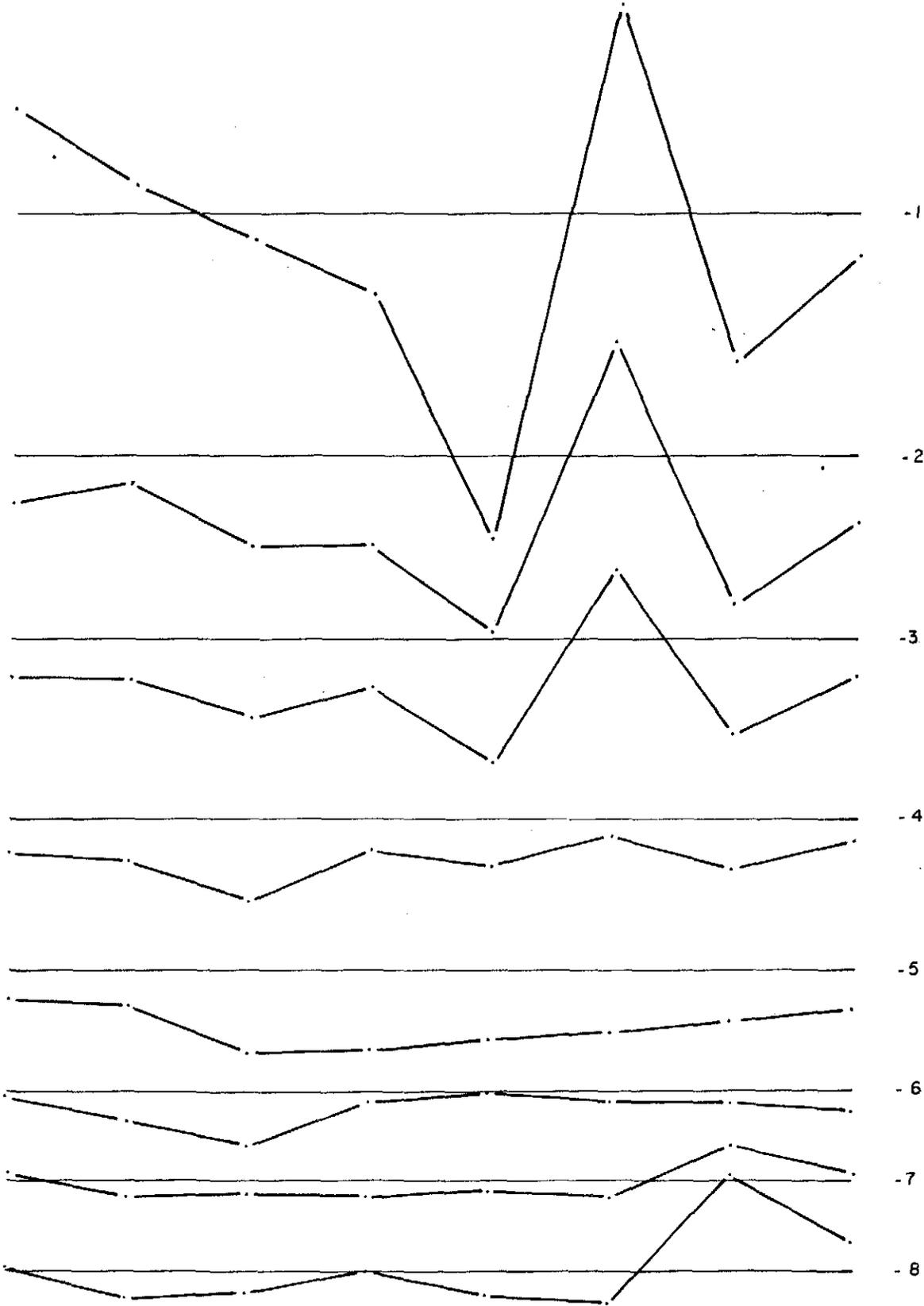
T-v30°-250-1
 CASE VIII-O-5-BU-250a

5 cm

061

850E 900E 950E 1000E 1050E 1100E 1150E 1200E

307062



5 cm

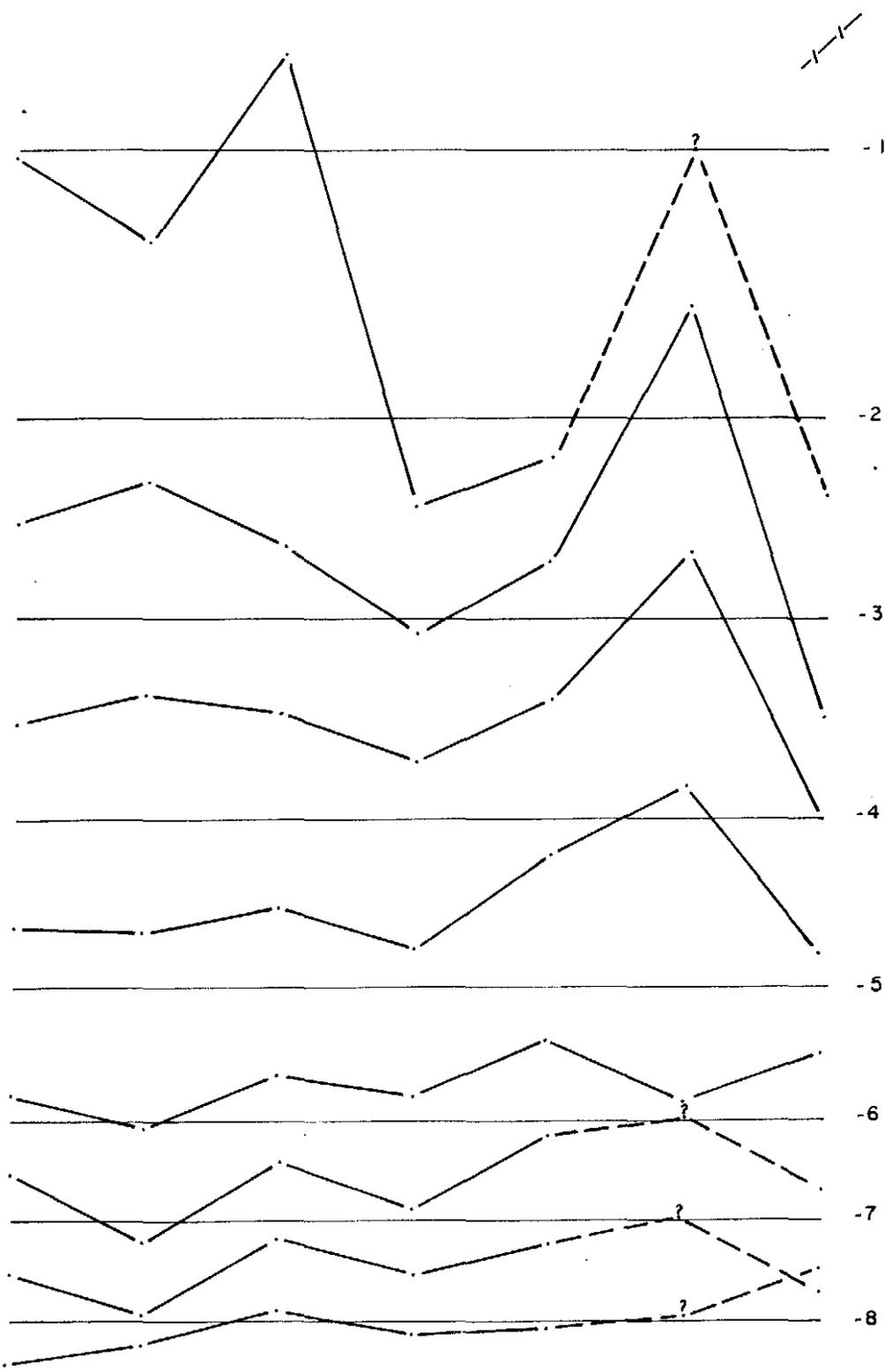
500
400
300
200
100
50
40
30
20
15
10
5
0
VERTICAL SCALE

T → R = 50m

Abminco Exploration

Drawn:	NORTH WEST TASMANIA QUEEN HILL — SEVERN ANOMALY P.E.M. SURVEY - LINE 1550N	Location code:
Traced: A.E.R.		Date: August 1977
Checked:		Scale: 1 : 2,500
Revised by: Date		Plate No QH 84/1550N

900E | 950E | 1000E | 1050E | 1100E | 1150E | 1200E



500
400
300
200
100
50
40
30
20
15
10
5
0

VERTICAL SCALE

T → R = 50 m

5 cm

 **Abminco Exploration**

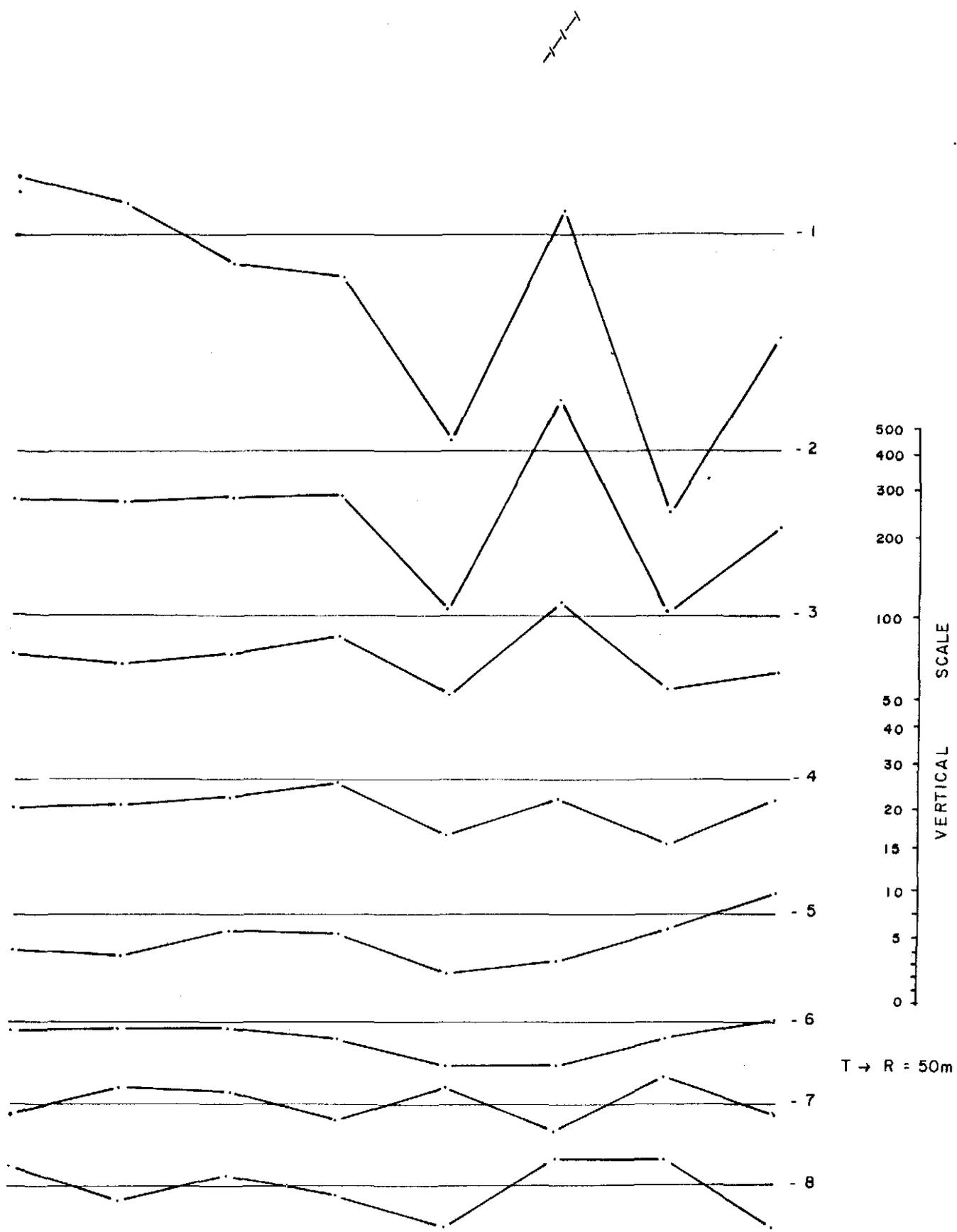
Drawn:
Traced: A.E.R.
Checked:
Revised by: Date

NORTH WEST TASMANIA
QUEEN HILL - SEVERN ANOMALY
P.E.M. SURVEY LINE 1700N

Location code:
Date: August 1977
Scale: 1: 2,500
Plate No. QH 84/1700N

063

850E 900E 950E 1000E 1050E 1100E 1150E 1200E 307064



T → R = 50m

 **Abminco Exploration**

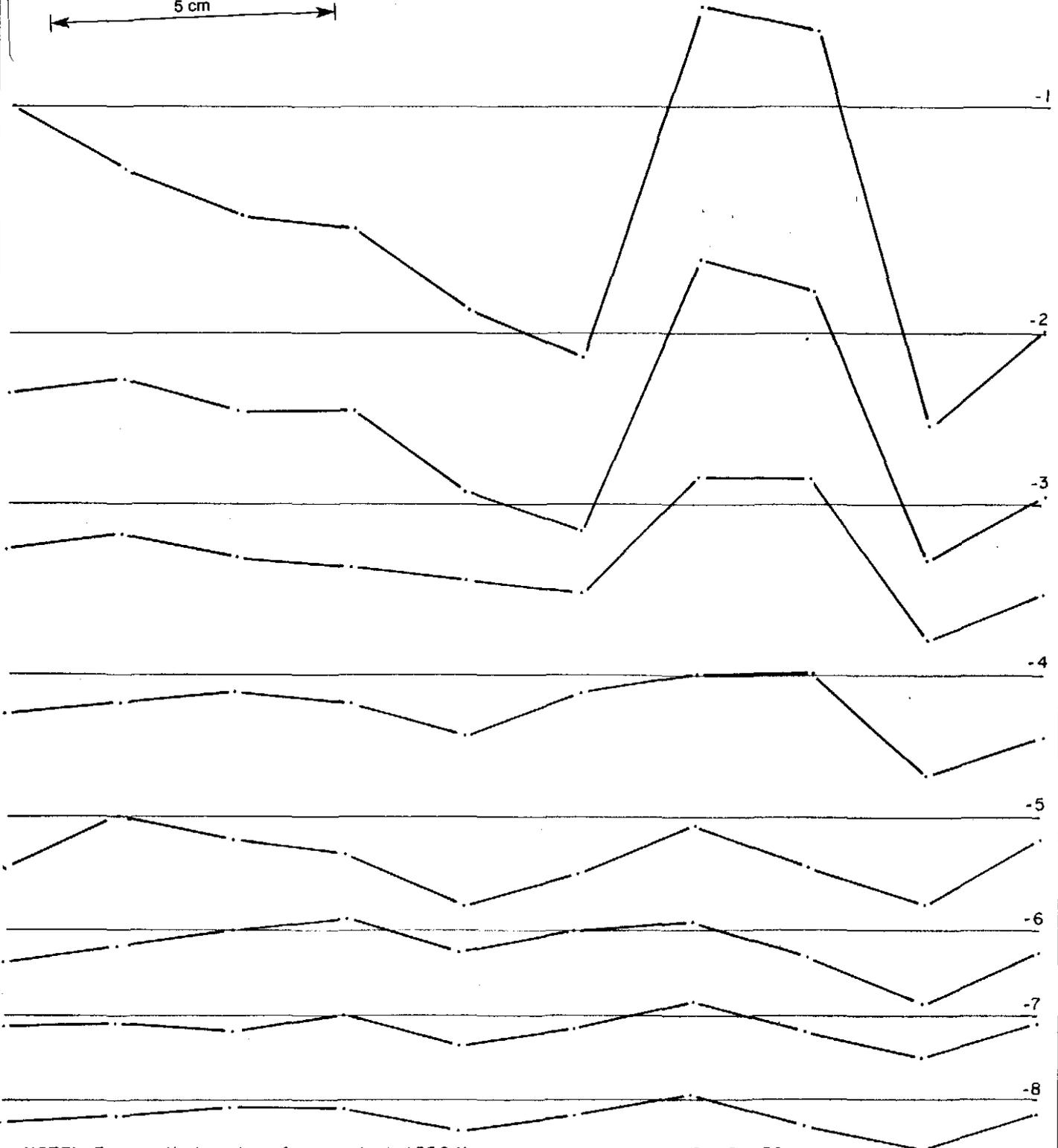
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Traced: A.E.R.		Date: August 1977
Checked:		Scale: 1 : 2,500
Revised by: Date:		Plate No QH 84/1600N

064

307065

975 E 1000 E 1025 E 1050 E 1075 E 1100 E 1125 E 1150 E 1175 E 1200 E

5 cm



NOTE: For vertical scale refer to sheet 1550 N

T → R = 50m



Abminco Exploration

Drawn:
 Traced: A.E.R.
 Checked:
 Revised by: Date:

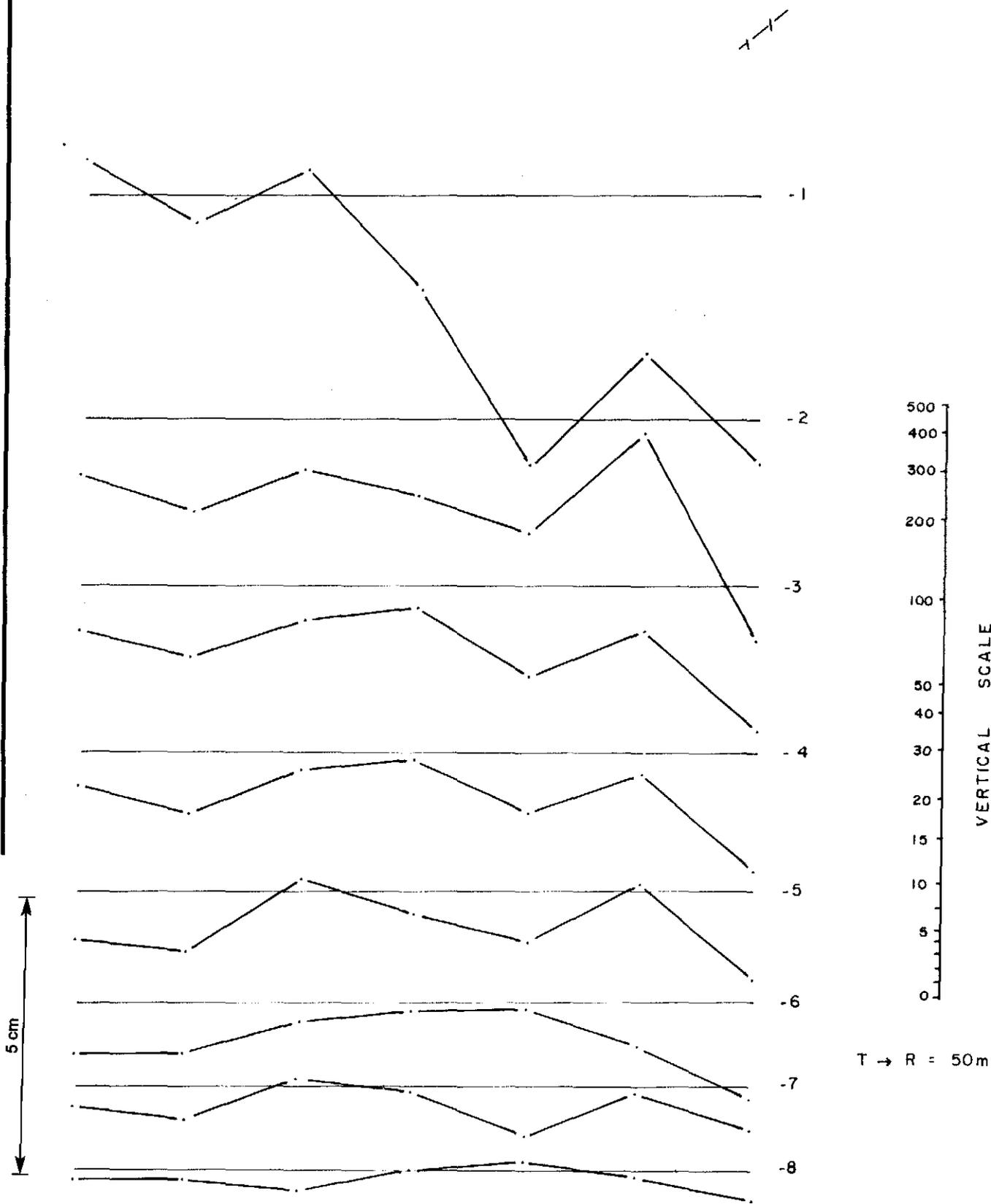
NORTH WEST TASMANIA
 QUEEN HILL - SEVERN ANOMALY
 P.E.M. SURVEY - LINE 1650N

Location code:
 Date: August 1977
 Scale: 1: 1,250
 Plate No QH 84/1650 N

065

307066

900E 950E 1000E 1050E 1100E 1150E 1200E



 **Abminco Exploration**

Drawn:
 Traced: A.E.R.
 Checked:
 Revised by: _____ Date: _____

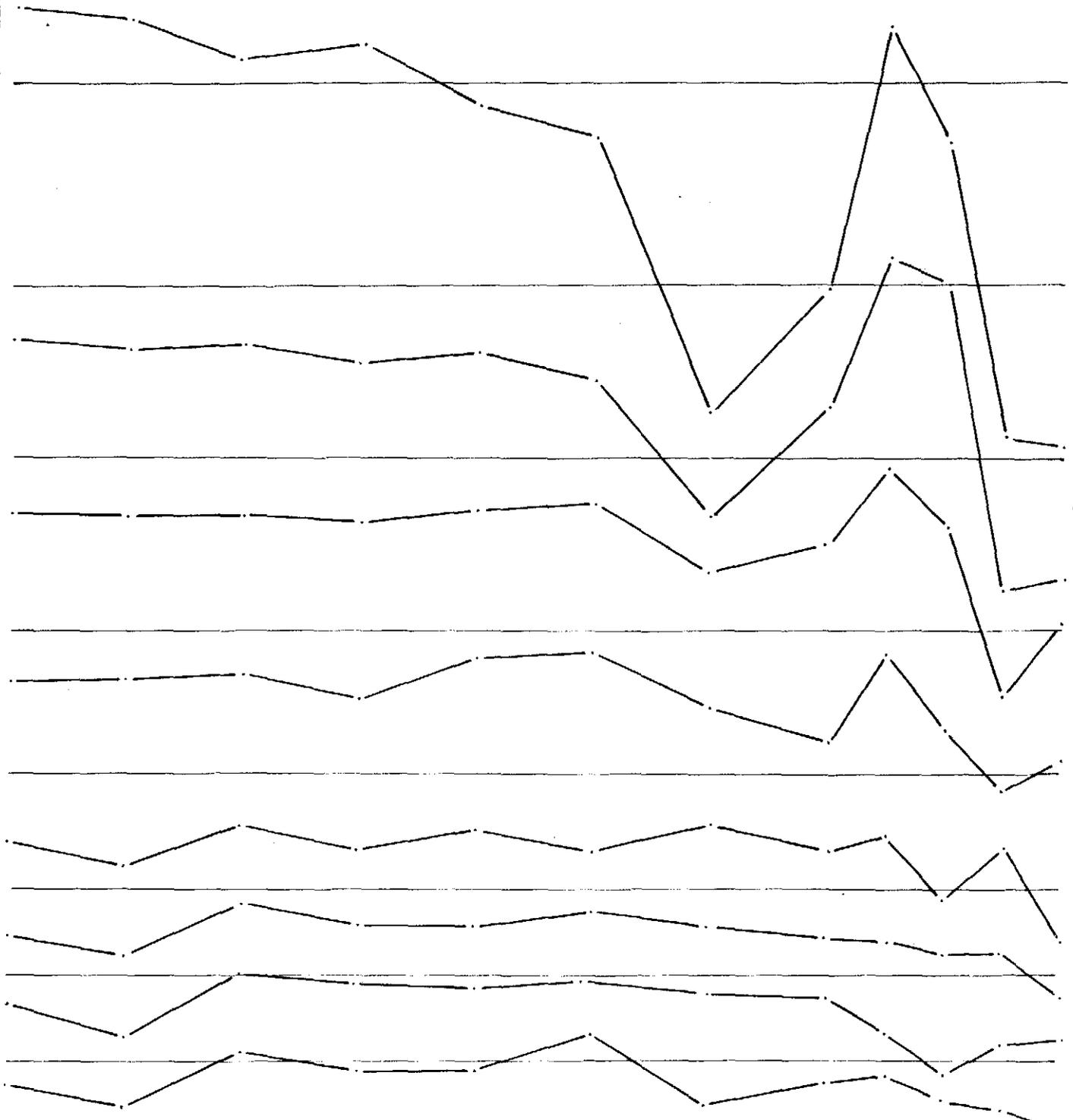
NORTH WEST TASMANIA
 QUEEN HILL - SEVERN ANOMALY
 P.E.M. SURVEY - LINE 1750N

Location code:
 Date: August 1977
 Scale: 1 : 2,500
 Plate No: QH 84 / 1750N

307067

800E 850E 900E 950E 1000E 1050E 1100E 1150E 1200E 1250E

5 cm



NOTE: For vertical scale refer to Line 1550E

T + R = 50m

 **Abminco Exploration**

Drawn:

Traced: A.E.R.

Checked:

Revised by: Date:

NORTH WEST TASMANIA
 QUEEN HILL - SEVERN ANOMALY
 P.E.M. SURVEY - LINE 1800N

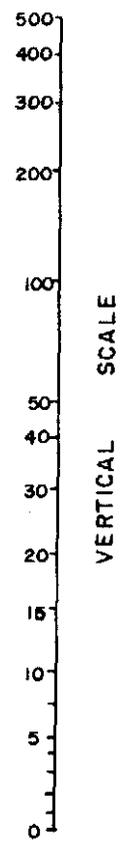
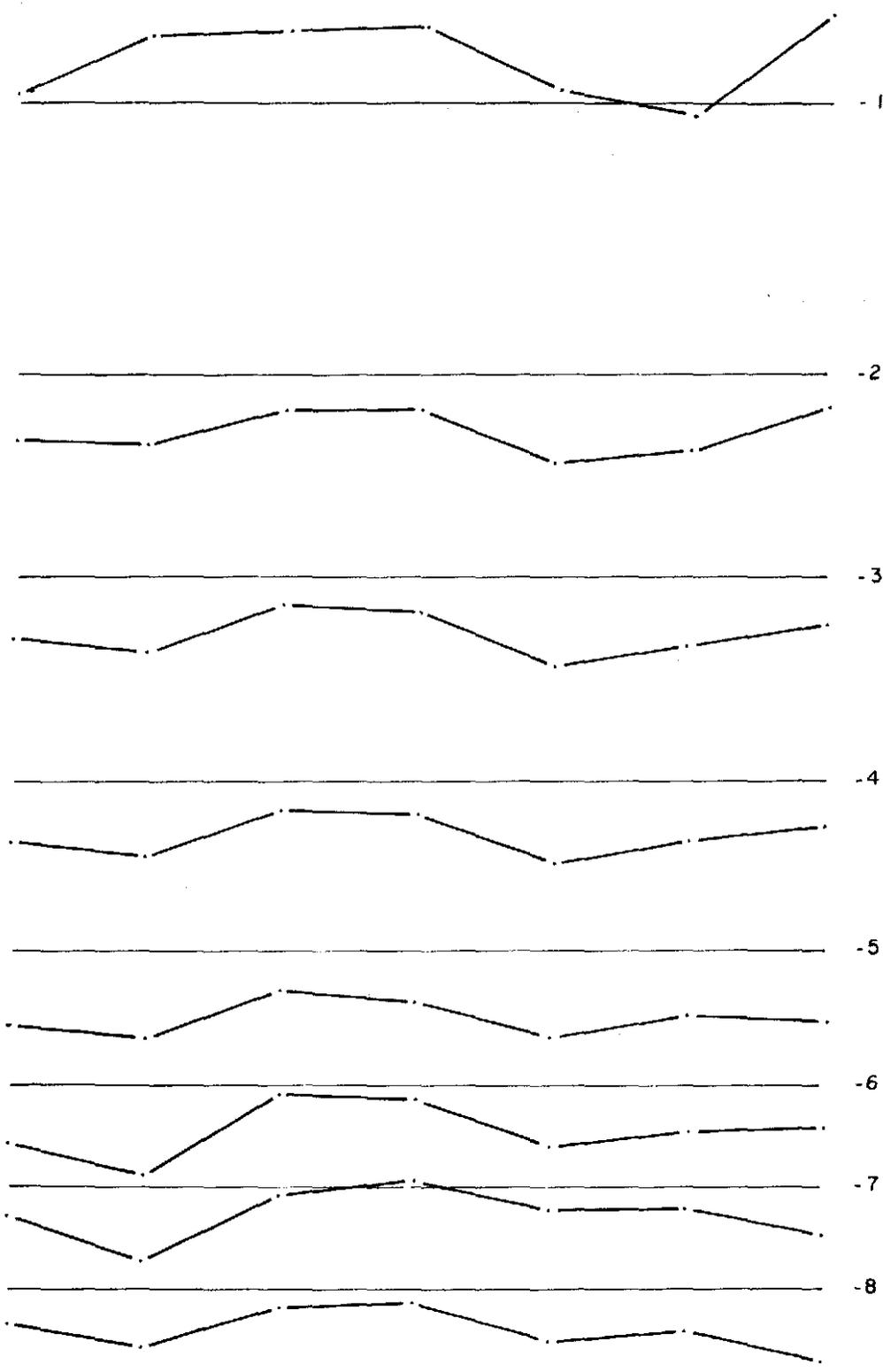
Location code:

Date: August 1977

Scale: 1 : 2,500

Plate No QH 84/1800NB

450E 500E 550E 600E 650E 700E 750E



5 cm

T → R = 50 m

Abminco Exploration

Drawn:	NORTH WEST TASMANIA QUEEN HILL — SEVERN ANOMALY P.E.M SURVEY — LINE 1800N	Location code:
Traced: A.E.R.		Date: August 1977
Checked:		Scale: 1 : 2,500
Revised by Date:		Plate No QH 84/1800NA

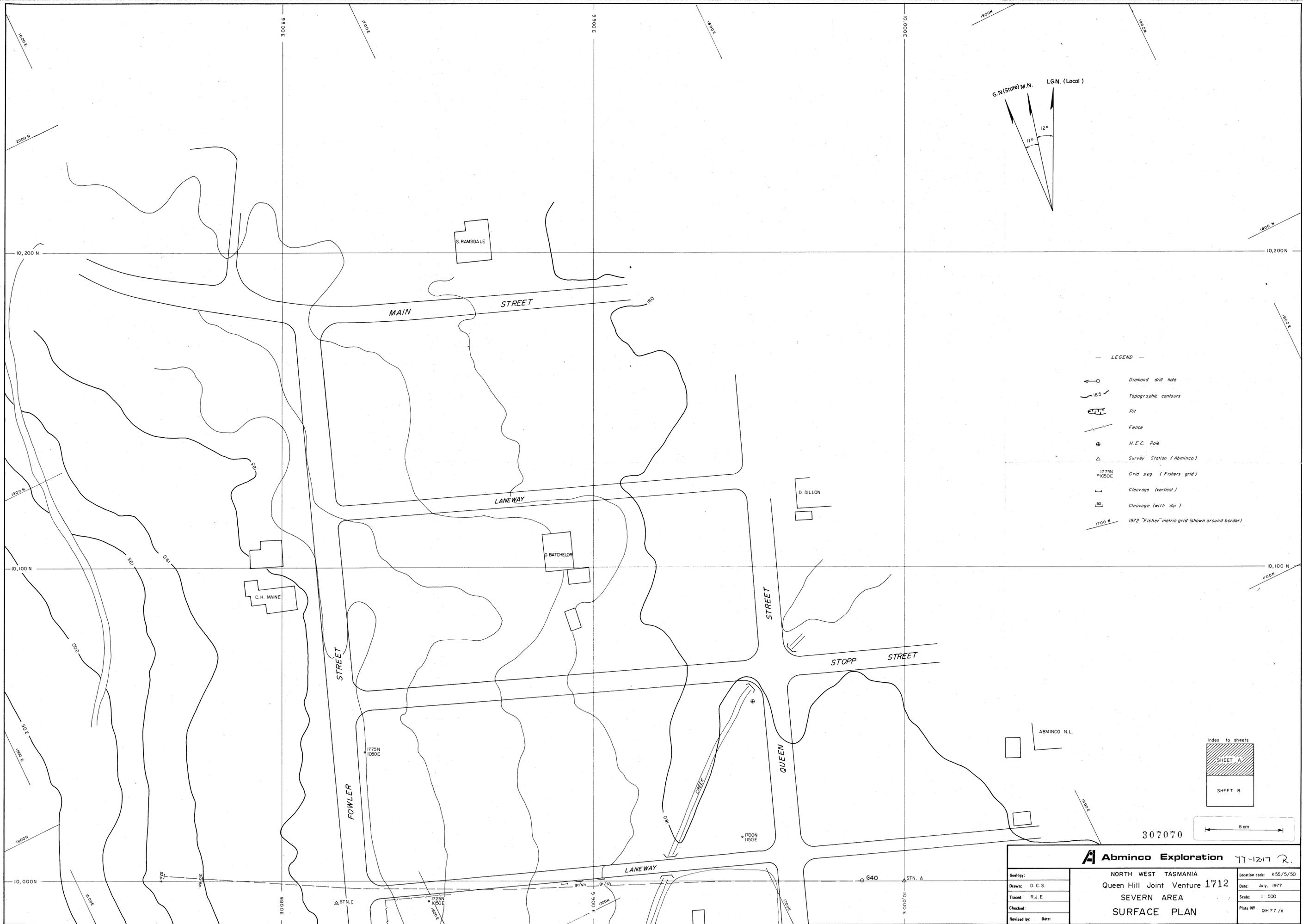
068

307069

APPENDIX III

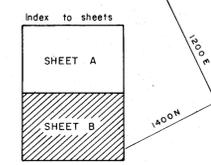
NOTES ON ASSAY METHOD FOR TIN

1. Half core was used for all samples.
2. Half core was crushed and split using standard quartering techniques.
3. 50 gm (approx) of quartered sample was then gound to - 200#.
4. Powdered sample was analysed by XRF technique with a stated error of $\pm 0.02\%$ Sn.
5. The assays were carried out by the assay laboratory at Abminco N.L. Luina, Tasmania.



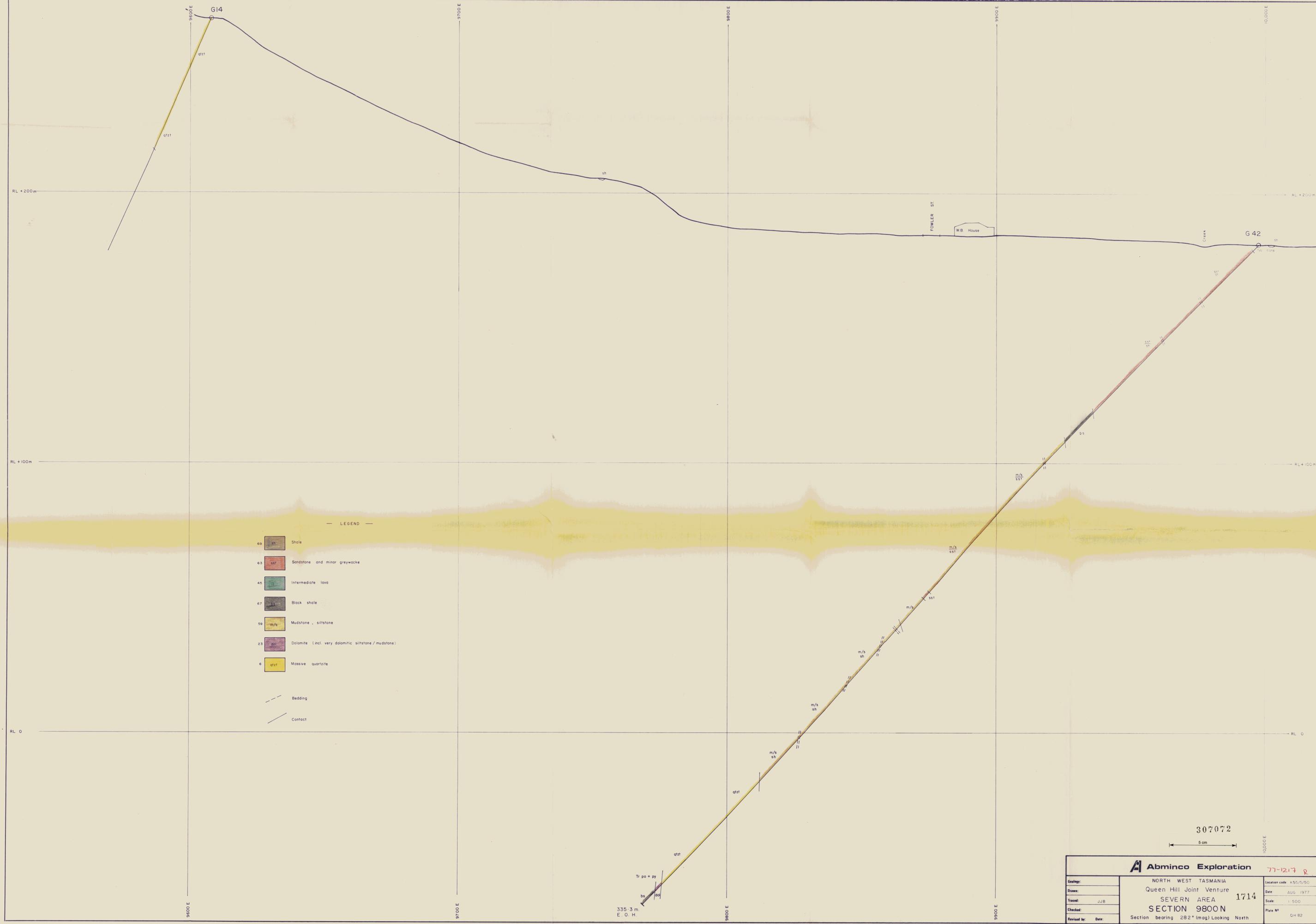


307071



5 cm

Abminco Exploration		77-1217 R
NORTH WEST TASMANIA Queen Hill Joint Venture 1713		Location code: K55/5/50
SEVERN AREA		Date: July, 1977
SURFACE PLAN		Scale: 1:500
Geology:		Plate No QH 77/b
Drawn: D.C.S.		
Traced: R.J.E.		
Checked:		
Revised by: Date:		



— LEGEND —

69	sh	Shale
63	sst	Sandstone and minor greywacke
45		Intermediate lava
67		Black shale
59	m/s	Mudstone, siltstone
23	sd	Dolomite (incl very dolomitic siltstone/mudstone)
6	qtzt	Massive quartzite
		Bedding
		Contact

335.3 m.
E. O. H.

307072
5 cm

Abminco Exploration		77-1217 R
Geology:	NORTH WEST TASMANIA	
Drawn:	Queen Hill Joint Venture	
Traced:	JJB	Date: AUG 1977
Checked:	SEVERN AREA 1714	
Revised by:	SECTION 9800N	
Date:	Section bearing 282° (mag) Looking North	
	Location code: K55/5/50	Scale: 1:500
		Plate No: QH 82

9700 E

9800 E

9900 E

10,000 E

RL + 200m

RL + 200m

+ 100m

+ 100m

00

00

-100m

9800 E

9900 E

10,000 E

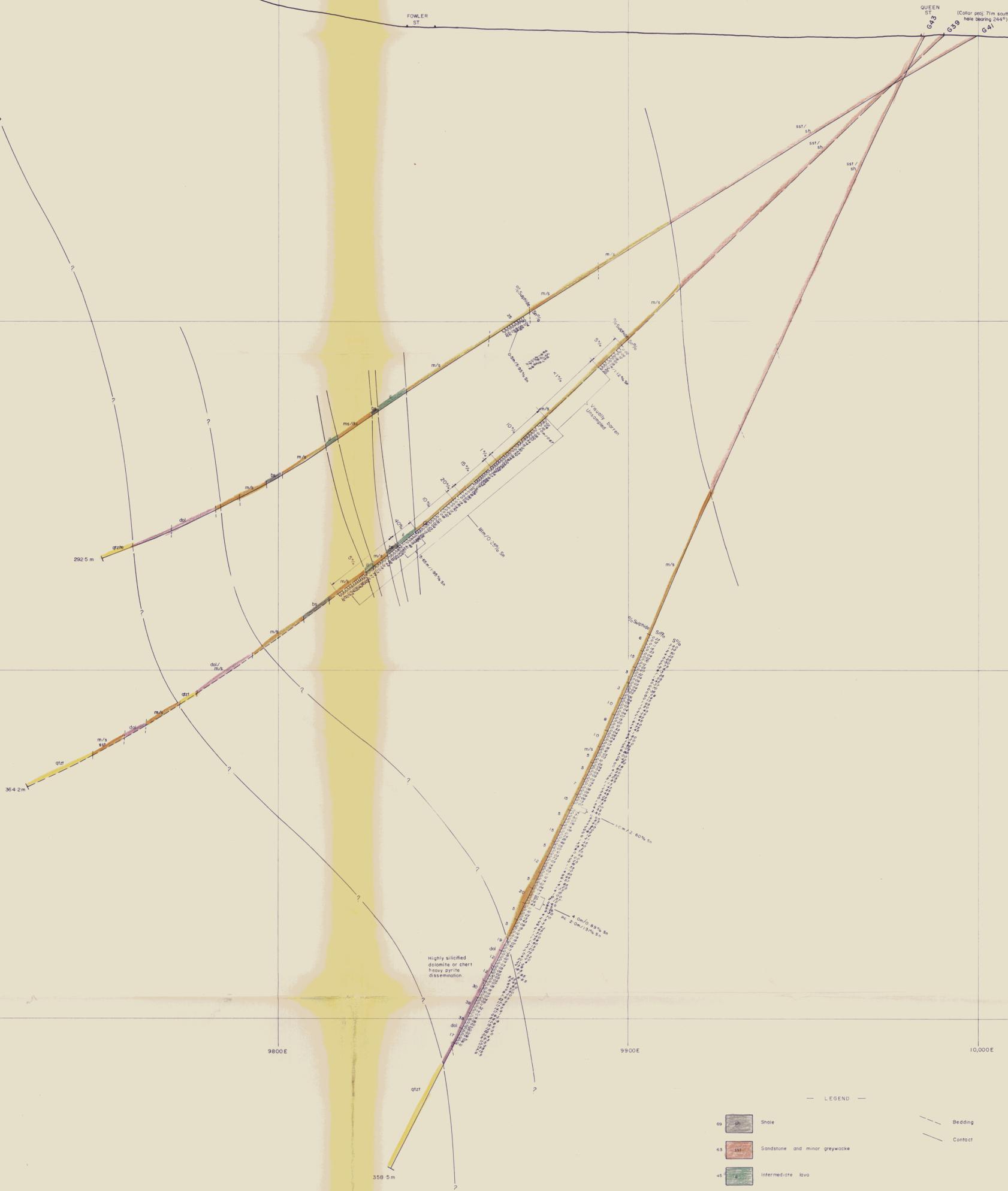
Abminco Exploration

NORTH WEST TASMANIA
Queen Hill Joint Venture
SEVERN AREA
SECTION 9900 N

307073

Geology	D.C.S.
Drawn	R.U.E.
Checked	
Revised by	
Date	

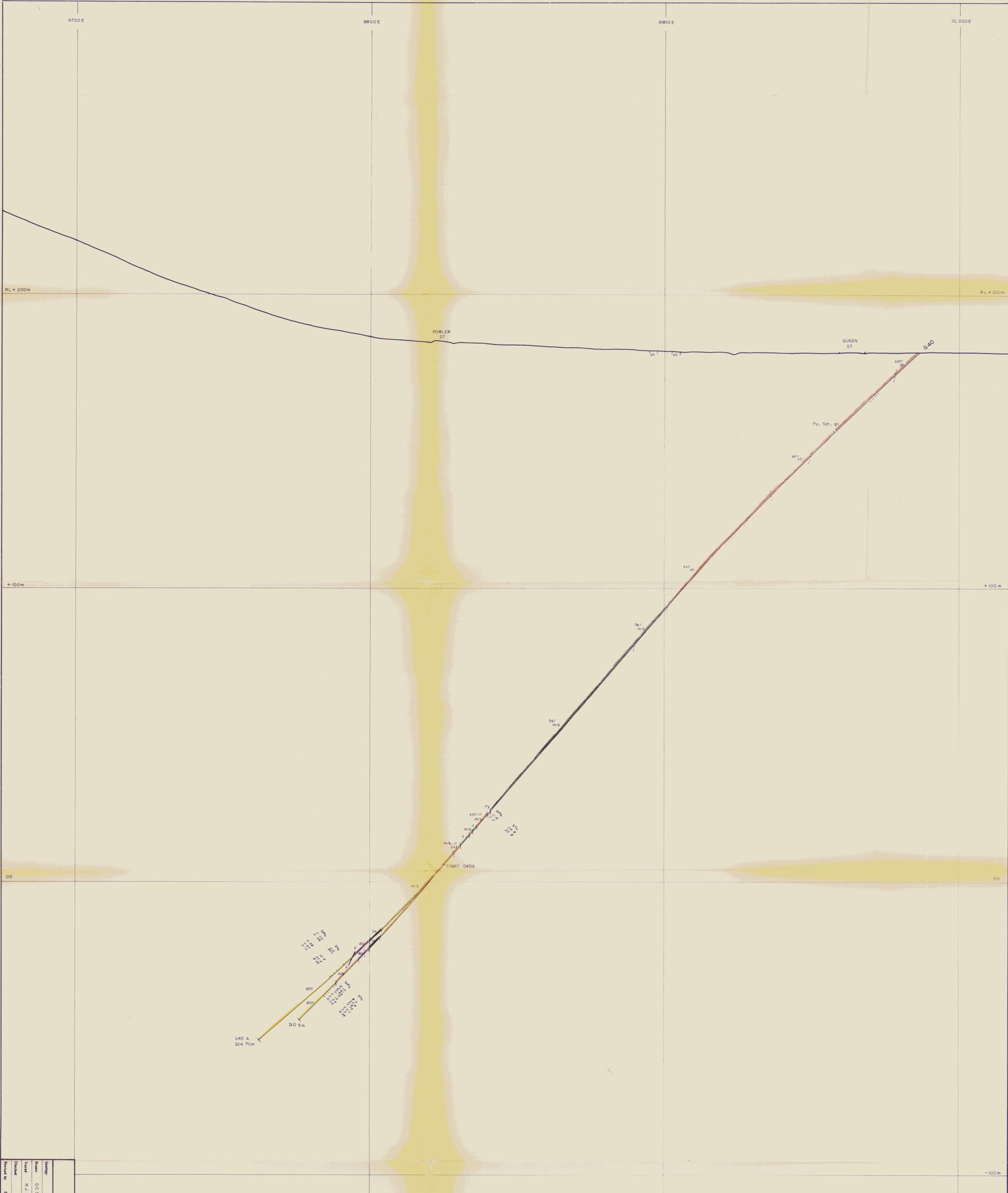
Location code: K35/5/530
Date: July 1977
Scale: 1:500
File no: 24/79



1 Vertical datum - mean sea level
2 Tin values quoted in per cent
3 DDH 39 - Projected - point of intersection with this section shown by ϕ

LEGEND

sh	Shale	---	Bedding
sst/gh	Sandstone and minor greywacke	---	Contact
int	Intermediate lava		
bs	Black shale		
m/s	Mudstone, siltstone		
dol	Dolomite (incl very dolomitic siltstone/mudstone)		
qtz	Massive Quartzite		



— LEGEND —

- 69 Shale
- 63 Sandstone and minor greywacke
- 48 Intermediate lava
- 67 Black shale
- 58 Mudstone, siltstone
- 23 Dolomite (incl. very dolomitic siltstone/mudstone)
- 6 Massive Quartzite

Bedding
 Contact

1. Vertical datum: mean sea level
 2. Tn values: quoted in per cent

5 cm

Abminco Exploration 307074	
NORTH WEST TASMANIA Queen Hill Joint Venture 1716 SEVERN AREA SECTION 10000N Section bearing 282°(mag) Looking North	77-1217 R Issue date: K58/5/50 Date: July, 1977 Scale: 1:500 File # OH 80
Designer: DCS Drafter: RJE Checked: [blank] Revised by: [blank]	Date: [blank]

SOLO GEOPHYSICS AND CO.

INDUCED POLARIZATION & RESISTIVITY SURVEY

CLIENT *ABMINCO N.L.*

AREA *QUEEN HILL*

GRID

LINE *1500 N*

ARRAY *DIPOLE - DIPOLE*

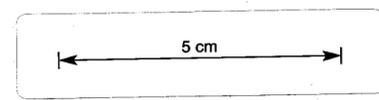
DIPOLE SPREAD *50 m.*

FREQUENCIES *0.3/2.5 Hz*

TRANSMITTER TYPE *McPhar P660*

RECEIVER TYPE *McPhar P660*

ELECTRODE TYPE *Alfoil*



SURVEYOR *S. BRONSKILL*

DATE OF SURVEY *15/2/77*

PLOTTED BY *SB*

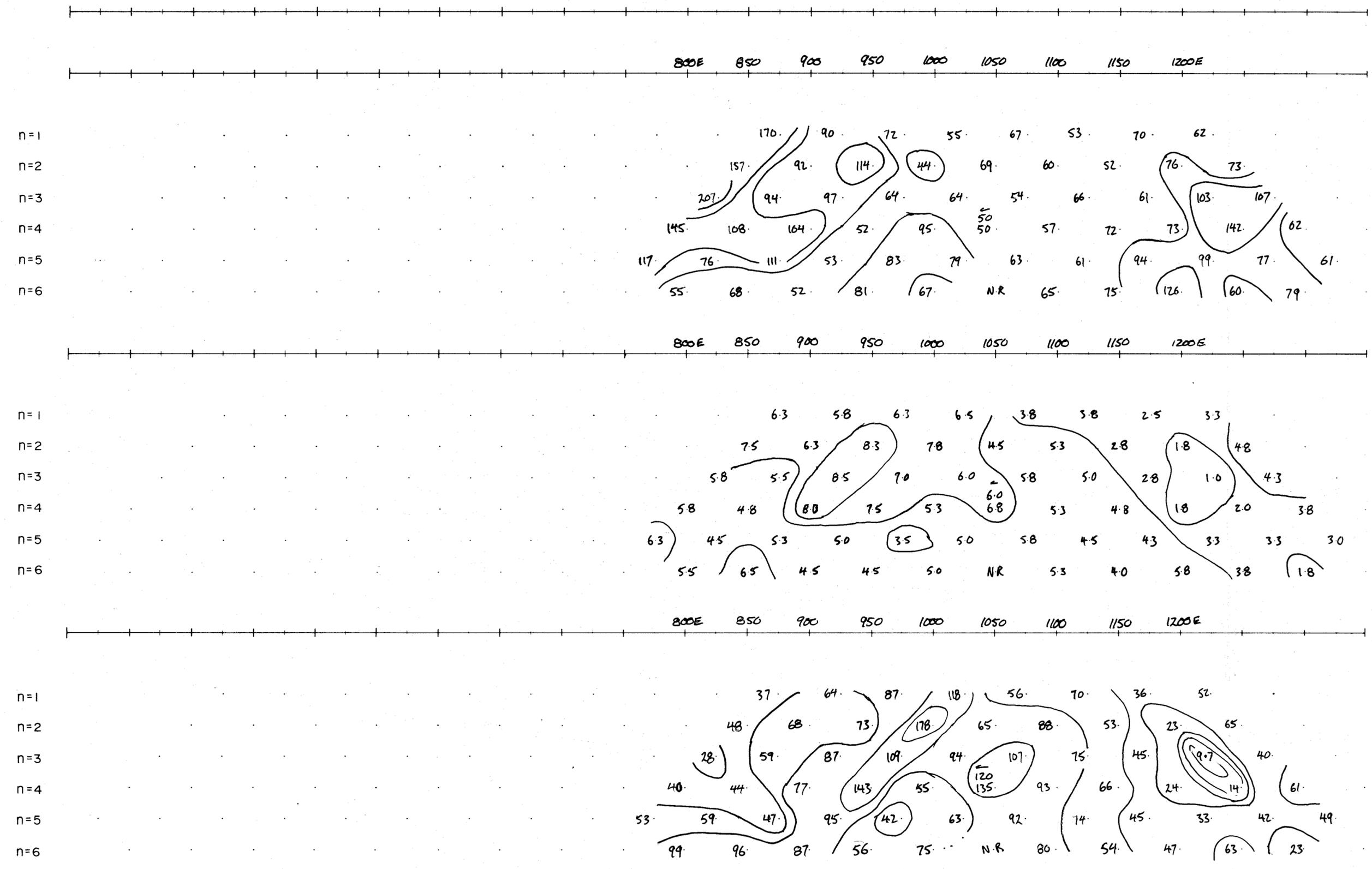
COMMENTS

Culture Plan

Apparent Resistivity (ohm-m)

Percentage Frequency Effect

Metal Factor



SOLO GEOPHYSICS AND CO.

INDUCED POLARIZATION & RESISTIVITY SURVEY

CLIENT *ABHINCO N.L.*

AREA *QUEEN HILL*

GRID

LINE *1600 N*

ARRAY *DIPOLE-DIPOLE*

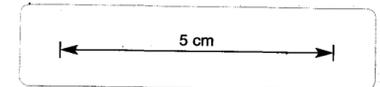
DIPOLE SPREAD *50 m*

FREQUENCIES *0.3/2.5 Hz*

TRANSMITTER TYPE *MPhar P660*

RECEIVER TYPE *MPhar P660*

ELECTRODE TYPE *Alfoil*

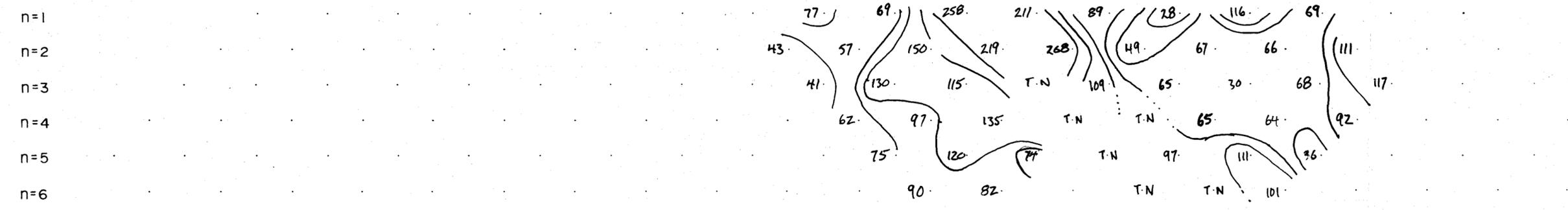
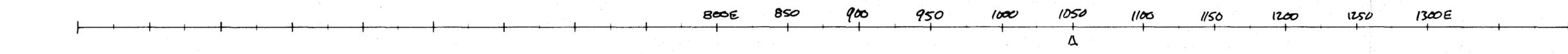
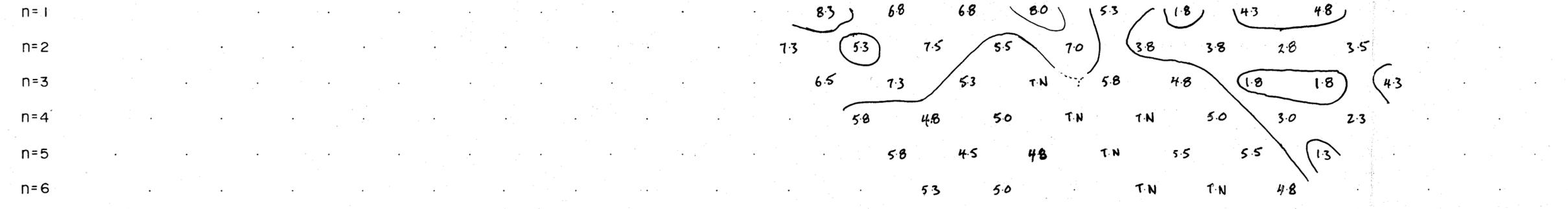
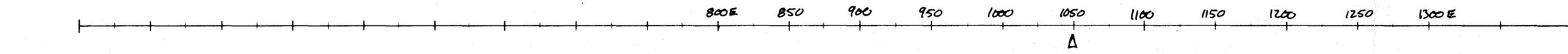
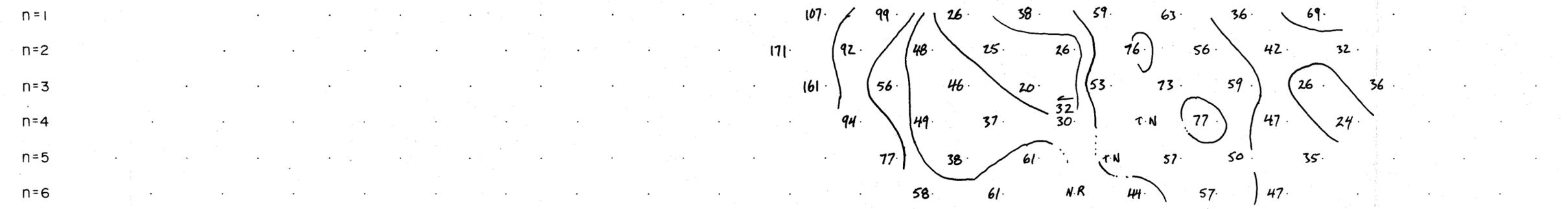
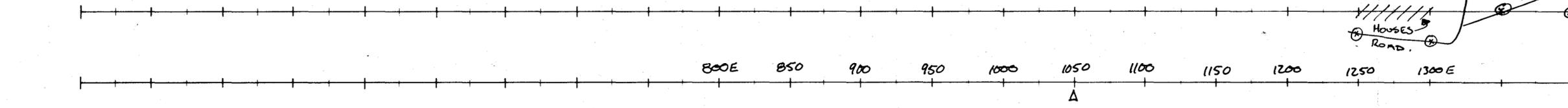
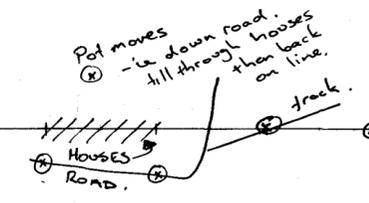


SURVEYOR *S. BRONSKILL*

DATE OF SURVEY *14/2/11*

PLOTTED BY *S.B.*

COMMENTS

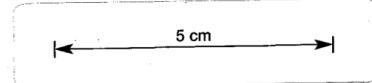


Culture Plan
Apparent Resistivity (ohm-m)
Percentage Frequency Effect
Metal Factor

SOLO GEOPHYSICS AND CO.

INDUCED POLARIZATION & RESISTIVITY SURVEY

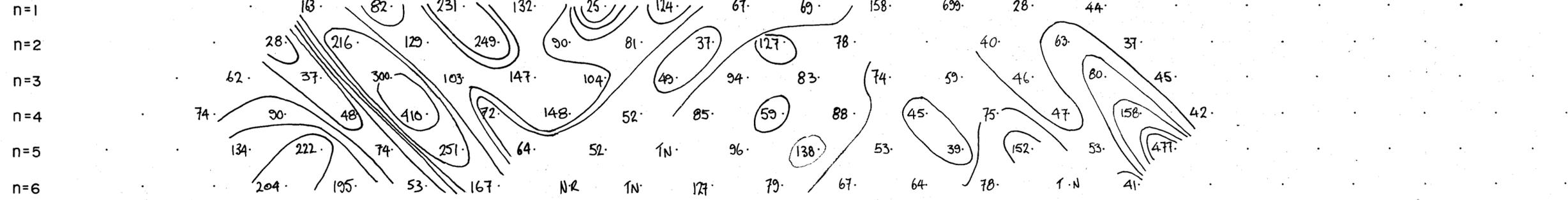
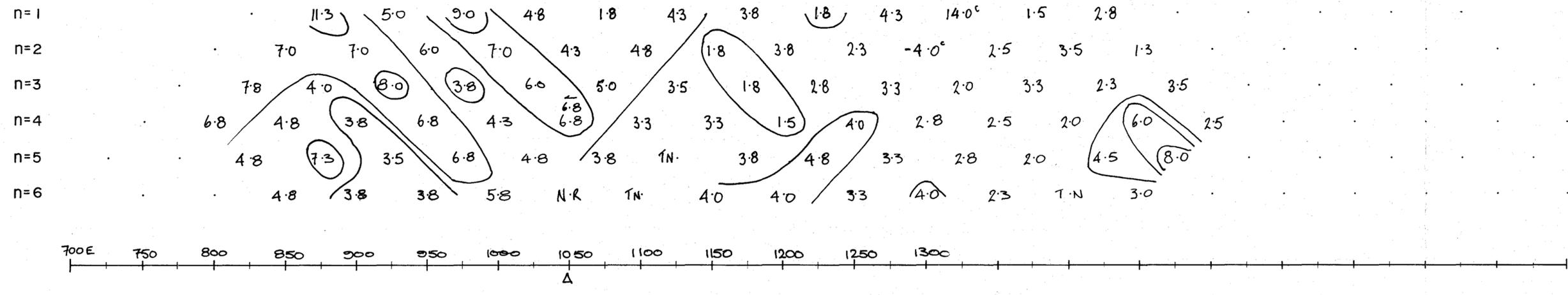
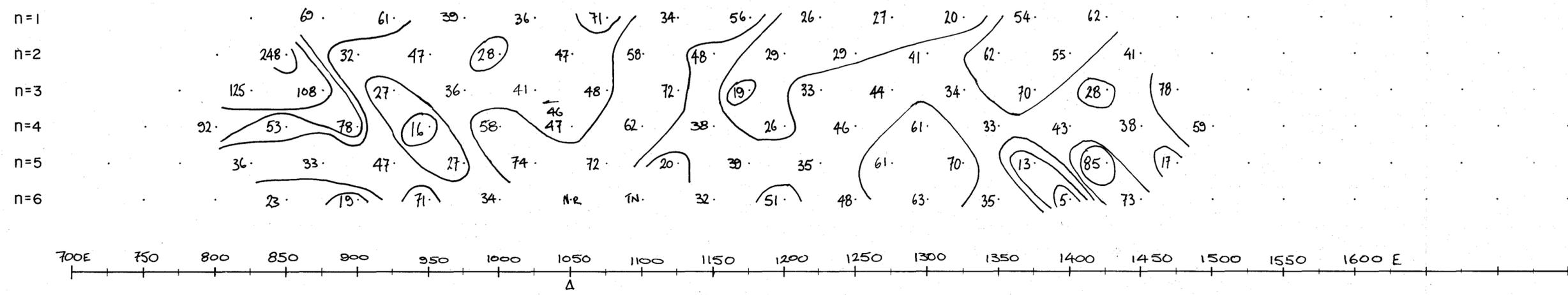
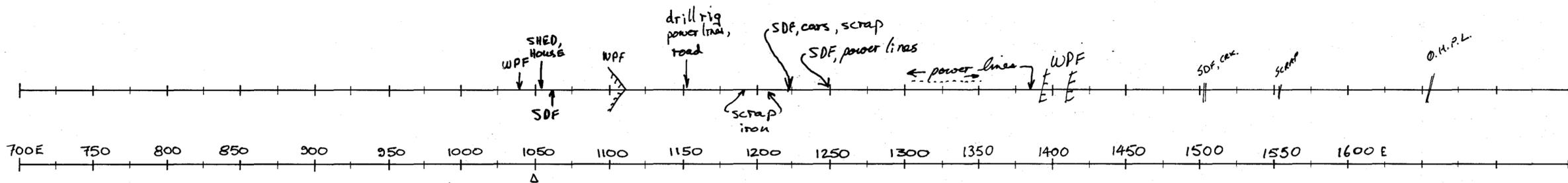
CLIENT ARMINCO N.L.
 AREA ZEEHAN
 GRID LINE 1700N
 ARRAY DIPOLE-DIPOLE
 DIPOLE SPREAD 50 METRES
 FREQUENCIES 0.3 + 2.5 HZ
 TRANSMITTER TYPE M^c PHAR P660
 RECEIVER TYPE M^c PHAR P660
 ELECTRODE TYPE SINGLE FOIL



SURVEYOR STEVE BRONSKILL
 DATE OF SURVEY 14.2.77
 PLOTTED BY NICK LIMB

COMMENTS SET UP IN BACKYARD OF HOUSE.

POWER LINES SUSPECTED CAUSE OF -VE PFE.
+ HIGH IVE PFE ADJACENT. - BOTH READINGS
DOUBLE CHECKED.



Culture Plan

Apparent Resistivity (ohm-m)

Percentage Frequency Effect

Metal Factor

SOLO GEOPHYSICS AND CO.
INDUCED POLARIZATION & RESISTIVITY SURVEY

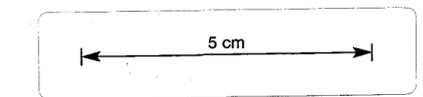
Culture Plan

Apparent Resistivity (ohm-m)

Percentage Frequency Effect

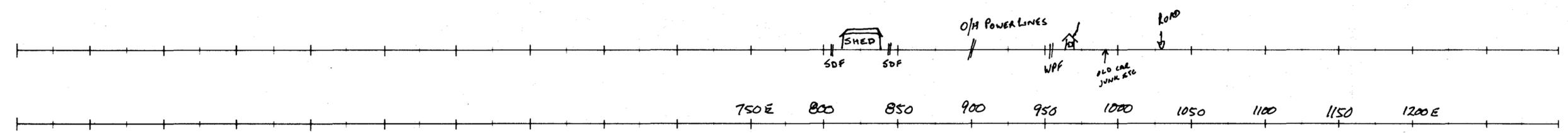
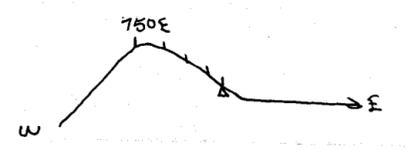
Metal Factor

CLIENT *ABMINCO N.L.*
 AREA *QUEEN HILL*
 GRID
 LINE *1800 N*
 ARRAY *DIPOLE-DIPOLE*
 DIPOLE SPREAD *50m*
 FREQUENCIES *0.3/2.5 Hz*
 TRANSMITTER TYPE *M^cPhar P660*
 RECEIVER TYPE *M^cPhar P660*
 ELECTRODE TYPE *Alfoil*

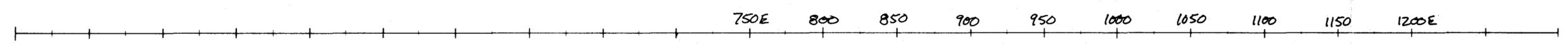
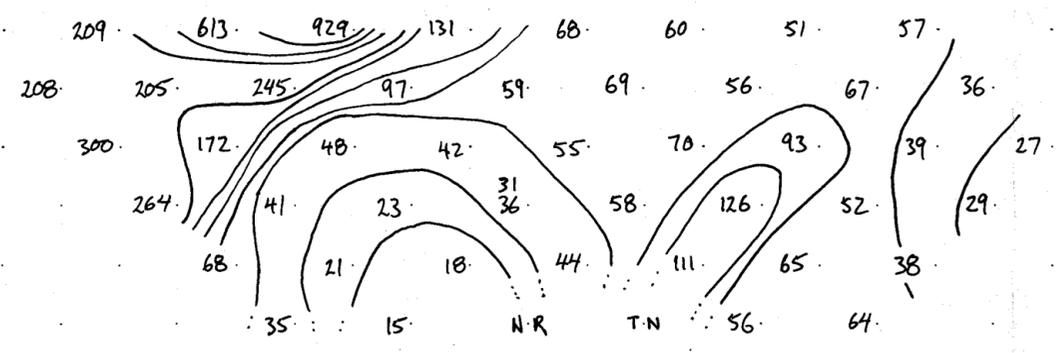


SURVEYOR *S. BRONSKILL*
 DATE OF SURVEY *14/2/77*
 PLOTTED BY *S.B.*

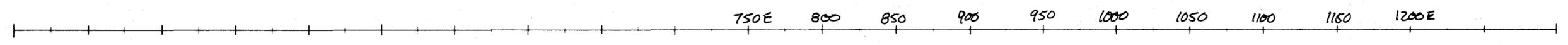
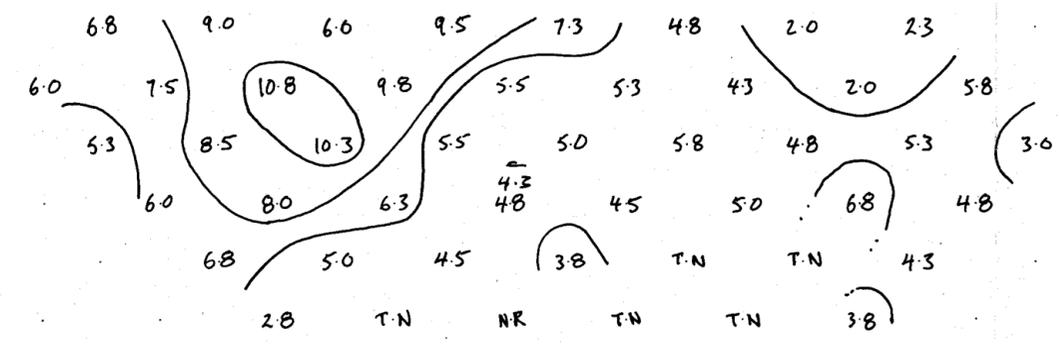
COMMENTS



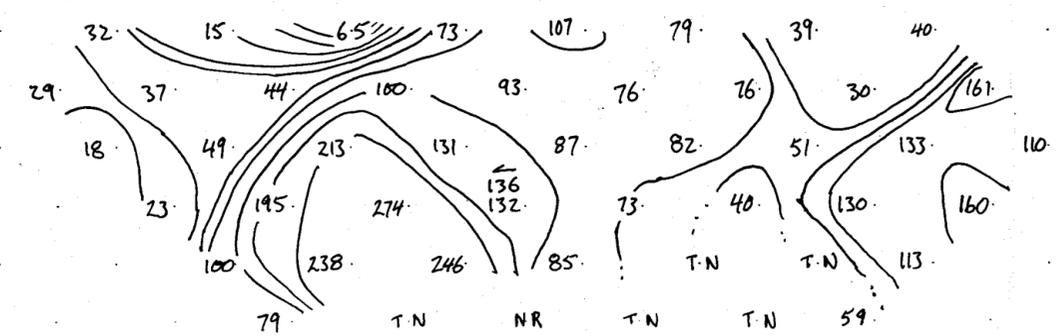
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n=3
n=4
n=5
n=6



n=1
n=2
n=3
n=4
n=5
n=6



n=1
n=2
n=3
n=4
n=5
n=6



SOLO GEOPHYSICS AND CO.

INDUCED POLARIZATION & RESISTIVITY SURVEY

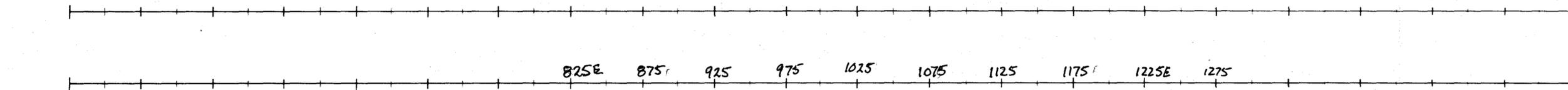
CLIENT *ABHINCO N.L.*
 AREA *QUEEN HILL*
 GRID
 LINE *1900 N*
 ARRAY *DIPOLE - DIPOLE*
 DIPOLE SPREAD *50m*
 FREQUENCIES *0.3/2.5 Hz*
 TRANSMITTER TYPE *McPhar P660*
 RECEIVER TYPE *McPhar P660*
 ELECTRODE TYPE *Alfoil*

Culture Plan

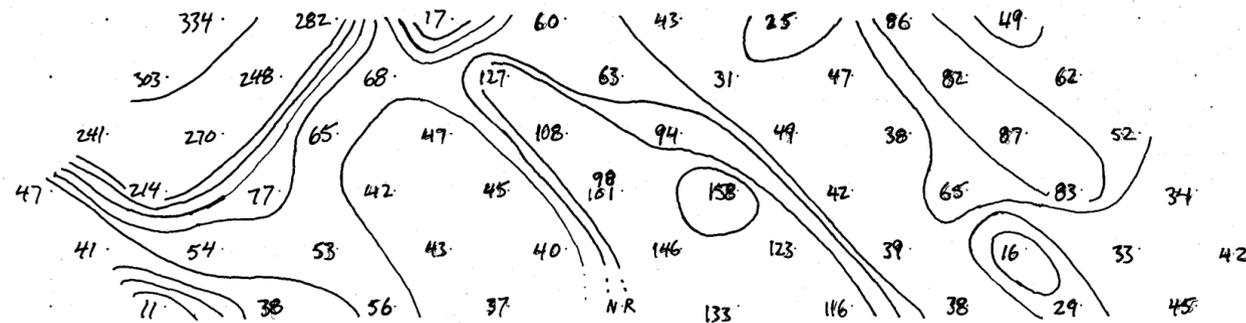
Apparent Resistivity (ohm-m)

Percentage Frequency Effect

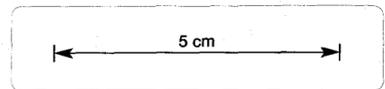
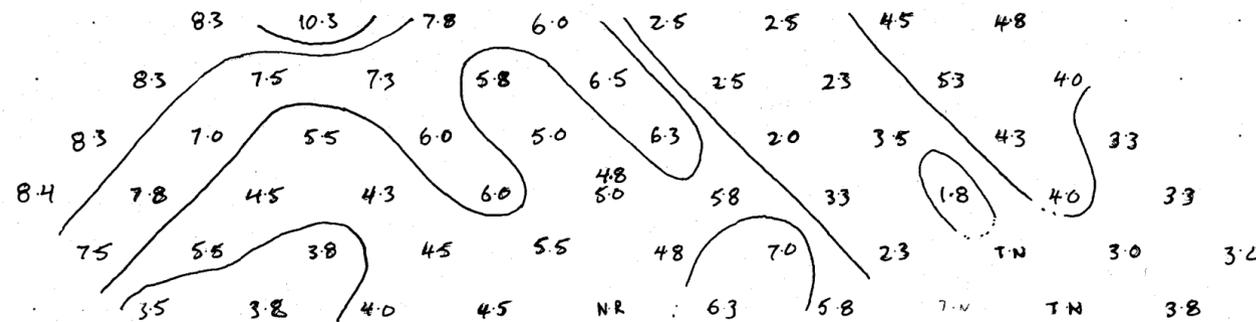
Metal Factor



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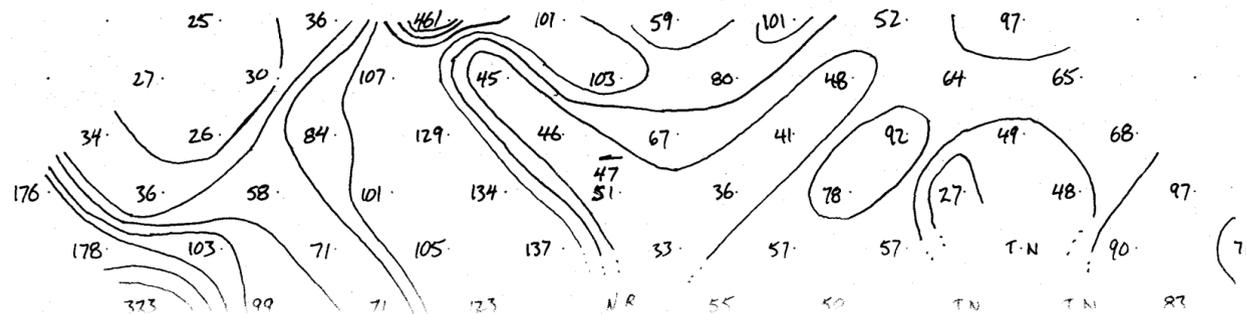


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 n=3
 n=4
 n=5
 n=6



SURVEYOR *S. BRONSKILL*
 DATE OF SURVEY *16/2/77*
 PLOTTED BY *S-B*

n=1
 n=2
 n=3
 n=4
 n=5
 n=6



COMMENTS