510001

THE SHELL COMPANY OF AUSTRALIA LIMITED

METALS DIVISION

E.L. 22/74 - MARIONOAK

Annual Report on Exploration , June 1982 - June, 1983

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SUMMARY

Work continued at the Bastyan Dam Grid. Additional IP and gravity surveys were used to locate a diamond drill target. Minor vein related sphalerite - galena mineralization was intersected in the drill hole. A subsequent UTEM survey located an anomalous zone which cross cuts the other geophysical trends.

Follow up work will consist of an additional UTEM survey to better understand the anomaly and a drill hole to test the anomaly.

Aberfoyle equity in the Marionoak Joint Venture is now down to 34%.

510006

1.0 INTRODUCTION

This report covers all investigations undertaken on the licence in the period July 1982 to June 1983.

Aberfoyle have in the previous year not contributed to expenditure and their equity in the Joint Venture is now at 34%.

Expenditure during the year on E.L. 22/74 has amounted to $44,617.

For previous references the reader is referred to "Progress Report on Exploration During the Period April, 1980 to June 1982", W.D. Smyth. (08.1261).

2.0 INVESTIGATIONS COMPLETED

2.1 BASTYAN DAM GRID

The grid was established to investigate outcropping base metals in a road cutting and also to cover a low order Dighem anomaly.

Soil geochemistry, ground magnetic, IP and gravity surveys were previously done over the grid.

2.1.1 Geophysics

A line of IP, three lines of gravity and three lines of UTEM were surveyed during the year.

The dipole-dipole IP was done at 50m spacings along line OON. It was done in an attempt to better define a drilling target but did not apparently reach the target depth outlined by the 100m dipole IP.

The gravity survey detected two anomalies on line OON at 350W and 150W. The two could be interpreted as a single broad high or a massive sulphide zone at depth. From a compilation of data and follow up gravity on lines 200N, OON, 200S (Refer Fig. 2) it would appear to be a broad high, possibly formational.

The UTEM survey was done on three lines, 200N, OON, 200S one loop only being laid at the west of the grid. A major anomaly was located on all three lines at approximately 50E. A parallel wide conductive zone was located along 200W.

The IP and gravity trends are generally true North-South. The UTEM features cross cut the trend and appear to be trending at approximately 315° magnetic.

2.1.2 Diamond Drilling

A diamond drill hole SBD 1 was collared at 90W 35mS with a bearing of 225° and dip of -60°. The hole was drilled to investigate the mineralization in the cutting; a gravity and IP target. Down hole surveying indicated the hole swung rapidly south although the readings may be affected by pyrrhotite and magnetite in the hole.

A summary log of SBD 1 is as follows:

From	To	Lithology
0.0	10.00m	Glacial overburden.
10.00	19.60m	Grey-green f-crs gn quartz psammite-arenite-carbonaceous.
19.60	22.05m	Black carbonaceous shale. Qtz/qtz-carb. veining chalco.
22.05	26.65m	Pale green/grey-green siltstone-sandstone-tuffaceous? Pyrite.
26.65	42.00m	Dark green/red brown sandstone-siltstone-tuffaceous.
42.00	58.90m	Dark green siltstone-tuffaceous greywacke. Pyrite.
58.90	59.90m	Carbonaceous siltstone-sandstone. Pyrite.
59.90	61.80m	Pale olive green siltstone-sandstone. Chlorite filled fractures.
61.80	62.00m	Quartz conglomerate - coarse sandstone.
62.00	63.55m	Grey green/black well bedded siltstone sandstone. Brecciated in part. Ankerite-sphalerite-galena veining.
63.55	66.50m	Grey green/black carbonaceous siltstone/sandstone. Pyrite. Minor noticeable sphalerite.
66.50	174.00m	Olive green v f-crs gn conglomeratic lithic wacke-tuffaceous. Infrequent carbonaceous shale. Pyrite. Some pyrrhotite.
		93.30 - 93.65m Chlorite-chalco fractures.
		172.70 - 173.00m Sphalerite-galena in qtz veins.
174.00	190.00m	Black brecciated carbonaceous shale/siltstone-arkosic Pyrite rich lenses.
		182.40 - 182.50m Qtz-sphalerite-galena vein.
		184.35 - 184.40m " " " "
		189.05 - 189.15m " " " " Minor sphalerite associated with minor qtz veins.
190.20	221.00m	Black carbonaceous siltstone/shale - well bedded. Pyrite. Some pyrrhotite after 215m. V f gn sphalerite in calcite veining.

510009


STRINGERS CREEK ROAD
RIVER
MARIONOAK
Mineralisation
D.D.H.
UTEM LOOP
400 N
200N
00 N
200 S
400 S
600 W
200 W
200 E
LEGEND
I P CHARGEABILITY ANOMALY
GRAVITY RIDGE
POSSIBLE FAULTS
UTEM ANOMALY
UTEM CONDUCTIVE ZONE
5 cm
0
100
200 m
The Shell Company of Australia Limited
METALS DIVISION
E.L. 22/74 MARIONOAK
BASTYAN DAM GRID
GEOPHYSICAL COMPILATION
SCALE 1: 5000
DATE 11 - 10 - 83
AUTHOR W.D.S.
DRAWN J.L.L.
OFFICE DEVONPORT
REP.No.
DRG No D/NL01/080
FIG No

(Refer Appendix 2, Diamond Drill Hole Logs, Appendix 3 - Petrographic Reports).

All mineralization, sphalerite - galena veinlets, appear to be associated with fractures or veining except for the fine grained syngenetic pyrite.

No down hole logging was able to be carried out. Selected samples were sent for geophysical testing. The results from these would apparently not account for the IP anomaly.

2.1.3 Geology

Several small pits were dug on line 200mN around 40E and on line 00N at 15 W Other pits were abandoned due to depth of fluvioglacials (>5m). The successful pits showed bedrock to be various siltstones and a possibly tuffaceous unit. Measurements from two pits on line 200N indicate trends of 065^{o} at 45^{o} E and 100^{o} at 70^{o} N. These compare with trends of 135^{o} at 70^{o} E in the road cutting and a regional true north-south trend. Rock chip samples from the pits showed no anomalous values. The carbonaceous shales and tuffaceous greywackes located in the diamond drill hole were not apparent in the pits.

Pb isotope studies were undertaken on various samples from the drill hole. This indicated that the mineralization encountered in DDH SBD 1 is not due to Rosebery style mineralization but due to derivation of the metals from the host rock either metamorphism or Devonian granitic intrusion. (Refer Appendix 4).

2.1.4 Conclusions & Recommendations

Because of the overburden of alluvials reliance is placed on the various geophysical techniques used. Results indicate north trending IP, gravity and magnetic(?) zones and a cross cutting north-west trending UTEM anomaly.

The diamond drill hole possibly did not test the IP zone fully on line OON. The UTEM survey was done subsequent to the drilling of the hole and was not tested by the drill hole. Mineralization intersected in the drill hole is associated with veining but may be related to base metals within the sediments.

A further UTEM survey is proposed. This will be surveyed in the opposite direction to the previous survey in order to obtain a better idea of the orientation of the anomaly. Additional lines will also be surveyed.

If after the additional survey a well defined target is located, a drill hole will be drilled to test the anomaly.

W.D. SMYTH
Exploration Geologist

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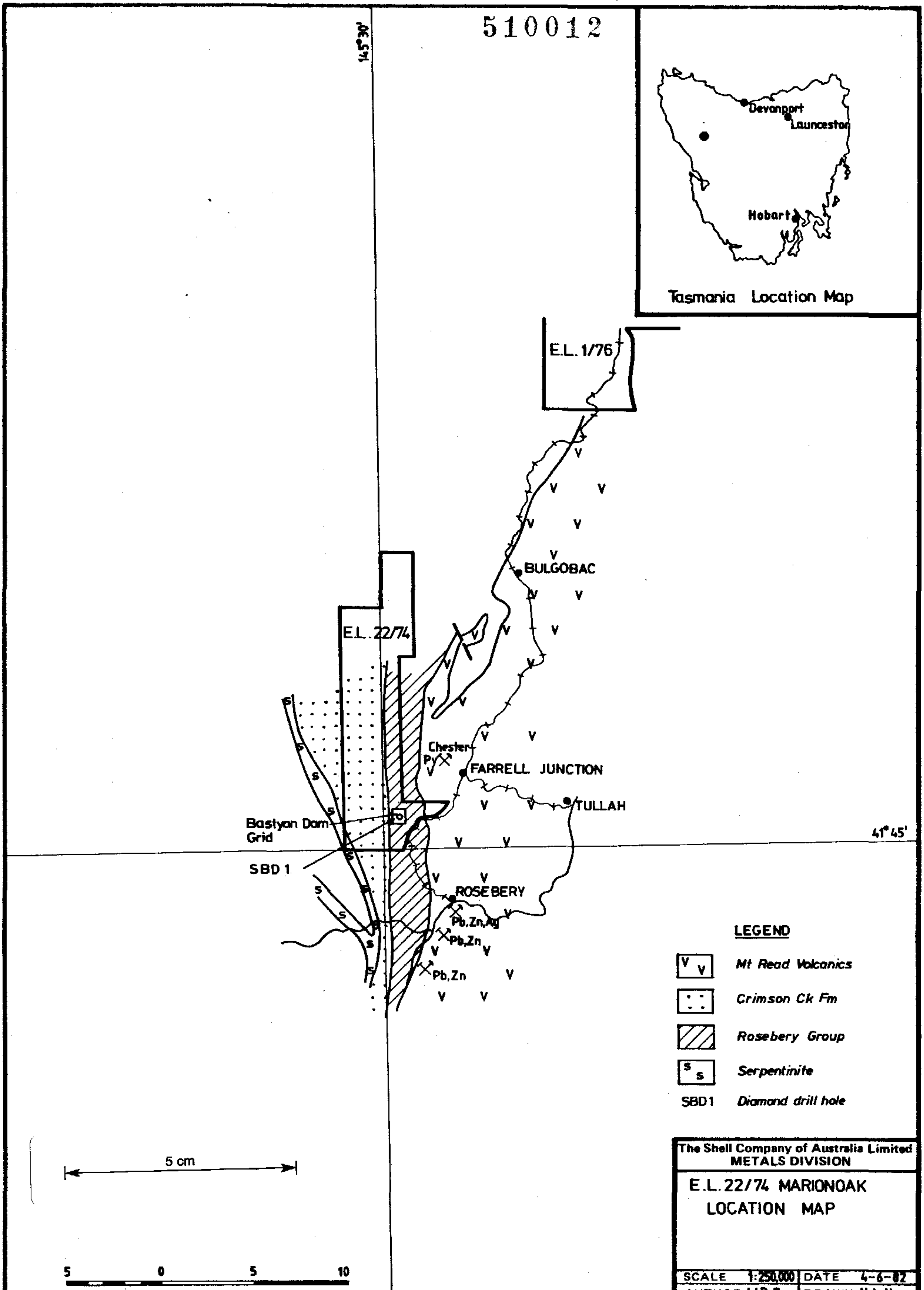

The Shell Company of Australia Limited METALS DIVISION	
E.L. 22/74 MARIONOAK LOCATION MAP	
SCALE 1:250,000	DATE 4-6-82
AUTHOR W.D.S.	DRAWN H.L.H.
OFFICE Devonport	REP.No.
DRG.No D/NL01/52	FIG.No

APPENDIX 1

Geophysical Reports

21/2/83

Bastyan Dam - Geophysical Summary & MOdelling Results

1.0 Gravity Results

Two anomalies were detected on line 00N, at 350W and 150W (1.2 mgal at 350W). The 2 are possibly part of a single, broad high zone: in which case, a formational model (similar to the contact model in my memo of 28/6/82) with a density contrast of the order of 0.3 g/cm^3 could explain the gravity. This model would require a formational boundary at roughly 400W, with the anomaly at 150W being caused by a near-surface zone of slightly higher density (eg due to disseminated sulphides).

An alternate model for the gravity, giving an equally good fit to the data, would be a massive zone at depth (giving the anomaly at 350W) with disseminated sulphides above it. Figures 6 and 7 give gravity results for such a model. Figure 8 gives the modelled bodies, with drillhole SBD 1 superimposed. To fit the strong gradient on the western flank of the gravity anomaly, a shallow source (eg just beneath the glacials) at 370W and dipping 30^{o}E is required.

The top of the body would not appear to be more than 30m deep. The bodies shown in Figure 8 are quite thick and have a density contrast of 0.7 g/cm^3, which would be consistent with heavily disseminated sulphides. A thinner, denser body would give an equally good fit to the gravity.

As can be seen from Figure 8, drill hole SBD 1 should definitely have tested the massive zone modelled in Figures 6 and 7. Density measurements on the core show no evidence of a significant dense zone having been intersected. A couple of veins between 180 and 190 metres give densities of 3.2 g/cm^3, as opposed to background of 2.8 g/cm^3, but these veins are in no way sufficient to explain the observed gravity, although they lie within the modelled target zone.

Thus either (a) the drillhole has gone under the main gravity target; or
(b) the dips are steeper than modelled, with disseminated sulphides to the east making the dip appear more shallow; or
(c) the formational model is correct.

Hypotheses (a) and (b) could be tested by a drillhole at 250-300W, inclined 60^{o}W. The IP and UTEM however show no signs of a massive target to the west of SBD 1, thus there is no real evidence to support either hypothesis and I do not think such a drillhole could be justified.

The background density throughout SBD 1 was 2.8 g/cm^3, which is fairly high. The observed gravity could therefore be explained quite easily by a formational boundary at 400W, with a less dense unit to the west.

The gravity anomaly possibly estends to line 200S and maybe 200N. (The exact nature of the regional is, as usual a bit tricky).

2.0 IP Results

The 100m dipole IP was described earlier. I feel that the chargeability anomalies have been adequately explained by the disseminated sulphides throughout the drillhole.

The results of the 50m dipole IP were rather dissappointing - I do not think it penetrated to the main zone seen at n = 3, and 4 of the 100m dipole work. It probably reflects near surface variations and minor disseminated sulphides. The main features were:-

(a) a very nebuluos chargeability anomaly beneath 100W, with no associated resistivity anomaly, implying a disseminated sulphide source.

(b) a resistivity low at 350W, probably due to a surficial conductor.

(c) a resistivity high at 25E, which appears to be a near surface effect (either poor electrode contact or a thin resistive zone).

Figures 2 to 5 give a progression of IP 2D models which attempt to model this data. Figure 2 gives a topographic model. It shows that topography is having some effect on the anomaly, but is not the major contributor.

Figure 3 shows the topography with a slightly conductive and chargeable body superimposed, to explain the gravity and 100m dipole IP results. Clearly, such a body, if it exists, has not had a major effect on the 50m dipole IP.

Figure 4 includes a disseminated sulphide zone above the main zone, with a thin resistive zone about OE and a formational contact at OE. Again, this does not fit the observed IP particularly well.Figure 5 includes some surficial conductive layers near streams and makes the resistive layer at OE more resistive (to attempt to model poor electrode contact). This model is starting to show some of the desired resistivity character. (Unfortunately, in order to model near surface, some of the approximations made in IP 2D become invalid and the results, especially PFE, are a bit dubious). The main result of the modelling is to show that near surface effects are sufficient to explain the 50m dipole IP, even if a deeper body does exist. Given the drilling results, I would be reluctant to drill IP anomalies resulting from small dipole work in the area, unless backed up by other work.

The seven media labelled in figures 2-5 represent:-

1. air
2. "host rock"
3. gravity/100m dipole conductive zone
4. disseminated sulphides (from 100m dipole chargeability and outcrop)
5. resistive rock unit to the west
6. near-surface resistive zone (possibly poor electrode contact)
7. near-surface conductive zones (in marshy ground of topographic lows).

3.0 UTEM Results

A conductor shows in the Hz results for the late channels (2 to 4) at station 75E on line ON. A conductor also shows at 200S, 75E and 200N, 50E. There is no response in Hx and Hy, that I can see, over any of the anomalies (I would have expected an Hx response, but not necessarily an Hy response). There is no response over the outcropping sulphides.

A detailed interpretation report from Guido Staltari is awaited. (I have no experience with UTEM interpretation, and do not have the necessary nomograms etc. to attempt an interpretation).

The 100m dipole IP shows no sign of a conductor at 75E on line ON. In fact, the ground is quite resistive down to n = 4, which is as deep as was surveyed in this region. I am quite confident in the IP results, as they represent 2 surveys with considerable overlap, and the overlapping values agree well. Thus either the UTEM anomaly is spurious (it has very low amplitude and no Hx response; but the data appears to be quite clean) or it represents a deep conductor (much deeper than 100m and quite possibly deeper than 200m). UTEM would certainly have 200m + depth of penetration in this environment and the down dip extension of the veins intersected in SBD 1 would be at depths greater than 200m at 75E, even assuming a dip of 30-45^{o} (which is shallower than the observed dip).

Until the detailed interpretation is received, the significance of the UTEM anomaly is uncertain. If a deep, reasonable to good conductor is interpretted, we certainly nees to consider drilling it, as there is Pb and Zn in the environment, and the aim of the UTEM was to test for the existence of a deeper conductor

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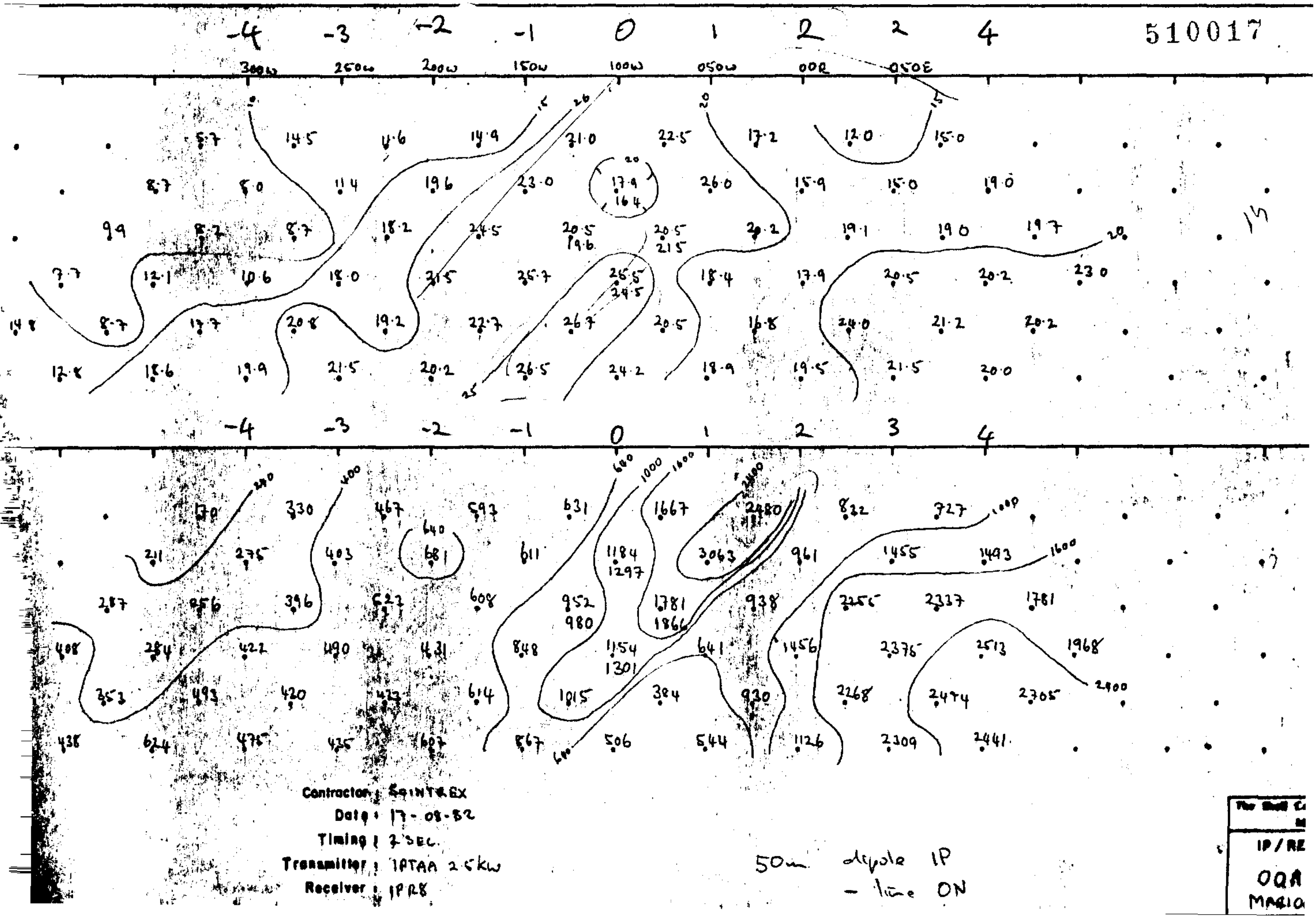
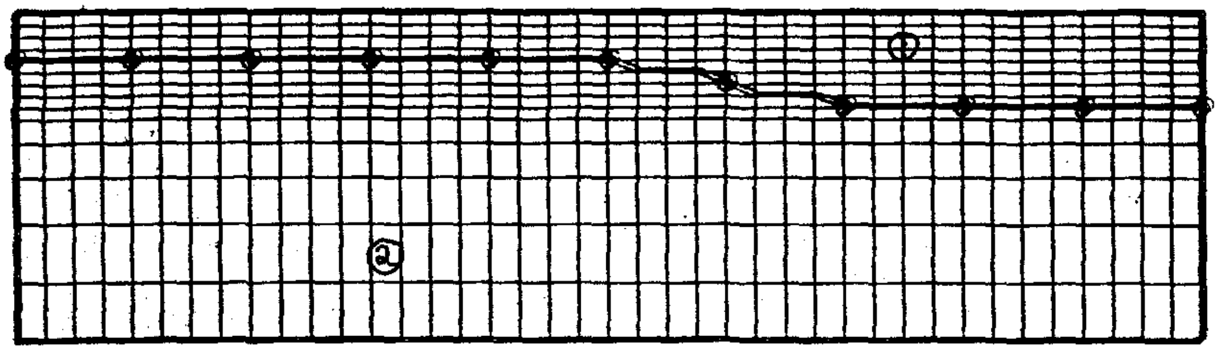
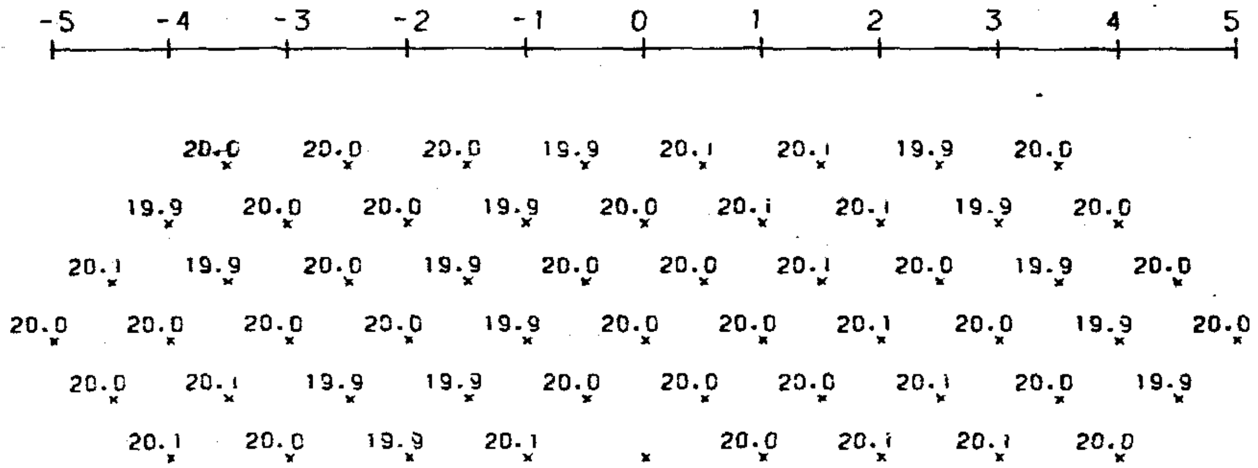


300W 250W 200W 150W 100W 050W 00R 050E
Contractor: SCINTREX
Date: 17-08-82
Timing: 2 SEC.
Transmitter: IPTAA 2.5kW
Receiver: IPR8
50m dipole IP
- line ON
IP / RE
OOA
MARIO

medium	①	②
ρ	10^6	2000
PFE	0	20



PFE - COMPUTED



APPARENT RESISTIVITY - COMPUTED

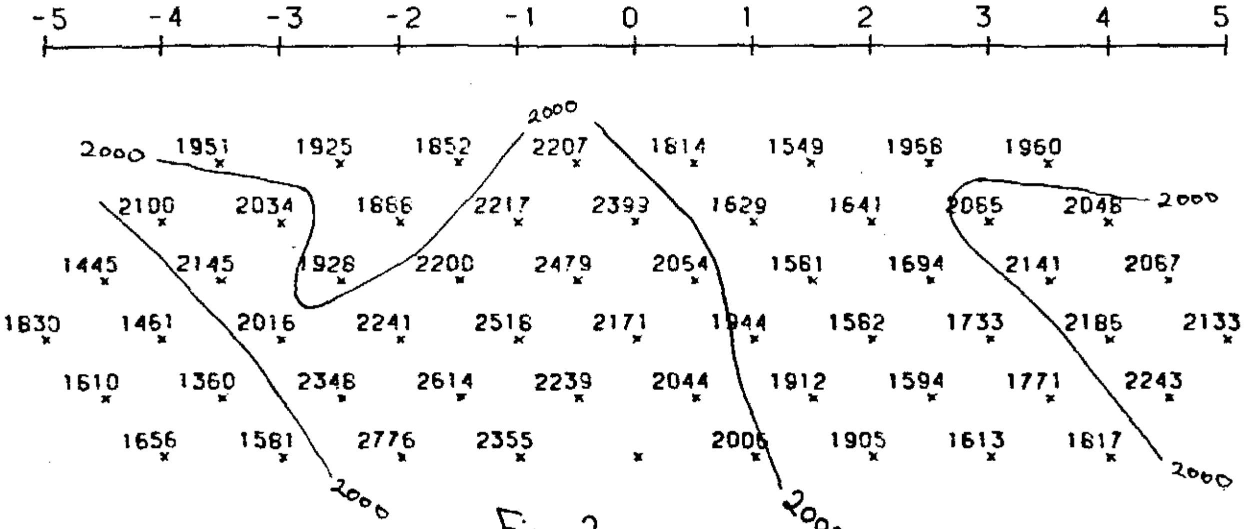
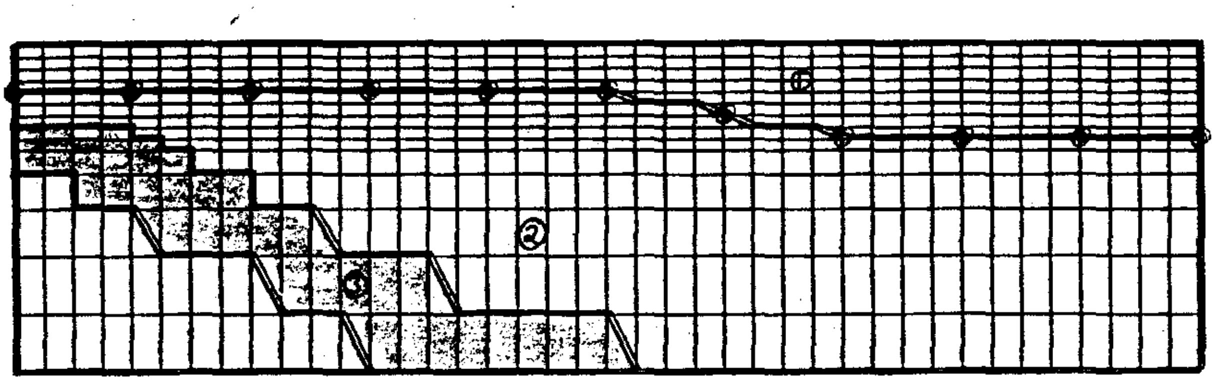
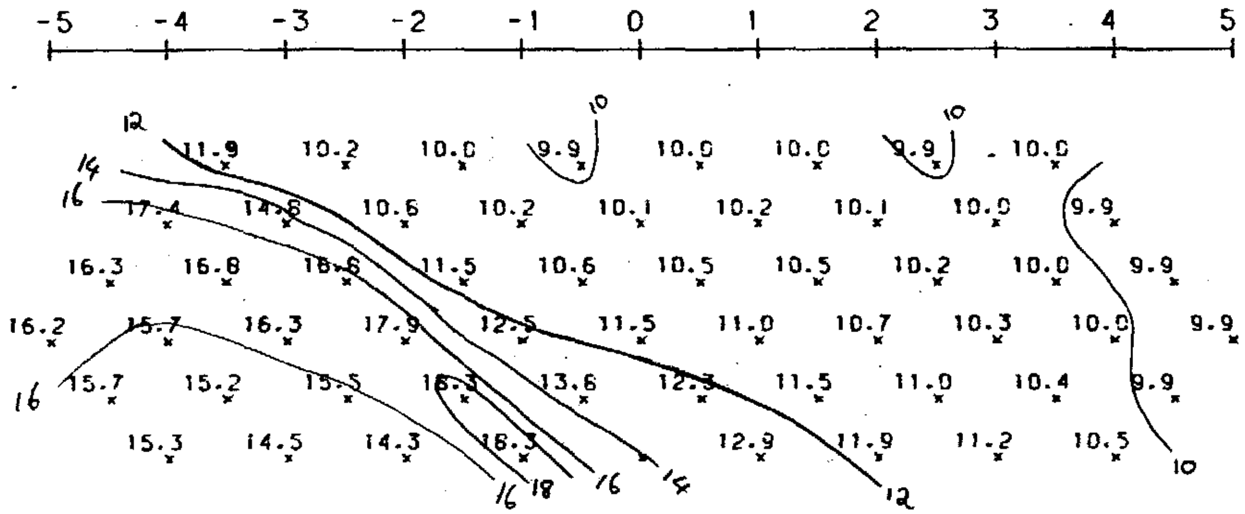


Fig 2

medium	①	②	③
ρ	10^6	2000	100
PFE	0	10	20



PFE - COMPUTED



APPARENT RESISTIVITY - COMPUTED

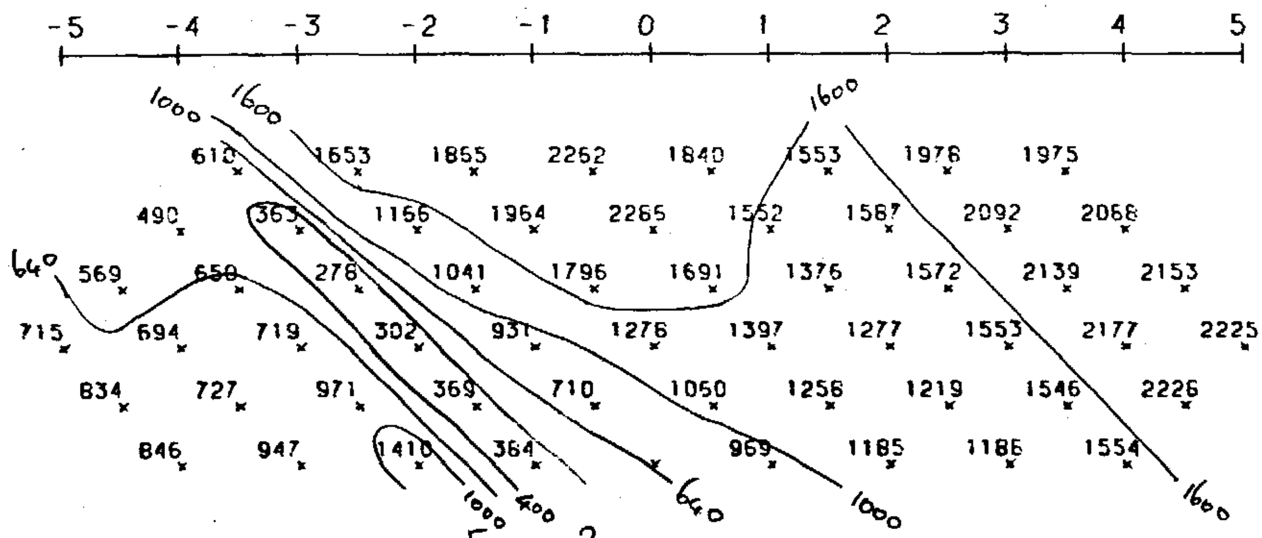


Fig. 3.

medium	①	②	③	④	⑤	⑥
ρ	10^6	1100	200	550	4500	10^4
PFE	0	5	10	50	32	10

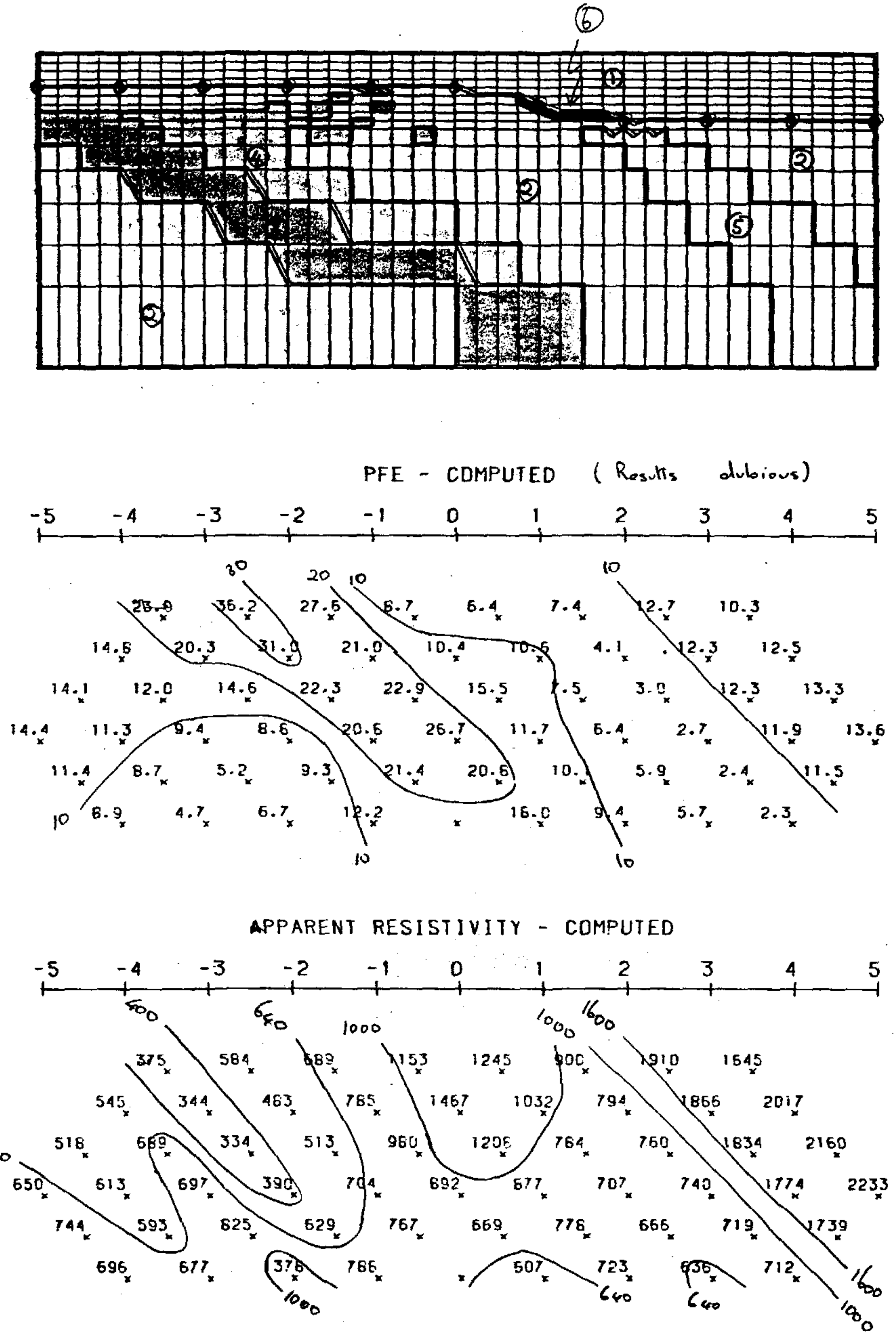
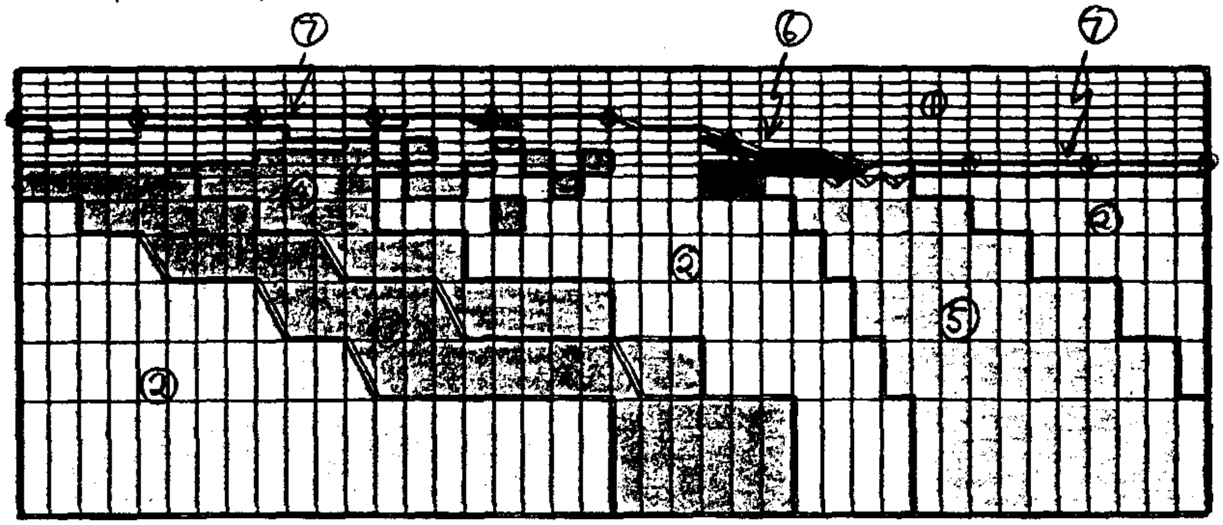
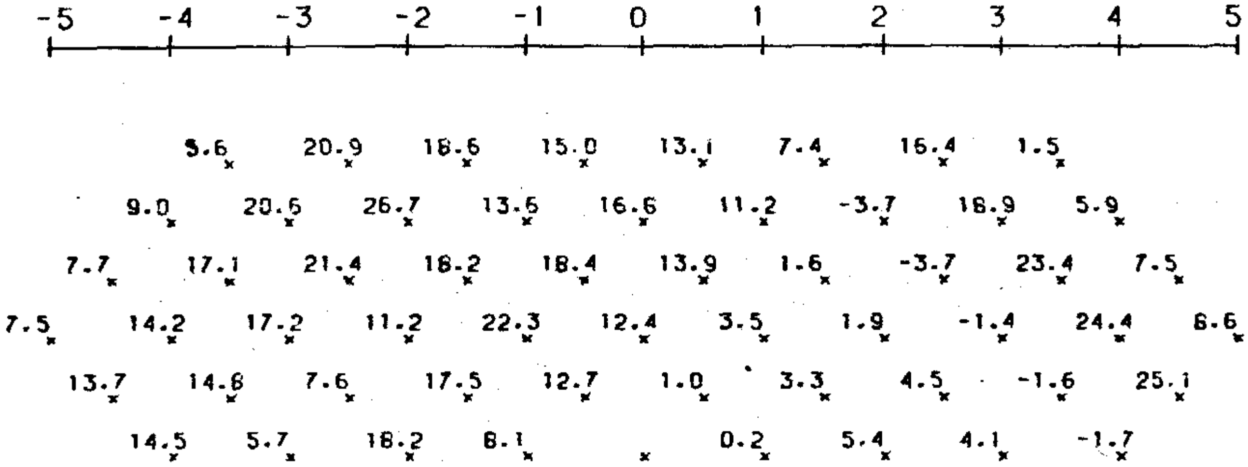


Fig. 4.

medium	①	②	③	④	⑤	⑥	⑦
ρ	10^6	1000	200	550	4500	8000	140
PFE	0	5	10	50	50	10	0



PFE - COMPUTED (Results dubious)



APPARENT RESISTIVITY - COMPUTED

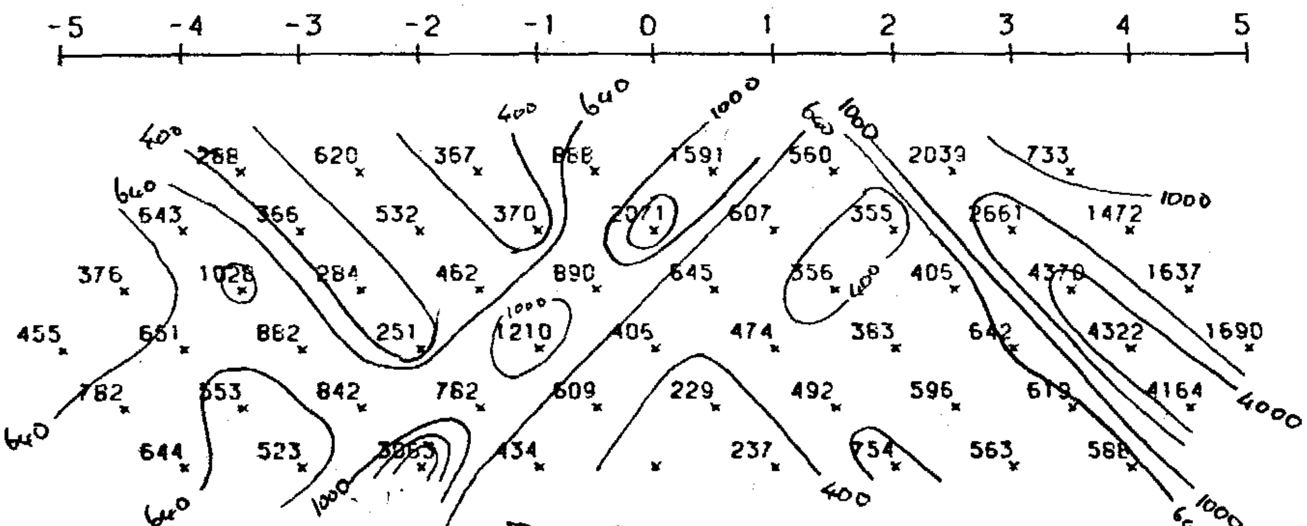
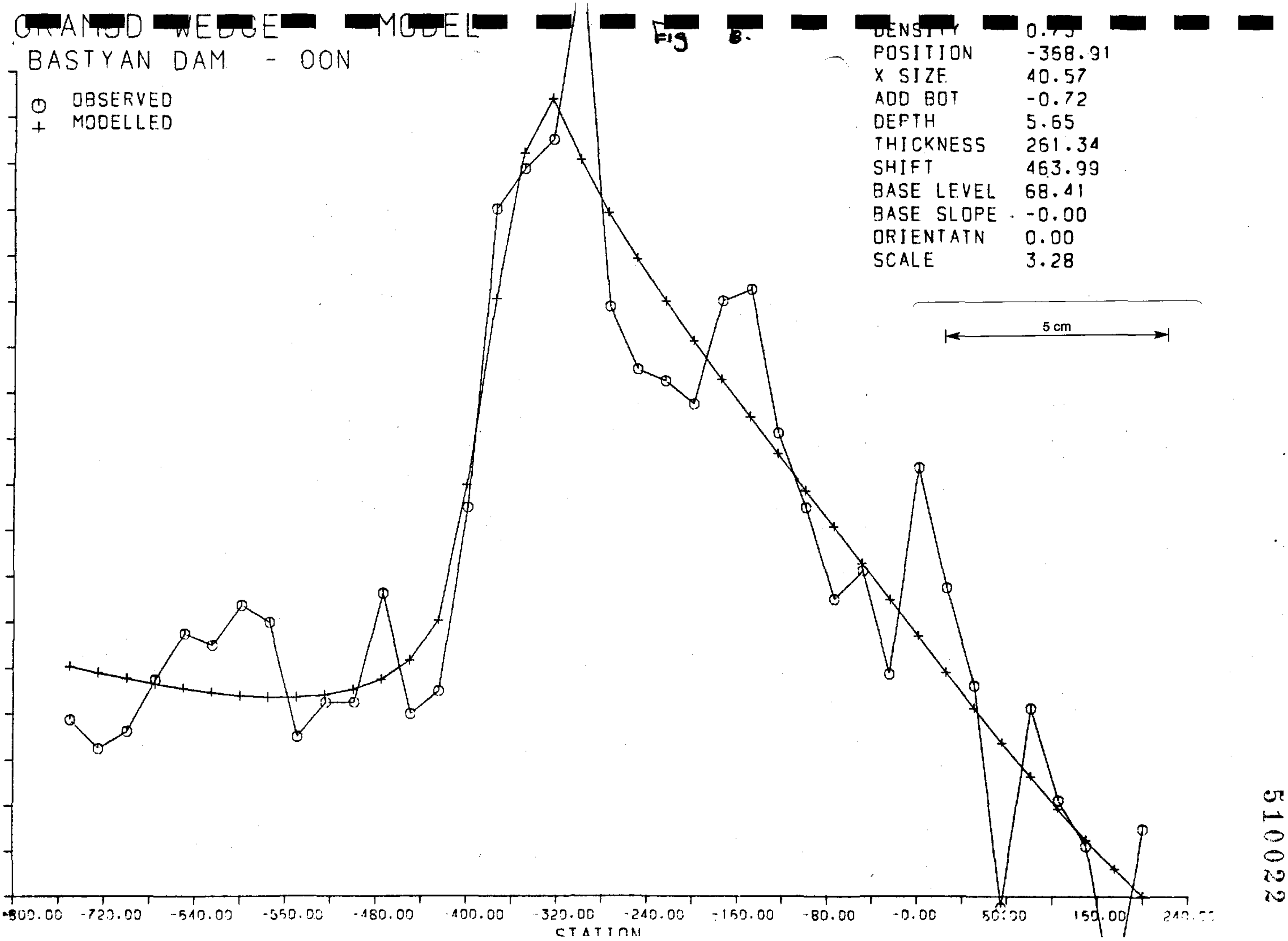


Fig. 5


BASTYAN DAM - OON
OBSERVED
MODELLED
POSITION -368.91
X SIZE 40.57
ADD BOT -0.72
DEPTH 5.65
THICKNESS 261.34
SHIFT 463.99
BASE LEVEL 68.41
BASE SLOPE -0.00
ORIENTATN 0.00
SCALE 3.28
5 cm
-720.00
-640.00
-560.00
-480.00
-400.00
-320.00
-240.00
-160.00
-80.00
-0.00
150.00

510022

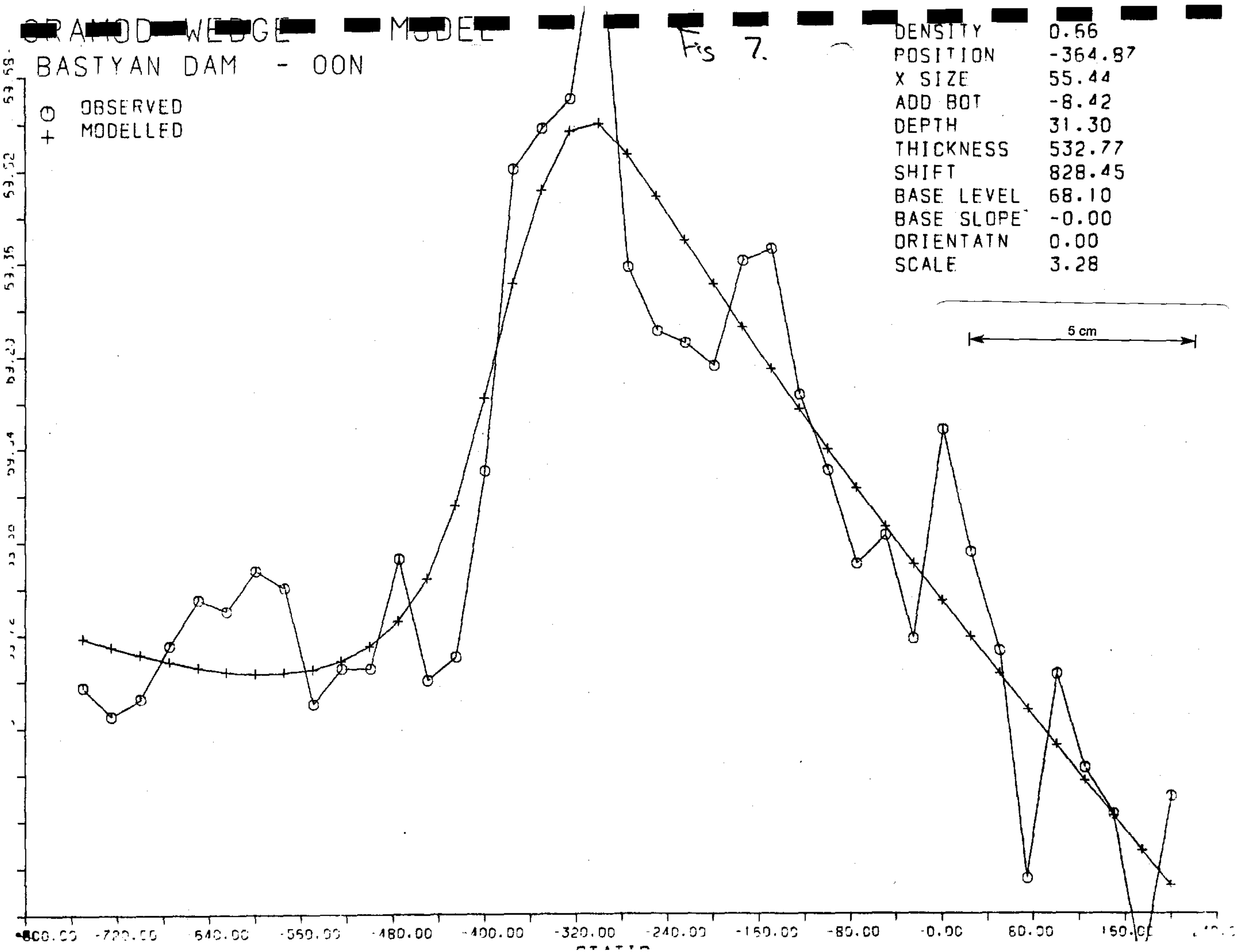

[redacted]
BASTYAN DAM - OON
OBSERVED
MODELLED
DENSITY 0.66
POSITION -364.87
X SIZE 55.44
ADD BOT -8.42
DEPTH 31.30
THICKNESS 532.77
SHIFT 828.45
BASE LEVEL 68.10
BASE SLOPE -0.00
ORIENTATN 0.00
SCALE 3.28
5 cm
-800.00 -720.00 -640.00 -560.00 -480.00 -400.00 -320.00 -240.00 -160.00 -80.00 -0.00 80.00 160.00

Fig 7.

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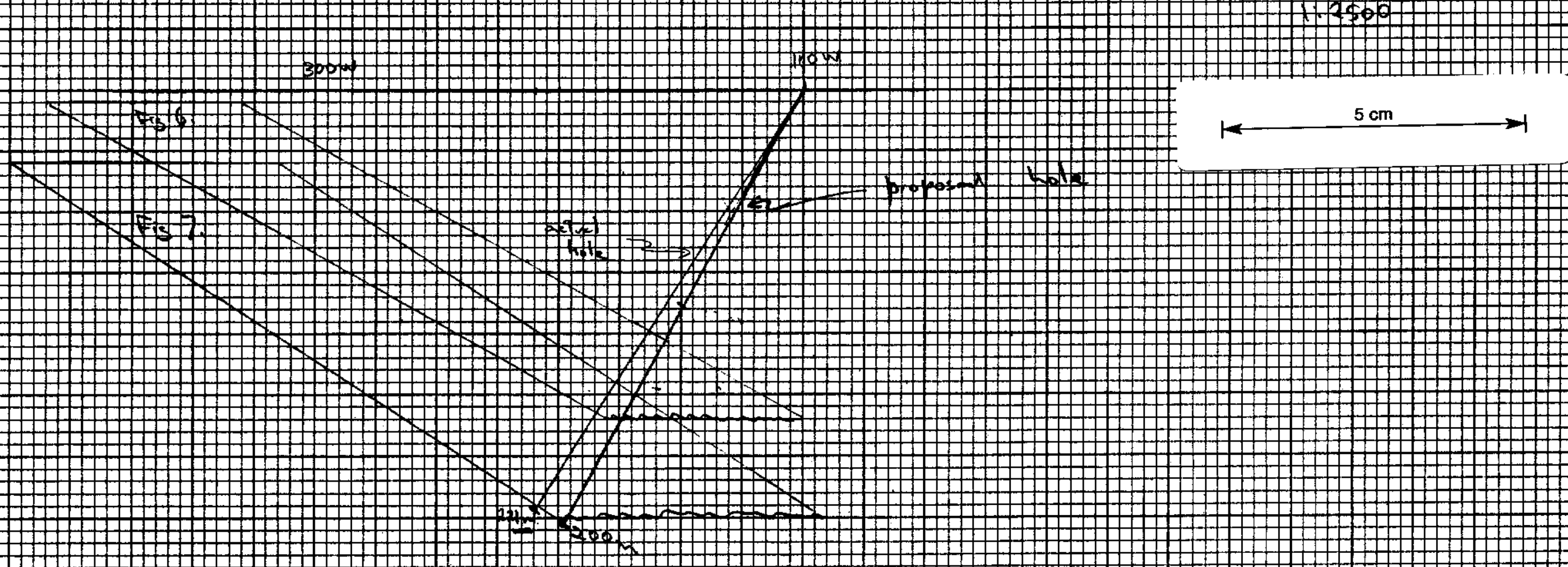

Fig 8 : GRAMOD models

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GEOPHYSICAL EXPLORATION CONSULTANTS PTY. LTD.

Suite 106, 104 Mount Street, Heidelberg, Victoria 3084 Telephone (03) 459 0533

9th June, 1983.

Date Rec'd 14/6/83		
Date Ans		
Action	Info.	
	W.DS.	

Mr. N. Hungerford,
Shell Metals,
Marland House,
570 Bourke Street,
MELBOURNE 3000

Dear Nigel,

BASTYAN DAM UTEM ANOMALY

Further to the several conversations we have had in relation to the significance of the Utem anomaly at Bastyan Dam, I have sent copies of the data to Yves Lamontagne for comment.

Yves has made the following comments:-

(i) it is difficult to fully assess the anomaly because its strike extent has not been closed off - further coverage (including reverse profiling) is required for a more complete interpretation,

(ii) it is likely that the true secondary field anomaly due to the conductor is much broader than the continuously normalized secondary effect, because of the proximity of the loop edge to the conducter. This would imply that the source of the anomaly, assuming a tabular shape, occurs at a depth in excess of 200 metres. My estimates of 150-200 metres may have been on the low side.

The latter point would explain the discrepancy between the geometric and amplitude depth estimates and indicate that the conductor need not necessarily be depth limited to the degree which I had suggested earlier in my brief report.

My earlier amplitude depth estimates of from 300 to 400 metres, based on an estimate of around 7% for the inductive limit, probably represent the largest depths interpretable, for a 600 metre strike length.

cont/..2

On the other hand, if we assume that the inductive limit is greater, at around 20% , then we would obtain depth estimates of between 140 and 240 metres for a tabular source of large dimensions and 600 metres strike length.

Thus, to summarize, it is quite possible that the cause of the Bastyan Dam anomaly is deeper than 200 metres but the depth estimate is somewhat dependent upon having required strike coverage. Its dip is also difficult to determine because of its extremely low amplitude and lack of complete grid coverage - note that the apparent migration of the cross-over at late time is not necessarily a manifestation of dip towards the loop; it may simply be a result of noise and/or a different background for each of channels 2,3 and 4.

In attempting to reconcile the Utem results with the I.P. data which you supplied me, I am still doubtful that the diamond drill hole collared south of line 00N at around 110W adequately tested the anomalous chargeable zone.

I would recommend that you seriously reconsider your doubts as to the existence or economic significance of the conductor, given its position in relation to the chargeable zone and given the lack of enough Utem data. I did not stress this point enough in my earlier report, as I understood from your comments at the time that you would prefer to simply diamond drill the source rather than go to the expense of further Utem work.

Finally, it is worth noting that a broad low amplitude Utem anomaly detected in a survey for St. Joseph Explorations in the North-West territories was found to be due to massive sulphides. However the interpretation of the anomaly was not sufficiently advanced until St. Joseph funded followup work to define the anomaly shape, strike extent, etc. The paper relating to this Utem discovery is attached for your information.

I trust the above information assists you in your deliberations. Please let me know if you would like further verbal clarification. I have enclosed an invoice for a small portion of the amount of time I have spent in your office and on followup conversations in relation to the Bastyan Dam project. I trust it is acceptable.

Kindest regards.

Yours sincerely,

Guido Staltari

GUIDO STALTARI
CONSULTANT GEOPHYSICIST.

cc: Messrs J.Silic/T. Eadie
Aberfoyle Exploration.
Mr. R. Wright/Shell Metals
Mr. J. Size/Aberfoyle Exploration

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DISCOVERY OF THE UTEM ZONE, HENINGA LAKE, N.W.T.

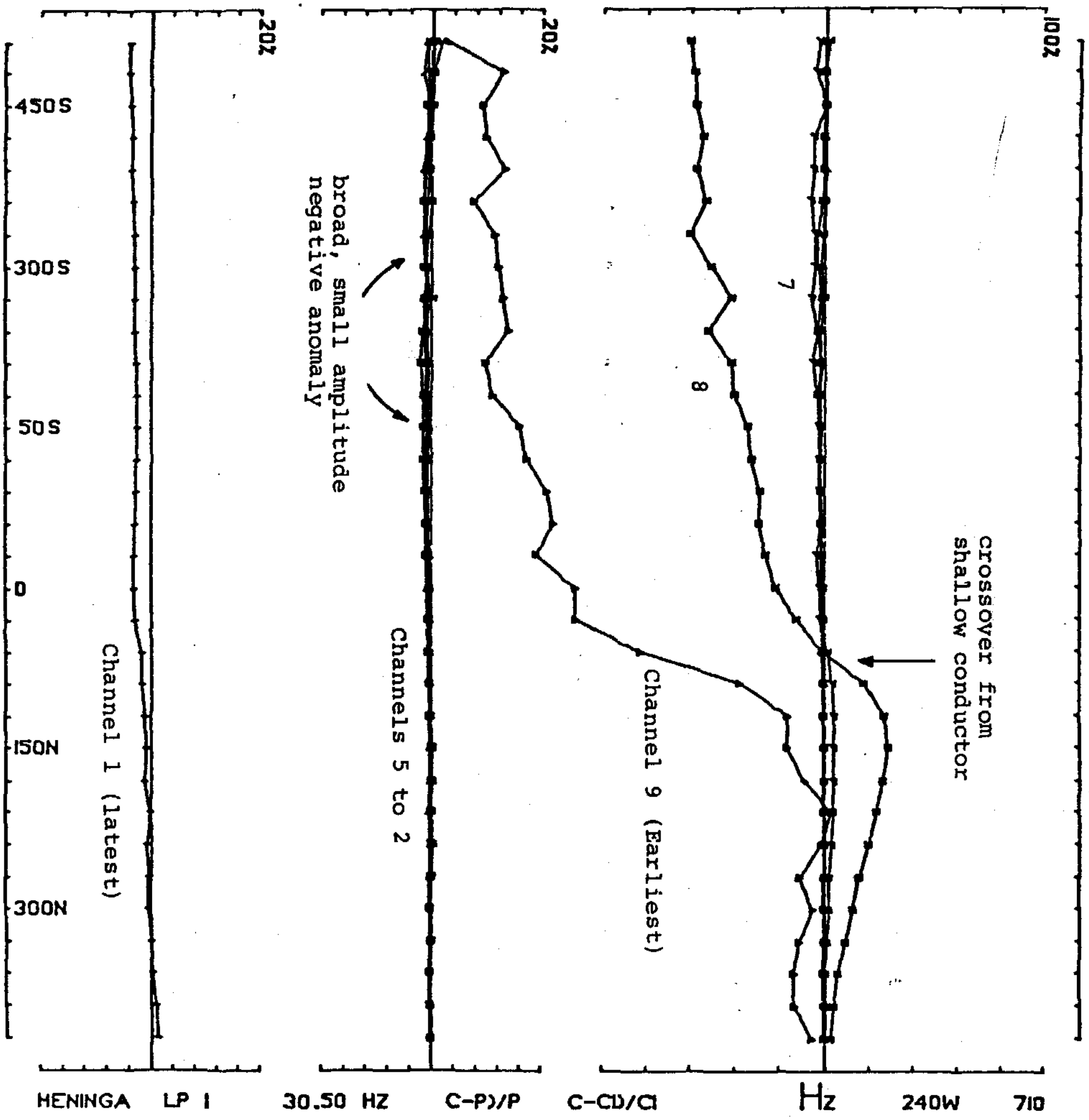
Heninga Lake, District of Keewatin, North West Territories, Canada is located 400km. due north of Churchill,Manitoba or 110km. WNW of Eskimo point, N.W.T. In 1979, Sulpetro Minerals Limited, formerly St. Joseph Explorations Ltd. had outlined two areas of potential economic interest.

The main zone is located at the south end of Heninga Lake and consists of six separate concentrations of mineralization within a total strike length of 1200m. One mile south is the AB-11 zone, consisting of three separate zones of mineralization within a strike length of 700m.

The host rocks are a precambrian volcanogenic sequence similar to those occurring in the Noranda or Flin Flon areas. The mineralization occurs within layered intermediate to felsic volcanics, mainly pyroclastic lapillae tuffs, grading upwards into finer grained volcanoclastic sediments and low grade magnetite iron formation. Drilling to present is not of sufficient detail to assign firm tonnage estimates, however a tentative estimate based on drill indications totalled 5 to 6 million tons grading 1.3% Cu, 9% Zn, .03oz Au, 2oz Ag.

Conventional geophysics had aided in delineating the near surface mineralization, and as the potential of finding other zones at greater depth was recognized, a UTEM survey was carried out with deep penetration in mind. Two new zones were detected by the UTEM survey; one at an interpreted depth of 100 to 150m had not previously been recognized due to overlying poorly conductive material, and has been confirmed by drilling to be massive sulphides; the second conductor was interpreted to be very deep and is located within the area of the main zone.

Figure 1: Routine field data plot of line 240W data from the Heninga Lake survey. The short time-constant anomaly seen on the early channels is unrelated to the anomaly from the deep conductor seen as a broad negative at late times.



The routine field plot of the UTEM data on line 240W is shown in Figure 1. Most evident at first glance is a crossover centred at about station 60N that shows up on the early time data (channels 9,8,7) which are plotted on the upper scale. This corresponds to poorly conducting mineralization in the near surface. The later time channels (channels 5 to 2) are plotted at an expanded scale in the middle plot. To the south end of the line, there is a broad, slowly decaying, negative anomaly of very small amplitude (less than 2%) that attracted attention when the data were played back and plotted by computer in the tent at camp.

Because of the small amplitude of the anomaly compared to the scatter in the data due to noise, an additional half day of surveying was performed with longer averaging times (2 to 4 minutes per station compared to 30 seconds used as routine) and a plot (Figure 2) shows the detected anomaly clearly with a peak to peak amplitude of about 1%. Note that as the anomaly was fairly broad, that only half the stations on the original line were resurveyed. A cross line was also surveyed, located so as to pass through the maximum of the negative part of the anomaly. The data (Figure 3) from this confirmed the reality of the anomaly, and indicated that the causative conductor must be strike limited. Due to severe time constraints no further data were collected to fully outline the small anomaly.

The data available were sufficient to detect with complete confidence the presence of a finite, very deep conductor. The very small amplitude and broad nature of the response made location and geometry extremely difficult to interpret. In particular, the dip of the zone is most difficult to asses without transmitter coverage with loops on both sides. The dip affects anomaly crossover and hence conductor location quite severely for a deep conductor. Assuming a vertical dip,

Figure 2: Detail (every second station) on line 240W. Note plotting scale for channels 2 to 5 is 2% which is ten times normal scale. Longer averaging times (2 to 4 min rather than 30 secs.) have reduced the noise in the plotted data from that shown in Fig. 1.

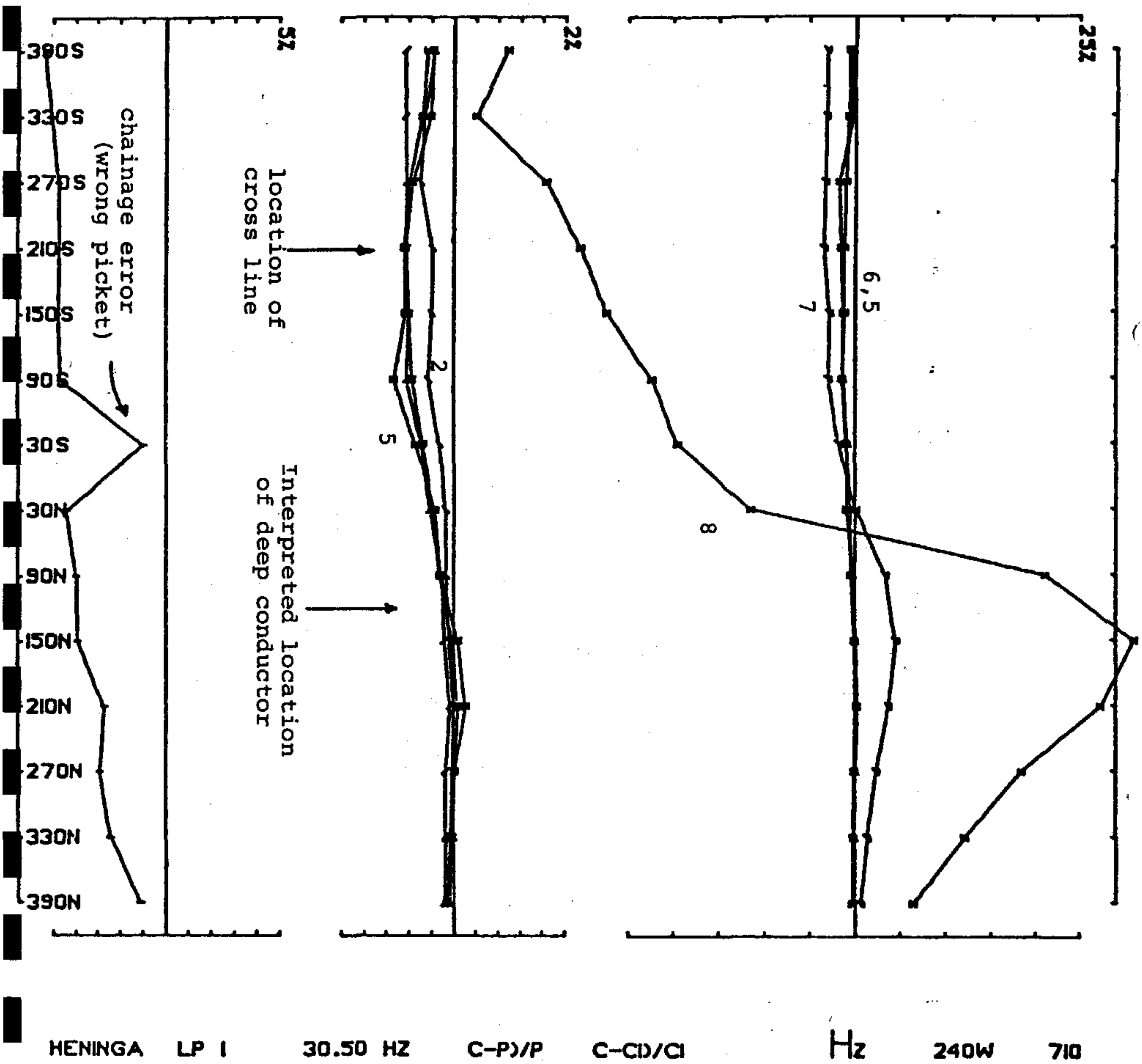
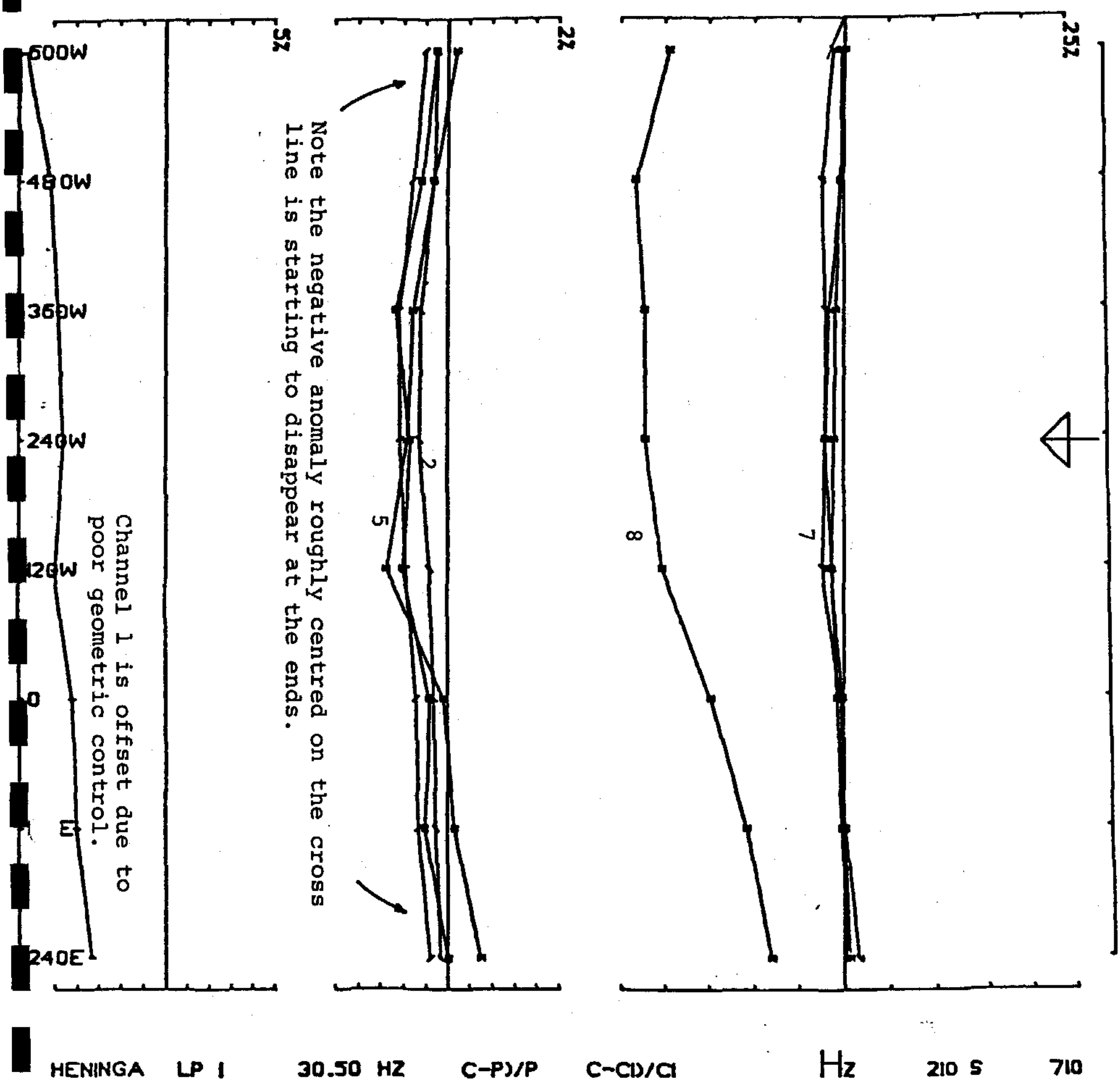


Figure 3: UTEM data collected on a cross line through the negative part of the anomaly shows the limited strike extent of the conductor.



the conductor would be located at about station 120N. However, a change of only 0.2% in background level would indicate a dip 45 degrees different and require the top of the conductor to be located 90m away from that that would fit a vertical body. The depth to top of the conductor was estimated to be 270m, and the zone itself to have both strike and depth extent limited to about 200m. Interpretation was performed using standard procedures which were checked by fitting a dipping plate model to the data (program PLATE, ref. Dyck et al, 1980). The conductance of the zone was interpreted to be very high; in the range 500 to 1000 Siemens (mhos). Figure 4 shows the fitted 500 Siemen, vertical plate conductor and the late time UTEM data on lines 240W and 210S. Based on the interpretation, a drill hole was recommended to test the source of the anomaly as shown in Figure 5. The hole has been drilled by Sulpetro minerals and 483m along the hole at a (vertical) depth of 300m intersected massive sulphides consisting mainly of pyrite with significant sphalerite.

The sulphides occurred in three closely spaced zones which are summarized below:

6.0m	15.6% Zn	3.6oz Ag
5.0m	12.0% Zn	1.3oz Ag
2.9m	16.0% Zn	1.2oz Ag

Three subsequent holes drilled based on the original UTEM interpretation all intersected massive sulphides and indicated that the actual dip of the zone is about 70^{o}S.

This example is a case of detection of a small body at great depth. Larger bodies can of course be detected at very much greater depths. An example of an extensive graphitic metasedimentary conductor with depth to top of 300m is shown in Figure 6, and the anomaly here is about 100 times the amplitude of the UTEM anomaly at Heninga Lake on the UTEM zone.

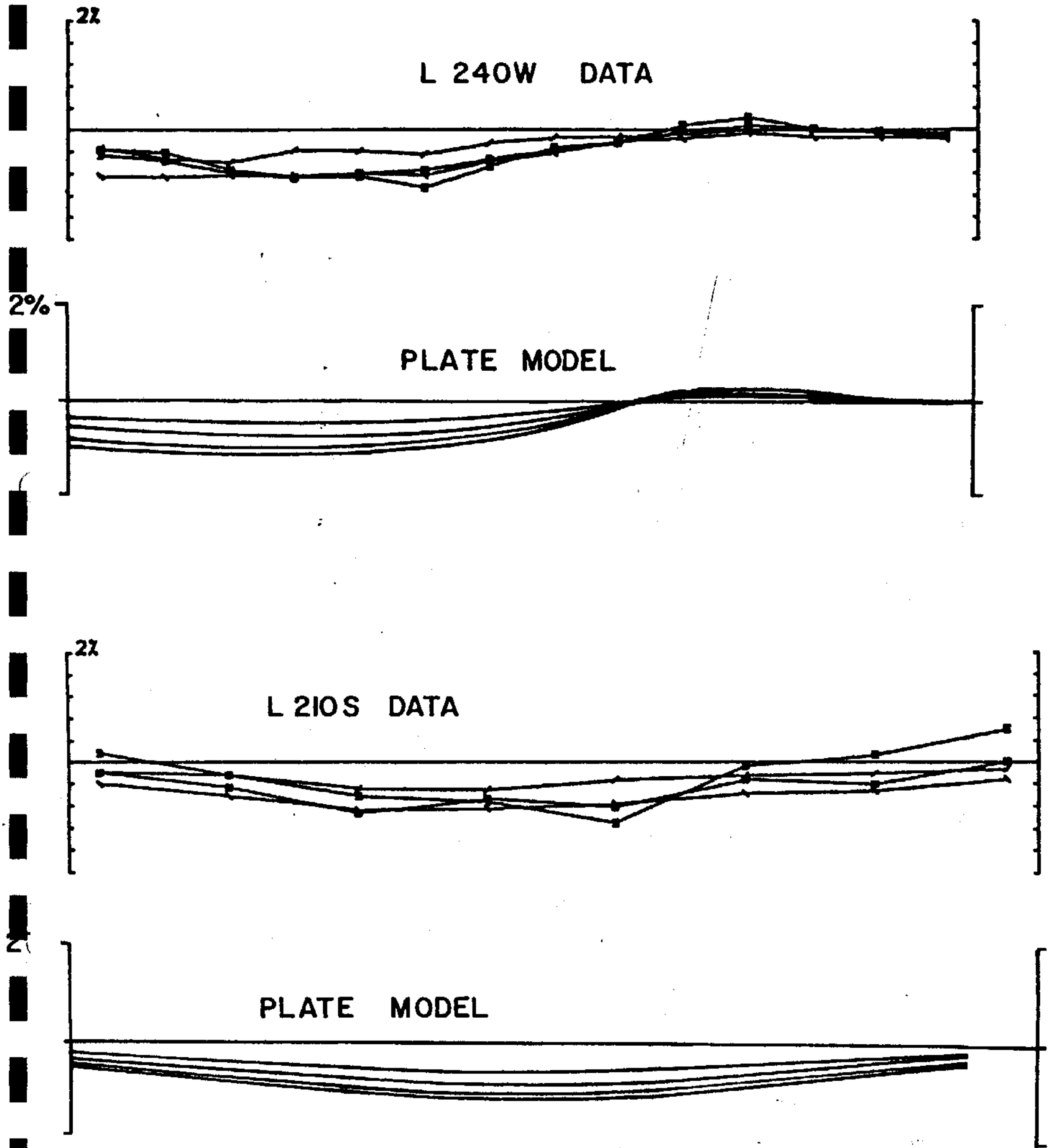


Figure 4: UTEM data in two directions over the deep conductor at Heninga Lake, together with fitted PLATE model. Only the late time data (Channels 5,4,3,2) plotted normalized to channel 1 is shown.

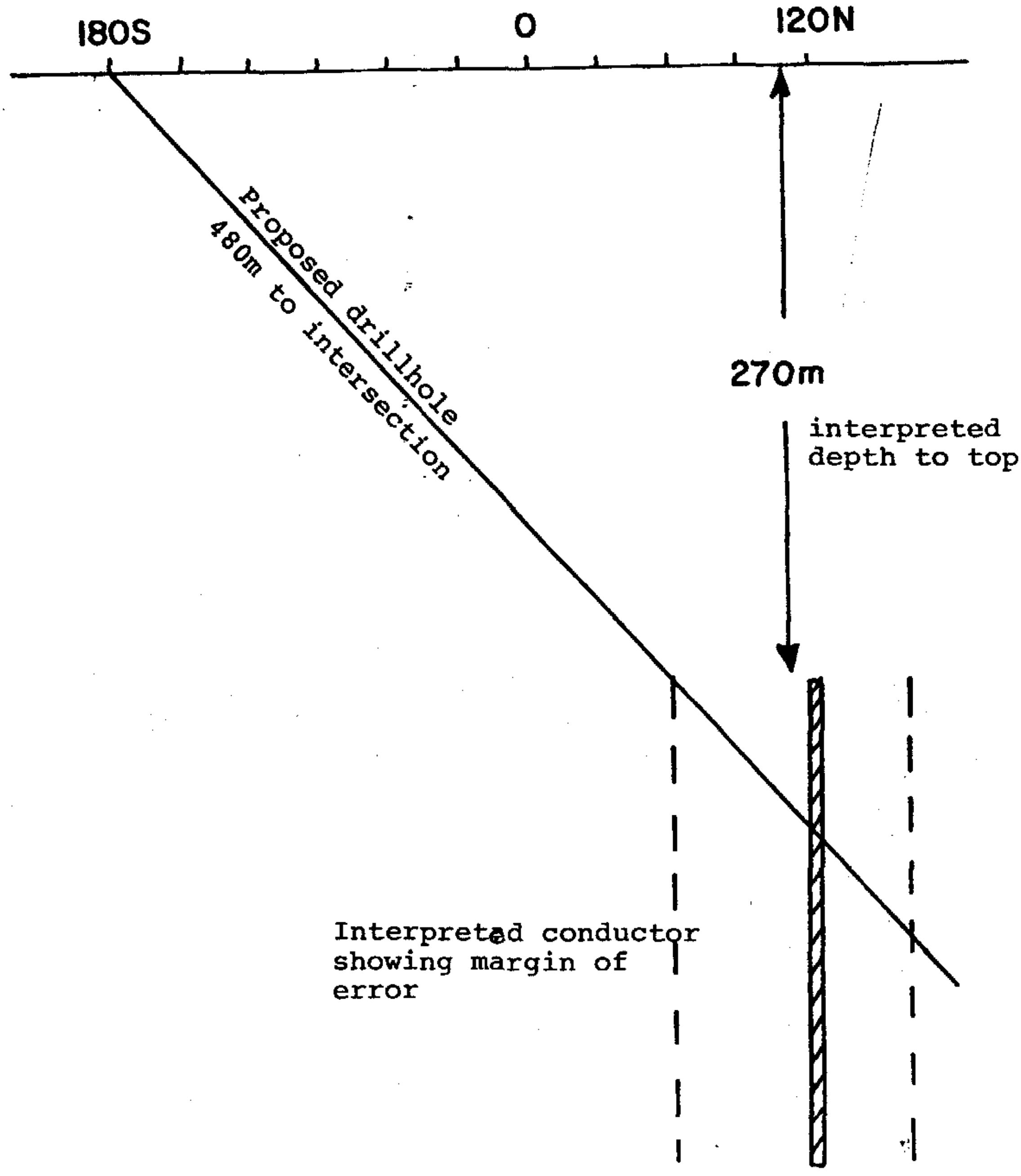
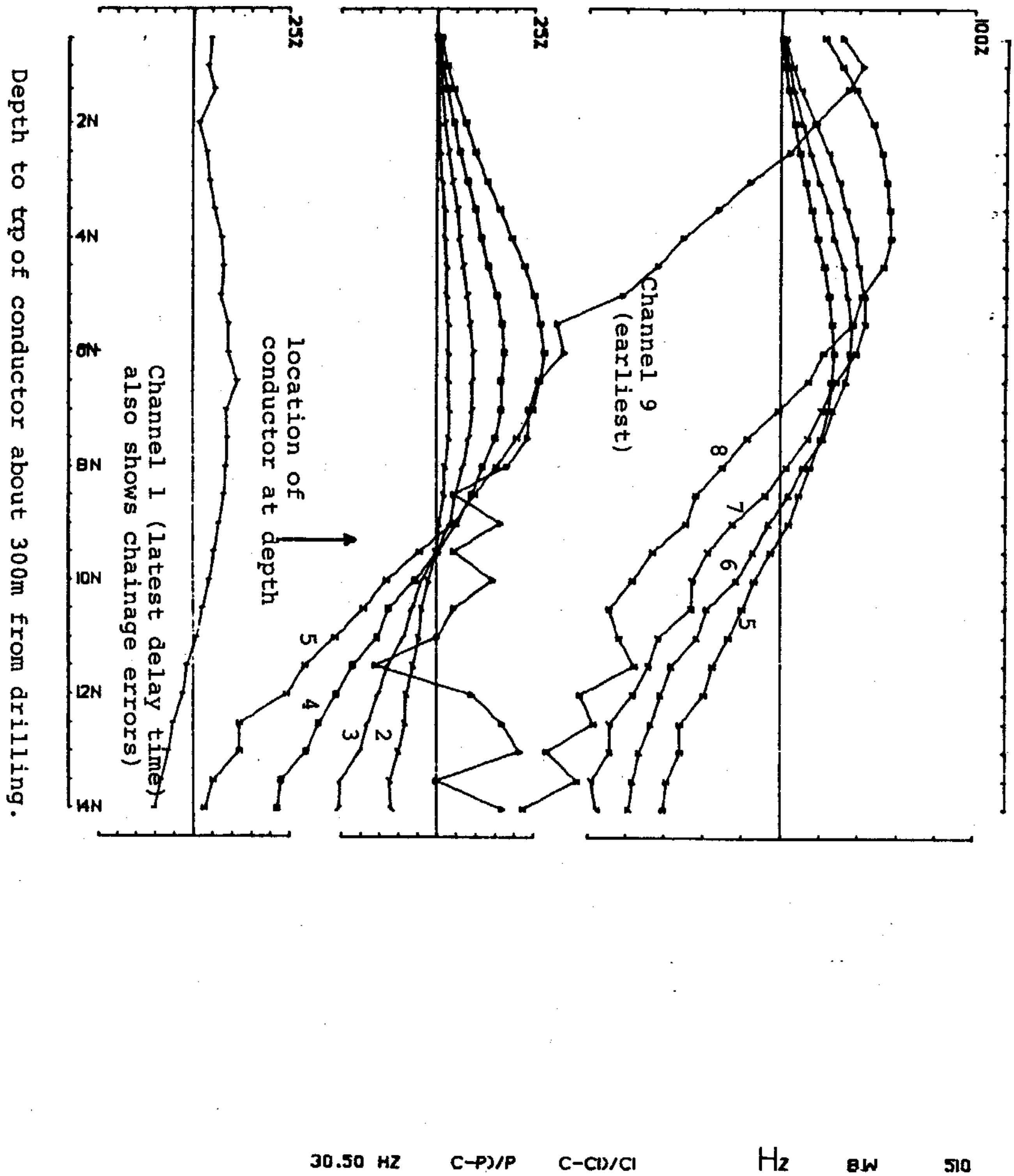


Figure 5: Drillhole sited based on interpretation and model fitting of the deep conductor at Heninga Lake. The large margin of error interpreted is due to the extremely small size of the conductor compared to its depth of burial.

Figure 6: UTEM survey over a large conductor at greater depth than the Heninga Lake conductor. This anomaly which is about 100 times the amplitude of the Heninga lake anomaly shows that finite size of a conductor is as important as its depth of burial in determining whether it is detectable



The UTEM 3 system now manufactured by Lamontagne Geophysics Ltd. has several technological improvements over the UTEM 2 system used on the Heninga Lake survey. Most significant of these is an intrinsic signal processing technique that has been proven to improve the signal to noise ratio by a factor of 3.5 to 1 in the presence of normal spheric noise. Coupled with an increase in transmitter power of the UTEM 3 system, 30 second averages with the UTEM 3 instrument have considerably greater precision than even the long average UTEM 2 coverage used to detail the Heninga Lake deep conductor.

Data provided courtesy of Sulpetro Minerals Limited.

Reference:

Dyck, A.V., Bloore, M., and Vallee, M.A.; User manual for programs PLATE and SPHERE, Research in Applied Geophysics #14, Geophysics Laboratory, University of Toronto.

J.C. Macnae

510037

Date Rec'd 24/6/83		File
Date Ans		NK01-7 W4
Action	Info.	Initials
	WDS	

Memorandum

Date 23 June, 1983

From BXN:NH:ajd

To BXH/Devonport

BASTYAN DAM, MARIONOAK

Herewith a brief report on the compilation of geophysical data covering this prospect. I would like to have spent more time doing further computer modelling especially of the IP, but wanted to get this report to you prior to the J.V. meeting on 4, 5 July. Let me know if you have any queries.

Nigel

N. HUNGERFORD

Enc.

FORM 32/6000

BASTYAN DAM ANOMALY, MARIONOAK, W. TASMANIA

Introduction

The area of work (Fig. 1) was initially selected for ground geophysical and geochemical coverage on the basis of a known minor Pb-Zn occurrence in a road cutting adjacent to a Dighem AEM resistivity low. The subsequent work has involved, to date, ground magnetic, gravity, IP/Resistivity and UTEM geophysical surveying in addition to geochemical surveys, and one diamond drill hole. The latter was drilled to test the Pb-Zn outcrop and an interpreted coincident gravity/IP source, prior to the UTEM survey which was designed to look for a much deeper target.

AIRBORNE GEOPHYSICS

In April 19785 Geoex flew an AEM survey for Aberfoyle (Cominco) using a McPhar H400 dual frequency (340 and 1070 Hz) EM System. Because the terrain clearance was often excessive during that survey, the EL was reflown in early 1981 by Shell using the Dighem AEM system. Normal line spacing for the former was 150 metres and for the latter was 200 m, with bird heights of 50 metres and 36 metres respectively.

Both surveys detected a low resistivity zone about 2 kms west of Bastyan dam site. There is in addition a magnetic linear extending from the southern end of the EL up to and immediately adjacent to the ~~west~~ EAST side of the resistivity low (Figs. 2 & 3).

GEOLOGICAL SETTING

The prospect area is covered by thick scrub and glacial drift so outcrop is minimal except that which can be seen in the HEC road cutting and along the sides of the nearby Pieman River. From that information it would appear that the prospect grid overlies the contact between the Crimson Creek Formation (predominantly mudstones) and the Rosebery Group (sandstones, shales and conglomerates). The more prospective and younger Mt. Read volcanics have an unconformable contact (thrust fault?) with the Rosebery Group about 1.25 kms east of the Bastyan Dam grid (Fig. 4). The Tasmanian Mines Dept. aeromag (Fig. 5) verifies very well that the Bastyan Dam grid does indeed overlie the western sedimentary sequence and not the main volcanic sequence that hosts Rosebery. The cause of the aeromagnetic anomaly on the west of the grid is probably caused by a basic volcanic unit in the Crimson Creek Formation. It is unlikely to be caused by an ultrabasic unit (serpentinite) similar to that west of the EL boundary since the latter is much more magnetic (1500nT greater from the Dighem aeromag) and is also much more conductive and strike extensive.

GEOPHYSICAL RESULTS

These are compiled on Fig. 6, and indicate trends from ground magnetic, gravity, IP/Resistivity and UTEM surveys. Two points are apparent: firstly the lack of correlation between the various anomalous trends, and secondly the probably inappropriate survey line direction. The latter should preferably have been in an east-west direction as dictated by the local geological strike, in order to maximise geophysical response. The lack of correlation between the trends suggests that the individual geophysical responses are due to different lithologies, rather than one particular source.

This is also seen on Fig. 7 which shows the various profiles along Line 00N.

A possible interpretation of the various anomalies on this line is as follows:

600W - 400 W	:	Magnetic, not dense. Crimson Creek basic volcanics and sediments?
400W - 100 W	:	Dense, magnetic, slightly conductive and chargeable. Rosebery Group sandstones, siltstones and conglomerate with minor sulphides expecially pyrrhotite.
100W - 300 E +	:	Very resistive, not dense or magnetic. Stitt Quartzite?

Dips from magnetics, gravity and resistivity are distinctly to the east.

DDH SBD-1 was drilled to test the Pb-Zn show in the HEC road cutting and an interpreted combined gravity and IP anomaly, as defined from previous geophysical modelling by DMN/Devonport (28/6/82). This hole although intersecting minor sphalerite and galena does not adequately explain the geophysical anomalies (Fig. 6). From the geophysical section along Line 00N (Fig. 7) it would appear that the hole was collared too far west to have intersected the main chargeability source. (Unfortunately downhole IP logging was not possible to check this). As for the gravity anomaly, this was not satisfactorily explained although core measurements gave consistent S.G.'s of 2.8 which is fairly high (Fig. 8). This implies that the DDH may have been drilled entirely in a broad anomalously dense lithologic unit, - a supposition which is verified by the plan of geophysical responses (Fig. 6). This shows that the DDH diverged from its initial direction to go almost along strike, and thus may have stayed within one lithologic unit.

UTEM RESULTS

It can be seen from Fig. 6 that the strike of the UTEM anomaly is divergent from the other geophysical trends. The interpreted anomaly is coincident with IP and gravity trends on Line 200N where it appears to be on the western contact of the very resitive eastern unit (Stitt quartzite?). On Lines 00N and 200S this correlation is no longer true. This effect is very curious since one could expect the UTEM anomaly to relate to the resistivity results from the IP survey.

The UTEM trend does, however, appear to parallel a possible fault about 250 metres to south that can be interpreted from the gravity and magnetic results, and which coincides with a shallow, broad UTEM anomaly.

Other downgrading features of the main UTEM anomalies relate to the anomaly shapes. For some reason there is little evidence of an X component anomaly coincident with the Z component crossover on later channels. The reason for this is unclear unless the noise level or half space response on the X component is exceeding the signal, so the anomaly is not obvious. Also the Z component crossover does not extend to the early channels as might be expected in a resistive host rock. This is possibly explained by the presence of the nearby surficial conductor whose response is drowning that from the deep conductor.

CONCLUSIONS

The trends from the various geophyscial surveys tend to be inconsistent varying from N-S to NW-SE. This suggests their causes are most likely to be due to a combination of varying litholgies and cross-cutting faults, of which the main UTEM anomaly of interest is likely to be related to the latter since it is inconsistent with the regional geologic strike. – local flexure?

It is also quite probable that the IP anomaly on Line 00N was not adequately drill tested by SBD-1, despite the minor sulphides intersected.

RECOMMENDATIONS

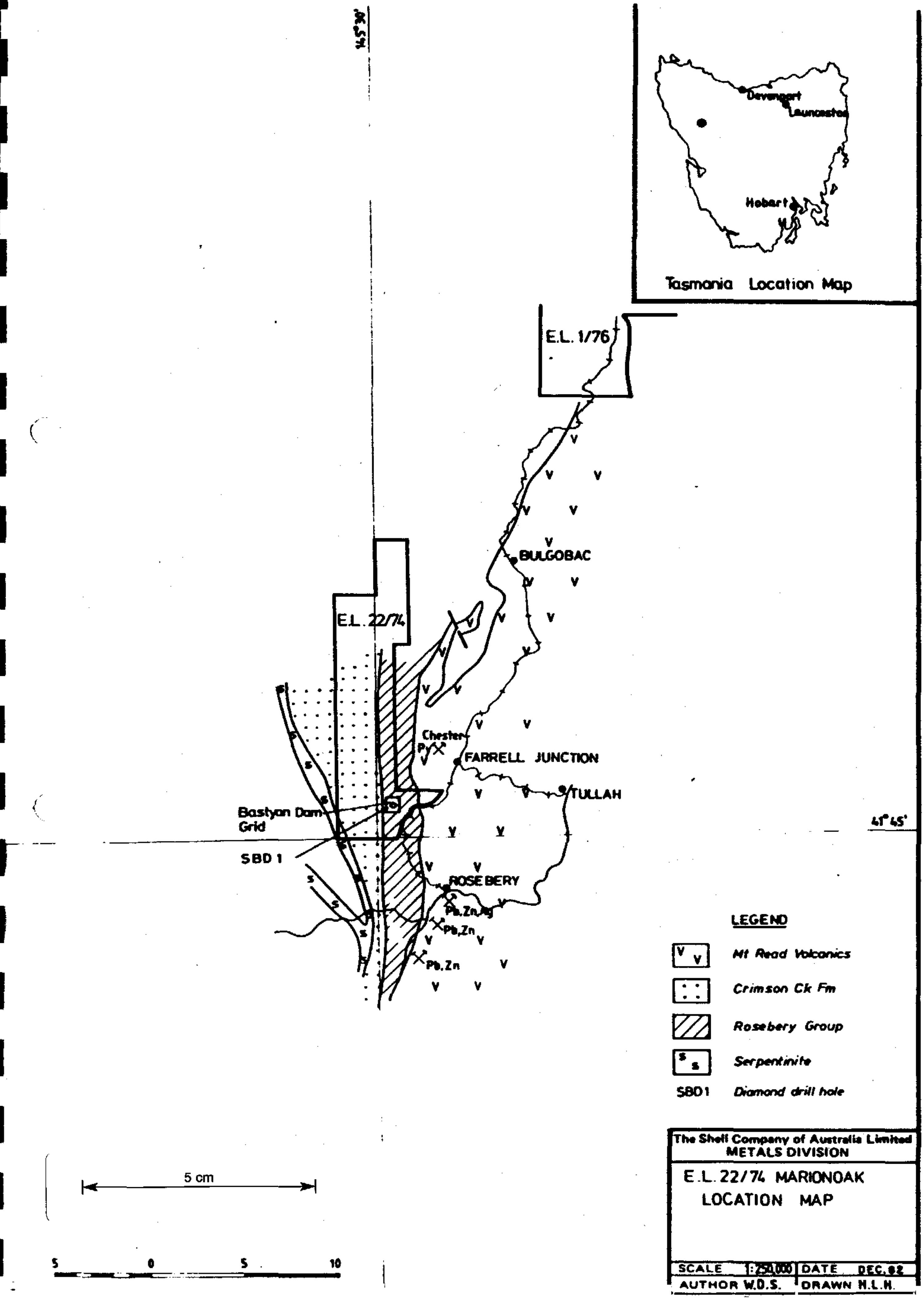
In principle further geophysical survey work is required to properly delineate a drill target. This would involve further ground magnetics (at a maximum 100 metre line spacing) to help unravel the local structure, and also further UTEM work with the transmitter loop on the other side of the grid to help delineate the deep conductor better (as suggested by G. Staltari in his reports). Both suggestions, however, would involve not inconsiderable cost due mainly to the difficulty of further line-cutting and gridding in the very thick bush.

It is somewhat difficult to define a drill target at present due to the lack of coincidence of geophysical anomalies. The only line on which there is some coincidence is Line 200N on which the UTEM anomaly coincides with a fairly deep resistivity low and a broad gravity high (Fig. 9). The broad chargeability anomaly appears to be due to a shallow source such as that due to disseminated sulphides in a particular lithologic unit. Computer modelling suggests that a thin (25-50 m) massive conductor at 200 metres depth will not be detected directly by an IP survey (using 100 m dipoles) but the chargeability response could be due to a disseminated halo from a deeper massive zone detected by the UTEM.

The drill target would be at 25E, Line 200N at a depth of 200 metres. A DDH should be sited at 160E to drill southwest along the grid line at an inclination of 55 down to a total planned depth of 300 metres.

It is very desirable that the hole is logged for IP/Resistivity so PVC casing should be used through the upper unconsolidated layers to leave the hole open at depth.

510042



145°30'
Devonport
Launceston
Hobart
Tasmania Location Map
E.L. 1/76
E.L. 22/74
BULGOBAC
Chester
Py
FARRELL JUNCTION
TULLAH
41°45'
Bastyan Dam Grid
SBD 1
ROSEBERY
Pb,Zn,Ag
Pb,Zn
Pb,Zn
LEGEND
Mt Read Volcanics
Crimson Ck Fm
Rosebery Group
Serpentinite
SBD1 Diamond drill hole
5 cm
5 0 5 10
The Shell Company of Australia Limited
METALS DIVISION
E.L. 22/74 MARIONOAK
LOCATION MAP
SCALE 1:250,000
DATE DEC. 82
AUTHOR W.D.S.
DRAWN H.L.H.

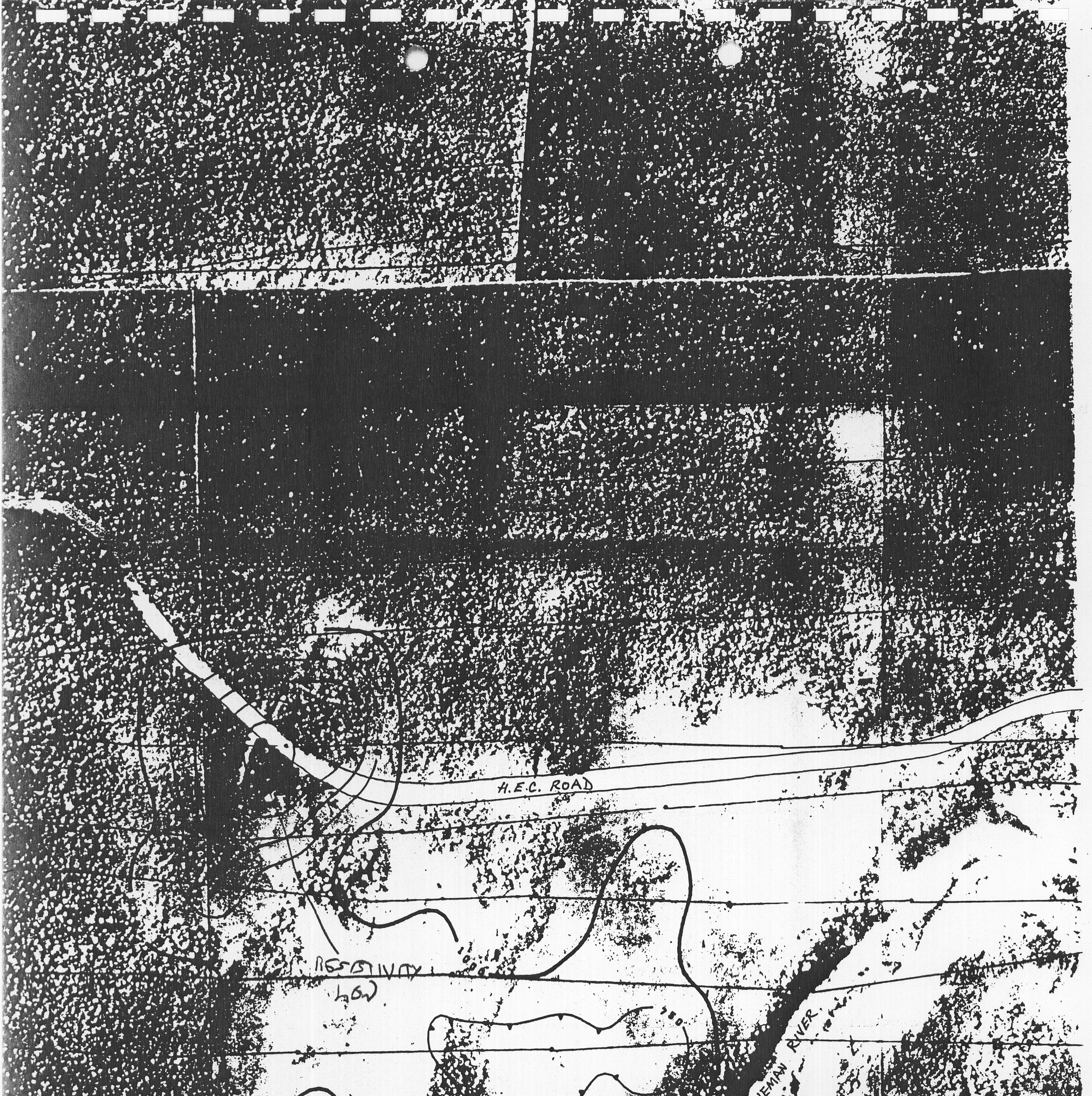

H.E.C. ROAD
RESISTIVITY
LOW
750
1000
PIEMAN RIVER
376
N
DIGHEM RESISTIVITY
1:10,000
0
400m.
75
76
77
5 cm

FIG 2

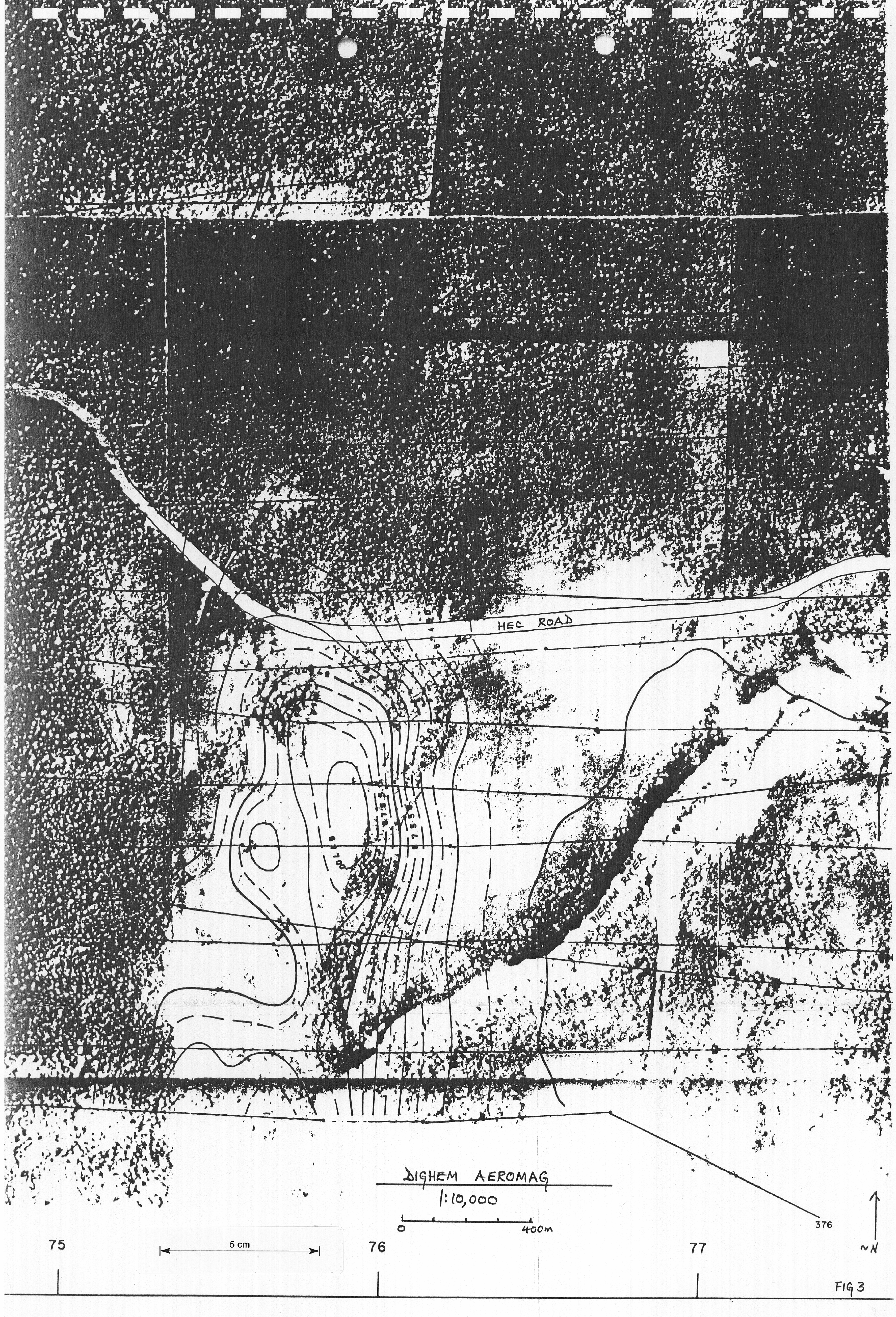

HEC ROAD
PIEMAN RIVER
DIGHEM AEROMAG
1:10,000
0
400m
376
N
5 cm
75
76
77

FIG 3

510044

510045

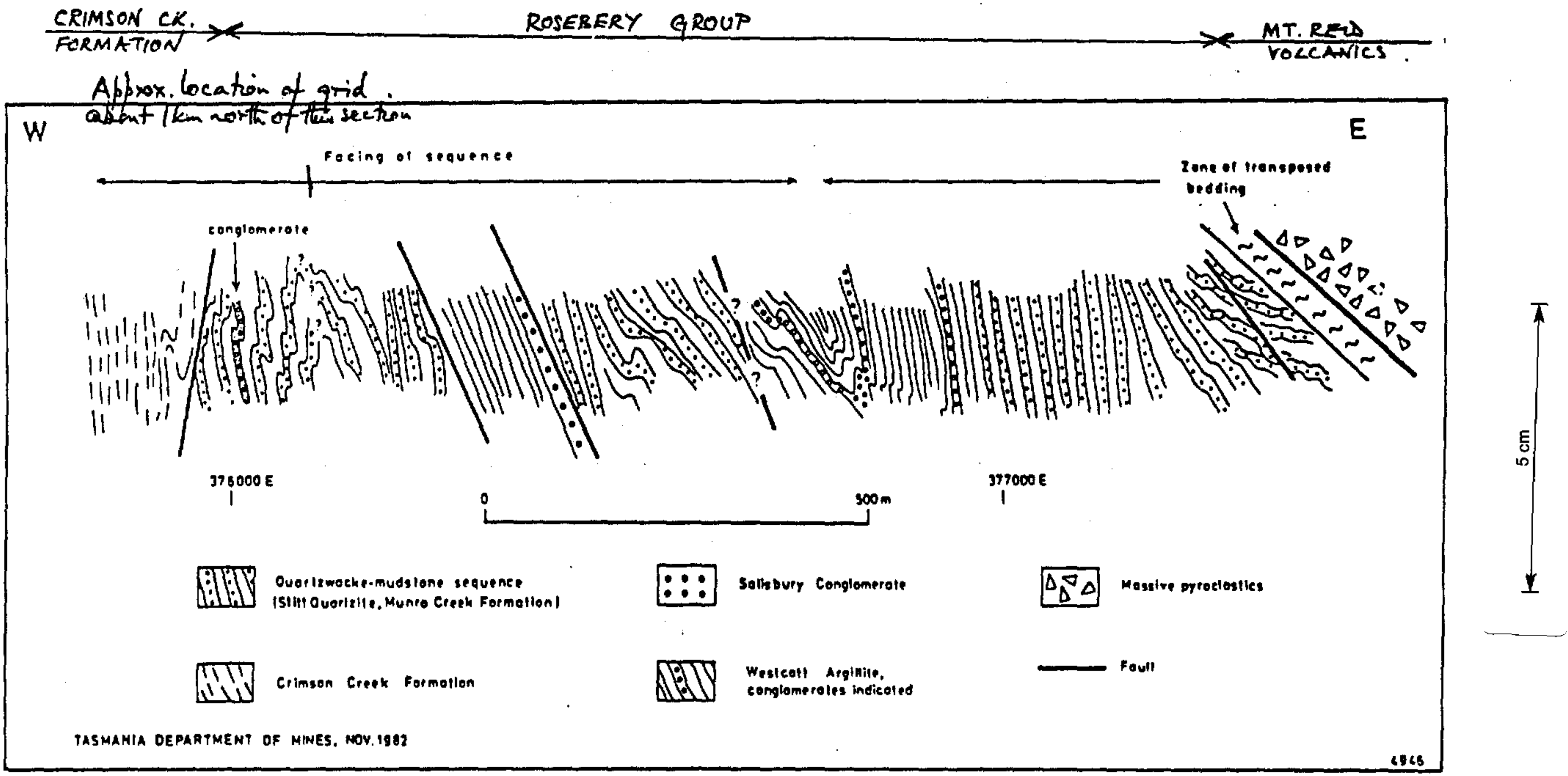
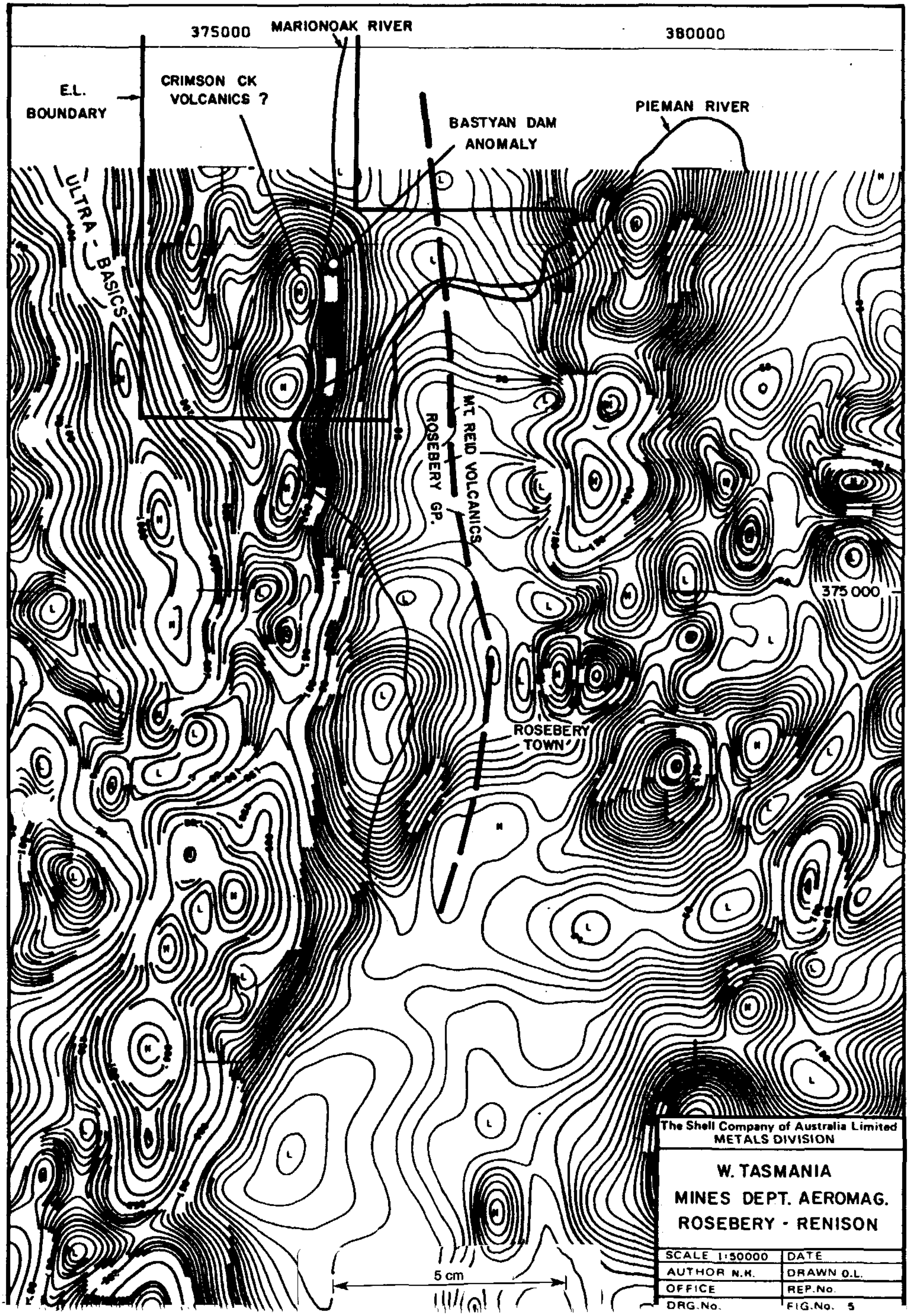
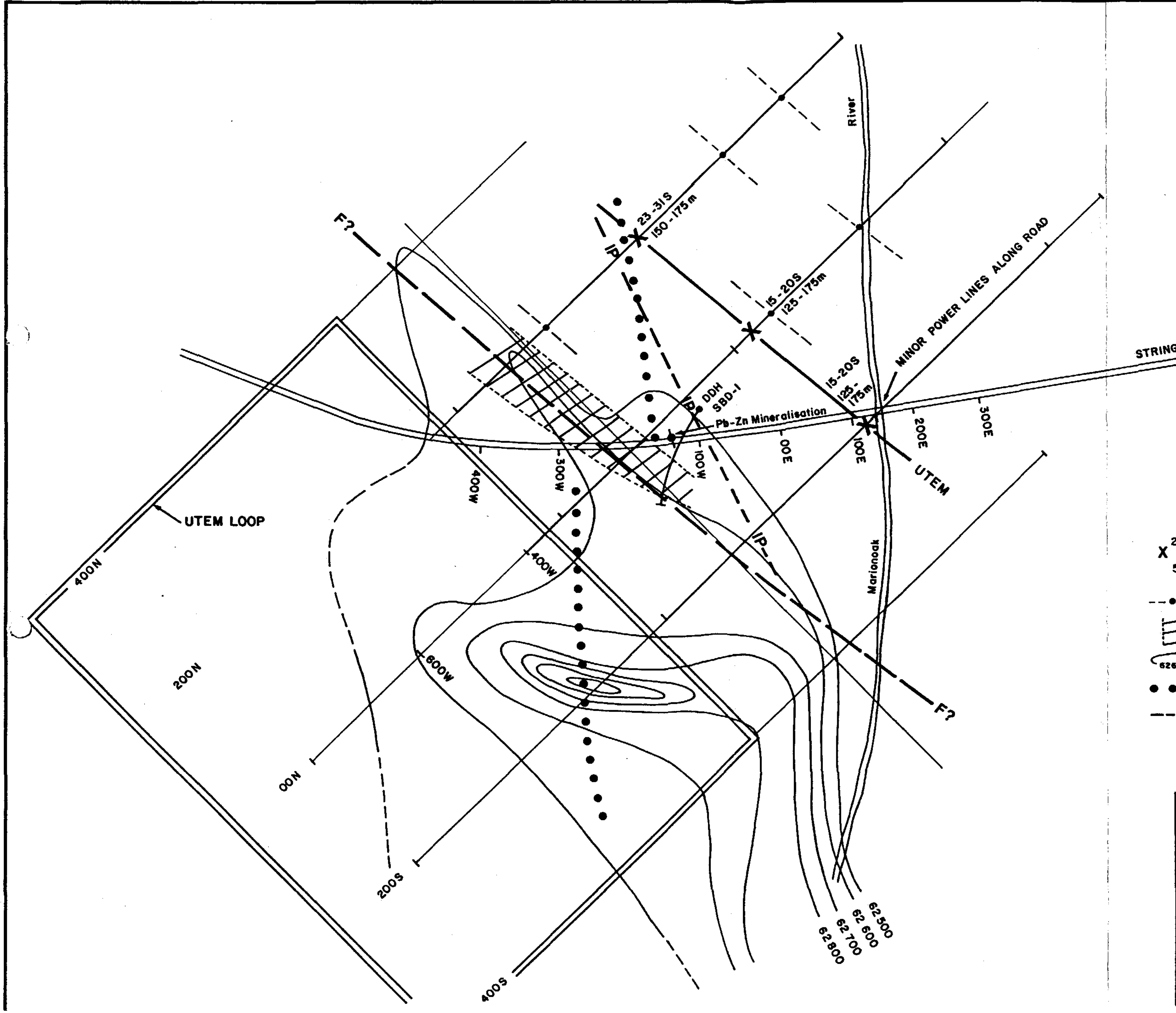


FIG 4

Fig. 3.30 E-W cross section through Rosebery Group in Pieman River Gorge projected to 7800N. Thickness of some conglomerate units is exaggerated for clarity and folds are somewhat generalized.

510046


375000
MARIONOAK RIVER
380000
E.L. BOUNDARY
CRIMSON CK VOLCANICS ?
BASTYAN DAM ANOMALY
PIEMAN RIVER
ULTRA - BASICS
MT. REID VOLCANICS
ROSEBERY GP.
375 000
ROSEBERY TOWN
5 cm
The Shell Company of Australia Limited
METALS DIVISION
W. TASMANIA
MINES DEPT. AEROMAG.
ROSEBERY - RENISON
SCALE 1:50000
DATE
AUTHOR N.H.
DRAWN O.L.
OFFICE
REP.No.
DRG.No.
FIG.No. 5



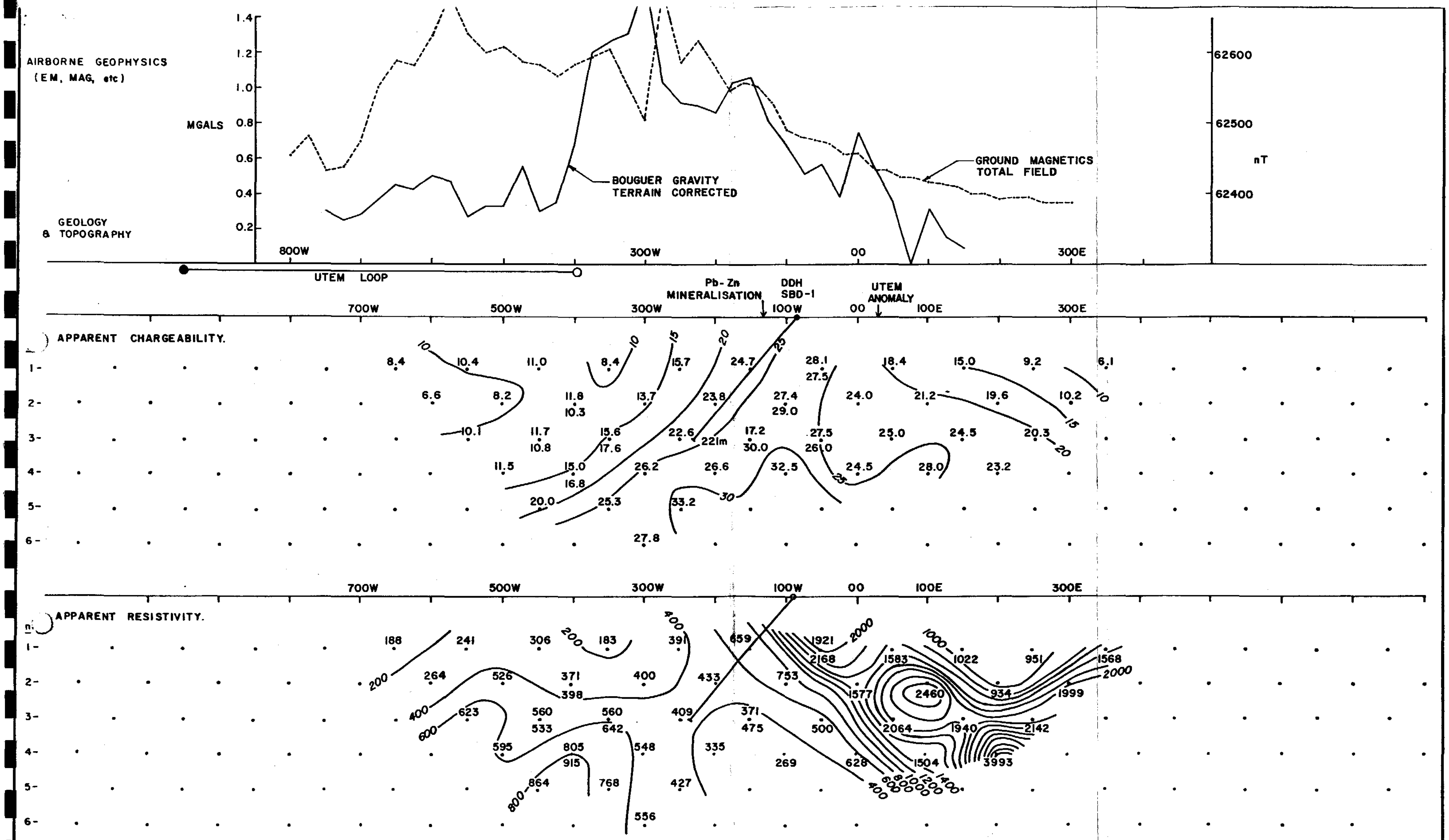
LEGEND

X 25S / 50m	Conductive unit	estimated conductance (Utem) / estimated depth
--•--	Minor conductive contact, fault or thin unit	
	Wide conductive rock unit	
62600	Magnetic contours (CI = 100 nT)	
• • •	Gravity Trend	
----	IP/ Resistivity trend	

The Shell Company of Australia Limited
METALS DIVISION

E.L. 22/74 MARIONOAK
BASTYAN DAM GRID -
GEOPHYSICAL PLAN

SCALE 1:5000	DATE 6/83
AUTHOR N.H.	DRAWN O.L.
OFFICE A.H.Q.	REP.No.



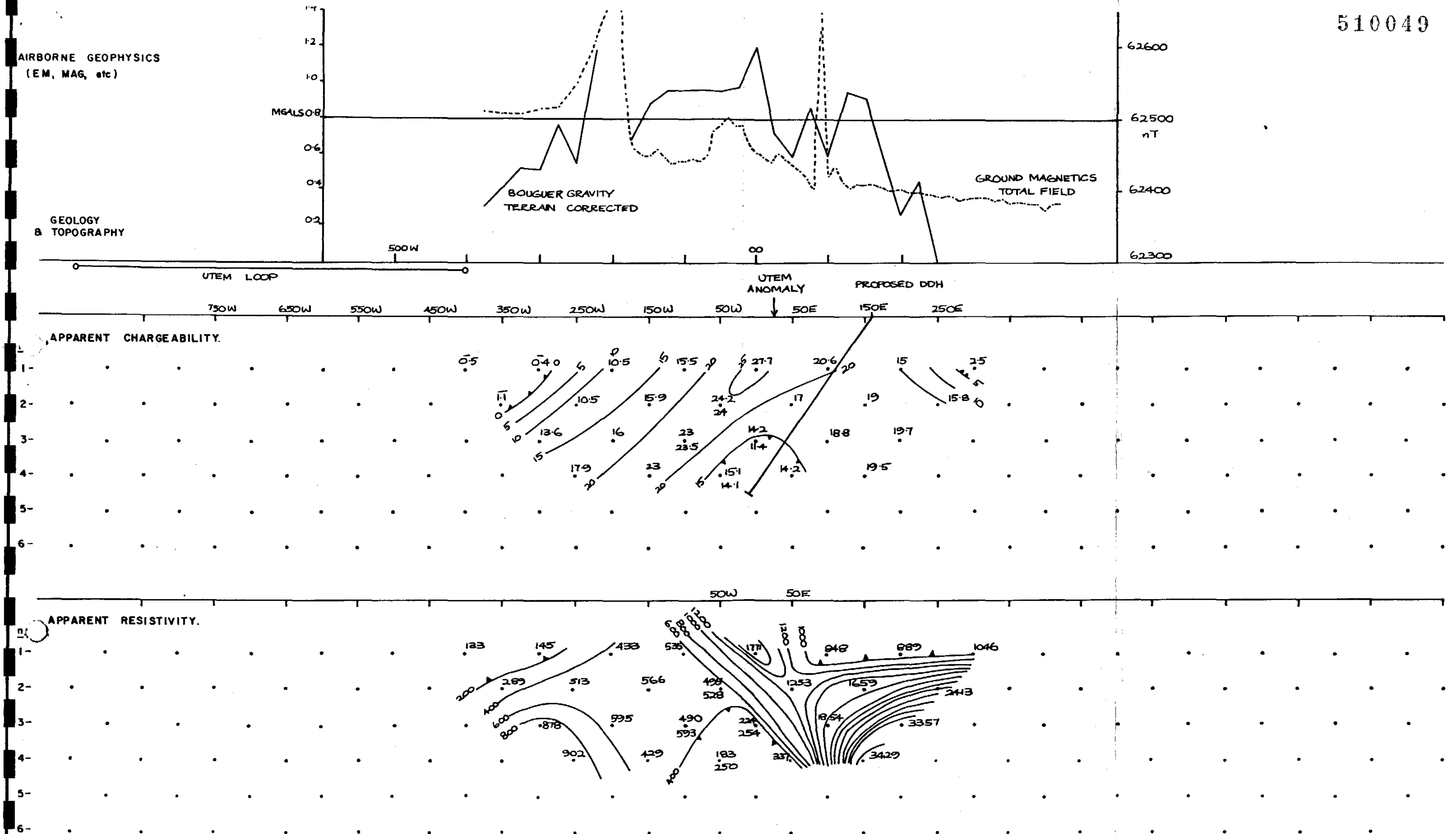
Contractor : Scintrex
Date : 30-10-81, 9-05-82
Timing : 2 sec on, 2 sec off
Transmitter : IPC 2.5 Kw
Receiver : IPR-10, IPR-8
Integration time : $M_3 + M_4$ plotted (650 to 1170 msec)
Array : Dipole - Dipole
Dipole length : 100

The Shell Company of Australia Limited
METALS DIVISION

IP/RESISTIVITY SURVEY
E.L. 22/74 MARIONOAK
LINE 00N
BASTYAN DAM

SCALE 1:5000	DATE 8-83
AUTHOR N.H.	DRAWN KW

510049



Contractor : SCINTREX PTY. LTD.
Date : 11-05-82
Timing : 2 SECS
Transmitter : IPTA 2 SEC. PULSE
Receiver : IPR -8
Integration time : 650 - 1170 m.s.
Array : DIPOLE - DIPOLE
Dipole length : 100m

5 cm

The Shell Company of Australia Limited
METALS DIVISION

IP/ RESISTIVITY SURVEY
E.L. 22/74 MARIONOAK
LINE 200N
BASTYAN DAM

SCALE 1:5000	DATE 6/83
AUTHOR N.H.	DRAWN O.L.
OFFICE A.H.O.	REP No

510050

SHELL COMPANY OF AUSTRALIA LTD.
Geophysical Log

PAGE 1 OF 1 PAGES

DIAMOND DRILL HOLE N° : SBD-1

PROJECT	: MARIONOAK	STATE	: TAS
ANOMALY N°	: BASTYAN DAM	GRID COORDS	: 90W/30S
INCLINATION	: -60°	AZIMUTH	: 225°
DATE DRILLED	: 9/82	TOTAL DEPTH	: 221.0 m
CASING	: NQ to 20 m BQ to T.D.		

GROUND GEOPHYSICAL ANOMALIES : GRAVITY, IP

IP / RESISTIVITY LOGGING —
CONTRACTOR : DATE LOGGED :
ARRAY : ELECTRODE SPACINGS :

SUSCEPTIBILITY LOGGING (JH-8)
BY : Devonport office DATE LOGGED : /82

DEPTH metres	LITHO'GIC LOG	ASSAYS	GEOLOGICAL DESCRIPTION
8.5			GLACIAL OVERBURDEN
			SST-SLT w. Carbonaceous Shales
26.5			
			SST-SLT Tuffaceous
42.0			
			SST/Tuff
58.5			
			SST-SLT w. Carbonaceous Shales minor Sphal, Gal.
76.3			
			(minor po)
			Siltstone-Greywacke
			(Qtz, Carb, Py)
173.0			
			SLT-SST w. Carbonaceous-Shale (180-190 m minor py sphal, gal in carbonate veining)
			(minor po)
221.0			T.D.

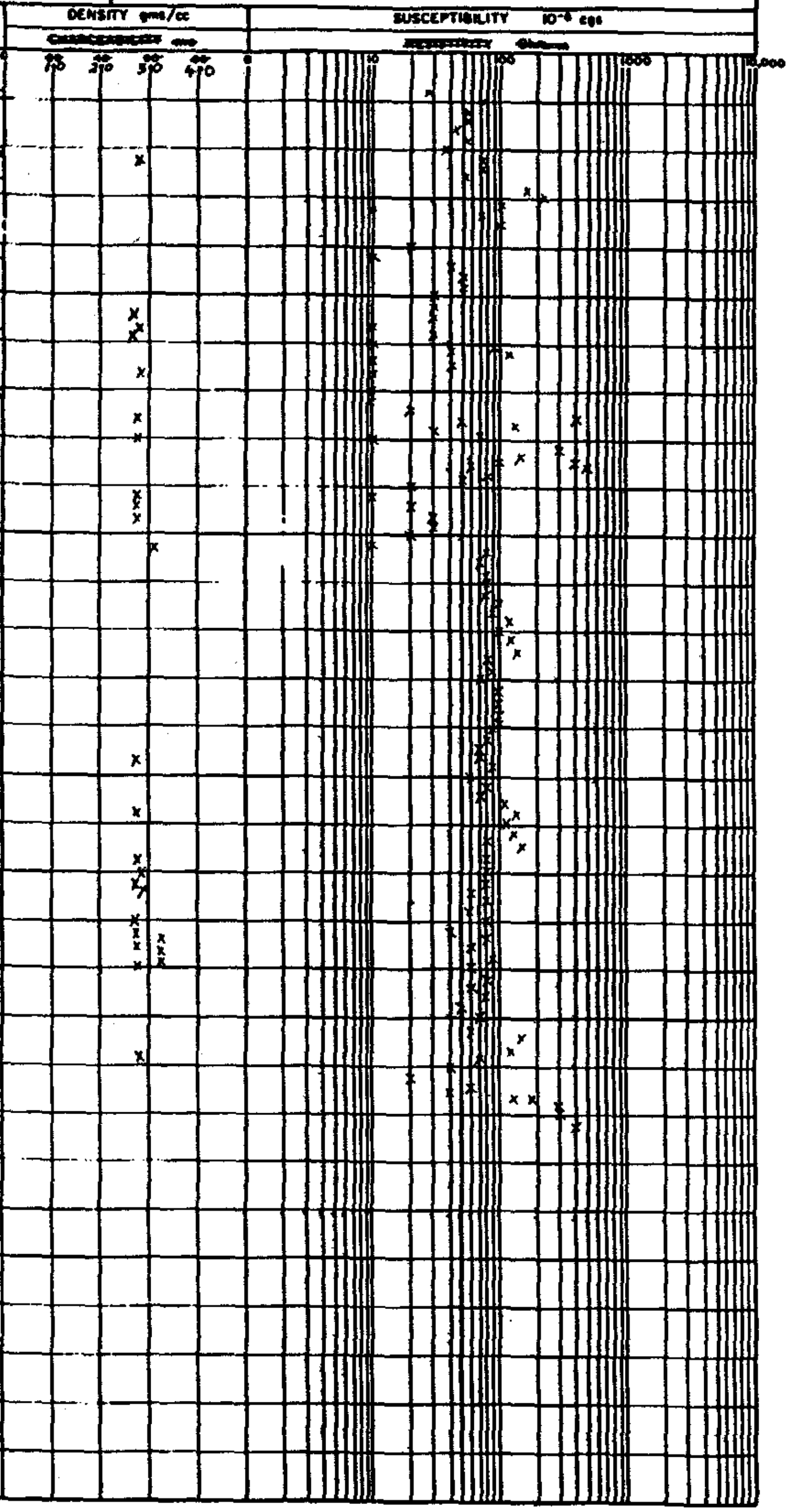


FIG 8

APPENDIX 2

Diamond Drill Hole Logs

The Shell Company of Australia Limited
METALS DIVISION

DRILL LOG SHEET

510052

Hole No : SBD 1

PROJECT: MARIONOAK

LOCATION CODE: NL 01

COLLAR CO-ORDINATES: 35S/110W

COLLAR R.L.: 170m (approx.)

LOCATION: MARIONOAK BASTYAN DAM GRID

MAP/PHOTO REFERENCE:

DATE STARTED	27-8-82	HOLE SIZE		FROM	TO	TOTAL	CORE STORAGE	
DATE FINISHED	9-9-82	NON CORE					Nº OF TRAYS	
TOTAL DEPTH	221m	TRICONE		0	3m	3·0m	SAMPLE STORAGE	
LOGGED BY	W. D. SMYTH	CORE					ASSAY LAB.	COMLABS
CONTRACTOR	LONGYEAR		NQ WL	3·00	20·80	17·80	ASSAY REPORTS	
RIG	BBSI		BQ WL	20·80	221·00	200·20		
DRILL CREW	H. ASCHMONEIT	CASING	NW	0	6·5		MIN. & PET. LAB.	C.M.S.
	J. WILLSHIRE		BW	0	21·00		MIN. & PET. REPORTS	C.M.S. 82/10/5
		CASING LEFT	NW	0	6·50			

HOLE SURVEY DATA

INSTRUMENT: TROPARI

DEPTH	INSTRUMENT INCL.	INSTRUMENT AZ.	ACID ETCH INCL.	ACID ETCH AZ.	REMARKS
COLLAR	-60°	220			
60m	-56°	206°			
150m	-51°	189°			
200m	-40°	171°			

Pyrrhotite/magnetite in hole possibly affected the bearings

GRAPHIC/LETTER SYMBOL LOGGING KEY

STRUCTURE/ALTERATION CODE

- B BEDDING
- J JOINTING
- C CLEAVAGE
- F FOLIATION
- sh SHEARING
- q QUARTZ VEINS
- O OXIDATION

DRILLING SUMMARY:

[redacted] THE S[redacted] COMP[redacted] OF [redacted]RAL[redacted]D. - [redacted]LS D[redacted]ION [redacted]

PROJECT: MARIONOAK

DIAMOND DRILL LOG - SAMPLING RECORD

HOLE NO: SBD 1

From	To	Interl (m)	Core Rec'd	% Rec	Sample No.	Compos No.	As	Ni	Ag	Cu	Pb	Zn	Mo	Au	Weighted Assays/Ratios	% Estimates	Core Angles	Alt	T.S P.S	Description
10·00	15·80	5·8	77	58	F 21169		4	110	<1	110	60	140	6				4 5			Grey-green f med gn qtz psammite - arenite. Carbonaceous.
15·80	19·60	3·8	95	100	F 21170		5	120	<1	110	50	140	6				6 0			Grey-green med crs psammite - arenite - carbonaceous.
19·60	20·80	1·2	100	100	s 21171		10	95	<1	170	100	95	6							Qtz/qtz-carbonate veined carbonaceous shale/siltstone.
20·80	22·05	1·25	100	100	s 21172		6	90	1	170	60	140		<0·05						" " " " " "
22·05	26·65	4·60	100	100	F 21173		4	100	<1	180	28	140	6							Pale green siltstone/sandstone - probably tuffaceous.
26·65	30·00	3·35	100	100	F 21174			70	<1	26	36	100	<4							Dark green sandstone/siltstone - tuffaceous.
30·00	32·00	2·00	100	100	s 21175		4	80	<1	145	24	130	6							Dark red brown siltstone - tuffaceous.
32·00	34·00	2·00	100	100	s 21176		3	95	<1	30	24	170	6						TS.	" " " "
34·00	42·00	8·00	99	99	F 21177			80	<1	110	14	185	<4							Interbedded dark red/green tuffaceous sandstone siltstone.
42·00	48·00	6·00	100	100	F 21178			250	<1	390	70	900	<4				7 0			Dark green tuffaceous greywacke - some feldspars - chloritic matrix
48·00	53·65	5·65	100	100	F 21179			80	<1	120	28	240	<4	-			8 0			" " " " " "
53·65	53·80	0·15	100	100	s 21180		110	110	2	65	1300	3500		<0·05			5 0			Carbonaceous zone - qtz-carbonate veining - sphalerite and galena.
53·80	56·25	2·45	100	100	F 21181			60	<1	50	210	60	<4							Dark green tuffaceous greywacke.
56·25	56·80	0·65	100	100	s 21182		6	36	1	120	12	120		<0·05						Qtz - qtz-carbonate veining in greywacke.
56·80	58·90	2·10	100	100	F 21183			110	<1	100	10	150	4						TS.	Dark green tuffaceous greywacke.
58·90	59·90	1·00	100	100	s 21184		10	95	<1	95	20	150		<0·05						Carbonaceous siltstone/sandstone. Bedding very disrupted
59·90	61·80	1·90	100	100	s 21185		2	95	<1	42	34	340	6							Pale grey green/pink siltstones/sandstones. Chloritic fractures.
61·80	63·55	1·75	100	100	s 21186		440	270	3	100	4800	3·00%	6				5 0		TS.	Finely interbedded siltstone/sandstone/clays - some carbonaceous. Ankerite Zn, Pb.
63·55	65·80	2·25	100	100	s 21187		360	780	2	165	560	1250	6							Interbedded carbonaceous shales. Qtz. carbonate veining.
[illegible]·80	66·50	0·70	100	100	s 21190		22	440	1	100	65	1700		<0·05						" " " " "
[illegible]0	76·30	8·80	100	100	F 21191			470	<1	90	100	410	<4							Olive green f-crs gn lithic wacke - lithic psammite - carbonaceous.
75·30	76·20	0·90	100	100	s 21192		<2	110	<1	80	30	120		<0·05						Black carbonaceous shale - pyrite in bedding - pyrrhotite
76·20	78·30	2·10	100	100	F 21193			430	<1	90	10	100	18							Olive green med-crs gn greywacke - pyrrhotite.
78·30	81·20	2·90	100	100	s 21194		<2	360	1	100	<4	110		<0·05						Olive green f gn greywacke/siltstone - part carbonaceous - pyrrhotite.
81·20	91·70	10·50	100	100	F 21195			400	<1	90	14	120	<4							Olive green f-crs gn greywacke.
91·70	93·30	1·60	100	100	s 21196		7	70	<1	14	16	230		<0·05						Black carbonaceous shale. Calcite/qtz-chlorite veins. Sphalerite.
93·30	93·80	0·50	100	100	s 21197		<2	65	<1	1400	8	160		<0·05						Olive green f gn siltstone. Chlorite - chalcopyrite filled fractures.
93·80	96·00	2·20	100	100	s 21198		3	65	1	60	<4	130		<0·05						" " " " Chlorite filled hairline fractures.
96·00	103·80	7·80	99	99	F 21199			60	<1	110	14	105	<4							" " " " - greywacke - finely laminated.
103·80	104·00	0·20	100	100	s 21200		22	42	1	14	<4	20		<0·05						Qtz/qtz-carbonate veining in carbonaceous shale.
104·00	113·00	9·00	100	100	F 9001			60	<1	95	10	100	<4				2 0			Olive green f gn siltstone - greywacke.
113·00	120·00	7·00	100	100	F 9002			60	<1	140	8	105	<4				4 5			" " " "
120·00	130·00	10·00	100	100	F 9003			60	<1	95	10	100	<4							" " " "
130·00	140·00	10·00	100	100	F 9004			60	<1	100	6	120	<4				3 0			" " " "
140·00	146·50	6·50	100	100	F 9005			55	<1	90	8	95	<4							" " " "
146·50	147·60	1·10	100	100	s 9006		26	55	<1	75	24	170		<0·05						Qtz - carbonate - C.R. vein - pyrite.
147·60	155·60	8·00	100	100	F 9007			55	<1	115	8	100	<4				3 0			Olive green f gn siltstone - greywacke - laminated.
155·60	155·85	0·25	100	100	s 9008		5	55	1	95	44	190		<0·05						Calcite veining brecciation.
155·85	163·80	7·95	100	100	F 9009			75	<1	90	130	410	<4							Olive green f gn - crs gn greywacke - laminated.
[illegible]·80	167·20	2·40	100	100	F 9010			65	<1	95	170	650	<4				3 0			" " " " "
[illegible]20	168·60	1·40	100	100	s 9011		50	260	<1	85	160	560		<0·05			7 0			Qtz - carbonate veining.
168·60	170·40	1·80	100	100	F 9012			470	<1	100	40	150	<4							Olive green f gn - crs gn greywacke.
170·40	171·05	0·65	100	100	s 9013		210	250	1	105	55	130		<0·05						Qtz - carbonate veining.
171·05	172·70	1·65	100	100	s 9014		140	430	3	85	130	470		<0·05						" " " Plus very fine sphalerite.
172·70	173·00	0·30	100	100	s 9015		240	250	1	350	700	900		<0·05						" " " " " "
173·00	174·00	1·00	100	100	F 9016			120	<1	100	60	160	<4							Olive green med gn greywacke - carbonaceous psammite.
174·00	176·00	2·00	100	100	s 21188		8	130	<1	120	90	200	6						TS.	Black carbonaceous shale - psammites. Bedding disturbed. Bedded pyrite
176·00	179·00	3·00	100	100	s 21189		6	130	<1	120	110	530	6				3 0		TS	" " " "
179·00	181·00	2·00	100	100	s 9017		32	65	10	100	230	480		<0·05						" " " "
181·00	182·35	1·35	100	100	s 9018		105	100	<1	65	530	1500		<0·05						" " . Intense qtz-carbonate veining.
182·35	182·45	0·10	100	100	s 9019		780	65	11	360	1·7%	12·0%		<0·05						Qtz. sphalerite - galena vein.
182·45	184·35	1·90	100	100	s 9020		24	145	<1	70	110	600		0·10						Black carbonaceous shale - psammites. Intense qtz-carbonate veining.
184·35	184·40	0·05	100	100	s 9021		1300	32	33	1500	5·20%	11·0%		<0·05						Qtz - sphalerite - galena vein.
184·40	187·00	2·60	100	100	F 9022			160	<1	105	40	300	<4							Black carbonaceous shale - psammites. Greywacke
187·00	189·05	2·05	100	100	F 9023			125	<1	105	440	760	<4							" " "
189·05	189·15	0·10	100	100	s 9024		3100	36	10	150	1·10%	12·0%		<0·05						Qtz - sphalerite galena veining.
189·15	190·20	1·05	100	100	s 9025		40	130	10	160	400	1100		<0·05						Brecciated Carbonaceous shale siltstone - arkosic in part.
190·20	200·00	9·80	100	100	F 9026			60	<1	105	44	200	<4							Well bedded grey siltstone - shale bands carbonaceous
200·00	208·40	8·40	100	100	F 9027			70	<1	80	90	320	<4							" " " "
208·40	208·55	0·15	100	100	s 9028		75	55	<1	34	520	2700		<0·05						Qtz - carbonate vein.
208·55	212·00	3·45	100	100	F 9029			60	<1	70	300	980	<4							Grey well bedded siltstone - shale - carbonaceous.
212·00	213·35	1·35	100	100	s 9030		7	38	1	40	175	750		<0·05						Breccia zone - carbonate filled. Sphalerite

51053

[redacted]HE SH[redacted]COMP[redacted]OF A[redacted]RALIA[redacted]. - M[redacted]ALS D[redacted]ON

PROJECT:

DIAMOND DRILL LOG - SAMPLING RECORD

HOLE NO:

From	To	Interl (m)	Core Rec'd	% Rec	Sample No.	Compos No.	As	Ni	Ag	Cu	Pb	Zn	Mo	Au	Weighted Assays Ratios	% Estimates	Core Angles	Alt	T.S P.S	Description
213.35	216.85	3.50	100	100	S 9031			50	<1	70	320	1100	<4							Grey well bedded siltstone - shale - carbonaceous
216.85	218.35	1.50	100	100	S 9032		<2	65	1	46	510	2100		<0.05						Zone of intense calcite veining - pyrrhotite, sphalerite.
218.35	221.00	2.65	100	100	S 9033		5	70	1	65	230	1000		<0.05						Grey well bedded siltstone shale / conglomeratic psammite.
	E.O.H.																			
																				E.O.H.

Sheet 2 of 2 Sheets

510054

APPENDIX 3

Petrographic Report

510056

Central Mineralogical Services

CMS

39 Beulah Road
Norwood, S.A. 5067
Telephone 42 5659

Mr. W.D. Smyth
Exploration Geologist
The Shell Co. of Aust. Ltd.
Metals Division
P.O. Box 860
DEVONPORT / TAS. 7310

26th October, 1982

REPORT CMS 82/10/5

YOUR REFERENCE:	Sample Despatch No. 4302/N201/WDS/156
DATE RECEIVED:	4th October, 1982
SAMPLE NOS.:	21161 - 21168
SUBMITTED BY:	W.D. Smyth
WORK REQUESTED:	Petrology

H.W. Fander, M. Sc.

REPORT CMS 82/10/5

Eight drill core samples were received for petrological examination; all were thin-sectioned, and five polished sections were also prepared in order to examine the sulphides.

Summary

The lithologies include tuffs and tuffaceous sediments, and carbonaceous shales and siltstones; the rocks with pyroclastic components are altered and thus there is uncertainty whether they are true pyroclastic rocks or are reworked. 21161 and 21162 (in particular) are reminiscent of the pyroclastic units in the Crimson Creek formation.

The carbonaceous shales/siltstones are typical of a "black shale" lithology, and contain sulphides. Although some diagenetic recrystallization has occurred, and there was a later shearing/veining event, it is believed that the sulphides were of syngenetic origin. 21164 is a banded, sulphide-rich rock in which the banding is probably inherited; however, the intersection is very small and could represent a banded vein formed from mobilised syngenetic material. The presence of framboidal textures in pyrite, the low Fe content of the sphalerite, the faint indication of colloform banding in galena, are all factors supporting a syngenetic origin, with an epigenetic overprint due to tectonism and remobilisation.

H.W. Fander, M. Sc.

Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
21161 (T.S. 43824) 32.2m	Altered Ferruginous Tuff. Small splinters of altered feldspars, quartz; interstitial ultrafine hematite; grading into fine silt/ ash.	Bedded and graded, with turbidity/scour structures. Fine-grained.	Lithic volcanic grains. Veins of dolomite/ chlorite. Secondary quartz.	Subaqueous deposition, oxidising conditions. Possibly correlatable with Crimson Creek formation.
21162 57.05m	Tuff or Tuffaceous Greywacke. Splintery and subangular grains of altered feldspars, volcanics, glass; felsite, quartz, oxide opaques; carbonate; chloritic matrix.	Well-sorted/sized; bedded. Weakly stressed, fractured and veined.	Carbonate-chlorite veinlets. Minor trace pyrite.	May be an altered tuff or reworked tuffaceous material, probably subaqueous. ?Crimson Creek formatio
21163 62.05m	Sheared, Veined Carbonaceous Shale. Ultrafine clay, quartz, carbonaceous matter; folded, brecciated; extensive carbonate veining with pyrite.	Finely laminated, with later tight folding and parallel shears.	Sulphides are pyrite, fine chalcopyrite, trace sphalerite and tetrahedrite.	Although sulphide distribution is related to veins, it is probably of syngenetic origin. Black shale facies.
21164 62.50m	Banded Sulphide Rock. Mostly bands of massive pale sphalerite ("resin blende") with thin galena laminae, coarse ankerite, minor shale and quartz.	Banding and veining difficult to distinguish; both are conformable with bedding.	Other sulphides are pyrite, trace chalcopyrite. Galena up to 1 mm.	Sulphides are granular, intergrown with carbonate; no relict syngeneti features; material is recrystallize
21165 63.50m	Brecciated, Mineralised Shale. Contorted and fragmented argillaceous quartzose shale, carbonaceous in places, with ragged, fragmented sulphide patches.	Originally finely laminated, but extensively disrupted.	Sulphides are granular pyrite, sphalerite up to 1 mm, trace galena, marcasite.	Pyrite shows relict framboidal textures and galena is vaguely colloform, suggesting syngenetic formation.
21166 113.4m	Fine Tuff/Tuffaceous Siltstone. Very small grains of plagioclase, quartz, ?altered glass, oxide opaques and leucoxene; ultrafine chloritic matrix/cement.	Faintly laminated, but very uniform fabric. Average grainsize = 10 μ.	Thin carbonate-chlorite veinlets. Ultrafine dispersed pyrite.	Alteration has obscured details, but major pyroclastic components are suspected; subaqueous depositio
21167 175.7m	Brecciated Carbonaceous Shale. Contorted, folded and fragmentary masses of fine siliceous, carbonaceous shale with pyrite-rich lenses.	Structures, textures suggest pre-lithification movement plastic deformation.	Carbonate grains and disrupted veins, with pyrite crystals.	Similar to the minor host rock in 21164 and to the other shales. Tuffaceous lenses probably occur. Pyrite shows framboidal textures.
21168 (T.S. 43831) 178.05m	Pyritic Carbonaceous Siltstone (?Tuffaceous). Small angular fragments of quartz; feldspar laths, mica flakes; fine pyrite crystals, aggregates. Chloritic matrix. Fine carbon throughout.	Fine-grained. Incipient cleavage; minor folding, fracturing and veining.	Disrupted carbonate-pyrite veins. Pyrite as euhedral crystals, framboidal grains.	Could range from siltstone with minor pyroclastic material to impure tuff. Subaqueous deposition.

APPENDIX 4

Pb - Isotopes

→ DEVONPORT – R. WRIGHT

510060

CSIRO

Division of Mineralogy
Delhi Road, North Ryde, NSW, Australia

A Division of the Institute of Energy and Earth Resources

PO Box 136, North Ryde, NSW, Australia 2113
Telephone (02) 887 8666, (02) 887 8730
Telex AA25817

	INFO	ACT	COPY
BXG			
BXHE			
BXHW			
BXP			
BXR			
BXN			
BXT			
BXR/2	✓		
BXR/1			
DATE REC'D: 7/2/83			
FILE: 03.13.23			

1 February 1983

Copy – BXH/Devonport.
Copy already sent to [illegible]

Mr R. Beeson
Senior Geologist - Research
Metals Division
The Shell Company of Australia Limited
PO Box 872K
MELBOURNE VIC. 3001

Dear Bob,

Enclosed is a report, the data, plots and interpretation for the samples you submitted as part of our collaborative research project on lead isotopes.

For a change, the data appear relatively straightforward. If you have any further questions, please don't hesitate to contact me.

Yours sincerely,

Brian Gulson

Brian Gulson

Enc.

[illegible] 25/2/83		File
[illegible]		NL01 – 643
Action	Info	Initials
	WDS.	

510061

EVALUATION OF LEAD ISOTOPES IN EXPLORATION: VEIN MINERALIZATION FROM DUNDAS TROUGH AND WEATHERED BEDROCK FROM McARTHUR BASIN FOR SHELL

DUNDAS TROUGH

Diamond drill core samples of galena-sphalerite mineralization from veins in Cambrian sediments overlying the Mt Read Volcanics were submitted for Pb isotopic analysis in order to establish if these veins were remobilized Rosebery-type massive sulfides.

The data are given in the Table and plotted along with reference points for Rosebery- and vein-style mineralization.

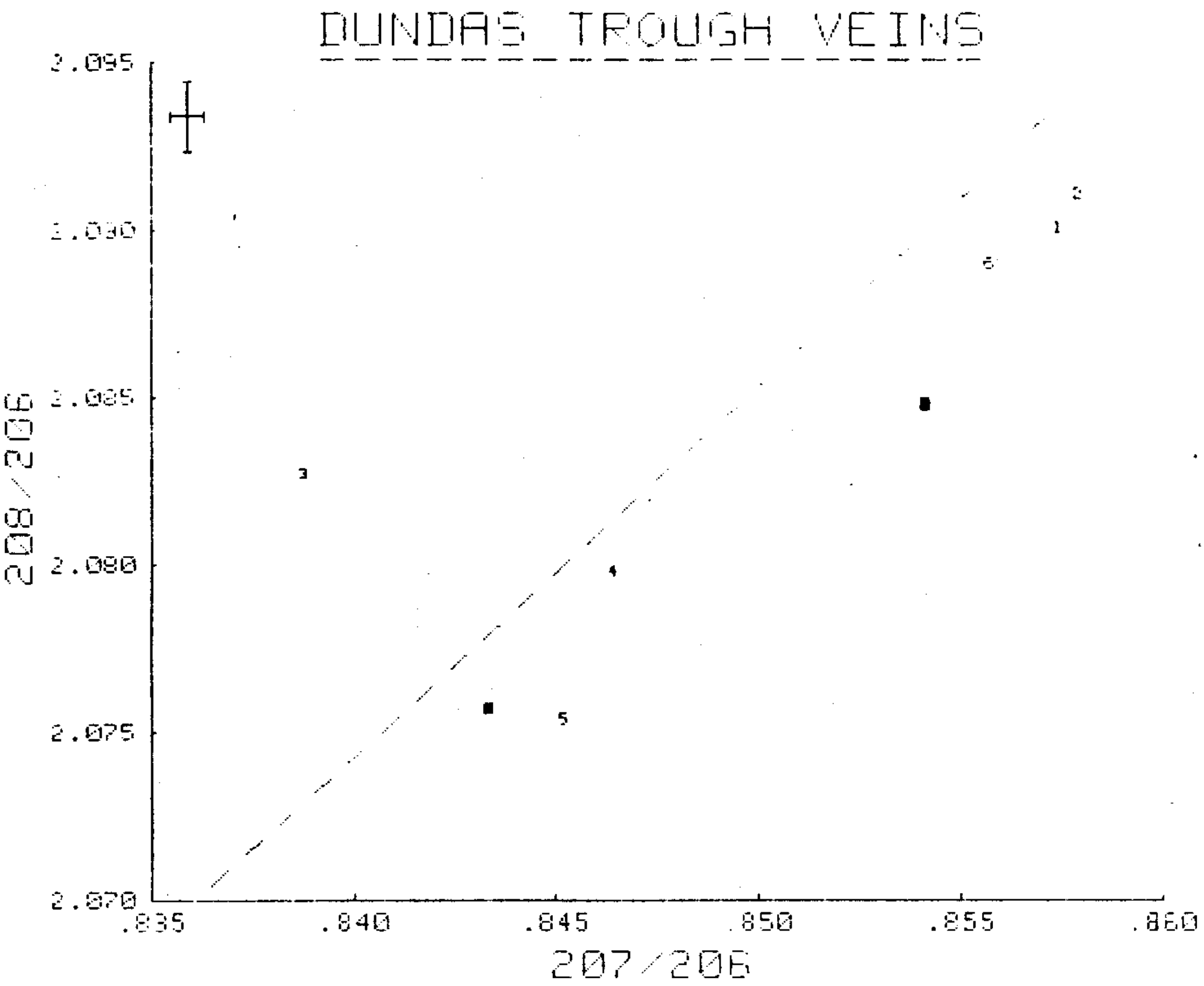
The data show significant dispersion and some scatter on the 208/204-206/204 plot and fall, more or less, into 2 groups: one group is less radiogenic than the Rosebery-style and the other plots around the vein-style. There is no correlation of Pb concentration and 207/206.

Interpretation: The isotopic results are consistent with derivation of the metals from the host rocks, either in response to metamorphism and/or Devonian granitic intrusion. The veins are not derived by remobilization from Rosebery-style mineralization.

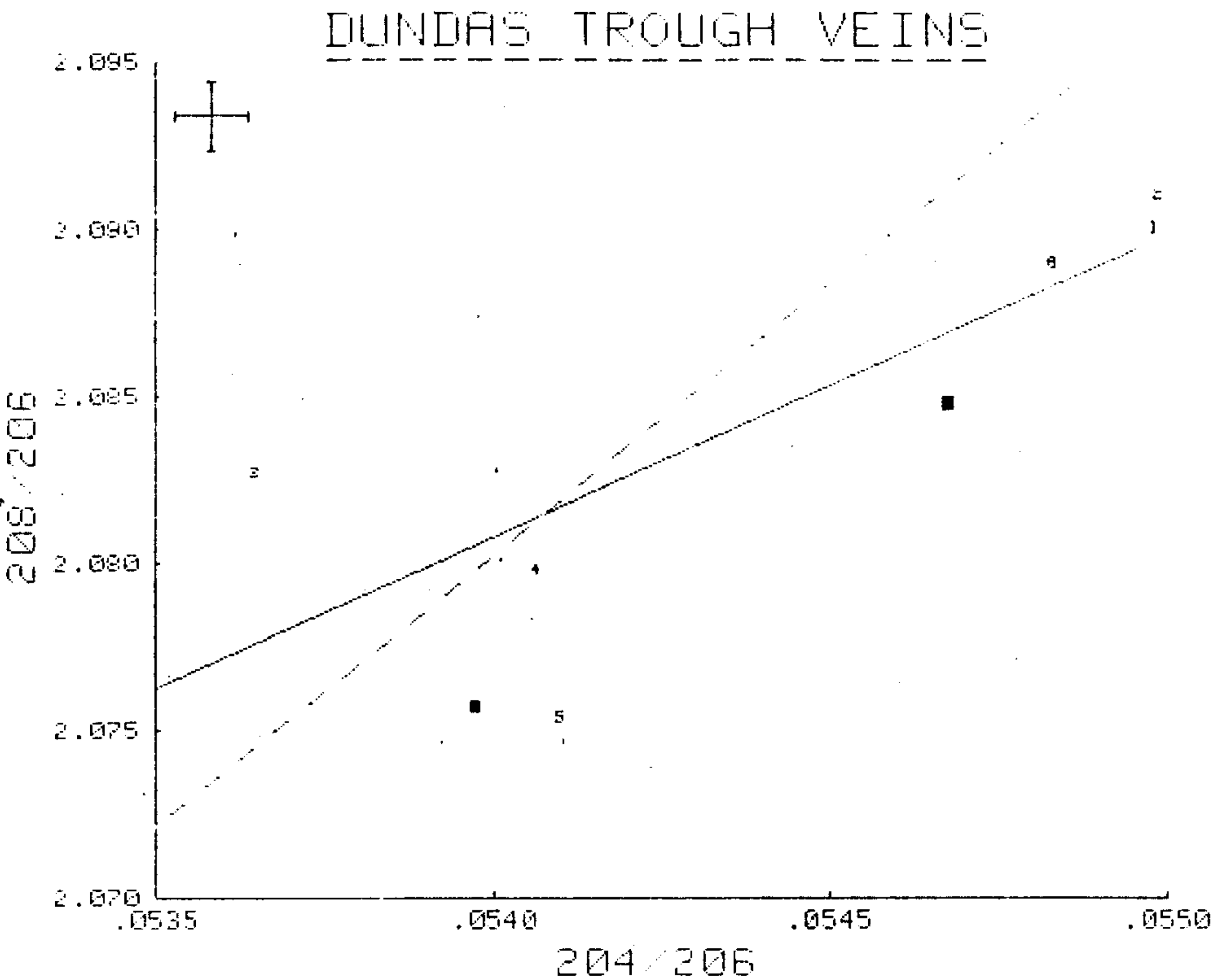
.ELL

Sample	208/206	207/206	206/204	207/204	208/204	Pb(ppm)
DUNDAS TROUGH VEINS						
21169 G458	2.0901	0.8574	18.188	15.594	38.015	60
21171 G459	2.0911	0.8579	18.186	15.602	38.029	100
21176 G460	2.0827	0.8388	18.641	15.636	38.824	24
21186 G461	2.0798	0.8464	18.497	15.656	38.470	4,800
21187 G462	2.0754	0.8452	18.485	15.624	38.364	560
21189 G467	2.0890	0.8557	18.238	15.606	38.099	110
REFERENCE ROSEBURY VEINS						
	2.0848	0.8541	18.290	15.621	38.131	
	2.0757	0.8433	18.529	15.626	38.461	

,OEFF. OF VARIATION= .795 0 DELETIONS
SLOPE= .6427 Y INTERCEPT= 1.5382 MEAN X= .85023 MEAN Y= 2.0847
INTERSECTION AT T= .222 X= .8484 Y= 2.0835



COEFF. OF VARIATION= .80776 0 DELETIONS
SLOPE= 9.0003 Y INTERCEPT= 1.5948 MEAN X= .054434 MEAN Y= 2.0847
INTERSECTION AT T= .197 X= .0541 Y= 2.0814

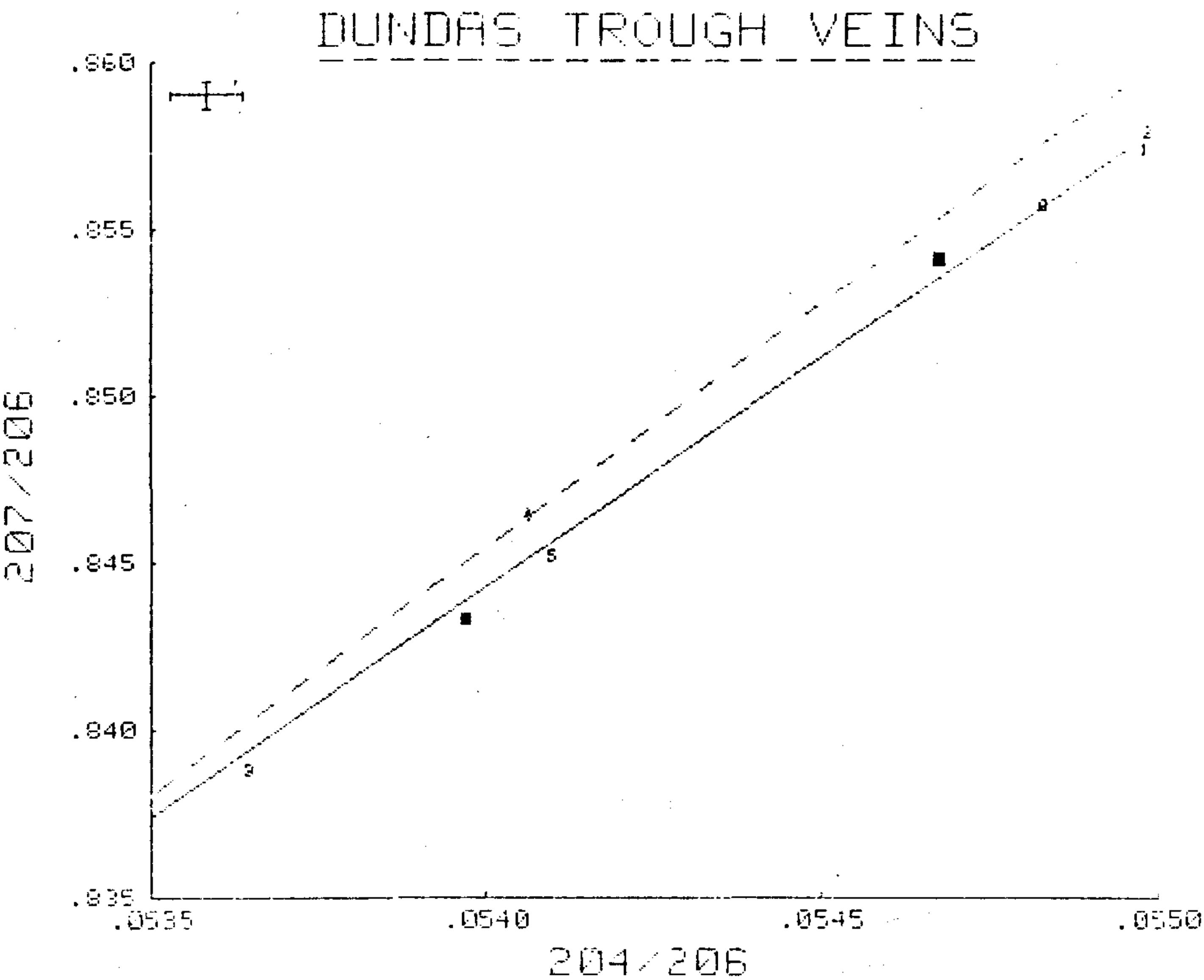


COEFF. OF VARIATION= .99636 0 DELETIONS
SLOPE= 13.733 Y INTERCEPT= .10271 MEAN X= .054434 MEAN Y= .85023

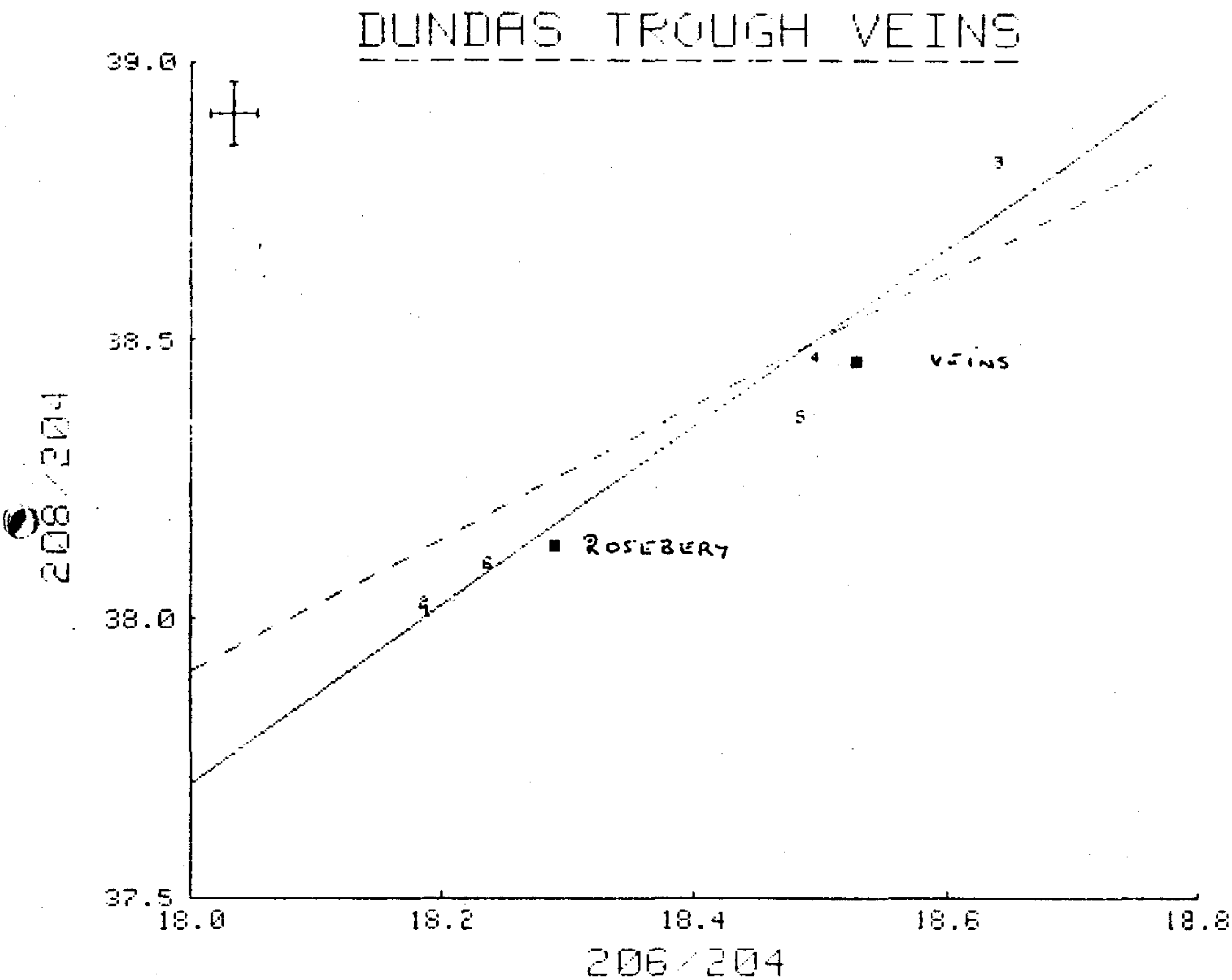
SLOPE= 13.81671+/-.00648 INTERCEPT= .09813+/-.00071
MSWD= .8

AGE=1.5885+/-.0135 b.y.

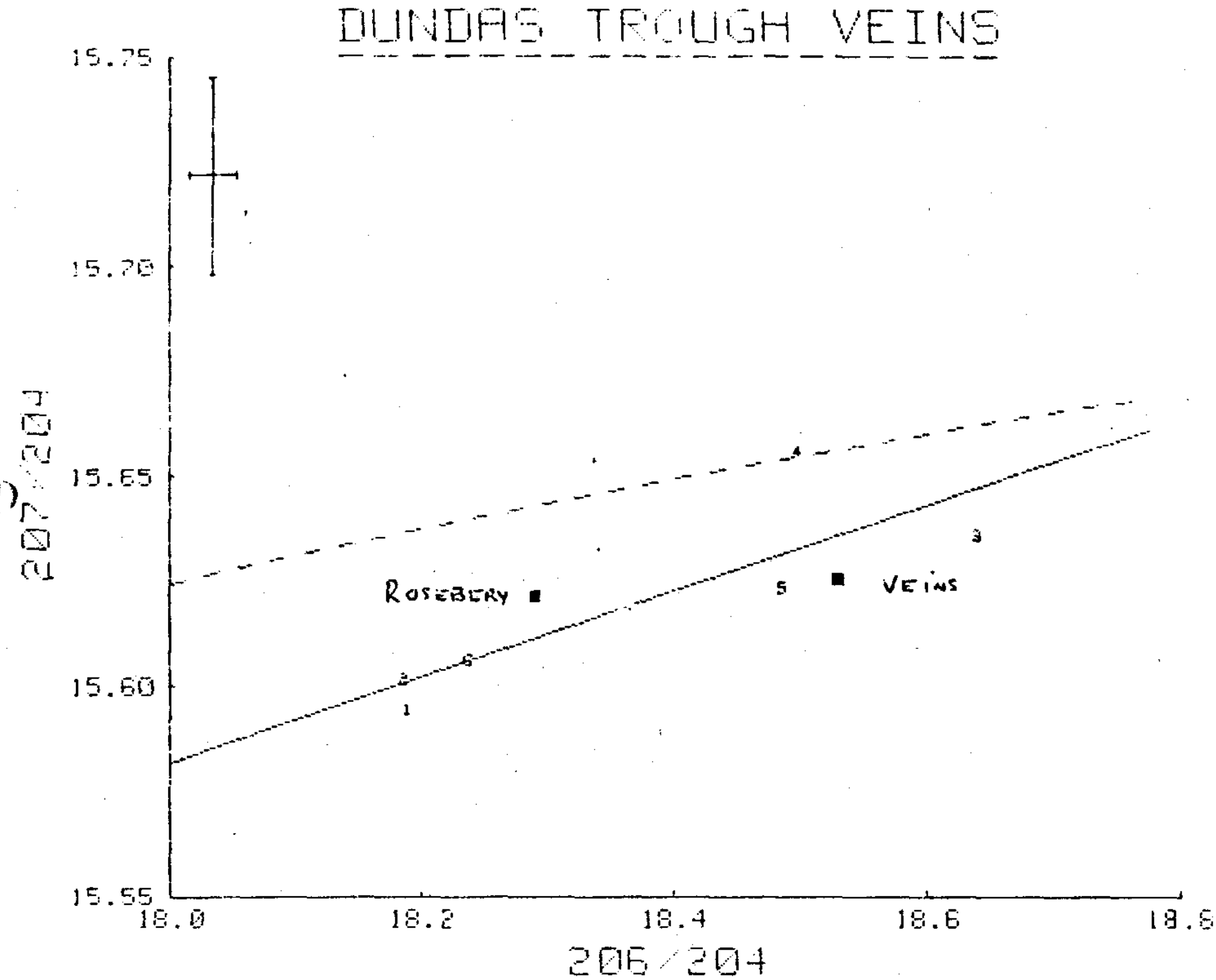
INTERSECTION AT T=1.721 X= .0638 Y= .9784



.FF. OF VARIATION= .97558 0 DELETIONS
LOPE= 1.5984 Y INTERCEPT= 8.9327 MEAN X= 18.373 MEAN Y= 38.3
INTERSECTION AT T= .198 X=18.4910 Y=38.4890



COEFF. OF VARIATION= .84669 0 DELETIONS
SLOPE= .10231 Y INTERCEPT= 13.74 MEAN X= 18.373 MEAN Y= 15.62
INTERSECTION AT T=1.714 X=15.6970 Y=15.3460



.OEFF. OF VARIATION=-.26295 0 DELETIONS
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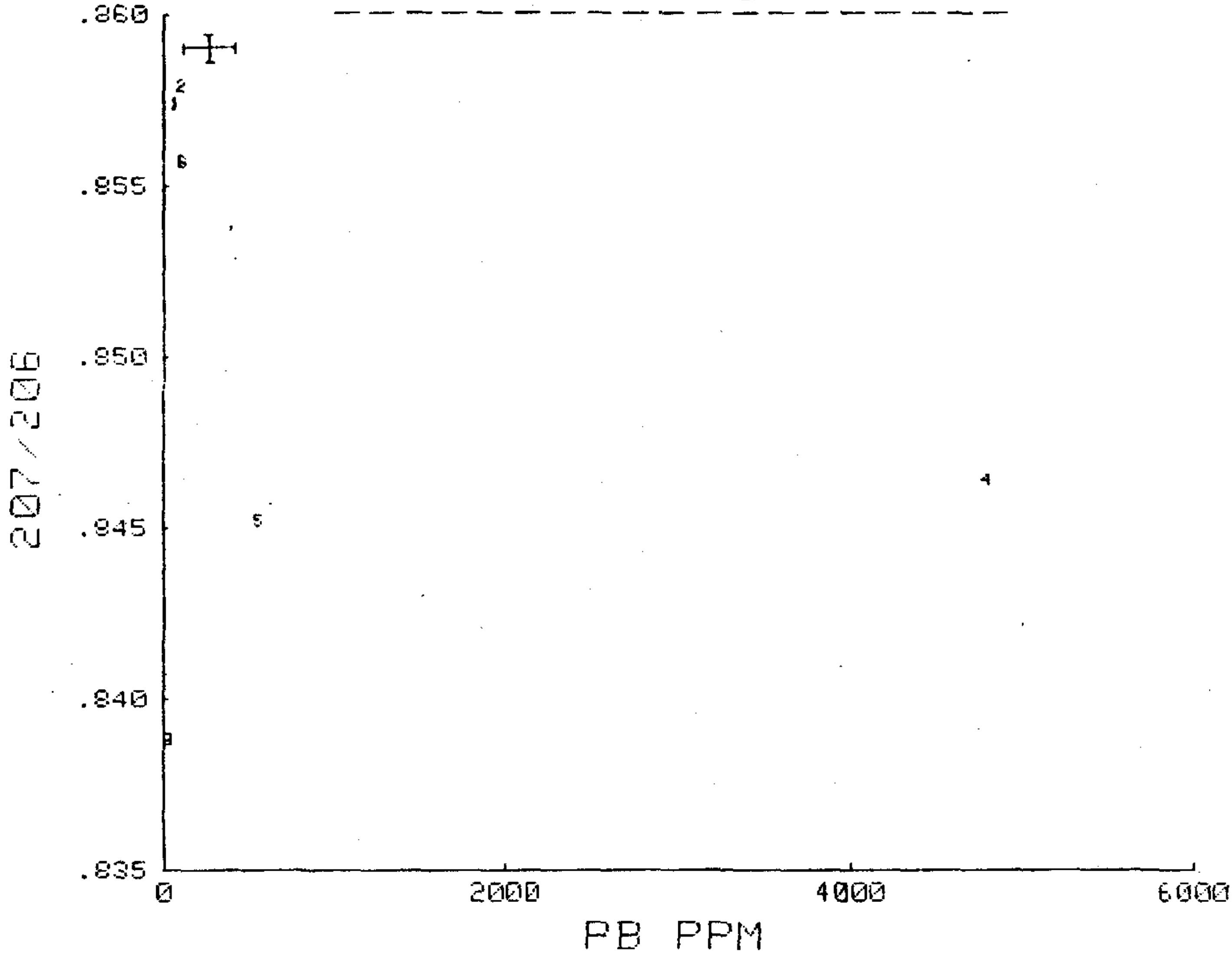
.85023

DUNDAS TROUGH VEINS



COEFF. OF VARIATION=-.44994 0 DELETIONS
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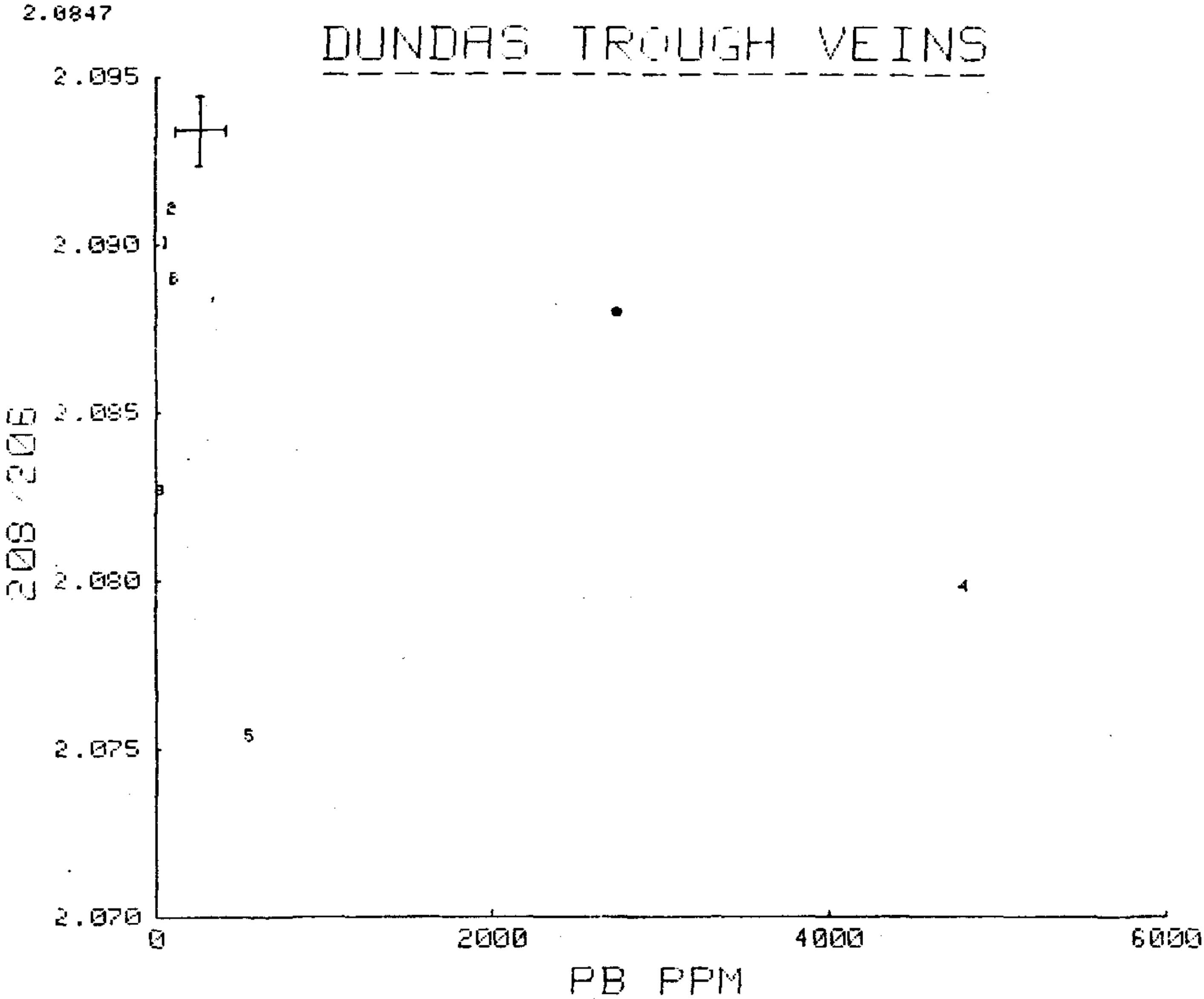

510070

The Shell Company of Australia Limited METALS DIVISION	
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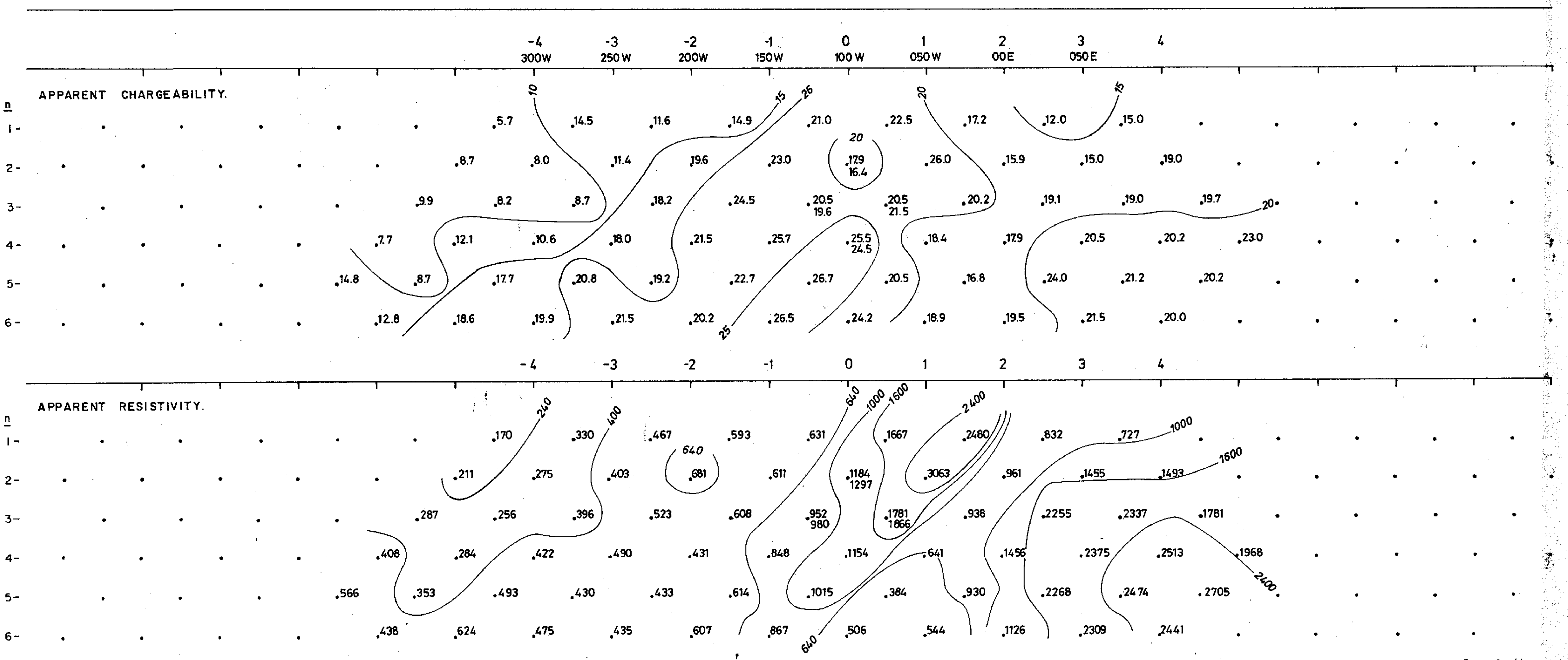
SCALE 1:5000	DATE 21-7-83
AUTHOR W.D.S.	DRAWN J.L.L.
OFFICE DEVONPORT	REP.No.
ENCL No.	DRG No. D/NL01/079

AIRBORNE GEOPHYSICS
(EM, MAG, etc)

GEOLOGY
& TOPOGRAPHY



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Receiver : IPR8
Integration time :
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Dipole length : 50M

5 cm

510071

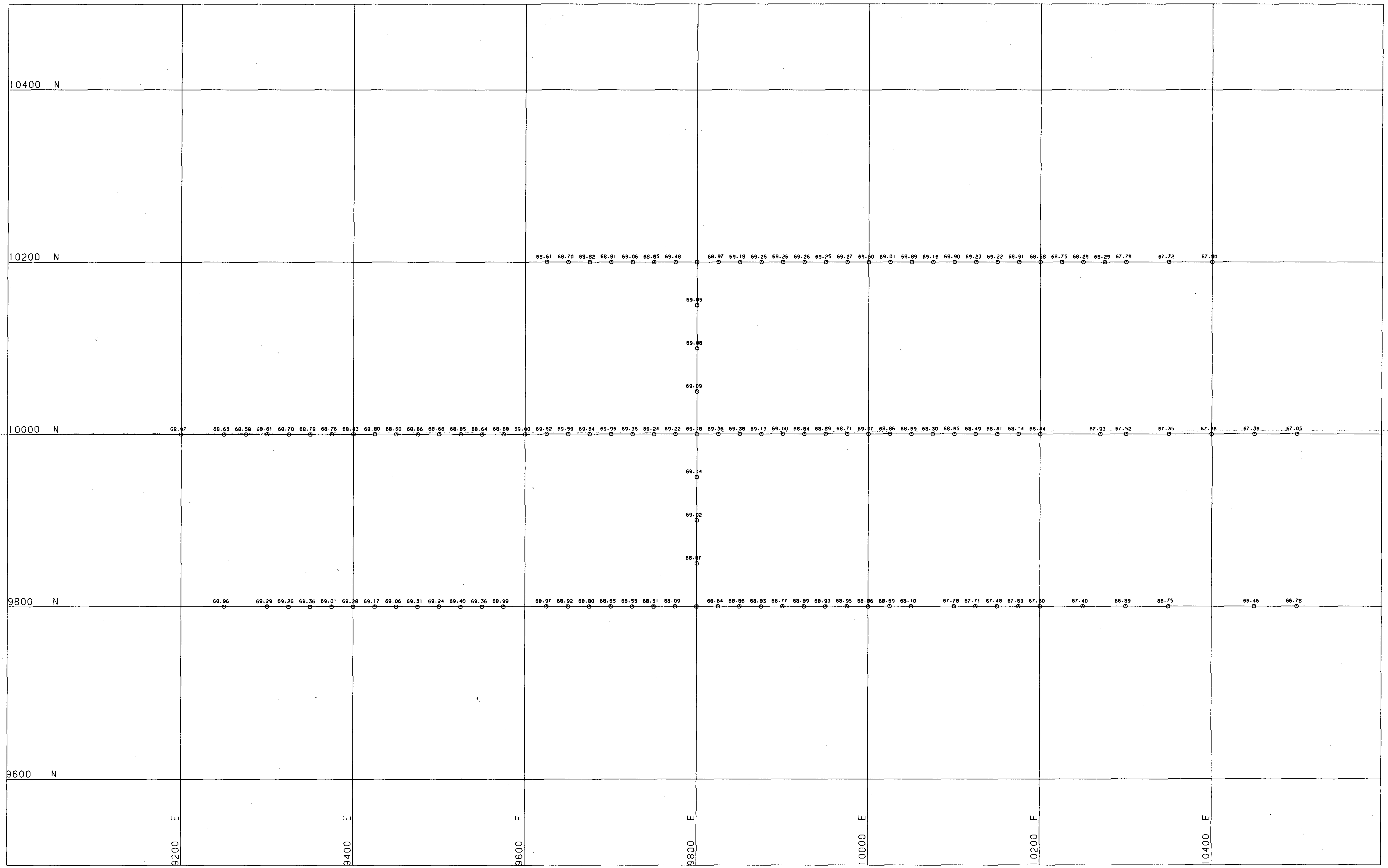
83-2044

The Shell Company of Australia Limited
METALS DIVISION

IP / RESISTIVITY SURVEY
E.L. 22/74 MARIONOAK
LINE 00 N

Scale 1:2500

22
Drg. No. D/NL01/070
7-9-82
Author G. OAKES
Drawn H.L.S.
Office DEVONPORT



SHELL METALS
ORE EVALUATION SYSTEM

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SHELL COMPANY OF AUSTRALIA
METALS DIVISION

BASTYAN DAM
GRAVITY 83-2044
TERRAIN CORRECTED
DENSITY = 2.7

SCALE 1 CM = 25.00 MTRS

FIG.NO:	REPT.NO:
ENCL.NO:	DRG.NO: D/NL01/068
DATE:	AUTHOR:
DRAWN:	OFFICE:

510072

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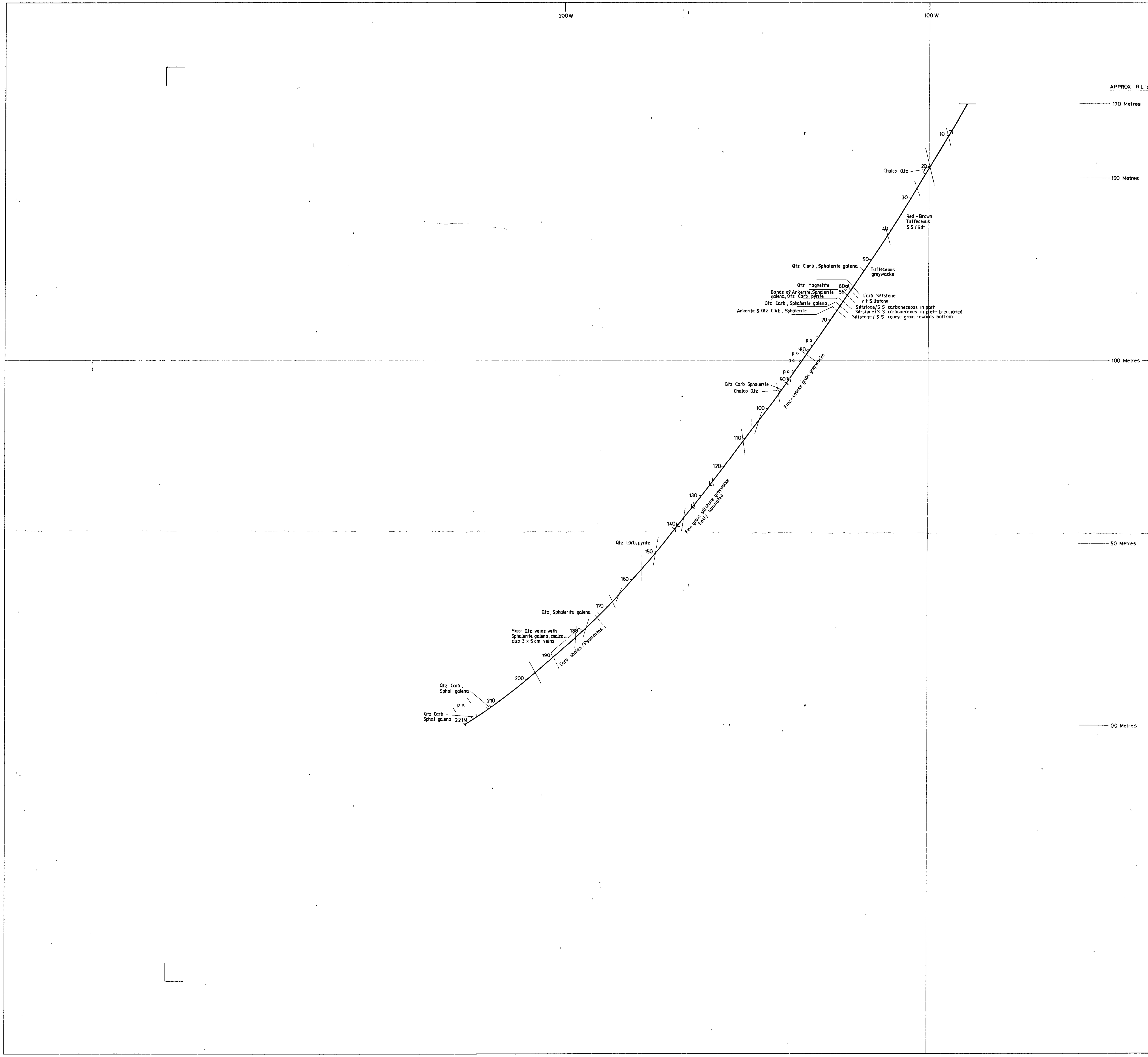

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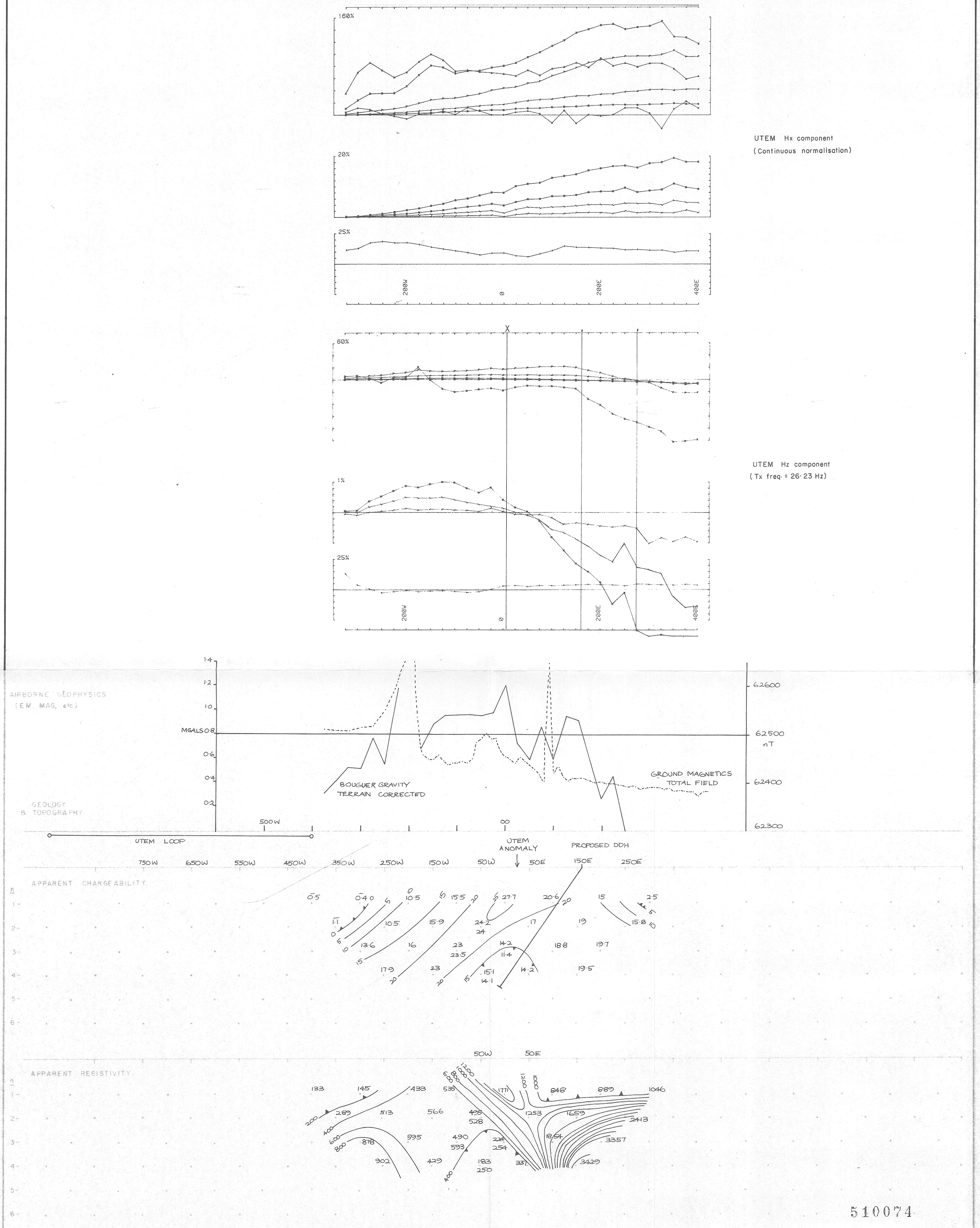
The Shell Company of Australia Limited
METALS DIVISION

E.L. 22/74 MARIONOAK
BASTYAN DAM GRID
DDH SBD1
LITHOLOGY

83-2044

SCALE	1 500	DATE	15-11-82
AUTHOR	W D SMYTH	DRAWN	H L SMYTH
OFFICE	DEVONPORT	REP No	
ENCL No		DRG No	D/NL01/072



510074

83-2044

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Date 11-05-82
Timing 2 SECS
Transmitter IPTA 2 SEC. PULSE
Receiver IPR-8
Integration time 650 - 1170 m.s.
Array DIPOLE - DIPOLE
Dipole length 100m

5 cm

IP/RESISTIVITY SURVEY
E.L. 22/74 MARIONOAK
LINE 200N.
BASTYAN DAM

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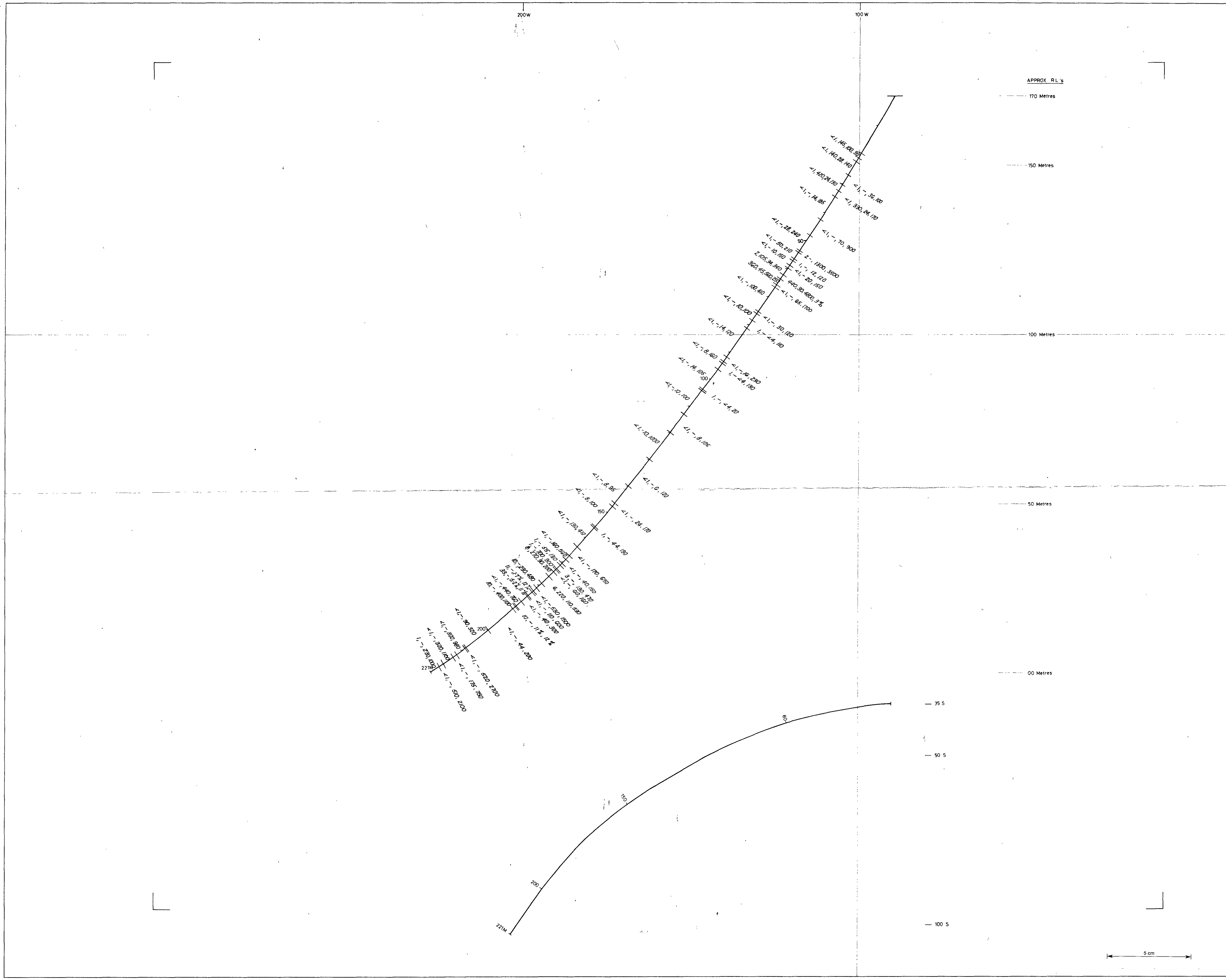
N.H.	O.L.
A.H.O.	
NL 01/1013	9



Ag, Ba, Pb, Zn
(PPM)

510075

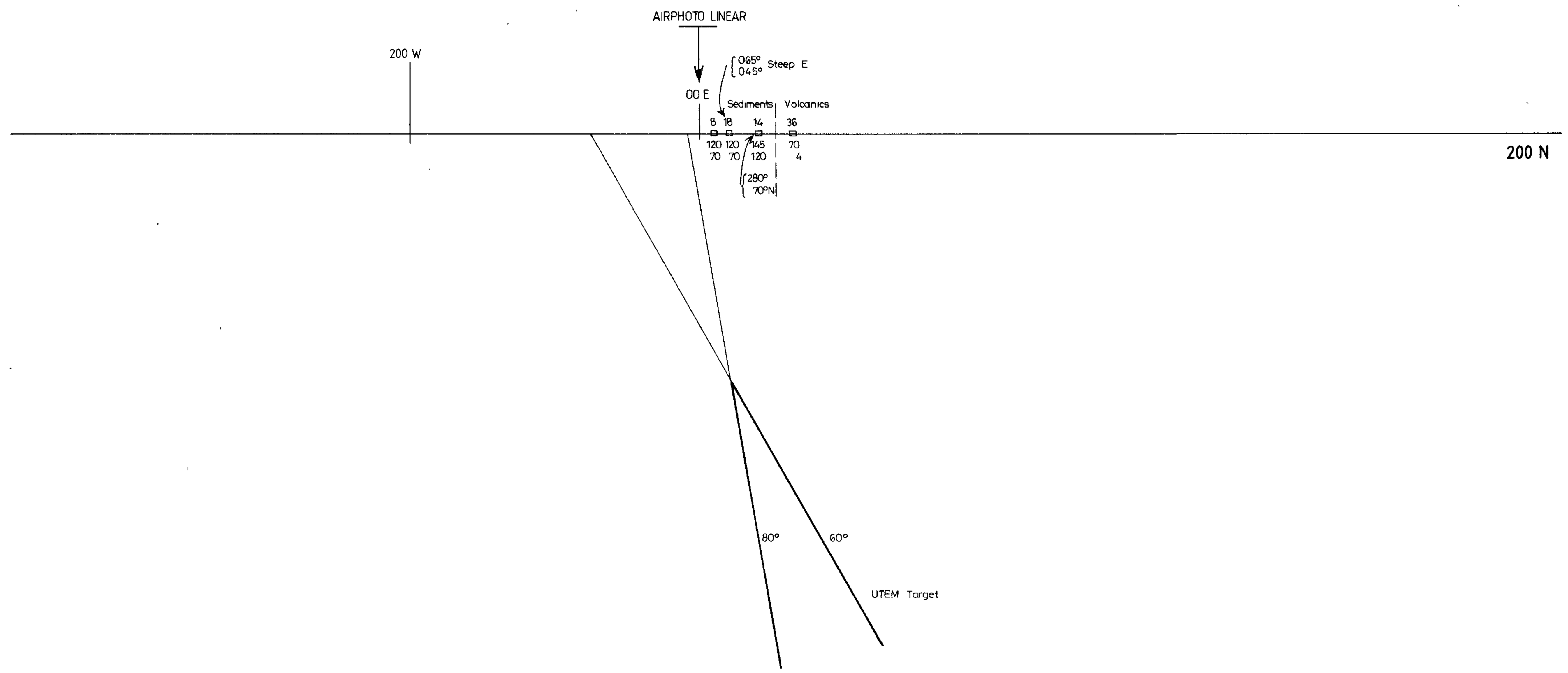
0 10 20 30M

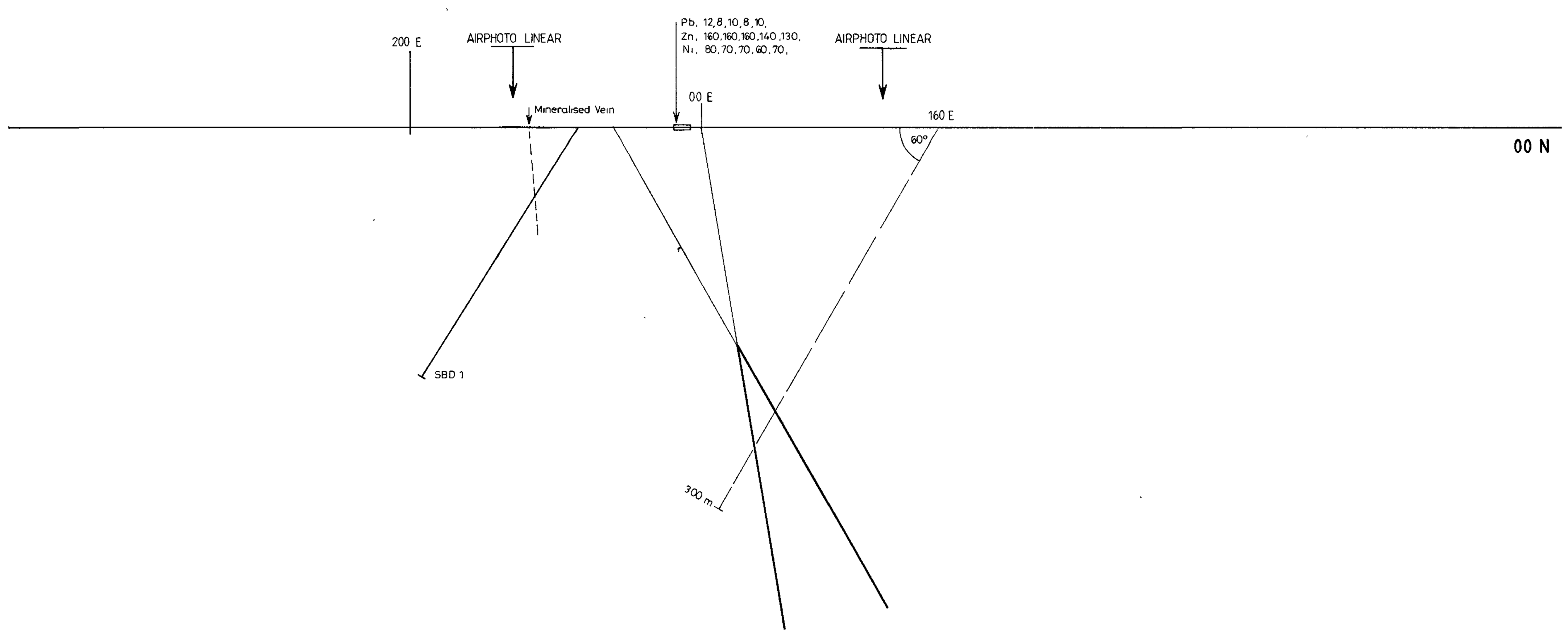
The Shell Company of Australia Limited
METALS DIVISION

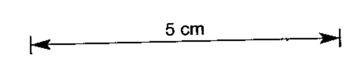
E.L. 22/74 MARIONOAK
BASTYAN DAM GRID
DDH SBD1
ASSAYS

83-2044

SCALE	1:500	DATE	4-3-83
AUTHOR	W.D. SMYTH	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP No	
ENCL No		DRG No	D/NL01/074







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The Shell Company of Australia Limited METALS DIVISION	
E.L. 22/74 MARIONOAK LINE 200 N SECTION LINE 00 N SECTION 83-2044	
SCALE 1 2500	DATE 11-5-83
AUTHOR W D S	DRAWN J L L
OFFICE DEVONPORT	REP No.
ENCL No	DRG No D/NL01/078