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EXPLORATION LICENCE 22/74

MARIONOAK

TASMANIA

REPORT ON EXPLORATION

FOR THE 12 MONTHS TO DECEMBER 1985.

MICROFILMED

DISTRIBUTION

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 Billiton
 Aberfoyle - Hawthorn
 Aberfoyle - Burnie

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ISSUED BY:

J. R. SISE
REGIONAL MANAGER.

April, 1986.

AMG REFERENCE POINTS ADDED

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1. EL 22/74 - Marionoak River Exploration
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1.

SUMMARY

Exploration Licence 22/74 (Marionoak) of 37 square kilometres is situated near the Bastyan Dam, west of Rosebery in Western Tasmania. The licence is explored under the terms of the Marionoak Joint Venture between Billiton Australia and Aberfoyle Resources Ltd. Currently both parties hold a 50% interest, with exploration during the first half of 1986 being managed by Aberfoyle.

The 1985 exploration programme involved a CSAMT survey and SIROTEM surface soundings followed by a thorough review of all geophysics conducted on the property. The diamond drill hole completed during 1984 was logged in detail, petrologically and geochemically sampled, measured for susceptibility and conductivity and sampled for lead isotope analysis. A total of \$23,790 was expended during the year ended 11th November, 1985.

The CSAMT survey confirmed the presence of a conductor at a depth of 500-600 metres on the Bastyan Dam grid. The 1984 drill hole was too shallow to intersect this target. The conductive source appears to plunge to the south, indicating that there may be exploration potential at a reasonable depth to the north. Core grind analyses revealed three zones of weakly anomalous lead-zinc values. The best of these (10m at 1700 ppm Pb and 6700 ppm Zn) coincides with a tectonic sulphidic breccia. Weak tin values negate the possibility of the conductor being related to a hydrothermal tin system.

During 1985 the conductor will be traced with CSAMT on 400 m spaced cut lines from its known position towards the geochemically anomalous zone to the north. Geological mapping, soil geochemical sampling and ground magnetics will be completed on the grid. Should a significant shallowing of the conductor be detected, and the geological and geochemical setting prove encouraging, then drilling may be proposed for the latter half of 1986.

INTRODUCTION

This report describes exploration activities on EL 22/74 - Marionoak during the 12 months to December 1985. The Statement of Expenditure pertains to the Aberfoyle budget year ended 11th November, 1985.

The Exploration Licence of 37 square kilometres is situated approximately 5 kilometres north-west of Rosebery in Western Tasmania (Figure 1). Currently, the main area of activity is the Bastyan Dam grid, which straddles the sealed Lower Pieman Dam road.

The licence is current until 26th February, 1987 and may be renewed for a further year through to the final expiry date of 26th February, 1988. No reduction in area is required during this period. The annual expenditure commitment is \$18,500.

The licence is explored under the terms of the Marionoak Joint Venture between Billiton Australia (the metals division of the Shell Company of Australia Limited) and Aberfoyle Resources Limited. Currently both parties hold a 50% interest with Aberfoyle acting as manager.

The following report is in 3 sections representing separate technical studies completed on the property during 1985. Section 1 documents the CSAMT survey conducted by Zonge Engineering and Research Organisation, Section 2 is a review of all geophysics completed on the Marionoak licence by N. Hungerford of Billiton and E. T. Eadie of Aberfoyle, and Section 3 by J. A. Anderson of Aberfoyle, describes geological and geochemical activities. Each section includes specific conclusions and recommendations which are summarised in the first part of this report.

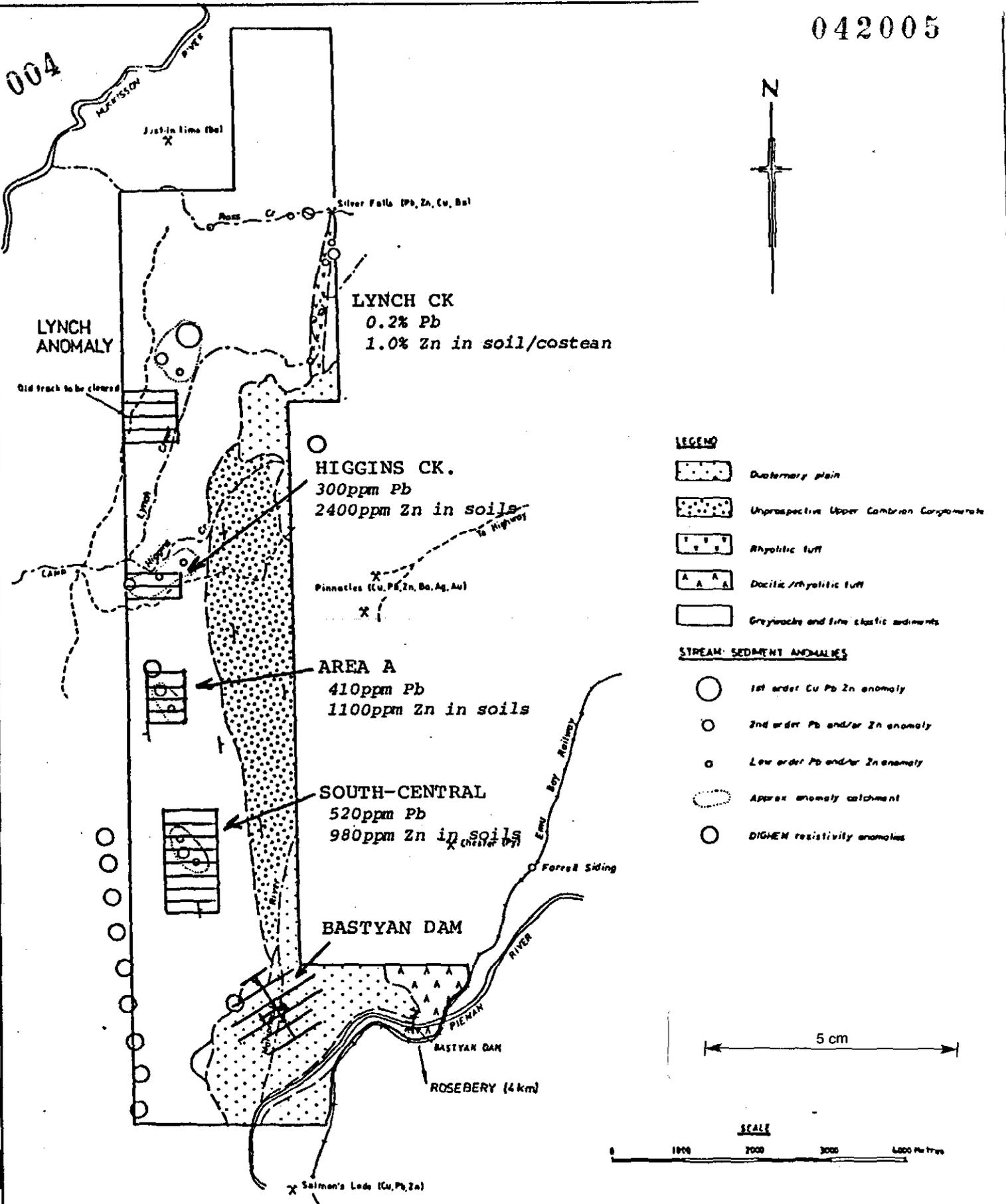


FIGURE 1.

ABERFOYLE EXPLORATION PTY. LTD

DRAWN I.B.F.	NORTH WEST TASMANIA EL22 74 - MARIONOAK RIVER EXPLORATION SUMMARY MAP	LOCATION CODE
TRACED R.X.Y.		SCALE 1:50,000
CHECKED		DATE OCT 1974
REVISED ON DATE 17-6-81		PLATE NO

SECTION 1.

Report on CSAMT Measurements
Marionoak Project
Waratah Shire, Tasmania
For Aberfoyle Exploration Pty., Ltd.

Report on CSAMT Measurements
Marionoak Project
Waratah Shire, Tasmania
For Aberfoyle Exploration Pty., Ltd.

July 11, 1985

INTRODUCTION

During the month of February, 1985, Zonge Engineering and Research Organization (ZERO) performed a controlled source audio-frequency magnetotelluric (CSAMT) survey at the Marionoak Prospect of Aberfoyle Exploration Pty., Ltd. Of the twelve stations which were collected, ten stations used an a-spacing of 100 meters, and two stations used a 50-meter a-spacing. The line of 100-meter stations was positioned to allow the CSAMT data to be correlated with UTEM data collected at the same site. The station centers were located at roughly 100-meter intervals along a portion of Stringers Creek Road which passes through the survey area. In every case the electric field dipoles were oriented N 45 W to be parallel to the transmitting dipole, and the magnetic field coil was oriented N 45 E to be perpendicular to the transmitting dipole.

A 1000-meter long transmitting dipole was built twelve kilometers to the northeast and oriented N 45 W. The crew was able to transmit two amperes of current into this dipole at all frequencies. A frequency range from 16 to 4096 Hz in binary intervals was used for the survey. The southeast electrode was located near the intersection of Highway A10 and the road up to Bulgobac Hill. A major electric powerline crosses the highway from the northeast a few hundred meters south of this electrode and continues to the southwest, but it does not come any closer than about two kilometers to the survey site. A small feeder powerline terminates near the east end of the receiver line, and it is probably responsible for contaminating the data at the higher frequencies for some of the stations.

007

Marionoak

DATA REVIEW

Line 1 is comprised of 10 stations positioned along Stringers Creek Road. The northern-most station (station 3) is severely contaminated by powerline noise.

Several interesting features are observed in the data from this line. At first glance the Cagniard resistivity data tend to indicate that there is a conductive feature on the southern half of the line, south of station -1. The northern edge of this anomaly coincides with the projected UTEM anomaly from Loop 2.

However, the phase data, (although somewhat noisy due to low transmitter current and powerline noise) are relatively homogeneous in this area, and the log-log resistivity plots display characteristics of static offsets. Adjusting this data set for static effects by normalizing to the average of the bottom five frequencies on each station, produces an "anomaly free" pseudosection as shown in the STATIC OFFSET CORRECTED RESISTIVITY pseudosection. Apparently this "deep" conductive feature is really a surface conductive unit occurring between stations -1 and -6.

Another interesting aspect of this data set is that the electric field data and the Cagniard resistivity show a general medium-over-high-over-low resistivity layering environment. This is also seen in the phase data. However, the log-log plots of the H-field data show a high-over-very-high electrically layered response. Converting the H-field values to apparent resistivities (see MAGNETIC FIELD APPARENT RESISTIVITY pseudosection) confirms this observation. Resistivity values for 16 and 32 Hz are not reliable due to near-field saturation. The absolute values of these resistivities are not correct due to the unavailability of accurate measurements between transmitter dipole and receiver stations. Dimensions were approximated from

Marionoak

rough field maps. However, the relative values are meaningful, and they present a totally different picture of the electrical response of the ground as compared to the Cagniard resistivity.

Why the difference? My guess is that we are seeing the affects of anisotropy, and that the low resistivity basement obtained in the Cagniard resistivities is an artifact of this anisotropy--possibly due to nearly vertically dipping layered sediments. The large phase numbers at depth are then also considered to be due to anisotropy.

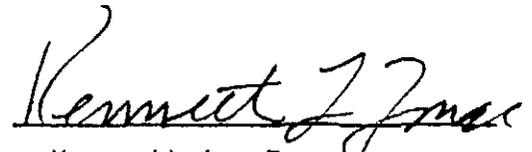
It is interesting to note the change in phase values at the lower frequencies as one goes from north to south. It appears that the ground becomes more anisotropic south of station 0. This could possibly be due to a fault, or a contact, or due to a fold or other mechanism that would change the bedding pattern in this vicinity.

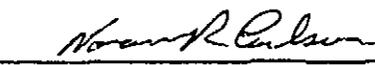
The two stations taken offline west of station 1 on line 1, show basically the same type of background response as seen on line 1.

Marionoak

SUMMARY

The conductive feature seen between stations -1 and -6 is interpreted to originate from a shallow surface layer. The northern edge of this layer coincides with the interpreted UTEM conductor from Loop 2. The high phase angles and lower resistivities at depth are interpreted to be due to anisotropic effects possibly due to vertically standing, bedded sediments. A lateral change is noted in the phase data on either side of station 0, indicating the possibility of a fault, a contact, or a change in the anisotropic characteristics in the rock in this vicinity.


Kenneth L. Zonge


Norman R. Carlson

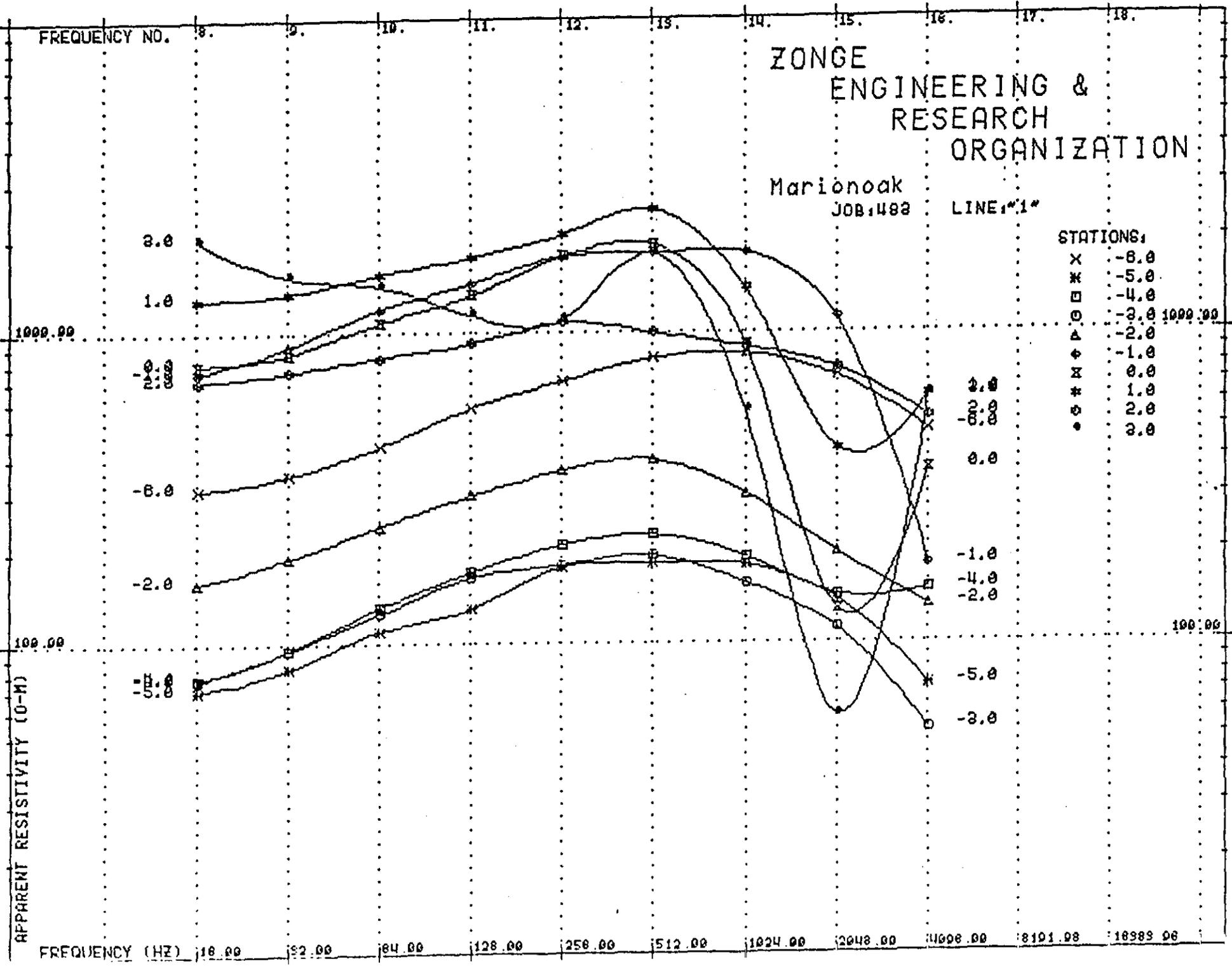
ZONGE ENGINEERING & RESEARCH ORGANIZATION

Marion oak
JOB: 482

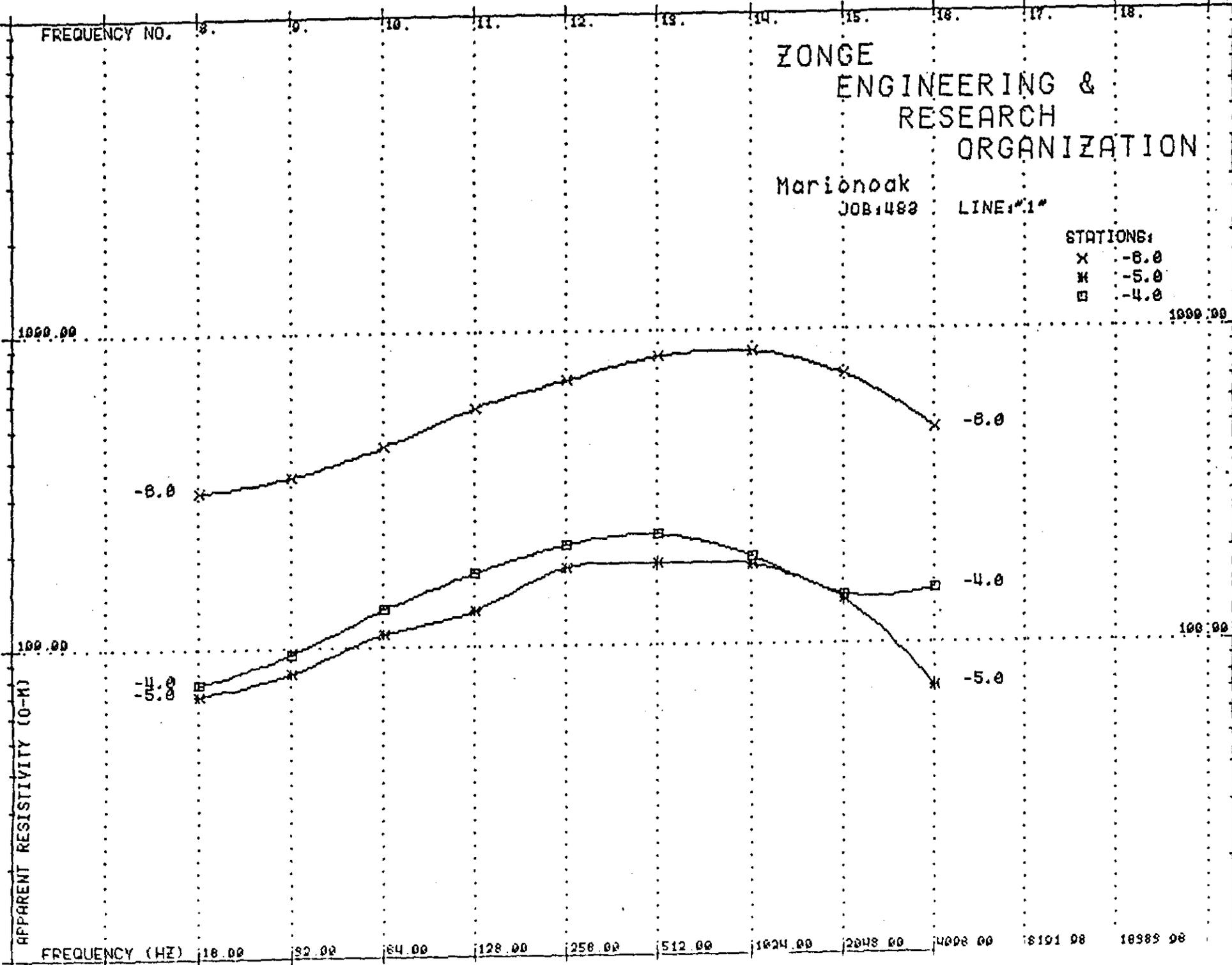
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STATIONS:

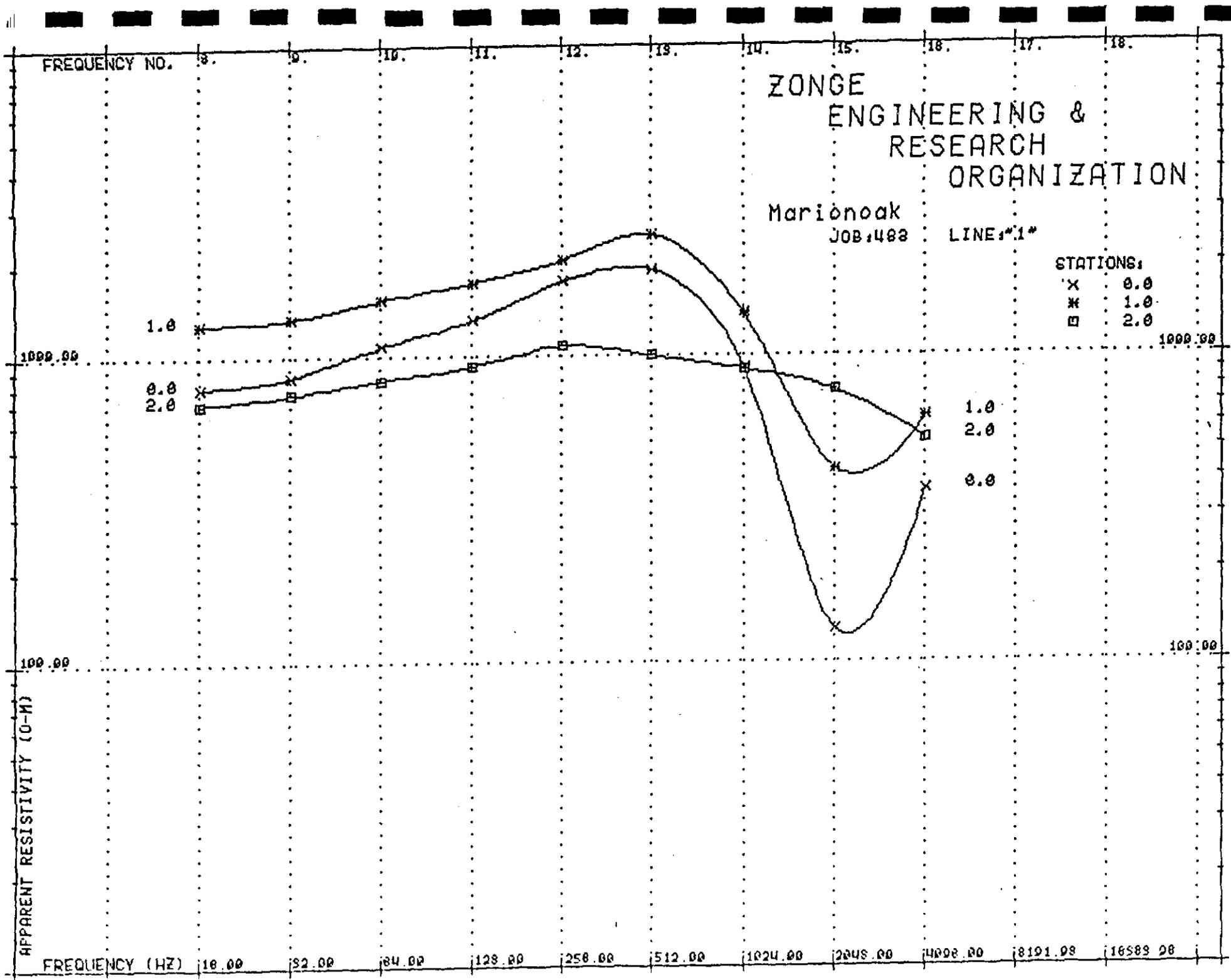
- X -6.0
- * -5.0
- -4.0
- -3.0
- △ -2.0
- ◇ -1.0
- ⊕ 0.0
- ⊗ 1.0
- ⊙ 2.0
- 3.0



011



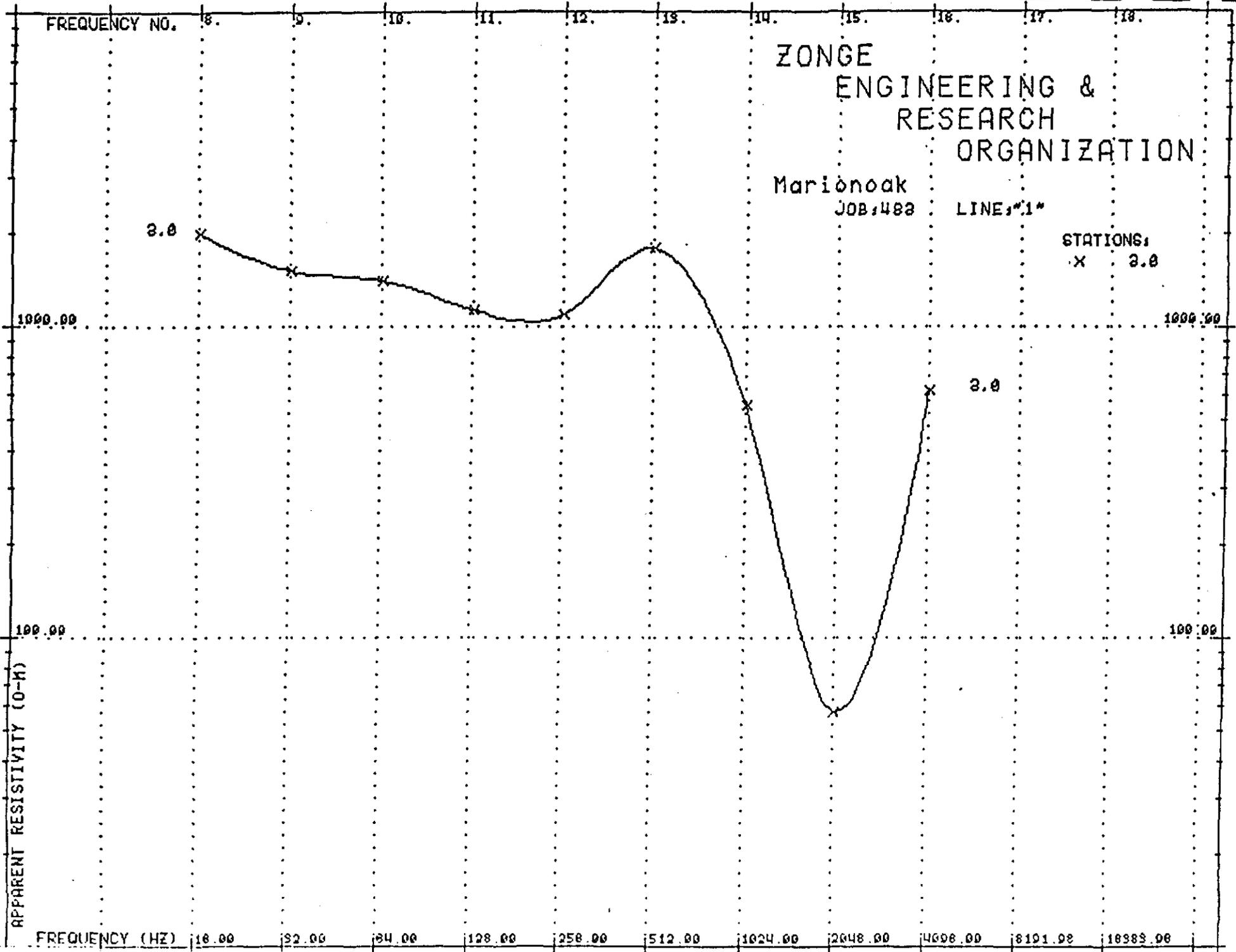
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013

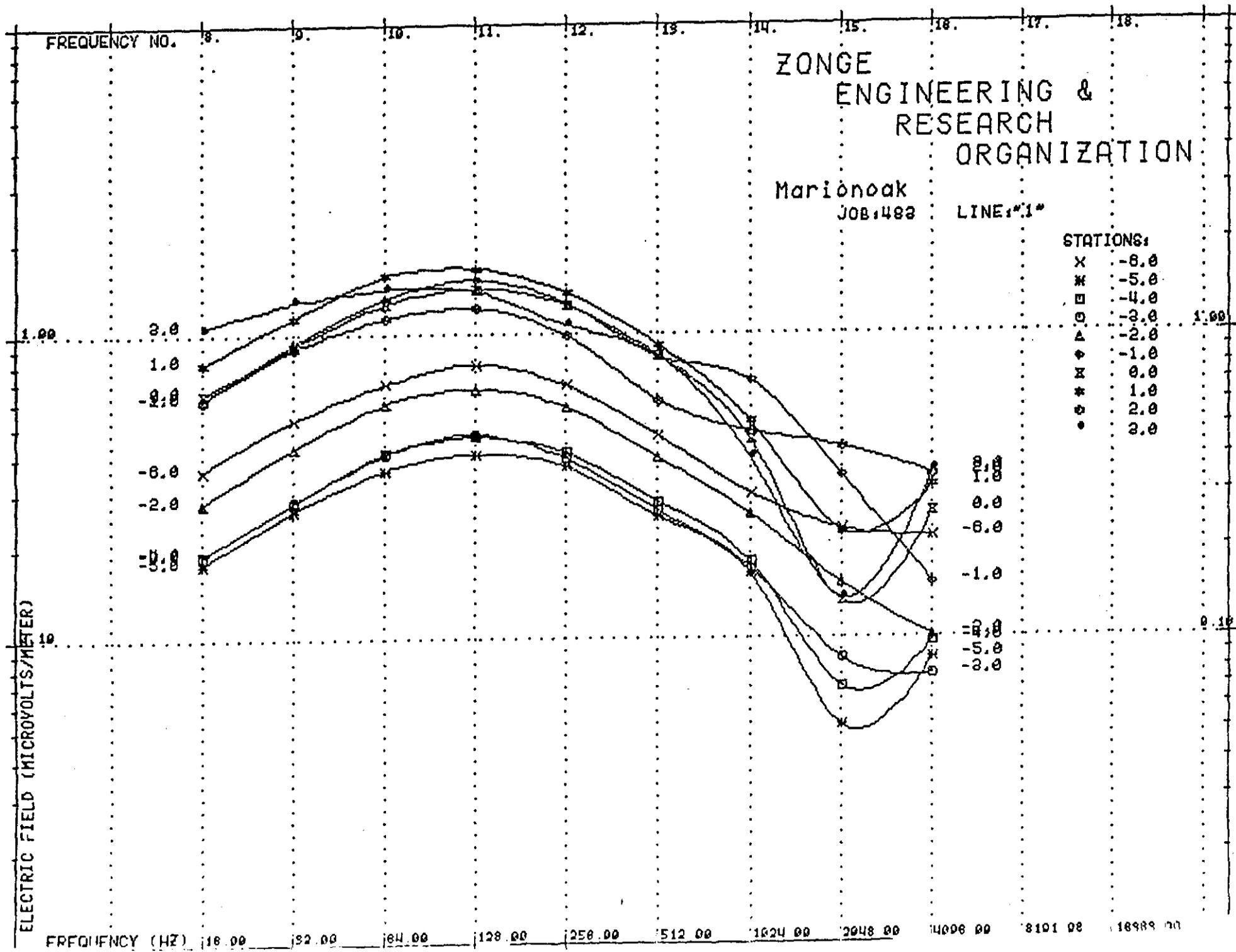
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014

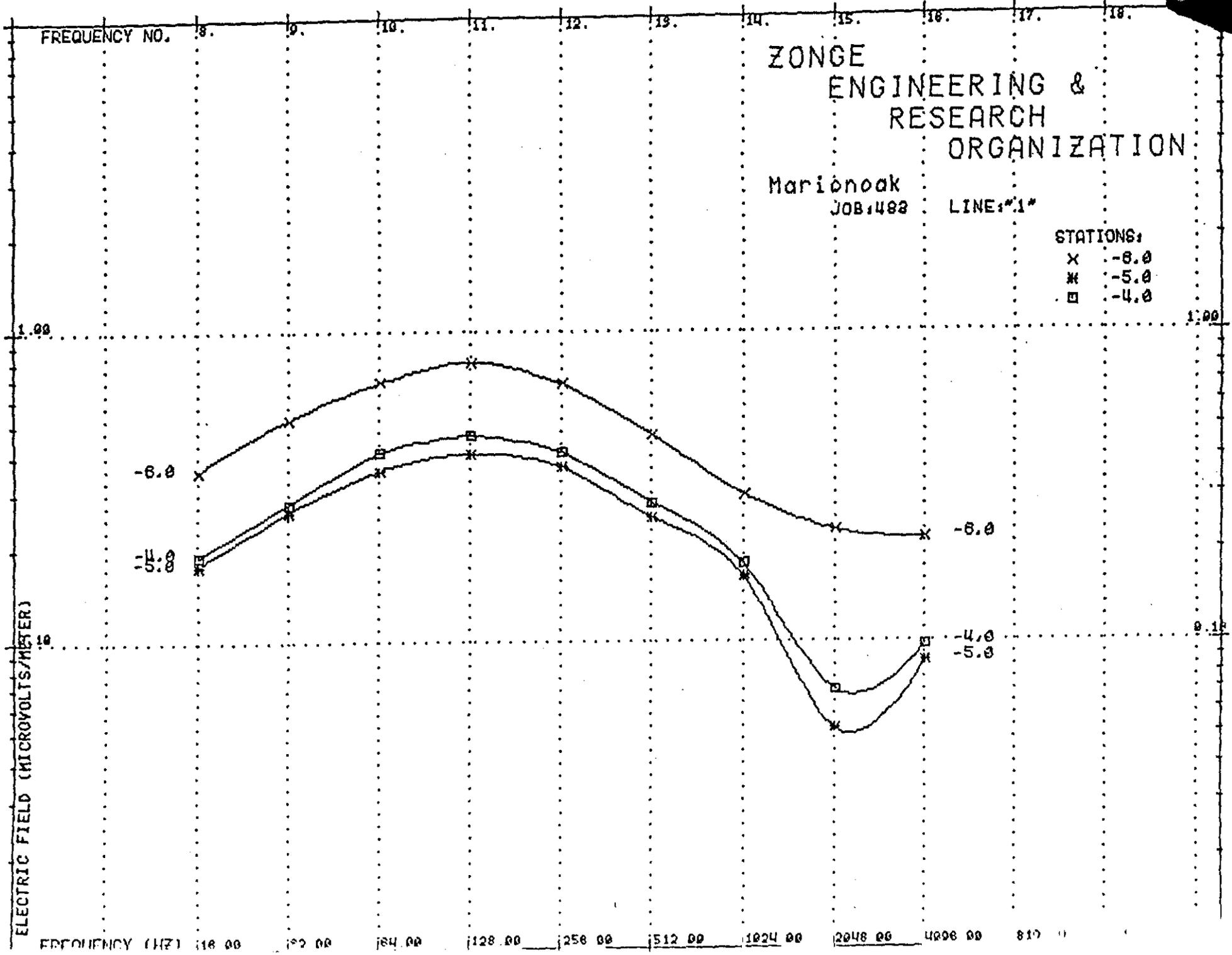


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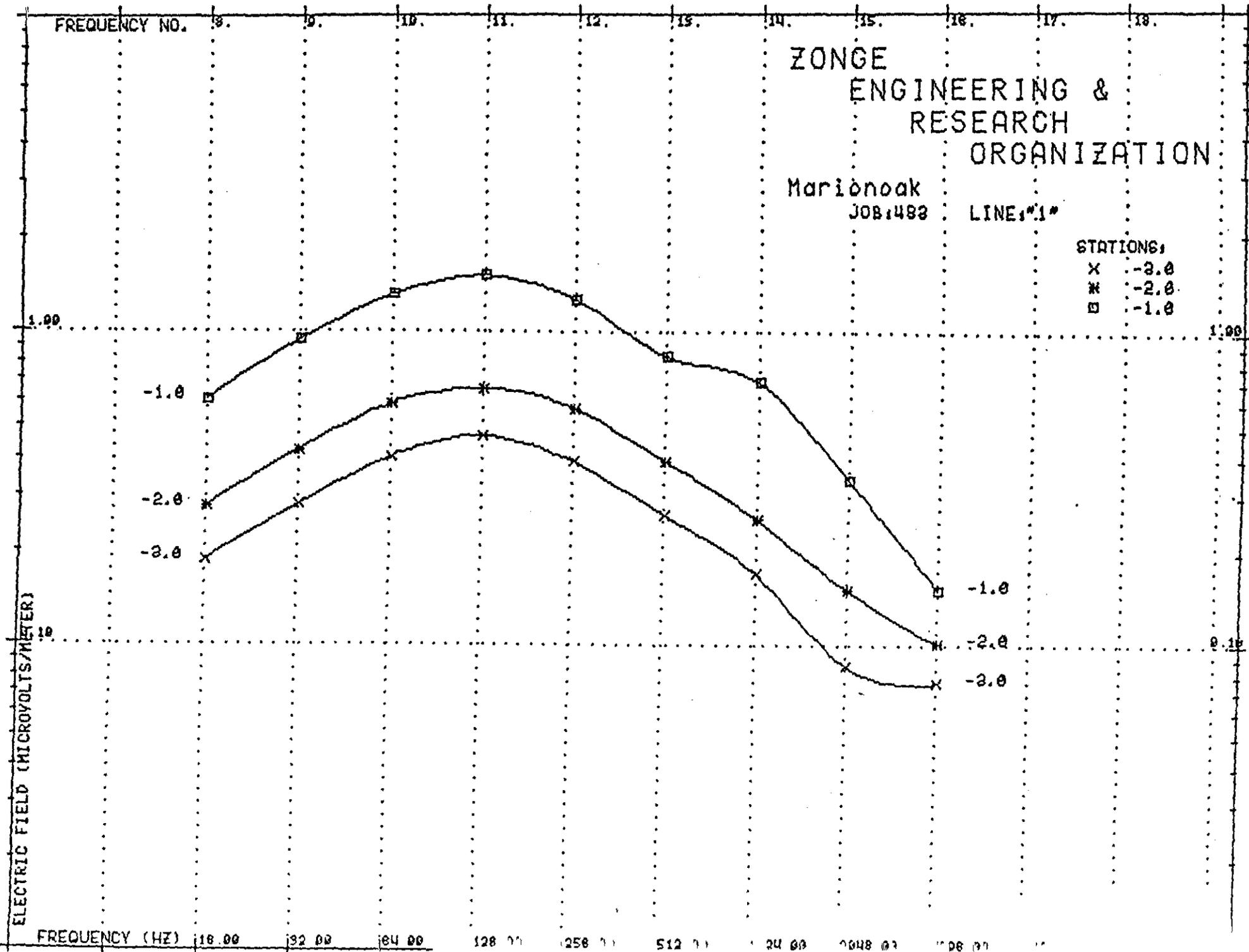
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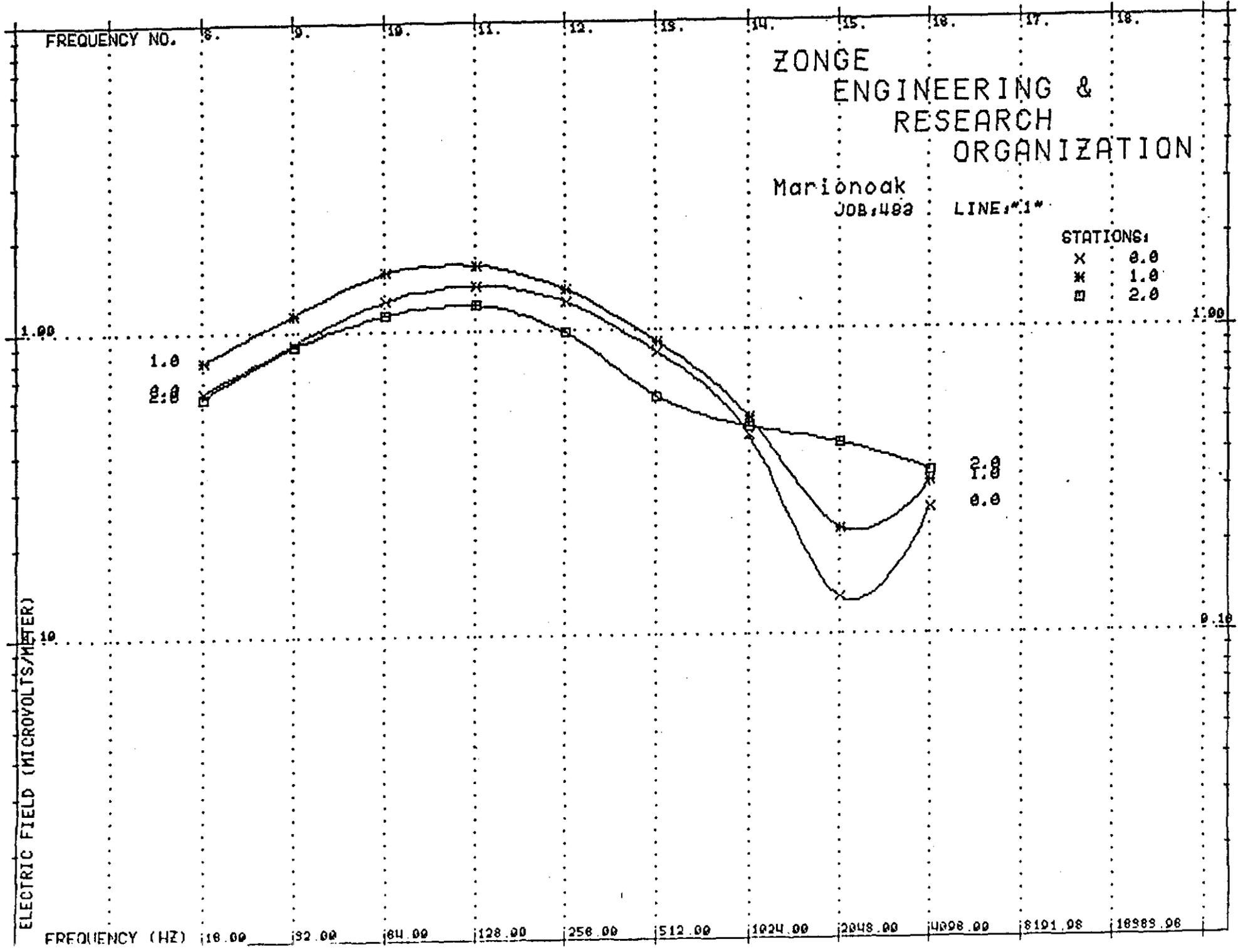


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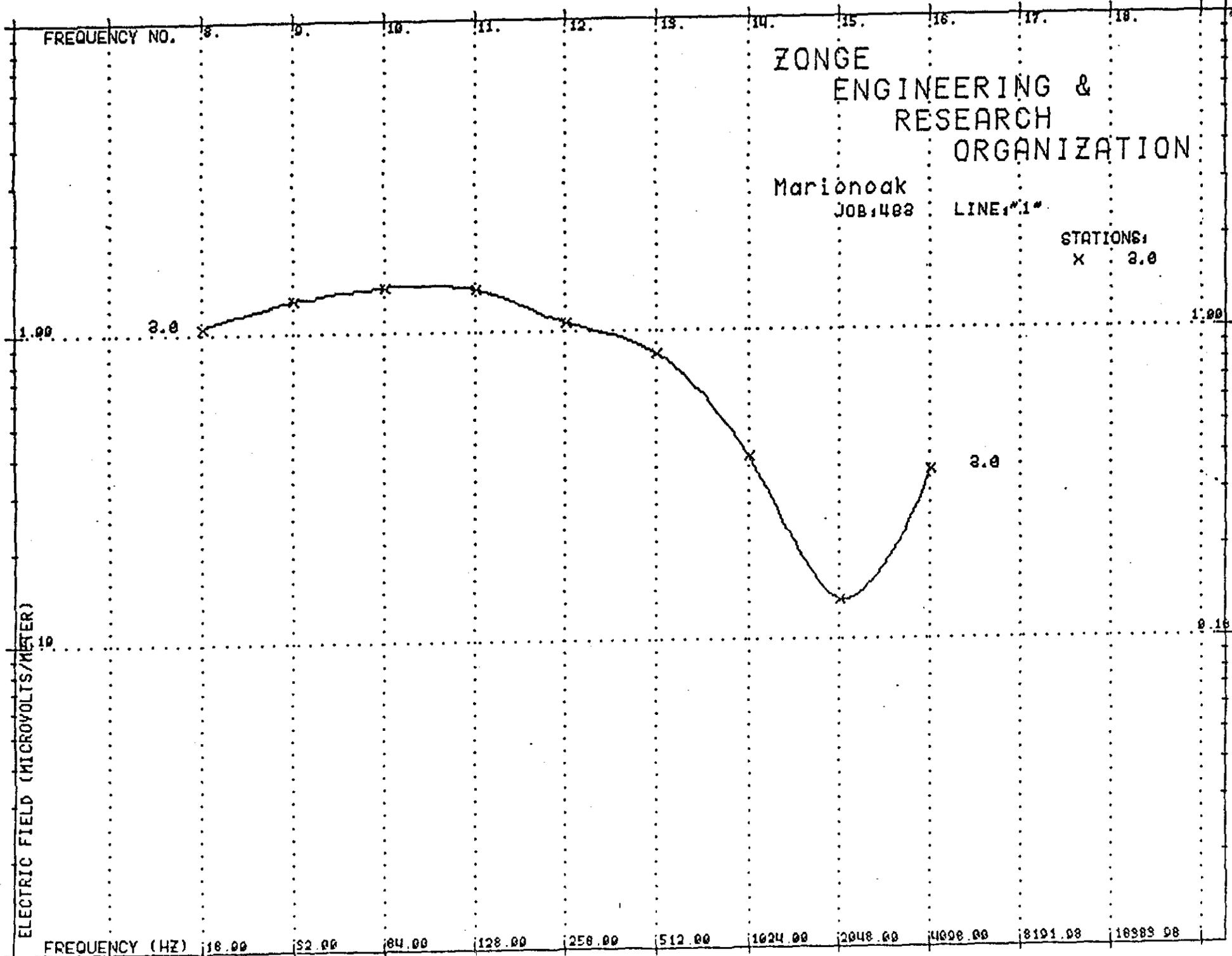
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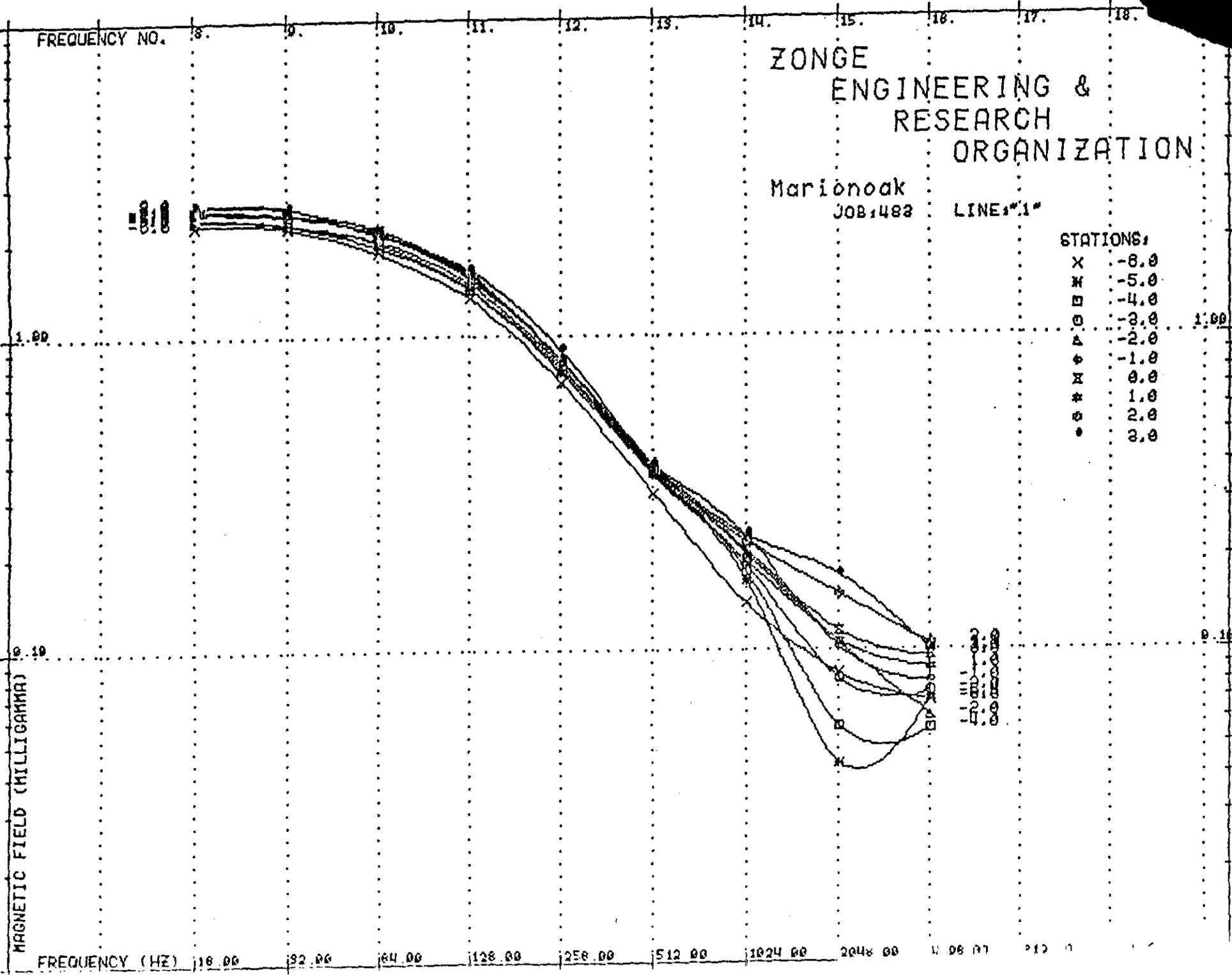
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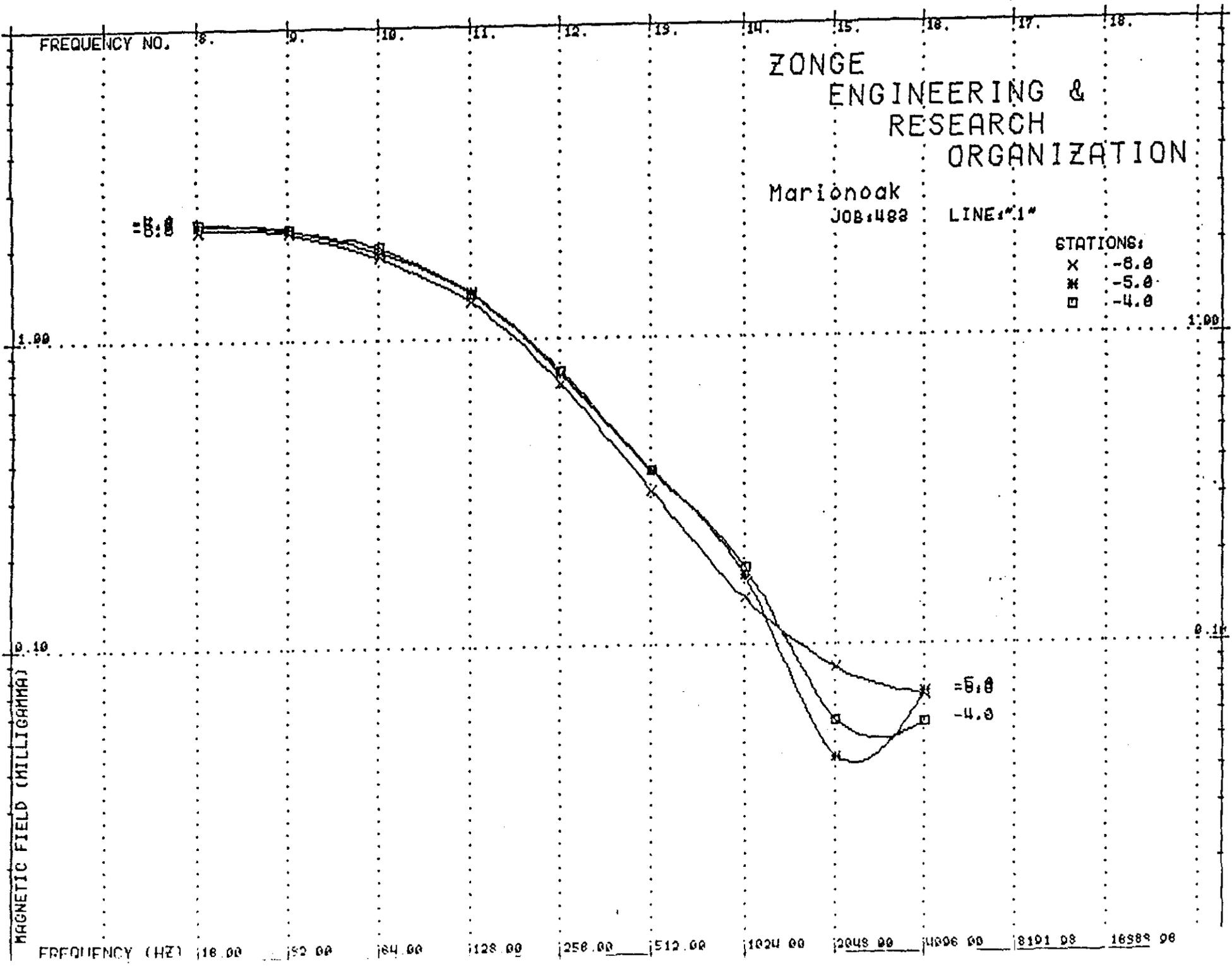


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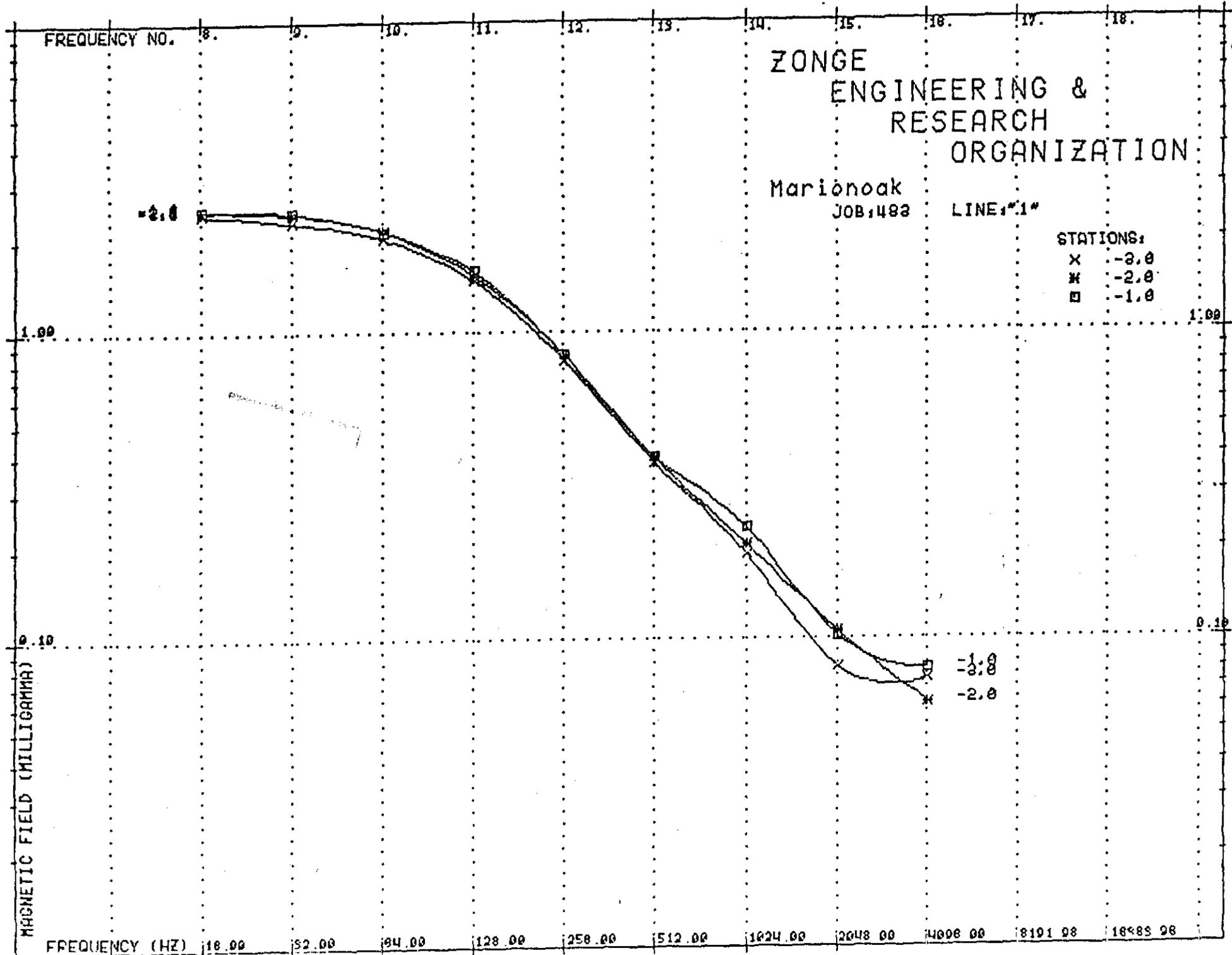
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042021



042022



022

042023

023

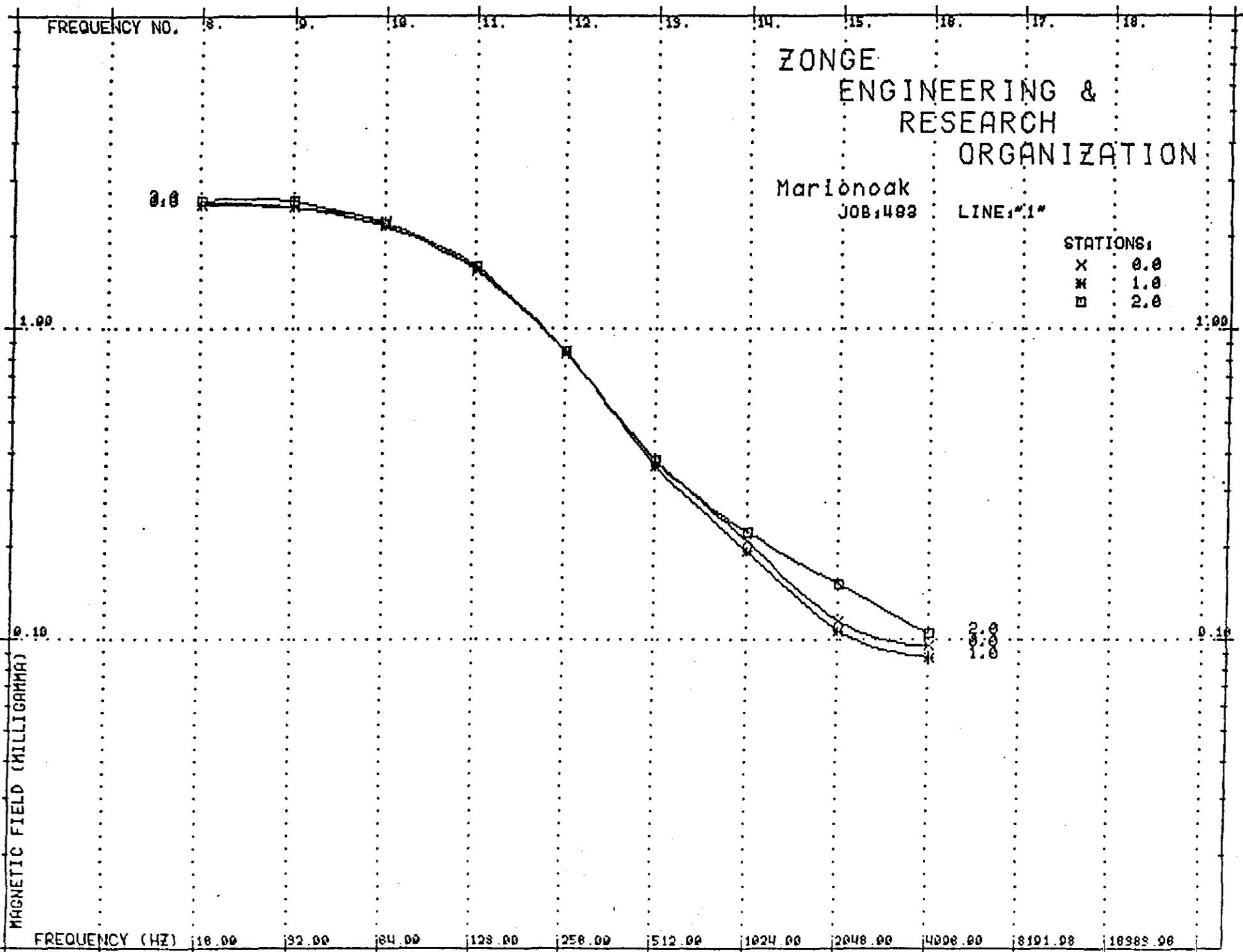
ZONGE ENGINEERING & RESEARCH ORGANIZATION

Marionook
JOB: 492

LINE: "1"

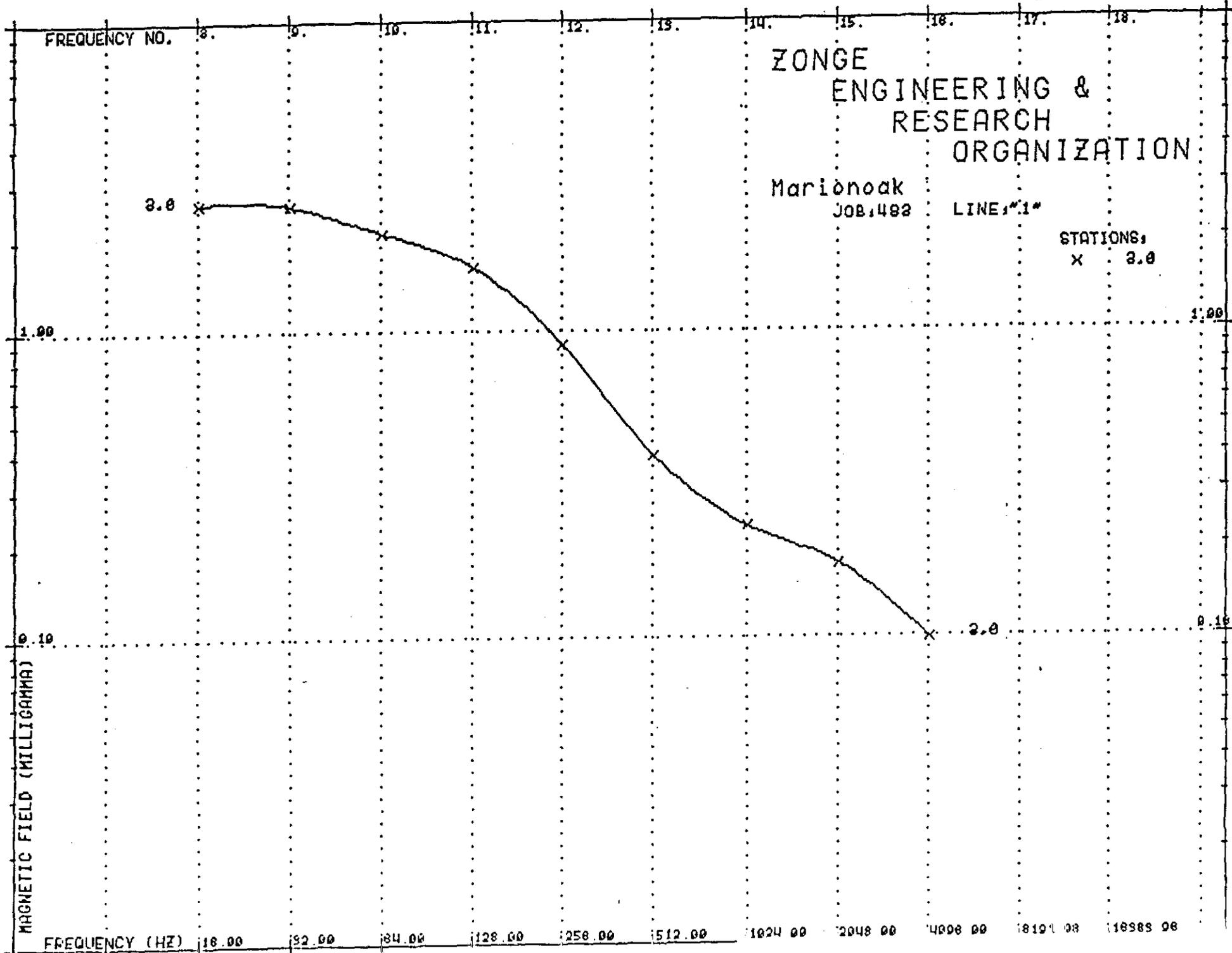
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*	1.0
□	2.0

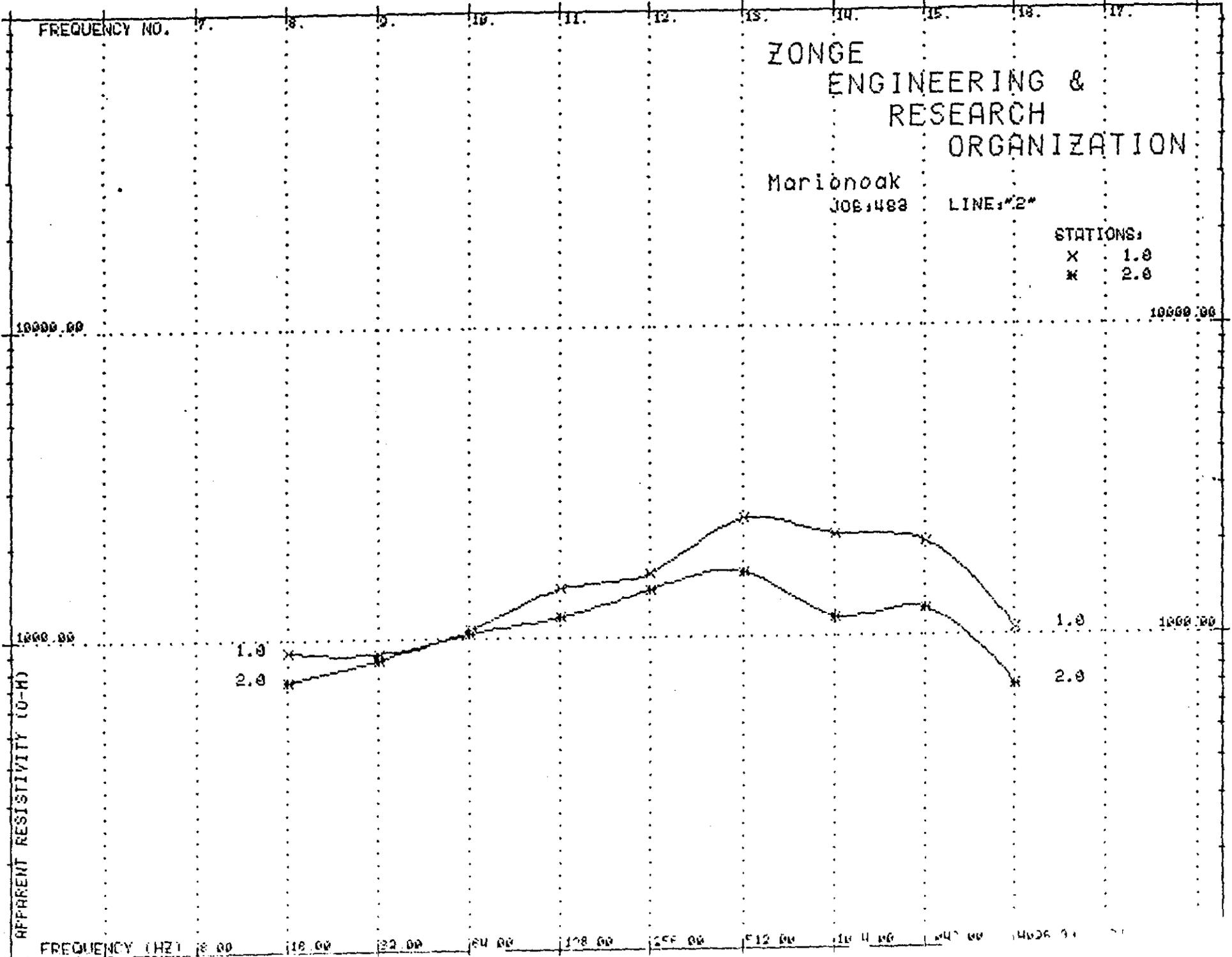


042024

02A

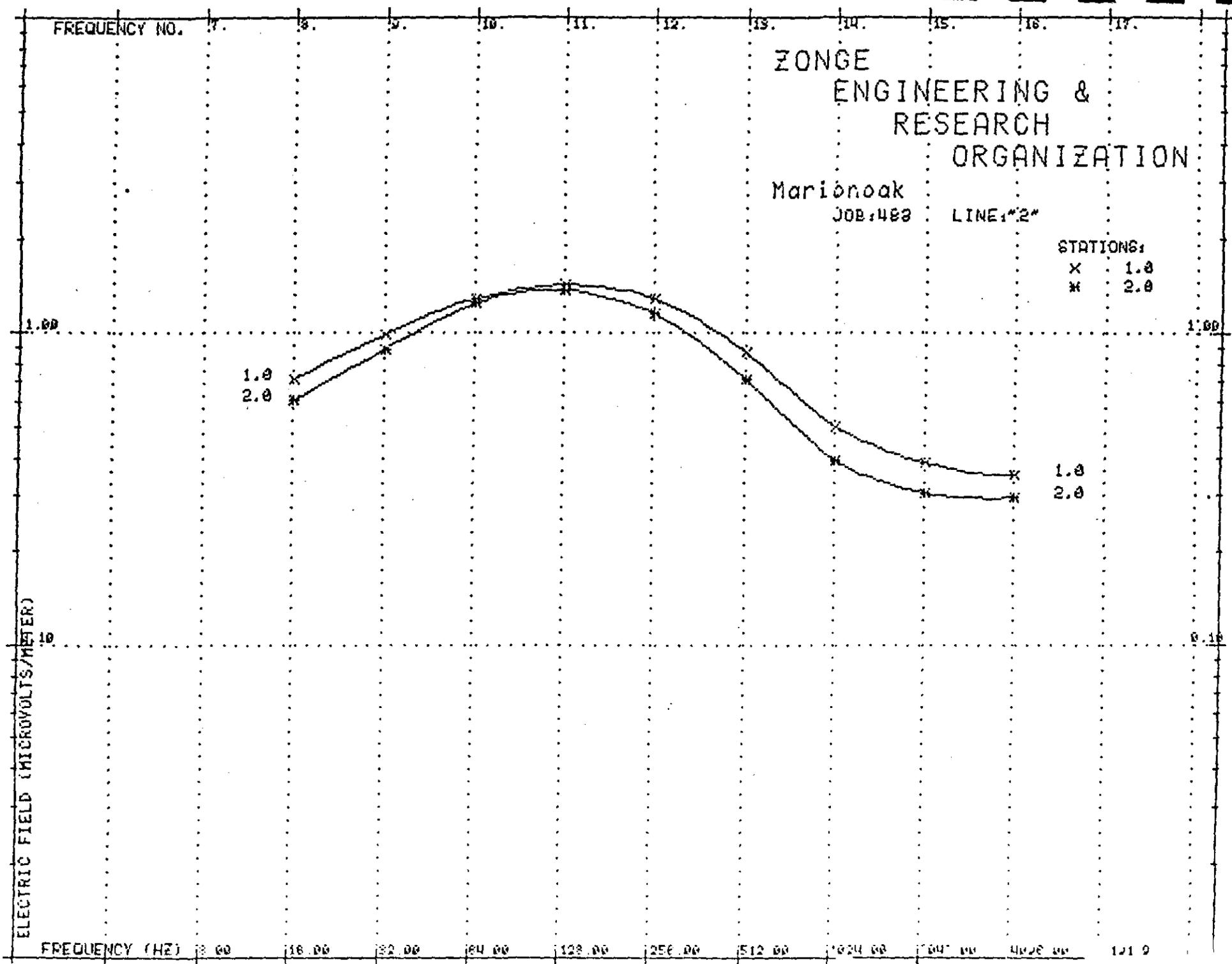


042025



042026

026



042027

FREQUENCY (HZ)

ZONGE
ENGINEERING &
RESEARCH
ORGANIZATION

027

Marion oak
JOB: 483 LINE: "2"

STATIONS:
X 1.0
* 2.0

MAGNETIC FIELD (MILLIGAUSS)

1.00

0.10

1.00

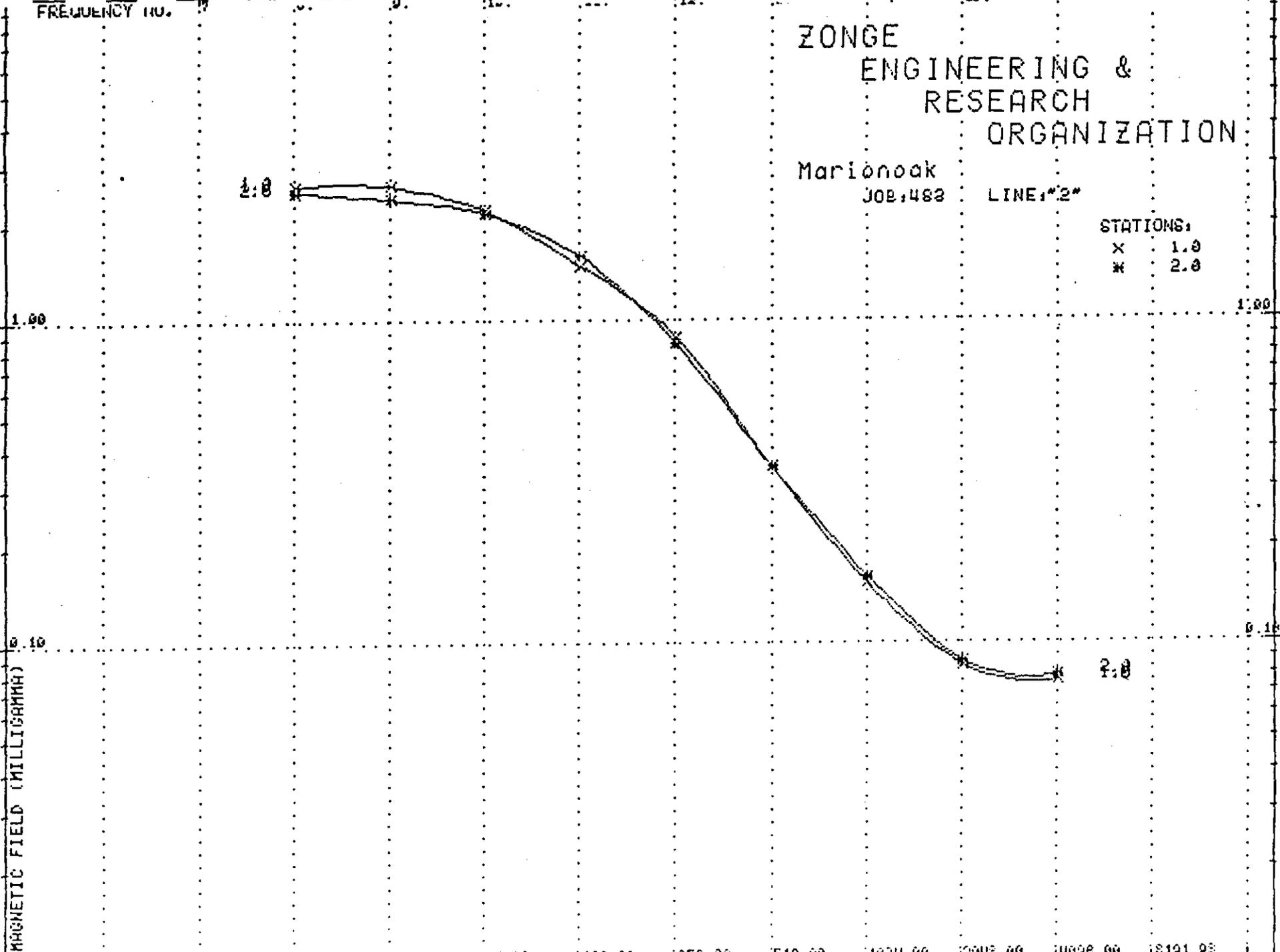
0.10

2.0

2.0

FREQUENCY (HZ) 2.00 18.00 32.00 64.00 128.00 256.00 512.00 1024.00 2048.00 4096.00 8191.00

042028



5 cm

Line "1"
Marionook
for
ABERFOYLE EXPLORATION PTY., LTD

Zone # 483
Plot by CFLOT 31
Plotted MED. JUL 14 1985



ZONE ENGINEERING &
RESEARCH ORGANIZATION

CSAMT SURVEY DATA
CAGNIARD RESISTIVITY
values in ohm-meters

RECEIVER DATA

Dipole Length: 100.m
Stn. Spacing: 100.m
Date of survey: Feb 85

Line Orient: Varies
Dipole Orient: Varies

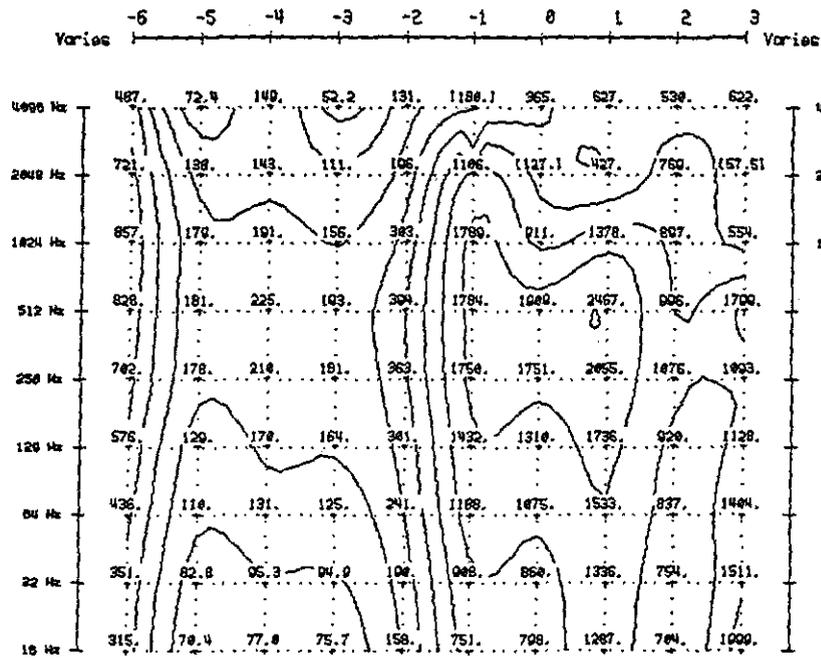
TRANSMITTER DATA

Length: 1000 m
Orient.: N 45 W
Distance: 12 km
Rx to Tx: NE

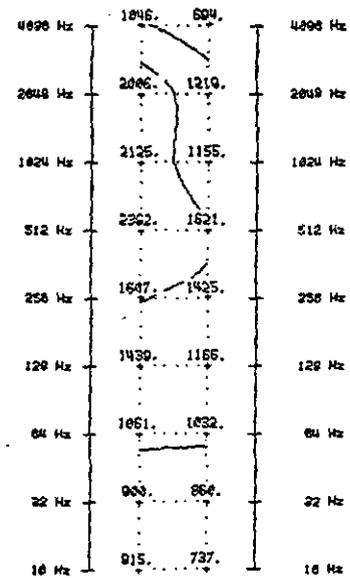
Plot limits and LOGARITHMIC CONTOURS (Interval: 0.20)

152.2
63.1
100.
150.
251.
300.
631.
1000.
1505.
2512.
12540.7

Line "2"

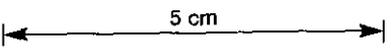


N 45 W 1 2 S 45 E



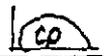
042029

010



Line "1"
Marion oak
for
ABERFOYLE EXPLORATION PTY., LTD

Zone # 483
Plot by CPLT 31
Plotted MED, JUL 18 1985



ZONGE ENGINEERING &
RESEARCH ORGANIZATION

CSAMT SURVEY DATA
PHASE DIFFERENCE (E phase - H phase)
values in milli-radians

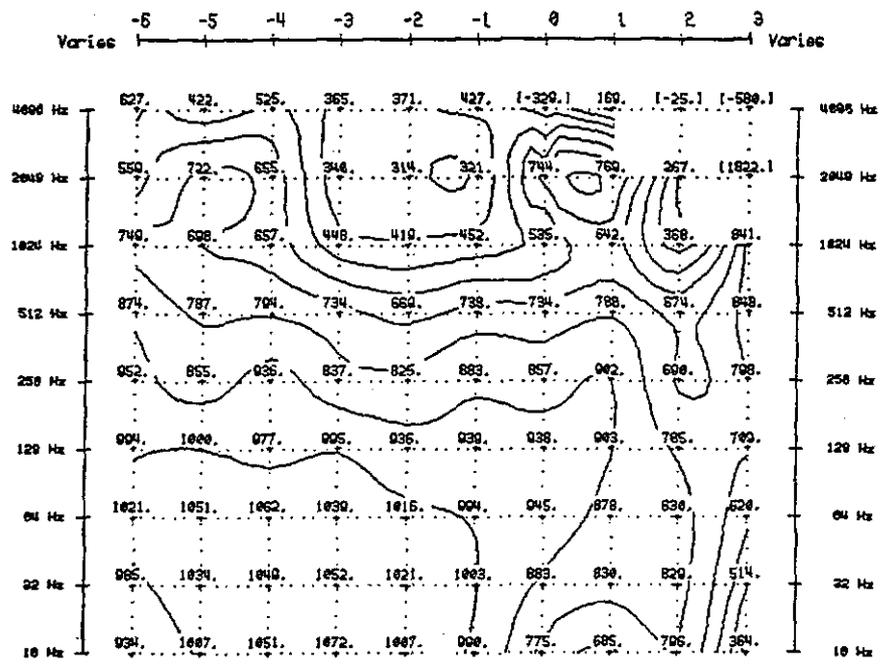
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Stn. Spacing: 100.m
Date of survey: Feb 85

Line Orient: Varies
Dipole Orient: Varies

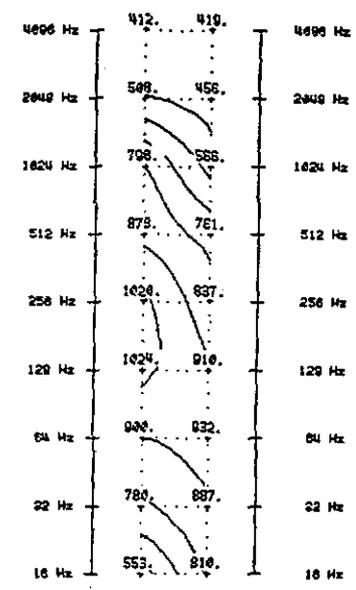
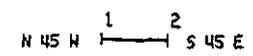
TRANSMITTER DATA
Length: 1000 m
Orient: N 45 W
Distance: 12 km
Rx to Tx: NE

(Plot limits) and ARITHMETIC CONTOURS (Interval: 100.00)

- (160.)
- 200.
- 300.
- 400.
- 500.
- 600.
- 700.
- 800.
- 900.
- 1000.
- (1074.)



Line "2"



042030

5 cm

Line "1"
Marionook
for
ABERFOYLE EXPLORATION PTY., LTD

Zone # 483
Plot by C/LOT 51
Plotted MED, JUL 19 1985



ZONGE ENGINEERING &
RESEARCH ORGANIZATION

CSAMT SURVEY DATA
CAGNIARD RESISTIVITY
values in ohm-meters

RECEIVER DATA

Dipole Length: 100.0
Stn. Spacing: 100.0

Line Orient: Varies
Dipole Orient: Varies

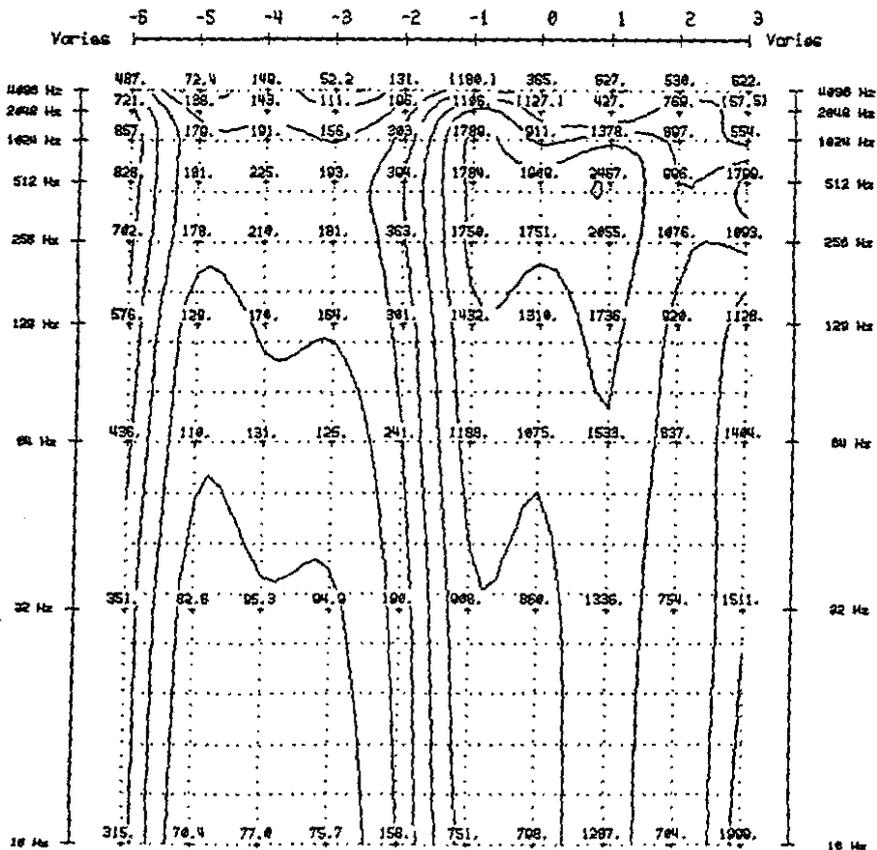
Date of survey: Feb 85

TRANSMITTER DATA

Length: 1000.0
Orient.: N 45 W
Distance: 12 km
Rx to Tx: NE

Plot limits and LOGARITHMIC CONTOURS (Interval: 4.24)

- (52.2)
- 63.1
- 100.
- 158.
- 251.
- 328.
- 631.
- 1000.
- 1585.
- 2512.
- (2598.)



042031

5 cm

Line "J"
Marionook
for
ABERFOYLE EXPLORATION PTY., LTD

Zone 483
Plot by C/LOT 31
Plotted MED, JUL 10 1985



ZONCE ENGINEERING &
RESEARCH ORGANIZATION

CSAMT SURVEY DATA
PHASE DIFFERENCE (E phase - H phase)
values in milli-radians

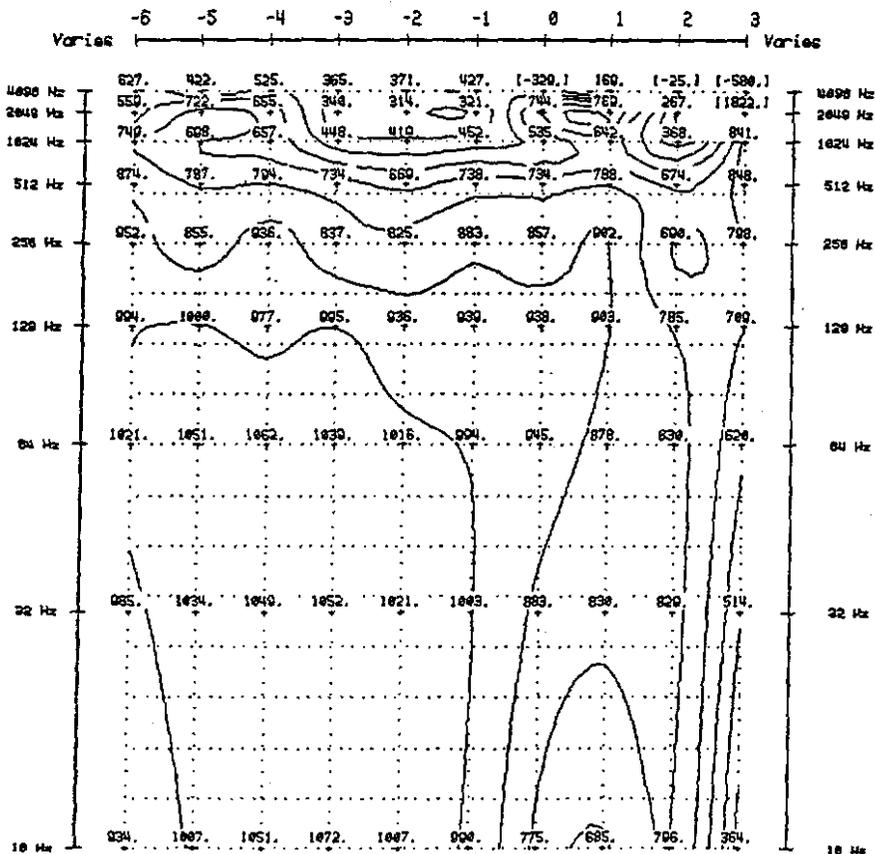
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Dipole Length: 100.m
Stn. Spacing: 100.m
Date of survey: Feb 85

Line Orient: Varies
Dipole Orient: Varies

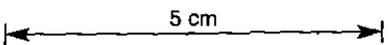
TRANSMITTER DATA
Length: 1000 m
Orient.: N 45 W
Distance: 12 km
Rx to Tx: NE

(Plot limits and ARITHMETIC CONTOURS (Interval: 100.00)

(160.)
200.
300.
400.
500.
600.
700.
800.
900.
1000.
(1074.)



042032



035

Line "1"
Marionook
for
ABERFOYLE EXPLORATION PTY., LTD

Zone # 483
Plot by CPLDT 31
Plotted WED, JUL 10 1985

 ZONDE ENGINEERING &
RESEARCH ORGANIZATION

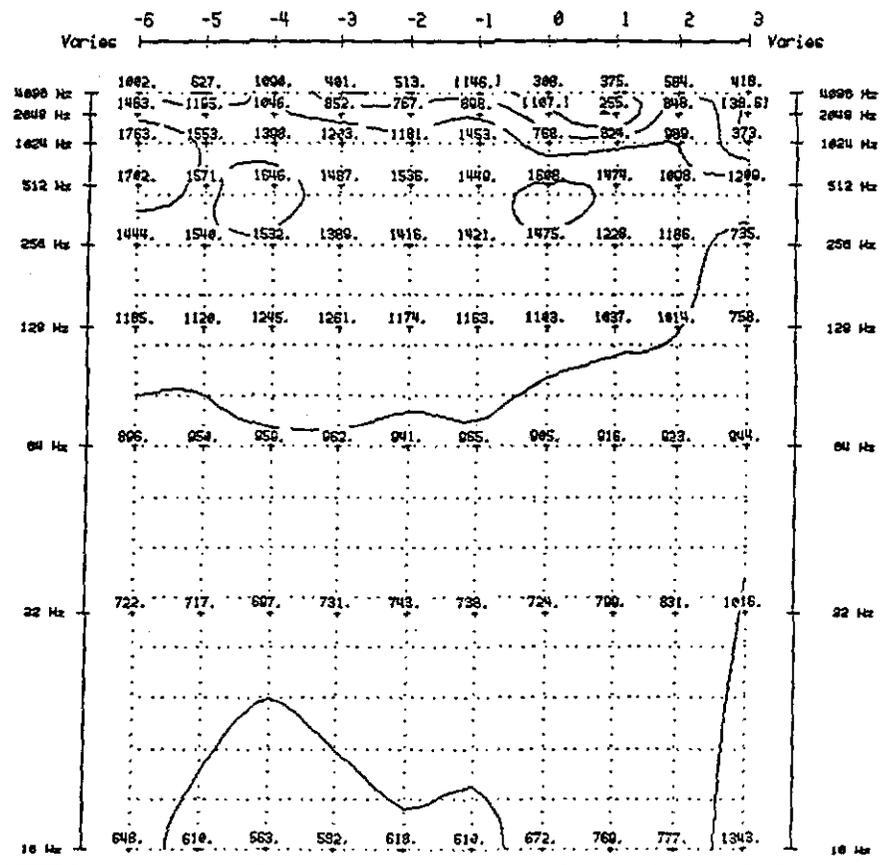
CSAMT SURVEY DATA
STATIC OFFSET CORRECTED RESISTIVITY
values in ohm-meters
Offset based on lower 5 frequencies.

RECEIVER DATA Line Orient: Varies
Dipole Length: 100.m Dipole Orient: Varies
Stn. Spacing: 100.m
Date of survey: Feb 85

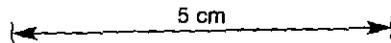
TRANSMITTER DATA
Length: 1000 m
Orient: N 45 W
Distance: 12 km
Rx to Tx: NE

(Plot limits and LOGARITHMIC CONTOURS (Interval: 0.20))

(248.)
251.
308.
631.
1000.
1585.
(1771.)



042033



030

Line "1"
Marionook
for
ABERFOYLE EXPLORATION PTY., LTD

Zone # 483
Plot by DPLOT S1
Plotted TUE. JUL 20 1985



ZONGE ENGINEERING &
RESEARCH ORGANIZATION

CSAMT SURVEY DATA
MAGNETIC FIELD APPARENT RESISTIVITY

based on matching observed H-fields
with analytical half-space H-fields.
Values in ohm-meters

RECEIVER DATA

Dipole Length: 100.m
Stn. Spacing: 100.m

Line Orient: Varies
Dipole Orient: Varies

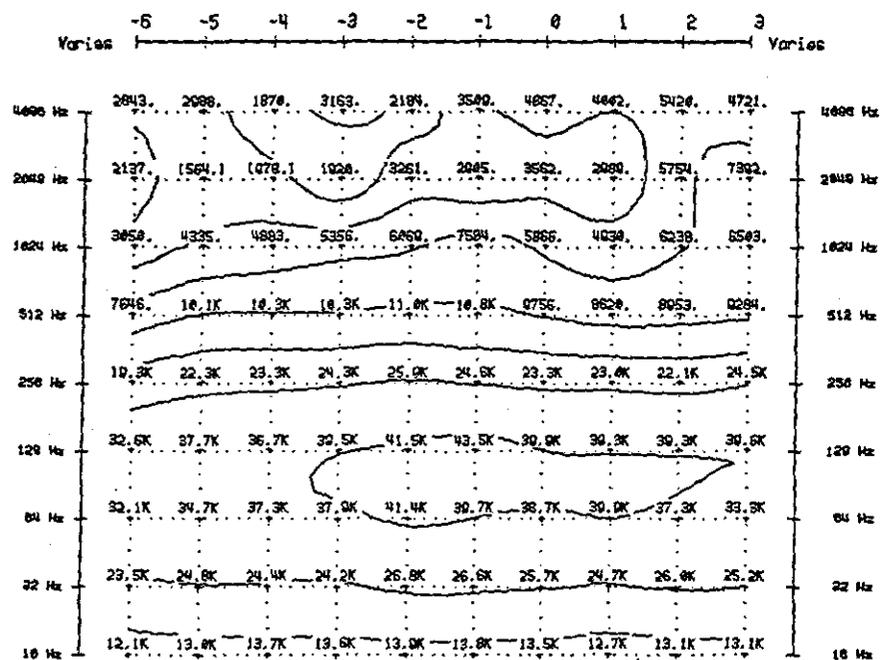
Date of survey: Feb 85

TRANSMITTER DATA

Length: 1000 m
Orient.: N 45 W
Distance: 12 Km
Rx to Tx: NE

(Plot limits) and LOGARITHMIC CONTOURS (Interval: 6.20)

(1868.)
2512.
3981.
6310.
10.0K
15.0K
25.1K
39.8K
(144.6K)



042034

007

042035

SECTION 2.
REVIEW OF THE GEOPHYSICS
DONE AT MARIONOAK

NIGEL HUNGERFORD
GEOPHYSICIST - BILLITON

TOM EADIE
GEOPHYSICIST - ABERFOYLE

18 NOVEMBER 1985

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TABLE

Final Version of Sirotem Sounding Marionoak

APPENDIX

UTEM Data Sections

REVIEW OF THE GEOPHYSICS DONE AT MARIONOAK

This review is written in two parts. The first is the earlier geophysical work up to mid-1983 summarized by Nigel Hangerford of Billiton and the second is the more recent work written by Tom Eadie of Aberfoyle.

PART 1 - GEOPHYSICS TO MID 1983BY NIGEL HUNGERFORDBASTYAN DAM ANOMALY, MARIONOAK, W. TASMANIAIntroduction

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 1975 Georex 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 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 especially 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. 8). From the geophysical section along Line 00N (Fig. 5) 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. 7). 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 resistive 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.

035

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 geophysical 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 lithologies 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.

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.

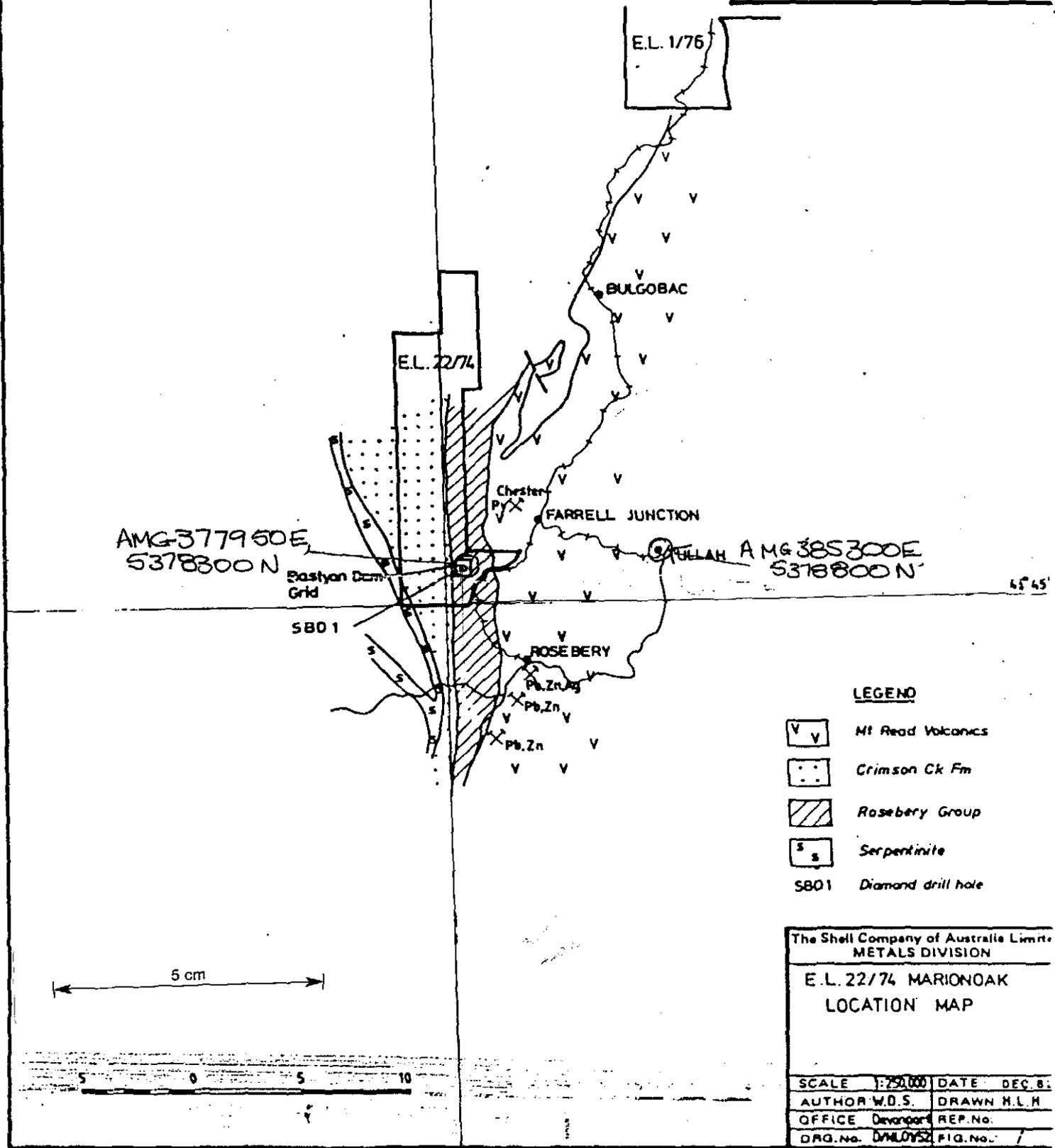
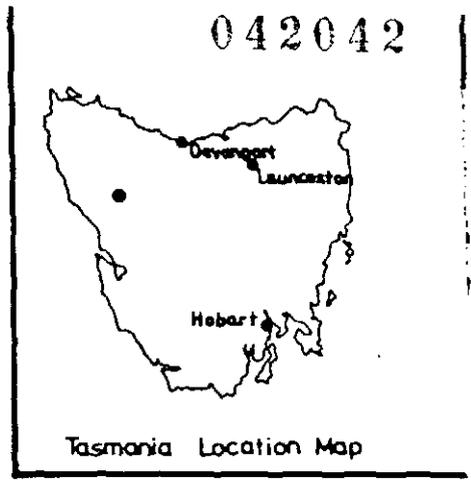
The drill target would be at 25E, Line 200N at a depth of 200 metres. A DDH should be sited at 160E to drill southwest along the grid line at an inclination of 55° down to a total planned depth of 300 metres.

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.

0-04

042042

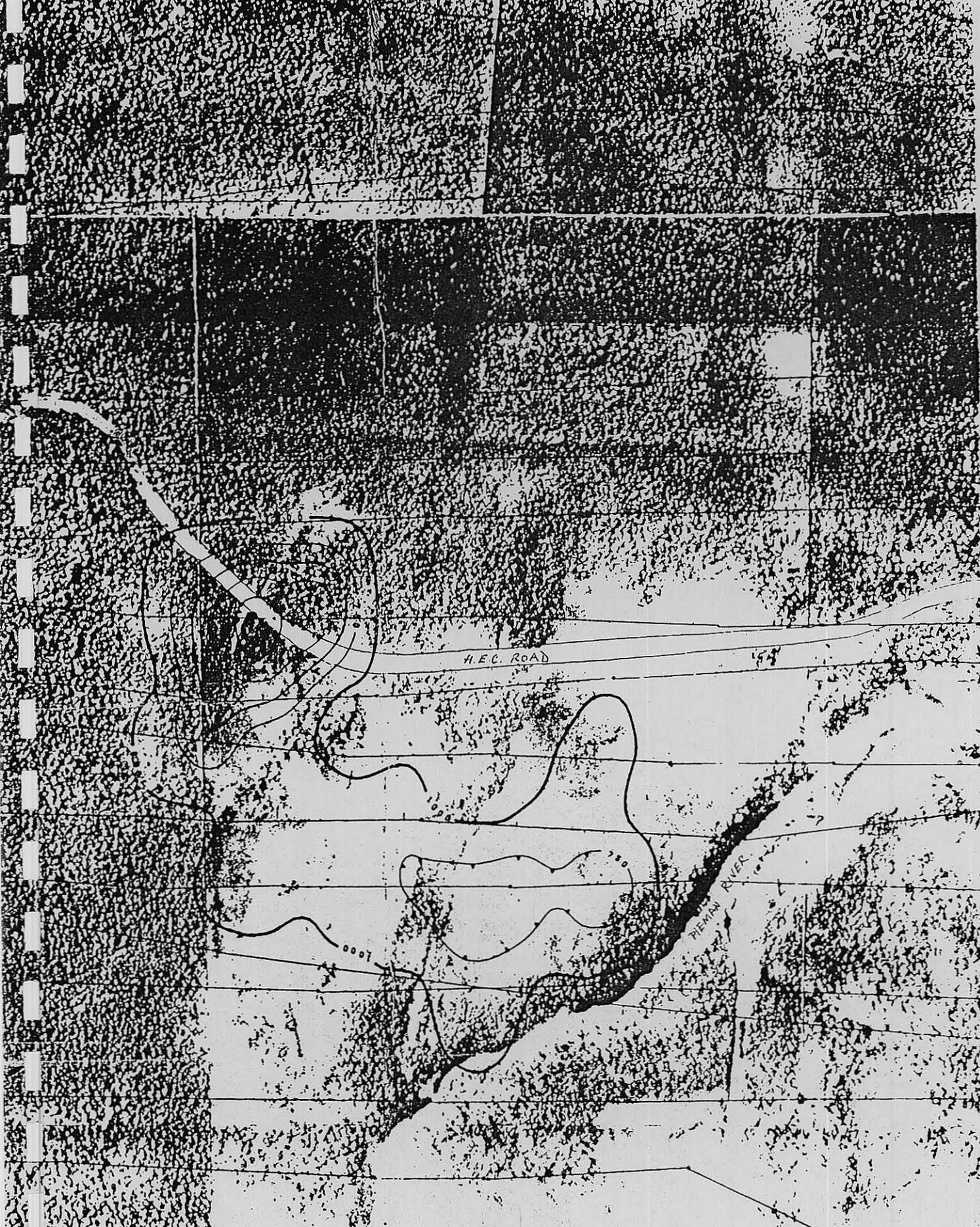
AMG REFERENCE POINTS ADDED



LEGEND

- V Mt Read Volcanics
- . Crimson Ck Fm
- / Rosebery Group
- S Serpentine
- SB01 Diamond drill hole

The Shell Company of Australia Limited METALS DIVISION	
E.L. 22/74 MARION OAK LOCATION MAP	
SCALE 1:250,000	DATE DEC. 8.
AUTHOR W.D.S.	DRAWN H.L.M.
OFFICE Devanport	REP.No.
DRG.No. DMLOY52	FIG.No. 7



DIGHEM RESISTIVITY
1:10,000

0 400m 77

75

76

77

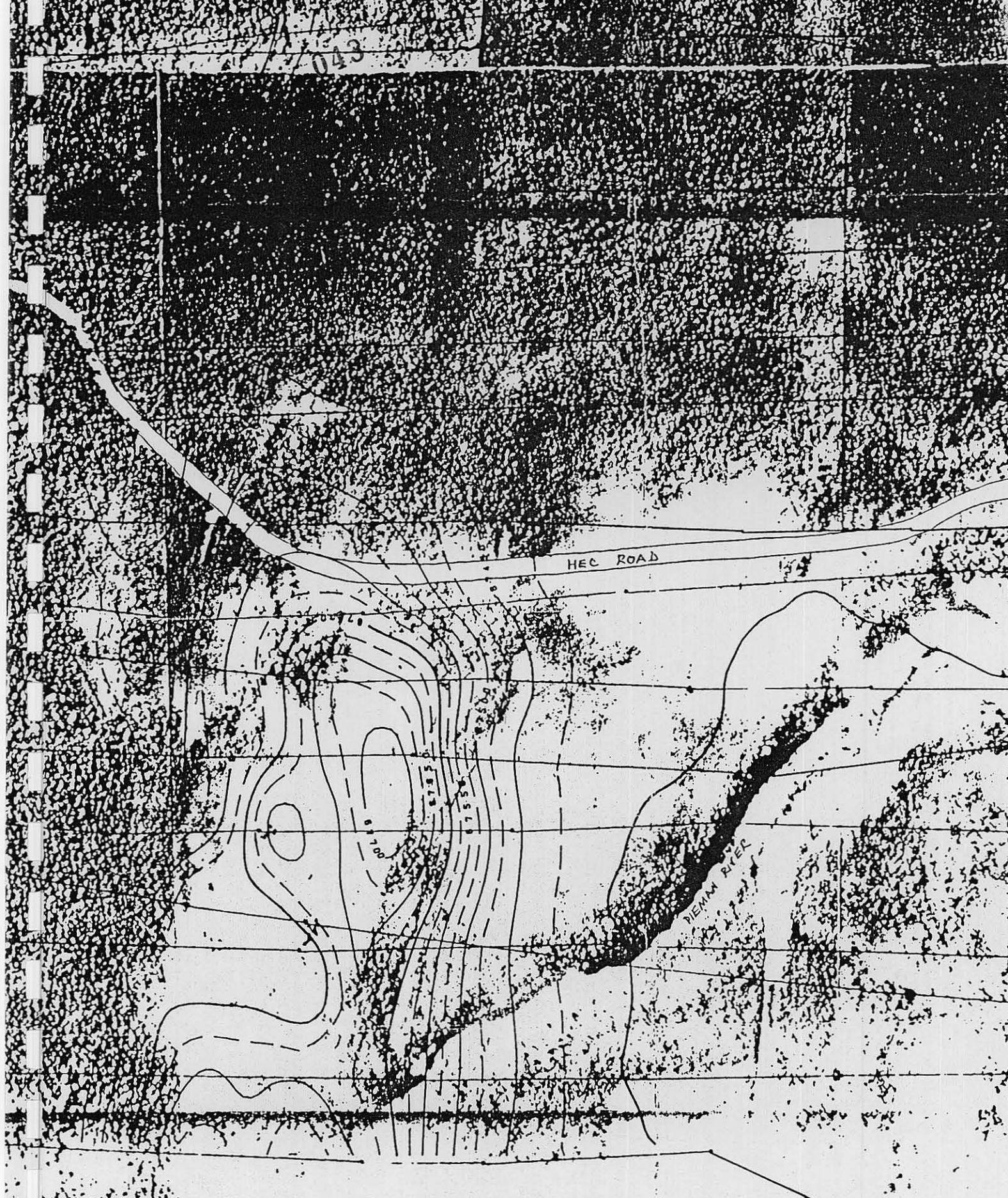
376 ↑
N

FIG 2

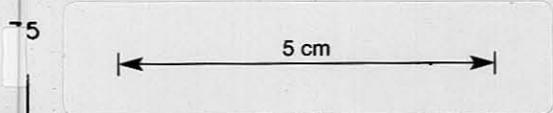
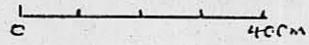
042

5 cm

042043



DICHEM AEROMAG
1:10,000



76

77

376

FIG.

042044

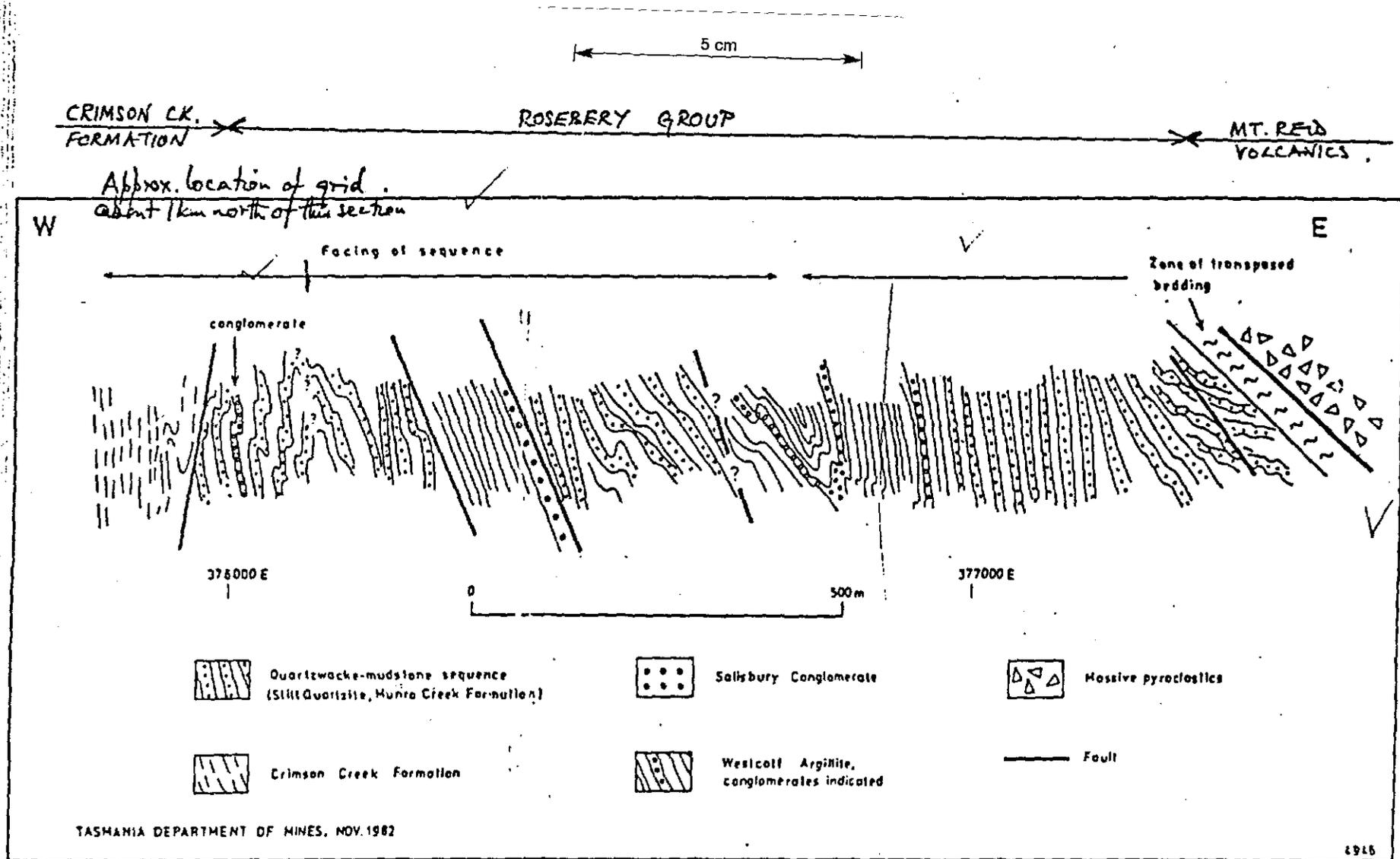


Fig. 3.30 E-W cross section through Rosebery Group in Pieman River Gorge projected to 7800N. Thickness of some conglomerate units is exaggerated for clarity and folds are somewhat generalized.

FIG 4

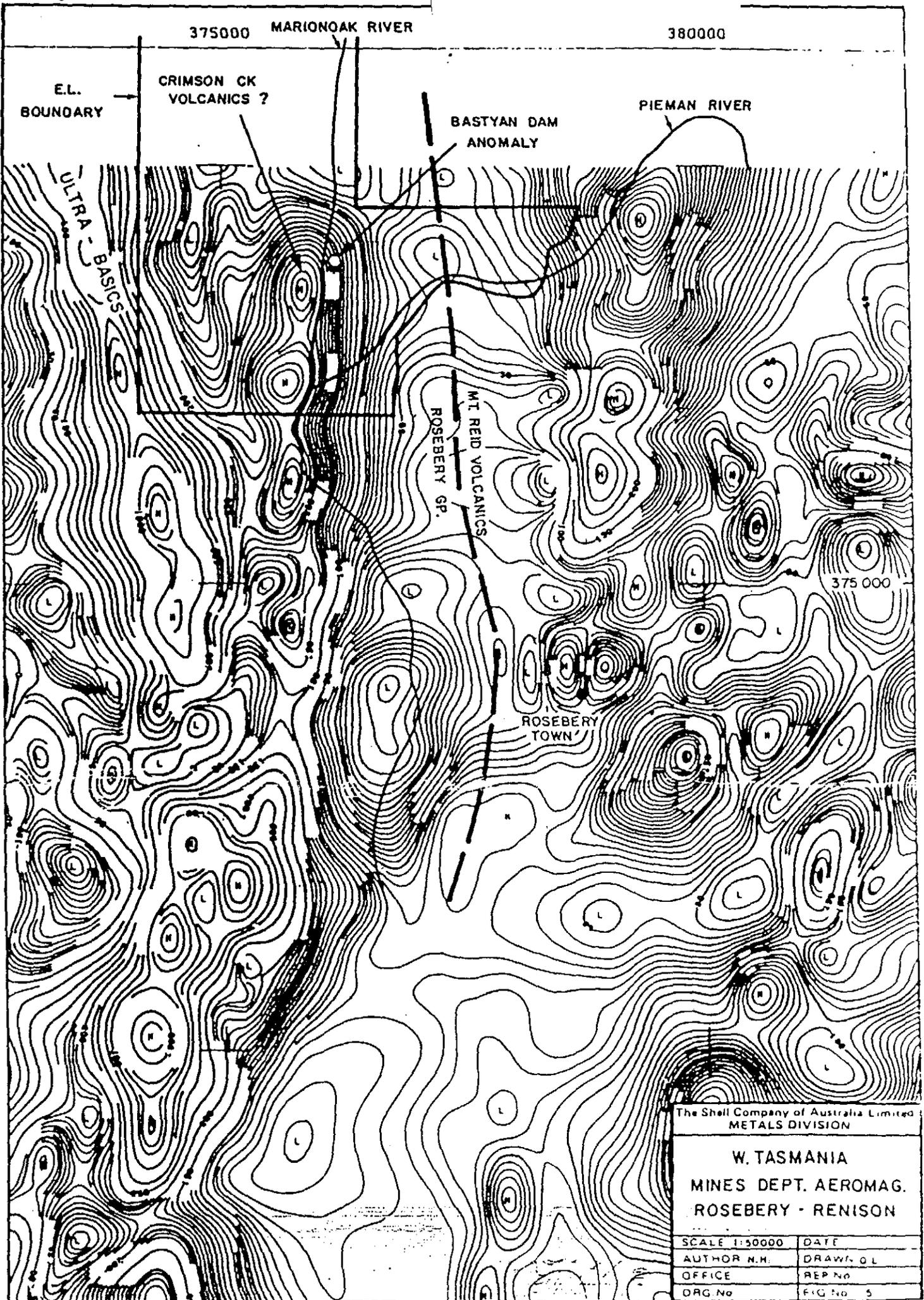
044

042045

04

5 cm

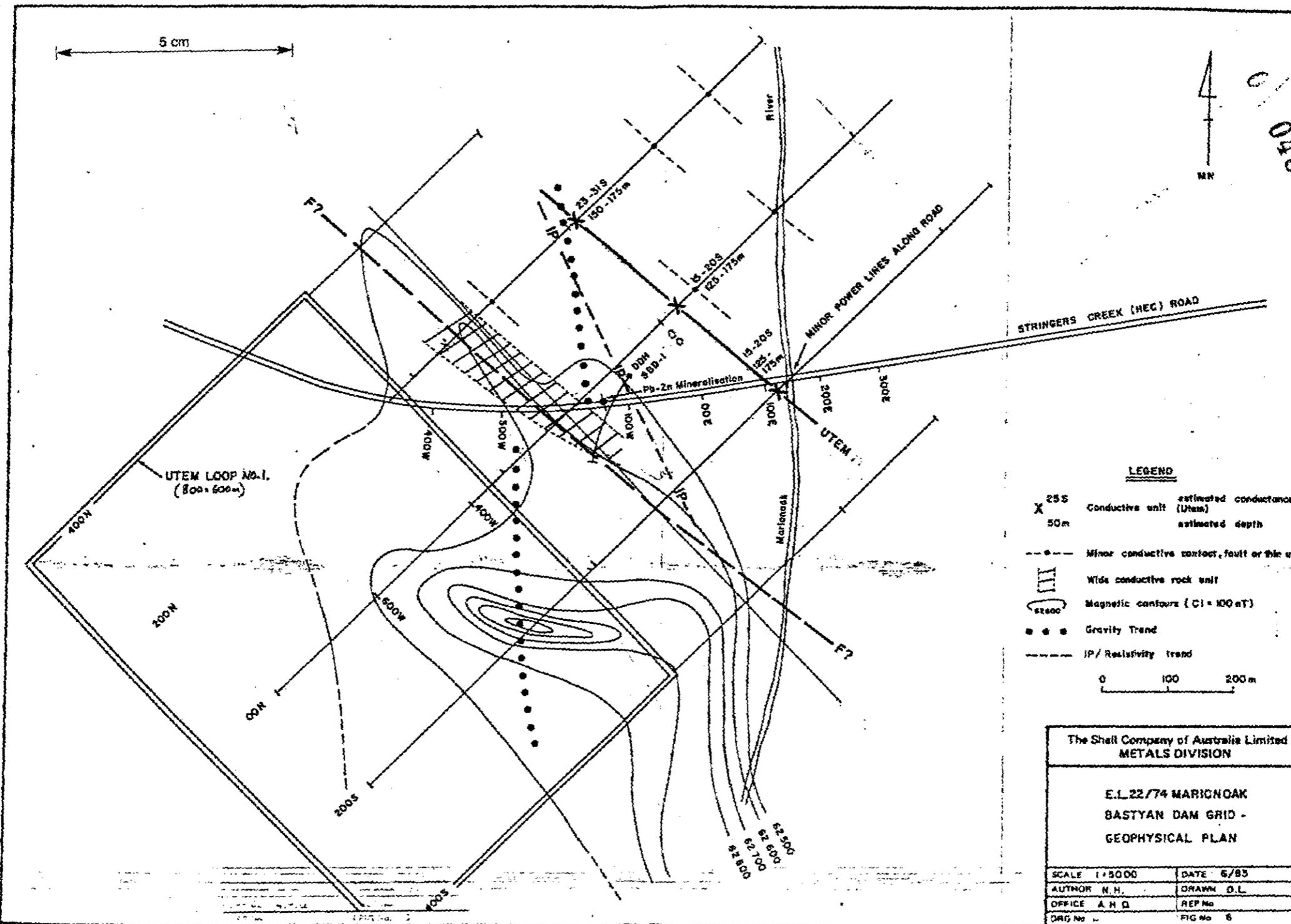
042046



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METALS DIVISION

W. TASMANIA
MINES DEPT. AEROMAG.
ROSEBERY - RENISON

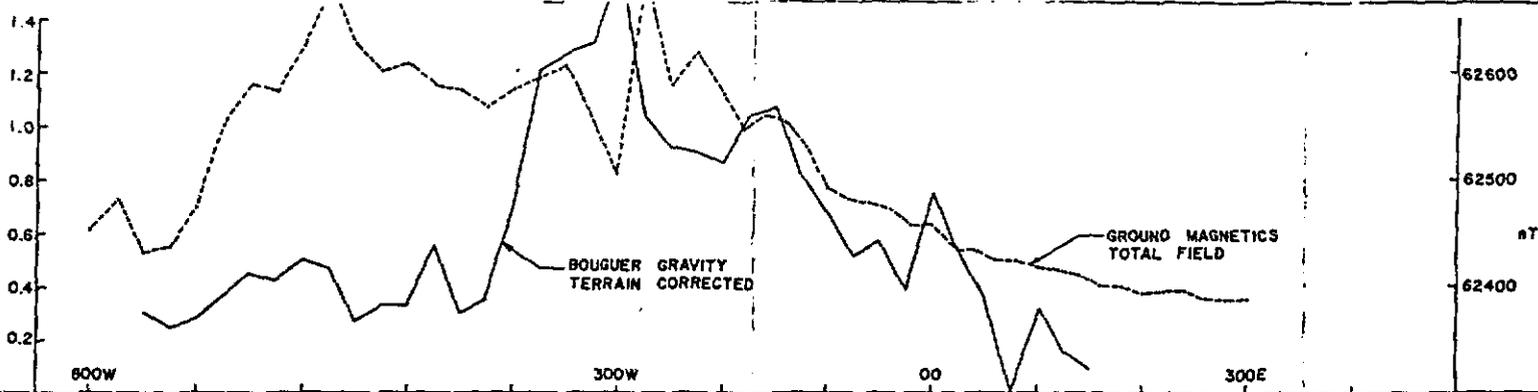
SCALE 1:50000	DATE
AUTHOR N.H.	DRAWN G.L.
OFFICE	REP No
DRG No	FIG No 5



042047

AIRBORNE GEOPHYSICS
(EM, MAG, etc)

MGALS



62600
62500
62400
nT

041

GEOLOGY & TOPOGRAPHY

800W 300W 00 300E

UTEM LOOP 1

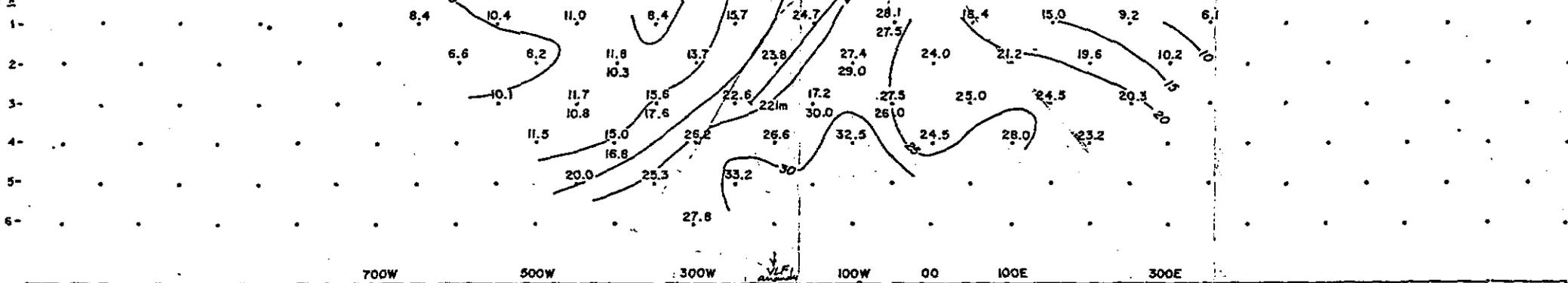
UTEM ANOMALY (Loop 2)

Pb-Zn MINERALISATION

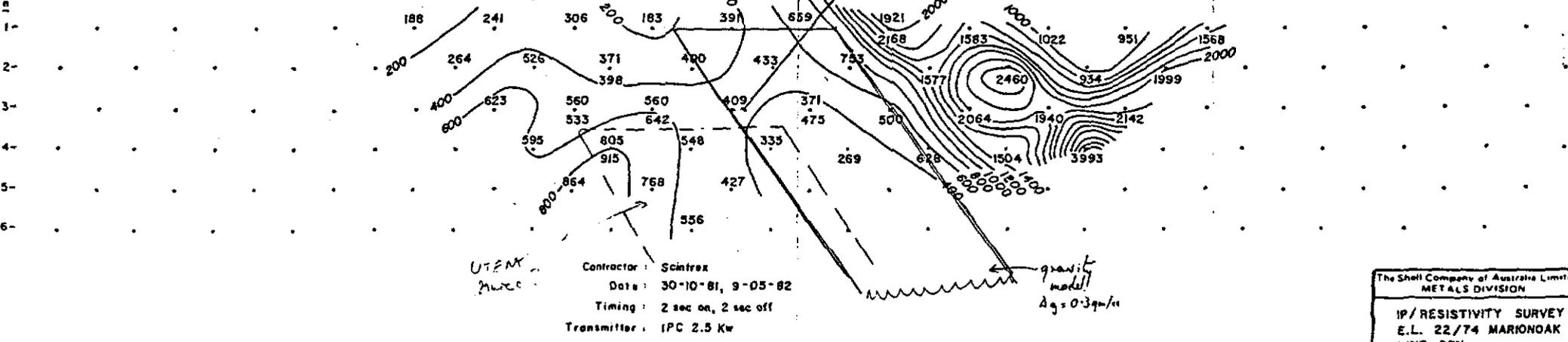
DDH SBD-1

UTEM ANOMALY (Loop 1)

APPARENT CHARGEABILITY



APPARENT RESISTIVITY



UTEM
MUSIC

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 m.

gravity
model!
 $\Delta g = 0.39 \mu\text{m/s}^2$

5 cm

The Shell Company of Australia Limited
METALS DIVISION

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

SCALE 1:8000 DATE 8 83
AUT OR N.N. DRAWN K.W.

042048

049

SHELL COMPANY OF AUSTRALIA LTD.
Geophysical Log

042049

PAGE 1 OF 1 PAGES

DIAMOND DRILL HOLE N° SBD-1

PROJECT : MARIONOAK	STATE : TAS	IP / RESISTIVITY LOGGING - (C) LAB MEASUREMENTS, UNI N.S.W.
ANOMALY N° : BASTYAN DAM	GRID COORDS : 90W/30S	CONTRACTOR :
INCLINATION : -60°	AZIMUTH : 225°	DATE LOGGED :
DATE DRILLED : 9/82	TOTAL DEPTH : 221.0 m	ARRAY :
CASING : NQ to 20 m		SUSCEPTIBILITY LOGGING (JH-8)
		BY : Devonport office
		DATE LOGGED : /82
GROUND GEOPHYSICAL ANOMALIES : GRAVITY, IP		

DEPTH metres	LITHOLOGIC LOG	ASSAYS	GEOLOGICAL DESCRIPTION	DENSITY g/cm ³				SUSCEPTIBILITY 10 ⁻⁴ CGS			
				170	370	570	770	100	200	300	400
8.5			GLACIAL OVERBURDEN								
			SST-SLT w. Carbonaceous shales								
26.5											
			SST-SLT Tuffaceous (A)?								
42.0											
			SST/Tuff								
58.5											
			SST-SLT w. Carbonaceous shales								
76.3			minor Sphal, Gal. (minor po)								
			Siltstone-Greywacke								
			(Qtz, Carb, Py)								
173.0			SLT-SST v. Carbonaceous Shale (B)								
			180-190 m minor py sphal, gal in carbonate veining								
			(minor po)								
221.0			T.D.								

FIG 8

PART II - POST 1983 WORKBY TOM EADIEA) ORIGINAL UTEM INTERPRETATION - DRILL HOLE MO-1

Following up Nigel Hungerford's initial report, a second loop of UTEM was completed and the results were interpreted by Tom Eadie. A plan of the transmitter loops, crossovers and interpretation is shown in figure 10. Figure 11 is the original interpretation in section on Line 00.

The interpretation was based on the fact that the conductor is very large in all dimensions; therefore it was hypothesized that current could be induced in it in many different planes. Using the data from loop 1 and loop 2 the conductor was interpreted to lie somewhere beneath loop 1.

In this position, horizontal current flow would be induced in the conductor from the first transmitter loop, causing the crossover to occur approximately 45 degrees out from the loop past the actual edge of the conductor. Using only loop 1 data, the interpreter is left with one too many unknowns; because the exact position of the edge is unknown, the depth of the body can not be determined.

A depth interpretation based on shape from the loop 1 data was impossible because no positive shoulder peak was developed, and the amplitude information was incomplete because the strike length of the conductor was unknown.

The crossovers from the loop 2 data support the approximate lateral position interpreted from loop 1, and give a better estimate of the location of the eastern edge. The interpretation assumed that the loop 2 crossover location was controlled by a combination of horizontal and vertical current flow in the body, and that therefore

the crossover occurred some distance past the edge of the body. The edge of the body was estimated to be at about 200W on Line 00. Therefore, using the 45 degrees concept for the loop 1 data, the body should have been about 275 metres deep. Drill hole M01 tested this interpretation and intersected no conductor. Further field work and a new look at the UTEM data shows why this drill hole missed.

B) WORK DONE SINCE M01

i) Downhole EM

Immediately after the drilling, the hole was logged with the Sirotem downhole EM system from two loops (400m x 300m), shown in figure 12. The profiles are included as figures 13 and 14.

From loop 1 (figure 13) no anomaly is readily apparent. However this is not surprising for the following reasons. Loop 1 is positioned almost directly above the conductor and would therefore induce a horizontal current flow in the body, similar to the UTEM loop 1, assuming the lateral location and shape of the initial UTEM interpretation had been right, but the depth too shallow. This would clearly cause a positive anomaly the full length of the drill hole. A subtle positive anomaly would be very difficult to see on the profiles because the background is positive and higher amplitude.

However, the loop 2 data (figure 14) shows a very broad negative anomaly, indicating a deep conductor beyond or below the hole. Loop 2 would induce a predominantly vertical current flow in the conductor, which would cause a negative anomaly as is seen in the loop 2 data. The broadness of the anomaly suggests the conductor is well over 100 metres away. However the fact that only part of the anomaly can be seen because of the limited extent of the drill hole, makes a complete interpretation impossible. These results are consistent with the UTEM interpretation being substantially correct in lateral position with the depth estimate much too shallow.

ii) Controlled Source Audio Magneto Tellurics (CSAMT)

Ten readings were taken with the CSAMT unit along the road. The position of the readings and the location of the conductor are shown in figure 15. In section, the interpretation (done by Lou O'Connor at Cominco American) is shown. This interpretation agrees almost identically with the UTEM interpretation that was proven to be wrong by drilling hole MØ-1. One other factor to consider is that Ken Zonge, well respected instrument maker and CSAMT expert, interpreted that this deep conductor did not really exist, but that the results were caused by a shallow conductive zone and lateral inhomogeneities. Clearly a reinterpretation of all the data was necessary at this stage.

C) REINTERPRETATION

i) UTEM

From all of the geophysical data, it appeared that the lateral position and shape of the original UTEM interpretation had been substantially correct. However the depth determination must have been wrong, possibly by 200 metres or more. The data was reviewed carefully to see if a different interpretation was possible.

A depth estimate based on UTEM amplitude was attempted. Even though the strike length of the body was not known, it turns out that this is not important as long as the strike length is greater than the length of the front edge of the loop, which is the case at Marionoak. The inductive limit of 33% for the peak to peak, point-normalized response on lines Ø, 400N, and 600N, (figure 17) therefore suggests that the body is at least 500 metres deep. A second interesting fact that comes out of this decay curve analysis is that the time constant of the body is about 3.5 milliseconds, definitely large enough to be a sulphide deposit.

053

The shape of the anomaly is perhaps less useful for depth determination because a believable positive peak is never developed in the point normalized data, even for loop 2. This indicates that the body is indeed very deep, certainly deeper than 500 metres.

One other parameter of the interpretation that needs some adjustment is the position of the eastern edge of the conductor. An examination of the primary field from loop 2 suggests that predominantly vertical current flow is induced in the conductor from this loop. Therefore the conductor's edge should lie almost directly beneath the crossover, at about 300W. This is supported by the CSAMT data.

One other observation that has come out of this analysis is that the body is plunging to the south, making it the most shallow on L600N, as indicated by the amplitude, shape and coherence of the anomalies on the various lines. This points to the idea that exploration should be continued off to the north.

ii) CSAMT

Ken Zonge feels that the CSAMT conductive anomaly can be explained by shallow features and lateral inhomogeneities. However no one, including Zonge's representative in Australia, or Cominco American (who do CSAMT continually) agree with him. Even if he is right, the lateral inhomogeneity may be what we are looking for.

The objective of this section is to determine where the Cominco American interpretation went wrong. One problem with most contemporary CSAMT solutions is that they are done assuming a horizontally layered earth. It is a well known, but somewhat empirical observation that when a two-dimensional body is detected, but one dimensionality is assumed in interpretation (as Cominco did), that the depth determinations come out too shallow. Therefore the CSAMT data is also consistent with a deeper body.

iii) Downhole EM

The downhole EM data was always thought to be caused by a deeper source. In fact it was this data that suggested this interpretation.

iv) Sirotem Surface Sounding

At this stage of the reinterpretation of the data, one Sirotem surface sounding was carried out in a very strategic location (figure 18). Because the transmitter loop was kept to a small size (200m x 200m) and placed over the very large conductor, a layered earth situation is approximated and therefore a one dimensional inversion of the data is legitimate.

The result of this inversion (done by the CSIRO in Sydney) was that there was a conductive feature at a depth of about 600 metres. The results and interpretation of this data are shown in Table 1.

D) GEOPHYSICAL CONCLUSIONS AND RECOMMENDATIONS

There is definitely a conductor at a depth of 500 - 600 metres on Line 00. The drill hole was too shallow to intersect the target.

The body appears to plunge to the south, indicating that there may be exploration potential at a reasonable depth to the north. This possibility should be explored by extending the grid at a 400 metre line spacing to the north (figure 15). These lines should be covered with CSAMT. This system is chosen because it is more easily interpretable for very large, deep conductors than UTEM and because with this system, line preparation is kept to a minimum.

050

042056

5 cm

FIGURE 10:
PLAN OF UTEM
COVERAGE AND
INTERPRETATION
SCALE 1:10000

500 M.

Soil: Fe to 340
Zn to 750
Mn to 3300
Ni to 320

biotite micropogon

DIGHEM
361 B

SHELL AREA C(II)
SOIL TRAVERSES (SHOWN)
Soil: Pb to 250
Zn to 980
Mn to 3400
Ni to 270

purple-brown & green tuff.
Fe-pb-rich sst with minor sil.
intercalations. prob. C.C.F.

dark green-grey
limonitic silty sh.

dark brown parallel
laminated silty sandst.

purple-green polymict
pebble-cobble conglomerate

green grey
shaly siltstone

lt brown with
tuffaceous silty sst
prob. C.C.F.

green-grey pebbly
greywacke siltstone

grey-lt. carbonaceous
silty sh.

green-grey silty calcite
veined silty siltstone (dolomitic?)
green-limbed feldspar rich tuffaceous
siltstone or epiclastic and grey wack
carbonaceous variably silty shaly
siltstones.

UTEM
CONDUCTOR

BASTYAN DAM
GRID

H.E.C. ACCESS
TRACK

NO-1
580
225 M. - 603
173

me, gy
MnO stained

gy, sh
valent
gy

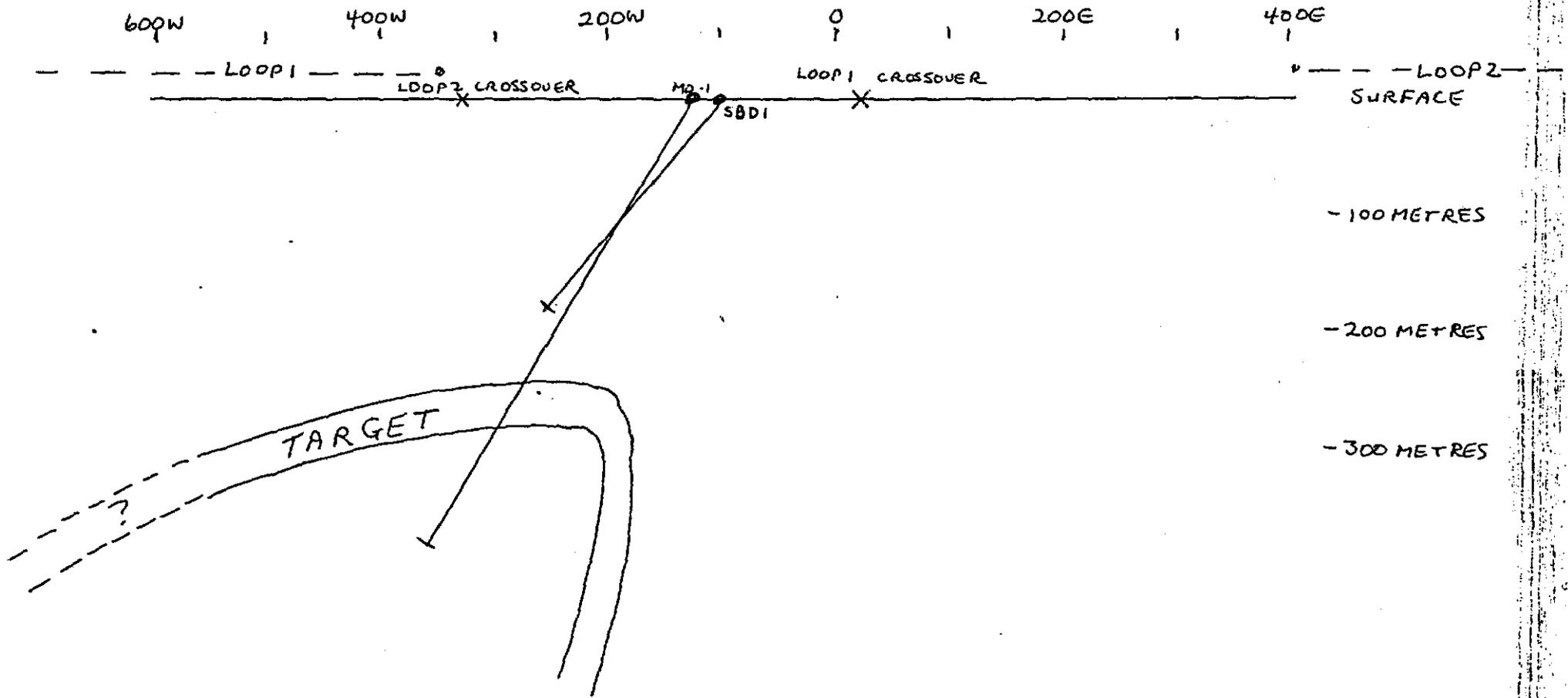
gy, sh
gy

7000 E

FIGURE 11: MARIONOAK
ORIGINAL UTEM INTERPRETATION
LINE 00

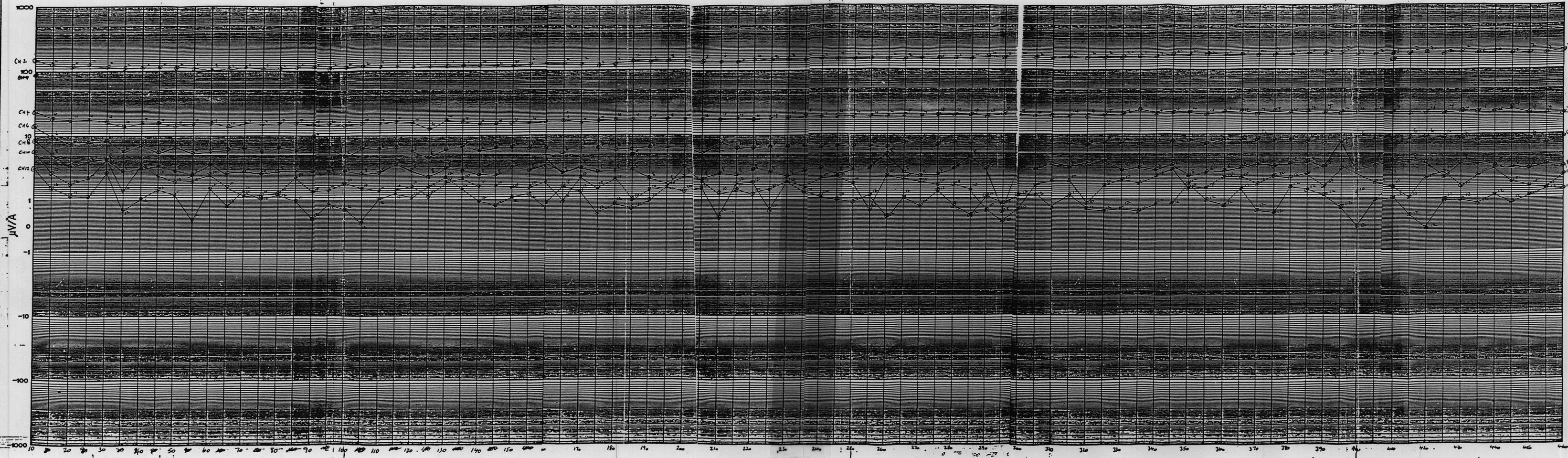
SCALE 1:5000

5 cm



050

042057



SIROTEM SURVEY

Alto Tom Eadie
 CLIENT Alto Tom Eadie
 AREA Maxon Dam 1
 LINE NO 384
MOI

LOOP CONFIG _____
 LOOP DIMENSION _____
 STATION INTERVAL 5m
 STACKS 9.2
 SFERICS _____
 INST. SERIAL NO _____
 OPERATOR A. Conroy
 DATE 3/10/84

LOOP DIAGRAMS ETC.

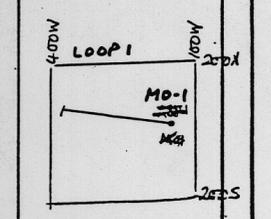
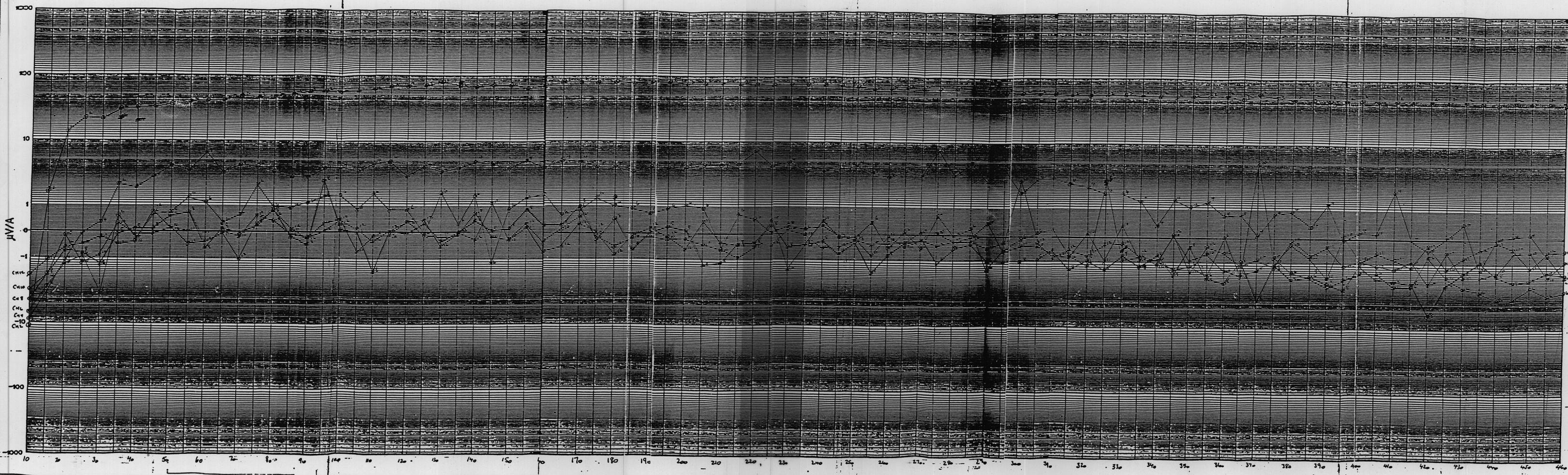


FIGURE 13

060

060

060



SIROTEM SURVEY

CLIENT Agrecom SA
 AREA Musaii Dam
 LINE NO M01

LOOP CONFIG _____
 LOOP DIMENSION _____

STATION INTERVAL 5m
 STACKS 9x2"
 SPHERICS _____
 INST. SERIAL NO _____

OPERATOR A. Coetzee
 DATE 2/1/74

LOOP DIAGRAMS ETC.

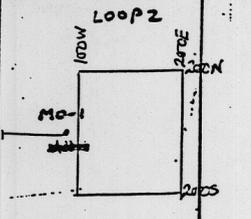


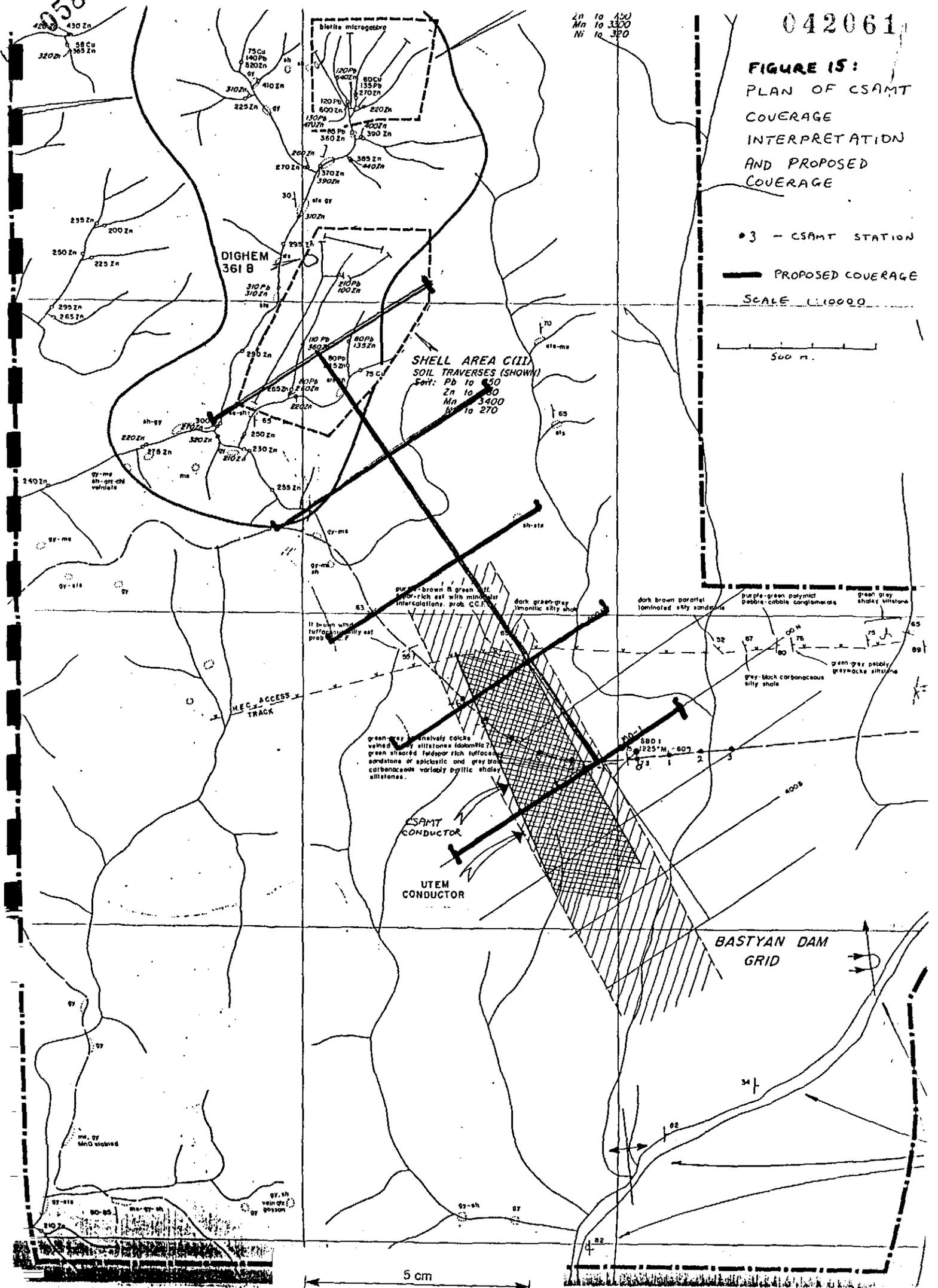
FIGURE 14

042061

FIGURE 15:
PLAN OF CSAMT
COVERAGE
INTERPRETATION
AND PROPOSED
COVERAGE

- 3 - CSAMT STATION
- PROPOSED COVERAGE
- SCALE 1:10000

500 m.



Zn to 150
Mn to 3300
Ni to 320

5 cm

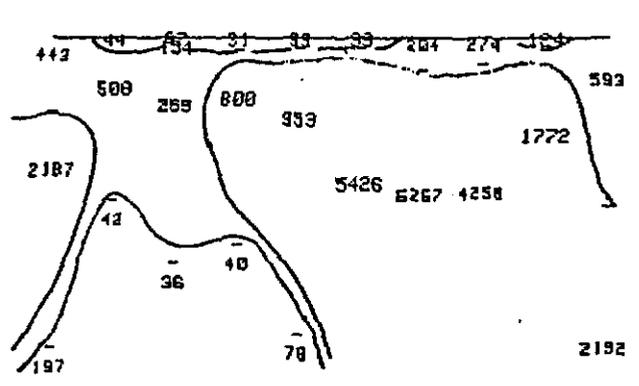
042062

1990

-6 -5 -4 -3 -2 -1 0 1 2 3

487	72	149	52	177	100	255	537	530	522	- 2048 HZ
721	108	143	171	197	1106	422	427	759	680	- 1024
857	178	191	196	307	1789	311	1378	607	654	- 512
828	191	225	193	354	1784	1909	2487	955	1799	- 256
702	178	210	181	363	1758	1751	2055	1076	1093	- 128
576	129	170	154	301	1432	1310	1736	926	1128	- 64
438	110	131	125	241	1108	1075	1533	637	1484	- 32
351	83	95	96	190	908	880	1336	754	1511	- 16
319	70	77	76	138	751	798	1297	704	1999	- 8
										- 4

627	422	525	365	371	427	329	169	25	588	- 2048 HZ
558	722	655	340	314	321	744	753	287	251	- 1024
749	698	657	418	419	452	535	642	368	811	- 512
874	787	794	734	669	738	734	788	674	818	- 256
952	855	936	837	825	883	857	902	690	788	- 128
994	1000	977	995	936	939	938	982	785	789	- 64
1021	1051	1062	1039	1018	934	945	878	830	628	- 32
989	1034	1049	1052	1031	1033	883	838	829	814	- 16
934	1007	1051	1072	1007	950	775	685	736	364	- 8
										- 4



5 cm

N.B. - SCALE IS IN FEET

COMINCO AMERICAN INCORPORATED

CS-AMT PSEUDOSECTION

LINE 1

PROPERTY

MARIONORK

COUNTY

TASMANIA

STATE

AUSTRALIA

TRANSMITTER

GROUNDED WIRE

RECEIVER

100 M. WIRE

SCALE 1" = 1000'

PLATE **FIGURE 16**

OHM-METERS

MILLIGAUSSIANS

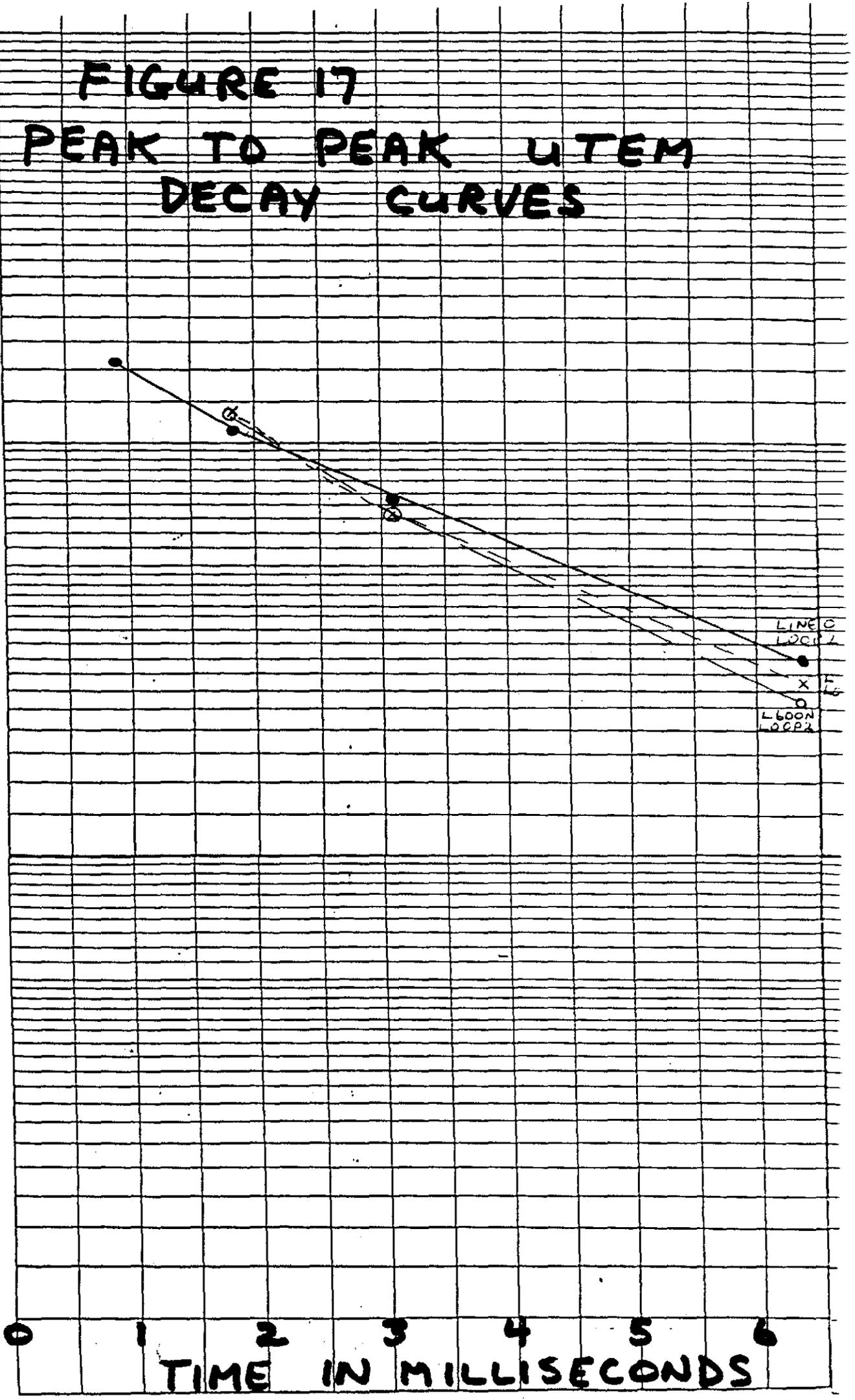
INTERPRETATION

0666

FIGURE 17 PEAK TO PEAK UTEM DECAY CURVES

ANOMALY AMPLITUDE (%)

042063



TIME IN MILLISECONDS

042064

5 cm

FIGURE 13:
SIROTEM SOUNDING
LOOP POSITION

SCALE 1:10000

500 M

Soil: Pb to 520
Zn to 150
Mn to 3300
Ni to 320

SHELL AREA C(II)
SOIL TRAVERSES (SHOWN)
Soil: Pb to 250
Zn to 980
Mn to 3400
Ni to 270

DIGHEM
361 B

SIROTEM
SOUNDING
LOOP
MS-1

UTEM
CONDUCTOR
(INTERP. BY ETE)

BASTYAN DAM
GRID

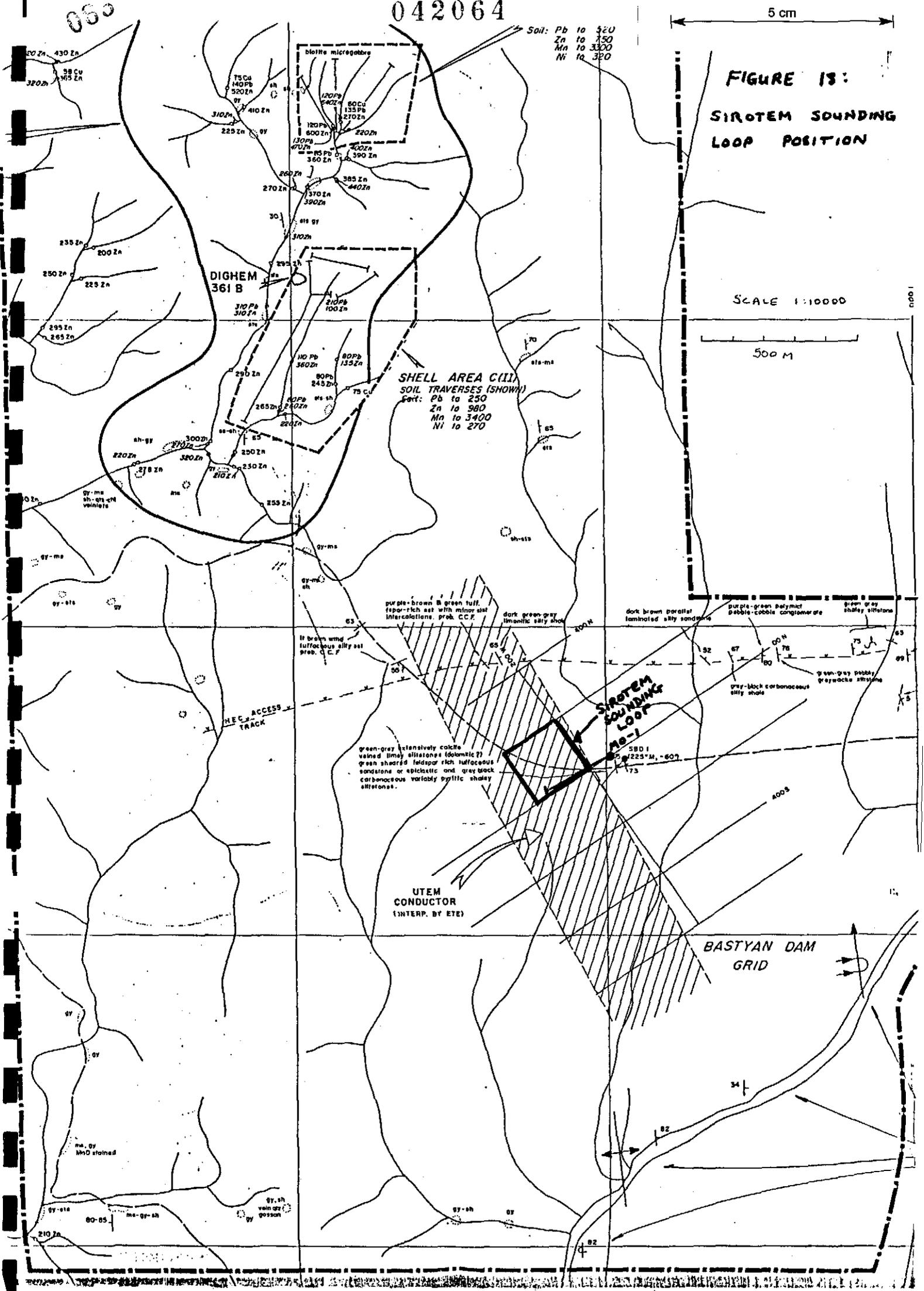
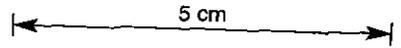
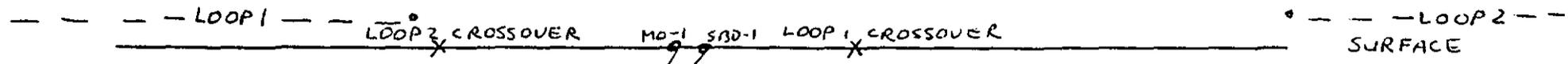


FIGURE 19: REVISED INTERPRETATION BASED ON UTEM, DHEM, CSAMT AND SIROTEM SOUNDING

SCALE 1:5000



600W 400W 200W 0 200E 400E

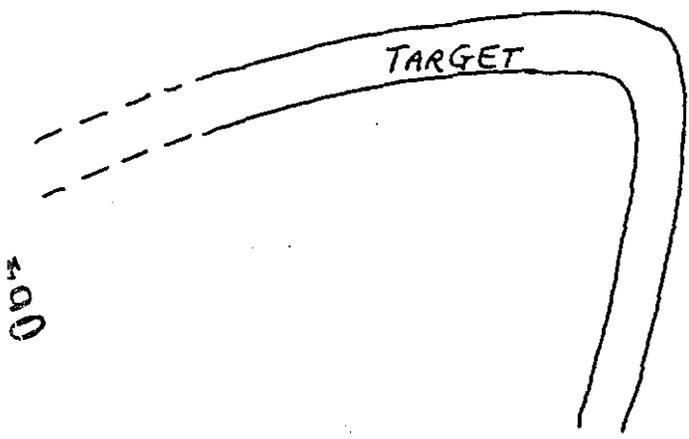


042065

- 200 METRES

- 400 METRES

- 600 METRES



000



TABLE 1: FINAL INVERSION OF SIROTEM SOUNDING
MARION OAK

FINAL MODEL

I	RESISTIVITY	THICKNESS	DEPTH	STANDARD ERROR = 4.92	PERCENT
1	53.04	10.58	0.0000E+00	NOISE TO SIGNAL RATIO = 1.64	PERCENT
2	1500.	609.1	10.58	GENERAL CROSS VALIDATION = 0.201E-01	
3	46.94		619.7		

* ERROR STRUCTURE OF THE FITTED MODEL *
* FOR TEM DATA *

I	DELAY TIME (MS)	OBSERVED APP.RES.	CALCULATED APP.RES.	OBSERVED VOLTAGE (MU V)	CALCULATED VOLTAGE (MU V)	VOLTAGE ERROR WEIGHTED	WEIGHTED PERCENT SYMMETRIC ERROR	I
1	0.4870	340.5	340.7	503.0	502.6	0.4305	0.8722E-01	1
2	0.0790	789.8	798.9	19.40	19.07	0.3200	1.705	2
3	1.271	668.1	647.0	8.500	8.917	-0.4172	-4.791	3
4	1.663	536.4	525.9	5.600	5.769	-0.1606	-2.967	4
5	2.055	443.5	444.8	4.200	4.183	0.1742E-01	0.4157	5
6	2.643	355.6	364.5	3.000	2.890	0.1098	3.728	6
7	3.427	287.3	302.2	2.090	1.937	0.1532	7.609	7
8	4.211	265.4	262.6	1.300	1.402	-0.2203E-01	-1.584	8
9	4.995	230.2	235.0	1.100	1.067	0.3338E-01	3.081	9
10	5.779	220.1	214.7	0.8100	0.8407	-0.3073E-01	-3.723	10
11	6.955	196.2	191.6	0.6000	0.6218	-0.2100E-01	-3.569	11

PARAMETER SPACE EIGENVECTORS (V MATRIX)

	EP1	EP2	EP3	EP4	EP5
LOG(RES1)	0.050	-0.650	0.107	0.298	0.609
LOG(RES2)	0.076	-0.280	-0.196	-0.923	0.159
LOG(RES3)	0.121	0.002	0.965	-0.218	0.011
LOG(H1)	-0.045	0.697	-0.079	-0.077	0.707
LOG(H2)	0.987	0.002	-0.113	0.077	-0.022

LAYER THICKNESS PARAMETER SENSITIVITY ANALYSIS *

NORMALIZED SINGULAR VALUES OF JACOBIAN

1.00	0.385	0.112	0.268E-01	0.153E-02
------	-------	-------	-----------	-----------

DAMPING FACTORS (1.000 PERCENT LEVEL)

1.000	1.000	1.000	0.981	0.001
-------	-------	-------	-------	-------

SCALE FACTOR (SIGMA(1)) IS 5.973642

THE NUMBER OF EFFECTIVE PARAMETERS IS 3.982

CORRELATION MATRIX

1	1.000	0.941	0.498	0.999	-0.971
2	0.941	1.000	0.660	0.951	-0.987
3	0.498	0.660	1.000	0.514	-0.656
4	0.999	0.951	0.514	1.000	-0.977
5	-0.971	-0.987	-0.656	-0.977	1.000

* 'ERROR BOUNDS' FOR LAYER THICKNESS *

LAYER RESISTIVITIES - 68 PERCENT CONFIDENCE INTERVAL (UNDAMPED)

I	RO(I)	BOUND(1)	BOUND(2)	IMPORTANCE
1	53.04	1.298	2167.	0.7227
2	1500.	611.9	3718.	0.9710
3	46.94	41.89	52.60	0.9990

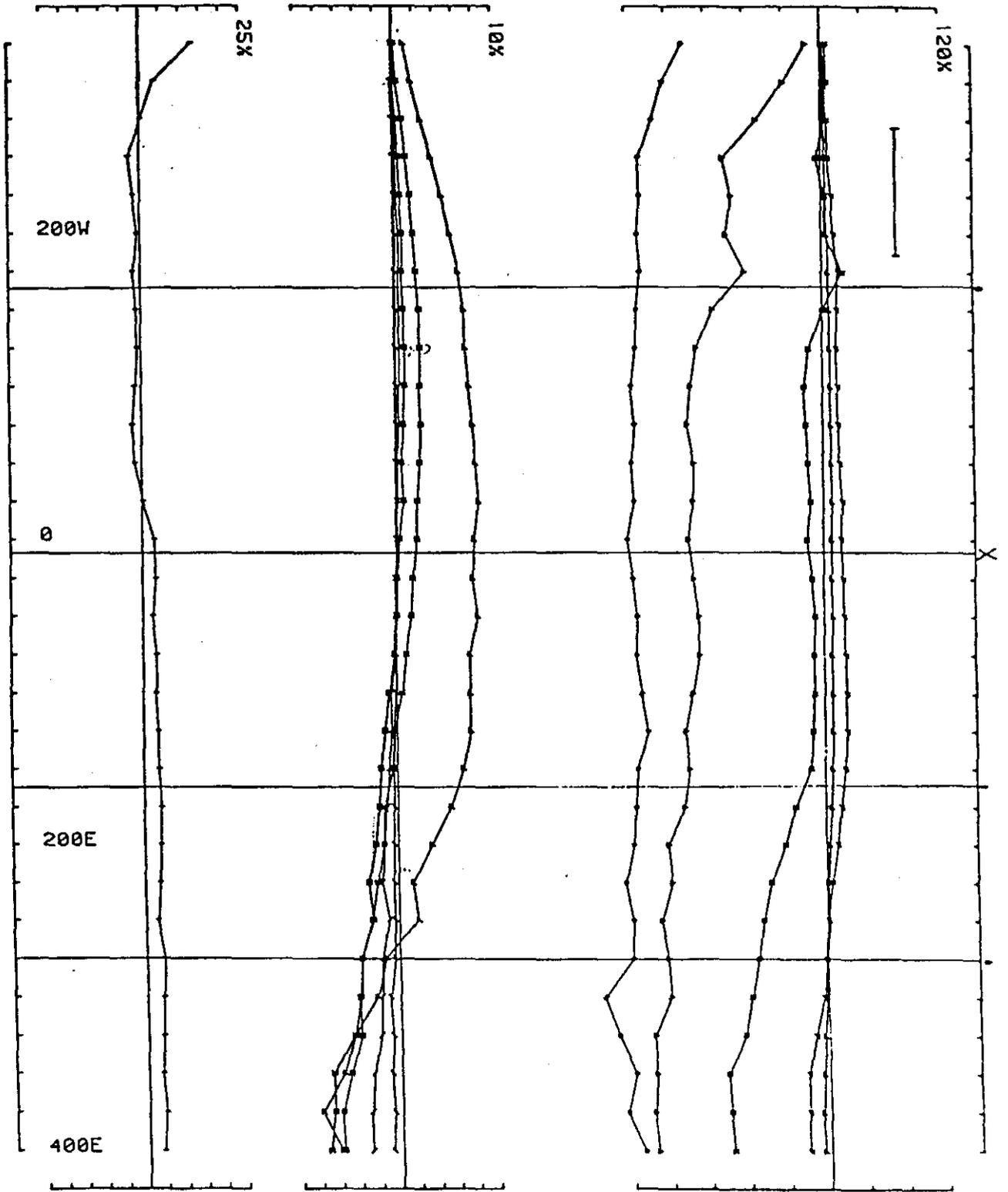
LAYER THICKNESSES - 68 PERCENT CONFIDENCE INTERVAL (UNDAMPED)

I	H(I)	BOUND(1)	BOUND(2)	IMPORTANCE
1	10.58	0.2350	476.0	0.7071
2	609.1	539.3	688.0	0.9996

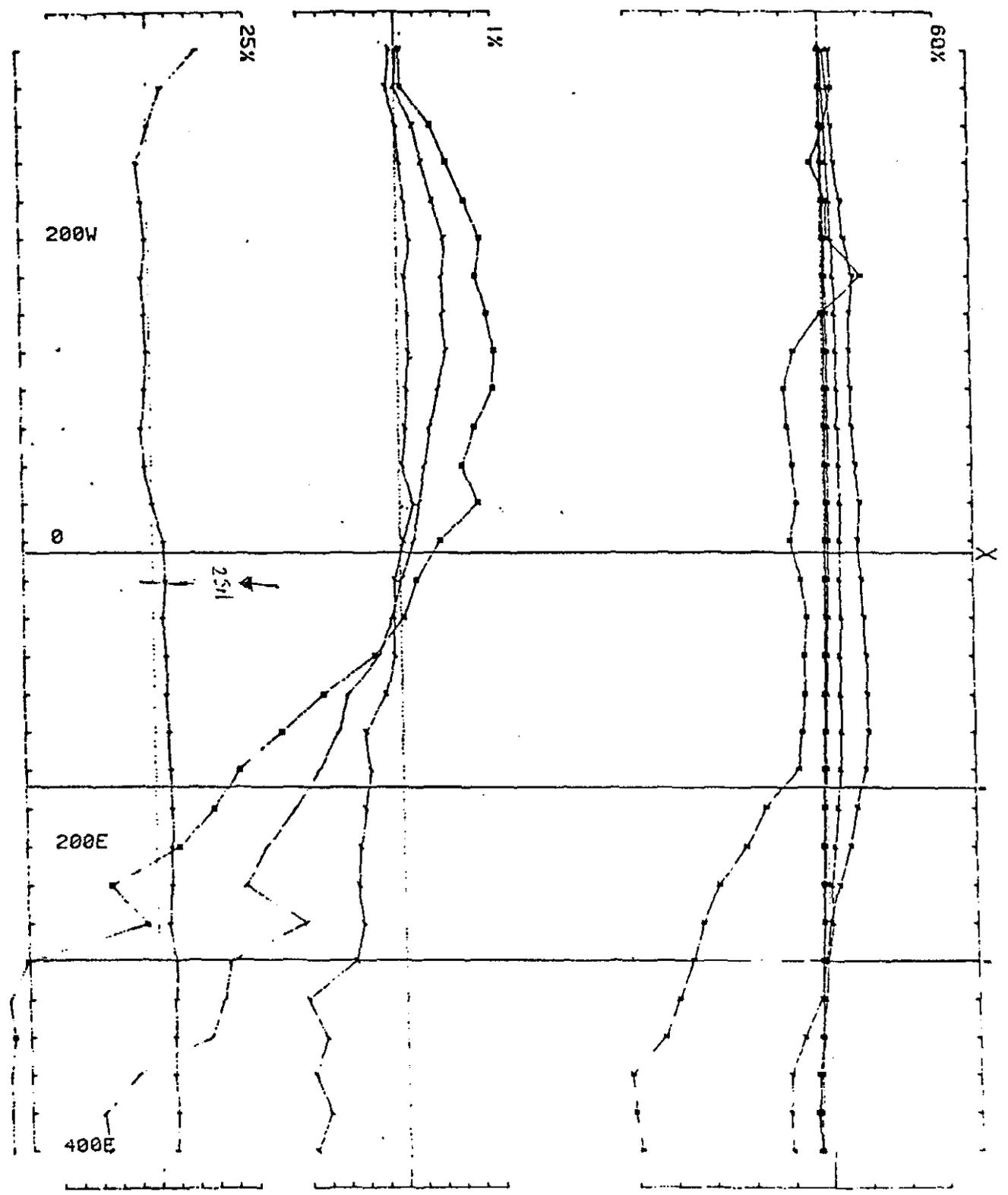
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SECTION 2 - APPENDIX

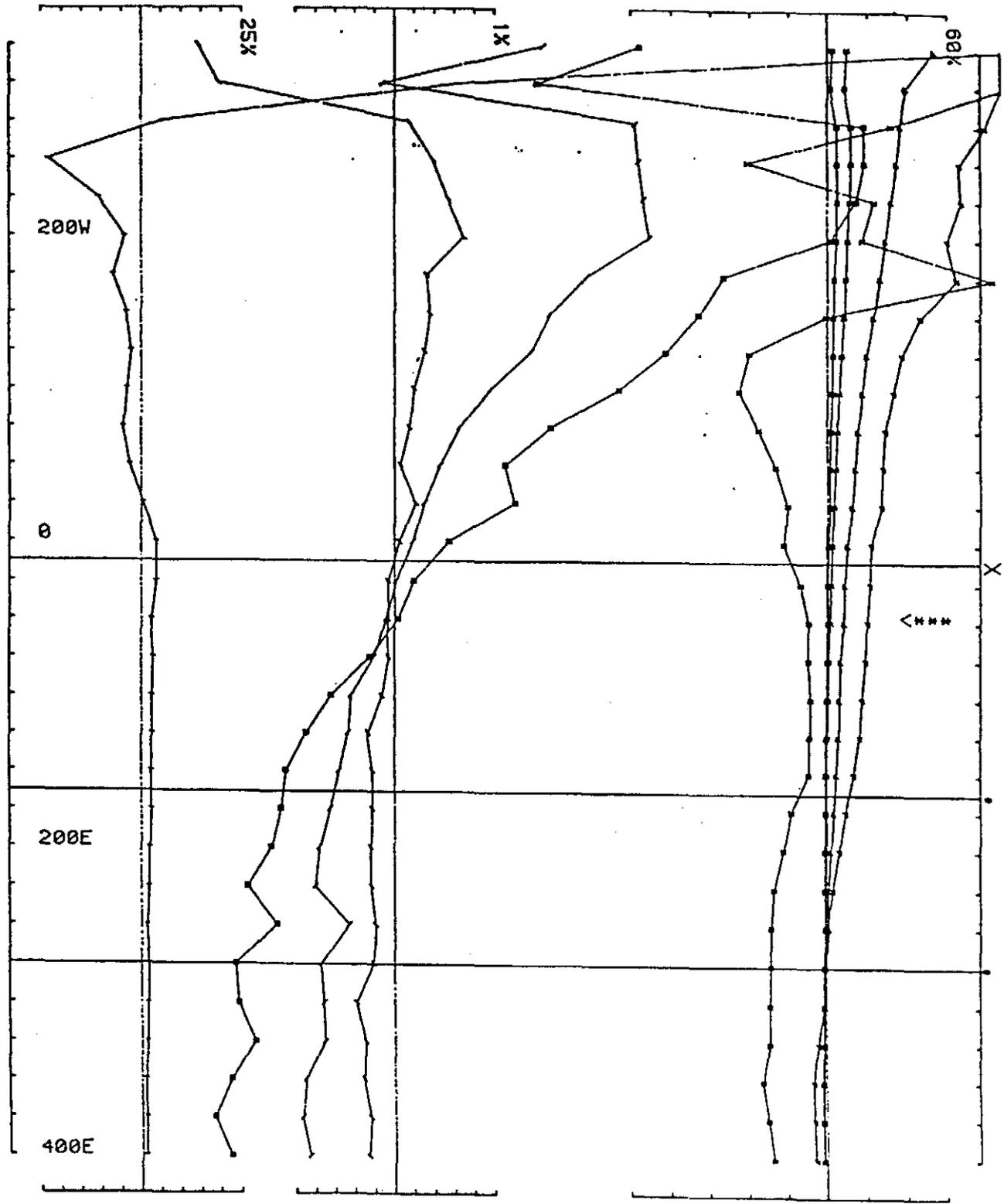
UTEM data sections



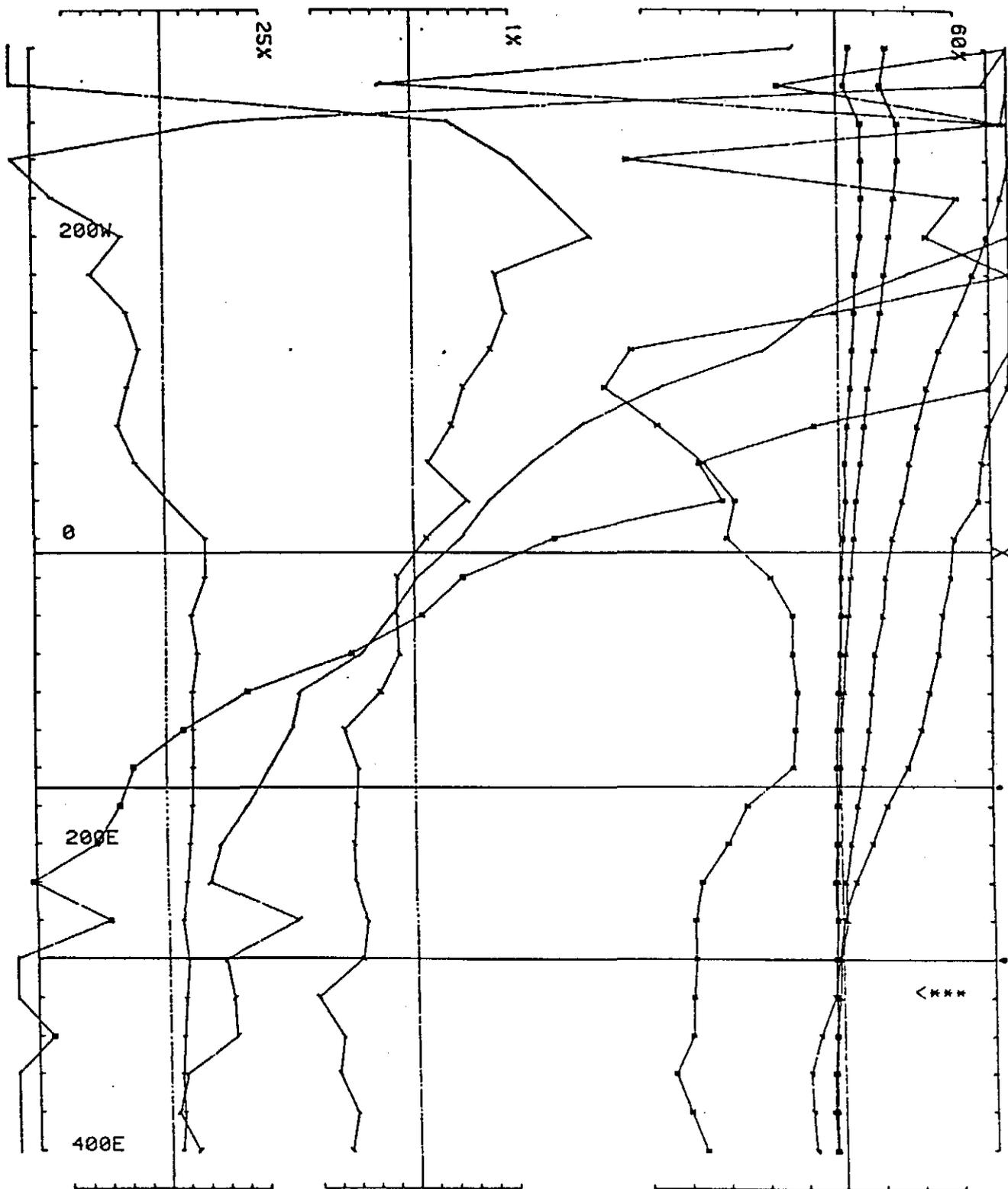
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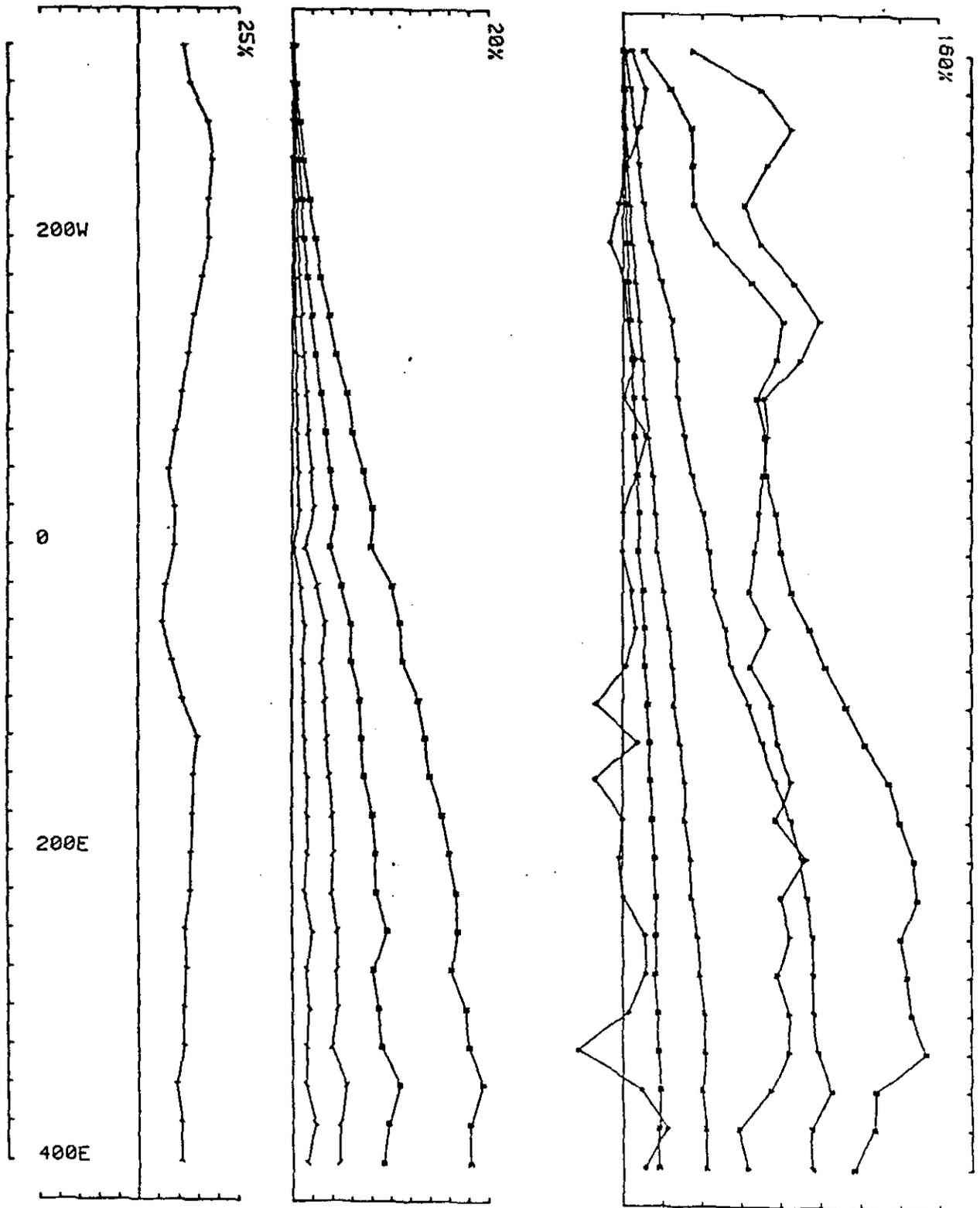
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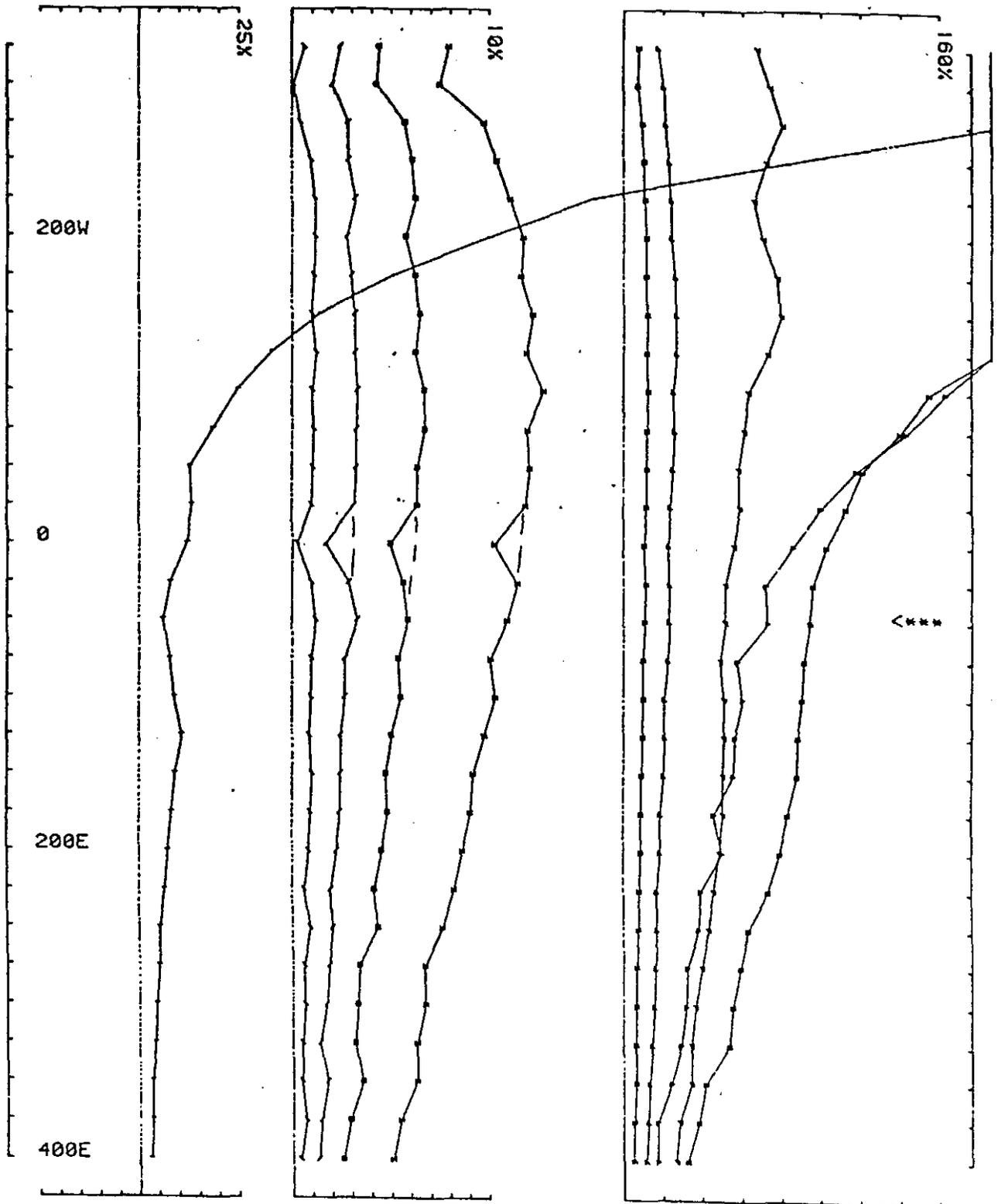
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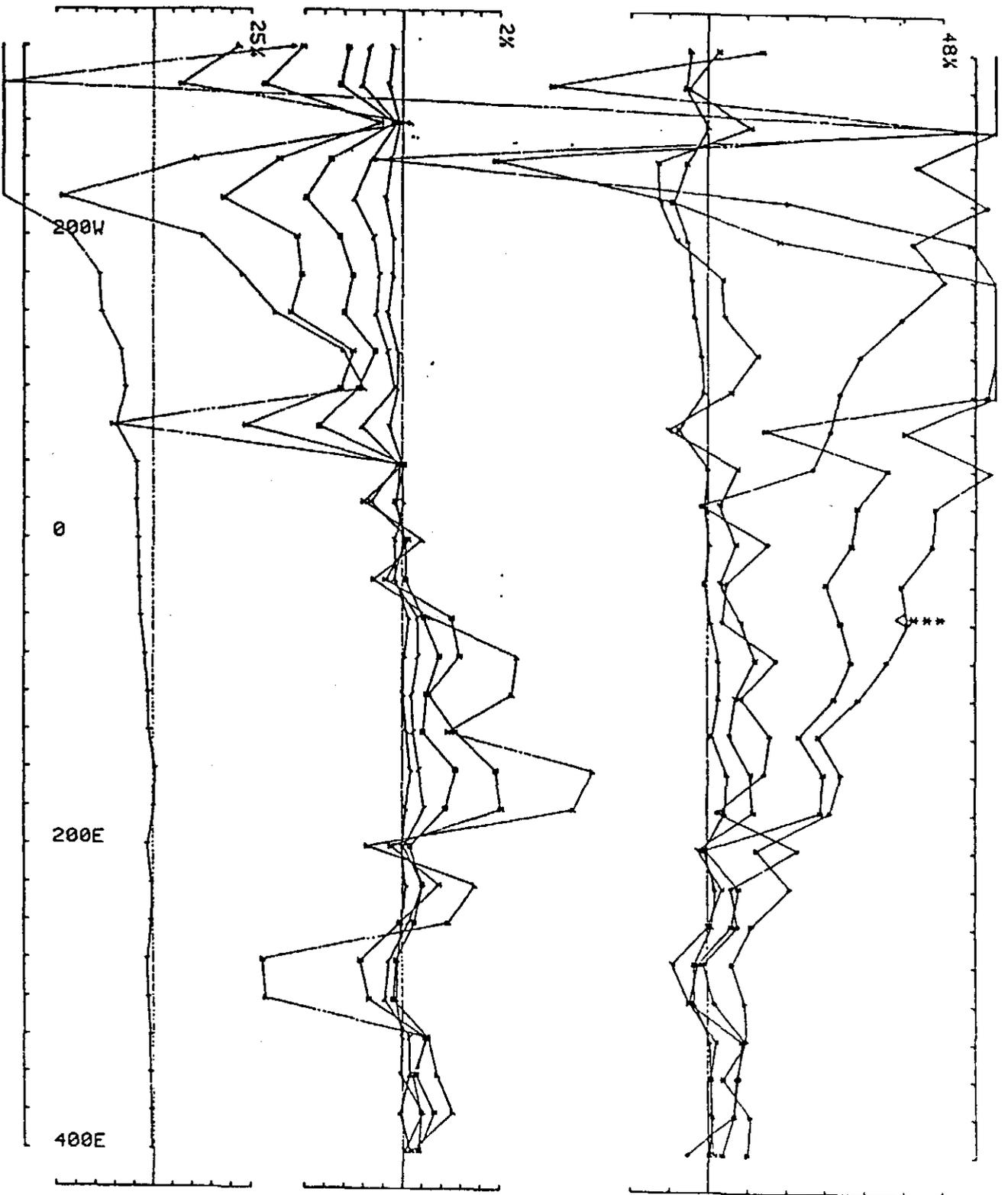


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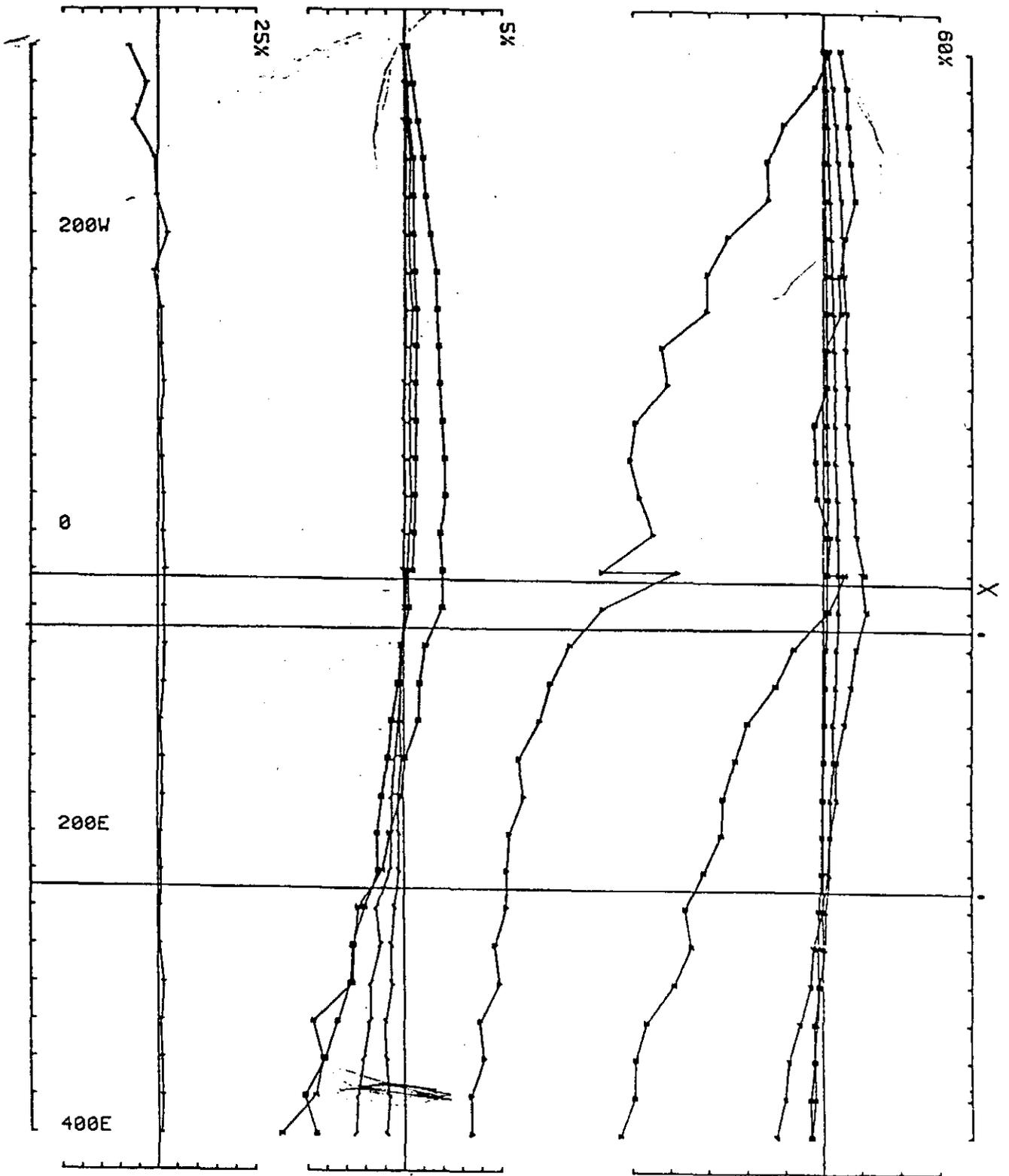


073

042074



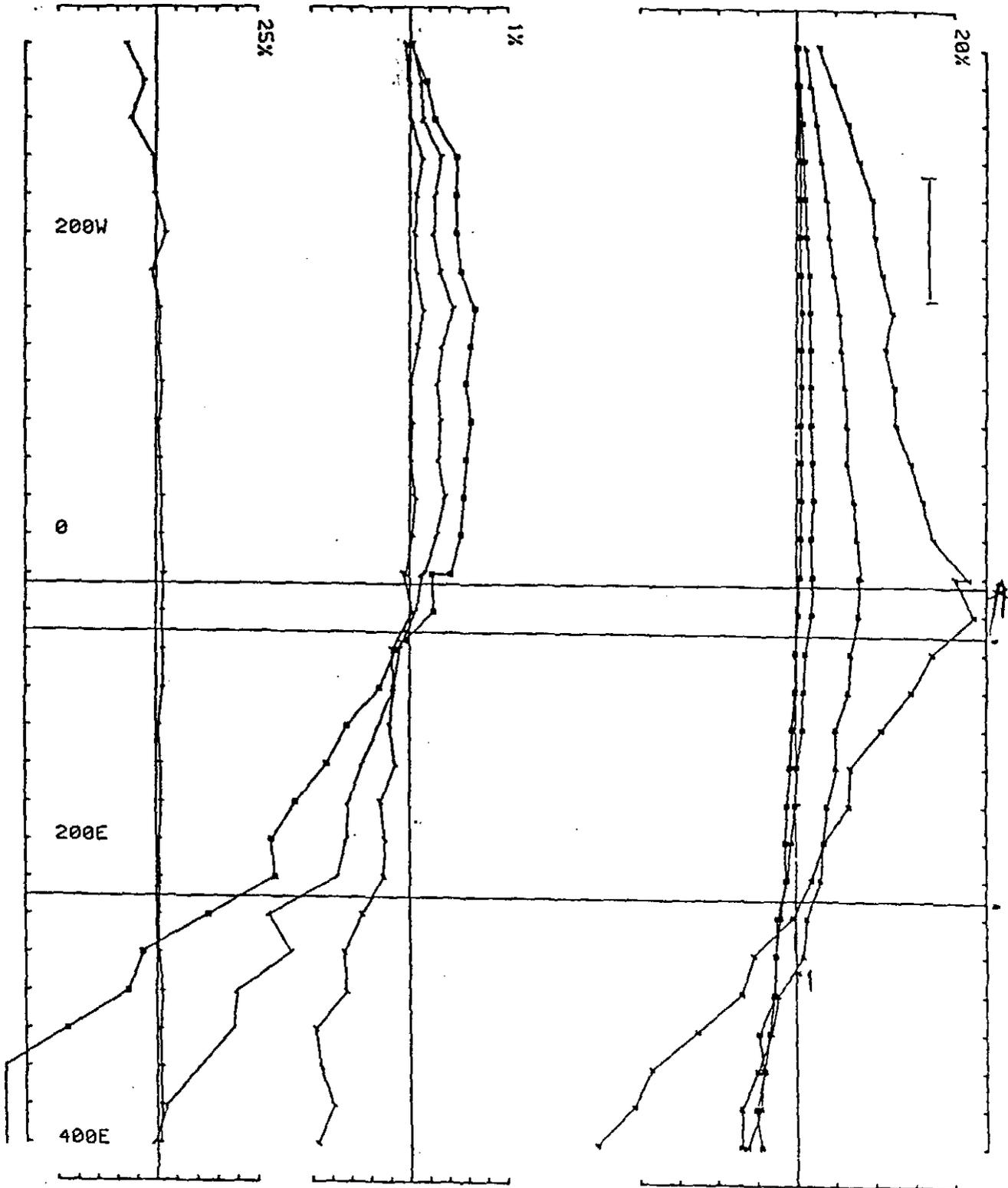
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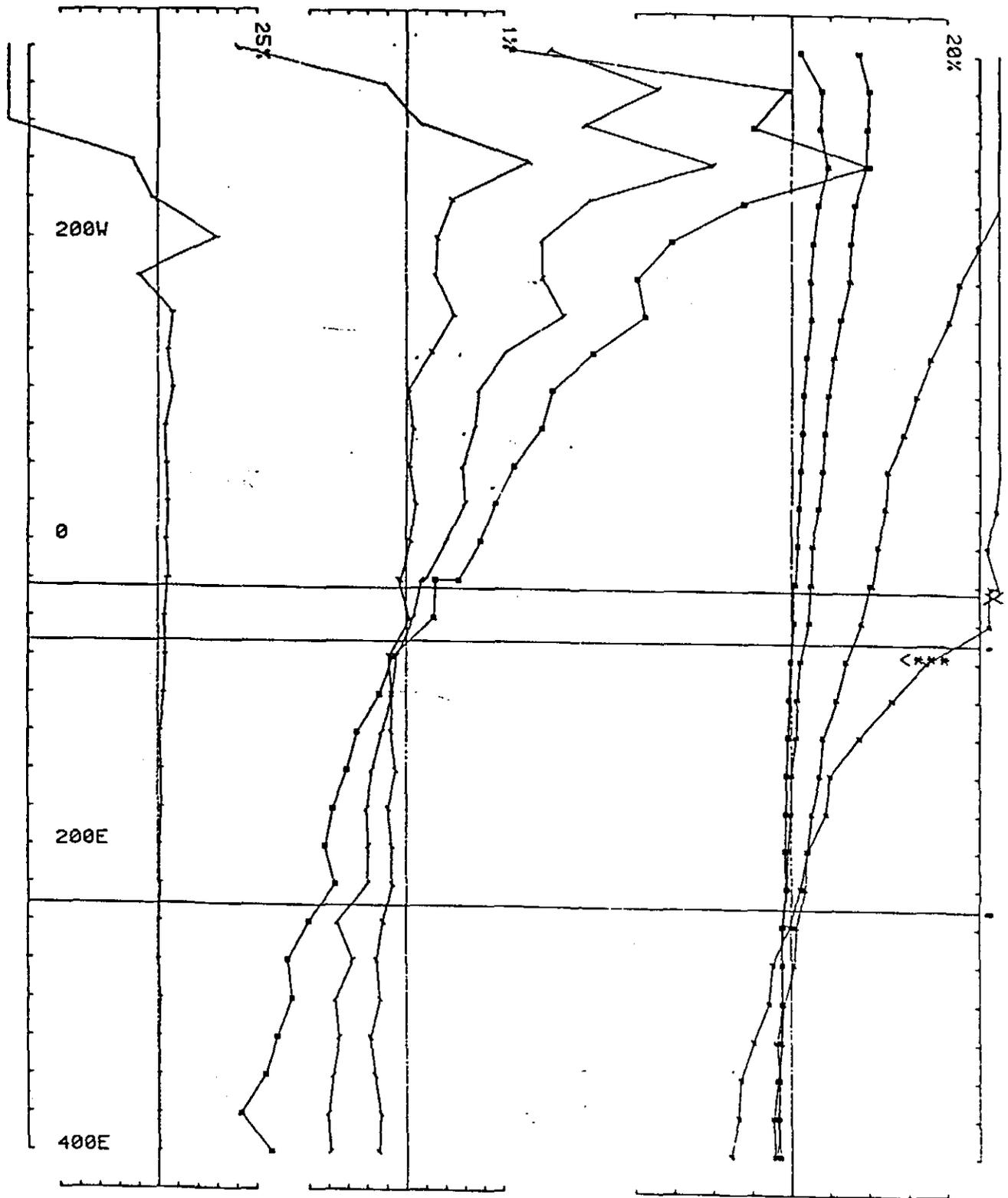
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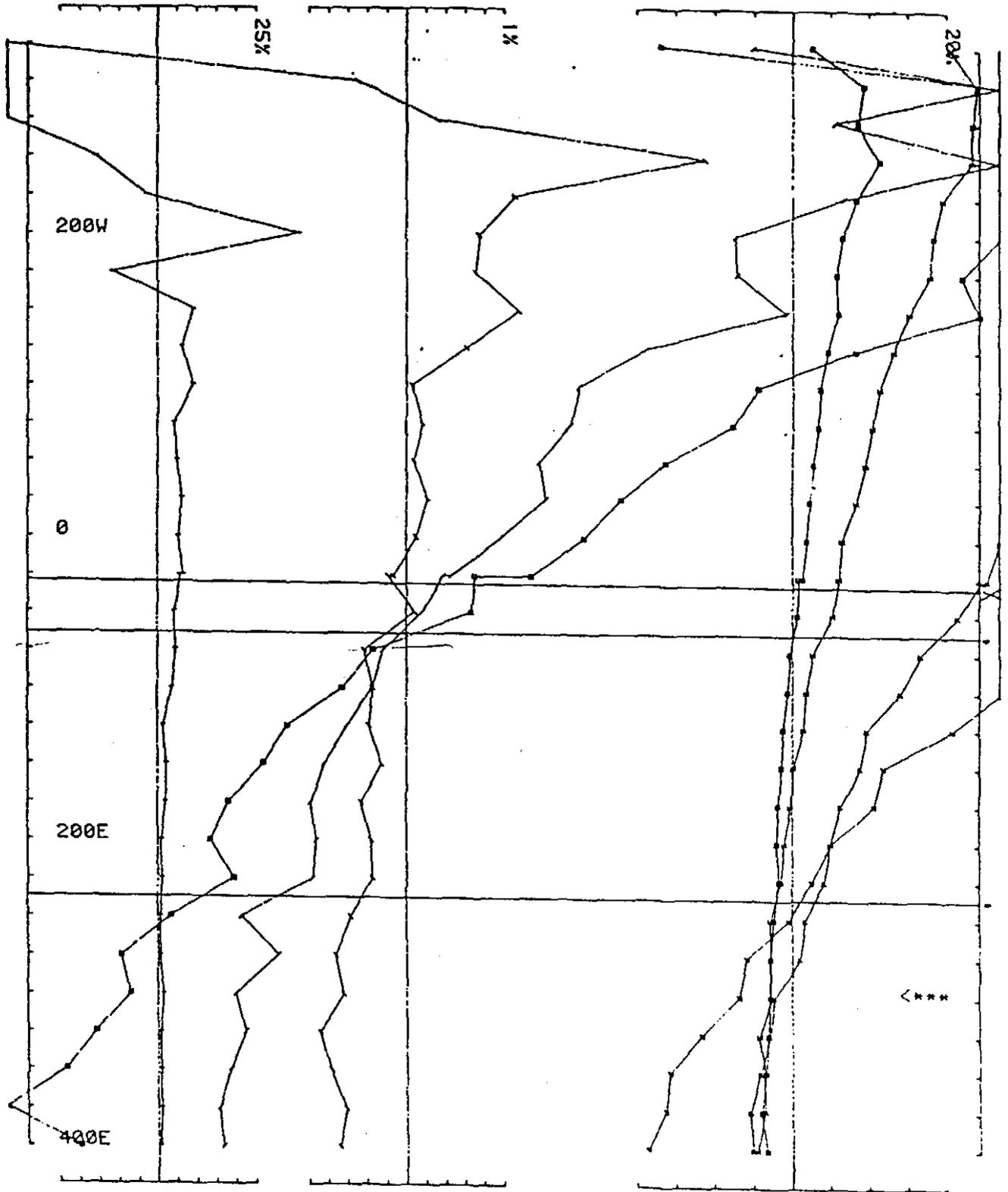
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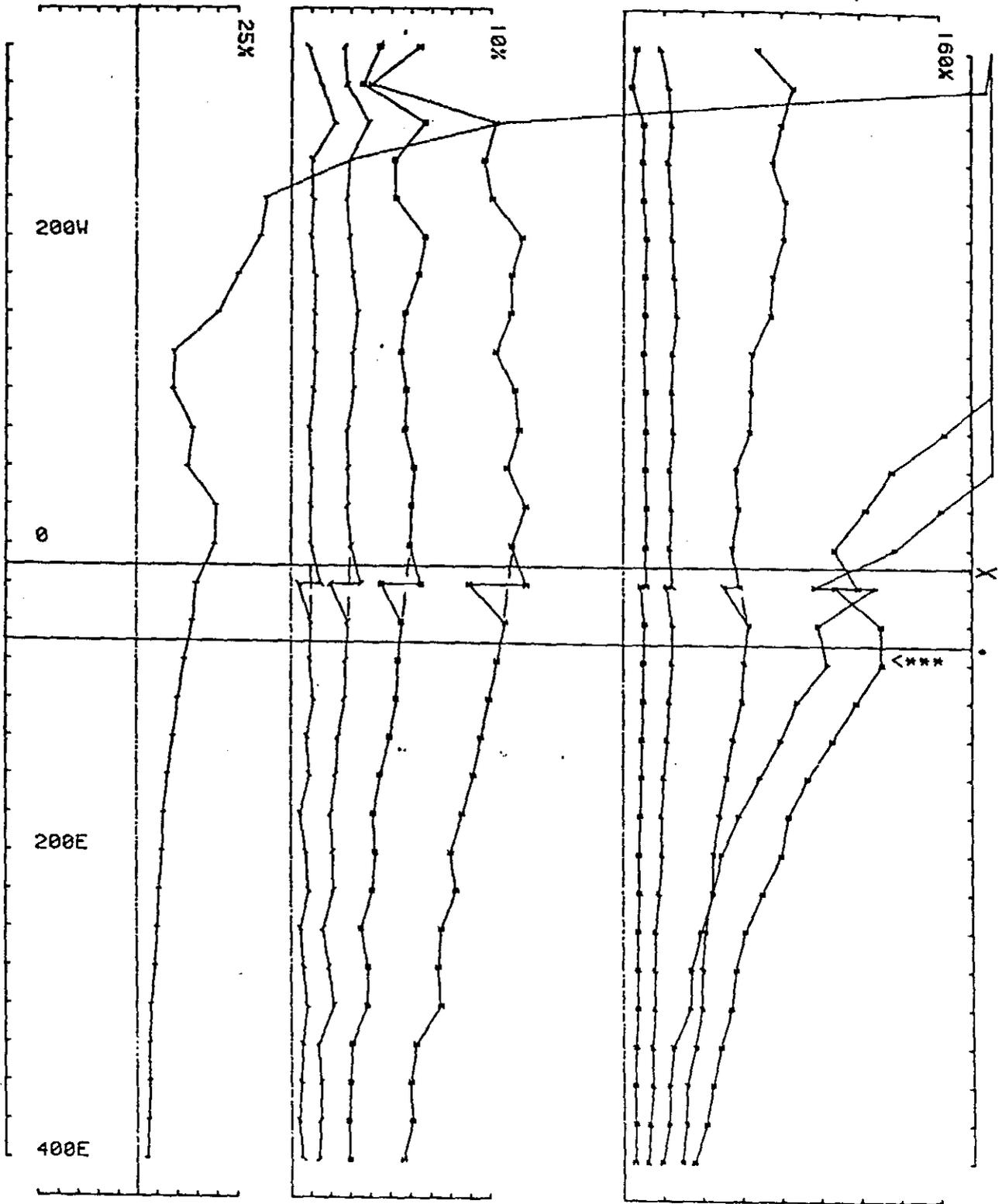
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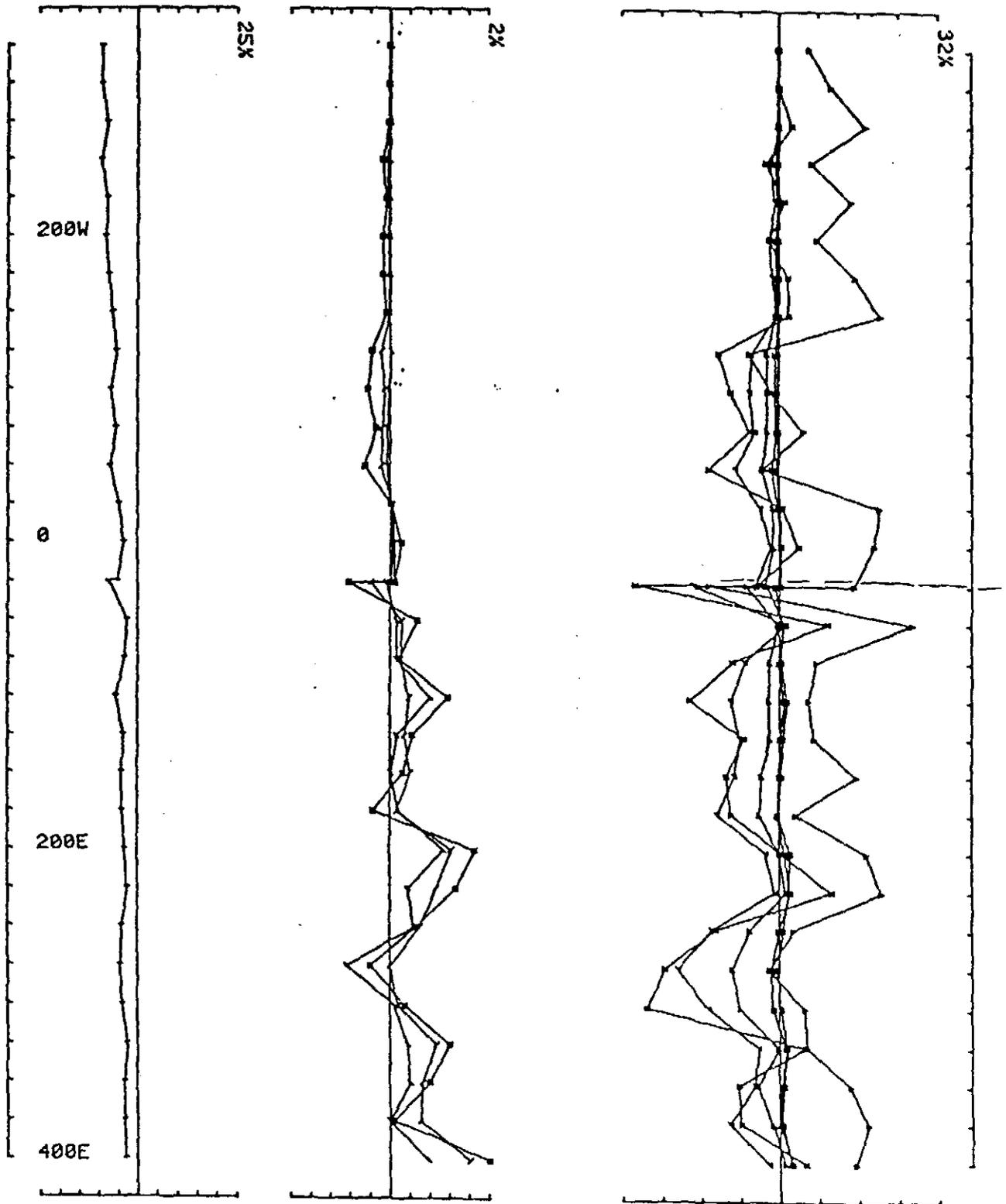
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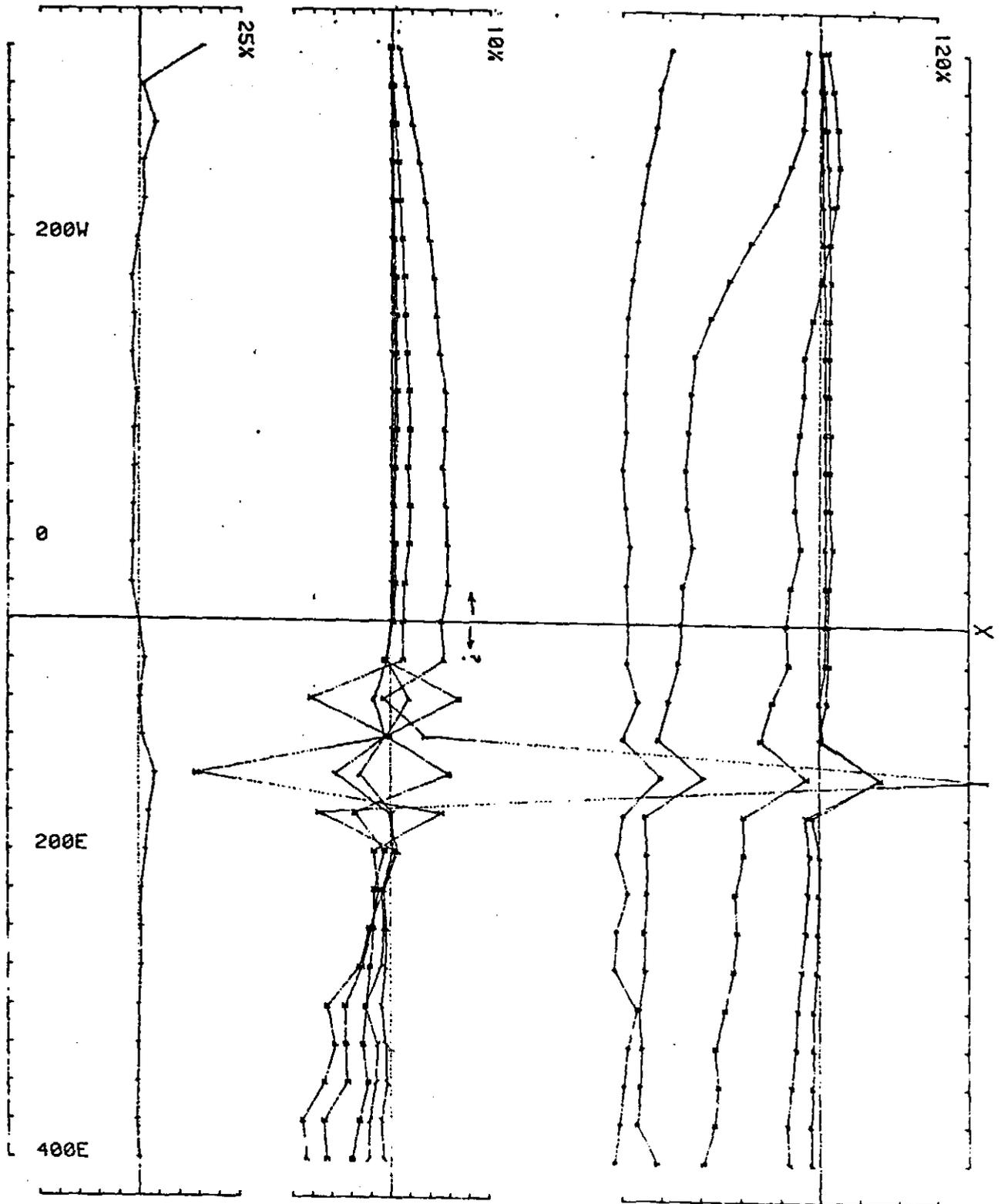
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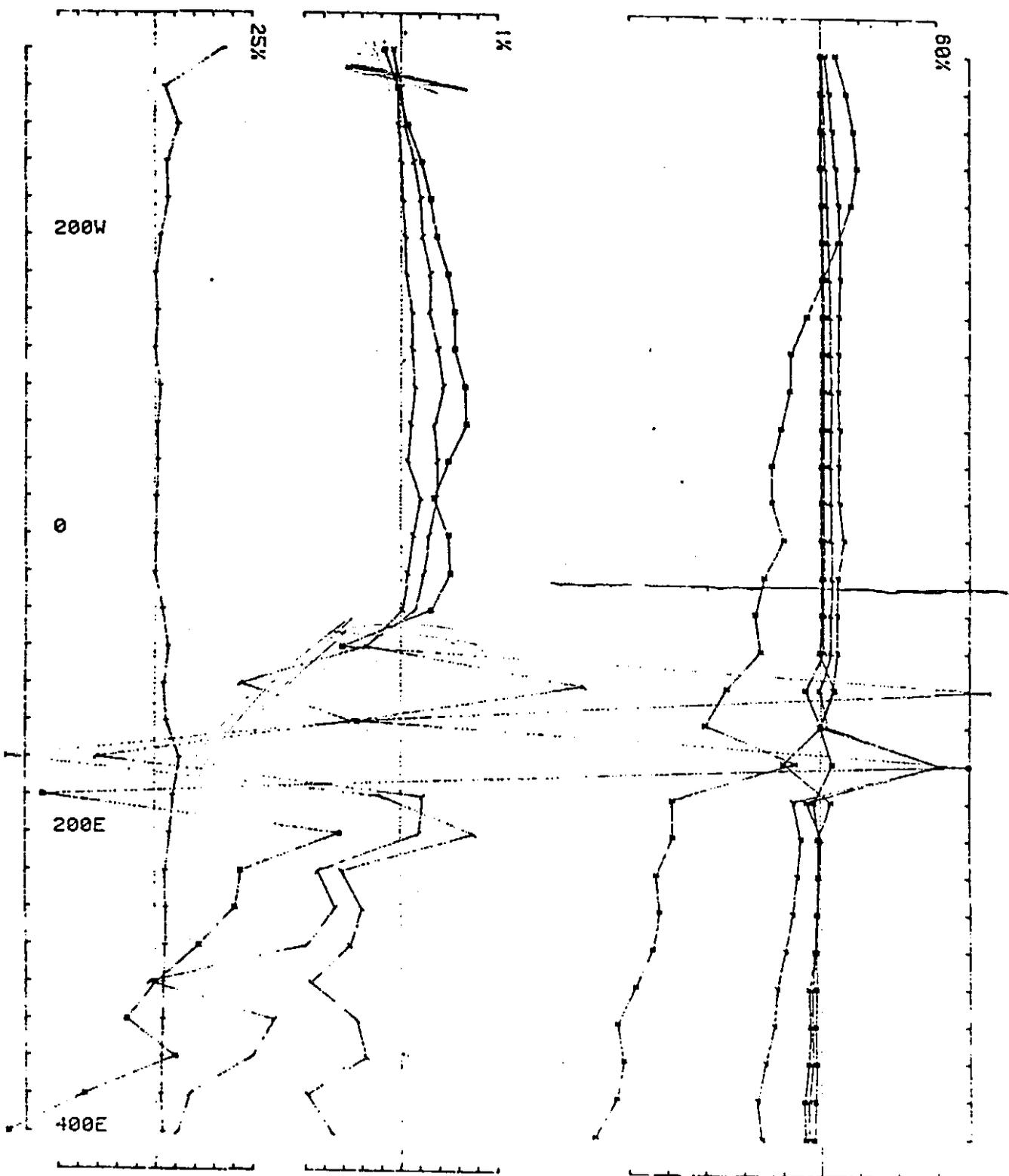
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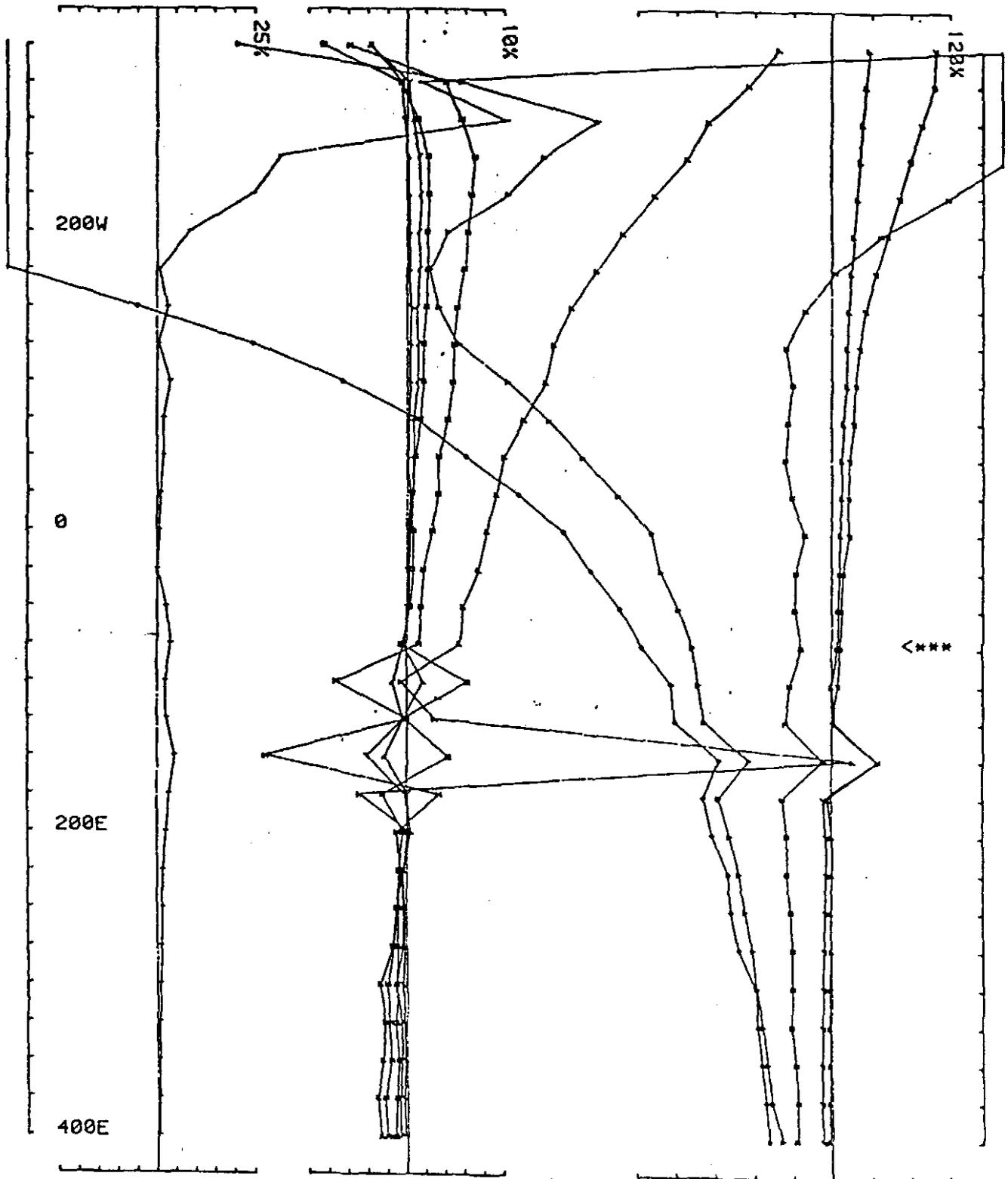
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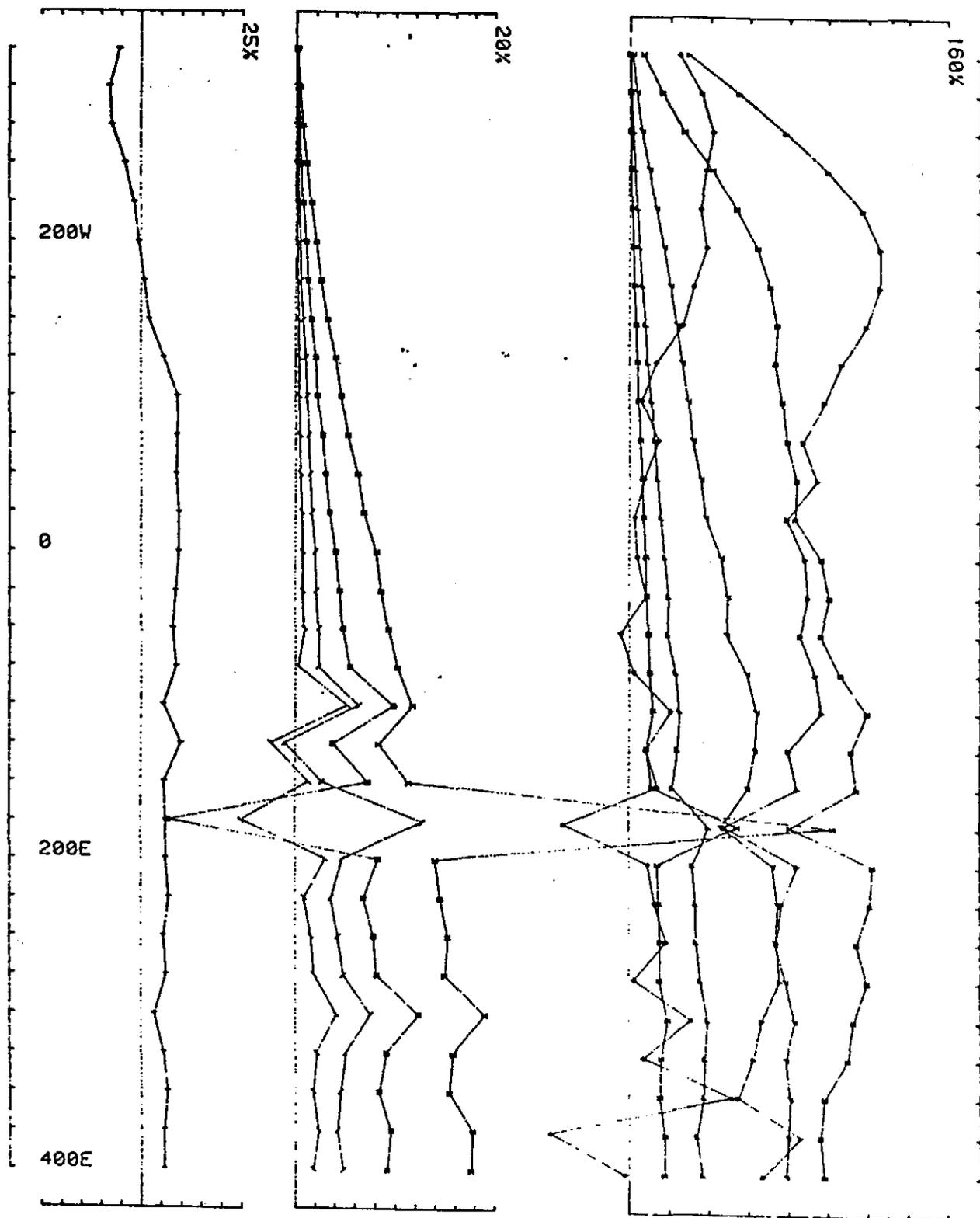
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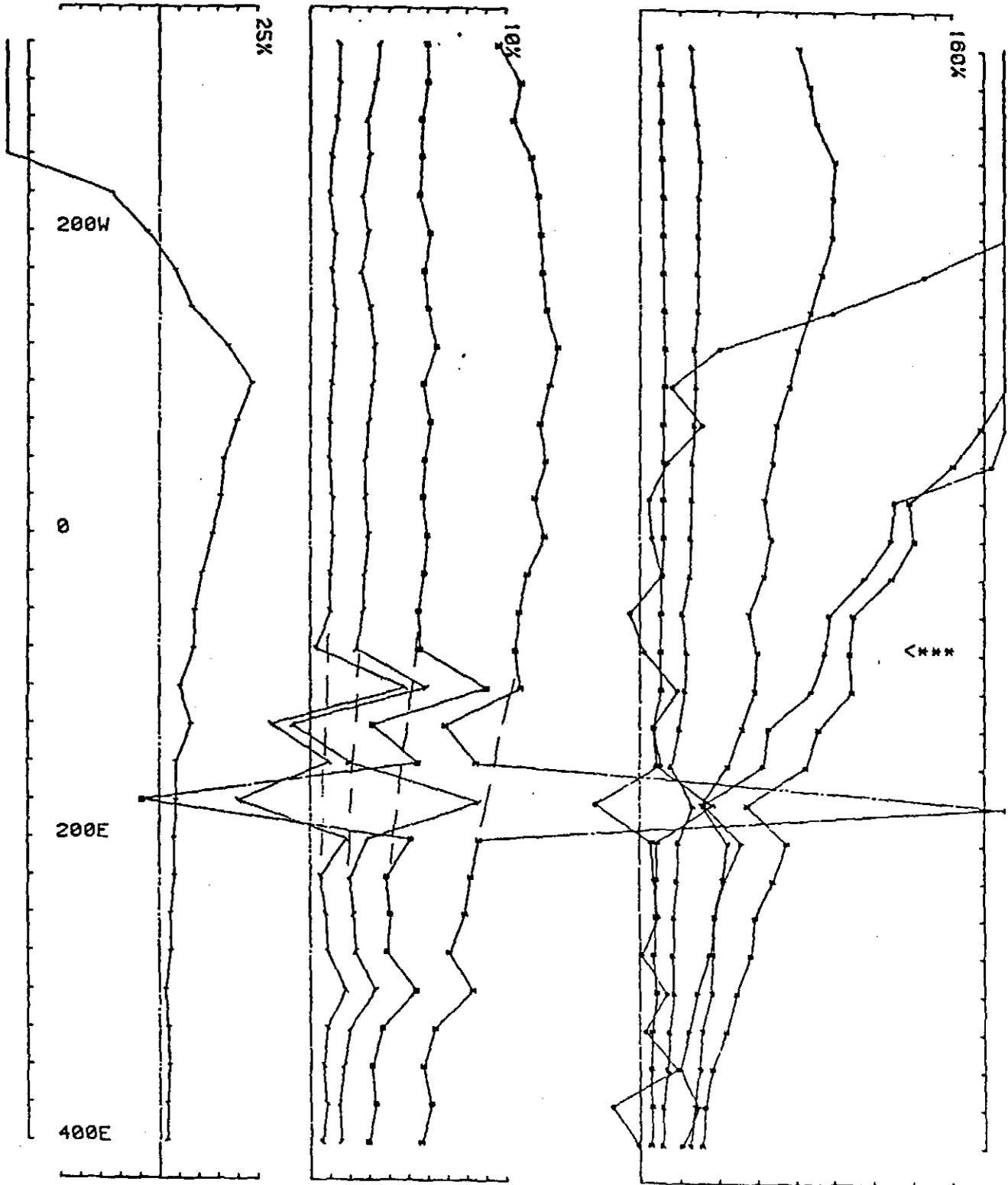


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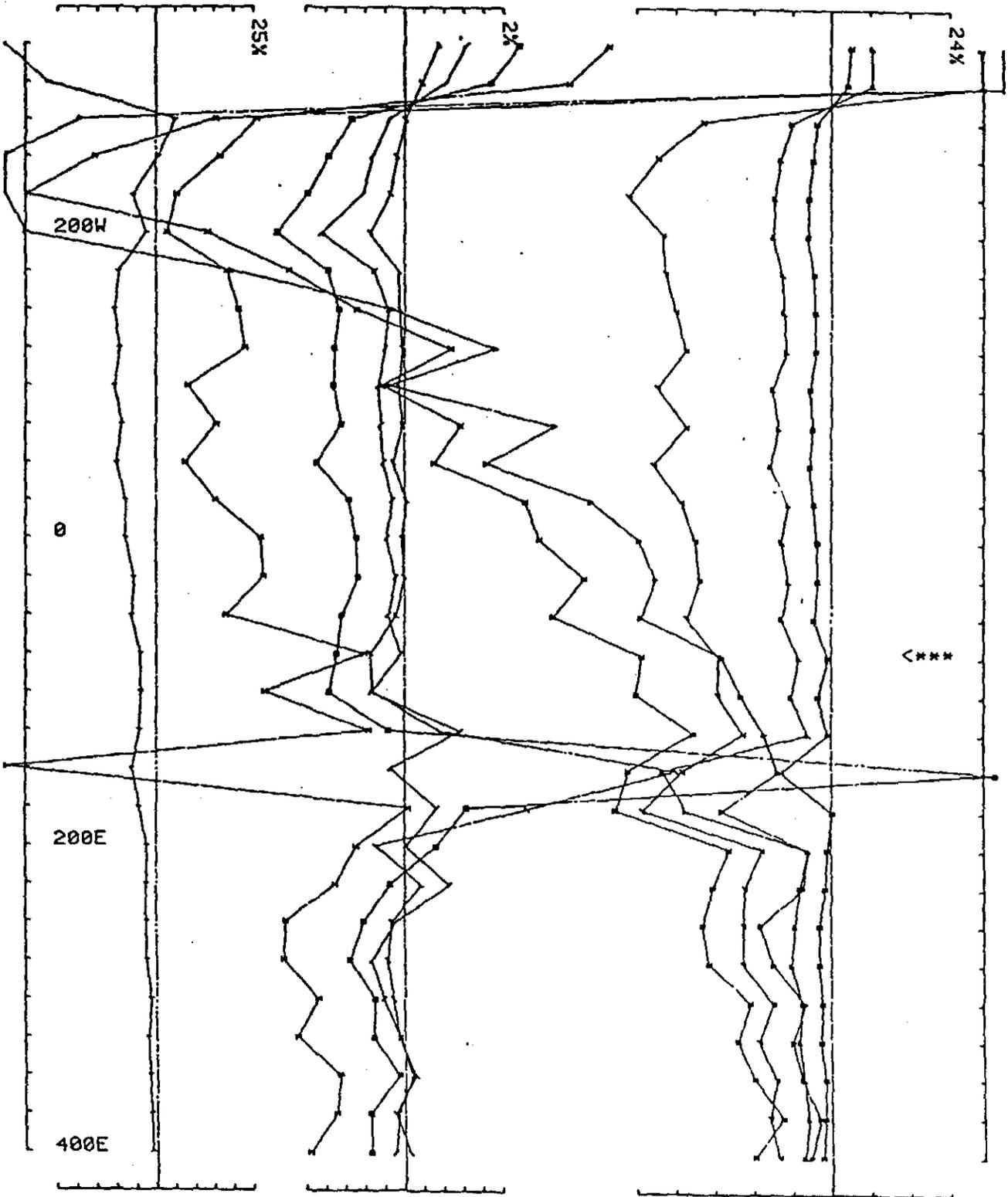
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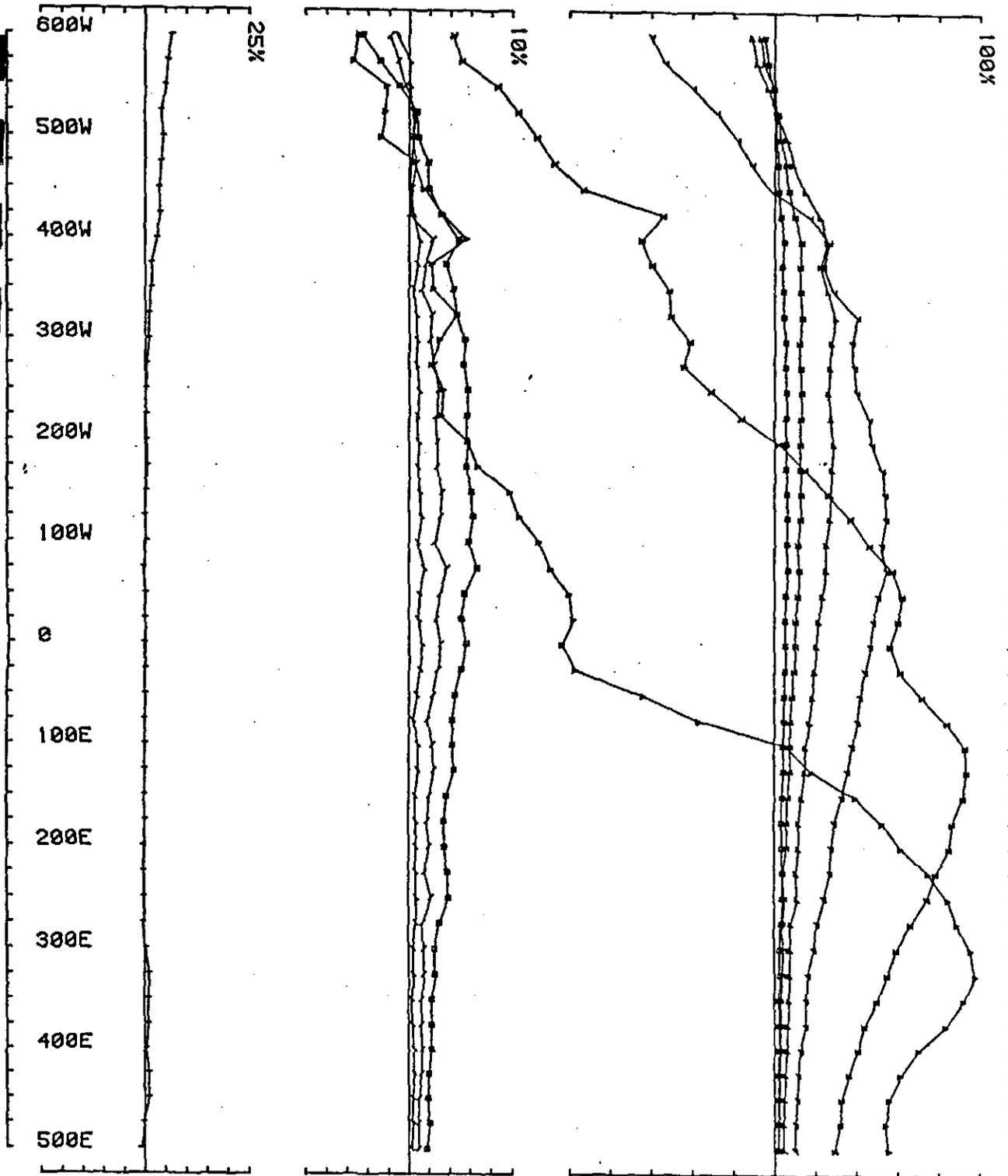
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042087



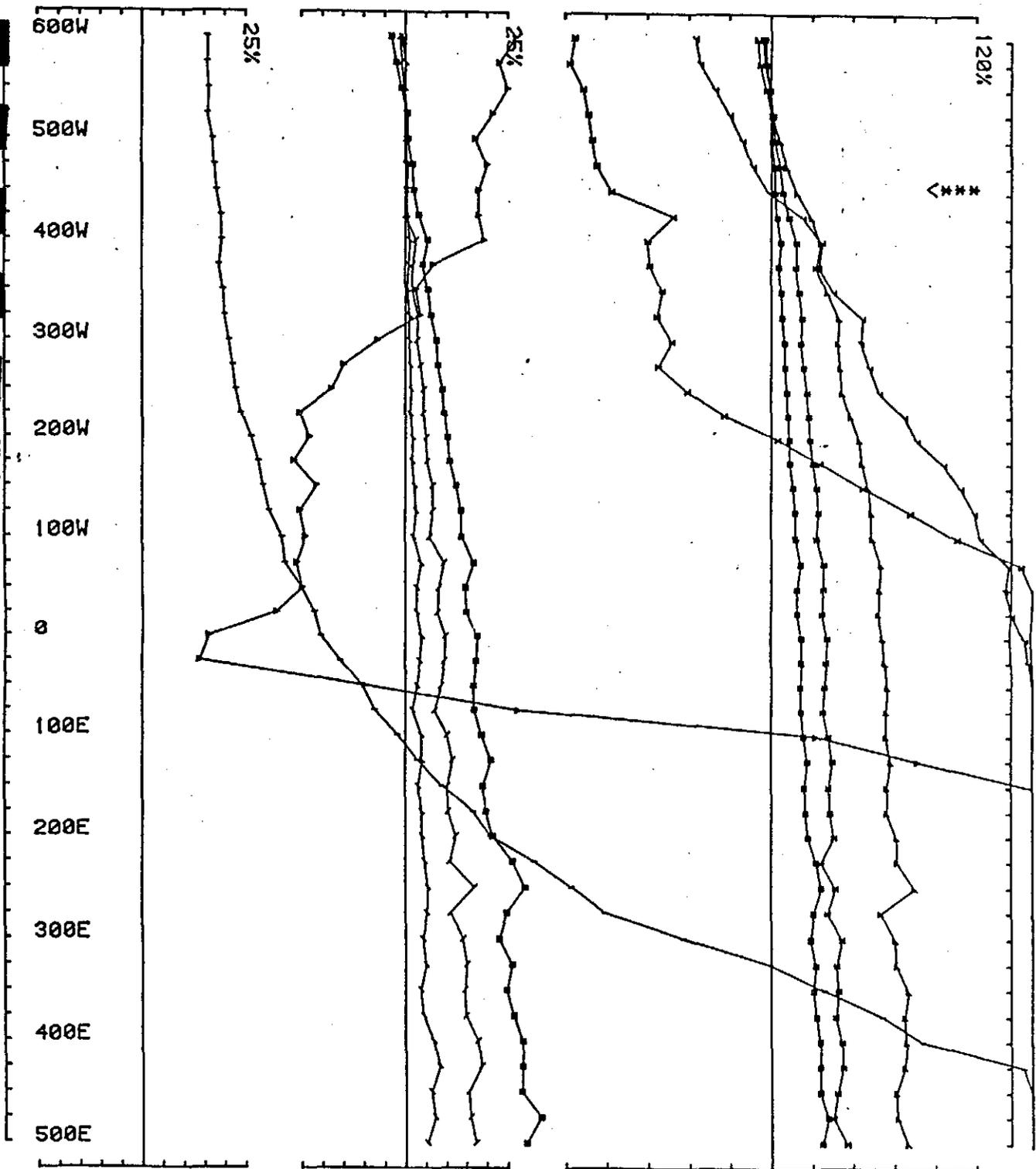
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042088



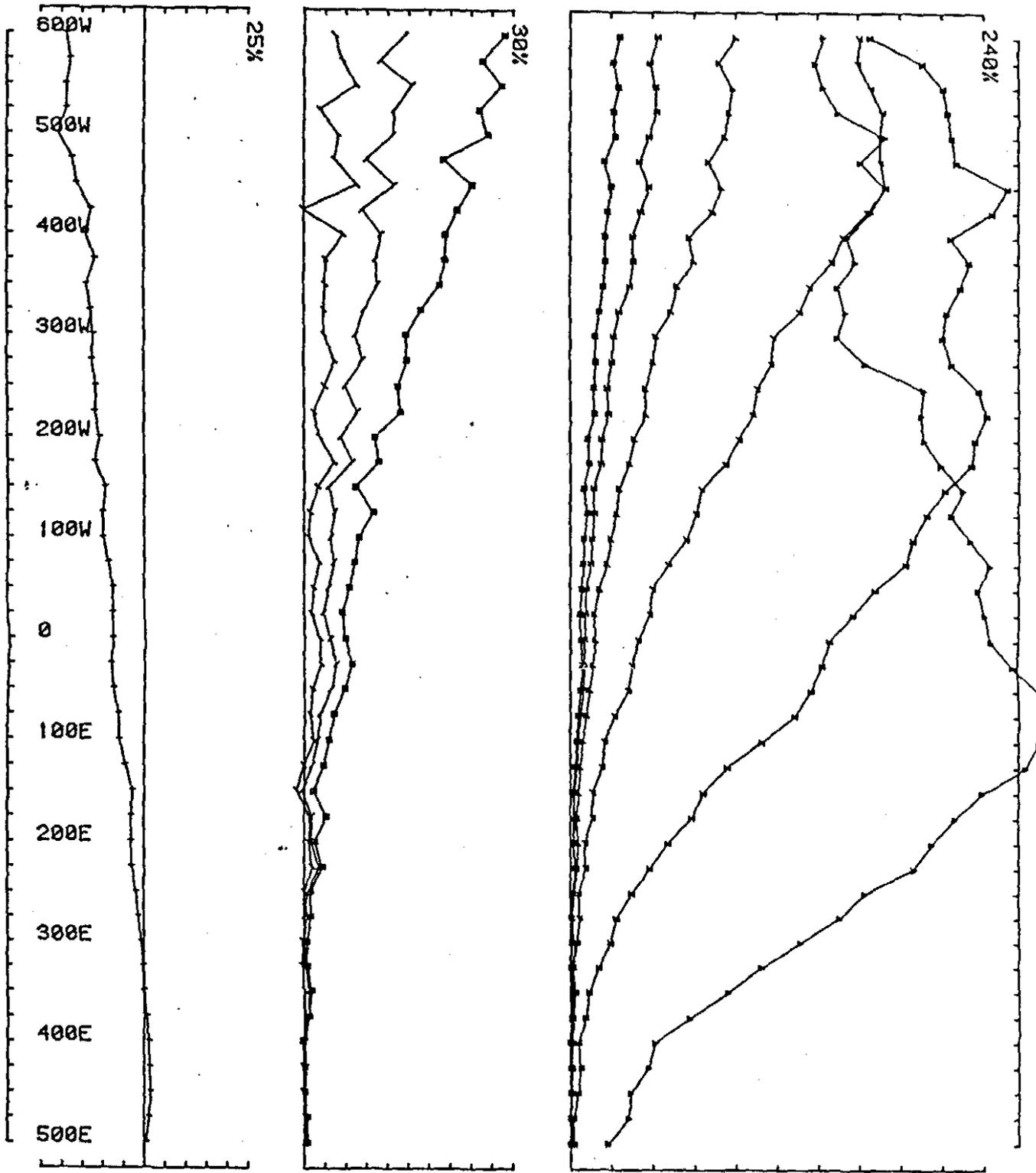
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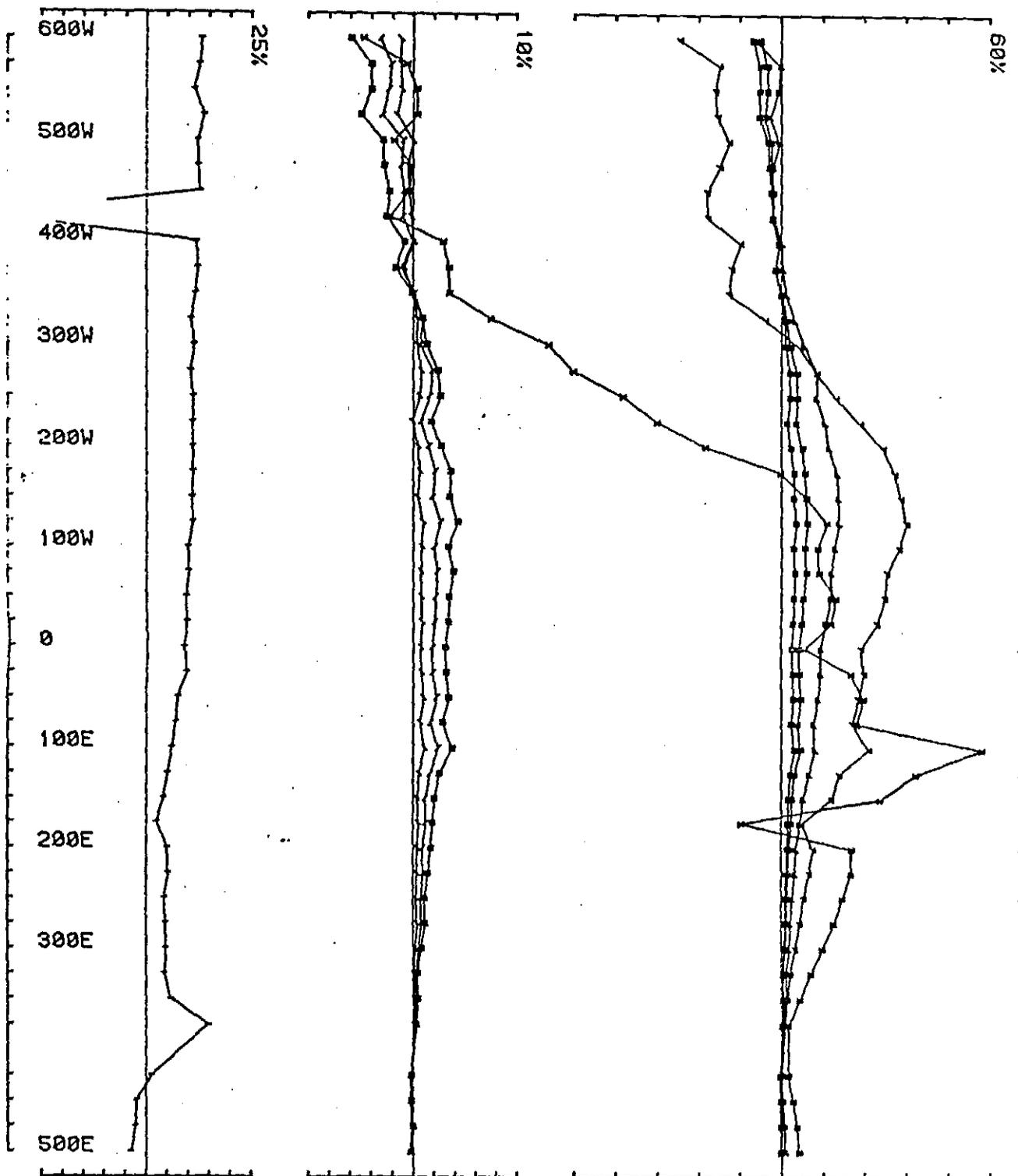
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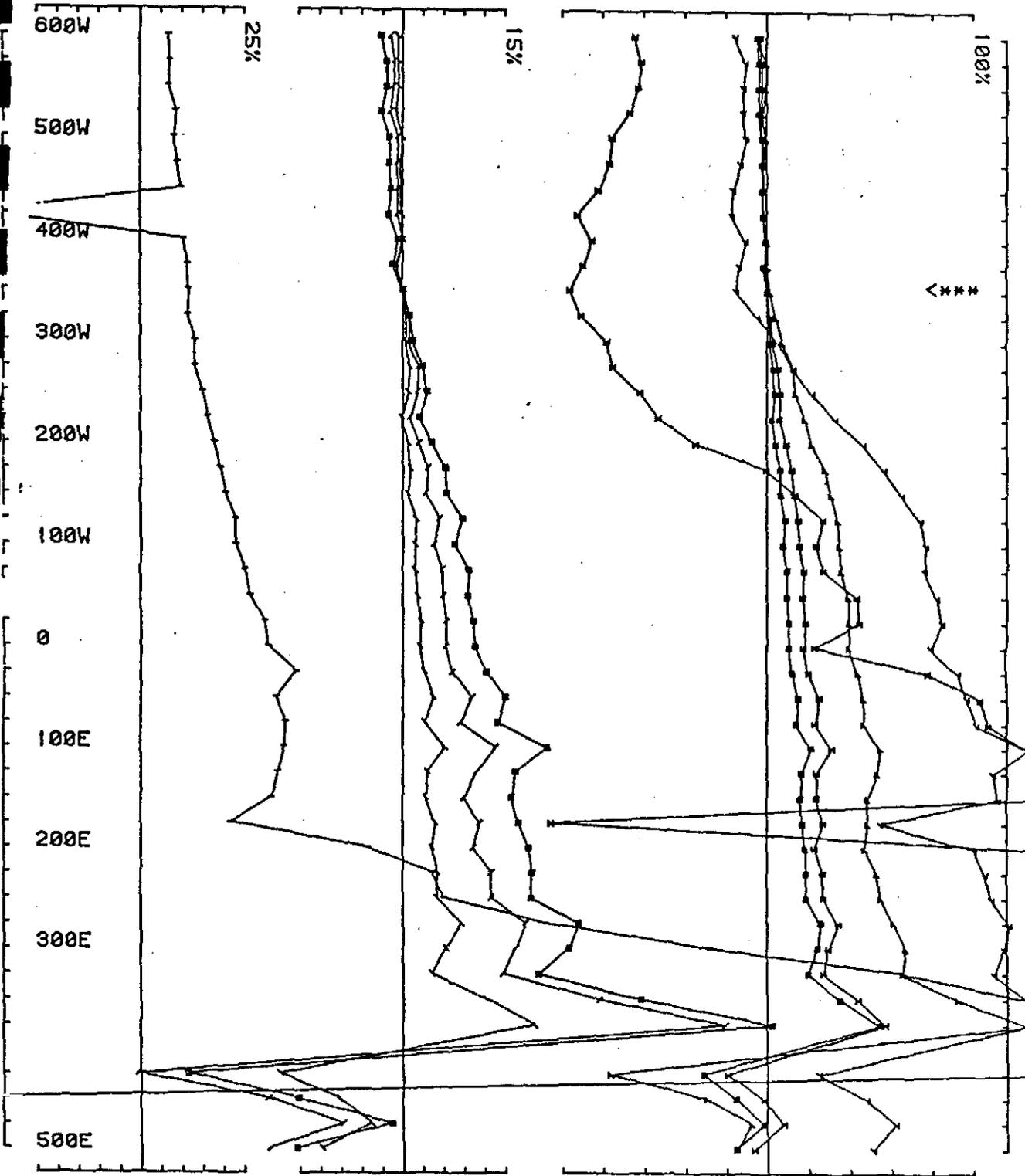
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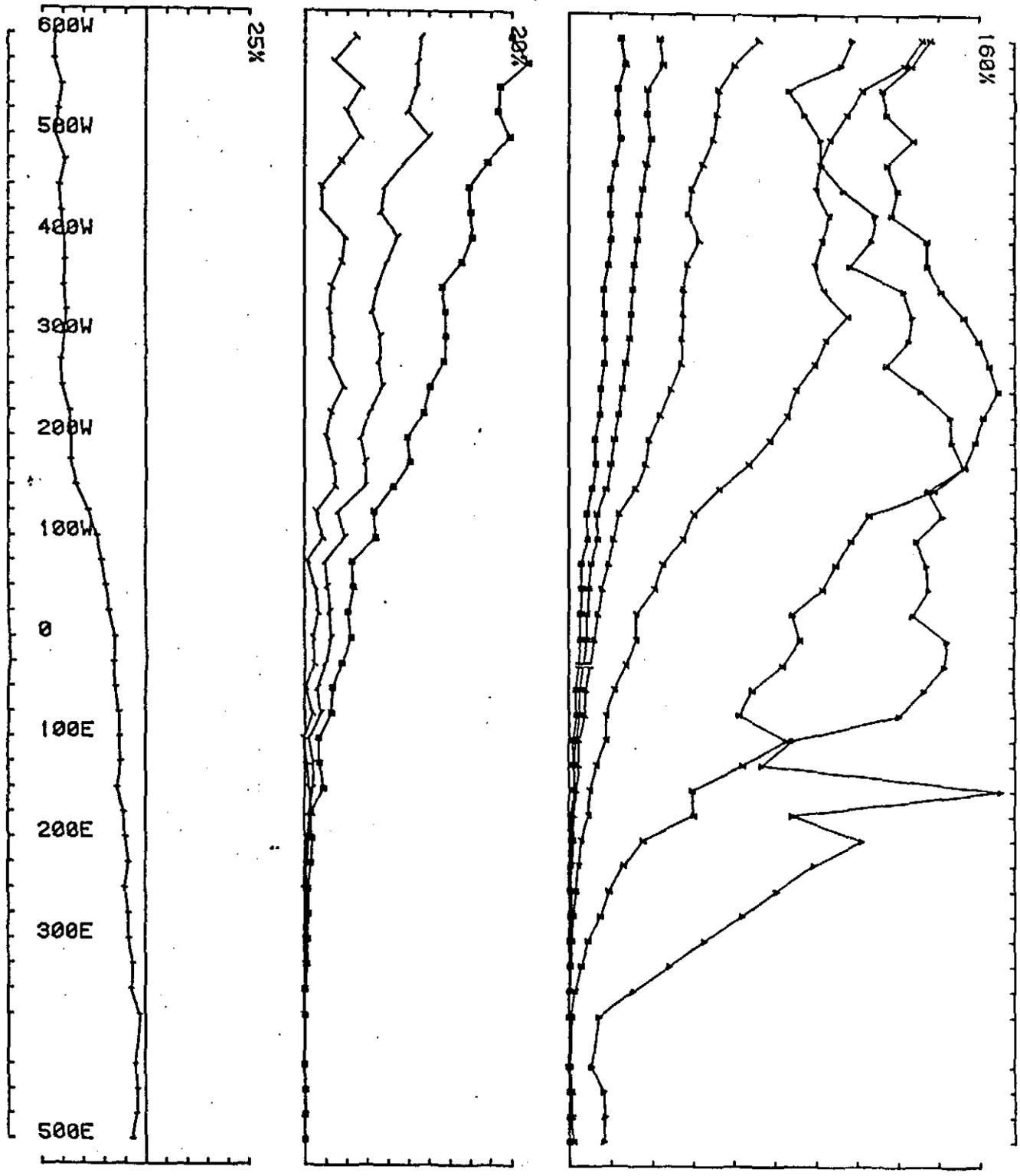
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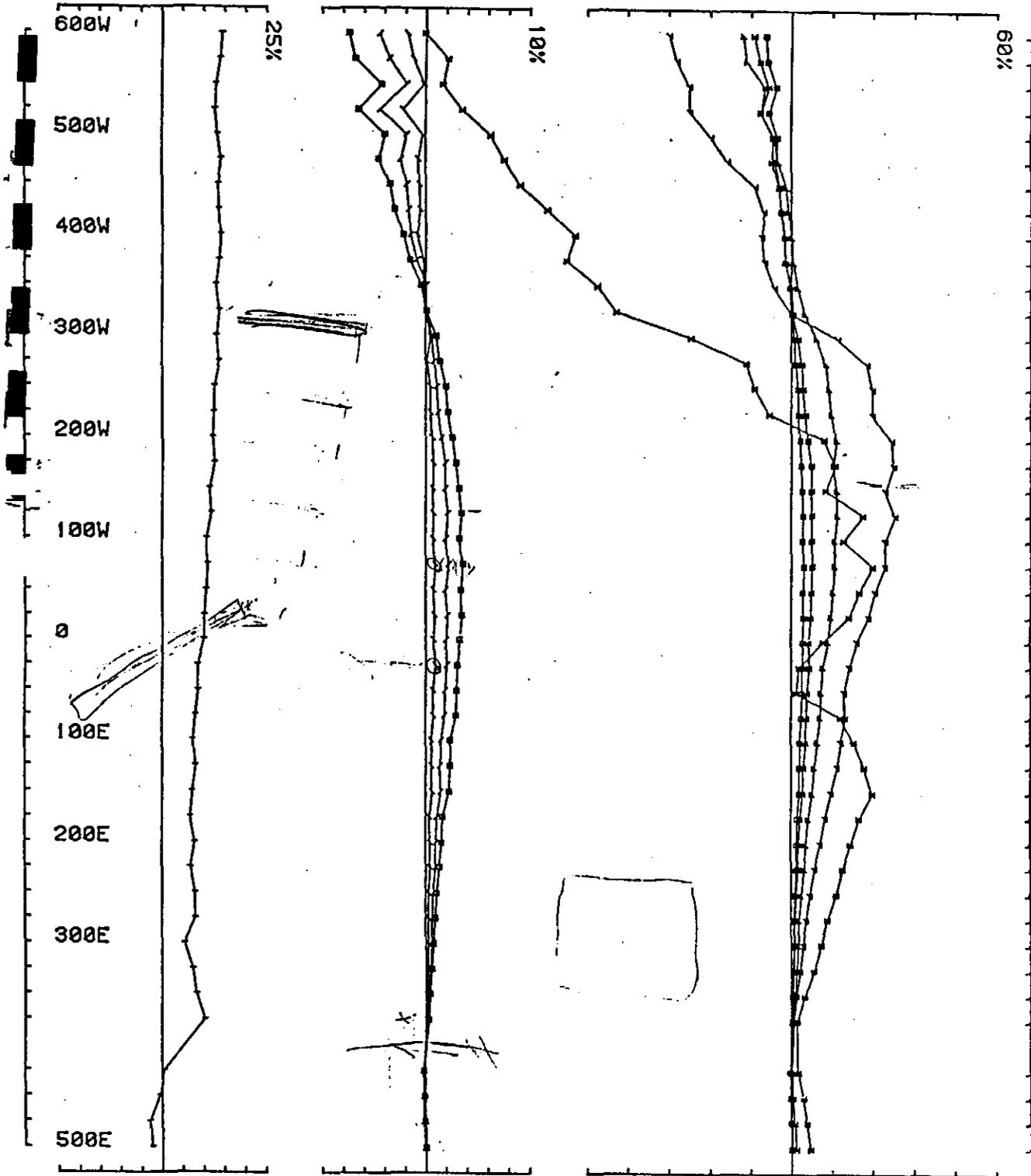
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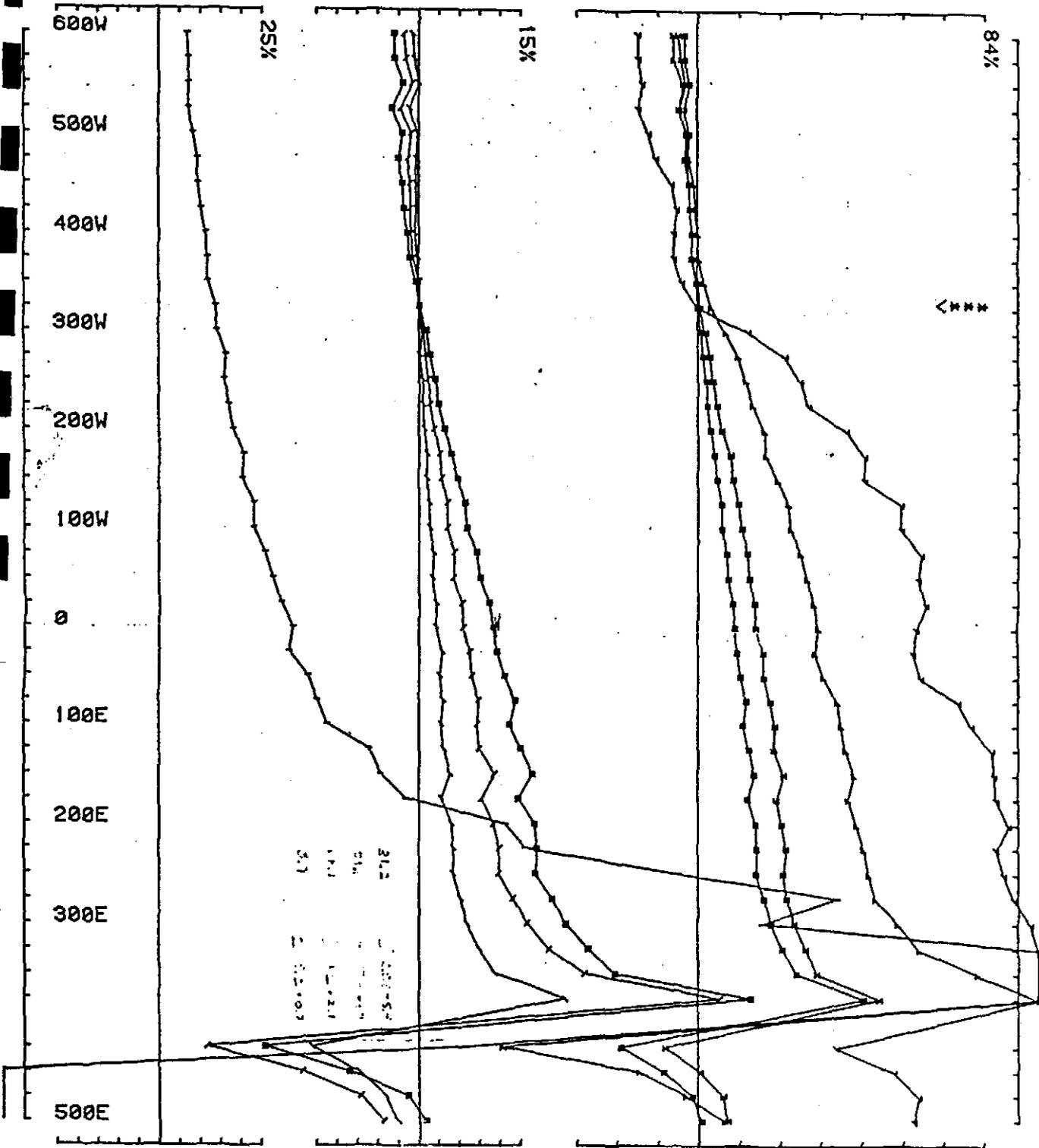
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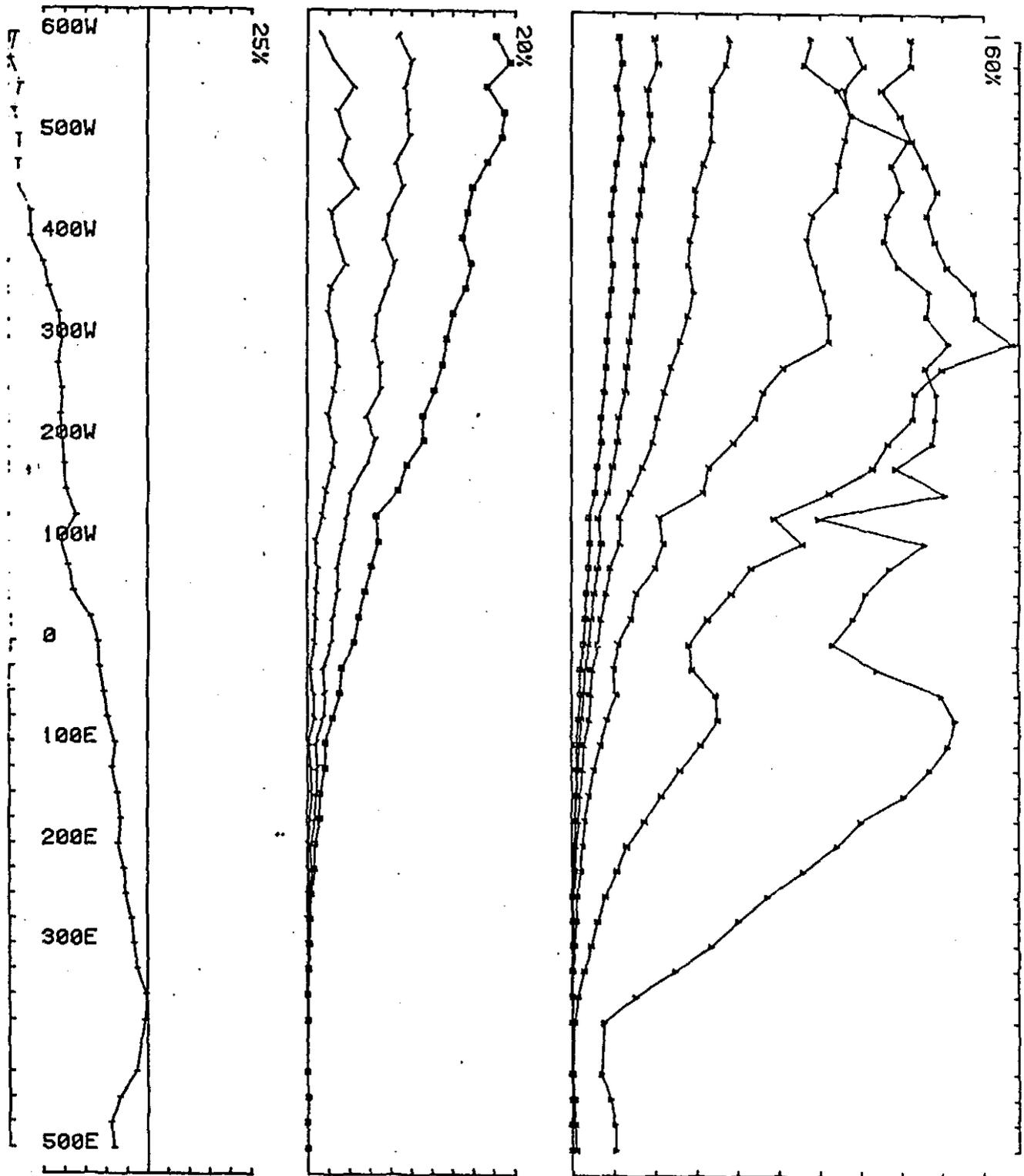
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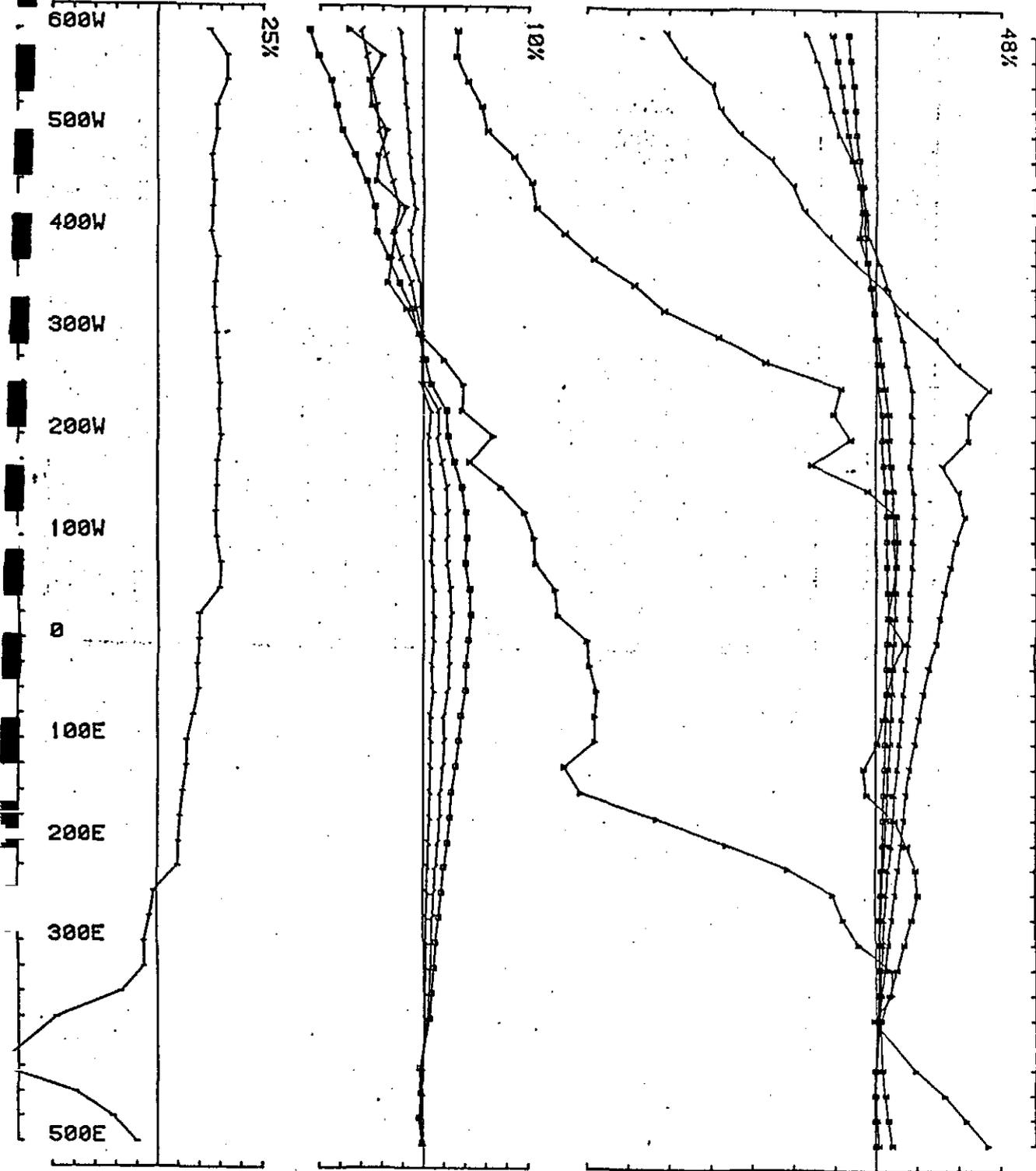
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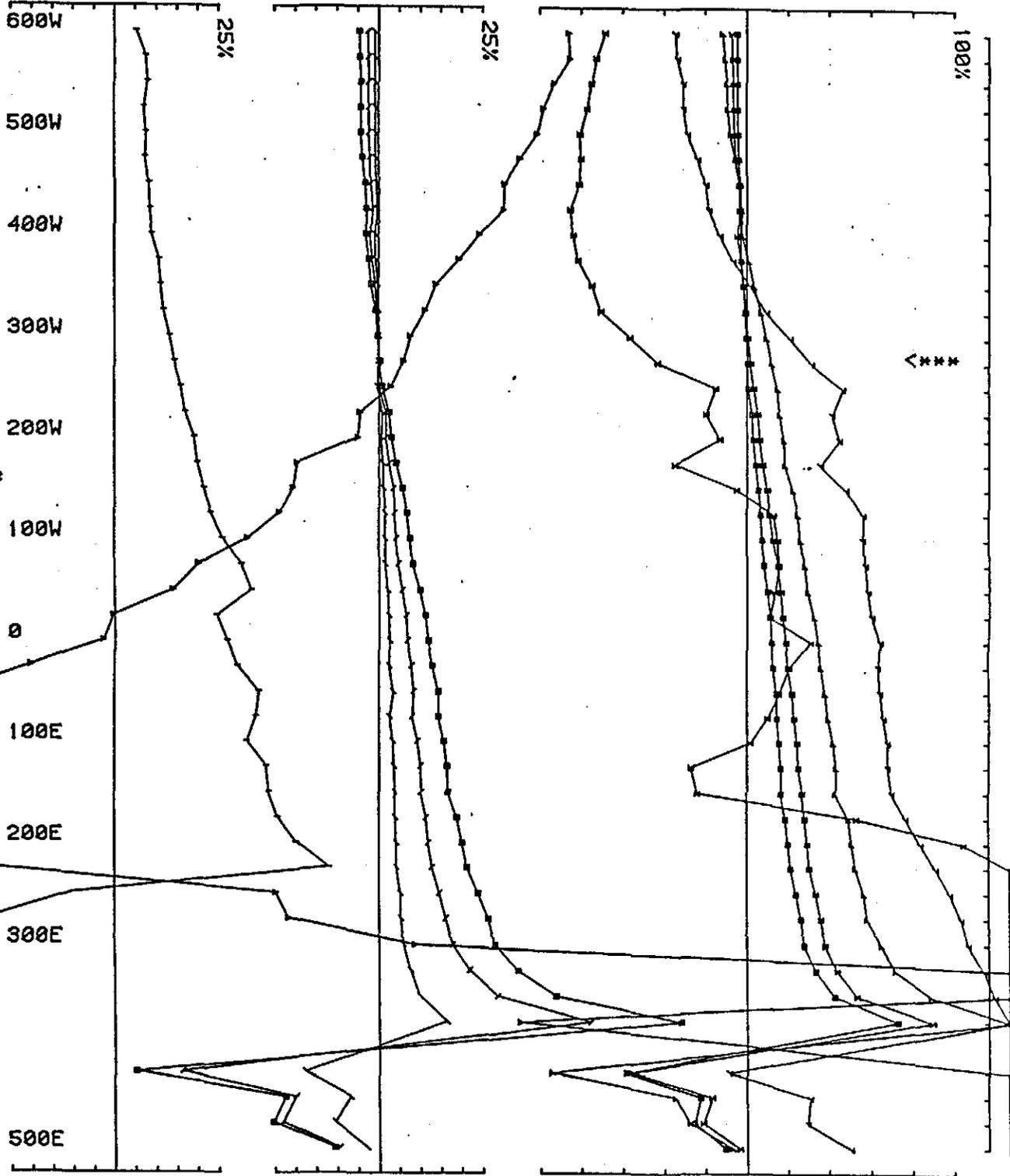
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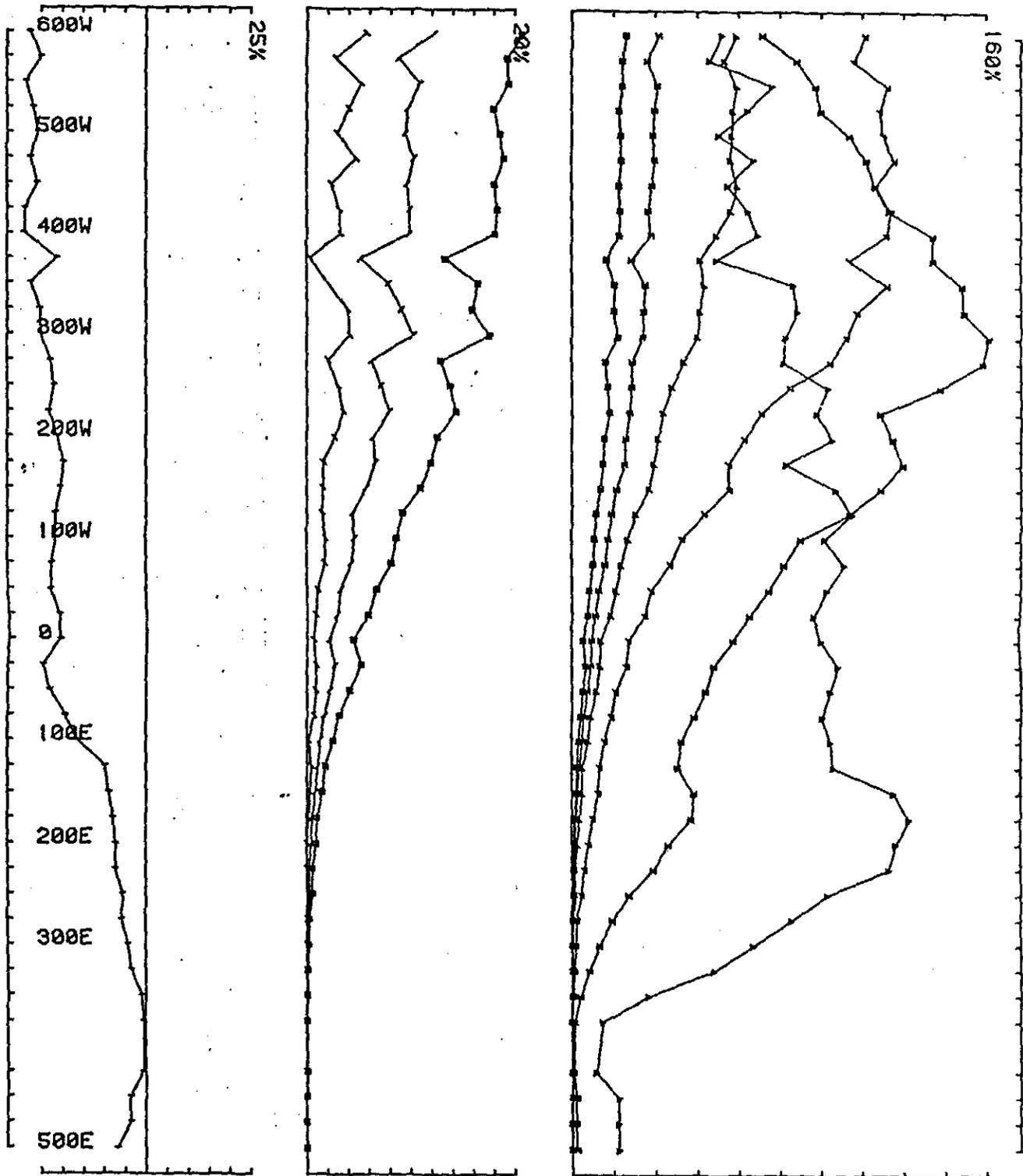
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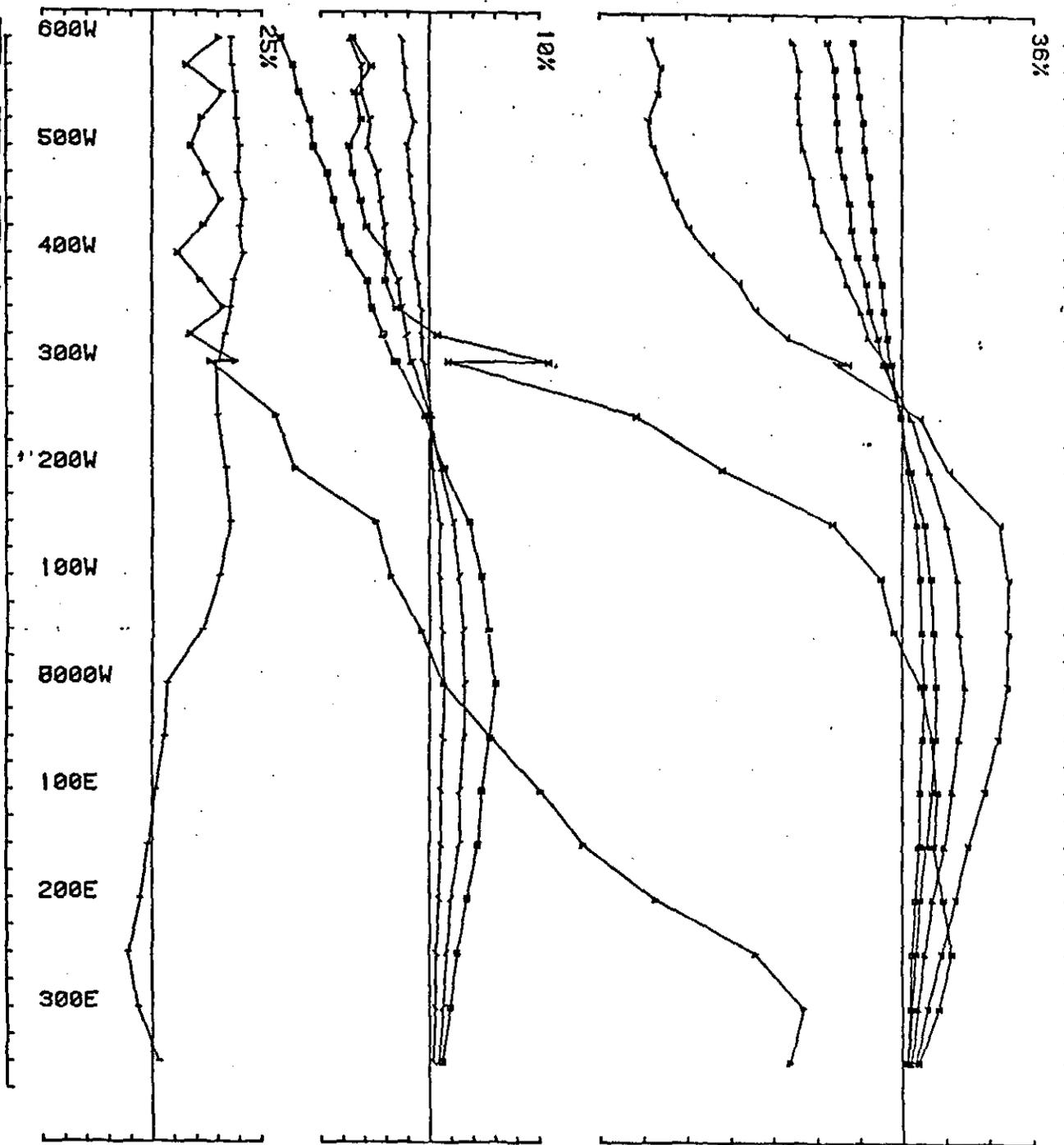
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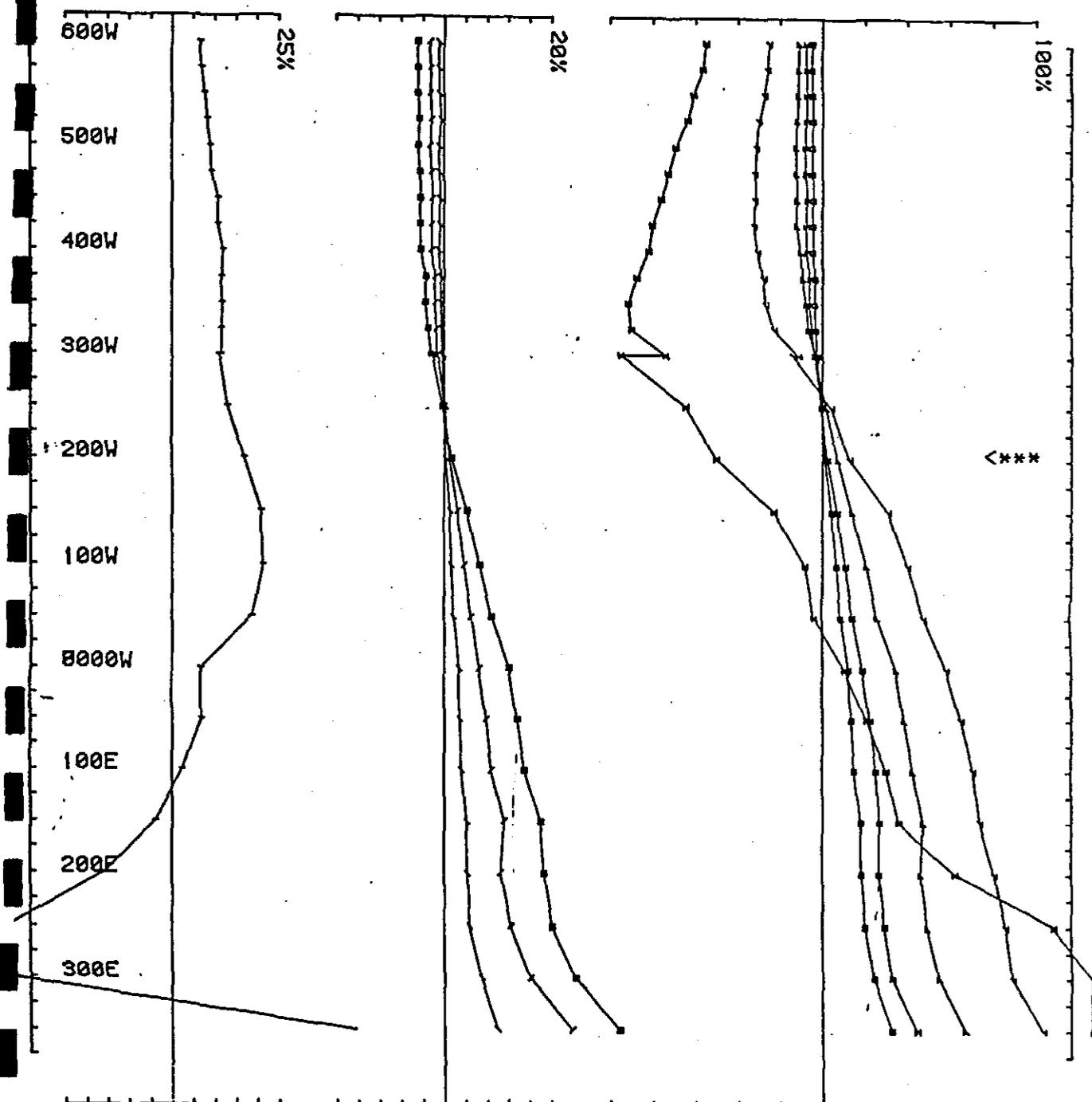
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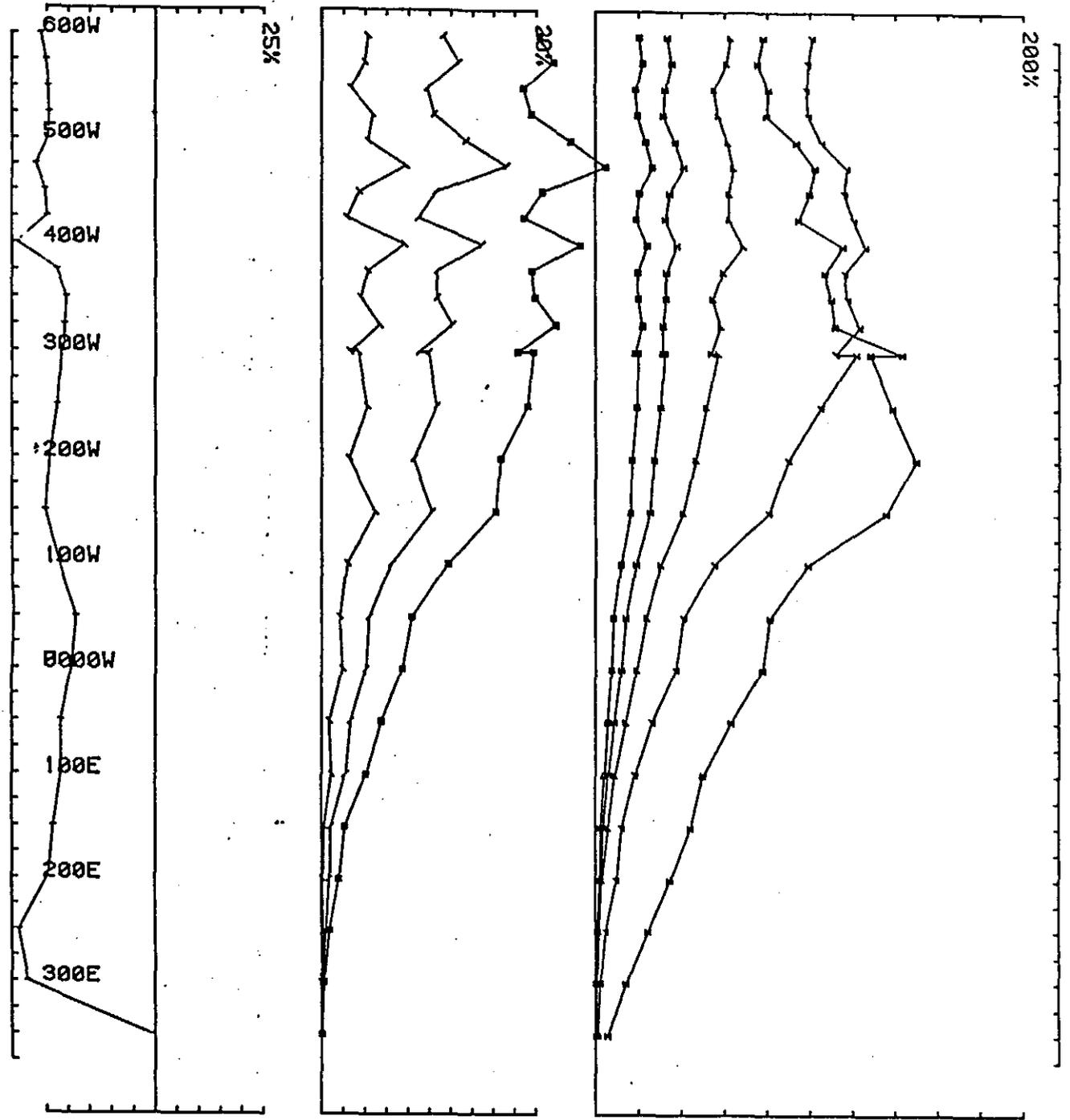


Hz
1.5
1.3
1.2

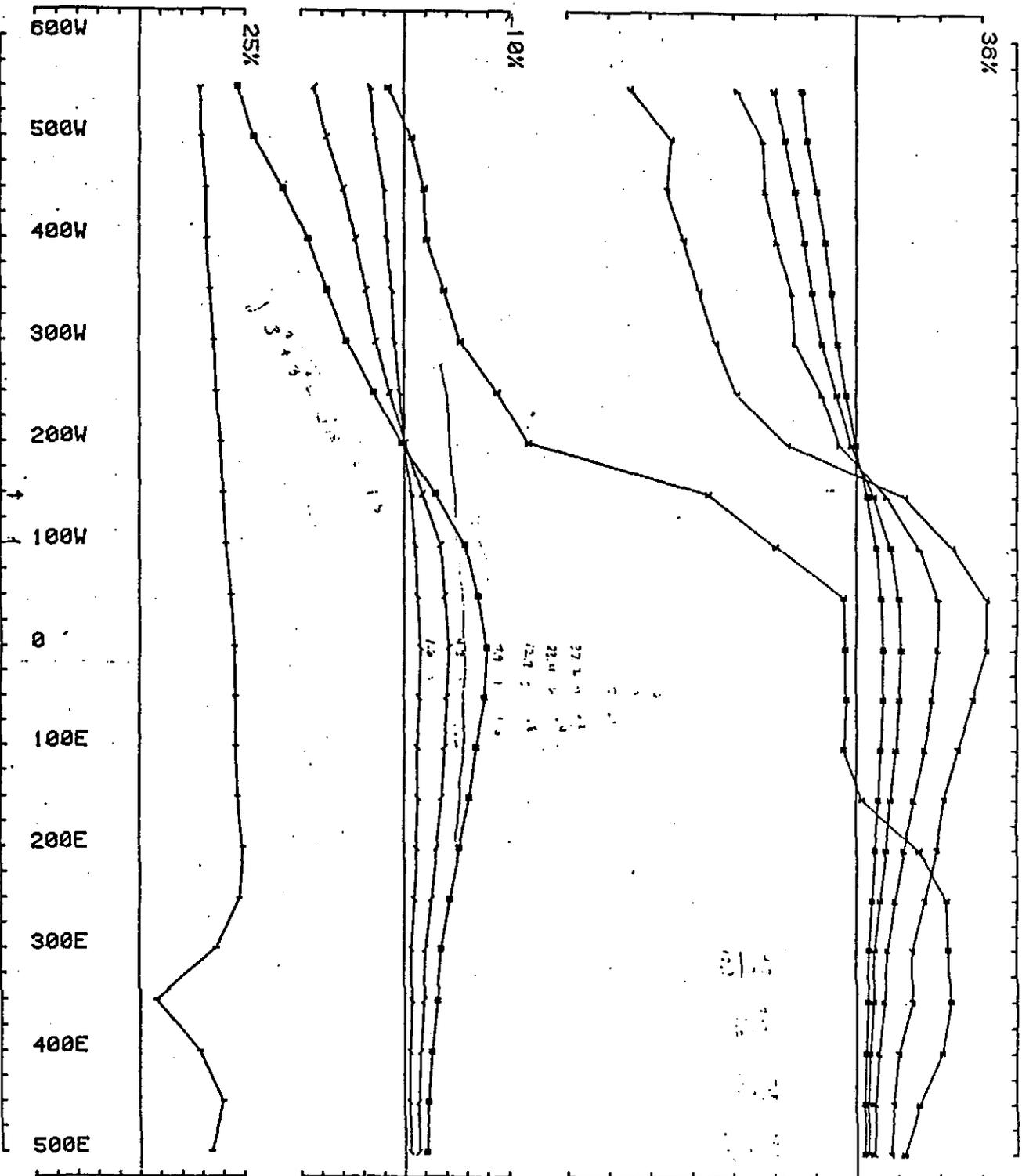
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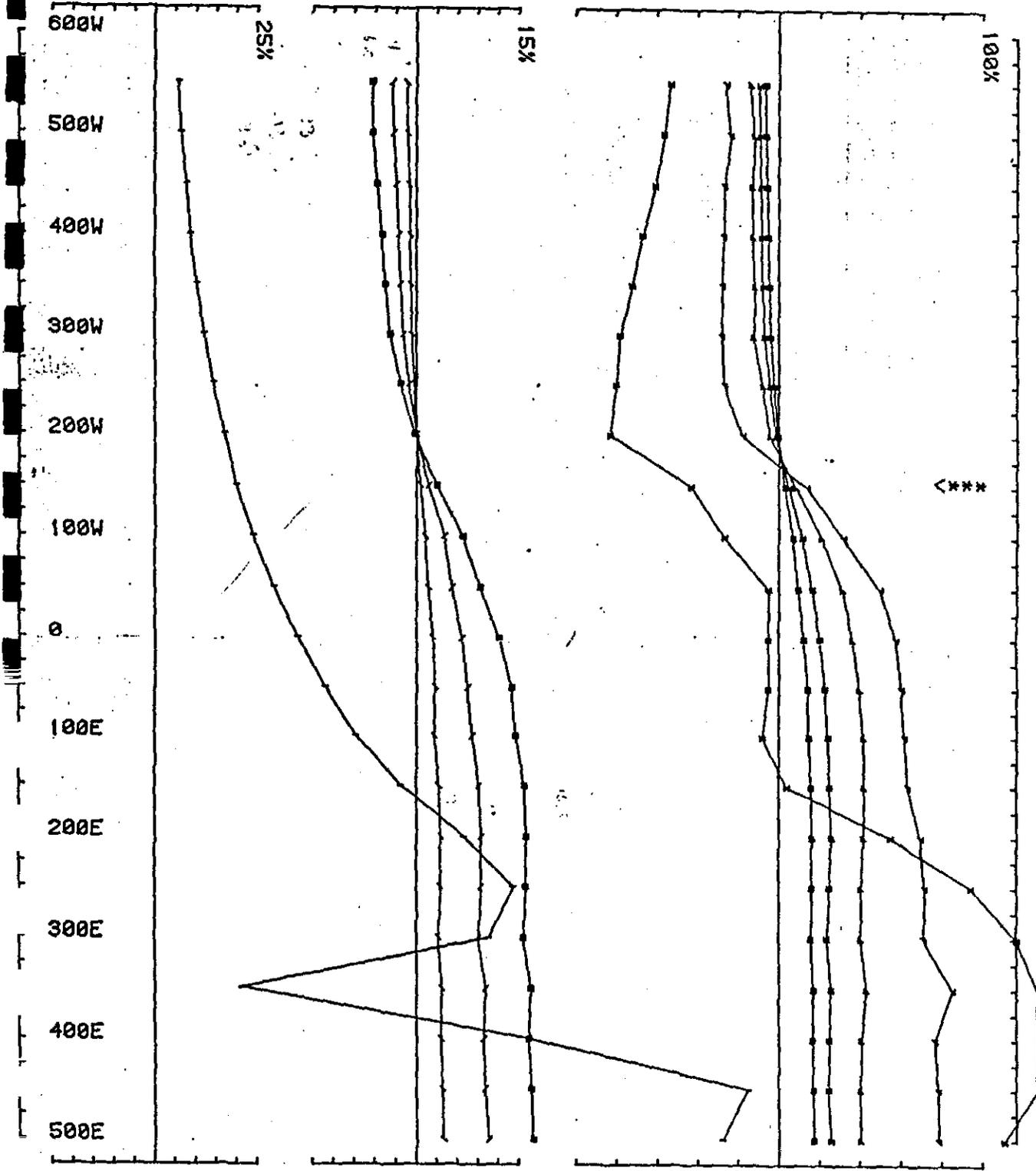
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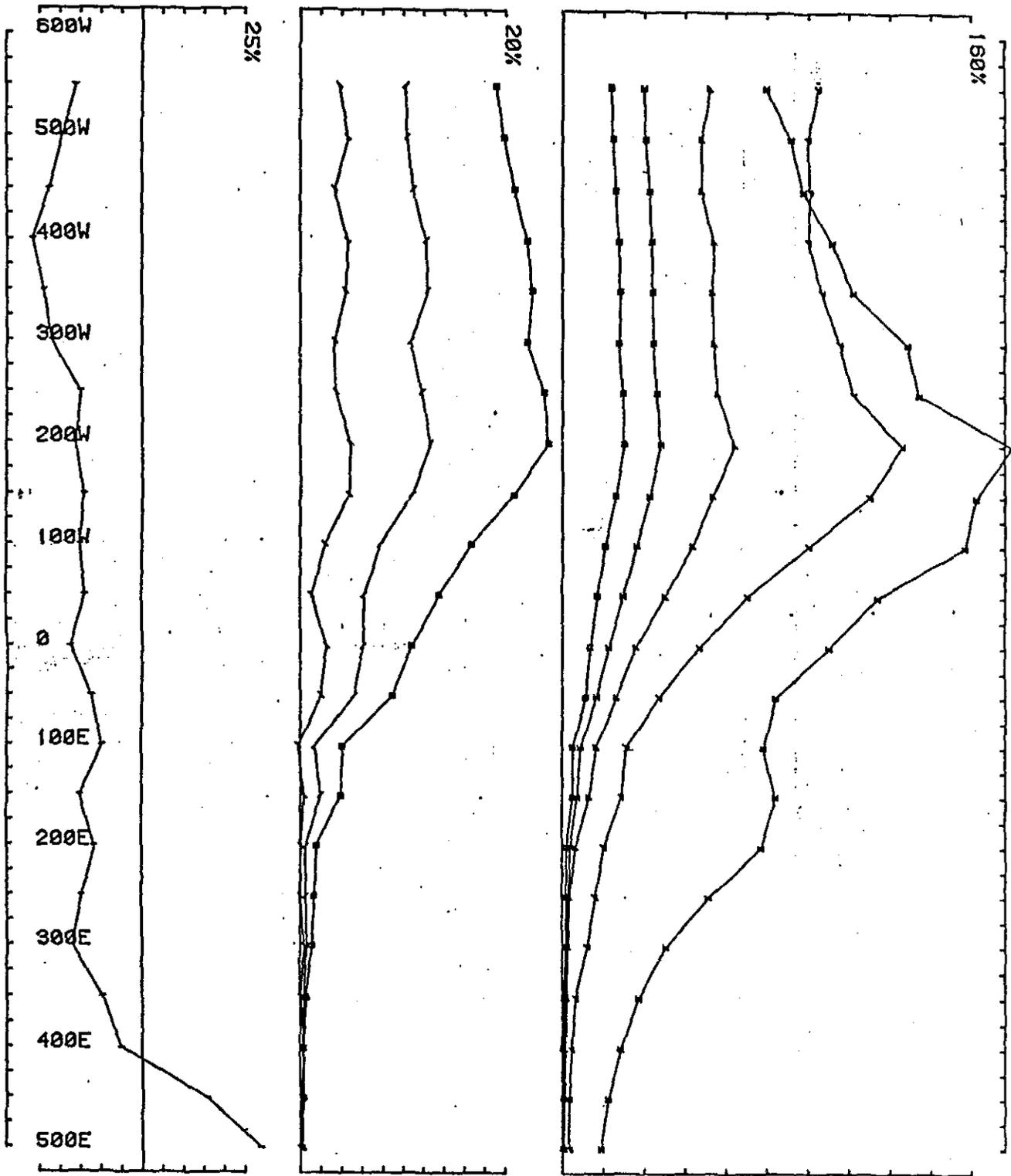
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UTEM SURVEY conducted by ART Job 8333
Project Area BASTYAN DAM PROSPECT Survey for SHELL MINERALS freq(hz) 26.230
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SECTION 3

ABERFOYLE EXPLORATION PTY LTDMARIONOAK E.L. 22/74

A review of the geology of the southern portion of the
Marionoak Licence, NW Tasmania

J A Anderson

11 November 1985

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OBJECTIVES OF REVIEW	3
REVIEW OF STRATIGRAPHIC/STRUCTURAL CONCEPTS	3
DDH-MO1 CORE EXAMINATION	6
DDH-MO1 GEOCHEMISTRY	7
RECONNAISSANCE ROCK CHIP GEOCHEMISTRY	8
DISCUSSION ON THE POTENTIAL OF THE BASTYAN GRID AREA	9
POTENTIAL TARGETS	10

LIST OF ATTACHMENTS

	SCALE
FIG.1 SUMMARY PLAN	1:50,000
FIG.2 ANNOTATED PORTION OF PLATE MOC 20 - SECTION MO 1 (IN POCKET)	1: 1,000 500
FIG.3 DDH-MO-1 - GRAPHS OF Pb, Zn, Rb vs DOWNHOLE DEPTH AND LITHOLOGICAL GRAPHIC	
TABLE 1 DDH-MO-1 CORE GRIND GEOCHEMISTRY	
TABLE 2 RECONNAISSANCE ROCK CHIP GEOCHEMISTRY	

APPENDIX 1 PETROGRAPHIC REPORT - 85/3/16/ DDH-MO-1

APPENDIX 2 CSIRO REPORT - THE SIGNIFICANCE OF Pb ISOTOPIC
COMPOSITIONS.... MARIONOAK PROSPECT

SUMMARY AND RECOMMENDATIONS

Two prospective areas within the southern portion of the Marionoak licence offer sufficiently attractive targets to warrant Aberfoyle maintaining maximum interest in future exploration.

- 1) The Bastyan Grid area has a deep untested UTEM anomaly associated with widespread disseminated pyrrhotite/BM sulphides and major fault structures. The anomaly is sourced within Rosebery Group sediments which according to one interpretation, represent a stratigraphic position approximating that of the volcanogenic deposits in the upper Central Volcanic sequence. Fuchsitic felsic volcanoclastics and a BM prospect are reportedly several kilometres along strike. Low Rb and Sn analyses from available drill core negate the possibility of a UTEM source related to a hydrothermal Sn system. Although the pyrrhotite-BM sulphide mineralisation intersected to 300m depth to date has Pb isotope signatures interpreted as epigenetic and is associated with a linear (fault?) contact, the association is insufficiently clear to ignore a possible stratiform massive sulphide source to the UTEM anomaly at a greater depth.
- 2) A small (0.5 sq km) but highly prospective area of Central Volcanics E of the Rosebery Fault is covered by the SE corner of the licence. Several features imply good prospectivity for Rosebery-style targets:-
 - . A possibility of stratigraphic mis-interpretation such that the Rosebery - position may in fact pass through the licence towards the Chester area.
 - . Pyritic nature of the volcanoclastics within the licence.
 - . Reported BMS boulders in the foundations of the Bastyan Dam wall.

There is additional potential for small? tonnage Au-Ag epigenetic targets along the Rosebery fault as evidenced in workings south of Rosebery ("Milton-style" veins).

As the relative potentials for a fault - related epigenetic versus syn-volcanic BM source cannot be sufficiently clarified for the UTEM anomaly at this stage and the licence contains two stratigraphic positions with potential for BM development, the following recommendations are made:-

- a) Tom Eadie's proposal to clarify the geology of the Bastyan Grid UTEM/ geochemical anomalies and to determine the extent of the UTEM anomaly should be undertaken. Any drilling proposals should be dependent on the results of this work.
- b) Detailed mapping of the Bastyan Dam area to clarify the stratigraphic relationship with the Rosebery position and to assess the character of the Rosebery fault should be undertaken.

BACKGROUND

On the Bastyan Grid in the SW corner of the licence, the Aberfoyle/Billiton J.V. located a deep (600m?) NNW-trending UTEM anomaly verified by CSMAT and SIROTEM (Fig. 1). The anomaly is situated in the vicinity of sphalerite-pyrite veins within a small window of dolomitic sediments and fine-grained mafic tuffs, otherwise obscured by Permian glacials.

Drill testing of (a) nearby shallow-sourced geophysical anomalies and the veins by DDH-SED 1; and (b) the initial interpretation of a moderately deepened source to the UTEM anomaly by DDH-MO 1, failed to intersect the conductor's source.

Substantial intervals of trace to 5% pyrrhotite and lesser pyrite and BM sulphides were intersected in MO-1. Eadie now interprets a deeper source to the UTEM anomaly where surveyed and proposes a NNW shallowing to the source beyond the survey area such that there is a likely association with Pb-Zn soil/stream sediment anomalies along a NNW trend up to 5km from the anomaly (Fig. 1). The UTEM anomaly is not closed off in either direction and the geology is poorly known N or the the UTEM anomaly, so additional geophysical/geological coverage is proposed by Eadie to test the concept of northward shallowing and to establish the likelihood of shallower drill targets with large tonnage BM prospectivity.

A small (0.5 sq.km) area of Central Volcanics is incorporated in the SE corner of the licence. Although only 4km N of the Rosebery deposit, the volcanics have failed to attract any exploration interest to date.

The last report on the Marionoak programme was written in January 1985 (Sise 1985) prior to detailed logging of DDH-M01 and receipt of a CSIRO Pb-isotope report on the hole's sulphides. Mark Teakle logged the core subsequently, but no assaying was done.

OBJECTIVES OF REVIEW

The writer examined the MO-1 core and accessible outcrops in the Bastyan Grid and Pieman River area to gain an opinion of the likelihood of a hydrothermal Sn system sourcing the UTEM anomaly. Additionally the regional interpretations of the Geological Survey were reviewed to assess the potential of the stratigraphic/structural setting. In the course of the review, it was realised that a fault with potential for Au-Ag mineralisation between the Rosebery Group and Central Volcanics, passed through the licence area. A brief review of the potential of the fault and volcanics was deemed appropriate.

Core grinding of the whole of the MO-1 core at approximately 10m intervals was undertaken by Burnie staff. Samples were assayed for Sn, Rb (XRF) to test for the hydrothermal Sn possibility, Cu, Pb, Zn (AAS) to establish the downhole BM distribution, and Au (30gm-AAS) to test for a possible association with the widespread sulphide dissemination (after Purvis' 1985 report suggesting the paucity of routine Au analyses in potential environments in N.W. Tasmania). Core samples were taken every 25m downhole for resistivity measurements by Tom Eadie in search of broad conductive units.

REVIEW OF STRATIGRAPHIC/STRUCTURAL CONCEPTS

Discussions with A V Brown (Geological Survey) and a review of literature were undertaken to familiarise the writer with the stratigraphic/structural framework. Much of the interpretation, well reviewed by M G Teakle in early

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1984 is sound, i.e. the Bastyan Grid overlies the Westcott Beds of the Rosebery Group, except the Rosebery Group is no longer correlated with the Eocambrian Success Creek Group (Loftus-Hills et al., 1967), but is correlated with either the Mt Read Volcanics (Brown 1985 in press) or younger Dundas Group (Williams et al., 1975; Corbett and Lees, 1985).

Brown's and Corbett's varying interpretations offer different stratigraphic potentials for stratiform BM targets in the Bastyan Grid area. Both agree the sediments such as those intersected in MO-1, are part of the Rosebery Group (RG) which has a western fault contact (Marionoak Fault) with the older Crimson Creek Formation (CCF). Brown who viewed the MO-1 core in 1984, reaffirmed this opinion to the writer.

Corbett argues that the major fault in the area is the Rosebery Fault which overthrusts the older prospective Central Volcanics onto the Rosebery Group, which he equates with the younger less prospective Dundas Group. On fossil and structural evidence, Brown disputes this interpretation, stating the Rosebery Group and Central Volcanics are lateral equivalents, with volcanics appearing late in each group and being tightly constrained to a small time range. He considers the Rosebery Fault to be only minor in displacement, preferring the Marionoak Fault as the major regional structure. This splay off the CCF/Rosebery Group contact near the Bastyan Grid.

Corbett interprets a synclinal axis along the Salisbury Conglomerate in the centre of the Rosebery Group belt such that the Stitt Quartzite is repeated on the W side of the belt. Brown claims the sequence is persistently overturned and W-facing across the belt, such that the Bastyan Grid occupies a position in the upper Rosebery Group. The anticline to the south of the UTEM anomaly is in fact in the CCF and therefore may not project across the Marionoak Fault.

With Corbett's interpretation, felsic tuffs of the White Spur Fm. are possible in the grid area. By Brown's interpretation, the stratigraphic position of the grid is approximately time equivalent with the upper, prospective levels of the Mt Read Volcanics. Regardless of which interpretation is correct, fuchsitic felsic tuffs do occur in the Rosebery Group 4km S and along strike from the Bastyan Grid. The Salmon's Lode (BM) is reported, but not confirmed, to be in a similar stratigraphic position.

The overview by Corbett and Lees (1985) describes two features, the interpretation of which can be important to the prospectivity of the SE corner of the Marionoak licence (Fig. 1); i.e (a) the Rosebery Fault between the Rosebery Group and Central Volcanics as a major tectonic overthrust which projects N through the licence; (b) the generally accepted view that the prospective Rosebery stratigraphic position strikes into the Rosebery Fault before reaching the licence. Therefore the volcanics within the licence area would be the less prospective Hangingwall quartz-phyric tuffs:

The Rosebery Fault may have economic significance in the licence as it is Au-Ag mineralised in prospects S of Rosebery, including a 5.2m exposure assaying 3.2 g/T Au (File note, 1984). The mineralisation is considered to be Devonian epigenetic because of the association with tourmaline, fluorite, bismuthinite and anomalous Sn values, however the association of Sn and Au is not a common one. The fault was examined and found to be E-dipping with a narrow footwall breccia of Rosebery Group sediments. The fault may not be as major as Corbett proposes as the sediments are not very deformed more than 3m from the fault plane. Anomalous Pb, Zn and Ag values were obtained from the fault breccia, thus supporting the mineralised character of the fault in the licence area.

Three features suggest the Rosebery position may strike N into the licence;

- 1). The volcanics exposed on the road above the dam are pyritic and partly andesitic, indicating a possible correlation with the feldspar-phyric Footwall pyroclastics at Rosebery.
- 2). Volcanic-hosted BM sulphide clasts were reported in the foundations of the dam wall.
- 3.) A shale is mapped as projecting S from the dam towards the Rosebery Shale immediately above the Rosebery ore position.

The NW striking boundary previously mapped may in fact be a facies variation and not a time position.

DDH-MO 1 CORE EXAMINATION

The core was briefly examined for a half day. A collation of lithological, petrographic, geochemical and magnetic susceptibility data is presented as Fig. 2. Fander's petrographic descriptions are included as Appendix 1. The CSIRO Pb isotope report is Appendix 2.

Microgabbro

More 'microgabbro' is apparent than previously logged. The contacts with the sediments appear semi-conformable but intrusive. In thin section, the groundmass is a fine mesh of feldspar with scattered pyroxene phenocrysts, indicative of a high level sub-volcanic emplacement and basalt-andesite composition. Fander implies "affinities to the andesitic-basalt/basaltic-andesite facies at Hellyer and Que River". Brown also considers the microgabbro to be volcanic.

Sediments

Brown is confident the calcereous units are definitive of the Rosebery Group, however Fander offers reasons for correlating the clastic units with either the Crimson Creek Formation or Durdas Group. Either correlation contradicts his suggestion that the microgabbros have affinities with the Mt Read Volcanics. Carbonate beds are known at least locally in the lower CCF, so Brown's confidence may be questioned. The resulting stratigraphic interpretation is confused, however weight must be given to Brown's regional familiarity.

Mineralisation

The pyrrhotite-pyrite-EM sulphide disseminations are associated with veining which cuts both the sediments and microgabbro. The vein paragenesis is simple:

- 1) quartz carbonate (feldspar?)
- 2) carbonate sulphides
- 3) chlorite.

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The feldspar reported by Fander in the veins was not recognised macroscopically.

Fander also describes diagenetic chlorite-carbonate-pyrite-sphalerite in the road exposure and core. He suggests the vein Bi- and Fe- sulphides are related as remobilised syngenetic mineralisation, although CSIRO reports non-Hellyer signatures for the Pb isotopes of this mineralisation.

Possibility of a Tin Bearing Hydrothermal System

As exemplified by the zoning around NW Tasmanian tin deposits, feldspar and pyrrhotite veining such as in DDH-MO 1 are not expected to be widely dispersed above a cassiterite-sulphide body. Re-examination of Fander's thin sections did not find any hydrothermal minerals such as fluorite, tourmaline or topaz which would indicate the immediate proximity of a hydrothermal body. These minerals usually only occur within a few tens of metres from an ore zone. If the chlorite and carbonate veining are representative of low temperature aureole 100's of metres above a tin target, then anomalous Sn and Rb values would be apparent. Accordingly, Rb and Sn analyses were conducted on the core grind samples to test this possibility.

DDH-MO 1 CORE GRIND GEOCHEMISTRY

The results of the core grind geochemistry are listed on Table 1 and summarized in Figures 2 and 3.

Sn Rb Maximum values of 16ppm Sn and 135ppm Rb strongly support the lithological evidence that the pyrrhotitic mineralisation is not associated with a tin-hydrothermal system. At least +50 ppm Sn and +200 ppm Rb would occur sporadically in a Sn aureole.

Cu Pb Zn There are broad zones of +200ppm Pb and +500ppm Zn which include three distinct peaks of +600ppm Pb and +2000ppm Zn, two of which have coincident +100ppm Rb anomalies, possibly reflecting the vein feldspar. The best assay of 10m at 1700ppm Pb and 6700ppm Zn coincides with a tectonic sulphidic breccia (TS 253030), whereas the two other anomalous zones are

associated with skarnised clastic sediments at the microgabbro margins. The two units which have potential as chemical or reactive sediments, the limestone and hematitic siltstone, are not anomalous in Pb or Zn.

Au No values were recorded above detection (0.05ppm).

RECONNAISSANCE ROCK CHIP GEOCHEMISTRY

Seven rock chip samples were collected from prospective positions Fig. 1 to initiate evaluation of the conceptual targets. The results are listed on Table 2. Low Sn and Rb values from all locations further downgraded any possibility of Sn-related targets.

Bastyan Grid Area Three chip samples, representative of entire exposures, returned weakly to moderately anomalous Pb and strongly anomalous Zn values. As expected by the BM veining present, the 20m length of the Rosebery Group exposure in the road beneath the DDH-MO 1 collar averaged 510ppm Pb and 1850ppm Zn (location #5, 261755). 500m to the NW at the unclosed end of the UTEM anomaly, two exposures interpreted to be on either side of the CCF/RG contact (locations #1 and 2, 261751/2) and not visibly veined, averaged similarly high Zn (1700/2000ppm) with lower Pb (110/155ppm). This strongly supports the arguments that a) the UTEM anomaly is coincident with a continuous 5km trend of BM anomalous rocks from DDH-MO 1 in the S to the Area A anomaly; b) the BM mineralisation is fault-related as both the CCF and RG lithologies are Pb/Zn anomalous; c) the strongest Pb/Zn bedrock values are in the southern part of the trend near the UTEM anomaly, as the anomalous values of the earlier sampling in the northern areas are lower.

Rosebery Fault Rock chip samples were taken from the brecciated sediments in the footwall of the Rosebery Fault below the dam and from the nearest exposure of RG sediments to the fault's position on the road (Fig. 1). The fault sample is Pb (990ppm), Zn (620ppm) and Ag (4ppm) anomalous, whereas the geochemistry of the road sample is non-anomalous.

Mt Read (Central) Volcanics Weakly pyritic (andesitic?) tuffs on the road immediately east of the Rosebery Fault and pyrite-carbonate veined pyritic

tuffs exposed in the road above the dam did not return anomalous values, the best being 60ppm Pb, 155ppm Zn and 2ppm Ag.

DISCUSSION ON THE POTENTIAL OF THE BASTYAN GRID AREA

There is no evidence that the UTEM anomaly is sourced by a hydrothermal tin system. There is abundant evidence (spatial association with a linear contact, Pb isotopes, CCF and RG both mineralised) that the strong Pb/Zn anomalies over the 5km trend and in relatively shallow drilling, are fault related. The UTEM source may be mineralisation with the same fault association as it is coincident with the southern, best mineralised portion of the trend and has a parallel linear trend. However the geophysical interpretation implies a flat-lying source at 600m depth, below that drill tested. Presumably at that depth, any sulphides sourcing the UTEM anomaly would be substantial. As there is a possibility of BM-mineralising (Salmon's Lode) fuchsitic felsic volcanics in the UTEM position, the potential for a massive sulphide source to the UTEM anomaly cannot be disregarded until the poor geological knowledge of the Bastyan Grid area is improved. If the shallow Pb/Zn mineralisation is fault-related, it is possible the mineralisation is remobilised from a primary syngenetic BM zone. The information required may be available if the source of the UTEM anomaly surfaces N of the area surveyed to date. The character of the microgabbro needs further study, particularly with regard to the anomalous Ni values in Billiton's geochemistry.

The prospect provides the opportunity to assess the relative credence the exploration division is willing to place on Pb isotopes versus UTEM information especially with a paucity of geological information.

POTENTIAL TARGETSA. Bastyan Grid UTEM anomaly, South Central and Area A geochemical anomalies

- 1) Massive BM hosted by volcanoclastics in the upper Rosebery Group (by A V Browns' interpretation, of similar age to the prospective levels of the Mt Read Volcanics).
- 2) Syn-volcanic dia - or epigenetic carbonate-hosted exhalative BM in dolomite or limestone units of the Rosebery Group.
- 3) Epigenetic pyrrhotite or pyrite Ag-Au mineralisation, referred to here as "Milton-style", associated with the Marionoak and related Faults. In one old working on this mineralisation in the Rosebery Fault to the south of Rosebery, an interval of 5.2m @ 3.2g/t Au and 9g/t Ag was recorded (see 1984 file note). The UTEM anomaly and geochemical anomalies delineate a trend proximal to a probable fault contact between the CCF and Rosebery Group. If such a fault association can be confirmed for the UTEM anomaly, the potential for the A1 target is downgraded severely.

B. Central Volcanics/Rosebery Fault (Bastyan Dam area)

- 4) Rosebery-style BM within small area (0.5sq km) of volcanics between the dam and the licence boundary. The indications of prospectivity are:
 - a) proximity to Rosebery and Chester
 - b) the pyritic nature of the volcanoclastics
 - c) reported EMS boulders in volcanoclastics forming the dam foundation
 - d) the above sulphide indications, the presence of "footwall" andesite volcanics above the dam wall and a shale unit projecting from the dam towards the Rosebery a shale, all point to a possible stratigraphic mis-interpretation, such that the Rosebery position does project through the licence area instead of running into the Rosebery Fault south of the licence area.

- 5) As for 4 above i.e. Milton-style epigenetic tourmaline sulphide Ag-Au veins up to several metres wide in the Rosebery Fault.

REFERENCES

- Anderson J A 1984
(Aberfoyle Exploration) File note - "Tourmaline exhalites and veins at Rosebery."
- Brown A V 1985 (in press) "The geology of the Dundas-Mt Lindsay-Mt Youngbuck region."
Geol. Survey Bulletin No. 62
- Corbett K D and Lees T C
1985 (in press) "Revised stratigraphy and tectonics of the Cambrian arc and forearc sequences, and a probable accretionary complex in the Rosebery-Lyell area, western Tasmania."
Aust. Journal Earth Science
- Eadie E T 1985 Review of Marionoak geophysics (in preparation)
- Loftus-Hills G D et al.
1967 The structure of the bedded rocks west of rocks west of Rosebery, Tasmania
Geol. Soc. Aust. Jour., v. 14, 333-337
- Purvis J G 1985 "Gold potential of the Mt Read Volcanics."
Report for Aberfoyle Exploration
- Sise J R 1985
(Aberfoyle Exploration) E.L. 22/74 Report on Exploration, March to December 1984.
- Teakle M G 1984
(Aberfoyle Exploration) Report on the status of E.L. 22/74.
- Williams E et al. 1975 The geological setting of metalliferous deposits in Tasmania in Knight C L ed., Economic geology of Australia and Papua and New Guinea, I. Metals: A.I.M.M., Mon. 5, 567-581

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Fig. 1.

"AREA A"

Soil anomalies to 410ppm Pb, 1100ppm Zn (+ Shell SS Sn anomalies)

"SOUTH-CENTRAL"

S.S. anomalies to 640ppm Zn, 210ppm Pb.
Recca soil anomalies to:
520 Pb,
980 Zn,
3400 Mn.

"BASTYAN GRID"

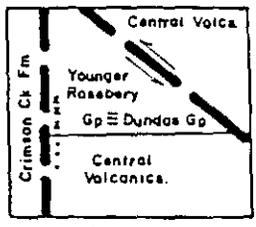
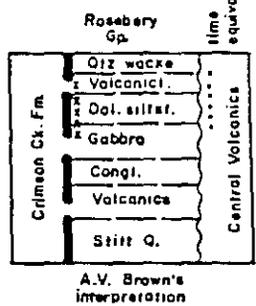
UTEM anomaly (DDH's SBD-1 & MO-1)
On contact between C.C. Gp & Rosebery Gp.
"Area A" and "South Central" anomalies may be on same contact.

E.L. 22/74

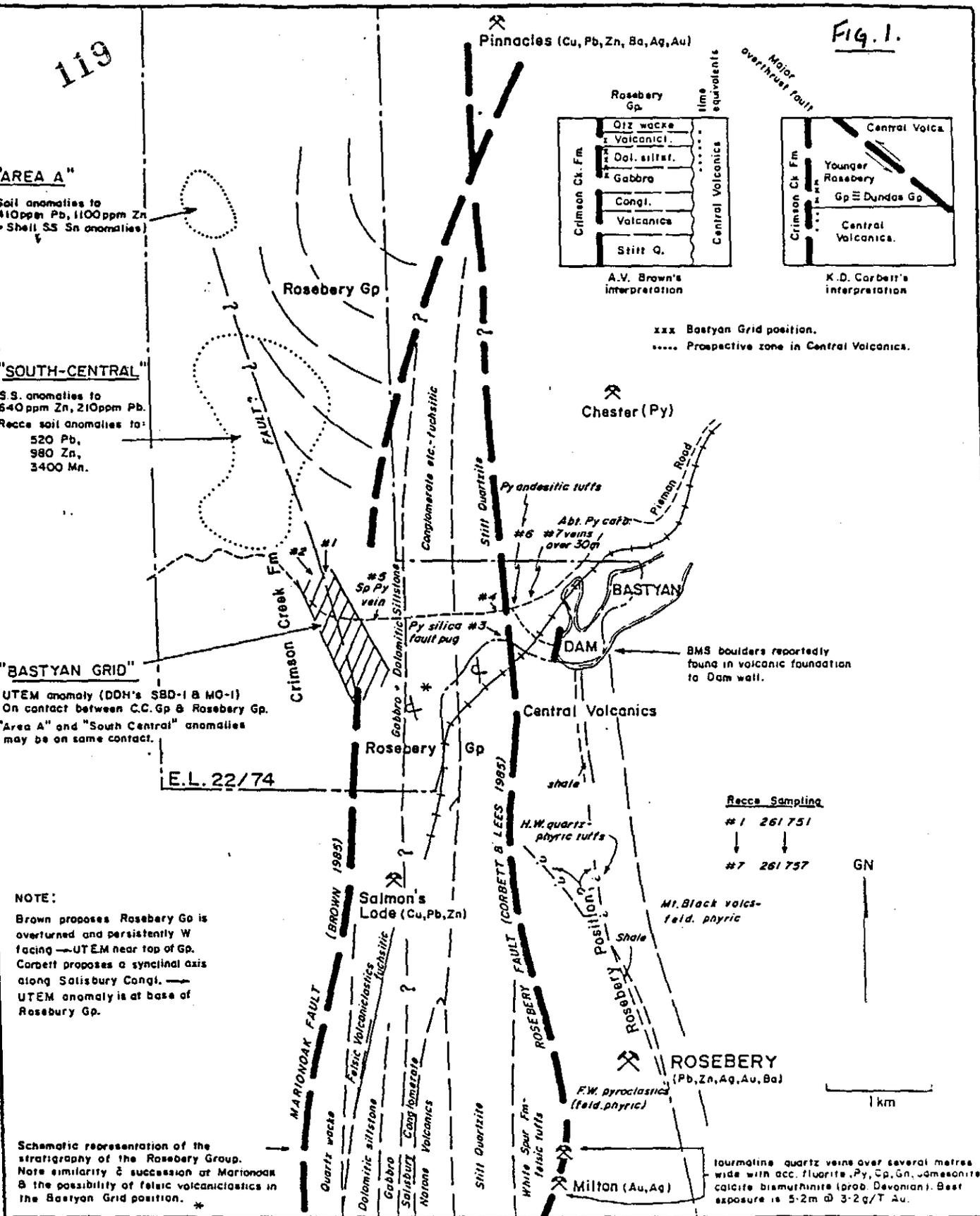
NOTE:

Brown proposes Rosebery Gp is overturned and persistently W facing — UTEM near top of Gp. Corbett proposes a synclinal axis along Salisbury Congl. — UTEM anomaly is at base of Rosebery Gp.

Schematic representation of the stratigraphy of the Rosebery Group. Note similarity & succession at Marionoak & the possibility of felsic volcanoclastics in the Bastyan Grid position. *



xxx Bastyan Grid position.
..... Prospective zone in Central Volcanics.



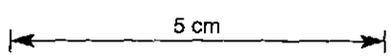
Recca Sampling

#1	261751
#7	261757



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<table border="1"> <thead> <tr> <th colspan="4">REVISIONS</th> </tr> <tr> <th>Init.</th> <th>Date</th> <th>Init.</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>ACD</td> <td>8.1.86</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				REVISIONS				Init.	Date	Init.	Date	ACD	8.1.86															<p>NORTH WEST TASMANIA MARIONOAK SOUTHERN PORTION SUMMARY PLAN showing regional stratigraphic/structural interpretations</p>		<p>Compiled: JAA Drawn: JAA Traced: KJO Checked:</p>
REVISIONS																														
Init.	Date	Init.	Date																											
ACD	8.1.86																													
Location Code: K55/3		Scale: 1:50,000	Date: Nov. 1985	Plate No. MOC 21																										

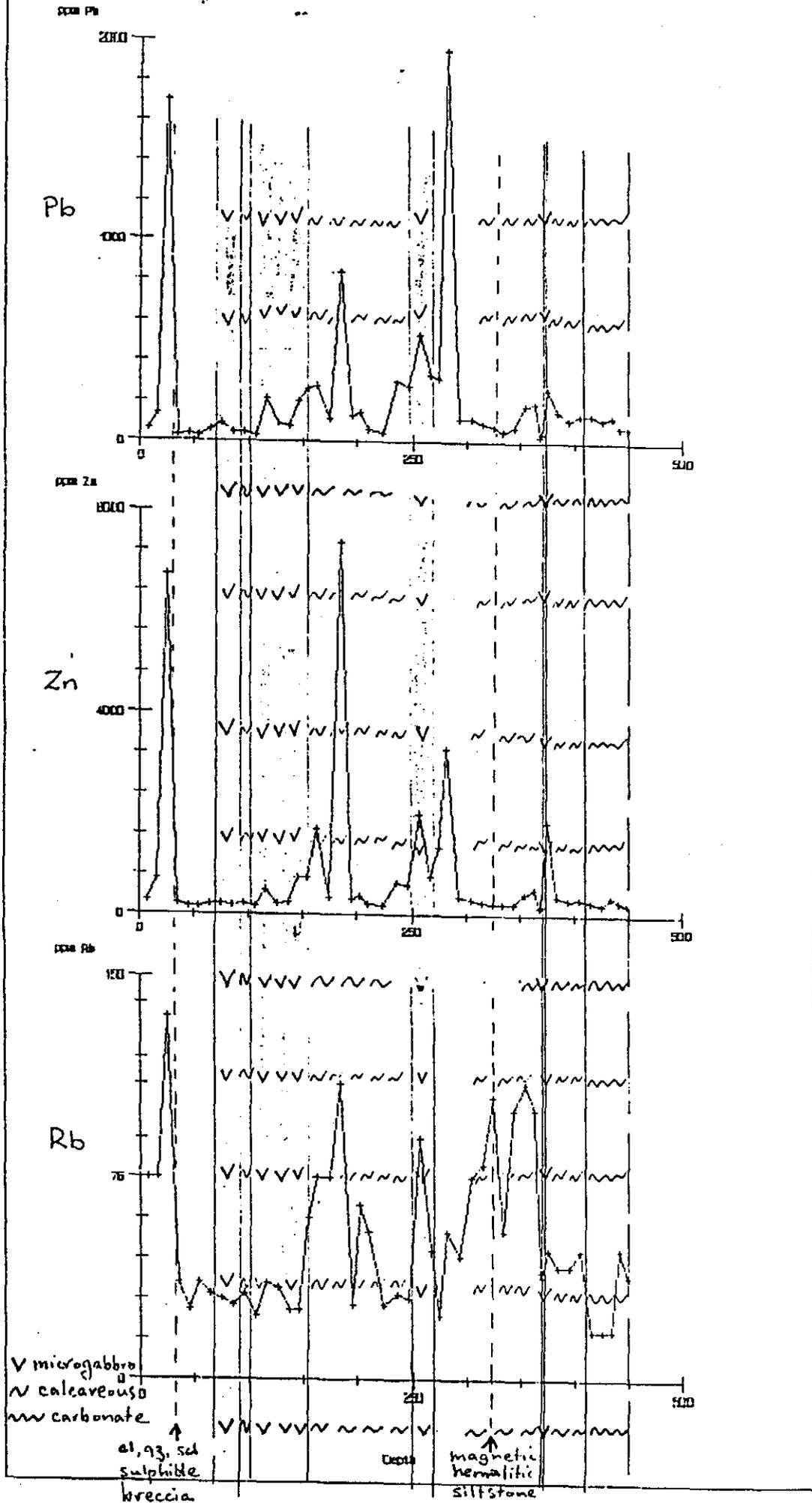


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FIGURE 3 - DDH-MO-1



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TABLE 1C



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042124



NATA REGISTERED No. 1526

COM852036

OUR REF.:

9605

YOUR REF.:

Mr. J. Anderson
Department of Geology and Geophysics
University of New England
ARMIDALE

NSW 2351

November 12, 1985

Dear John

RE: JOB COM852036

Enclosed are the assays for the samples delivered to our
Laboratory on November 11, 1985

Yours Sincerely,
COMLABS PTY LTD

per :

c.c.: Aberfoyle - VIC

No. of copies : 1

Report Length 2 pages

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JOB COM852036

O/N : 9605

ANALYTICAL REPORT

SAMPLE	Cu	Pb	Zn	Au	Sn	Rb
333821	70	60	270	<0.05	<4	75
333822	105	140	730	<0.05	<4	75
333823	115	1700	6700	<0.05	10	135
333824	105	34	230	<0.05	10	36
333825	90	40	165	<0.05	4	26
333826	100	32	165	<0.05	<4	36
333827	90	60	210	<0.05	4	32
333828	95	95	210	<0.05	6	30
333829	130	46	180	<0.05	6	28
333830	90	48	220	<0.05	<4	32
333831	130	32	155	<0.05	6	24
333832	130	220	490	<0.05	4	36
333833	130	90	230	<0.05	8	34
333834	125	80	260	<0.05	<4	26
333835	90	200	740	<0.05	<4	26
333836	125	260	740	<0.05	4	60
333837	75	280	1700	<0.05	4	75
333838	105	115	350	<0.05	10	75
333839	80	840	7350	<0.05	8	110
333840	75	135	310	<0.05	8	28
333841	70	145	380	<0.05	4	65
333842	100	65	230	<0.05	<4	55
333843	110	44	185	<0.05	10	28
333844	105	300	660	<0.05	10	32
333845	115	280	600	<0.05	6	30
UNITS	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	AAS1	AAS1	AAS1	AAS5A	XRF1	XRF1



ANALYTICAL REPORT

JOB COM852036
O/N : 9605

SAMPLE	Cu	Pb	Zn	Au	Sn	Rb
333846	85	530	2000	<0.05	4	90
333847	60	330	770	<0.05	4	48
333848	155	320	1350	<0.05	<4	24
333849	175	1950	3300	<0.05	8	55
333850	90	115	360	<0.05	8	46
333851	85	115	310	<0.05	8	75
333852	85	90	250	<0.05	<4	80
333853	50	75	220	<0.05	16	105
333854	80	55	210	<0.05	4	55
333855	75	75	220	<0.05	4	100
333856	100	190	440	<0.05	6	110
333857	95	195	530	<0.05	4	100
333858	65	30	150	<0.05	<4	40
333859	115	44	185	<0.05	<4	38
333860	85	260	1850	<0.05	4	48
333861	90	155	380	<0.05	<4	42
333862	90	115	310	<0.05	6	42
333863	95	140	340	<0.05	6	48
333864	32	140	270	<0.05	6	18
333865	28	120	230	<0.05	<4	18
333866	46	135	370	<0.05	6	18
333867	95	80	270	<0.05	<4	48
333868	90	80	220	<0.05	6	38
UNITS	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	AAS1	AAS1	AAS1	AAS5A	XRF1	XRF1

GEOCHEMICAL SAMPLE LEDGER

A

PROJECT	SIEVE SIZE CODE		ANALYST	SAMPLE TYPE CODE		WEATHERED GELACK		CARD PUNCH PRINT		VERIFY		DATE	SHEET									
	U 80	G 30		0	1	W	T	YES	NO	YES	NO	Nov '85	1/1									
MANROCK REESE ROCKCHIP SAMPLING				UNGRAZED PRODUCTS	0	PREP. ROCK	R	RESIDUAL SOIL	E	OTHER ELEMENTS	S	WATER CLUMP	M									
				METAL VALUES PPM				GEOLOGICAL LOG														
				Cu	Pb	Zn	Sr	Rb	As	Ag												
				AAS 1	XRF 1	AAS 5A	AAS 3															
NW DDH-MC 1 - E of Pylon on access track; o/c. Rubble immediately SW of pylon (not pylon foundation fill) Track down N river bank from Postyan Dam - between vent bridge & former road bridge. Road cutting immed. W of power station turn off - 100m E of Manroack R. Road cutting beneath MC-1 cellar. Road cutting immed W of Postyan Dam turn off. Large cutting E of Dam turn off.	26	75	#1	80	110	1700	14	135	<0.05	<1.0	Buff limonitic fissile shale + white green siltstone over 5m wide zone (Roseberg Gp limonite-stained green carbonated bedded f.g. tuffaceous shale (CC Gp))											
	2		#2	70	155	2000	4	26	"	"	4m wide weakly pyritic silica graphite shear zone in Roseberg Gp sediments on immediate W side of "Postyan Fault."											
	3		#3	34	990	620	4	125	"	4	Bedded quartzitic sandstone + more massive gritty sandstone + carbonate (minor quartz) veined. (Still Quartzite)											
	4		#4	4	26	170	<4	46	"	<1.0	Hematitic dolomite, green sheared feld. tuff; siltstones; incl. py. sp. veins; over 20m											
	5		#5	105	510	1850	<4	150	"	1.0	Central Volcanics - green feld. tuffs ± to 1% diam. py.											
	6		#6	6	20	130	6	155	0.05	<1.0	30m zone - selected py ^c tuffs + thin py ^c carb. veins (→ 20% py)											
	26	75	#7	42	60	155	<4	135	<0.05	<1.0												

for locations.

See Plate MOC 21

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TABLE 2A

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TABLE 2B



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NATA REGISTERED No. 1526

042128

COM852072

OUR REF.:

YOUR REF.: 9615

Mr. J. Anderson
Department of Geology and Geophysics
University of New England
ARMIDALE

NSW 2351

November 29, 1985

Dear Sir

RE: JOB COM852072

Enclosed are the assays for the samples delivered to our
Laboratory on November 14, 1985

Yours Sincerely,
COMLABS PTY LTD

per :

c.c.: East Hawthorn

No. of copies : 1

Report Length 1 pages



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ANALYTICAL REPORT

JOB COM852072
O/N : 9615

SAMPLE	Cu	Pb	Zn	Ag	Au	Sn	Rb
261751	80	110	1700	<1	<0.05	14	135
261752	70	155	2000	<1	<0.05	4	26
261753	34	990	620	4	<0.05	4	125
261754	4	26	170	<1	<0.05	<4	46
261755	105	510	1850	1	<0.05	<4	150
261756	6	20	130	<1	0.05	6	155
261757	42	60	155	2	<0.05	<4	135
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	AAS1	AAS1	AAS1	AAS3	AAS5A	XRF1	XRF1

Central Mineralogical Services



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

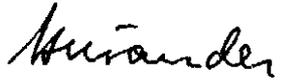
Mr. M. Teakle
Geologist
Aberfoyle Exploration Pty. Ltd.
1, Greenhill Road
WAYVILLE / S.A. 5034

1st April, 1985

REPORT CMS 85/3/16

YOUR REFERENCE:	Order No. 5767
DATE RECEIVED:	19th March, 1985
SAMPLE NOS.:	253030 - 253039
SUBMITTED BY:	M. Teakle
WORK REQUESTED:	Petrology

Copy to:
The Chief Geologist
Aberfoyle Exploration Pty. Ltd.
144, Camberwell Road
HAWTHORN EAST / VIC. 3123


H.W. Fander, M. Sc.

REPORT CMS 85/3/16

A suite of ten drill core samples was received for petrological examination. Representative thin-sections were prepared and examined together with their respective offcuts, with carbonate stain tests carried out as warranted. Attached tabulated descriptions summarise the microscopic data and include interpretative comments.

Summary

As sampled, this drilled section comprises mainly altered labile turbiditic sediments with minor microgabbros ("dolerites") and intercalated impure limestone facies.

The sediments are typically strongly basic-volcanomict (reworked-tuffaceous) types analogous to the Crimson Creek Formation labile turbiditic facies. In detail, however, there are certain contrasts, notably the presence of detrital chromite, chromian magnetite, clinopyroxene and pyroxenic basaltic lithic clasts as clastic components, and the presence of limestone intercalations.

The clastic chromite component alone categorises these sediments as younger than Crimson Creek Formation and the late Cambrian ultramafic complexes. Broad lithological comparisons may be made with basalt-turbidite-limestone association in certain sections of the Dundas Group (e.g. Brewery Junction and Comet Formations).

Microgabbros are strongly pyroxenic types with certain affinities to the andesitic basalt/basaltic andesite facies at Hellyer and Que River. These appear to be extrusives and partly reworked into the turbiditic psammopelites on the basis of compositional affinities. Similar rocks, chromite-bearing in part, are known from the Dundas Group.

Sediments exhibit variable development of diagenetic calcite impregnations, complexed by more or less pervasive chlorite development. Microgabbros include accessory prehnite, consistent with sub-greenschist facies regional effects (zeolite facies of Turner & Verhoogen). Locally imprinted on these assemblages, and partly complexed by stree-related retrograde chloritic assemblages, are diopsidic to actinolitic pyrometasomatic effects (samples 275.3 m, 283.0 m), with calcareous ("calcitised") zones as an apparent spatial control.

Base metal- (colour-variable sphalerite, galena, chalcopyrite) and Fe-sulphide (largely variably pyritised pyrrhotite) disseminations are semi-ubiquitous. As observed, the bulk of sulphide is strictly vein-controlled, with associated quartz, feldspar, carbonate and chlorite components. These assemblages locally supplement "syngenetic" pyrite disseminations and are conceivably remobilised rather than strictly epigenetic.

D. Cowan, B. Sc.

Sample No.	Classification - Composition	Fabric	Accessories	Comments
253-030 25.7 (T.S. 52859)	<u>Breccia</u> . Clasts, zones of chloritic/variably cherty-silicified and sideritic carbonate-stained labile psammopelite. Matrix/veinlets of sideritic carbonate with disseminations of sphalerite, minor galena.	Random, submillimetric to centimetric clasts, locally granulated matrix with interspersed films, clots of chlorite.	Traces of micro-crystalline pyrite (after pyrrhotite?). Clasts of carbonaceous pelite, vein-quartz.	Siderite-healed/veined composite breccia (tectonic) with altered tuffaceous psammopelite, carbonaceous pelite as clasts. Siderite-matrix, semi-granulated, colour-variable
253-031 49.2	<u>Tuffaceous Greywacke</u> . Framework of chloritic/saussurite-stained andesitic basalt, subordinate augite grains, minor clasts of basaltic tuff/tuffaceous psammopelite. Chlorite matrix with minor sericite, calcite, quartz.	Angular to subangular, medium-grained, turbidite-like, sandy clastic. Weakly sheared.	Rare clastic chromite. Clastic chlorite aggregates, traces of clastic and basalt clast-hosted chromite. Traces of prehnite, ultrafine pyrite.	Turbiditic-reworked basaltic lithic tuff with ill-defined chloritised ultramafic or basic glass components.
253-032 76.7	<u>Altered Microgabbro</u> . Saussurite, albitised/variably pumpellyite-stained plagioclase laths and weakly chloritised titanite with subordinate chloritised orthopyroxene, conspicuous leucoxenised opaques.	Medium-grained, weakly pyroxene-porphyrific, subophitic.	Minor chlorite amygdaloids, veinlets. Traces of fine to ultrafine pyrrhotite.	Altered hypersthene microgabbroic intrusive or core of thick flow. Reflects selective alteration (chloritisation) or orthopyroxene.
253-033 153.1	<u>Altered Microgabbro</u> . Saussuritic/albitised plagioclase laths and weakly chloritised augite with relatively minor chloritised orthopyroxene, conspicuous leucoxenised opaques. Sporadic albite-adularia-quartz-calcite, late	Analogous to 76.7 m, slightly finer-grained. Weakly chlorite-amygdaloidal. Chlorite-calcite veinlets.	Minor pumpellyite. Traces of pyrrhotite, chalcopryite, sphalerite, galena in feldspathic veinlets.	Close affinities with 76.7 m and similarly altered. Sulphides restricted to an irregular network of feldspathic veinlets.
253-034 202.3	<u>Carbonaceous Psammopelite</u> . Framework of silt- to pebble-sized limestone, dolomitic limestone, subordinate calcitised, chloritised basalt clasts, minor quartz grains. Carbonaceous shale matrix. Disseminated pyrite.	Poorly sorted, angular to rounded, shale-matrixed, clastic. Mildly sheared, phyllitic.	Minor clasts of carbonaceous shale, impure chert. Minor sheared calcite (+ quartz) veinlets. Fine clastic leucoxenic opaques.	Sedimentary breccia composite of limestone, pelite, basalt, impure chert components. Pyrite exhibits recrystallized syngenetic-diagenetic characteristics.
253-035 275.3	<u>Skarnised Greywacke</u> . Fine-grained andesine diopside, medium-grained pale pink melilite (gehlenite) and degraded (epidotised) grossular-andradite in varying proportions. Minor clots of calcite, chlorite.	Fine- to medium-grained, finely banded, hornfelsic. Vague relict "turbiditic", silty, fine sandy clastic.	Rare calcite-quartz veinlets with traces of chalcopryite, sphalerite. Minor disseminated pyrrhotite, chalcopryite, sphalerite.	Medium- to high-grade contact-pyrometamorphic assemblage developed in a calcareous, labile turbiditic sandstone. Weakly carbonaceous.
253-036 283.0	<u>Altered Greywacke</u> . Relict framework of splintery to angular albitised plagioclase, minor quartz grains, chloritised lithic clasts. Actinolitic, chloritic matrix. Irregular chlorite-quartz veinlets with disseminated sphalerite, galena.	Contorted to semi-brecciated phyllitic; relict turbiditic, silty sandy clastic. Sheared irregular veinlets.	Traces of pyritised pyrrhotite in chloritic veinlets. Disseminated clastic Cr-magnetite.	Sheared, extensively chloritised, resheared labile turbidite. Primarily actinolitic, apparently a marginal variant of the contact-altered 275.3 m facies.
253-037 326.2	<u>Hematitic Siltstone</u> . Pervasively Fe-pigmented, variably cloudy carbonate-stained clays with varying proportions of silt-sized clastic quartz, partly degraded feldspar, extensively martitised magnetite.	Finely banded, locally weakly graded, silty clastic. Weakly microfractured.	Calcite, chlorite as discontinuous films on microfractures.	Argillaceous "arkosic" siltstone, primarily strongly (detrital) magnetic, ?dolomitic. Detail obscured by secondary ferruginisation.

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Sample No.	Classification - Composition	Fabric	Accessories	Comments
253-038 382.4	<u>Altered Greywacke.</u> Framework of splintery to angular albitised plagioclase grains, chloritic "basaltic" lava clasts, minor quartz, clinopyroxene grains. Chloritic matrix. Semi-pervasive clots, minor veinlets of cloudy calcite.	Weakly banded, turbiditic, silty, fine sandy clastic. Incipiently sheared.	Minor clastic opaques, leucoxenic semi-opaques, rare chromite. Traces of fine to ultrafine pyrrhotite.	Extensively chloritised "tuffaceous" greywacke. The more or less pervasive calcite clots are of diagenetic character.
253-039 414.9 (T.S. 52868)	<u>Impure Limestone.</u> Carbonaceous, weakly pyritic fine to microcrystalline limestone with minor stylolitic carbonaceous shale partings. Interbeds of calcite-stained; extensively chloritised labile sandstone.	Irregularly calcite-veined, stylolitic, weakly banded limestone; turbiditic fine to medium sandstone. Moderately sheared.	Traces of pyrrhotite, relict detrital quartz; opaques, leucoxenic semi-opaques in sandstone beds.	Intercalated impure limestone and calcitic/extensively chloritised labile sandstone. Relatively sheared.

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042134

APPENDIX 2

SIROTOPE

CSIRO

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CONFIDENTIAL

REPORT
TO
ABERFOYLE EXPLORATION PTY LTD
ON
THE SIGNIFICANCE OF LEAD ISOTOPIC COMPOSITIONS
OF
SAMPLES FROM THE MARIONOAK PROSPECT, WESTERN TASMANIA

GRAHAM R. CARR
BRIAN L. GULSON
28/5/85

134
1. AIM OF STUDY

The aim of this study was to determine the likely metallogenic association of sulfide-rich veins intersected in DDH M01 at Marionoak.

2. SAMPLES

Four samples were provided, all containing visible sulfides. Samples 253026 and 253027 consisted of shales with cross cutting veins containing siderite and variable sphalerite and galena. In samples 253028 and 253029 siderite was absent, and the sulfides occurred in blebs and tension gashes.

In two samples (253027 and 253029) galena was analysed and in the others, whole rocks were analysed.

3. METHODS

Galena samples were dissolved in concentrated nitric acid and Pb was electroplated onto Pt electrodes. The whole-rock samples were digested in a 7N nitric + 7N hydrochloric solution prior to ion exchange and electroplating as above. The samples were analysed on an ISOMASS 54E solid source thermal ionization mass spectrometer in fully automated mode. Precision estimates representing the standard deviations about the mean of over 700 analyses of standards are shown in the top left hand corner of the figures presented below.

4. RESULTS

The results are presented in Table 1 and Figures 1 and 2. The data form 2 distinct groups on both plots. Samples 253026 and 253027 from near the top of the drill hole have almost identical ratios and are more radiogenic than the Hellyer signature (i.e they have higher $^{206}\text{Pb}/^{204}\text{Pb}$, $^{207}\text{Pb}/^{204}\text{Pb}$ and $^{208}\text{Pb}/^{204}\text{Pb}$). Samples 253028 and 253029 have similar ratios and are

considerably less radiogenic than the Hellyer target signature.

5. DISCUSSION

Veins from high in the drill hole represent a different mineralizing event to the veins from deeper in the hole. Vein systems with similar Pb isotopic compositions have been recognised elsewhere in the Dundas Trough, the majority being more radiogenic than the Hellyer target and resulting from probable Devonian metamorphism. The less radiogenic group from deep in the drill hole have an upper Precambrian model age probably indicating metamorphic remobilization of Precambrian rocks with a relatively high Pb content. Neither vein systems are likely to be related to the major Cambrian massive sulfide mineralizing event responsible for the Hellyer, Que River and Rosebery ore deposits. It is possible, however, that the more radiogenic group represents mixing of Pb of similar origin to the massive sulfide deposits with a more radiogenic source. Such mixing may have occurred in a localized Cambrian hydrothermal system, or during later metamorphism as noted above. In either case, no direct association with a massive sulfide deposit is indicated.

These analyses are consistent with the isotopic patterns measured previously for Shell and shown in Figures 1 and 2.

6. CONCLUSION

Based on Pb isotopic compositions, we consider the sulfide vein mineralization intersected in DDH M01 is unlikely to be associated with massive sulfide mineralization and would thus be considered a low priority for further exploration.

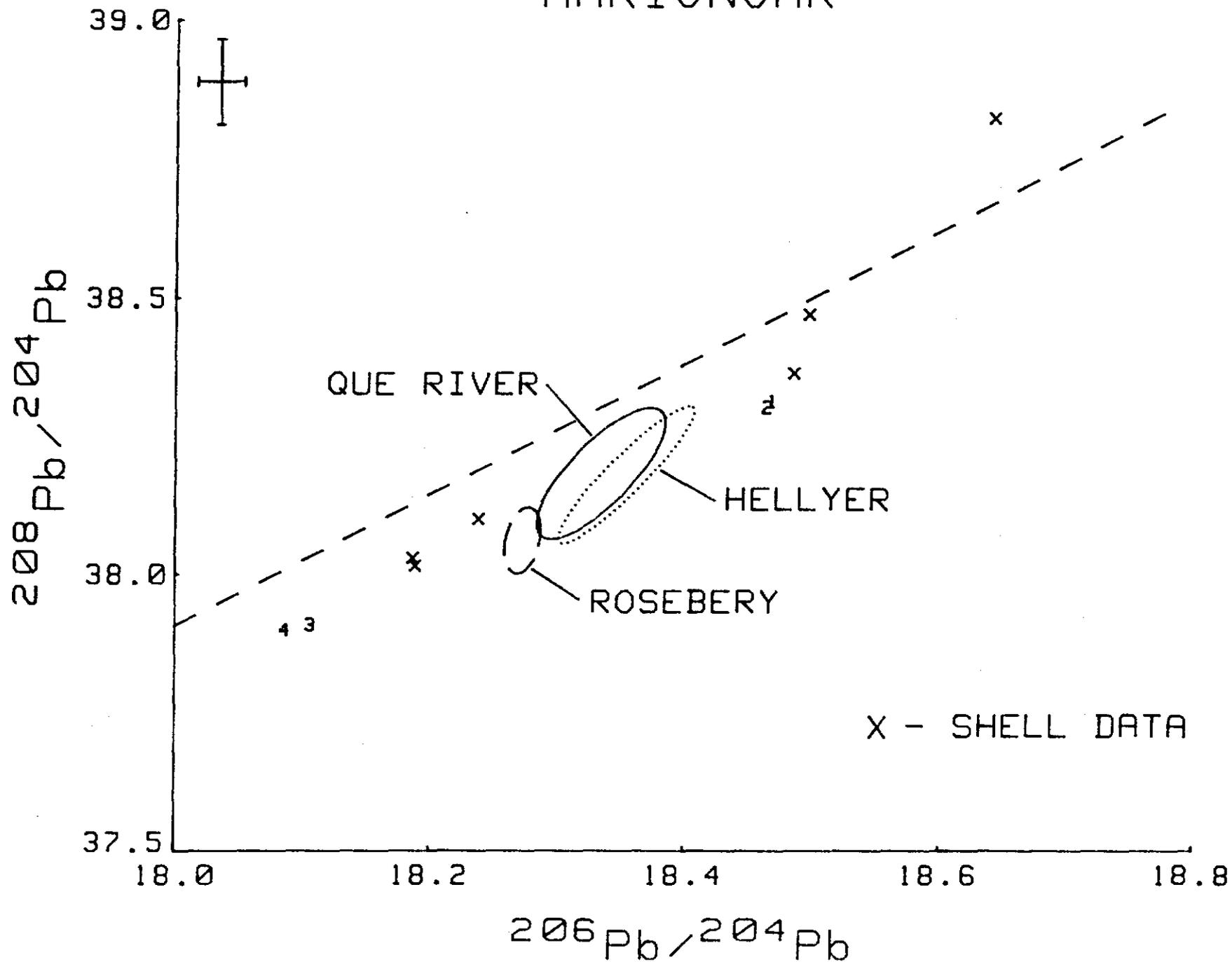
TABLE 1 Pb isotopic compositions of samples from Marionoak

Sample		$\frac{208 \text{ Pb}}{206 \text{ Pb}}$	$\frac{207 \text{ Pb}}{206 \text{ Pb}}$	$\frac{206 \text{ Pb}}{204 \text{ Pb}}$	$\frac{207 \text{ Pb}}{204 \text{ Pb}}$	$\frac{208 \text{ Pb}}{204 \text{ Pb}}$	Pb (ppm)
253026	25 m	2.0747	0.8452	18.467	15.609	38.314	
253027	26.7 m	2.0745	0.8452	18.464	15.605	38.303	
253028	115.0 m	2.0937	0.8605	18.106	15.580	37.909	
253029	283.0 m	2.0956	0.8616	18.086	15.583	37.900	

Figure 1

MARIONOAK

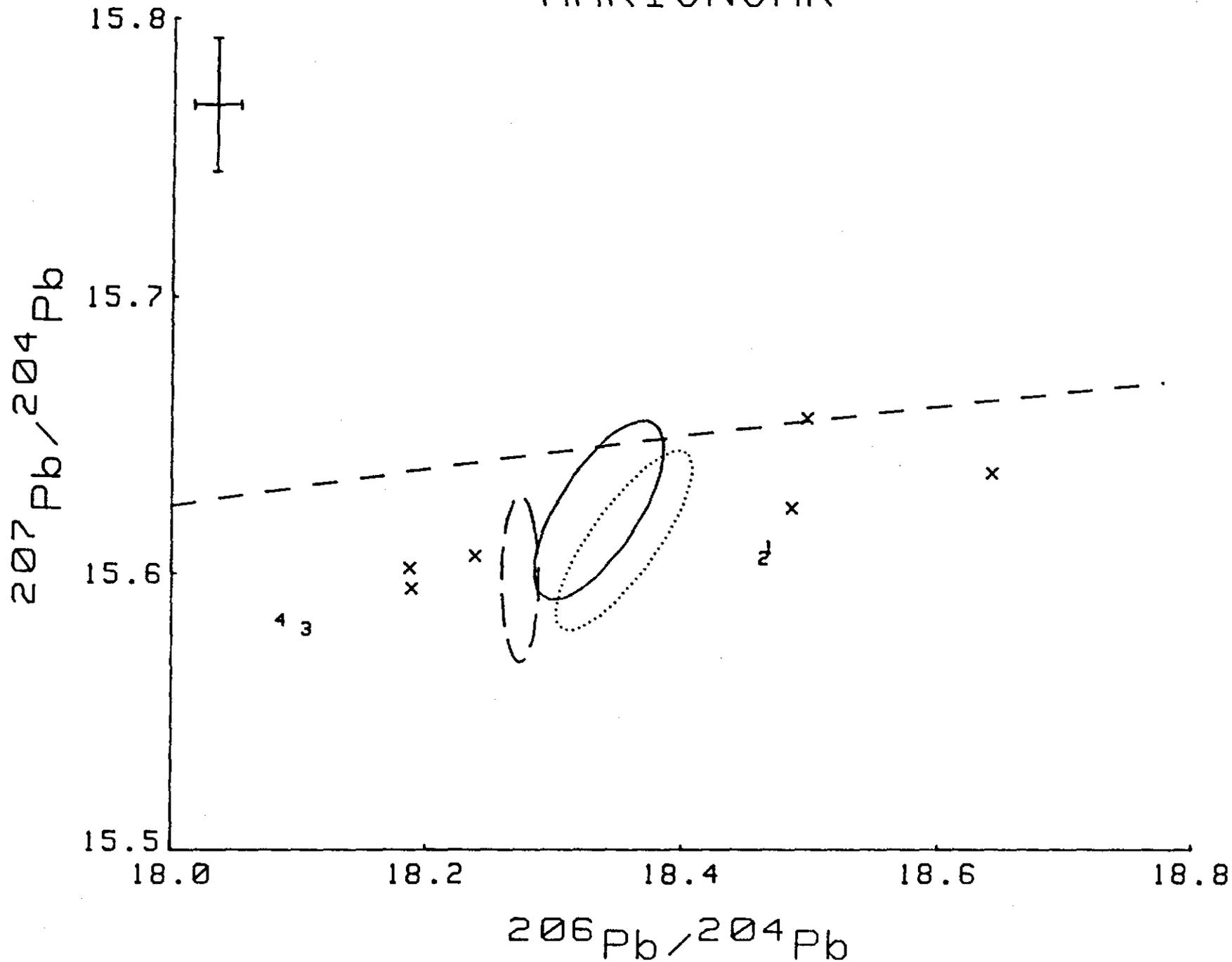
137



042138

Figure 2

MARIONOAK



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042139

APPENDIX 1.

Statement of Expenditure.

ABERFOYLE EXPLORATION PTY LTD

PROJECT COST REPORT
AS AT PERIOD : 12 1985
=====

=====	=====	=====
CODE	ACCOUNT DETAIL	VALUE
=====	=====	Y. T. D.
=====	=====	=====
WP-307 MARIDNOAK		

1401	GEOLOGY - SALARIES	3295.00
1403	GEOLOGY - CONTRACTORS	360.00
1404	GEOLOGY - MATERIALS	21.67
1405	GEOLOGY - TRAVELLING	631.95
1406	GEOLOGY - FUEL	63.00
1409	GEOLOGY - HIRING COSTS	350.00
1410	GEOLOGY - DISTRICT ACCOMMODATION	502.01
1411	GEOLOGY - FREIGHT	48.22
1412	GEOLOGY - VEHICLE COSTS	150.00
TOTAL GEOLOGY		5421.85
2001	GEOPHYSICS - SALARIES	2965.00
2002	GEOPHYSICS - WAGES	641.00
2003	GEOPHYSICS - CONTRACTORS	3474.67
2005	GEOPHYSICS - TRAVELLING	50.00
2010	GEOPHYSICS - DISTRICT ACCOMMODATION	0.00
2011	GEOPHYSICS - FREIGHT	936.69
TOTAL GEOPHYSICS		8067.36
2602	GEOCHEMISTRY - WAGES	253.00
2621	GEOCHEMISTRY - ASSAYS	2616.00
TOTAL GEOCHEMISTRY		2869.00
3201	TARGET DRILLING - SALARIES	0.00
3202	TARGET DRILLING - WAGES	41.00
3203	TARGET DRILLING - CONTRACTORS	0.00
3204	TARGET DRILLING - MATERIALS	538.42
3209	TARGET DRILLING - HIRING COSTS	0.00
TOTAL TARGET DRILLING		579.42
4803	ACCESS - CONTRACTORS	0.00
4809	ACCESS - HIRING COSTS	1020.00
TOTAL ACCESS		1020.00

ABERFOYLE EXPLORATION PTY LTD

PROJECT COST REPORT
AS AT PERIOD : 12 1985

==== CODE ====	===== ACCOUNT DETAIL =====	===== VALUE Y. T. D. =====
6101	TENURE - SALARIES	1155.00
6108	TENURE - TENEMENT COSTS	925.00
	TOTAL TENURE	2080.00
6201	LEGAL - SALARIES	0.00
	TOTAL LEGAL	0.00
7001	OTHER SERVICES - SALARIES	440.00
7004	OTHER SERVICES - MATERIALS	162.90
7007	OTHER SERVICES - COMMUNICATIONS	446.93
7010	OTHER SERVICES - DISTRICT ACCOMMODA	139.00
7012	OTHER SERVICES - VEHICLE COSTS	62.40
	TOTAL OTHER SERVICES	1251.23
9070	INDIRECT COSTS - ADMINISTRATION	2501.39
	TOTAL INDIRECT COSTS	2501.39
	TOTAL PROJECT COSTS	23790.25
	COST CENTRE : JOINT VENTURE	

	**TOTAL WP-307 MARIONOAK J.V (BILLITON)	23790.25
		=====

AS checked.

APPENDIX 11

Diamond Drill Log - MO-1

Feature 143

Bedding
Foliation
Fragment size & shape



Shearing
Fault
Vein



Mineralization

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

042144

CORE RECD	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
No CORE		0-3.0 HW Tricone							
0.4	3.0	HR core Green to purple f-cg feldspathic, chloritic arenite with intercalated thin, wispy, discontinuous mudstone-argillite.							
0.9		variably FeOx stained, weathered.							
1.6	5	irregular thin siderite veinlets bedding disrupted by microfaulting						5	
1.5	5.8	Green interbedded lithic-feldspathic fg sst-slst and wispy carbonaceous mudstone. Occasional subangular to moderately well rounded argillite fragments (crisp clasts?) and subangular basaltic(?) fragments to 3mm.							rare to trace sph in qtz-calcite veins
1.6		Occasional irregular qtz-siderite & thin chlorite-rich microveinlets	40°						
1.6	10	9.5m graded bedding (?) Younging down hole						10	
1.56	11.1	gradational contact Green-black carbonaceous mudstone with interbedded irreg. tuff. sst-slst. Poorly sorted. Occ thin wispy ripple cross lamination(?) in black argillite in arenaceous units suggest younging down hole. Poorly developed scour surfaces.							Trace vfg py.
1.5	12.8	Grades via diminished carbonaceous content to green-grey mafic rich poorly sorted lithic sst with minor intercalated mudstone. Occ. finely laminated mod. well rounded argillite clasts	13.5						13.5m 1cm qtz-carb. vein dissem. trace sph.
0.7	15	13.5-13.8: Numerous <3mm FeOx stained chlorite & qtz-carb. veinlets 13.8: graded bedding ↑ 13.3: wispy convolute bedding	35°					15	13.5-13.8 trace dissem. sph in veinlets.
1.6	16.4	Finely intercalated grey-green calcareous argillite and grey-black argillite. Bedding frequently disturbed and faulted. Thin qtz-calcite-siderite veinlets	45°						16.9-17.2 py to 20% vfg dissem. associated with calcareous bands.
1.02	17.9	Green-grey predominantly poorly bedded fg tuffaceous lsc sst to slst with minor black carbonaceous patches. Occ. calcite microveinlets 18.0-18.8: orange brown limonitic zone							18.0 trace sph, gm in 1cm q-c vein 18.0-18.8: vfg dissem py (oxidized)
2.2	20							20	
1.3	20.1	Interbedded green-grey to black tuffaceous & carbonaceous mudstone-argillite. Disturbed bedding. Occ. tuff. lithic sst intercalations. Occ. lithic (argillite & basalt?) fragments to 3mm. Occ. <3mm chloritic epiclastic(?) intercalation	40°						Trace vfg dissem. py. rare cpy in siderite veins.
1.45	21.0	Local intraformational breccia							
	23.1	Broken core brecciated calcite-siderite vein.							
	21.3	Possible flame structure. Black argillite penetrates fg tuff. lithic sst.							
1.3	23.5	Grey f-mg feldspathic (tuffaceous) lithic sst. with occ. grey-black 2-3cm finely laminated mst interbeds.							
	24.6	Brecciated siderite vein							
	24.7	Black carbonaceous mst.						25	24.7-25.2 Occ. <1mm qtz veins with trace dissem. sph

Feature

Bedding
Foliation
Fragment
size & shape



Shearing
Fault
Vein



c carbonate
q quartz

Mineralization

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

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042145

CORE RECD	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
1.6	25.2	Greenish brown & black finely intercalated carbonaceous & tuffaceous mst, minor lithic sst. Generally highly disturbed bedding.						25.2	1cm calcite-siderite vein. colloform sph with trace gn.
1.4	25.7-26.8	Highly disturbed to brecciated siderite-rich zone containing disseminated sph, py, gn in microfines, veinlets						25.5	gn, sph (py) in 1cm siderite vein + disseminated sph in host rock.
1.6	29.3							25.7	0.5cm sph, gn, mt rimmed by siderite vein parallel to bedding
1.2	30	Black & green-grey variably carbonaceous tuff. mst. rare sericite-chlorite patches Vuggy fract. core 30.0-30.2						25.7-26.8	sph, py, gn
0.9	30.5	Green-grey & black interbedded mg tuff. sst & carbonaceous sst. Puggy core						26.1	1cm sph vein-parallel to bedding
1.2	31.2	Green-grey mod. well sorted f-mg feldspathic qtz sst. rare 2cm black carbonaceous mst intercalations 31.7-32.0 Puggy broken core, FeOx stained. possible fault.							occ. calcite (± py ± cpy) veinlets.
0.5	33.7								Trace disseminated py
1.4	35	Green & black finely intercalated tuff. sst-mst-fg sst (chlorite rich) & carbonaceous mst. Occ. disturbed bedding						31.0-31.2	c.g. euhedral py in fractured vuggy zone.
1.5	36.1								Trace disseminated py.
1.6	40	Greyish green poorly bedded lithic feldsparite to litharenite. Fine sand to silt grain size overall. Occasional black wispy argillaceous partings & thicker mudstone-lignite intercalations. Overall, chlorite rich, high mafic & feldspar content with lithic (basic volcanic) fragments & rare quartz. Pervasive diagenetic(?) soft sediment deformation.							Trace fg py as syngenetic(?) beds & with calcite veinlets.
1.6	45								Traces, specks of py, Po occ. with thin qtz or calcite veins.
1.6	50								
1.6	42.6	Coarser grained (m-c.g.) section						42.6	2cm calcite 60° to c.a.

Feature Bedding
Foliation
Fragment size & shape

Shearing
Fault
Vein

c carbonate
q quartz

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

042148

CORE RECD	DEPTH m	GEOLOGY	VISUAL LOG	TRACE COMMON ABUNDANT MASSIVE	DEPTH m	MINERALIZATION
		100.2				
1.6		Green-grey fine-grained massive lithic sst composed of chlor, sericitized mafic (?) minerals + feldspar (Possibly minor intercalated basic igneous rocks (?))				
1.4						
1.4						
1.6	105					105
1.6						
1.4		3cm 107.2: qtz-calcite-chlorite vein				
1.6	110				110	
		110.1 1cm calcite vein 40° to core axis				
		110.4 1cm calcite-qtz vein } trace po, cpy, gn				110.4 trace po, cpy, gn in 1cm q-c vein.
3.0						
0.69		1cm 113.4 pink-purple qtz vein				
		113.9				
		114.1 1cm calcite vein trace po, cpy, gn				114.1 trace po, cpy, gn in c vein.
1.5	115				115	
		114.8 q-c vein; trace po, cpy, gn				114.8 ditto
		116.0 2cm calcite-chlorite vein 40° to core axis				115.0 2cm bleb vfg gn + trace po.
3.1						
		117.3 1-2cm calcite-chlorite vein 50° to core axis				118.0 2mm po, cpy, gn + calcite vein.
			60°			
3.0	120				120	
		122.0 10cm pervasive silica alteration/veining				
3.0		Slightly coarser grained over last 2 m. Occ. angular lithic frags to 3 mm (ie pebble sized clasts)				
1.0	125	124.7			125	

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%

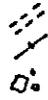
149

CORE RECD	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
042150	3.0								
	3.0	153.1: Petrology describes as saussuritic/albitized microgabbro							
	153.5	Contact diffuse over last metre Green-khaki fg gabbro(?) Occ. chlorite spots to 2-3mm (replaced phenocrysts or amygdules?)						155	
	3.0	156.5 Green grey well layered mst - lithic sst - slst intercalated with black to brown argillite. Occasional thin black carbonaceous & thin calcareous mudstone to calcareous siltstone beds. Bedding slumped, disrupted Rare convolute(?) bedding observed.	55°						
	160	Black carbonaceous mst interbeds	158.4 puggy 158.2					160	160-160.6: qtz-siderite ± py zone thin pyritic bands
	1.2	160.0-160.6: qtz-siderite ± py vein, bleb } minor thin pyritic bands							
	1.2								
	1.4								
	165	165.1-168.7 Badly broken core. Numerous graphitic shears, siderite-qtz veins, becciation. Carbonaceous zone						165	
	1.2								
	3.0	168.7 169.1 Black carbonaceous argillite, cherty section last 5cm. Lt green-grey siliceous mst. Bedding extremely disturbed. Occ. carbonaceous interbeds							
	170	169.9 Predominantly black, occ. grey-green to black massive to weakly bedded argillite-mst. Rare calcareous bands.	60°					170	
	3.0	171.2 First 0.5m, lt grey calcareous mst. Grey green to black variably carbonaceous very finely laminated mudstone-siltstone. Variable volcanitic content	45°						
	0.6	Black carbonaceous argillite. Alternating black argillite & thin tuffaceous bands. very variable calcareous component.	172.6						
	175	174.9						175	

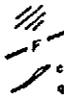
Feature

151

Bedding
Foliation
Fragment
size & shape



Shearing
Fault
Vein



c carbonate
q quartz

Mineralization

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

042152

CORE RECD	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	3.0	200.5 Internationally brecciated black carbonaceous calcareous shale-mst, containing subangular calc-mst, andilitic & basalt (volcanic) clasts in limey matrix.							
	3.0	202.3 202.9 202.3: Petrology describes as carbonaceous psammopelite with poorly sorted, angular to rounded clasts of limestone, dolomitic limestone calcitized, chloritized basalt clasts, minor qtz grains in carbonaceous shale matrix.							201.9-205.3 py vfg disseminations, beds, trace-2%
	205							205	204.3 1cm calcite vein, trace fg sph.
	6.2	205.3 Lt grey-green well lam. mst with intercalated tuff. lithic sst & carbonaceous bands Local convolute bedding, graded bedding & load structure in carbonaceous units suggest ↓ scour surface at 207.6 in basic lithic tuff suggest ↓ 207.6 Green calcareous tuff. slst → fg sst 208.2 208.6 Black massive carbonaceous mst, calcite veins throughout	50° 205.9 graded bedding, flame structures						205.3-207.6 py trace fg veinlets, blebs.
	3.0	210 Lt. green-grey calcareous tuffaceous sst - high fspan, basic lithic fragment content, low qtz content. Occ. green mst clasts to 3cm. Very minor interbedded khaki mst.						210	
	3.0								
	3.0	213.5 Khaki/grey-black variably calcareous, carbonaceous mst - slst. Slumped. Calcite veins throughout							
	3.0	214.7 Grey-green, fairly massive volcanic lithic slst to fg sst. Rare carbonaceous mst as interbeds & angular detritus.						215	
	3.0	217.7 Approximately 50:50 interbedded grey-green tuff., qtz-poor, volcanic lithic slst → mst (occ. m-cg sst) & black carbonaceous mst. Occasional local slumping, convolute bedding, carbonaceous mst detritus, thin films and wispy fragments. Variably, but generally calcareous throughout.							Occasional c-q, + py, po veins
	1.2	220						220	
	3.0								
	225							225	223.5-223.9 3x4mm f-ming py veinlets (syn. bands) 224.6-227.3 extensive calcite + py, po veinlets + beds.

Feature

152

Bedding

Foliation

Fragment

size & shape



Shearing

Fault

Vein



c carbonate
q quartz

Mineralization

Trace 1-5%

Common 5-15%

Abundant 15-60%

Massive > 60%

042153

CORE RECD	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
	3.0								
	3.0								
	230							230	
	3.0	~228.2-231.7: Diminished carbonaceous mst component. Vague increase in chlorite, mafic content of sst.							
	231.7								
	3.0	Medium to dark green f-mg basic volcanic(?) - lithic sst - slst. Occ. thin carbonaceous mst interbeds, detritus. Calcite veins throughout. Parts quite calcareous, possibly due to very fine pervasive carbonate veining (diagenetic?) or alteration or original deposition in a calcareous matrix.							231.7-251.1 Traces of py, po (fg) disseminations & veinlets
	235							235	
	3.0								
	3.0								
	240							240	
	3.0								
	3.0								
	245							245	
	3.0	245.0: Subangular carbonaceous mst & angular green buff. mst clasts to 6cm. over 0.1 - 0.2 metres. Clasts frequently pyritic							Pyritic fragments (clasts)
	3.0								
	248.7								
	250	248.7: 0.2m Black carbonaceous mst interbed.						250	

Feature

Bedding

Foliation

Fragment

size & shape



Shearing

Fault

Vein



carbonate
quartz

Mineralization

Trace 1-5%

Common 5-15%

Abundant 15-60%

Massive > 60%

155

042156

CORE RECD	DEPTH m	GEOLOGY	VISUAL LOG	TRACE	COMMON	ABUNDANT	MASSIVE	DEPTH m	MINERALIZATION
			15°	X					
6.0	305	<p>304.5</p> <p>Interbedded green-grey chlorite rich (tuffaceous?) mst-slst, grey-black carbonaceous mst-slst and lt. grey laminated calcareous-carbonaceous mudstones. The latter consists of alternating carbonaceous & calcareous beds ~1 mm thick but occasionally up to 10-20 cm.</p> <p>Patchy carbonate alteration(?)</p> <p>Occasional slumping, micro faulting.</p>						305	
6.1	310							310	
	315		50°	X				315	
6.0	320							320	
6.0	325	<p>321.4</p> <p>Contact gradational over 1 metre.</p> <p>Lt brown to red-brown Fe-rich v. finely laminated mudstone, containing disseminated iron minerals (magnetite?) in beds.</p> <p>Intercalated with above are calcareous argillite beds (iron rich in parts) & magnetite (hematite) rich units. Possibly detrital?</p>						325	

APPENDIX 111

DDH MO-1 - Susceptibility readings

SUSCEPTIBILITY (0.5 M INTERVALS)

DEPTH	READ								
0.0		15.5	0.5	31.0	0.5	46.5	1.6	62.0	1.15
0.5		16.0	0.4	31.5	0.7	47.0	1.3	62.5	1.3
1.0		16.5	0.5	32.0	0.5	47.5	1.3	63.0	0.35
1.5		17.0	0.7	32.5	1.3	48.0	1.3	63.5	1.0
2.0		17.5	0.8	33.0	0.8	48.5	0.55	64.0	0.9
2.5		18.0	1.0	33.5	0.6	49.0	0.7	64.5	1.9
3.0	0.8	18.5	0.8	34.0	0.6	49.5	0.6	65.0	1.4
3.5	0.7	19.0	0.75	34.5	0.55	50.0	0.8	65.5	0.8
4.0	0.45	19.5	0.65	35.0	0.65	50.5	0.75	66.0	1.4
4.5	0.7	20.0	0.8	35.5	0.7	51.0	8.7	66.5	2.0
5.0	0.75	20.5	0.45	36.0	0.6	51.5	0.75	67.0	1.5
5.5	0.6	21.0	0.6	36.5	0.55	52.0	0.9	67.5	1.3
6.0	0.65	21.5	0.6	37.0	0.5	52.5	0.8	68.0	0.8
6.5	0.65	22.0	0.45	37.5	0.45	53.0	0.5	68.5	0.6
7.0	0.55	22.5	0.5	38.0	0.6	53.5	0.75	69.0	0.8
7.5	0.7	23.0	0.55	38.5	0.6	54.0	1.7	69.5	0.6
8.0	0.6	23.5	0.6	39.0	0.6	54.5	1.0	70.0	0.5
8.5	0.65	24.0	0.8	39.5	0.6	55.0	1.1	70.5	0.6
9.0	0.6	24.5	0.5	40.0	0.7	55.5	1.0	71.0	0.8
9.5	0.7	25.0	1.9	40.5	0.65	56.0	0.8	71.5	0.8
10.0	0.8	25.5	1.2	41.0	0.6	56.5	0.6	72.0	2.4
10.5	0.7	26.0	0.6	41.5	0.6	57.0	1.3	72.5	0.8
11.0	0.7	26.5	1.1	42.0	0.8	57.5	1.9	73.0	0.7
11.5	0.7	27.0	0.5	42.5	1.35	58.0	1.25	73.5	0.6
12.0	0.8	27.5	0.4	43.0	0.7	58.5	1.0	74.0	1.5
12.5	0.6	28.0	0.45	43.5	0.7	59.0	1.0	74.5	1.6
13.0	0.75	28.5	0.5	44.0	0.7	59.5	1.1	75.0	0.8
13.5	0.7	29.0	0.55	44.5	0.7	60.0	1.7	75.5	0.8
14.0	1.0	29.5	0.4	45.0	1.5	60.5	1.4	76.0	1.1
14.5	0.8	30.0	0.5	45.5	1.6	61.0	1.6	76.5	1.5
15.0	0.7	30.5	0.45	46.0	1.7	61.5	1.5	77.0	0.9

MARIONOAK HOLE MO-1

042165

SUSCEPTIBILITY (0.5 M INTERVALS)

DEPTH	READ								
77.5	0.9	93.0	1.0	108.5	1.0	124.0	0.7	139.5	1.0
78.0	0.4	93.5	1.1	109.0	0.95	124.5	1.8	140.0	5.0
78.5	0.9	94.0	0.9	109.5	0.8	125.0	2.4	140.5	0.8
79.0	1.1	94.5	1.0	110.0	1.0	125.5	2.0	141.0	0.15
79.5	0.8	95.0	0.7	110.5	0.9	126.0	1.4	141.5	0.7
80.0	0.7	95.5	3.0	111.0	0.7	126.5	1.4	142.0	1.0
80.5	0.75	96.0	1.8	111.5	0.7	127.0	1.3	142.5	1.0
81.0	1.4	96.5	1.2	112.0	1.8	127.5	0.9	143.0	0.9
81.5	1.0	97.0	1.5	112.5	1.0	128.0	2.4	143.5	1.1
82.0	1.2	97.5	4.2	113.0	0.9	128.5	3.0	144.0	0.8
82.5	1.15	98.0	1.8	113.5	0.9	129.0	0.9	144.5	1.8
83.0	0.8	98.5	0.7	114.0	0.8	129.5	1.7	145.0	1.1
83.5	0.7	99.0	0.7	114.5	0.8	130.0	3.8	145.5	0.8
84.0	0.25	99.5	0.5	115.0	1.1	130.5	3.4	146.0	0.8
84.5	0.75	100.0	1.2	115.5	1.1	131.0	3.7	146.5	0.5
85.0	0.4	100.5	0.6	116.0	0.6	131.5	2.7	147.0	0.9
85.5	0.6	101.0	0.8	116.5	0.5	132.0	1.2	147.5	0.6
86.0	0.5	101.5	0.8	117.0	0.5	132.5	1.9	148.0	0.8
86.5	0.5	102.0	1.0	117.5	0.6	133.0	1.3	148.5	2.2
87.0	0.5	102.5	1.1	118.0	0.8	133.5	0.6	149.0	1.0
87.5	0.55	103.0	0.7	118.5	0.7	134.0	1.1	149.5	0.9
88.0	1.1	103.5	0.7	119.0	0.6	134.5	0.8	150.0	0.9
88.5	0.7	104.0	0.9	119.5	0.7	135.0	0.8	150.5	0.5
89.0	0.75	104.5	0.8	120.0	1.1	135.5	1.2	151.0	0.8
89.5	1.0	105.0	0.65	120.5	1.3	136.0	0.7	151.5	1.9
90.0	2.8	105.5	0.6	121.0	0.6	136.5	1.1	152.0	1.7
90.5	6.3	106.0	0.75	121.5	0.8	137.0	0.7	152.5	0.8
91.0	4.0	106.5	0.7	122.0	0.5	137.5	0.9	153.0	1.0
91.5	0.6	107.0	0.8	122.5	1.3	138.0	1.0	153.5	1.1
92.0	0.6	107.5	0.7	123.0	0.7	138.5	0.9	154.0	0.6
92.5	1.3	108.0	0.6	123.5	0.6	139.0	1.1	154.5	1.0

165
MARIONOAK HOLE MO-1

042166

SUSCEPTIBILITY (0.5 M INTERVALS)

DEPTH	READ								
155.0	0.8	170.5	0.2	186.0	0.7	201.5	0.5	217.0	0.6
155.5	0.6	171.0	0.6	186.5	0.5	202.0	0.5	217.5	0.7
156.0	0.7	171.5	0.6	187.0	0.4	202.5	0.3	218.0	0.7
156.5	0.6	172.0	0.5	187.5	0.4	203.0	0.3	218.5	0.5
157.0	0.7	172.5	0.7	188.0	0.8	203.5	0.1	219.0	2.8
157.5	0.7	173.0	0.8	188.5	0.6	204.0	0.1	219.5	1.0
158.0	0.7	173.5	0.7	189.0	0.5	204.5	0.4	220.0	0.8
158.5	0.6	174.0	0.4	189.5	0.6	205.0	0.3	220.5	1.1
159.0	0.5	174.5	0.4	190.0	0.5	205.5	0.5	221.0	1.1
159.5	0.8	175.0	0.3	190.5	0.5	206.0	0.4	221.5	0.8
160.0	0.5	175.5	0.7	191.0	0.6	206.5	0.6	222.0	0.8
160.5	0.8	176.0	0.5	191.5	0.6	207.0	0.7	222.5	1.3
161.0	0.8	176.5	0.5	192.0	0.6	207.5	0.5	223.0	1.9
161.5	0.6	177.0	0.5	192.5	0.5	208.0	0.5	223.5	6.8
162.0	0.7	177.5	0.3	193.0	0.6	208.5	0.4	224.0	2.0
162.5	0.9	178.0	0.5	193.5	0.3	209.0	0.8	224.5	0.6
163.0	1.7	178.5	0.5	194.0	0.3	209.5	0.7	225.0	0.5
163.5	1.3	179.0	0.5	194.5	0.5	210.0	0.4	225.5	0.5
164.0	0.5	179.5	0.5	195.0	0.9	210.5	0.6	226.0	0.2
164.5	0.5	180.0	0.5	195.5	0.8	211.0	0.6	226.5	1.5
165.0	0.8	180.5	0.6	196.0	0.5	211.5	0.6	227.0	0.6
165.5	0.5	181.0	0.6	196.5	0.6	212.0	0.8	227.5	2.0
166.0	0.5	181.5	0.6	197.0	0.4	212.5	0.2	228.0	0.6
166.5		182.0	0.5	197.5	0.8	213.0	0.7	228.5	0.6
167.0		182.5	0.6	198.0	0.4	213.5	0.7	229.0	0.5
167.5		183.0	0.5	198.5	0.3	214.0	0.8	229.5	0.6
168.0	0.2	183.5	0.3	199.0	0.5	214.5	0.5	230.0	0.5
168.5	0.4	184.0	0.4	199.5	0.4	215.0	0.8	230.5	0.5
169.0	0.6	184.5	0.6	200.0	0.4	215.5	0.8	231.0	0.4
169.5	0.5	185.0	0.4	200.5	0.3	216.0	0.6	231.5	0.6
170.0	0.6	185.5	0.8	201.0	0.7	216.5	0.9	232.0	0.3

CORE LOSS

MARIONOAK HOLE MO-1

042167

SUSCEPTIBILITY (0.5 M INTERVALS)

DEPTH	READ								
232.5	0.7	248.0	0.8	263.5	1.0	279.0	0.9	294.5	0.7
233.0	0.7	248.5	0.7	264.0	1.3	279.5	0.5	295.0	1.1
233.5	0.4	249.0	0.8	264.5	1.2	280.0	0.6	295.5	0.8
234.0	0.7	249.5	0.8	265.0	1.1	280.5	0.5	296.0	0.9
234.5	0.8	250.0	1.4	265.5	1.0	281.0	0.5	296.5	1.5
235.0	0.7	250.5	4.2	266.0	0.9	281.5	0.5	297.0	2.4
235.5	0.9	251.0	0.6	266.5	1.0	282.0	0.5	297.5	1.5
236.0	0.8	251.5	0.6	267.0	1.8	282.5	0.5	298.0	1.1
236.5	0.9	252.0	0.6	267.5	0.6	283.0	0.4	298.5	0.9
237.0	0.8	252.5	1.0	268.0	0.9	283.5	0.4	299.0	1.0
237.5	0.6	253.0	0.9	268.5	1.5	284.0	0.5	299.5	0.9
238.0	0.7	253.5	0.7	269.0	1.4	284.5	0.5	300.0	0.8
238.5	0.7	254.0	1.5	269.5	1.2	285.0	0.3	300.5	0.9
239.0	0.7	254.5	1.1	270.0	0.6	285.5	0.4	301.0	0.8
239.5	0.7	255.0	1.1	270.5	1.2	286.0	0.5	301.5	0.8
240.0	0.8	255.5	1.0	271.0	1.0	286.5	0.4	302.0	0.9
240.5	0.7	256.0	1.0	271.5	0.7	287.0	0.5	302.5	0.8
241.0	0.7	256.5	0.6	272.0	0.5	287.5	0.75	303.0	0.7
241.5	0.7	257.0	1.5	272.5	0.6	288.0	0.85	303.5	0.6
242.0	0.7	257.5	3.8	273.0	0.6	288.5	0.7	304.0	0.9
242.5	1.1	258.0	1.0	273.5	0.2	289.0	1.0	304.5	0.5
243.0	3.0	258.5	1.0	274.0	3.6	289.5	0.8	305.0	0.4
243.5	0.9	259.0	0.6	274.5	0.6	290.0	0.8	305.5	0.4
244.0	0.8	259.5	0.6	275.0	0.6	290.5	0.6	306.0	0.3
244.5	0.8	260.0	0.5	275.5	0.7	291.0	1.2	306.5	0.5
245.0	0.6	260.5	0.7	276.0	3.6	291.5	0.8	307.0	0.5
245.5	0.7	261.0	1.1	276.5	0.8	292.0	0.9	307.5	0.6
246.0	0.8	261.5	0.9	277.0	0.5	292.5	1.1	308.0	0.4
246.5	0.7	262.0	2.0	277.5	3.0	293.0	0.9	308.5	0.5
247.0	0.7	262.5	1.0	278.0	3.6	293.5	1.2	309.0	0.5
247.5	0.6	263.0	1.1	278.5	5.0	294.0	0.9	309.5	0.5

SUSCEPTIBILITY (0.5 M INTERVALS)

DEPTH	READ	DEPTH	READ	DEPTH	READ	DEPTH	READ	DEPTH	READ
310.0	0.5	325.5	22	341.0	0.4	356.5	0.4	372.0	0.6
310.5	0.6	326.0	16	341.5	0.4	357.0	0.6	372.5	0.4
311.0	0.6	326.5	20	342.0	0.8	357.5	0.6	373.0	0.8
311.5	0.6	327.0	20	342.5	0.6	358.0	0.4	373.5	1.3
312.0	0.5	327.5	24	343.0	0.7	358.5	0.6	374.0	0.7
312.5	0.6	328.0	19	343.5	0.6	359.0	0.6	374.5	1.7
313.0	0.6	328.5	25	344.0	0.3	359.5	0.6	374.0	
313.5	0.5	329.0	27	344.5	0.4	360.0	0.5	374.5	
314.0	0.6	329.5	40	345.0	0.5	360.5	0.7	375.0	1.7
314.5	0.3	330.0	27	345.5	0.5	361.0	0.6	375.5	0.6
315.0	0.6	330.5	21	346.0	0.6	361.5	0.4	376.0	1.0
315.5	0.8	331.0	15	346.5	0.8	362.0	0.6	376.5	0.9
316.0	0.8	331.5	1.6	347.0	0.6	362.5	0.4	377.0	1.7
316.5	16	332.0	0.5	347.5	0.6	363.0	0.7	377.5	0.9
317.0	23	332.5	0.8	348.0	0.6	363.5	1.1	378.0	0.7
317.5	1.1	333.0	0.6	348.5	0.7	364.0	0.6	378.5	0.7
318.0	19	333.5	0.9	349.0	0.6	364.5	0.9	379.0	0.8
318.5	17	334.0	0.8	349.5	0.5	365.0	1.1	379.5	0.9
319.0	26	334.5	0.7	350.0	0.7	365.5	1.1	380.0	0.7
319.5	21	335.0	0.8	350.5	0.5	366.0	2.8	380.5	0.9
320.0	14	335.5	0.7	351.0	0.6	366.5	2.2	381.0	0.9
320.5	0.9	336.0	0.8	351.5	0.6	367.0	0.8	381.5	1.5
321.0	17	336.5	0.5	352.0	0.6	367.5	0.9	382.0	1.0
321.5	24	337.0	0.6	352.5	0.7	368.0	2.5	382.5	1.0
322.0	28	337.5	0.7	353.0	0.7	368.5	5.5	383.0	1.0
322.5	14	338.0	0.6	353.5	0.5	369.0	0.6	383.5	1.0
323.0	4.6	338.5	0.6	354.0	0.6	369.5	0.7	384.0	1.3
323.5	17	339.0	0.4	354.5	0.6	370.0	3.0	384.5	1.4
324.0	14	339.5	0.6	355.0	0.6	370.5	4.9	385.0	1.2
324.5	21	340.0	0.5	355.5	0.6	371.0	0.8	385.5	0.9
325.0	11	340.5	0.2	356.0	0.5	371.5	0.7	386.0	1.7

MARION OAK HOLE MO-1

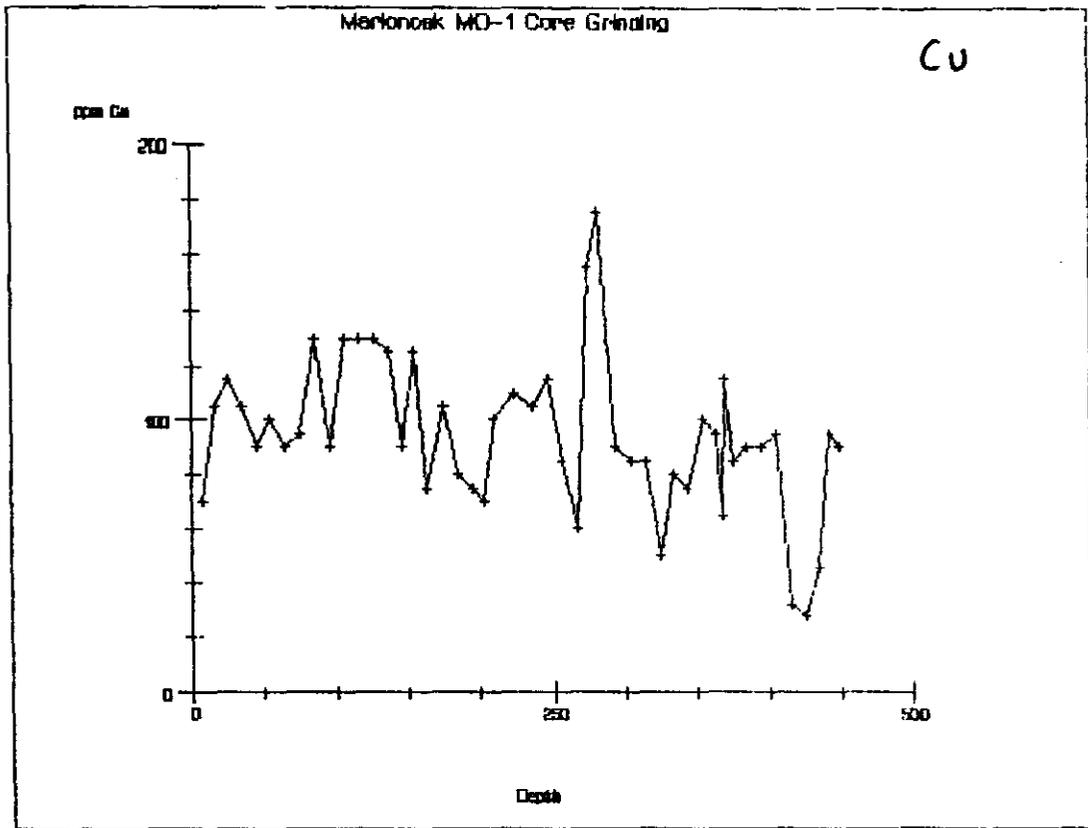
042169

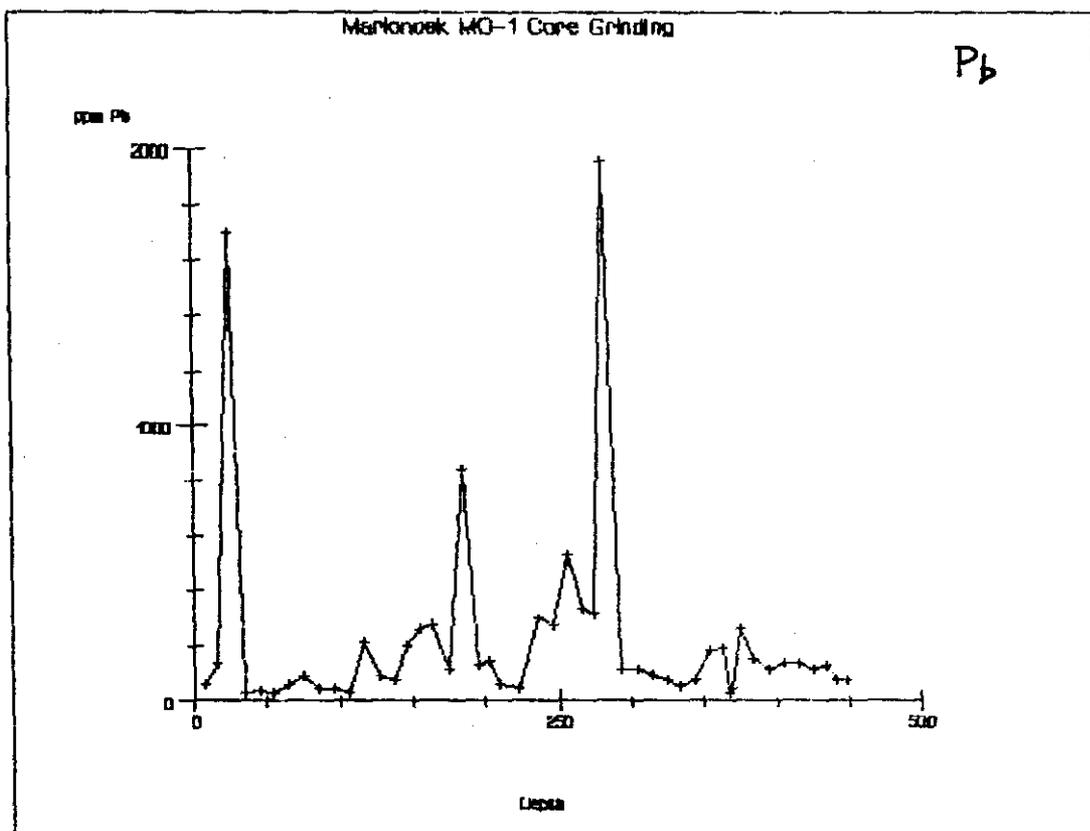
SUSCEPTIBILITY (0.5 M INTERVALS)

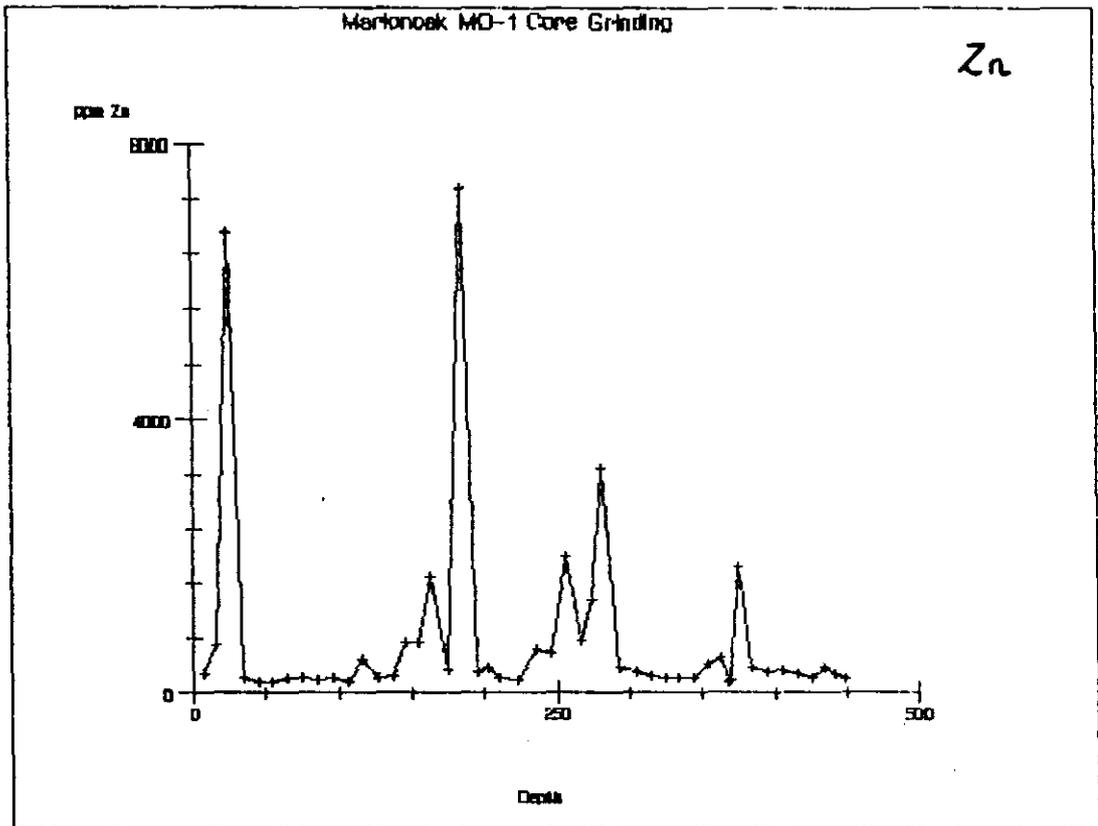
DEPTH	READ								
386.5	0.7	402.0	0.9	417.5	0.1	433.0	0.2	448.5	1.0
387.0	1.0	402.5	1.2	418.0	0.2	433.5	0.2	449.0	1.0
387.5	0.7	403.0	1.2	418.5	0.1	434.0	0.1	449.5	0.8
388.0	0.9	403.5	0.9	419.0	0.1	434.5	0.6	450.0	0.9
388.5	0.9	404.0	1.5	419.5	0.1	435.0	0.4	450.5	1.1
389.0	0.9	404.5	1.1	420.0	0.1	435.5	0.2	451.0	1.3
389.5	0.8	405.0	1.4	420.5	0.1	436.0	0.1	451.5	1.5
390.0	0.9	405.5	1.2	421.0	0.2	436.5	0.8	452.0	1.4
390.5	1.0	406.0	1.7	421.5	0.1	437.0	0.7	452.5	1.8
391.0	0.8	406.5	2.8	422.0	0.1	437.5	0.8	453.0	4.2
391.5	1.1	407.0	1.1	422.5	0.2	438.0	0.4	453.5	1.1
392.0	1.2	407.5	0.9	423.0	0.1	438.5	0.5	454.0	0.7
392.5	0.9	408.0	0.8	423.5	0.1	439.0	0.4		
393.0	1.0	408.5	1.1	424.0	0.2	439.5	0.4		
393.5	1.1	409.0	0.9	424.5	0.1	440.0	0.5		
394.0	1.1	409.5	0.4	425.0	0.4	440.5	0.6		
394.5	0.7	410.0	0.3	425.5	0.1	441.0	1.1		
395.0	0.7	410.5	0.3	426.0	0.1	441.5	1.2		
395.5	1.2	411.0	0.3	426.5	0.4	442.0	0.9		
396.0	1.1	411.5	0.3	427.0	0.2	442.5	1.0		
396.5	1.1	412.0	0.1	427.5	0.4	443.0	3.2		
397.0	1.1	412.5	0.2	428.0	0.7	443.5	0.6		
397.5	0.9	413.0	0.1	428.5	0.1	444.0	0.6		
398.0	1.0	413.5	0.1	429.0	0.2	444.5	0.6		
398.5	1.1	414.0	0.1	429.5	0.1	445.0	1.0		
399.0	1.0	414.5	0.2	430.0	0.1	445.5	1.1		
399.5	0.5	415.0	0.1	430.5	0.1	446.0	2.1		
400.0	0.6	415.5	0.1	431.0	0.8	446.5	1.2		
400.5	0.9	416.0	0.1	431.5	2.3	447.0	1.5		
401.0	1.0	416.5	0.1	432.0	0.3	447.5	1.1		
401.5	0.8	417.0	0.1	432.5	0.4	448.0	1.3		

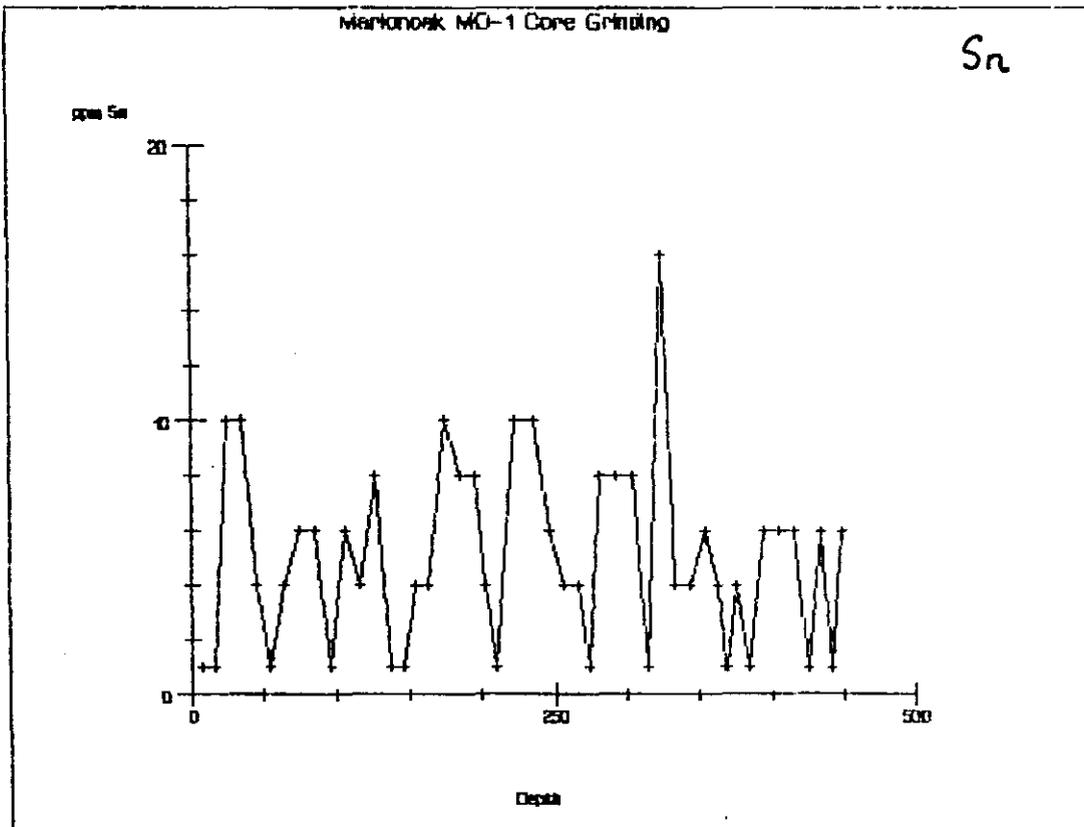
APPENDIX 1V

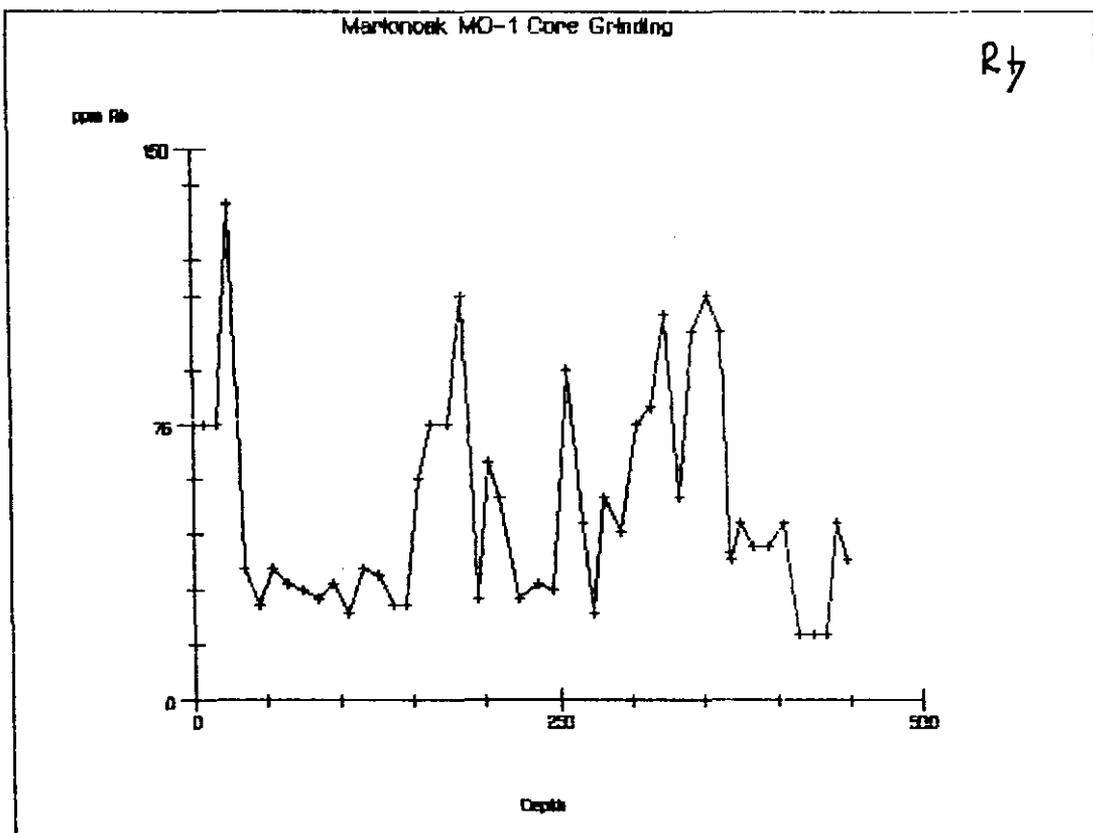
DDH MO-1 - Core grind data

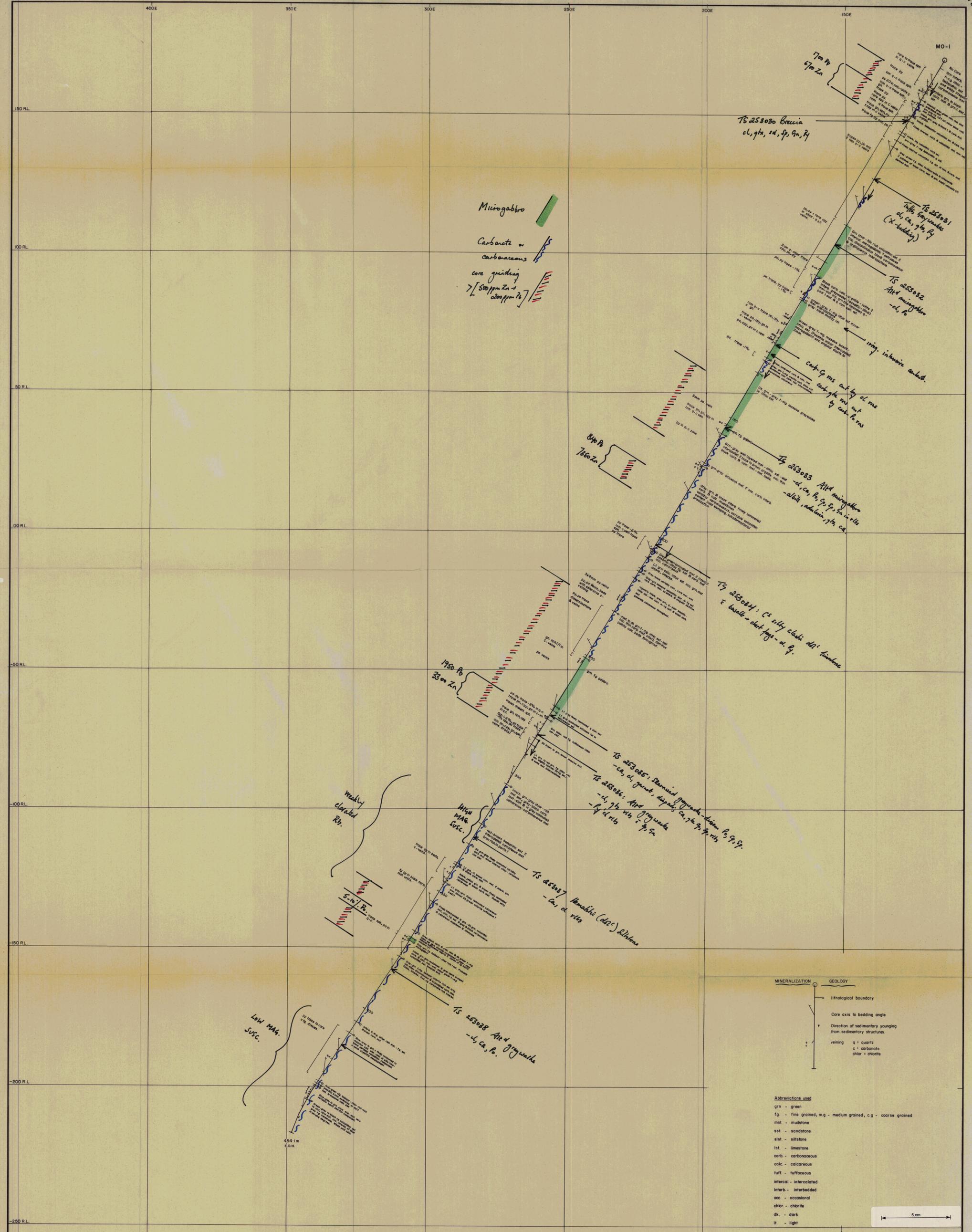












Microgabbro

Carbonate or carbonaceous

core quiding
 7 [Strombolian + Strombolian]

MINERALIZATION

○ lithological boundary

○ Core axis to bedding angle

○ Direction of sedimentary younging from sedimentary structures

○ v. quartz (q)

○ c = carbonate

○ chlor = chlorite

Abbreviations used

grn - green

fg - fine grained, mg - medium grained, cg - coarse grained

mst - mudstone

sst - sandstone

silt - siltstone

lst - limestone

carb - carbonaceous

calc - calcareous

tuff - tuffaceous

intercal - intercalated

interb - interbedded

occ - occasional

chlor - chlorite

dk - dark

lt - light

FIG. 2 ANNOTATED WELL LOG MO-1

042176

A Aberfoyle Exploration Pty Ltd		NORTH WEST TASMANIA MARIONOAK SECTION MO1		Compiled: MT Drawn: MT Traced: EUM Checked:
REVISIONS No. Date Init. Date	Location Code K55/5	Scale: 1:500	Date: May, 1985	Plate No: Moc 20