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23 JUL 1986
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7257/86

BILLITON AUSTRALIA, THE METALS DIVISION OF
THE SHELL COMPANY OF AUSTRALIA LIMITED

E.L. 39/83 - CATTLEY RANGE

Progress Report on Exploration for the Period
23/8/85 - 22/8/86

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REPORT NO : 08.3410

N. HUNGERFORD

DATE : 15th July, 1986

COPY NO : 1

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D.B. Hall

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 2. Billiton, Melbourne
 3. Billiton, Devonport

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SUMMARY

The survey area has been extended south from the area gridded in 1984 - 1985, to cover the southern exposed area of Cambrian volcanics/sediments.

A TEM survey produced one anomaly which was detailed with a 5-line Sirotem survey. The anomaly has been confirmed and requires followup exploration and drilling.

1. INTRODUCTION

Exploration Licence No. 39/83, covering 44 km², was granted to the Shell Company of Australia Limited on 22nd August, 1983.

The major target of exploration is massive volcano-genic base metal sulphides. Within the E.L. there is a window of Cambrian volcanics and sediments that may represent the northwest extension of the units hosting the Hellyer deposit.

2. PREVIOUS EXPLORATION

Geopeko had completed a DIGHEM survey, and regional stream sediment sampling. However, no detailed followup work was reported.

Work completed by Shell has been reported in two annual reports to the Mines Department, reference Billiton Report No's 08.2489 and 08.2887.

Exploration in 1984 - 1985 consisted of geological mapping, gridding, ground magnetics and three loops of transient EM survey. The bulk of the work was carried out in the northwest part of the licence, in the vicinity of a weak Dighem anomaly, and a weak stream sediment anomaly.

3. EXPLORATION COMPLETED 1985 - 1986

The geophysical-based programme was extended to the southwest to cover the remainder of the non-basalt covered Cambrian volcanics. The work comprised:

- 28.4 line kms of gridding
- 15.5 kms, 300 stations of Transient Electromagnetics

- 3.25 kms, 130 stations of Sirotem survey
- 19.3 line kms of ground magnetics
- 97 soil samples
- grid based geological mapping.

4. RESULTS

4.1 Geology

The lithologies, stratigraphy and structure outlined in previous reports is essentially unchanged. Geological mapping of grid lines has been of limited value due to the extensive Tertiary basalt cover, and poor outcrop.

It is difficult to relate the Cambrian units to any of the units in the Mt. Read Volcanics further south. It is assumed that they are the time equivalents of the volcanic sequences in the Que River/Hellyer area.

4.2 Geochemistry

Three lines of hand auger samples were taken to test for any response associated with a weak chargeability anomaly at 9800N. No significantly anomalous values were detected for the elements analysed for - Cu, Pb, Zn, Mn and Fe.

The results appear to discriminate between different rock types, and elevated values for Fe and Mn define basalt soils. Slightly elevated Zn and Cu values are also associated with the basalt.

The major lithologies indicated from the sampling are basalt and lithic/greywackes. Other lithologies identified are felsic tuffs, tuffaceous siltstones, siltstones and some shales. Only slightly elevated Pb values are associated with felsic tuffs and micaceous siltstones on 9600N, from 11060E to 11120E.

An auger sampling programme across a UTEM anomaly on line 5900N has recently been undertaken. Assay results are not available.

4.3 Geophysics

In the last report to the Mines Department mention was made of an EM-37 conductor that occurs in the north of the EL on lines 10600 to 9800N. It was unclear whether this conductor was caused by variable conductivity and thickness of the Tertiary basalt, or whether it was a genuine bedrock conductor. As a result a line of dipole-dipole IP was carried out (pseudo-section in the last report) which indicated a chargeability anomaly adjacent to but not coincident with the EM-37 conductor. The opinion of a consultant was sought and is attached in Appendix IV. He maintained that the EM-37 response(s) were due to the basalt and the IP also to the basalt. Since there still remained some doubt, a line of auger geochemistry was carried out on 9800N across the window in the basalt (as well as further east to define a previously detected Pb/Zn soil geochem. anomaly). The geochemistry results are reported in Section 4.2 of this report, and they did not indicate any evidence of economic mineralization.

The EM-37 time domain electromagnetic survey coverage was extended south from the previously surveyed area (see Progress Report 23/8/84-22/8/85), and covered the remaining known area of Cambrian volcanics within the EL. Part of the surveyed area is covered with Tertiary basalt.

Similar survey and recording parameters were used for this survey, but with wider line spacings of 300 metres (as opposed to 200 metres). A total of 15.2 line kms was surveyed on this occasion. Both horizontal (x) and vertical (z) components were measured. Loop positions are a compromise between:

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- (1) the need for optimum coupling (expected dips $90-60^{\circ}E$);
- (2) avoidance of long survey lines (decreased primary field); and
- (3) access requirements for the EM-37 transmitter and generator.

As with the previous survey the Tertiary basalt has a fairly severe response which will obscure all but large and shallow bedrock conductors. The basalt is readily mapped by the use of ground magnetics since the Cambrian volcanics are (as far as is known) non-magnetic in comparison to the magnetic basalt.

A conductor was recorded on the intermediate EM-37 channels (6-16=0.58-3.1ms after start Tx turn-off) on lines 5900N and 5600N at about 12300E. As a result this conductor was later detailed using a 600x350 metre loop (near edge along 12150E). Sirotem was used for this since a Solo Geophysics crew was readily available. A MkII receiver with early-time option was used, with a medium power stand-alone transmitter. The position of the Sirotem loop was placed for optimum coupling for a conductor at about 100 metres depth. The conductor occurs on earlier channels than on the EM-37 (5-13=0.25-1.25ms after start Tx turn off) and appears to be shallower. It may thus be caused by a basalt layer of variable thickness. A ground magnetic survey has confirmed the presence of basalt (Figs. 5, 6, 7) which generally correlates with the TEM conductor as plotted on a voltage plan of the X component (Fig. 8).

Both X & Z components of Line 5900N were replotted on a linear voltage scale (as with the EM-37 convention). These are shown on Figs. 9 & 10 and indicate the anomaly at 12350E more clearly, as does the Fraser filtered plot of the Z component on Fig. 11.

Decay curve analysis of the anomaly was carried out, with the power curve plot (Fig. 12) having a power of -4.5 , very close to that of a theoretical thin layer (-4.0). The exponential curve plot (Fig. 13) does not have a straight-line decay (a decay with time constant of only 0.17ms is plotted). Both these analyses suggest the TEM anomaly is due to an isolated thin conductive layer of Tertiary basalt rather than a bedrock conductor. However, further geophysical modelling, geochemical sampling and geological mapping are required before this can be confirmed.

5. CONCLUSIONS & RECOMMENDATIONS

The geophysical surveys completed have defined a moderate EM anomaly in the southern part of the gridded area.

It is proposed to carry out detailed geological mapping and sampling across the EM anomaly, prior to drill-testing.

REFERENCES

- WRIGHT, R.G., SMYTH, W.D., 1984. Progress Report on Exploration for the Period 23/8/83-22/8/84, Unpubl. Billiton Report 08.2489.
- CARTER, D.N., HUNGERFORD, N., 1985. Progress Report on Exploration for the Period 23/8/84 - 22/8/85, Unpubl. Billiton Report 08.2887.

011

005012

402 200E

406 200E

(Moina J.V.)
LOONGANA E.L. 36/79

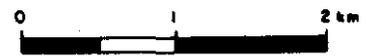
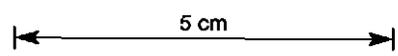
5411000N

1985 - 86
SURVEY AREA



CATTLE RANGE

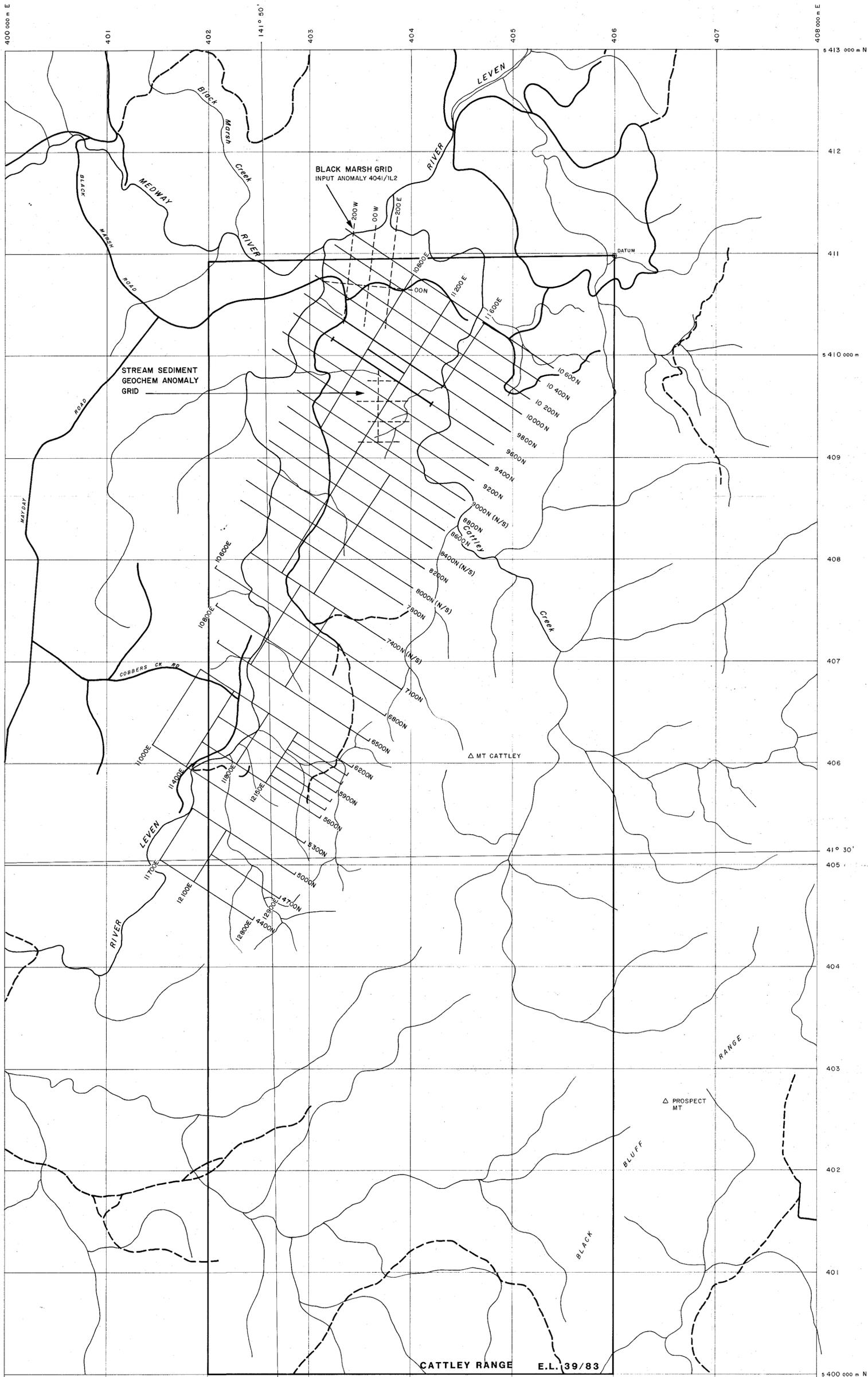
- TERTIARY  BASALT
- ORDOVICIAN  CONGLOMERATE
GREYWACKE, SILTSTONE
- CAMBRIAN?  JUKES BRECCIA EQ
- CAMBRIAN  VOLCANICS
(minor sediments)



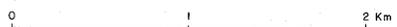
E. L. 39/83

5400000N

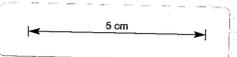
	
The State Director of the South Australian Land Office	
Project: CATTLE RANGE	
Title: LOCATION PLAN	
Author: D.C./D.H. Date: 7/86	Scale: 1:50000
Drawn: H.M.R. Office: AHO	Revised: Date:
Drawing No: L051/1021	Fig No:



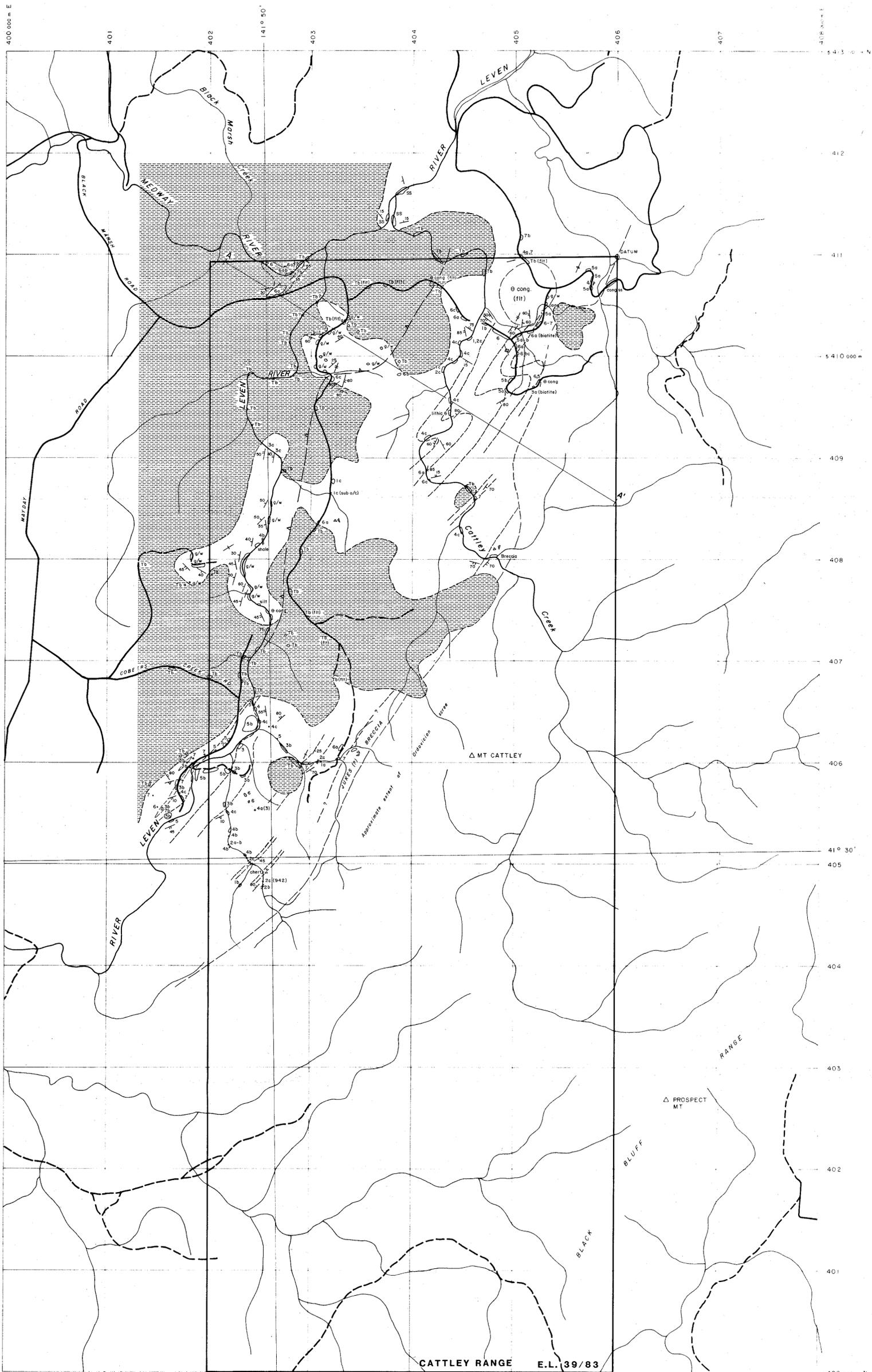
- SOIL SAMPLES - SITES @ 20m SPACINGS
 - BLACK MARSH AND GEOCHEM ANOMALY GRIDS. SEE REP. No. 08-2489 (1984)
 - MAIN GRID FOR 1985 EM - 37 SURVEY
- N.B. Grids are approximate



005013



Billiton Australia	
Project CATTLEY RANGE N.W. TASMANIA	
Title GRID PLAN	
Author NH, DC Dept.	Scale 1:20,000
Drawn AS Date 3/85	Revised HMR Date 7/86
Checked Date	S'ceded Date
Sheet No. FIG. 2	Drawing No. LD 51 / 1012

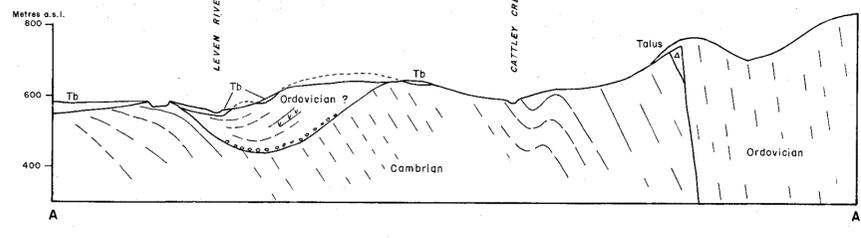
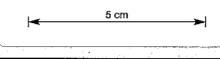


- LITHOLOGIES**
- Tertiary**
- Tb Basalt
- Ordovician (O)**
- cong Conglomerate
 - ss Sandstone
 - silt Siltstone
 - g/w Greywacke
- Cambrian**
- 1 Quartz phyrlic lava
 - 2 Quartz phyrlic tuff
 - 3 Quartz feldspar phyrlic lava
 - 4 Quartz feldspar phyrlic tuff
 - 5 Feldspar phyrlic lava
 - 6 Feldspar phyrlic tuff
 - 7 Fine grained tuff - sediment
- Structural Symbols**
- /ss Bedding
 - /s Schistosity
 - /j Jointing
 - ||| Fault
- Grain Size**
- a > 3 mm
 - b 1 - 3 mm
 - c < 1 mm
 - 4p Coarse lapilli
- Other Symbols**
- 926 Rock sample, number
- N.B.**
- Tb BASALT
 - OUTLINE FROM GROUND MAGNETIC SURVEYS
 - ROAD / TRACK
 - CREEK / RIVER
 - GEOLOGICAL BOUNDARY



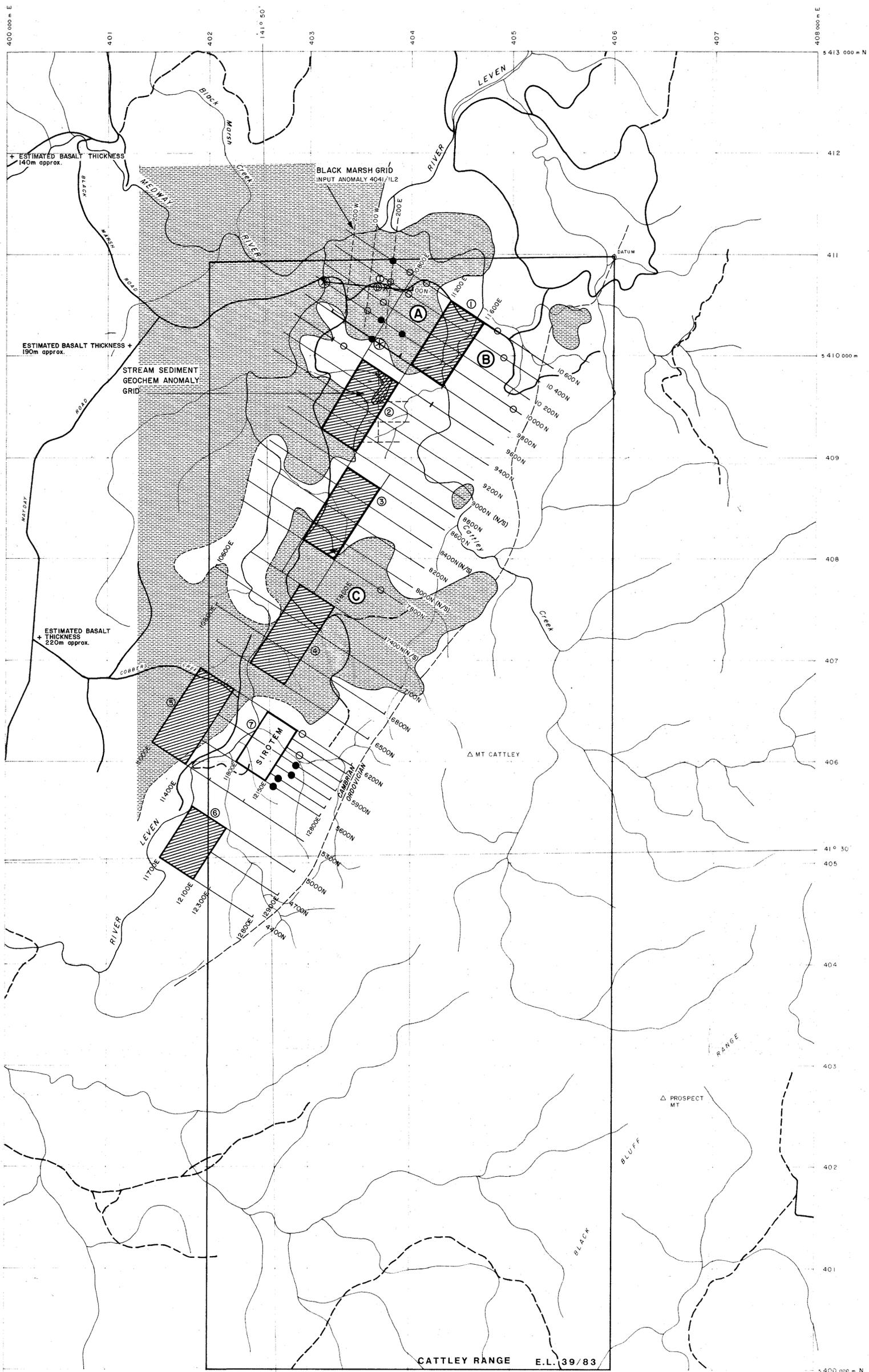
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0 1 2 Km

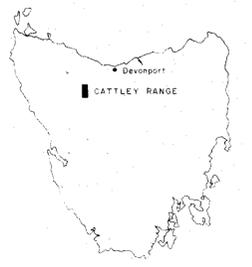


Billion Australia	
CATTLE RANGE N.W. TASMANIA	
GEOLOGICAL INTERPRETATION	
Author: NH, DC	Scale: 1:20,000
Drawn: AS	Date: 3/85
Checked: [blank]	Revised: [blank]
Project No: FIG. 3	Drawn by: LD 51 / 1017

870



- OUTLINE OF TERTIARY BASALT (from Ground Magnetics)
- EM-37 TRANSMITTER LOOP
- ANOMALOUS Pb/Zn SOIL GEOCHEM
- IP LINES
- STRONG / WEAK CHARGEABILITY ANOMALY
- MODERATE / WEAK EM-37 OR SIROTEM ANOMALY
- LINE NOT SURVEYED WITH EM-37
- INPUT ANOMALY (4041/IL2)
- DIGHEM ANOMALY (10A)
- LOOP NUMBER



- SOIL SAMPLES - SITES @ 20m SPACINGS
 - BLACK MARSH AND GEOCHEM ANOMALY GRIDS. SEE REP. No. 08-2489 (1984)
 - MAIN GRID FOR 1985 EM-37 SURVEY
- N.B. Grids are approximate

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Billiton Australia			
CATTLEY RANGE N.W. TASMANIA			
GEOPHYSICAL SUMMARY PLAN 1985			
Drawn	N.H.	Sup. A.H.O.	Scale 1:20,000
Checked	H.M.R.	Date 1/85	Revised
Drawn		Date	Checked
Sheet No.	FIG. 4	Drawing No.	LDS1/1019

014

9758-98

005016

5 cm

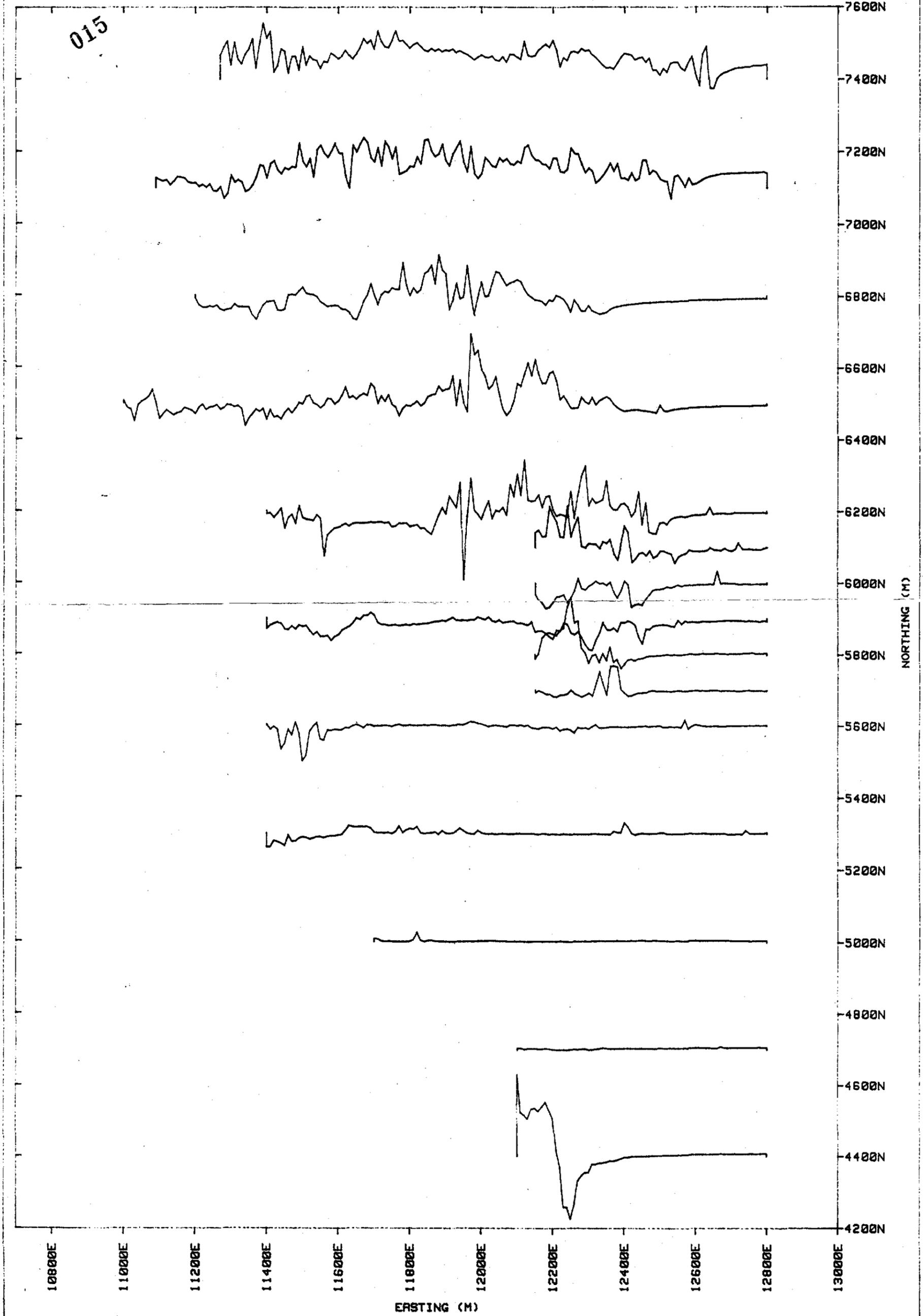


SHELL COMPANY OF AUSTRALIA
METALS DIVISION
R.O.C.S. - PROTEM

N.W. TASMANIA
CATTLEY RANGE
GROUND MAGNETICS
BASE 62000nT
SCALE 1 : 10000

FIG No : 5
DATE : 7 / 86
AUTHOR : N.H.
OFFICE : A.H.O.
DRAWN :

LEGEND
DRG. No. LD51/1023



9252-98

005017

5 cm



SHELL COMPANY OF AUSTRALIA

METALS DIVISION

R.O.C.S. - PROTEM

N.W. TASMANIA
CATTLEY RANGE

GROUND MAGNETICS

BASE 62000nT

SCALE 1 : 20000

FIG No : 6

DATE : 7/85

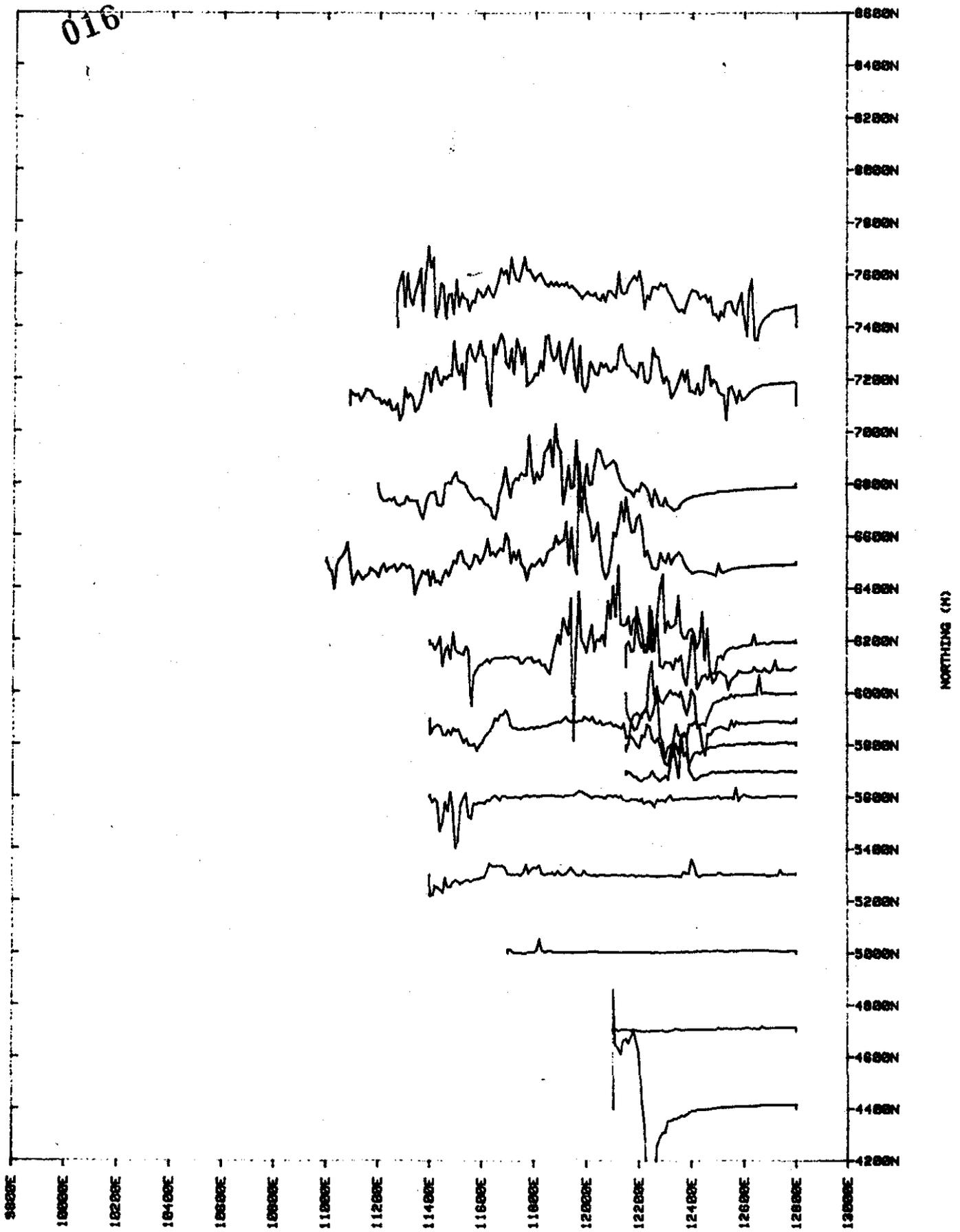
AUTHOR : N.H.

OFFICE : AHO

DRAWN :

LEGEND

DRG. No. L051/1022





SHELL COMPANY OF AUSTRALIA
METALS DIVISION
R.O.C.S. - POST

N.W. TASMANIA
CATTLEY RANGE
GROUND MAGNETICS
BASE 62000nT
CI = 100nT
SCALE 1 : 5000

FIG No : 7

LÉGEND

DATE : 17-7-86

AUTHOR : N.H.

OFFICE : AHO

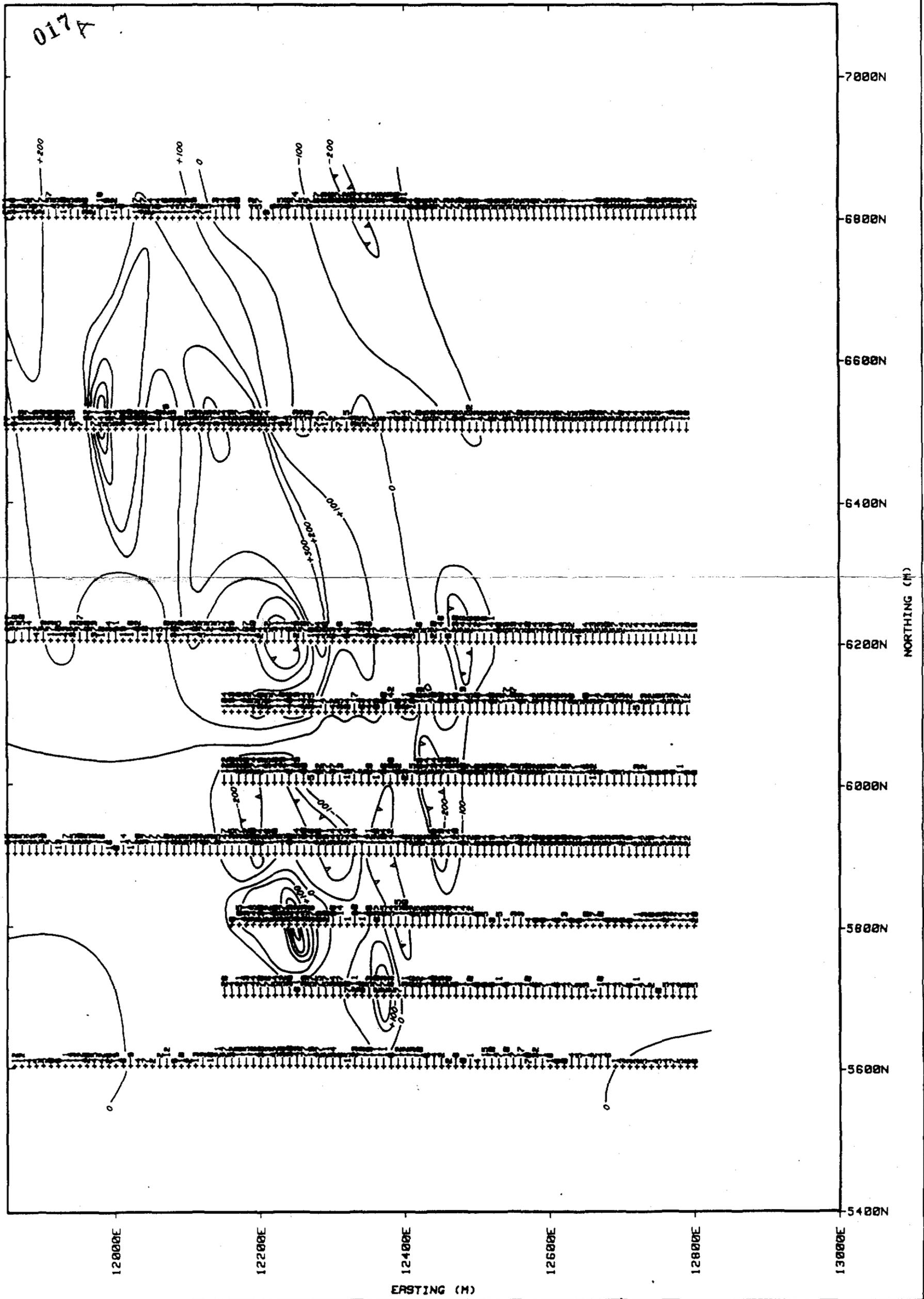
DRAWN :

DRG. No. LD51/1024

5 cm

86-2576
005018

017A





SHELL COMPANY OF AUSTRALIA
METALS DIVISION
R.O.C.S. - PROTEM

N.W. TASMANIA
CATTLEY RANGE
SIROTEM, X COMP
CH 8 VOLTAGE PLAN
(0.443ms)

FIG No : 8

LEGEND

DATE : 18-7-86

SCALE : 1:5000

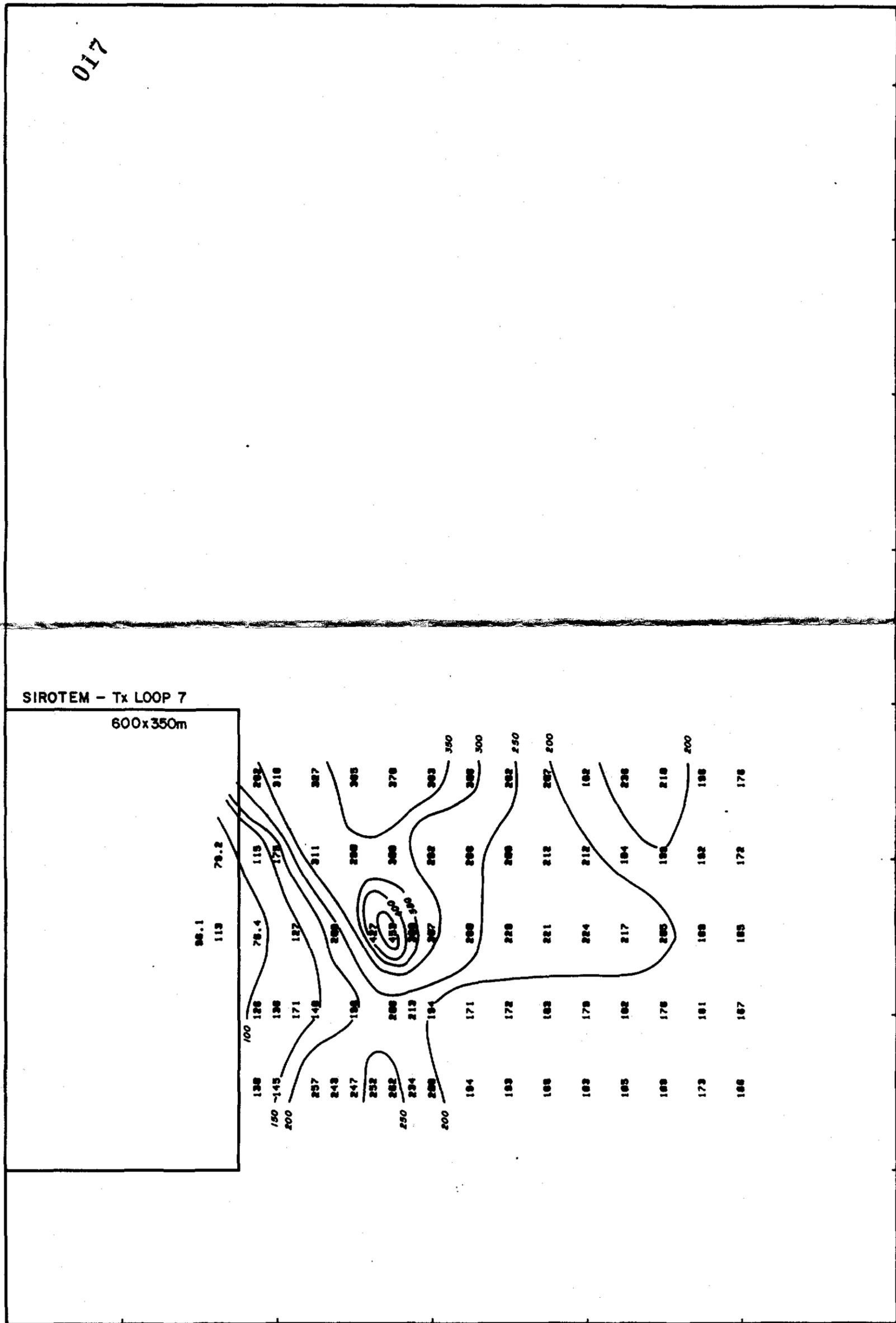
AUTHOR : N.H.

OFFICE : AHO

DRAWN :

DRG.No. LD51/1025

017



NORTHING (M)

EASTING (M)

86-2576

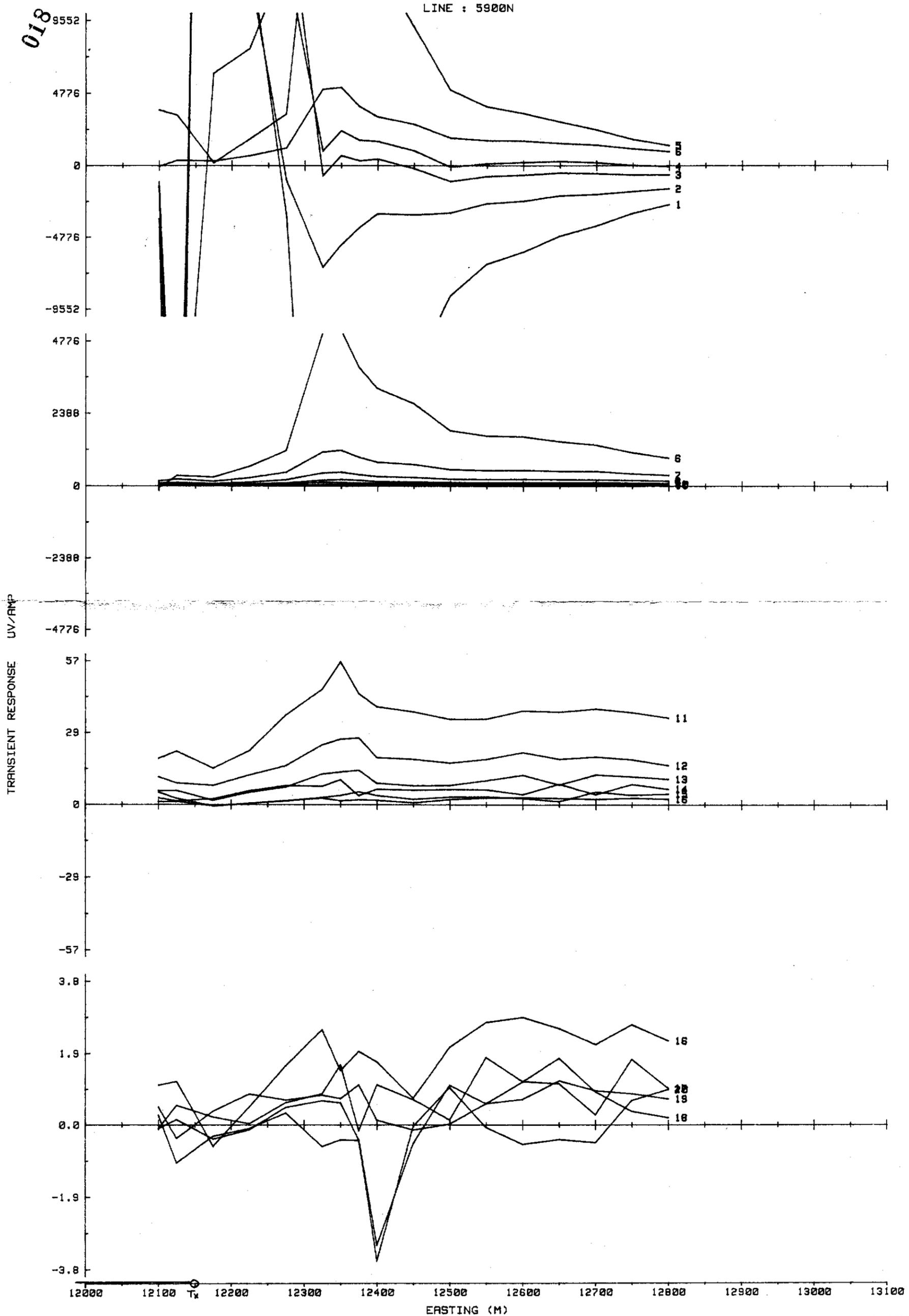
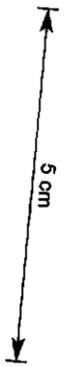


SHELL COMPANY OF AUSTRALIA
METALS DIVISION
R.O.C.S. - PROTEM

N.W. TASMANIA
CATTLEY RANGE
LINE 5900N
SIROTEM E.T., X COMP
SCALE 1 : 5000

FIG No : 9	LEGEND
DATE :	
AUTHOR :	
OFFICE :	
DRAWN :	

86-2576





SHELL COMPANY OF AUSTRALIA

METALS DIVISION

R.O.C.S. - PROTEM

N.W. TASMANIA
CATTLEY RANGE
LINE 5900N
SIROTEM E.T., Z COMP

SCALE 1 : 5000

FIG No : 10

LEGEND

DATE :

AUTHOR :

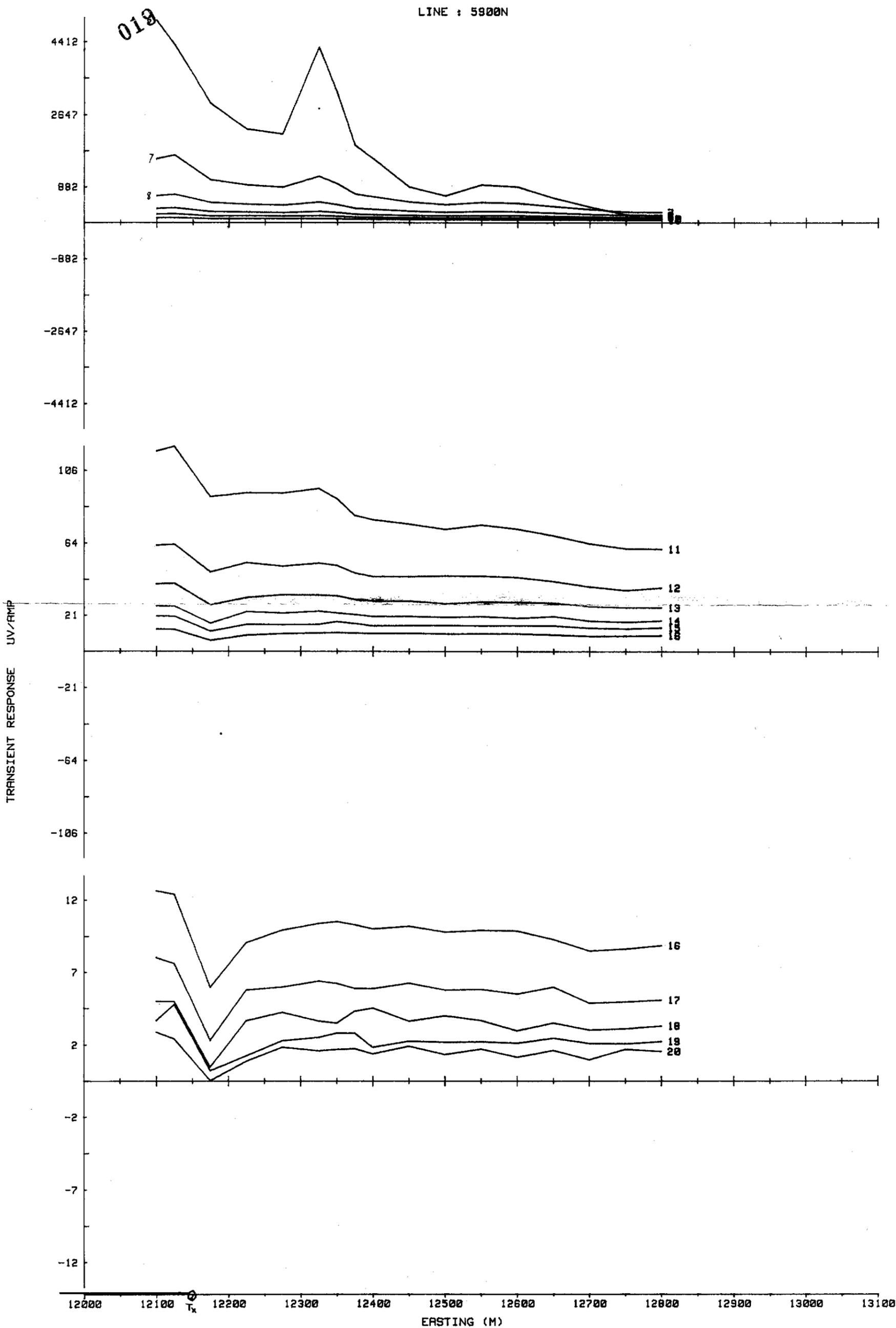
OFFICE :

DRAWN :

LINE : 5900N

86-2576

5 cm





SHELL COMPANY OF AUSTRALIA
METALS DIVISION
R.O.C.S. - PROTEM

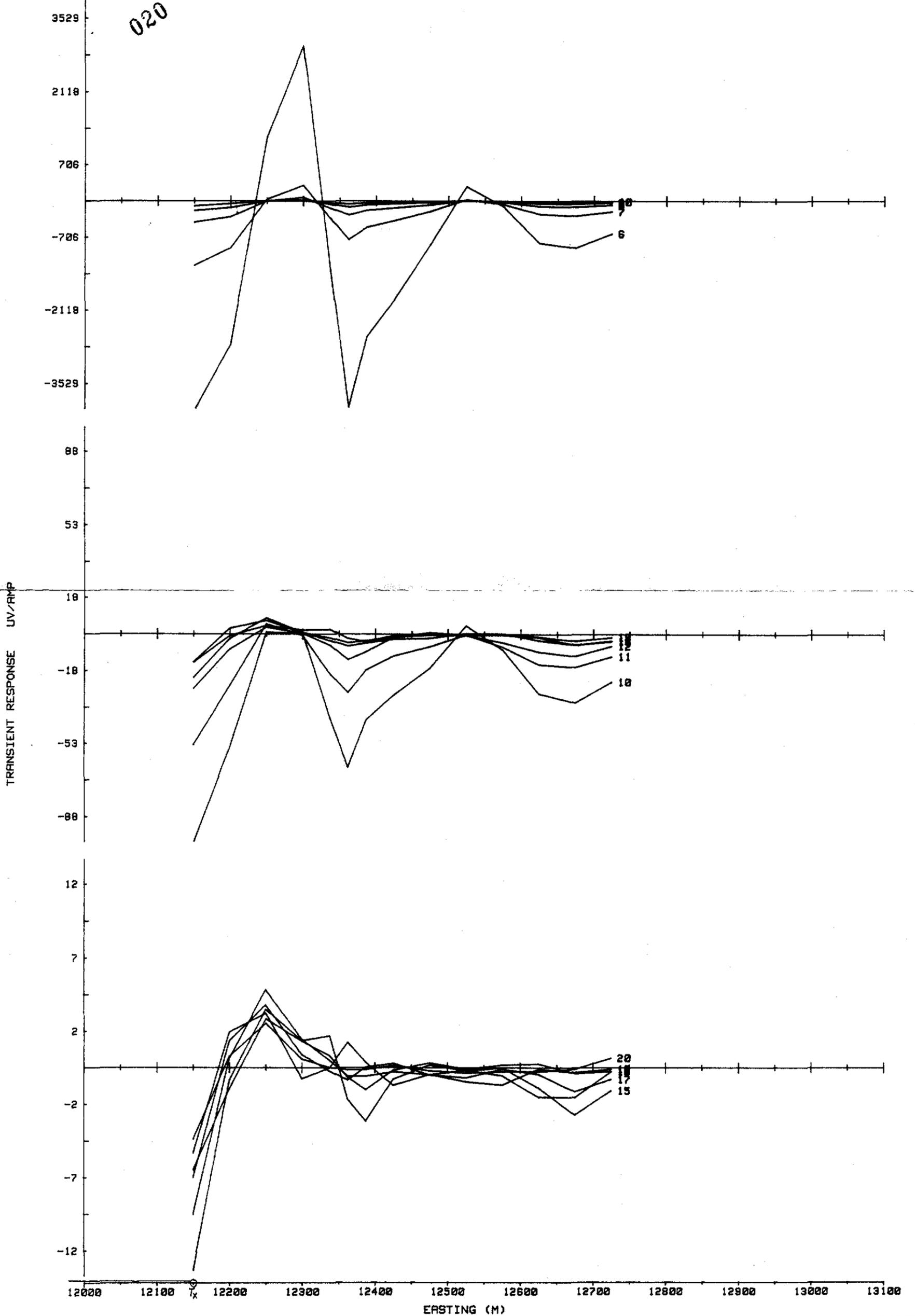
N.W. TASMANIA
CATTLEY RANGE
LINE 5900N, Z COMP
FRASER FILTERED
SCALE 1 : 5000

FIG No :	11	LEGEND
DATE :		
AUTHOR :		
OFFICE :		
DRAWN :		

86-2576

5 cm

LINE : 5900N



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OBSERVED DATA : o
 FITTED : -



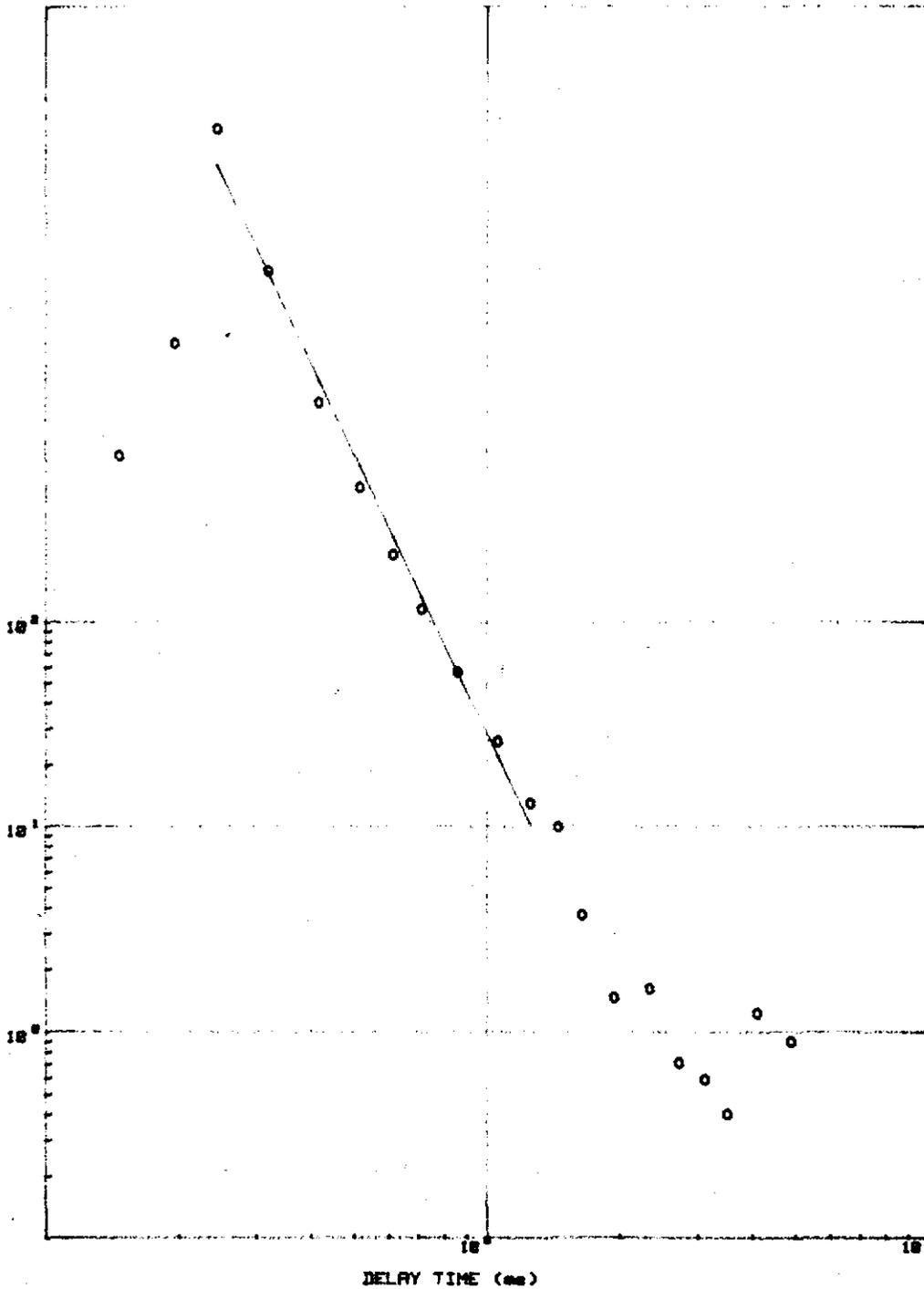
R.O.C.S.

TEM DATA PROCESSING - PROTEM

DECAY CURVE ANALYSIS

POWER CURVE, SELECTED CHANNELS

TRANSIENT RESPONSE UV/RMP



STATION EASTING : 12358

STATION NORTHING : 5980

CONSTANT : 20.136

POWER : -4.545

COEFFICIENT : .986

SHELL COMPANY OF AUSTRALIA
 METALS DIVISION

N.W. TASMANIA
 CATTLE RANGE

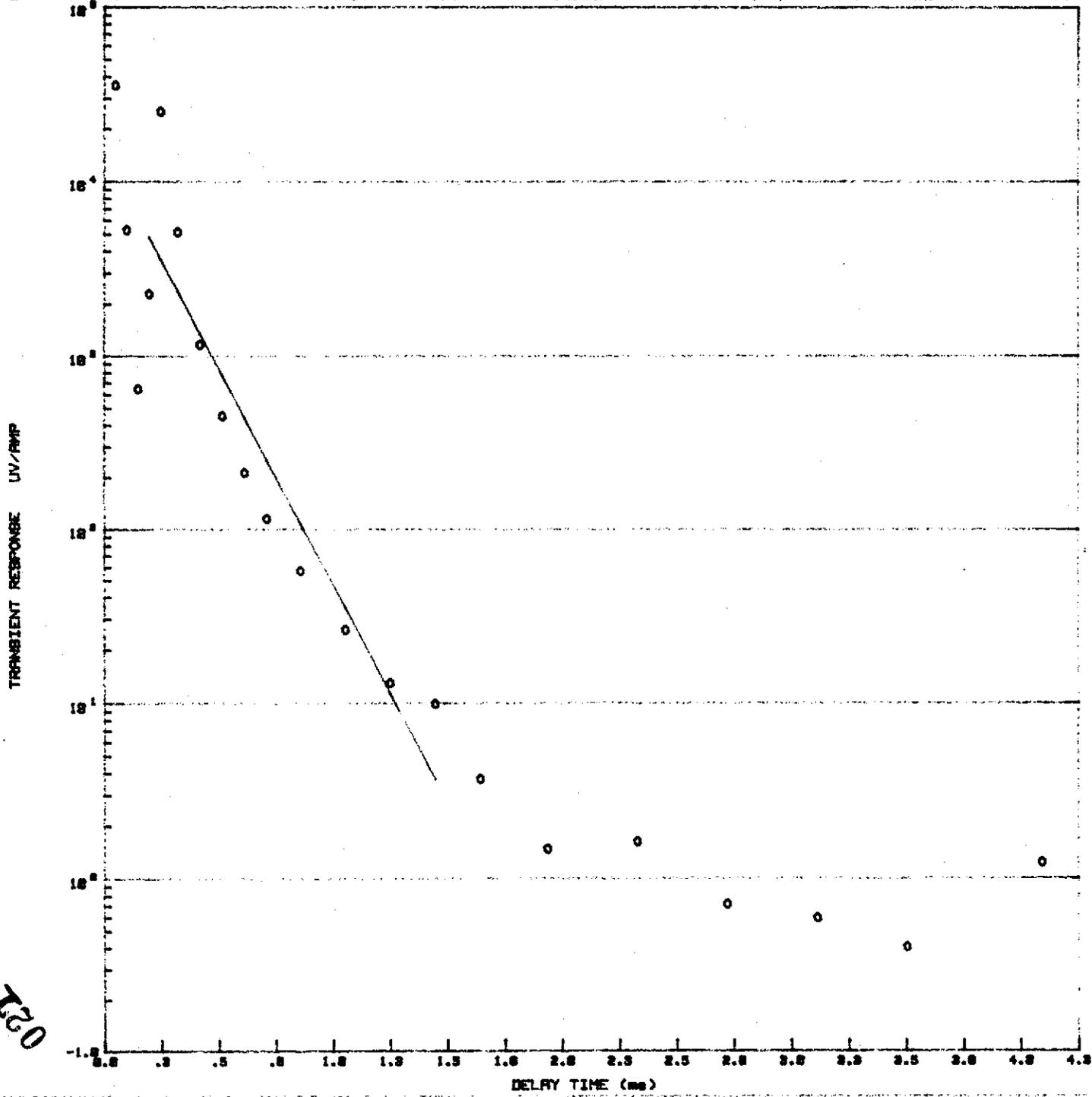
POWER CURVE
 12358E, 5980N

FIG. NO: 12	REPT. NO:
ENCL. NO:	DRG. NO:
DATE:	AUTHOR:
DRAWN:	OFFICE:

DELAY TIME (ms)

56-2576

021



OBSERVED DATA : o

FITTED : -



R.O.C.S.

TEM DATA PROCESSING - PROTEM

DECAY CURVE ANALYSIS

EXPONENTIAL CURVE ANALYSIS

STATION EASTING : 12358

STATION NORTHING : 5988

CONSTANT : 14778.688

POWER : -5.738

COEFFICIENT : .938

TIME CONSTANT : .174

SHELL COMPANY OF AUSTRALIA
METALS DIVISION

N.W. TASMANIA
CATTLEY RANGE

EXPONENTIAL CURVE
12358E, 5988N

FIG. NO: 13	REPT. NO:
ENCL. NO:	DRG. NO:
DATE:	AUTHOR:
DRAWN:	OFFICE:

005024

86-2576

120

023
1

APPENDIX I

SOIL SAMPLING SURVEY

ASSAY RESULTS

02A

Analysis code A1/1,2

Report AC 2786/86

Page G1

NATA Certificate

Order No. 08324

Results in ppm

Sample	Cu	Pb	Zn	Mn	Fe
9600N 10440E	11	18	64	92	2.82%
9600N 10460E	12	26	60	80	2.37%
9600N 10480E	17	22	110	110	5.04%
9600N 10500E	7	16	58	54	2.37%
9600N 10520E	9	48	94	72	3.42%
9600N 10540E	7	62	70	42	2.54%
9600N 10560E	6	60	62	38	1.84%
9600N 10580E	8	84	64	34	3.28%
9600N 10600E	3	14	50	44	2.33%
9600N 10620E	5	26	74	44	3.33%
9600N 10640E	6	14	56	40	2.37%
9600N 10660E	3	16	35	30	6500
9600N 10680E	12	44	145	115	2.52%
9600N 10700E	7	28	47	30	1.38%
9600N 10720E	5	10	46	38	8050
9600N 10740E	4	20	42	40	1.09%
9600N 10760E	5	<5	37	42	4760
9600N 10780E	4	12	12	48	1.11%
9600N 10800E	3	68	21	24	6400
9600N 10820E	4	54	33	30	1.19%
9600N 10840E	5	30	26	34	1.07%
9600N 10860E	4	24	11	48	7800
9600N 10880E	5	18	13	44	1.90%
9600N 10900E	7	20	16	36	1.70%
9600N 10920E	6	22	36	34	1.37%
9600N 10940E	8	22	20	36	2.53%
9600N 10960E	7	16	18	58	2.73%
9600N 10980E	9	24	24	60	2.67%
9600N 11000E	13	52	70	60	3.46%
9600N 11020E	14	64	52	135	2.73%
9600N 11040E	12	155	49	50	2.22%
9600N 11060E (1)	6	110	22	34	1.45%
9600N 11060E (2)	13	30	34	40	1.62%
9600N 11080E (1)	28	105	78	140	6.86%
9600N 11080E (2)	5	20	16	38	1.30%
9600N 11100E	15	240	46	34	2.24%
9600N 11120E	28	130	125	94	5.74%
9600N 11140E	7	80	42	26	1.44%
9600N 11180E	74	16	72	700	11.6%

Detn limit	(2)	(5)	(2)	(5)	(5)
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11160?

025

continued

005027

Analysis code A1/1.2

Report AC 2786/86

Page 62

NATA Certificate

Order No. 08324

Results in ppm

Sample	Cu	Pb	Zn	Mn	Fe
9600N 11200E	19	92	96	100	5.72Z
9700N 10800E	7	20	33	60	1.65Z
9700N 10880E	15	56	74	100	3.57Z
9700N 10900E	12	36	40	98	2.90Z
9700N 10920E	10	68	44	105	3.06Z
9700N 10940E	26	20	35	155	4.10Z
9700N 10960E	7	18	15	60	2.09Z
9700N 10980E	6	10	11	36	1.97Z
9700N 11000E (1)	8	18	18	68	2.54Z
9700N 11000E (2)	22	20	42	210	4.76Z
9700N 11020E	82	10	175	2500	13.2Z
9700N 11040E	60	18	105	2620	12.0Z
9700N 11060E	37	46	52	355	5.42Z
9700N 11080E	100	6	86	910	15.4Z
9700N 11100E	78	14	84	1880	12.8Z
9700N 11120E	24	44	28	285	5.54Z
9700N 11160E	110	12	155	1040	15.9Z
9700N 11200E	66	22	115	1260	13.5Z
9800N 10460E	17	6	52	34	3.68Z
9800N 10480E	18	24	20	30	1.90Z
9800N 10500E	56	40	42	38	1.29Z
9800N 10520E	35	56	170	475	9.42Z
9800N 10540E	54	64	195	3260	16.2Z
9800N 10560E	82	18	275	1060	12.2Z
9800N 10580E	50	32	115	840	9.90Z
9800N 10600E	52	36	145	710	10.6Z
9800N 10620E	37	40	135	440	9.82Z
9800N 10640E	54	12	115	650	26.5Z
9800N 10660E	46	36	110	115	8.52Z
9800N 10680E	56	34	130	86	11.7Z
9800N 10700E	42	40	115	355	14.0Z
9800N 10720E	52	36	100	80	10.7Z
9800N 10740E	30	44	58	64	2.24Z
9800N 10760E	46	50	66	80	1.67Z
9800N 10780E	11	22	38	58	1.98Z
9800N 10800E	6	34	12	12	3220
9800N 10820E	10	28	30	68	3.45Z
9800N 10840E	6	20	23	40	1.30Z
9800N 10845E	16	34	64	110	4.75Z
9800N 10860E	13	20	37	52	1.64Z

Detn limit

(2)

(5)

(2)

(5)

(5)

026

canmedlab

005028

Analysis code A1/1.2

Report AC 2786/86

Page 63

NATA Certificate

Order No. 08324

Results in ppm

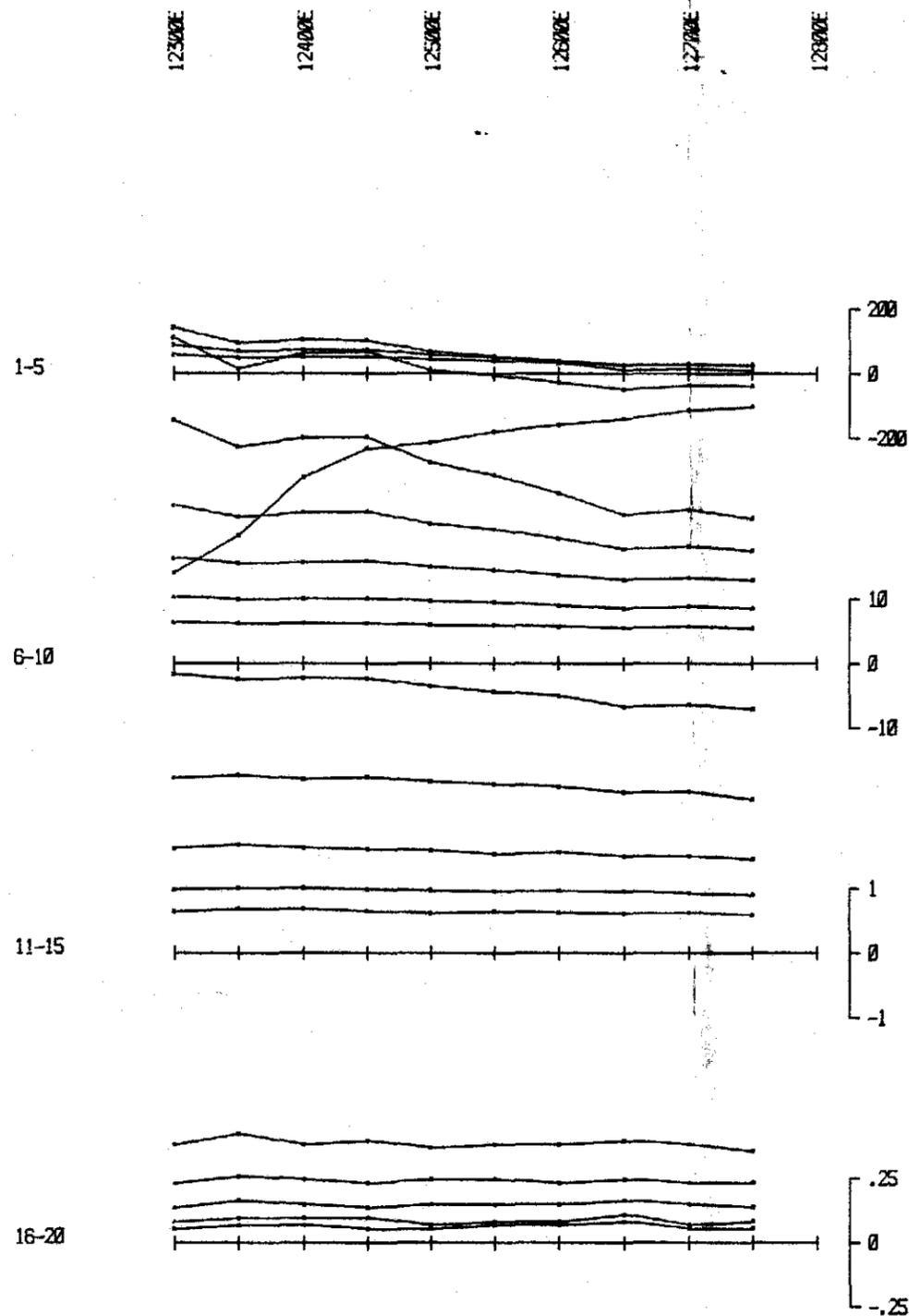
Sample	Cu	Pb	Zn	Mn	Fe
9800N 10880E	7	12	21	22	1.25%
9800N 10900E	19	42	94	40	3.22%
9800N 10920E	15	42	66	280	4.05%
9800N 10940E	31	28	66	495	8.06%
9800N 10960E	72	20	110	485	8.44%
9800N 10980E	98	10	155	1120	13.6%
9800N 11000	72	12	140	1160	12.8%
9800N 11020	82	70	115	1520	14.9%
9800N 11040	68	28	92	1800	12.7%
9800N 11060	98	<5	110	1320	17.3%
9800N 11080	56	26	72	325	9.38%
9800N 11100	94	14	125	1180	13.4%
9800N 11120	54	18	105	5050	10.3%
9800N 11140	49	20	88	1840	10.6%
9800N 11200	56	12	80	1300	11.1%
A	330	440	94	560	3.49%
B	68	330	13	185	1.55%
C	110	215	78	275	2.30%
Detn limit	(2)	(5)	(2)	(5)	(5)

APPENDIX II

EM-37 Profiles

005030

VERTICAL COMPONENT \dot{B} (Z)



EM-37
FIXED
TRANSMITTER
SURVEY

ELECTROMOTIVE FORCE INDUCED BY
SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per amp metre squared

5 cm

TX LOOP SIDES : 04400N 11700E
 : 05200N 12100E
TX LOOP SIZE : 600 m X 400 m
TX TURN OFF TIME : 260 microseconds.
FIRST GATE TIME : 88.5 microseconds.
CURRENT : 11.0 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : RJL
DATE : 11/04/1986

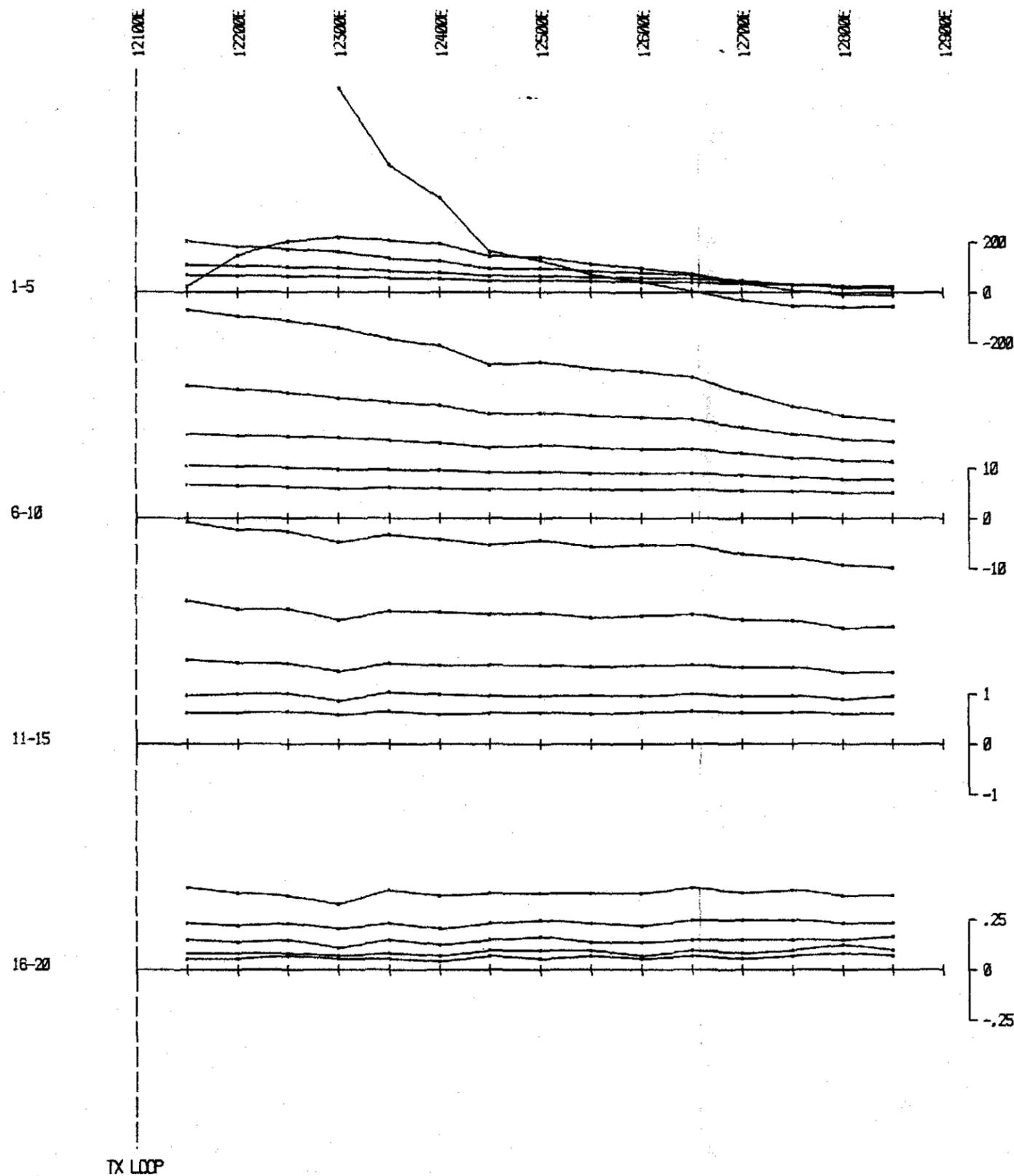
	SURVEYED AND COMPILED BY GEOTREX PTY. LTD.	PROJECT NO. 85-1993
	CLIENT : Billiton Aust. Ltd. PROJECT : Catley Range AREA : Waratah Tas. LINE : 04400N Z TX LOOP : 6	

028

86-2576

005031

VERTICAL COMPONENT B (Z)



EM-37
FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per amp metre squared

5 cm

TX LOOP SIDES : 04400N 11700E
 : 05000N 12100E
TX LOOP SIZE : 600 m X 400 m
TX TURN OFF TIME : 260 microseconds.
FIRST GATE TIME : 88.5 microseconds.
CURRENT : 11.0 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : R.J.L.
DATE : 11/04/1986



SURVEYED AND COMPILED BY
GEOTREX PTY. LTD.

PROJECT NO.
85-1993

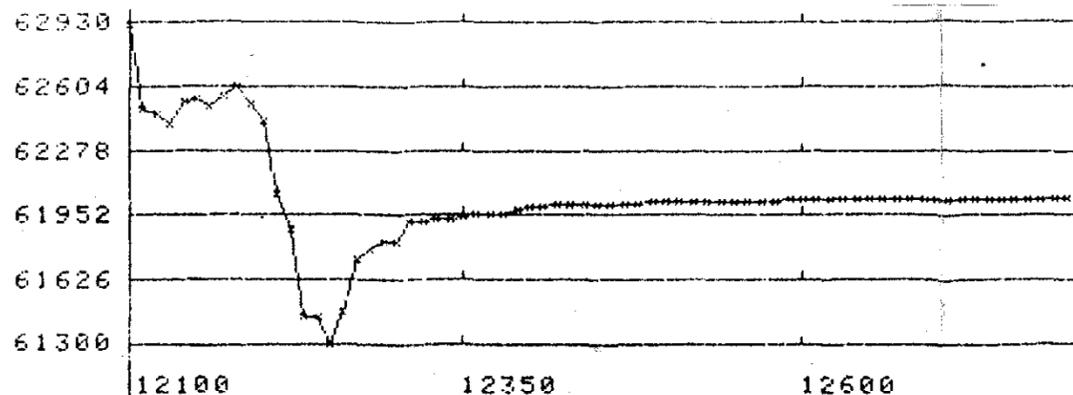
CLIENT : Billiton Aust. Ltd.
PROJECT : Catley Range
AREA : Waratah Tas.
LINE : 04700N Z
TX LOOP : 6

029

86-2576

030

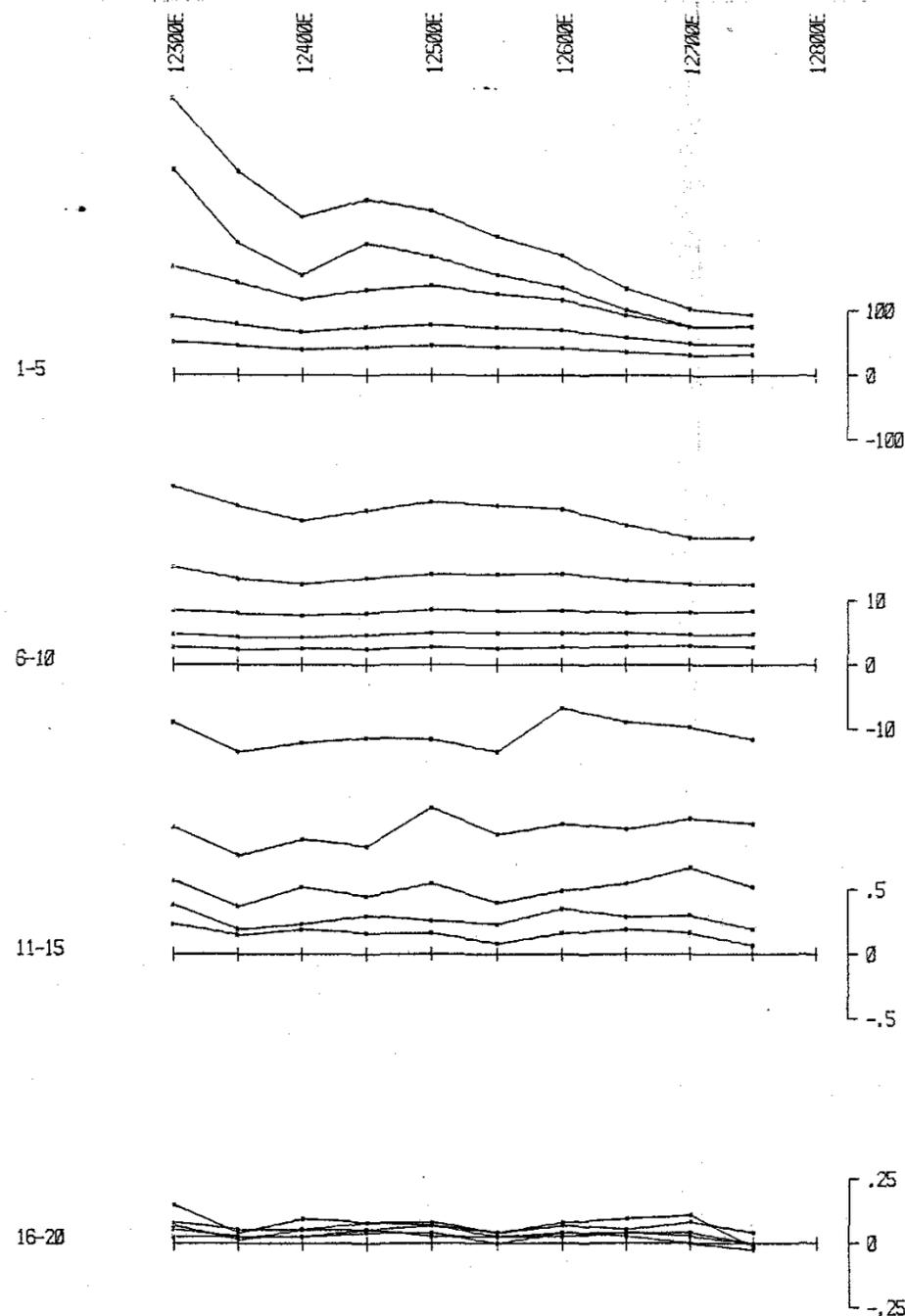
G
R
M
R
S



LINE : 4400N
FROM : 12100 E
TO : 12800 E
STATION SPACING : 10 mts
MIN READING => 61306
MAX READING => 62922
AVG. READING => 62039

005032

HORIZONTAL COMPONENT B (X)



EM-37
FIXED
TRANSMITTER
SURVEY

ELECTROMOTIVE FORCE INDUCED BY
SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

nanovolts per amp metre squared

TX LOOP SIDES : 04400N 11700E
 : 05000N 12100E
TX LOOP SIZE : 600 m X 400 m
TX TURN OFF TIME : 260 microseconds.
FIRST GATE TIME : 88.5 microseconds.
CURRENT : 11.0 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : R.J.L
DATE : 11/04/1986

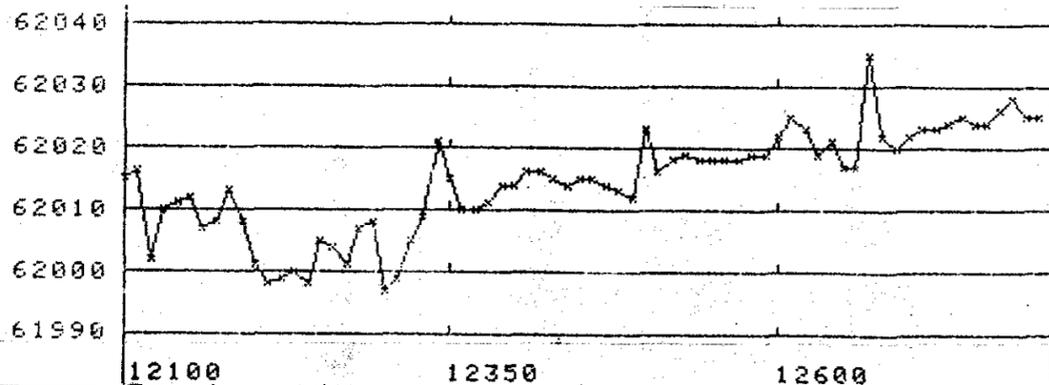
SURVEYED AND COMPILED BY
GEO TERREX PTY. LTD. PROJECT NO.
85-1993

CLIENT : Billiton Aust. Ltd.
PROJECT : Cailley Range
AREA : Waratah Tas.
LINE : 04400N X
TX LOOP : 6

86-2576

031

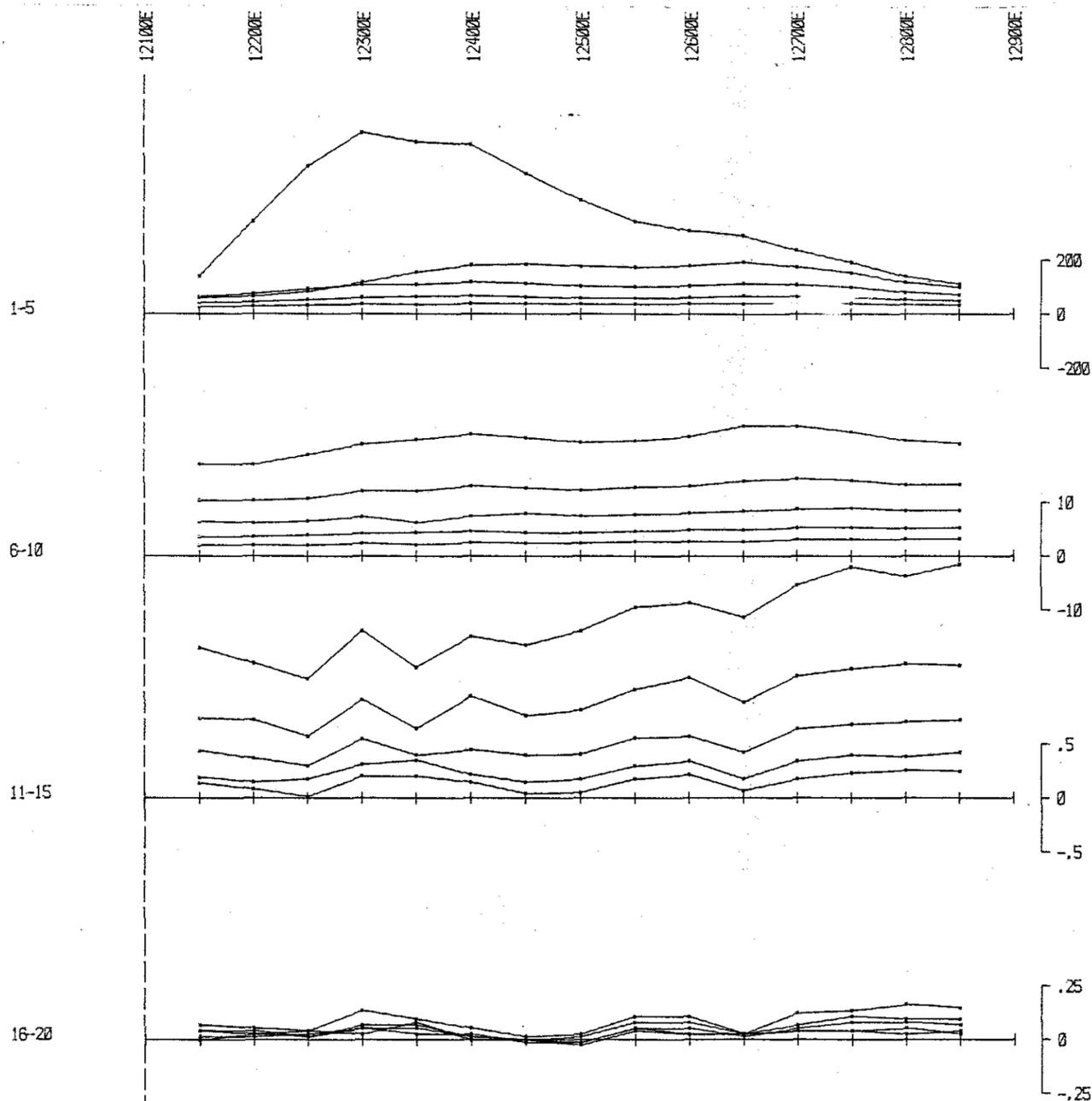
G
R
M
M
R
S



LINE : 4700N
FROM : 12100 E
TO : 12800 E
STATION SPACING : 10 mts
MIN READING => 61997
MAX READING => 62035
AVG. READING => 62014

005033

HORIZONTAL COMPONENT B (X)



TX LOOP

EM-37

FIXED
TRANSMITTER
SURVEY

ELECTROMOTIVE FORCE INDUCED BY
SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

nanovolts per amp metre squared

TX LOOP SIDES : 04400N 11700E
: 05000N 12100E
TX LOOP SIZE : 600 m X 400 m
TX TURN OFF TIME : 260 microseconds.
FIRST GATE TIME : 88.5 microseconds.
CURRENT : 11.0 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : R.J.L.
DATE : 11/04/1986

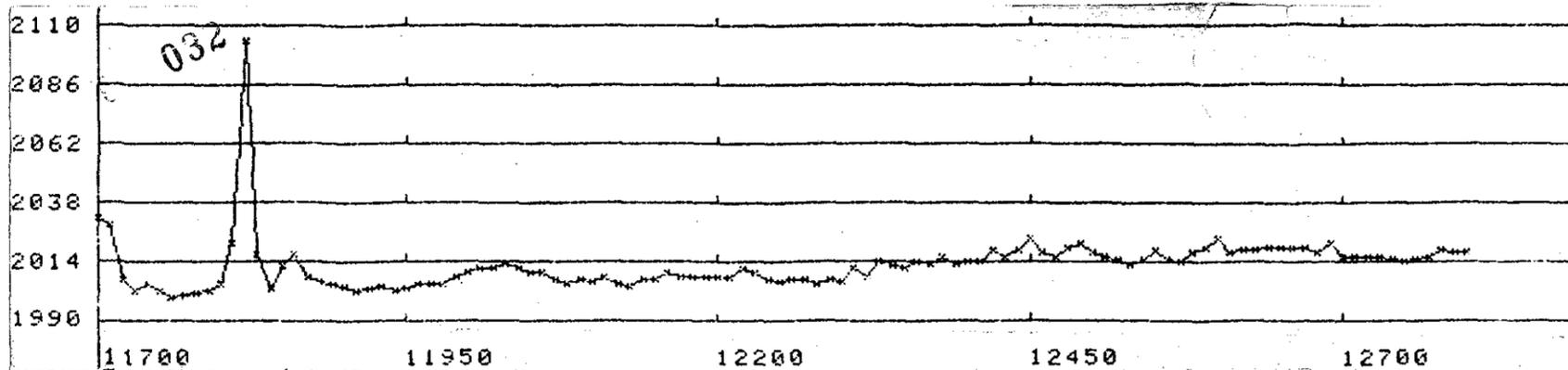


SURVEYED AND COMPILED BY
GEOTERREX PTY. LTD.

PROJECT NO.
85-1993

CLIENT : Billiton Aust. Ltd.
PROJECT : Catley Range
AREA : Waratah Tas.
LINE : 04700N X
TX LOOP : 6

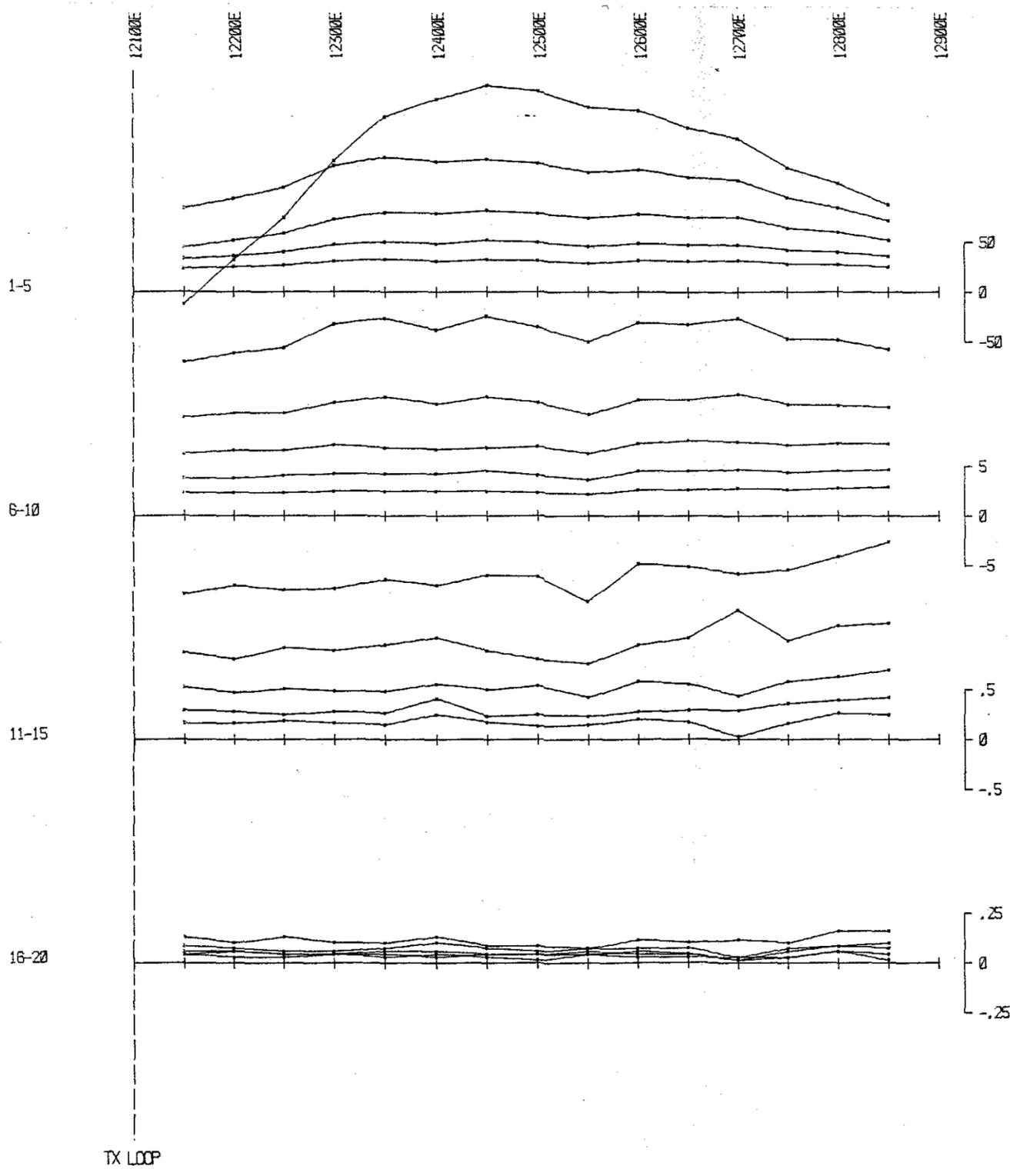
86-2576



LINE : 5000N
 FROM : 11700 E
 TO : 12800 E
 STATION SPACING : 10 mts
 TN READING => 61999
 MAX READING => 62104
 AVG. READING => 62012

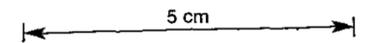
005034

HORIZONTAL COMPONENT B (X)



EM-37
FIXED
TRANSMITTER
SURVEY

ELECTROMOTIVE FORCE INDUCED BY
 SECONDARY FIELD
 TIME DERIVATIVE OF FLUX DENSITY (B)



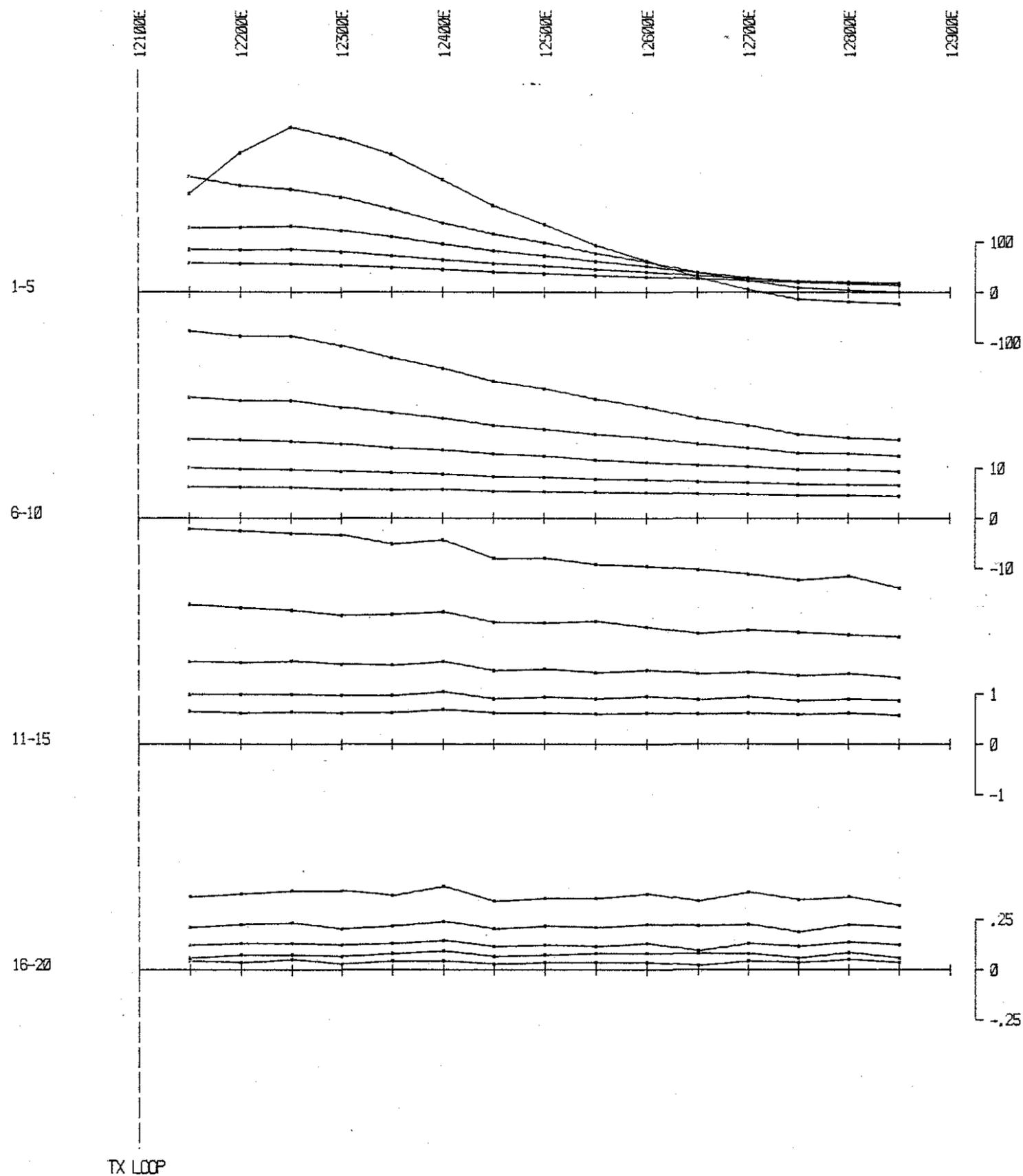
nanovolts per amp metre squared

TX LOOP SIDES : 04400N 11700E
 : 05000N 12100E
 TX LOOP SIZE : 600 m X 400 m
 TX TURN OFF TIME : 260 microsecs.
 FIRST GATE TIME : 88.5 microsecs.
 CURRENT : 10.3 amps
 FREQUENCY : 25 Hz.
 INTEGRATION TIME : 256 cycles
 SYNC MODE : CRYSTAL
 HORIZONTAL SCALE : 1:5000
 SURVEYED BY : R.J.L.
 DATE : 10/04/1986

 SURVEYED AND COMPILED BY
 GEOTREX PTY. LTD. PROJECT NO.
 85-1993

CLIENT : Billiton Aust. Ltd.
 PROJECT : Catley Range
 AREA : Waratah Tas.
 LINE : 5000N X
 TX LOOP : 6

VERTICAL COMPONENT B (Z)



EM-37
FIXED
TRANSMITTER
SURVEY

ELECTROMOTIVE FORCE INDUCED BY
SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per amp metre squared

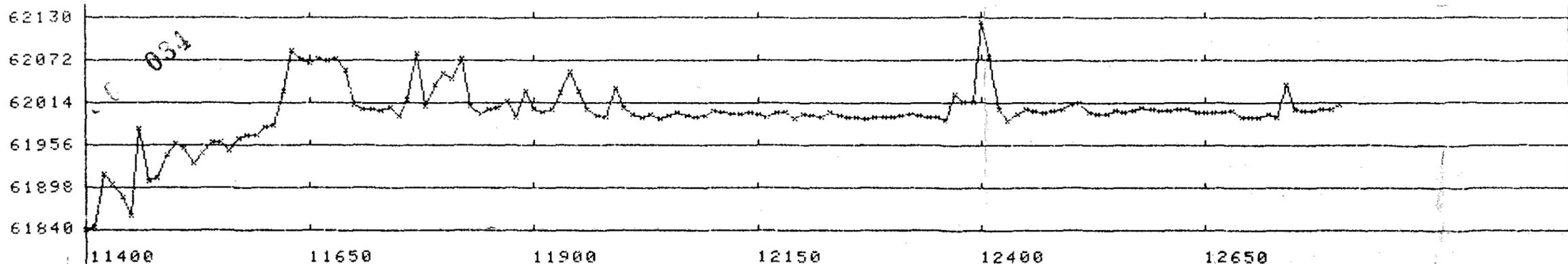
5 cm

TX LOOP SIDES : 04400N 11700E
: 05000N 12100E
TX LOOP SIZE : 600 m X 400 m
TX TURN OFF TIME : 260 microsecs.
FIRST GATE TIME : 88.5 microsecs.
CURRENT : 10.3 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : R.J.L.
DATE : 10/04/1986

	SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1993
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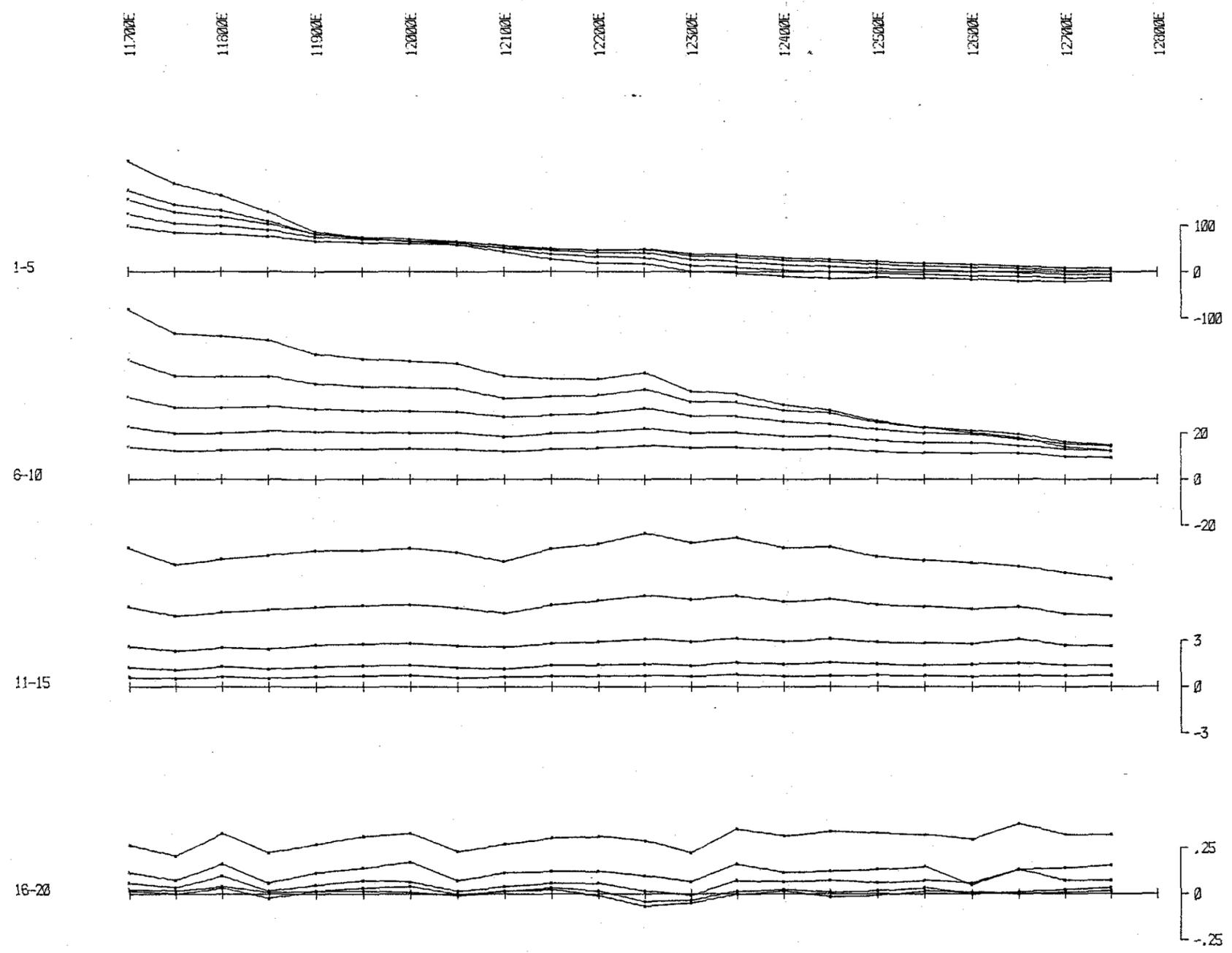
CLIENT : Billiton Aust. Ltd.
PROJECT : Catley Range
AREA : Waratah Tas.
LINE : 05000N Z
TX LOOP : 6

380



LINE : 5300N
 FROM : 11400
 TO : 12800
 STATION SPACIN
 MIN READING =>
 MAX READING =>
 AVG. READING =>

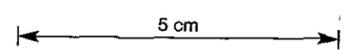
HORIZONTAL COMPONENT B (X)



EM-37
 FIXED
 TRANSMITTER
 SURVEY

ELECTROMOTIVE FORCE INDUCED BY
 SECONDARY FIELD
 TIME DERIVATIVE OF FLUX DENSITY (B)

005036



nanovolts per amp metre squared

TX LOOP SIDES : 05300N 11000E
 : 06200N 11400E
 TX LOOP SIZE : 900 m X 400 m
 TX TURN OFF TIME : 300 microseconds.
 FIRST GATE TIME : 88.5 microseconds.
 CURRENT : 09.1 amps
 FREQUENCY : 25 Hz.
 INTEGRATION TIME : 256 cycles
 SYNC MODE : CRYSTAL
 HORIZONTAL SCALE : 1:5000
 SURVEYED BY : R.J.
 DATE : 08/04/1986

SURVEYED AND COMPILED BY
 GEOTERREX PTY. LTD. PROJECT NO.
 85-1993

CLIENT : Billiton Aust. Ltd.
 PROJECT : Catley Range
 AREA : Waratah Tas.
 LINE : 05300N X
 TX LOOP : 5

VERTICAL COMPONENT \dot{B}_z (Z)

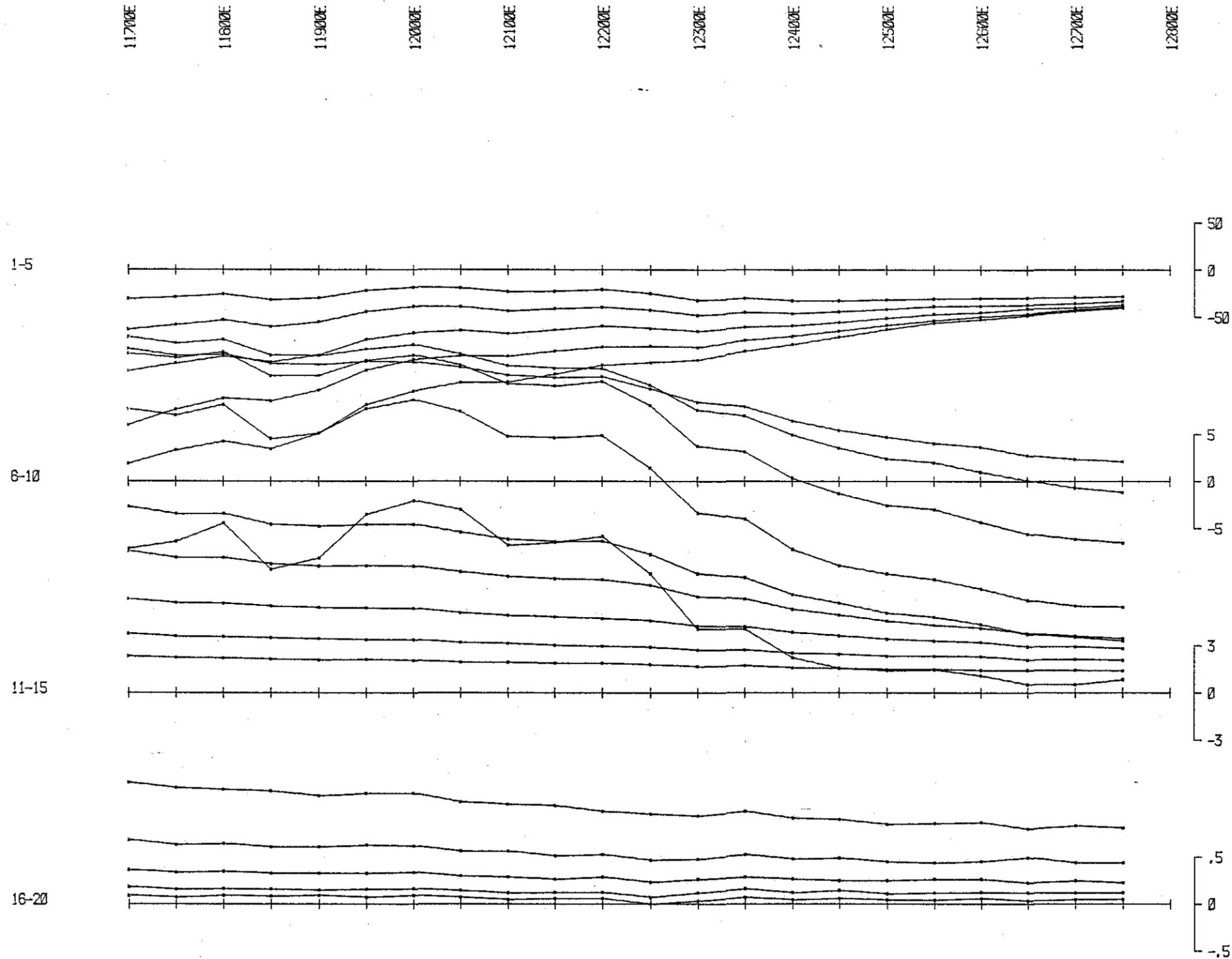
005037

EM-37

FIXED
TRANSMITTER
SURVEY

ELECTROMOTIVE FORCE INDUCED BY
SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)



nanovolts per amp metre squared

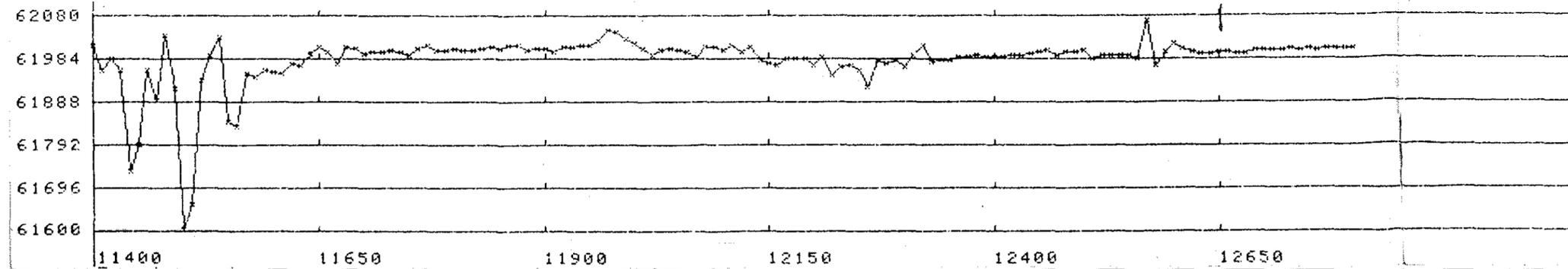
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 : 06200N 11400E
 TX LOOP SIZE : 900 m X 400 m
 TX TURN OFF TIME : 300 microseconds.
 FIRST GATE TIME : 88.5 microseconds.
 CURRENT : 09.1 amps
 FREQUENCY : 25 Hz.
 INTEGRATION TIME : 256 cycles
 SYNC MODE : CRYSTAL
 HORIZONTAL SCALE : 1:5000
 SURVEYED BY : R.J.L.
 DATE : 08/04/1986

	SURVEYED AND COMPILED BY GEOTREX PTY. LTD.	PROJECT NO. 85-1993
	CLIENT : Billiton Aust. Ltd.	

PROJECT : Catley Range
 AREA : Waratah Tas.
 LINE : 05300N Z
 TX LOOP : 5

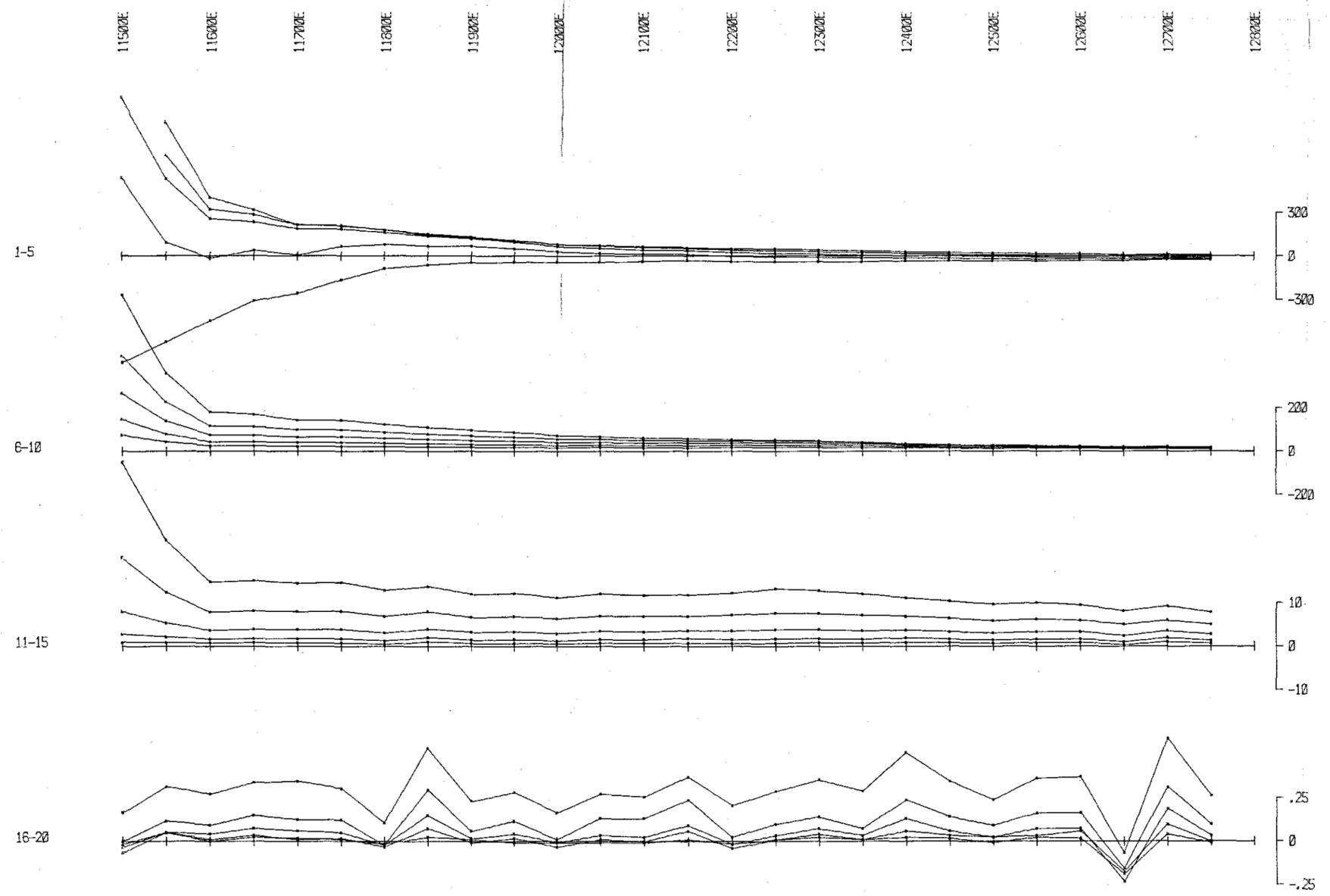
035

86-2576



LINE : 5600N
 FROM : 11400
 TO : 12800
 STATION SPACING
 MIN READING =>
 MAX READING =>
 AVG. READING =>

HORIZONTAL COMPONENT B (X)

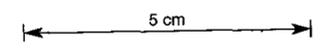


035A

EM-37
 FIXED
 TRANSMITTER
 SURVEY

ELECTROMOTIVE FORCE INDUCED BY
 SECONDARY FIELD
 TIME DERIVATIVE OF FLUX DENSITY (B)

005038



nanovolts per amp metre squared

TX LOOP SIDES : 05300N 11000E
 : 06200N 11400E
 TX LOOP SIZE : 900 m X 400 m
 TX TURN OFF TIME : 300 microsecs.
 FIRST GATE TIME : 88.5 microsecs.
 CURRENT : 09.1 amps
 FREQUENCY : 25 Hz.
 INTEGRATION TIME : 256 cycles
 SYNC MODE : CRYSTAL
 HORIZONTAL SCALE : 1:50000
 SURVEYED BY : R.J.L.
 DATE : 08/04/1986


 SURVEYED AND COMPILED BY
 GEOTREX PTY. LTD.
 PROJECT NO.
85-1993

CLIENT : Billiton Aust. Ltd.
 PROJECT : Catley Range
 AREA : Waratah Tas.
 LINE : 05600N X
 TX LOOP : 5

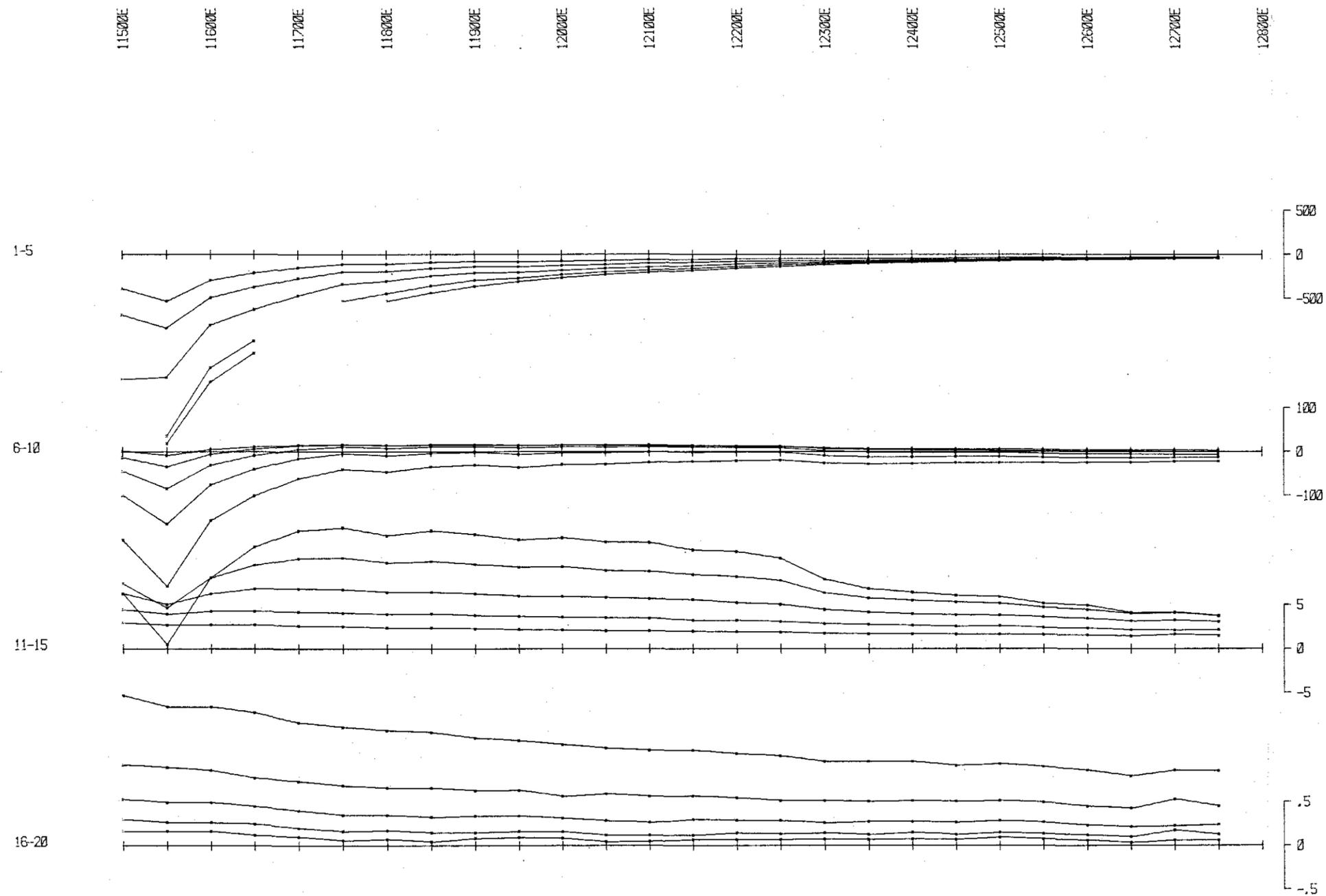
035A

86-2576

036

036

VERTICAL COMPONENT \dot{B} (Z)



005039

EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (B)

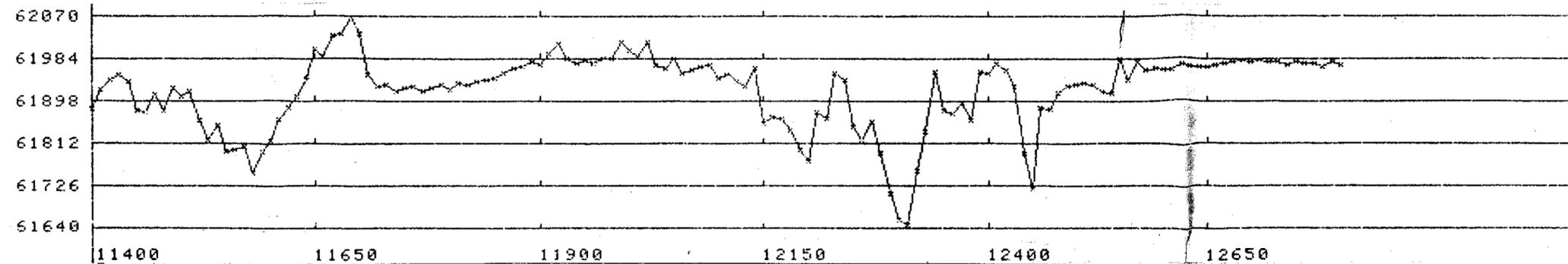
5 cm

nanovolts per amp metre squared

TX LOOP SIDES : 05300N 11000E
 : 06200N 11400E
TX LOOP SIZE : 900 m X 400 m
TX TURN OFF TIME : 300 microseconds.
FIRST GATE TIME : 88.5 microseconds.
CURRENT : 09.1 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : RJL
DATE : 08/04/1986

	SURVEYED AND COMPILED BY GEO TERREX PTY. LTD.	PROJECT NO. 85-1993
	CLIENT : Billiton Aust. Ltd.	

PROJECT : Catley Range
AREA : Waratah Tas.
LINE : 05600N Z
TX LOOP : 5

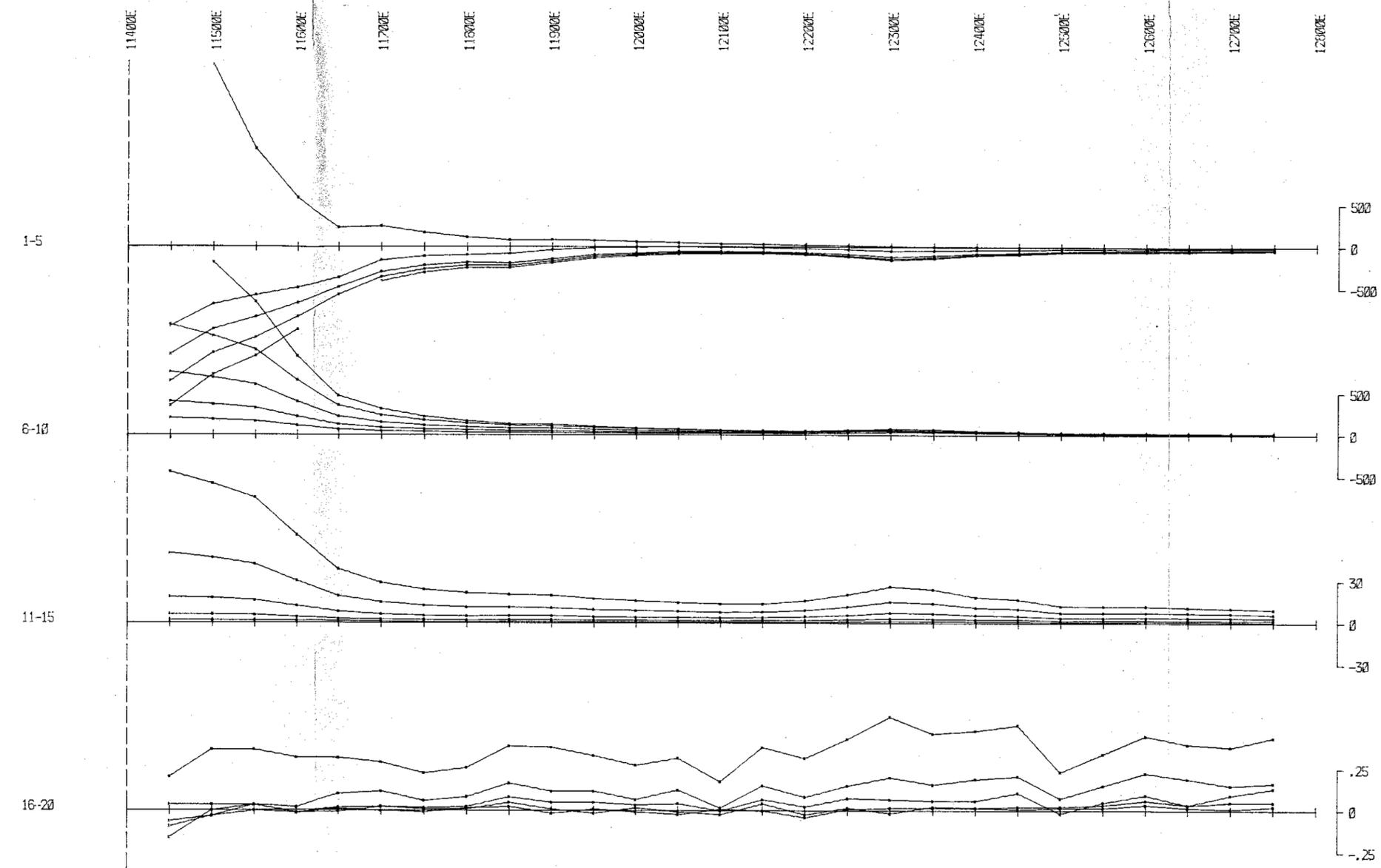


LINE : 5900N
FROM : 11400
TO : 12800
STATION SPACIN
MIN READING =>
MAX READING =>
AVG. READING =>

037

HORIZONTAL COMPONENT B (X)

037



TX LOOP

EM-37
FIXED
TRANSMITTER
SURVEY

ELECTROMOTIVE FORCE INDUCED BY
SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (B)

005040

5 cm

nanovolts per amp metre squared

TX LOOP SIDES : 05300N 11220E
 : 06200N 11420E
TX LOOP SIZE : 900 m X 400 m
TX TURN OFF TIME : 300 microseconds.
FIRST GATE TIME : 99.5 microseconds.
CURRENT : 9.1 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : R.J.
DATE : 06/04/1996

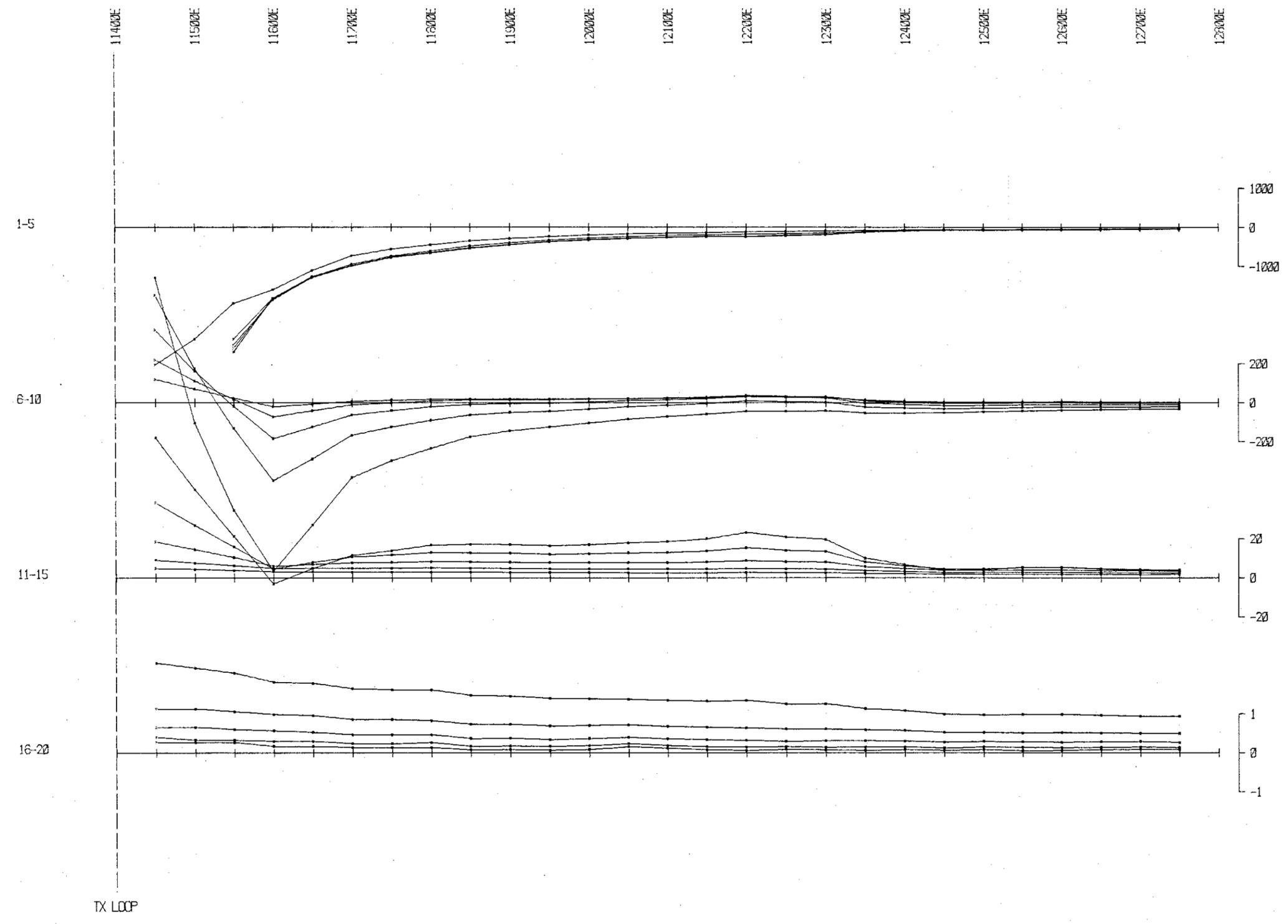
SURVEYED AND COMPILED BY : GEOTERREX PTY. LTD. PROJECT NO. 85-1993

CLIENT : B. Hilton Aust. Ltd.
PROJECT : Catley Range
AREA : Waratah Tas.
LINE : 05900N X
TX LOOP : 5

038

038

VERTICAL COMPONENT B (Z)



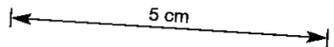
EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

005041

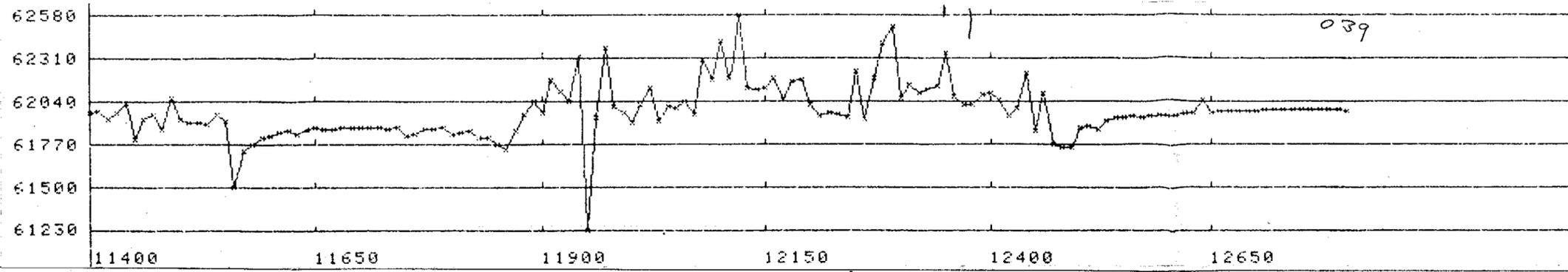


nanovolts per amp metre squared

TX LOOP SIDES : 05300N 11000E
 : 06200N 11400E
 TX LOOP SIZE : 900 m X 400 m
 TX TURN OFF TIME : 300 microseconds.
 FIRST GATE TIME : 89.5 microseconds.
 CURRENT : 9.1 amps
 FREQUENCY : 25 Hz.
 INTEGRATION TIME : 256 cycles
 SYNC MODE : CRYSTAL
 HORIZONTAL SCALE : 1:5000
 SURVEYED BY : RJL
 DATE : 06/04/1986

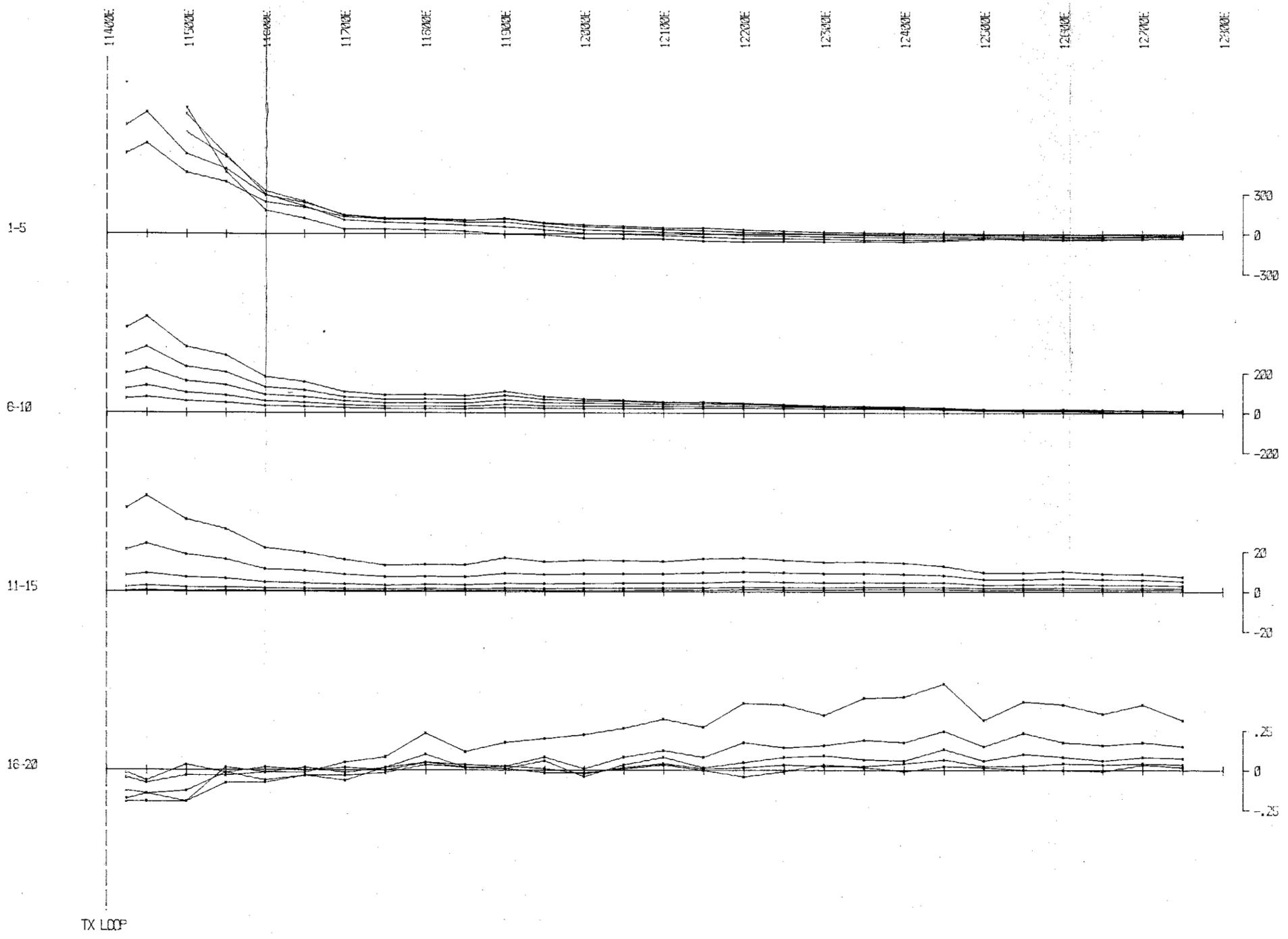
	SURVEYED AND COMPILED BY	PROJECT NO.
	GEOTREX PTY. LTD.	85-1935

CLIENT : Billiton Aust. Ltd.
 PROJECT : Catley Range
 AREA : Waratah Tas.
 LINE : 05900N Z
 TX LOOP : 5



LINE : 6200N
 FROM : 11400
 TO : 12800
 STATION SPACIN
 MIN READING =>
 MAX READING =>
 AVG READING =>

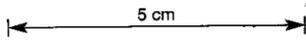
HORIZONTAL COMPONENT \dot{B} (X)



EM-37
 FIXED
 TRANSMITTER
 SURVEY

ELECTROMOTIVE FORCE INDUCED BY
 SECONDARY FIELD
 TIME DERIVATIVE OF FLUX DENSITY (B)

005042



nanovolts per amp metre squared

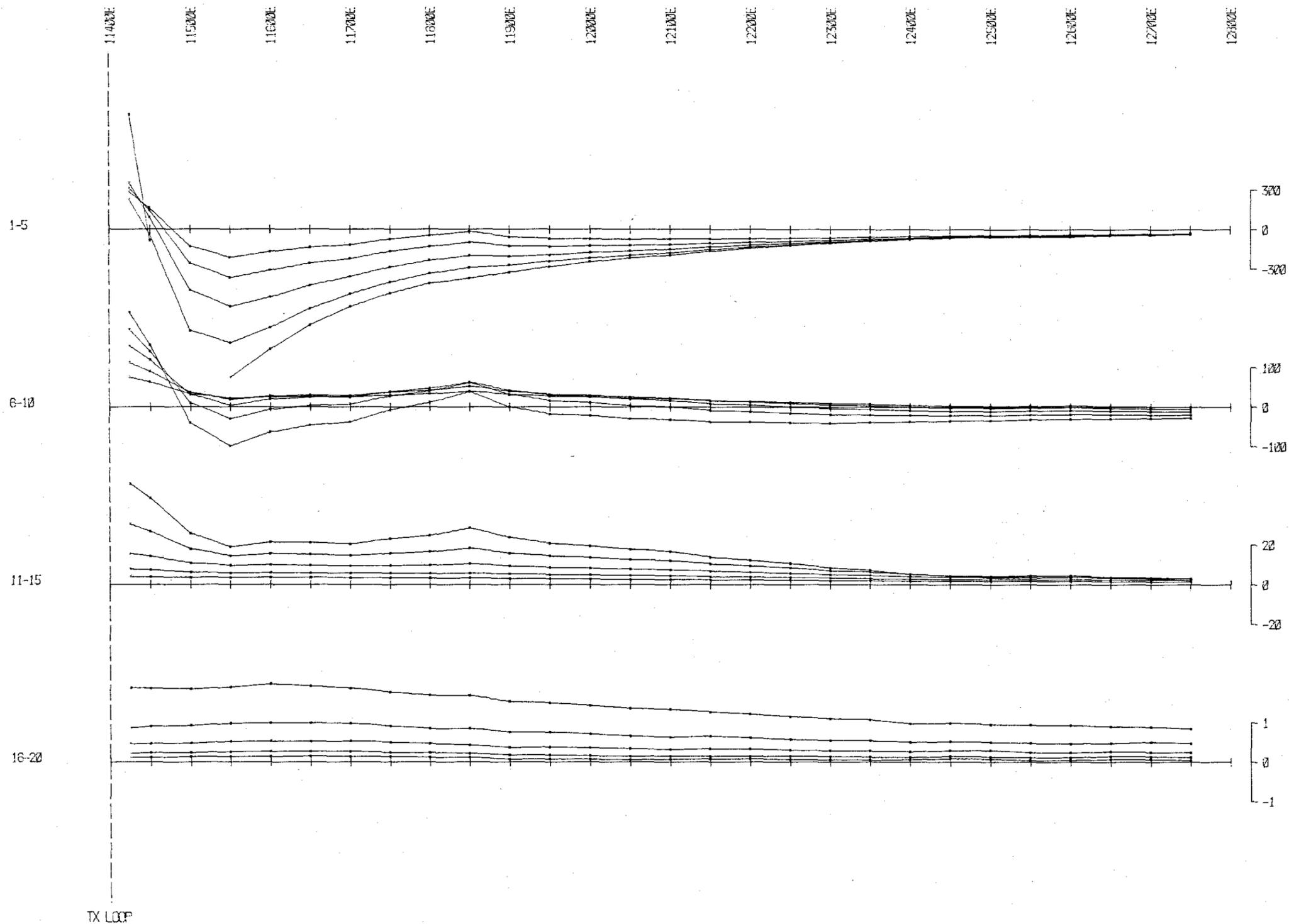
TX LOOP SIDES : 05300N 11000E
 : 08200N 11400E
 TX LOOP SIZE : 900 m X 400 m
 TX TURN OFF TIME : 300 microseconds.
 FIRST GATE TIME : 93.5 microseconds.
 CURRENT : 0.1 amp
 FREQUENCY : 25 Hz.
 INTEGRATION TIME : 256 cycles
 SYNC MODE : CRYSTAL
 HORIZONTAL SCALE : 1:5000
 SURVEYED BY : R.J.L.
 DATE : 06/04/1996

	SURVEYED AND COMPILED BY GEOTERRIX PTY. LTD.	PROJECT NO. 95-1993
	CLIENT : Billiton Aust. Ltd. PROJECT : Catley Range AREA : Waratah Tas. LINE : 08200N X TX LOOP : 5	

040

040

VERTICAL COMPONENT \dot{B} (Z)



EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

005043

5 cm

nanovolts per amp metre squared

TX LOOP SIDES : 05300N 11000E
 : 06200N 11400E

TX LOOP SIZE : 900 m X 400 m

TX TURN OFF TIME : 300 microseconds.

FIRST GATE TIME : 83.5 microseconds.

CURRENT : 9.1 amps

FREQUENCY : 25 Hz.

INTEGRATION TIME : 256 cycles

SYNC MODE : CRYSTAL

HORIZONTAL SCALE : 1:5000

SURVEYED BY : RJL

DATE : 06/04/1986

	SURVEYED AND COMPILED BY	PROJECT NO.
	GEOTERREX P.Y. LTD.	35-1935

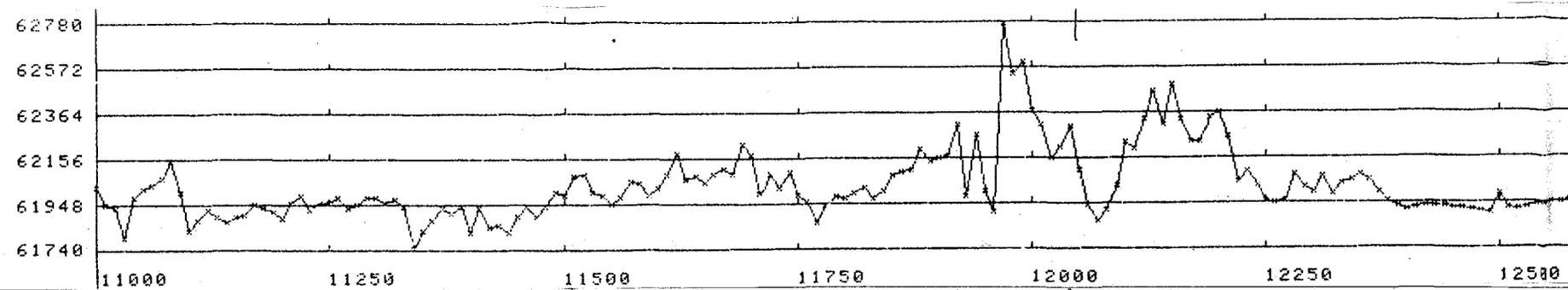
CLIENT : Billiton Aust. Ltd.

PROJECT : Catley Range

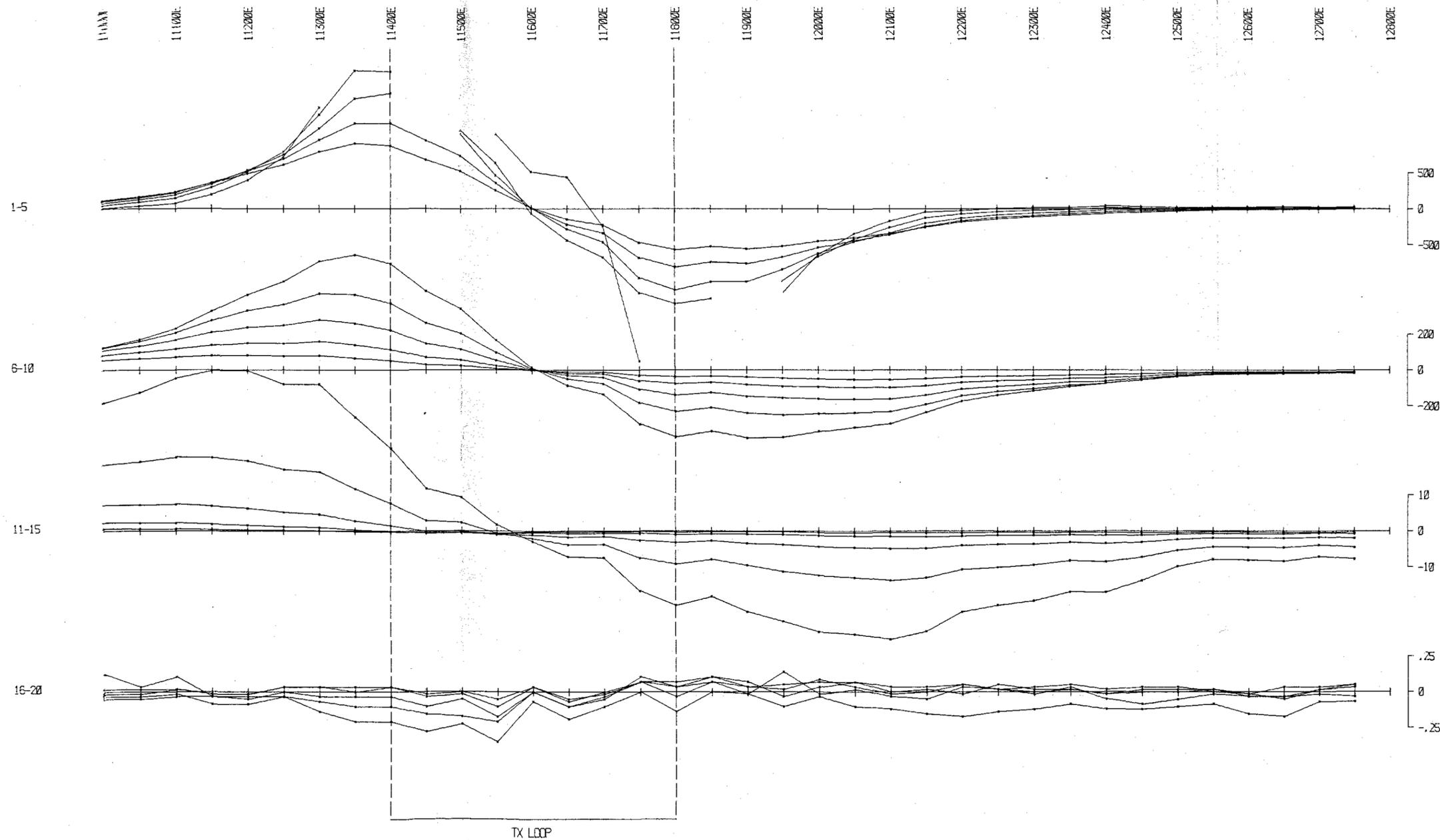
AREA : Waratah Tas.

LINE : 06200N Z

TX LOOP : 5



HORIZONTAL COMPONENT B (X)



EM-37

FIXED
 TRANSMITTER
 SURVEY

ELECTROMOTIVE FORCE INDUCED BY
 SECONDARY FIELD
 TIME DERIVATIVE OF FLUX DENSITY (B)

005044

5 cm

nanovolts per amp metre squared

TX LOOP SIDES : 06500N 11400E
 : 07400N 11600E
 TX LOOP SIZE : 900 m X 400 m
 TX TURN OFF TIME : 280 microsecs.
 FIRST GATE TIME : 88.5 microsecs.
 CURRENT : 8.6 amps
 FREQUENCY : 25 Hz.
 INTEGRATION TIME : 256 cycles
 SYNC MODE : CRYSTAL
 HORIZONTAL SCALE : 1:5000
 SURVEYED BY : R.J.L.
 DATE : 14/04/1986

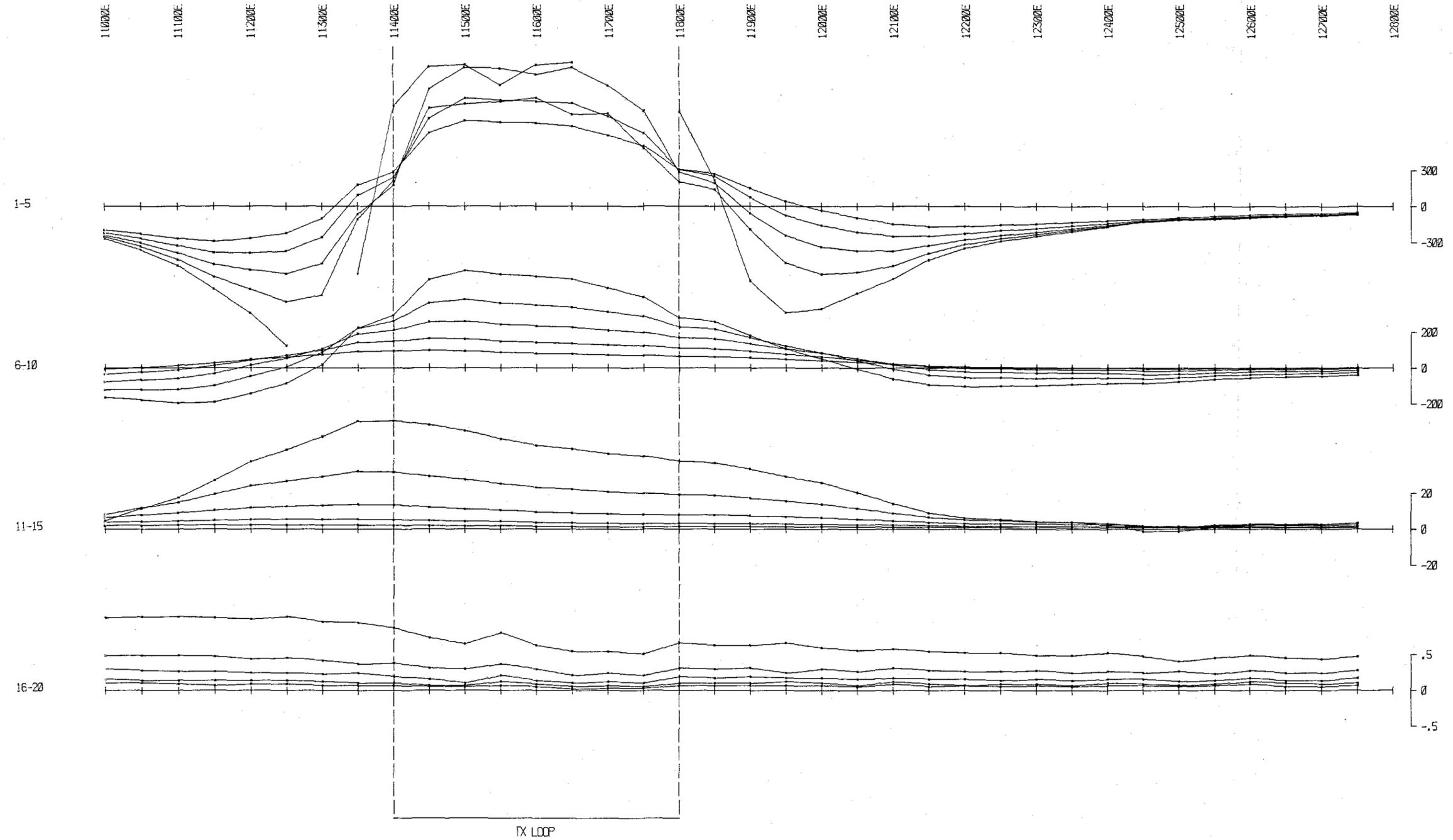
SURVEYED AND COMPILED BY : GEOTERREX PTY. LTD. PROJECT NO. : 85-1993

CLIENT : Billiton Aust. Ltd.
 PROJECT : Catley Range
 AREA : Waratah Tas.
 LINE : 06500N X
 TX LOOP : 4

042

042

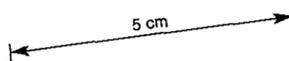
VERTICAL COMPONENT B (Z)



EM-37
FIXED
TRANSMITTER
SURVEY

ELECTROMOTIVE FORCE INDUCED BY
SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (B)

005045

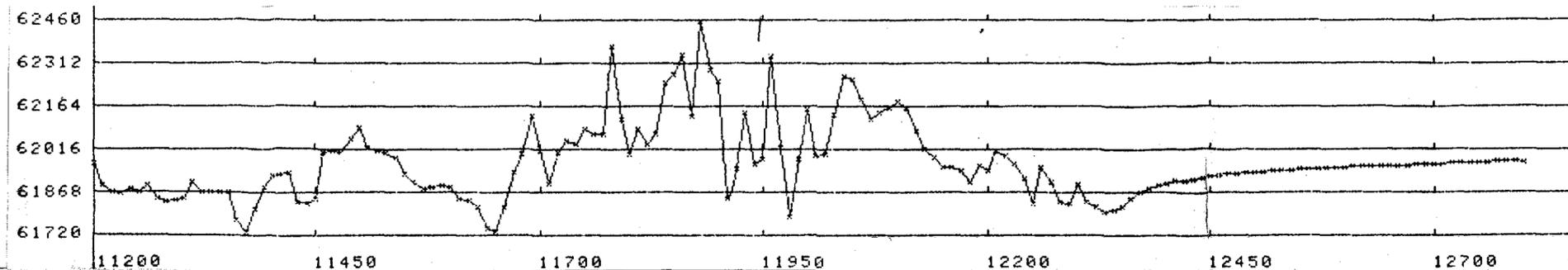


nanovolts per amp metre squared

TX LOOP SIDES : 06500N 11400E
 : 07400N 11600E
TX LOOP SIZE : 900 m X 400 m
TX TURN OFF TIME : 280 microseconds.
FIRST GATE TIME : 88.5 microseconds.
CURRENT : 8.6 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : RJL
DATE : 14/04/1986

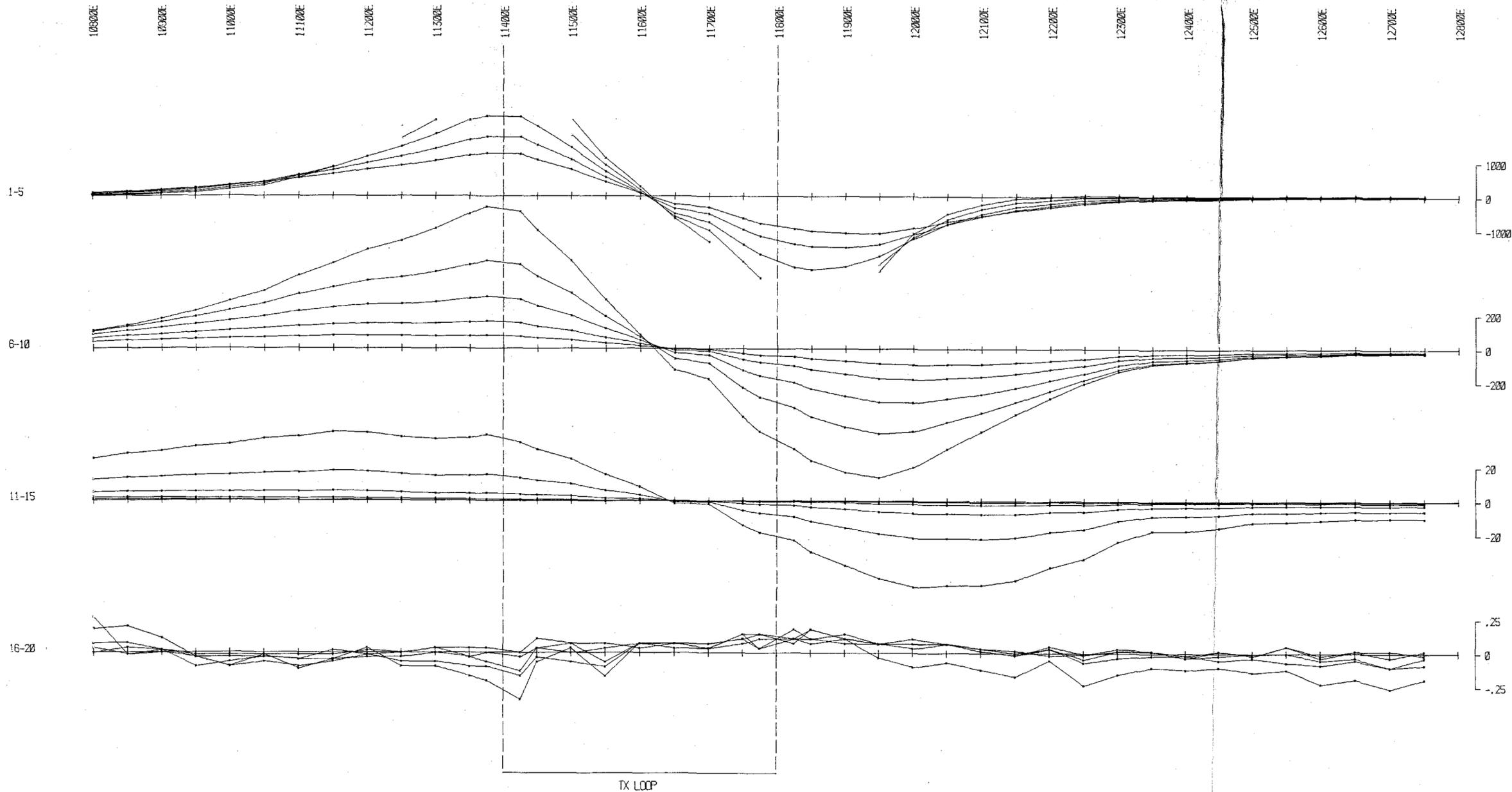
SURVEYED AND COMPILED BY
GEOTERREX PTY. LTD. PROJECT NO.
85-1993

CLIENT : Billiton Aust. Ltd.
PROJECT : Catley Range
AREA : Waratah Tas.
LINE : 06500N Z
TX LOOP : 4



HORIZONTAL COMPONENT B (X)

043



EM-37
 FIXED
 TRANSMITTER
 SURVEY

ELECTROMOTIVE FORCE INDUCED BY
 SECONDARY FIELD
 TIME DERIVATIVE OF FLUX DENSITY (B)

005046

5 cm

nanovolts per amp metre squared

TX LOOP SIDES : 06500N 11400E
 : 07400N 11600E
 TX LOOP SIZE : 900 m X 400 m
 TX TURN OFF TIME : 200 microsecs.
 FIRST GATE TIME : 88.5 microsecs.
 CURRENT : 8.6 amps
 FREQUENCY : 25 Hz.
 INTEGRATION TIME : 256 cycles
 SYNC MODE : CRYSTAL
 HORIZONTAL SCALE : 1:5000
 SURVEYED BY : R.J.L.
 DATE : 14/04/1986

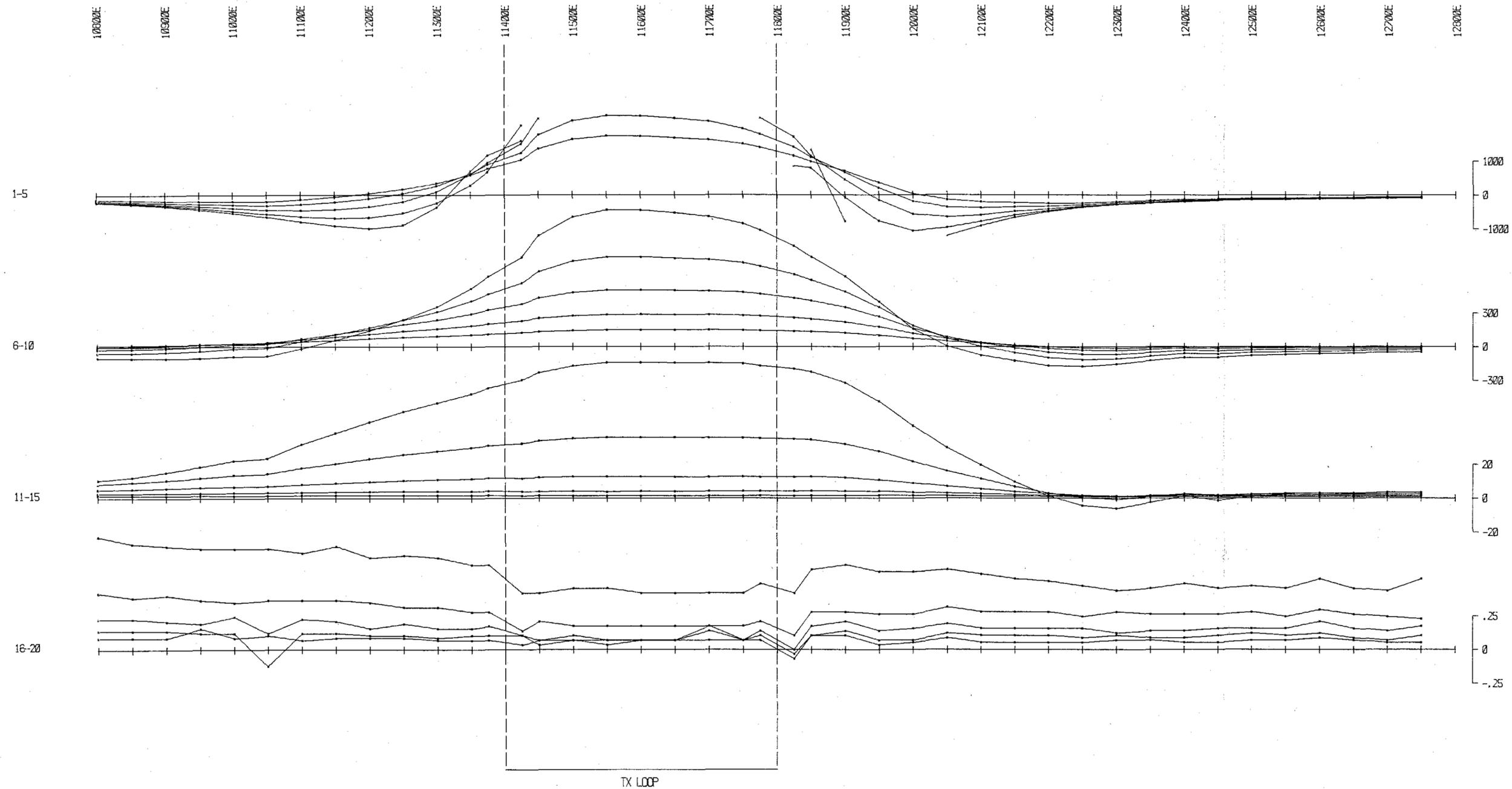
SURVEYED AND COMPILED BY
 GEOTERREX PTY. LTD. PROJECT NO.
 85-1993

CLIENT : Billiton Aust. Ltd.
 PROJECT : Catley Range
 AREA : Waratah Tas.
 LINE : 06800N X
 TX LOOP : 4

044

0414

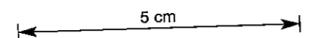
VERTICAL COMPONENT B (Z)



EM-37
FIXED
TRANSMITTER
SURVEY

ELECTROMOTIVE FORCE INDUCED BY
SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (B)

005047



nanovolts per amp metre squared

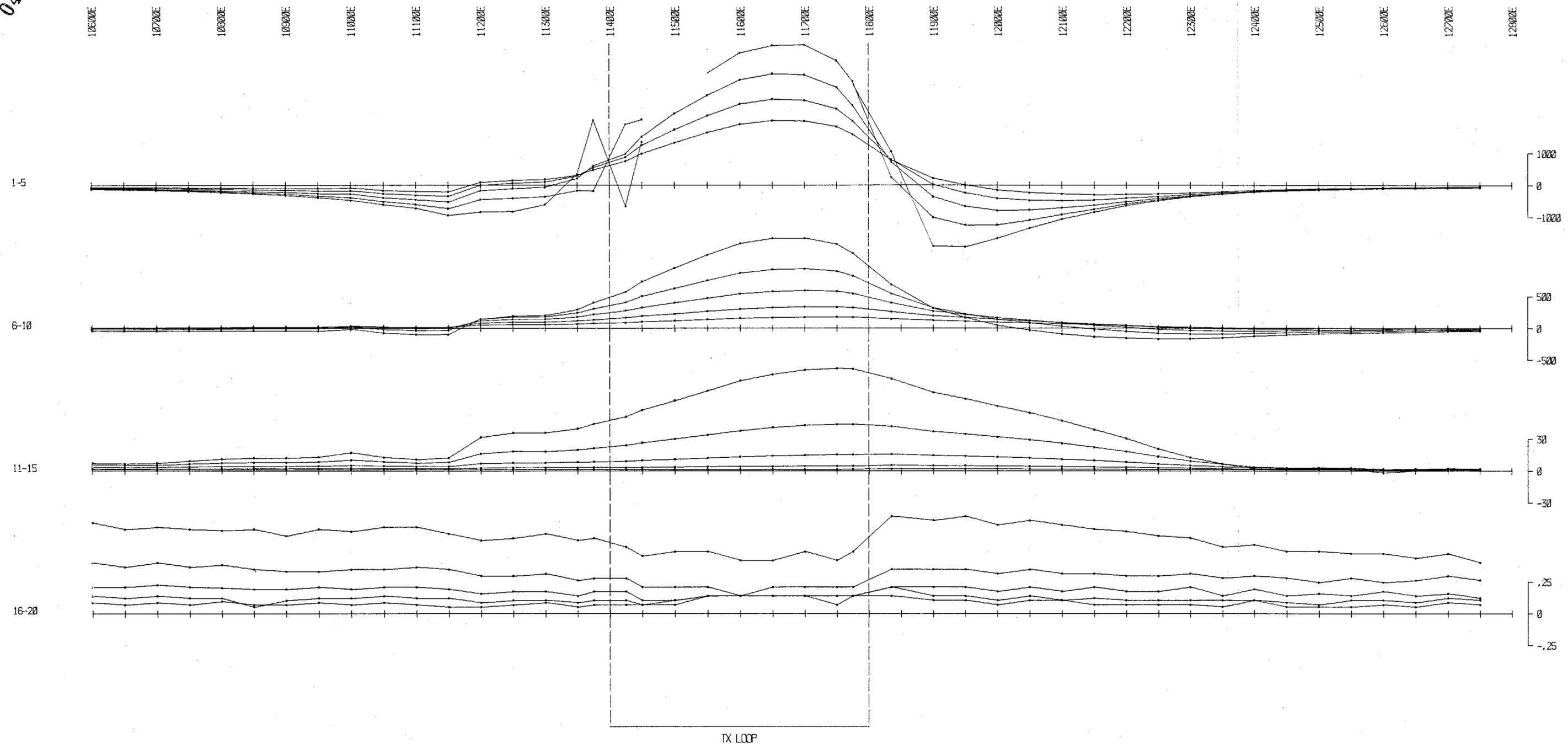
TX LOOP SIDES : 06500N 11400E
 : 07400N 11800E
TX LOOP SIZE : 900 m X 400 m
TX TURN OFF TIME : 280 microseconds.
FIRST GATE TIME : 88.5 microseconds.
CURRENT : 8.6 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : RJL
DATE : 14/04/1986

	SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT NO. 85-1993
	CLIENT : Billiton Aust. Ltd.	

PROJECT : Cailey Range
AREA : Waratah Tas.
LINE : 06800N Z
TX LOOP : 4

046

VERTICAL COMPONENT \dot{B}_z

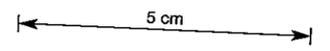


EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (\dot{B})

005048

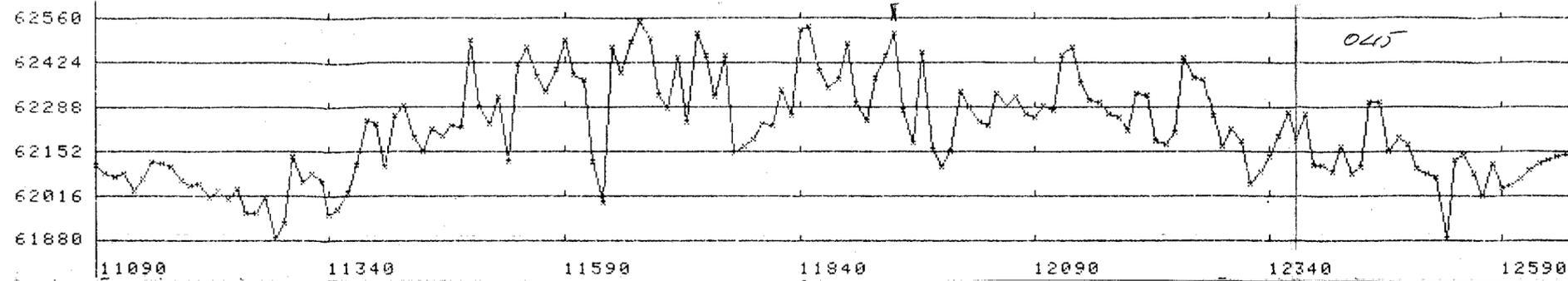


nanovolts per amp metre squared

TX LOOP SIDES : 06500N 11400E
 : 07400N 11600E
TX LOOP SIZE : 800 m X 400 m
TX TURN OFF TIME : 200 microseconds.
FIRST GATE TIME : 88.5 microseconds.
CURRENT : 8.6 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : RJL
DATE : 12/04/1986

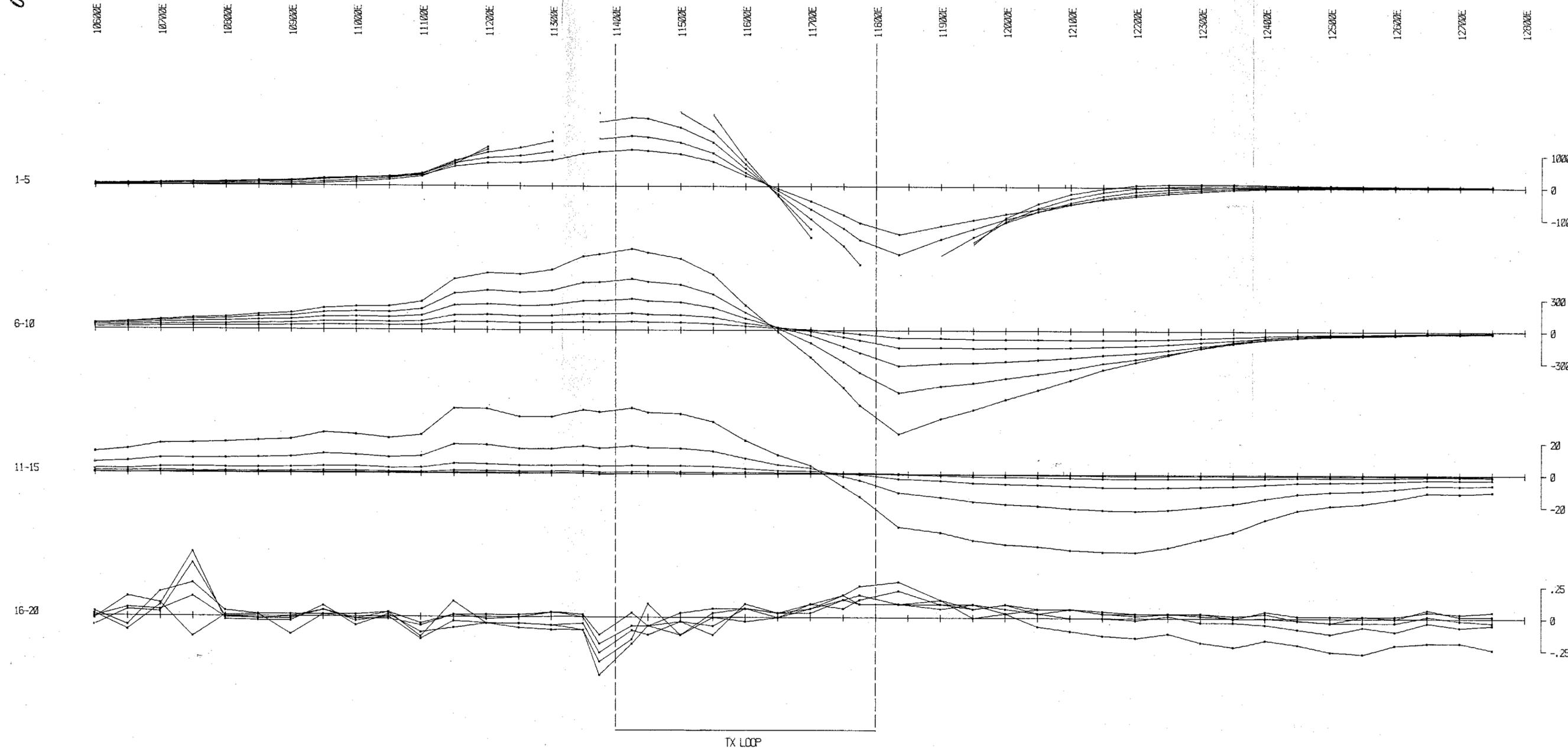
 SURVEYED AND COMPILED BY GEOTREX PTY. LTD. PROJECT NO. 85-1993

CLIENT : Billiton Aust. Ltd.
PROJECT : Catley Range
AREA : Waratah Tas.
LINE : 07100N Z
TX LOOP : 4



LINE : 7100N
FROM : 11090
TO : 12800
STATION SPACING : 1
MIN READING => 6
MAX READING => 6
AVG READING => 6

045



EM-37
FIXED
TRANSMITTER
SURVEY

ELECTROMOTIVE FORCE INDUCED BY
SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (B)

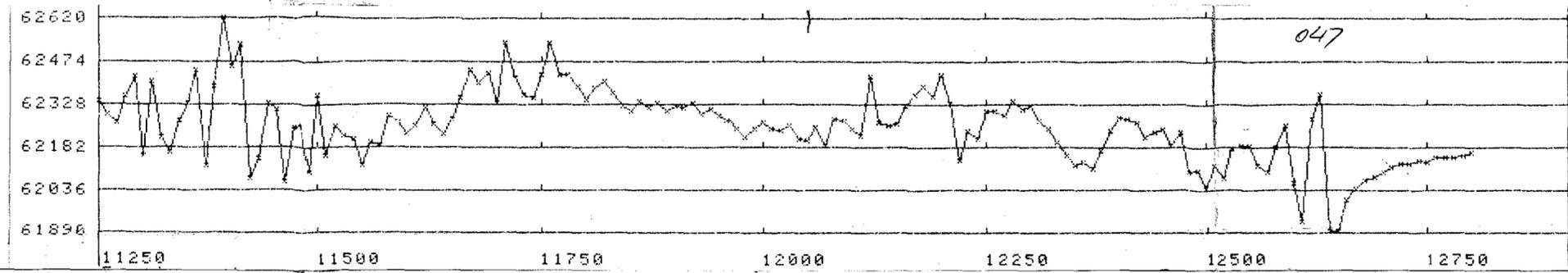
005049

5 cm

TX LOOP SIDES : 06500N 11400E
: 07400N 11600E
TX LOOP SIZE : 800 m X 400 m
TX TURN OFF TIME : 280 microseconds.
FIRST GATE TIME : 88.5 microseconds.
CURRENT : 8.6 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : RJL
DATE : 12/04/1986

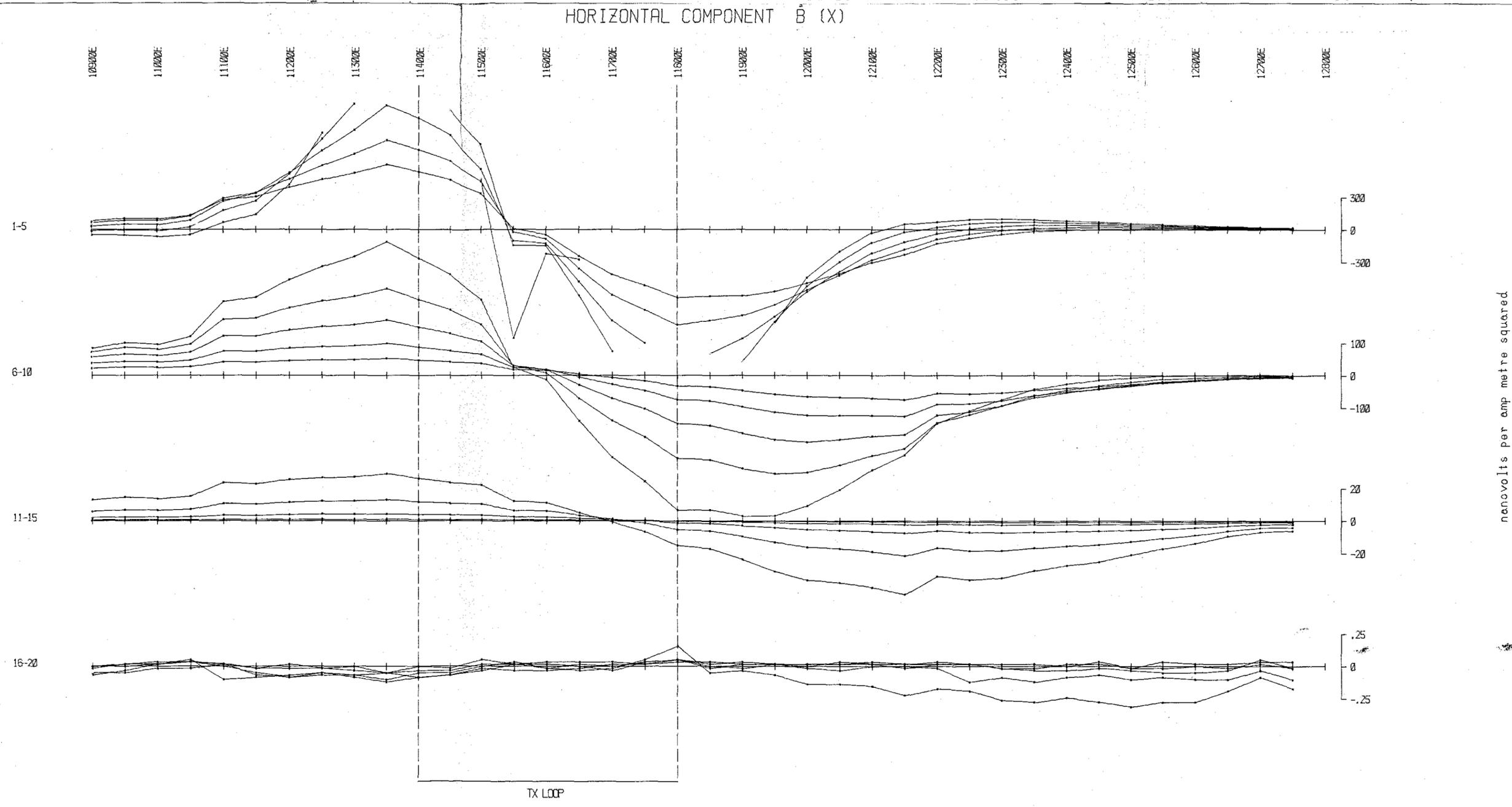
SURVEYED AND COMPILED BY
GEOTERREX PTY. LTD. PROJECT NO.
85-1993

CLIENT : Billiton Aust. Ltd.
PROJECT : Catley Range
AREA : Waratah Tas.
LINE : 07100N X
TX LOOP : 4



LINE : 7400N
 FROM : 11250
 TO : 12800
 STATION SPACING
 MIN READING =>
 MAX READING =>
 AVG READING =>

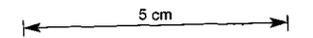
047



EM-37
 FIXED
 TRANSMITTER
 SURVEY

ELECTROMOTIVE FORCE INDUCED BY
 SECONDARY FIELD
 TIME DERIVATIVE OF FLUX DENSITY (B)

005050



nanovolts per amp metre squared

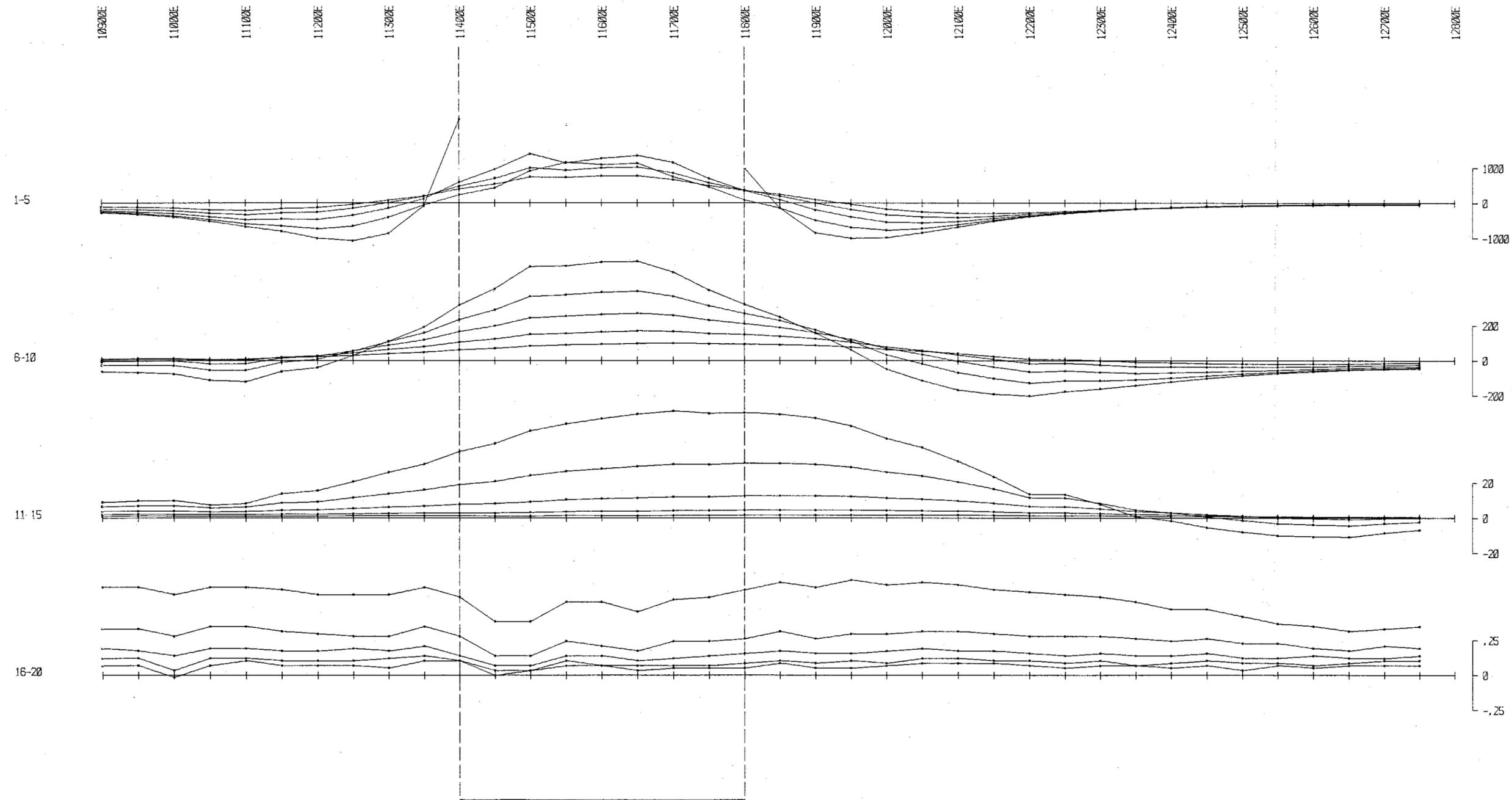
TX LOOP SIDES : 06500N 11400E
 : 07400N 11800E
 TX LOOP SIZE : 600 m X 400 m
 TX TURN OFF TIME : 200 microseconds.
 FIRST GATE TIME : 88.5 microseconds.
 CURRENT : 8.6 amps
 FREQUENCY : 25 Hz.
 INTEGRATION TIME : 256 cycles
 SYNC MODE : CRYSTAL
 HORIZONTAL SCALE : 1:5000
 SURVEYED BY : R.J.L.
 DATE : 13/04/1986

SURVEYED AND COMPILED BY
 GEOTERREX PTY. LTD. PROJECT NO.
 85-1993

CLIENT : Billiton Aust. Ltd.
 PROJECT : Catley Range
 AREA : Waratah Tas.
 LINE : 07400N X
 TX LOOP : 4

048

VERTICAL COMPONENT B (Z)

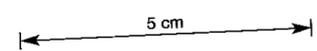


EM-37

FIXED TRANSMITTER SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD
TIME DERIVATIVE OF FLUX DENSITY (B)

005051



nanovolts per amp metre squared

TX LOOP SIDES : 06500N 11400E
: 07400N 11800E
TX LOOP SIZE : 800 m X 400 m
TX TURN OFF TIME : 200 microseconds.
FIRST GATE TIME : 88.5 microseconds.
CURRENT : 8.6 amps
FREQUENCY : 25 Hz.
INTEGRATION TIME : 256 cycles
SYNC MODE : CRYSTAL
HORIZONTAL SCALE : 1:5000
SURVEYED BY : R.J.L.
DATE : 13/04/1986

	SURVEYED AND COMPILED BY GEOTREX PTY. LTD.	PROJECT NO. 85-1993
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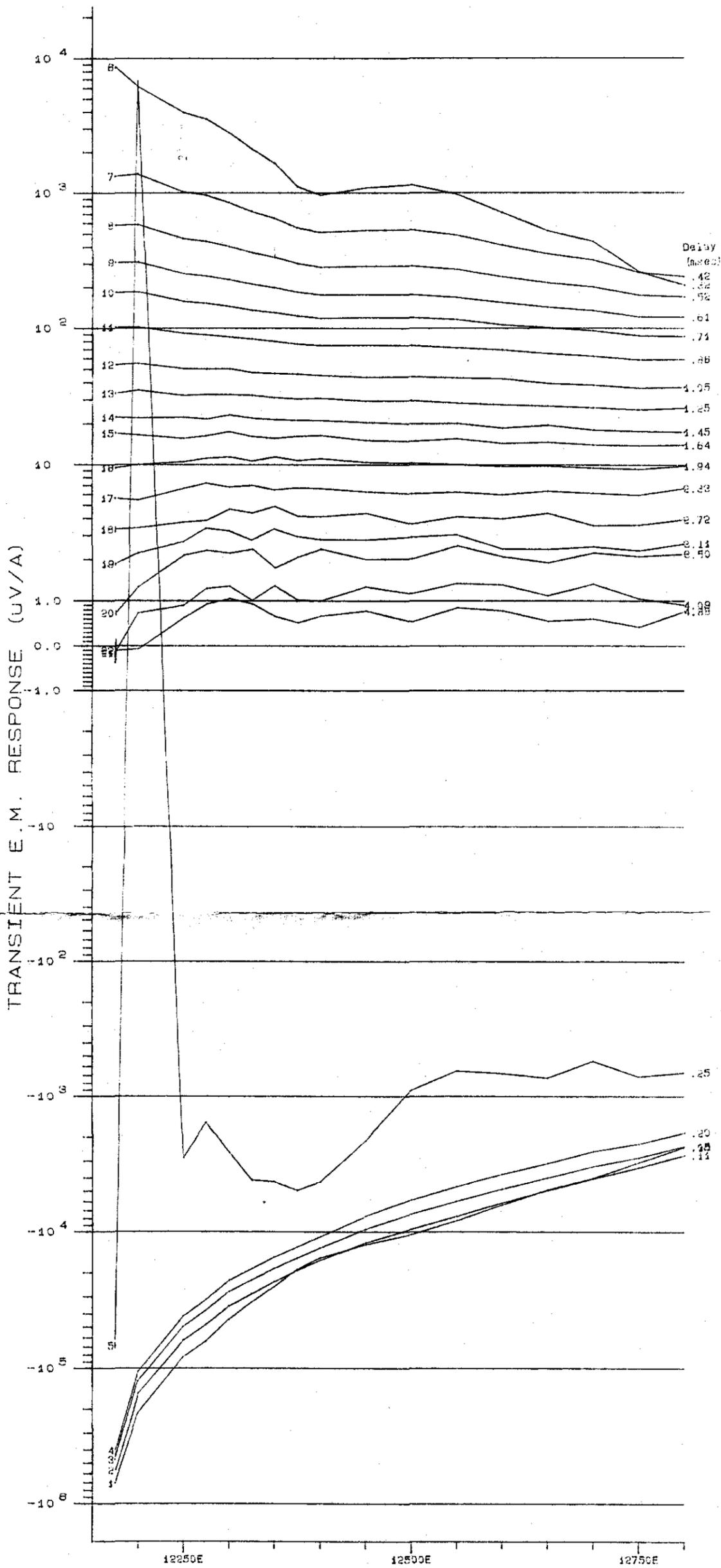
CLIENT : Billiton Aust. Ltd.
PROJECT : Catley Range
AREA : Waratah Tas.
LINE : 07400N Z
TX LOOP : 4

APPENDIX III

SIROTEM Profiles

005053

050



BILLITON AUSTRALIA
 TASMANIA
 CATTLE RANGE (JOB NO.632Z)
 EARLY TIMES LOOP #7 600X350M
 SIROTEM Survey by SOLO Geophysics & Co. 17/ 5/86
 LINE : 5700 NORTH Reading interval 25.0 m
 SCALE 1 : 5000 Loop size 600 m
 LOOP configuration : TURAM mode (Z component)
 Plotted : 3:22 PM 20/ 6/86

LOOP DIAGRAM



A = (12200N, 12250E)
 B = (12200N, 12750E)
 C = (12200N, 12750E)

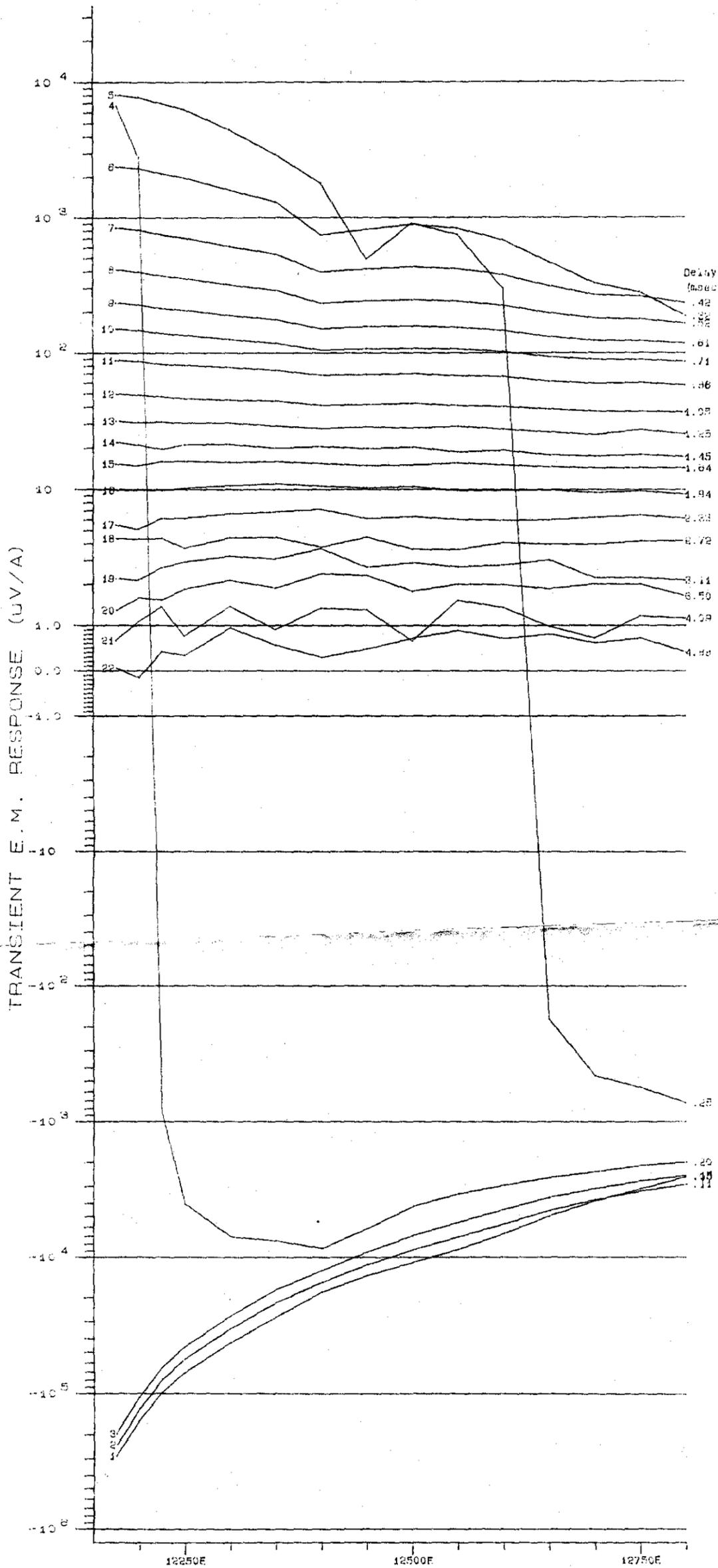
SOLO

5 cm

86-2576

005054

051



BILLITON AUSTRALIA
TASMANIA

CATTLEY RANGE (JOB NO.632Z)
EARLY TIMES LOOP #7 600X350M

SIROTEM Survey by SOLO Geophysics & Co. 19/ 5/86

LINE : 5800 NORTH Reading interval 25.0 m

SCALE 1 : 5000 Loop size . 600 m

LOOP configuration : TURAM mode (Z component)

Plotted : 3:33 PM 20/ 6/86

LOOP DIAGRAM



A = (EQUIN, 12111E)
 B = (EQUIN, 12111E)
 C = (EQUIN, 12111E)

SOLO

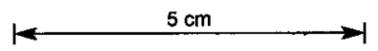
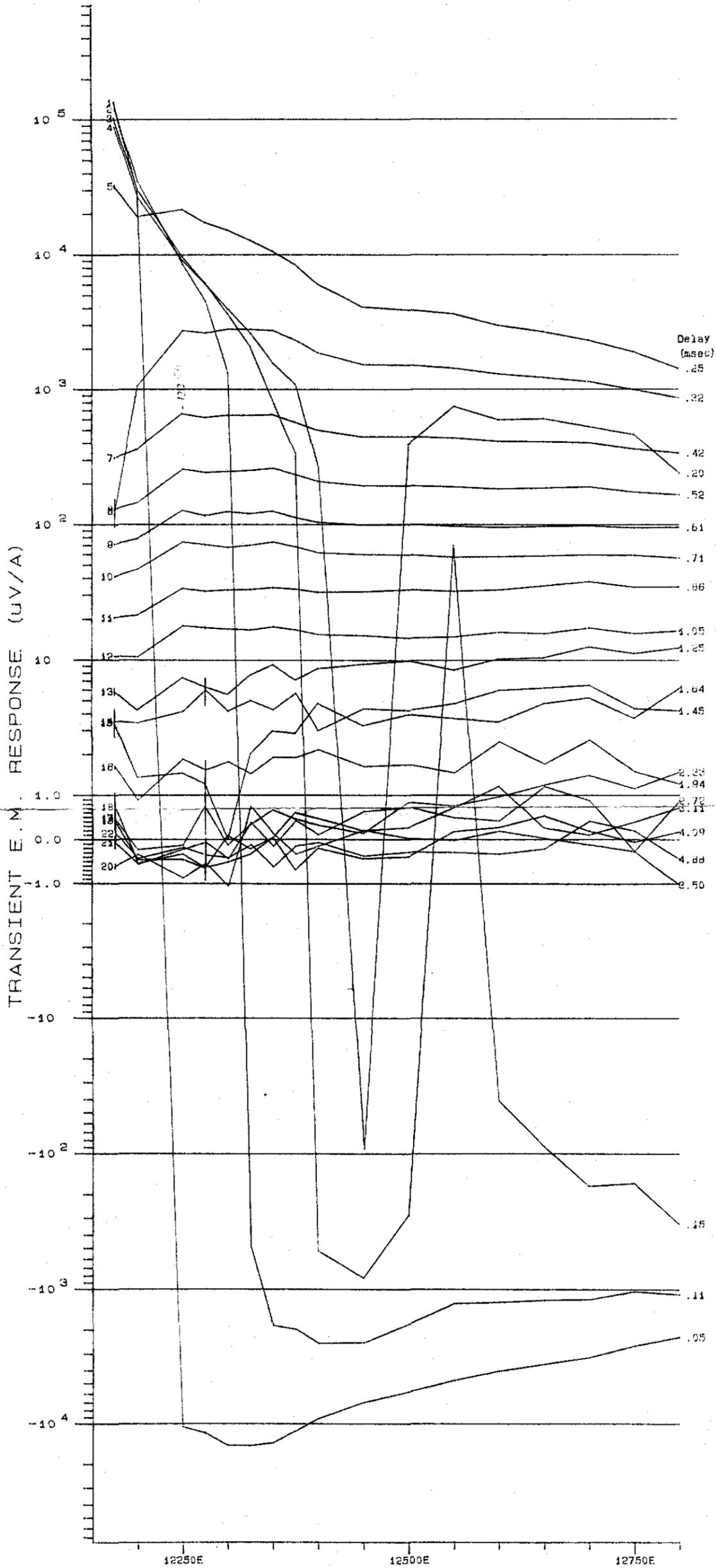
5 cm

86-2576

052

005055

86-2576



BILLITON AUSTRALIA
 TASMANIA
 CATTLEY RANGE (JOB NO.632X)
 EARLY TIMES LOOP #7 600X350M
 SIROTEM Survey by SOLO Geophysics & Co. 17/ 5/86
 LINE : 5700 NORTH Reading interval 25.0 m
 SCALE 1 : 5000 Loop size : 600 m

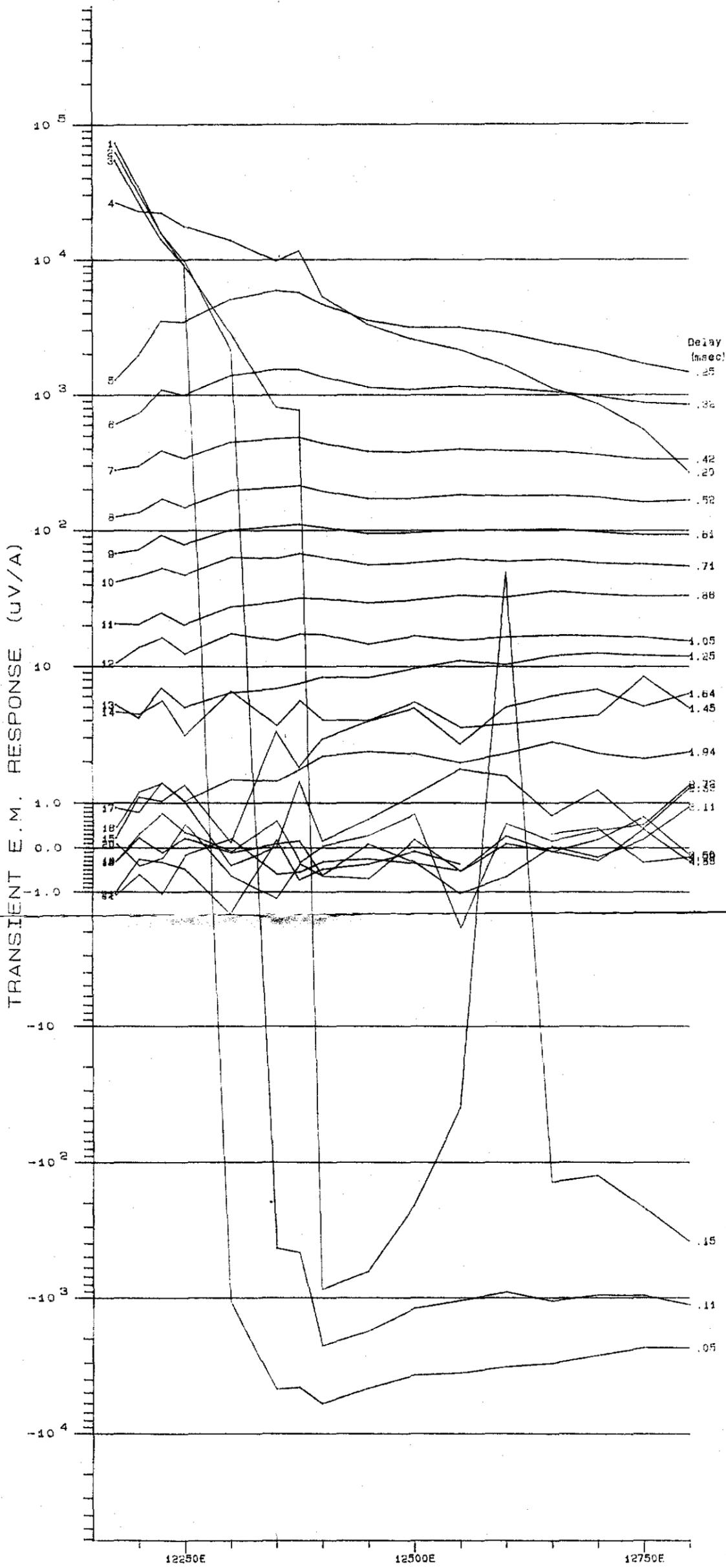
LOOP DIAGRAM



A = (6500N, 12150E)
 B = (5800N, 12150E)
 C = (5800N, 12400E)

005056

053



BILLITON AUSTRALIA
TASMANIA

CATTLEY RANGE (JOB NO.632X)

EARLY TIMES LOOP #7 600X350M

SIROTEM Survey by SOLO Geophysics & Co. 19/ 5/86

LINE : 5800 NORTH Reading interval 25.0 m

SCALE 1 : 5000 Loop size : 600 m

LOOP configuration : TURAM mode (X component)

Plotted : 3:07 PM 20/ 6/86

LOOP DIAGRAM



A = (5800N, 12150E)
B = (5800N, 12150E)
C = (5800N, 12150E)

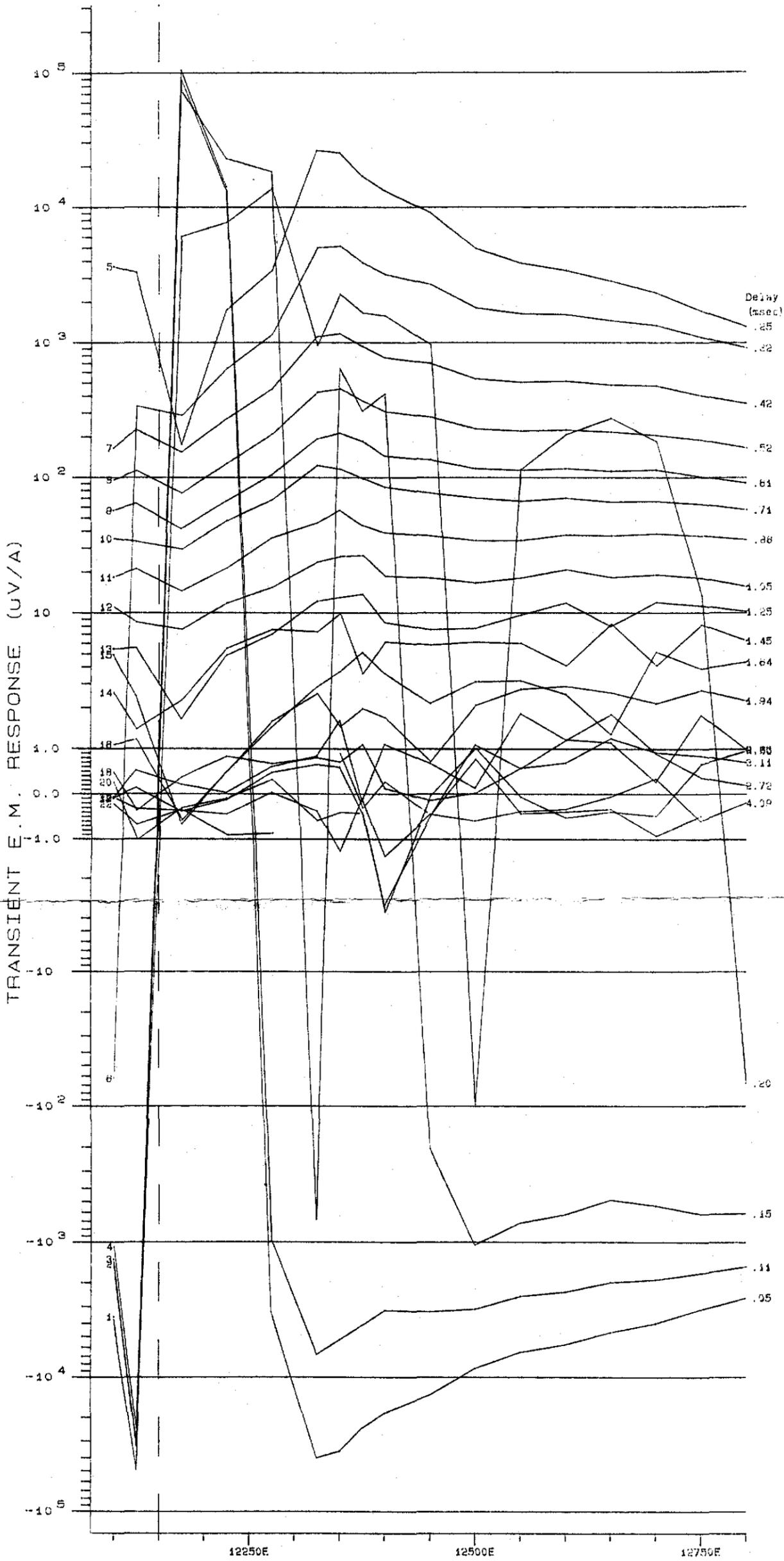
SOLO

5 cm

86-2576

054

005057



BILLITON AUSTRALIA
TASMANIA

CATTLEY RANGE (JOB NO.632X)

EARLY TIMES LOOP #7 600X350M

SIROTEM Survey by SOLO Geophysics & Co. 20/ 5/86

LINE : 5900 NORTH Reading interval 25.0 m

SCALE 1 : 5000 Loop size : 600 m

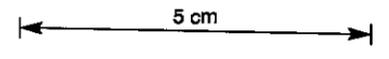
LOOP configuration : TURAM mode (X component)

Plotted : 3:10 PM 20/ 6/86

LOOP DIAGRAM

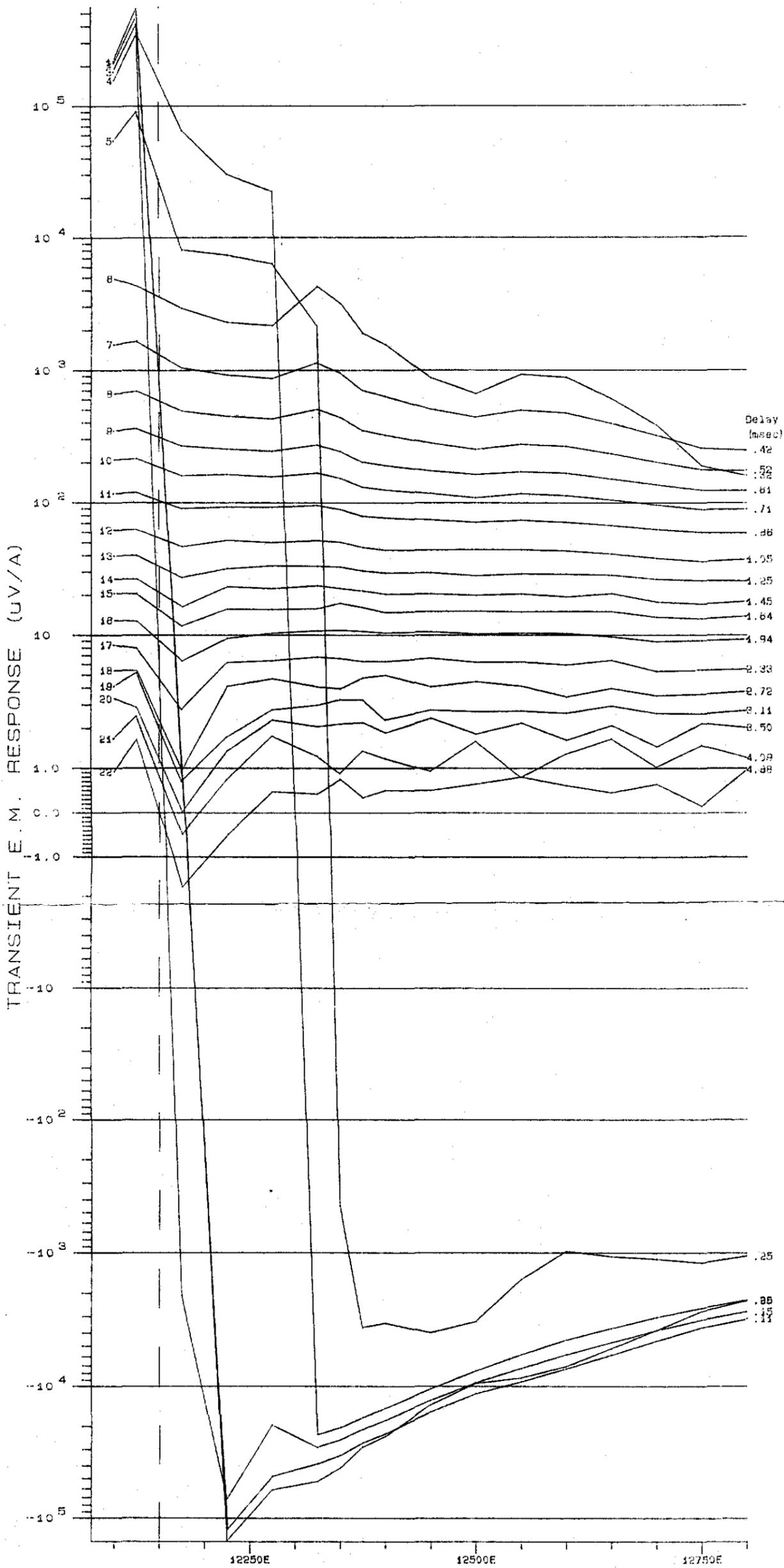


A = (5900N, 12180E)
 B = (5800N, 12180E)
 C = (5800N, 11800E)



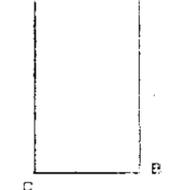
86-2576

005058 055



BILLITON AUSTRALIA
 TASMANIA
 CATTLEY RANGE (JOB NO.632Z)
 EARLY TIMES LOOP #7 600X350M
 SIROTEM Survey by SOLO Geophysics & Co. 20/ 5/88
 LINE : 5900 NORTH Reading interval 25.0 m
 SCALE 1 : 5000 Loop size : 600 m
 LOOP configuration : TURAM mode (Z component)
 Plotted : 3:43 PM 20/ 6/88

LOOP DIAGRAM



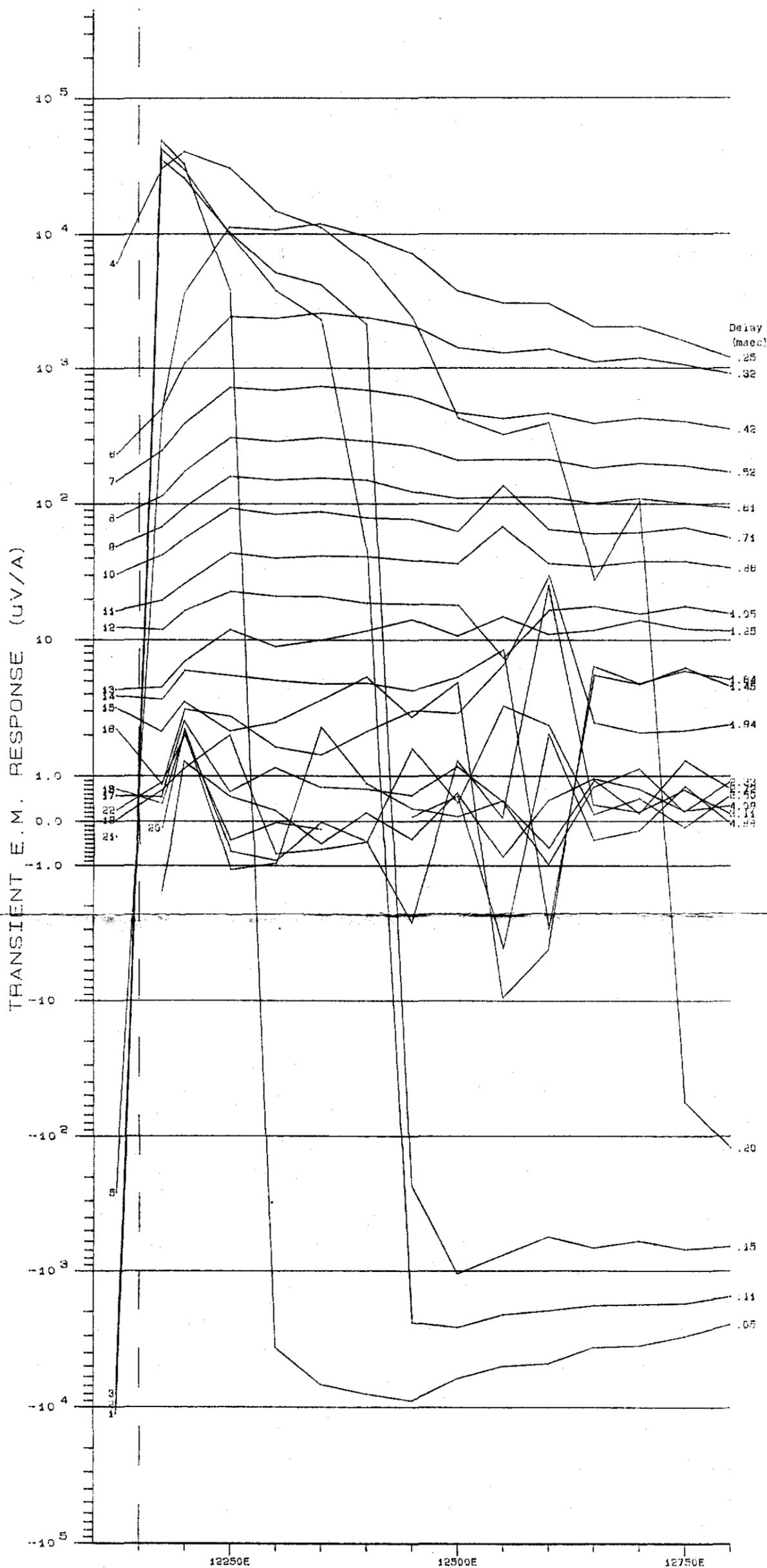
A = (5900N, 12450E)
 B = (5900N, 12150E)
 C = (5900N, 11850E)

SOLO

5 cm

056

005059



BILLITON AUSTRALIA

TASMANIA

CATTLEY RANGE (JOB NO.632X)

EARLY TIMES LOOP #7 600X350M

SIROTEM Survey by SOLO Geophysics & Co. 21/ 5/86

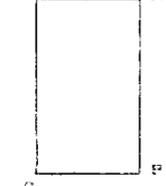
LINE : 6000 NORTH Reading interval 25.0 m

SCALE 1 : 5000 Loop size : 600 m

LOOP configuration : TURAM mode (X component)

Plotted : 3:14 PM 20/ 6/86

LOOP DIAGRAM



A = (6200N, 12150E)
 B = (5800N, 12450E)
 C = (5800N, 12150E)

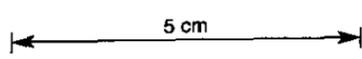
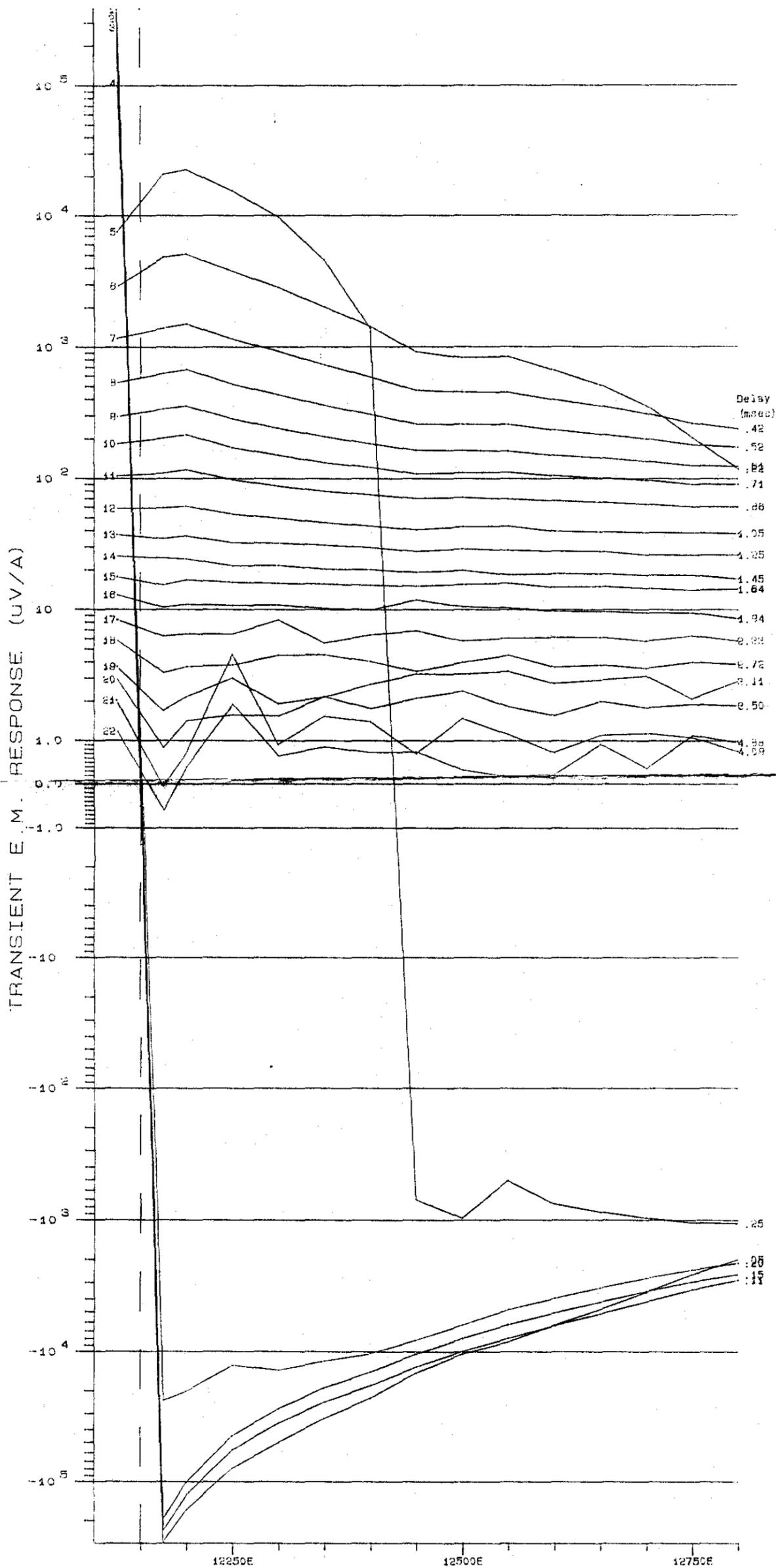
SOLO

5 cm

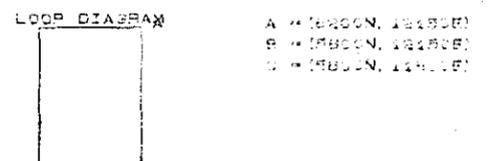
86-2576

057

005060



BILLITON AUSTRALIA
 TASMANIA
 CATTLE RANGE (JOB NO. 632Z)
 EARLY TIMES LOOP #7 600X350M
 SIRCTEM Survey by SOLO Geophysics & Co. 21/ 5/86
 LINE : 6000 NORTH Reading interval 25.0 m

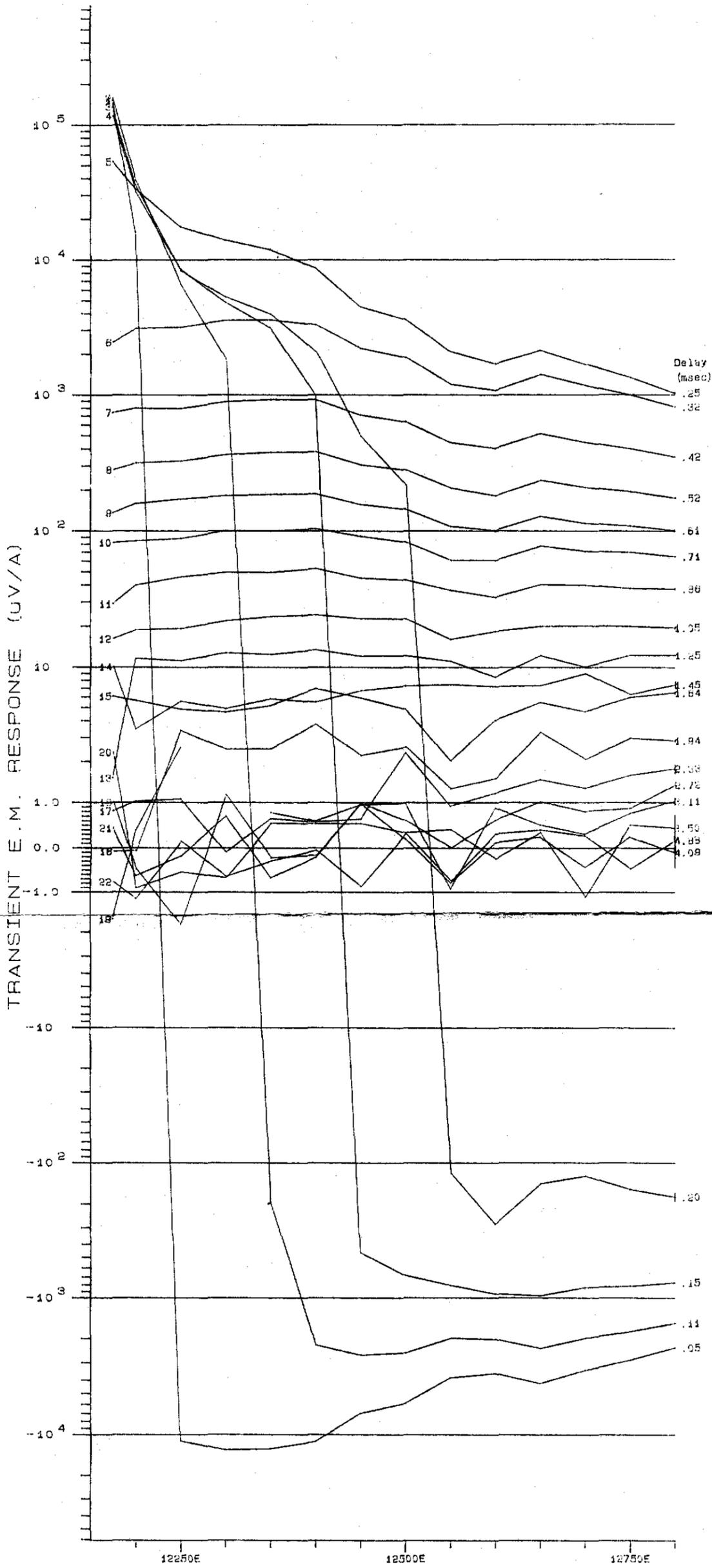


9/52-98

005061

059

94-2576

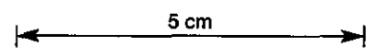


BILLITON AUSTRALIA
 TASMANIA
 CATTLE RANGE (JOB NO.632X)
 EARLY TIMES LOOP #7 600X350M
 SIROTEM Survey by SOLO Geophysics & Co. 22/ 5/86
 LINE : 6100 NORTH Reading interval 25.0 m
 SCALE 1 : 5000 Loop size : 600 m
 LOOP configuration : TURAM mode (X component)
 Plotted : 3.18 PM 20/ 6/86

LOOP DIAGRAM

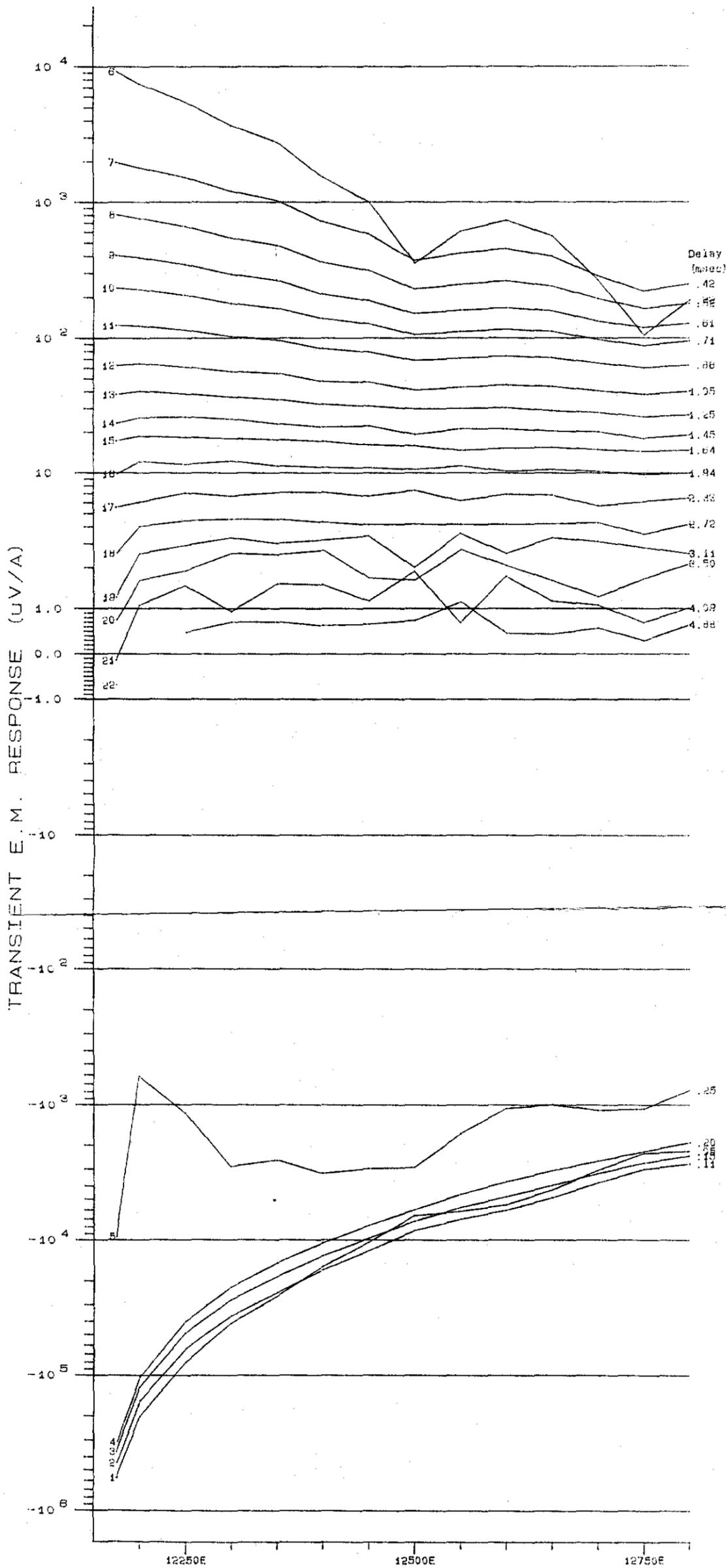


A = (5820N, 12450E)
 B = (5820N, 12450E)
 C = (5820N, 11400E)



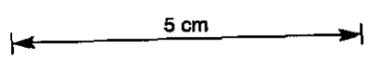
058

005062



BILLITON AUSTRALIA
 TASMANIA
 CATTLEY RANGE (JOB NO.632Z)
 EARLY TIMES LOOP #7 600X350M
 SIROTEM Survey by SOLO Geophysics & Co. 22/ 5/86
 LINE : 6100 NORTH Reading interval 25.0 m
 SCALE 1 : 5000 Loop size : 600 m
 LOOP configuration : TURAM mode (Z component)
 Plotted : 3:52 PM 20/ 6/86

LOOP DIAGRAM
 A * (5800N, 12450E)
 B * (5800N, 12450E)
 C * (5800N, 12450E)



86-2576

060

005063

APPENDIX IV

TEM Interpretation


GEOPHYSICAL EXPLORATION CONSULTANTS PTY. LTD.

Suite 106. 104 Mount Street, Heidelberg, Victoria 3084

 Telephone (03) 459 0533
 Telex AA 30625

6th September, 1985

Mr N. Hungerford,
 Billiton Australia,
 570 Bourke Street,
MELBOURNE. VIC. 3000

Dear Nigel,

Cattley Range T.E.M. data

On studying the EM37 data and Protem plots from Cattley Range, my opinion is that each of the main TEM responses reflect the basalt. My reasoning follows.

Vertical component EM37 profile - line 9800N

Zones A and B and C are consistent with responses due to wide conductive zones. The main features of the responses, seen more clearly on the Protem plot of the vertical component, are:-

- (i) The migration of the inflection point of the cross-over response from the edge of the conductive zone - edge of A is at around 10775E while the edge of B is around 11050E - outwards into the conductive patch, and
- (ii) the trough shape character of the response.

For zone A, the return roll-over at around 10475E may reflect the return current flow expected from horizontally induced current flow in a conductive patch.

The solid bars shown as zones A and B represent my interpretation of the probable extent of each conductive patch. The correlation with the magnetic interpretation is reasonable.

On the Protem plot, the strong roll-over at early times (in the negative region of the plot) around 10775E is typical of current channeling. Likewise, zone B shows similar behaviour.

Note also that the EM37 plot shows evidence of zone C, a weakly conductive patch east of B.

One big disadvantage of log-linear plotting of fixed loop TEM data is highlighted by the Protem plot. The distortion of inflection points due to the large plot height between +10 and -10nV/amp.m² is drastic and may cause difficulty in reconciling the two data plots.

Horizontal component profile - line 9800N

Whereas the vertical component shows inflection migration, the horizontal component data shows peak migration. This is most clear for zone A and complements the features discussed above.

Note that the power decay curves for stations 10650E and 10400E both asymptote to t^{-4} confirming a predominantly layered environment.

I.P. pseudo section - line 9800N

Although less resolving than the TEM data, the apparent resistivity pseudo-section shows clear evidence of a conductive zone between approximately 10600E and 10750E (zone A). The coincidence of this zone with the basalt patch (as indicated by the ground magnetic profile) is quite clear. Zone B is not clearly indicated because of incomplete coverage and/or too large a dipole size.

The cause of the chargeability anomaly is probably a weakly chargeable (pyritic ?) zone within 100 metres from the surface between 10900E and 11000E. It may lie within a thicker section of basalt, or underneath the basalt. Note that weakly pyritic layers, and clay layers, are not uncommon within the Tertiary basalts.

I trust the above comments improve your assessment of the data. Please contact me if you'd like to follow up any of the matters I've raised.

Best regards,



GUIDO STALTARI

GS:MI

Enc...



063

SHELL COMPANY OF AUSTRALIA
METALS DIVISION
R.O.C.S. - PROTEM

N.W. TASMANIA
CATTLEY RANGE
LINE 9800N
Z COMP

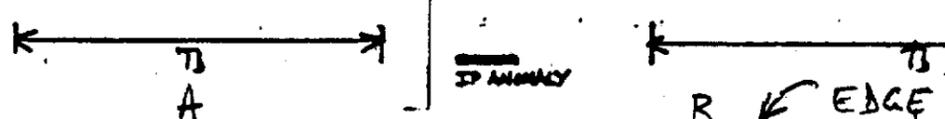
FIG No :
DATE :
AUTHOR :
OFFICE :
DRAWN :

LEGEND

REC # 26 51 76 121

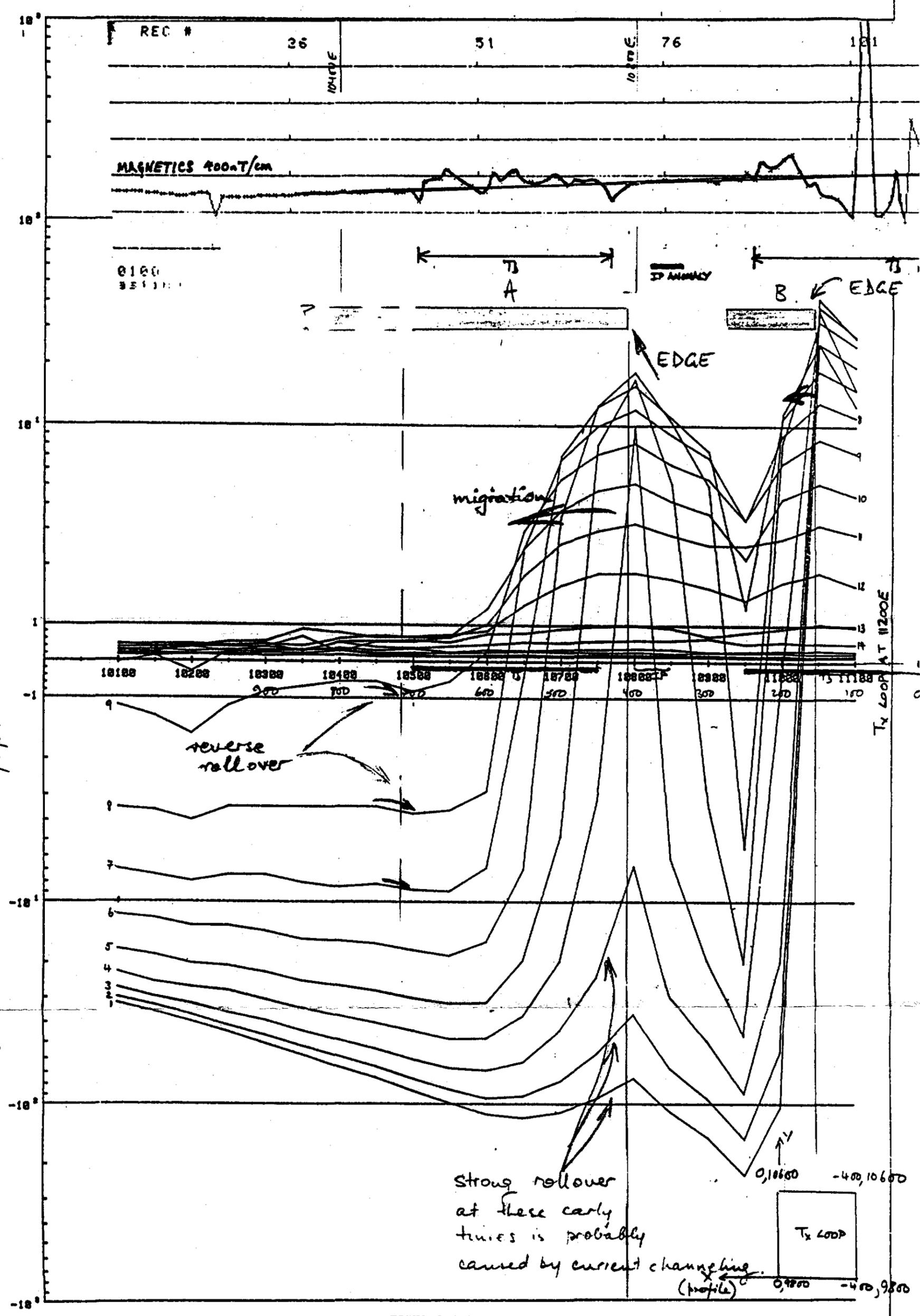
MAGNETICS 200-T/cm

0100
351111

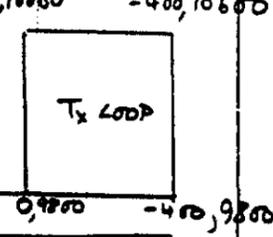


TRANSIENT RESPONSE (MU-V/ft)

nV/amp.m²



Strong rollover at these early times is probably caused by current channeling (profile)



003066

5 cm

T_B less than 50m to north

VERTICAL COMPONENT B (Z)

10100E 10200E 10300E 10400E 10500E 10600E 10700E 10800E 10900E 11000E 11100E 11200E 11300E 11400E 11500E 11600E 11700E

200 nV/a²/cm

1-5

A

B

C

20/cm

6-10

250 m

1/cm

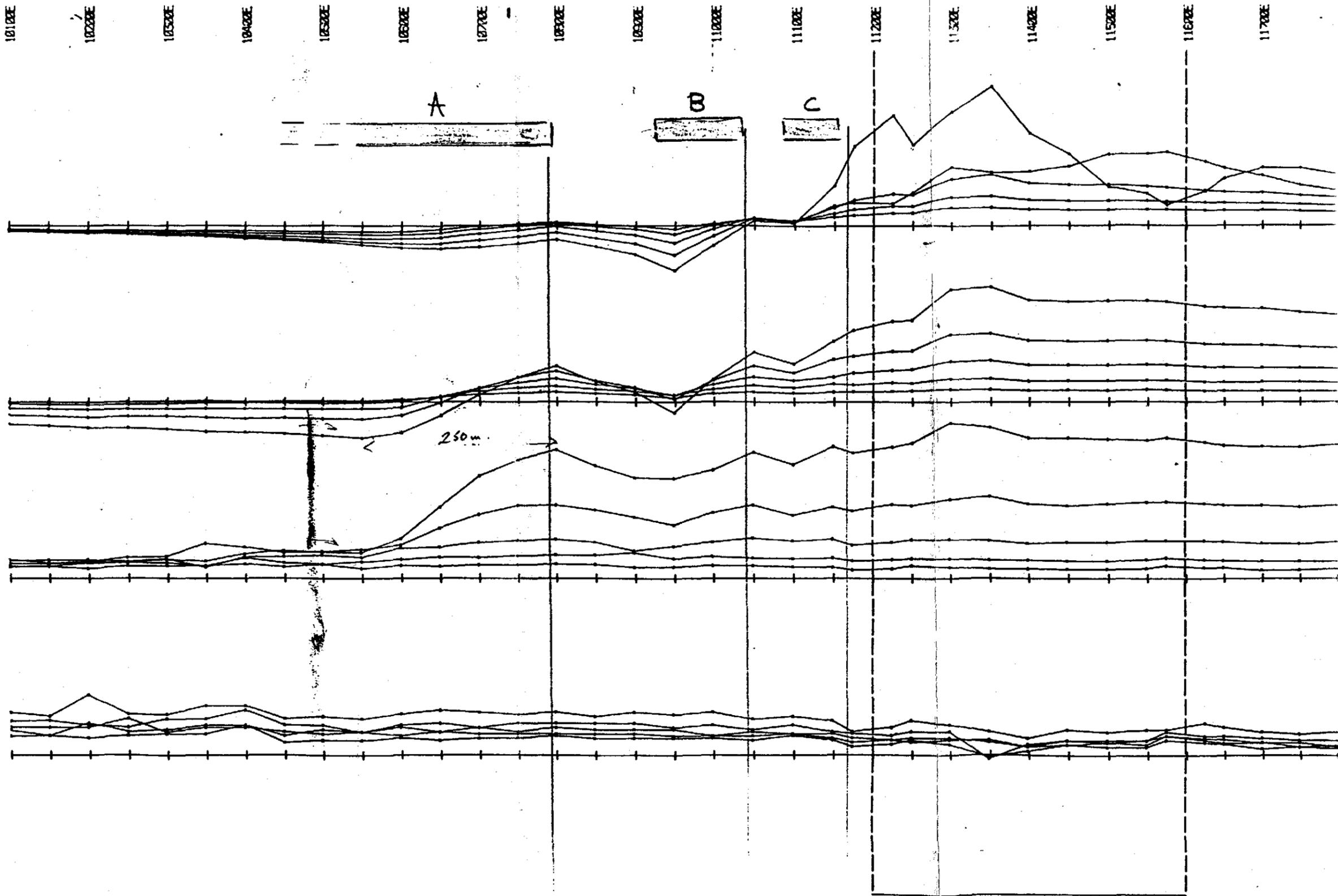
11-15

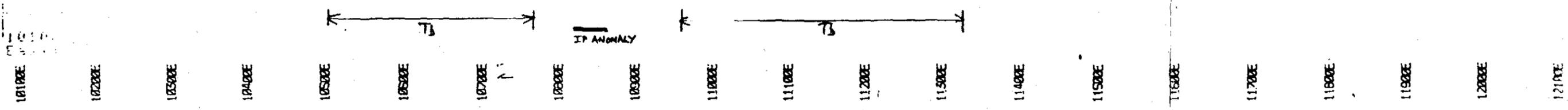
.25/cm

16-20

TX LOOP

064





10100E 10200E 10300E 10400E 10500E 10600E 10700E 10800E 10900E 11000E 11100E 11200E 11300E 11400E 11500E 11600E 11700E 11800E 11900E 12000E 12100E

zone A

250/cm

peak migration

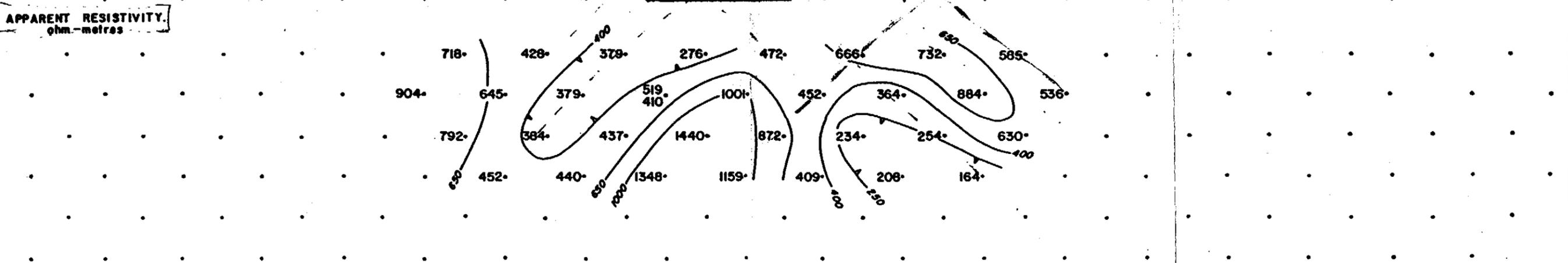
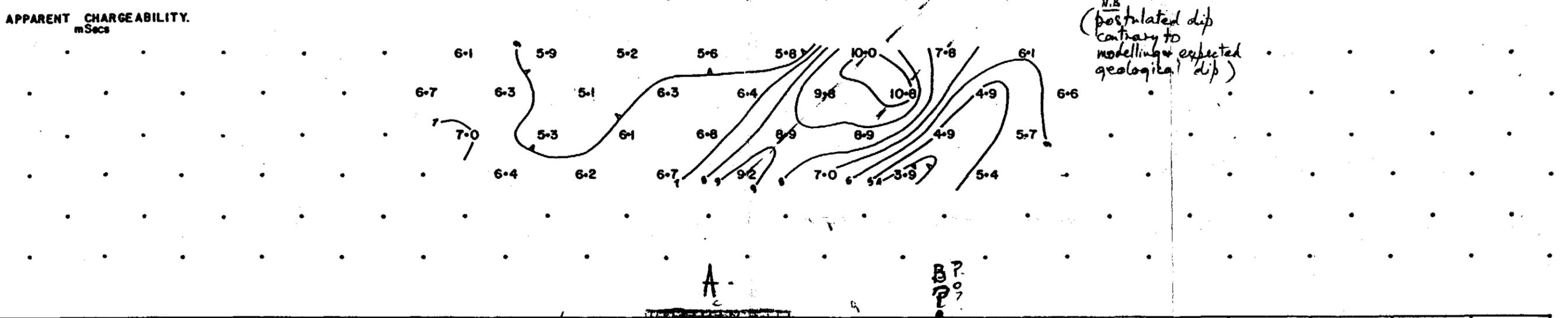
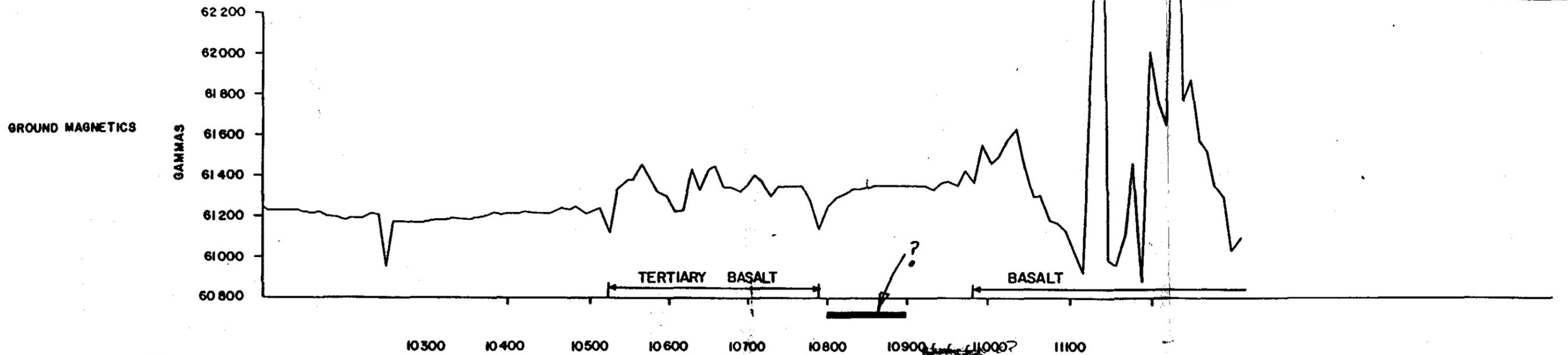
20/cm

1/cm

2/cm

065

IX LOOP



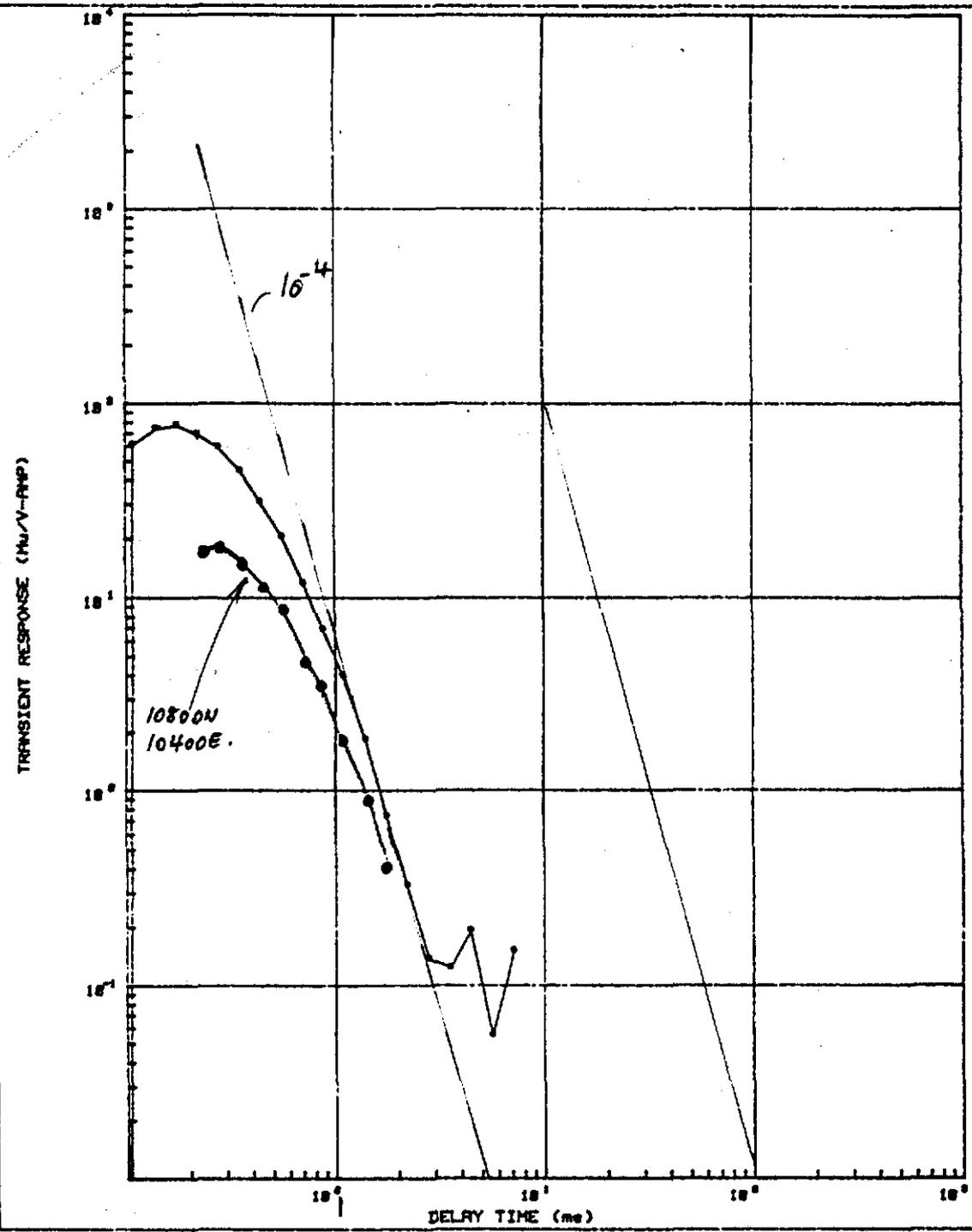
Contractor : ZONGE
 Date : 5/85
 Timing : 2sec ON-OFF
 Transmitter : HIGH POWER
 Receiver : GDP-12
 Integration time : UNCORRECTED NEWMONT
 Array : DIPOLE - DIPOLE
 Dipole length : 100m

5 cm

Billiton Australia			
Project WEST TASMANIA			
CATTLEY RANGE			
Title			
I.P. RESISTIVITY SURVEY			
LINE 9800N			
Author N.H.	Dept. A.H.O.	Scale 1:5000	
Drawn H.M.R.	Date 5/85	Revised	Date

990

067



OBSERVED DATA : o
 FITTED : -



R.O.C.S.
 TEM DATA PROCESSING - PROTEM
 DECAY CURVE ANALYSIS
 AUTOMATIC POWER CURVE

STATION EASTING : 18788
 STATION NORTHING : 9888

SHELL COMPANY OF AUSTRALIA METALS DIVISION	
N.W. TASMANIA CATTLEY RANGE 10658N, 9888E POWER CURVE, X COMP	
FIG. NO:	REPT. NO:
ENCL. NO:	DRG. NO:
DATE:	AUTHOR:
DRAWN:	OFFICE:

005070