

CONTENTS**SUMMARY**

	PAGE NO.
1 INTRODUCTION	1
2 TENURE	2
3 PREVIOUS EXPLORATION & MINING	3
4 GEOLOGY	4
4.1 Regional Setting	4
4.2 Geology of Oceana	5
4.2.1 Geology of Oceana	5
4.2.2 Stratigraphy of the Gordon Limestone at Oceana	5
5 WORK COMPLETED SEPTEMBER 1992 - AUGUST 1993	8
5.1 Diamond Drilling	8
5.2 Sampling	10
5.3 Geophysics	11
5.3.1 Gravity	11
5.3.2 Physical Properties	12
5.3.3 Aeromagnetism	12
5.3.4 Combined Gravity and Magnetic Interpretation	13
5.3.5 DHEM	14
6 CONCLUSIONS	16
7 EXPENDITURE	17
8 PROPOSED PROGRAMME AND BUDGET	18
KEYWORDS & LOCATION	
REFERENCES	

LIST OF APPENDICES

- 1 Schedule RL 8809
- 2 Analytical Reports
- 3 Oceana DDH collar coordinates and down-hole surveys
- 4 Diamond Drill Hole Logs
- 5 Physical Properties from Recent Drilling
- 6 DHEM Surveys at Oceana, OP1 and OP2
- 7 Operations report – Gravity survey at Oceana
- 8 Amoco Gravity Grids: Coordinate Corrections
- 9 Further Evaluation – Gravity and Magnetic Data RL 8809 September 1993 D E
Leaman

LIST OF TABLES

- TABLE 1 Analyses of gossans from Oceana and from the Amber Slate.

LIST OF FIGURES

1.	Location Map	1:500000
2.	Tenure	1:25000
3.	Regional Geology	1:10000
4.	Stratigraphic Column, Regional Context of Gordon Limestone	nominal
5.	Stratigraphic Column, Gordon Limestone	nominal
6.	DDH Locations: Plan View and Long Section	1:2500
7.	Geology: Drill Section 2800mN (Oceana Grid)	1:1000
8.	Geology: Drill Section 3300mN (Oceana Grid)	1:1000
9.	GRAVITY: Corrected Location and Values	1:5000
10.	GRAVITY: 1992 – Location and Values	1:5000
11.	MAGNETICS: colour drape s/a NE45–70	1:50000
12.	RADIOMETRICS: OCEANA Total Count Image	1:10000
13.	RADIOMETRICS: OCEANA Potassium Count Image	1:10000
14.	RADIOMETRICS: OCEANA Thorium Count Image	1:10000
15.	RADIOMETRICS: OCEANA Uranium Count Image	1:10000
16.	AEROMAGNETICS: OCEANA Flight Lines	1:10000
17.	AEROMAGNETICS: OCEANA Residual Magnetic Contours	1:10000

SUMMARY

Exploration conducted on the Oceana RL 8809 Joint Venture during the period from September 1992 to August 1993 has been principally concerned with drilling of targets defined during the previous year, and with the collection of regional geophysical data.

Two targets were drill tested, and whilst the results were disappointing in that they did not find ore, they have provided useful geological information.

An airborne magnetic and radiometric survey, and a gravity survey were conducted over Oceana providing new information of regional significance.

Total exploration costs for the twelve months ending August 1993 were **\$168 701**, bring the total expenditure on the Retention Licence since its inception to **\$238 823**.

1 INTRODUCTION

Retention Licence 8809 (Oceana) covering 5km², is located 1km south of Zeehan in Western Tasmania (see Figure 1). Title to the tenement is held by Arimco Mining Pty Ltd. Pasmaenco Australia Limited are in Joint Venture agreement with Arimco to evaluate the mineral potential of the licence area.

This report covers the period from September 1992 to August 1993. Work conducted during this period included:

- evaluation of existing data;
- a gravity survey;
- an aeromagnetic and radiometric survey;
- a combined gravity and magnetic interpretation;
- and the drilling of two diamond drill holes.

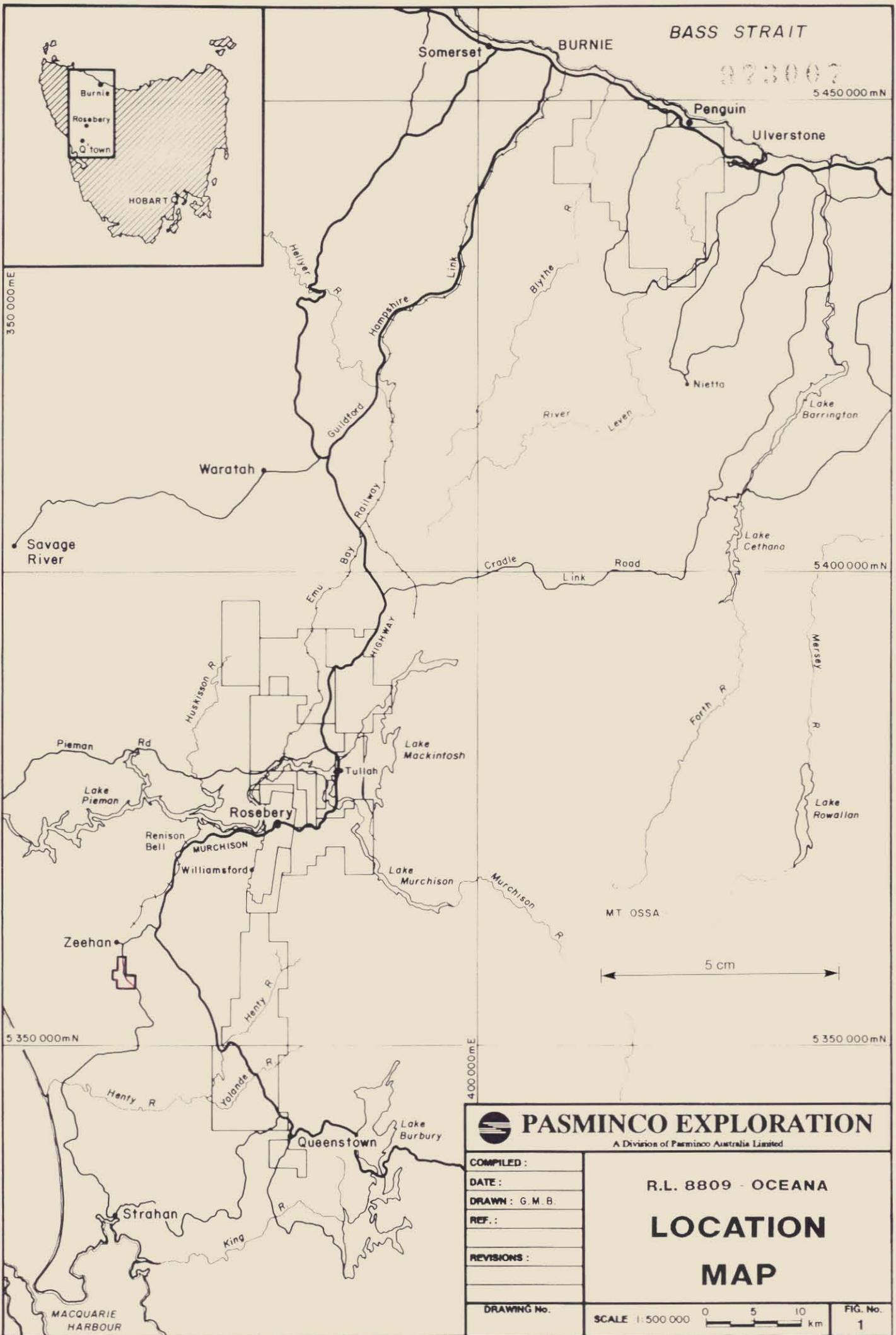
Access to the Oceana RL is easily gained by the Zeehan to Strahan road.

The Gordon Limestones hosting mineralisation occur in a marshy valley between steep ridges of Moira Sandstone and Zeehan Conglomerate to the west, and Crotty Quartzite to the east.

Vegetation cover is sparse in the most part with grasses and banksia on the ridges, grasses and gorse in the marshy valley with dense tea tree scrub along the creeks.

Work conducted by Pasmaenco Exploration during the previous year included:

- refurbishing and extension of existing grids;
- a detailed ground-magnetic survey;
- and a detailed sedimentological study of the setting to the Oceana mineralisation.



BASS STRAIT

923007

5 450 000 mN

3 500 000 mE

5 350 000 mN

4 000 000 mE

5 350 000 mN

5 cm

PAMINCO EXPLORATION
A Division of Paminco Australia Limited

COMPILED :
DATE :
DRAWN : G. M. B.
REF. :
REVISIONS :

R.L. 8809 - OCEANA

**LOCATION
MAP**

DRAWING No.

SCALE 1:500 000 0 5 10 km

FIG. No. 1

2 TENURE

Retention Licence 8809, Oceana was granted to Cyprus Gold Australia Corporation on 14 October 1988 for a period of two years. The licence was retained from part of former Exploration Licence 4/78, which was relinquished on 14 July 1988.

Title to RL 8809 was transferred to Hudspeth and Company Pty Ltd on 23 October 1990. This was subsequently transferred to Arimco Mining Pty Ltd on 24 August 1991 following a certified change of Company name.

Pasminco Australia Limited entered into negotiations with Hudspeth (Arimco) in late 1990 to reach an agreement to evaluate the base metal mineral potential of the licence area. A formal Joint Venture Agreement was signed on 14 May 1992. Under the terms of a Joint Venture Agreement, Pasminco Exploration, a division of Pasminco Australia Limited, would manage and operate the Joint Venture. Pasminco have the right to earn a 65% interest in the tenement by spending \$2 million within 9 years with \$1 million being spent in the first 5 years.

The licence covers an area of 5.5km² (see Schedule in Appendix 1). This area excludes a total of 1.1km² of the following Mine Leases: 9M/91, 10M/91 and 4W/77, held by Pasminco Australia Limited, and 39M/77 held by JNR Enraught - Mooney (see Figure 2). Lease 10M/01 is subject to a joint agreement with Dragon Resources whereby they have the surface rights to retreat the old Zeehan smelter dumps. Also excluded is 0.2km² of Crown Reserves.

The land tenure of RL 8809 comprises: Crown Land; Private Property and Timber Reserve. In addition, part of the area is on the interim list of the Register of the National Estate as part of the Zeehan Smelters Geological monuments (see Figure 2).

973009

5 360 000mN

5 360 000mN

5 358 000mN

5 358 000mN

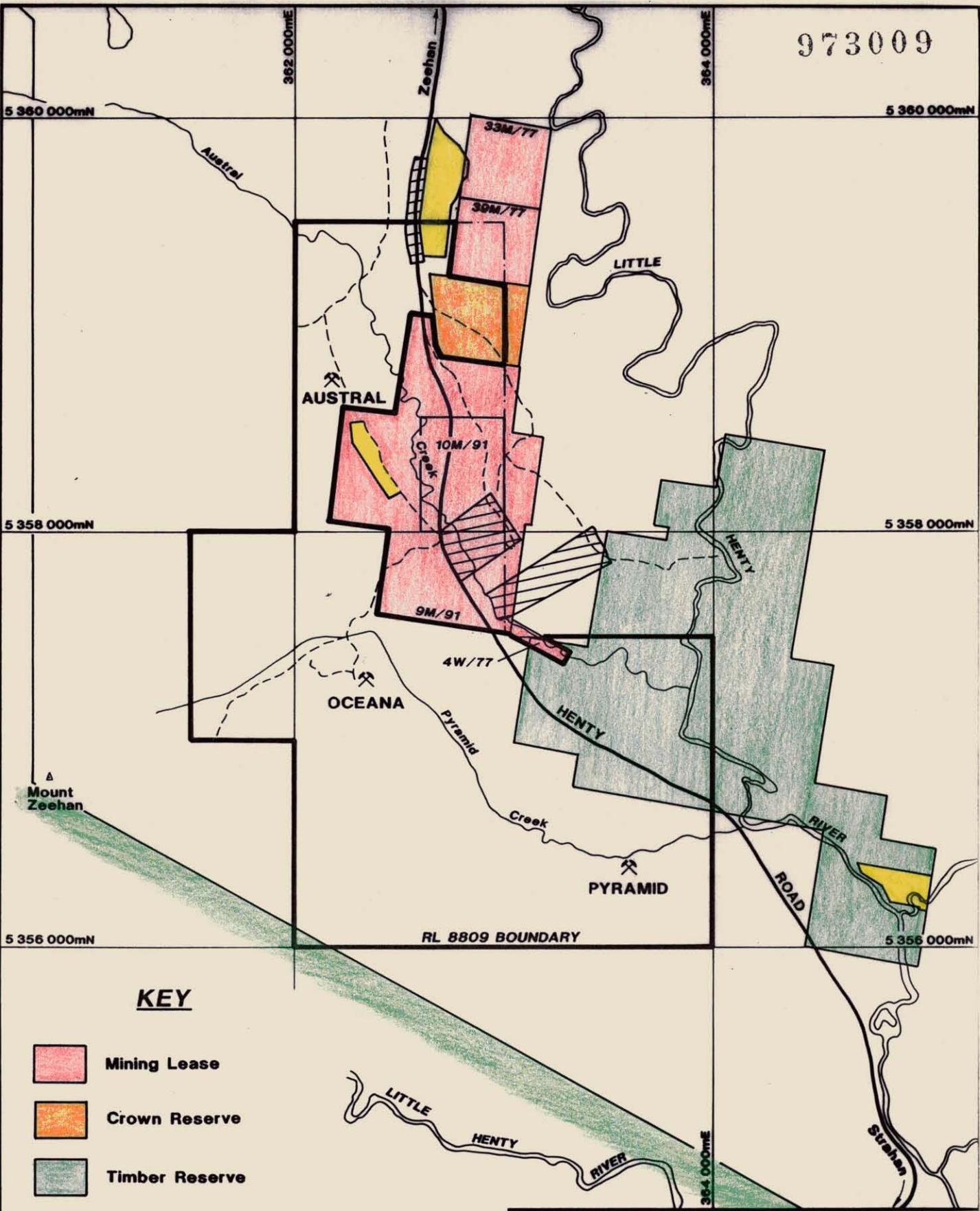
5 356 000mN

5 356 000mN

362 000mE

364 000mE

364 000mE



KEY

-  Mining Lease
-  Crown Reserve
-  Timber Reserve
-  State Forest
-  Private Freehold Land
-  Uncommitted Crown Land (within E.L. Boundary)
-  National Estate Interim Listing

5 cm

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : G.M.B.
 DATE : Sept, 1992
 DRAWN :
 REF. :
 REVISIONS :

RL 8809 - OCEANA

LAND TENURE

DRAWING No.

SCALE 1:25,000 

FIG. No.

2

3 PREVIOUS EXPLORATION AND MINING

Comprehensive accounts of past prospecting and mining activities in the Zeehan area, including the Oceana RL have been given in Taylor (1983) and Jones (1988). Jones (op cit) also presents a good summary of the more recent exploration undertaken by Amoco (Cyprus) during 1978–88.

The earliest report of mining activity at Oceana dates from 1890 when small-scale trenching was undertaken. During the next 3 years the Oceana Silver Mining Co extracted approximately 1000t at 39% Pb and 14.5oz/t Ag. A further 517t of lead ore was mined between 1896–99 by Oceana Pty Ltd. No further significant production from the Oceana Mine occurred until 1954 when Zeehan Mines Pty Ltd (a joint venture between North Broken Hill and Broken Hill South) reopened the old workings, following a successful exploration drilling program. Zeehan Mines extracted a total of 128 177t at 11.6% Pb and 4.79oz/t Ag up to 1960 when the mine closed again.

The Cyprus exploration program focussed on carbonate hosted lead–zinc–silver mineralisation within their EL 4/78. During the 10 years of this licence's tenure Cyprus undertook a major program of geological mapping, geochemistry (bedrock auger and costean sampling) geophysics (IP, EM, gravity and magnetics surveys) and diamond drilling (25 holes for a total of 6690m) within the current area of RL 8809. This work culminated in the delineation of an ore resource of:

	tonnes	Pb%	Zn%	Ag g/t
3550 – 3700mN	2 297 000	7.1	2.5	48
3200 – 3450mN	750 000	12.0	4.0	89
Total	3 047 000	8.3	2.9	58

Significant untested potential for similar mineralisation was also recognised over several other prospects, including Oceana South, Austral and Pyramid.

Since RL 8809 was granted, Hudspeth (Arimco) have not undertaken any significant work, due to the prevailing unfavourable mineral economics associated with the ore resource, outlined above.

4. GEOLOGY

4.1 Regional Setting

The regional geological setting of the Oceana area is well described in Blissett (1962), Taylor (1983) and Jones (1988).

To summarise, the Gordon Limestone lies at the top of the Junee Group of Ordovician sediments (Fig. 4) above the Mt Zeehan Conglomerate and Moina Sandstone, and is overlain by the Eldon Group sediments of Silurian to Devonian age. Whilst the contact between the Gordon Limestone and the Crotty Quartzite (the base of the Eldon Group) may be locally disconformable, there do not appear to be major structural breaks through this sequence.

Underlying the Junee Group is: the Cambrian Dundas Group, a mixed sedimentary and volcanic sequence; the Eo-Cambrian Crimson Creek Formation, deep marine mudstones and turbidites; and Proterozoic Oonah Quartzites.

The Crimson Creek Formation may be the source of the metals that forms the Oceana orebody, amongst others in western Tasmania (Lees, 1992).

The Proterozoic Oonah Quartzite has recently been interpreted (Findlay and Brown, 1992) as a Tabberabberan thrust sheet. This model has profound implications on both the reconstruction of regional geology and for mineral exploration.

Work conducted by the Mines Department has identified several other major thrusts in the South Zeehan area, which indicates that the thrusting is of regional importance. These features have significant implications for regional mineral exploration.

PERMIAN
 SILURIAN/DEVONIAN
 SILURIAN
 ORDOVICIAN
 CAMBRIAN
 PROTERZOIC

ELDON GROUP

JUNEE GROUP

DUNDAS GROUP

CRIMSON CREEK FORMATION

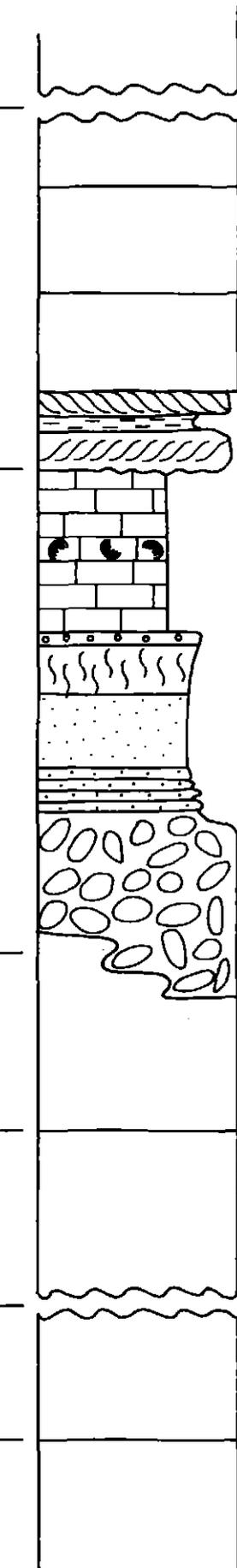
OONAH QUARTZITE

CONCERT SCHIST

~1500m

~500m

~500m



TABBERABBERAN OROGENY

folding and granite intrusive

BELL SHALE

FLORENCE QUARTZITE

AMBER SLATE

CROTTY QUARTZITE

GORDON LIMESTONE

MOINA SANDSTONE

MT. ZEEHAN CONGLOMERATE

(This contact is a time transgressive response to Tynnanland convergence and may be coeval with Dundas Group)

Mixed sedimentary, epistatic, volcanic sequence

Deep marine mudstones and turbidites

PENGUIN OROGENY

5 cm

 PASMINCO EXPLORATION <small>A Division of Pasminco Australia Limited</small>	
COMPILED : P.M.Q. DATE : Sept. 1992 DRAWN : G.M.B. REFERENCE : REVISIONS :	R.L. 8809 - OCEANA STRATIGRAPHIC COLUMN OF GORDON LIMESTONE REGIONAL CONTEXT
DRAWING No.	SCALE  m FIG. No. 4

4.2 Geology of Oceana

4.2.1 GEOLOGY OF OCEANA

Sedimentological work conducted last season determined that the sequence from the Mt Zeehan Conglomerate to the top of the Gordon Limestone (and possibly including the Crotty Quartzite) is conformable. No major structural breaks were indicated. Lithological variation is due to lateral facies change complicated by differing tectonic conditions.

The sedimentological study concluded that the depositional environment was marine, sub-tidal, had high biological activity indicating oxygenated water, and was close to a terrigenous source. Much of the deposition involved turbulent suspension currents. An off-reef basin was inferred.

Three types of mineralization were observed:

- i post lithification vein or fracture fill;
- ii fine to coarse disseminated to massive sulphides in mudstone;
- iii coarse open space filling and bioclast replacement

A syngenetic origin for mineralisation was ruled out due to the presence of bioturbation indicating an oxygenated environment.

4.2.2 GORDON LIMESTONE STRATIGRAPHY AT OCEANA.

A stratigraphy has been developed for the Gordon Limestone at Oceana. This is based on field mapping, the logging of several diamond drill holes during the previous season, and the drilling of holes OP1 and OP2 this period.

The stratigraphy is based on the area south of 3600mN (Oceana grid) which is less disrupted by faulting than the area to the north.

CLASSIFICATION

This classification is documented in (Quayle 1992) and is summarised as follows:

There are four main facies:

- i laminated carbonate sandstones;
- ii massive carbonate sandstones and siltstones;
- iii terrigenous sandstones and conglomerates.
- iv intercalated mudstones and carbonates.

Mudstone refers to dolomitic, carbonaceous siltstones with a fine terrigenous component, generally dark grey to black in colour.

Carbonate refers to a generally calcite-cemented siltstone, sandstone or conglomerate composed of bioclastic debris, generally pale grey in colour.

Intercalated mudstone and carbonate are by far the most abundant facies type.

A drillcore logging scheme has been developed using the following criteria:

- mudstone to carbonate ratio;
- grainsize of carbonate component;
- bed thickness;

and the presence of :

- tube mottled bioturbation – (worm burrows);
- sculpture mottled bioturbation – (sediment surface dwellers);
- slump sheared texture – (soft sediment slumping wispy texture);
- coarse shell beds – (bioclastic turbidites);
- bioclastic breccia – (reefal debris flows);
- in-situ corals or stromatolites;
- fine mudstone laminae in otherwise massive carbonates;
- stylolites;
- terrigenous component.

SUMMARY OF STRATIGRAPHY

A stylised stratigraphy (Fig. 5), may be described as follows:

The top of the Moina Sandstone is characterised by massive quartzose sandstone, bands of accumulated worm burrows, and upwards coarsening white quartz pebble conglomerate.

CROTTY QUARTZITE

rare Zn rich position associated with cavities?

predominantly sculpture mottled bioturbation

GORDON LIMESTONE

Pb, Ag rich mineralised below bioclastic debris flow

predominantly tube mottled bioturbation

Pb, Ag rich mineralisation with dolomite-siderite ankerite gangue spatially associated with bioclastic debris flows

predominantly sculpture mottled bioturbation

MOINA SANDSTONE

fluvial cross bedded sandstones to siltstones

variable: carbonate-dolomitic carbonaceous, siltstones and sandstones

insitu corals and stromatolites

typically well bedded

coarse grained bioclastic debris flow with coral, stromatolites and coarse shell fragments

variable carbonate-mudstone and sandstone-siltstone ratios

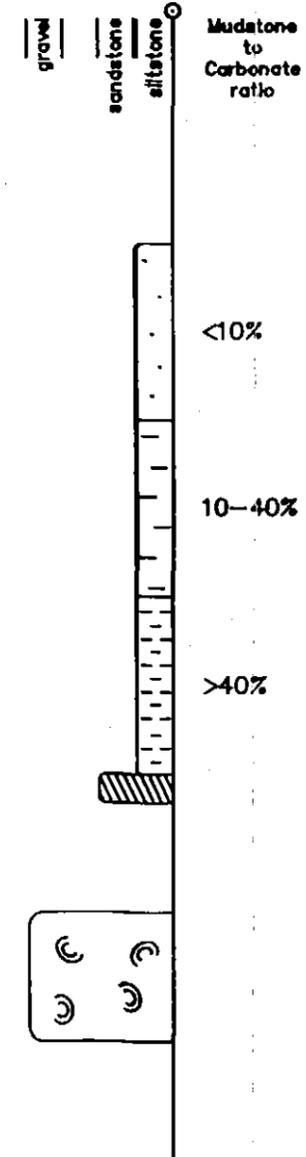
occasional repetition of bioclastic debris flow

quartz pebble sandstones derived from Moira Sandstone

distinctive: upwards coarsening white quartz pebble conglomerate, worm burrowed sandstone and massive quartzose sandstone

generally sharp boundaries but components grade throughout

LEGEND



- tm = tube mottled bioturbation
- sc = sculpture mottled bioturbation
- ss = slump shearing
- wb = well bedded
- lam = finely laminated
- csb = coarse shell beds
- sty = stylolites

Intercalated bands of mudstone and carbonate where:

Mudstone = partly dolomitic carbonaceous siltstone with fine terrigenous component (dark grey to black)

Carbonate = generally calcite cemented silt to sand to gravel size bioclastic shell and coral debris (pale grey)

Finely laminated carbonate

Coarse bioclastic debris coral-stromatolite-bivalves

5 cm

PASMINCO EXPLORATION <small>A Division of Pasminco Australia Limited</small>	
COMPILED: P.M.O.	R.L. 8809 - OCEANA STRATIGRAPHIC COLUMN GORDON LIMESTONE
DATE: Sept., 1993	
DRAWN: G.M.B.	
REF.:	
REVISIONS:	
DRAWING No.	SCALE
	FIG. No. 5

The contact with the Gordon Limestone is not clearly exposed, but the rapid change from upwards coarsening Moina Sandstone to limestone is thought to reflect a "jog" from the influence of one growth fault to that of another further inland.

In most part the Gordon Limestone consists of subtle variations in carbonate : mudstone, and siltstone : sandstone ratios. A subtle stratigraphy however does exist, based on a central distinctive bioclastic debris flow. A second, lower bioclastic breccia occurs locally although this may be due to fault repetition or facies variation.

Sculpture mottled bioturbation tends to be dominant at the base of the limestones, and from the bioclastic debris flow to the Crotty Quartzite contact. Tube mottled bioturbation tends to be dominant below the bioclastic debris flow, and slump shearing occurs immediately below the debris flow. Massive carbonate grading upwards to a distinctive carbonate with fine mudstone partings occurs peripheral to the bioclastic debris flow.

Minor in-situ corals and stromatolites occur in mudstones close to and above the bioclastic breccia.

Terrigenous components, including minor bands of quartzitic sandstone, and distinctive quartz conglomerate bands occur close to the Moina Sandstone contact, and to a lesser extent minor sandstone beds occur towards the Crotty Quartzite contact.

The main mineralization appears to occur immediately below the main bioclastic debris flow, or peripheral to the lower bioclastic breccia. Minor zinc rich mineralisation occurs both higher in the sequence close to the Crotty Quartzite contact, and lower close to the Moina Sandstone contact.

5 WORK COMPLETED: SEPTEMBER 1992 – AUGUST 1993

5.1 Diamond Drilling

Two diamond drill holes have been completed during the year, totalling 704.7m, as follows:

OP1 270.7m

OP2 425.0m

Both holes were targeted at combined geological and geophysical features.

The first hole was drilled over 600m south of the closest "ore" intersection, to test a new geological model. The second hole was drilled 100m south of the "line of lode" to test for the southern continuation of mineralisation.

The best intersection was 11.9m (5m true width) at 2036ppm Zn, and 200ppm Pb in OP1.

5.1.1 DDH OP1

OP1 (Fig. 7) was designed to test a model which proposed a continuation of the South Oceana line of mineralisation within Gordon Limestone which had been overthrust by Moina Sandstone. It was designed to intersect the entire Gordon Limestone sequence from the Crotty Quartzite in the east, to the conformable contact with the Moina Sandstone in the west, below the postulated thrust. Results showed that the thrust did exist, but at a considerably steeper angle than expected. OP1 intersected the thrust, and not the conformable contact between the Gordon Limestone and the Moina Sandstone.

The thrust is a zone approximately 20m in true thickness with 10m of quartzose sandstone rubble (Moina Sandstone) and 10m of black decomposed limestone. The limestone, whilst retaining "ghost" primary features, was entirely plastic and when removed from the core tube, it was cut with a knife to fit in the core boxes. The limestone part of the fault zone is anomalous in base metals with maximum assay values of:

3850ppm Zn, 750ppm Pb, 6ppm Ag, 20.4% Fe and 1.1% Mn.

Background values in the Gordon Limestone, which occur as close as a few centimetres to the main Oceana ore lenses, rarely exceed a hundred ppm Pb and Zn. No observable mineralisation was intersected below the South Oceana position on surface. However

there are two minor anomalous EM responses above the hole in the fault position.

The original target of mineralisation in the Gordon Limestone below the thrust is not yet tested and the premise is enhanced by the results from

OP1. Such mineralisation would be at least 350m below surface.

OP1 conformed with the stratigraphy developed at Oceana. The sequence is dominated by a "sculpture mottled" bioturbation texture in banded carbonate and dolomitic-carbonaceous, siltstones and sandstones. The existence of bands of finely laminated carbonates, and coarse shell beds close to the fault suggests that the position of the coarse bioclastic debris flow is close by.

5.1.2 DDH OP2

OP2 (Fig. 8) was designed to test for the southern strike extension of the Oceana mineralisation. The target also coincided with a negative magnetic anomaly and an offset positive gravity anomaly, from which Leaman (in Quayle 1992) has inferred a zone of alteration, and a structural offset.

The drill hole did not intersect observable mineralisation, the highest value analysed is 67ppm Pb. Also no significant structures were intersected with the exception of intense weathering close to the Crotty Sandstone contact, and faulting close to the Moira Sandstone contact.

OP2 has demonstrated the difficulties in predicting the location of mineralisation in carbonate hosted deposits. Dolomite, ankerite and siderite gangue does not extend more than a few tens of centimetres from ore lenses and neither does anomalous geochemistry.

OP2 conforms to the Oceana-Gordon Limestone stratigraphy as follows:

(from base of hole up stratigraphy)

- i a zone dominated by carbonate, with abundant stylolites, "sculpture mottled" bioturbation, and minor quartz pebble sandstone to conglomerate beds;
- ii a zone dominated by dolomitic-carbonaceous siltstones with "tube mottled" bioturbation, with minor finely laminated carbonates;

- iii a zone of coarse bioclastic debris flows;
- iv a zone of dolomitic-carbonaceous siltstones with minor finely laminated carbonates, and minor insitu corals and stromatolites;
- v a zone of stylolitic carbonates with minor "sculpture mottled" bioturbation.

Both drill holes were disappointing in that they did not intersect significant mineralisation. It is possible that both targets still exist at greater depths than were drilled. However, further testing of potential targets is not a priority, at this time.

5.2 Sampling

Two samples were taken from the Moina Sandstone worm-burrowed unit close to the Gordon Limestone contact. The purpose of these samples was to resolve the anomalous density at this location, noted by Leaman (in Quayle 1992), also high SG measurements were recorded for these samples. These measurements which were found to be erroneous as the samples contained 98% and 99% SiO₂ respectively. Leaman's anomalous density is yet unresolved.

Two samples were taken of fault rock:

- A from the Oceana Fault 300m from the ore body;
- B from the South Oceana Fault 180m from the ore body.

Assay results (in ppm) are as follows:

- A 9 Cu, 175 Pb, 69 Zn, <1 Ag, 45 Mn
- B 6 Cu, 1350 Pb, 150 Zn, 2 Ag, 15 Mn

Results for the South Oceana Fault are anomalous for Pb, Zn and Ag. A detailed programme of sampling of faults away from the mineralised horizon could indicate which faults have transected mineralisation.

Four samples of gossan were taken from between the Oceana Mine shaft and the Oceana fault. A fifth sample of gossan was taken from within the Amber Slates to the east of South Oceana. The purpose of this sampling was to categorise Oceana ore, and to compare it to other gossan occurrences close by. Results (Table 1) do not show any similarities between Oceana and Amber Slate gossans.

TABLE 1

OCEANA SAMPLING 1992 - 1993

gossans from Oceana line of lode

sample	Cu	Pb%	Zn%	Ag	Au	Fe%	Mn	Ba	As	Sn	W
31467	540	9.4	0.7	165.0	<0.008	41.50	38500	55	8	40	<5
31468	330	14.6	4.1	155.0	<0.008	26.50	75500	<10	2	7	
31469	50	3.3	1.4	<10	<0.008	38.70	25500	120	10	8	5.5
31470	20	4.8	1.0	10.0	<0.008	33.30	74000	120	4	25	5.5

gossan from Amber Slate

31471	<20	0.1	0.1	<10	0.01	49.70	5600	470	15	<3	<5
-------	-----	-----	-----	-----	------	-------	------	-----	----	----	----

5.3 Geophysics

Geophysical investigations included: an infill gravity survey of 66 readings; an aeromagnetic and radiometric survey of 125 line kms; the collection of physical property readings from diamond drillcore and down hole EM surveying of drill holes OP1 and 2.

5.3.1 GRAVITY

A gravity survey of 66 stations peripheral to the Oceana grid was carried out. Specifications of this survey are detailed in Appendix 6. Stations were positioned by a surveyor during acquisition of the gravity data with an accuracy of better than 0.1m in all three coordinates.

The purpose of this survey was to place the existing detailed grid surveys in a more regional context and also to provide critical information pertaining to the Oceana Fault, and the Moina Sandstone / Gordon Limestone contact.

Unfortunately the recent survey uncovered discrepancies in the location of the values of

the existing Oceana grid data set. This has limited the ability to correlate data sets (Appendix 9). Richardson has suggested a coordinate correction scheme (Appendix 8), and gravity values and locations are plotted (Fig. 9) by correction from a known point on the old grid.

Results from this survey are discussed in Leamans report (Appendix 9), and are summarised in section 5.3.4 below.

5.3.2 PHYSICAL PROPERTIES

Specific gravity and magnetic susceptibility data from diamond drill core collected during this period are listed with the drill logs (Appendix 4). The average values for physical properties of Gordon Limestone are listed below:

	number of samples	average value
SG	21	2.7
Magnetic Susceptibility	224	0.0026

5.3.3 AEROMAGNETICS

A magnetic and radiometric survey was flown over Oceana RL 8809 to following specifications:

Aircraft;	Aerospatiale Squirrel 350B
Survey size;	125 line Kilometres
Line Spacing;	100m
Tie Line Spacing;	1000m
Flight Line Direction;	90° AMG
Tie Line Direction;	Orthogonal to traverse lines
Navigation;	DGPS
Nominal sensor terrain clearance;	80m above tree conopy
Nominal aircraft speed;	40m per second

Plans of flight lines and contoured values are enclosed (Figs. 16 and 17). Results are discussed in Leaman (Appendix ⁹8) and are summarised below.

5.3.4 Combined Gravity and Magnetic Interpretation

A combined gravity and magnetic interpretation of the Oceana data was conducted by Leaman Geophysics (Appendix 9). The study used the following data sets:

- 1 ground magnetics;
- 2 airborne magnetics;
- 3 gravity.

The purpose of this study was as follows:

- a to produce a regional evaluation;
- b to update the 1992 local scale interpretation;
- c to assess the applicability of correlation between various data sets, and review the usefulness of each set;
- d to review the specifications of the various surveys.

REGIONAL CONCLUSIONS

Leaman proposes the existence of two primary structures, a NW/SE, and a NE/SW trending structure.

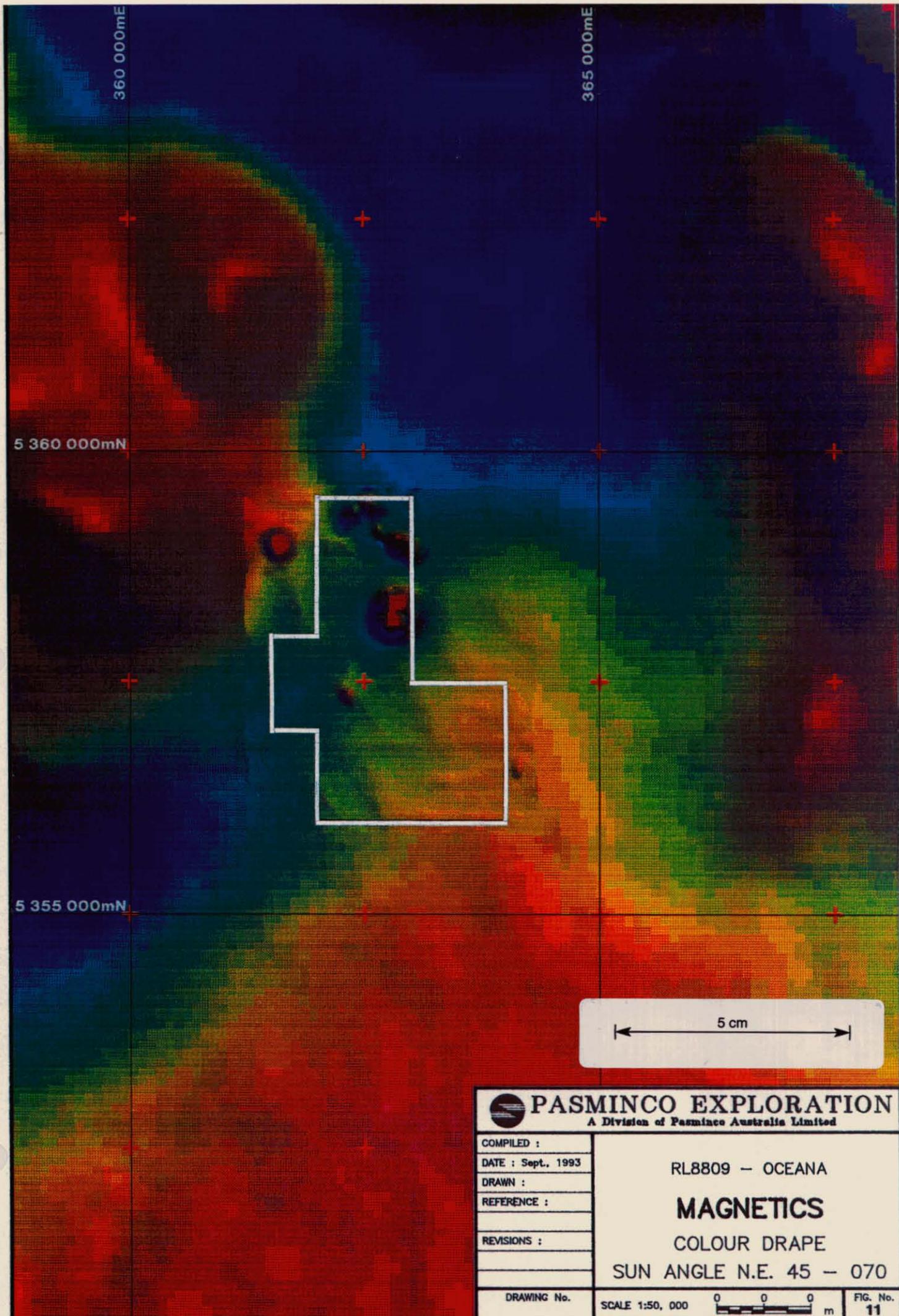
The NW/SE structure is parallel to the mineralising axis, and to spine of Heemskirk Granite. Leaman interprets this as a primary structural/depositional control active in the late Cambrian, possibly a basin margin, which is later occupied by Devonian granite.

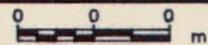
The NE/SW structure now evident as the Oceana Fault transects the NW/SE structure although it may be synchronous. Leaman suggests that a thin slice of ultramafics occurs to the south east of the Oceana Fault.

CORRELATION

Leaman demonstrates that the three data sets all provide distinct and different information but stresses that all three sets are necessary to resolve regional geological complexities.

The ground magnetic survey provides a subtle, fine texture, that is lost in the aerial magnetic data set. The aerial magnetic data set reflects different, deeper source trends, but is in places dominated by cultural effects. The gravity set provides different patterns again, and lends constraints to possible magnetic solutions.



 PASMINCO EXPLORATION A Division of Pasminco Australia Limited	
COMPILED : DATE : Sept. 1993 DRAWN : REFERENCE : REVISIONS :	RL8809 - OCEANA MAGNETICS COLOUR DRAPE SUN ANGLE N.E. 45 - 070
DRAWING No.	SCALE 1:50,000 
FIG. No. 11	

Leaman stresses that only the ground magnetic data should be used in defining exploration targets.

Suggested specifications are listed in (Appendix 9), together with a set of profiles across the licence, and a discussion of local implications.

5.3.5 DHEM

Diamond Drill holes OP1 and OP2 were both surveyed with the Crone system, using east and west transmitter loops (see Appendix 6).

Axial components of the secondary magnetic field were measured for OP1, whereas all three orthogonal components of the decay of the secondary magnetic field were measured for OP2.

Results for OP1 do not indicate a response due to significant accumulations of conductive material.

Two zones of interest do however occur in OP1, as follows:

- i At 90m depth a sign reversal of a cross-over response was observed between the west and east loops. This indicates a weakly conductive feature above the hole with an orientation sub-parallel to the hole. This anomaly possibly corresponds to mineralisation from the South Oceana line caught up in the reverse fault (Fig. 7).
- ii At 160m a very small conductive feature is indicated, vertically oriented above and close to the hole. This again possibly reflects mineralisation within the reverse fault.

Optimistically, the above anomalies could suggest that the South Oceana line of mineralisation, evident in costeans, is the overthrust part of an ore lens existing below OP1.

Results for OP2 do not indicate significant accumulations of conductive material. However the responses in the early channels for both loops are increasing down the hole. This

indicates a conductive feature beyond the end of the hole, probably reflecting the Gordon Limestone/Moina Sandstone contact.

6 CONCLUSIONS

A model proposing a continuation of the South Oceana mineralisation, within Gordon Limestone, and overthrust by Moina Sandstone was drill tested. Results confirmed that the thrust did exist, but at a considerably steeper angle than expected. The thrust itself was intersected above the target position.

Anomalous mineralisation occurs within the thrust zone, and subtle anomalous DHEM responses indicate small conductive features above the drill hole in the position of the fault.

The original target of mineralisation in the Gordon Limestone below the thrust is not yet tested and the premise is enhanced by the results from this drilling. This mineralisation would however be at least 350m below surface.

The southern continuation of the Oceana mineralisation was drill tested. No signs of mineralisation or significant structures were intersected.

7 EXPENDITURE

Total expenditure on RL 8809 during the twelve months period to 31 August 1993, was \$168,701 bringing the total expenditure on the licence since the start of Pasminco Exploration's Joint Venture to \$238 823.

Details of the 1992-93 expenditure are as follows:

Personnel & Oncosts	39 940
Travel & Accommodation	2 209
Geological Consultants	7 482
Geochemical Assays	654
Geophysical Consultants	3 230
Survey (for gravity)	1 995
Geophysical Surveys	
- Airborne	5 562
- Ground	2 979
Image Processing	84
Downhole EM	2 342
Other Contractors	1 977
Drilling (including access, core processing & storage)	67 403
Stores & Supplies	1 502
Vehicles & Equipment	2 435
Tenement	524
Computing	1 902
Office Running Costs	10 156
Administration fee	15 336
Total	168 701

*Admin. Fee at 10%

Accumulated expenditure to 31/8/93 **238 823**

8 PROPOSED PROGRAMME AND BUDGET

No active fieldwork is proposed for the coming twelve months, due to in part to the continuing serious base metal price recession.

KEYWORDS

LEAD, SILVER, ZINC, LIMESTONE, FACIES MARINE SUB-TIDAL, FAULT, THRUST, CARBONATE HOSTED, ORDOVICIAN, DRILL DIAMOND, GEOPHYS GRAVITY, GEOPHYS MAGNETICS.

LOCATION

QUEENSTOWN SK5505

TENEMENT: RL 8809 OCEANA JV

ZEEHAN

REFERENCES

- Blissett, A.H. 1962. One mile geological map series. K/55-5-50. Zeehan. Explanatory Rep. Geol. Surv. Tas.
- Blissett, A.H. & Gulline, A.B., 1962 One mile geological map series. K/55-5-50. Zeehan Department of Mines, Tasmania.
- Findlay, R.H., & Brown, A.V., 1992. The 10th Legion Thrust, Zeehan District: Distribution, interpretation and regional and economic significance. Division of Mines and Mineral Resources - Report 1992/02.
- Jones, P.A., 1988, Geological Report Retention Licence Application Oceana - Austral Zeehan Tasmania. Unpublished Cyprus Report No.574, May 1988.
- Lees, T.C., 1992. Second Regional Study of West Tasmania. Pasminco Exploration Internal Report HW96
- Quayle, P.M., 1992. RL 8809 OCEANA JV - Annual Report for 12 month September 1992. Pasminco Exploration Report No. T92-14
- Taylor, S., 1983. Review of Amoco Exploration of Gordon Limestone in EL4/78 and Assessment of Pb-Zn Potential of Gordon Limestone in West-Central Tasmania. Unpublished EZ Report, March 1983.

APPENDICES

APPENDIX 1

Schedule RL 8809

SCHEDULE RL8809

Commencing at a south west corner of the area whose grid co-ordinates are 362 000 metres E. 5 356 000 metres N. thence grid north to 5 357 000 metres N. grid west to 361 500 metres E. again grid north to 5 358 000 metres N. grid east to 362 000 metres E. aforesaid again grid north to 5 359 500 metres N. again grid east to 363 000 metres E. grid south to 5 357 500 metres N. again grid east to 364 000 metres E. again grid south to 5 356 000 metres N. thence again grid west to the point of commencement.

APPENDIX 2

Analytical Reports

ANALABS

A Division of Inchope Inspection and
Testing Services Australia Pty Ltd

973035

ANALYTICAL DATA

Phone (004) 316837

14 Thirlwell St. COOEE TAS 7320

Fax (004) 316890

ANALYTICAL REPORT No.

111310.60.09033

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

INVOICE TO:

Pasminco Exploration
P.O. Box 886
BURNIE TAS 7320

ORDER No.

0191

PROJECT

3011

DATE RECEIVED

05/10/92

RESULTS REQUIRED

ASAP

No. OF PAGES
OF RESULTS

3

DATE
REPORTED

16/10/92

No.
OF COPIES

1

TOTAL No.
OF SAMPLES

4

SAMPLE NUMBERS

SAMPLE DESCRIPTION

ELEMENT/METHOD

31444/45

RD Prep : GP033;P4

Cs, Pb, Zn, Ag, Mn/GA140

31445/46

RD Prep : GP033;P4

Whole Rock Analysis/GY402

Pb, Bi, Sn/GX401

REMARKS

RESULTS

TO

Mr M Quayle
Pasminco Exploration
P.O. Box 886
BURNIE TAS 7320

RESULTS

TO

RESULTS

TO

AUTHORISED OFFICER

ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty Ltd
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX

REPORT NUMBER

REPORT DATE

CLIENT ORDER No

PAGE

111310.60.09033

15/10/92

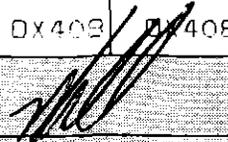
0191

1 OF 3

TUBE No	SAMPLE No	Cu	Pb	Zn	Ag	Mn	Al2O3	SiO2	TiO2	Fe2O3
1	31444	6	1350	150	2	15	-	-	-	-
2	31445	9	175	69	11	42	-	-	-	-
3	31465	-	-	-	-	-	0.84	98.0	0.10	0.48
4	31466	-	-	-	-	-	0.17	99.0	0.10	0.58
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	2	3	2	1	3	0.05	0.1	0.01	0.01
24	UNITS	ppm	ppm	ppm	ppm	ppm	%	%	%	%
25	METHOD	GA140	GA140	GA140	GA140	GA140	DX40B	DX40B	DX40B	DX40B

Results in ppm unless otherwise specified
 T = element present but concentration too low to measure
 X = element present but concentration is below detection limit
 - = element not determined

AUTHORISED OFFICER



ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty Ltd
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX

REPORT NUMBER

REPORT DATE

CLIENT ORDER No

PAGE

111310.60.09033

16/10/92

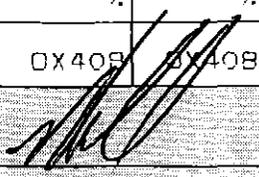
0191

2 OF 3

TUBE No.	SAMPLE No.	MnO	CaO	K2O	MgO	Na2O	P2O5	SO3	LOI	Total
1	31465	0.02	0.01	0.26	0.03	<0.05	0.006	0.04	0.26	100.00
2	31465	0.02	0.01	0.03	<0.01	<0.05	0.007	0.09	0.24	100.24
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	0.01	0.01	0.01	0.01	0.05	0.005	0.01	0.01	0.01
24	UNITS	%	%	%	%	%	%	%	%	%
25	METHOD	DX408								

Results in ppm unless otherwise specified
 I = element present, but concentration too low to measure
 X = element concentration is below detection limit
 - = element not determined

AUTHORISED OFFICER



ANALABS

A Division of Inchcape Inspection and Testing Services Australia Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX

REPORT NUMBER

REPORT DATE

CLIENT ORDER No.

PAGE

111310.60.09033

16/10/92

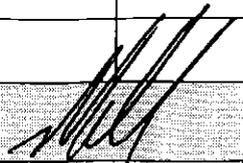
0191

3 OF 3

TUBE No.	SAMPLE No.	Sn	Sb	Ba					
1	31465	<3	<3	20					
2	31466	<3	<3	15					
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23	DETECTION	3	3	10					
24	UNITS	ppm	ppm	ppm					
25	METHOD	GX401	GX401	GX401					

Results in ppm unless otherwise specified
 T = element present, but concentration too low to measure
 X = element concentration is below detection limit
 — = element not determined

AUTHORISED OFFICER





ANALABS

A Division of Incharge Inspection and Testing Services Australia Pty. Ltd.

OCEANA - ROCK - OPI

973039

Phone (004) 316837

14 Thirkell St. COOEE TAS 7320

Fax (004) 316890

ANALYTICAL REPORT No. 111310.60.09125

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

INVOICE TO:

Pasminco Exploration
P.O. Box 886
BURNIE TAS 7320

ORDER No.

PROJECT

0194

3011

DATE RECEIVED

RESULTS REQUIRED

23/11/92

ASAP

No. OF PAGES OF RESULTS

DATE REPORTED

No. OF COPIES

TOTAL No. OF SAMPLES

3

22/12/92

1

12

SAMPLE NUMBERS

SAMPLE DESCRIPTION

ELEMENT/METHOD

31467/78

RC Prep : BP029,P1,P4

Cu,Pb,Zn,Fe,Ag,Mn/5A140

Cu,Pb,Zn,Fe,Ag,Mn,Mo,Mg,Bi,
Ca/5A104

As/6A114,Au/6E309

Sa,Sn,W/5X401,W/6M124

REMARKS

RESULTS

TO

Mr H Quayle
Pasminco Exploration
P.O. Box 886
BURNIE TAS 7320

SAMPLE NOS. 31468/70 WERE UNABLE TO BE ANALYSED BY METHOD GX401 DUE TO SPECTRAL INTERFERENCE.

RESULTS

TO

Mr F Fitzgerald
Pasminco Exploration
P.O. Box 886
BURNIE TAS 7320

RESULTS

TO

[Empty box for results recipient]

AUTHORISED OFFICER

ANALABSA Division of Incape Testing Services (Australia) Pty. Ltd.
A.C.N. 004 591 664**ANALYTICAL DATA**

SAMPLE PREFIX

REPORT No.

REPORT DATE

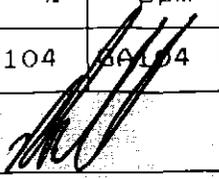
CLIENT ORDER No.

PAGE

SAMPLE PREFIX		REPORT No.				REPORT DATE		CLIENT ORDER No.		PAGE	
		111310.60.09123				22/12/92		0194		1 OF 3	
TUBE No.	SAMPLE No.	Cu	Cu	Pb	Pb	Zn	Zn	Fe	Fe	Ag	
1	31467	540	-	9.45	-	0.69	-	-	41.50	165	
2	31468	330	-	14.60	-	4.10	-	-	26.50	155	
3	31469	50	-	3.28	-	1.43	-	-	38.70	<10	
4	31470	20	-	4.84	-	0.97	-	-	33.30	10	
5	31471	<20	-	0.05	-	0.10	-	-	49.70	<10	
6	31472	-	21	-	2800	-	1900	>5.00	7.14	-	
7	31473	-	<2	-	235	-	835	0.90	-	-	
8	31474	-	<2	-	240	-	855	0.65	-	-	
9	31475	-	4	-	22	-	25	>5.00	20.40	-	
10	31476	-	19	-	125	-	1450	>5.00	13.10	-	
11	31477	-	14	-	135	-	1300	>5.00	18.20	-	
12	31478	-	71	-	455	-	3150	3.10	-	-	
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23	DETECTION	20	2	0.01	3	0.01	2	0.01	0.01	10	
24	UNITS	ppm	ppm	%	ppm	%	ppm	%	%	ppm	
25	METHOD	GA104	GA140	GA104	GA140	GA104	GA140	GA140	GA104	GA104	

Results in ppm unless otherwise specified
 T = element present; but concentration too low to measure
 X = element concentration is below detection limit
 - = element not determined

AUTHORISED
OFFICER



ANALYTICAL DATA

SAMPLE PREFIX

REPORT No.

REPORT DATE

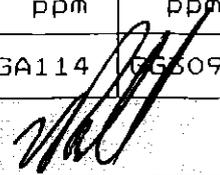
CLIENT ORDER No.

PAGE

TUBE No.	SAMPLE No.	Ag	Mn	Mn	Mo	Mg	Bi	Ca	As	Au	
		111310.60.09123				22/12/92	0194			2 OF 3	
1	31467	-	-	3.85	<50	4900	<100	1800	8	<0.008	
2	31468	-	-	7.55	<50	6350	<100	2800	2	<0.008	
3	31469	-	-	2.55	<50	1900	<100	1000	10	<0.008	
4	31470	-	-	7.40	<50	8550	<100	2200	4	<0.008	
5	31471	-	-	0.56	<50	330	<100	260	15	0.008	
6	31472	1	450	-	-	-	-	-	16	-	
7	31473	<1	990	-	-	-	-	-	1	-	
8	31474	<1	800	-	-	-	-	-	1	-	
9	31475	<1	>10000	1.10	-	-	-	-	2	-	
10	31476	<1	6350	-	-	-	-	-	8	-	
11	31477	<1	8700	-	-	-	-	-	11	-	
12	31478	2	63	-	-	-	-	-	60	-	
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23	DETECTION	1	3	0.01	50	25	100	25	1	0.008	
24	UNITS	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	
25	METHOD	GA140	GA140	GA104	GA104	GA104	GA104	GA104	GA114	G5509	

Results in ppm unless otherwise specified
 T = element present, but concentration too low to measure
 X = element concentration is below detection limit
 - = element not determined

AUTHORISED OFFICER



ANALABS

973042

A Division of Inchcape Testing Services (Australia) Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX

REPORT No.

REPORT DATE

CLIENT ORDER No.

PAGE

111310.60.09123

22/12/92

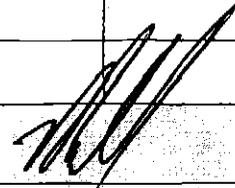
0194

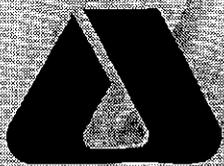
3 OF 3

TUBE No.	SAMPLE No.	Ba	Sn	W	W					
1	31467	55	40	<5	-					
2	31468	<10	7	-	<0.5					
3	31469	120	8	-	5.5					
4	31470	120	25	-	5.5					
5	31471	470	<3	<5	-					
6	31472	220	-	-	-					
7	31473	<10	-	-	-					
8	31474	<10	-	-	-					
9	31475	220	-	-	-					
10	31476	420	-	-	-					
11	31477	390	-	-	-					
12	31478	360	-	-	-					
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	10	3	5	0.5					
24	UNITS	ppm	ppm	ppm	ppm					
25	METHOD	GX401	GX401	GX401	GM124					

Results in ppm unless otherwise specified
 T = element present, but concentration too low to measure
 X = element concentration is below detection limit
 - = element not determined

AUTHORISED OFFICER





ANALABS

A Division of Incharge Inspection and
Testing Services Australia Pty. Ltd.
A.C.N. 004 501 864

Oceana OPI-OP2

973043

Phone (004) 316837

14 Thirkell St. CODEE TAS 7320

Fax (004) 318890

ANALYTICAL REPORT No. 111310.60.09241

THIS REPORT MUST BE READ IN CONJUNCTION WITH THE ACCOMPANYING ANALYTICAL DATA

INVOICE TO:

Pasminco Exploration
P.O. Box 886
BURNIE TAS 7320

ORDER No.

0198

PROJECT

3011

DATE RECEIVED

22/01/93

RESULTS REQUIRED

ASAP

No. OF PAGES
OF RESULTS

1

DATE
REPORTED

03/02/93

No.
OF COPIES

1

TOTAL No.
OF SAMPLES

14

SAMPLE NUMBERS

34704/717

SAMPLE DESCRIPTION

DC Prep : GP029,P4

ELEMENT/METHOD

Cu,Pb,Zn,Ag,Fe,Mn/GA140

RESULTS

TO

Mr M Quayle
Pasminco Exploration
P.O. Box 886
BURNIE TAS 7320

RESULTS

TO

Mr F Fitzgerald
Pasminco Exploration
P.O. Box 886
BURNIE TAS 7320

RESULTS

TO

REMARKS

OPI + OP2.

in Total.

AUTHORISED OFFICER

ANALABS

973044

A Division of Incharge Testing Services (Australia) Pty. Ltd.
A.C.N. 004 591 664

ANALYTICAL DATA

SAMPLE PREFIX

REPORT No.

REPORT DATE

CLIENT ORDER No.

PAGE

TUBE No.	SAMPLE No.	Cu	Pb	Zn	Ag	Fe	Mn	kde.id			
		111310.60.09241				03/02/93		0198		1	OF 1
1	34704	17	31	155	<1	4.27	1450	OP1	206.2	211.2	
2	34705	19	80	405	<1	9.19	3600		211.2	222.6	
3	34706	18	92	1300	<1	8.17	3650		214.2	216.9	
4	34707	16	37	825	<1	13.30	6250		216.9	218.7	
5	34708	18	51	500	<1	12.00	5000		218.7	220.2	
6	34709	18	84	1550	<1	18.40	8400			221.8	
7	34710	21	120	1150	1	13.90	6700		223.5	225.3	
8	34711	29	135	1600	1	2.09	105			227	
9	34712	29	250	2800	1	2.09	54			228.5	
10	34713	26	140	2550	1	2.23	49			230.4	
11	34714	215	750	3850	6	2.92	55		231.6	232.1	
12	34715	5	19	20	<1	1.80	960	OP2	199.6	200.7	
13	34716	8	67	7	<1	1.35	490	"	200.7	202.1	
14	34717	6	38	5	<1	1.55	520	"		202.8	
15											
16											
17											
18											
19											
20											
21											
22											
23	DETECTION	2	3	2	1	0.01	3				
24	UNITS	ppm	ppm	ppm	ppm	%	ppm				
25	METHOD	GA140	GA140	GA140	GA140	GA140	GA140				

Results in ppm unless otherwise specified
 T = element present; but concentration too low to measure
 X = element concentration is below detection limit
 - = element not determined

AUTHORISED OFFICER

APPENDIX 3**Oceana DDH Collar Coordinates and Down-hole Surveys**

OCEANA DDH COLLARS
1992 - 1993

HOLE	AMG_N	AMG_E	grid_N	grid_E	RL
OP1	5356867.41	362819.88	2795.0	1500.0	168.00
OP2	5357263.50	362463.23	3328.0	1500.0	193.00

OCEANA DOWN HOLE SURVEYS

OP1

DEPTH	DIP	AMG_AZ
0.0	-50.00	229.50
30.0	-51.00	232.50
60.0	-52.00	232.00
90.0	-52.50	231.50
120.0	-52.50	230.50
150.0	-52.00	229.50
180.0	-52.80	229.00
230.0	-53.00	229.00
270.0	-54.00	229.00

OP2

DEPTH	DIP	AMG_AZ
0.0	-50.00	229.50
30.0	-51.00	228.50
60.0	-51.00	227.50
90.0	-50.00	227.00
120.0	-49.00	225.50
151.0	-47.75	224.50
181.0	-46.75	223.50
211.0	-46.00	223.50
241.0	-43.50	221.50
271.0	-42.00	221.00
301.0	-39.25	220.00
331.0	-36.00	219.50
361.0	-33.25	219.50
391.0	-32.00	218.50
425.0	-32.75	218.00

APPENDIX 4

Diamond Drill Hole Logs

HOLE No. OPI

PASMINGO EXPLORATION DIAMOND DRILL CORE RECORD

LOCATION	OCEANA	OBJECTIVE To test a gravity/magnetic anomaly, and the geological model of the Gordon Limestone containing to the south overthrust by the Moira Sandstone. A secondary target is the down dip continuation of the South Oceana mineralization intersected in ^{from the Crotty Quartz} costeans. The hole is designed to traverse the Gordon Limestone to the Moira Sandstone.	LOCATION/SURVEY DATA (AMG)					
PROJECT	OCEANA		Grid	AMG	RL Collar m	168m		
PROSPECT	SOUTH OCEANA		Northing m	5,356,867.4	Bearing Collar	229.5° AMG		
DESIGNED BY	P M QUAYLE		Easting m	362,819.9	Dip Collar	-50		
LOGGED BY	P M QUAYLE		DH Survey Type	EASTMAN SINGLE SHOT			Length Hole m	279m
RELOGGED		RESULT						
COMMENCED	20-9-1992	The drill hole intersected the thrust contact between the Gordon Limestone and the Moira Sandstone. This is consistent with the geological model however the thrust was steeper than expected. The Moira Sandstone was intersected before the target depth so the target still remains at a greater depth below surface. Decomposed & sheared Gordon Limestone at the contact averaged up to 0.315% Zn and 20.4% Fe.						
COMPLETED	5-11-1992							
DRILLED BY	East Coast Drilling							
DRILL RIG	LM 38							

SIGNIFICANT INTERSECTIONS

From m	To m	Interval m	Pb ppm	Zn ppm	Fe %	Mn ppm	Comments
220.2	232.1	11.9	200	2036			} Within fault zone.
211.2	225.3	14.1			18%	5964	
							270 } casing in hole
							279.7 } E.O.H

SIGNIFICANT CORE LOSS

POOR GROUND CONDITION ZONES

From m	To m	% Lost	From m	To m	Condition
-	-	-	0	200.9	Consistently Broken Core.
-	-	-	200.9	232.1	Plastic decomposed limestone
-	-	-	232.1	279.4	Quartz sandstone rubble

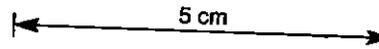
HOLE SIZE

HOLE CONDITIONS AFTER COMPLETION

Size	Depth m	Collar	Notes
HW <small>ream</small>	0-10	Steel Casing	Sealed steel pipe
HQ	0-99	PVC Casing	0-260m
NQ	99-260.8	Ground Water	Surface
BQ	260.8-279.7	Wedge	-
		Drill Pad	Site restored.

973048

**PALMINGO EXPLORA
DIAMOND DRILL CORE LOG**



HOLE No. OPI

PROJECT:

Graphic Scale 1: 200

Page 3 of 14

CORE RECOVERY				DESCRIPTION				MINERALISATION				CODES			
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.		LITHO	STRUCT	ALTN	MIN	
				0	9.8	Crotty Quartzite: bleached white to pale grey, well sorted, fine grained quartzose sandstone. Trace laminations in part, carbonaceous content increases towards 9.8m Structure: core is broken and there are several zones of sandy pug to decomposed rock. Contact: 90° to LCA, very sharp - faulted brittle shear.	9.8				Mudstone to Carbonate ratio <10%				
				9.8	11.6	Intercalated mudstone/carbonate: <10% mudst - cb = st/st - indistinct bioturbated txt - indistinct banding ~10 cms scale L's ~60° to LCA (bedding) Contact sharp at 60° to LCA.	11.6				10-40%				
				11.6	13	Massive carbonate: fg sst with minor irregular mudst patches - trace laminations at 12m, at 50° to LCA. Abund insitu fractures developing & breccia at 24.6m Sandy pug filled cavity at 22.7m Minor fossil weathered pits Contact: increased fracturing developed into breccia.	12.6				>40%				
				24.6	34	Breccia Zone: insitu intense fracturing of above interval.	24.6								
				28	4.8	Intercalated mudstone/carbonate: >40% mudst - cb, st - irregular sculpture mottling. core broken, indistinct banding at low angle to CA. Contact: shear pug	34.4								

Intercalated bands of mudstone and carbonate where:
Mudstone = partly dolomitic carbonaceous siltstone with fine terrigenous component. (dark grey to black)
Carbonate = generally calcite cemented silt to sand to gravel size bioclast shell and coral debris (pale grey)
Finely laminated carbonate

Trace eg pyrite cubes in fractures, and infilling shell cavities.

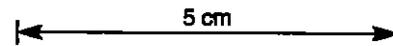
pyritic pug-shear 20° to LCA

Coarse bioclast debris coral-stromatolite-bivalves

- lm = tube mottled bioturbation
- sc = sculpture mottled bioturbation
- ss = slump shearing
- wb = well bedded
- lam = finely laminated
- cab = coarse shell beds
- sty = stylolite

973049

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG



No. 0P1

PROJECT: OCEANA

Graphic Scale 1: 200

Page 5 of 14

CORE RECOVERY				DESCRIPTION							CODES			
From m	Interval m	%	RCD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology Struct.		MINERALISATION	LITHO	STRUCT	ALTN	MIN
						vainlets. Contact: abrupt conformable.								
				61.3	11.4	Intercalated mudst/cb: <40% mudst - cb sst - distinct sculpture mottled bioturbation - bed thickness 3-10cms banding Δ 's 60' to LCA - Abundant coarse shell beds - Contact: gradational.								
				72.7	3.4	Intercalated mudst/cb - <40% mudst - cb sst, - bed thickness 5-10cms - sculpture mottled bioturbation - cb bands fine upwards (upside) from coarse shell beds do msv fg tops. Abundant 1cm biogenic? calcite spots. bedding Δ 's 40' to LCA. Minor carb veining Contact: conformable abrupt.								
				76.1	9.2	Intercalated mudst/cb - <40% mudst - cb fg sst - sculpture mottled bioturbation - bed thickness 3-10cms - minor coarse shell beds - Minor calcite veining. Contact: conformable abrupt.								
				85.3	3.2	Intercalated mudst/cb - <40% mudst - cb sst - well banded - cb msv with stylolites - minor coarse shell beds - minor calcite veining - bedding Δ 's 40' LCA. Contact: conformable abrupt.								
				88.5	5.6	Intercalated mudst/cb: <40% mudst - cb fg sst - sculpture mottled bioturbation with trace tube mottling. Minor coarse shell beds - minor calcite veining - Msv calcite vein								

073051

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

5 cm

No. OPI

PROJECT: OCEANA

Graphic Scale 1:200

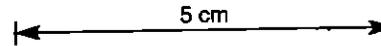
Page 6 of 14

CORE RECOVERY				DESCRIPTION										CODES			
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic		MINERALISATION	LITHO	STRUCT	ALTN	MIN			
								Lithology	Struct.								
						91.8-92.2m.											
						Contact: conformable abrupt.											
				94.1	5.4	Intercalated mudst/cb - <10% mudst - cb cg sst - sculpture mottled bioturbation - minor bioclasts - Minor bands of shear pug. Contact: conformable abrupt.	94.1										
							94.1										
				99.5	20.2	Intercalated mudst/cb: <10% mudst - cb msv sst - sculpture mottled bioturbation - cb bands >10cms - msv, stylolites. Zone of intense irregular fine calcite veining from 99.5 - 109.5m. Contact: conformable abrupt.	99.5										
							99.5										
				119.7	2.5	Intercalated mudst/cb: <40% mudst - cb sst - sculpture mottled bioturbation, irregular banding - abundant bioclasts, corals ± stromatolites. Contact: gradational.	119.7										
							119.7										
				122.2	3.0	Intercalated mudst/cb: <10% mudst - cb sst - sculpture mottled bioturbation - bed thickness 3-10cms. Minor irregular calcite veining. Contact: gradational.	122.2										
							122.2										
				125.2	9.3	Intercalated mudst/cb: <40% mudst - cb, sst - sculpture mottled bioturbation to well bedded - bed thickness 3-10cms - Minor carbonate veinlets throughout - Core broken on joints at 132.5 - 134m.	125.2										
							125.2										
				132.5			132.5										
							132.5										
				134.0			134.0										
							134.0										

973052

PASMINGO EXPLORATION DIAMOND DRILL CORE LOG

PROJECT: OCEANA



I-No. OPI

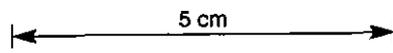
Graphic Scale 1: 200

Page 7 of 14

CORE RECOVERY				DESCRIPTION										CODES			
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic		MINERALISATION	LITHO	STRUCT	ALTN	MIN			
								Lithology	Struct								
						bedding \angle 's 40° to LCA - trace stylolites Contact: conformable - minor slump shearing.	130										
				134.5	1.2	Massive Carbonate: sst with stylolites + coarse shell beds. Contact: gradational.	134.5 135.7 137.6										
				135.7	1.9	Massive Carbonate: fg sst - trace stylolites. Contact: gradational.	141.9										
				137.6	4.3	Intercalated mudst/carb: $<40\%$ mudst - cb, cg sst - sculpture mottled bioturbation with stylolitized boundaries, irregular mottling, early cementation feature? Minor carbonate veining - minor coarse shell beds. Contact: conformable abrupt.	141.9 146.6 148.9 151.2										
				141.9	9.3	Intercalated mudst/carb: $<40\%$ mudst - cb, slt - sculpture mottled bioturbation with stylolitized boundaries - bedding \angle 's 40° to LCA - minor bands of bleached decomposed core at 146.6 + 148 m - Minor calcite veining - broken core. Contact: cavity.	151.2										
				151.2	.3	Cavity: water loss - no recovery.	151.5										
				151.5	3.1	Zone of intense calcite veining, fine irregular to massive.	154.6										

973053

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG



E-No. OPI

PROJECT: OCEANA

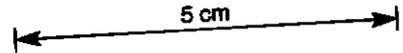
Graphic Scale 1: 200

Page 8 of 14

CORE RECOVERY				DESCRIPTION				MINERALISATION				CODES			
From m	Interval m	%	ROD	From m	Interval m	(incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.		LITHO	STRUCT	ALTN	MIN	
				154.6	4	Intercalated mudst/carb: <40% mudst - cb sst - sculpture mottled bioturbation with stylotized contacts - minor stylolites in fg sst. Bleached pug breccia zone with minor calcite veining. Contact: abrupt.	1574 151		ps						
				158.6	3	Coarse Shell Bed: aggregate of 1-10mm shell + coral fragments.	161		100% frags						
				158.9	6	Massive mudstone: with minor intercalated carbonate sst with slump shear towards 164m. Minor fine calcite veining. Contact: gradational.	1705 173		brn zone of low angle frags						
				164.9	5-6	Intercalated mudst/carb: <40% mudst - cb sst - irregular mixing + broken core.	1781								
				170.5	2-5	Intercalated mudst/carb: irregular laminations of mudst in carb - possibly slump shear effect (not true lam.) lam at ~30° to LCA Zone broken with fine calcite veining. Contact: not seen.									
				173	5-1	Intercalated mudst/carb: mudst >40% - cb fg sst - minor bands of massive mudst - trace lam at 178m at 40° to LCA. Very decomposed to pug in part brecciated in part. Contact: not seen.									

973054

PASMINCO EXPLORATION
DIAMOND DRILL CORE LC



OLE No. OPI

PROJECT: OCEANA

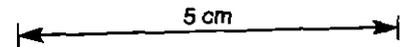
Graphic Scale 1: 200

Page 9 of 14

CORE RECOVERY				DESCRIPTION							CODES				
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN	
				178.1	6.1	Intercalated mudst/carb: <40% mudst - cb fg sst - sculpture mottled bioturbation to well bedded. - abundant bioclasts, 5-50um coral + shell ± stromatolite fragments. Zone decomposed to puggy in part. Shear with angular 0.5-2um quartz grains at 179.3m. Contact: conformable abrupt.	178.1		<p>178.1-184.2</p> <p>184.2-185.1</p> <p>185.1-189.5</p> <p>189.5-191.4</p>						
				184.2	0.9	Massive laminated carbonate: abndnt slump sheared laminations in msv carb sst. Contact: shear	184.2		<p>184.2-185.1</p>						
				185.1	4.4	Intercalated mudst/carb: - <40% mudst - fg sst - zone is sheared in part with decomposed pug in part. Ghost bioclastic texture. Contact: not seen.	185.1		<p>185.1-189.5</p>						
				189.5	1.9	Laminated mudst partings in fg carb sst. (fine // lam, not slump shear) L's 40° to LCA. Contact: not seen.	189.5		<p>189.5-191.4</p>						
				191.4	9.5	Massive carbonate: fg sst - core very broken on fractures ~30° to LCA. Contact: abrupt colour change - mid grey to (Fe) brown.	191.4		<p>191.4-200.9</p>						
				200.9	10.1	Partially decomposed core: broken to pug in part. Significant feature is brown mineral resembling sphalerite in part, apparently replacing indistinct bioclastic shapes or appears to be pervasive through rock like an	200.9		<p>200.9-211.0</p>	fg brown mineral resembling sphalerite in part - replacing bioclastic shapes in part, + pervasive thru rock like					

973055

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG



LE No. OPI

PROJECT: OCEANA

Graphic Scale 1: 200

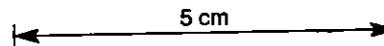
Page 10 of 14

CORE RECOVERY				DESCRIPTION				CODES						
From m	Interval m	%	RQD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTH	MIN
						Fe stain weathering front. (Contact: coarse in-situ breccia, and abrupt change in appearance - may represent increase in influence of shearing in a similar rock type. - Ankerite + dolomite alteration.	2097			(Sample 31475 >10,000ppm Mo) Fe stain weathering front.				
				211	13.8	Totally decomposed rock: grey brown massive rock, when first drilled was plastic but retained ghost (possibly) bioclastic texture + ghost jointing so decomposition was in-situ? When dry rock becomes friable. Zone contains irregular patches of brown mineral. Minor zones of in-situ brecciation. Contact: abrupt conformable. Alteration: minor ankerite-dolomite.	211			Trace very fine grained disseminated pyrite - Trace vfg dis sp? abundant unidentifiable brown mineral?				
				224.8	7.3	Totally decomposed rock: dark grey - plastic when drilled - friable when dry. 225.8-226.8 zone contains abundant 1-3mm angular white quartz grit - increasing towards contact at 232.1m. Minor ghost breccia texture. Indistinct pyrite in part. Contact: brittle fault breccia ~ 30° to LCA. Alteration: minor ankerite-dolomite.	224.9			Minor fine disseminated pyrite - indistinct. Minor granulated aggregates of vfg dis. py. Pyrite is indistinct and may be abundant.				
				232.1	-	MOINA SANDSTONE - Zone very broken + brecciated - contains framework supported white quartz grit (not typical qtz conglomerate seen at normal conformable contact) overlain by pale grey fg. siliceous sandstone with minor bands +	232.1							
							232.5							

973056

PROJECT: OCEANA

PASMINCO EXPLORATI
DIAMOND DRILL CORE I

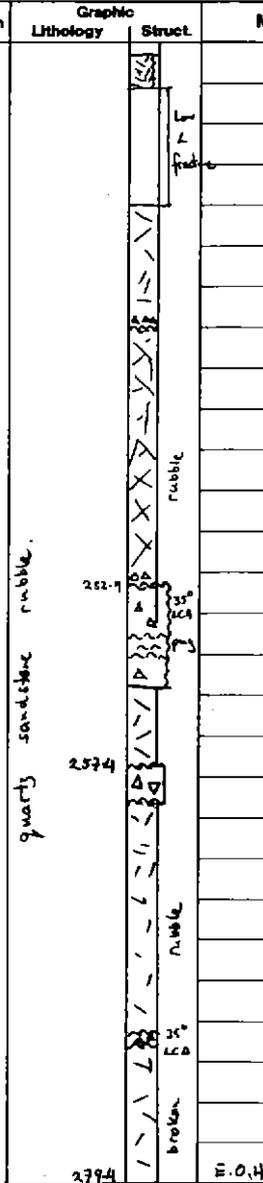


HOLE No. OPI

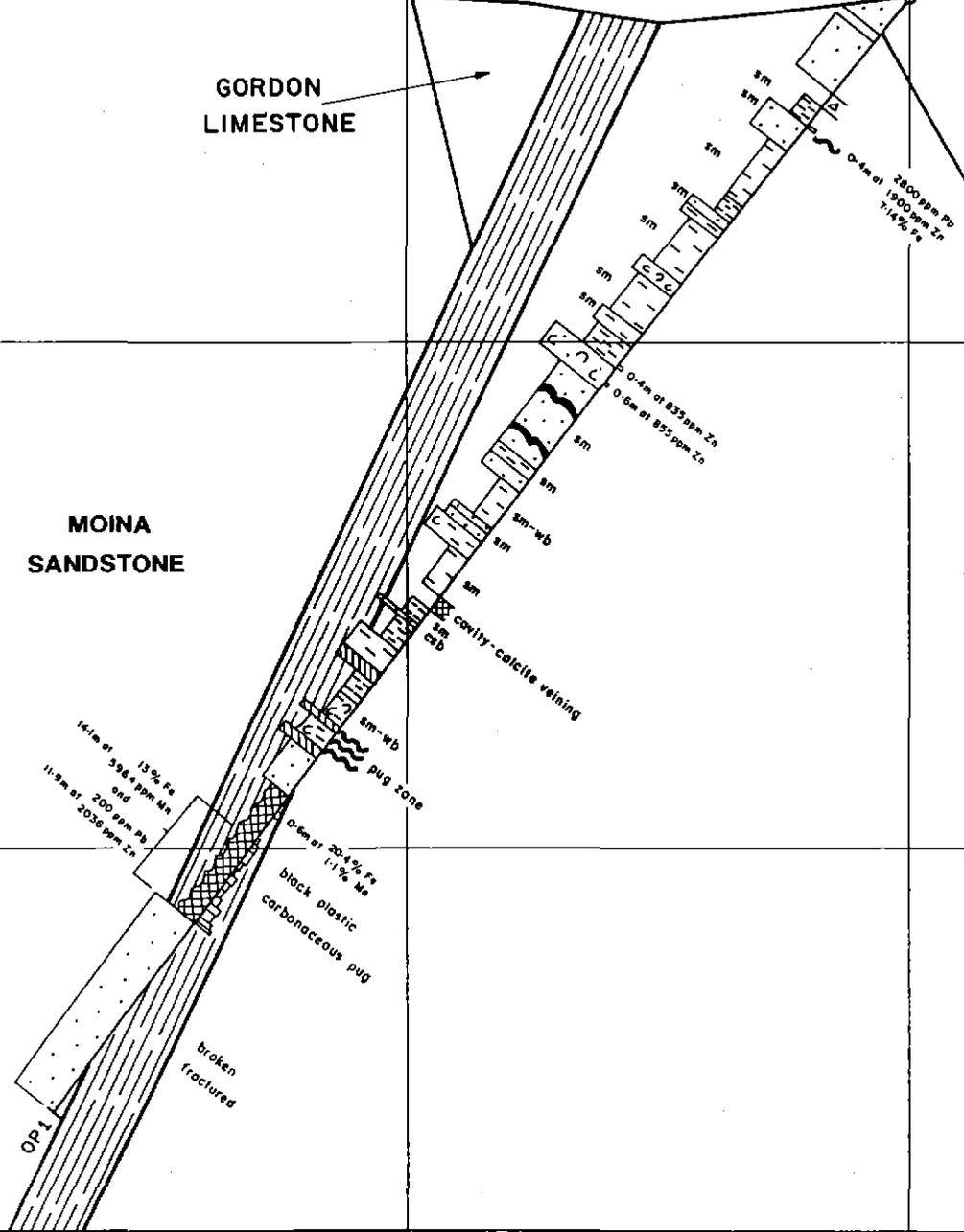
Graphic Scale 1:

Page 11 of 14

CORE RECOVERY				DESCRIPTION										CODES			
From m	Interval m	%	RQD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic		MINERALISATION	LITHO	STRUCT	ALTN	MIN			
								Lithology	Struct.								
						wisps overlain by massive buff coloured sandstone, siliceous but with carbonate component in matrix.											
				233.4	-	Redrill - contains contact - brittle fault.											
				254.5	44.9	Moina Sandstone: core very broken to rubble, texture mostly obliterated - but variable from massive coarse grained siliceous quartzose sandstone to fine grained grey siliceous sandstone. bedding α 's at 274.5 = 45° to LCA.											
				279.4	-	E.O.H.											



973057



CROTTY QUARTZITE

MOINA SANDSTONE

GORDON LIMESTONE

973058

973059

DDH OP1 ore suite (values in ppm)

from	to	sample	Cu	Pb	Zn	Ag	Fe%	Mn	Ba	As
32.80	33.20	31472	2	2800	1900	1.0	7.14	450	220	16
93.20	93.60	31473	<2	235	835	<1	0.90	990	<10	1
97.30	97.90	31474	<2	240	855	<1	0.65	800	<10	1
204.20	205.80	31475	4	22	25	<1	20.40	11000	220	2
208.20	211.20	34704	17	31	155	<1	4.27	1450		
211.20	212.60	34705	19	80	405	<1	9.19	3600		
212.60	214.20	31476	19	125	1450	<1	13.10	6350	420	8
214.20	216.90	34706	18	92	1300	<1	8.17	3650		
216.90	218.70	34707	16	37	825	<1	13.30	6250		
218.70	220.20	34708	18	51	500	<1	12.00	5000		
220.20	221.80	34709	18	84	1550	<1	18.40	8400		
221.80	223.50	31477	14	135	1300	<1	18.20	8700	390	11
223.50	225.30	34710	21	120	1150	1.0	13.90	6700		
225.30	227.00	34711	29	135	1600	1.0	2.09	105		
227.00	228.50	34712	29	250	2800	1.0	2.09	54		
228.50	230.40	34713	26	140	2550	1.0	2.23	49		
230.40	231.60	31478	71	455	3150	2.0	3.10	63	360	60
231.60	232.10	34714	215	750	3850	6.0	2.92	55		

DDH OP1

SPECIFIC GRAVITY

depth S.G.
 13.00 2.76
 45.30 2.46
 74.20 2.71
 120.10 2.72
 160.10 2.73
 197.00 2.80
 234.60 2.61
 274.60 2.61

CORE RECOVERY AND MAGNETIC SUSCEPTIBILITY

from to % rec depth mag-sus
 0 2.4 17
 2.4 3.2 50
 3.2 3.3 100
 3.3 4.3 50
 4.3 5.8 20
 5.8 6.2 75
 6.2 7.4 50
 7.4 8.3 56
 8.3 9.4 23
 9.4 11.5 76
 11.5 13 100
 13 14.8 72
 14.8 16.3 100
 16.3 16.7 100
 16.7 17.8 95
 17.8 19.3 67
 19.3 20.8 60
 20.8 21.6 75
 21.6 22.7 100
 22.7 24.6 58
 24.6 25.8 8
 25.8 26.8 60
 26.8 27.4 58
 27.4 27.9 40
 27.9 29.5 100
 29.5 30.4 111
 30.4 31.6 92
 31.6 32.8 83
 32.8 34 83
 34 35.8 78
 35.8 39.4 1
 39.4 40.6 75
 40.6 41.2 83
 41.2 41.8 100
 41.8 42.6 18
 42.6 43.3 86
 43.3 43.9 92
 43.9 44.8 13

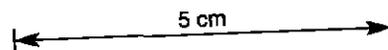
depth	S.G.	mag-sus	depth	mag-sus															
44.8	46.3	100	46.3	0.02	140.2	142.2	100	142.2	0.01	207.3	208.2	22	208.2	0.01					
46.3	47.6	100			142.2	144.1	100	144.1	0.02	208.2	209.6	71	209.6	0.02					
47.6	48.8	92			144.1	145.5	100	145.5	0.01	209.6	211.2	50							
48.8	49.6	25			145.5	146.5	100			211.2	212.3	91	212.3	0.01					
49.6	50.4	38			146.5	148.7	86	148.7	0.01	212.3	214.2	92	214.2	0					
50.4	50.8	100			148.7	151.2	40	151.2	0.01	214.2	216.9	72	216.9	0.01					
50.8	51.4	75			151.2	152	75			216.9	218.7	94	218.7	0.01					
51.4	52.5	91			152	153.2	75	153.2	0.01	218.7	220.2	93	220.2	0.01					
52.5	53.8	100			153.2	154	63			220.2	221.8	94	221.8	0.05					
53.8	53.9	100	53.9	0.01	154	154.5	40			221.8	223	79	223	0					
53.9	55.4	100	55.4	0.01	154.5	156.1	78	156.1	0.01	223	224.8	89	224.8	0					
55.4	56.8	100	56.8	0.01	156.1	157.3	92	157.3	0.01	224.8	227.9	95	227.9	0					
56.8	58.3	100	58.3	0.01	157.3	160.1	75	160.1	0.01	227.9	231	90	231	0					
58.3	58.5	75			160.1	161.4	100	161.4	0.01	231	232.2	100							
58.5	59.8	85	59.8	0.01	161.4	162.6	125	162.6	0.01	232.2	233.7	23							
59.8	61.3	93	61.3	0.02	162.6	163.2	33			233.7	234.1	50	234.1	0.01					
61.3	62	200	62	0.01	163.2	163.8	100	163.8	0.01	234.1	234.8	86	234.8	0.01					
62	64.3	65	64.3	0.01	163.8	165	67			234.8	235.8	90	235.8	0.01					
64.3	67.3	97	67.3	0.01	165	165.9	33			235.8	236.7	0							
67.3	68.8	100	68.8	0.01	165.9	166.4	50	166.4	0.01	236.7	238.2	7							
68.8	70.3	100	70.3	0.02	166.4	167	100			238.2	238.5	33							
70.3	71.8	100	71.8	0.01	167	167.6	67			238.5	239.3	30							
71.8	73.3	100	73.3	0.02	167.6	168.3	29			239.3	240.2	33	239	0.01					
73.3	74.8	93	74.8	0.01	168.3	169.2	17			240.2	242.3	14	238.5	0.01					
74.8	75.9	100	75.9	0.01	169.2	169.8	17			242.3	243.6	15							
75.9	76.5	83	76.5	0.02	169.8	170.3	60			243.6	244.2	33							
76.5	77.8	100	77.8	0.01	170.3	171.1	50			244.2	245.2	10							
77.8	79.3	100	79.3	0.01	171.1	172.2	91	172.2	0	245.2	246.1	11							
79.3	80.8	100			172.2	173.1	89			246.1	247	67	247	0.01					
80.8	81.8	100	81.8	0.01	173.1	173.6	71			247	247.2	100							
81.8	83.3	100			173.6	174.3	71			247.2	249.8	15							
83.3	83.8	100			174.3	175	100	175	0.01	249.8	251.1	15							
83.8	85.3	100	85.3	0.01	175	175.5	40	175.5	0	251.1	253.2	10							
85.3	86.8	100			175.5	177	60			253.2	254.7	13	254.7	0					
86.8	88.3	100			177	177.9	44			254.7	255.2	80							
88.3	89.8	100	89.8	0.01	177.9	179.1	67	179.1	0	255.2	255.8	42							
89.8	91.3	100	91.3	0.01	180.4	181.4	40			255.8	257.3	13							
91.3	92.8	100	92.8	0.01	181.4	182.4	10	182.4	0.01	257.3	257.8	100							
92.8	93.6	100	93.6	0.01	182.4	183.3	100	183.3	0.01	257.8	259	92	259	0.01					
93.6	94.8	100	94.8	0.01	183.3	186.3	68			259	259.1	100							
94.8	95.8	100	95.8	0.01	186.3	187.2	67			259.1	260.3	100							
95.8	97.3	100	97.3	0.01	187.2	188.4	92			260.3	260.4	100							
97.3	98	100	98	0.01	188.4	189.5	68			260.4	260.6	50							
98	98.8	100	98.8	0.01	189.5	189.6	100			260.6	260.7	100							
98.8	99.5	100			189.6	190.6	60			260.7	260.8	100							
99.5	100.2	100	100.2	0.01	190.6	191.4	75			260.8	260.9	100							
100.2	103.2	100			191.4	192	100			260.9	261.9	7							
103.2	105.2	98	105.2	0.01	192	192.4	75			261.9	266.5	23	266.5	0.01					
105.2	106.5	100	106.5	0.01	192.4	192.8	100			266.5	268.4	21							
106.5	108.5	100			192.8	193.7	36	193.7	0.04	268.4	270.9	16							
108.5	109.7	100	109.7	0.01	193.7	195.2	100			270.9	274.1	9	274.1	0.01					
109.7	111.5	100	111.5	0.01	195.2	195.5	100			274.1	275.1	100							
111.5	113.1	94	113.1	0.02	195.5	196.7	92			275.1	276.3	50							
113.1	114.1	100	114.1	0.01	196.7	197.9	83			276.3	276.7	13							
114.1	117.1	100	117.1	0.01	197.9	199	64			276.7	278.7	30							
117.1	120.1	100	120.1	0.01	199	199.9	56			278.7	279.3	33							
120.1	121.2	100	121.2	0.01	199.9	200.9	20	200.9	0.12	279.3	279.7	100							
121.2	124.2	100	124.2	0.01	200.9	201.9	70	201.9	0.09										
124.2	127.2	100	127.2	0.01	201.9	203.2	38	203.2	0.05										
127.2	129.5	93	129.5	0.01	203.2	204.2	30	204.2	0.18										
129.5	132.5	100			204.2	205.8	69												
132.5	133.8	100	133.8	0.01	205.8	206.5	14												
133.8	135.6	100	135.6	0.01	206.5	207.3	25												
135.6	137.2	94	137.2	0.01															
137.2	140.2	97	140.2	0.01															

Page
14 of 14

973060

PROJECT: OCEANA

PASMINCO EXPLORATION
DIAMOND DRILL CORE L



HOLE No. OP2

Graphic Scale 1: 200

Page 3 of 19

CORE RECOVERY				DESCRIPTION										CODES			
From m	Interval m	%	RQD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic		MINERALISATION	LITHO	STRUCT	ALTM	MIN			
								Lithology	Struct								
				0		Crotty Quartzite: white to pale pink massive fine-medium grained, quartz sandstone. Competent rock broken by drilling. Contact: sheared with both quartzite + limestone pug.	0		X			CQ					
				3.1		Massive Carbonate: fine grained sst with stylolites. Rock is mostly broken, core loss + pug and bright irregular slick faces. Minor irregular qtz-calc veins. Contact: ? affected by shear zone.	3.1		X		Core loss - tr qtz vein						
				9.1		Sheared breccia zone: zone of very broken rock with lms gravel chips in pug - still part of sheared contact with Crotty Quartzite. Contact: decrease in decomposition.	9.1				pug - core loss + qtz matrix						
				24		Intercalated mudstone/carbonate: mdst <10% - carb fg sst - coarse shell layers - trace stylolites - trace slump shearing - trace calcite veining. Contact: gradational.	24										
				28.4		Intercalated mdst/carb: mdst >10% - carb fg sst with coarse shell frags - well bedded - bed thickness 3:10 cm. Contact: gradational.	28.4				tr calcite veining						
				31.1			31.1										
				28.4			38		X		healed broken zone						
				31.1			39		X								
				41.9			41.9										
				31.1		Intercalated mdst/carb: mdst >10% - cb fg sst with coarse shell frags - stylolitic contact between mdst	46.6				cavity						

973062

PROJECT: OCEANA

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

5 cm

OLE No. OP2

Graphic Scale 1: 200

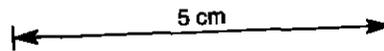
Page 4 of 19

CORE RECOVERY				DESCRIPTION							CODES			
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN
						carb bands (distinct texture) bedding 115° by 90° Contact: gradational.	44			minor low angle calcite veins				
				42.9		Intercalated mdst/carb: mdst <10% - cb fg sst with coarse shell frags - trace stylolites - trace calcite veining. Contact: cavity.	52							
				46.6		Intercalated mdst/carb: mdst >10% - cb fg sst - trace coarse shell beds - well bedded - bed thickness 5:15. Minor low angle calcite veining. Contact: gradational.								
				52.0		Intercalated mdst/carb: mdst <10% - cb fg sst with coarse shell frags - mudstone partings bounded by stylolites to well bedded in part. Bedding 57m = 105° 80°E, 58.5m = 125° 90°								
				83.4		Intercalated mdst/carb: mdst >40% - cb fg sst - well bedded - bed thickness 5:10cms - trace slump shear (lines oblique to banding) trace calcite veining. Contact: gradational.								
				88.1		Intercalated mdst/carb: mdst <10% - carb fg sst with minor coarse shell frags. Mdst partings with stylolitic contact in part to well bedded in part. Minor calcite veins throught. Pug zone ~10 cms coincident with loss of water at 99.2m. Minor shear 35-40° to LCA at 108.5m Contact: gradational.	84							
							87.1							
							93							

973063

PROJECT: OCEANA

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG



ILE No. OP2

Graphic Scale 1: 200

Page 5 of 19

CORE RECOVERY				DESCRIPTION							CODES			
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN
				115		Intercalated mdst/carb: mdst > 50% - cb: large frags of indistinct stromatolites. Contact: gradational	115							
				120.1		Laminated Carbonate: fg sst ± fine mdst partings Contact: gradational.								
				120.6		Intercalated Carbonate: mdst < 40% - cb fg sst - sculpture mottling ± trace tube mottling to well bedded texture - bed thickness 3:15 cms. Contact: gradational.								
				128.0		Bioclastic debris flow: 20-50mm clasts of coral ± stromatolites in intercalated mdst/carb. Minor calcite veining, trace pyrite. Contact: calcite vein possibly small shear.	115							
				130.0		Intercalated mdst/carb: mdst > 40% - cb fg sst - well bedded - bed thickness 10:10 - bedding 70° to LCA Contact: Gradational.	120.4 120.6							
				133.6		Mixed carb/mdst: fine wispy mixing > 40% mdst unusual texture. Contact: Gradational.	128 130							
				137.2		Msv carb: fg sst - minor stylolite - Contact: gradational	131.6 132.8 137.2							
				137.8		Laminated Carbonate: fine mdst/laminar: Ct: gradational	137.2 137.8 139.3 140							

increased calcite veining
minor broken core

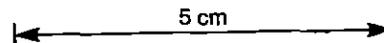
trace dolomite/parkerite alt
at 115.6m

trace fg diss py+sp

973064

PROJECT: OCEANA

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG



HOLE No. OP2

Graphic Scale 1: 200

Page 6 of 19

CORE RECOVERY				DESCRIPTION							CODES			
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN
				139.3		Massive carbonate: fg sst - trace stylolite. Contact: abrupt conformable.	140.7							
				140.7		Bioclastic debris flow: large 10-20 cm indistinct corals +stroms. mdst > 10%. Contact: gradational.	148.3							
				148.3		Laminated Carbonate (vg): fine mdst laminae in fg sst 65° to LCA + worn trace. Contact: gradational	149.6							
				149.6		Intercalated mdst/carb: mdst > 40% - cb fg sst - well bedded - bed thickness 5:5 cm - trace lam, trace slump shear. Contact: abrupt conformable.	157.1							
				157.1		Bioclastic debris flow: indistinct 5-10 cm strom clasts in > 10% mdst Contact: abrupt conformable.	158.4							
				158.4		Massive mudstone: ± minor bioclasts. Contact: abrupt conformable	159.5							
				159.5		Bioclastic debris flow: distinct coral, shell, strom clasts in > 10% mdst. Contact: abrupt conformable	165.5			trace flecks of pale sp.				
				165.5		Bioclastic debris flow: mdst < 10% - mv cb in part large clasts. Contact: conformable	174.5			abrupt pg at 178.8-178.9 - as 1-2 mm cubes replacing irregular clasts.				
				174.5			177							

973065

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

PROJECT: OCEANA

5 cm

ME No. OP2

Graphic Scale 1: 200

Page 7 of 19

CORE RECOVERY				DESCRIPTION							CODES				
From m	Interval m	%	ROD	From m	Interval m	(incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN	
				174.6		Bioclastic debris flow: distinct coral + strom frags fine to 20cms. in mdst < 10%. Contact gradational.	177								
				184.3		Bioclastic debris flow: msv intertexture - indistinct clasts - minor stylolites - trace calcite veins - Contact: abrupt conformable.	187								
				188.7		Bioclastic debris flow: characterized by large ~ 5-15cm stroms in mdst matrix to 191m becoming more msv cemented carb, features becoming indistinct. Contact: abrupt conformable.	191								
				194.8		Bioclastic debris flow: characterized by abundant mudstone matrix + more homogeneous clast size (0.5-3cms) Contact: abrupt conformable.	200.7								
				199.0		Massive carbonate: fg sst ± minor mdst laminae ± scalloped texture becoming massive, coarser grained and calcite veined dolomite. Contact: abrupt conformable.	203.7								
				200.7		Intercalated mdst/carb: mdst > 10% - cb sst - indistinct bedding overprinted by calcite veining. Minor stylolites in msv cb bands. Contact: abrupt conformable.	206.6								
				203.7		Intercalated mdst/carb: mdst > 10% - cb fg sst - distinct tube mottled bioturbation. Bedding 50° to LCA Contact abrupt conformable.	210.4								
				206.6		Intercalated mdst/carb: mdst > 10% - cb fg sst - sculpture									

1996
2004
2012
2024

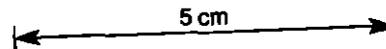
calcite veining
minor brecciation
dolomite veining

Trace pyrite on joint faces, trace dolomite alteration in calcite veins trace brown min carb? or sp?

trace py in coarse shell bands

973066

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG



E No. OP2

PROJECT: OCEANA

Graphic Scale 1: 200

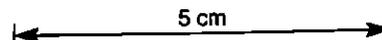
Page 8 of 19

CORE RECOVERY				DESCRIPTION										CODES			
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic		MINERALISATION	LITHO	STRUCT	ALTR	MIN			
								Lithology	Struct.								
						mottled texture ± trace tube mottling and trace course shell beds. Bedding 60° to LCA. Contact: abrupt conformable.	217.8										
				210.8		Intercalated mudst/carb: mudst >10% - cb fg sst - tube mottled bioturbation ± cb infill in mudst beds. trace stylolites in carb bands - indistinct tm in cb bands producing indistinct texture. Contact: abrupt conformable.	217.4										
				214.9		Intercalated mudst/carb: mudst <10% - cb fg sst - mudst partings with sharp stylolitic boundaries - carb tending to massive. Contact: abrupt conformable.	223.4										
				217.4		Intercalated mudst/carb: mudst <40% - cb sst - txt tube mottling bioturbation, bands of sst casts in mudst matrix, cb casts in cb matrix in part coalescing to msu carb. Contact: abrupt conformable.	223.5										
				221.4		Massive Carbonate: coarse grained clastic debris fining down hole with trace stylolitic mudst partings Contact: abrupt conformable.	210.2										
				223.3		Intercalated mudst/carb: mudst >40% - cb sst - txt dominated by tube mottling bioturbation, cb clasts in mudst or in carb coalescing to msu cb. Minor shell fragment bands in mudst in part. Contact: abrupt conformable.	232.9										

973067

PROJECT: OCEANA

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG

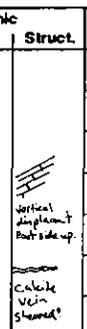


OLE No. OP2

Graphic Scale 1: 200

Page 9 of 19

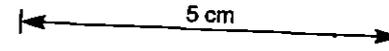
CORE RECOVERY				DESCRIPTION										CODES			
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic		MINERALISATION	LITHO	STRUCT	ALTN	MSH			
								Lithology	Struct.								
				230.2		Massive Carbonate: fining uphole with base at 232.4m being packed shell fragments fining to msv fg sst. with stylolites then to intercalated mudst/carb bands of 2-3 cms. Abundant shell fragments throughout. Contact: abrupt conformable.	232.4										
				232.4		Intercalated mudst/carb: mudst >10% - cb fg sst - dominant tabe mottling texture. Mudst bands well defined. TM best defined in cb sst stratigraphically below mudst abundant coarse shell beds in cb sst. Contact: abrupt conformable.	241.0										
				238.9		Massive Carbonate: m-fg, fining downhole, increasing irregular mudstone partings downhole. Contact: abrupt conformable.	248.5										
				239.8		Intercalated mudst/carb: mudst >40% - cb sst - well banded, beds ~5cms thick - minor coarse shell beds younging uphole. Contact: calcite veining, slicken features - possible shear.	251.0										
				241.1		Intercalated mudst/carb: mudst <10% - cb sst - TM dominant texture, mudst partings tend to be stylolitic or interstitial to worm casts. Casts in cb indistinct. minor stylolites in cb. minor coarse shell beds. Contact: abrupt conformable.	263.4										
				248.5		Massive Carbonate: bands of massive cb, ? cemented shell											



973068

PROJECT: OCEANA

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG



FILE No. OP2

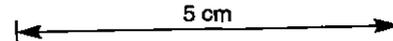
Graphic Scale 1: 200

Page 10 of 19

CORE RECOVERY						DESCRIPTION				CODES				
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN
						debris in background of intercalated mdst/carb bands. Contact: sharp conformable.	266.9			calcite pads at contact Trace ankerite in calcite vein at 249.2m.				
				251.4		Intercalated mdst/carb: mdst >10% - cb sst - dominant txt TM casts generally cb sst in cb sst and lesser in mdst. Mdst component decreases downhole and stylolites increase. Calcite veining increases from 256.4m. Contact: abrupt conformable.	267.8 261.4		264.7 260.0 271.2 bleached zone hiding shear.	Trace pyrite in irregular calcite patches at 254.8m.				
				263.4		Intercalated mdst/carb: mdst <10% - cb fg sst - txt variable, sty. in msv sst bands, some well defined mdst casts in cb sst + irregular patches of rotted txt in part. Calcite veining 266.2m Contact: abrupt conformable.	271.9 277							
				267.8		Massive carbonate: sst with minor development of fine laminations + stylolites in part. Rock bleached towards 269.4m Contact: missing.	283 288.5							
				269.4		Intercalated mdst/carb: mdst <10% - cb fg sst - txt irregular to tube rotting bioturbation with jigsaw fit appearance in part. Shear with pug at 270.8m ± bleached hole. Contact: abrupt conformable.	295							
				275.9		Laminated Carbonate: msv fg cb sst ± minor development of mdst partings at 50° to LCA. Contact: abrupt conformable.	295.1		294.4 calcite vein	Pyrite in shear at low angle to CA. 270.8m Trace calcite/dolomite veins at 275m.				
				277.0		Intercalated mdst/carb: mdst <40% - cb sst - txt banded								

973069

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG



NLE No. OP2

PROJECT: OCEANA

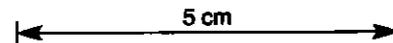
Graphic Scale 1: 200

Page 11 of 19

CORE RECOVERY				DESCRIPTION							CODES			
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN
						to sculpture mottled bioturbation - bed thickness 5-10 cms - trace coarse shell beds. Angles 40-45° to LCA. Insitu coral at 278.5m Contact: abrupt conformable.								
				281.3		Intercalated mdst/carb: mdst >10% - cb sst, m-cg granular prominent TM in sst and well bedded mdst. α 's 45-50° Contact: abrupt conformable.				283.4m - semi msv cg pyrite replacing carbonate worn carb.				
				283.5		Intercalated mdst/carb: mdst >40% - cb sst - txt variable within a unit of with uniform grain-size and mdst/cb ratio. Well bedded mdst bands 1-2cm ± 5cm bands of msv cb ± trace TM edged by mdst partings which grade into laminations with increased shear stamping to 286m then TM becomes more pronounced but irregular. Trace indistinct coarse shell beds ± coral fragments. α 's ~ 40-45° Contact: abrupt conformable.				285.3 - 6mm banded vein of msv pyrite // bedding infilled with calcite				
				295.1		Intercalated mdst/carb: mdst <10% - cb cg sst, granular with trace coarse shell beds - indistinctly banded with general massive appearance Contact: abrupt conformable.				Trace wispy pyrite replacement at 296.5m				
				296.6		Massive Carbonate: fg sst with minor fine laminations trace stylolites. Contact: abrupt conformable.								
				297.2		Intercalated mdst/carb: mdst >10% - cb fmg sst - well				Trace wispy pyrite				

923070

PASMINGO EXPLORATION DIAMOND DRILL CORE LOG



No. OP2

PROJECT: OCEANA

Graphic Scale 1: 200

Page 12 of 19

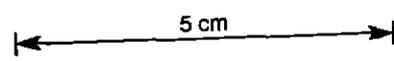
CORE RECOVERY				DESCRIPTION							CODES			
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTR	MIN
						banded with defined coarse granular layers, msv fine sst layers (with stylolites) + mdst bands - minor tm in part - minor coarse shell bands ± coral frags in part. Orientation = 301.4m bedding 65° E dip, 345° azimuth. Contact: gradational.	296.1			on selvages at 299 + 300.3m				
				302.3		Intercalated mdst/carb: mdst <10% - cb fg sst - txt tending to msv cb with distinct wispy partings of mdst throughout - minor tm ~ 310.4m, minor stylolites towards base of interval. Δ 's 45-50° to LCA - homogeneous interval. Contact: conformable.								
				318.2		Intercalated mdst/carb: mdst >10% - cb sst - txt well bedded to tm - bed thickness md 2, cb 5-10cm - Δ 's 55° to LCA Contact: abrupt conformable.	318.1							
				323.3		Intercalated mdst/carb: mdst >40% - cb sst - msv appearance minor shell fragments in sst, bands 5cms md:cb. Δ 's 55-60° to LCA Contact: abrupt conformable.	323.3 324.1							
				324.4		Intercalated mdst/carb: mdst >10% - cb sst - txt irregular tm - trace coarse shell debris. Contact: abrupt conformable.								
				329.1		Intercalated mdst/carb: mdst >40% - cb fg sst - txt well bedded - bed thickness md 3, cb 5cms Δ 's 60-70° to LCA								

Calc. with
mineral
50

973071

PROJECT: OCEANA

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG



E No. OP2

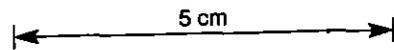
Graphic Scale 1: 200

Page 13 of 19

CORE RECOVERY				DESCRIPTION							CODES			
From m	Interval m	%	RQD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALT	MIN
						Contact: abrupt conformable.	322.4							
				331.7		Intercalated mdst/carb: mdst < 10% - cb fg sst - irregular slumped tm picked out by mdst partings. Contact: abrupt conformable.	322.4							
				336.5		Intercalated mdst/carb: mdst > 10% - cb fg sst - well bedded to tm - bed thickness md 1-5cms cb 2-10cms. X's 60° to LCA calcite heated breccia zone at 339.8-340.2 (z trace sp.) Contact: abrupt conformable.	331.7							
				343.4		Massive Carbonate: mg sst ± stylolites Bleached zone round possible fault at 344.8m + minor associated calcite veining. Contact: gradational.	336.5			Trace eg sphalerite in breccia. (pale brown 1-3mm) Trace pyrite at 342m				
				344.7		Intercalated mdst/carb: mdst > 10% - cb fg sst - tm prominent becoming indistinct through indistinct superimposed slump shearing at 346.5m. X's ~ 55° to LCA. Contact: abrupt conformable.	343.4							
				346.5		Intercalated mdst/carb: mdst > 10% - cb fg sst - well bedded - bed thickness 2-4cms - X's ~ 50° to LCA minor shear at 347m // bedding. Contact: abrupt conformable.	343.4							
				348.6		Massive Carbonate: fg sst - minor stylolites to 350m then trace laminations. Contact: abrupt conformable.	340.7							

973072

PASMINCO EXPLORATIO
DIAMOND DRILL CORE LC



OLE No. OP2

PROJECT: OCEANA

Graphic Scale 1: 200

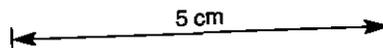
Page 14 of 19

CORE RECOVERY				DESCRIPTION							CODES				
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN	
				351.6		Terrigenous sandstone - cg ~ 0.5-2mm qtz-calcite grains, poorly sorted matrix supported. Contact: abrupt conformable	351.6 351.9								
				351.9		Intercalated mdst/carb: mdst >10% - grades from mg to fg cb sst, mdst content increases downhole together with increased tube mottling + slump shear. Δ 's ~ 50° to LCA. Contact: abrupt conformable.	351.9 357.4			trace pale sphalerite in calcite vein at 354.2m					
				355.2		Turbidites: medium to coarse grained terrigenous derived bases qtz rich to fg carb rich tops. Contact: abrupt conf.	355.2 361.1								
				356.1		Intercalated mdst/carb: mdst <10% - cb sst - txt indistinct TM - Contact: abrupt conformable.	356.1 371.8								
				358.8		Intercalated mdst/carb: mdst >10% - cb sst - bands ~ 15-20cms. with cg bases and increasing TM texture towards the top. Contact: abrupt conformable.	358.8 360.4								
				360.4		Intercalated mdst/carb: mdst <10% - cb, msv fg sst, with increasing mdst wisps - minor stylolites. Contact: gradational.	360.4 362.6								
				362.6		Intercalated mdst/carb: mdst >40% - cb mg sst - txt Sculpture mottling - bed thickness 5:5 - coarse shell beds graded, trace isolated 3cm coral frags. Contact: abrupt conformable.	362.6 365.4								
				365.4		Intercalated mdst/carb: mdst >40% - cb sst - dominant TM txt	365.4								

973073

PROJECT: OCEANA

PASMINCO EXPLORATION
DIAMOND DRILL CORE LOG



LE No. OP2

Graphic Scale 1: 200

Page 15 of 19

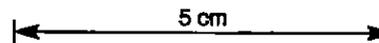
CORE RECOVERY				DESCRIPTION				CODES						
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN
						α 's ~ 50° to LCA. Contact: abrupt conformable.	1793							
							1792		minor cleav					
				366.1		Intercalated mdst/carb: mdst >10% - cb sst - well bedded - trace stylolites - Contact: abrupt conformable.								
							1791			cavity bleached broken zone				
				367.9		Intercalated mdst/carb: mdst <10% - cb sst - indistinct tube mottling - α 's ~ 55° to LCA. Contact: abrupt conformable.	3821							
							3851							
							3822							
							3826							
				371.8		Massive Carbonate: sst with trace stylolites. Contact: abrupt conformable.								
							3403		shear cleav leached broken					
				372.2		Intercalated mdst/carb: mdst >10% - cb m.fg sst - txt from jigsaw fit sculpture mottling to well bedded with carb becoming msr and mdst tending to fine laminations towards 379.4m. Contact: cavity at 379.4m ~2m thick rock broken, leached.			calc vein sprod.					
							3428							
				379.4		Massive carbonate: sst trace stylolites. Contact: gradational.	4016		cleav					
							4024							
				382.1		Laminated Carbonate: fg sst with fine mdst partings α 's 55-60° to LCA. Contact: gradational	4114		brkn py.					
							4202							
				383.1		Massive Carbonate: sst - stylolites - Contact: gradational	4101							
							4215							
				383.9		Laminated Carbonate: Contact: gradational								
				384.6		Massive Carbonate: sst with trace stylolites. Contact: broken leached zone with calcite veining.								

E.O.H.

973074

PROJECT: OCEANA

PASMINCO EXPLORATION
DIAMOND DRILL CORE LC



OLE No. OP2

Graphic Scale 1: 200

Page 16 of 19

CORE RECOVERY				DESCRIPTION							CODES			
From m	Interval m	%	ROD	From m	Interval m	(Incl. LITHOLOGY, STRUCTURE & ALTERATION)	Depth	Graphic Lithology	Struct.	MINERALISATION	LITHO	STRUCT	ALTN	MIN
				390.3		Intercalated mdst/carb: mdst >40% - cb mg sst - +tr distinct tube mottling in part with superimposed slump shear in part. Contact: sheared.								
				398.4		Massive Carbonate: fg sst with minor stylolites. Contact: sheared.								
				402.6										
				402.6		Zone of extreme weathering: 7m core loss. Brown black rubble-grit, ghost tube mottling in part.								
				409.4		No recovery.								
				415.4		Sheared black carbonaceous pug + broken rock with slickensides.								
				420.2		Intercalated mdst/carb: mdst >10% - cb fg sst - well bedded - bed thickness 3-10cms tending to slump shear or laminations towards 424.7m. Shear bleach of 423.2m								
				424.7		Sandstone: cg carbonate sst with terrigenous content. Trace granular quartz.								
				425		E.O.H.								

973075

DDH OP2 ore suite (values in ppm)

from	to	sample	Cu	Pb	Zn	Ag	Fe%	Mn
199.60	200.70	34715	5	19	20	<1	1.80	960
200.70	202.10	34716	8	67	7	<1	1.35	490
202.10	202.80	34717	6	38	5	<1	1.55	520

DDH OP2

SPECIFIC GRAVITY

depth S.G

25.6 2.64
49.3 2.70
79 2.71
120.8 2.74
154.4 2.70
174.6 2.72
200 2.69
238.4 2.72
281.3 2.73
320.9 2.71
360.1 2.72
400 2.71
425 2.71

CORE RECOVERY AND MAGNETIC SUSCEPTIBILITY

from	to	% rec	depth	mag-sus
0	3	10		
3	9	20		
9	12	7		
12	13.8	17		
13.8	15	25		
15	18	13		
18	19	35		
19	21	25		
21	22.6	31		
22.6	24	21		
24	25.6	100	25.6	0.02
25.6	27	86	27	0.01
27	28.4	100	28.4	0.01
28.4	29.8	100	29.8	0.02
29.8	31.1	100	31.1	0.01
31.1	31.5	100	31.5	0.01
31.5	33	100	33	0.01
33	34.5	100	34.5	0.01
34.5	36	100	36	0.01
36	37.5	93	37.5	0.02
37.5	39	53	39	0.01
39	40.2	67	40.2	0.01
40.2	41.8	100	41.8	0.01
41.8	43.4	100	43.4	0.02
43.4	45	100	45	0.02
45	46.5	87	46.5	0.01
46.5	48	60	48	0.01
48	49.5	100	49.5	0.01
49.5	51	70	51	0.01
51	52.5	100	52.5	0.01
52.5	54	93	54	0.01
54	55.5	100	55.5	0.01

55.5	57	100	57	0.01						394.4	395.6	100	396.6	0.08
57	58.5	107	58.5	0.01	214.4	217.4	100	217.4	0.05	396.6	399.6	100	399.6	0.07
58.5	60	90	60	0.01	217.4	220.4	100	220.4	0.04	399.6	402.6	60	402.6	0.04
60	61.4	100	61.4	0.01	220.4	223.4	100	223.4	0.04	402.6	406.4	18		
61.4	64.4	100			223.4	226.4	100	226.4	0.04	406.4	409.4	10		
64.4	65.1	100			226.4	229.4	100	229.4	0.03	409.4	412.4	0		
65.1	66	100			229.4	232.4	100	232.4	0.01	412.4	415.4	0		
66	67.4	95	67.4	0.01	232.4	235.4	100	235.4	0.07	415.4	418.4	17		
67.4	70.4	100			235.4	238.4	100	238.4	0.08	418.4	420.2	44	420.2	0.04
70.4	73.4	100			238.4	241.4	100	241.4	0.07	420.2	423.2	100	423.2	0.01
73.4	76.4	100			241.4	244.4	100	244.4	0.1	423.2	425	29	425	0.04
76.4	79.4	98			244.4	247.4	100	247.4	0.11					
79.4	82.3	97			247.4	250.4	100	250.4	0.06					
82.3	85.1	100			250.4	253.4	100	253.4	0.06					
85.1	88.1	100			253.4	256.4	100	256.4	0.08					
88.1	90.6	104			256.4	259.4	100	259.4	0.07					
90.6	91.4	88			259.4	262.4	100	262.4	0.07					
91.4	94.4	100			262.4	265.4	100	265.4	0.05					
94.4	96.8	100			265.4	268.3	97	268.3	0.06					
96.8	99.2	100			268.3	269.3	100	269.3	0.05					
99.2	102.2	100			269.3	271.4	86	271.4	0.07					
102.2	105	100			271.4	274.4	97	274.4	0.09					
105	105.8	100			274.4	277.4	103	277.4	0.08					
105.8	107.3	100			277.4	280.4	100	280.4	0.08					
107.3	109.4	100			280.4	283.4	100	283.4	0.06					
109.4	112.4	93			283.4	286.4	97	286.4	0.06					
112.4	115.4	63			286.4	289.4	100	289.4	0.04					
115.4	118.4	70			289.4	292.4	100	292.4	0.06					
118.4	120.8	133	120.8	0.01	292.4	295.4	100	295.4	0.05					
120.8	123.8	100	123.8	0.01	295.4	298.4	100	298.4	0.04					
123.8	126.8	100	126.8	0.01	298.4	301.4	100	301.4	0.04					
126.8	129.9	100	129.9	0.02	301.4	304.4	100	304.4	0.06					
129.9	131.2	138	131.2	0.01	304.4	307.4	100	307.4	0.03					
131.2	132.6	14	132.6	0.01	307.4	310.4	100	310.4	0.07					
132.6	135.6	117	135.6	0.01	310.4	313.4	100	313.4	0.05					
135.6	138.1	88	138.1	0.01	313.4	316.4	100	316.4	0.06					
138.1	140.3	100	140.3	0.01	316.4	319.4	100	319.4	0.06					
140.3	142.4	100	142.4	0.01	319.4	322.4	100	322.4	0.05					
142.4	145.4	100	145.4	0.01	322.4	325.4	100	325.4	0.06					
145.4	148.4	100	148.4	0.01	325.4	328.4	97	328.4	0.02					
148.4	151.4	100	151.4	0.01	328.4	331.3	100	331.3	0.03					
151.4	154.4	100	154.4	0.01	331.3	334.3	100	334.3	0.02					
154.4	156.4	100	156.4	0.01	334.3	337.3	100	337.3	0.02					
156.4	157.4	100	157.4	0.01	337.3	338.3	100	338.3	0.05					
157.4	160.4	100	160.4	0.01	338.3	340.4	81	340.4	0.06					
160.4	162.8	100	162.8	0.01	340.4	342.6	100	342.6	0.07					
162.8	165.5	104	165.5	0.01	342.6	345.9	91	345.9	0.05					
165.5	168.6	97	168.6	0.01	345.9	349	97	349	0.04					
168.6	171.6	100	171.6	0.01	349	352	100	352	0.06					
171.6	174.6	100	174.6	0.01	352	355	100	355	0.06					
174.6	177.6	100	177.6	0.01	355	358	100	358	0.04					
177.6	180.6	100	180.6	0.01	358	360.1	100	360.1	0.01					
180.6	181.4	88	181.4	0.01	360.1	361.4	100	361.4	0.01					
181.4	184.4	100	184.4	0.01	361.4	364.4	100	364.4	0.02					
184.4	187.4	100	187.4	0.01	364.4	367.4	100	367.4	0.02					
187.4	190.4	100	190.4	0.01	367.4	370.4	100	370.4	0.02					
190.4	193.4	100	193.4	0.01	370.4	373.4	100	373.4	0.05					
193.4	196.4	100	196.4	0.01	373.4	376.4	100	376.4	0.04					
196.4	199.4	100			376.4	379.4	27	379.4	0.02					
199.4	202.1	100	202.1	0.01	379.4	381.7	70	381.7	0.04					
202.1	205.1	100	205.1	0.01	381.7	384.7	100	384.7	0.07					
205.1	208.2	97	208.2	0.06	384.7	387.7	70	387.7	0.05					
208.2	209	100	209	0.04	387.7	390.4	111	390.4	0.1					
209	211.4	100	211.4	0.06	390.4	391.4	100	391.4	0.05					
211.4	214.4	100	214.4	0.05	391.4	394.4	73	394.4	0.1					

Page 19 of 19

973078

APPENDIX 5

Physical Properties from Recent Drilling

PHYSICAL PROPERTIES from 1992 - 1993 DIAMOND DRILLING

OP1		OP2	
from	S.G.	from	S.G.
13.0	2.76	25.6	2.64
45.3	2.46	49.3	2.70
74.2	2.71	79.0	2.71
120.1	2.72	120.8	2.74
160.1	2.73	154.4	2.70
197.0	2.80	174.6	2.72
234.6	2.61	200.0	2.69
274.6	2.61	238.4	2.72
		281.3	2.73
		320.9	2.71
		360.1	2.72
		400.0	2.71
		425.0	2.71
samples	8	samples	13
average	2.68	average	2.71

		OP1		OP2			
from	mag-sus	from	mag-sus	from	mag-sus		
3.3	0.01	25.6	0.02	92.8	0.01	135.6	0.01
9.4	0.01	27.0	0.01	93.6	0.01	138.1	0.01
13.0	0.02	28.4	0.01	94.8	0.01	140.3	0.01
14.8	0.02	29.8	0.02	95.8	0.01	142.4	0.01
16.3	0.03	31.1	0.01	98.0	0.01	145.4	0.01
16.7	0.01	31.5	0.01	98.8	0.01	148.4	0.01
17.8	0.02	33.0	0.01	100.2	0.01	151.4	0.01
20.8	0.02	34.5	0.01	105.2	0.01	154.4	0.01
31.6	0.02	36.0	0.01	106.5	0.01	156.4	0.01
35.8	0.02	37.5	0.02	109.7	0.01	157.4	0.01
46.3	0.02	39.0	0.01	111.5	0.01	160.4	0.01
53.9	0.01	40.2	0.01	113.1	0.02	162.8	0.01
55.4	0.01	41.8	0.01	114.1	0.01	165.5	0.01
56.8	0.01	43.4	0.02	117.1	0.01	168.6	0.01
58.3	0.01	45.0	0.02	120.1	0.01	171.6	0.01
59.8	0.01	46.5	0.01	121.2	0.01	174.6	0.01
61.3	0.02	48.0	0.01	124.2	0.01	177.6	0.01
62.0	0.01	49.5	0.01	129.5	0.01	180.6	0.01
64.3	0.01	51.0	0.01	135.6	0.01	181.4	0.01
67.3	0.01	52.5	0.01	137.2	0.01	184.4	0.01
68.8	0.01	54.0	0.01	140.2	0.01	187.4	0.01
70.3	0.02	55.5	0.01	142.2	0.01	190.4	0.01
71.8	0.01	57.0	0.01	144.1	0.02	193.4	0.01
73.3	0.02	58.5	0.01	145.5	0.01	196.4	0.01
74.8	0.01	60.0	0.01	148.7	0.01	202.1	0.01
75.9	0.01	61.4	0.01	151.2	0.01	205.1	0.01
76.5	0.02	67.4	0.01	153.2	0.01	208.2	0.06
77.8	0.01	120.8	0.01	156.1	0.01	209.0	0.04
79.3	0.01	123.8	0.01	157.3	0.01	211.4	0.06
81.8	0.01	126.8	0.01	160.1	0.01	214.4	0.05
85.3	0.01	129.9	0.02	161.4	0.01	217.4	0.05
89.8	0.01	131.2	0.01	162.6	0.01	220.4	0.04
91.3	0.01	132.6	0.01	163.8	0.01	223.4	0.04

166.4	0.01	226.4	0.04		
175.0	0.01	229.4	0.03		
182.4	0.01	232.4	0.01		
183.3	0.01	235.4	0.07		
193.7	0.04	238.4	0.08		
200.9	0.12	241.4	0.07		
201.9	0.09	244.4	0.10		
203.2	0.05	247.4	0.11		
204.2	0.18	250.4	0.06		
208.2	0.01	253.4	0.06		
209.6	0.02	256.4	0.08		
212.3	0.01	259.4	0.07		
216.9	0.01	262.4	0.07		
218.7	0.01	265.4	0.05		
220.2	0.01	268.3	0.06		
221.8	0.05	269.3	0.05		
234.1	0.01	271.4	0.07		
234.8	0.01	274.4	0.09		
235.8	0.01	277.4	0.08		
238.0	0.01	280.4	0.08		
238.5	0.01	283.4	0.06		
247.0	0.01	286.4	0.06		
259.0	0.01	289.4	0.04		
266.5	0.01	292.4	0.06		
274.1	0.01	295.4	0.05		
		298.4	0.06		
		301.4	0.04		
samples	91	304.4	0.06		
average	0.02	307.4	0.03		
		310.4	0.07		
		313.4	0.05		
		316.4	0.06		
		319.4	0.06		
		322.4	0.05		
		325.4	0.06		
		328.4	0.02		
		331.3	0.03		
		334.3	0.02		
		337.3	0.02		
		338.3	0.05		
		340.4	0.06		
		342.6	0.07		
		345.9	0.05		
		349.0	0.04		
		352.0	0.06		
		355.0	0.06		
		358.0	0.04		
		360.1	0.01		
		361.4	0.01		
		364.4	0.02		
		367.4	0.02		
		370.4	0.02		
		373.4	0.05		
		376.4	0.04		
		379.4	0.02		
		381.7	0.04		
		384.7	0.07	420.2	0.04
		387.7	0.05	423.2	0.01
		390.4	0.10	425.0	0.04
		391.4	0.05		
		394.4	0.10		
		396.6	0.08		
		399.6	0.07	samples	133
		402.6	0.04	average	0.03

APPENDIX 6

DHEM Surveys at Oceana, OP1 and OP2



MEMORANDUM

**PASMINCO
EXPLORATION**

A Division of Pasma Australia Limited,
A.C.N. 004 074 962

Level 7
380 St Kilda Road
Melbourne, Australia 3004
G.P.O. Box 1291K
Melbourne, Australia 3001

TO: M Quayle

FROM: NA Hughes

DATE: 14 April 1993

FILE: EP/02/3011

SUBJECT: **DHEM Surveys at Oceana, OP1 and OP2**

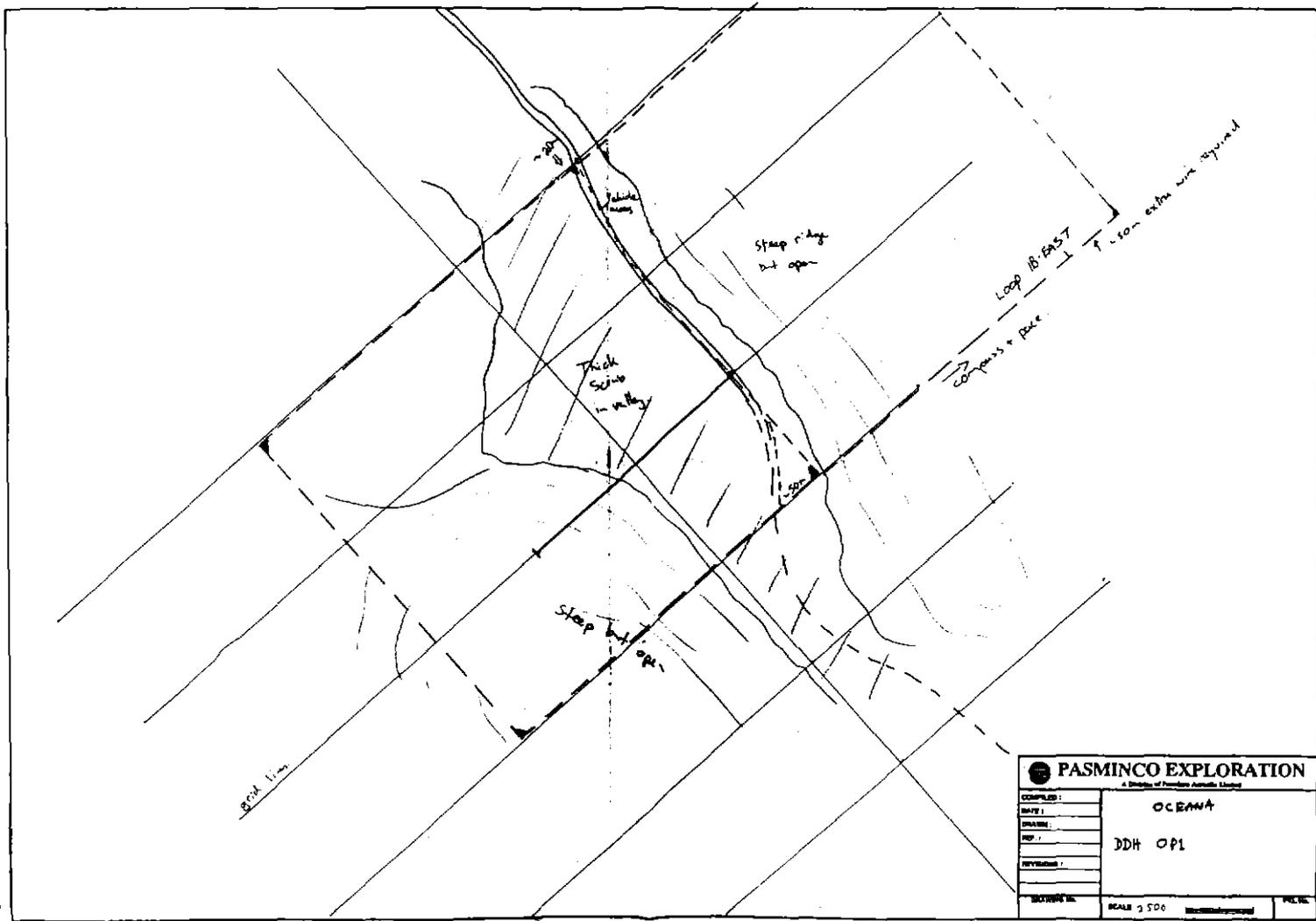
Drill-hole OP1 was surveyed with the Crone DHEM system during November, 1992. Although the hole was to be read from two transmitter loops, an east and west (Figure 1), only the east loop was read because of poor weather conditions and operator time limits. The drill-hole was read from the west loop in February 1993 during another programme of drill-hole EM. Drill-hole OP2 was also surveyed during this programme from two loops, an east and west (Figure 4). For drill-hole OP1 only the axial component of the secondary magnetic field was measured, whereas all three orthogonal components of the decay of the secondary magnetic field were measured for drill-hole OP2.

The primary field excitation vectors along the drill section for the east and west loops for drill-holes OP1 and OP2 are shown in Figures 2, 3 and 4, 5 respectively.

The results for drill-hole OP1 indicate no response due to a significant accumulation of conductive material. A very small conductive feature, close to the hole, is indicated at a hole depth of 160m. The position and orientation of this feature is likely above the hole and nearly vertical since no anomalous response at 160m is measured from the west loop. A cross over type anomalous response is noted at 90m. The reversal in sign of the cross over from west to east loop indicates a weakly conductive feature above the hole, with an orientation sub parallel to that of the hole. It is thought this anomaly corresponds to a weakly mineralised fault or contact central on the Amaco costean. It must be noted that the response is only evident in the first three channels and is also near the top of the hole, where the primary field excitation is strongest and the possibility for signal corruption the greatest.

For drill-hole OP2 all three components of the decay of the secondary magnetic were measured for both loops. The positive orientation of the orthogonal vectors is shown in Figure 4. Z corresponds to the axial or in-line vector and X and Y are the cross-hole vectors. No response due to a significant accumulation of conductive material were detected from either loop, however for both loops the responses in the early channels are increasing down the hole. This indicates a conductive feature beyond the end of the survey and is interpreted to be (at this time) the contact of the Moina Sandstone and Gordon Limestone. The response is better defined for the west loop, and this is probably due to the greater strength of the primary excitation field.

Figure 1



973084

Figure 2

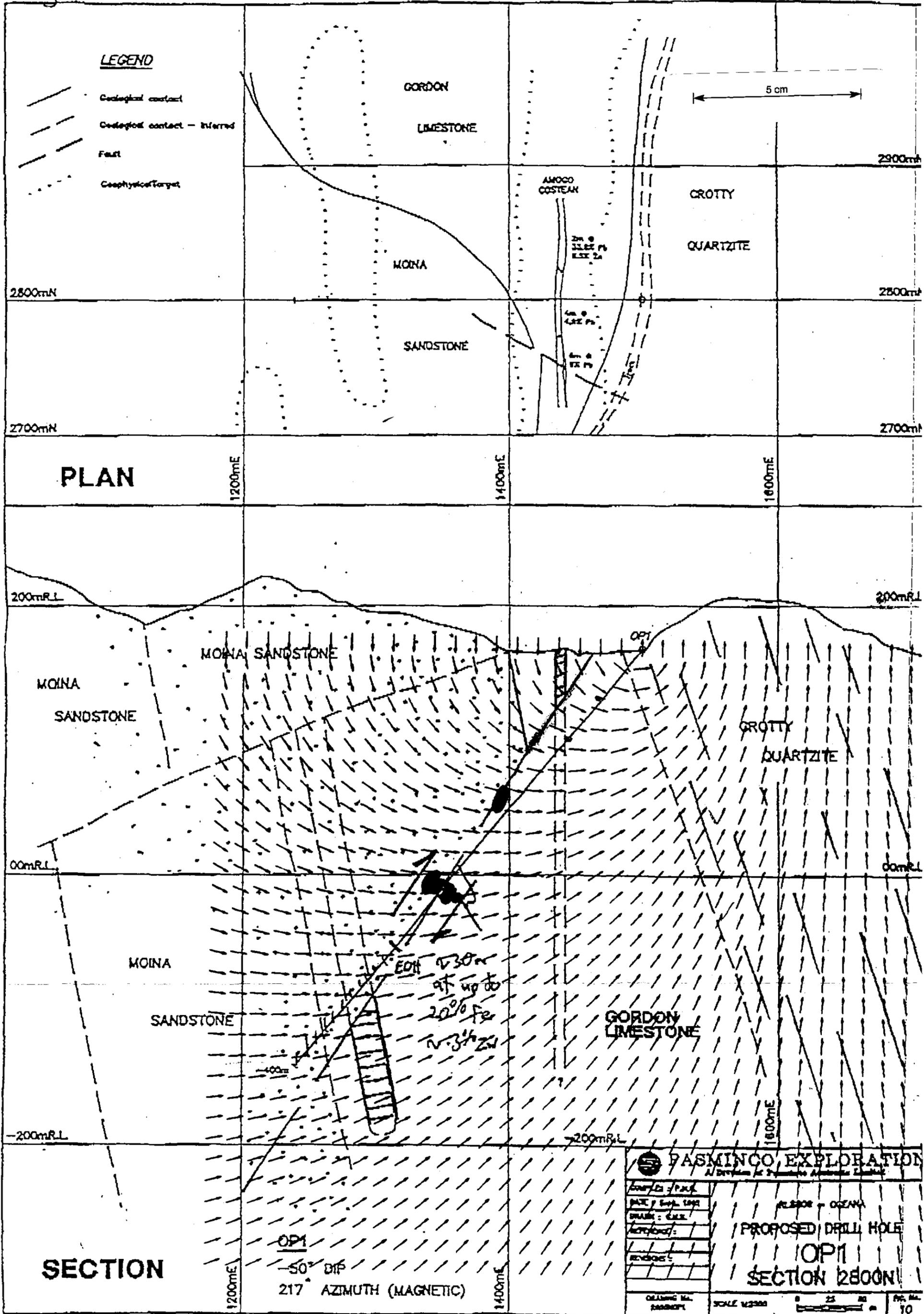


Figure 2

Figure 3

973086

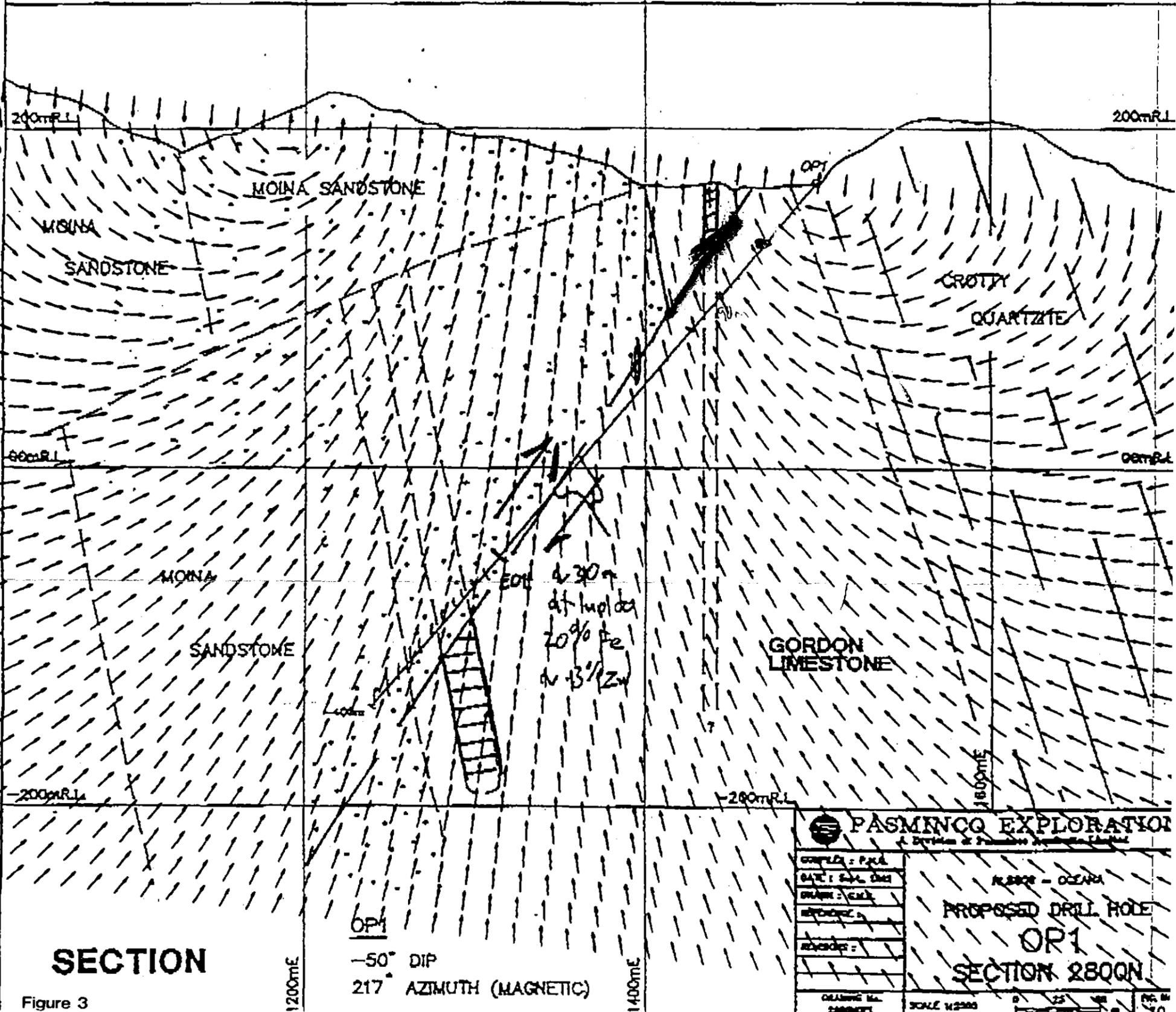
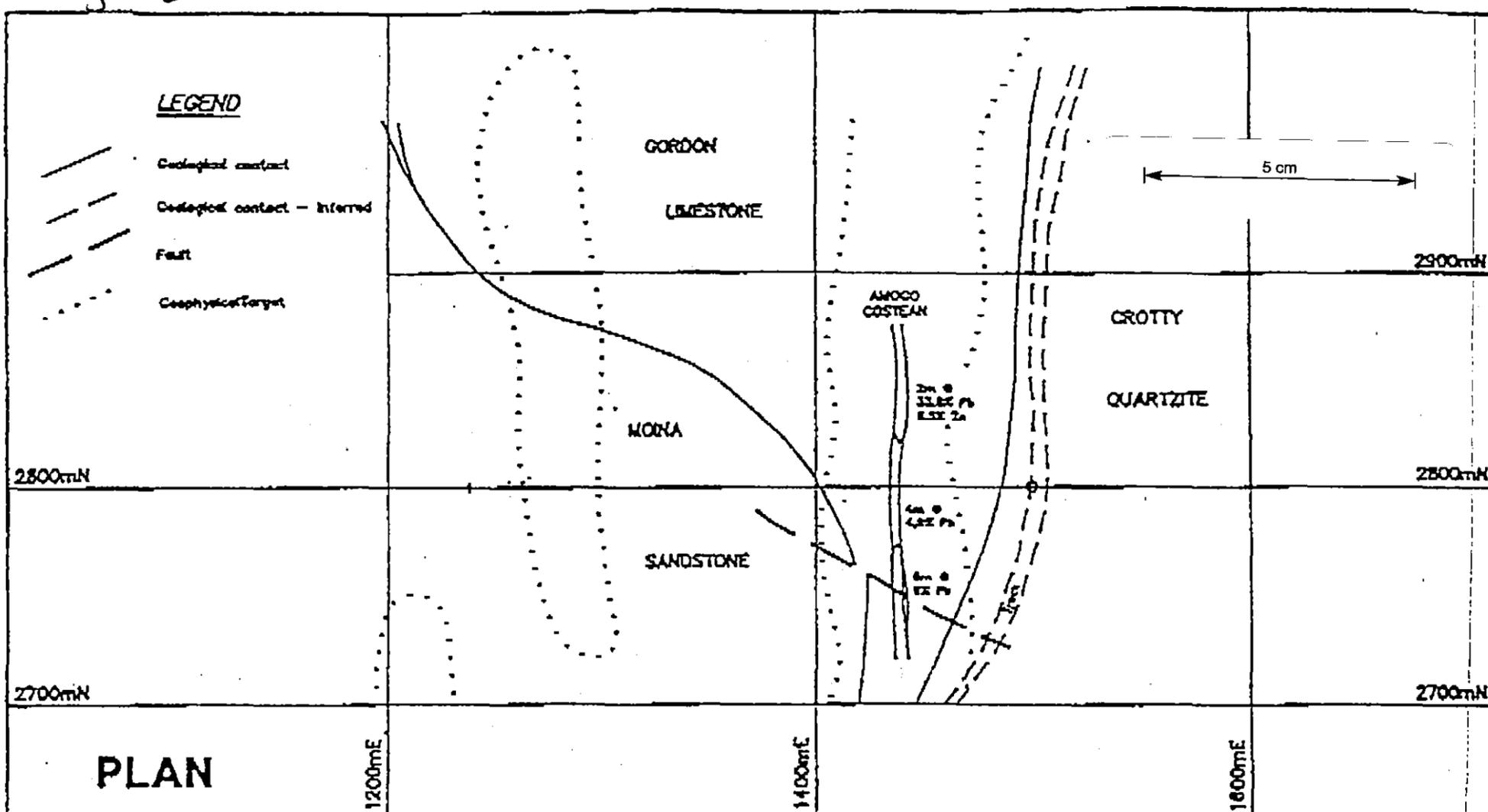


Figure 3

973087

CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

Client : PASMINGO EXPLORATION
Grid : OCEANIA
Date : Feb 2, 1993

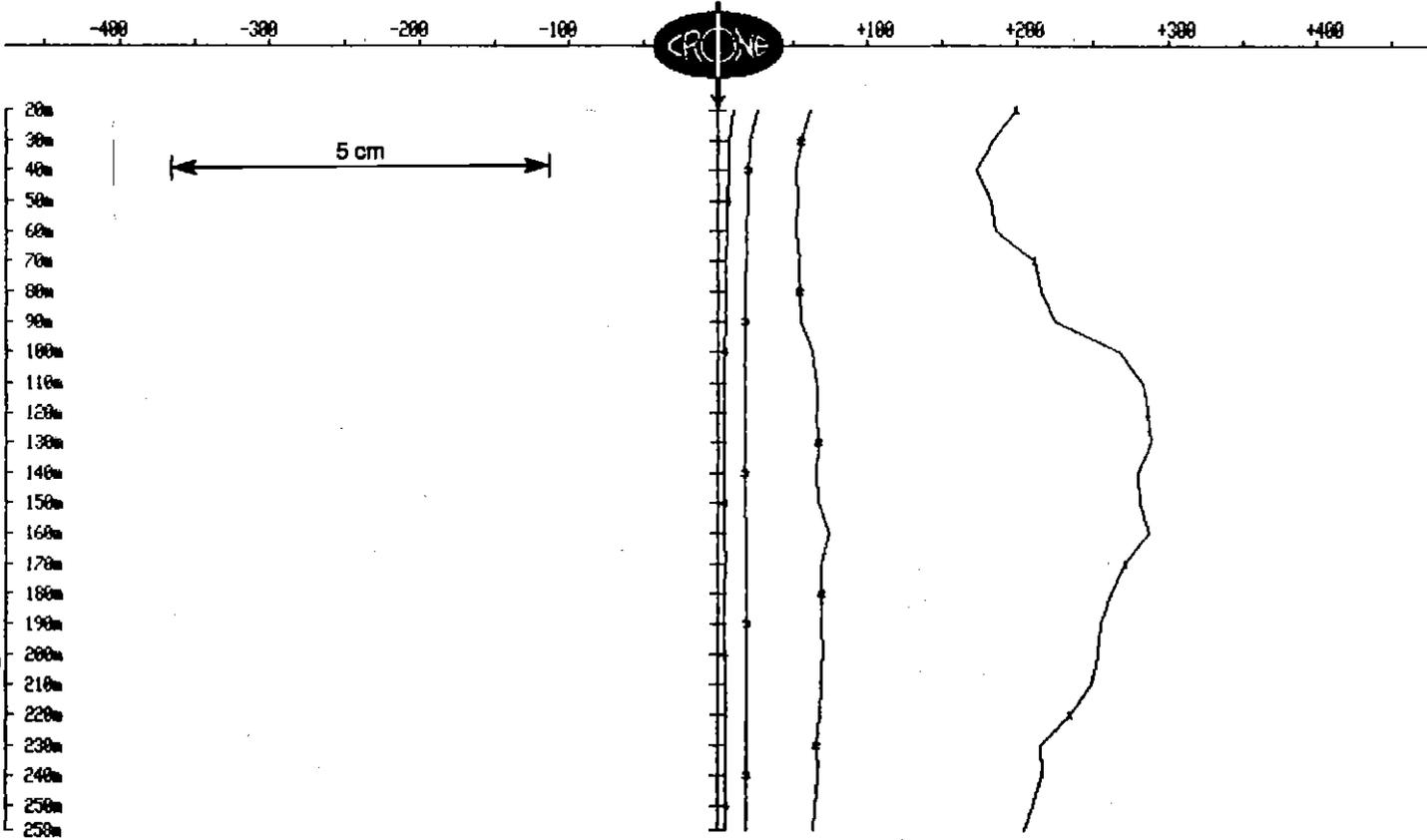
Hole : OP1
Tx Loop : OP1-W
File name : oplzw.am2

Data Scaled by Factor of 0.10

Z COMPONENT dBz/dt nanoTesla/sec - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 50



973089

CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

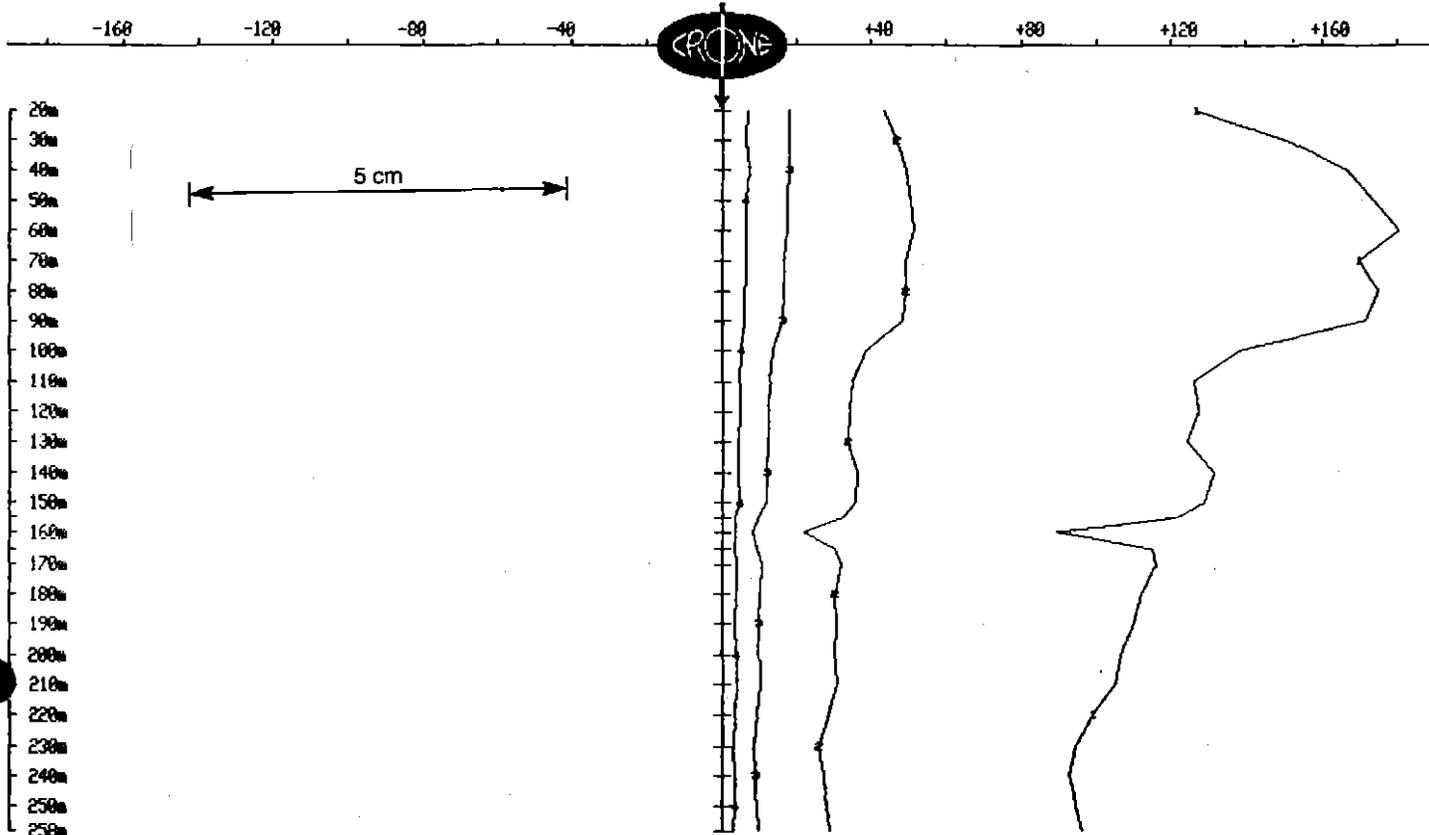
Client : PASMINGO EXPL
Grid : OCEANIA
Date : Nov 21, 1992

Hole : OP1
Tx Loop : 1B-EAST
File name : oplze.am2

Z COMPONENT dBz/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 20



973090

CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

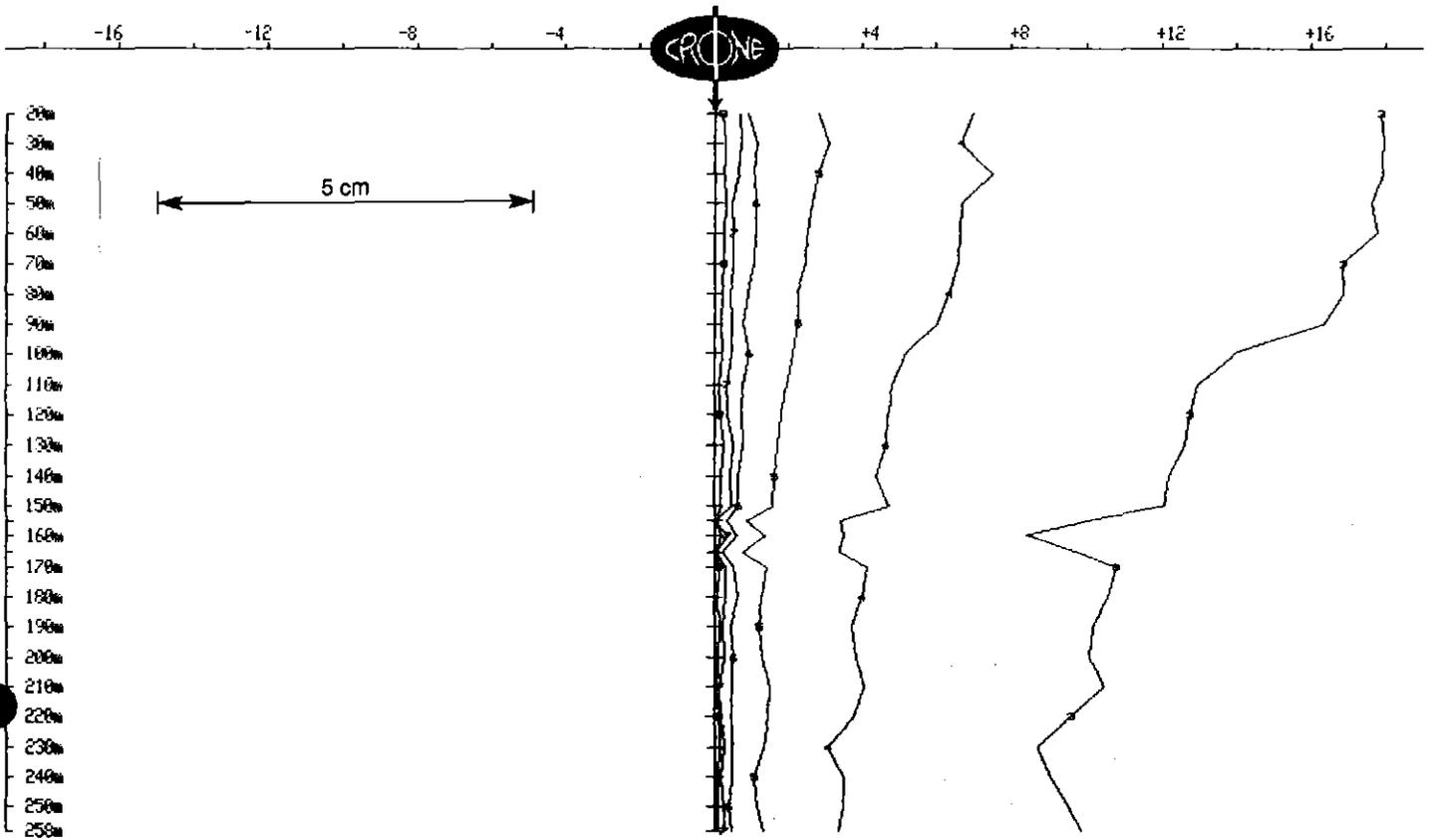
Client : PASMINGO EXPL
Grid : OCEANIA
Date : Nov 21, 1992

Hole : OP1
Tx Loop : 1B-EAST
File name : oplze.am2

Z COMPONENT dBz/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 2



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

Client : PASMINGO EXPL
Grid : OCEANIA
Date : Nov 21, 1992

Hole : OP1
Tx Loop : 1B-EAST
File name : oplze.am2

Z COMPONENT dBz/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 20

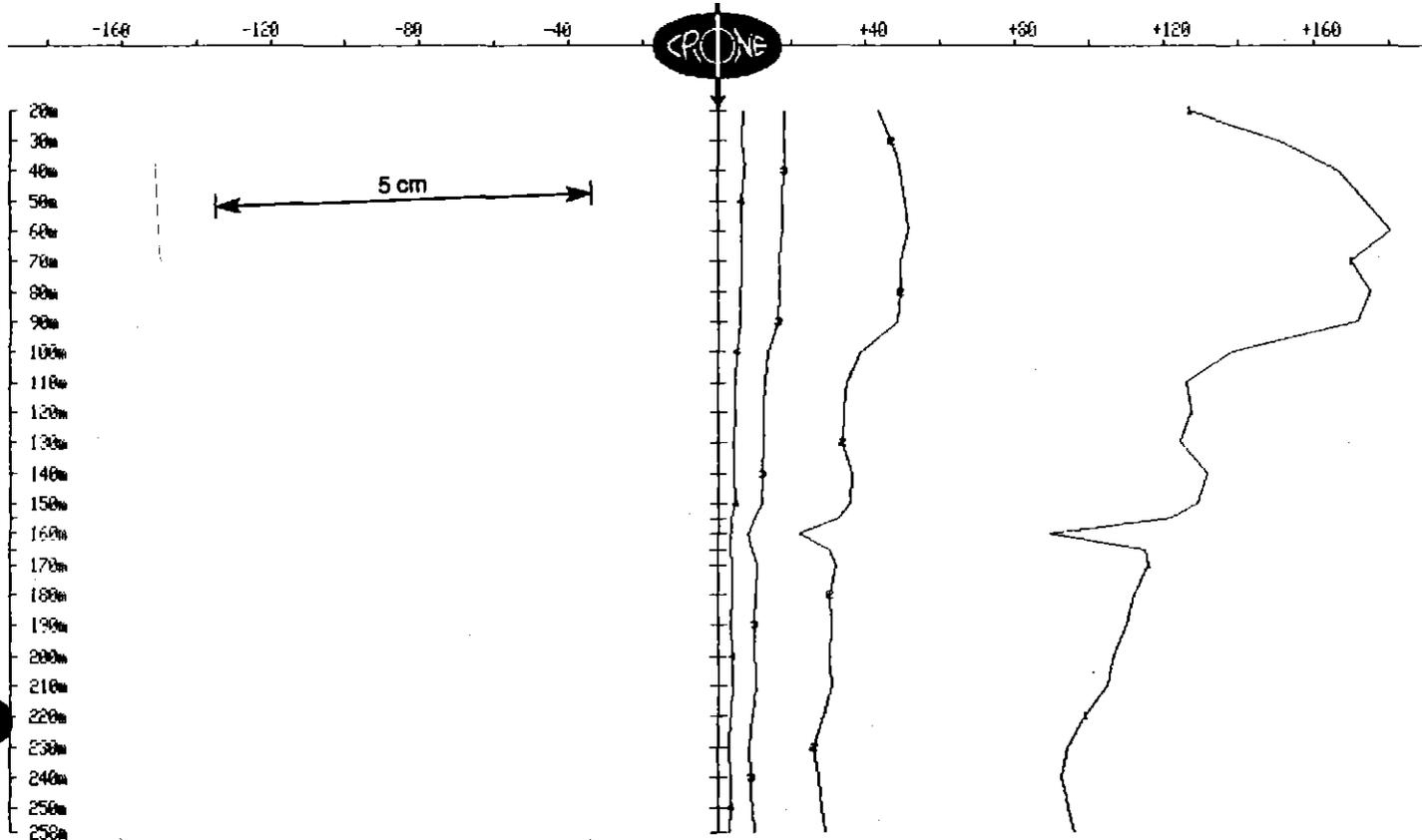
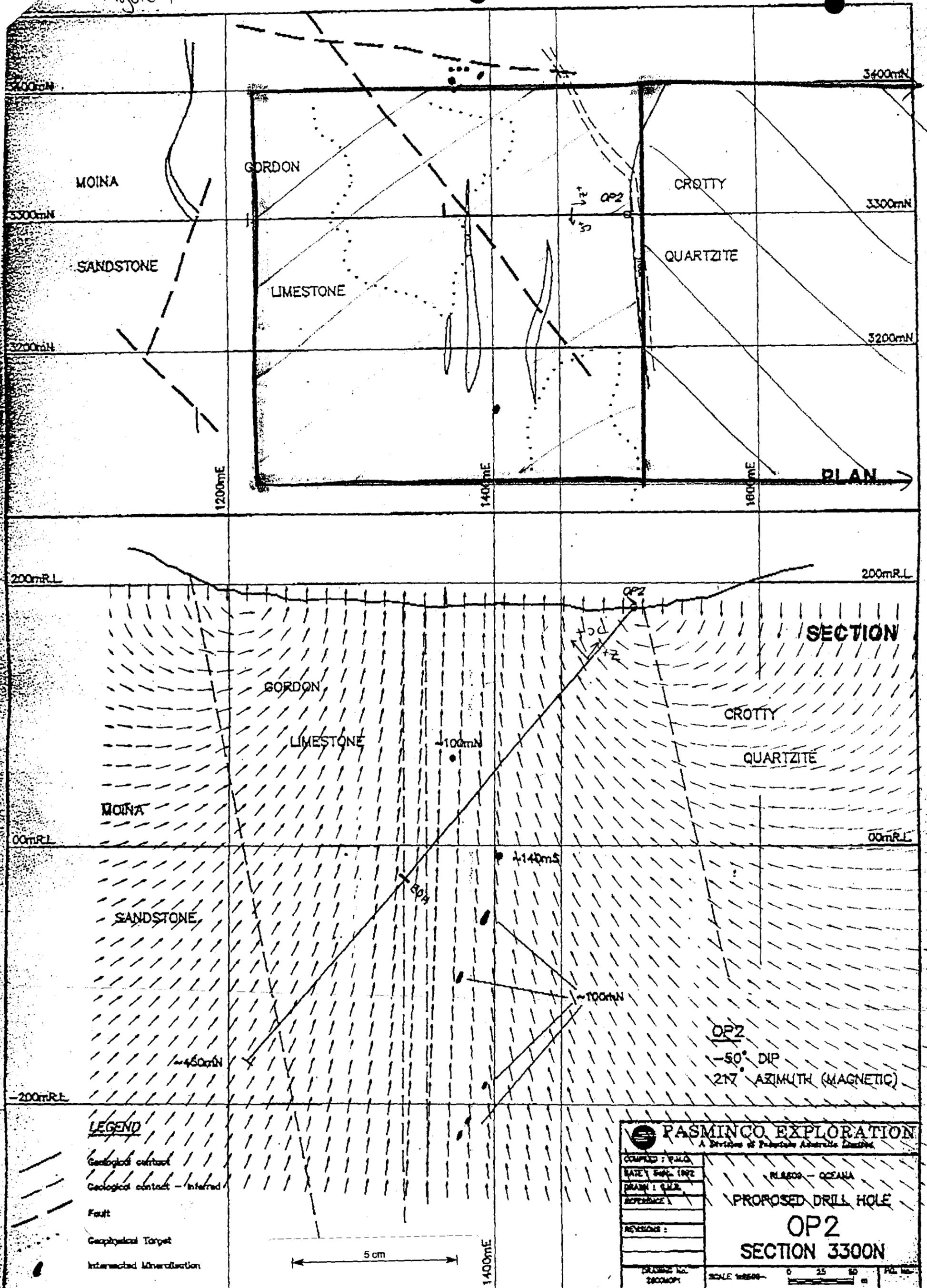


Figure 4

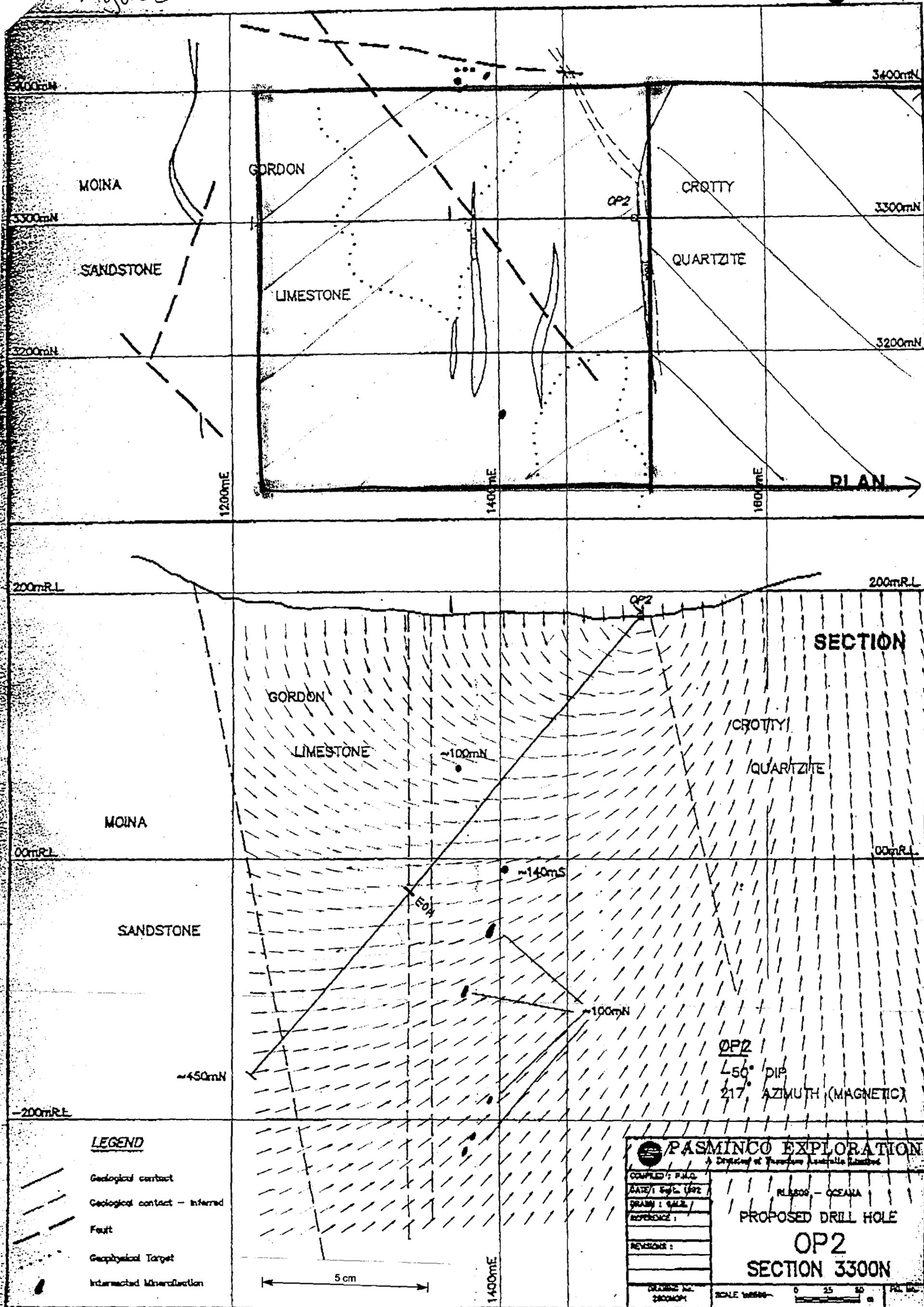


973092

Figure 4

<p>PASMINCO EXPLORATION A Division of Pasminco Australia Limited</p>	
<p>COMPILED BY: P.M.A. DATE: Feb. 1992 DRAWN BY: G.M.R. REFERENCE:</p>	<p>RL800 - OCEANA</p>
<p>REVISIONS:</p>	<p>PROPOSED DRILL HOLE OP2 SECTION 3300N</p>
<p>DRAWING No. 280000P1</p>	<p>SCALE 1:8500 0 25 50 m</p>

Figure 5



973093

Figure 5

CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

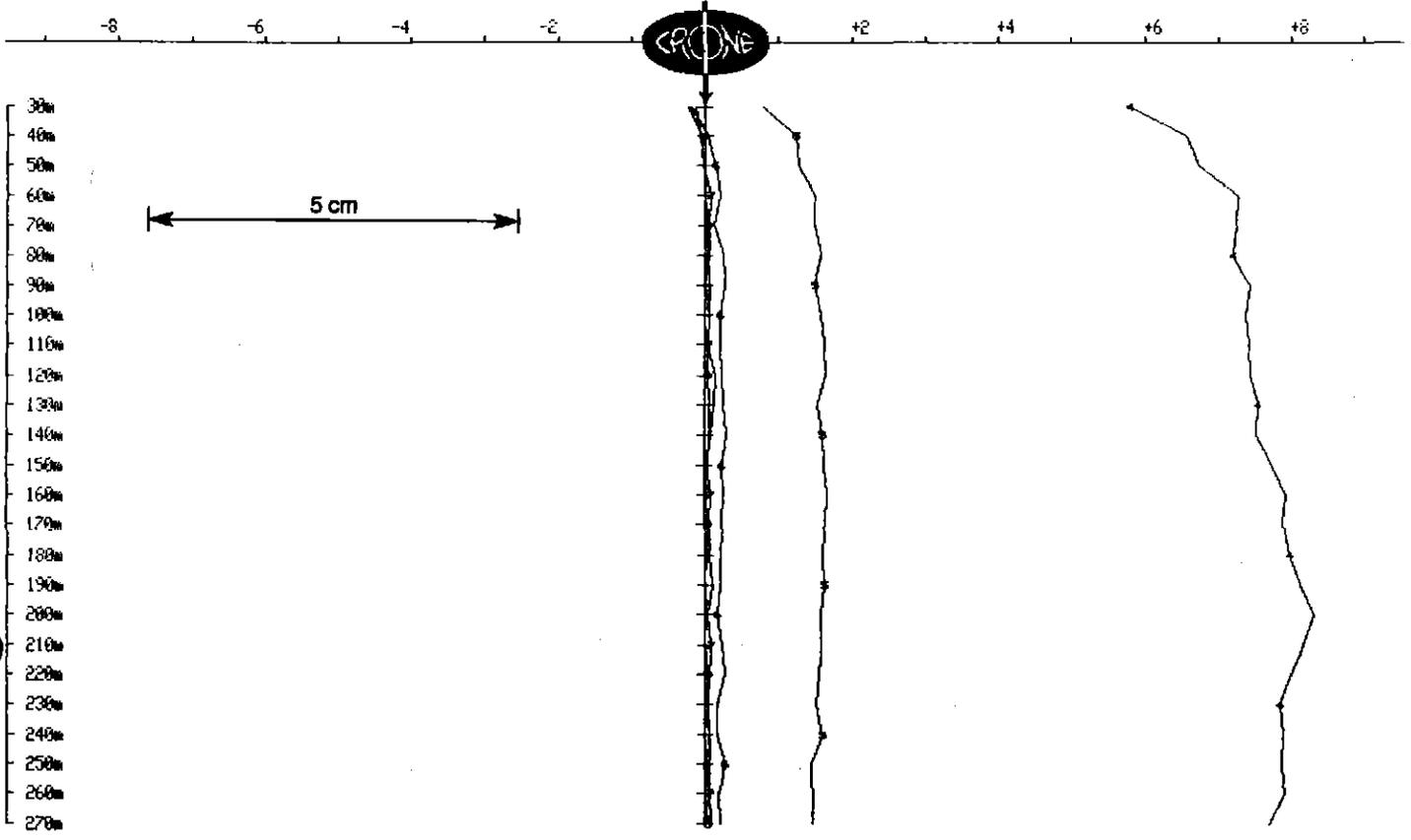
Client : PASMINGO EXPLORATION
Grid : OCEANIA
Date : Feb 2, 1993

Hole : OP2
Tx Loop : OP2-E
File name : OP2ZE.AM2

Z COMPONENT dBz/dt nanoVolt/amp-m - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 1



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

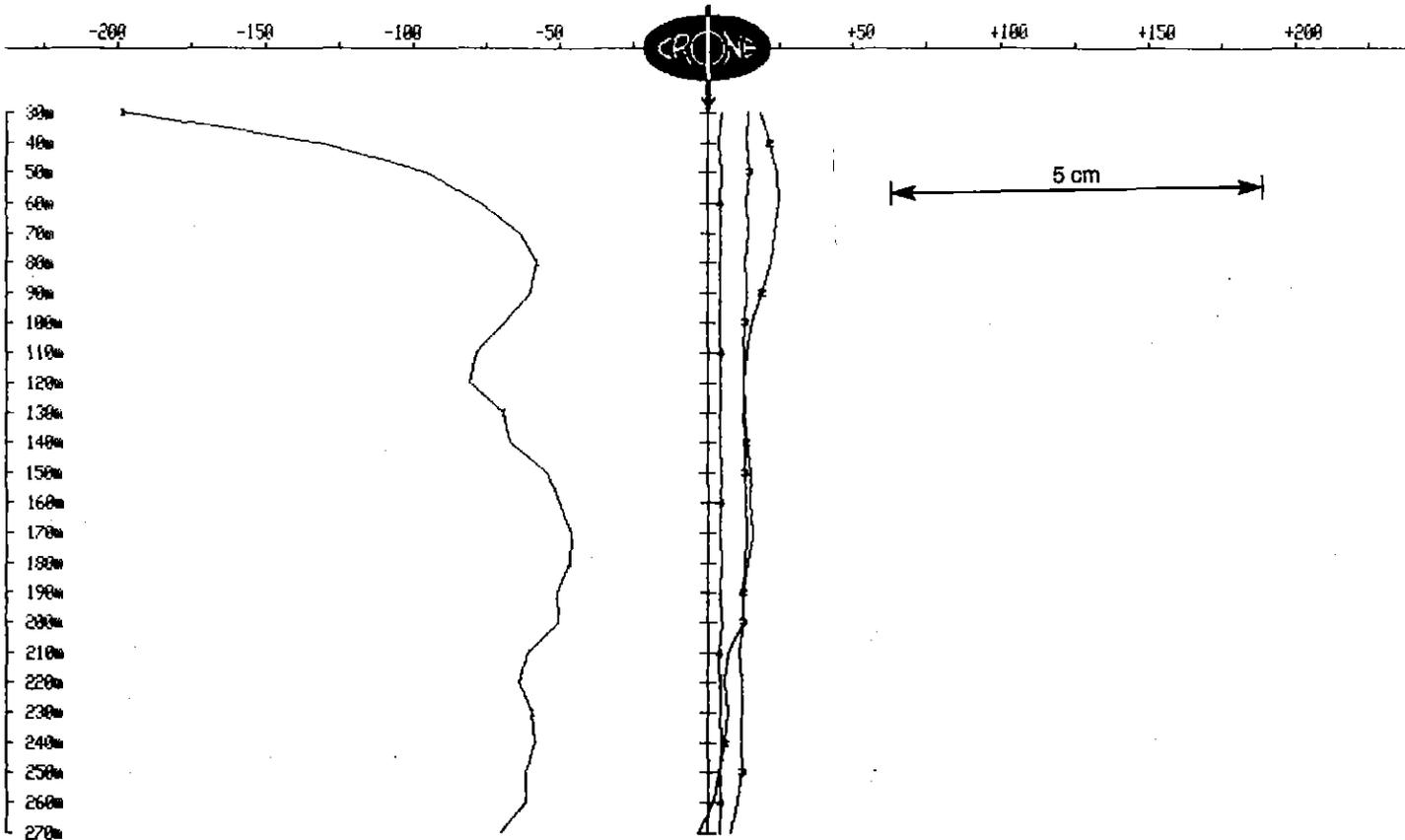
Client : PASMINGO EXPLORATION
 Grid : OCEANIA
 Date : Feb 2, 1993

Hole : OP2
 Tx Loop : OP2-E
 File name : OP2XYE.AM2

Data Corrected for Probe Rotation using Cleaned PP
 X COMPONENT dBx/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 25



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

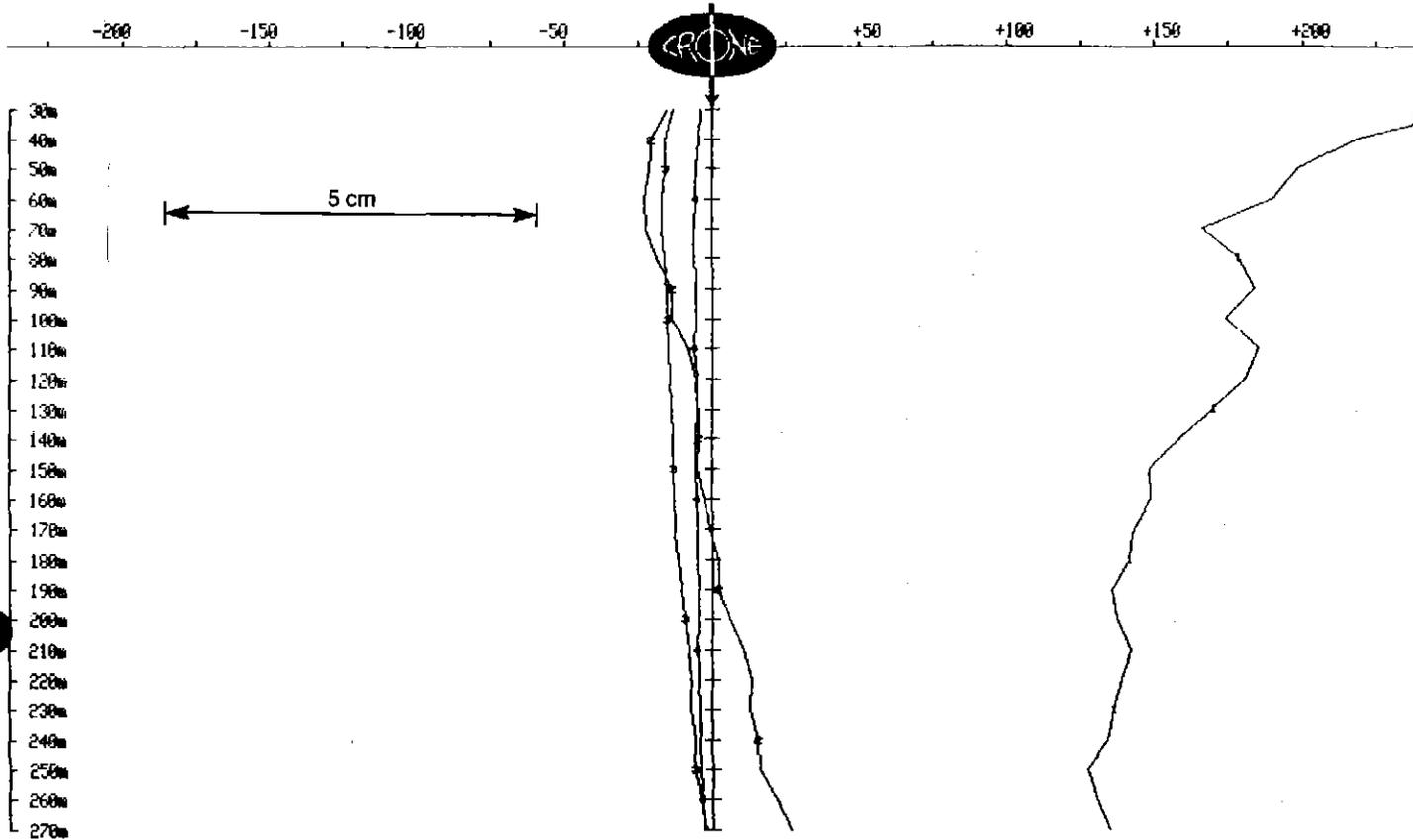
Client : PASMINGO EXPLORATION
 Grid : OCEANIA
 Date : Feb 2, 1993

Hole : OP2
 Tx Loop : OP2-E
 File name : OP2XYE.AM2

Data Corrected for Probe Rotation using Cleaned PP
 Y COMPONENT dBy/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 25



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

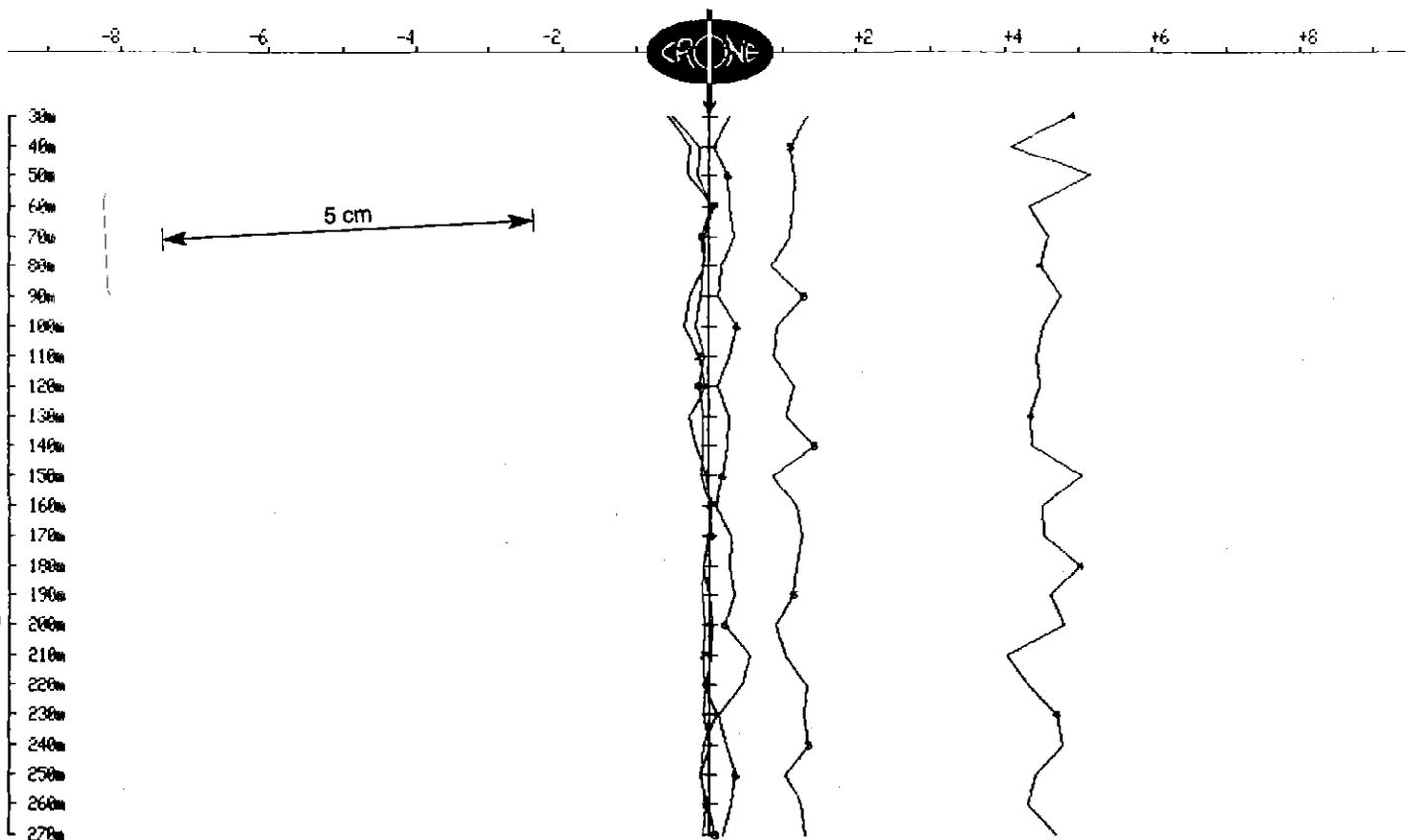
Client : PASMINGO EXPLORATION
 Grid : OCEANIA
 Date : Feb 2, 1993

Hole : OP2
 Tx Loop : OP2-E
 File name : OP2XYE.AM2

Data Corrected for Probe Rotation using Cleaned PP
 X COMPONENT dBx/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 1



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

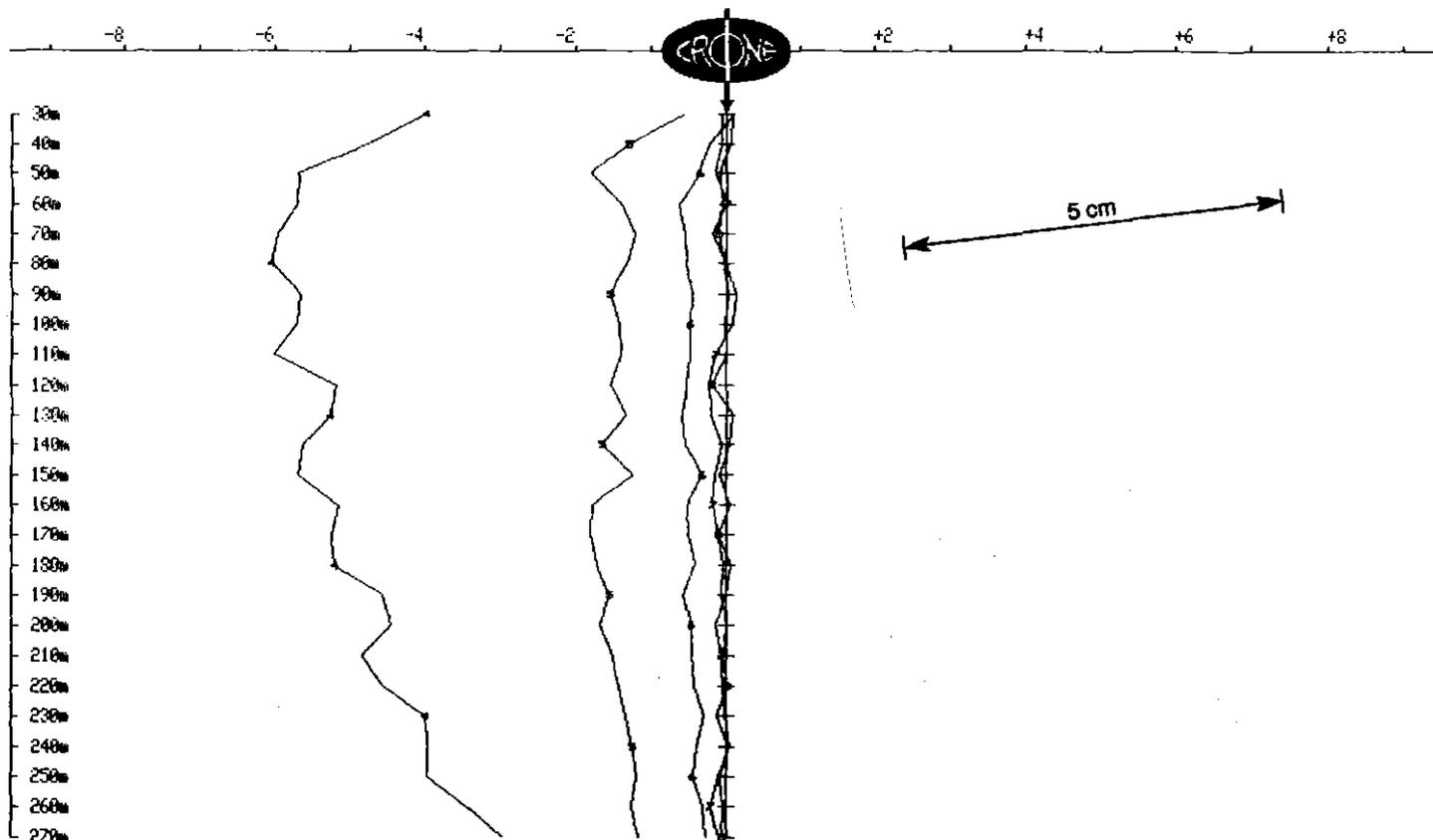
Client : PASMINGO EXPLORATION
Grid : OCEANIA
Date : Feb 2, 1993

Hole : OP2
Tx Loop : OP2-E
File name : OP2XYE.AM2

Data Corrected for Probe Rotation using Cleaned PP
Y COMPONENT dBy/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 1



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

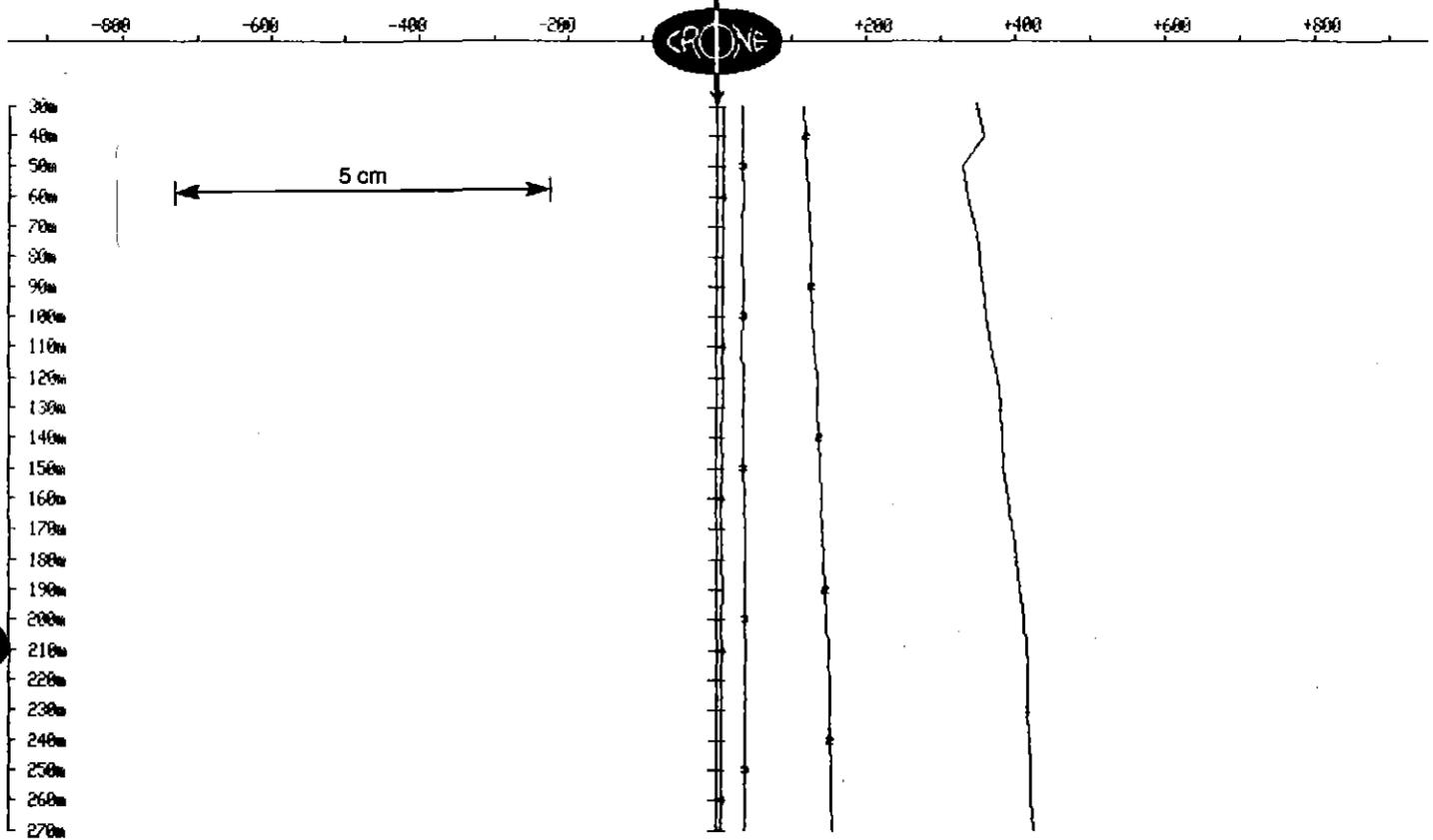
Client : PASMINGO EXPLORATION
Grid : OCEANIA
Date : Feb 2, 1993

Hole : OP2
Tx Loop : OP2-W
File name : OP2ZW.AM2

Z COMPONENT dBz/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 100



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

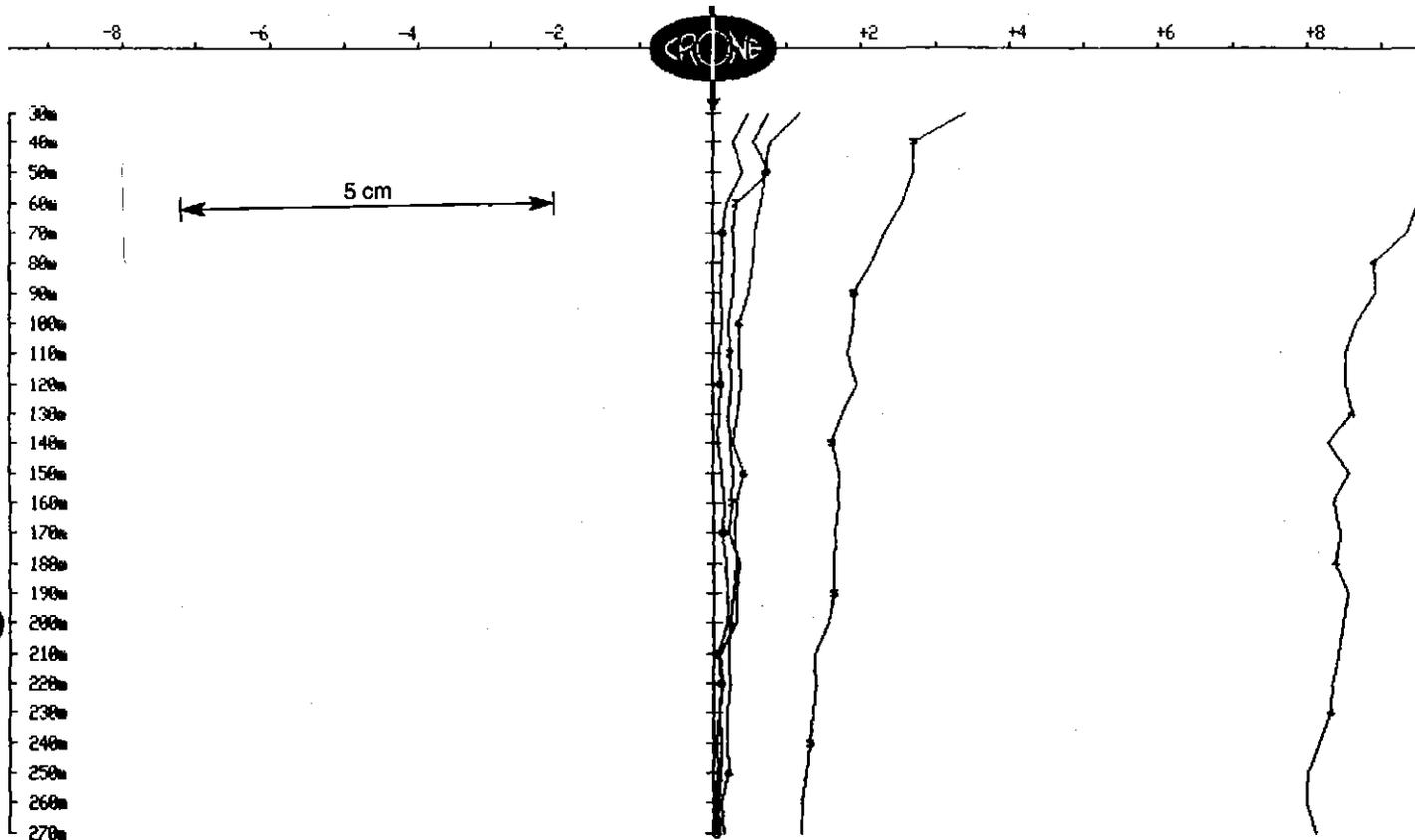
Client : PASMINGO EXPLORATION
 Grid : OCEANIA
 Date : Feb 2, 1993

Hole : OP2
 Tx Loop : OP2-W
 File name : OP2ZW.AM2

Z COMPONENT dBz/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 1



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

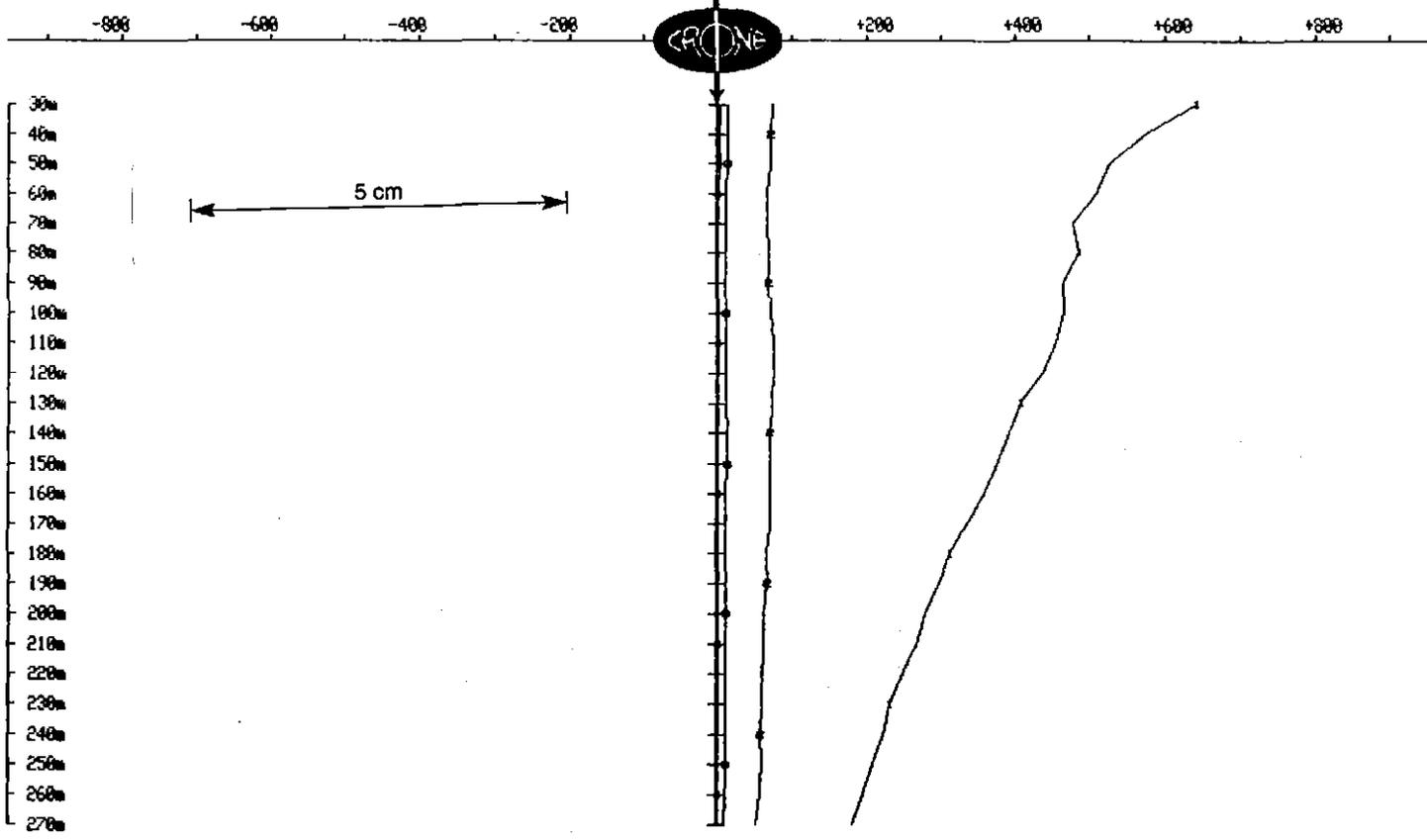
Client : PASMINGO EXPLORATION
Grid : OCEANIA
Date : Feb 2, 1993

Hole : OP2
Tx Loop : OP2-W
File name : OP2XYW.AM2

Data Corrected for Probe Rotation using Cleaned PP
X COMPONENT dBx/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 100



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

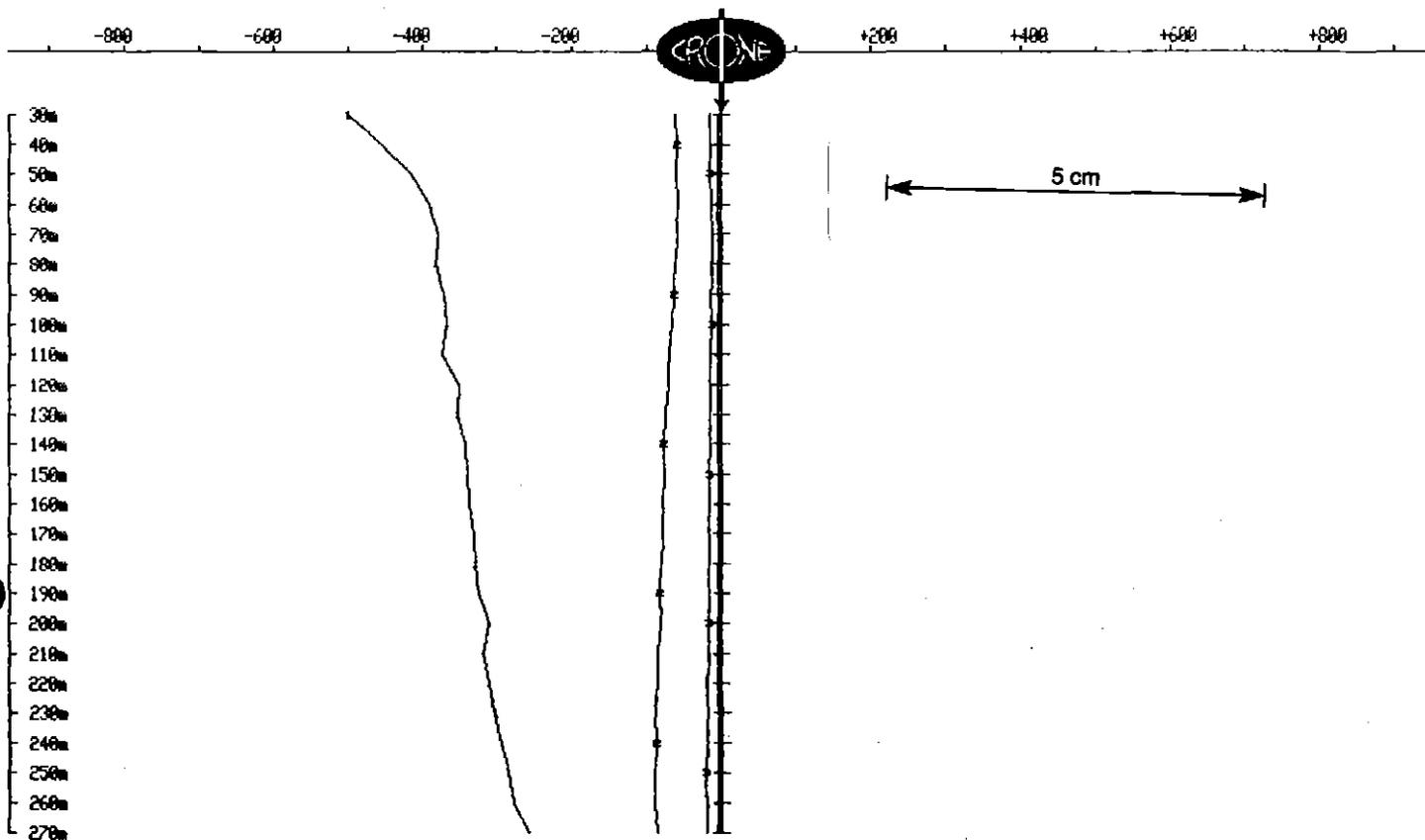
Client : PASMINCO EXPLORATION
Grid : OCEANIA
Date : Feb 2, 1993

Hole : OP2
Tx Loop : OP2-W
File name : OP2XYW.AM2

Data Corrected for Probe Rotation using Cleaned PP
Y COMPONENT dBy/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 100



973104

CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

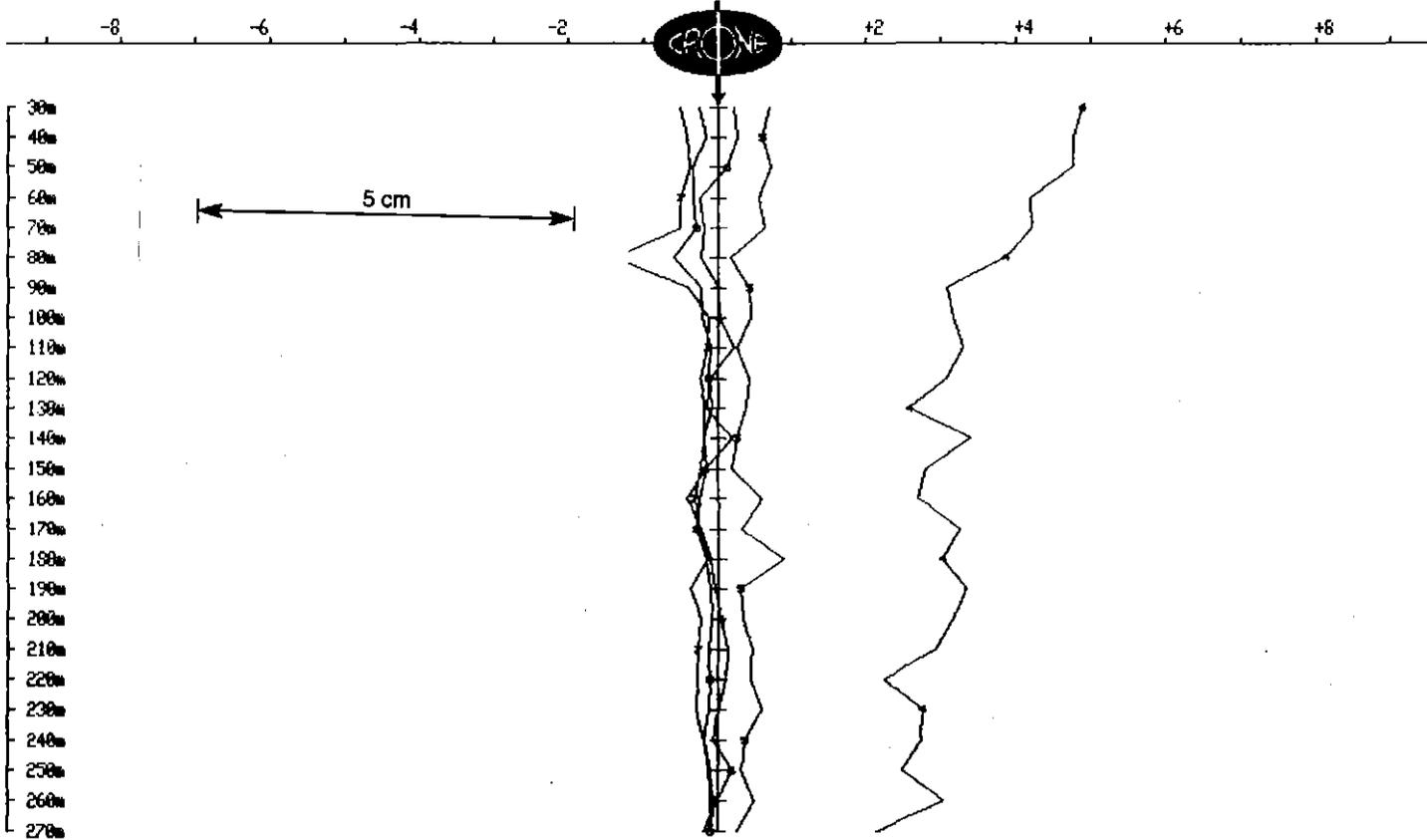
Client : PASMINGO EXPLORATION
Grid : OCEANIA
Date : Feb 2, 1993

Hole : OP2
Tx Loop : OP2-W
File name : OP2XYW.AM2

Data Corrected for Probe Rotation using Cleaned PP
X COMPONENT dBx/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 1



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

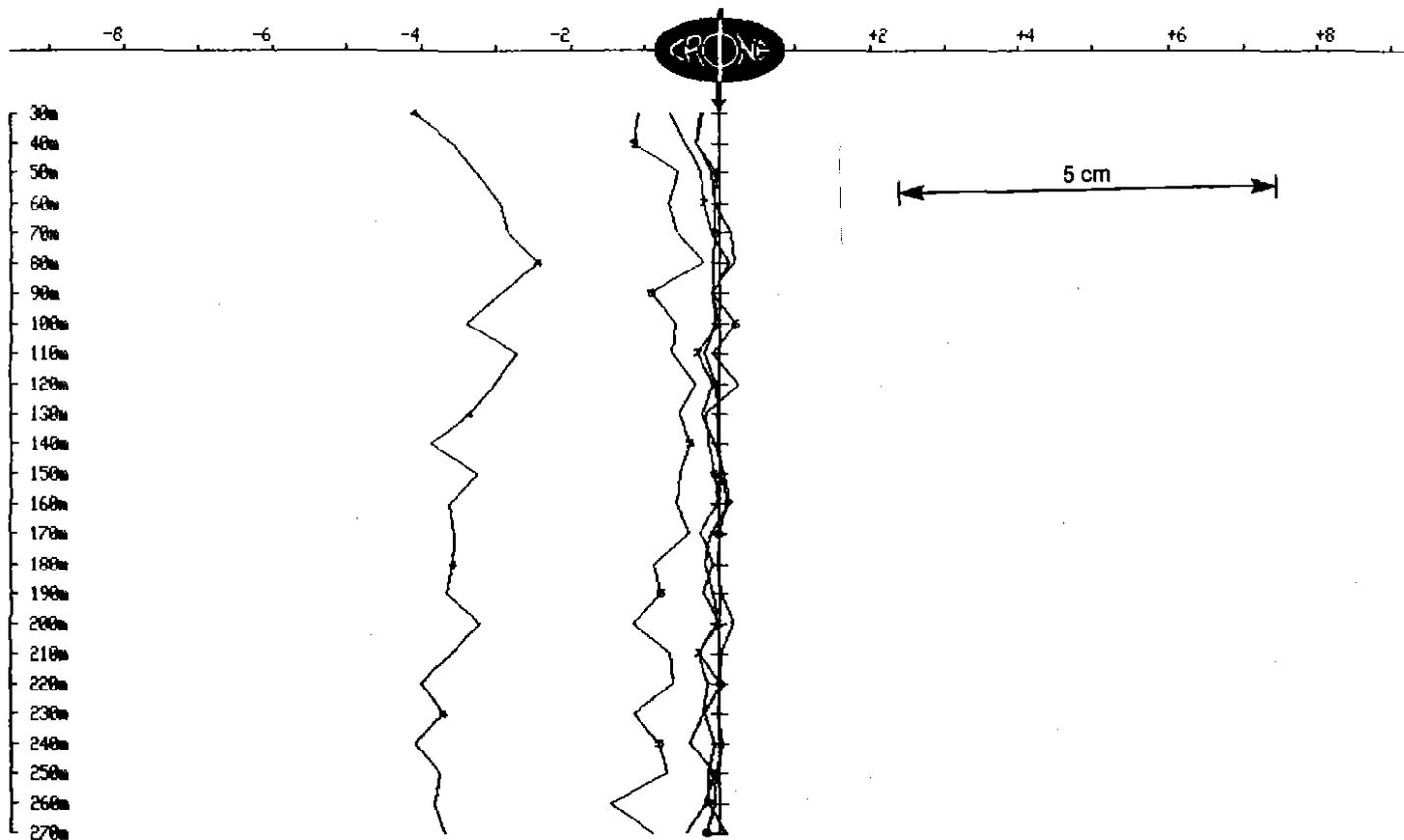
Client : PASMINGO EXPLORATION
 Grid : OCEANIA
 Date : Feb 2, 1993

Hole : OP2
 Tx Loop : OP2-W
 File name : OP2XYW.AM2

Data Corrected for Probe Rotation using Cleaned PP
 Y COMPONENT dBy/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 1



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

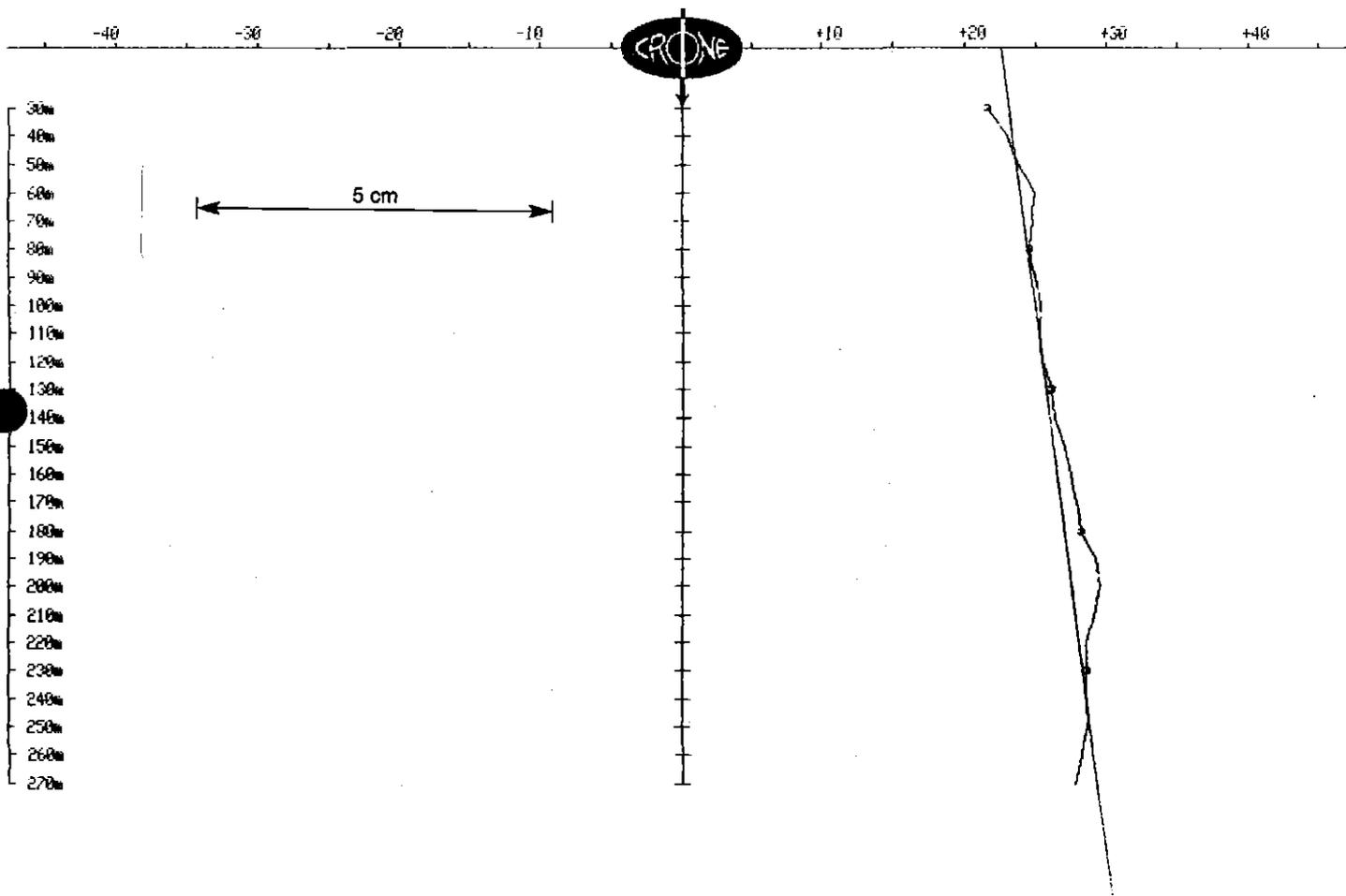
Client : PASMINGO EXPLORATION
 Grid : OCEANIA
 Date : Feb 2, 1993

Hole : OP2
 Tx Loop : OP2-E
 File name : OP2ZE.AM2

Z COMPONENT dBz/dt nanoVolt/amp-m - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 5



973107

CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

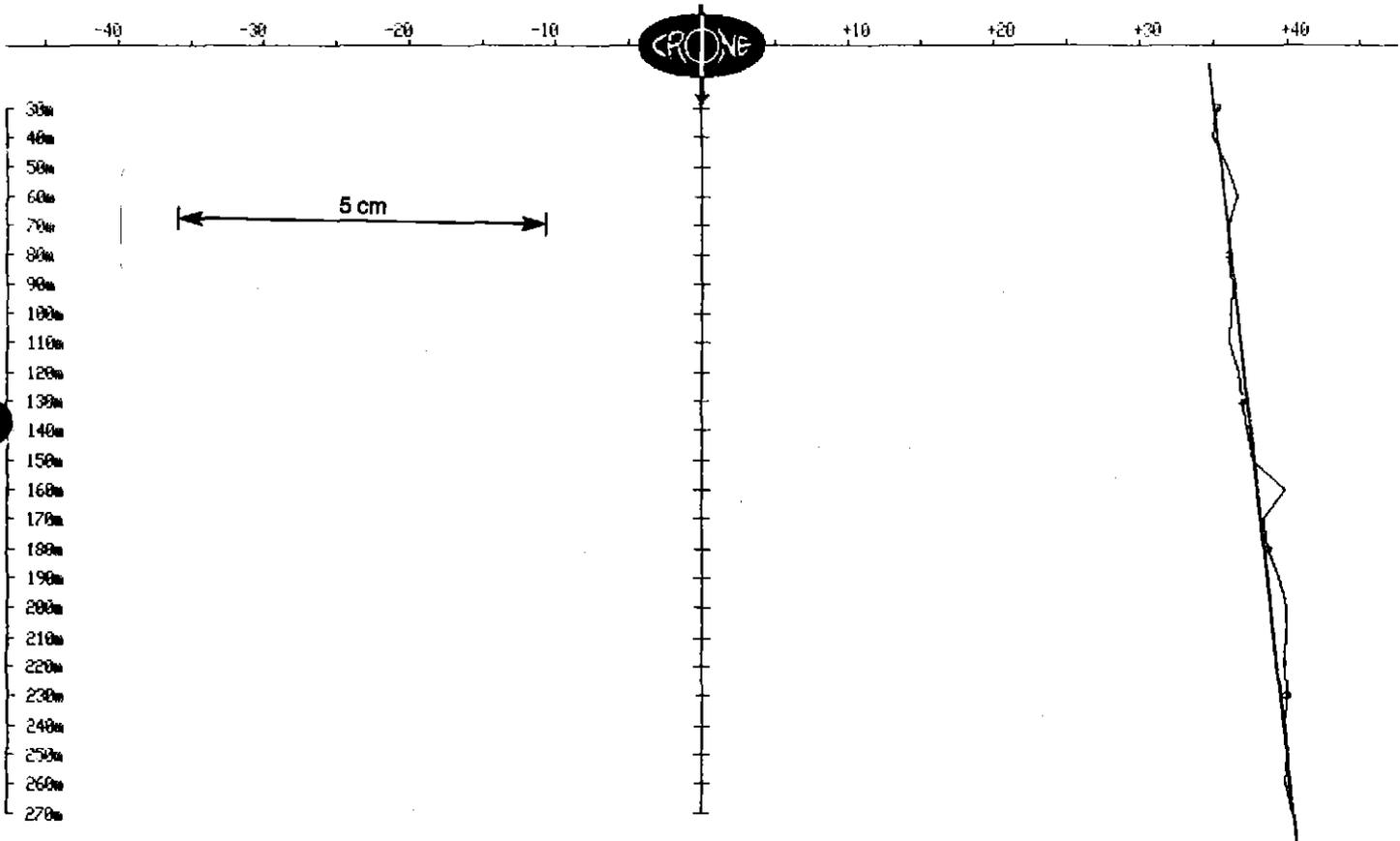
Client : PASMINCO EXPLORATION
Grid : OCEANIA
Date : Feb 2, 1993

Hole : OP2
Tx Loop : OP2-W
File name : OP2ZW.AM2

Z COMPONENT dBz/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 5



973108

CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

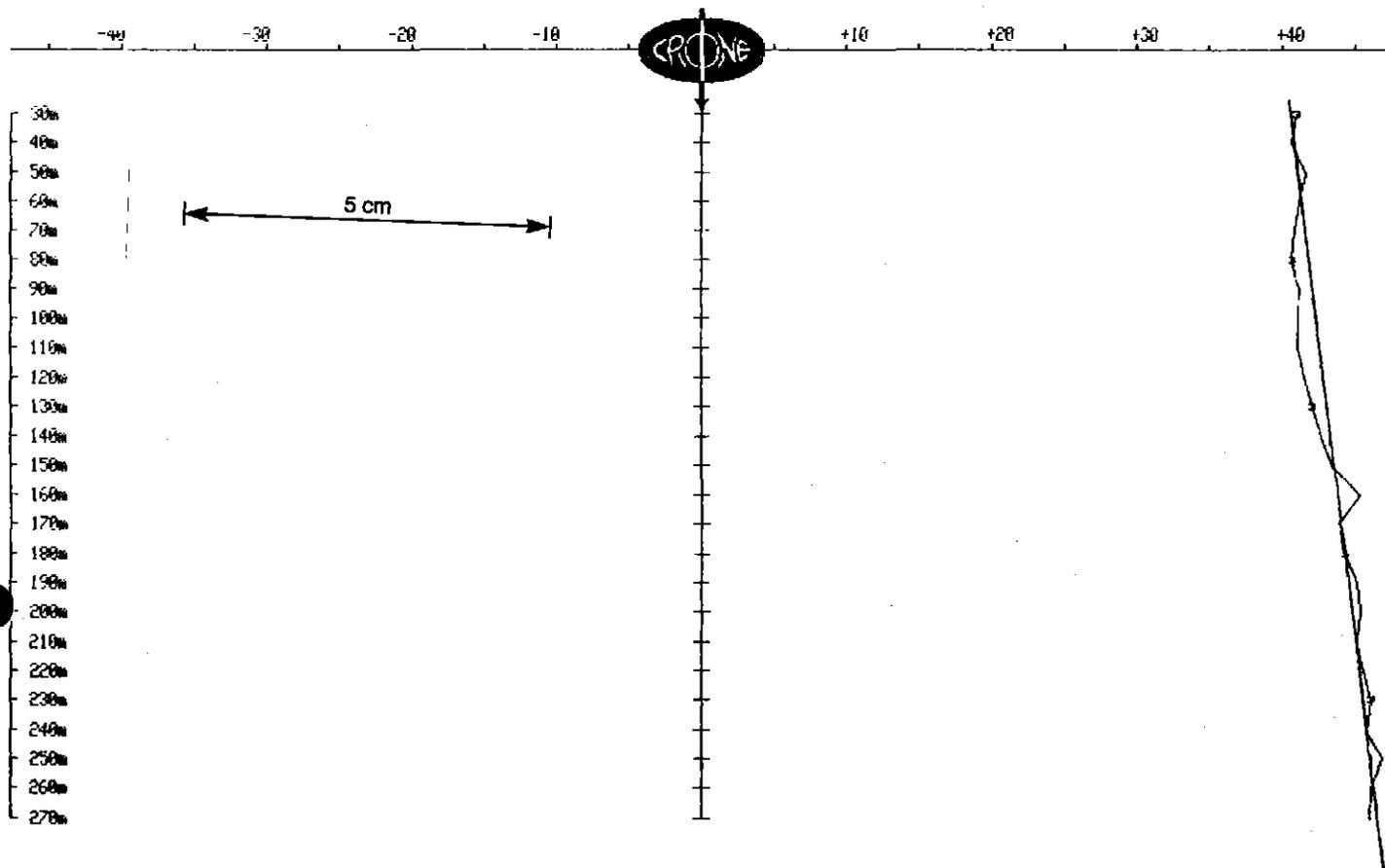
Client : PASMINGO EXPLORATION
Grid : OCEANIA
Date : Feb 2, 1993

Hole : OP2
Tx Loop : OP2-W
File name : OP2W.AM2

TOTAL FIELD dBxyz/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 5



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

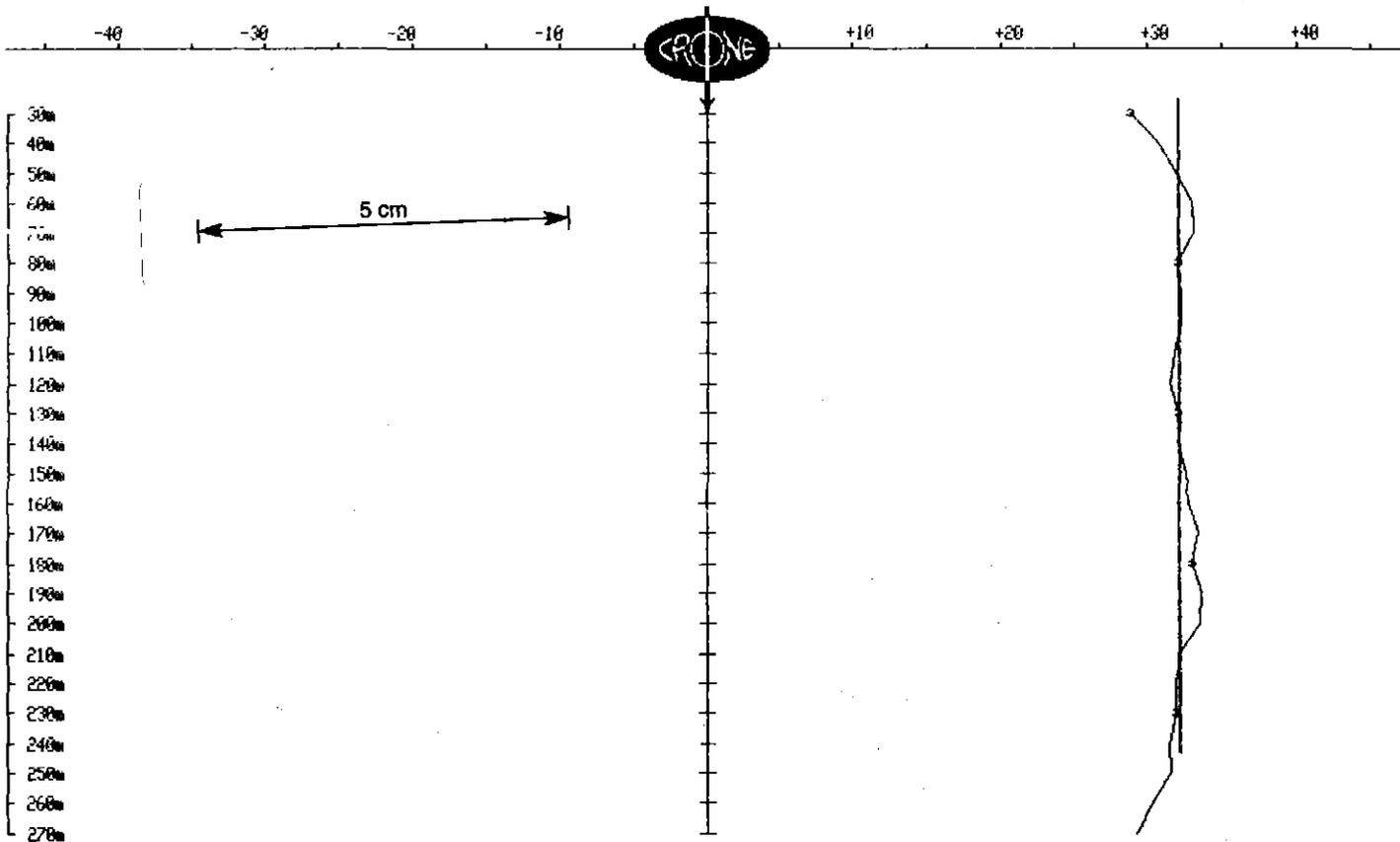
Client : PASMINGO EXPLORATION
 Grid : OCEANIA
 Date : Feb 2, 1993

Hole : OP2
 Tx Loop : OP2-E
 File name : OP2E.AM2

TOTAL FIELD dBxyz/dt nanoVolt/amp-m² - 8 channels

Scale: 1:2500

Unit Scale: 1cm = 5



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

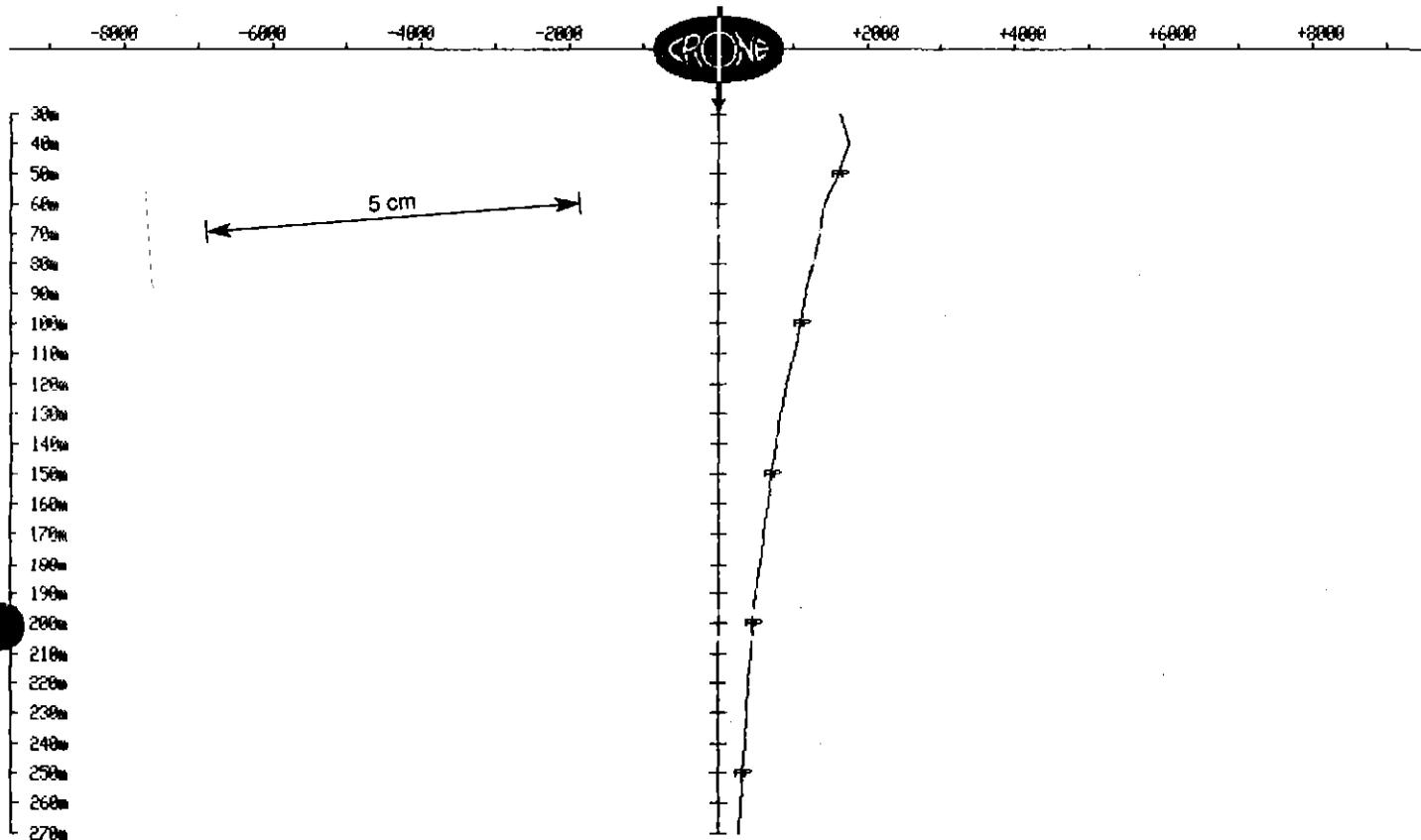
Client : PASMINGO EXPLORATION
 Grid : OCEANIA
 Date : Feb 2, 1993

Hole : OP2
 Tx Loop : OP2-E
 File name : OP2E.AM2

Z COMPONENT dBz/dt nanoVolt/amp-m² - 8 channels and PP

Scale: 1:2500

Unit Scale: 1cm = 1000



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

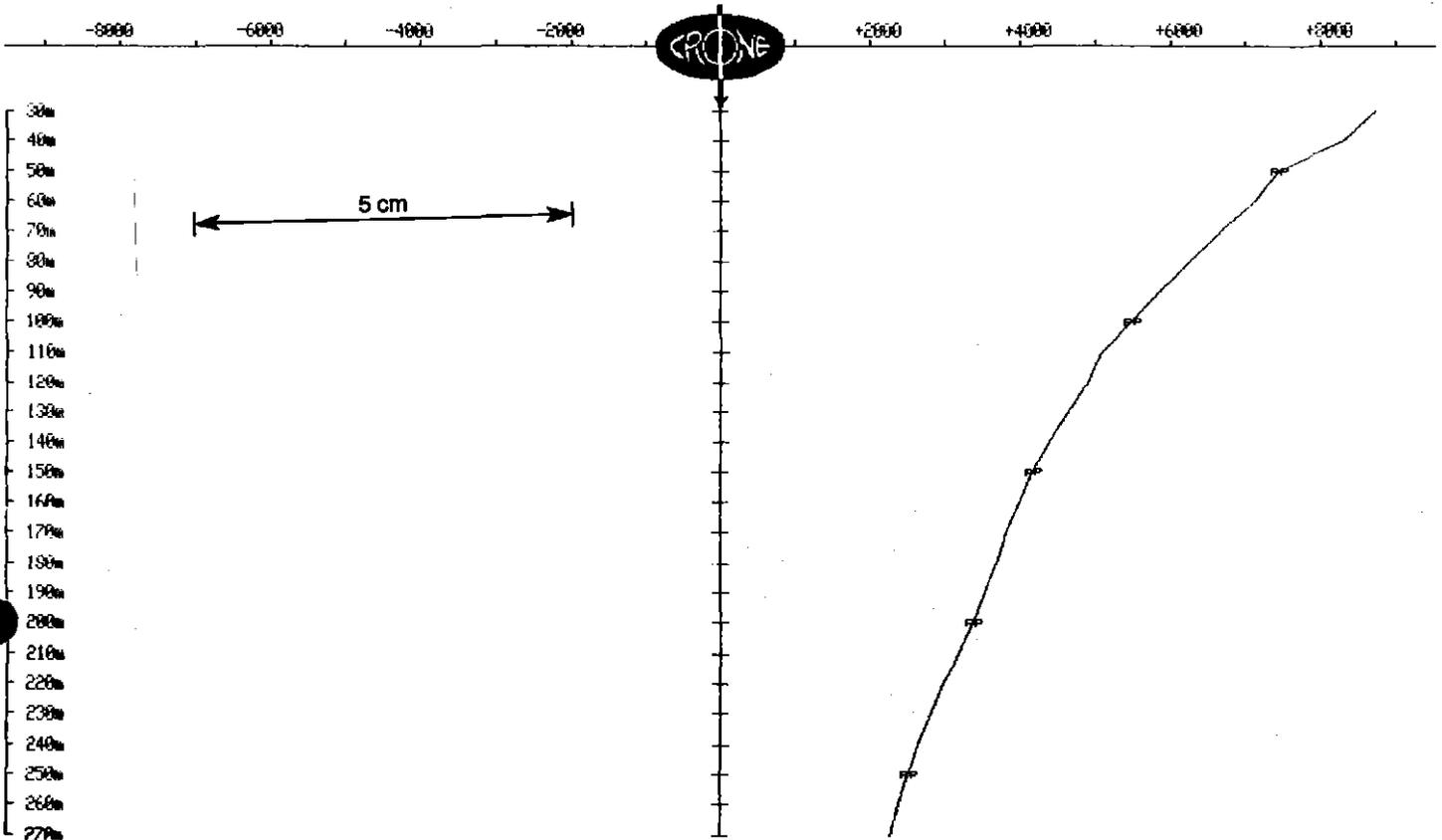
Client : PASMINCO EXPLORATION
 Grid : OCEANIA
 Date : Feb 2, 1993

Hole : OP2
 Tx Loop : OP2-W
 File name : OP2W.AM2

Z COMPONENT dBz/dt nanoVolt/amp-m² - 8 channels and PP

Scale: 1:2500

Unit Scale: 1cm = 1000



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

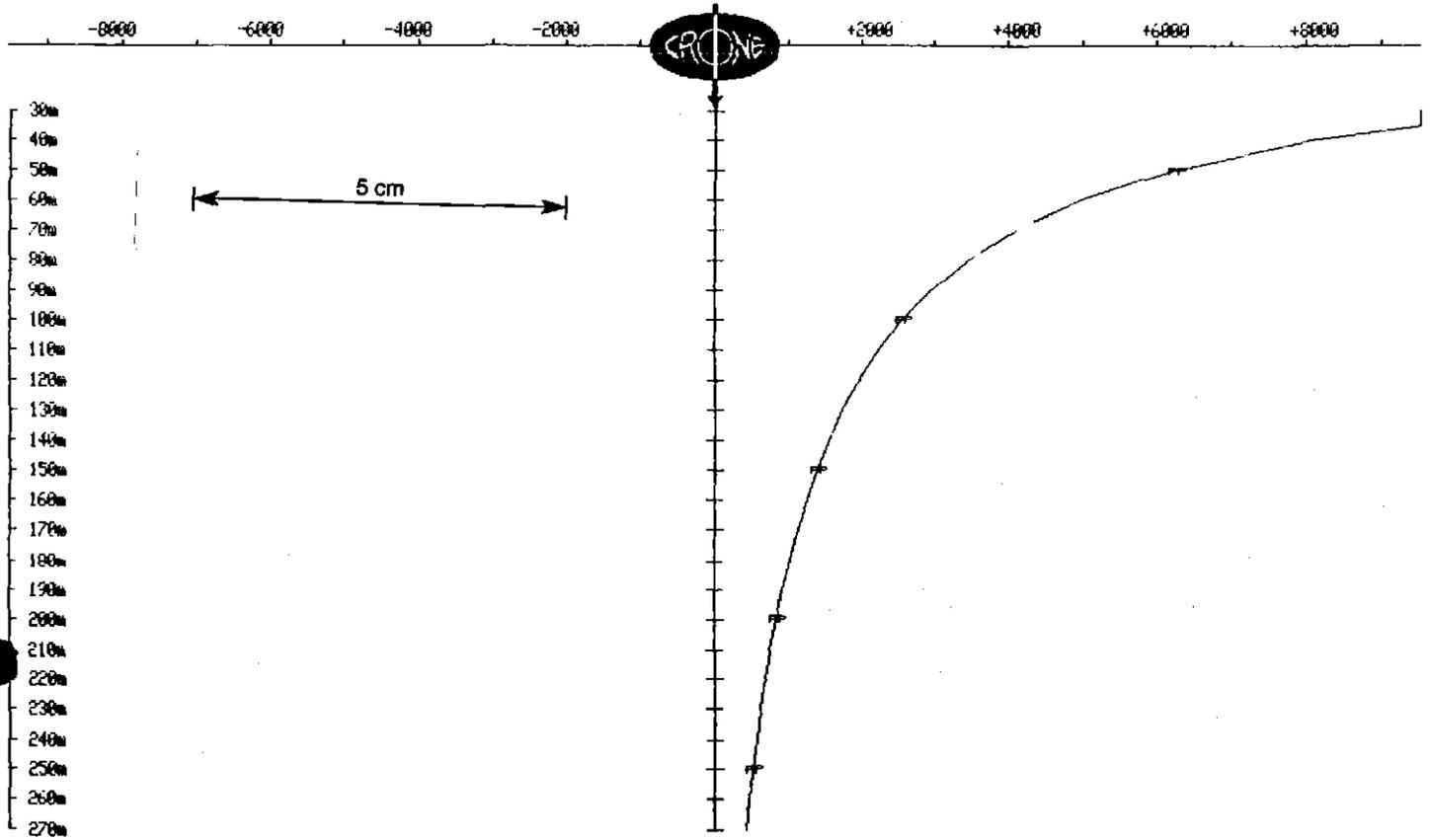
Client : PASMINGO EXPLORATION
Grid : OCEANIA
Date : Feb 2, 1993

Hole : OP2
Tx Loop : OP2-E
File name : OP2E.AM2

TOTAL FIELD dB_{xyz}/dt nanoVolt/amp- m^2 - 8 channels and PP

Scale: 1:2500

Unit Scale: 1cm = 1000



CRONE GEOPHYSICS & EXPLORATION LTD

BOREHOLE PEM

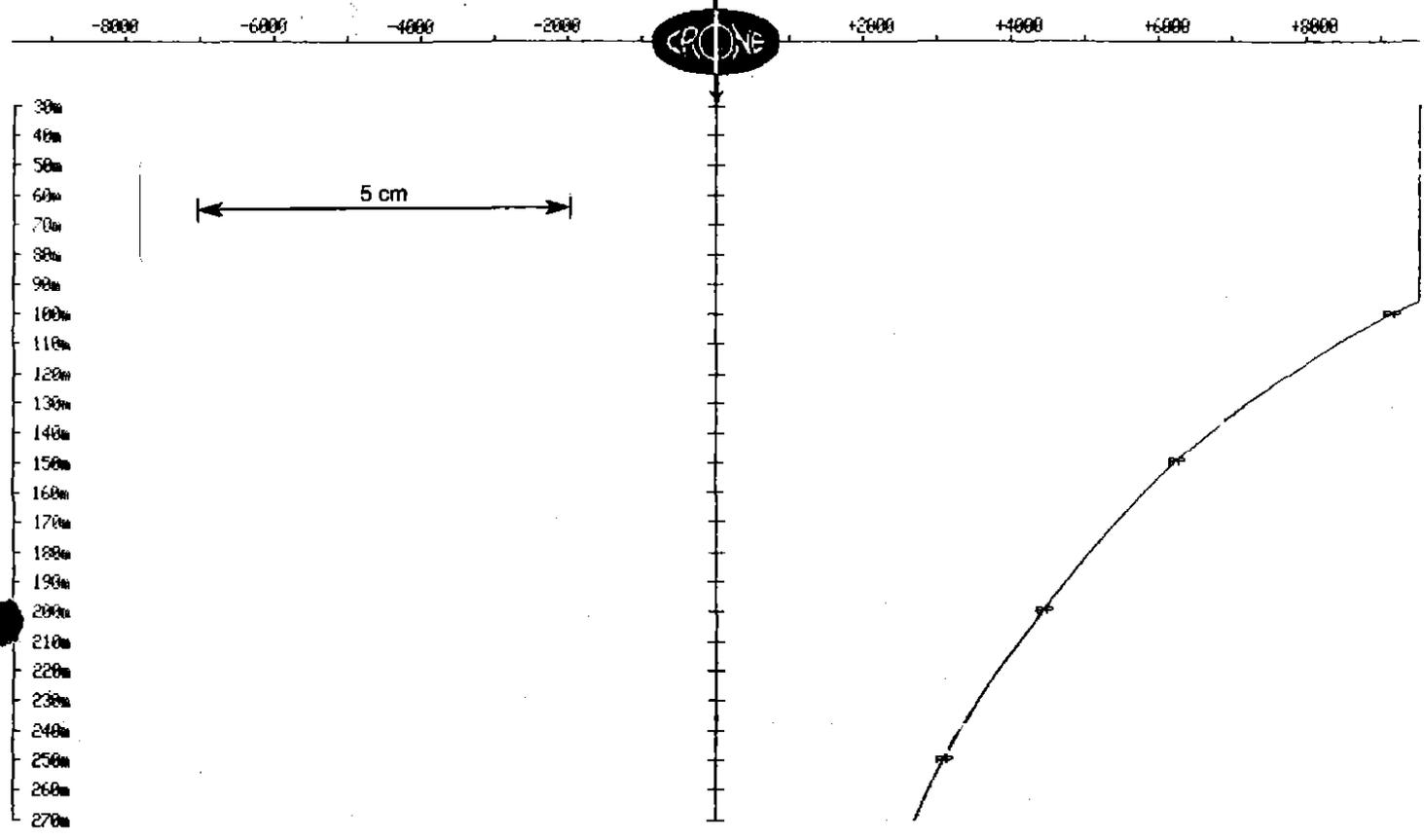
Client : PASMINCO EXPLORATION
Grid : OCEANIA
Date : Feb 2, 1993

Hole : OP2
Tx Loop : OP2-W
File name : OP2W.AM2

TOTAL FIELD dBxyz/dt nanoVolt/amp-m² - 8 channels and PP

Scale: 1:2500

Unit Scale: 1cm = 1000



APPENDIX 7

Operations Report – Gravity Survey at Oceana

***Operations report —
Gravity survey at Oceana
for Pasmaenco Exploration***



TASMANIA DEPARTMENT OF MINES



Operations report — Gravity survey at Oceana for Pasminco Exploration

by R. G. RICHARDSON, B. Sc., (Hons), Ph.D.

Abstract

At the request of Pasminco Exploration the Department of Mines acquired gravity data at 66 points in the specified area. Stations were positioned by a surveyor during acquisition of the gravity data with an accuracy of better than 0.1 m in all three co-ordinates. The survey was conducted from 20 October 1992 to 23 October 1992 inclusive.

BASE STATION

The base station used for the survey was station 8451.9011 at the junction of the Zeehan and Murchison Highways (Richardson and Dix, 1986). It has an observed gravity value of 980298.00 mgal. Base readings were made three times per day.

GRAVITY METER

A Sodin gravity meter, #183, was used for the survey. The constant of this meter is 0.1014 mgal/scale division. The reading accuracy of the meter is 0.01 mgal on good ground and 0.02–0.05 mgal on soft ground.

DATA PROCESSING

All data were corrected for linear drift between base readings. The gravity data were reduced to Bouguer Anomalies using the 1930 International Gravity Formula and a Bouguer Density of 2.67 t/m^3 . Terrain corrections were computed to a radius of 21 km using a density of 2.67 t/m^3 .

DATA SUPPLIED

- (i) Floppy disk of reduced data. Columns are station number, easting, northing, elevation, obscured gravity, theoretical gravity, terrain correction and Bouguer Anomaly. Only the data collected in this survey are presented.
- (ii) A listing of the contents of the floppy disk.
- (iii) A handwritten field map showing station positions.

REFERENCES

- RICHARDSON, R. G.; DIX, M. J. 1986. West Coast gravity tie stations (Revision 1). *Unpubl. Rep. Dep. Mines Tasm.* 1986/79.

R. G. Richardson

SUPERVISING GEOPHYSICIST

November 1992

Enquiries: Dr R.G. Richardson
Phone: 33 8324
Your ref:
Our file: 69159
RGR77.92:LD

Mr M. Quayle
Pasminco Exploration
PO Box 886
BURNIE TAS 7320

Dear Mike,

GRAVITY SURVEY, OCEANA AREA

Please find enclosed an operations report and data listing for the above survey.

Yours faithfully,



R.G. Richardson
SUPERVISING GEOPHYSICIST

Encl.

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mgal)	File Name
9251.1000	362425.9	357754.1	213.75	980.305331	980.351949	1.24	-3.33	*PAS183A
9251.1001	362317.5	357801.0	245.22	980.299014	980.351909	2.21	-2.45	*PAS183A
9251.1002	362110.9	357838.2	345.02	980.276513	980.351876	3.65	-3.85	*PAS183A
9251.1003	362007.8	357897.2	377.78	980.269192	980.351827	4.75	-3.57	*PAS183A
9251.1004	362223.9	357653.1	234.82	980.301539	980.352027	2.47	-1.83	*PAS183A
9251.1005	362116.7	357574.3	221.71	980.303851	980.352089	2.40	-2.23	*PAS183A
9251.1006	361905.2	357532.3	270.84	980.294552	980.352120	2.91	-1.38	*PAS183A
9251.1007	361692.2	357456.0	329.51	980.283287	980.352178	3.93	-0.15	*PAS183A
9251.1008	361554.5	357333.6	372.91	980.274779	980.352275	4.07	-0.07	*PAS183A
9251.1009	361723.1	357345.3	291.92	980.291287	980.352268	3.73	0.17	*PAS183A
9251.1010	361937.6	357428.2	227.36	980.303536	980.352204	3.27	-0.68	*PAS183A
9251.1011	362017.0	357392.1	222.81	980.304743	980.352235	2.57	-1.10	*PAS183A
9251.1012	361849.7	357270.2	258.31	980.298406	980.352331	2.76	-0.36	*PAS183A
9251.1013	361683.5	357152.0	309.91	980.288124	980.352423	3.80	0.46	*PAS183A
9251.1014	361615.9	356976.2	396.45	980.270287	980.352564	5.47	1.18	*PAS183A
9251.1015	361455.3	356865.8	473.71	980.253242	980.352651	7.80	1.58	*PAS183A
9251.1016	361283.5	356847.2	522.09	980.242463	980.352663	9.00	1.50	*PAS183A
9251.1017	361102.3	356829.0	605.82	980.221149	980.352675	14.50	2.15	*PAS183A
9251.1018	360903.5	356868.7	690.62	980.196914	980.352640	23.63	3.77	*PAS183A
9251.1019	360832.7	356818.1	701.50	980.194491	980.352680	24.66	4.48	*PAS183A
9251.1020	361493.1	356671.5	479.04	980.253333	980.352808	7.66	2.42	*PAS183A
9251.1021	361609.7	356546.8	453.82	980.259610	980.352911	5.87	1.84	*PAS183A
9251.1022	361810.9	356549.5	484.32	980.249429	980.352912	7.06	-1.15	*PAS183A
9251.1023	361913.1	356429.8	457.05	980.257399	980.353010	7.13	1.43	*PAS183A
9251.1024	362048.6	356263.4	458.91	980.256142	980.353147	8.63	1.90	*PAS183A
9251.1025	362174.2	356119.6	466.53	980.252664	980.353265	9.87	1.04	*PAS183A
9251.1026	362305.8	355988.7	437.42	980.260391	980.353373	7.00	0.06	*PAS183A
9251.1027	362429.1	355843.7	449.84	980.255584	980.353492	7.67	-1.75	*PAS183A
9251.1028	362603.4	355803.8	402.95	980.268604	980.353527	4.80	-0.86	*PAS183A
9251.1029	362724.1	355708.8	364.03	980.278257	980.353605	3.86	0.12	*PAS183A
9251.1030	362875.1	355630.9	321.94	980.289067	980.353671	2.47	1.19	*PAS183A
9251.1031	362987.6	355716.6	303.57	980.293356	980.353603	1.48	0.95	*PAS183A
9251.1032	363001.3	355831.4	279.19	980.298375	980.353511	1.69	1.47	*PAS183A
9251.1033	362843.8	355946.0	274.08	980.297209	980.353416	1.77	-0.53	*PAS183A
9251.1034	362699.4	356090.6	287.44	980.295566	980.353297	1.75	0.56	*PAS183A
9251.1035	362588.6	356271.3	273.01	980.298081	980.353149	1.64	0.27	*PAS183A
9251.1036	362151.7	357381.5	204.61	980.308089	980.352245	2.13	-1.78	*PAS183A
9251.1037	362129.0	357433.2	206.80	980.307532	980.352203	2.53	-1.47	*PAS183A
9251.1038	362128.8	357495.2	201.60	980.308170	980.352153	2.92	-1.41	*PAS183A
9251.1039	362105.1	357519.7	204.90	980.307298	980.352133	2.95	-1.58	*PAS183A
9251.1040	361782.1	357350.3	268.65	980.295789	980.352265	3.85	0.22	*PAS183A
9251.1041	361805.5	357395.1	257.81	980.297645	980.352229	3.30	-0.57	*PAS183A
9251.1042	361856.2	357420.3	249.19	980.299247	980.352209	3.56	-0.39	*PAS183A
9251.1043	361899.3	357452.8	234.44	980.301924	980.352184	3.09	-1.06	*PAS183A
9251.1044	361954.7	357477.6	229.23	980.302806	980.352165	3.15	-1.12	*PAS183A
9251.1045	362000.1	357504.2	225.05	980.303506	980.352144	2.92	-1.45	*PAS183A
9251.1046	361914.5	357094.7	263.71	980.297381	980.352473	3.04	-0.18	*PAS183A
9251.1047	362041.9	356960.1	258.23	980.298821	980.352584	2.63	-0.34	*PAS183A
9251.1048	362142.7	356769.0	259.37	980.298639	980.352740	2.39	-0.69	*PAS183A
9251.1049	362239.7	356609.2	274.56	980.295962	980.352871	2.64	-0.26	*PAS183A
9251.1050	362343.1	356434.9	281.46	980.294968	980.353013	2.52	-0.16	*PAS183A
9251.1051	362502.2	356303.0	279.02	980.296307	980.353122	2.05	0.12	*PAS183A
9251.1052	363123.6	357910.8	201.41	980.305118	980.351833	1.00	-6.10	*PAS183A
9251.1053	363101.8	357684.5	207.80	980.305159	980.352015	1.04	-4.94	*PAS183A
9251.1054	362963.1	357805.9	178.83	980.310188	980.351915	1.08	-5.47	*PAS183A
9251.1055	363251.5	357580.1	209.06	980.304155	980.352102	1.41	-5.42	*PAS183A
9251.1056	362787.6	357775.0	158.17	980.315258	980.351937	1.01	-4.56	*PAS183A

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mgal)	File Name
9251.1057	362898.8	357610.1	156.48	980.315836	980.352072	1.03	-4.43	*PAS183A
9251.1058	362988.2	357457.7	155.91	980.316820	980.352197	1.11	-3.60	*PAS183A
9251.1059	363101.5	357288.5	154.95	980.317570	980.352335	0.91	-3.38	*PAS183A
9251.1060	363226.9	357127.2	152.10	980.318534	980.352468	0.84	-3.18	*PAS183A
9251.1061	363390.1	357011.9	149.14	980.319629	980.352563	0.64	-2.96	*PAS183A
9251.1062	363570.3	356908.7	146.11	980.320734	980.352649	0.58	-2.60	*PAS183A
9251.1063	363755.4	356824.8	143.00	980.321464	980.352720	0.75	-2.38	*PAS183A
9251.1064	363972.1	356710.3	140.68	980.321981	980.352816	0.69	-2.47	*PAS183A
9251.1065	363014.6	357516.7	155.24	980.316475	980.352150	1.02	-4.12	*PAS183A

APPENDIX 8

Amoco Gravity Grids: Coordinate Corrections

Inquiries: Dr R.G. Richardson
Phone: 33 8324
Your ref:
Our file: RGR80.92:JH

Mr M Quayle
Pasminco Exploration
PO Box 886
BURNIE TAS 7320

Dear Mike,

AMOCO GRAVITY GRIDS, ZEEHAN

David Leaman has compared the topographic plots produced from the Amoco data with the Lands Department 1:10 000 maps and suggested a series of co-ordinate shifts and rotations which should improve the match to the real world. As you would realise I am not able to make these changes immediately so I have enclosed a list of the shifts and rotations and a listing of my simple FORTRAN program. Note that the angle of rotation is positive for an anti-clockwise direction.

Yours sincerely,



R.G. Richardson
SUPERVISING GEOPHYSICIST

Encl.

PO Box 56 Rosny Park Tasmania 7018
Gordons Hill Road Rosny Park
Ph (002) 33 8333 Fax (002) 44 2117

Grid Name	Old East	Old North	New East	New North	Rotation (degrees)
SASSAF	364000	365000	364090	364945	+2
ROSE2	361000	348000	360995	347890	-2
ROSE1	361000	347000	360965	346825	+4.5
NUBEENA	361000	358000	360990	358020	+1
AUSTRAL	362000	359000	362150	359030	+2
OCEANA	362000	357000	362030	357040	+0.5
PYRAMID	363000	356000	363005	356020	+0.5
GRIEVES	364000	349000	364080	348980	+2
BAURA2	361000	350000	361065	350160	+4.5
BAUR1	361000	350000	361250	349800	-7
SWANSEA2	359000	358000	359020	358020	+4
SWANSEA1	359000	358000	359010	358010	+3

```

C ROTBAMOC.FTM - FO ROTATING AND ORIGIN SHIFTING AMOCO ZEEHAN
C GRAVITY DATA
  REAL*8 XOLD,YOLD,XNEW,YNEW,ROT,SINROT,COSROT,X,Y,XR,YR,
  . FACT

```

```

C

```

```

  FACT=1.0D00/57.29577951D00
C CONVERT FROM DEGREES TO RADIANS
  WRITE(5,100)
100 FORMAT(' REFERENCE POSITION'/' OLD COORDS (mE,mN)')
  READ(5,*) XOLD,YOLD
  WRITE(5,101)
101 FORMAT(' NEW COORDS (mE,mN)')
  READ(5,*) XNEW,YNEW
  WRITE(5,102)
102 FORMAT(' ROTATION (DEGREES, -ve CLOCKWISE)')
  READ(5,*) ROT
  ROT=ROT*FACT

```

```

C CONVERT TO RADIANS
  SINROT=DSIN(ROT)
  COSROT=DCOS(ROT)

```

```

C

```

```

10 READ(4,*,END=20) X,Y
  X=X-XOLD
  Y=Y-YOLD

```

```

C MAKE ORIGIN REF POINT
  XR=(X*COSROT+Y*SINROT)+XNEW
  YR=(Y*COSROT-X*SINROT)+YNEW

```

```

C ROTATE AND ADD REFCOORDS IN NEW COORD SYSTEM
  WRITE(6,200) XR,YR

```

```

200 FORMAT(2F12.2)
  GOTO 10

```

```

C

```

```

20 CONTINUE
  STOP
  END

```

APPENDIX 9

Further Evaluation - Gravity and Magnetic Data RL 8809

September 1993 D E Leaman

LEAMAN GEOPHYSICS

Survey Review, Specification, Reduction, Interpretation
Gravity, Magnetic and Seismic Methods
Structure and Prospect Evaluation

Registered office:

3 MALUKA STREET, BELLERIVE, TAS. 7018

All correspondence to:

GPO BOX 320 D, HOBART, TAS. 7001

Telephone: (002) 44 1233

Fax: (002) 44 6674

973125

FURTHER EVALUATION
GRAVITY AND MAGNETIC DATA
RL 8809 OCEANA

for
PASMINCO EXPLORATION

by
D.E. Leaman

September 1993

OCEANA2

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This report describes a new, more regional evaluation of gravity and magnetic data in RL 8809 which includes the Oceana and Austral mine sites near Zeehan in western Tasmania.

Previous interpretation, and drilling, in the Oceana area was based on old grid-based gravity data and some similarly restricted ground magnetic data. The analysis was restricted to a small set of control sections across the Oceana mineralisation and was a preliminary study intended to appraise the value of the data sets and their character (Leaman, 1992).

Gravity data were suggestive but the existence of several major gaps in coverage and the inference of some anomalous rock properties and potential ambiguities limited the treatment.

Ground magnetic data appeared much more useful but were limited by extent of coverage and some interference from cultural noise. There were also some problems linking the magnetic and gravity interpretations.

Some infill of the gravity surveys in the region have been completed since Leaman (1992) but the coverage remains very patchy. Unfortunately many of the older data sets were only located approximately and it is difficult to ascertain both the nature of the error and its magnitude and the best manner in which the data sets should be combined. (What a pity things were not done with care and rigour). The problems are considered to be of nuisance value and are not serious in terms of the present review.

Completion of an aeromagnetic coverage of the RL by Pasminco Exploration has enabled a broader view and an appraisal of the correlations between ground and aerial surveys, and gravity surveys, and their relative value. The comparison clearly shows that the two magnetic surveys possess distinct and different worth. They are not incompatible but the appearance and interpretation is quite different.

Ground magnetic data are able to provide focus for particular targetting; air magnetic survey data is unable to do this in this area. This may be a general conclusion but is here the result of a subtle, low relief field and interference from cultural elements (old mine dumps and structures). The aerial survey, however, does allow structural weightings to be defined - especially in combination with the gravity data.

Neither data set (in airborne magnetic or residual gravity forms) appears to be particularly useful in terms of prospect study. There are some recognisable effects but few of these are easily linked either to known formations, mineralisation, or structures. This disturbing, but accurate observation, could lead to rejection of these data sets but it simply stresses the care needed if their implication and character is to be extracted. Both data sets have integrated the responses from numerous sources of complex shape and disposition and qualitative examination must be misleading in such

circumstances. Only the surface magnetic survey has obvious and direct exploration value - and this statement is not intended to reduce the value of the other presentations; simply that it is less obvious.

This review does not refine the shallow/targetting of the earlier review. It is directed at comparative analysis and recommendations for survey specifications.

The coupling of gravity and magnetic data reveals two important features; there is a decoupling of stratigraphic and structural style across the area, and a spine of the Heemskirk Granite may crest near the mineralised axes. These features may be thought to be correlated; that is, there was a primary structural-deposition control in the region which was certainly active in late Cambrian times since the conglomerates are involved and it has been rejuvenated and splintered by later stresses, then partially occupied and transformed by granite intrusion.

The granite component in this sequence, and its relationship to mineralisation, is perhaps the most uncertain and ambiguous since solutions have been found which can be supported magnetically and which lack any granite component. Any granite effect is long wavelength and not conclusively drawn in this area even though granite occurs at shallow depth (<1,5 to 2 km) immediately north of the RL. Part of the regional granite component may be detected in the gravity data but it is easily swamped by other effects and uncertainties about pre Moina Sandstone densities and combinations. (The interpreted spine, however, lies directly on trend with a similar feature which has been confirmed nearer Zeehan and the structure may be valid within the Oceana RL).

The analysis has, however, confirmed and clarified issues declared and queried in previous work. It has shown that mineralised sequences are dislocated with an opposition of west facing and east dipping structures at the mineralised axis. The locus of mineralisation is structurally controlled; the same structures may have influenced granite intrusion and fluid transfer. The structure is ancient. It is also clear that previously suspected surface weathering and alteration effects are significant but variable. The most affected units are the Crotty Quartzite and the Gordon Limestone. No gravity interpretation can be considered reliable unless it includes some allowance for this effect.

The results, although far from exhaustive, can be used to suggest the nature of future survey specification and treatment.

Magnetic data are applicable to detailed and regional issues and in the latter application provide important constraints on the use of gravity data.

Airmagnetic cover, even at terrain clearances of 80 m and line spacings of 100 m, is unable to provide reliable prospect evaluation in any area with cultural disturbance. Ground data fare much better

(also my experience at Mt Isa) since influences can be recognised and/or removed. Air cover with the current specification does permit detailed structural analysis in zones where the field is undisturbed and this is crucial to resolution of rock property or gravity ambiguities.

Ground survey sampling grids of 5 m spacing with a line separation of 50 m is satisfactory.

The existing gravity coverage with either 25 or 50 m sample spacing and line separations of 50 or 100 m, or 500 by 500 m grids demonstrates two things.

First, the close spacing is required if any targets or shallow cover effects are to be resolved with confidence. Failure to recognise the latter may eliminate any value the survey may have had.

Second, the survey must be properly done, without compromise. Short cuts are not recommended. In this case failure of original workers (for Amoco) to accurately position themselves, while of no great importance overall - or in terms of grid results, has made linking, correlation and expansion of surveys unnecessarily difficult with several data assumption conflicts which slightly reduce the value of the *entire* data set since no one can be sure what is proper or valid.

Treatment of the full section (depths > 500 m) requires many profiles and preferably three dimensional analysis. Proper evaluation of any granite contribution will require this *plus* a full conceptual appraisal of other major units and structures. (A study of this type already exists north of 5360 N).

Shallower assessments can only be considered using magnetic data. No gravity analysis focussed on a possible target at 400 m, say, can be presumed reliable *unless* it considers contributions from the regional geology to depths of *at least* 3 km and can define surface effects.

DISCUSSION

DATA

The location of RL 8809 is shown in Figure 1. It lies immediately south of the township of Zeehan.

Regional gravity data are displayed in a residual compilation in Figure 2. Regional data with station separations in excess of 500 m have not been contoured. Some sizeable gradients have been observed and there is a 5 mgal relief in the gravity field. Some offsets in these gradient occur near the Oceana Fault and the Oceana Mine (see Leaman, 1992). A detailed compilation of the Oceana grid is shown in Figure 4. Figure 3 presents the actual residual Bouguer values as now retained by the complete data base - after some traverses by Pasminco Exploration. These traverses were located to the immediate north and west of the Oceana grid and an inspection of the values reveals some conflicts in both position and reduced value. The positions, in theory, should not conflict since the new stations were observed outside the Amoco grid. Precise adjustment and relocation of the old grid has not been satisfactorily accomplished even after some matching of levels, topography and rotation about the only common point observed. The approximate nature of the older grid confounds simple solutions. The differences in values are more serious since these may imply incorrect levels, terrain corrections or simply relatively invalid values due to incorrect locations. For example, the terrain correction is calculated on the basis of the *claimed* position in the topography and clearly this may result in serious error in hilly terrain (as occurs north of the Oceana grid) even if the error in coordinates is less than 100 m - which is the case here. Proper and final adjustment might depend on accurate relocation which, on the basis of this review, is not really justified. But it is a pity that the surveys were not done properly in the first place. Some other differences for the stations on the slopes west of the Oceana grid may be due other assumptions and these have not been resolved. All of these problems detract from the use of the gravity data base and add a veneer of uncertainty which does not assist complete evaluation.

A compilation of the ground magnetic survey by Pasminco Exploration is shown in Figure 5. This clearly shows much high frequency character and the central anomaly is related to the mineralised host zone or structure. It also reveals a NE-SW discontinuity just south of the Oceana Mine. The region north of this is affected by some cultural effects but all are recognisable and can be removed or de-spiked; many were for this compilation (Leaman, 1992). The ground survey data may be compared with the new airborne survey (Figure 6).

The location of the magnetic survey is indicated in Figure 7 and the relative positions of both ground magnetic and Oceana grid gravity surveys is shown in Figures 8 and 9.

The gravity survey coverage density is indicated in Figure 3 where the grid survey with observations 25 or 50 m apart along lines 50 or 100 m apart may be contrasted with regional station spacings of 500 m or traverses with variable spacings.

The ground magnetic survey compilation is based on observations about 5 m apart along the nominal grid lines used for the gravity survey (50 and 100 m separation). This means that this grid could be re-established if necessary.

The airborne magnetic survey was completed by Geoterrex Pty Ltd for Pasminco Exploration in May 1993 using a vapour magnetometer with a precision of 0.05 nT. The traverse lines were about 100 m apart and the magnetometer was nominally 80 m above ground. The clearance has not been confirmed but was probably reasonably consistent given the helicopter flying. The sample interval is not known but is unlikely to exceed 10 m.

DATA CORRELATIONS

As noted above, there are some major differences between the magnetic surveys. The fine texture recovered by the ground survey has been lost in the region of the Oceana grid. Many of the trends and other patterns, some of which are associated with the host sequence are either not apparent or very muted. Only a smoothed and subdued form of the central feature in the ground survey is evident at 80 m, although a slightly more pronounced version can be seen near South Oceana. All other trends are quite different reflecting the integration from deeper and more widespread sources recorded by the aerial survey.

The airborne survey is also dominated by cultural effects and these may be correlated with the known effects near Oceana, as well as with other cultural features or dumps. The effect of these at 80m is to cause distortion of the magnetic field and some confusion or loss of other responses. The features, in addition, are not well enough defined as to allow unambiguous removal of the causative spikes - as is the case with the ground survey.

There is no obvious correlation between gravity and magnetic surveys (compare Figures 2 and 6 or 7). Each potential field has integrated distinctive response patterns.

Neither field can be correlated simply with the surface geology as mapped and shown in Figures 1 and 7. There is little to suggest that any of the mapped faults, perhaps with the exception of the Oceana Fault which does have some linking magnetic response, is either particularly significant or disrupts the magnetic sources. The response pattern may also be used to suggest that most features, including the faults, have substantial dips.

Qualitative inspection and deduction from either data set is clearly not advisable since it may be misled to a complex interaction or deep offset source distribution. Image treatments need to be used with care, and for these reasons, other methods of analysis must be used.

PREVIOUS ANALYSIS

Leaman (1992) reviewed some conceptual sections across the Oceana grid.

Magnetic modelling of grid line 2800 suggested that it was possible to satisfy a west-facing overthrust concept involving the host limestone and the underlying sandstones.

Gravity and magnetic modelling of line 3400 showed that some alteration did occur near the mineralised structures (faults?) but that it was possible to interpret the gravity data in various ways depending upon property assumptions and inclusion of any surface weathering profiles.

Magnetic review of line 3500 supported the proposition that the mineralised zone was magnetised. The contact between limestone and Crotty Quartzite was found to present similar properties.

Combined modelling of line 3700 confirmed the contact effects within and at top of the limestone and suggested two densities for the Moira Sandstone (2.71-2.72 and 2.78 gm/cc). Both values seemed high for this lithology and the issue of a thick weathering blanket was raised.

A number of rock properties were inferred in this initial modelling.

unit	density	susceptibility
Ordovician conglomerate	2.66 gm/cc	
sandstone 1	2.78	0.0001 cgs
sandstone 2	2.71-2.72	0.00003-0.00005
limestone	2.72	0.00004
Silurian sandstone	2.55-2.57	0.0
alteration		0.00014-0.0004
top limestone contact		0.0002

These results suggest that the most magnetic elements of the region are the altered and mineralised host and the upper limestone contact. It is also interesting to note that the limestone is considered to possess a bulk magnetisation that is both measurable and significant. This may result from alteration changes or other mineral variant within the limestone volume.

Note: The cgs values of susceptibility can be converted to SI units by multiplication by 4π (or about 13). A simple conversion is to multiply by 10.

Thus 0.0001 cgs is equivalent to about 0.001 SI or 1 of the normal units measured by most modern susceptibility meters.

Subsequent drilling of the Oceana zone did not indicate that any problems exist with the magnetisation estimates but that densities of 2.72 is reasonable for the limestone (but may be increased by mineralisation) while 2.61 - 2.63 gm/cc is a more realistic value for the small sample of underlying sandstones drilled. A clear problem thus exists in the initial interpretations where these have depended upon Ordovician sandstone densities in excess of 2.67 gm/cc. The queried extreme densities of 2.78 are certainly anomalous.

Several conclusions were drawn from this initial study.

1. The mineralised rock was magnetised and readily identified.
2. Parts of the structure were overthrust and details could be resolved by both gravity and magnetic data sets. Dips were also resolved by surface surveys.
3. Many of the structures were complex but review was limited by the restricted grid coverage.
4. Rock properties must be much better defined.
5. No obvious explanation for the location or locus of mineralisation could be offered. The distinctive character of the Oceana Fault could be the basis for exploration but the character might also be relatively recent in origin.
6. Understanding of the setting of the mineralisation depends on a much more regional view not permitted by local data.
7. The gravity data may be significantly affected by surface effects and that relatively positive features temptingly linked to mineralisation may simply be artifacts of changes in thickness of weathering cover.

NEW ANALYSIS

Some aspects of the previous conclusions may be directly commented using the reference of the airborne magnetic data.

The belt of mineralised material is not readily identified in the new data set even though there are some smoothed suggestions near Austral and South Oceana (especially). The anomaly patterns certainly confirm the complex and compound nature of the structures in the region since there is little direct correlation with exposed features. Indeed, the Oceana Fault is far from obvious other than in the zone west of Oceana.

The value of the data sets and the type of information contained has been assessed by detailed modelling of four profiles chosen virtually at random but selected to test both the mineralised axes and the cultural disturbances. Each profile has, in addition, allowed an expanded structural view as recommended by the earlier study (Leaman, 1992). The principal objective of the analysis has been to test whether the data sets can be unified. Subsidiary objectives have included appraisal of desirable specifications for various purposes and the possible resolution of some reason for the location of mineralisation.

The location of the selected profiles is shown in Figure 10

LINE 1: AUSTRAL 1 (Figure 11)

This line extends across the principal gravity gradient in the region and allows review of some cultural effects and the Austral Mine area.

The magnetic profile illustrates the extreme character of the cultural response. The bulk of the profile displays very subtle character even though it is said to traverse a fault block of Crimson Creek Formation.

The main spike can be explained by a surface effect with a relief of

10 to 25 m and properties of 0.003 to 0.01 cgs. These are extreme values and no rocks in the region possess these properties. Calculation shows that any buried variation, such as a magnetised lode or dyke, leads to rapid spreading of the effect and quite unrealistic contrasts since the body must remain very narrow. It should also be recognised that most profiles and, indeed, most presentation of cultural effects by the survey are integrations and are distorted by glancing samples.

The rocks of the section generate the subtle field and show that both the limestone and sandstone are slightly magnetised but at least an order of magnitude less intensely than the Crimson Creek Formation. The data cannot support a thick section of Crimson Creek rocks from exposure but the response further west suggests a larger volume either of such materials or mafics within the Oonah Formation. If the Crimson Creek Formation is repeated then west-facing thrusting is indicated. It is interesting to note that even the subdued properties implied for this formation, whether at exposure or concealed, cannot be continued eastward beneath the Ordovician rocks of the Austral area. There is a major structural change in this area and it has both primary Cambrian character and secondary Devonian displacement.

The nominal position of such a primary structure as indicated by the magnetic analysis is reinforced by the gravity profile which reveals an increasing gradient to the east from this point. The issue, however, is how much of this gradient is due to changes in near surface lithologies, weathering or underlying materials such as a granite cupola? Some clues to this are offered by the response of the gravity field to the exposure of the Bell Shale. The presence of this unit, assuming no truncations within the section, implies a substantial block of material - to base Moina Sandstone level - and this is gravimetrically elevated. Maintenance of all density assumptions indicates that the shale is at least 1500 m thick. This is not an unreasonable estimate given regional characteristics of the unit.

The reduction in the gravity field is thus seen to be largely related to the central zone and, in particular, the limestone and Crotty Quartzite members. Neither of these units can account for the effect which must either be generated at modest depth or by surface changes or some combination of these sources. The model shown in the figure is based on a combination solution since the wavelength pattern from the granite, if included, cannot generate the gradients observed and it is unreasonable to suppose the crest could be shallower than shown. The subtleties of the field can be accounted for by cover variations in the form of alluvials and weathering which may locally reach 55 m in thickness. This is a maximum estimate.

The western end of the profile is a balance between the volume of Oonah Formation and the granite which must be present at depths of at least 2 km. The importance of the the restrictions imposed by the magnetic data cannot be overstated; the gravity model could not be derived credibly without constraints on significant volumes and parts of the sequence near the mineralisation. The profile and its solution give no suggestion of any anomalous or irregular mass in the Austral region.

This first line and its solution involving limited volumes of magnetic material, surface cover and a granite crest depends on some crucial assumptions. Each is linked to the curve fit conditions applied. Examination of all magnetic profiles and the data set indicates that the magnetic base value, or true zero for the corrected survey, is about 30 nT offset from absolute zero as calculated. This fit has been matched throughout to remove ambiguity and uncertainty.

Decisions on fit parameters are much more difficult in the gravity case since the properties are more poorly constrained and many more units are involved in the appraisal. The solution shown in Figure 11 is based on a modelled range of 4000 m and a fit shift of 5 mgal. The range is based on the occurrence of granite universally across the small area studied at depths of this order, or greater. The models have been designed to assess roof relief, not the margins of the pluton. The justification of the fit shift is considered along other, more sensitive, profiles but it is clear that such a curve match does work given credible properties for all units, ties to the magnetic solution and all parts of the geology (including soil and cover variations which are definitely present).

LINE 2: AUSTRAL 2 (Figure 12, 13)

Figure 12 presents a solution based on the same assumptions as those described for Line 1. This yields a solution containing the same elements.

The relationship between Crimson Creek Formation and Oonah Formation is complex but the unit generally thins rapidly to the SE such that only part of the Ordovician series is underlain by it. This suggests some fundamental pinch point affecting original deposition is contained in the north western portion of the Austral area. A more interesting question arises to the south east, across the Oceana Fault. A basal magnetic unit is required in the Oceana region. Its effect is subtle and the contrast must be quite low if the the volume is substantial and thicknesses are of the same order as implied to the west. Figure 13 presents a variation of the theme. (As shown below, it is possible to remove this large volume completely and replace it with a very thin slice of ultramafics which would then lie in the depositional and detachment position noted for such rocks within the Renison-Huskisson region. Such a solution would be perfectly consistent with a fundamental change in association character in the region of, or immediately north west of, the Oceana Fault)

The anticlinal structure to the southeast is not a critical part of the model but the magnetic field does require some gross flexing of the sources which include the *entire* Ordovician series.

The gravity solution is much more critical and requires a large amount of granite at depths between 2 and 4 km *with* a recognition of surface alteration. This is the only way in which the abrupt

gradients observed near 1200 and 2400 m along the profile can be explained. These observations, and the change at 3500 m, which have been defined by the close station spacing demonstrate beyond any reasonable doubt that surface effects are both involved and important and that the attraction of the solid geology must generate a profile more positive than that observed and that the two can only be fitted by the addition of the negative effect of surface materials. The slight misfits in the solution (near 1200 m) show that the thicknesses derived and the contrasts used are absolute minima (55 m max at 1.67 gm/cc). No attempt has been made to fit the irregularities near Oceana Creek (2400 m) which may be related to patchy alluvium and the complete spike near 1200 m may involve some excess mass. In general, however, there is nothing in these results to suggest unusual conditions.

Figure 13 offers a comparison based on different assumptions. The curve fit shift is 8 mgal for the same depth range and rock properties. This produces a reasonable fit but considers only major changes in the principal rock units and excludes surface effects. This is the main reason that the calculated curve is 3 mgal more positive than that in Figure 12 since the granite effect spreads only about 1 mgal extra along the curve. The central low is explained by forcing abrupt changes in the Crotty Quartzite which is clearly unreasonable in geological terms and inadequate in geophysical terms. Such a solution can never account for the sharpness of features such as that observed near 3500 m.

The implications are clear; surface effects must be included in the gravity models, and the gravity models must be constrained magnetically at as many points as possible.

LINE 3: OCEANA 1 (Figures 14, 15, 16)

Figure 14 presents the accepted compound solution compatible with both data sets and other solutions while Figures 15 and 16 offer contrasting variations. Figures 15 and 16 illustrate the issues involved in use of different base levels, model depth ranges, inclusion of density variations and choice of cover assumptions.

The magnetic profile is generally of very low relief but samples part of the dump area. The anomaly can be completely explained by the dumped material and culturally-related waste but can also be resolved in terms of a very narrow dyke-like source with very high contrast. Such a source may not extend more than about 50 m in depth nor be more than 5 m wide since the effect spreads rapidly. This is an unrealistic solution given that the surface piling and the general anomaly distribution is readily satisfied by dumped material. The calculation does, however demonstrate that the major anomaly "blips" in the survey are unquestionably related to cultural features with limited spread of effect. The remainder of the profile match depends on the subtle properties of the Ordovician rocks.

The gravity solution (Figure 14) depends on a balance between granite and Oonah Formation, and cover variations. These can be associated with particular units, such as the limestone near 1200 m.

An denser but non magnetic member has been incorporated into the Oonah Formation at the western end of the profile but the same effect might be thought to have been achieved simply by lowering the level of granite. This is not so since the granite effect then becomes very long wavelength. Some combination of sources is required but, in view of the absence of magnetic control, no precision of relationship can be offered.

Figure 15 illustrates some of these features. The upper diagram shows the effect of the Ordovician units and Oonah Formation without any weathering effects. Such a solution can not explain the high relief step at 1200 m. If the curve were to be fitted through the more positive values at the western end of the profile then a major negative change would be required of the eastern end and no sources are obvious. Such changes in fit would change the curve fit shift from 8 mgal to around 5 mgal. Note also that the fit shown here depends on a total depth range of 3300 m and no granite.

The effect of shift is shown in the lower diagram. Some extra mass has been added by presuming the existence of a dolomite within the Oonah Formation. This does lift the curve, and reduces the shift slightly but it simply exposes the problem of the negative effect required overall to balance the curves.

Figure 16 offers a variation on this theme by changing the model depth range to 4000 m for consistency with other models. This shows that it is possible to fit the curves with a shift fit of 8 mgal *provided* surface weathering effects are included. This type of calculation shows, regardless of what is assumed about granites in the area, that cover *must be considered*.

Unfortunately there are two problems with Figure 16. First it excludes granite at any depth and second it is inconsistent with other sections which, closer to clear exposure of the Heemskirk Granite, realistically involve it. Incorporation of the granite in any form leads to Figure 14.

LINE 4: OCEANA 2 (Figure 17)

Figure 17 offers a solution for the structure near South Oceana. It is consistent with all other models but offers some minor variants which illustrate aspects of issues already raised.

The basic sedimentary pattern is similar to previous sections but a denser unit must underlie the Ordovician sandstones in the west of the area. This may partly include the basal conglomerates or a dolomite within the Oonah Formation as described for line 3.

Whatever solution is preferred geologically the volume is restricted and podded to the block west of Oceana. No magnetic sources are involved and this distinguishing difference may also be seen at line

3. The western portion of the area is different north and south of the Oceana Fault.

But it is also different in an E-W sense across the mineralised structure in the centre of the section (also line 3) - a character which may also be observed at Austral (line 1, Figure 11).

The mineralisation in the region is clearly associated with this NW-SE structure which transects, or is present in, all other blocks. Major depositional changes are associated with the Oceana Fault and these changes involve basal Ordovician (or older) rocks.

Discussion for line 2 considered the contents of the stratigraphic eastern block and suggested the possible presence of Crimson Creek Formation at depth even though this was not consistent with the regional implications of the sections. This solution uses a thin sheet of ultramafics beneath the Ordovician sequence, as in the Huskisson River section, to explain the effect and the solution is both more credible and more controllable. The slice of ultramafics directly overlies Oonah Formation. But it is patchy in terms of the mineralised structure which it does not cross. This would also imply that this structure is also old.

Only these two intersecting major structures can be clearly inferred to possess ancient controlling characteristics. All other faults are but minor breaks in comparison and involve the entire sequence such that a Devonian origin is likely.

The final model also includes a granite crest although the solution is not sensitive to its relief or exact position. The bulk of the final gravity fit depends on the content and thickness of surface cover which is most extreme near the base of the sandstones and top of the limestone. Greatest alteration in these rocks is always intimately associated with the major faults nearby.

COMMENTS

The present interpretation suggests that much more detail could be recovered from the present data sets but the deduced properties and structures are now consistent and credible. The specifications of the data used are the minimum required to extract this information and a coarser gravity coverage could not provide resolution of the potential ambiguities.

The analysis also depends on the combination of methods and the implied setting of the mineralisation could not have been extracted from either data set in isolation. Neither data set (aerial magnetics and gravity) could have defined the details of the prospects and local mineralisation for targetting - this requires ground magnetics in this area - although the two other facets of the data provide the gross setting for the mineralisation for primary exploration. This has been summarised in Figure 18.

The present interpretation suggests the existence of two primary

which are at least Cambrian in age intersect in the RL. The mineralised element, trending NW, appears to have been offset by the other (Oceana Fault) although both structures may have moved synchronously. Devonian granite has intruded along the NW axis which may be an old basin margin and shallow crests occur along this alignment which is also mineralised.

REFERENCES

- Leaman, D.E., 1992. Review of gravity and magnetic data, Oceana Mine area, Zeehan. Report for Pasminco Exploration, by Leaman Geophysics, August.
- Leaman, D.E., & Richardson, R.G., 1989. Production of a residual gravity field map for Tasmania and some implications. Exploration Geophysics, 20, 181-184.
- Richardson, R.G., 1992. Gravity gradients at several Tasmanian sites. Unpub. Rep. Dep. Mines Tasm. 1992/25.

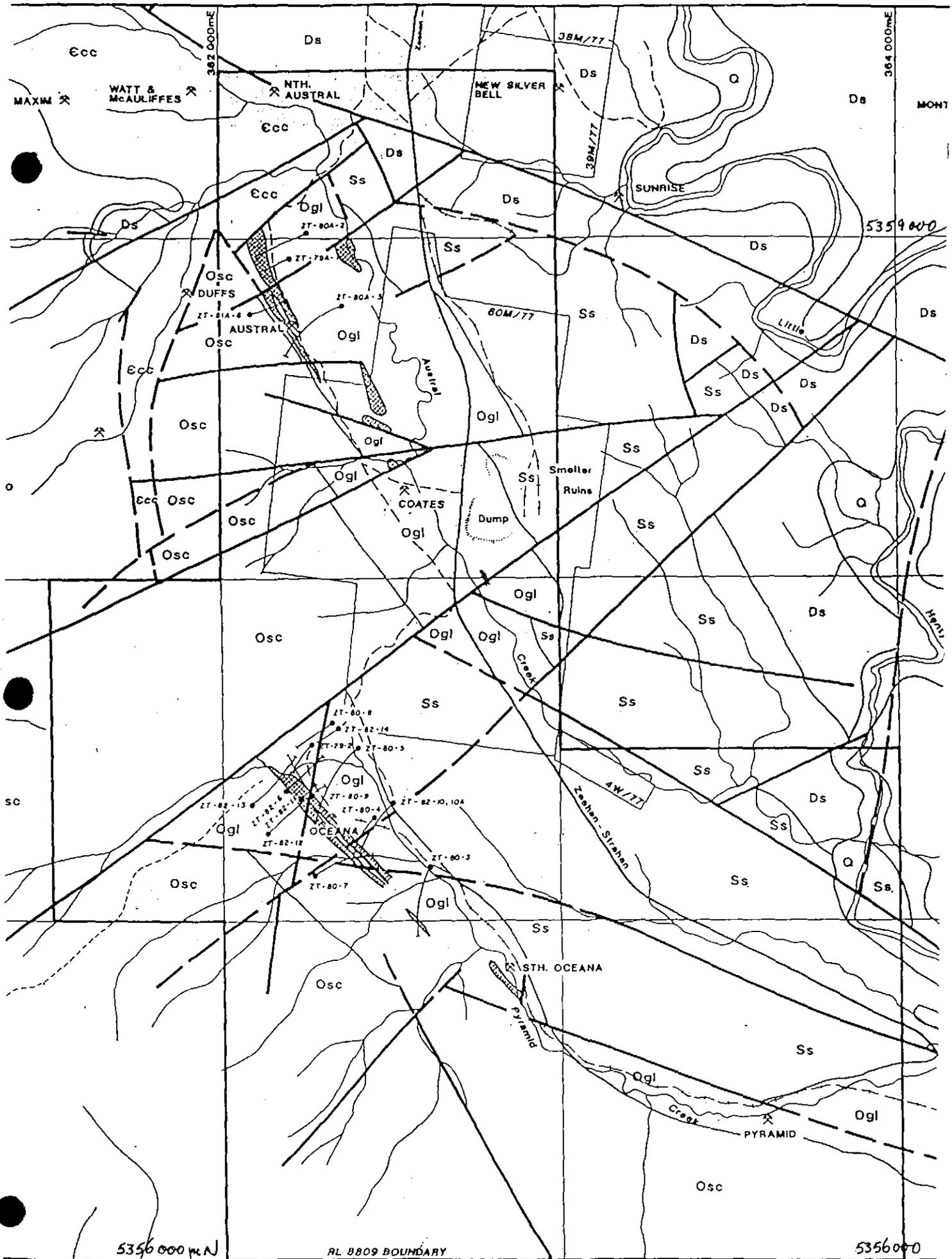
Report submitted on behalf of Leaman Geophysics

by



Dr. D. E. Leaman, B.Sc., Ph.D.,
F. Aus. I.M.M., M.M.I.C.A.

Date: 3/9/93



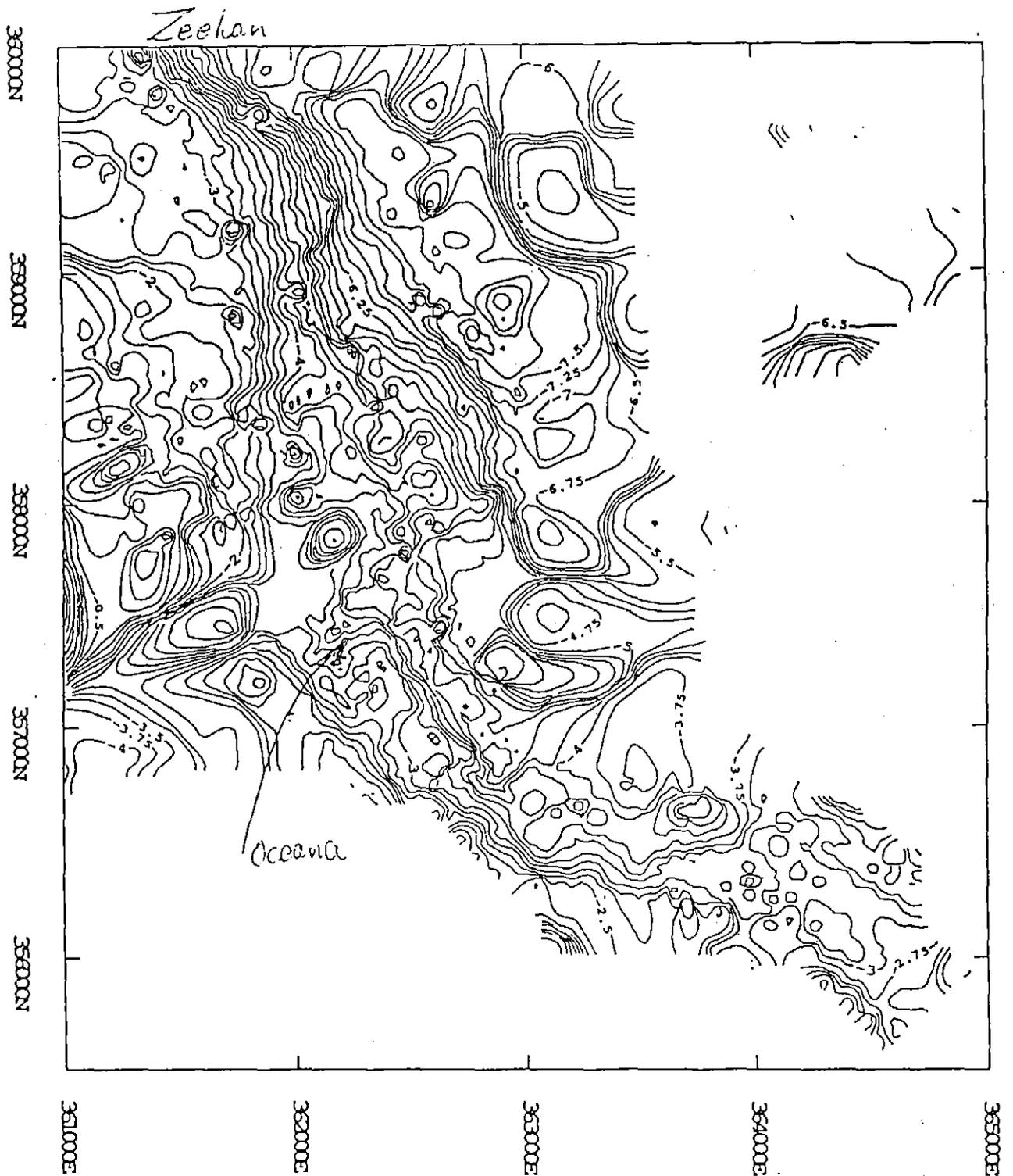
LOCATION OF RL 8809, OCEANA

973139

FIGURE 1

Residual Bouguer anomalies in the Zeehan area processed using the method of Leaman & Richardson (1989). Map reproduced from Richardson (1992).

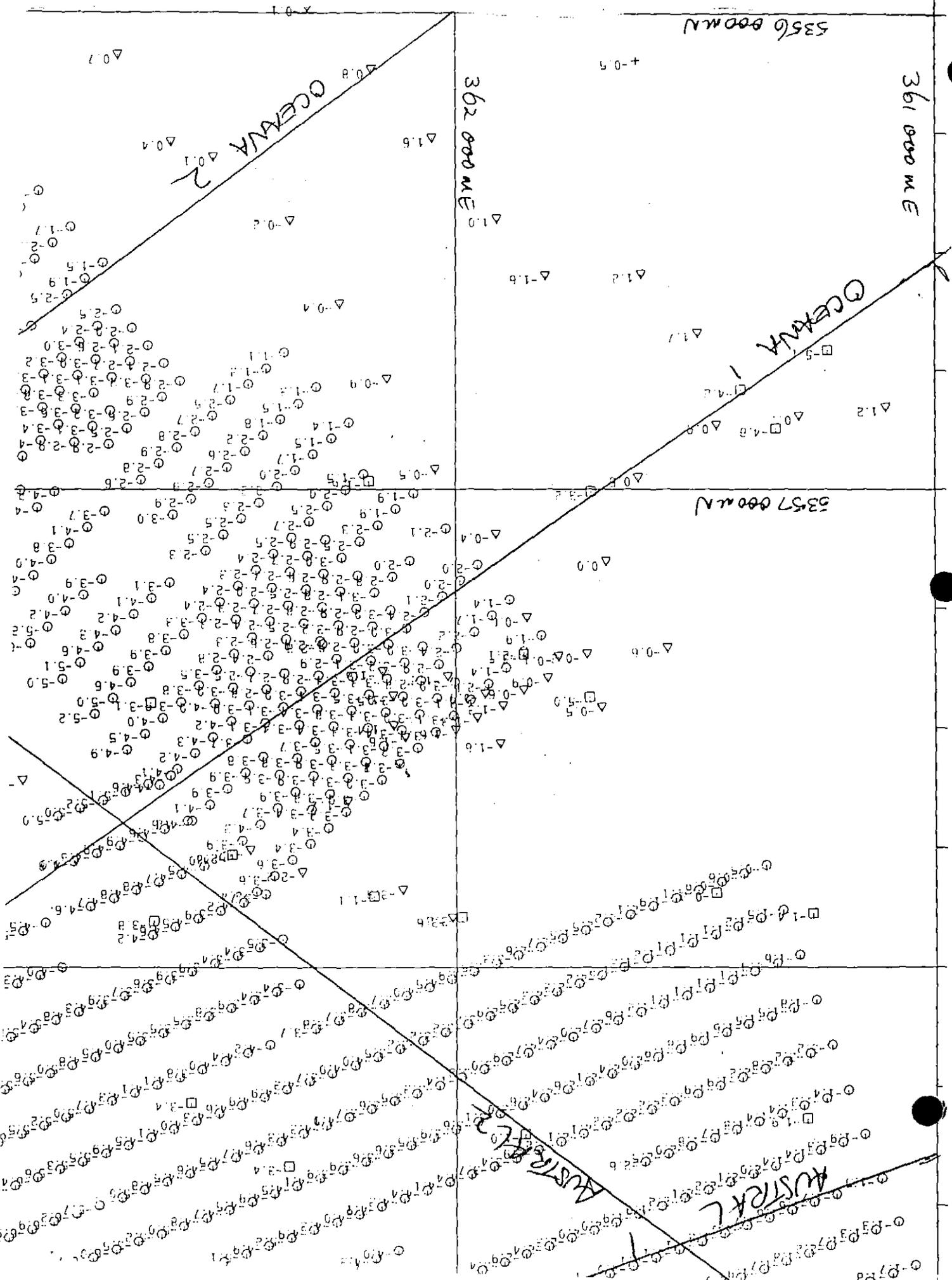
FIGURE 2

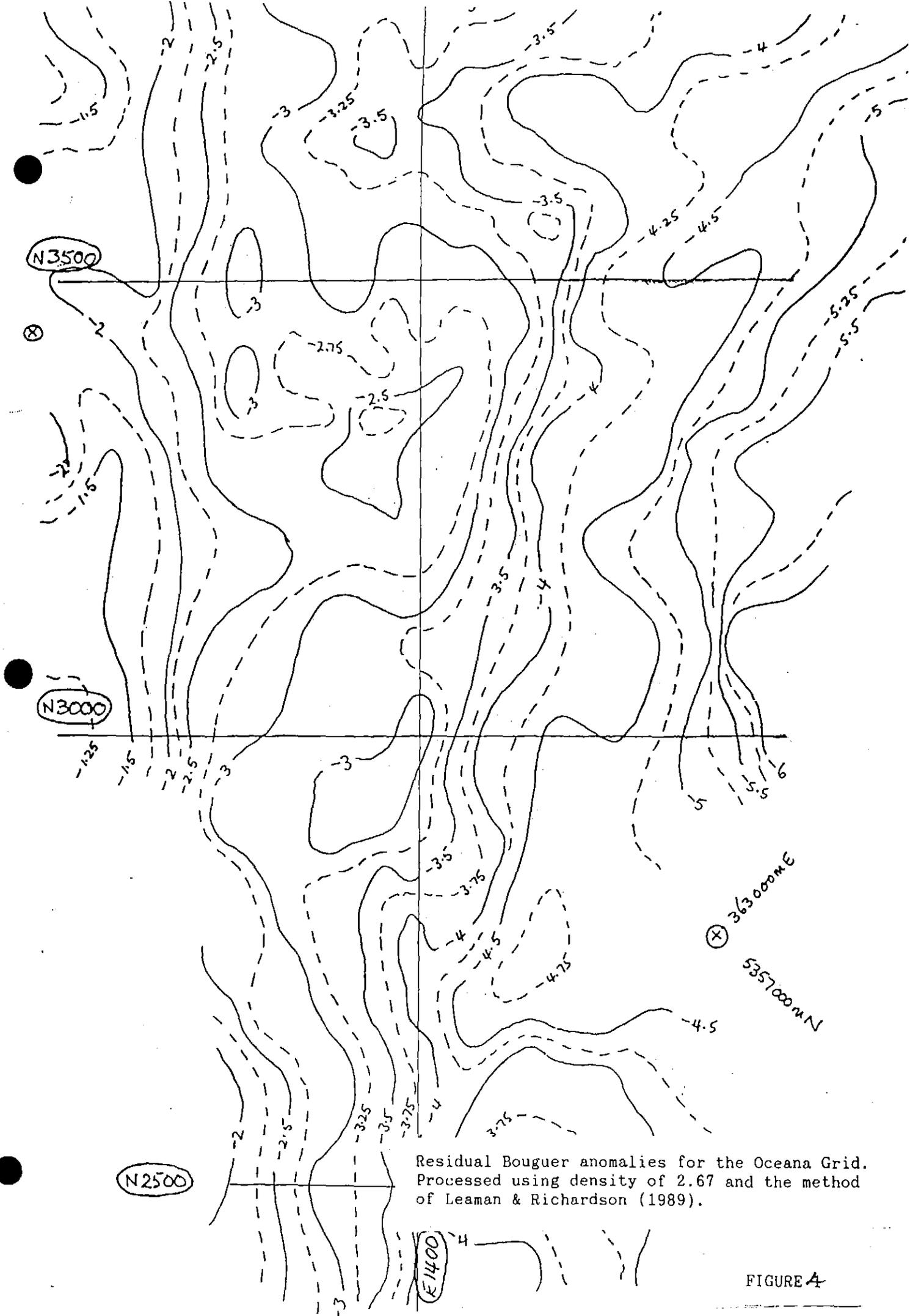


973141

SAMPLE OF GRAVITY STATION COVERAGE AND NATURE OF CONFLICTS NEAR THE OCEANA GRID. Residual Bouguer anomalies quoted.

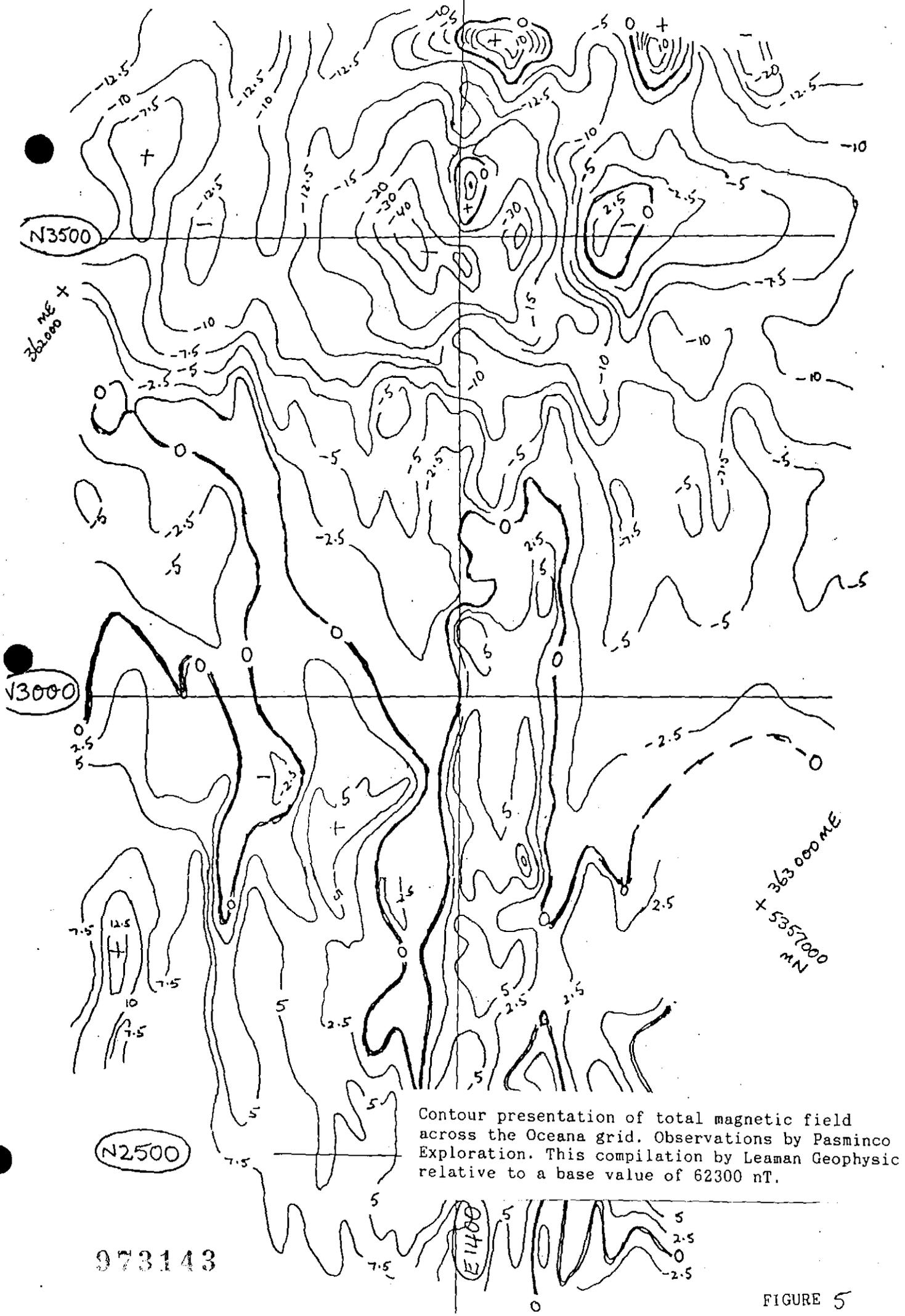
+0.4





Residual Bouguer anomalies for the Oceana Grid. Processed using density of 2.67 and the method of Leaman & Richardson (1989).

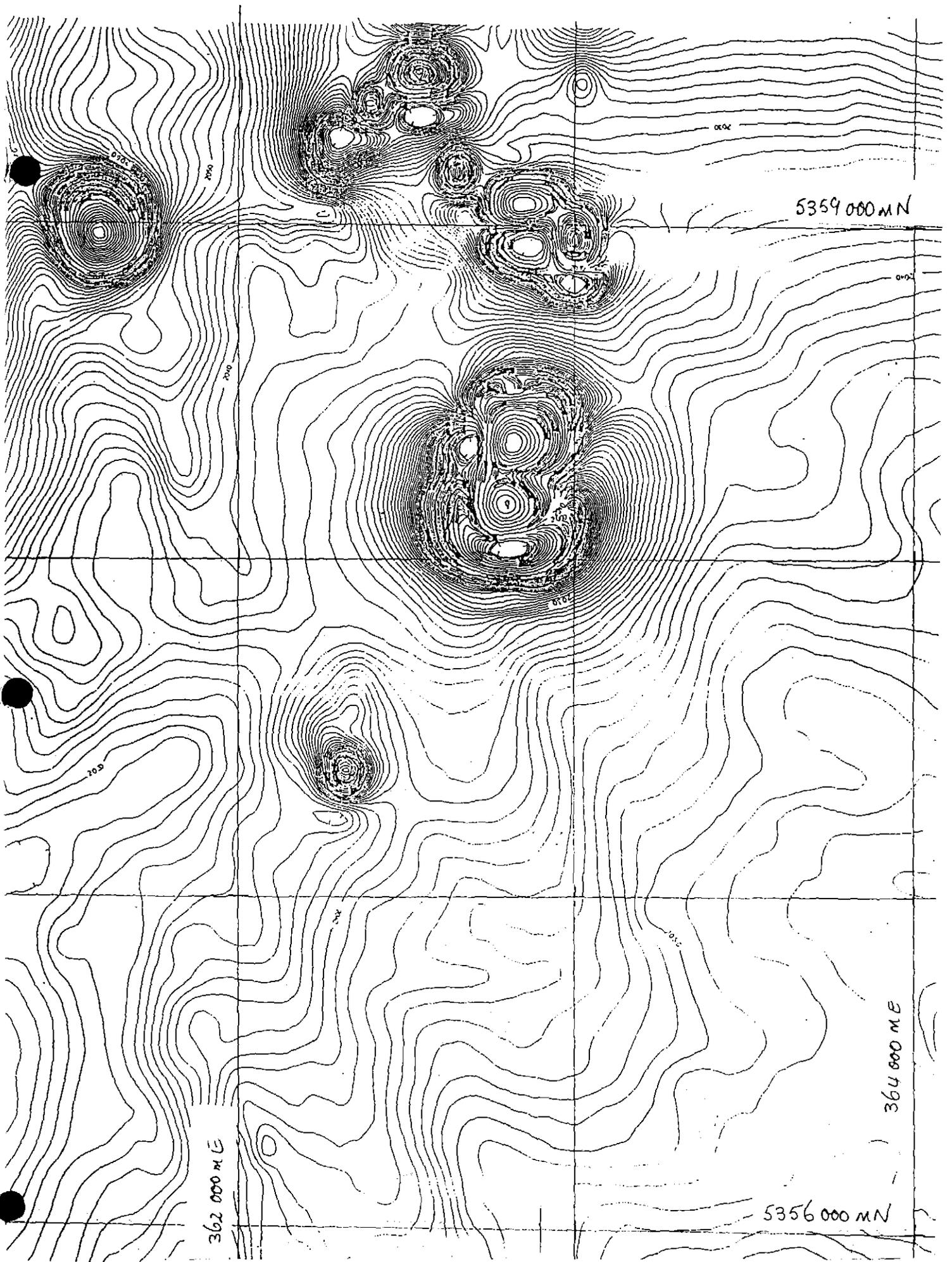
FIGURE 4



Contour presentation of total magnetic field across the Oceana grid. Observations by Pasmenco Exploration. This compilation by Leaman Geophysic relative to a base value of 62300 nT.

973143

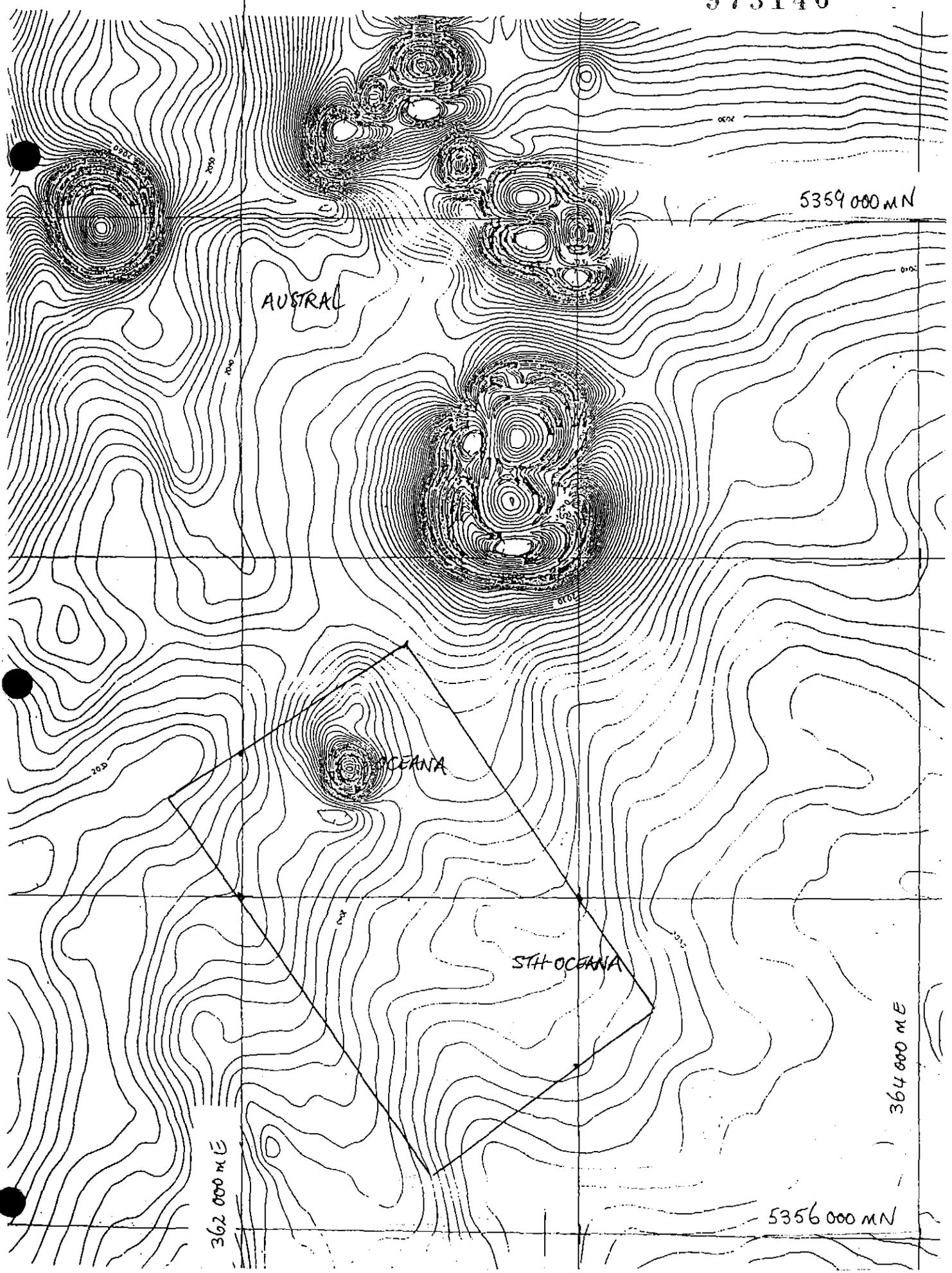
FIGURE 5



RESULTS OF AIRMAGNETIC SURVEY OF RL 8809 OCEANA
Contour interval 1 nT.

FIGURE 6

973144



AIRBORNE MAGNETIC SURVEY SHOWING AREA COVERED BY GROUND MAGNETIC SURVEY ON OCEANA GRID FIGURE 8

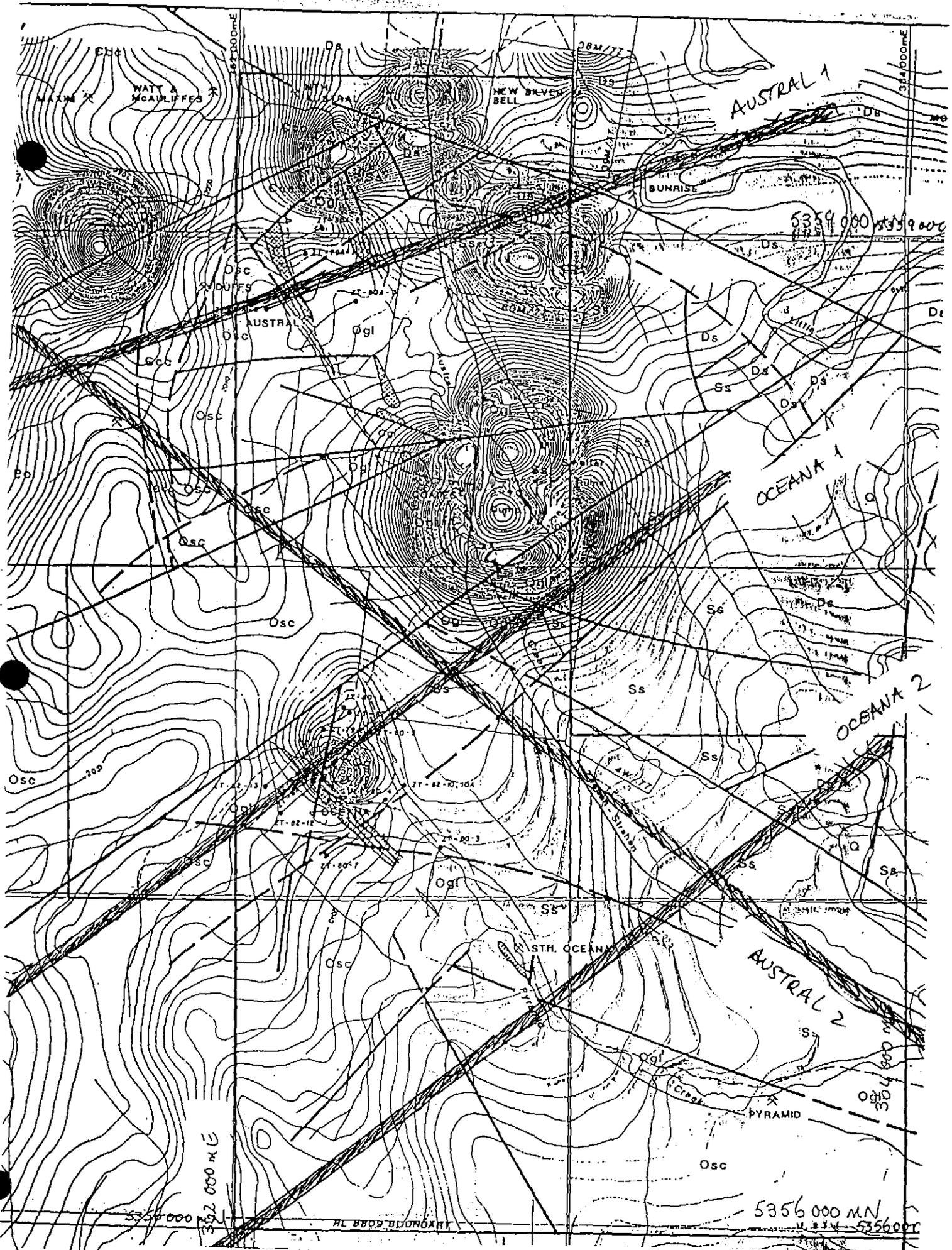
Residual Bouguer anomalies in the Zeehan area processed using the method of Leaman & Richardson (1989). Map reproduced from Richardson (1992).



GRAVITY COMPILATION SHOWING LOCATION OF BOTH GROUND AND AIRBORNE MAGNETIC SURVEYS

FIGURE 9

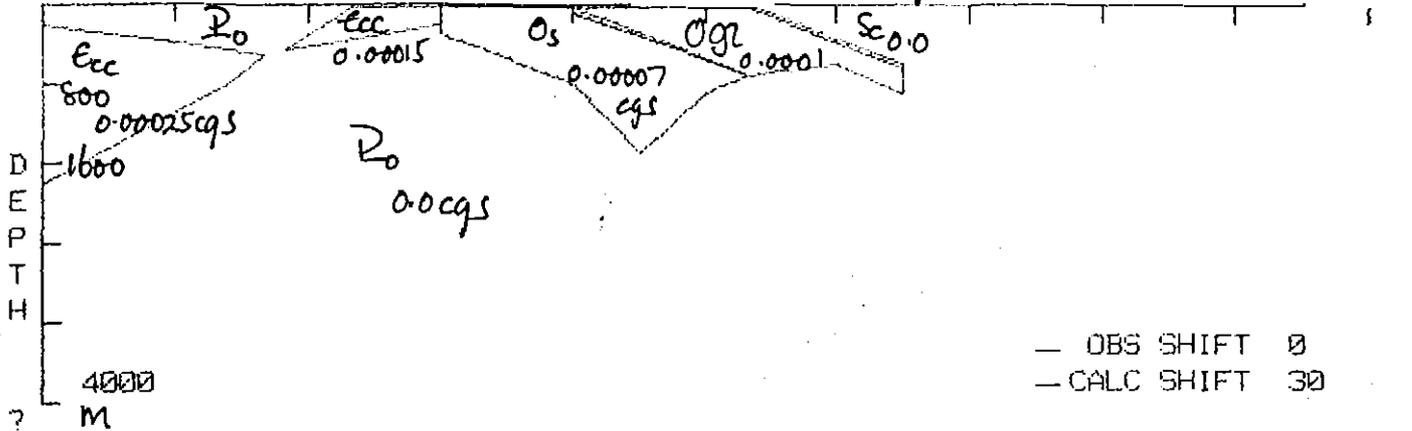
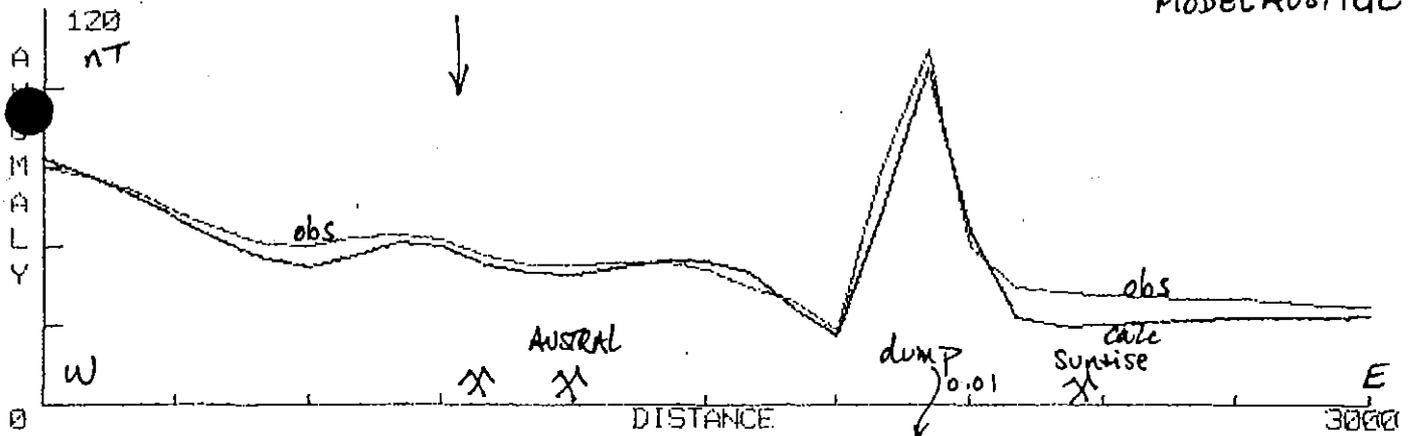
973147



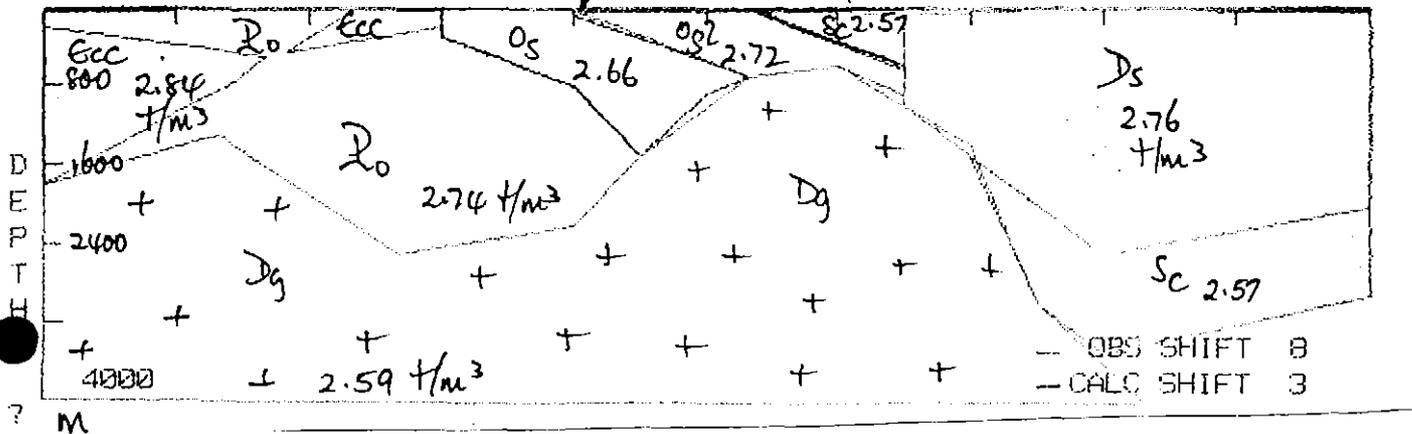
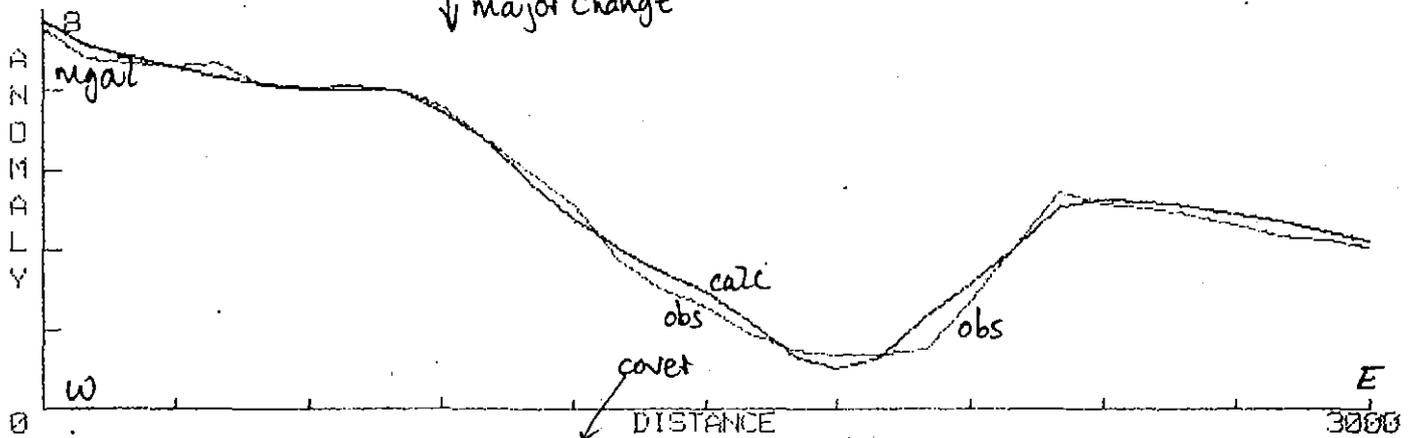
LOCATION OF MODELLED PROFILES, RL 8809 OCEANA

FIGURE 10

973148



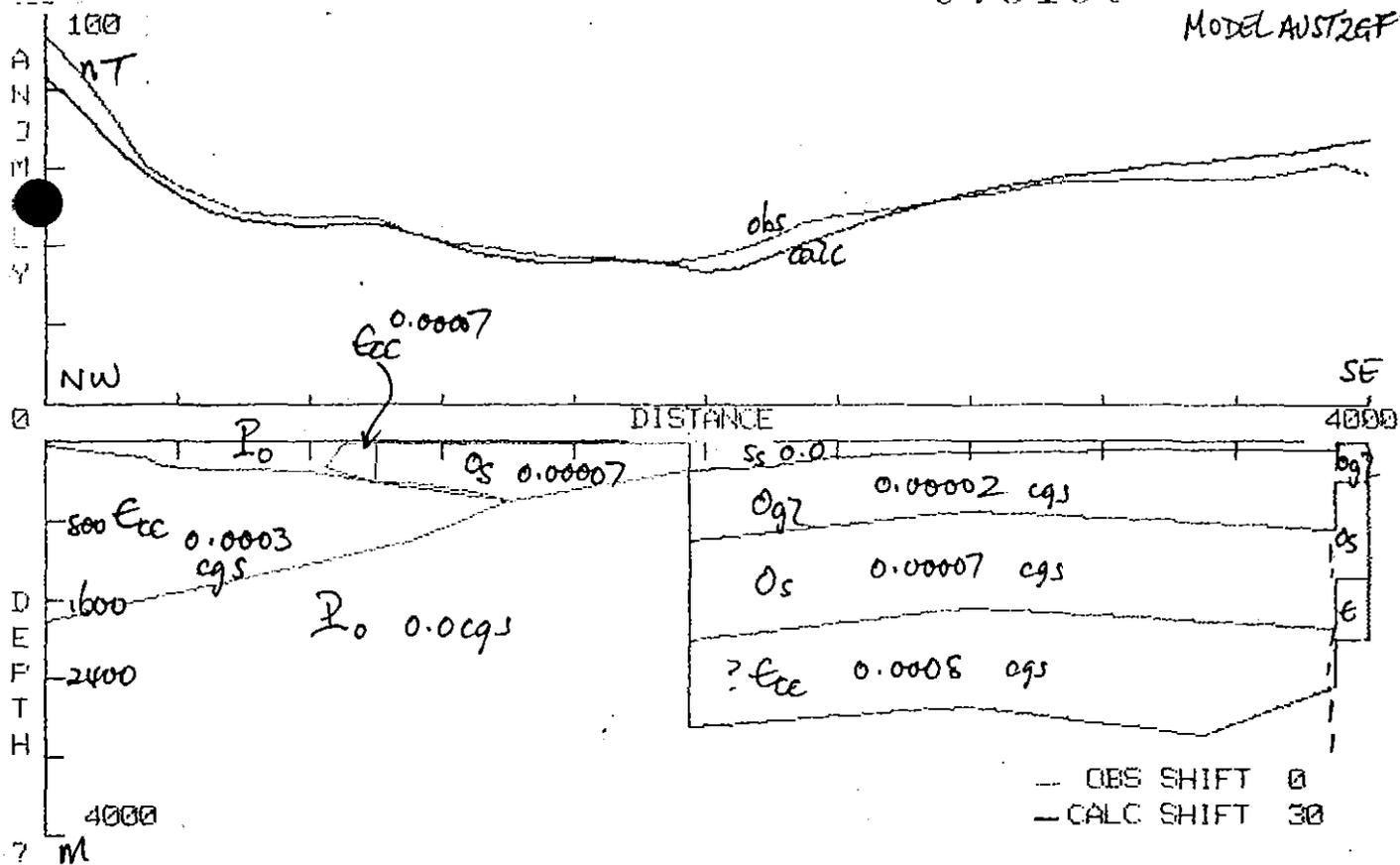
LINE 1 AUSTRAL 1
 ↓ major change



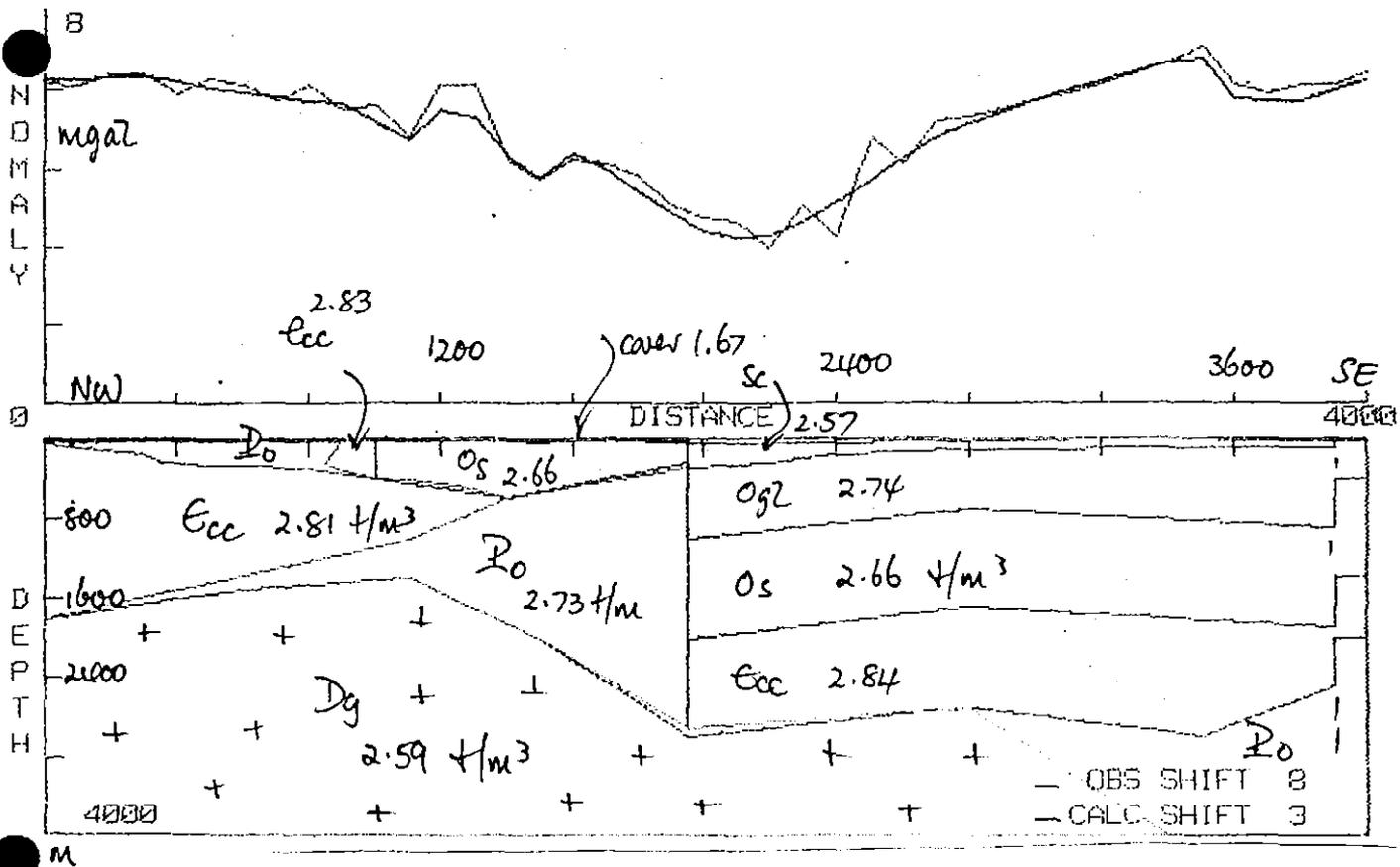
09/93

973150

MODEL AUST2GF

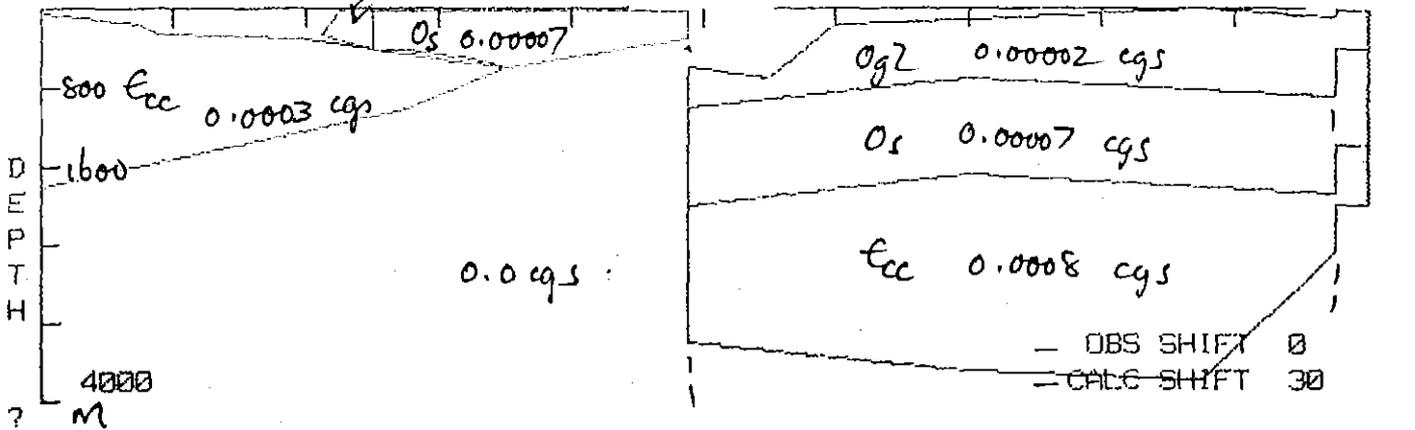
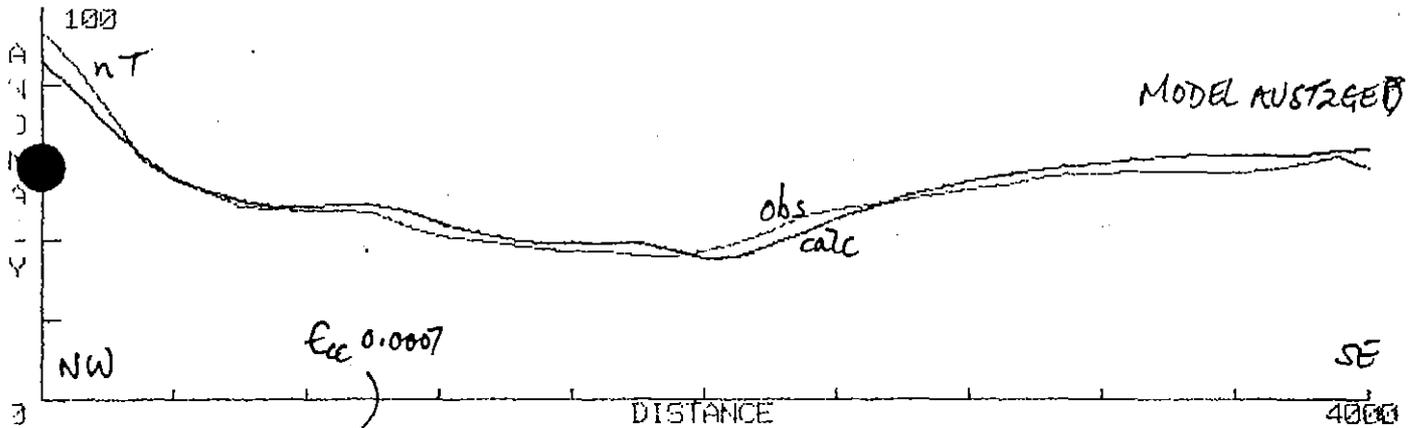


AUSTRAL 2

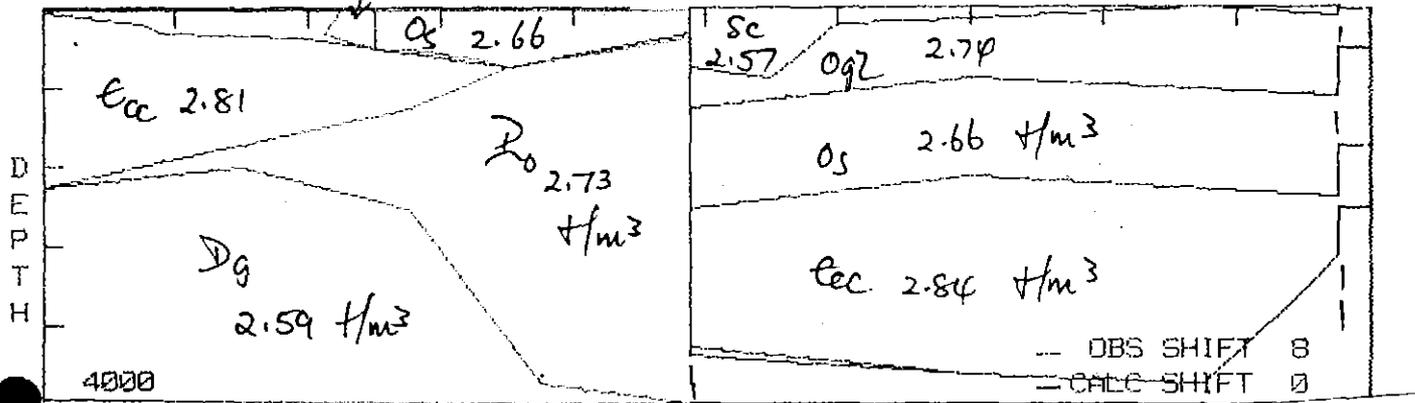
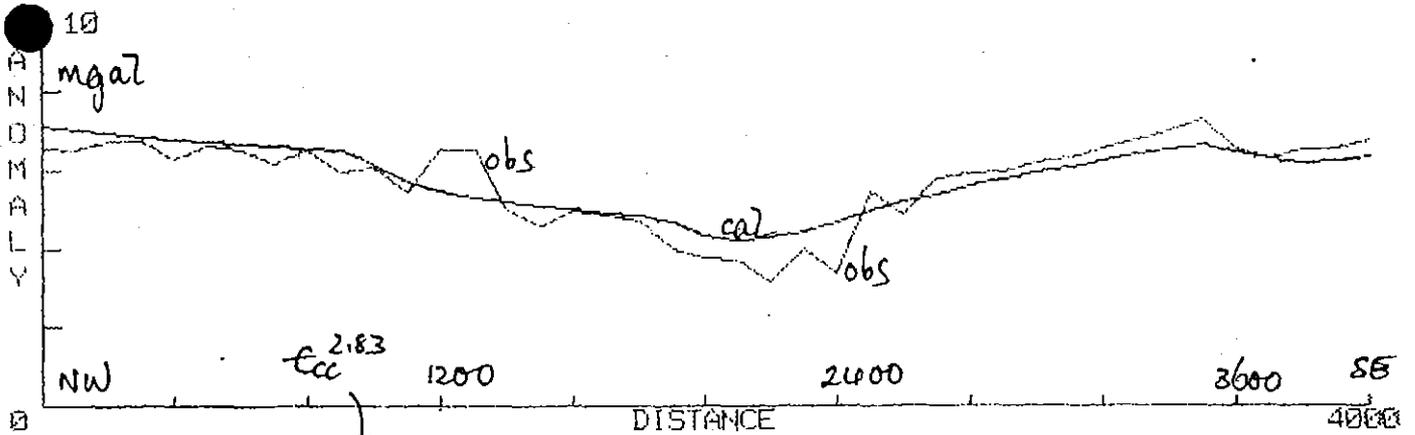


2D GRAVITY AND MAGNETIC MODELS LINE AUSTRAL 2
 accepted granite and surface alteration version

FIGURE 12

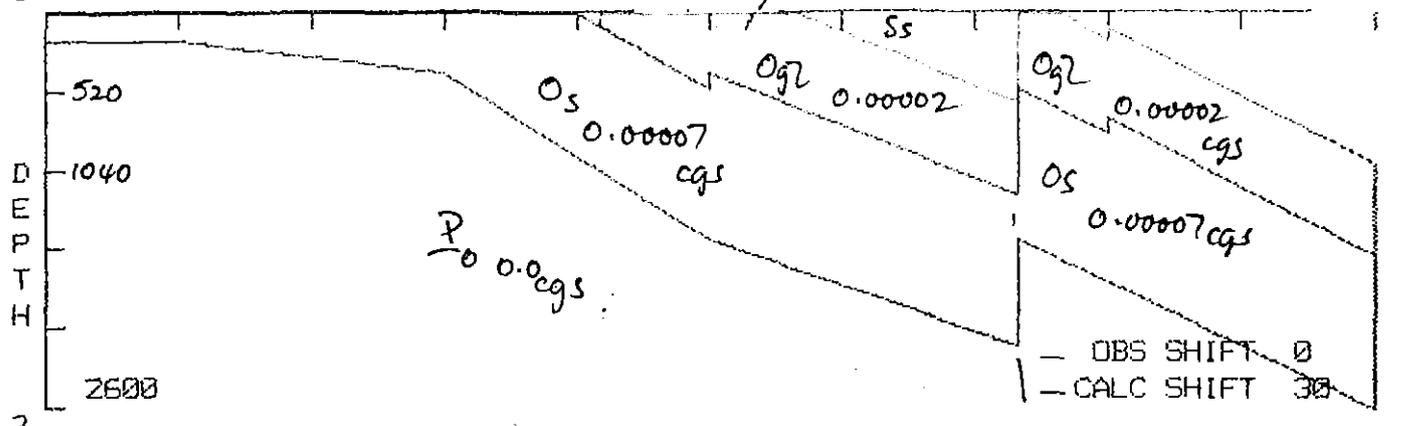
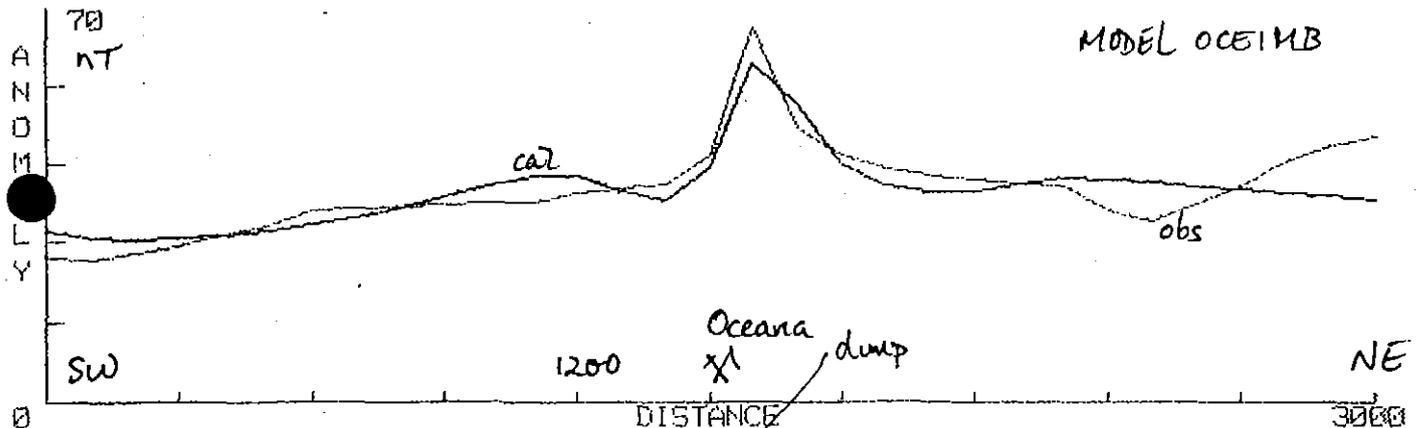


AUSTRAL2

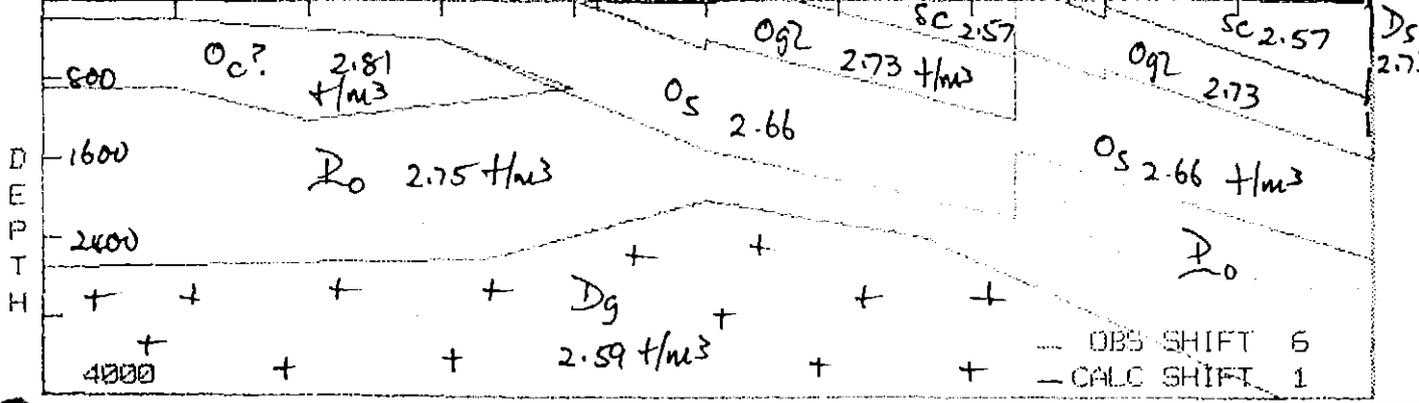
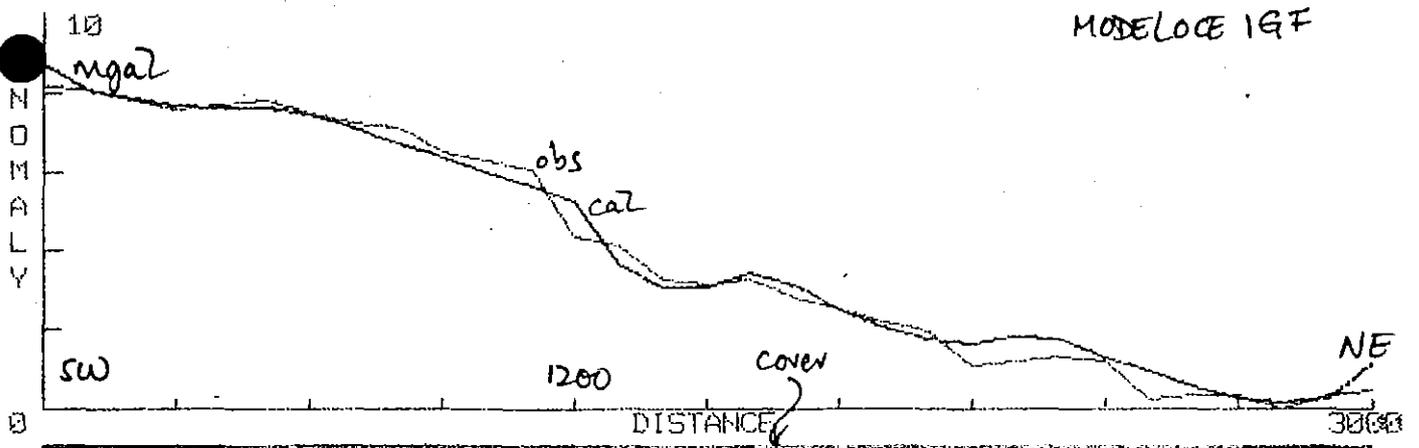


2D GRAVITY AND MAGNETIC MODELS LINE AUSTRAL 2
 alternate stratigraphic variation and no surface alteration

FIGURE 13



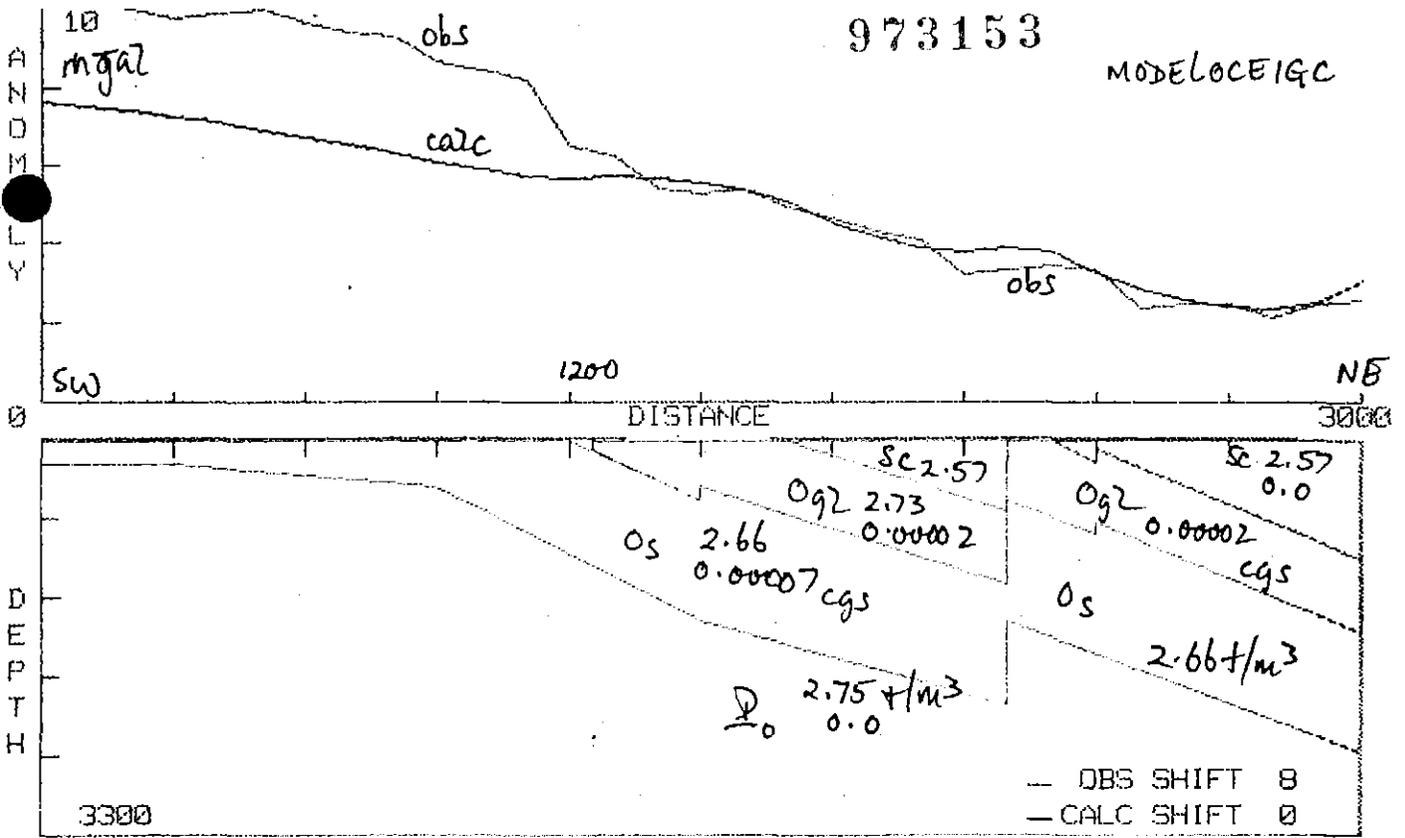
OCEANA 1



2D GRAVITY AND MAGNETIC MODELS LINE OCEANA 1
 accepted granite and surface alteration version

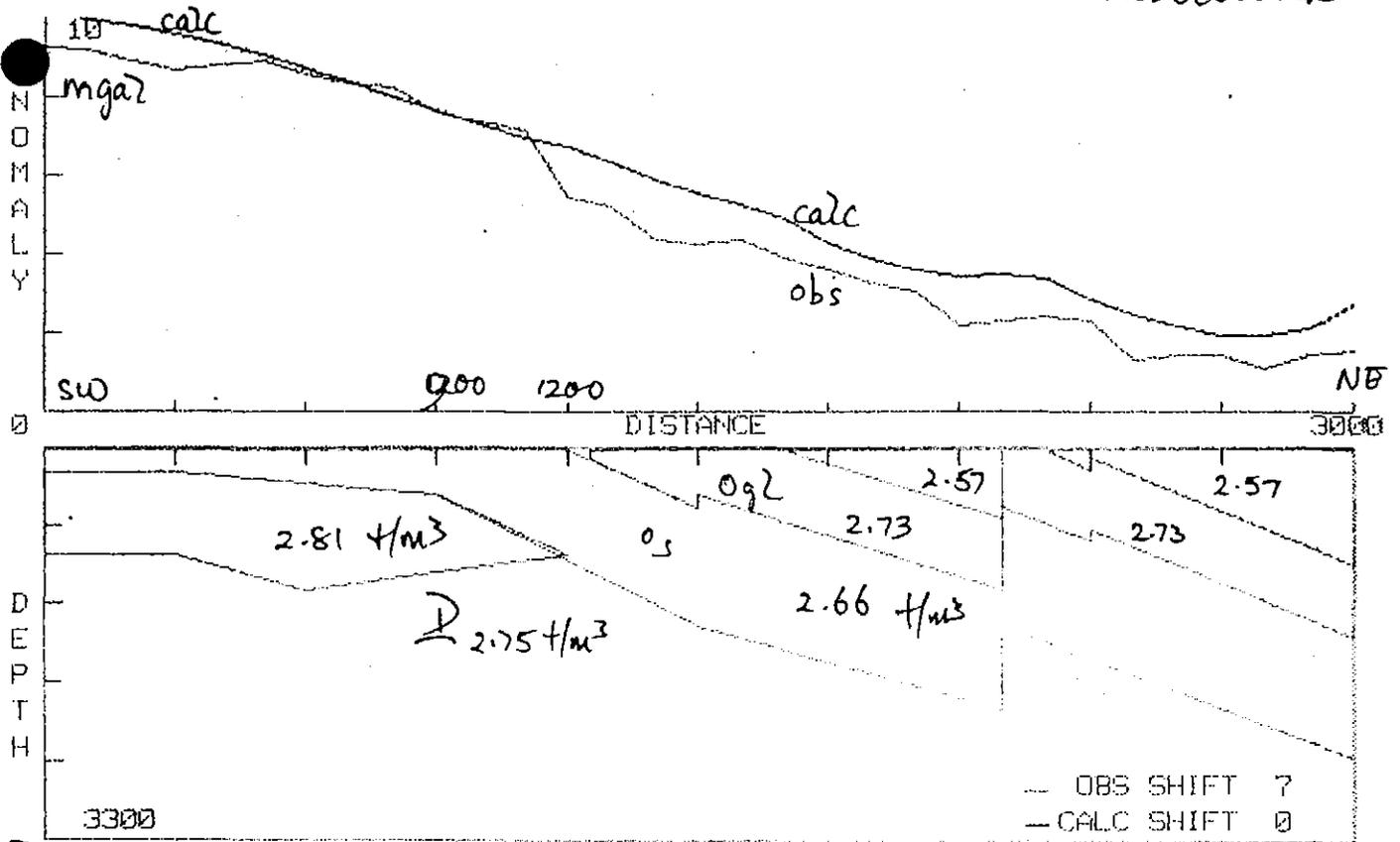
FIGURE 14

07/43



OCEANA 1

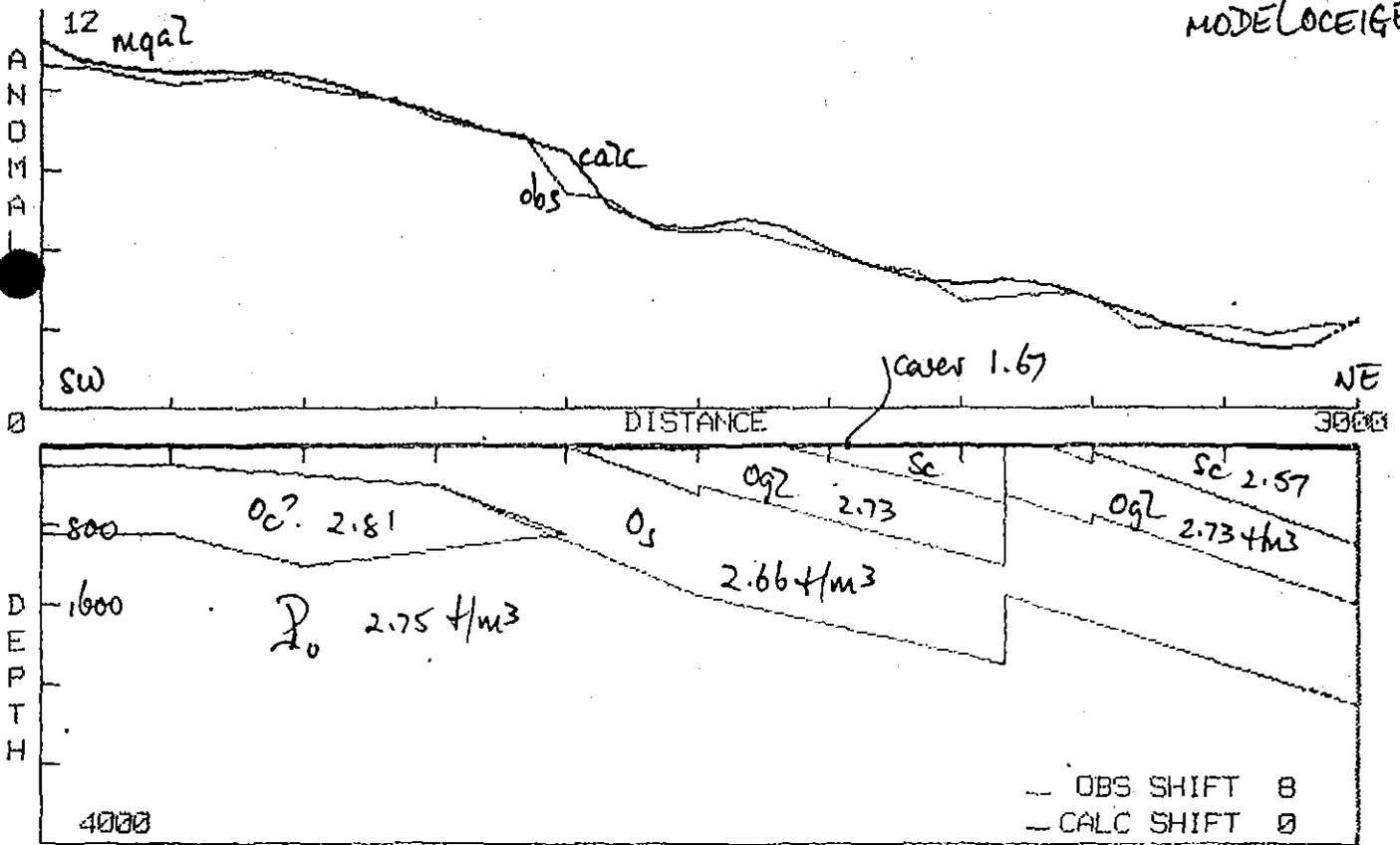
MODEL0CE1GD



2D GRAVITY MODEL LINE OCEANA 1
alternate depth base and stratigraphic variation

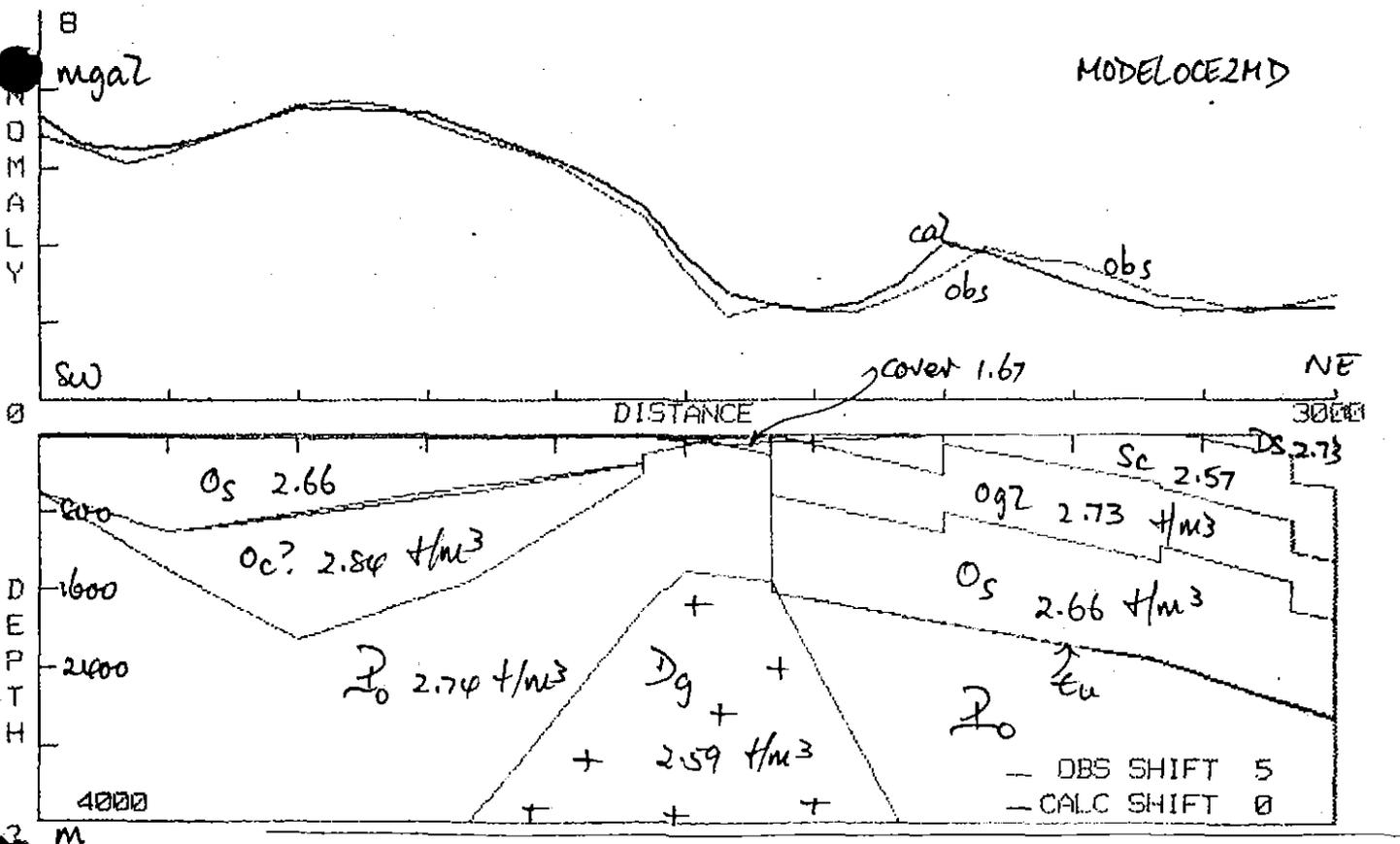
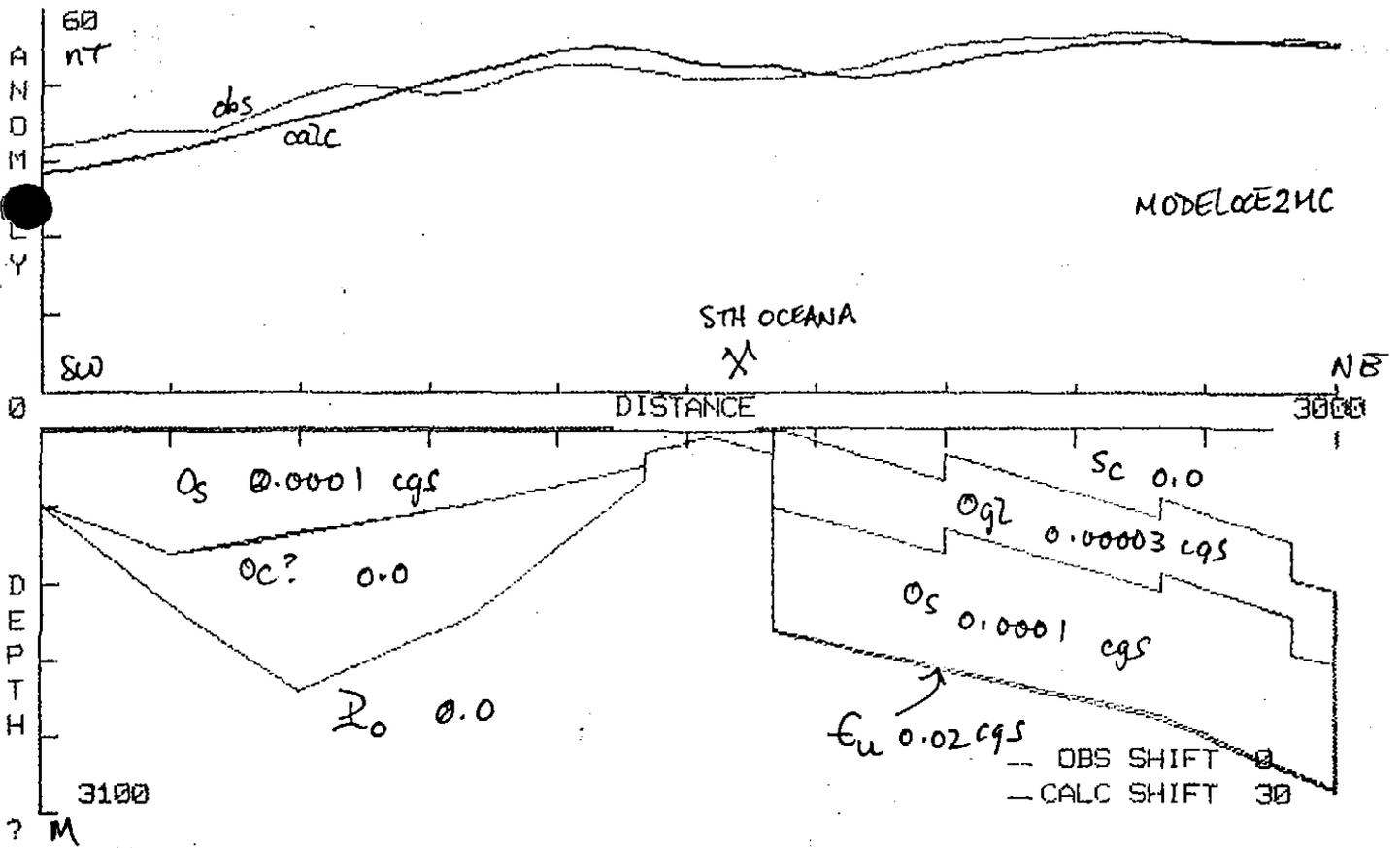
LEAMAN GEOPHYSICS
 G.P.O. Box 320 D,
 Hobart, Tasmania 7001

MODEL OCE1GE



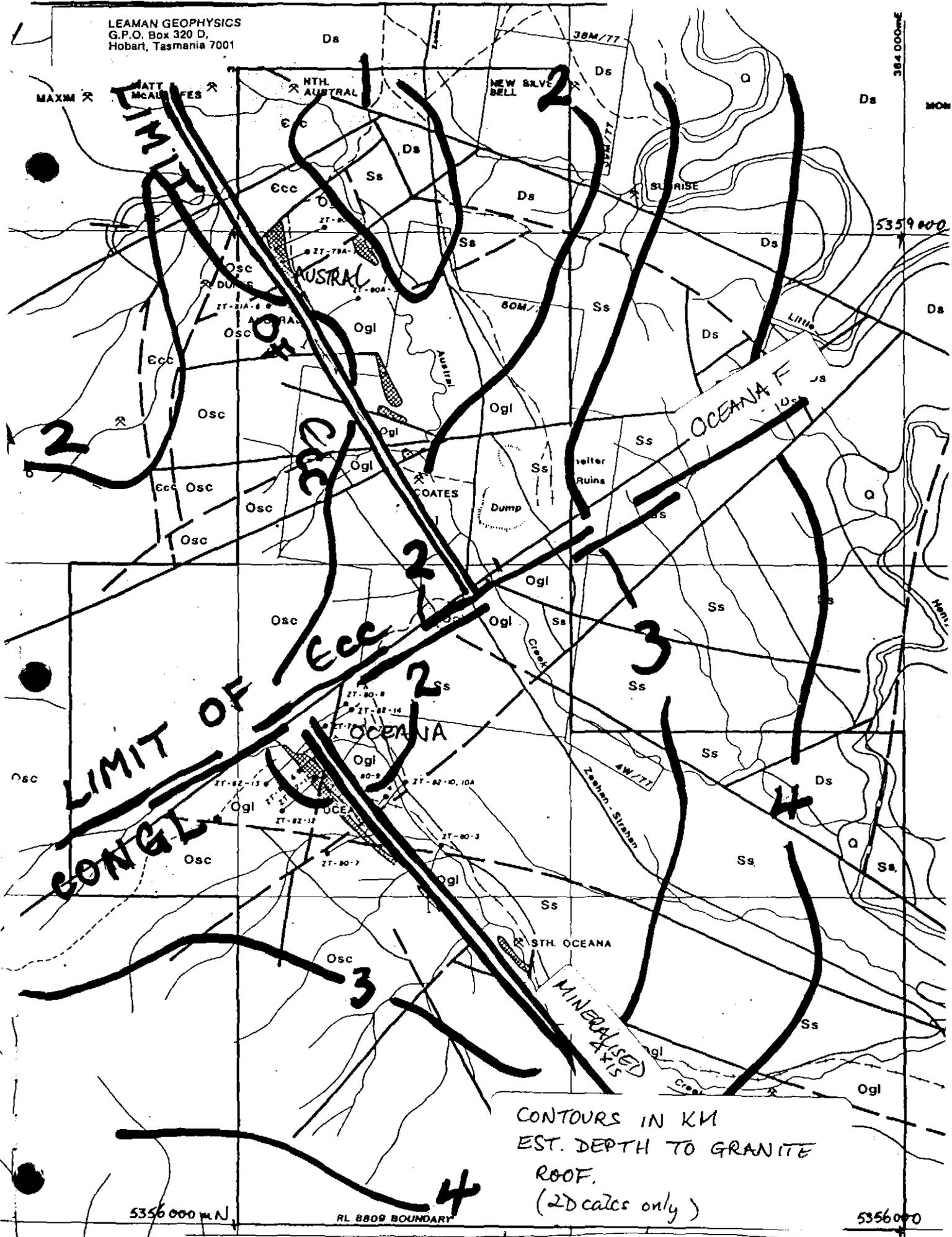
2D GRAVITY MODEL LINE OCEANA 1
 alternate weathering and no granite variation

FIGURE 16



2D GRAVITY AND MAGNETIC MODELS LINE OCEANA 2
accepted granite and surface weathering version

FIGURE 17



CONTOURS IN KM
 EST. DEPTH TO GRANITE
 ROOF.
 (2D cases only)

SUMMARY OF PRIMARY ELEMENTS OF INTERPRETATION
 RL 8809 OCEANA

FIGURE 18

973156

FIGURES

LEGEND

QUATERNARY

Q Alluvium, talus

DEVONIAN

Ds Bell Shale, Florence Quartzite

SILURIAN

Ss Austral Creek Siltstone, Keel Quartzite, Amber Slate, Crotty Quartzite

ORDOVICIAN

Ogl Gordon-Limestone Ironstone

Osc Moira Sandstone Mt. Zeehan Conglomerate

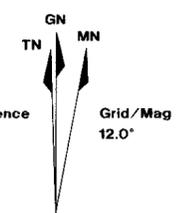
CAMBRIAN

Ccc Crimson Creek Formation

PROTEROZOIC

Po Oonah Quartzite, Slate Minor Volcanics

Geology after Cyprus 1980



973158

5 cm

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

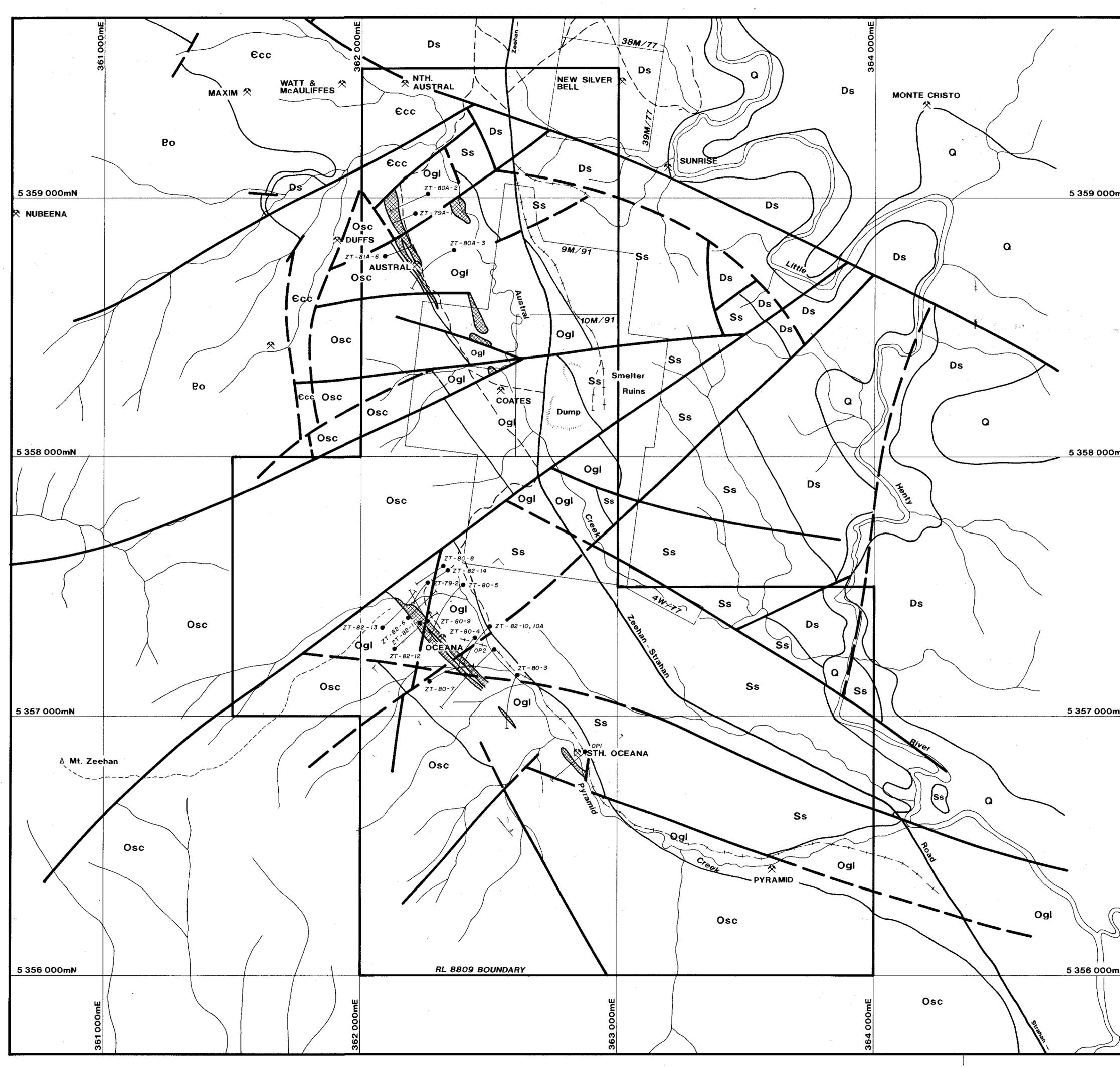
COMPILED :
DATE : Oct, 1991
DRAWN : G.M.B.
REF:
REVISIONS :

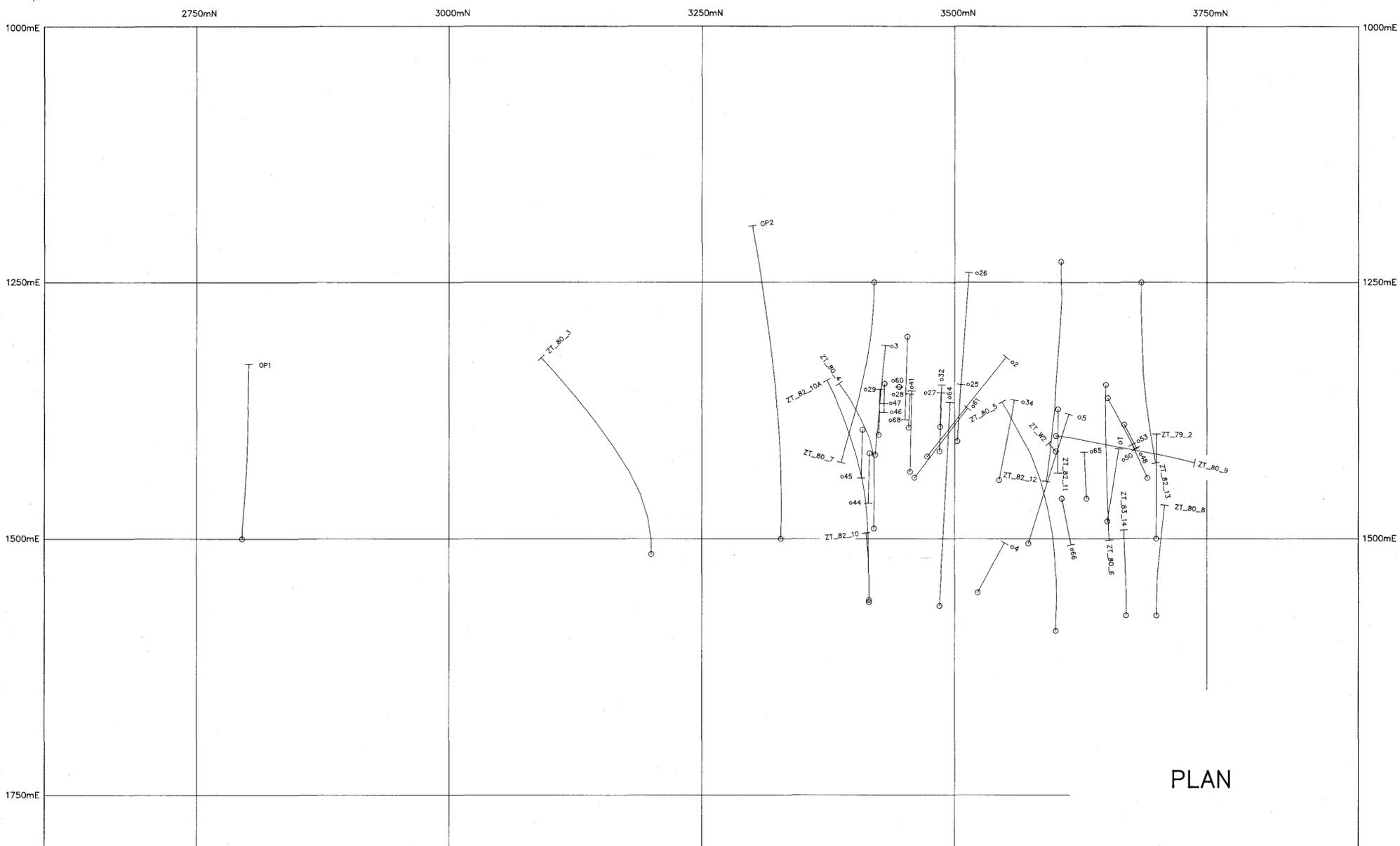
RL 8809 - OCEANA

GEOLOGY

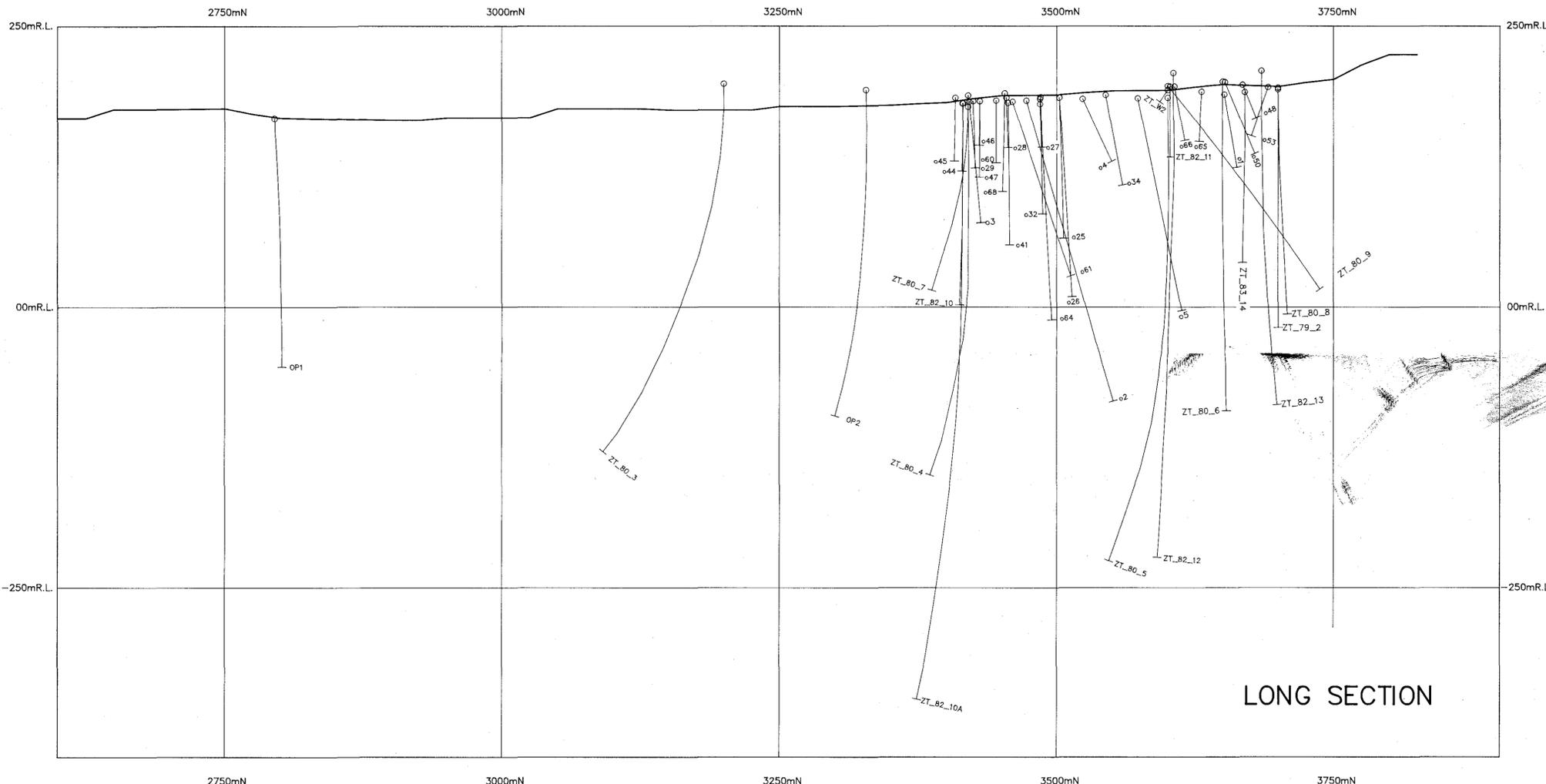
93-3501.

DRAWING No. SCALE 1:10,000 200 0 200 metres FIG. No. 3





PLAN



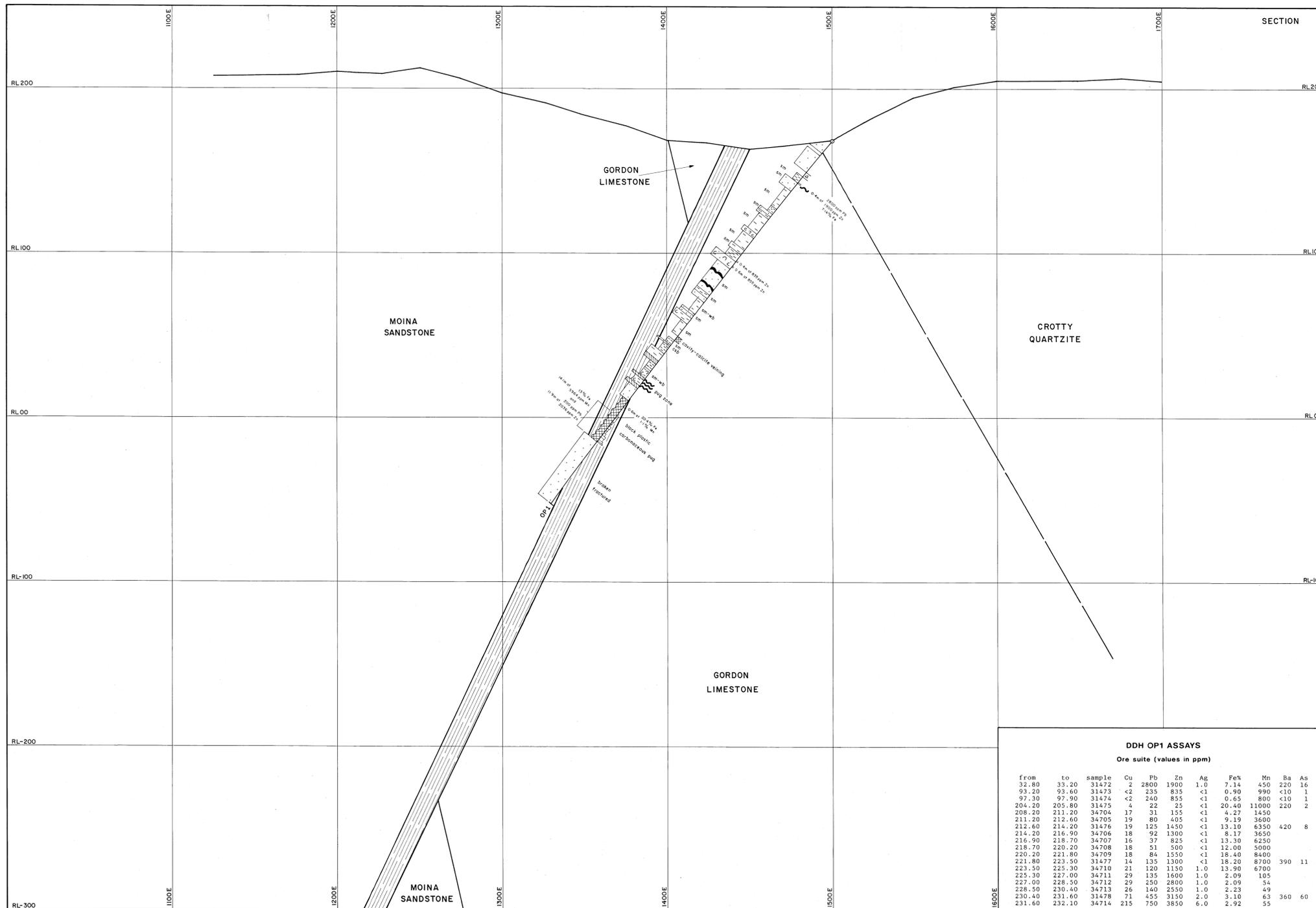
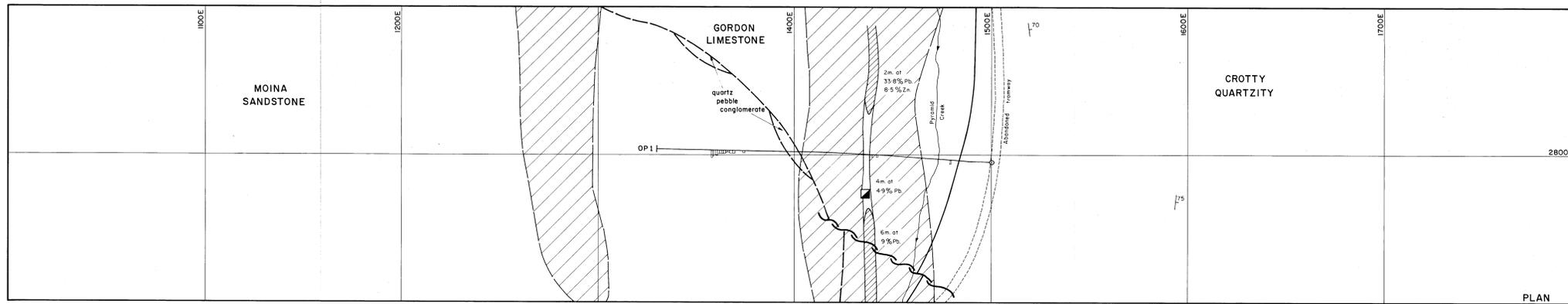
LONG SECTION

5 cm

93 - 3501

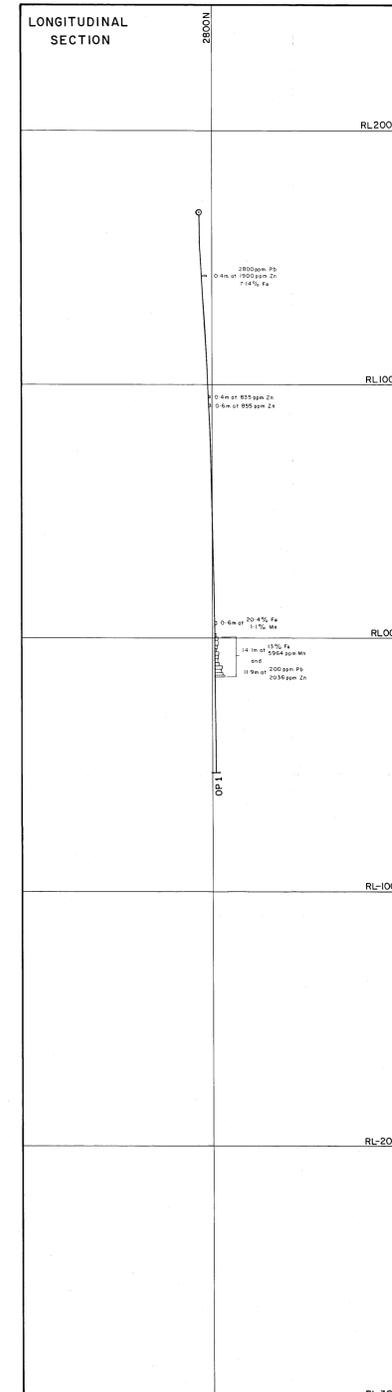
973159

 PASMICO EXPLORATION A Division of Pasmico Australia Limited	
COMPILED : P.M.Q. DATE : Oct. 1992 DRAWN : G.M.B. REFERENCE : REVISIONS : P.M.Q. Sept., 1993	RL8809 - OCEANA OCEANA GRID DDH LOCATIONS PLAN VIEW AND LONG SECTION
DRAWING No. 0600HPLS	SCALE 1:2500
	FIG. No. 6



DDH OP1 ASSAYS
Ore suite (values in ppm)

from	to	sample	Cu	Pb	Zn	Ag	Fe%	Mn	Ba	As
32.80	33.20	31472	2	2800	1900	1.0	7.14	450	220	16
93.20	93.60	31473	<2	235	835	<1	0.90	990	<10	1
97.30	97.90	31474	<2	240	855	<1	0.65	800	<10	1
204.20	205.80	31475	4	22	25	<1	20.40	11000	220	2
208.20	211.20	34704	17	31	155	<1	4.27	1450		
211.20	212.60	34705	19	80	405	<1	9.19	3600		
212.60	214.20	31476	19	125	1450	<1	13.10	6350	420	8
214.20	216.90	34706	18	92	1300	<1	8.17	3650		
216.90	218.70	34707	16	37	825	<1	13.30	6250		
218.70	220.20	34708	18	51	500	<1	12.00	5000		
220.20	221.80	34709	18	84	1550	<1	18.40	8400		
221.80	223.50	31477	14	135	1300	<1	18.20	8700	390	11
223.50	225.30	34710	21	120	1150	1.0	13.90	6700		
225.30	227.00	34711	29	135	1600	1.0	2.09	105		
227.00	228.50	34712	29	250	2800	1.0	2.09	54		
228.50	230.40	34713	26	140	2550	1.0	2.23	49		
230.40	231.60	31478	71	455	3150	2.0	3.10	63	360	60
231.60	232.10	34714	215	750	3850	6.0	2.92	55		



LEGEND

Mudstone to Carbonate ratio

- <10% Intercalated bands of mudstone and carbonate where
- 10-40% Mudstone = partly diamicitic carbonaceous siltstone with fine terrigenous component. (dark grey to black)
- >40% Carbonate = generally calcite cemented silt to sand to gravel size biolite shell and coral debris. (pale grey)

Finely laminated carbonate

Coarse biolite debris coral-stromatolite-bivalves

tm = tube mottled bioturbation
 sm = sculpture mottled bioturbation
 w = slump shearing
 wb = well beds
 fm = finely laminated
 cb = coarse shell beds
 sty = stylolite

Vein mass or fractured
 Mineralisation
 breccia
 Shear/fault, pop

Mineralisation
 Grotty/Magnetic Target (Leaman, 1992)
 Geology boundary
 Geology boundary - inferred
 Fault
 Fault
 Fault

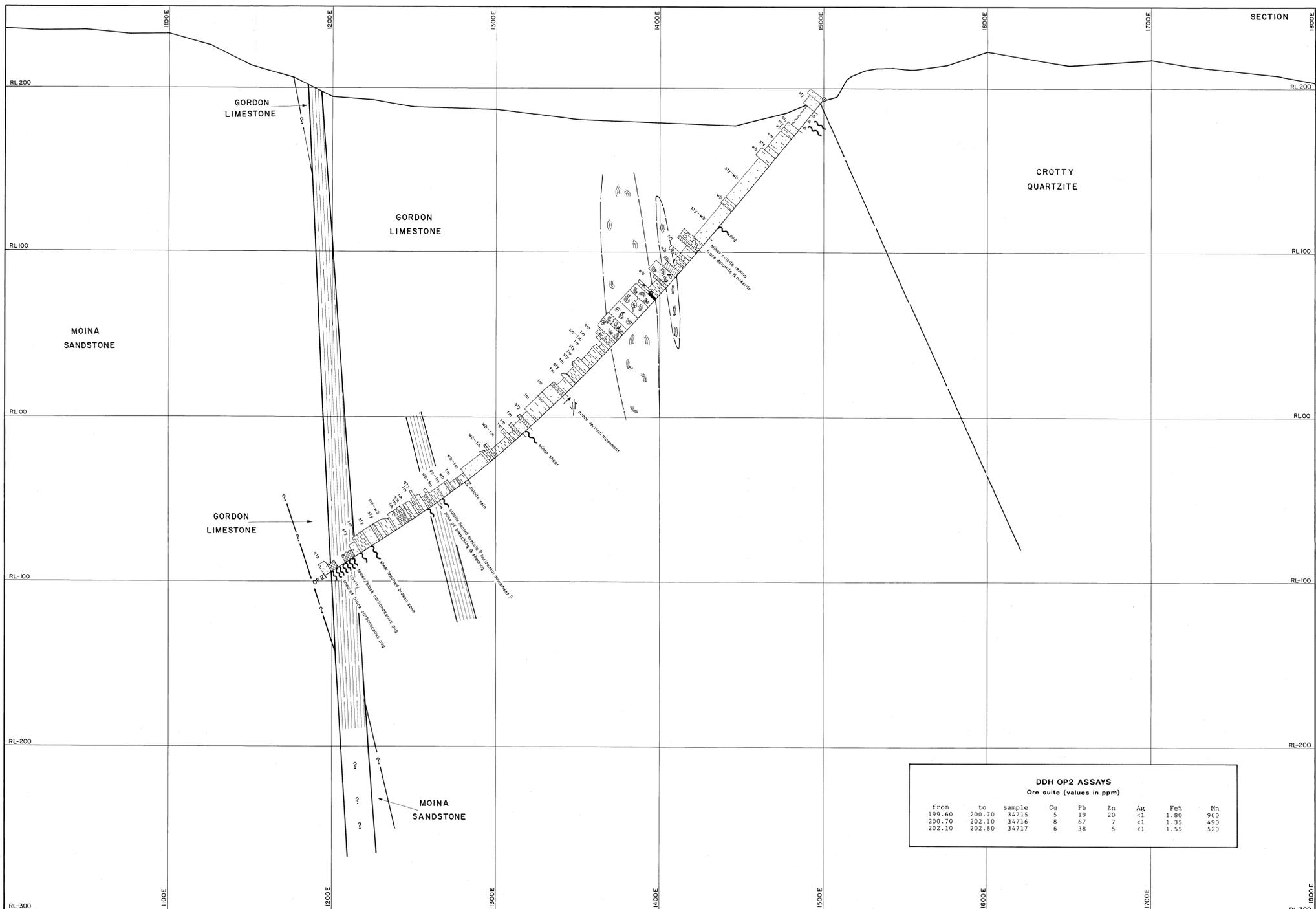
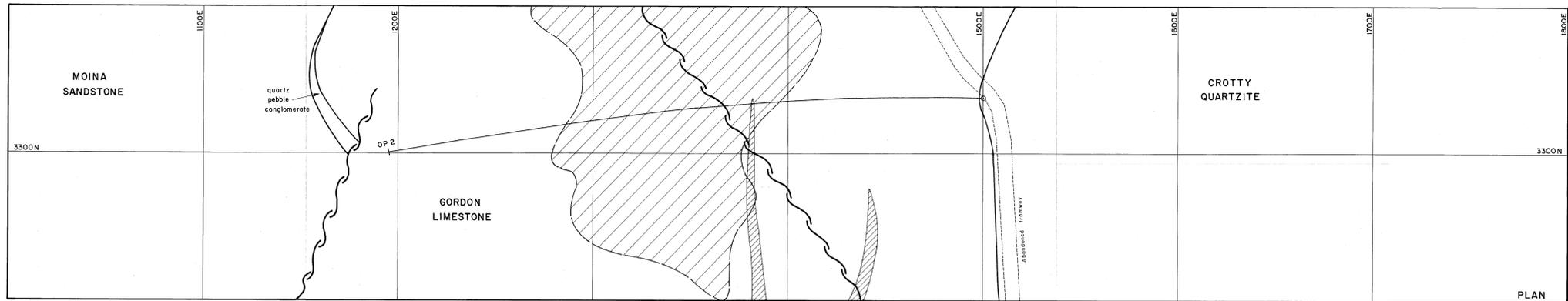
5cm

93-3501.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

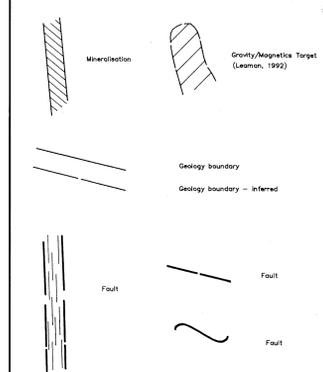
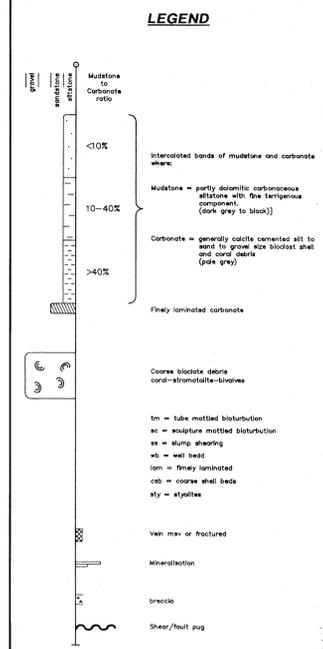
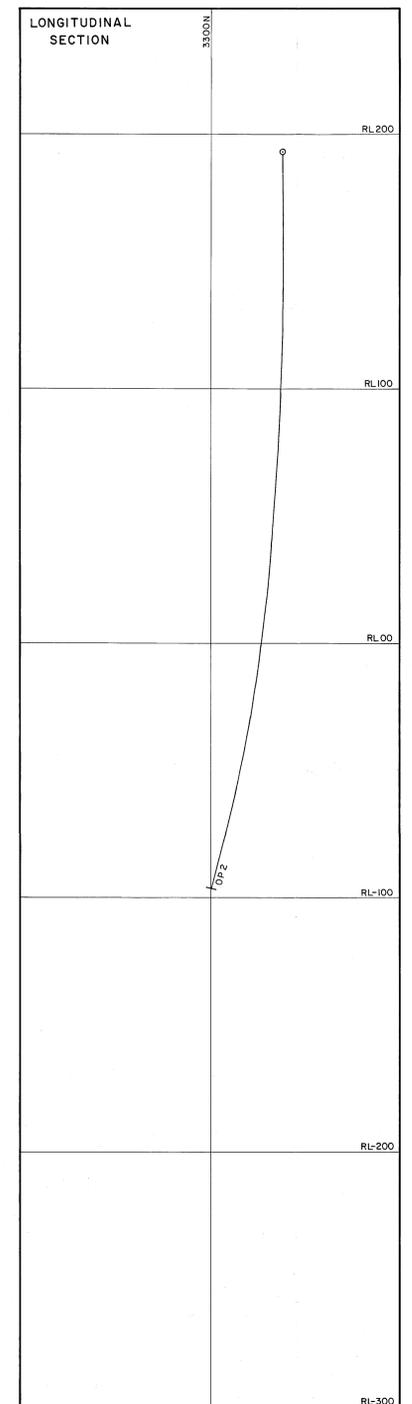
COMPILED: M.Q.
 DATE: 16-5-93
 DRAWN: N.W.D.S.
 REF:
 REVISIONS:
 DRAWING NO. SCALE 1:1,000 FIG. No. 7

RLB09 - OCEANA
GEOLGY
 SECTION AT 2800N



DDH OP2 ASSAYS
Ore suite (values in ppm)

From	To	sample	Cu	Pb	Zn	Ag	Fe%	Mn
199.60	200.70	34715	5	19	20	<1	1.80	960
200.70	202.10	34716	8	67	7	<1	1.35	490
202.10	202.80	34717	6	38	5	<1	1.55	520



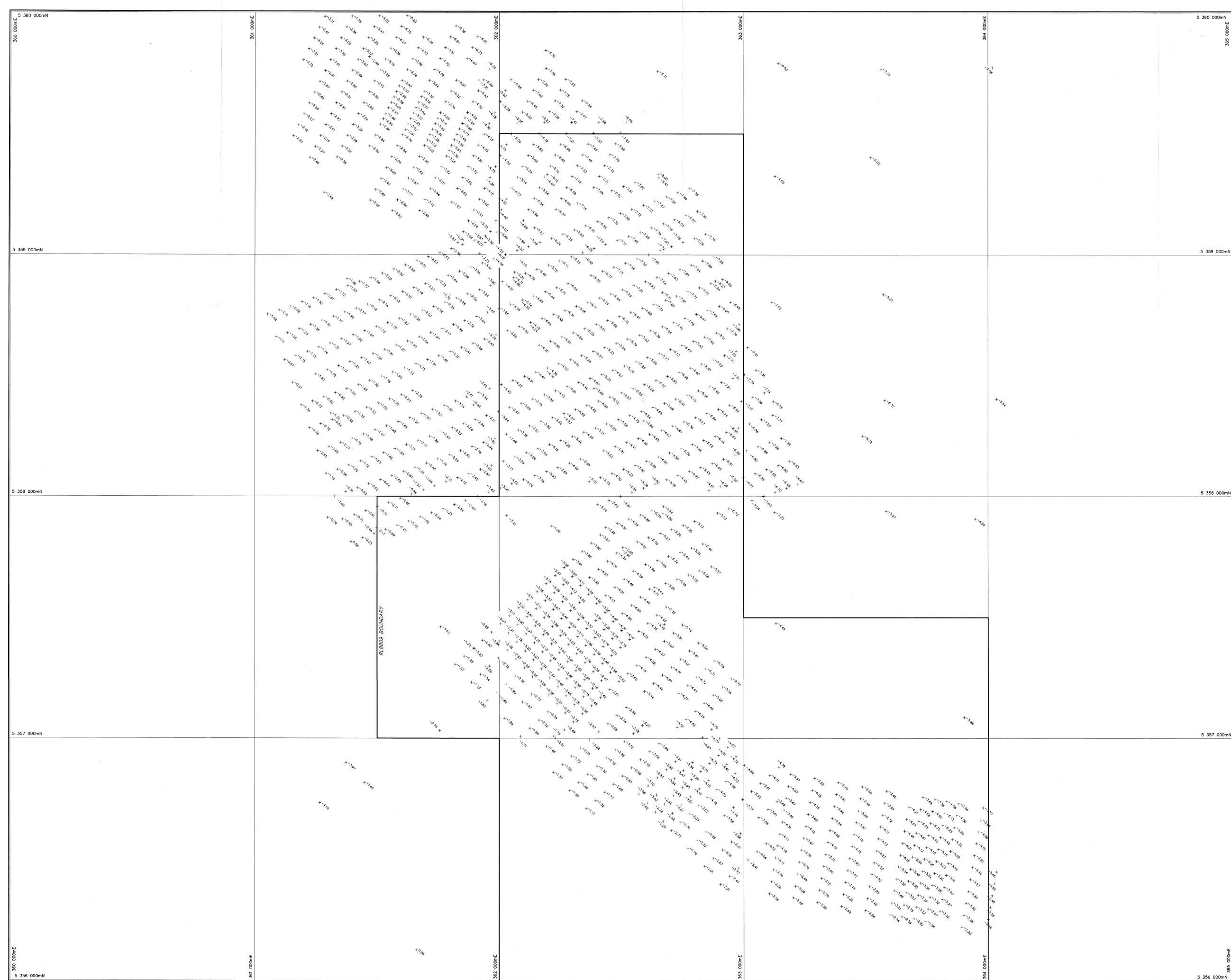
973161
5 cm

93-3501.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED: M.Q.	DATE: 8-6-'93	DRAWN: N.W.D.S.	REF:
REVISIONS:			
DRAWING No.	SCALE 1:1,000	0 20 40 meters	FIG. No. 8

RL8809-OCEANA
GEOLOGY
SECTION AT 3300N



5 cm

KEY

Corrected bouguer values

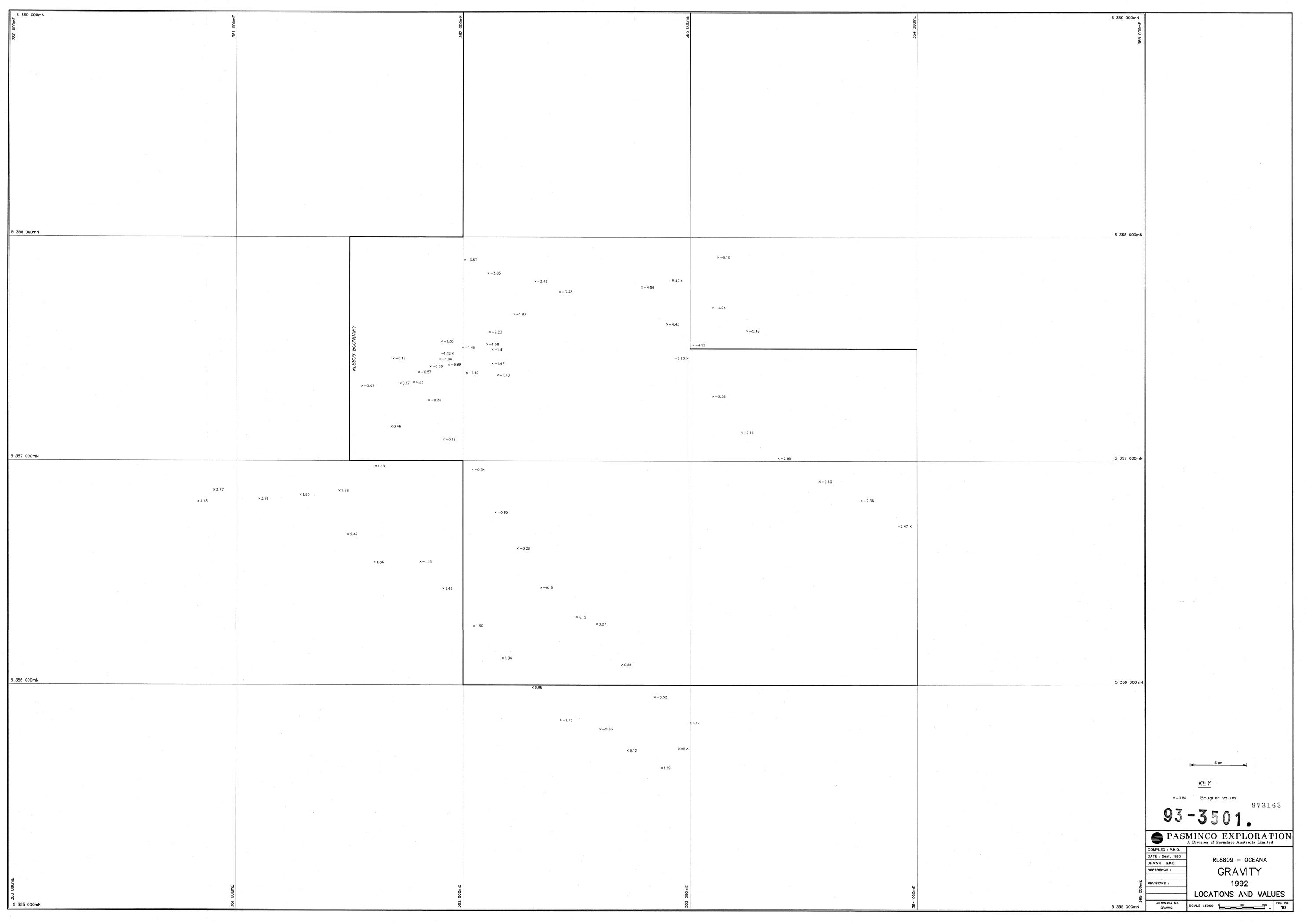
93-3501.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : P.M.G.
DATE : Sept. 1992
DRAWN : G.M.B.
REFERENCE :
REVISIONS :

973162
RL8809 - OCEANA
GRAVITY
CORRECTED LOCATIONS
AND VALUES

DRAWING No. OCSRAV SCALE 1:5000 FIG. No. 9



RL8809 BOUNDARY



KEY

x = -0.86 Bouguer values

973163

93-3501.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : P.M.O.
DATE : Sept. 1993
DRAWN : G.M.B.
REFERENCE :
REVISIONS :

RL8809 - OCEANA
GRAVITY
1992
LOCATIONS AND VALUES

361000E

362000E

363000E

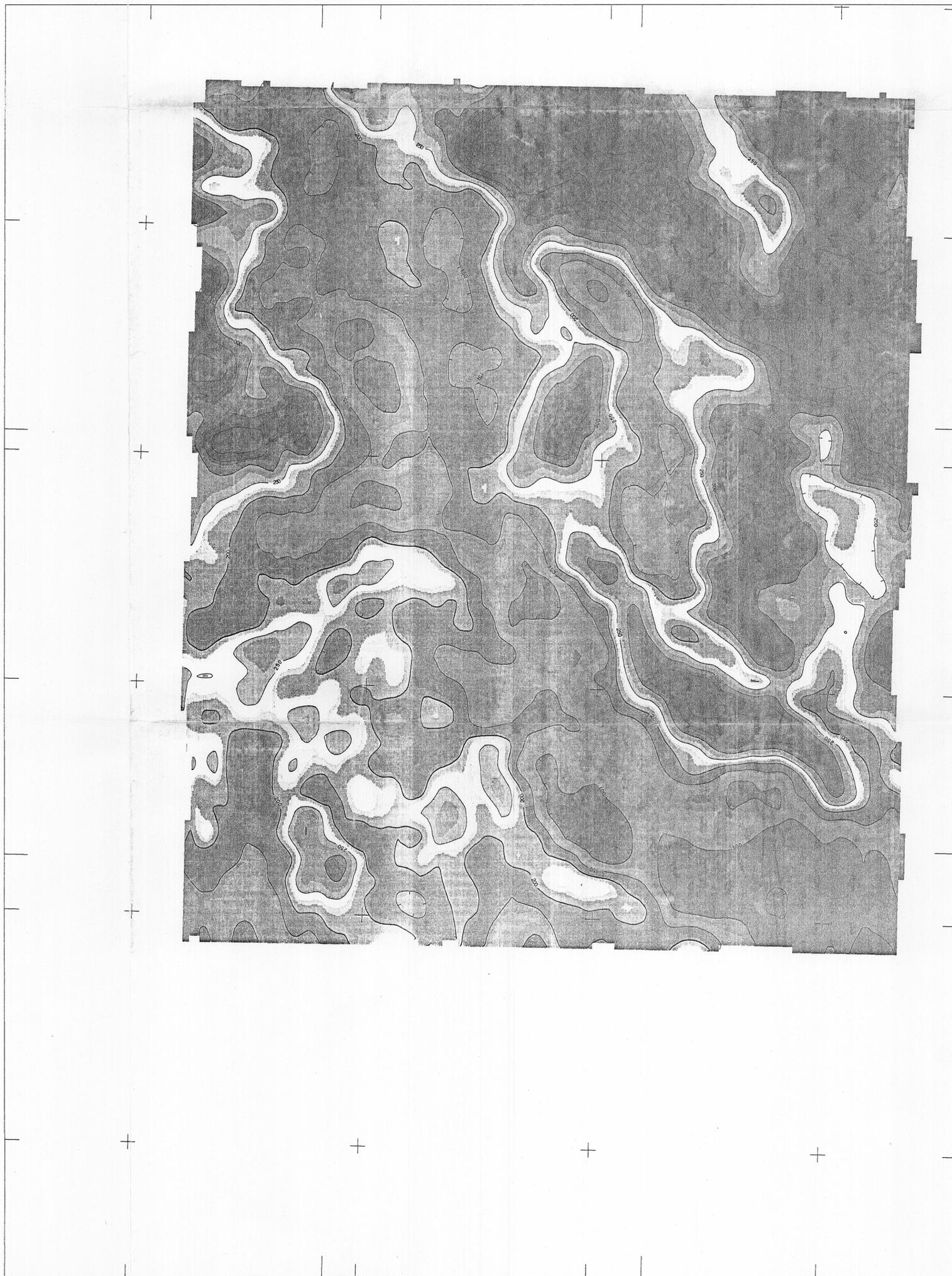
364000E

41°54'00"S

41°55'00"S

41°56'00"S

41°57'00"S



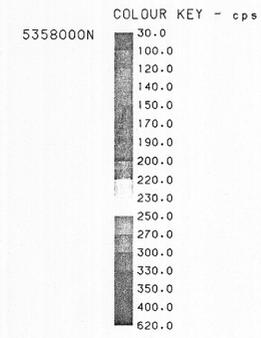
5360000N AIRBORNE SURVEY SPECIFICATIONS

AIRCRAFT : Squirrel Helicopter
MAGNETOMETER : SCINTREX cesium vapour optical absorption mounted on a bird
Sensitivity : 0.05 nT
RECORDING INTERVAL : 0.1 sec
NOMINAL TERRAIN CLEARANCE : Sensor in towed bird at 80 m
SPECTROMETER : Nuclear Data 256 channel ADC
Volume : 16.8 litres
0.4 - 3.00 MeV
TOTAL COUNT WINDOW : 1.35 - 1.57 MeV
URANIUM WINDOW : 1.63 - 1.89 MeV
THORIUM WINDOW : 2.42 - 2.62 MeV
RECORDING INTERVAL : 1.0 sec
DATA RECORDING : Geotrex MADACS acquisition system
Digital to magnetic tape
NOMINAL TERRAIN CLEARANCE : Detectors in aircraft at 110 m
NOMINAL LINE SPACING : Traverse lines 100 m
Tie lines 1.0 km
FLIGHT PATH NAVIGATION : SERCEL NR103 GPS and SERCEL NDS100
UHF DGPS navigation system
FLIGHT PATH RECORD : real time from UHF DGPS system
corrected for selected availability

5359000N TOTAL COUNT IMAGE

Grid notation refers to Australian Map Grid Zone 55
Radiometrics : Cosmic and aircraft background removed
Live time corrected
Temperature corrected
Compton corrected
Alpha - 0.421
Beta - 0.411
Gamma - 0.678
Height attenuated to 110 metres
mean terrain clearance
Total Count - 0.00630/metre
Potassium Count - 0.00768/metre
Uranium Count - 0.00595/metre
Thorium Count - 0.00543/metre
Alpha - 0.000076/metre

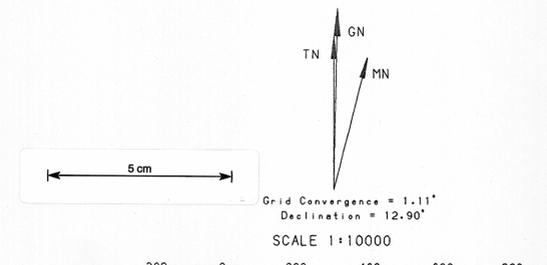
Grid mesh size : 25 x 25 metres
Grid filter : None
Contour interval : 50 and 200 cps



5357000N

5356000N

5355000N



93-3501.

JOB NO : 3-446
Surveyed by GEOTERREX PTY LTD : March 1993
Compiled by GEOTERREX PTY LTD, SYDNEY
Processed by GEOTERREX PTY LTD, SYDNEY 973104

PASMINCO EXPLORATION

OCEANA RL 8809
TOTAL COUNT IMAGE
BURNIE SK55-3
SHEET 1 OF 1

DRAWING NO: DATE : 14-MAY-1993

145°19'00"E

145°20'00"E

145°21'00"E

145°22'00"E

Figure 12

361000E

362000E

363000E

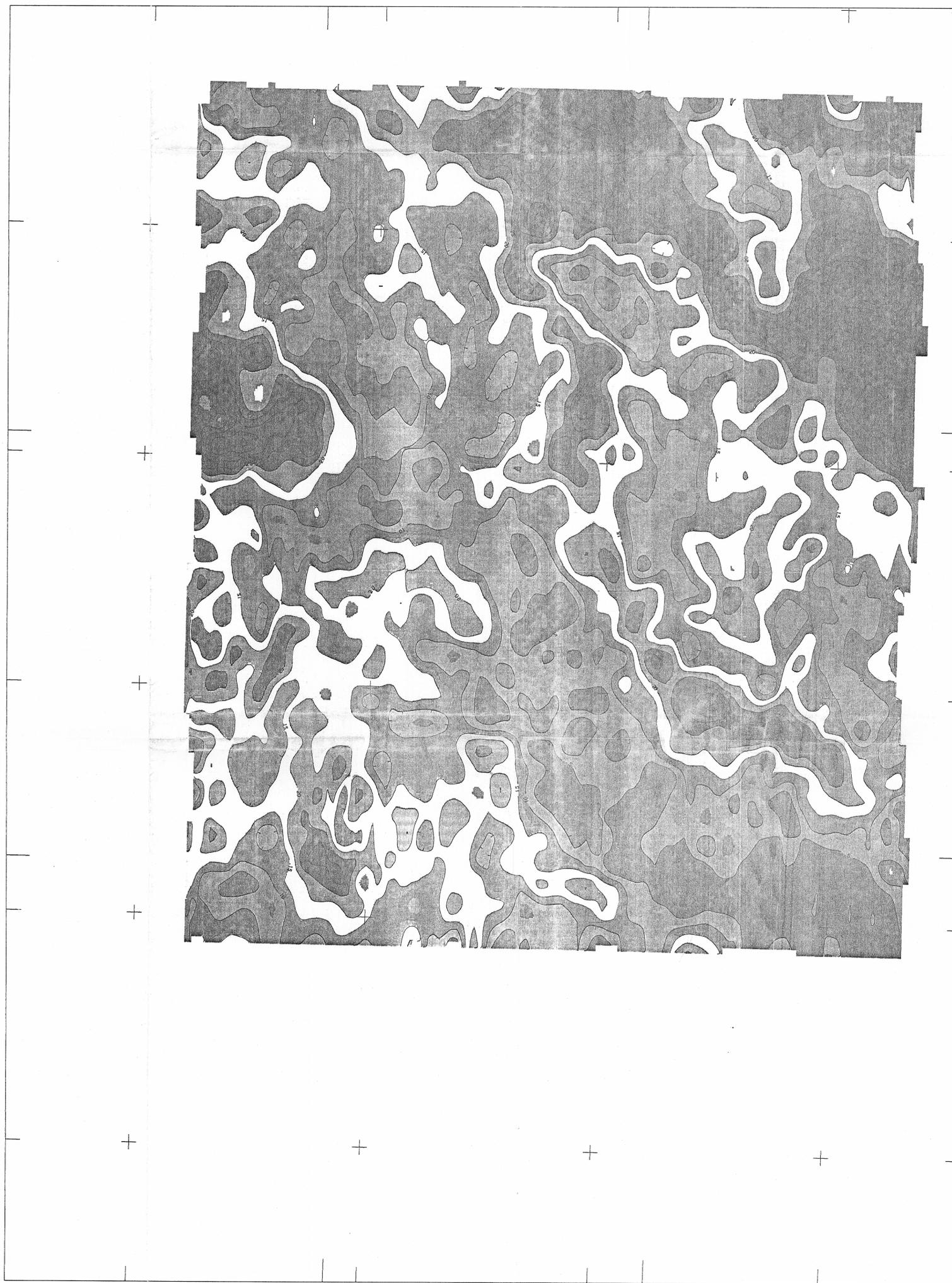
364000E

41°54'00"S

41°55'00"S

41°56'00"S

41°57'00"S



536000N AIRBORNE SURVEY SPECIFICATIONS

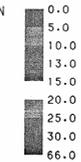
AIRCRAFT : Squirrel Helicopter
 MAGNETOMETER : SCINTREX cesium vapour optical absorption mounted on a bird
 Sensitivity : 0.05 nT
 0.1 sec
 RECORDING INTERVAL : Sensor in towed bird at 80 m
 NOMINAL TERRAIN CLEARANCE : Nuclear Data 256 channel ADC
 SPECTROMETER : Volume : 15.8 litres
 TOTAL COUNT WINDOW : 0.4 - 3.00 MeV
 POTASSIUM WINDOW : 1.35 - 1.57 MeV
 URANIUM WINDOW : 1.63 - 1.89 MeV
 THORIUM WINDOW : 2.42 - 2.82 MeV
 RECORDING INTERVAL : 1.0 sec
 DATA RECORDING : Geotrex MADACS acquisition system
 Digital to magnetic tape
 Detectors in aircraft at 110 m
 Traverse lines 100 m
 Tie lines 1.0 km
 SERCEL NR103 GPS and SERCEL NDS100
 UHF DGPS navigation system
 real time from UHF DGPS system
 corrected for selected availability

535900N POTASSIUM COUNT IMAGE

Grid notation refers to Australian Map Grid Zone 55
 Radiometrics : Cosmic and aircraft background removed
 Live time corrected
 Temperature corrected
 Compton corrected
 Alpha - 0.421
 Beta - 0.411
 Gamma - 0.678
 Height attenuated to 110 metres
 mean terrain clearance
 Total Count - 0.00630/metre
 Potassium Count - 0.00768/metre
 Uranium Count - 0.00595/metre
 Thorium Count - 0.00643/metre
 Alpha - 0.000076/metre

Grid mesh size : 25 x 25 metres
 Grid filter : None
 Contour interval : 5 cps

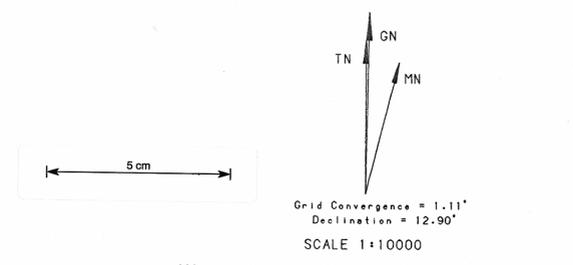
535800N COLOUR KEY - cps



535700N

535600N

535500N



93-3501.

JOB NO : 3-446
 Surveyed by GEOTERREX PTY LTD : March 1993
 Compiled by GEOTERREX PTY LTD, SYDNEY
 Processed by GEOTERREX PTY LTD, SYDNEY

973165

PASMINCO EXPLORATION

OCEANA RL 8809
POTASSIUM COUNT IMAGE

BURNIE SK55-3

SHEET 1 OF 1

Figure 13

DRAWING NO:

DATE : 14-MAY-1993

145°19'00"E

145°20'00"E

145°21'00"E

145°22'00"E

361000E

362000E

363000E

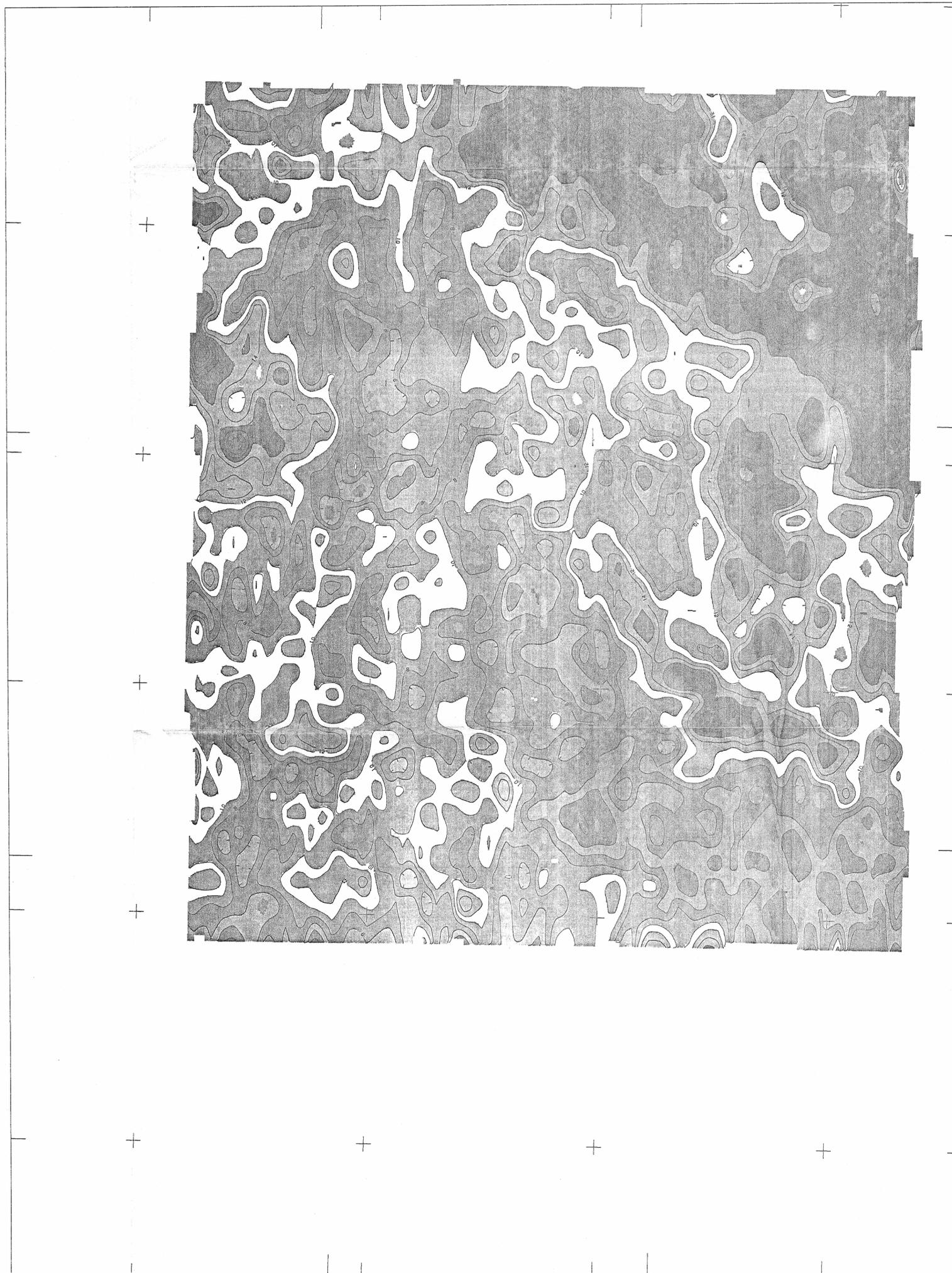
364000E

41°54'00"S

41°55'00"S

41°56'00"S

41°57'00"S

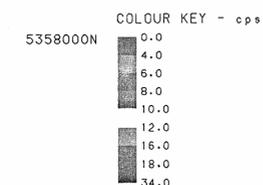


536000N AIRBORNE SURVEY SPECIFICATIONS

AIRCRAFT : Squirrel Helicopter
 MAGNETOMETER : SCINTREX caesium vapour optical absorption mounted on a bird
 SENSITIVITY : 0.05 nT
 RECORDING INTERVAL : 0.1 sec
 NOMINAL TERRAIN CLEARANCE : Sensor in towed bird at 80 m
 SPECTROMETER : Nuclear Data 256 channel ADC
 Volume : 16.5 litres
 TOTAL COUNT WINDOW : 0.4 - 3.00 MeV
 POTASSIUM WINDOW : 1.35 - 1.57 MeV
 URANIUM WINDOW : 1.63 - 1.89 MeV
 THORIUM WINDOW : 2.42 - 2.82 MeV
 RECORDING INTERVAL : 1.0 sec
 DATA RECORDING : Geotrex MADACS acquisition system
 Digital to magnetic tape
 NOMINAL TERRAIN CLEARANCE : Detectors in aircraft at 110 m
 NOMINAL LINE SPACING : Traverse lines 100 m
 TIE LINES : 1.0 km
 FLIGHT PATH NAVIGATION : SERCEL NR103 GPS and SERCEL NDS100
 UHF DGPS navigation system
 FLIGHT PATH RECORD : real time from UHF DGPS system corrected for selected availability

535900N THORIUM COUNT IMAGE

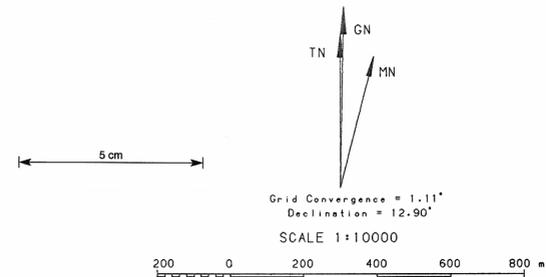
Grid notation refers to Australian Map Grid Zone 55
 Radiometrics : Cosmic and aircraft background removed
 Live time corrected
 Temperature corrected
 Compton corrected
 Alpha - 0.421
 Beta - 0.411
 Gamma - 0.678
 Height attenuated to 110 metres
 mean terrain clearance
 Total Count - 0.00630/metre
 Potassium Count - 0.00768/metre
 Uranium Count - 0.00595/metre
 Thorium Count - 0.00643/metre
 Alpha - 0.000076/metre
 Grid mesh size : 25 x 25 metres
 Grid filter : None
 Contour interval : 2 cps



535700N

535600N

535500N



93-3501

JOB NO : 3-446
 Surveyed by GEOTERREX PTY LTD : March 1993
 Compiled by GEOTERREX PTY LTD, SYDNEY
 Processed by GEOTERREX PTY LTD, SYDNEY 973166

PASMINCO EXPLORATION
 OCEANA RL 8809
 THORIUM COUNT IMAGE
 BURNIE SK55-3
 SHEET 1 OF 1 Figure 14

DRAWING NO: DATE : 14-MAY-1993

145°19'00"E

145°20'00"E

145°21'00"E

145°22'00"E

361000E

362000E

363000E

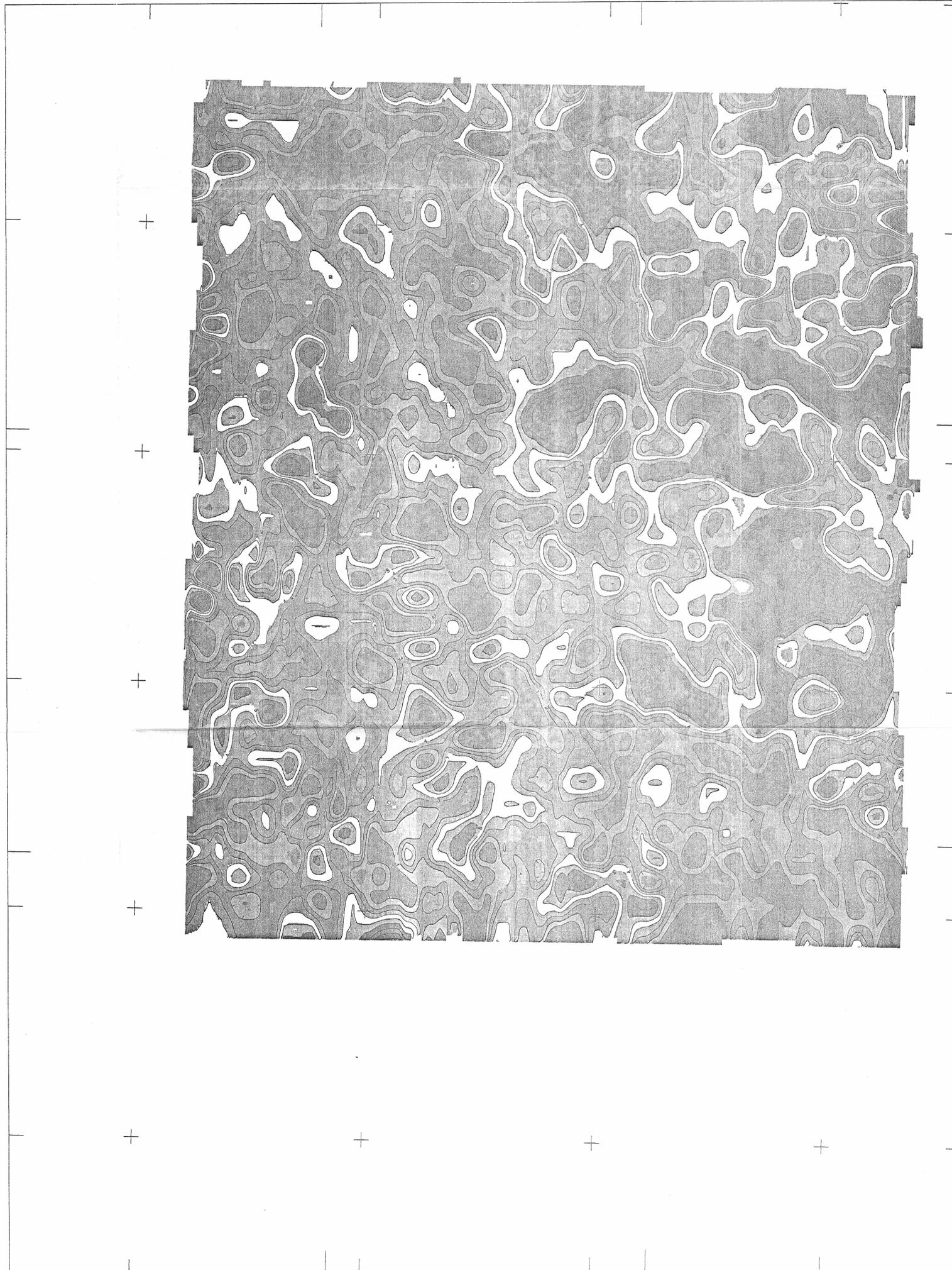
364000E

41°54'00"S

41°55'00"S

41°56'00"S

41°57'00"S

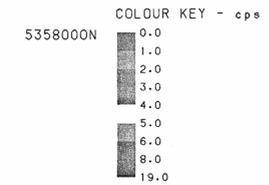


536000N AIRBORNE SURVEY SPECIFICATIONS

AIRCRAFT : Squirrel Helicopter
MAGNETOMETER : SCINTREX cesium vapour optical absorption mounted on a bird
Sensitivity : 0.05 nT
0.1 sec
RECORDING INTERVAL : Sensor in towed bird at 80 m
NOMINAL TERRAIN CLEARANCE : Nuclear Data 256 channel ADC
SPECTROMETER : Volume : 16.8 litres
0.4 - 3.00 MeV
TOTAL COUNT WINDOW : 1.35 - 1.57 MeV
POTASSIUM WINDOW : 1.63 - 1.89 MeV
URANIUM WINDOW : 2.42 - 2.82 MeV
THORIUM WINDOW :
RECORDING INTERVAL : 1.0 sec
DATA RECORDING : Geotrex, MADACS acquisition system
Digital to magnetic tape
NOMINAL TERRAIN CLEARANCE : Detectors in aircraft at 110 m
NOMINAL LINE SPACING : Traverse lines 100 m
Tie lines 1-0 km
FLIGHT PATH NAVIGATION : SERCEL NR103 GPS and SERCEL NDS100
UHF DGPS navigation system
FLIGHT PATH RECORD : real time from UHF DGPS system
corrected for selected availability

5359000N URANIUM COUNT IMAGE

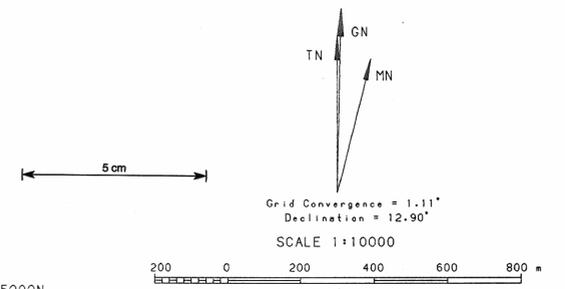
Grid notation refers to Australian Map Grid Zone 55
Radiometrics : Cosmic and aircraft background removed
Live time corrected
Temperature corrected
Compton corrected
Alpha - 0.421
Beta - 0.411
Gamma - 0.678
Height attenuated to 110 metres
mean terrain clearance
Total Count - 0.00630/metre
Potassium Count - 0.00768/metre
Uranium Count - 0.00595/metre
Thorium Count - 0.00643/metre
Alpha - 0.00076/metre
Grid mesh size : 25 x 25 metres
Grid filter : None
Contour interval : 1 cps



5357000N

5356000N

5355000N



93-3501.
JOB NO : 3-446
Surveyed by GEOTERREX PTY LTD : March 1993
Compiled by GEOTERREX PTY LTD, SYDNEY
Processed by GEOTERREX PTY LTD, SYDNEY 973167

PASMINCO EXPLORATION
OCEANA RL 8809
URANIUM COUNT IMAGE
BURNIE SK55-3
SHEET 1 OF 1
DRAWING NO: DATE : 14-MAY-1993

145°19'00"E

145°20'00"E

145°21'00"E

145°22'00"E

Figure 15

361000E

362000E

363000E

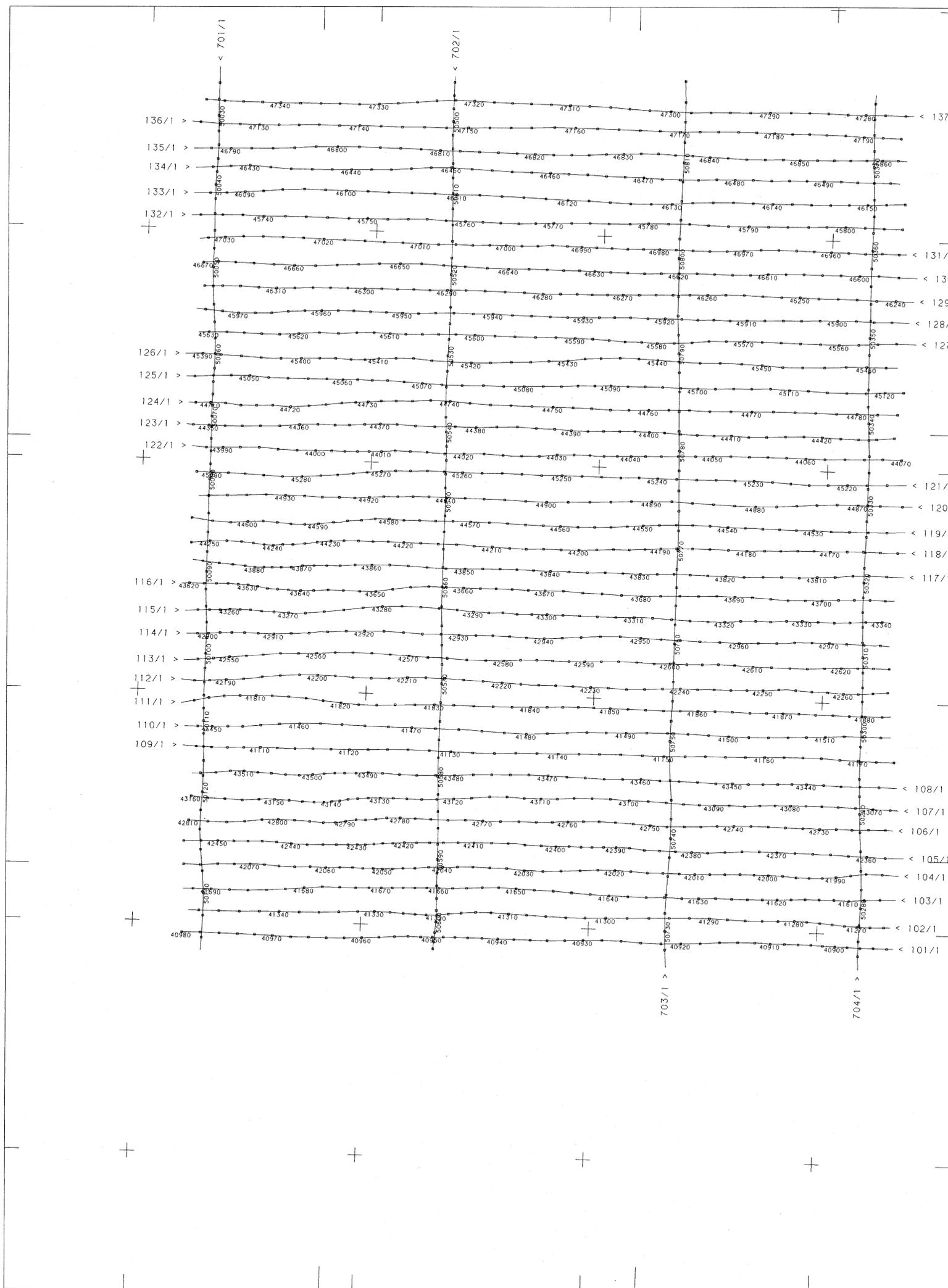
364000E

41°54'00"S

41°55'00"S

41°56'00"S

41°57'00"S



536000N AIRBORNE SURVEY SPECIFICATIONS

AIRCRAFT : Squirrel Helicopter
MAGNETOMETER : SCINTREX cesium vapour optical absorption mounted on a bird
Sensitivity : 0.05 nT
0.1 sec

RECORDING INTERVAL : Sensor in towed bird at 80 m
NOMINAL TERRAIN CLEARANCE : Nuclear Data 256 channel ADC
SPECTROMETER : Volume : 15.8 litres
0.4 - 3.00 MeV

TOTAL COUNT WINDOW : POTASSIUM WINDOW : 1.35 - 1.57 MeV
URANIUM WINDOW : 1.63 - 1.89 MeV
THORIUM WINDOW : 2.42 - 2.82 MeV

RECORDING INTERVAL : 1.0 sec
DATA RECORDING : Geotrex MADACS acquisition system
Digitized to magnetic tape

NOMINAL TERRAIN CLEARANCE : Detectors in aircraft at 110 m
NOMINAL LINE SPACING : Traverse lines 100 m
FLIGHT PATH NAVIGATION : SERCEL NR103 GPS and SERCEL NDS100
UHF DGPS navigation system
FLIGHT PATH RECORD : real time from UHF DGPS system
corrected for selected availability

5359000N FLIGHT PATH

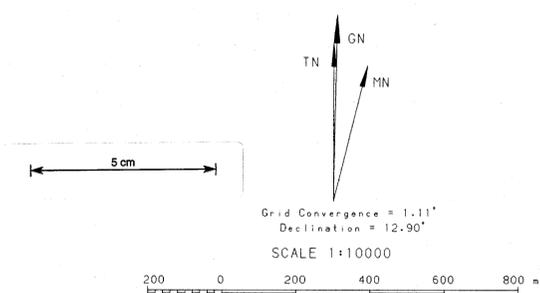
Grid notation refers to Australian Map Grid Zone 55
Navigation Fix 32768

5358000N

5357000N

5356000N

5355000N



93-3501.

JOB NO : 3-446
Surveyed by GEOTERREX PTY LTD : March 1993
Compiled by GEOTERREX PTY LTD, SYDNEY
Processed by GEOTERREX PTY LTD, SYDNEY 97316S

PASMINCO EXPLORATION
OCEANA RL 8809
FLIGHT PATH
BURNIE SK55-3
SHEET 1 OF 1

DRAWING NO: DATE : 13-MAY-1993

361000E

362000E

363000E

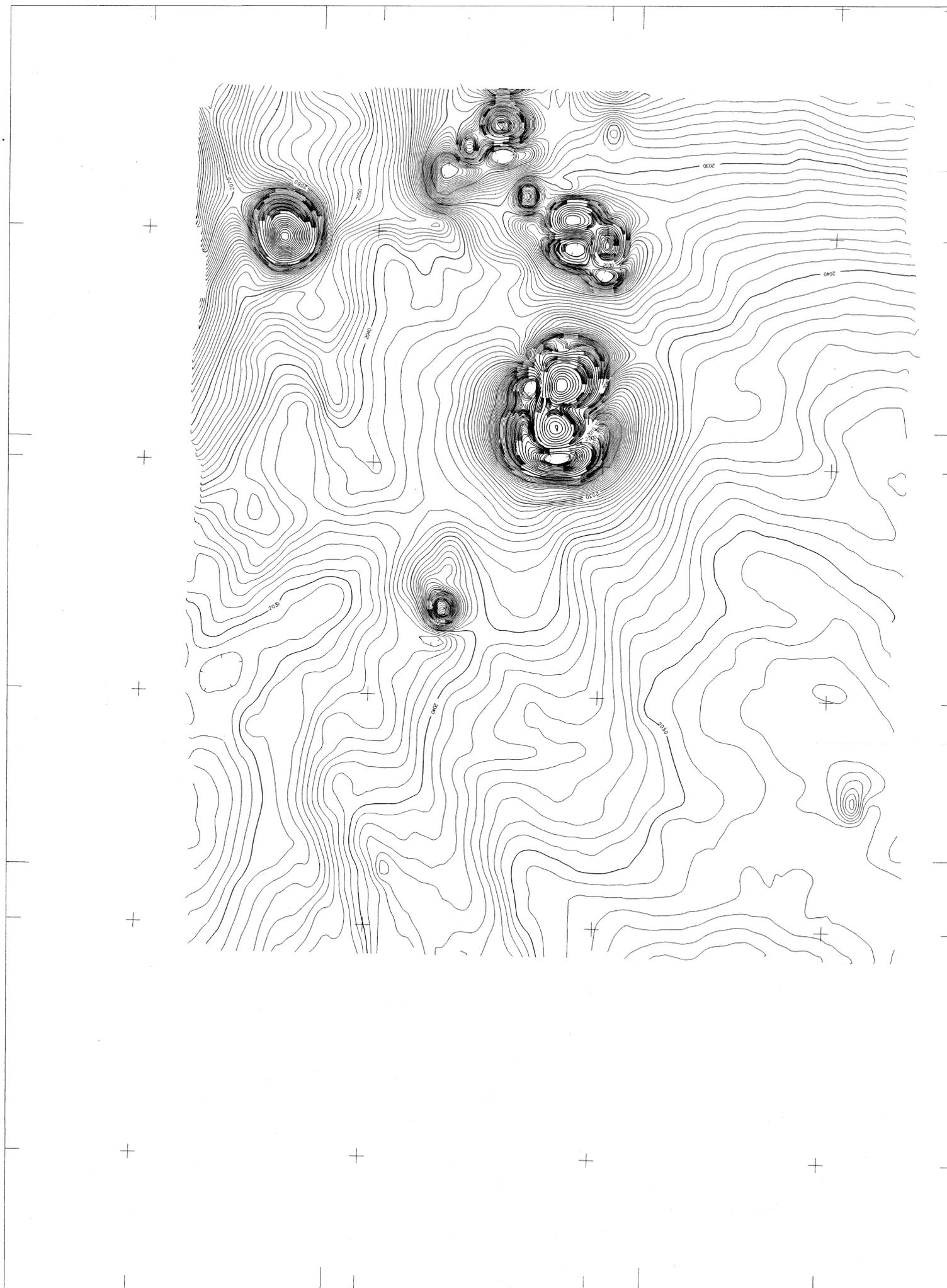
364000E

41°54'00"S

41°55'00"S

41°56'00"S

41°57'00"S



536000N AIRBORNE SURVEY SPECIFICATIONS

AIRCRAFT : Squirrel Helicopter
MAGNETOMETER : SCINTREX cesium vapour optical absorption mounted on a bird
Sensitivity : 0.05 nT
RECORDING INTERVAL : 0.1 sec
NOMINAL TERRAIN CLEARANCE : Sensor in towed bird at 80 m
SPECTROMETER : Nuclear Data 256 channel ADC
Volume : 16.8 litres
TOTAL COUNT WINDOW : 0.4 - 3.00 MeV
POTASSIUM WINDOW : 1.35 - 1.57 MeV
URANIUM WINDOW : 1.63 - 1.89 MeV
THORIUM WINDOW : 2.42 - 2.82 MeV
RECORDING INTERVAL : 1.0 sec
DATA RECORDING : Geotrex MADACS acquisition system
Digital to magnetic tape
NOMINAL TERRAIN CLEARANCE : Detectors in aircraft at 110 m
NOMINAL LINE SPACING : Traverse lines 100 m
Tie lines 1.0 km
FLIGHT PATH NAVIGATION : SERCEL NR103 GPS and SERCEL NDS100
UHF DGPS navigation system
FLIGHT PATH RECORD : real time from UHF DGPS system
corrected for selected availability

5359000N RESIDUAL MAGNETIC CONTOURS

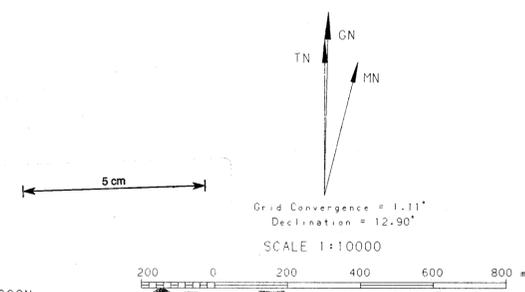
Grid notation refers to Australian Map Grid Zone 55
Magnetics : Diurnals removed, tie-line levelled
1990 model (updated for secular variation to March 1993) removed,
IGRF : datum 2000 nT added
Total Field : 62322 nT (at 415600S, 1452100E)
Inclination : 72.5 degrees S
Declination : 12.9 degrees E
Grid mesh size : 25 x 25 metres
Grid filter : None
Contour interval : 1, 10 and 100 nT

5358000N

5357000N

5356000N

5355000N



93-3501

JOB NO : 3-446
Surveyed by GEOTERREX PTY LTD : March 1993
Compiled by GEOTERREX PTY LTD, SYDNEY
Processed by GEOTERREX PTY LTD, SYDNEY 973169

PASMINCO EXPLORATION
OCEANA RL 8809
RESIDUAL MAGNETIC CONTOURS
BURNIE SK55-3
SHEET 1 OF 1

145°19'00"E

145°20'00"E

145°21'00"E

145°22'00"E

DRAWING NO: DATE : 12-MAY-1993

Figure 17