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95-3726 OF
PASMINCO EXPLORATION
BOCO EL 2/90
&
NORTH PINNACLES EL 8/90

RELINQUISHMENT REPORT
APRIL 1990 - APRIL 1995

Volume 1 of 2

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SUBMITTED BY:

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ACCEPTED BY:

M. G. Goffe

BURNIE
May 1995

95-3726

ELs 2/90 8/90 Nth Pinnacles
Relinquishment 2 vols

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1 SUMMARY

Exploration Licence 2/90 (Boco) of 55km² was granted to the Shell Company of Australia Limited on 20 April 1990 for a period of 10 years. The Shell Company of Australia were sole managers and operators of EL 2/90 from the date of inception until 12 October 1990 when a heads of agreement to form a joint venture with Pasminco Australia Limited was signed. The Joint Venture agreement between Pasminco and The Shell Company of Australia Limited was terminated during the licence year, resulting in EL 2/90 being fully owned and managed by Pasminco.

The Boco tenement covers an area of 55 km², excluding lands vested in the HEC, and 0.5km² of Mine Leases. Pasminco Exploration, as part of the Boco JV and independently, has explored this area for precious metal rich polymetallic massive sulphide deposits. The main focus of this intensive exploration program has been within the portion of EL 2/90 to be retained. Under current Department of Mines regulations the tenement is due for a 50% reduction in area by 8th May 1995. This report details all exploration completed within the 33 km² proposed for relinquishment.

Active exploration within the area to be relinquished has been restricted to the following work:

- 1 photogrammetry
- 2 compilation of drilling data
- 3 high resolution helicopter-borne magnetic and radiometric survey
- 4 semi-regional gravity survey and interpretation
- 5 regional geological mapping
- 6 grid based geological mapping, soil sampling, IP

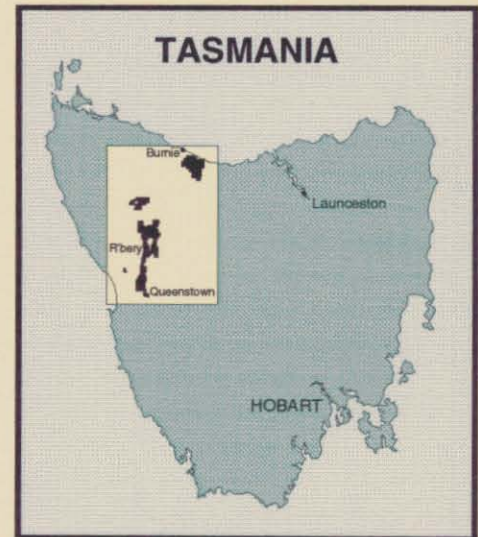
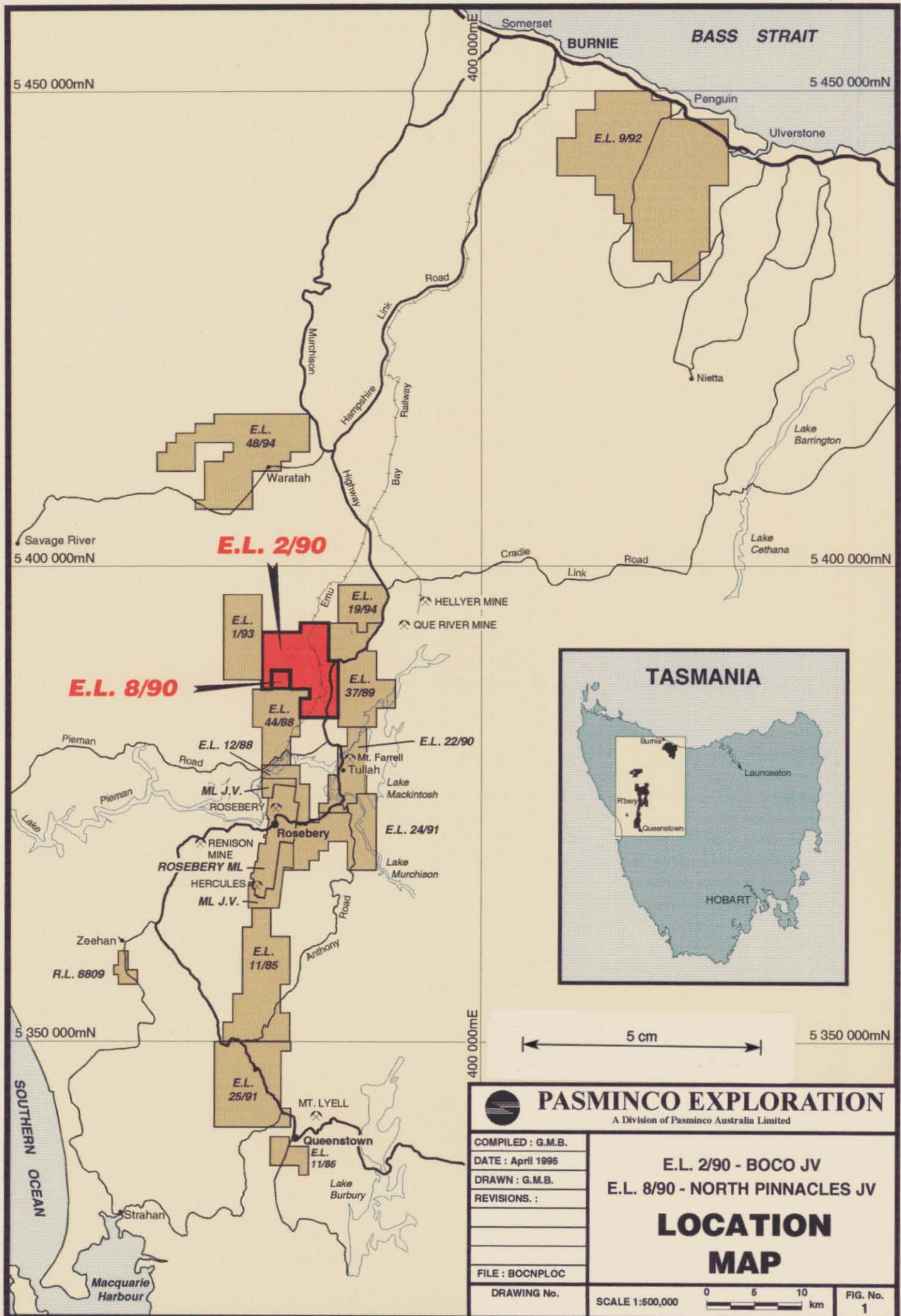
An evaluation of the results of these programs, including a detailed assessment of previous exploration data, has not identified any zones of potentially economic mineralization within a few hundred metres of the surface. These results are in accord with the distinct lack of old prospects within the area, despite its proximity to the Pinnacles workings.

The area of Block A (31 km²) is underlain by Dundas Group correlates, an interbedded sequence of siltstone, sandstone, conglomerate with minor intercalated rhyolite lava. This sedimentary sequence has been intruded by a number of quartz-feldspar porphyries. The area of Block B (2 km²) is underlain by massive dacite and rhyolite lavas.

2 INTRODUCTION

This report details all exploration completed during the period April 1990 to April 1995 within the area of EL 2/90 Boco, that is to be relinquished. The tenement is centred 17km NNE of Rosebery and 16km SW of the Hellyer Mine on Tasmania's West Coast (Figure 1). The licence covers 55km², with minor exclusions for land vested in the HEC, and mining leases. The area proposed for relinquishment on 8/6/1995, in compliance with Department of Mines regulations, is 33km², made up of two separate areas, Blocks A (31km²) and B (2km²).

The EL includes old workings at Boco Creek (Samuel Smith's Lode), with the Silver Falls lead workings occurring immediately outside the licences western boundary. Advanced exploration throughout the past 20 years, principally over the North Pinnacles, Silver Falls and Boco Siding prospects (Figure 4), has left a legacy of good access tracks and grid lines on the southern half of the licence, with access in the east and northeast via the Murchison Highway and Emu Bay Railway. The northwest corner of EL 2/90 can be accessed by Huskisson Drive and Olympic Road forestry roads.



PASMINCO EXPLORATION

A Division of Pasma Australia Limited

COMPILED : G.M.B.

DATE : April 1995

DRAWN : G.M.B.

REVISIONS :

FILE : BOCNPLOC

DRAWING No.

E.L. 2/90 - BOCO JV
E.L. 8/90 - NORTH PINNACLES JV

LOCATION MAP

SCALE 1:500,000

0 5 10 km

FIG. No.
1

3 TENURE

Exploration Licence 2/90 (Boco) of 55km² was granted to the Shell Company of Australia Limited on 20 April 1990 for a period of 10 years, renewable every 12 months. This followed Shell's successful tender through the Tasmanian Department of Mines tender system.

Billiton Australia (Billiton), the metals division of the Shell Company of Australia, were sole managers and operators of EL 2/90 from the date of inception until 12 October 1990 when a heads of agreement to form a joint venture between the Shell Company of Australia Limited and Pasminco Australia Limited (Pasminco) was signed. This Joint Venture applied to both EL 2/90 and EL 8/90 (North Pinnacles). The JV agreement allowed Pasminco to earn a 60% interest in the two licences by spending a combined total of \$500,000 over 4 years from the date of inception of the Joint Venture.

The Joint Venture agreement between Pasminco and the Shell Company of Australia Limited was terminated during the licence year. EL 2/90 and EL 8/90 are now fully owned and managed by Pasminco.

This report covers exploration activities on the area of the EL 2/90 to be relinquished, since licence inception. Partial relinquishment of EL 8/90 is not planned to take place this year, due to the licence being 4km² in size, and reduction of this would result in an unworkable exploration area.

EL 2/90 excludes lands vested in the HEC, and 0.5km² of Mine Leases. The remainder of EL 2/90 is Un-allocated Crown Land designated as Multiple Use Forest Land (Figure 2).

**AREA FOR
RELINQUISHMENT
BLOCK A**

HATFIELD

**BULGOBAC
FALLS**

**SILVER
FALLS**

**SAWMILL
CREEK**

**ANIMAL
CREEK**

**NORTH
PINNACLES**

**BOCO
SIDING**

**AREA FOR
RELINQUISHMENT
BLOCK B**



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FILE : 50_BNPR

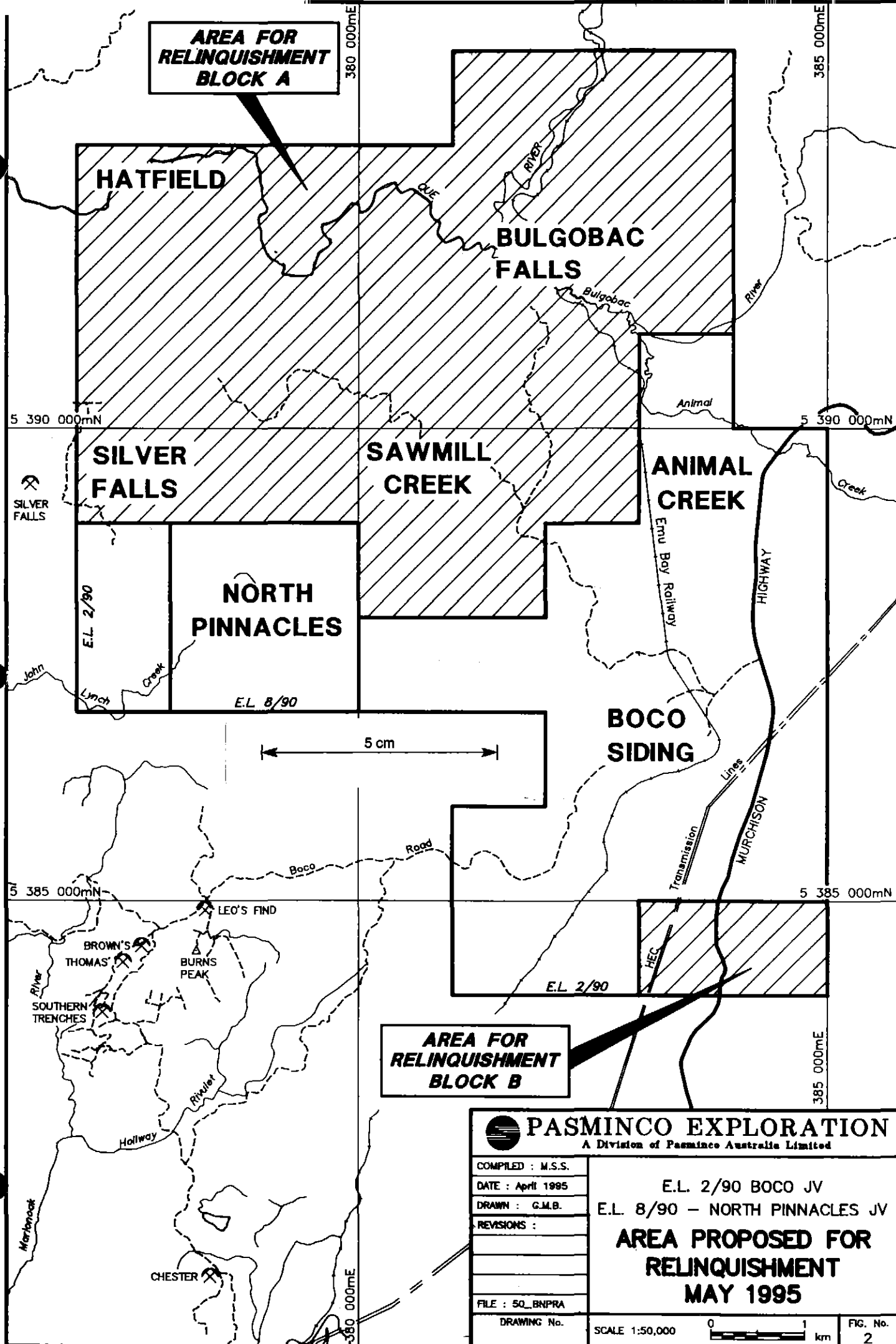
DRAWING No.

E.L. 2/90 BOCO JV
E.L. 8/90 - NORTH PINNACLES JV
**AREA PROPOSED FOR
RELINQUISHMENT
MAY 1995**

SCALE 1:50,000



FIG. No.
2



**AREA FOR
RELINQUISHMENT
BLOCK A**

801010

380 000mE

385 000mE

5 390 000mN

5 390 000mN

SILVER
FALLS

E.L. 8/90

5 cm

5 385 000mN

5 385 000mN

385 000mE

380 000mE

**AREA FOR
RELINQUISHMENT
BLOCK B**

KEY

-  HEC Vested Land — included in E.L.
-  Multiple Use Forest
-  Mine Lease

NOTE

Tenure is shown within E.L.'s only



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FILE : 50_BNLTR

DRAWING No.

E.L. 2/90 BOCO JV
E.L. 8/90 — NORTH PINNACLES JV

**LAND
TENURE**

SCALE 1:50,000

0 1 km

FIG. No.
3

4 EXPLORATION PHILOSOPHY

The principal exploration target within EL 2/90 is a precious metal-rich polymetallic massive sulphide deposit hosted by the Cambrian Mt Read Volcanics. The target is expected to have characteristics similar to the world class deposit at Rosebery or the small high grade deposits at the Pinnacles, which occur 15km and 2km south of the licence respectively. Lesser potential is also considered for mineralization of the Hellyer-style, hosted by intermediate to mafic volcanics.

The tenement abuts to the south Pasminco EL 44/88, and to the east Pasminco EL 37/89. The prospective sequences from both tenements extend into EL 2/90. Consequently EL 2/90 has potential for along strike continuation of mineralization located within these tenements.

5 REGIONAL GEOLOGY

Basement in western Tasmania is Precambrian in age, consisting predominantly of greenschist facies metasediments with minor basalts and dolerites. Higher grade amphibolite and eclogite facies also occur within the Precambrian (Turner, 1989). Basement is exposed west of the licence in the Huskisson River valley (Figure 3).

Cambrian volcanism and sedimentation developed on this continental crust, and can be subdivided into the Eo-Cambrian tholeiitic Crimson Creek Formation (CCF) and the Middle Cambrian Mt Read Volcanics (MRV).

The Boco tenement, EL 2/90, lies entirely within the MRV. The MRV are part of the Tasman Fold Belt of eastern Australia, and form a tract approximately 200km long and 20km wide on the western and northern margin of a Precambrian basement block known as the Tyennan region. The volcanic belt is comprised of an eastern zone of a stratigraphically and structurally complex series of massive felsic lavas and associated volcanoclastics, with common intrusives and a broader western zone of volcano-sedimentary sequences known variously as the Dundas Group, Yolande River Sequence and Mt Charter Group (Corbett, 1992). The relationship between different units is complicated by rapid facies variations, at least two phases of major deformation in the late Cambrian – early Ordovician and the Devonian, and by generally poor exposure.

Lower greenschist facies regional metamorphism and syn to post-kinematic granitoid intrusion accompanied the Devonian Tabberaberan Orogeny, which overprinted the earlier hydrothermal alteration and deformation features.

5 cm

801013



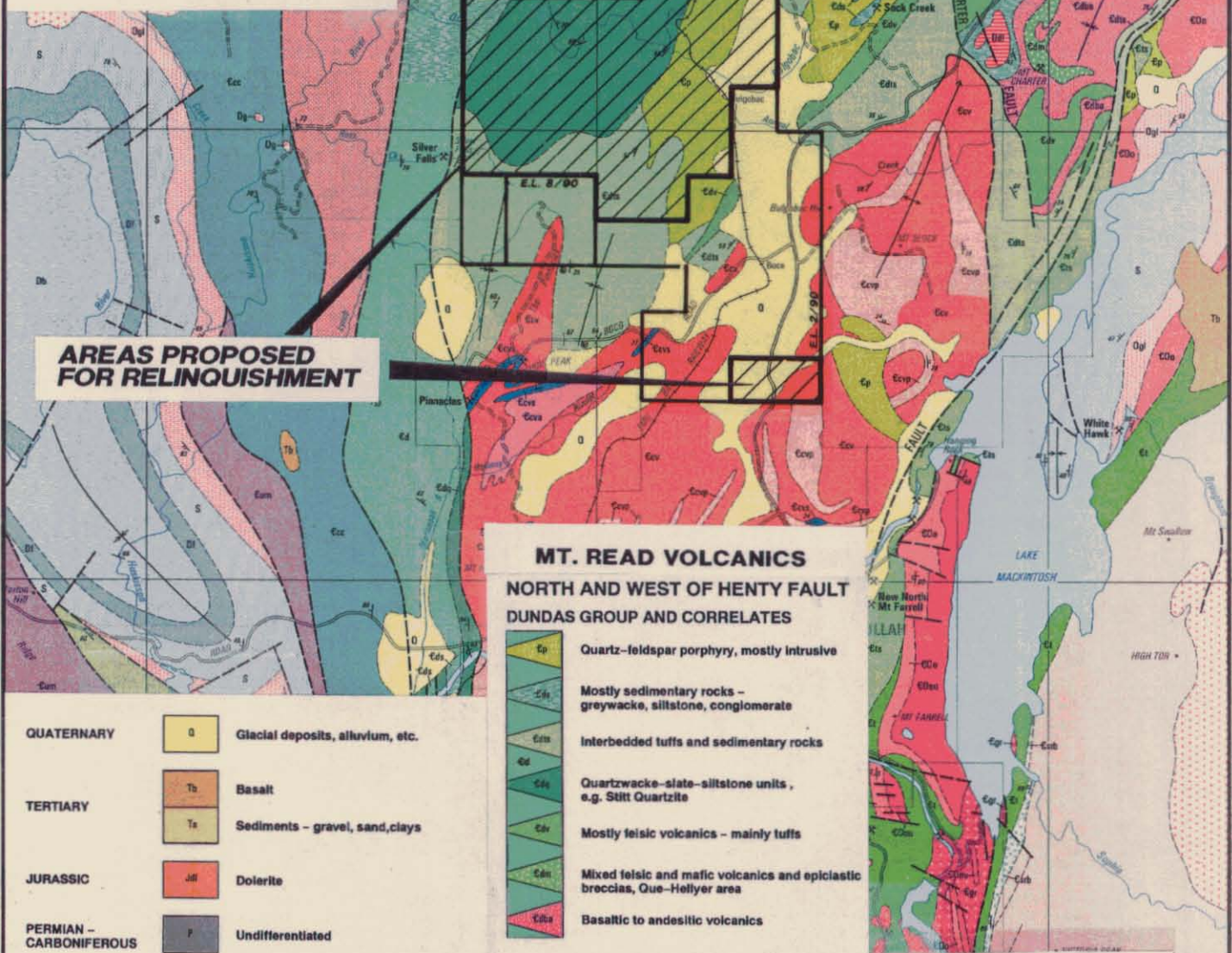
PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : P.G.R.
DATE : April 1995
DRAWN :
REVISIONS

FILE :
DRAWING No. SCALE 0 2 4 km FIG. No. 4

E.L. 2/90 - BOCO JV
E.L. 8/90 - NORTH PINNACLES JV
REGIONAL GEOLOGY
FROM MAP 6 OF THE
MT. READ VOLCANICS PROJECT

ACKNOWLEDGEMENT
Mt. Read Volcanics Project adopted from Map 6 - Geological Compilation Map of the Mt. Read Volcanics & Associated Rocks, from Hellyer to St. Darwin Peak.
K.D. Corbett B Sc (HON) PhD and
A.W. McNeill B Sc (HON) 1988.



AREAS PROPOSED FOR RELINQUISHMENT

MT. READ VOLCANICS
NORTH AND WEST OF HENTY FAULT
DUNDAS GROUP AND CORRELATES

- Quartz-feldspar porphyry, mostly intrusive
- Mostly sedimentary rocks - greywacke, siltstone, conglomerate
- Interbedded tuffs and sedimentary rocks
- Quartzwacke-slate-siltstone units, e.g. Stitt Quartzite
- Mostly felsic volcanics - mainly tuffs
- Mixed felsic and mafic volcanics and epiclastic breccias, Que-Hellyer area
- Basaltic to andesitic volcanics

- CENTRAL VOLCANIC COMPLEX**
- Mainly felsic porphyry - dacite, rhyolite, minor andesite (Ccv)
 - Felsic porphyry, mainly intrusive
 - Mainly pyroclastic rocks
 - Sedimentary rocks, mainly shale and sandstone
 - Andesitic volcanics

- SOUTH AND EAST OF HENTY FAULT**
TYNDALL GROUP AND CORRELATES
- Mainly sed. rocks, incl Farrell Slat
 - Mainly quartz-feldspar-phryic volcanic and volcanoclastic rocks (Ct)
 - Mainly volcanoclastic cong. and sandstone
 - Sticht Range Beds - sandstone, siltstone, siliciclastic conglomerate

- CAMBRIAN INTRUSIVE ROCKS**
- Granite
 - Felsic porphyry
 - Gabbro
 - Ultramafic rocks & serpentinite

- PRECAMBRIAN**
- Quartzite-slate sequences - correlates of Oonah Formation
 - Metamorphosed sequences of Tyennan Region. Major lithological boundary trends shown

- QUATERNARY**
 - Q Glacial deposits, alluvium, etc.
- TERTIARY**
 - Tb Basalt
 - Ts Sediments - gravel, sand, clays
- JURASSIC**
 - Jd Dolerite
- PERMIAN - CARBONIFEROUS**
 - P Undifferentiated
- DEVONIAN**
 - Dd Dolerite
 - Dg Granite
- DEVONIAN - SILURIAN**
 - Db Bell Shale
 - Df Florence Sandstone
 - S Silurian
- ORDOVICIAN**
 - Og GORDON GROUP limestone
- EARLY ORDOVICIAN - LATE CAMBRIAN**
 - OOnu Upper sandstone sequence including Pioneer Beds (COou)
 - OCo Undifferentiated conglomerate and sandstone (COo)
 - ONC Newton Creek Sandstone (COon) - interbedded sandstone siltstone and conglomerate with marine fossils

6 PREVIOUS EXPLORATION

The current area of EL 2/90 has been extensively prospected and explored since late last century, especially following the discovery of the Rosebery deposit in 1893. Old workings within the licence are limited to Samuel Smiths Lode within the Boco Creek, however the Silver Falls lead workings lie immediately west of the licence boundary.

The area now covered by Boco EL 2/90 has been subject to a moderate amount of modern exploration activity, and has been under licence since 1963. Exploration has been carried out by:

Comstaff	1963–1972
EZ Co. (EL12/72)	1972–1985
CSR Ltd. (EL12/72)	1985–1986
Pancon. Mining (EL12/72)	1985–1987
Samisen Ltd (EL17/88)	1988–1989
Shell Co. Aust. (EL2/90)	1990–1990
Pasminco Aust. Ltd (EL2/90)	1990–1995

A wide range of geological, geochemical and geophysical techniques, plus drilling, has been applied to exploration in the area of the licence, as summarised in table 1.

Table 1 Previous Exploration on EL 2/90

COMPANY	PERIOD	AREA	ACTIVITY
COMSTAFF	1963-1972	Regional	Stream sediment sampling 2 lines IP at Boco
EZ Co.	1972-1976	Regional	Mapping Aeromagnetics INPUT EM
EZ Co.	1976-1979	Boco	Airborne EM Gradient Array IP Ground Magnetics Soil sampling 3DDH DIPOLE-DIPOLE IP
EZ Co.	1976-1979	Silver Falls & North Pinnacles	3DDH Stream sediment sampling
EZ Co.	1979-1984	Boco	Geophysics review Soil sampling DIPOLE-DIPOLE IP Mapping Percussion Drilling 8DDH UTEM DH SIROTEM
CSR	1985	Boco	Mapping Alteration study 3DDH
PANCON.	1986-1987	Boco	UTEM
SAMISEN	1988-1989	Boco	RRM IP Gravity test
BILLITON	1990	Boco	Lithogeochemistry

7 EXPLORATION COMPLETED April 1990 – April 1995

Most of the active exploration undertaken since the inception of EL 2/90 has been within the area to be retained after May 1995. Work completed on the relinquished blocks has involved a combination of semi-regional programs as part of larger coverage surveys, and local grid based exploration.

Billiton carried out minor exploration within the relinquished area. A review of data and lithogeochemical study was completed, predominantly over the Boco Alteration Zone. Work undertaken by Pasminco since establishment of the Boco JV within the relinquished blocks has included:

- 1 photogrammetry
- 2 compilation of drilling data
- 3 high resolution helicopter-borne magnetic and radiometric survey
- 4 semi-regional gravity survey and interpretation
- 5 regional geological mapping
- 6 grid based geological mapping, soil sampling, IP

7.1 Photogrammetry

The entire tenement was flown for new aerial photography in January 1991. The work was done as part of a contract between Pasminco and HEC Enterprises, for the latter to produce an up to date set of computer generated topographic base plans for the greater Rosebery area. The survey was flown in north-south orientated lines.

Resultant photographs were received in colour at 1:10,000. The survey was used by the HEC to produce topographic plans of the tenement at 1:10,000, 1:5,000, and 1:2,500 scale. These plans were acquired by Pasminco in digital form.

7.2 Geology

Mapping of the area proposed for relinquishment was of a regional nature only, except for the Silver Falls area, where grid based mapping has been completed. This work has confirmed and extended the interpretations of previous geologists (see Figure 4).

The area of Block A is dominated by a sequence of fine grained to coarse grained MRV and Precambrian/Eo-Cambrian basement derived sedimentary rocks. Minor coherent felsic volcanics occur within the sequence. This sequence is a correlative of the Dundas Group (Figure 4), and includes the following:

Southwell Subgroup:	siltstone, sandstone, conglomerate and minor felsic volcanics.
Lynchford Tuff:	volcaniclastic sandstone, mafic to intermediate clasts, pelitic metamorphics, and ultramafics.
White Spur Formation:	grey to dark grey siltstones and sandstones with mass debris flows derived from felsic volcanics; basal unit is distinctive quartz crystal rich sandstone.
Pinnacles Rhyolite:	feldspar-quartz phyric rhyolite lava and lava breccia.
Stitt Quartzite:	quartz muscovite sandstone, siltstone and quartzose conglomerate.
Wescott Argillite:	mid brown thickly bedded siltstone, greywacke and conglomerate.

The northeastern section of Block A is dominated by the extensive Sock Creek quartz-feldspar porphyry.

The area of Block B has received no exploration attention during the duration of EL 2/90. This zone is underlain by massive feldspar phyric dacite and rhyolite lava and lava derived volcaniclastics of the Central Volcanic Complex (Corbett, 1992). Glacial cover is extensive in this region.

7.3 Aeromagnetics and Radiometrics

A high resolution helicopter borne aeromagnetic and radiometric survey was flown by Geoinstruments during February of 1991, covering all of EL 2/90. East-west flight lines were at 100m spacing, north-south tie lines every 1000m, nominal terrain clearance of 80m, with sample intervals less than 10m at a <0.1nT magnetometer sensitivity. Data was provided as filtered and corrected contour plans by Geoinstruments. The Department of Mines was employed to produce a drape at 120m terrain clearance and upward continuation of the data to 1300m above sea level (Figure 5). All relevant maps and location plans for this data set have been lodged with the Department of Mines (Kirsner, 1992).

An acquisition report and preliminary interpretation of data was provided by Leaman in Kirsner, 1992. Key conclusions to come from Leamans preliminary interpretation are as follows:

1. a large circular anomaly occurs within the centre of the survey area. Modelling suggests the source is deep and of high magnetic contrast.
2. the exposed sedimentary units of the Dundas Group have variable magnetic character.
3. distinct geological regimes are suggested by magnetic data, evidenced by primary structural or stratigraphic displacement. One key boundary can be correlated with the NW edge of the MRV.
4. data indicates that the Dundas Group extends below the MRV in the licence area.
5. repetition of lithologies within the volcanic sequence is common, and may be either structural or stratigraphic.

Further interpretation by Leaman covering specific areas has been completed and reported.

7.4 Gravity Surveys

The two blocks to be relinquished within EL 2/90 have been covered by gravimetric surveys as part of a program of gravity infill over areas of interest. All work has been undertaken by Dr RG Richardson of the Department of Mines, under contract to Pasminco Exploration during 1991 and 1993 (Figure 10 & 11). The surveys were carried out along existing access, including tracks and gridlines. Terrain correction and data reduction has been undertaken by the Department of Mines and Leaman Geophysics. The residual Bouguer Anomalies have been derived from corrected data.

Dr DE Leaman was contracted during 1993 to interpret the results of all the available gravity data, in conjunction with existing magnetic, petrophysical and geological databases, to help develop a sub-surface structural model of the region. Key conclusions to come from this study are:

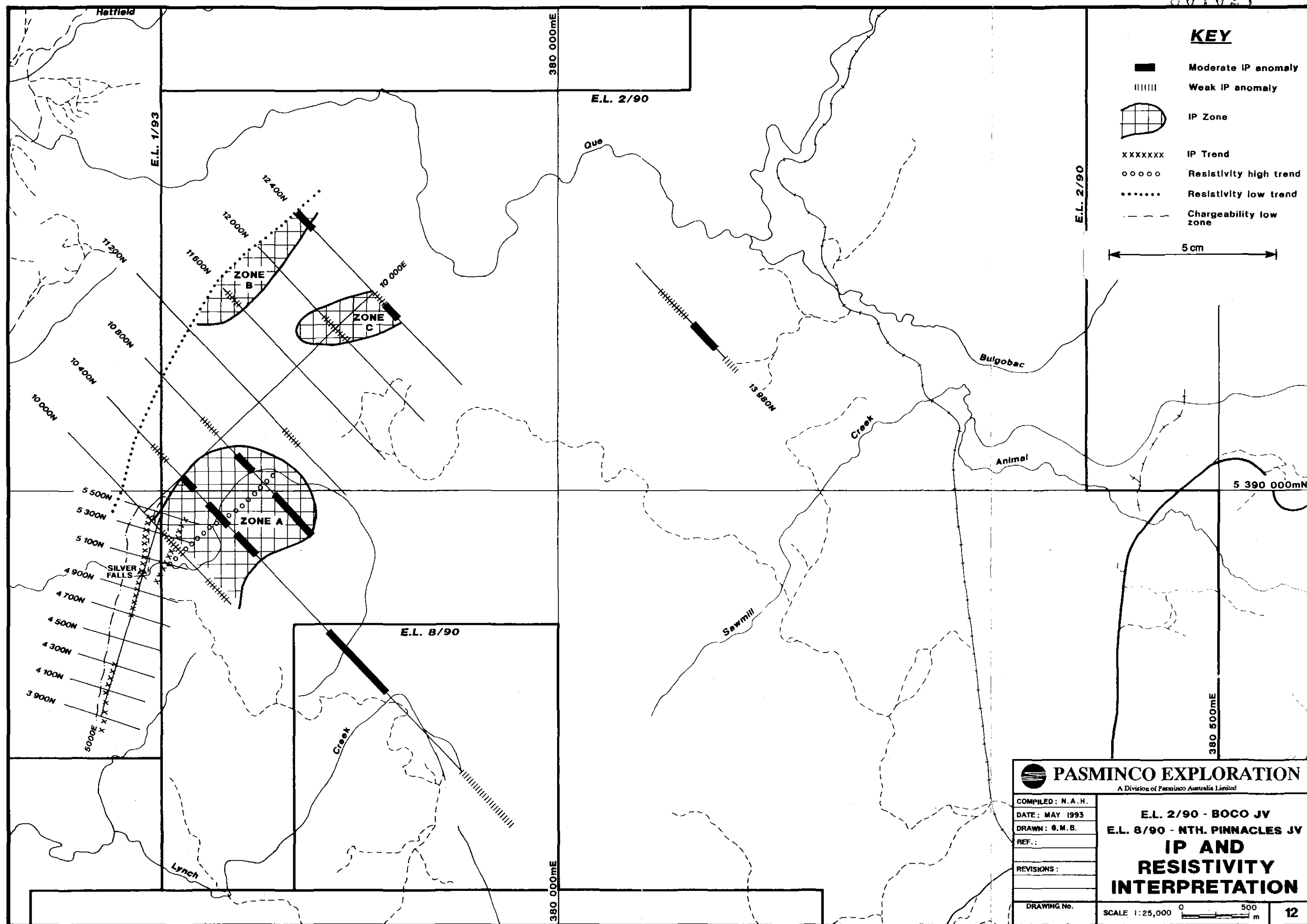
1. a major NE–SW structure trends across the Burns–Pinnacles Ridge.
2. this ridge is parallel to and immediately east of a primary change in basement composition.
3. the major NE–SW structure is a deep sediment filled rift.
4. a continuous layer of ultramafics sits at depth within the rift.
5. the SE margin of the rift is concealed by later thrusting but is an important mineralizing structure.

7.5 IP Survey, Silver Falls Grid

A pole-dipole induced polarisation and resistivity survey was conducted over the Silver Falls grid during 1993. The program was contracted to Scintrex Ltd of Perth, using an IPR12, Time Domain receiver and a TSQ3, Time Domain Square Wave Generator. The dipole-dipole separation was 100m, and 6 dipole separations recorded at each station.

Results were interpreted by Neil Hughes in conjunction with existing data, and summarised as figure 12. Three zones of interest are detailed below, as indicated on figure 12:

- Zone A:** on the main Boco grid there is an increase in chargeability to the southwest, east of the baseline and south of line 11200N, with the best responses on lines 10400N and 10800N at 10600E to 10800E, with amplitudes of 14 mV/V for channel 10. This zone appears to correlate to the zone of increased chargeability mapped on the Aberfoyle grid. The fact that the zone is not associated with the Pinnacles Rhyolite indicates that the source of the anomalism may be related to NW and NE faulting as indicated by mapping and aeromagnetics.
- Zone B:** defined across three lines with the strongest response on line 12400N, amplitude 11 mV/V. This zone appears to be entirely within the Stitt Quartzite although it may mark the boundary with the Southwell Subgroup.
- Zone C:** interpreted on two lines, with the strongest response on line 12400N, amplitude 11mV/V, and appears to be associated with a subtle magnetic high trend.



PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED: N.A.H.

DATE: MAY 1993

DRAWN: G.M.B.

REF.:

REVISIONS:

DRAWING No.

E.L. 2/90 - BOCO JV
E.L. 8/90 - NTH. PINNACLES JV
IP AND
RESISTIVITY
INTERPRETATION

SCALE 1:25,000 0 500 m

7.6 Soil Geochemistry, Silver Falls Grid

470 B/C soil samples were collected on the Silver Falls grid during 1993. The survey covered the extensions of the Silver Falls soil anomaly defined by Aberfoyle (Taylor, 1979) and EZ (Mollison, 1980). Sample locations and proportional plots of Pb and Zn are shown on figures 13–18. Maximum values for elements were 7 ppm Cu, 1178 ppm Pb, 391 ppm Zn, 1.19% Mn, and 100 ppm As.

Two anomalous areas have been defined by the soil geochemistry, a NNE continuation of the Silver Falls prospect and an area centred on 5391000N 378300E. Both anomalies had previously been located by Aberfoyle and EZ. The anomaly at Silver Falls has a strike length of 600m, and is associated with galena–sphalerite–quartz–carbonate veining in carbonatised and sericitised felsic volcanics in the Hangingwall of the Rosebery Fault. No evidence of mineralization has been located associated with the soil anomaly at 5 391 000N, 378 300E.

8 ENVIRONMENTAL DISTURBANCE AND REHABILITATION

Field activities associated with the exploration undertaken within the two blocks of EL 2/90 to be relinquished that have impacted on the natural environment have been very limited.

An extensive network of grid lines exist within EL 2/90, a legacy of previous exploration. These gridlines have been recleared as required, and new lines cut, to allow access for mapping and gravity surveying.

The existing Silver Falls track was used as access for diamond drilling by Pasminco Exploration on neighbouring EL 1/93. This track was returned to original condition after rig demobilization.

No rehabilitation is necessary or planned within either of the two areas to be relinquished.

9 CONCLUSIONS

The results from the semi-regional and grid-based exploration within the two blocks proposed for relinquishment from EL 2/90 do not indicate the likely occurrence of economic massive sulphide mineralisation within a few hundred metres of the surface.

The area of Block A is underlain by Dundas Group, correlates an interbedded sequence of siltstone, sandstone, and conglomerate with intercalated rhyolite lava. This sedimentary sequence has been intruded by a number of quartz-feldspar porphyries, including the extensive Sock Creek porphyry. Prospects are scarce from this areas, confirming the low prospectivity for polymetallic massive sulphide deposits.

The area of Block B is underlain by massive feldspar phyric dacite and rhyolite lavas, with common glacial cover. No mineralisation is known from this area.

10 KEYWORDS AND LOCATION

BASEMETAL, GOLD, CONGLOMERATE, VOLCANICS, FAULT, VEINS, CAMBRIAN, DATA REVIEW, GEOCHEM, SOIL, GEOL MAPPING, REGIONAL, GEOPHYS, GRAVITY, MAGNETICS, GEOPHYS, IP.

BURNIE SK5503 BOCO, NORTH PINNACLES, SILVER FALLS, BURNS PEAK, ROSEBERY.

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APPENDICES

APPENDIX 1

SCHEDULE OF AREA RELINQUISHED - EL 2/90 APRIL 1995

SCHEDULE OF AREA RELINQUISHED – EL 2/90 APRIL 1995**BLOCK A (31km²)**

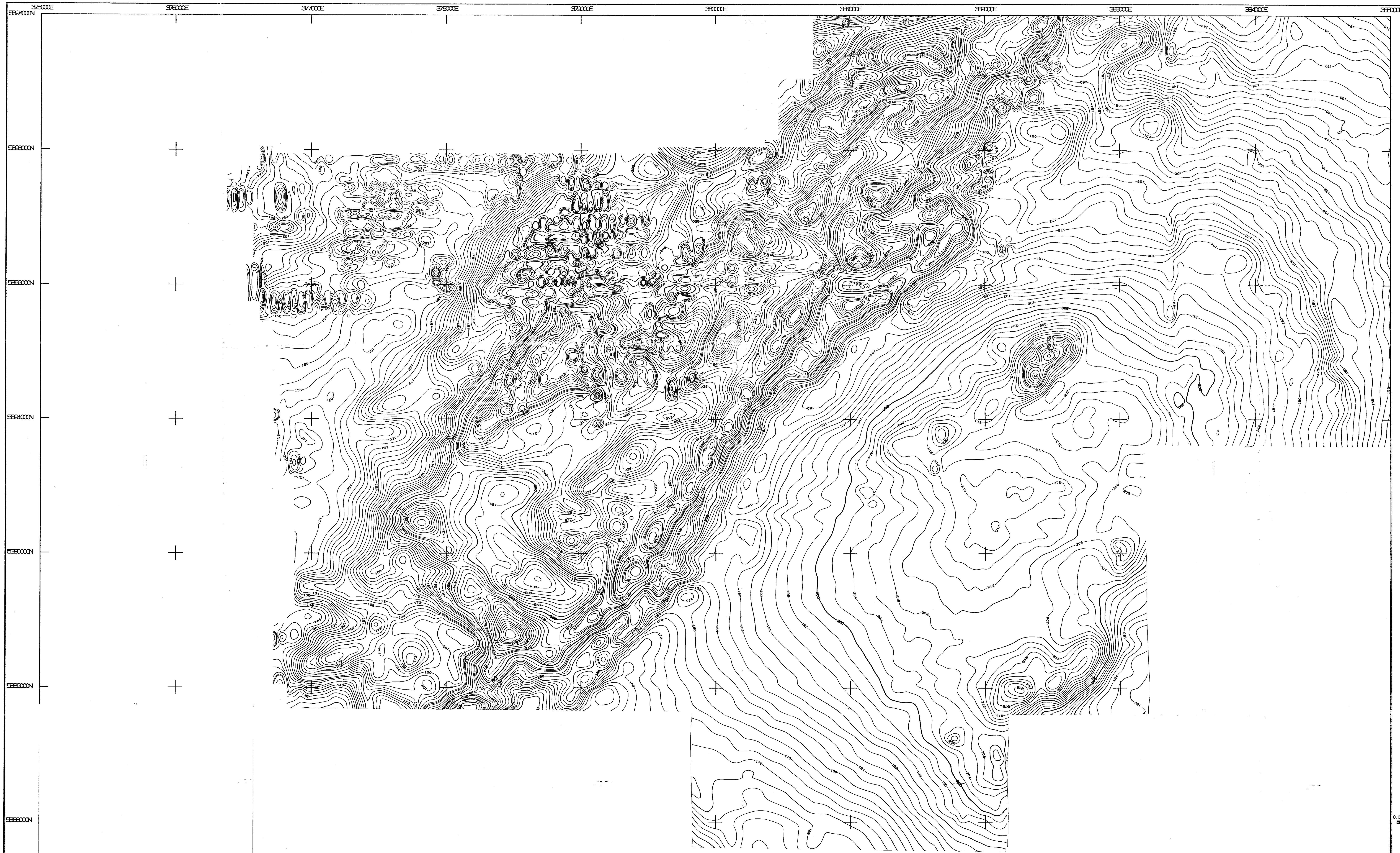
Commencing at the north east corner of the area whose grid coordinates are:

384 000 metres E, 5 394 000 metres N, thence grid south to 5 391 000 metres N, grid west to 383 000 metres E, grid south to 5 389 000 metres N, grid west to 382 000 metres E, grid south to 5 388 000 metres N, grid west to 380 000 metres E, grid north to 5 389 000 metres N, grid west to 377 000 metres E, grid north to 5 393 000 metres N, grid east to 381 000 metres E, grid north to 5 394 000, thence grid east to the point of commencement.

BLOCK B (2km²)

Commencing at the north east corner of the area whose grid coordinates are:

385 000 metres E, 5 385 000 metres N, thence south to 5 384 000metres N, west to 383 000 metres E, north to 5 385 000 metres N, thence grid east to the point of commencement.



0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 km
SCALE 1:10000

5 cm

95-3726

PASMINCO EXPLORATION
WEST TAS TENDMENTS
RESIDUAL MAGNETICS
Contour Interval 2 nT
Terrain Clearance - 120m
SHEET **3**
Processed The Division of Mines & Mineral Resources
August 2001

801031

LEGEND

1. General Form
Colour, grain size, overall texture, Rock Type, constituents & textures, alteration, mineralisation. Descriptors and Rock Types to be separated by comma or slash. Derwent series 19 colours (in brackets) are intended for the Cambrian sequences.

2. Rock Types
Lavas L (a) acid (b) intermediate (c) basaltic (d) rhyolitic (e) andesitic

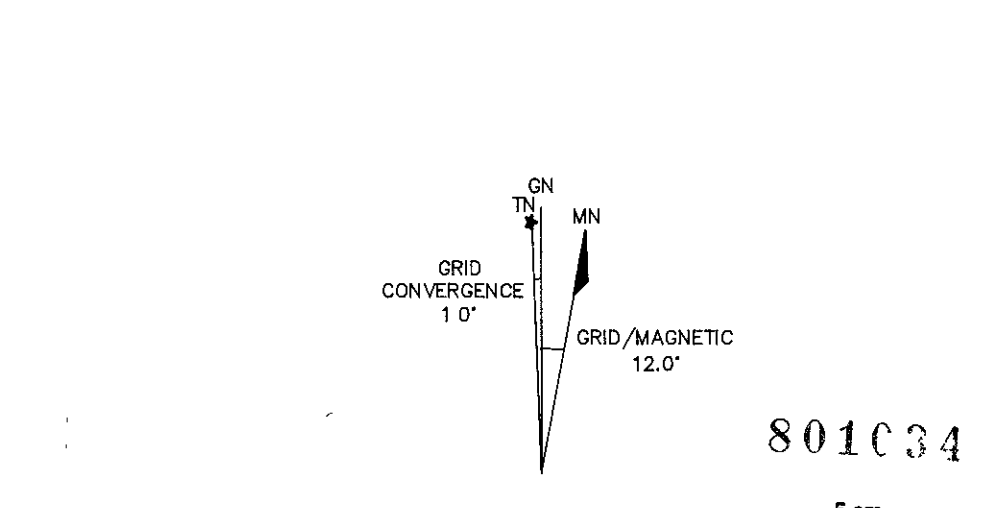
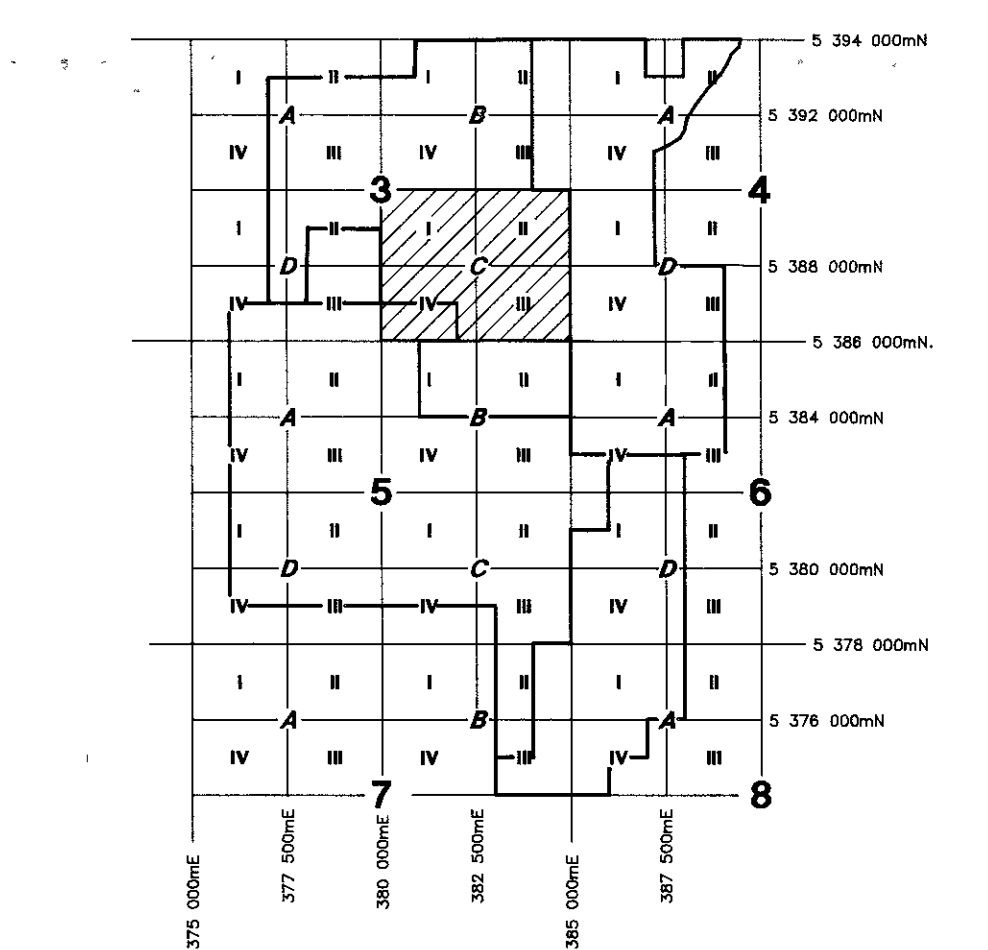
Intrusives I (a) acid (b) intermediate (c) basic (d) felsic (e) porphyritic (f) granitic (g) pegmatitic

Volcaniclastics V (a) pumiceous mass flow (b) quartz phytic mass flow (c) sandstone (d) graded crystal lithic

Sediments S (a) shale (b) slate incl. black slate (c) siltstone (d) sandstone (e) turbidite (f) wacke (g) conglomerate (h) breccia (i) chert (j) limestone (k) dolomite (l) quartzite (m) iron formation (n) glacial deposits (o) fluvioglacial deposits (p) alluvial deposits (q) mudstone

Metamorphic Rocks M (a) schist (b) semi-pelite (c) psammite (d) amphibolite (e) granulite (f) skarn (g) marble (h) mylonite

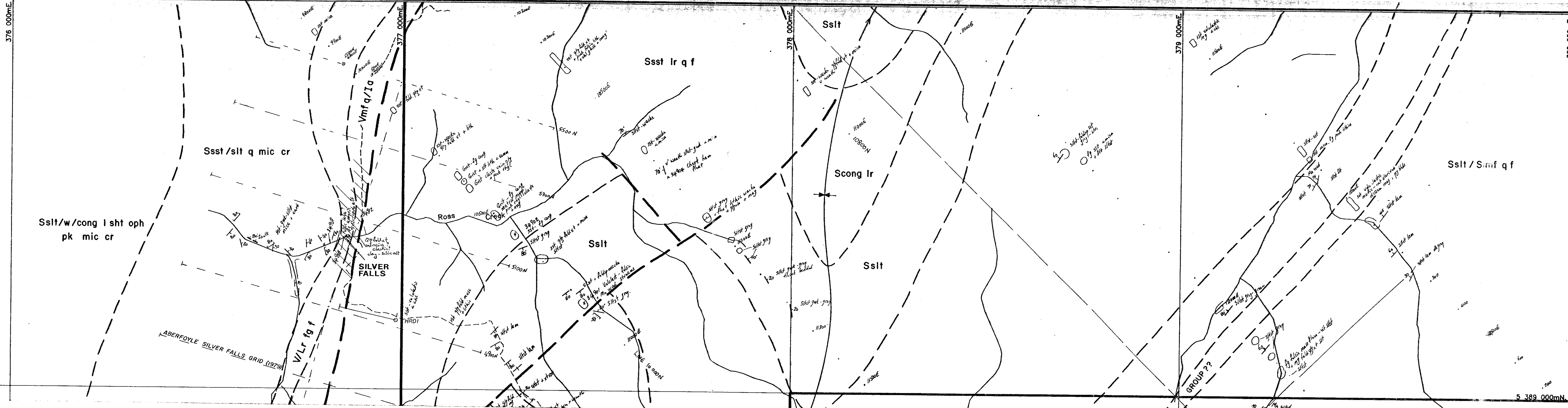
3. Mapping Symbols
Unassigned (a) Use done or as a qualifier to other rock types where uncertain.



PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : R.A.P.
DATE : April, 1993
DRAWN : G.M.B.
REFERENCE :
REVISIONS :
DRAWING No. SHEET 3C
SCALE 1:5000
FIG. No. 8

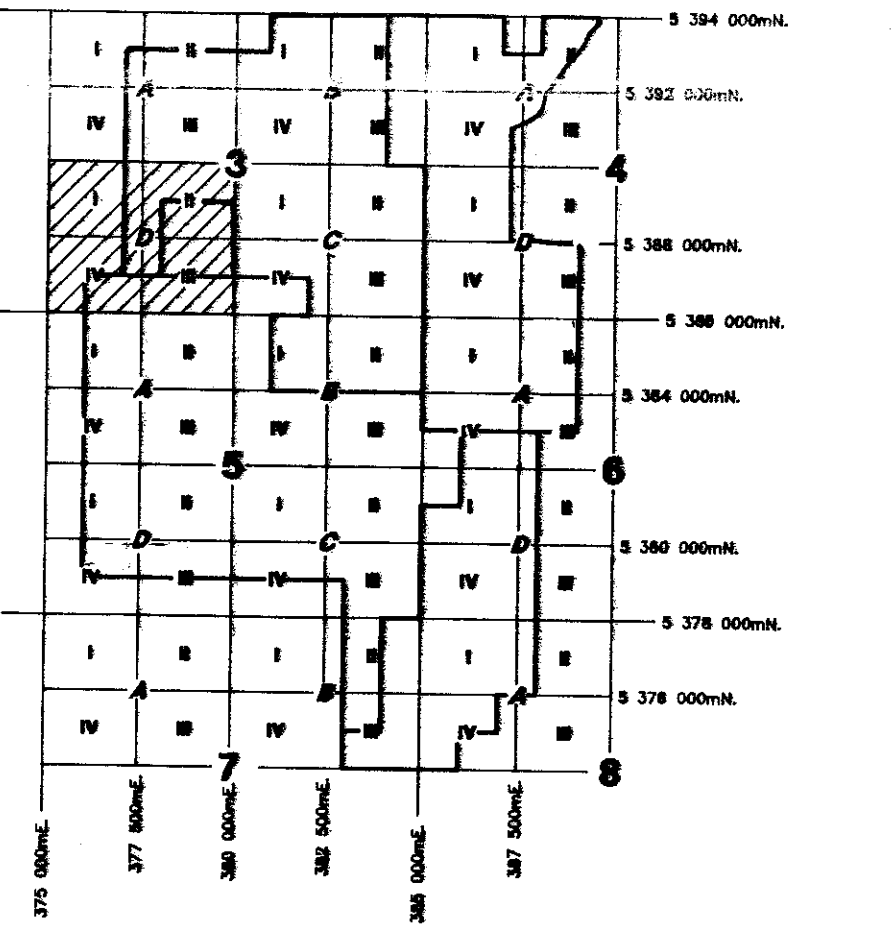
E.L. 2/90 - BOCO JV
OUTCROP GEOLOGY AND ROCK SAMPLE LOCATIONS



LEGEND

1. General Form
Colour, grain size, overall texture, Rock Type, constituents & textures, alteration, mineralisation.
Descriptors and Rock Types to be separated by comma or slash. Darwent series 19 colours (in brackets) are intended for the Cambrian sequences.
2. Rock Types
Lavas L
Intrusives I
Volcaniclastics V
Sediments S
Metamorphic Rocks M
3. Descriptors
Colour:
Grain size:
Overall texture:
Constituents & internal textures:
Alteration:
Mineralisation:

3. Mapping Symbols
Unassigned
Strike and Dip of Strata
Strike and Dip of Inverted Strata
Strike and Dip of cleavage or foliation
Plunge of lineation
Geological boundary position accurate
Geological boundary position approximate
Mine
Abandoned prospect of mine
Crestline or trench
Diamond drill hole, including projection
I.P. Anomaly
Magnetic/Gravity/TM Lineaments
Magnetic Trend Line



95-3726

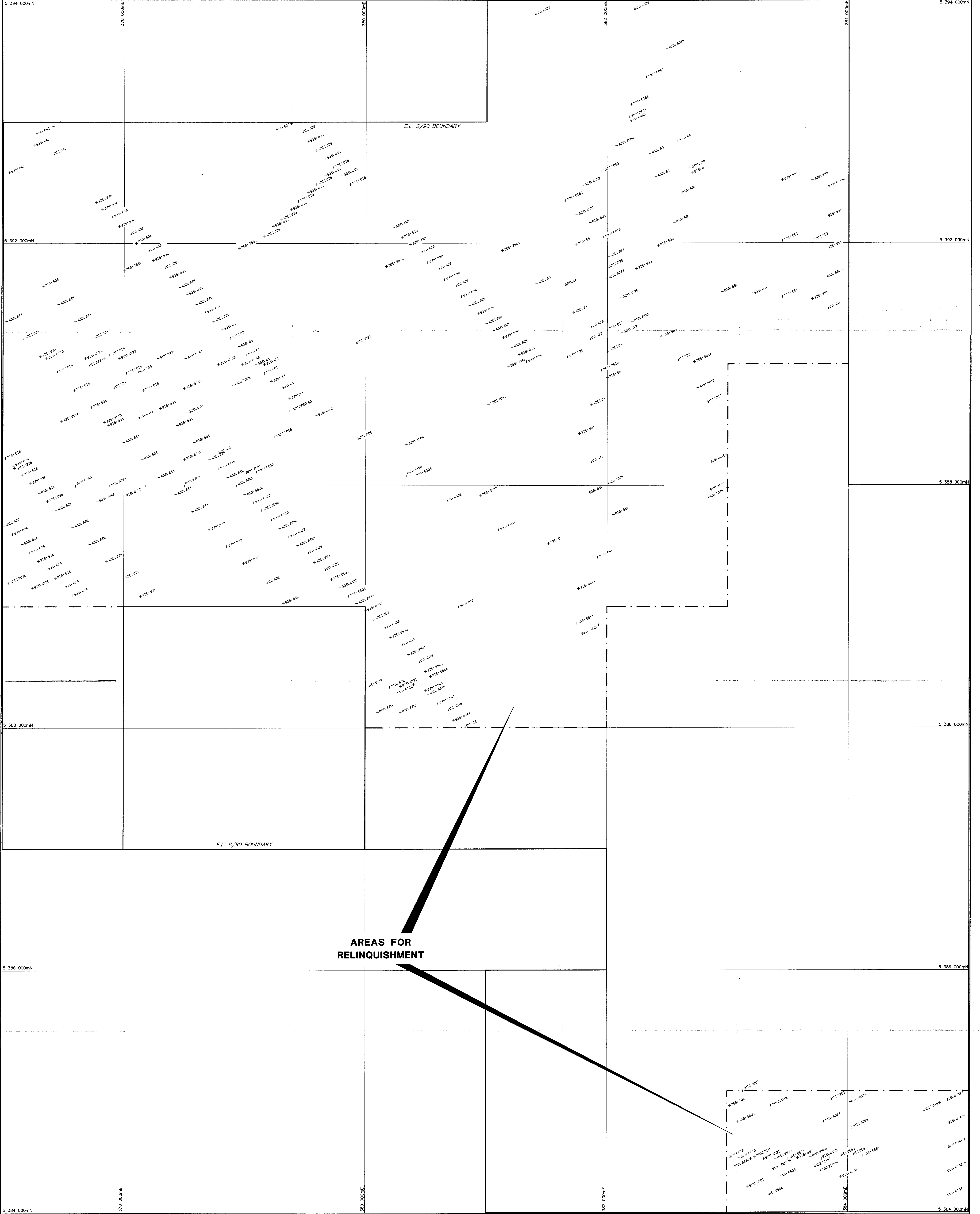
PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED: R.A.P.
DATE: April, 1993
DRAWN: G.M.B.
REFERENCE:
REVISIONS:

SCALE 1:5000
SHEET 3D

801035

8/90 - BOCO JV
8/90 - NORTH PINNACLES JV
**OUTCROP GEOLOGY,
INTERPRETIVE
GEOLOGY AND ROCK
SAMPLE LOCATIONS**



AREAS FOR
RELINQUISHMENT

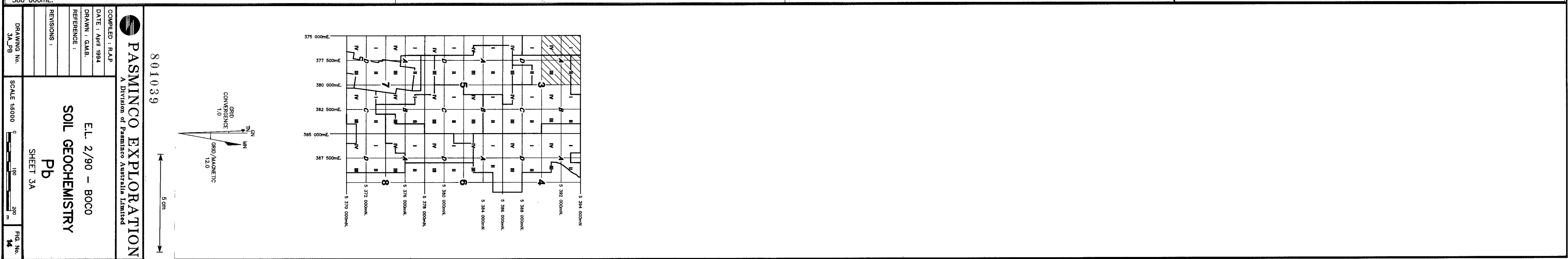
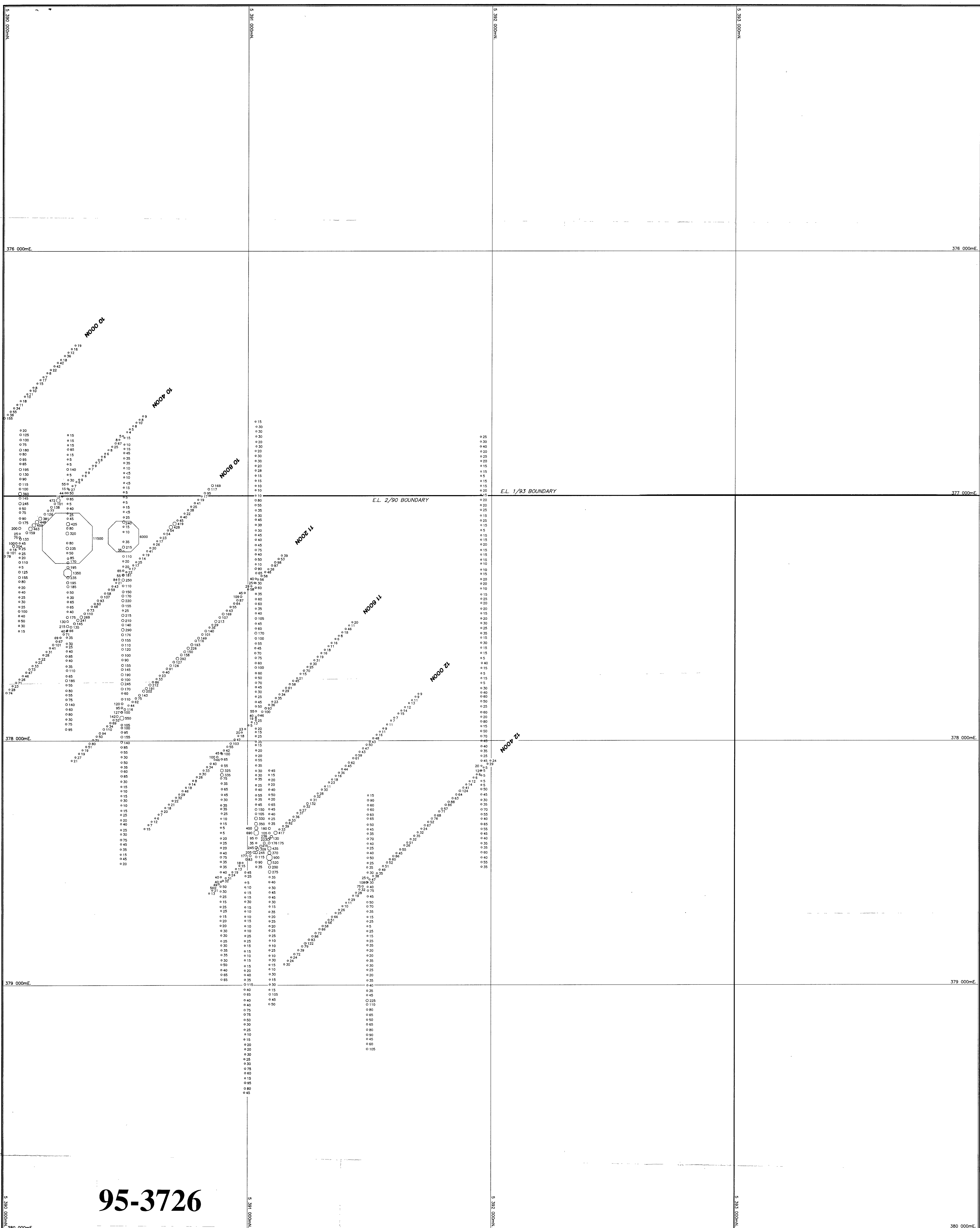
95-3726

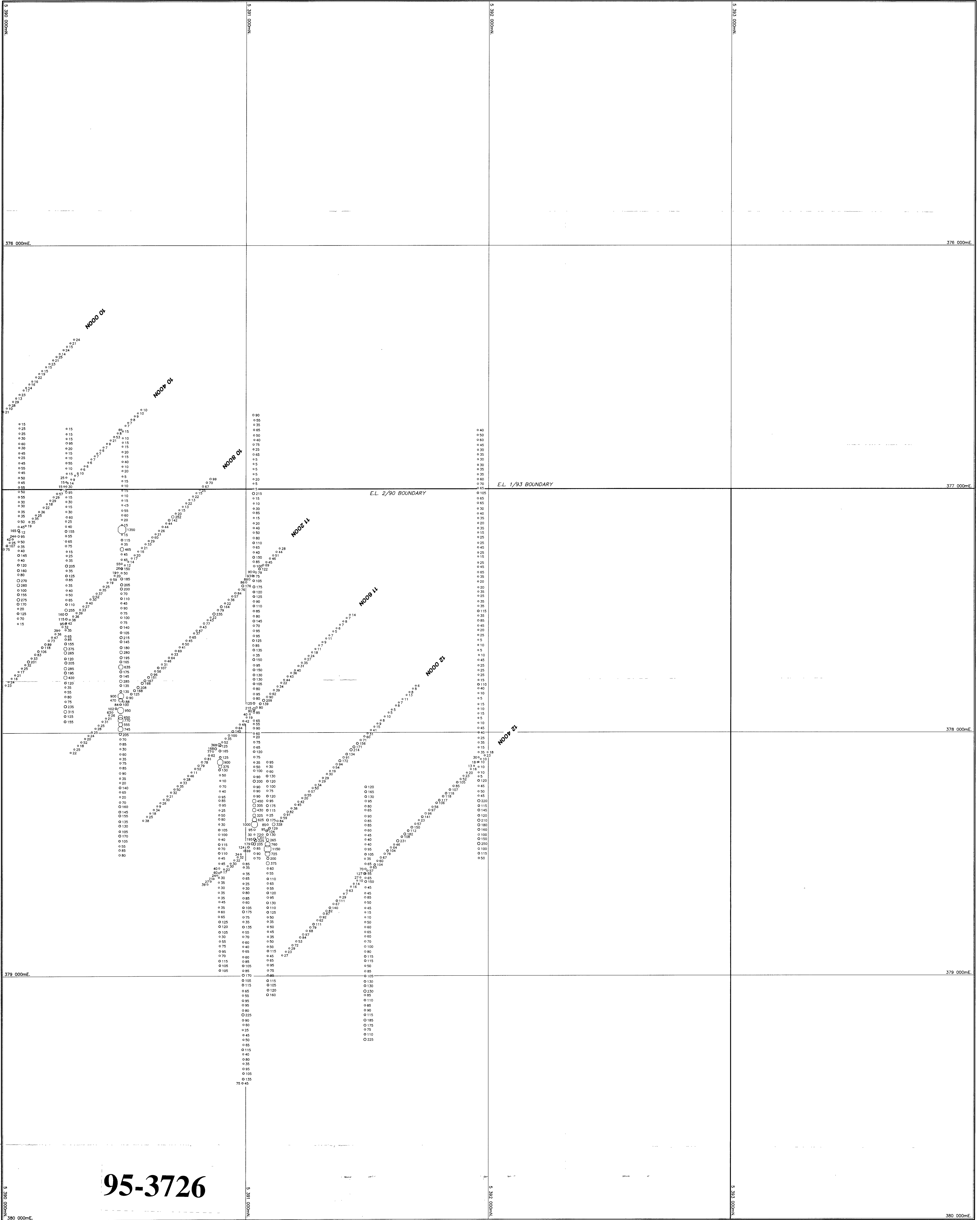
PASMINCO EXPLORATION A Division of Pasminco Australia Limited	
COMPILED : M.S.S.	E.L. 2/90 - BOCC E.L. 8/90 - NORTH PINNACLES GRAVITY SURVEY STATION LOCATIONS
DATE : May 1995	
DRAWN : G.M.B.	
REVISIONS :	
FILE : 10_GSSL	FIG. No. 10
DRAWING No.	

80103C

5 cm

SCALE 1:10,000





95-3726

COMPUTED: R.A.P.

DATE: APR 1994

DRAWN: L.O.B.

REFERENCE: 1

REVISIONS: 1

DRAWING No. 34.2N

SCALE: 1:5000

SHEET 3A

FIG. No. 15

801040

5.0m

COMPARISON

1:0

PRO. MACHINIC

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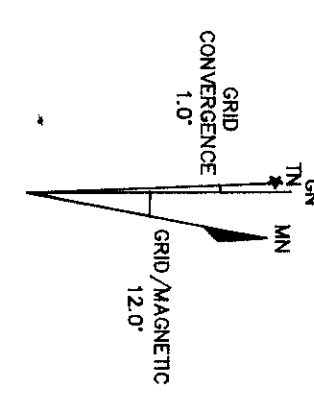
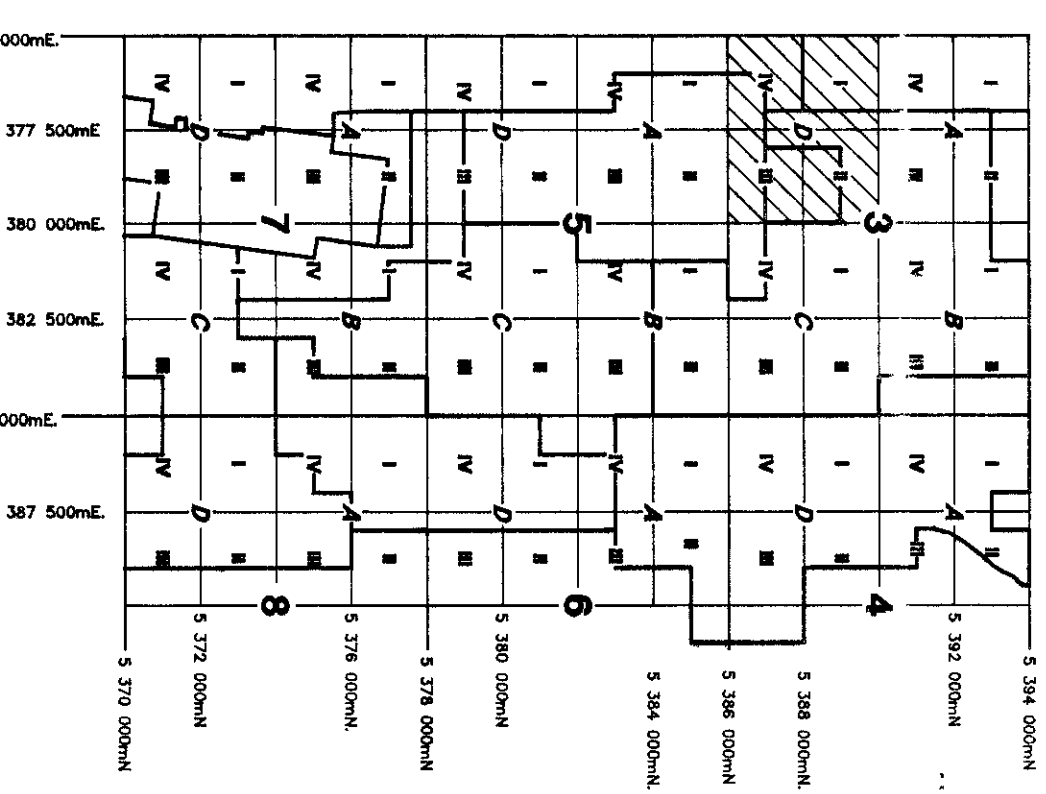
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1927 000mE

1929 000mE

1931 000mE

1933 000mE



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COMPILED : R.A.P.	
DATE : April 1994	CI 0/00 0000

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REFERENCE :	E.L. 8/90 - NORTH PINNACLE

SOIL GEOCHEMISTRY

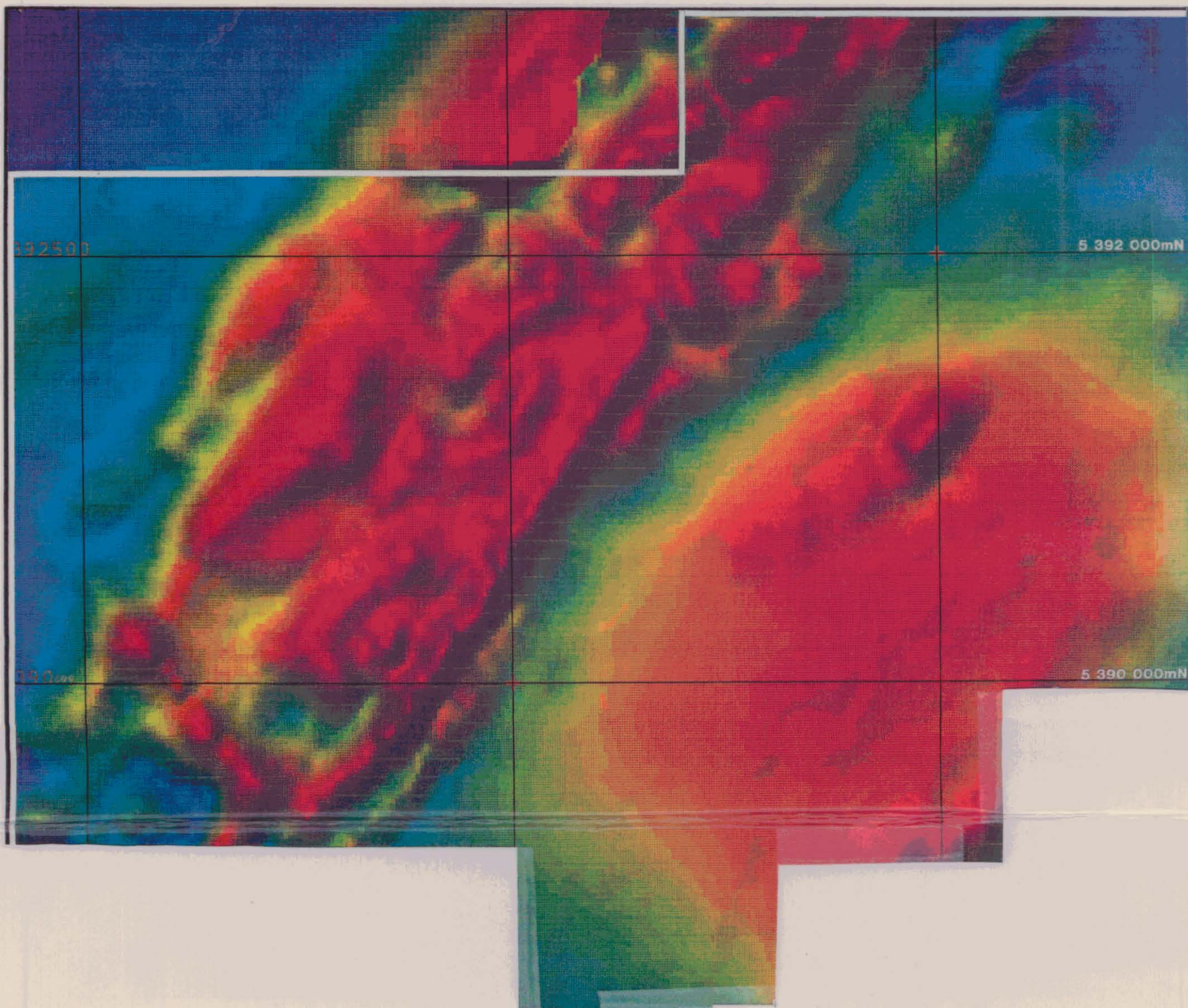
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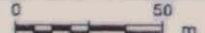
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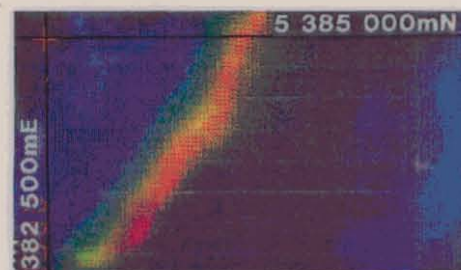
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 PASMINCO EXPLORATION A Division of Pasminco Australia Limited		
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DATE : April, 1993		
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Fig 19





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PASMINCO EXPLORATION

BOCO EL 2/90

&

NORTH PINNACLES EL 8/90

RELINQUISHMENT REPORT

APRIL 1990 - APRIL 1995

Volume 1 of 2

AUTHOR: MS Saxon

DATE: April 1995

REPORT No.: T95-2

SUBMITTED TO: Regional Exploration Manager - Tasmania

DISTRIBUTION: Tasmania Development & Resources Industry Safety & Mines Division - Hobart

Pasminco Exploration - Burnie
- Melbourne

SUBMITTED BY:

Mark Saxon

ACCEPTED BY:

M. Saxon

BURNIE
May 1995

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EL8/90	SEE FOLIO 86	91
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DATE		

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**ELs 2/90 8/90 Nth Pinnacles
Relinquishment 2 vols**

PASMINCO EXPLORATION
BOCO EL 2/90
&
NORTH PINNACLES EL 8/90

RELINQUISHMENT REPORT
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Volume 2 of 2

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Mark Saxon

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M. G. [Signature]

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Appendix 2

**Stratigraphic Summary of Relinquishment Block A
(includes petrographic descriptions)**

BOCO – NORTH PINNACLES STRATIGRAPHY

Stratigraphic relationships and unit thickness are presented in schematic stratigraphic columns (see attached figures).

Westcott Argillite/ Salisbury conglomerate

(Thin sections 34922 34948)

Interpreted as the stratigraphic base in the Boco JV area, they are only exposed in the W – NW sector of the licence on Huskisson Drive, Olympic Road and the lower reaches of the Que River.

The unit comprises mauve dolomitic siltstone –greywacke–polymict conglomerate, with a total thickness in excess of 500m. The sediments are thickly bedded, frequently graded and occasionally have well developed ripple marks.

Contacts with the underlying Precambrian? quartzite and slates exposed on Huskisson Drive are faulted. Contacts with the overlying quartz sandstone to the east are gradational and locally faulted (D.Selley, Tas Uni, pers comm 1993).

Lithic constituents of coarser grained lithologies are described by Crawford (Appendix VI) and in order of abundance comprise:

- sedimentary clasts including siltstone, sandstone, chert and limestone (frequently haematitic).
- chloritized aphyric basalt – andesite of possible ophiolite affinities.
- pelitic schist and gneiss or granitoid.
- serpentinite and coarse grained anorthosite.

The sandstone and the groundmass of the conglomerates is comprised of polycrystalline quartz (vein/metamorphic), plagioclase, muscovite, biotite and K feldspar.

The inferred provenance includes haematitic sediments, limestone, metamorphics and ophiolite. Crawford (Appendix VI) sees no material that can be confidently identified as being sourced from the Mt Read Volcanics.

On the basis of provenance the unit is allocated to a stratigraphic position post dating the CCF and ophiolite emplacement but predating Mt Read volcanism; and is tentatively correlated with the Westcott Argillite at Rosebery on the basis of clast type, dolomitic component and association with the Stitt Quartzite (Green 1983). However, at Rosebery Green (1983) states that the Stitt Quartzite overlies the Westcott Argillite which is the reverse of that observed at Silver Falls.

Stitt Quartzite

(Thin section 34944)

The quartzite is exposed only in the western limb of the Silver Falls Syncline. Extensive exposures occur in the Que River, the NE extent of the Olympic Road, Ross Creek and John Lynch Creek. Contacts with the underlying Wescott Argillite are gradational and locally faulted.

The dominant rock type is a well bedded quartzose sandstone with grey siltstone partings and occasional quartz cobble conglomerate horizons. The total thickness may be in excess of 500m.

Lithic constituents in order of abundance in a coarse grained sandstone (TS 34944) are as follows:

- quartzite.
- sericitized, quartz-phyric, glassy felsic lava.
- quartz muscovite schist.
- chlorite (serpentinite or volcanic glass?).

The sand grade component includes both polycrystalline and phenocrystic quartz and muscovite. Minor chrome spinel has also been reported by Aberfoyle in thin sections at Silver Falls (Taylor, 1979).

The quartzites are correlated with the Stitt Quartzite at Rosebery on the basis of lithology and stratigraphic associations.

Pinnacles Rhyolite

The rhyolite is the lowest stratigraphic unit which is exposed on both limbs of the Silver Falls Syncline. The volcanics are frequently altered and host mineralisation at Silver Falls and North Pinnacles.

The volcanics are massive, sparsely feldspar > quartz phyric, with a fine grained groundmass. The western exposures are pervasively sericite carbonate +- pyrite altered and in the east they are moderately sericitized, with the greatest intensity occurring in shear zones.

Contact with underlying lithologies in the west are not exposed, but the description of abundant felsic detritus in the top of the underlying quartzite by Taylor (1979) indicates that it may be gradational. In the Pinnacles area the rhyolite forms the upper part of Lorrigan's (1992) "Transition sequence" (CII), the lower part of which includes the Browns Tunnel host rocks. This lower sequence was intercepted beneath the Pinnacles Rhyolite in hole BPD 71, 2km south of the EL 8/90 boundary.

Quartz – Feldspar phyrlic lavas/intrusives/clastics

This distinctive quartz rich (quartz crystals to 8mm, rounded, embayed and with inclusions) but texturally extremely variable unit forms a marker horizon between the Pinnacles Rhyolite and overlying White Spur Formation. It occurs on both limbs of the Silver Falls syncline and the Pinnacles anticline. Thickness of the unit ranges from 1m – 100m.

Lithological variants include:

- medium grained equigranular quartz feldspar rock, which in thin section was described in an Aberfoyle report (Taylor, 1979) as a porphyritic microgranite (Silver Falls).
- equigranular quartz feldspar rock with locally abundant sericitized pumice clasts (EZ costean 5 390 270N).
- quartz crystal sandstone, exposed on the drill access road to hole NPP 214.
- quartz feldspar crystal lithic mass flow (lithics are fine grained white rhyolite) exposed in the eastern limb of the Pinnacles anticline at 5 386 000N.

The unit is interpreted as a shallow intrusive to extrusive rhyolite with quartz crystal rich clastics being shed from the lavas.

White Spur Formation

Exposures occur mainly on the eastern limb of the Silver Falls syncline in the headwaters of John Lynch Creek. The sequence is interpreted to have been faulted out by a splay of the Rosebery Fault in the west.

The sequence comprises grey – black siltstone with felsic mass debris flows. The sediments overlie the Pinnacles Rhyolite /quartz–phyric unit and in turn are overlain with apparent conformity by Tyndall Group correlates. The sequence, lithologies and stratigraphic associations are similar to those at Lynchford south of Queenstown.

The felsic mass debris flows are frequently graded from a coarse crystal lithic base to a vitric siltstone top. The siltstones are considered to represent the ambient sedimentation. The maximum thickness of graded units is 50m. The interpreted basal unit on the Sawmill Creek track contains carbonate silica pyrite altered felsic clasts and ragged massive pyrite fragments. A similar lithology is reported by Poltock (in Sheppard, 1987) in the Bulgobac River at 381 700E.

Felsic porphyry sills and lavas associated with these siltstones are restricted to the area east of 381 000E (see MRV Map 2, Corbett and McNeill, 1986) indicating that there may be a major structure at this easting. Some of these porphyries are the source of the near surface component of a magnetic anomaly centred at 383 000E 5 392 000N.

The siltstone and mass debris flows are correlated with the White Spur Formation on the basis of:

- grey siltstone and felsic mass flow sequence overlies a prominent quartz crystal sandstone which in turn overly predominantly feldspar–phyric rhyolites. This is a similar association to that at White Spur 10km south of Rosebery.
- the overlying mafic to felsic–derived magnetite bearing volcanoclastics are lithologically very similar to those at Lynchford (5km south of Queenstown), where they also overlie siltstone and felsic mass debris flows.

Tyndall Group – Lynchford Tuff (Thin section 34915)

These mafic to felsic derived sandstones are exposed on the Silver Falls track at 378 600E 5 388 440N and 377 380E 5 388 760N and in the Que River at 381 300E 5391 900N (Poltock in Sheppard, 1987).

The horizon which is <50m thick represents the first appearance of mafic volcanic detritus and magnetite in the sequence and is a distinctive marker horizon both in lithotype and magnetic character.

Contacts with the units above and below have not been observed but the bedding attitude is similar. Magnetic trends associated with the unit conform with fold trends in the enclosing sediments.

The sandstones are coarse grained, composed of both a lithic and crystal component. In order of abundance lithics are:

- plagioclase and quartz phyric dacite – rhyolite lavas.
- volcanoclastic sandstone.
- chloritic fragments (glass or serpentinite).
- quartz mica schist.

The detrital component includes phenocrystic plagioclase, augite, hornblende, quartz and Fe Ti oxides. Crawford (Appendix VI) interprets the provenance as being Que/Hellyer Footwall type andesites, however the abundance of magnetite is atypical.

The sandstones are correlated with the Tyndall Group/Lynchford Tuff on the basis of;

- lithological similarity, compare petrological description 34915 (Boco JV) and 31624 (EL 11/85) see Appendix VI.
- similar association with the underlying siltstone and quartz feldspar crystal felsic mass debris flows at Lynchford and Silver Falls.
- being overlain by sediments and volcanics. Crawford (Appendix VI No 34932) sees similarities of the latter to the late Cambrian Southwell Subgroup.

Southwell Subgroup

(Thin sections 34902 34933 34932)

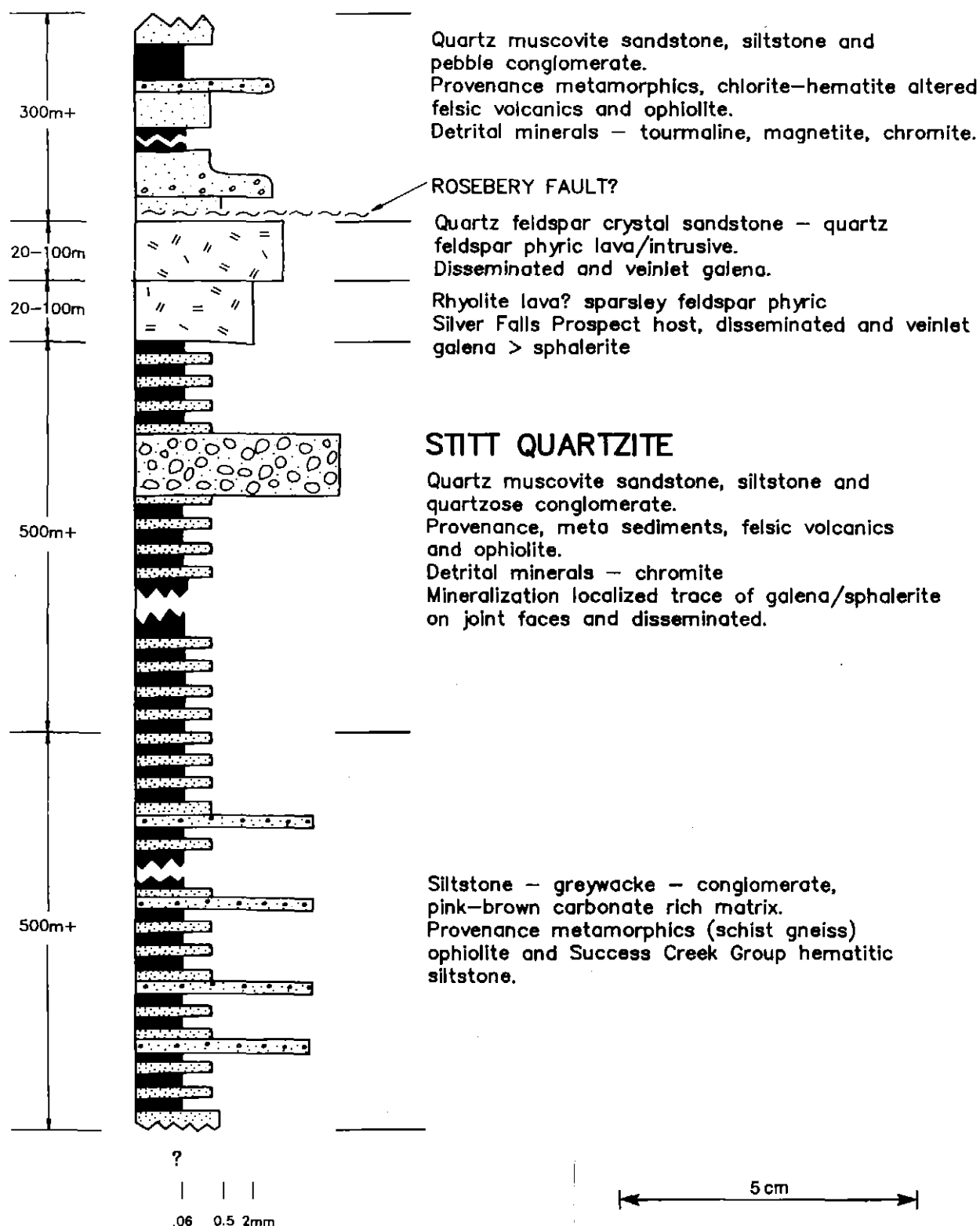
A thick sedimentary sequence, probably in excess of 750m, occupies the core of the Silver Falls Syncline.

The sequence comprises predominantly grey – khaki siltstone with subordinate micaceous lithic sandstone, polymict conglomerate, felsic mass debris flows and primary felsic volcanics. The internal stratigraphy and structure are not well understood due to poor exposure through most of the area.

The sequence is correlated with the Southwell Subgroup on the basis of petrology and association with Tyndall Group-like volcanoclastics.

A brief description of the main lithotypes in order of abundance is:

- grey to khaki siltstones.
- micaceous, feldspathic, lithic sandstone/grit with minor detrital magnetite. Best exposures are along the Silver Falls track.
- polymict volcanoclastic conglomerate (thin sections 34902 34933). Lithics include aphyric to slightly plagioclase-quartz phyric lavas, which have undergone intense chlorite haematite alteration, and pelitic schist. The detrital components in order of abundance are plagioclase and quartz phenocrysts, muscovite, Fe Ti oxides, chromite and tourmaline.
- felsic mass debris flows (thin section 34932), occur in the northern part of the syncline core towards the top of the exposed sequence. The mass flows occur within siltstones as graded units up to 75m thick. They are composed of plagioclase > quartz crystals, Fe Ti oxides and clasts of glassy lava and tuffaceous siltstone. The presence of Fe Ti oxides differentiate these felsic mass debris flows from those in the White Spur Formation.



PASMINCO EXPLORATION

A Division of Pasminco Australia Limited

COMPILED : R.A.P.

DATE : April, 1993

DRAWN : G.M.B.

REFERENCE :

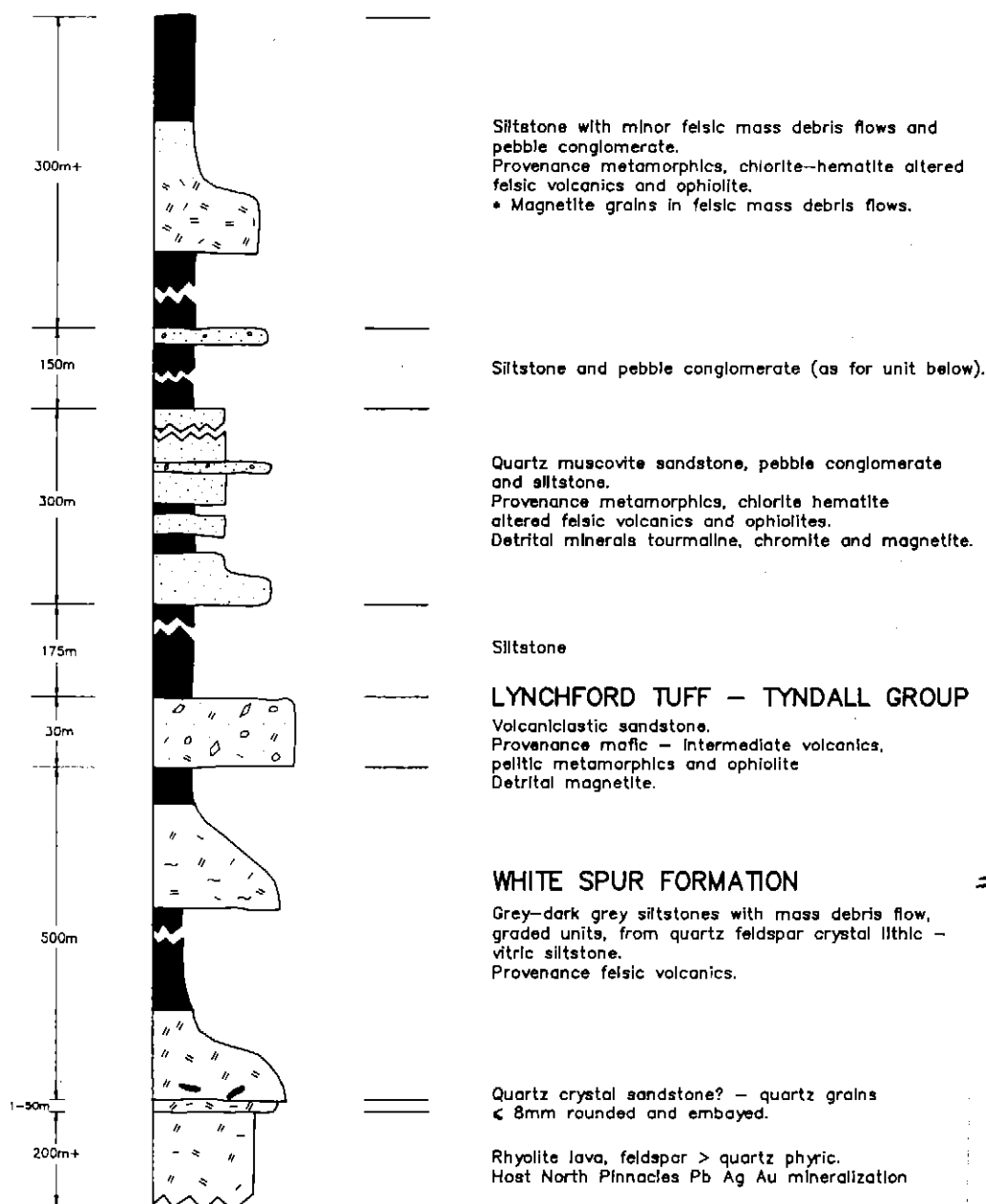
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FIG. No.

E.L. 2/90 - 8000 JV
E.L. 8/90 - NORTH PINNALS JV
SCHEMATIC STRATIGRAPHIC
COLUMN
**WESTERN LIMB OF
SILVER FALLS SYNCLINE**



BROWN'S
TUNNEL
PACKAGE 7

 PASMINCO EXPLORATION A Division of Pasma Australia Limited	
COMPILED : R.A.P.	E.L. 2/90 — BOCO JV E.L. 8/90 — NORTH PINNACLES JV SCHEMATIC STRATIGRAPHIC COLUMN EASTERN LIMB OF SILVER FALLS SYNCLINE
DATE : April, 1993	
DRAWN : G.M.B.	
REFERENCE :	
REVISIONS :	
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PETROGRAPHIC REPORT

PASMINCO QUE RV. EL 2/90

(Attn Roger Poltock, Fergus Fitzgerald)

Tony Crawford, 26/3/93

LOCATION: PASMINCO Bulgobac EL2/90

SUMMARY:

This is a polymict coarse volcanoclastic sandstone that contains a dominant clast population derived from formerly glassy felsic plagioclase±quartz-phyric lavas (including some that show intense hydrothermal chlorite alteration), but also contains detritus from quartz-mica schists, and occasional ophiolitic chromites.

HAND SPECIMEN:

This is a coarse volcanoclastic with clasts of dark green fine-grained volcanics and reddish chert(?) to 1cm across.

THIN SECTION:

This sample is a coarse, poorly-sorted and matrix-supported volcanoclastic sandstone containing occasional clasts up to 1cm across, but the average grain size is <1mm. The majority of clasts are meta-volcanics, and most of these were glassy to vitrophyric felsic lavas with albitized plagioclase phenocrysts varying in abundance from 0 to about 5-7 modal%. A notable number of these clasts, including several of the largest and presumably least-travelled, are very strongly chloritized, with the groundmass glass being entirely replaced by dull green chlorite. The intensity of this chlorite alteration demands an origin involving strong hydrothermal alteration, and resembles that developed in the stringer zones beneath VMS deposits. Less altered to almost unaltered clasts are also present, and have groundmasses composed of variably-textured quartzo-feldspathic intergrowths after former glass. Occasional trachytic-textured, almost holocrystalline but very fine-grained rocks are also present, and are probably from the interior portions of the same flows that yielded the glassy clasts.

Other detrital clasts in this rock are dominated by broken phenocrysts of albitized plagioclase <3mm long, that are slightly sericitized, and much less abundant broken quartz phenocrysts and altered FeTi oxide phenocrysts. Notable also are three or four small clasts of pelitic quartz-muscovite schist, and common detrital muscovite flakes to about 1mm long. Also significant are several small clasts of detrital reddish chromite, and two small grains of blue-green pleochroic tourmaline.

This is clearly a polymict volcanoclastic sandstone derived largely from felsic glassy plagioclase±quartz-phyric volcanics, including some that are strongly hydrothermally altered. However, the presence of chromite from the mafic-ultramafic complexes, and common detrital muscovite and quartz-mica meta-pelites, indicates that at least three sources were contributing detritus to this rock. It might be looked upon as an Animal Creek-type greywacke sand that has been reworked into a mass flow of felsic volcanoclastics.

SAMPLE NUMBER: 34904

LOCATION: PASMINCO Bulgobac EL2/90

SUMMARY:

This is a

HAND SPECIMEN:

This is a dark reddish strongly hematite-silica-altered rock

THIN SECTION:

This sample is composed of silica, hematite and a brownish chloritic mineral. There are no diagnostic traces of an original texture left, and the present texture is exceptionally heterogeneous and variable. There are two possible interpretations of this texture.

1: In many places, the texture reminded me of a serpentinized ultramafic rock (dunite) in which the serpentinized olivine had been almost entirely replaced by polygonal quartz, leaving bands and 'cells' of fine-grained magnetite, characteristic of serpentinization of olivine, set in dominant quartz and subordinate brownish chlorite or serpentine. The hematite-(magnetite)-rimmed, quartz-filled cells that look like former olivine crystals in a cumulate ultramafic, are often separated by meandering seams and veins of brownish chloritic material and or fibrous quartz.

An alternative interpretation is that this is a colloidal texture grown in silica-hematite from a siliceous gel or sinter. Seams of finer-grained silica may be due to localized recrystallization

LOCATION: PASMINGO EL2/90

SUMMARY:

This is a distinctive volcanoclastic sandstone derived from plagioclase+augite-phyric andesites and basalts, presumably correlated with the Que Footwall Andesites. It also contains a minor detrital component from felsic glassy lavas and rare pelitic metamorphic clasts.

HAND SPECIMEN:

This is a dark grey volcanoclastic sandstone with a maximum grain size around 1mm.

THIN SECTION:

This sample is an even-textured, framework-supported volcanoclastic sandstone dominated by detrital phenocrysts and phenocryst fragments of plagioclase, augite, hornblende and FeTi oxides, and clasts of plagioclase-, and plagioclase+quartz-phyric felsic lava and finer-grained volcanoclastic sandstone and siltstone. Blocky, largely altered albitized plagioclase phenocrysts to about 2mm long maximum dominate the detrital grain population, and are replaced by pale chlorite, darker green pumpellyite and specks of sericite. Similar-sized often euhedral phenocrysts of augite are largely fresh, with rims and fractures replaced by pale green chlorite. These probably make up around 15 modal% of the rock. Much less abundant but still quite common, are phenocrysts of hornblende. These are pale brown and deep-greenish pleochroic and up to about 80modal% chloritized. Quartz phenocryst fragments are quite angular and up to 2mm long, and only make up around 2-4modal% of the rock. Former FeTi oxide phenocrysts up to 1mm long are strongly altered and disaggregated to leucoxene-chlorite.

The lava clasts are mainly formerly glassy dacites and rhyolites, with sparse phenocrysts of quartz and albite. These are up to about 3mm across, and only make up about 2modal% of the rock. There are perhaps 3-4 modal% of totally chloritized lithic clasts, but there are no phenocrysts in these and it is not possible to tell whether they were chloritized felsic glass or serpentinous material. Significant are several small but distinct clasts of quartz-mica schist, and a larger clast of volcanogenic sandstone in which many of the clastic grains are epidote-altered. The limited matrix of this sample was probably clayey to silty, and has recrystallized to a very fine-grained, almost isotropic messy material.

This is a distinctive sandstone derived dominantly from andesitic volcanics, presumably of the Que Footwall-type andesites, with a minor input from felsic lavas and pelitic metamorphics. Presumably it post-dates the Animal Creek Greywacke and correlates, and would be either interbedded in, or post-date the Que Footwall Andesite horizon.

SAMPLE NUMBER: 34922

LOCATION: PASMINCO EL2/90

SUMMARY:

This is a coarse-grained greywacke derived dominantly from fine-grained, sometimes carbonate-bearing metasediments, some pelitic metamorphics, detrital metamorphic or reef quartz, and serpentine and chromite from the mafic-ultramafic complexes. It contains apparently no material from the Mount Read Volcanics.

HAND SPECIMEN:

This is a dark red-grey volcanoclastic sandstone with clasts of very fine-grained lava or tuff and chert to almost 1cm across.

THIN SECTION:

This sample is a totally framework-supported, poorly-sorted sandstone with clasts up to 1cm long, but the average grain size is probably closer to 0.5mm. A large variety of lithic clasts are present, and most are sedimentary, although there are a few metavolcanic clasts. The latter are themselves variable, and include a large black clast of quenched aphyric andesite or basalt dominated by tiny sheaves of acicular albite microlites in devitrified glass charged with hematite dust. Other volcanic clasts include a few strongly chloritic rocks that have textures suggestive of derivation from the ophiolite (mafic-ultramafic complex) rather than the Mount Read Volcanics. Most lithic clasts, however, are composed of sandstones and siltstones with abundant angular, detrital quartz and albite. Finer-grained, often almost opaque sedimentary clasts are abundant and include cherty material, and siltstones or shales in which common calcite rhombs probably reflect an originally carbonate-rich sediment. At least three clasts unambiguously derived from the ophiolites are obvious. Two of these are flattened and smeared out serpentine clasts hosting several large euhedral red chromites. The third is a coarse-grained anorthosite, such as are represented in the upper parts of the ophiolitic magma chambers. Many smaller chlorite/serpentine clasts are probably similarly derived.

The other major detrital component in this greywacke is the abundant (~30 modal%) angular quartz grains. These average around 0.5mm across, show complex internal strain features, are sometimes polycrystalline, and are clearly not of volcanic origin. Detrital muscovite is not uncommon, and several small quartz-mica schist lithic clasts are clearly of metamorphic derivation. Despite a careful search, there is no compelling evidence that there is any component in this rock derived from the Mount Read Volcanics; if there is, it is subordinate and modally insignificant.

This rock is a coarse greywacke containing recycled metasediments and pelitic metamorphics, and less abundant material from the mafic ultramafic complexes. It is not typically Animal Creek Greywacke, although that would be the unit in the Mount Read Volcanic region that is petrographically most similar to this rock.

SAMPLE NUMBER: 34932

LOCATION: PASMINCO EL2/90

SUMMARY:

This is a volcanoclastic greywacke derived from felsic plagioclase-phyric lavas and tuffs, and minor silty volcanoclastics. It has suffered pervasive chlorite+epidote alteration of the matrix. It is probably a Southwell Subgroup Dundas Group correlate.

HAND SPECIMEN:

This is a mottled greenish-cream, quite altered, medium-grained volcanoclastic greywacke.

THIN SECTION:

This sample is an almost framework-supported greywacke composed largely of detrital albitized plagioclase phenocrysts, and fine-grained tuffaceous siltstone clasts in a chloritized matrix. The detrital plagioclase phenocrysts are mainly entire, and are up to 3mm long. They are free of sericite, though occasional crystals contain granular epidote inclusions. Occasional quartz phenocryst fragments are present, and a few lithic clasts were clearly formerly glassy lavas with sparse phenocrysts of albite and/or quartz. Former FeTi oxide phenocrysts are altered to leucoxenitic material, and are relatively abundant. The lithic clasts are not nearly as abundant as the detrital albite, and are mainly fine-grained siliceous, probably recrystallized cherty material and some definite fine-grained greywackes.

The matrix of this sample originally probably made up 20-30 modal% of the rock, and has virtually entirely altered to chlorite, which contains common epidote and secondary silica.

This sample is a greywacke derived from felsic volcanics and tuffaceous volcanoclastics. It has suffered moderate but pervasive hydrothermal alteration, producing extensive chlorite from the matrix. It is probably best correlated with Dundas-Southwell Subgroup volcanoclastics.

SAMPLE NUMBER: 34933

LOCATION: PASMINCO EL2/90

SUMMARY:

This is a coarse-grained volcanoclastic sandstone composed of angular clasts of felsic quartz+plagioclase-phyric former glassy lavas set in a fine, sandy matrix composed of detrital metamorphic quartz and muscovite.

HAND SPECIMEN:

This is a quite coarse-grained volcanoclastic sandstone dominated by clasts of brown and red felsic fine-grained lava and cherty material averaging around 5mm across.

THIN SECTION:

This sample is a matrix-poor, fairly poorly-sorted volcanoclastic coarse sandstone dominated by angular lithic clasts composed of a great variety of rhyolitic and dacitic formerly glassy lavas mainly around 4-8mm long. Matrix probably makes up around 10-15 modal% of this sample. The lithic clasts vary from aphyric-, to moderately plagioclase+quartz-phyric, and all have groundmasses composed of very fine-grained quartz-feldspathic intergrowths after glass. A few clasts of quartz-muscovite schist are present, and at least two very recrystallized, hydrothermally-altered silica-rich clasts are present.

The matrix of this sample is a fine-grained sandstone composed of angular polycrystalline detrital metamorphic quartz and well-formed plates of detrital muscovite, with common interstitial chlorite, and is petrographically identical to the typical Animal Creek Greywacke. This is a coarse-grained volcanoclastic greywacke petrographically very similar to 34902, with similar stratigraphic implications.

SAMPLE NUMBER: 34942

LOCATION: PASMINGO EL2/90

SUMMARY:

This is an unusual greywacke interpreted as a rather fine grained variant of Animal Creek Greywacke in which are set detrital, euhedral blocky plagioclase phenocrysts. It has suffered notable carbonate alteration.

HAND SPECIMEN:

This is a fairly fine-grained dark grey tuffaceous siltstone which contains common small clasts (<2mm) of dark felsic lava.

THIN SECTION:

This sample is unusual in that it is composed of around 15-20 modal% of blocky euhedral to slightly rounded plagioclase phenocrysts that are totally sericitized, set in a silty to fine sandstone matrix dominated by detrital angular quartz and muscovite. The plagioclase phenocrysts often occur in clots of several crystals, sometimes including fresh to slightly altered FeTi oxide microphenocrysts. Small angular clots of chlorite, and quite common big (to 4mm across) patches of calcite overprint the fine-grained matrix.

The unusual texture of this sample requires comment. Except for the presence of the large detrital plagioclase phenocrysts, this sample would be a standard, if not a slightly fine-grained, Animal Creek Greywacke, with the typical detrital muscovite and metamorphic angular quartz. Presumably, these plagioclase phenocrysts are from unconsolidated crystal lapilli tuffs that have been reworked into the greywacke during mass slumping.

SAMPLE NUMBER: 34944

LOCATION: PASMINCO EL2/90

SUMMARY:

This is another mixed provenance greywacke, with detrital components from pelitic metamorphics, quartz-phyric felsic lavas, and possibly some carbonated serpentine clasts from ophiolitic rocks.

HAND SPECIMEN:

This is a coarse, quartz-rich greywacke with visible grains of quartz, lithic clasts and a dark, altered matrix.

THIN SECTION:

This is a poorly-sorted, almost framework-supported quartz-rich greywacke. The clasts vary in size from about 4mm maximum down to silt, and are dominantly angular quartz, and quartzite lithic clasts. The quartz clasts include both metamorphic quartz, commonly polycrystalline, with strained extinction, and bands of subgrain recrystallization, and more abundant and generally larger quartz phenocrysts. The latter are also commonly strained and sometimes show subgrain recrystallization, but they also often preserve crystal faces and recrystallized rounded melt inclusions. The lithic clasts show a large range in mineralogy and texture, reflecting their varied origins. Most abundant are thoroughly recrystallized, formerly glassy felsic lavas in which mosaic quartz-feldspathic textures predominate, but are also variably recrystallized due to deformation. These felsic lava clasts occasionally contain small quartz phenocrysts and are often quite strongly sericitized. Other common lithic clasts include abundant quartzites, with strongly foliated quartz and no other mineral, and a number of quartz-muscovite schists. There are also quite a few small, less obvious lithic clasts composed of dull chlorite or serpentinite(?), that are strongly overprinted by calcite.

The matrix of this sample is all but eliminated by pressure solution, with strong stylolites marked by concentrations of insoluble opaque oxides or carbonaceous material being quite common. Minor components of the matrix are small detrital muscovite laths, and silty material that is highly sericite-altered, and commonly partially overprinted by calcite. A few small spots of brown sphalerite are present in the matrix.

This quartz-rich greywacke has a mixed pelitic metamorphic, and felsic volcanics provenance. The abundance of volcanic quartz and felsic lava clasts makes this greywacke petrographically unlike typical Animal Creek Greywacke. The probable presence of altered serpentinitic material could be checked by a Cr assay.

LOCATION: PASMINGO EL2/90

SUMMARY:

This is a polymict greywacke, with clasts from pelitic metamorphic, ophiolitic, and possibly Success Creek Group hematitic siltstones and carbonates. It is probably best correlated with the Animal Creek Greywackes.

HAND SPECIMEN:

This is a dark grey, fine-grained, unbedded, micaceous greywacke.

THIN SECTION:

This sample in thin section shows bedding, in the form of minor but obvious variations of grain size, although the clast composition of the various poorly-defined beds is essentially identical. This rock is a moderately well-sorted, framework-supported, almost matrix-free greywacke. It is marked by a remarkable diversity of lithic and mineral clasts, indicating at least three or four sources. Probably the most abundant grains are particularly angular quartz fragments, up to a maximum of 1mm across. These show features indicating derivation from pelitic metamorphics, and are sometimes intergrown with Kspar. There are few grains if any that I can confidently say were phenocrysts in felsic volcanics. Among the detrital grains are plentiful, well-formed biotite and muscovite crystals. These may be derived from coarse-grained pelitic metamorphics (gneisses) but it cannot be ruled out that are, in fact, derived from granitoids. It is significant in this respect that there is common angular detrital Kspar, some grains showing microcline twinning, that I have not seen in similar rocks from W Tasmania.

There is a great diversity of lithic clasts, including the following in approximate order of decreasing abundance:

(1) fine-grained siltstones and mudstones, often quite reddish and hematitic, (2) coarser-grained pelitic metamorphics, including quartz-muscovite schists and quartz-Kspar-mica gneisses, (3) chloritic, quench-textured and formerly glassy lavas, many of which are very similar to the low-Ti basalts in the ophiolites such as Heazlewood River Complex, (4) serpentine-chlorite clasts, occasionally with textures suggesting derivation from pyroxenites, and again suggesting derivation from the ophiolites, and (5) not uncommon reddish carbonate lithic clasts.

The source of the schists and gneisses, and the detrital quartz, micas and Kspar is presumably the Precambrian Tyennan core of Tasmania, but the common hematitic siltstones and reddish carbonates strongly resemble lithologies in the Success Creek Group and at the base of the Smithton Trough sequence. The ophiolites have clearly contributed significantly to this rock, and I see no lithic clasts unambiguously derived from the Mount Read Volcanics. This is probably a more 'mafic' version of the Animal Creek Greywackes.

Appendix 3

**Rock Chip Descriptions, Locations & Assays
from Relinquished Area**



PASMINCO EXPLORATION GEOCHEMICAL ANALYSES RECORD

PAGE 1
1992

Sample Type Rock Chip

PROSPECT _____
PROJECT BOCO EL 2/90

Sample No.	MAP SHEET	Location	AMG COORDINATES (APPROX)		METAL CONTENT (ppm unless specified)							DATE	SAMPLER	MAG SUS	DESCRIPTION
			N	E	Cu	Pb	Zn	Ag	Au						
30521	3D	Track to J. Lynch Creek	5386 810	376 00								April 1991	ANL	0.19	- small, buff coloured crystals, scattered through a hard, dark grey groundmass ??
30535	3B	Bulgobac Falls Road	5390 852	381 942	3	29	24	< 1.0	< 0.008			"	"	0.02	- QUARTZ - FELDSPAR PORPHYRY - strongly cleaved, sericite & silica altered.
30536	3B	"	5390 836	381 915								"	"	-	- QFP - fine, hard, siliceous, with some qtz phenocrysts. Silica flooded.
30537	3C	"	5389 985	381 995	7	164	445	< 1.0	< 0.008			"	"	-	- QFP - deformed & altered - dark green & cleaved, Fe Oxides (ex-sulphide?)
30538	3C	"	5389 965	382 005	17	63	66	< 1.0	< 0.008			"	"	0.10	- QFP - qtz & fsp phynic rock & sericitic groundmass.
30539	3C	"	5389 150	381 775								"	"	0.00	- ⁽³⁰⁵³⁹⁾ SANDSTONE - bedded, fine grained.
30540	3C	"	5389 092	381 752								"	"		- feldspar-quartz - ? sericite
30541	3C	EBR, Nth Boco Siding	5388 168	383 250								"	"	-	- ANDESITE LAVA - fine, massive groundmass, qtz & silica amygdalae. Rare fsp phenos.
30543	3B	Bulgobac Falls Road	5392 437	381 555								"	"	0.16	- BEDDED BLACK SHALE
30544	3B	"	5391 703	381 616	4	104	68	< 1.0	< 0.008			"	"	0.03	- QFP - large qtz & fsp phenos (upto 5mm) in sil-ser groundmass.
30545	3B	"	5391 250	381 904								"	"	-	- QFP -
30546	3B	"	5391 680	381 626								"	"	0.34	- BEDDED BLACK SHALE
30547	3B	Bulgobac River	5391 715	381 678								"	"	0.03	- SHALE / QFP CONTACT - QFP is sil-ser altered. Shale contains feldspars.
30548	3B	"	5391 564	382 032								"	"	-	- QFP - brecciated & weakly sericitic
30549	3B	Bulgobac Falls Road	5391 690	381 620								"	"	-	- MUDSTONE - deformed & carbonate altered.
30550	3C	Sawmill Creek Track	5388 486	382 272								"	"	0.05	- VOLCANICLASTIC SST with MUD MATRIX - mud & bands of fine rst. bel. frags of qtz & felds.
30557	3B	EBR - Nth Boco Siding	5391 540	382 100								"	"	-	- QFP - qtz & felds. yills in sericite & fractured siliceous matrix. FeOx on felds.



PASMINCO EXPLORATION GEOCHEMICAL ANALYSES RECORD

PAGE 2
1992

Sample Type Rock Chip

PROSPECT -
PROJECT Boco EL 2/90

Sample No.	MAP SHEET	Location	AMG COORDINATES		METAL CONTENT (ppm unless specified)							DATE	SAMPLE	MAG SUS	DESCRIPTION.
			N	E	Cu	Pb	Zn	Ag	Au						
30558	3B	EBR, Nth Bulgaback River	5392 200	381 835								April 1991	ANL	0.27	- MICACEOUS SILTSTONE - red, weathered, qtz & volcanic lithics, in muddy micaceous matrix.
30561	3D	Silver Falls Road	5388 840	377 385								"	"	0.16	- MICACEOUS SANDSTONE - as above, but with coarser lithics.
30562	3D	Silver Falls Adits	5389 390	376 890	24	7034	125	1.4	<0.008			"	"	0.11	- SANDSTONE + qtz + feld - Mineralised & altered. Siliceous; black & streaks of silt. qtz matrix.
30563	3D	Downstream Silver Falls	5389 398	376 875								"	"	0.21	- CONGLOMERATE - clast-supported; green, black & buff-coloured siliceous sandst. clasts + v. mafic clasts.
30564	3C	Sawmill Creek Track	5389 655	381 370								"	"	-	- QFP - deformed; pervasive silicified & traces of pyrite.
30565	3C	"	5389 635	381 144								"	"	-	- VOLCANICLASTIC SST + qtz + fsp crystals - fine gr. lithics, in chl. dk. mat matrix. tr py.
30566	3A	"	5390 414	379 835								"	"	0.38	- MICACEOUS SST - brown, med. grained matrix qtz & chl. & volcanic clasts in gr/bn micaceous.
30567	3A	"	5390 084	379 008								"	"	-	- CONGLOMERATE - green/grey; coarse red gr. clasts of qtz, fsp & lithics. Red rot in chl. mat matrix.
30568	3A	"	5390 709	378 529								"	"	4.64	- CONGLOMERATE - as above (30567)
30583	3B	Que River / EBR Cutting	5392 605	381 955								"	"	-	- CONGLOMERATE - rounded sediment & volcanic clasts + qtz + fsp rills, in brown/gm matrix.
30584	(1C)	"	5394 035	382 630								"	"	0.32	- VOLCANICLASTIC SANDSTONE - as above (30583) with smaller lithics.
30585	(1C)	"	5394 500	382 650								"	"	-	- CONGLOMERATE - Red, hard, cherty clasts, v. mafic clasts, in green qtz-rich matrix.
31710	5B	EBR - 294m south of old Boco Rd	5385 560	382 643								25.4.91	LWK		DAKITE LAVA - grey/cream, blotchy, very fine grained, massive, very hard (? HORNFELSK)
31711	5B	EBR - 372m south of old Boco Rd	5385 465	382 666								25.4.91	LWK		DAKITE SHALLOO INTRUSIVE? - dark green/grey, feldspar phyric, massive, chloritic, med grained.
31712	5B	EBR - 468m south of old Rd	5385 380	382 660								25.4.91	LWK		DAKITE LAVA - dk, pyritic (<1%), massive, chlorite, similar to 31710.
31713	5B	EBR - 563m south of old Rd	5385 315	382 655								25.4.91	LWK		DAKITE? - pink, silicified, randomly qtz veined - ? fluid conduit / fault zone?

PASMINGO EXPLORATION GEOCHEMICAL ANALYSES RECORD

PAGE 3
1992

Sample Type Rock CHIP

PROSPECT .

PROJECT BOCO EL 2/90

Sample No.	MAP SHEET	Location	AMG COORDINATES (Approx)			METAL CONTENT (ppm unless specified)								DATE	SAMPLED	MKS	S.S.	DESCRIPTION
			N	E		Cu	Pb	Zn	Ag	Au								
31714	3C	Adjacent to old Boco Rd. (1km west of Hwy)	5386135	383	340									30.4.91	LWK			- Boco ALTERATION ZONE - float - silicified; massive; pyritic (locally >50%); some foliation
31719	5B	EBR - 182m SW of 94 post	5384871	382	295									16.5.91	"			- Dacite LAVA - massive, pink-green/grey, chl + alb alt.
31722	3C	Boco ROAD	5387075	383	250									24.5.91	"			- Volcaniclastic? - crudely banded? pumiceous (tubular wisps...)
31723	3C	Boco ROAD	5386625	382	925									24.5.91	"			- Hyaloclastite - breccia & jigsaw fit, pink-cream clasts, angular, f. chl matrix.
31785	5B	ALTIN ZONE OUTCROP - SW of old Boco Rd.	5385960	383	325									12.12.91	"	300 gfe		- silicified, pyritic, acid LAVA (massive). → (1.52; 0.82; 2.80; 6.41; 0.39; 0.40)
31786	5B	Grid Line - E of Hwy. (NEAR GRV. STN 6597)	5385435	384	585									12.12.91	"			- ? Dacite-Andesite - cream feldspars + hornblende? chloritic.
31787	5B	Grid Line - E of Hwy. (NEAR GRV. STN 6599)	5385425	384	680									12.12.91	"	0.15		- Dacite-Andesite (as above) + 31786
31788	5B	Grid Line - 75m E of Hwy	5385010	383	940									12.12.91	"	0.12		- Dacite LAVA - feldspar-phryic; devitrified, massive.
31789	5B	Grid Line - 950m E of Hwy	5385005	384	815									12.12.91	"	0.56		- Dacite LAVA? - dark, massive, fine gr.
									</									

PASMINGO EXPLORATION GEOCHEMICAL ANALYSES RECORD

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Sample Type Rock CHIP

PROSPECT _____
PROJECT NORTH PINNACLES EL 8/90

[illegible]

801

ROGER POLTOCK GEOLOGICAL PTY. LTD.

CLIENT *PALMINCO EXPLORATION*
 PROJECT *EL 2/90*
 PROSPECT *SILVER FALLS*

SAMPLE RECORD AND ANALYTICAL DATA SHEET

LABORATORY *ANALABS*
 SAMPLE TYPE *Rock - LITHO CHEM*

COLLECTED BY: *L.W. KRSNER*
 DATE DISPATCHED:
 DATE RECEIVED: *16/4/92*

A 28305

SAMPLE NUMBER	LOCATION		DESCRIPTION	ANALYSES							
				C	Pb	Zn	Ag				
32949	5389185 N	376995E	Sst feldspath, < mica								
32950	5389170 N	377140E	Sst feldspath, m-cgrd + lithics.								
32951	5389195 N	376970E	Sst feldsp - biotite + lithics < seric								
32952	5389195 N	376945E	Qtz feld porph? pale gray. weak								
32953	5389230 N	376905E	Sst - wacke, qtz feld xt, siltst clasts								
32954	5389270 N	376860E	Sst feldsp, m-cgrd, poorly sorted								
32955	5389340 N	376890E	Qtz feld cryst rock sst or porph?								
32956	5389390 N	376865E	Rhyolite, lg, silic galena veinlets	22	1500	81	1				
32957	"	"	Long/brecc? silic minor galena	<2	1850	57	1				
32958	"	"	Sst - rhyolite, 2/fract, sericitic	6	425	42	1				
32959	5389455 N	376900E	Qtz feld cryst sst - intrusive								
32960	5389460 N	376900E	" " " " "								
32961	5389490 N	376800E	" " " " " Mn								
32962	5389535 N	376900E	" " " " " " "								
32963	5389615 N	376890E	" " " " " " "								
32964	5389675 N	376675E	" " " " " " "								
32965	5389750 N	376900E	" " " " " " "								
32966	5390270 N	377230E	Sst feldsp mica med - poorly sorted								
32967	"	377160E	Rhyolite fgd								
32968	"	377090E	" " "								
32969	"	376975E	Sst mica ceous								

MAJOR ELEMENTS
 SEE Appendix ...

801073

Appendix 4

Soil Geochemical Data from Silver Falls Grid

SILVER FALLS GRID - ASSAY DATA

(SOIL SAMPLES COLLECTED BY PASMINCO EXPLORATION)

SAMPLE NUMBER	NORTHING	EASTING	Zn	Cu	Pb	Mn	As
35221	5390782	377030	22	13	41	28	25
35222	5390796	377016	15	9	19	27	4
35223	5390810	377002	25	8	17	35	4
35231	5389117	377571	82	15	71	84	6
35232	5389134	377554	57	7	25	98	4
35233	5389151	377537	35	6	16	68	5
35234	5389168	377520	16	4	13	39	<1
35235	5389189	377499	28	8	41	59	4
35236	5389205	377483	35	7	32	74	6
35237	5389223	377465	49	6	46	105	3
35238	5389238	377450	254	9	77	640	6
35239	5389255	377433	30	4	18	121	2
35240	5389274	377414	23	5	57	40	27
35241	5389292	377396	33	6	20	35	11
35242	5389311	377377	29	5	44	33	17
35243	5389326	377362	27	4	73	31	11
35244	5389343	377345	33	5	52	45	8
35245	5389363	377325	71	12	36	47	7
35246	5389380	377307	44	5	45	80	3
35247	5389397	377290	93	13	96	97	14
35248	5389417	377271	108	18	88	113	13
35249	5389432	377255	46	5	37	137	4
35250	5389452	377235	72	6	36	129	4
35252	5389467	377220	76	12	22	258	3
35253	5389483	377204	84	4	16	326	3
35254	5389500	377187	70	10	20	59	4
35255	5389516	377171	43	4	10	38	2
35256	5389532	377156	59	5	12	72	2
35257	5389547	377141	25	4	17	29	1
35258	5389566	377121	27	5	24	29	1
35259	5389584	377103	30	4	12	27	2
35260	5389601	377086	67	7	28	85	4
35261	5389614	377073	100	11	112	359	7
35262	5389631	377056	67	7	104	67	9
35263	5389639	377049	34	3	107	36	9
35264	5389653	377034	25	4	231	42	6
35265	5389668	377019	25	2	73	49	7
35266	5389681	377006	36	5	120	64	7
35301	5389375	377853	53	5	25	102	5
35302	5389389	377839	70	10	42	241	8
35303	5389403	377825	35	6	26	51	14
35304	5389418	377811	32	6	54	55	12
35305	5389432	377797	36	6	61	64	8
35306	5389449	377781	67	11	83	122	13
35307	5389463	377768	38	7	29	68	5
35308	5389477	377755	43	14	24	75	10
35309	5389490	377742	69	13	27	93	4
35310	5389506	377727	58	10	21	80	3

SAMPLE NUMBER	NORTHING	EASTING	Zn	Cu	Pb	Mn	As
35311	5389521	377713	56	3	18	66	3
35312	5389536	377699	47	6	14	61	3
35313	5389549	377685	71	14	45	84	6
35314	5389563	377672	83	18	35	93	9
35315	5389577	377658	158	10	90	260	6
35316	5389594	377643	205	13	118	614	6
35317	5389607	377630	98	10	79	131	5
35318	5389620	377617	58	7	51	55	8
35319	5389635	377603	38	3	17	42	3
35320	5389650	377589	63	5	37	82	5
35321	5389666	377573	93	11	56	175	13
35322	5389684	377556	65	6	53	123	6
35323	5389701	377540	90	3	68	178	6
35324	5389717	377525	43	6	10	42	3
35325	5389732	377510	102	2	11	395	3
35326	5389751	377493	148	2	3	633	3
35327	5389769	377475	234	2	3	560	3
35328	5389784	377461	163	3	14	286	5
35329	5389798	377447	78	11	35	78	4
35330	5389816	377430	150	10	35	272	4
35331	5389832	377415	124	17	31	160	4
35332	5389842	377405	60	9	25	132	3
35333	5389854	377394	145	8	33	1198	5
35334	5389867	377381	116	7	32	437	4
35335	5389880	377369	147	4	18	412	4
35336	5389893	377356	84	5	26	129	4
35337	5389904	377346	123	3	24	225	4
35338	5389921	377329	93	3	23	112	3
35339	5389934	377317	100	3	34	106	5
35340	5389949	377303	54	3	22	47	2
35341	5389963	377289	40	10	62	46	5
35342	5389978	377275	29	5	52	32	4
35343	5389992	377261	28	5	68	37	4
35344	5389988	377257	106	11	90	264	7
35345	5390004	377245	75	9	78	168	6
35346	5390017	377231	107	8	101	558	6
35347	5390028	377218	25	4	18	38	1
35348	5390040	377204	42	8	204	46	5
35349	5390051	377192	24	5	100	39	3
35350	5390068	377175	12	3	133	29	1
35351	5389452	377235	10	3	153	34	<1
35352	5390094	377149	19	3	159	36	4
35353	5390109	377133	35	6	463	267	10
35354	5390123	377119	35	3	459	61	5
35355	5390136	377106	25	4	448	52	4
35356	5390149	377092	36	3	381	61	4
35357	5390168	377074	22	3	126	37	4
35358	5390181	377060	18	5	77	24	2
35359	5390195	377046	29	3	138	62	7
35360	5390209	377032	29	4	101	58	3
35361	5390223	377018	57	5	472	64	18
35362	5390239	377002	15	4	16	25	3
35387	5390373	377440	52	7	60	88	5

SAMPLE NUMBER	NORTHING	EASTING	Zn	Cu	Pb	Mn	As
35388	5390386	377427	37	6	93	58	8
35389	5390401	377412	35	6	107	47	10
35390	5390415	377398	25	5	58	34	6
35391	5390431	377382	19	4	59	36	5
35392	5390445	377369	59	30	43	52	100
35393	5390460	377354	20	5	21	26	2
35394	5390472	377341	19	4	84	41	2
35395	5390489	377323	26	3	181	44	2
35396	5390502	377311	12	5	22	42	1
35397	5390516	377297	14	3	17	32	1
35398	5390530	377283	17	8	17	38	1
35399	5390542	377270	20	3	25	54	1
35400	5390557	377255	16	7	14	45	1
35401	5390572	377240	21	6	19	34	
35402	5390587	377225	33	5	41	53	
35403	5390600	377212	29	7	20	47	
35404	5390615	377197	60	5	26	323	
35405	5390628	377184	21	6	17	34	
35406	5390642	377170	26	5	23	32	
35407	5390657	377154	44	8	54	29	
35408	5390672	377140	44	6	54	42	
35409	5390684	377127	142	11	428	88	
35410	5390699	377113	252	13	419	146	
35411	5390711	377100	20	5	45	29	
35412	5390726	377086	15	4	40	34	
35413	5390740	377072	13	5	22	29	
35414	5390754	377058	22	4	38	36	
35415	5390767	377044	13	5	25	33	
35416	5390361	377451	30	4	48	54	
35417	5390346	377466	40	5	73	63	
35418	5390332	377480	27	4	110	60	
35419	5390318	377494	33	4	269	52	
35420	5390304	377507	39	5	241	52	
35421	5390290	377521	36	5	145	44	
35422	5390276	377535	38	7	135	42	
35423	5390261	377549	42	8	66	43	
35424	5390246	377564	32	5	71	34	
35425	5390233	377578	39	7	69	36	
35426	5390217	377593	36	7	67	37	
35427	5390203	377607	47	12	101	43	
35428	5390190	377620	73	18	41	83	
35429	5390176	377635	89	12	31	171	
35430	5390163	377648	118	13	28	387	
35431	5390147	377664	106	8	22	996	
35432	5390134	377677	83	6	22	182	
35433	5390119	377692	33	9	33	75	
35434	5390106	377706	201	14	73	11900	
35435	5390093	377719	32	9	47	90	
35436	5390079	377733	25	7	46	45	
35437	5390065	377747	17	5	26	22	
35438	5390051	377761	21	6	71	30	
35439	5390037	377775	16	5	23	25	
35440	5390024	377789	24	7	28	49	

SAMPLE NUMBER	NORTHING	EASTING	Zn	Cu	Pb	Mn	As
35441	5390012	377803	23	5	74	31	
35442	5390640	377732	107	4	23	199	
35443	5390655	377718	31	6	40	35	
35444	5390669	377704	46	10	91	40	
35445	5390684	377691	64	13	124	79	
35446	5390697	377677	33	4	127	45	
35447	5390712	377663	69	7	292	92	
35448	5390728	377648	41	4	158	57	
35449	5390742	377635	50	7	150	80	
35450	5390756	377621	45	8	226	60	
35451	5390771	377607	65	11	193	108	
35452	5390787	377591	37	6	116	91	
35453	5390798	377580	47	6	149	75	
35454	5390814	377565	43	3	101	65	
35455	5390828	377551	77	5	140	113	
35456	5390843	377537	43	4	36	51	
35457	5390855	377526	22	4	29	51	
35458	5390869	377512	235	7	213	282	
35459	5390885	377496	79	5	107	84	
35460	5390899	377482	164	25	169	302	
35461	5390914	377468	22	3	43	44	
35462	5390929	377453	36	6	55	93	
35463	5390944	377439	57	12	64	197	
35464	5390957	377426	84	18	87	2178	
35465	5390972	377411	76	16	109	225	
35466	5390987	377396	176	25	45	4661	
35467	5391001	377381	86	17	58	1541	
35468	5391014	377369	89	14	29	2400	
35469	5391027	377355	93	7	25	454	
35470	5391041	377341	79	7	56	147	
35471	5391056	377327	122	10	58	270	
35472	5391071	377311	69	8	48	91	
35473	5391084	377299	45	6	26	89	
35474	5391099	377284	46	6	87	32	
35475	5391112	377271	51	6	98	100	
35476	5391126	377257	44	8	53	46	
35477	5391139	377243	28	4	39	29	
35478	5390627	377746	56	4	33	58	
35479	5390612	377759	96	8	86	215	
35480	5390600	377771	151	18	212	359	
35481	5390585	377785	167	26	191	1466	
35482	5390574	377796	198	23	202	520	
35483	5390557	377813	208	25	143	238	
35484	5390542	377826	168	9	75	143	
35485	5390529	377840	125	3	62	146	
35486	5390512	377855	90	3	44	89	
35487	5390497	377871	88	3	116	88	
35488	5390484	377883	84	5	127	77	
35489	5390466	377900	102	7	142	110	
35490	5390451	377915	63	5	52	77	
35491	5390438	377927	26	5	69	44	
35492	5390425	377940	21	7	34	36	
35493	5390411	377953	31	7	110	50	

SAMPLE NUMBER	NORTHING	EASTING	Zn	Cu	Pb	Mn	As
35494	5390395	377969	25	6	94	43	
35495	5390382	377982	28	6	50	47	
35496	5390367	377997	25	6	71	41	
35497	5390353	378011	24	8	80	31	
35498	5390339	378024	20	8	51	30	
35499	5390324	378038	52	14	19	31	
35500	5390310	378052	18	6	19	26	
35501	5390295	378067	25	7	27	35	
35502	5390280	378081	22	7	21	34	
35503	5390578	378360	38	13	15	93	
35504	5390594	378344	25	8	7	41	
35505	5390607	378330	18	6	12	29	
35506	5390622	378316	34	9	6	88	
35507	5390636	378301	9	4	7	20	
35508	5390649	378288	26	9	20	54	
35509	5390663	378274	30	12	18	42	
35510	5390678	378260	21	8	21	35	
35511	5390693	378245	32	10	22	58	
35512	5390707	378232	50	15	32	79	
35513	5390720	378219	35	9	29	56	
35514	5390734	378205	33	8	46	59	
35515	5390748	378191	28	8	18	51	
35516	5390763	378177	46	10	14	84	
35517	5390777	378163	11	4	8	28	
35518	5390792	378148	52	12	26	104	
35519	5390806	378135	79	25	30	206	
35520	5390820	378121	78	22	33	301	
35521	5390834	378107	81	26	34	386	
35522	5390849	378093	62	19	40	301	
35523	5390865	378077	77	9	46	239	
35524	5390876	378066	168	13	100	796	
35525	5390892	378050	368	38	45	559	
35526	5390903	378039	52	14	42	86	
35527	5390917	378024	35	7	55	55	
35528	5390931	378011	100	11	103	277	
35529	5390947	377995	145	15	42	394	
35530	5390962	377980	64	7	18	142	
35531	5390976	377966	45	7	20	78	
35532	5390990	377952	42	10	23	69	
35533	5391004	377937	19	5	5	28	
35534	5391017	377924	40	17	13	61	
35535	5391034	377909	80	21	19	143	
35536	5391045	377896	80	34	46	885	
35537	5391060	377881	139	40	100	2227	
35538	5391074	377867	209	36	93	706	
35539	5391088	377853	90	26	36	217	
35540	5391101	377840	62	16	23	134	
35541	5391116	377825	39	10	35	49	
35542	5391131	377810	34	8	34	52	
35543	5391146	377795	22	7	29	33	
35544	5391158	377783	44	11	61	65	
35545	5391173	377768	43	10	58	57	
35546	5391187	377754	36	10	45	40	

SAMPLE NUMBER	NORTHING	EASTING	Zn	Cu	Pb	Mn	As
35547	5391203	377743	40	5	21	56	
35548	5391217	377725	31	5	15	46	
35549	5391231	377712	35	6	70	50	
35550	5391245	377697	27	6	25	44	
35551	5391259	377684	24	6	30	47	
35552	5391273	377670	18	6	31	41	
35553	5391287	377656	11	6	19	25	
35554	5391302	377641	7	5	16	24	
35555	5391316	377628	9	6	18	22	
35556	5391331	377613	11	6	11	27	
35557	5391344	377600	7	6	16	21	
35558	5391360	377584	5	5	6	18	
35559	5391374	377571	6	5	8	16	
35560	5391388	377557	7	5	18	17	
35561	5391402	377543	8	5	46	12	
35562	5391416	377529	7	6	11	18	
35563	5391429	377516	14	8	20	26	
35564	5390843	378623	39	19	13	70	
35565	5390856	378611	27	15	21	48	
35566	5390868	378600	21	11	56	50	
35567	5390883	378586	24	12	49	49	
35568	5390899	378572	17	9	32	37	
35569	5390911	378561	22	11	31	45	
35570	5390926	378548	30	15	24	54	
35571	5390938	378537	30	17	19	79	
35572	5390953	378524	32	14	13	70	
35573	5390967	378511	32	15	15	61	
35574	5390980	378499	34	15	18	67	
35575	5390995	378485	69	18	83	180	
35576	5391011	378470	124	13	177	393	
35577	5391027	378456	179	16	205	510	
35578	5391041	378443	225	18	309	559	
35579	5391055	378431	311	8	215	875	
35580	5391069	378418	73	18	176	671	
35581	5391086	378403	104	32	223	3189	
35582	5391098	378392	129	20	238	3024	
35583	5391115	378376	328	25	417	4882	
35584	5391131	378362	84	8	33	497	
35585	5391146	378349	59	12	39	231	
35586	5391160	378336	91	28	82	326	
35587	5391173	378324	82	16	33	396	
35588	5391189	378310	38	11	36	83	
35589	5391205	378295	45	13	37	97	
35590	5391217	378283	42	11	27	103	
35591	5391233	378268	20	7	32	38	
35592	5391246	378256	55	29	132	61	
35593	5391261	378241	57	43	31	374	
35594	5391276	378227	50	20	32	108	
35595	5391288	378215	34	21	28	70	
35596	5391305	378199	29	17	30	56	
35597	5391318	378186	29	18	11	77	
35598	5391334	378170	30	19	23	58	
35599	5391347	378158	19	10	18	43	

SAMPLE NUMBER	NORTHING	EASTING	Zn	Cu	Pb	Mn	As
35600	5391362	378143	54	9	16	100	
35601	5391375	378130	94	26	36	443	
35602	5391388	378116	172	19	44	1815	
35603	5391403	378102	91	15	45	227	
35604	5391416	378089	134	17	62	1641	
35605	5391434	378071	214	28	61	729	
35606	5391446	378059	171	20	59	1091	
35607	5391460	378045	156	17	43	307	
35608	5391474	378031	71	9	47	123	
35609	5391489	378016	60	10	50	86	
35610	5391502	378004	31	7	43	54	
35611	5391516	377990	41	7	48	56	
35612	5391530	377976	15	3	16	20	
35613	5391543	377963	9	3	11	23	
35614	5391557	377950	8	3	9	19	
35615	5391573	377934	10	4	11	16	
35616	5391589	377918	5	4	7	17	
35617	5391602	377906	5	3	7	19	
35618	5391619	377889	8	4	15	17	
35619	5391631	377877	7	4	14	15	
35620	5391646	377863	11	3	12	17	
35621	5391663	377846	13	5	13	20	
35622	5391675	377834	8	4	11	13	
35623	5391689	377820	8	4	9	17	
35624	5391701	377808	6	3	9	13	
35625	5391151	378915	27	18	30	59	
35626	5391166	378900	23	16	24	55	
35627	5391180	378886	29	13	24	114	
35628	5391193	378873	72	28	72	1486	
35629	5391209	378857	53	30	39	414	
35630	5391225	378841	84	26	79	1065	
35631	5391237	378829	97	23	122	2438	
35632	5391252	378814	68	17	83	1075	
35633	5391266	378800	79	28	86	4740	
35634	5391279	378787	111	35	72	4511	
35635	5391295	378771	62	17	66	1254	
35636	5391308	378758	92	22	58	2669	
35637	5391322	378744	87	19	56	1132	
35638	5391333	378733	82	12	51	949	
35639	5391347	378720	140	18	66	1171	
35640	5391362	378704	67	9	25	152	
35641	5391376	378691	111	5	26	215	
35642	5391390	378676	29	2	10	99	
35643	5391405	378662	7	2	11	30	
35644	5391418	378649	63	6	29	109	
35645	5391434	378633	16	4	19	37	
35646	5391446	378621	14	3	28	32	
35647	5391460	378608	10	2	32	27	
35648	5391473	378595	27	12	75	82	
35649	5391490	378579	127	31	108	1208	
35650	5391502	378567	57	29	47	1631	
35651	5391516	378553	65	34	38	1209	
35652	5391532	378542	104	51	35	1390	

SAMPLE NUMBER	NORTHING	EASTING	Zn	Cu	Pb	Mn	As
35653	5391543	378527	60	39	49	966	
35654	5391557	378513	67	30	51	1178	
35655	5391573	378498	79	52	52	2054	
35656	5391585	378485	104	62	60	3151	
35657	5391599	378472	64	19	86	351	
35658	5391612	378460	46	15	45	247	
35659	5391627	378445	231	41	55	533	
35660	5391644	378428	108	21	26	836	
35661	5391656	378417	182	17	51	485	
35662	5391670	378403	112	37	32	1963	
35663	5391685	378389	150	40	35	1185	
35664	5391699	378375	57	24	32	168	
35665	5391714	378360	23	6	24	63	
35666	5391728	378346	141	45	67	2483	
35667	5391742	378332	96	29	52	1215	
35668	5391757	378318	97	25	76	1234	
35669	5391770	378305	56	17	68	679	
35670	5391787	378289	106	41	71	2310	
35671	5391798	378278	117	38	57	2979	
35672	5391814	378262	118	48	86	2368	
35673	5391826	378250	118	42	88	1478	
35674	5391842	378235	107	32	63	947	
35675	5391857	378220	85	22	64	201	
35676	5391872	378205	105	29	124	197	
35677	5391886	378192	52	8	41	67	
35678	5391898	378179	23	4	14	27	
35679	5391912	378166	20	5	12	34	
35680	5391928	378151	16	6	6	27	
35681	5391941	378138	13	4	6	23	
35682	5391956	378123	18	5	12	25	
35683	5391969	378110	10	4	5	28	
35684	5391985	378095	23	5	29	26	
35685	5391997	378082	18	6	24	27	

ROGER POLTOCK GEOLOGICAL PTY. LTD.

CLIENT *PASMINKO EXPLORATION*
PROJECT *EL 270, 270*
PROSPECT *SILVER FALLS*

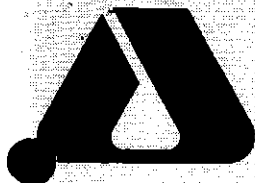
SAMPLE RECORD AND ANALYTICAL DATA SHEET

LABORATORY ANALYSIS
SAMPLE TYPE Rock

COLLECTED BY: *R. B. Duck*
DATE DISPATCHED:
DATE RECEIVED:

A 28306

[illegible]



ANALABS

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

AKI-Beco: lithogeochem
Silver Falls

Phone (004) 316837

14 Thirkell St. DOOE TAS 7320

Fax (004) 318890

ANALYTICAL REPORT No.

111310.60.08675

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.

0180

PROJECT

3009

DATE RECEIVED

30/03/92

RESULTS REQUIRED

ASAP

No. OF PAGES OF RESULTS

2

DATE REPORTED

16/04/92

No. OF COPIES

1

TOTAL No. OF SAMPLES

21

SAMPLE NUMBERS

032949/969

SAMPLE DESCRIPTION

RC Prep : GP029.P4

RC Prep : GP029.P4

ELEMENT/METHOD

Cu,Pb,Zn,Ag/GA140

Whole Rock Analysis/OX408

RESULTS

TO

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

RESULTS

TO

Mr L Kirsner
Pasminco Exploration
P.O. Box 886
BURNIE TAS 7320

RESULTS

TO

REMARKS


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

			111310.60.08675			16/04/92		0180		1 OF 2	
TUBE No.	SAMPLE No.	Cu	Pb	Zn	Ag	Al2O3	SiO2	TiO2	Fe2O3	MnO	
1	032949	-	-	-	-	15.38	72.3	0.39	1.49	0.40	
2	032950	-	-	-	-	10.57	74.8	0.59	5.30	0.05	
3	032951	-	-	-	-	14.47	73.2	0.39	2.33	0.02	
4	032952	-	-	-	-	10.09	81.2	0.25	2.27	0.04	
5	032953	-	-	-	-	17.70	63.0	0.59	4.95	0.60	
6	032954	-	-	-	-	16.37	60.0	1.22	9.64	0.39	
7	032955	-	-	-	-	18.81	68.2	0.52	1.28	0.07	
8	032956	22	1500	81	1	10.20	77.9	0.19	1.55	0.16	
9	032957	<2	1850	57	1	16.23	72.3	0.35	1.63	0.04	
10	032958	6	425	42	1	11.84	79.1	0.24	1.38	0.07	
11	032959	-	-	-	-	14.04	75.5	0.43	1.10	0.01	
12	032960	-	-	-	-	13.10	75.0	0.38	2.64	0.08	
13	032961	-	-	-	-	12.40	77.6	0.26	1.84	0.25	
14	032962	-	-	-	-	11.38	79.9	0.29	1.50	0.01	
15	032963	-	-	-	-	10.40	77.8	0.32	3.91	0.14	
16	032964	-	-	-	-	12.64	76.0	0.36	2.35	0.17	
17	032965	-	-	-	-	11.89	73.9	0.31	2.95	0.43	
18	032966	-	-	-	-	12.09	75.6	0.68	1.77	0.03	
19	032967	-	-	-	-	12.01	78.5	0.31	1.04	0.02	
20	032968	-	-	-	-	13.51	75.9	0.31	0.98	0.01	
21	032969	-	-	-	-	7.84	86.2	0.42	0.82	0.01	
22											
23	DETECTION	2	3	2	1	0.05	0.1	0.01	0.01	0.01	
24	UNITS	ppm	ppm	ppm	ppm	%	%	%	%	%	
25	METHOD	GA140	GA140	GA140	GA140	OX40B	OX40B	OX40B	OX40B	OX40B	

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

801085

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

			111310.60.08675			16/04/92		0180		2 OF 2	
TUBE No	SAMPLE No	CaO	K2O	MgO	P2O5	Na2O	SO3	LOI	TOTAL	AI:	
1	032949	0.08	1.20	0.20	0.111	5.58	0.03	3.14	100.29	19.8	
2	032950	0.04	1.33	2.23	0.085	0.99	0.03	3.70	99.69	77.6	
3	032951	0.08	0.62	0.32	0.102	6.04	0.01	2.33	99.90	13.3	
4	032952	0.02	3.04	0.56	0.015	0.13	0.01	2.44	100.06	96.0	
5	032953	0.12	0.83	0.88	0.089	7.02	0.03	4.10	99.91	19.3	
6	032954	0.16	0.51	2.33	0.131	5.61	0.03	3.60	100.04	33.0	
7	032955	0.05	3.25	0.49	0.126	4.09	0.03	3.23	100.14	47.5	
8	032956	1.29	1.46	0.69	0.028	3.25	0.14	2.93	99.76	32.1	
9	032957	0.05	3.44	0.61	0.035	2.93	0.03	2.51	100.18	57.6	
10	032958	0.04	2.09	0.40	0.026	3.12	<0.01	1.69	100.04	44.1	
11	032959	0.06	2.12	0.31	0.011	4.11	0.01	2.58	100.23	36.8	
12	032960	0.07	2.03	0.31	0.054	3.73	0.02	2.38	99.77	38.1	
13	032961	0.08	1.55	0.31	0.034	4.39	0.10	1.68	100.47	29.4	
14	032962	0.03	2.56	0.48	0.024	1.79	0.01	2.31	100.30	62.6	
15	032963	0.06	1.05	0.17	0.026	3.73	0.03	2.56	100.19	24.4	
16	032964	0.11	1.20	0.22	0.054	5.04	0.02	1.85	99.96	21.6	
17	032965	1.31	1.08	0.39	0.069	4.98	0.02	2.96	100.25	18.9	
18	032966	0.02	1.35	0.57	0.137	0.09	0.04	7.46	99.81	94.6	
19	032967	0.07	1.57	0.37	0.036	3.54	0.02	2.66	100.18	35.0	
20	032968	0.05	1.96	0.44	0.023	2.43	0.01	4.30	99.92	49.2	
21	032969	0.01	2.02	0.53	0.023	0.09	<0.01	1.83	99.81	96.2	
22										K ₂ O + MgO K ₂ O + MgO + Na ₂ O	
23	DETECTION	0.01	0.01	0.01	0.005	0.05	0.01	0.01	0.01		
24	UNITS	%	%	%	%	%	%	%	%		
25	METHOD	OX408	OX408	OX408	OX408	OX408	OX408	OX408	OX408	//	

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. 004 581 884

801086

Phone (004) 316837

14 Thirkell St. CODEE TAS 7320

Fax (004) 313890

ANALYTICAL REPORT No. 111310.60.09384

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.

0128

PROJECT

5009

DATE RECEIVED

19/03/93

RESULTS REQUIRED

ASAP

No. OF PAGES
OF RESULTS

2

DATE
REPORTED

06/04/93

No.
OF COPIES

1

TOTAL No.
OF SAMPLES

5

SAMPLE NUMBERS

34904, 34918, 34919, 34921, 34935

SAMPLE DESCRIPTION

RD Prep : GP029, P1

ELEMENT/METHOD

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

Au, Au(S)/66309

Ba, Sb, Sn/61401

As/GA114

RESULTS

TO

Roger Pollock Geological Pty Ltd
Mineral Exploration Contractor
C/- Post Office
WILMOT TAS 7310

RESULTS

TO

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

RESULTS

TO

REMARKS

AUTHORISED OFFICER

ANALABS

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

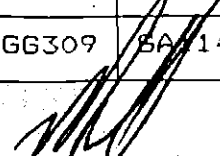
801087

ANALYTICAL DATA

SAMPLE PREFIX			REPORT No.			REPORT DATE		CLIENT ORDER No.		PAGE	
			111310.60.09384			06/04/93		0128		1	OF 2
TUBE No.	SAMPLE No.	Cu	Pb	Zn	Ag	Mn	Bi	Au	Au(S)	As	
1	34904	12	32	68	<1	241	<10	<0.008	<0.008		
2	34918	5	35	100	<1	735	<10	<0.008	-		
3	34919	7	22	93	<1	866	<10	<0.008	-		
4	34921	5	5	144	<1	1076	<10	<0.008	-		
5	34935	12	43	43	<1	246	<10	<0.008	-	30	
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23	DETECTION	2	3	2	1	3	10	0.008	0.008		
24	UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	
25	METHOD	GA140	GA140	GA140	GA140	GA140	GA140	GG309	GG309	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



ANALYTICAL DATA

SAMPLE PREFIX

REPORT No.

REPORT DATE

CLIENT ORDER No.

PAGE

111310.50.09364

06/04/93

0128

2 OF 2

TUBE No.	SAMPLE No.	Sn	Sb	Ba						
1	34904	<3	5	41						
2	34918	<3	<3	458						
3	34919	4	3	251						
4	34921	4	<3	1213						
5	34935	<3	<3	344						
6										
7										
8										
9										
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11										
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13										
14										
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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

Appendix 5

IP Survey Results on Silver Falls Grid



801090

**PASMINCO
EXPLORATION**

A Division of Pasminco Australia Limited,
(Incorporated in Victoria)

Old Burnie Railway Station,
(off Marine Terrace)

Postal Address:

P.O. Box 886, Burnie
Tasmania, Australia, 7320

A.C.N. 004074962

MEMORANDUM

TO: R Poltock
FROM: NA Hughes
DATE: 12th May 1993
FILE: EP/02/3009
SUBJECT: Interpretation of Induced Polarisation and Resistivity survey results from on BOCO EL 2/90 and EL 4/90

Introduction

During February, 1993 Scintrex Ltd of Perth were contracted to perform Induced Polarisation and Resistivity Surveys on Pasminco's BOCO grid, EL 2/90 and EL 4/90.

Eight lines were surveyed for a total of 16.8 line kilometres (MAP 1). The line separation on the grid is 400m. A pole-dipole array was used with a dipole separation of 100m and 6 dipoles separations recorded at each station ($n = 1$ to 6). For all lines the travel direction was from west to east with the current injection point east of the measuring array. The survey was stopped before completion because of poor weather conditions and equipment breakdown. Line 12800N remains to be surveyed.

The equipment used for the surveys were an IPR12, Time Domain Receiver, and a TSQ3, Time Domain Square Wave Generator, Transmitter. The transmitter cycle consisted of an interrupted square wave (2 seconds ON : 2 seconds OFF : 2 seconds ON reversed polarity : 2 seconds OFF)

Several of the data points have been interpreted to be invalid, due to current leakage or poor placement of porous pots (used in the measurement of the dipole potential), and as such neglected.

The data is interpreted in conjunction with a 1979 Aberfoyle IP/Resistivity survey on a grid directly south of the BOCO grid (MAP 1). The details of this survey can be found in Open File 79-1380. This survey used a dipole-dipole array with a dipole separation of 50m, and 6 dipole separations recorded at each station, and was done with Frequency Domain equipment.

Interpretation of Results

The data from both surveys have been compiled onto a compilation plan map (MAP 1) at a scale of 1 : 25000. The map shows the survey lines, chargeability anomalies and zones, and resistivity trends. Interpreted and mapped geological boundaries of the units of interest; the Pinnacles Rhyolite and the base of the White Spur Formation are shown on Fig 5(annual report). The data from the 1993 survey is also presented as stacked pseudosections of the M10 (mV/V) chargeability channel and Apparent Resistivity (ohm-m), at a scale of 1 : 5000.

The 1979 Aberfoyle survey detected several anomalous responses within, or at the contact of the Pinnacles Rhyolite and the Quartz Crystal Sandstone. The best defined and strongest anomaly is on line 4100N at 5000E to 5100E with an amplitude of 4 pfe. Responses on all lines indicate the cause of the anomalies to be close to surface (less than one dipole separation) and mostly depth limited. The low chargeability zone to the west of the grid correlates to the Stitt Quartzite.

The objectives of the Pasminco IP survey was to map the extension of the Pinnacles Rhyolite chargeability anomalism north of the Aberfoyle grid and also to test for chargeability anomalies at the base of the White Spur Formation.

A review of the chargeability pseudo cross sections indicates that no significant anomalies were detected with the survey. A compilation of chargeability anomalies is given on MAP 1. They are graded as weak and moderate. A moderate anomaly is one that has a well defined shape and amplitude double that of background. A weak anomaly is defined by chargeabilities greater than background. Anomalies showing line to line correspondence and having similar features have been grouped into zones.

Zone A

On the main BOCO grid there is an increase in chargeability to the southwest, east of the baseline and south of line 11200N, with the best responses on lines 10400N and 10800N at 10600E to 10800E, with amplitudes of 14 mV/V for channel 10.

This zone appears to correlate to the zone of increased chargeability mapped on the Aberfoyle grid. The fact that the zone is not associated with the Pinnacles Rhyolite indicates the source of the anomalism may be related to NW and NE faulting, as indicated by mapping and aeromagnetics (see Fig 6 annual report).

Zone B

Zone B is defined across three lines with the strongest response on line 12400N, amplitude 11 mV/V. This zone appears to be entirely within the Stitt Quartzite although it may mark

the boundary with the Southwell subgroup.

Zone C

Zone C is interpreted on two lines, with the strongest response on line 12400N, amplitude 11mV/V, and appears to be associated with a subtle magnetic high trend.

Lines 10400N and 14000N

Both lines, west of 11000E, have increased background chargeability values. There is no clear chargeability anomaly at the base of the White Spur Formation on either line, although there is a slight increase at the contact.

There is little variation in resistivity values across the grid. However, a slight increase in resistivity to depth near 10400E on lines 10000N to 11600N may indicate a silicified fault or cross structure. A slight decrease in resistivity values to the west of the grid may map a fault zone or the boundary of the Stitt Quartzite and the Southwell Subgroup.

Conclusions

The Induced Polarisation and Resistivity survey on the BOCO grid failed to detect any strong chargeability or resistivity (lows or highs) anomalies.

There was no chargeability anomalies associated with the Pinnacles Rhyolite north of the Aberfoyle grid.

There was reasonable correlation between the Aberfoyle IP data and the present survey data where the grids overlapped.

The base of the White Spur Formation appears to be weakly chargeable, with respect to background, on the lines surveyed.

Zone A appears to be terminated to the north by a NW trending structure (see Fig.6 Annual Report).

Zone B appears to be at the contact of the Stitt Quartzite and the Southwell Subgroup.

Zone C appears to be related to a magnetic high trend within the Southwell Subgroup.

Recommendations

1. The IP data be compared to geochemistry results. It is expected that since the source of the IP anomalies is shallow that those of interest should have a correlateable geochemical anomaly.

2. Correlate percentage metallic sulphides from areas of known mineralisation and areas of barren mineralisation to those measured with the IP method to determine if further surveying would be useful.

3. The lack of a clear anomalous IP signatures at the base of the White Spur Formation or from the Pinnacles Rhyolite do not negate the further use of the IP/Resistivity method as long as there is minimal sulphides associated with those areas already surveyed.

REFERENCES

Taylor J.F., 1979 Aberfoyle Exploration. Marionoak River EL 22/74 Tasmania. Report for year ending August, 1979. Open File Report 79-1380

KEYWORDS and LOCALITY

BOCO, SILVERFALLS, ABERFOYLE, INDUCED POLARISATION, RESISTIVITY, POLE-DIPOLE, DIPOLE-DIPOLE, TIME DOMAIN, FREQUENCY DOMAIN, PFE, OHM-M, mV/V, AEROMAGNETICS, STITT QUARTZITE, PINNACLES RHYOLITE, QUARTZ CRYSTAL SANDSTONE, WHITE SPUR FORMATION, LYNCHFORD TUFF, SOUTHWELL SUBGROUP

APPENDIX

Time gates for the IPR12 IP Receiver

All times in milliseconds, measured from the end of the ON cycle.

Slice	Start	End
4	50	70
5	70	110
6	110	150
7	150	230
8	230	310
9	310	450
10	450	590
11	590	820
12	820	1050
13	1050	1410
14	1410	1770

Pasminco Exploration Ltd

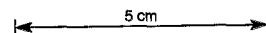
BOCO, EL2/90
Silver Falls Grid

Survey Parameters

Pole-dipole Array
 $a = 100\text{m}$; $n = 1$ to 6
 TD - East; C1 - East
 Equip: IPR12/TSQ3
 Timing: 2s ON; 2s OFF
 Survey: March, 1993

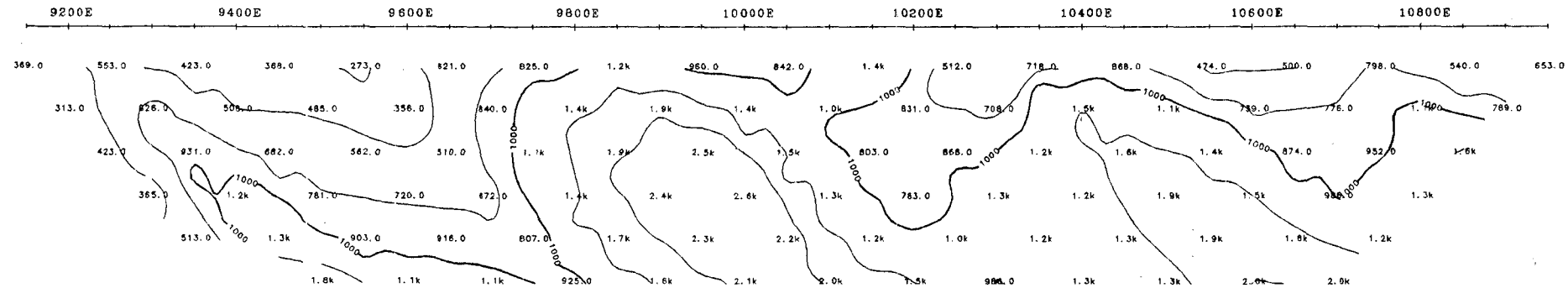
Line 12400N

Scale 1 : 5000

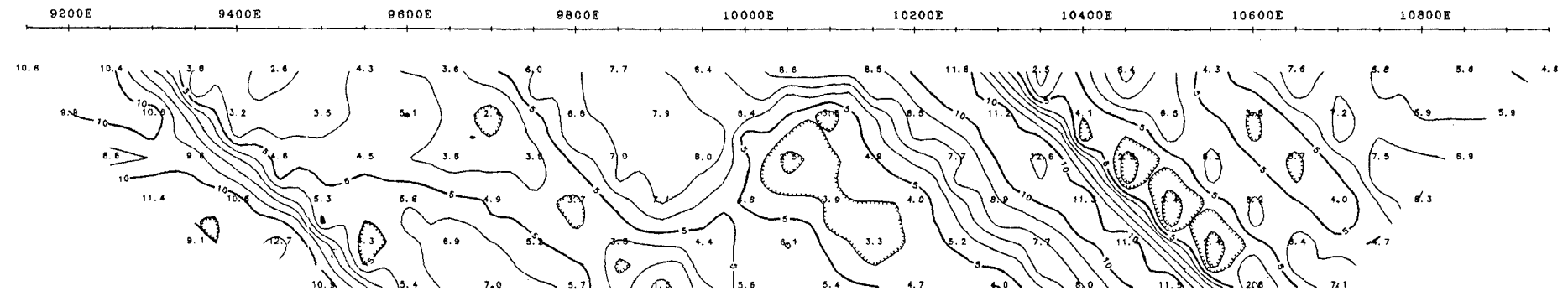


IP & Resistivity Survey

RHO



M10



Pasminco Exploration Ltd

BOCO, EL2/90
Silver Falls Grid

Survey Parameters

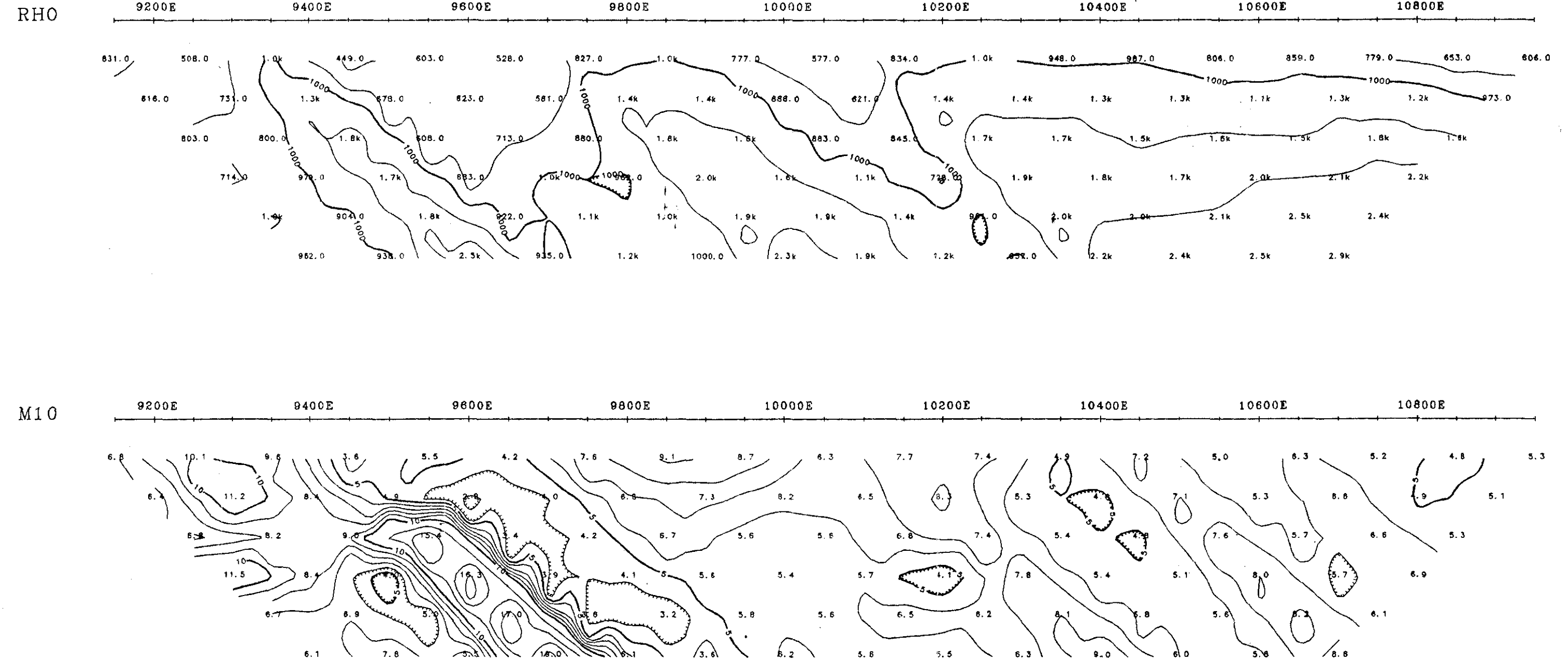
Pole-dipole Array
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TD - East; C1 - East
Equip : IPR12/TSQ3
Timing: 2s ON: 2s OFF
Survey : March, 1993

Line 12000N

5 cm

Scale 1 : 5000

IP & Resistivity Survey



BOCO, EL2/90
Silver Falls Grid

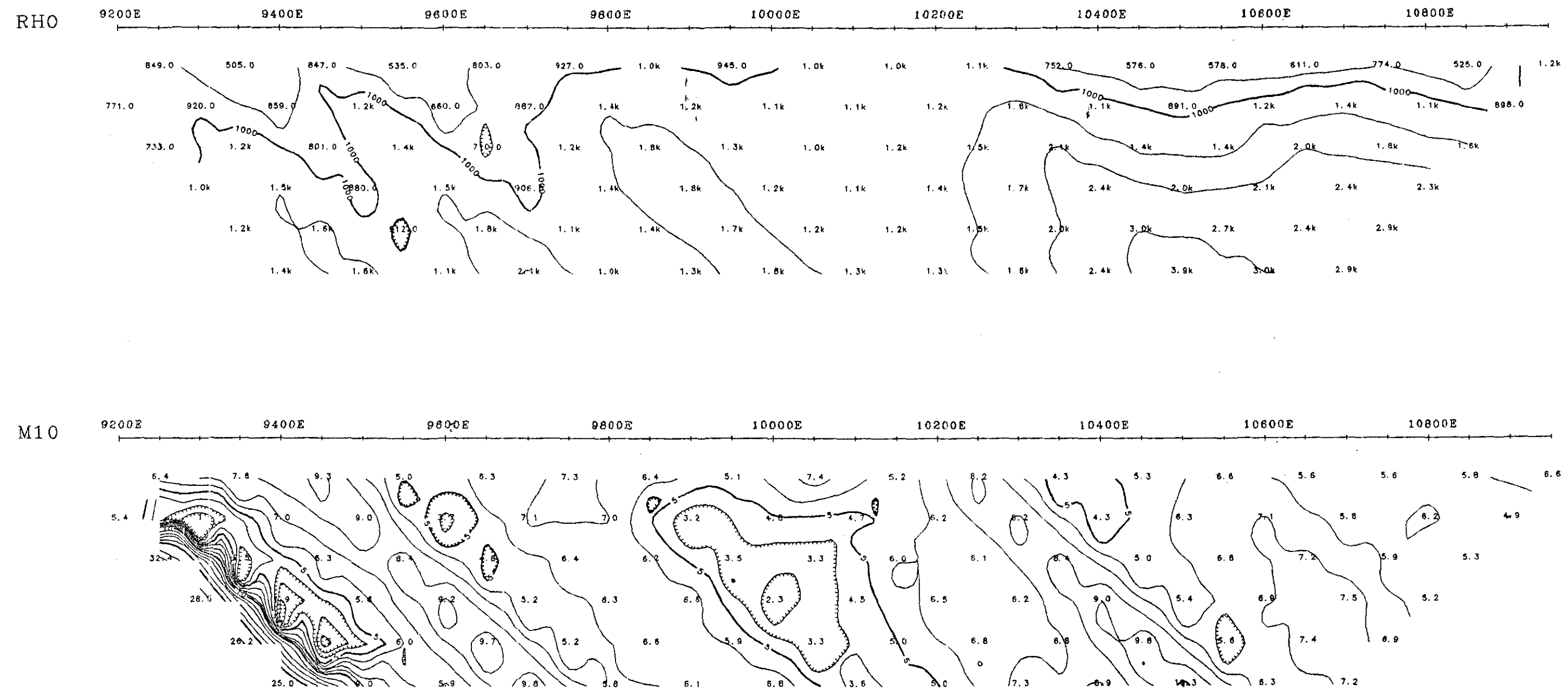
Survey Parameters

Pole-dipole Array
a = 100m; n = 1 to 6
TD - East; C1 - East
Equip : IPR12/TSQ3
Timing: 2s ON: 2s OFF
Survey : March, 1993

Line 11600N

Scale 1 : 5000

IP & Resistivity Survey



BOCO, EL2/90
Silver Falls Grid

Survey Parameters

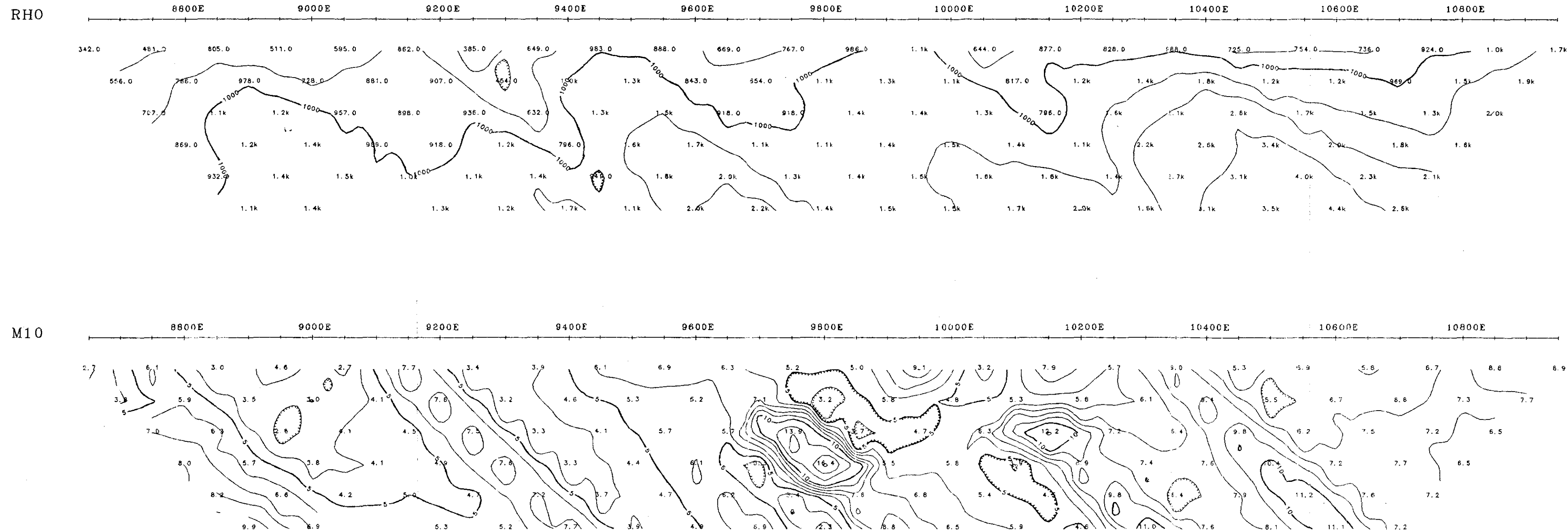
Pole-dipole Array
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TD - East; C1 - East
Equip : IPR12/TSQ3
Timing: 2s ON: 2s OFF
Survey : March, 1993

Line 11200N

Scale 1 : 5000



IP & Resistivity Survey



Pasminco Exploration Ltd

BOCO, EL2/90
Silver Falls Grid

Survey Parameters

Pole-dipole Array
 $a = 100m$; $n = 1$ to 6
 TD - East; CL - East
 Equip: IPR12/TSQ3
 Timing: 2s ON; 2s OFF
 Survey: March, 1993

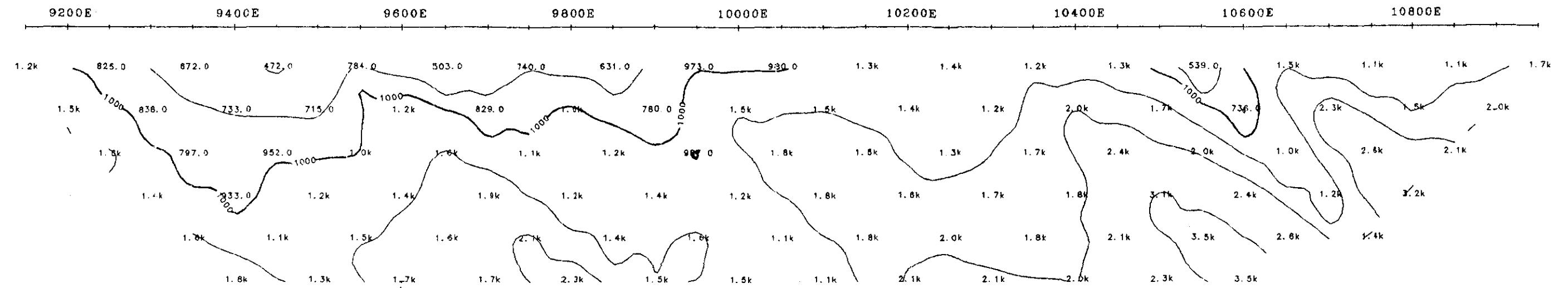
Line 10800N

5 cm

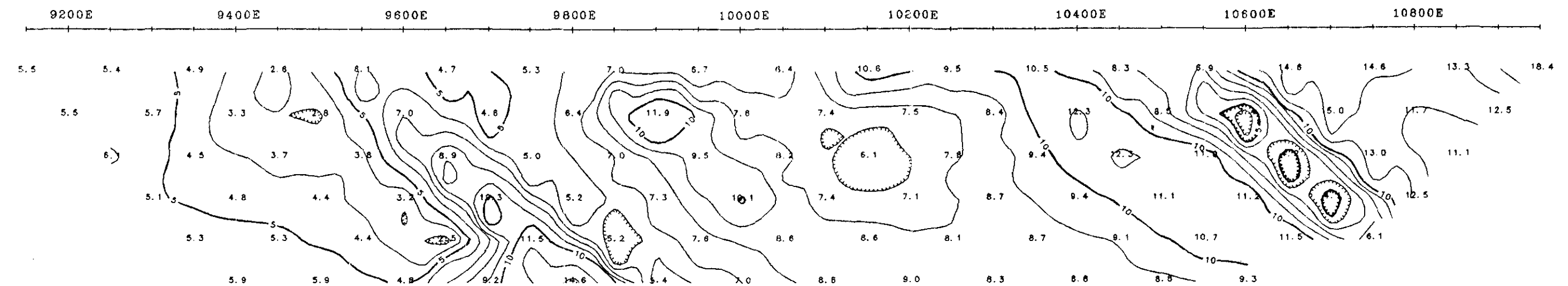
Scale 1 : 5000

IP & Resistivity Survey

RHO



M10



BOCO, EL2/90
Silver Falls Grid

Survey Parameters

Pole-dipole Array, 6

a = 100m; n = 1 to 6

~~TD - East, CI - East~~
~~SL - East, LBR - East~~

Timing: 2s ON: 2s OFF

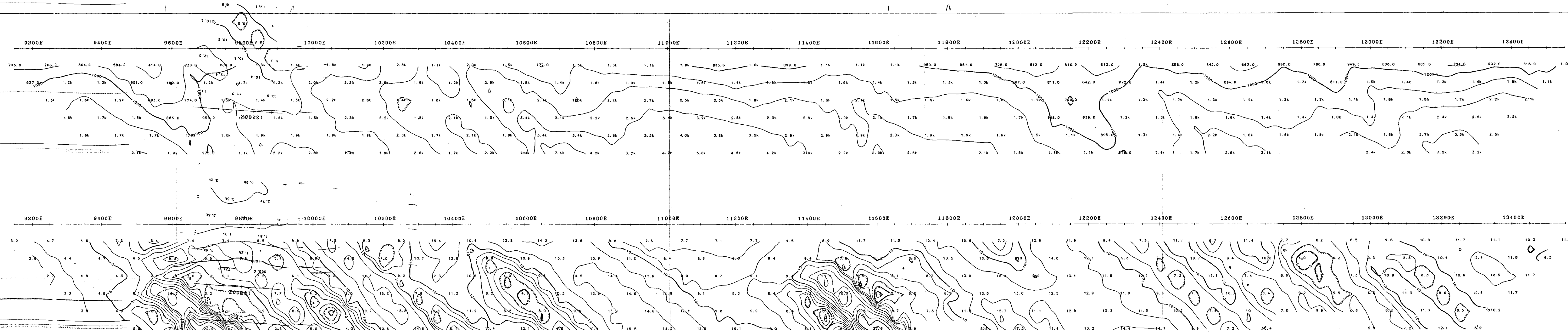
Survey : March, 1993

Line 10400N

Scale 1 : 5000



IP & Resistivity Survey



BOCO, EL2/90
Silver Falls Grid

Survey Parameters

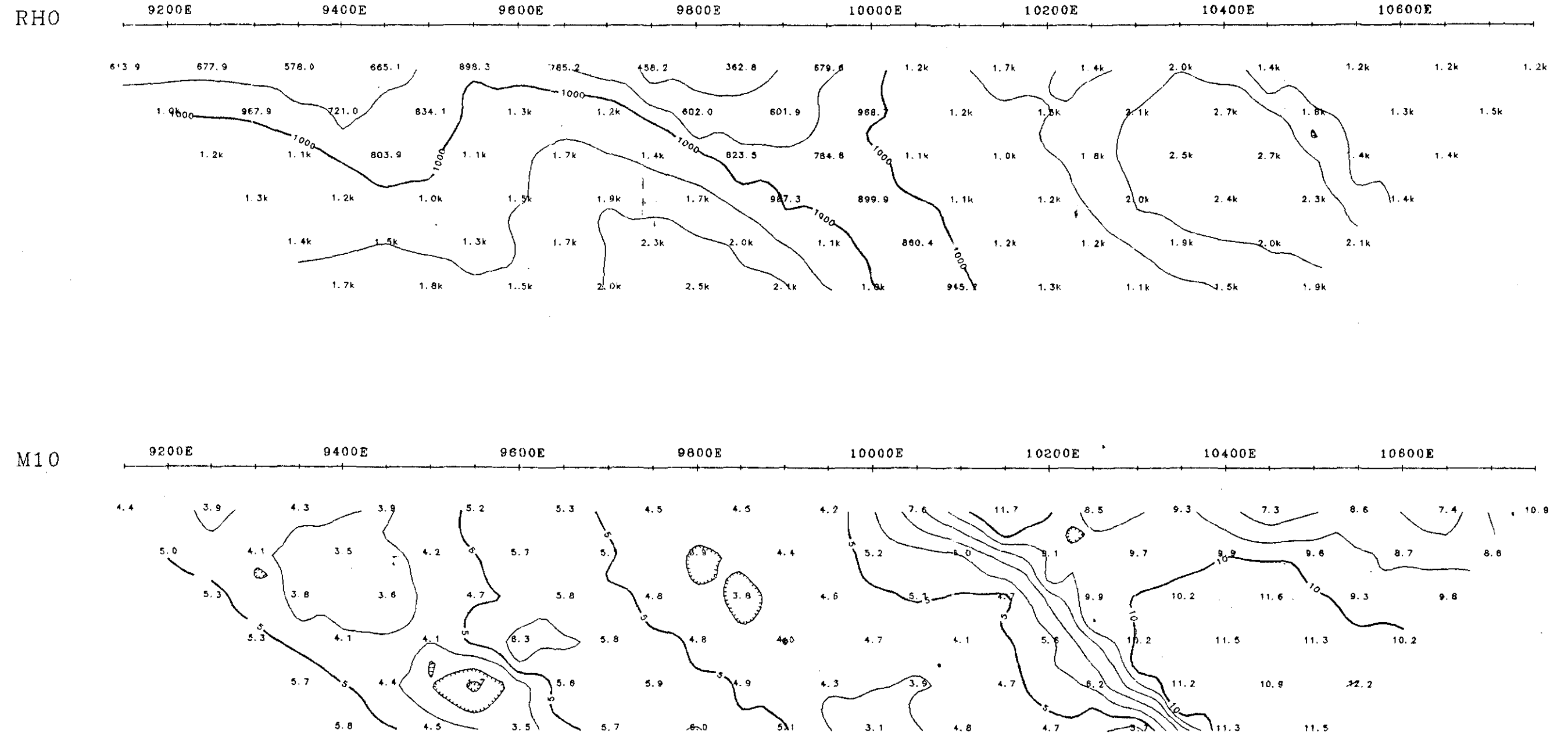
Pole-dipole Array
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Equip : IPR12/TSQ3
Timing: 2s ON: 2s OFF
Survey : March, 1993

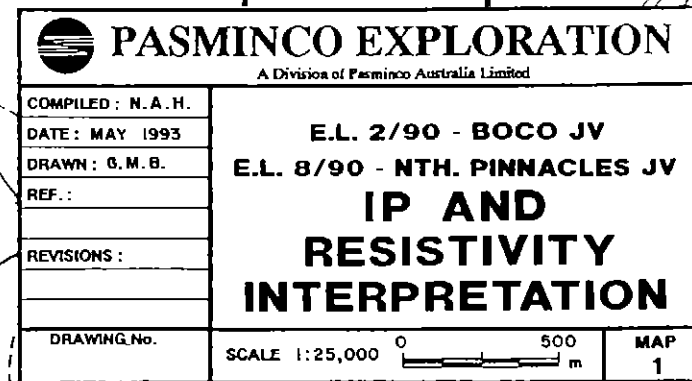
Line 10000N

Scale 1 : 5000



IP & Resistivity Survey





Appendix 6

Reassessment of Geophysical Data over the Silver Falls Grid



**PASMINCO
EXPLORATION**

MEMORANDUM

TO: R Poltock

FROM: NA Hughes

DATE: September 01, 1993

FILE: EP/02/3009

SUBJECT: Reassessment of Electrical Geophysical Data over the Silver Falls (EL2/90) and North Pinnacles Grids (EL4/90).

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

Summary

A review of extant electrical geophysical data over the Silver Falls and North Pinnacles Grids, EL2/90 and EL4/90, failed to reveal any anomalies worthy of follow-up, save perhaps ground checking.

Silver Falls Extension Grid

Two reconnaissance style IP and Resistivity surveys have been conducted over this area, both by Scintrex, in 1979 and 1993. The first survey for EZ used a dipole-dipole array with a 100m dipole separation, the second survey for Pasma Exploration used a pole-dipole array with a 100m dipole separation. The second survey was initiated to obtain greater coverage over the contact of the Pinnacles Rhyolite and White Spur Formation, and was run on lines striking N45W to account for local strike, whereas the first ran along EW lines.

Neither survey detected any significant chargeability anomalies, however several moderate strength (double background) anomalies are noted. No drilling has been done on the grid to date.

North Pinnacles Grid

An IP and Resistivity survey was conducted over the area during 1979 by Scintrex on behalf of EZ, and a large loop TEM survey by Geoterrex on behalf of Outokumpu/Pancontinental in 1987.

The IP and Resistivity survey used a dipole-dipole array with a dipole separation of 100m. No significant anomalies were detected, however several of the better defined anomalies were detailed using a dipole separation of 40m, the results of which indicate a more polarisable near surface. Drilling of coincident IP and geochemical anomalies intersected disseminated base metal sulphides but no massive sulphides.

The IP and Resistivity data have been Fraser Filtered and then contoured to aid in line to line comparison of results (Figures 1 and 2). Also shown on the figures is the contact of the Pinnacles Rhyolite and the White Spur formation and location of drill-holes.

The large loop TEM surveys undertaken by Pancontinental and Outokumpu failed to detect any significant anomalies. An early time response is noted on line 10200N at station 10000E (5387100mN, 378600mE) in both the in-line and vertical components. The fact the response has a reversed polarity would indicate a source close to surface (at surface) and dipping east. This position is at the contact of the Pinnacles Rhyolite and the White Spur Formation and east of an IP anomaly. The anomaly is not detected on lines to the south or north, nor is it detected by resistivity surveying.

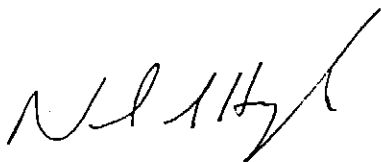
Conclusions

No significant IP or EM anomalies were detected on either grid. The two IP anomalies detected on the North Pinnacles Grid have been drill-tested.

Recommendations

For the North Pinnacles Grid it is recommended that the position of the weak EM anomaly be ground checked to determine a source, either a contact or change in the conductivity and/or thickness of the cover.

For the Silver Falls Grid it is recommended that the data from the 1979 and 1993 IP surveys be merged and imaged/contoured for future reference and as a mapping aid for geology.



Neil

REFERENCES

Howland-Rose, A.W. 1979, Comments on Additional Dipole-dipole EIP surveys over the North Pinnacles Grid, Rosebery Area, Tasmania, on behalf of Electrolytic Zinc Company of Australasia Limited

Howland-Rose, A.W. 1980, Comments on Dipole-dipole Reconnaissance Surveys, Silver Falls Grid, Near Tullah, Tasmania, on behalf of Electrolytic Zinc Company of Australasia Limited

Hughes, N.A. 1993, Pasminco Exploration Memorandum. Interpretation of Induced Polarisation and Resistivity Results from BOCO EL2/90 and EL4/90.

Mill, J.H.A. 1981, Electrolytic Company of Australasia Limited. Bulgobac Exploration Licence E.L. 12/72. Progress Report on Activity, July, 1980 - June, 1981

Mollison, A.J. 1980, Electrolytic Company of Australasia Limited. Bulgobac Exploration Licence E.L. 12/72. Progress Report on Activity, October, 1979 - June, 1980

Wilson, D.R. 1987, Report on an EM37 Survey, North Pinnacles Prospect, Bulgobac E.L. 12/72. Tasmania

North Pinnacles (Fraser Filtered) IP

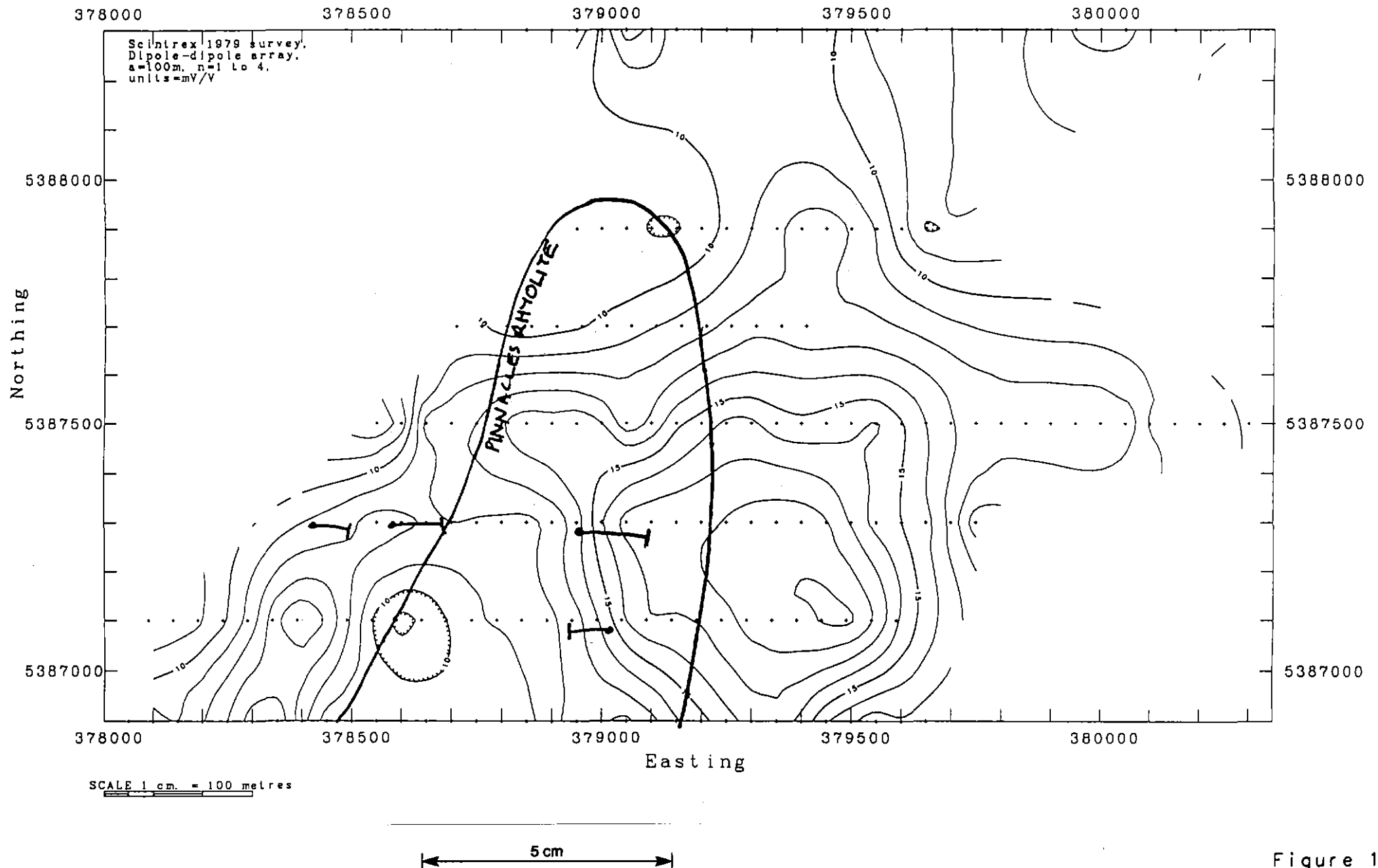


Figure 1

801108

North Pinnacles (Fraser Filtered) Resistivity

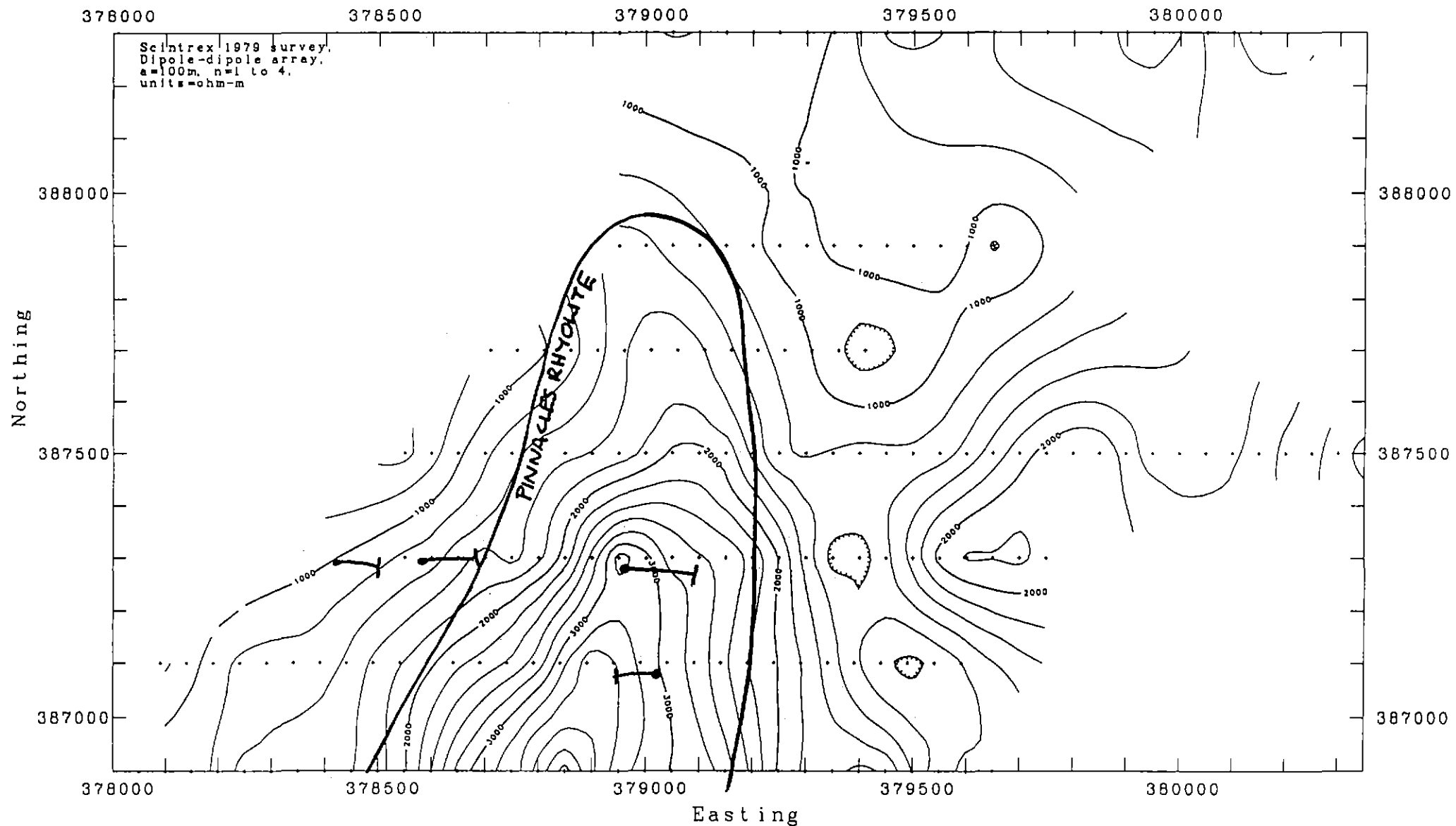


Figure 2

801109

MEMORANDUM

Append 111

TO: R Poltock
 FROM: NA Hughes
 DATE: October 19, 1993
 FILE: EP/02/3009

SUBJECT: Merging of the 1979 and 1993 IP and Resistivity
 Data sets over the Silver Falls (EL2/90) Grid.

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

Two reconnaissance style IP and Resistivity surveys have been conducted over the Silver Falls Grid, both by Scintrex, in 1979 and 1993. The first survey for EZ used a dipole-dipole array with a 100m dipole separation and four potential dipoles read from each current set up, the second survey for Pasminco Exploration used a pole-dipole array with a 100m dipole separation and six potential dipoles read per current set up.

The second survey was initiated to obtain greater coverage than the first over the contact of the Pinnacles Rhyolite and Whiter Spur Formation, and was run on lines striking N45W to account for local strike, whereas the first ran along EW lines.

The data for both surveys have been merged into a common data set for future reference. For the 1979 data this involved digitising all the data points into files, since it was only available as pseudosections, and then fraser filtering the results. For the 1993 survey the data for the first four dipoles were fraser filtered for the resistivity and tenth channel of chargeability (450 to 590 milli seconds for a 2 second bipolar interrupted transmitter pulse).

The data from the 1993 data was converted from grid coordinates to AMG coordinates as to match those of the 1979 survey.

To grid both data sets together the 1979 data was "normalised" to the 1993 data by adjusting the 1979 data to have the same mean and standard deviation as the 1993 data set. This is done by first finding the mean and standard deviation for both grids and then calculating a "normalised" value for the 1979 data using the formula :

$$m_1 = (m_0 - \mu_0) \times \sigma_1 / \sigma_0 + \mu_1$$

Where: m_0 = 1979 IP value m_1 = "normalised" IP value
 μ_0 = 1979 mean value μ_1 = 1993 mean value
 σ_0 = 1979 std deviation σ_1 = 1993 std deviation

(from Whitaker, 1991)

Figure 1 shows the IP and Resistivity coverage from the two surveys. Figures 2 and 3 are contour plan maps of the IP and Resistivity results for the combined grid. A copy of the digitised data for the 1979 survey and the combined fraser filtered results are attached.

Neil

NAH024.93

Telephone (03) 288 0333 Facsimile (03) 288 0211

REFERENCES

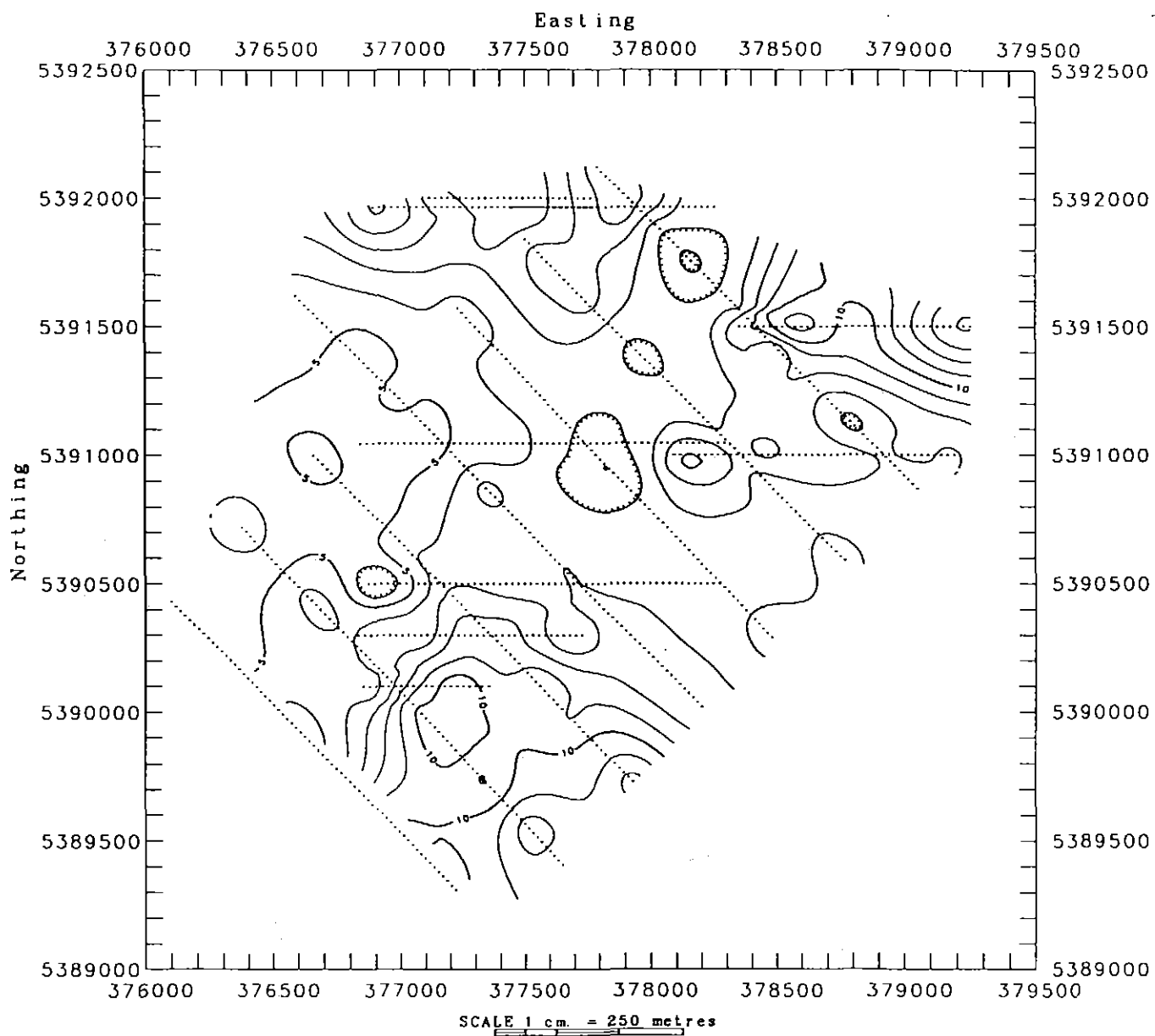
801110

Basford, P.W. 1992, Pasminco Exploration Report. A Compilation of the IP and Resistivity Data Collected on the Little Broken Hill E.L. (HL213,BH59)

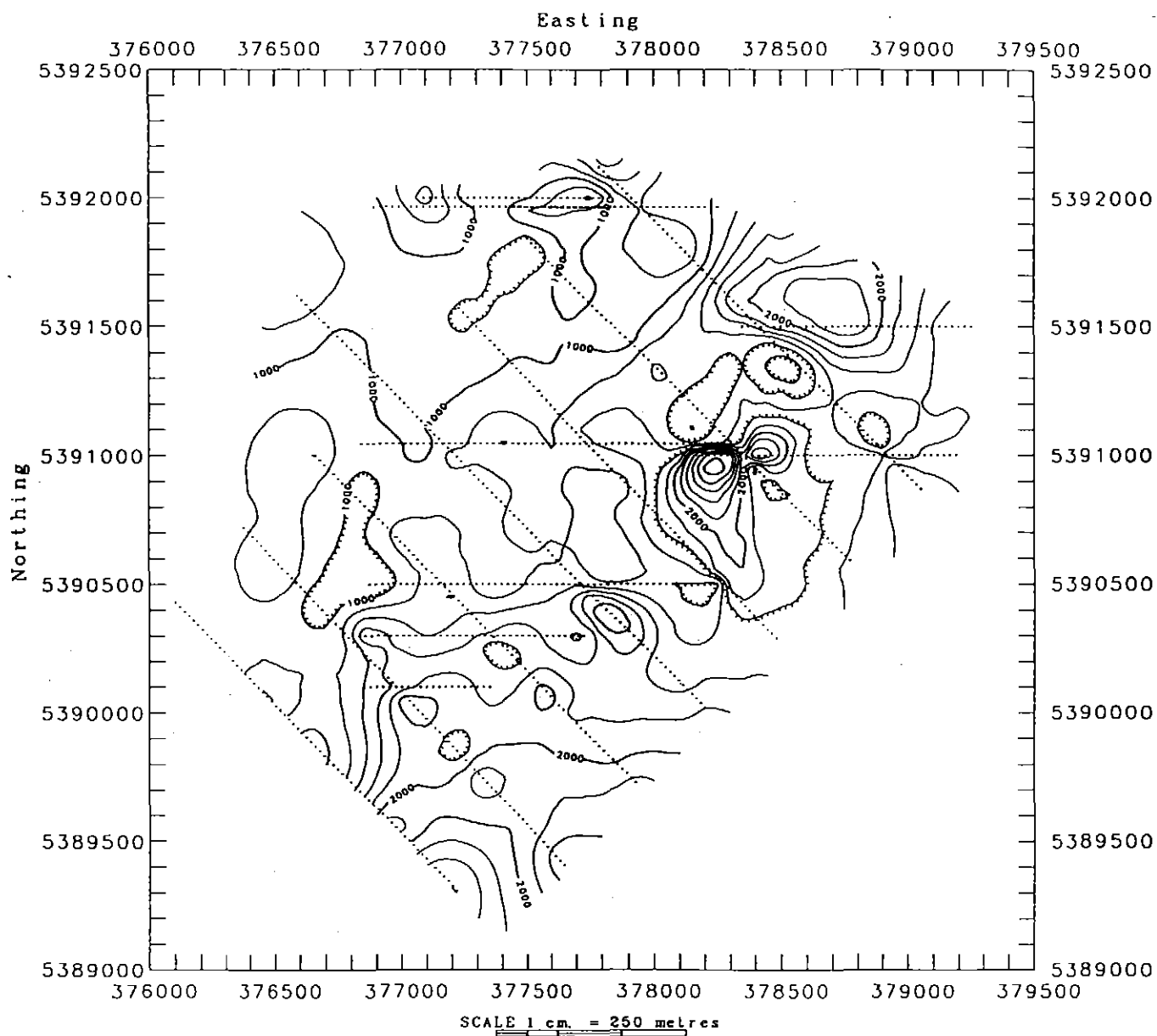
Howland-Rose, A.W. 1980, Comments on Dipole-dipole Reconnaissance Surveys, Silver Falls Grid, Near Tullah, Tasmania, on behalf of Electrolytic Zinc Company of Australasia Limited

Hughes, N.A. 1993, Pasminco Exploration Memorandum. Interpretation of Induced Polarisation and Resistivity Results from BOCO EL2/90 and EL4/90.

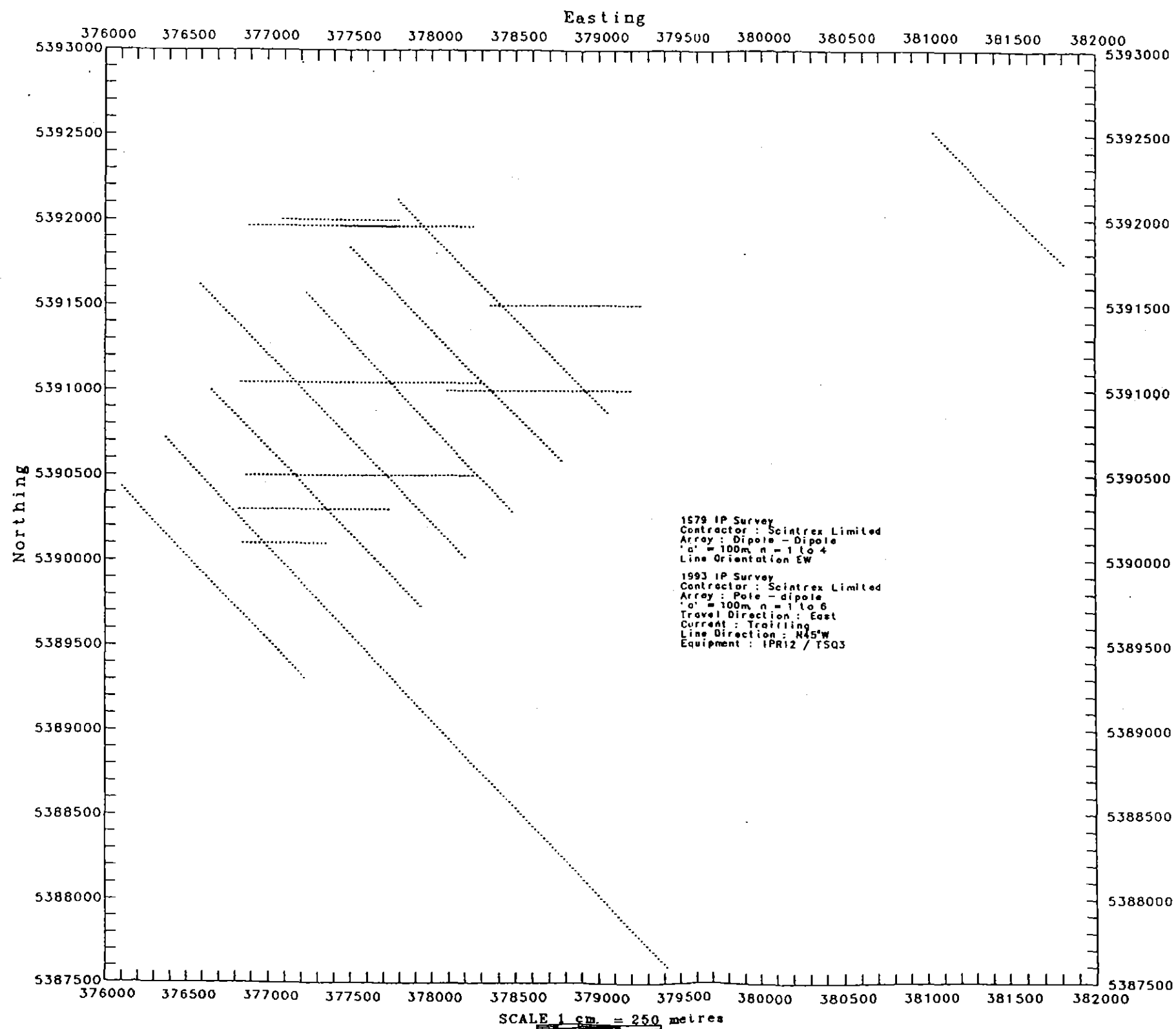
BOCO EL 2/90 : IP Contour Map (mV/V)



BOCO EL 2/90 : Resistivity Contour Map (ohm-m)



BOCO EL 2/90 : IP Coverage 1979, 1993



Appendix 7

Aeromagnetic Survey Acquisition Report

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

801115

AEROMAGNETIC SURVEY
EL 2/90 - BOCO AREA

ACQUISITION REPORT
(INCLUDING PRELIMINARY INTERPRETATION)
for
PASMINCO EXPLORATION

by
Dr. D.E. Leaman

June 1991

BOCOMAG

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SUMMARY

A new high resolution helicopter aeromagnetic survey of the Bulgobac - Boco region between Burns Peak and Que River in western Tasmania has revealed dissimilar terranes and suggested explanations for many aspects of the structure.

This report describes specification and acquisition of the survey. It also includes a preliminary discussion of possible implications but further interpretation requires some re-examination of specific features observed at, or near, known mineralised sites such as Boco or which affect significant volumes of the Mt Read Volcanics such as west of Mt Block. Any further examination must use observed rather than processed contour data and fully compensate for terrain effects due to the subtlety of many responses.

The most obvious features of the magnetic field trend NE-SW. These clearly reflect compositional variations within the volcanic piles in the eastern part of the area but no obvious explanation is available for the large response in the west of the area. Extant surface mapping does not provide any realistic clues.

Other trends and lineaments can be recognised. These display NW-SE, N-S and sub E-W orientations approximately. It is not yet possible to define the relative significance of these features. Such features probably represent transverse or conjugate fracture sets and some clearly truncate shallow source texture. The large E-W effects have been noted regionally and are associated with mineralisation. Features associated with the Mt Read Volcanics can not generally be traced into Dundas Group rocks.

The largest anomaly observed in the survey area can be associated with mafic members of the Cambrian sequence on the basis of inferred properties and ultramafic rocks are presumed. The source appears to be localised, roughly tabular and very deep (3 to 6 km). Much more work is necessary to resolve the nature and implications of such a feature.

The Dundas Group rocks, including the mafic source at depth, are structurally overlain by slabs of the Mt Read Volcanics and the whole folded. Volcanic members dip steeply and several magnetic units may be inferred. Structural patterns or lineaments within the volcanics contrast with those inferred within the Dundas Group below.

This review has considered the possible origin of the anomaly patterns observed in the west of the area as well as within the volcanics. Mapped sedimentary rocks west of Bulgobac do not appear to explain the magnetic field and some review mapping and property studies are essential.

Mineralisation at Boco is associated with a N-S to NNE trending arc of negative anomaly consistent with alteration of the volcanics. It is terminated south of Boco by a major E-W feature.

Mineralisation at Silver Falls is marginal to the regional magnetic feature in the west of the area and may be linked with major fractures.

INTRODUCTION

EL 2/90, Bulgobac, is located north and east of Pinnacles in western Tasmania (Figure 1). Boco Siding is in the south east of the area. It includes the northern exposures of the Central Volcanic Sequence of the Mt Read Volcanics and includes mineralisation in the Boco area.

Gravity and magnetic data in the area have only been reviewed in regional terms previously (Leaman, 1986a, b; 1988). Results indicated that these data sets could reveal much information about structural setting and control within the area and further analysis was recommended. The regional data available were shown, however, to lack resolution due to line spacing or terrain clearance excesses.

This report describes a detailed aeromagnetic survey undertaken to upgrade the regional data base. The principal aims of this survey were to

- a) define alteration within the volcanics,
- b) assess structural controls,
- c) aid mapping and subdivision of the volcanics and
- d) identify any mineralisation signatures present.
- e) review anomalous character within the Dundas Group rocks.

A detailed, high resolution survey was specified.

This report outlines survey specification, presents the results of survey and provides a preliminary outline of implications and interpretation.

The report forms a basis for idea generation and testing with suggestions for further analysis.

MAGNETIC SURVEY

SPECIFICATION

Specifications for the survey were determined by the previous experience provided by the Mines Department survey (Leaman, 1986a), other recent (1990) surveys for Pasminco Exploration, and the need to resolve possible alteration features, subtle trends, and the contribution due to various parts of the Cambrian volcanic pile. Leaman (1986) has established the general viability of magnetic methods for assessment of alteration and mineralised sites in areas free of strong interference effects such as introduced by Tertiary basalt or Cambrian ultramafics.

Many of the features sought are known to be subtle and all previous regional data has lacked the necessary data resolution - in terms of low clearance, close sampling and line density. Detail, once lost due to variable or excessive clearances, is not recoverable. Since the reliability of the regional data set was not known, and there is limited information available on the variability of contrasts within the volcanics it was important to ensure that a fair and substantial trial of the application was permitted. The best practicable specification was defined.

Line spacing: 100 metres E-W
Tie line spacing: 1000 metres N-S
Nominal terrain clearance: 80m.
Sample interval: < 10 m.
Magnetometer sensitivity: < 0.1 nT.

The line balance and orientation reflects a general compromise in order to obtain cost effective coverage, the general form of the terrain and the need to define sub E-W or NW-SE and SW-NE trends as suggested by regional analysis of the Mines Department survey. Rigorous draping necessitated use of a helicopter. Use of fixed wing aircraft, a higher nominal clearance and general wide variation in that clearance effectively destroyed the resolving power of the Mines Department survey across the important, relatively low relief magnetic field environment associated with Cambrian volcanics and adjacent Dundas Group. Only high relief features were defined by that survey in this area.

Multichannel radiometric data were also specified but no commitment was made toward processing of that data pending inspection of the raw data.

(This data has not yet been fully processed and it is possible that no further analysis will be undertaken).

SURVEY

The survey was flown between February 1 and 8, 1991 by Geo Instruments Pty Ltd under the supervision of Zoltan Beldi using a G833 helium vapour magnetometer in a towed bird and a Geometrics GR800 spectrometer. The survey was flown using an Aerospatiale Squirrel helicopter.

An equivalent magnetometer was used as base station and the survey was completed over several days.

Survey tracking was visual supported by colour video using topographic basemaps and aerial photographs with a recovery scale of 1: 10000. Data pickup was undertaken by D. Morrison.

Total line coverage was about 700 km. Line recovery and line location details are presented in Map 1 (folder).

PROCESSING

Flight path digitising, processing, gridding and mapping were performed by Kevron Geophysics and D. Morrison.

IGRF 1990 updated to 1991.3 was removed from the data and a scalar of 62000 nT added to residual data.

The stability of gridding and acquisition was tested and the many cross ties generated by this survey were adjusted by spline interpolations in both directions.

A contour interval of 2 nT was selected for the primary presentation (Map 3 - folder). Stacked profiles are presented in Map 2.

Radiometric data have not been corrected, levelled or compiled.

DATA PRESENTATION

Maps 1, 2 and 3 (folders) provide detailed presentation of the survey coverage, observed profiles and contours of the magnetic field at 1: 10000 scale.

Maps used as bases have been derived from Corbett & McNeill (1986). See Figure 4A.

The specifications were closely approximated for this survey. The effective terrain clearance was 80-100 m for the entire area and the line coverage, including tie line intersections, was satisfactory. The 0.01 nT precision, 0.2 second sampling, or spacing of about 7m, exceeded these conditions. Note that the map legends indicate a tie line spacing of 2000 m; 1000 m was observed (Map 1).

COMPARISON WITH PREVIOUS DATA

The previous regional survey described by Corbett et al (1982) and Leaman (1986a) has been reproduced as Figure 2 and may be compared with the new survey (Figure 3). Contour intervals are 2 nT for the new survey and 5 or 10 for the old.

The regional survey can be seen to provide a reasonably reliable view of the magnetic field in terms of the location and identification of all significant responses but there was clearly considerable loss of resolution and definition in many areas. Specific examples relate to the western exposures of the volcanics, the shoulder and compound detail on large anomalies and the differentiation of responses in the anomalies in the west of the area.

The lower clearance, higher resolution and better constrained flight path with closer line spacings has considerably improved feature recognition and location. The significance of some of this detail is discussed below.

Character correlation of the older data was used to suggest possible sub E-W alteration corridors (approx 5386 000 and 5394 000 mN) and many NE-SW and NW-SE fractures generally (see Leaman, 1987). The validity of many of these was unknown. Alteration responses had not been recognised previously.

The large sub-circular anomaly in the centre of the survey (and central to Figure 2) was described by Leaman (1986a) and associated with a slice of ultramafics trapped in fault surfaces which may dip east at some depth. Regional magnetic modelling of this region suggested conflicting dip arrangements for possible sources and no conclusions about the source was offered.

Other features, such as the belt of anomalies in the western part of the area, the low amplitude variations on the main anomaly and the diverse character of responses associated with volcanics in the south eastern part of the area have not been examined previously in any detail.

INTERPRETIVE COMMENTS

The following comments outline possible correlations and implications within, and of, the data set with respect to exposed geology and mineralised sites.

The principal object of this discussion has been to assess observed features and possible identification of patterns and relationships which may lead to explanation of known sites and prediction of possible targets for follow-up study.

FEATURES OF THE MAGNETIC FIELD

The features and elements of the magnetic field are best displayed in Figure 3D.

Three principal characteristics are evident.

These include a large central anomaly and superimposed character; some of which is very subtle and some which reflects rocks of moderate magnetisation.

The very large anomaly centred just west of the surveyed area dominates the magnetic field. The pervasive influence of the source extends across a radius of at least 6 km and normal gradients are evident to north and east. Some truncation is evident along its SE aspect, however. The scale of the effect and the magnitude and consistency of the observed gradients imply that the source is deep and of high contrast. (It would be possible to explain it with a huge, low contrast, shallow source and this presently seems unlikely. Proper assessment of this feature would require 3D evaluation).

Relatively shallow-sourced effects are clearly superimposed. Such sources are aligned NE-SW, ENE or NW-SE where substantial relief is generated but gradients are present which suggest some additional orientations within the central zone above the primary anomaly. This zone is associated with exposed sedimentary members of the Dundas Group and a mass of quartz porphyry.

The major belts of anomaly, in the east near Mt Block and to the west of Bulgobac, are simply higher relief elements of the same style. This is more clearly recognised in regional coverage (Figure 2) than in the detailed survey fragment described in this report.

The anomalies south and east of Boco are clearly associated with Mt Read Volcanics but no such association can be suggested for the western anomalies on the basis of extant mapping. Each belt displays similar anomaly relief and character. Many elements of the trend patterns are comparable in each zone and each presents a similar regional signature.

There are contrasting trend and orientation patterns in each zone and it is rarely possible to trace features across the entire surveyed area.

Trends are suggested in Figure 5. Many subtler features will be identified after image processing but some have been suggested.

The patterns and relationships suggest distinct geological regimes, or terranes and a primary structural or stratigraphic displacement. One key boundary can be correlated with the NW face of the Mt Read Volcanics (Figure 4A).

The lack of structural continuity, as illustrated by character north of this contact, between regions (non volcanic, volcanic) suggests that the fracture(?) systems mapped north of the Mt Read Volcanics are either older than, or buried beneath, structurally emplaced volcanic masses. Corbett and McNeill (1986) do indicate faulted margins for these volcanic blocks north of Bulgobac Hill.

Similar comments might be made for the block of anomalies extending SW to 387 000 mE, 5387 000 mN in the west of the area. This feature is bounded by abrupt gradients and, although the western face is complex and disrupted, the eastern face is quite sharp and could well be fault defined. It may be noted that the ragged western side to this belt of anomalies is comparable to that associated with the limit of the volcanics west of Mt Block. Since this boundary also appears to be a faulted or structural limit it is therefore possible that both sides of the western anomaly is also fault bounded.

Consideration of available surface mapping (Burns et al, 1966) which indicates predominantly sedimentary sequences in this area and minimal faulting does not resolve the issues posed by these observations. The widespread occurrence of quartz porphyries in the area does not account for it, or the large central anomaly, which occupies the same general area.

If this anomaly is unrelated to shallow mafic or intermediate rocks then the sources must lie within the sedimentary rocks and would imply substantial proportions of magnetic minerals or remanent magnetisation.

The southern closure of the anomaly parallels horizons mapped by Corbett & McNeill (1988) which suggests that the source is either a sedimentary unit or a concordantly folded igneous unit, perhaps similar to the basalts exposed near Que River and Hellyer.

Trends evident in the region S of Mt Block and E of Boco, as displayed by high frequency volcanic sources at surface, appear to fan or cross over within the area SW of Boco Siding. Regional data, although of lower resolution (Figure 2) indicate a continuity of these trends SW toward Chester from this focus.

The Dundas Group variations mapped across the central axis where the main circular effect is evident, and porphyries, do not obviously disturb the magnetic field. This indicates a uniform magnetisation (possibly zero).

These properties and correlations demonstrate two things; the large anomaly is not related to any exposed materials and there is a physical uniformity within these materials.

Some isolated responses are, however, present. The largest of these are located near 379 500 mE, 5388 000 mN, 382 500, 5389 000 and 382 500, 5391 500. Extant mapping associates these with porphyries.

Review of the noisier magnetic fields, in the east and west of the survey, suggests that the sources are exposed or occur at very shallow depth. This is an acceptable conclusion for the volcanics near Boco and Mt Block.

The only mapping available for the western anomalies (Burns et al, 1966 - the Mackintosh sheet) suggests that only Cambrian sedimentary rocks are present in this area. Approximate correlations indicates that the anomaly pattern correlates with the sequence which is composed primarily of mudstone and greywacke. There is clearly a need to inspect these rocks and check their magnetic properties but, if the response is directly related to them, then the magnetic field should be generated by low contrasts at very shallow depth.

The description of features and nominal relationships given above shows that the magnetic data can be used to upgrade mapping and unit definition in the area. Some features are obvious, others require some analysis in order to precisely define boundaries or offsets.

The boundary between the Mt Read Volcanics and the Dundas Group is evident but the continuity of underlying Dundas Group is implied by the large overprinted anomaly centred to the west of the surveyed area.

Repetition of lithologies within the volcanics, whether stratigraphic or structural, is apparent. The gross pattern implies folding. The high frequency character of many responses shows that the sources are shallow and of limited depth range as well.

Several of the elements of this qualitative interpretation have been reviewed quantitatively.

MODELLED SECTIONS

Seven sections have been modelled in order to provide a preliminary assessment of the interaction of various elements of the magnetic field and the likely general solution for the observed patterns. The profiles examined sample all principal elements described above. The modelling described is of simple assumption preliminary nature and designed only to provide some indication of source styles and relationships. Some elements would require extended three dimensional analysis supported by a rock property survey for full appraisal.

PROFILE 1: 379 500 mE, 5387 000 mN - 384 000, 5392 500 (Figure 6)

This north south profile was designed to test the possible source options for the regional effect observed in the area of exposed Dundas Group rocks. The large anomaly hump is clearly seen. Note that its relief is barely 100 nT and that gradients, although three dimensional, only imply source depths of perhaps 3 to 4 km to its upper surface. (3D implications may show it to be a little less but localised)

This profile has been used to assess equivalent source characteristics which might account for the effect. This means that any model offered for the regional effect is not necessarily correct or even appropriate in style but that it does satisfy the magnetic field requirements. This is done in order to examine the low relief, near surface responses more reliably.

Various model types have been tried but the regional effect is best satisfied by a dipping tabular body which dips to the south west and which extends from depths of about 7 km to about 2.5 km. The precise characteristics depend on the properties assumed. Some limits can be placed upon these and values of 0.01 to 0.03 cgs are implied. This would indicate that the source is mafic or ultramafic. It must be noted that the contrast value employed does affect the inferred source shape deduced, and its depth, and the variable shift parameters noted in the profile set reflect both different contrasts for the regional source and its three dimensional character.

This is, therefore, a deficient interpretation. It is incorrect in terms of description of the regional source but the required analysis has been beyond the scope of this preliminary review.

The aim has been to find some explanation for regional effects and to use this to enhance local effects. While deficiencies in the regional forms may well affect analysis of local forms it is not believed to be a serious problem at this early stage in interpretation but the risk of error should not be allowed to persist into refinements after property studies and surface checking has been completed.

Given these comments we may examine profile 1.

The crest of the anomaly is eroded and "flatter" than would be expected from the regional source. Porphyries are exposed in this zone and these clearly modify the magnetic field.

The model presented is not satisfactory, perhaps because the regional effect was imposed at an elevated level, but the general humpiness due to an irregular but thin porphyry mass has been reproduced. These are of very low contrast with the Dundas Group rocks. This type of effect accounts for the local spikiness observed in the central part of the survey.

The issue of where to fit the regional effect, and the reason it must be properly determined by 3D analysis, is shown in this section at 1000 m and in most other sections.

Near 1000 m a small spike anomaly appears to possess a strong negative effect on its eastern and northern side. Possible positions for the regional zero or base line have been marked. The upper line would imply that there are anomalous negative property contrasts on either side of the spike while the lower line much as modelled, would indicate a subtle positive at 1400 m. The latter is more likely, but the former would be important in exploration terms since it would suggest alteration. This can only be determined when a single source shape has been created which satisfies ALL profiles at the same curve fitting shift parameters. This has not yet been done, and cannot be, with simple methods.

A similar issue of this type occurs at the northern end of the profile where there is another strong and anomalous negative gradient.

PROFILE 2: 377 000 mE, 5390 000 mN - 385 000, 5384 000 (Figure 7).

The regional effect is not as obvious at the general northing of this profile due to an approximately E-W gradient which is only disturbed within the volcanics zone near Mt Block. The reality of the primary gradient is indicated in Figure 6 by the relative positions of the dip lines modelled.

The volcanics generate the largest responses and imply modest contrasts and depth ranges. Note that if the contrast is reduced and the depth range increased to generate the anomaly magnitudes observed then the gradients observed cannot be recovered. This suggests that the general contrasts employed in all models is of the right order, or is the minimum reasonable value in bulk, and that the volcanic sources are relatively thin, no more than 1000 to 1500 m thick. They also dip steeply and some indication of attitude is given.

The magnetic material in the west of the area contains one source with a contrast equivalent to the volcanics and the remainder is much less magnetic but more magnetic than normal Dundas Group. This material is also of limited depth range, and the source extends from surface. It must be exposed.

PROFILE 3: 377 000 mE, 5391 000 mN - 385 000, 5385 000 (Figure 8)

This important profile crosses the Boco zone and stresses the importance of regional assumptions. It uses fit assumptions which are consistent with most profiles (not the N-S link, however).

Accepting the regional assumptions made which provide generally compatible fits for the entire profile the following comments may be made.

Good correlations from all sources are possible for the zone up to the volcanic contact at about 7000 m.

The magnetic anomalies in the west of the area are clearly satisfied by shallow, dipping sources of moderate contrast. There is a consistent symmetry in magnetic profiles drawn across this western zone which indicates a folded body. The present profile would suggest an antiform with the limbs faulted but other explanations are possible. The extreme spikiness of the eastern anomaly, which may be traced from several kilometres and forms the sharp edge of the anomaly pattern, indicates the existence of locally higher contrasts. These bodies are depth limited and perhaps stratigraphic. They are exposed and would appear therefore to be sedimentary in origin, given present mapping information.

The porphyries of the central part of the profile similarly corrode the peak of the anomaly with a crestal peak to the east. This type of pattern can be used to suggest that these materials are thin, or largely reversely magnetised - albeit with a low contrast, with thickening to the east (about 5500 m). An alternate view, depending on the regional conditions is to argue that the regional fit is too high and should be much lower (broken line). This then implies that magnetic sources extend as far east as the volcanic contact and that the porphyries are both more extensive and normally magnetised.

However the regional effect is fitted the anomalous character of the Boco area cannot be disguised. A key element here is the negative effect to the west of the main feature. It cannot be explained by any normal source in the volcanics and implies loss of contrast or alteration and correlates directly with known alteration. The effect to the east of the anomaly may be of similar type but regional and geometric effects must be properly assessed before this can be asserted.

Any sources in the volcanics must also be relatively thin, no more than 2000 m in extent and steeply dipping. Most must be shallower but virtually all are exposed.

PROFILE 4 377 000 mE, 5392 000 mN - 385 000, 5386 000 (Figure 9)

The regional character of this line appears to make good sense. Note that there is a 15 nT differential between this line fit and those of Figure 8 which is consistent with the lower line in that diagram.

All sources are depth limited, extend from surface and have moderate contrasts.

Most of the units in the western source pattern are slightly magnetic but only particular members of the volcanics in the east are magnetic. The properties are comparable.

The pattern of sources in the volcanics suggests a termination of the volcanics by a low angle surface which dips east and extends to depths of about 2000 m near Mt Block. The models suggest that the

solution offered represents a property-geometry compromise and that some sources, at the contrast used, extend too deep.

The Boco zone is not definitively recognised in this profile and examination of the contours maps shows why this is so. The effect is locally closed off (see also Figure 13).

These sections show that the volcanics do not extend west of their mapped limit at any depth.

PROFILE 5: 377 000 mE, 5393 000 mN - 385 000, 5387 000 (Figure 10)

This profile re-inforces these conclusions although using slightly different regional assumptions.

As in previous profiles the eastern part of the western anomaly belt is seen to be strongly magnetised. Sources extending from surface to shallow depths with moderate dips are implied. Faulted folds are suggested.

The volcanic sources are isolated but indicate easterly dips at this northing. All must be depth limited or returned to surface.

This model suggests that the eastern part of the porphyry is comparably magnetised and dips in a similar sense.

PROFILE 6 377 000 mE, 5394 000 mN - 385 000, 5388 000 (Figure 11)

This section stresses the regional problem and samples the main body of porphyry.

The interpretation depends on the identification of the magnetic base levels and these are not obvious. Review suggests that the profile west of 2000 m and at about 8000 m represents base level. The model assumes this and achieves a curve fit balance which lies intermediate between fits for profiles 2 and 3 to 5. It does then require, however, that a large block of porphyry is present with modest contrast.

The model requirements for the western anomalies is consistent with other profiles with the eastern face being most strongly magnetised. The western margin of the volcanics is similarly marked, but by a strong negative effect. In no case, however, do any of the sources extend to great depths. All are localised.

PROFILE 7 377 000 mE, 5395 000 mN - 385 000, 5389 000 (Figure 12)

This profile confirms the implication of profile 6 and shows that the block of porphyry thins northward, as it also does to the south, but less rapidly.

The volcanics occurs east of this profile and their effect is just seen. The western anomaly belt is also sampled, but its character is reversed at this northing. This indicates that a fold solution may be realistic for this source, the magnetic limb having been thinned or terminated to the east by cross structures (see Figure 5).

MINERALISATION

No major mineralised sites have yet been found in the area covered by this licence but mineralisation is known to exist. The principal examples are at Boco and Silver Falls.

Pyritisation and alteration have been established near Boco and Figure 13 suggests some of the information known about this site. Anomalous magnetic responses have been recognised in the Boco zone and the negative pattern correlates absolutely with the drilling-controlled zone of "strong alteration" projected in the old plan south of 5387 000 mN. Even the pinch point near BBP 248 can be identified.

The magnetic survey suggests, however, that this zone of alteration does not extend much further south than UTEM anomaly A. More analysis is required but the feature is truncated or controlled by a transverse structure a little south of 5386 000 mN.

Similar disturbance can be seen a little north of 5387 000 mN (near holes 9, 12 and 10)(profile 4) but the feature is re-asserted to the north east and the zones in which the response appears to occur are hatched. The largest area occurs NE of 5388 000 mN. This poses a question; what is exposed near the highway and what other information was used to make the projection in this 1984 diagram?

More recent drilling (holes 278-280) would appear to be beyond the zone of interest.

The patchiness of this zone must be noted. It also appears to lie between two magnetic volcanic units.

The other mineralisation occurs at Silver Falls in the far west of the area. Little is known about it and it appears to lie on the faulted contact of the magnetic units in this region.

The magnetic uniformity within the Dundas Group, zone is not especially encouraging for base metals unless an alternate concept relating porphyries can be developed - assuming the mapping of these is correct. Alteration character is not readily detected when most units are similar in character - although this has not been attempted here. This review has been based on contour and raw profile data and the actual data would need to be examined to assess such subtle character. It is clear that significant structures are present, and that some magnetic variations are present at moderate depth, since small step anomalies are evident. Changed magnetic character can be associated with these and some of it may represent alteration. This judgment must await some rock property studies and detailed evaluation. These structures must be ground traced and checked geochemically.

The potential of the volcanics within the eastern part of the EL is not immediately apparent. No substantial mineralised sites are known (with the exception of Boco) and the reason for this is now evident. The volcanic pile is contorted and sliced with little evidence of mass alteration. Most of the pile, being strongly magnetised, is not consistent with this. The non magnetic elements must, however, be

further reviewed for abnormal character.

TREND IMPLICATIONS

Several trend or lineament systems have been identified in this small survey area. There is clear evidence of lack of continuity and conflicting trends in different parts of the area. While part of these differences can be assigned to structural overlays there are some wider issues relevant to the tracing of mineralised sites - assuming these have any association with major crustal structures and their high level incarnations.

Trends have been summarised in Figure 5. The Boco alteration axis is indicated and it is extensive. The relative economic significance of other features is not known.

Acute trends within the western anomaly field indicate disruptive structures if it is assumed that the main body of anomaly is due to sedimentary or stratigraphically concordant units. These should be inspected. The most obvious of these trend NE-SW.

This study has identified the issues and the preliminary work is sufficient to show that magnetic methods can be used to unravel the issues once further ground and property control is available.

Gravity data can be used to resolve some of these issues. Regional gravity data in the region of the corridor fragment discussed here have been inspected. Although station coverage is coarse (1 km spacing) the gravity field has considerable relief and can be expected to define major structures, important trends and unit relationships.

Conclusions drawn from the above discussion and its modelling basis have been summarised in Figure 14. Although areas of specific interest have been suggested it should be noted that further work using the actual observations, fully corrected for all influences, is advised.

CONCLUSIONS AND RECOMMENDATIONS

The new high resolution survey of the Bulgobac - Boco area will be able to resolve many geological issues. Although the present work has been restricted and preliminary in terms of data use it has been possible to consider many issues relevant to subsequent analysis.

The volcanics of the area are structured and particular units can be recognised and traced. All yield systematic dip patterns but are depth limited, indicating the presence of detachments or limited volumes.

The survey has revealed a large structural feature centred near Bulgobac; it is believed to be a slice of ultramafic-mafic rocks at considerable depth.

Magnetic texture comparable to that observed across the Mt Read Volcanics has been observed in the west of the area. This appears to be associated with particular sedimentary units within the Dundas Group and are magnetically distinct from other rocks of the group. These materials should be inspected. The magnetic survey enables structural definition in this relatively inaccessible area. The sources for these anomalies are exposed or nearly exposed and are also depth limited, probably folded and fault bounded. structural texture within the northern

The survey has also demonstrated that trends and structures are rarely continuous across the area even though some orientations, such as NE-SW, E-W or NW-SE, are common.

Mineralisation at Boco can be associated with an anomalous alteration effect within the volcanics and the survey demonstrates the minimum extent of this zone. Anomaly swells should be investigated since these may reflect enlargements of altered volumes.

The magnetic data should be used to check indications of concentrated alteration and to further support mapping and structural appraisal. More sophisticated modelling will be required. The feasibility of both applications has already been demonstrated.

Magnetic analysis might be productively supported by gravity survey. General infill of the regional data base is suggested.

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From : asestape
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 Deck : /prj6/J1120/FAR/ldt.Par-
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 With a blocking factor of 50, each record is 6500
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 northings
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 diurnal_sammas
 mas_level
 rad_alt
 baro_alt
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 bi214
 tl208
 time_hh_ddd

, written under format 2A4,2A4,f12.1,f12.1,f12.1,f9.2,f9.2,f9.2,f7.2,f7.2,f6.0,f6.0,f6.0,f6.0,f9.5
 Line information on ASCII file,lin.all
 Line info will be read under format (1x,2a4,2(1x,f15.2),1x,2a4)

Line 10011 Samples 50 Tape required 0.29 Tape used 49.01 feet

line 10011	had	246 samples						
VARIABLE		Data Ranges:	Min	Max	Mean	Std Dev		SUS
fiducial			6131.00	6180.00	6155.50	+/- 14.23		0
easting			-99999.00	379129.19	339435.86	+/- 130991.28		0
northings			-99999.00	5340059.00	4897764.75	+/- 1489776.13		0
mas_sammas			62293.37	62330.24	62309.57	+/- 11.65		0
diurnal_sammas			62297.29	62298.04	62297.67	+/- 0.22		0
mas_level			-99999.00	-22.13	-8157.24	+/- 27376.98		0
rad_alt			235.00	407.00	270.16	+/- 29.29		0
baro_alt			1145.00	1295.00	1203.48	+/- 34.60		0
total_count			646.00	1018.00	843.62	+/- 96.54		0
k40			25.00	57.00	78.00	+/- 1.00		0

804133

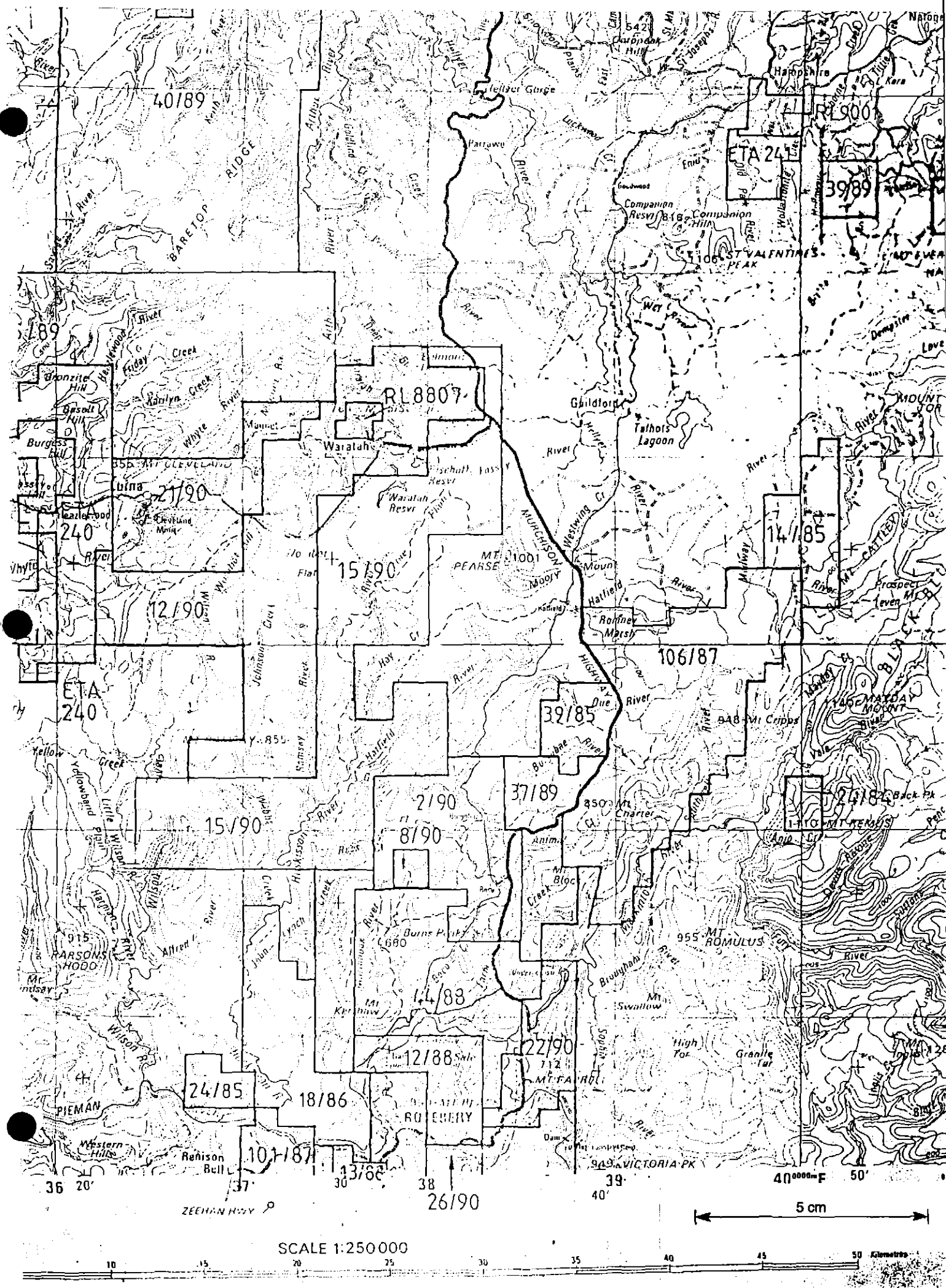
Report submitted on behalf of Leaman Geophysics

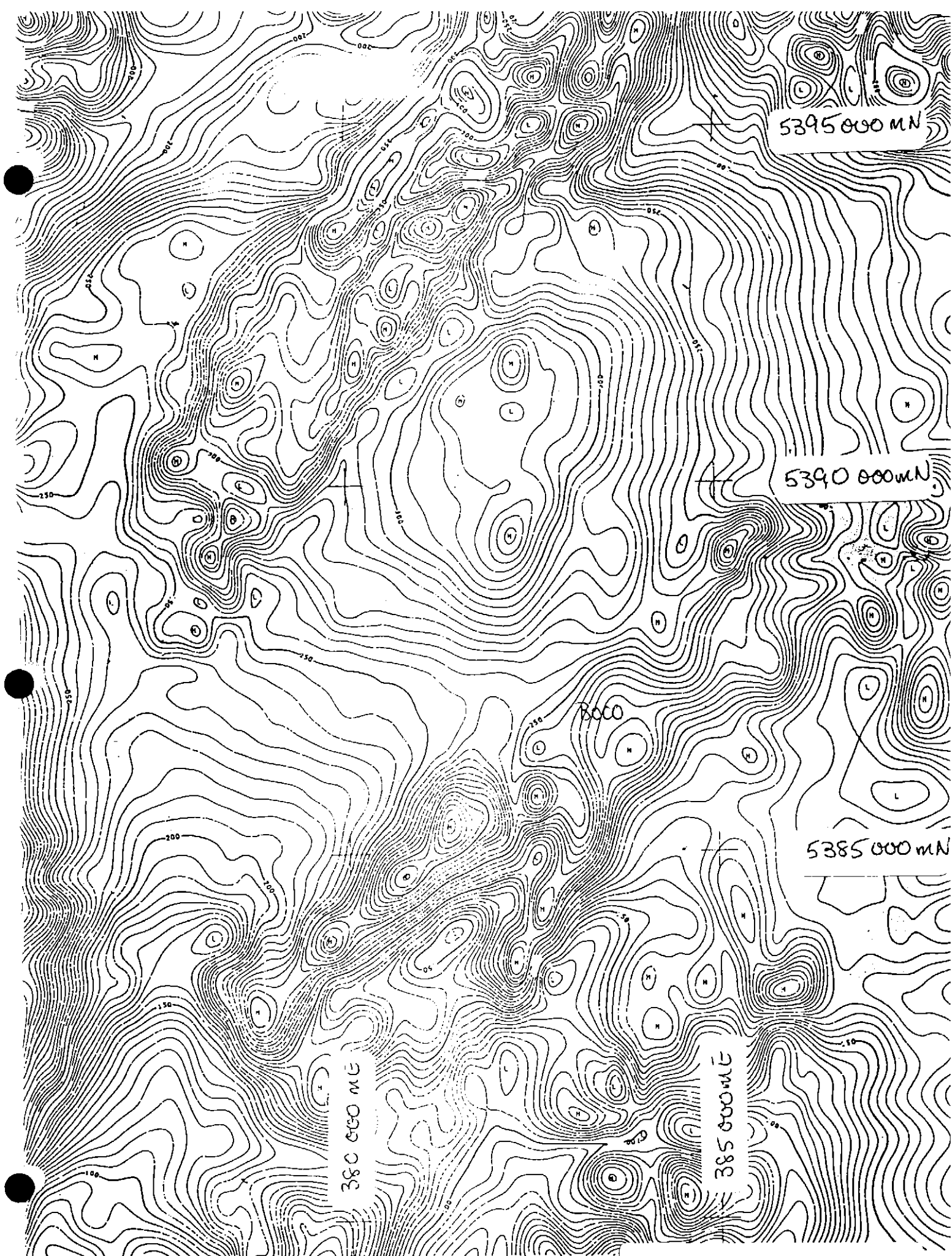
by

A handwritten signature in cursive script, appearing to read 'D. Leaman'.

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

Date: 1-7-91

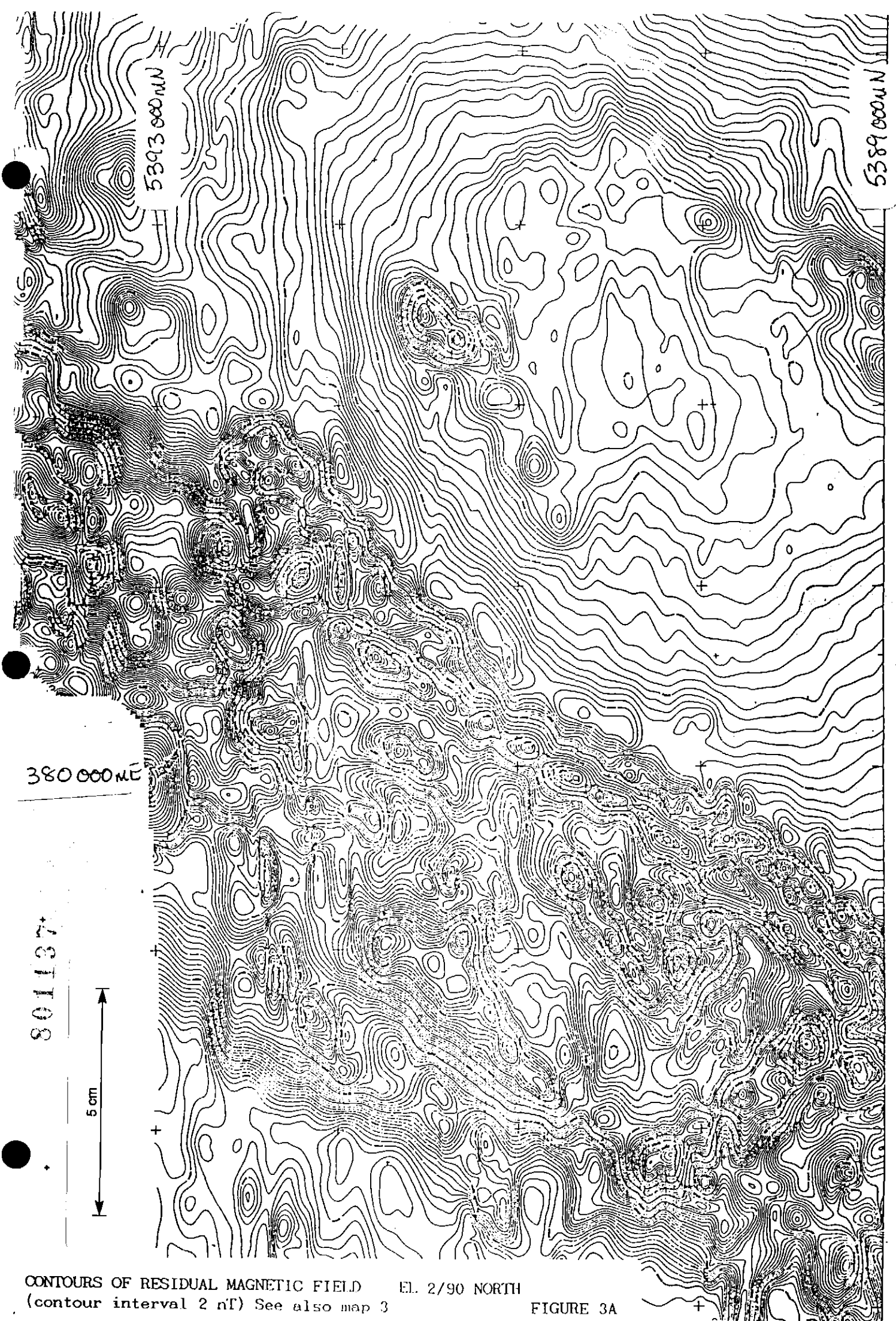


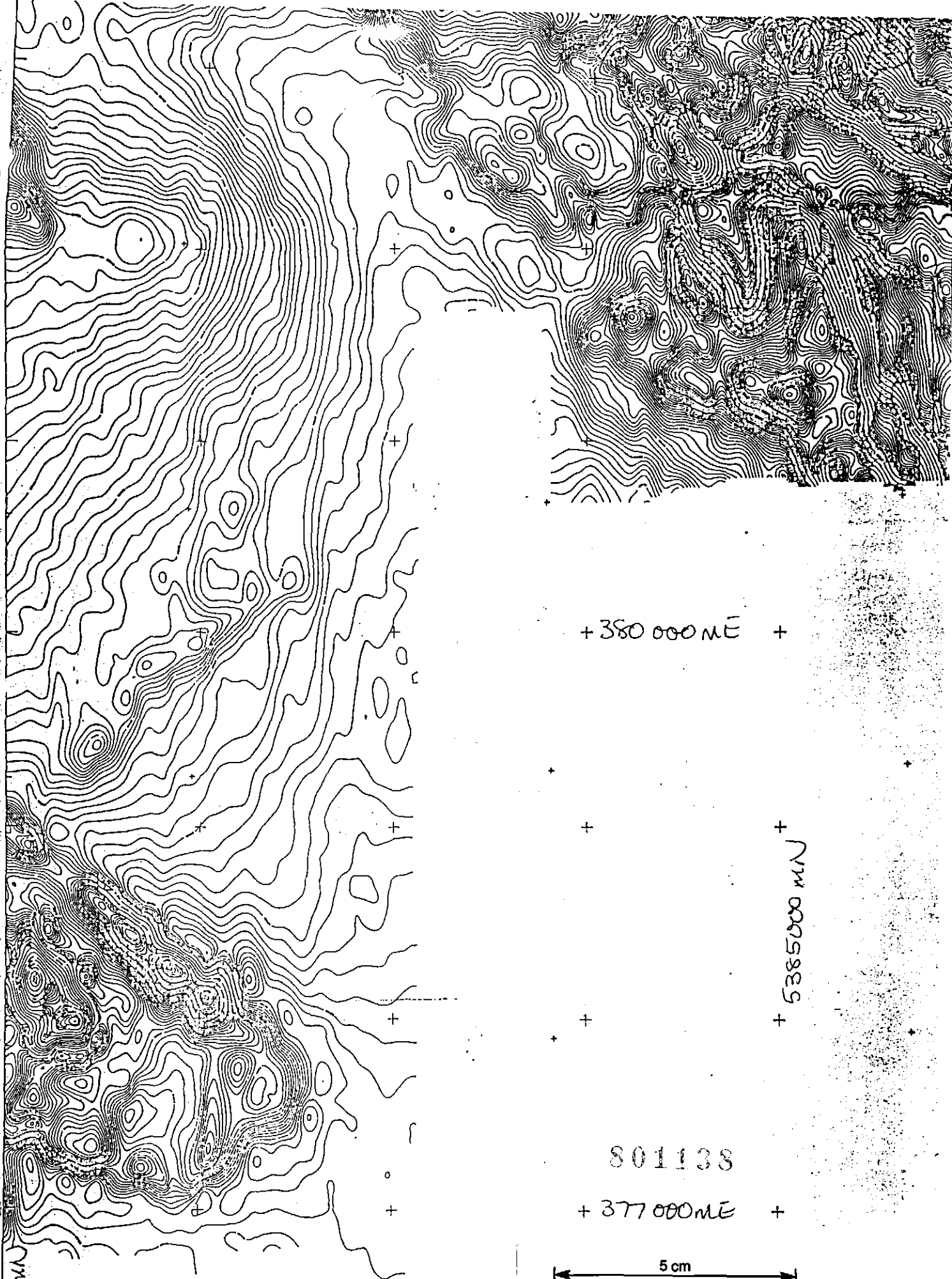


801136

5 cm

EXTRACT OF 1981 MINES DEPARTMENT REGIONAL SURVEY IN BULGOBAC AREA
FIGURE 2

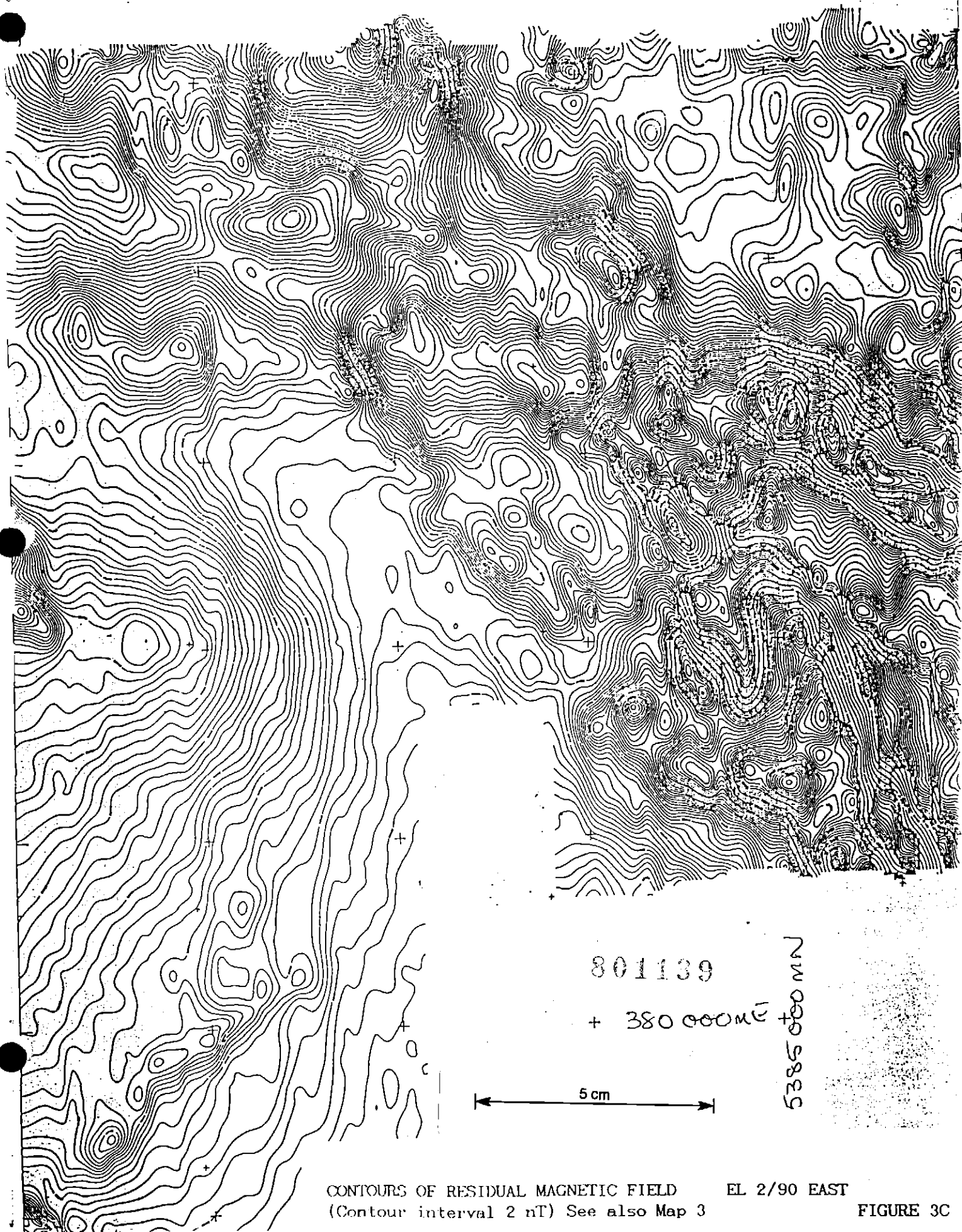




CONTOURS OF RESIDUAL MAGNETIC FIELD
 (Contour interval 2nT) See also Map 3

EL 2/90 SOUTH

FIGURE 3B



801139

+ 380 000 mE

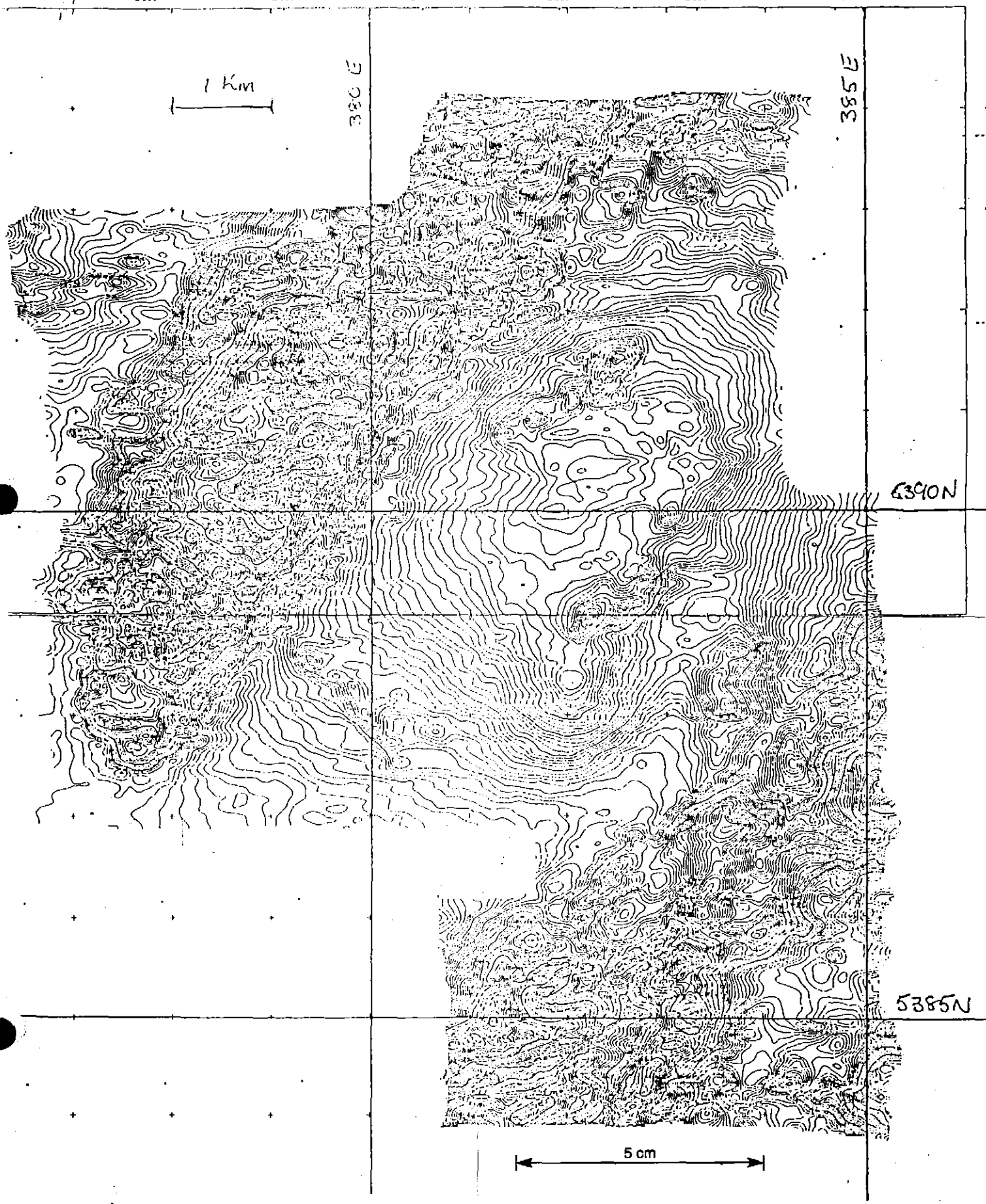
5385 000 mN

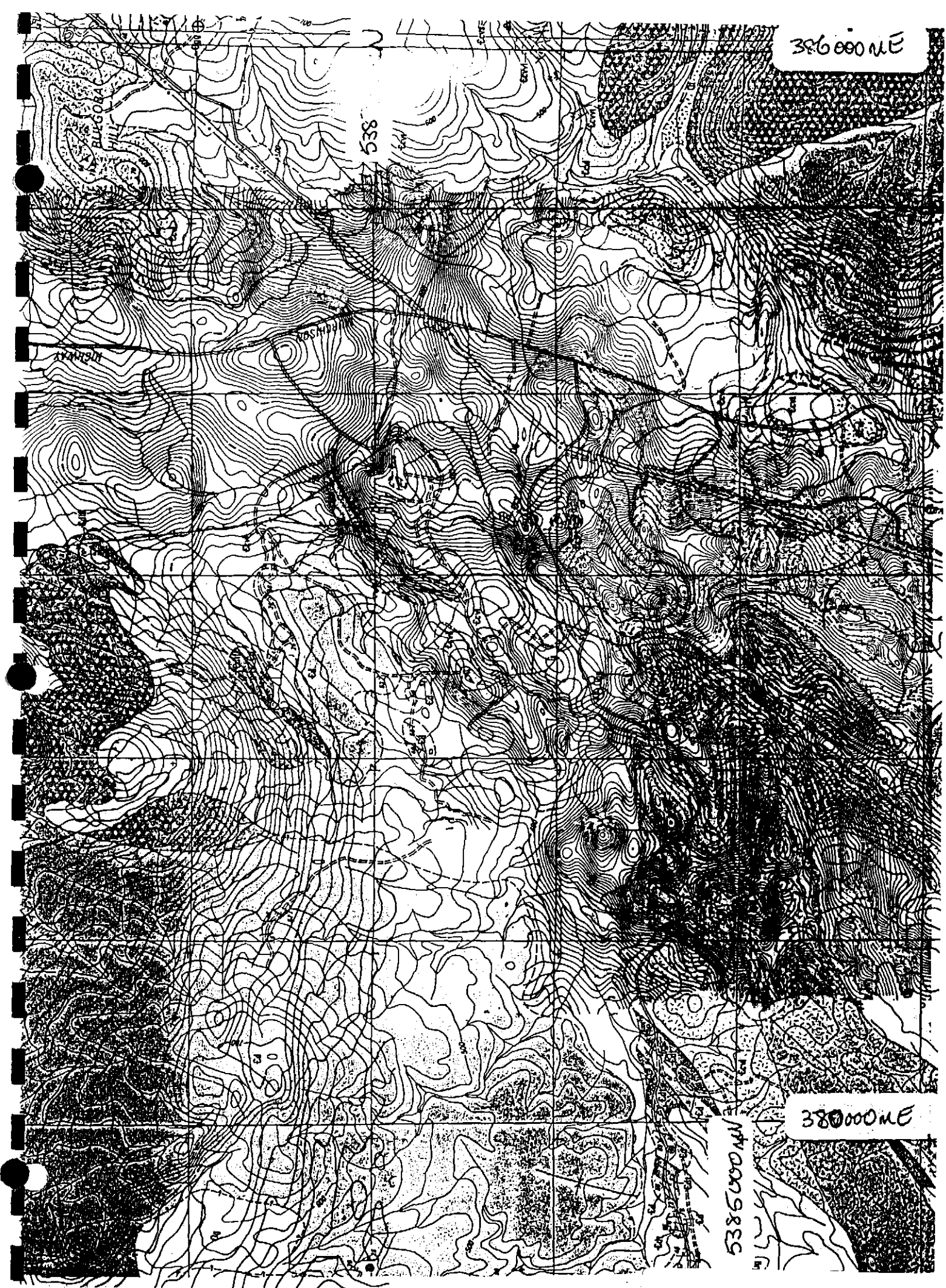
5 cm

CONTOURS OF RESIDUAL MAGNETIC FIELD
(Contour interval 2 nT) See also Map 3

EL 2/90 EAST

FIGURE 3C





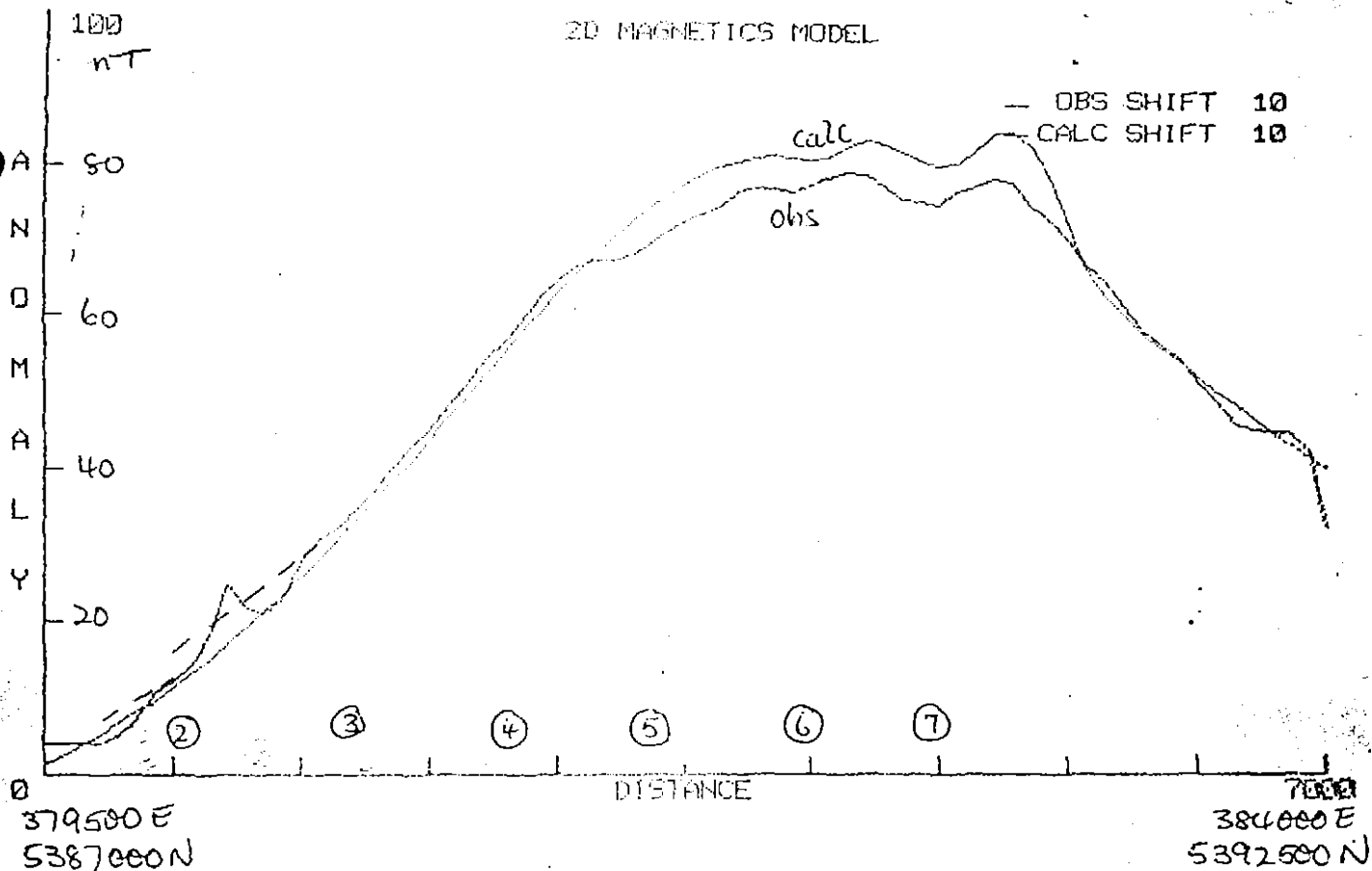
CONTOURS OF MAGNETIC FIELD EL 2/90 SOUTH
 Basemap after Corbett & McNeill (1986)

801141

FIGURE 4A



2D MAGNETICS MODEL

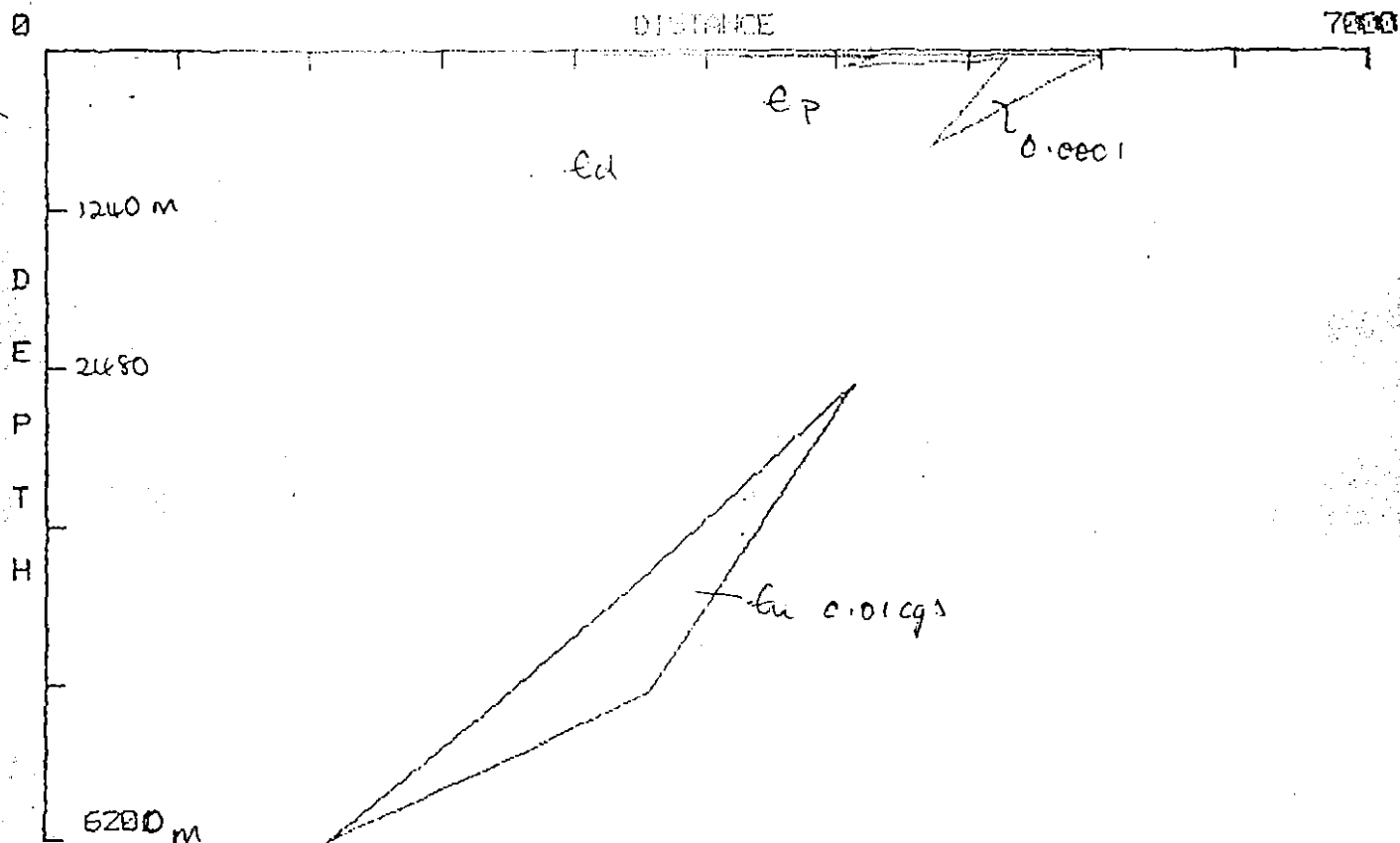


8000 1 379500/5387000-384000/5392500

S

5 cm

N



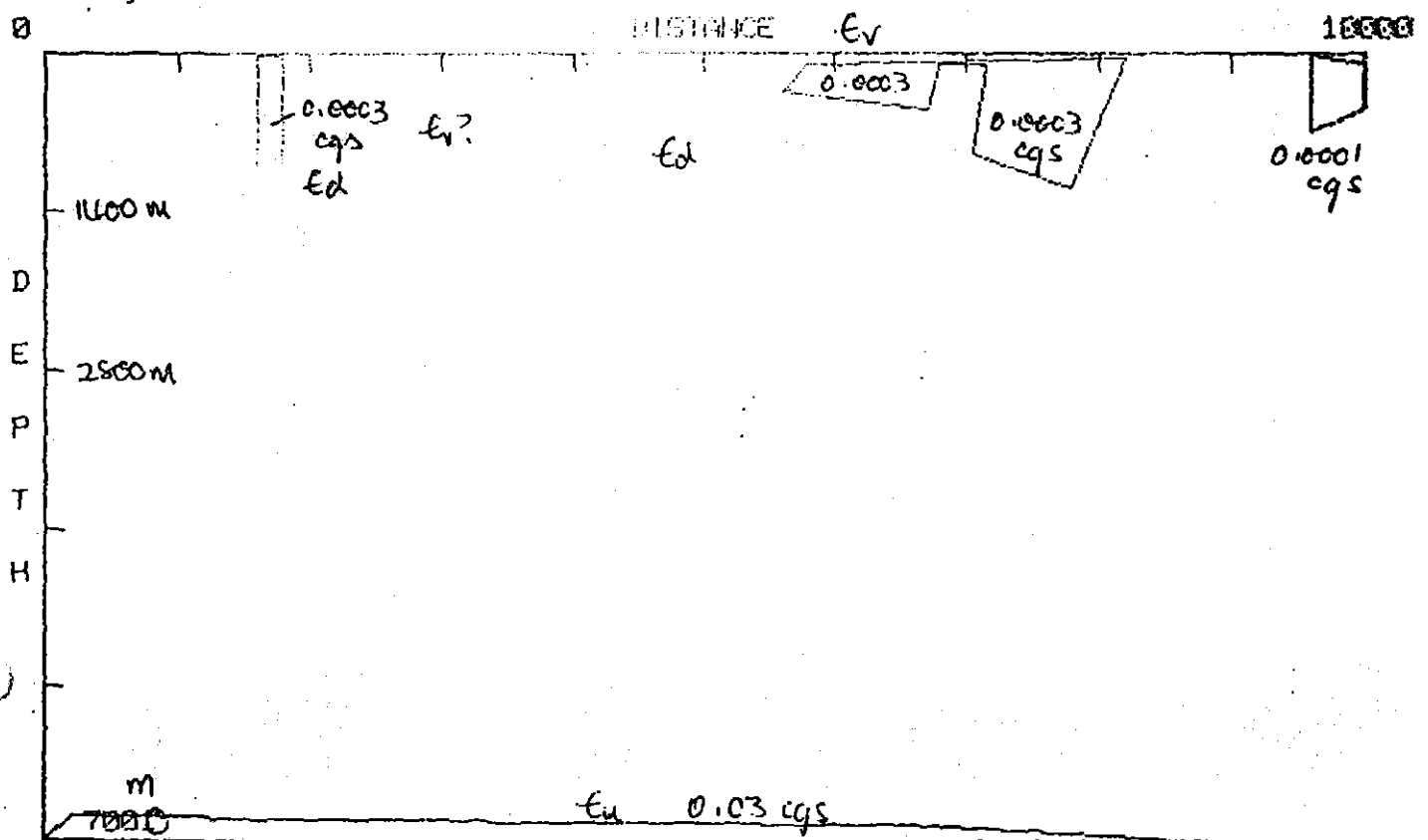
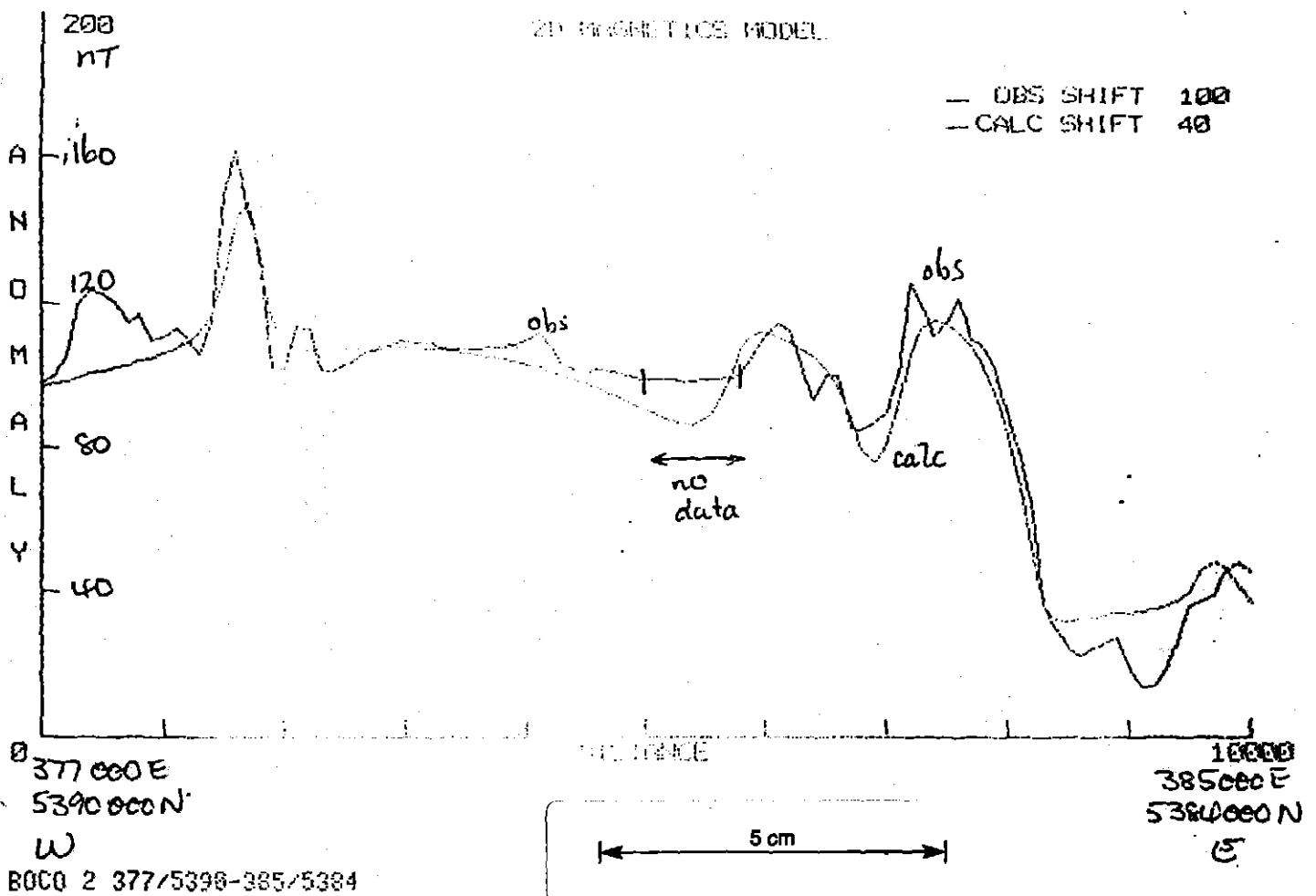
PROFILE 1. 379 500, 5387 000 384 000, 5392 500

FIGURE 6

INTENSITY INCLINATION DECLINATION OBS LEVEL LINE DIRECTION
 62000.0 -72.0 13.0 100.0 130.0

801144

LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 10000 100



PROFILE 2. 377 000, 5390 000 - 385 000, 5384 000

FIGURE 7

62000.0

-72.0

13.0

100.0

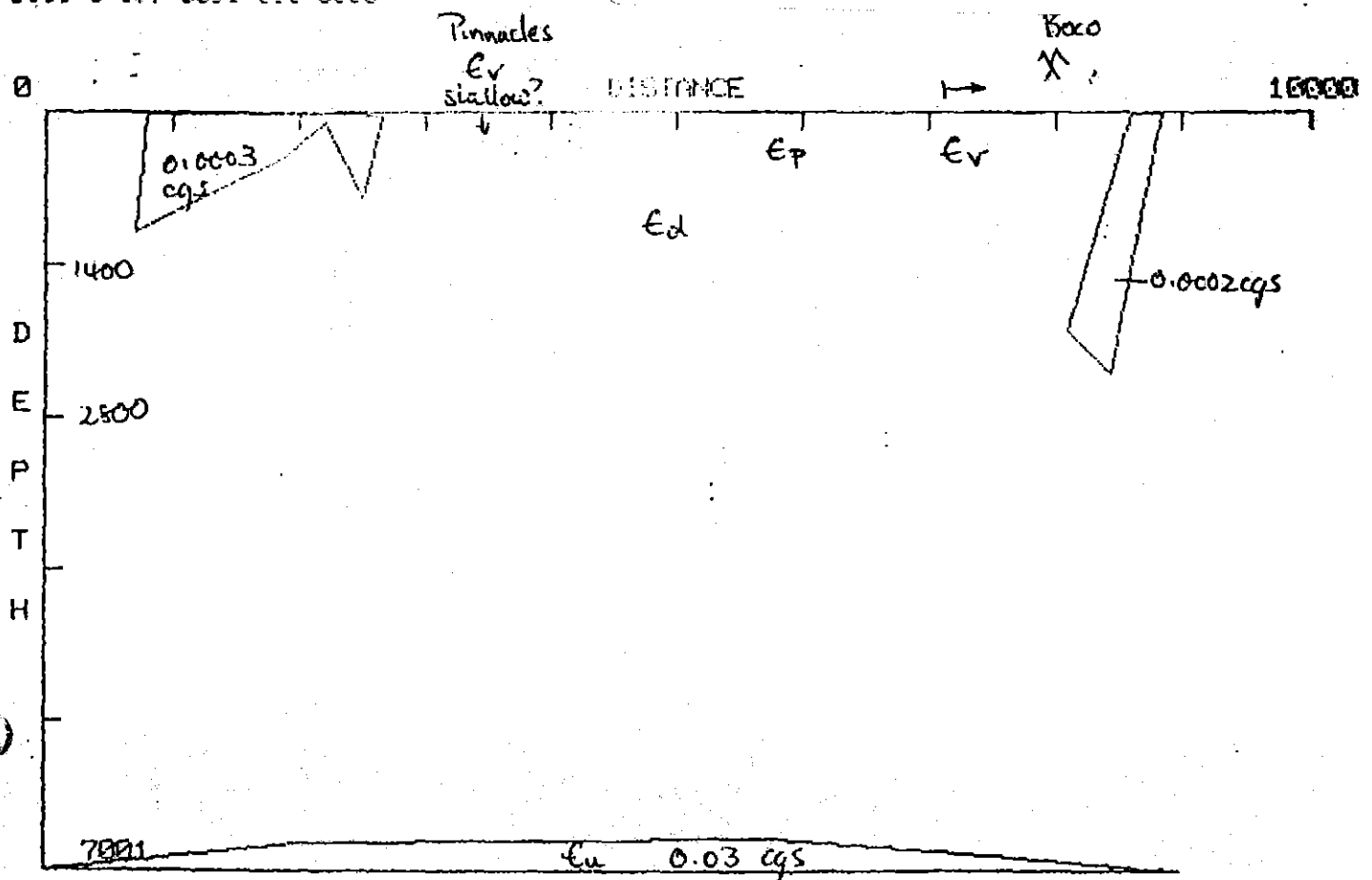
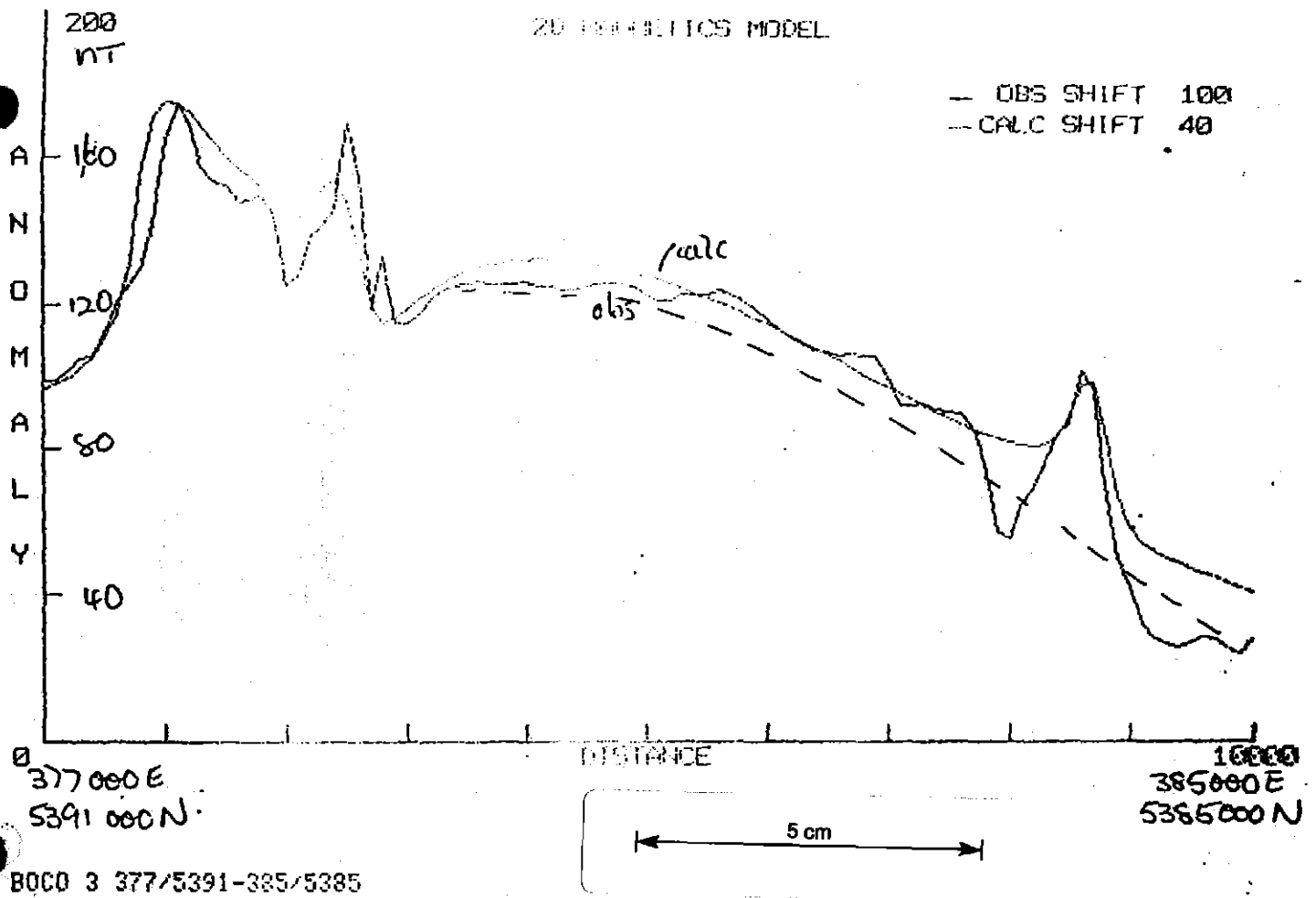
130.0

LINE PARAMETERS - ORIGIN, LIMIT, INCR

10000

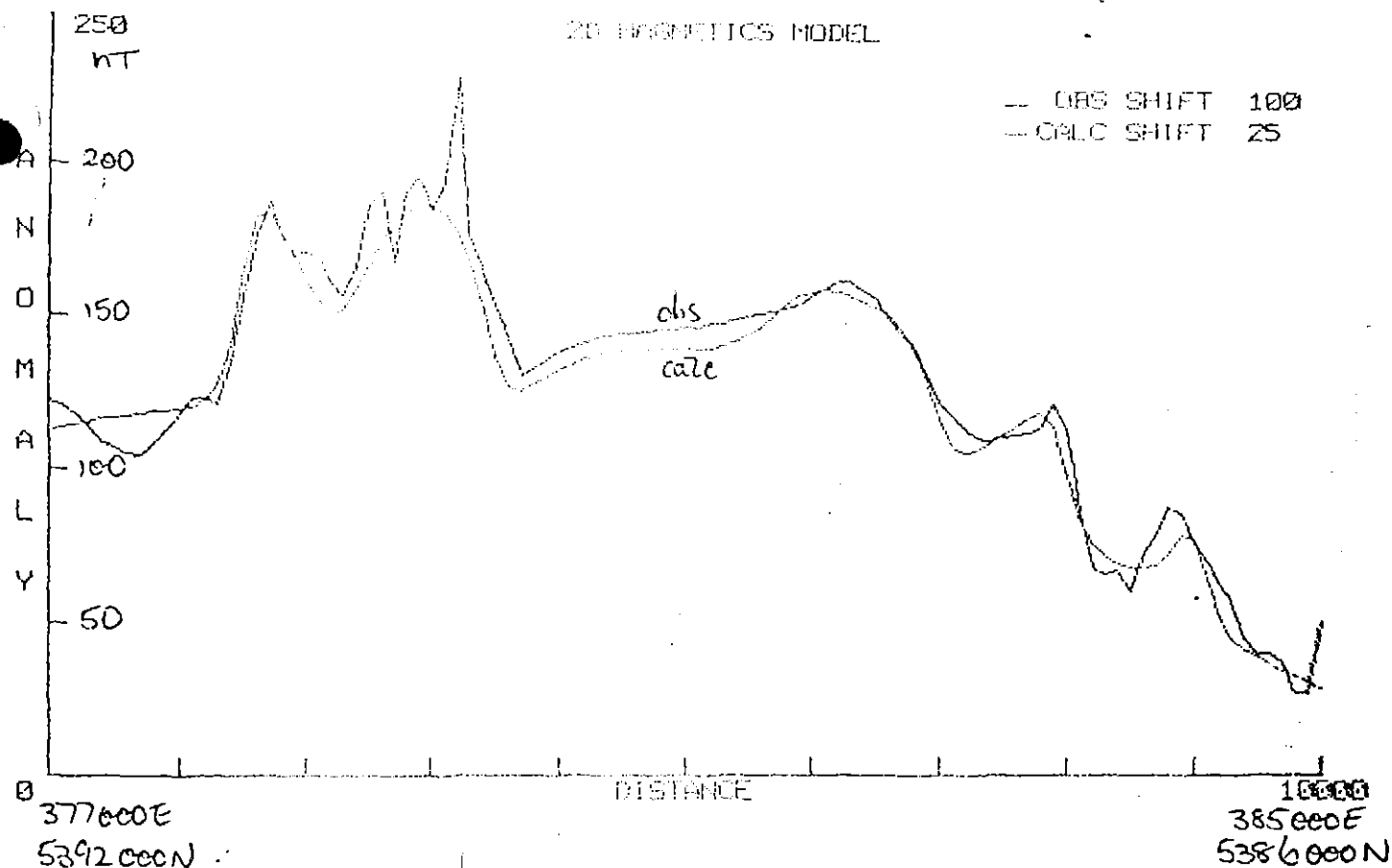
100

801145

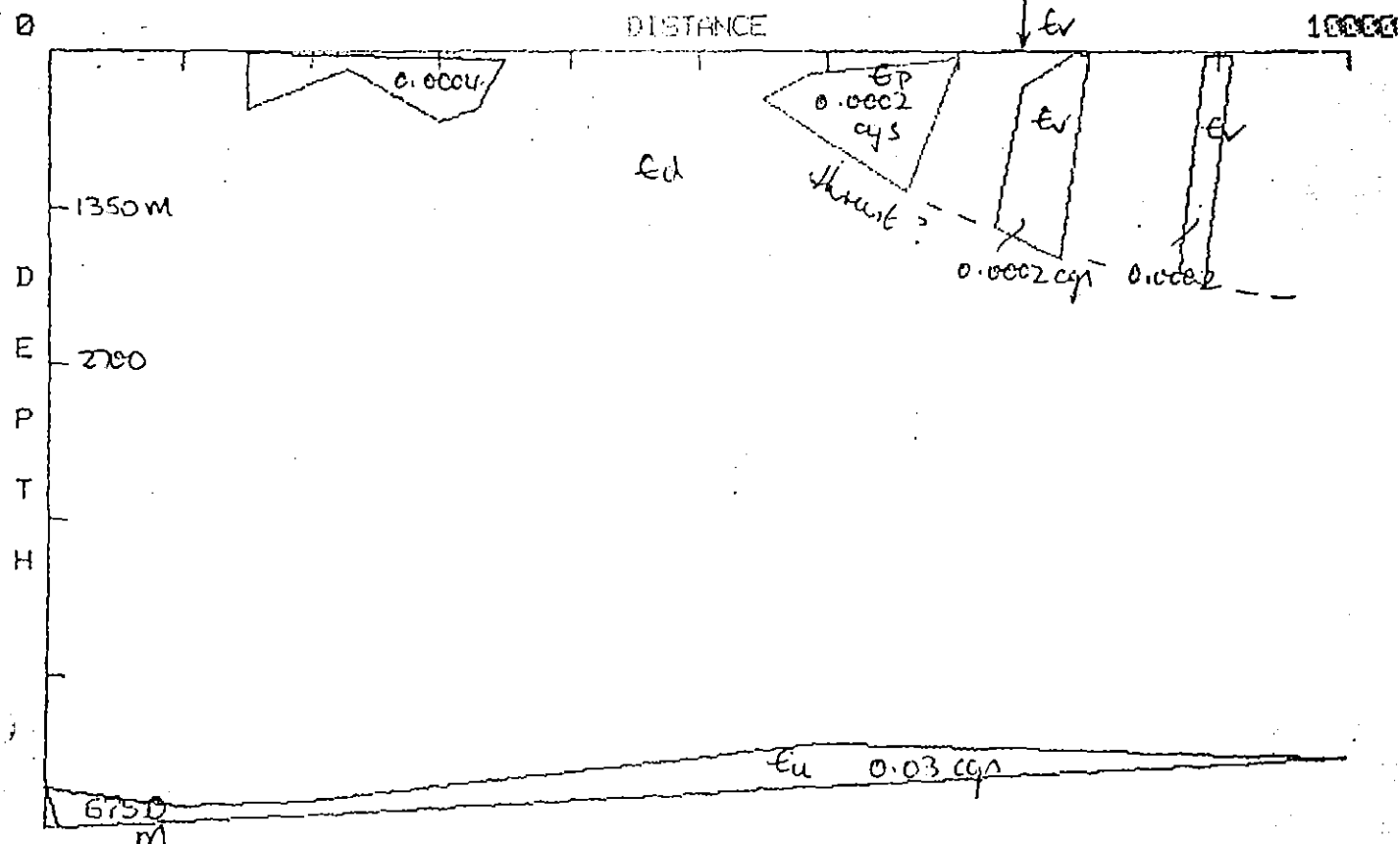


PROFILE 3. 377 000, 5391 000 - 385 000, 5385 000

FIGURE 8



000 M4 377/5392-385/5386



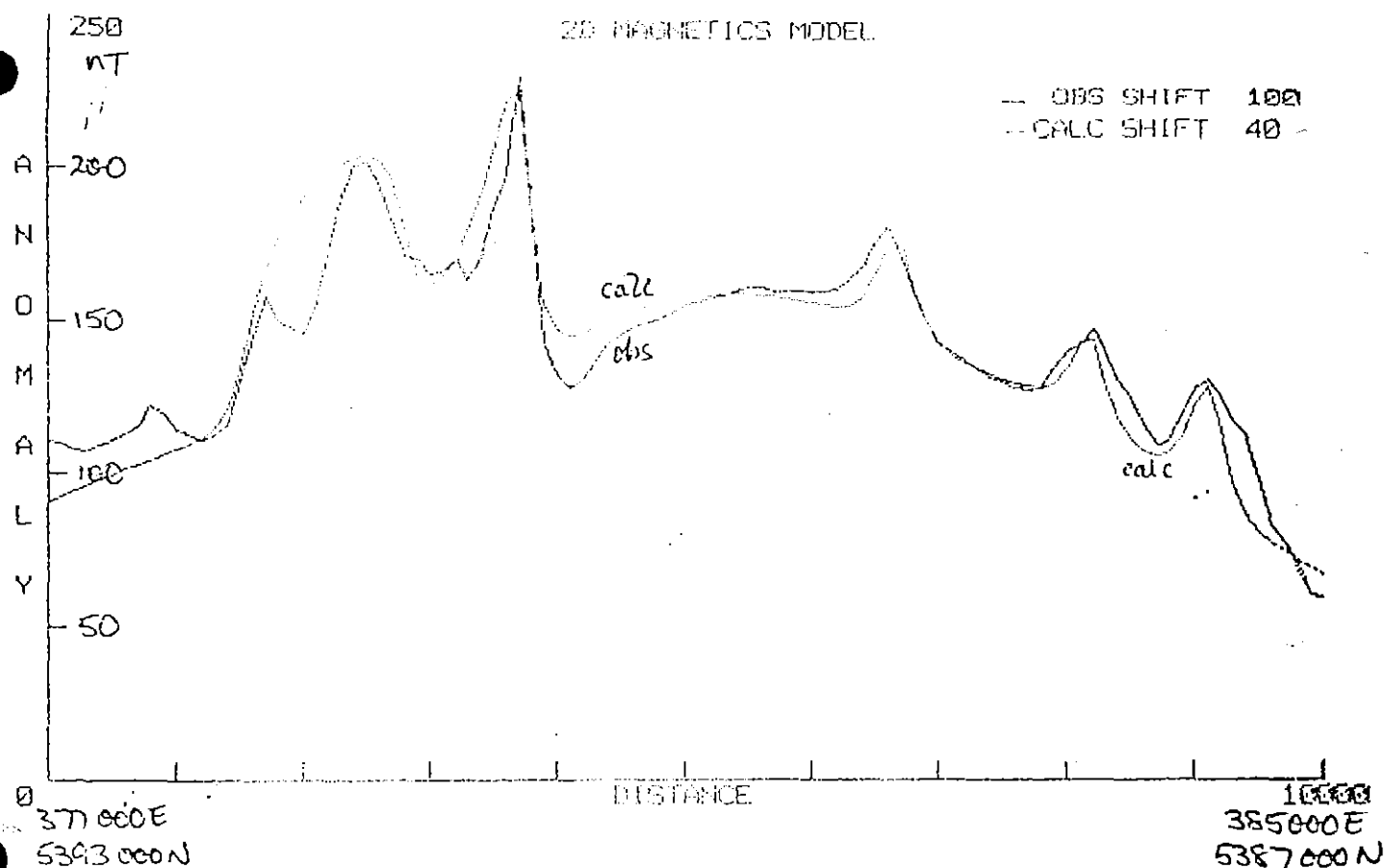
PROFILE 4. 377 000, 5392 000 - 385 000, 5386 000

FIGURE 9

INTENSITY 62000.0 ISOLINE 100 DECLINATION 13.0 OBS LEVEL 100.0 LINE DIRECTION 130.0
 -72.0 13.0 100.0 130.0

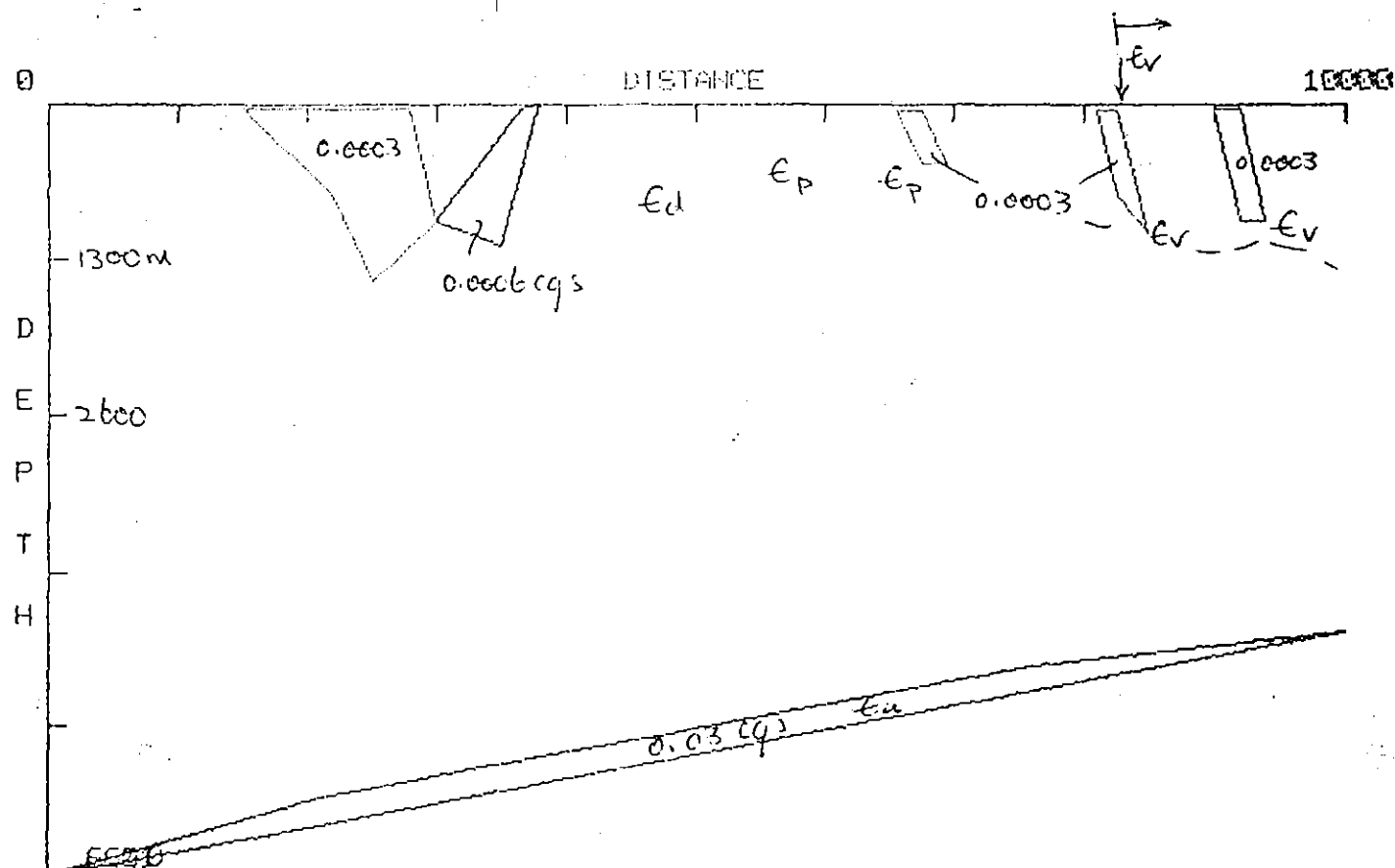
801147

LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 10000 100



BOCO 5 377/5393-385/5387

5 cm

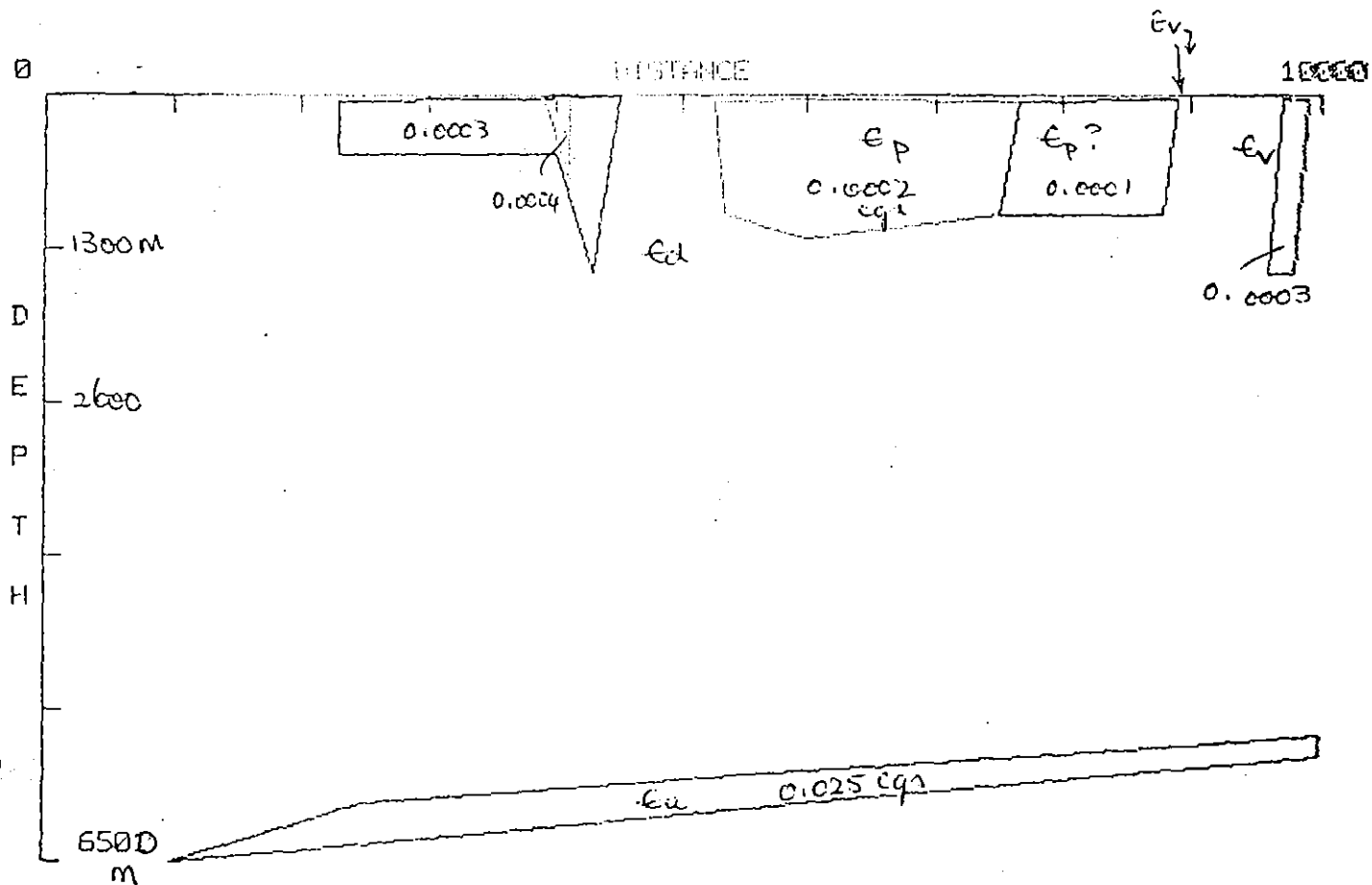
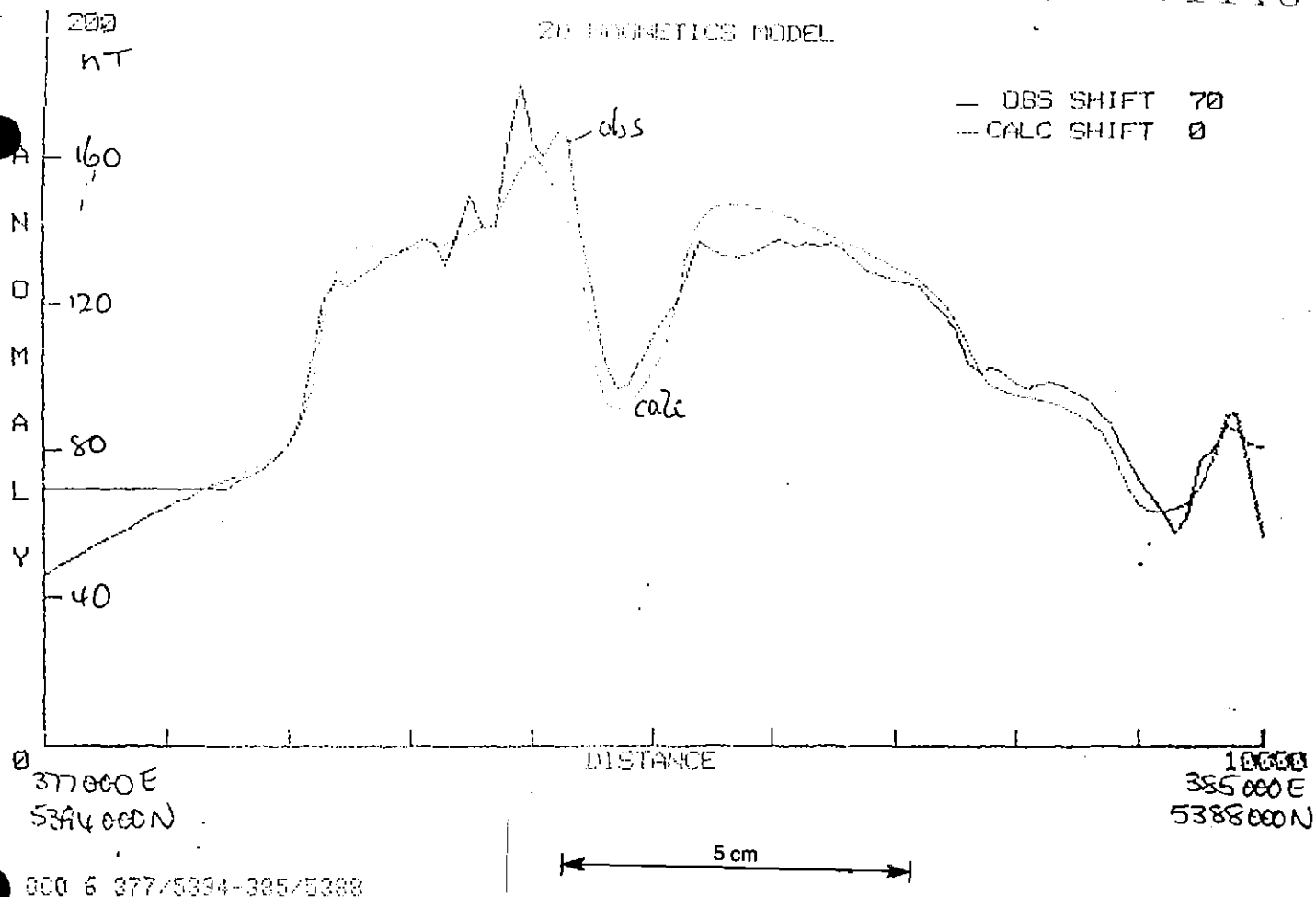


PROFILE 5. 377 000, 5393 000 - 385 000, 5387 000

FIGURE 10

801148

2D MAGNETICS MODEL



PROFILE 6. 377 000, 5394 000 - 385000, 5388 000

FIGURE 11

62800.0

-12.0

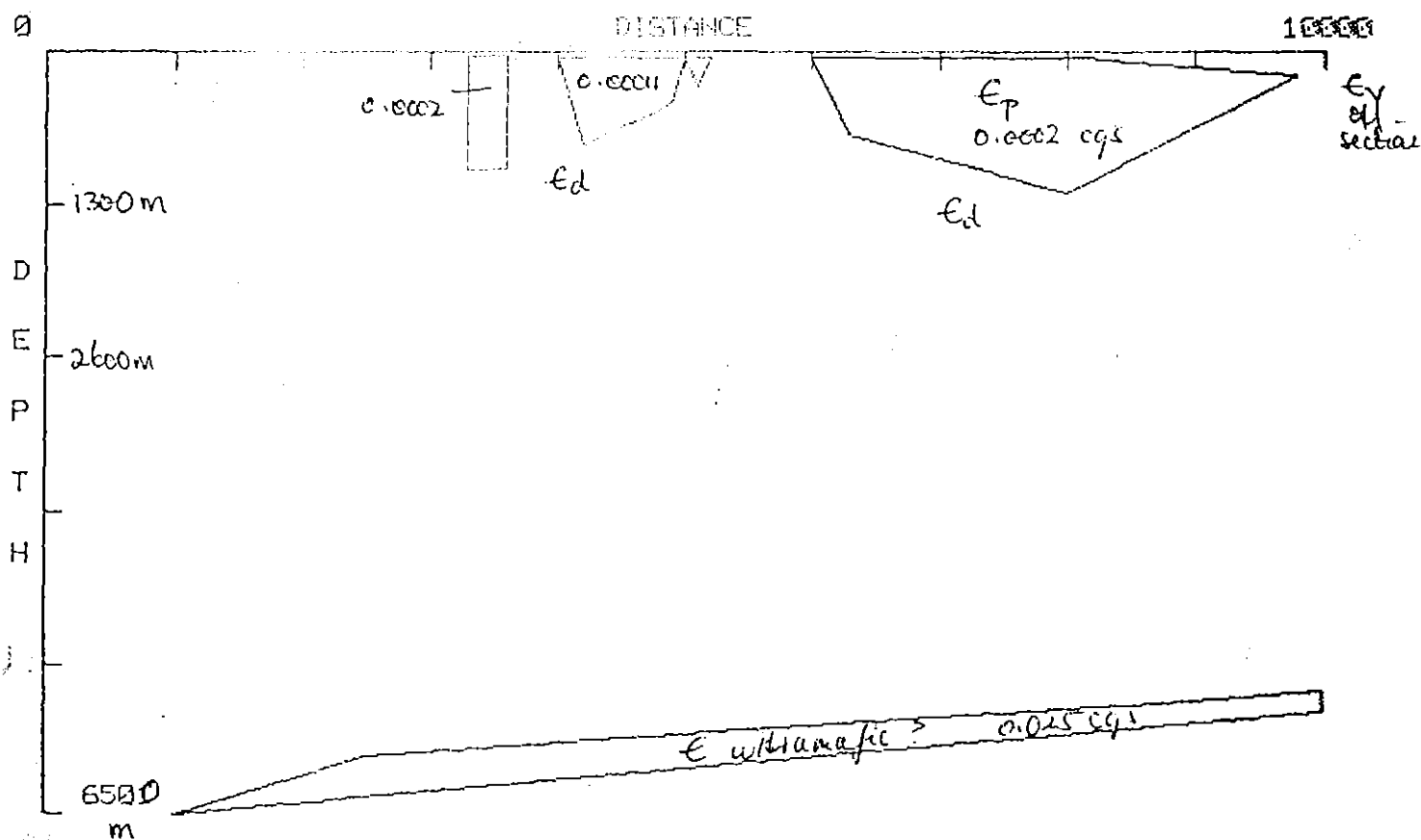
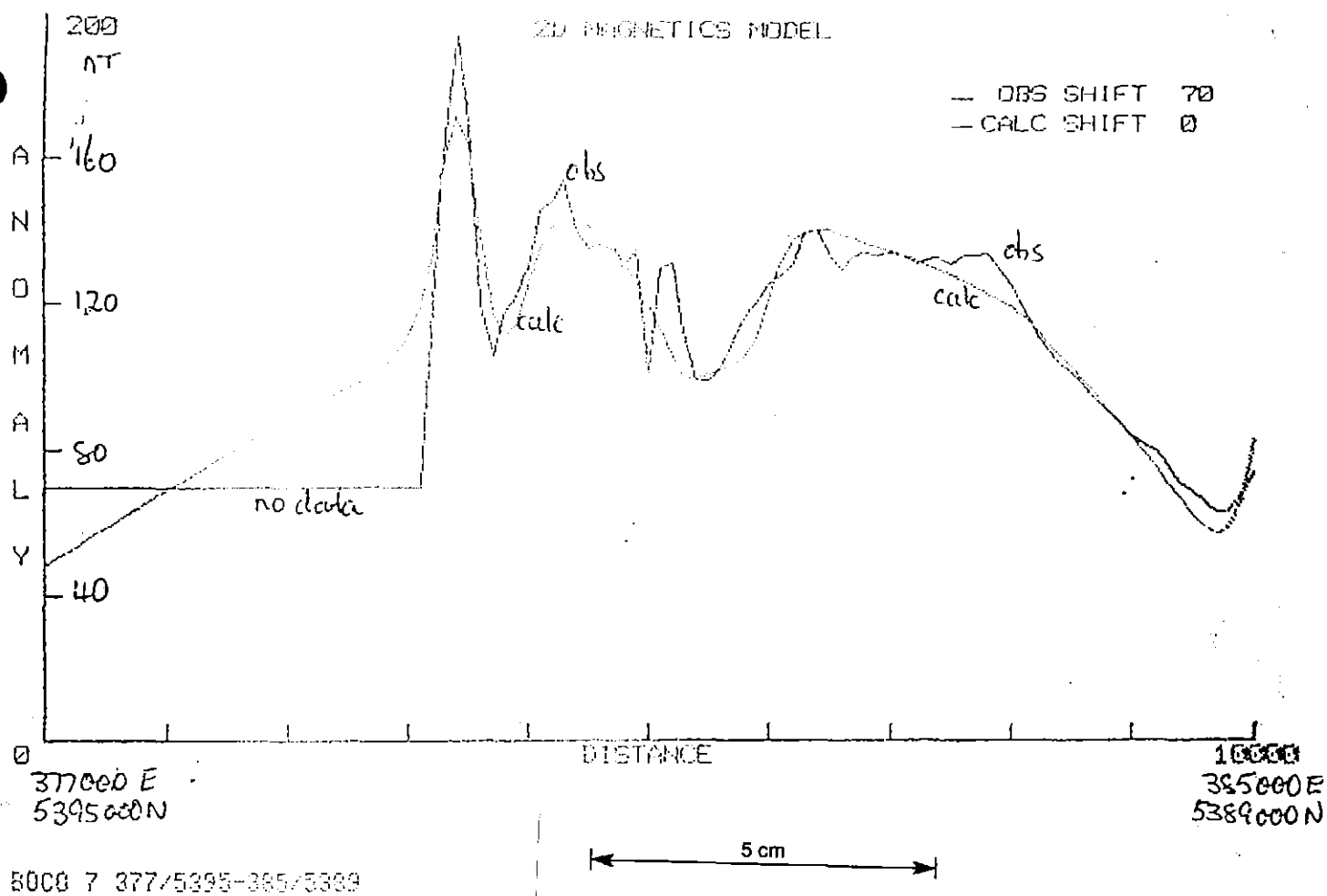
13.6

100.0

130.0

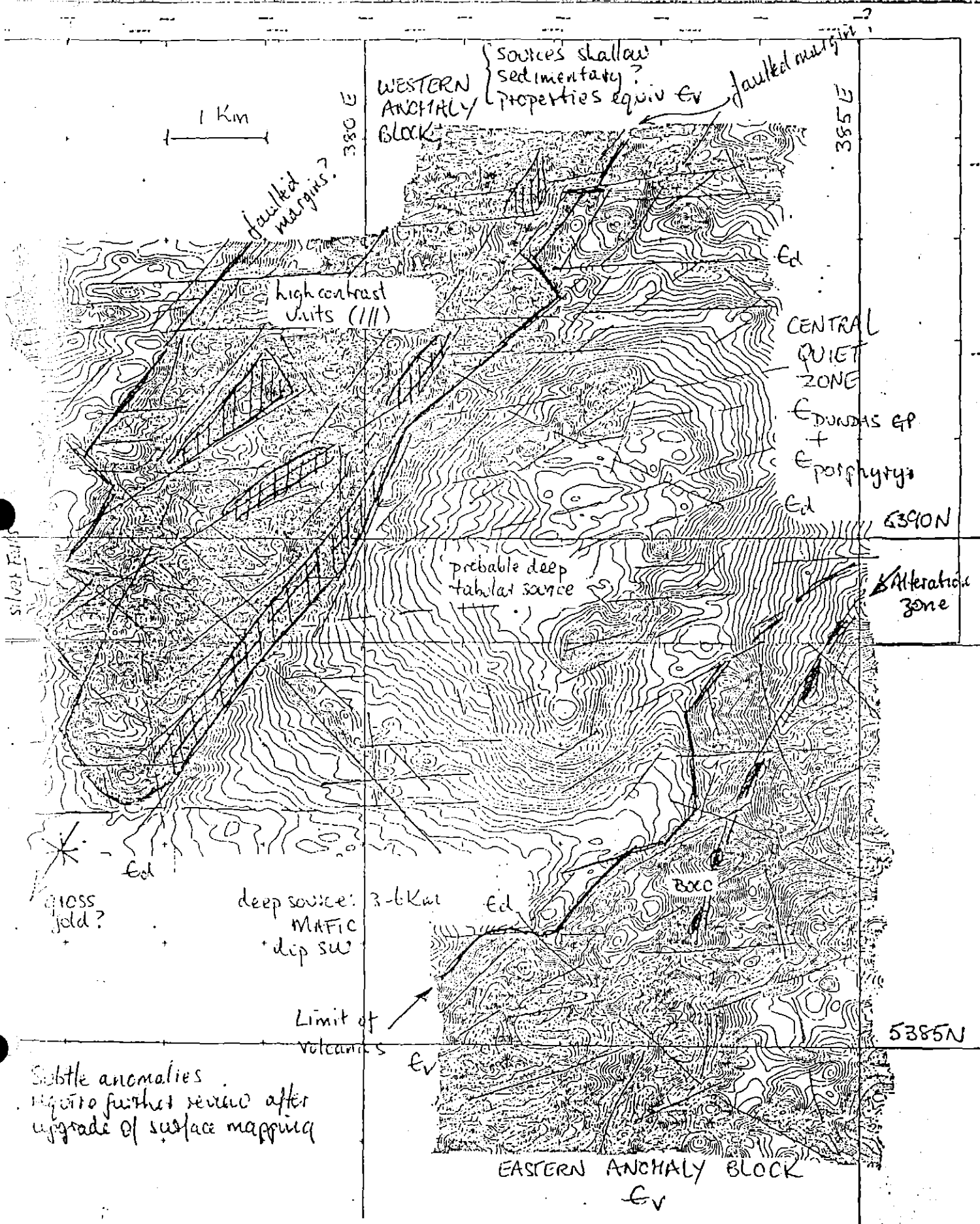
LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 10000 100

801149



PROFILE 7. 377 000, 5395 000 - 385 000, 5389 000

FIGURE 12



Appendix 8

North Pinnacles Area Gravity Survey Acquisition Report

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

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801153

NORTH PINNACLES AREA
WESTERN TASMANIA
1991-2 GRAVITY SURVEYS
ACQUISITION REPORT
for
PASMINGO EXPLORATION
by
Dr. D.E. Leaman

March 1992

NPINA

INTRODUCTION

The North Pinnacles area has been defined as the region between 376 and 380 000 mE and 5385 to 5391 000 mN. The topography and geology of the area is indicated in the base maps for Figures 3 and 4 but it lies immediately north of Burns Peak in western Tasmania. This is about 10 km north of Rosebery and about 5 km north of Lake Rosebery.

For the purposes of this report, and to clarify some of the characteristics of the observed gravity field, the area has been slightly enlarged to include an additional marginal zone 1 km wide around the perimeter.

Gravity coverage in this region prior to 1991 was extremely patchy; most stations were located south and east of the Burns Peak - Pinnacles ridge although one traverse had been completed along the ridge. Most of the stations in the area had been acquired by Geopeko as part of its Burns Peak coverage. This data has been reported previously (Leaman, 1990).

Other stations in the area were observed as part of very regional or Mt Read Volcanics Project surveys and form the basis of the Tasmanian gravity data base. Regional stations are irregularly spaced, but rare, while the Mt Read coverage has a nominal spacing of 1 km. This spacing was not achieved in this area due to negligible easy helicopter access and difficult ground access. Large gaps were present in the coverage.

The few stations present in the area implied that some major changes in the gravity field occurred in this area. These did not appear to correlate with any known geology but lack of detail and possible variations in precision may have affected results. All older (pre Geopeko) surveys depended on barometric elevation determinations and judged positioning in difficult terrain. Some stations had been considered possibly errant almost from initial reduction but in absence of sufficient coverage and detail these suspicions (by Dr R.G. Richardson as observation and reduction supervisor, and myself as corrector and validation checker) could be neither confirmed nor denied and the stations were retained in the data base pending infill and correlation.

Work in this area, and adjacent areas, by Pasminco Exploration during 1990 and 1991 indicated that some re appraisal of the geological and structural content of the region was justified. Gravity data was to form various litmus tests of evolving ideas (in company with magnetic data) but coverage had to be improved to effect this objective.

ACQUISITION

Gravity survey infills in the North Pinnacles area were undertaken on behalf of Pasminco Exploration by teams from the Department of Mines led and supervised by Dr. R.G. Richardson. Proposals for traverses and specifications were coordinated between Pasminco staff and myself and all observations were terrain corrected and vetted by me.

Work in the area was undertaken at different times during late 1991 and early 1992 as relatively low priority surveys within a much larger programme.

All stations acquired during this period, with station codes 9151 and 9251, have been tabulated in Appendix 1 and were reduced, by the contractor, using a density of 2.67 t/m^3 and terrain corrected to a radius of 22 km by me. The terrain estimates were based on supplied station positions and near meter landform notes provided by observers. All data were then check plotted, reviewed and compared with any pre-existing data.

Most elevations are barometric estimates calculated from available tie points and derived by tight looping techniques. While these appear to be valid within about 2 m some ill defined, but not necessarily incorrect, values exist. This type of uncertainty may or may not be serious but cannot be evaluated where loop times are occasionally very long due to access problems and the station density is low.

The nominal precision of the data is determined by estimates of elevation reliability since possible errors in position and observed gravity are generally less than 0.03 mGal. The reproducibility of the terrain corrections in this area, with supplied details, is generally better than 0.1 mGal. The nominal survey precision is inferred at about 0.5 to 0.6 mGal and this is consistent with recent surveys of the same type.

Spotty infill needs and difficult or limited access forced use of barometric methods in this area since slower and more expensive methods are not yet justified by available results and indications. The survey is more than adequate for regional and structural indications. Large gaps remain in the gravity coverage of this area.

The current coverage is shown in Figure 1 which presents the located position of stations of different vintages, their number and the observed Bouguer anomaly.

It will be noted that there is a systematic gradient across the area with values at least 5 to 7 mGal lower to the east.

DISCUSSION

In order to provide a rapid qualitative correlation of the upgraded gravity coverage with extant geological base maps the raw Bouguer data have been filtered using the crustal filter known as MANTLE91 (for method see Leaman and Richardson, 1989). This process removes the gross continental and oceanic effects and provides a true residual presentation free of normal filter blemishes. The residual Bouguer anomalies are shown in Figure 2.

Figure 2 may be compared with the compilations given in Leaman (1990) and shown to contain primary similarities but differences in detail. This is to be expected. The gross characteristics of the gravity field have been confirmed. The region west of the Pinnacles ridge has been demonstrated to be anomalously positive and that the positive effect does extend to the west with negligible correlation - within the detail afforded by current coverage - with surface geological data.

Some differences between this and previous compilations are evident. These related particularly to the location and extent of the primary trend at about 378 000 mE and the implied forms and amplitudes in the west of the area presented. The changes in inferred trend position north of 5388 000 mN reflect the much improved coverage near 5390 000 mN while the patchy improvements in the west have led to review or modification of the form of the field.

This raises some important issues for all explorers using data of this type. Gravity survey coverage is rarely adequately detailed or universal and may represent an integration or compilation of many surveys. These may be based on different acquisition methods, correction requirements or specifications and while any incorporation is feasible and valid some distortions may result where widely spaced surveys are used. Especially if these have used old base maps or barometric levelling. Such sites are not immediately obvious even in the current compilation and can only be identified after consideration of the survey code, and the methodology and crew employed. Problems generated, or rather randomly inserted into a data base, in this way are sometimes major but rarely limit the use of the data for primary regional purposes. Even an error of 2 or 3 mGal may be tolerated, or not even recognised due to large or irregular station separation, and not be an issue in such terms. Large variations in Bouguer anomaly may well be real; how real can not be assessed until other stations have been acquired in the same area, or the geological patterns are better understood. Single stations may be

affected by very local features - such as placement on abnormal till or alluvial pods - due to location or observer convenience which is always the prime consideration in initial, coarsely-spaced regional surveys.

Truly representative and detailed views of the gravity field may only emerge with complete infilling. It is only after this is done that features recognised should be accepted as a basis for detailed exploration. This does not deny any regional implications which may lead to the appropriate detailed work - which will inevitably lead to some review of previous compilations. It would be strange if this were not so.

Gravity data bases can never be regarded in the same way as a magnetic data base which will usually be the result of a massive, comprehensive data acquisition based on a line spacing of a few hundred metres at most and, in modern cases, a sample interval of less than 10 metres. And flaws can occur, and be recognised, and removed in such sets.

There should be no concern that a gravity data base is flawed or suspect beyond use - provided that the use is consistent with the nature of the data set.

The present data set has been closely examined by Dr. Richardson (as trustee of the state data base) and myself (as representative of Pasminco) in order to ensure that any compilation is not biased by possible flaws where coverage affords no tests and that other problems have been identified where different data sets overlap. These very occasional difficulties usually lead to either rejection or correction of offending stations depending on the nature of the problem and archived observation notes. Some corrections can be based on improved estimates of terrain correction using better positioning or newer or more detailed maps, better base ties, or better near station descriptions. Some commercial contractors whose data now forms part of the data base did not provide detailed near meter descriptions, for example, even though this may have been specified and any resulting deficiency is now irrecoverable.

Some stations, in the west of the area, while generally of the right magnitude, may disguise local problems and no great weight should be placed on any feature based on points in gappy coverage unless the feature or trend is supported in areas of better coverage.

The residual map (Figure 2) reveals a general NNE trending feature which presents a step anomaly with an amplitude of about 5 mGal. Offsets of this trend, which lies along the western side of the volcanics forming the

Burns-Pinnacles ridge can be correlated with zones of disturbed field observed to the west - even though such disturbances may not be accurately defined at present.

Figures 3 and 4 present the residual field overlain on available base maps; that produced by Corbett & McNeill (1986) and a more recent provisional compilation by Pasminco Exploration.

These diagrams show that the main step anomaly follows the western edge of the volcanic spine north of 5385 000 mN but lies within the volcanics-covered area south of this northing in the region between "Brown's Tunnel" and "Leo's Find". Its truncation at the northern exposure of the volcanics shows that the feature is not associated with any exposed feature, unit or lithology. This truncation is also interesting in that the gradient is offset and also becomes more diffuse - implying a change in source depth. A similar disruption is evident in the region of "Silver Falls" several kilometres to the WNW.

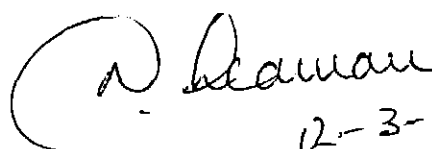
The inferred position of the Rosebery Fault may mark a zone of disturbed field (to the west) from a stabler field to the east. There is insufficient data to confirm this. Certainly the Silver Falls area appears more erratic and anomalous in gross terms and the deviations are supported by data of different vintages.

REFERENCES

- Corbett, K.D., & McNeill, A.W., 1986. Geology of the Rosebery - Mt Block area. Mt Read Volcanics Project geological map, Dept. Mines Tasm.
- Leaman, D.E., 1990. Gravity survey, EL 44/88 Burns Peak. Acquisition report (including preliminary interpretation) for Pasminco Mining (Geopeko).
- Leaman, D.E., & Richardson, R.G., 1989. Production of a residual gravity map for Tasmania and some implications. Exploration Geophysics, 20, 181-184.

Report submitted on behalf of Leaman Geophysics
by

D.E. Leaman


12-3-92

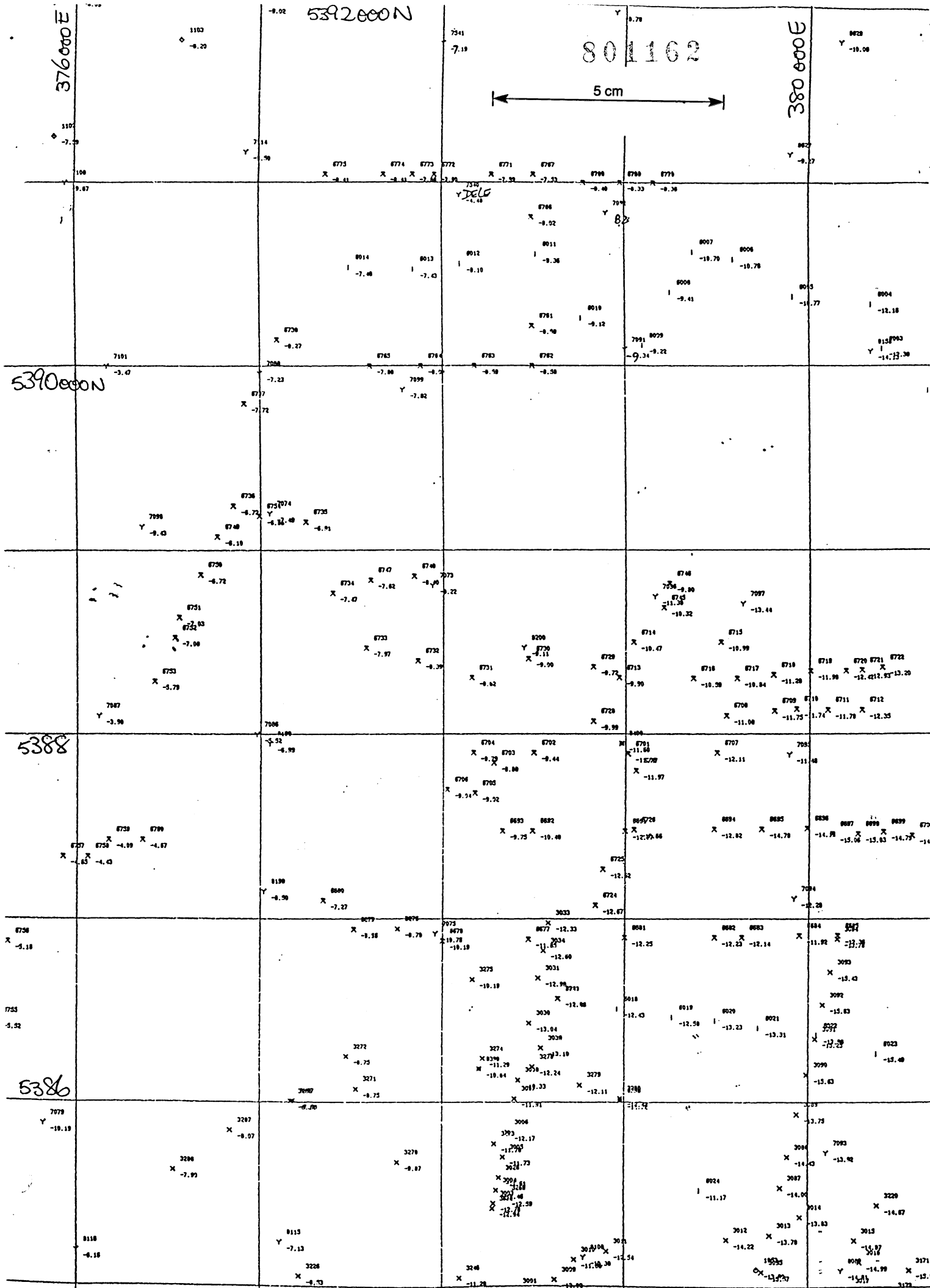
APPENDIX ONE

TABULATION OF GRAVITY STATIONS ACQUIRED IN THE NORTH
PINNACLES AREA DURING 1991-2 BY PASMINCO EXPLORATION

The table quotes
Station code (year, surveyor and number)
AMG easting and northing (without leading 5)
Height in metres
Observed and theoretical gravity (less 980)
Terrain correction
Bouguer anomaly (reduced at 2.67 t/m^3)

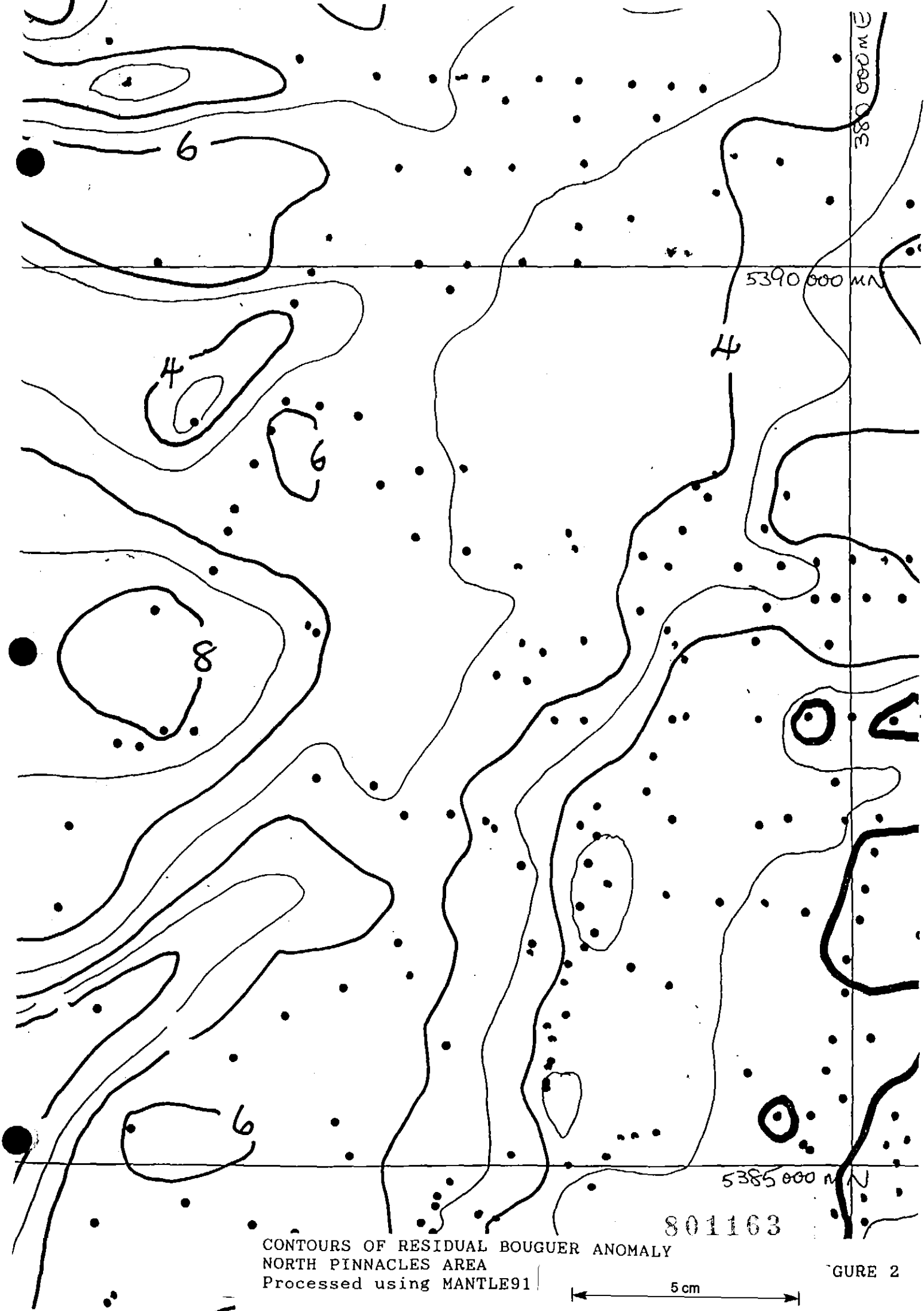
9151.6677	378480.0	386890.1	568.0	0.203990	0.328663	1.09	-11.85
9151.6678	378000.0	386880.1	492.0	0.221261	0.328664	0.43	-10.19
9151.6679	377510.0	386944.0	459.7	0.230150	0.328606	0.45	-7.58
9151.6680	377340.0	387100.1	479.0	0.226260	0.328478	0.72	-7.27
9151.6681	379000.0	386900.1	590.0	0.199144	0.328662	1.20	-12.25
9151.6682	379490.0	386900.1	526.0	0.212334	0.328668	0.63	-12.23
9151.6683	379640.0	386900.1	545.0	0.208597	0.328670	0.72	-12.14
9151.6684	379950.0	386910.1	541.0	0.209237	0.328667	1.08	-11.92
9151.6685	380160.0	386910.1	569.0	0.203378	0.328669	1.00	-12.36
9151.6691	379000.0	387475.1	628.0	0.191249	0.328198	0.64	-12.77
9151.6692	378500.0	387475.1	567.0	0.205481	0.328191	0.69	-10.48
9151.6693	378335.0	387475.1	544.0	0.210690	0.328189	0.73	-9.75
9151.6694	379485.0	387485.1	611.0	0.194384	0.328196	0.79	-12.82
9151.6695	379745.0	387485.1	678.0	0.178632	0.328200	1.41	-14.78
9151.6696	379990.0	387490.1	672.0	0.180735	0.328199	1.07	-14.19
9151.6697	380130.0	387460.1	690.0	0.175708	0.328225	1.71	-15.06
9151.6698	380270.0	387460.1	692.0	0.175402	0.328227	1.66	-15.03
9151.6699	380410.0	387470.1	702.0	0.173051	0.328221	2.28	-14.79
9151.6700	380565.0	387450.1	684.0	0.176558	0.328239	2.51	-14.61
9151.6701	379015.0	387895.1	595.0	0.199268	0.327859	0.48	-11.06
9151.6702	378505.0	387900.1	541.0	0.211598	0.327848	0.39	-9.44
9151.6703	378285.0	387845.1	511.0	0.218136	0.327889	0.35	-8.88
9151.6704	378170.0	387900.1	538.0	0.212888	0.327843	0.33	-8.79
9151.6705	378180.0	387680.1	503.0	0.219617	0.328021	0.44	-9.02
9151.6706	378025.0	387700.1	531.0	0.214140	0.328003	0.37	-9.04
9151.6707	379500.0	387900.1	603.0	0.196678	0.327862	0.45	-12.11
9151.6708	379550.0	388100.1	584.0	0.201266	0.327701	0.47	-11.08
9151.6709	379810.0	388125.1	606.0	0.196229	0.327684	0.49	-11.75
9151.6710	379930.0	388135.1	608.0	0.195932	0.327678	0.40	-11.74
9151.6711	380100.0	388130.1	640.0	0.188993	0.327684	1.01	-11.78
9151.6712	380290.0	388130.1	652.0	0.186183	0.327687	0.89	-12.35
9151.6713	378965.0	388305.1	551.0	0.208864	0.327528	0.37	-9.90
9151.6714	379045.0	388500.1	551.0	0.208281	0.327371	0.23	-10.47
9151.6715	379520.0	388500.1	555.0	0.206934	0.327378	0.27	-10.99
9151.6716	379370.0	388300.1	565.0	0.205509	0.327537	0.29	-10.59
9151.6717	379610.0	388300.1	578.0	0.202633	0.327540	0.36	-10.84
9151.6718	379805.0	388320.1	578.0	0.202049	0.327527	0.49	-11.28
9151.6719	380005.0	388340.1	613.0	0.194097	0.327513	0.84	-11.98
9151.6720	380200.0	388340.1	636.0	0.188993	0.327516	0.99	-12.42
9151.6721	380290.0	388345.1	645.0	0.186862	0.327513	0.83	-12.93
9151.6722	380400.0	388360.1	656.0	0.184166	0.327503	1.08	-13.20
9151.6723	378640.0	386566.1	602.5	0.197003	0.328926	0.95	-12.45
9151.6724	378840.0	387074.1	644.3	0.187789	0.328519	1.31	-12.67
9151.6725	378880.0	387268.1	636.7	0.189662	0.328363	0.83	-12.62
9151.6726	379050.0	387483.1	630.5	0.190905	0.328192	0.59	-12.66
9151.6727	379060.0	387803.1	607.9	0.195904	0.327934	0.47	-11.97
9151.6728	378825.0	388070.1	558.2	0.207517	0.327715	0.39	-9.99
9151.6729	378825.0	388365.1	545.0	0.210336	0.327477	0.20	-9.72
9151.6730	378475.0	388410.1	544.3	0.211187	0.327436	0.19	-9.00
9151.6731	378160.0	388305.1	547.7	0.210929	0.327517	0.23	-8.62
9151.6732	377860.0	388400.1	568.3	0.206876	0.327436	0.37	-8.39
9151.6733	377575.0	388470.1	563.4	0.208100	0.327375	0.48	-7.97
9151.6734	377390.0	388770.1	525.2	0.216042	0.327131	0.31	-7.47
9151.6735	377245.0	389155.1	506.8	0.219818	0.326818	0.39	-6.91
9151.6736	376855.0	389240.1	469.9	0.226671	0.326744	0.92	-6.72
9151.6737	376915.0	389795.1	546.2	0.210365	0.326297	0.76	-7.72
9151.6738	377095.0	390145.1	560.7	0.206915	0.326017	0.53	-8.27
9151.6745	379210.0	388690.1	542.0	0.210040	0.327220	0.24	-10.32
9151.6746	379240.0	388820.1	526.0	0.213433	0.327116	0.41	-9.80
9151.6747	377600.0	388840.1	541.0	0.212649	0.327077	0.38	-7.62
9151.6748	377840.0	388860.1	555.0	0.208998	0.327064	0.49	-8.40
9151.6749	376770.0	389075.0	461.0	0.229252	0.326876	0.84	-6.10
9151.6750	376680.0	388870.1	479.0	0.225428	0.327040	0.67	-6.72
9151.6751	376565.0	388640.1	510.0	0.219273	0.327224	0.60	-7.03
9151.6752	376540.0	388530.1	565.0	0.207211	0.327313	1.87	-7.08
9151.6753	376430.0	388290.1	502.0	0.221806	0.327505	1.16	-5.79

9151.6754	376995.0	389185.1	517.8	0.217390	0.326791	0.68	-6.86
9151.6755	375565.0	386440.0	435.0	0.237586	0.328985	0.31	-5.52
9151.6756	375625.0	386875.0	435.0	0.237395	0.328635	0.51	-5.16
9151.6757	375925.0	387340.0	423.0	0.239880	0.328264	0.53	-4.65
9151.6758	376060.0	387340.0	424.0	0.240004	0.328266	0.43	-4.43
9151.6759	376175.0	387430.0	425.0	0.240033	0.328195	0.47	-4.09
9151.6760	376365.0	387430.0	458.0	0.232874	0.328198	0.56	-4.67
9151.6761	378500.0	390220.1	522.0	0.214226	0.325976	0.47	-8.59
9151.6762	378500.0	390000.1	510.0	0.216797	0.326154	0.45	-8.58
9151.6763	378180.0	390000.1	503.0	0.218183	0.326149	0.43	-8.59
9151.6764	377880.0	390000.1	503.0	0.218757	0.326145	0.41	-8.03
9151.6765	377600.0	390000.1	502.0	0.219034	0.326141	0.48	-7.88
9151.6766	378500.0	390805.1	482.0	0.221940	0.325504	0.73	-8.02
9151.6767	378510.0	391050.0	449.0	0.228611	0.325307	0.84	-7.53
9151.6768	378780.0	391000.1	482.0	0.221452	0.325351	0.68	-8.40
9151.6769	378980.0	391000.1	485.0	0.220774	0.325353	0.84	-8.33
9151.6770	379160.0	391000.0	465.0	0.224597	0.325356	0.93	-8.36
9151.6771	378280.0	391050.0	439.0	0.230160	0.325303	0.80	-7.99
9151.6772	377960.0	391050.1	480.0	0.222131	0.325299	0.85	-7.90
9151.6773	377840.0	391050.1	494.0	0.219493	0.325297	0.77	-7.86
9151.6774	377680.0	391050.1	540.0	0.209868	0.325295	0.79	-8.41
9151.6775	377360.0	391050.1	546.0	0.208339	0.325291	1.13	-8.41
9251.6002	380650.0	389865.1	519.6	0.210365	0.326292	0.71	-13.00
9251.6003	380400.0	390095.0	461.9	0.222073	0.326103	0.79	-12.38
9251.6004	380340.0	390340.0	443.7	0.225495	0.325904	0.97	-12.16
9251.6005	379910.0	390380.0	447.6	0.226174	0.325866	0.87	-10.77
9251.6006	379590.0	390580.1	518.3	0.212257	0.325700	0.73	-10.76
9251.6007	379370.0	390620.1	548.8	0.206083	0.325665	0.92	-10.70
9251.6008	379245.0	390405.1	520.4	0.213357	0.325837	0.69	-9.41
9251.6009	379095.0	390115.1	523.3	0.213328	0.326069	0.59	-9.22
9251.6010	378760.0	390265.1	533.5	0.211349	0.325943	0.53	-9.12
9251.6011	378520.0	390605.1	509.1	0.216606	0.325666	0.55	-8.36
9251.6012	378100.0	390555.1	504.4	0.217667	0.325700	0.71	-8.10
9251.6013	377840.0	390525.1	502.7	0.218738	0.325721	0.67	-7.43
9251.6014	377485.0	390535.1	526.0	0.214131	0.325708	0.63	-7.48
9251.6018	378960.0	386510.1	534.0	0.210269	0.328976	1.23	-12.43
9251.6019	379260.0	386465.1	503.0	0.216530	0.329016	0.96	-12.58
9251.6020	379495.0	386445.1	509.0	0.214704	0.329036	0.97	-13.23
9251.6021	379730.0	386405.1	478.0	0.221013	0.329071	0.72	-13.31
9251.6022	380045.0	386365.1	487.0	0.218719	0.329108	0.63	-13.96
9251.6023	380375.0	386265.0	418.0	0.230188	0.329193	1.29	-15.49
9251.6024	379410.0	385525.0	426.0	0.233734	0.329777	1.07	-11.17



STATION LOCATIONS, NUMBERS, BOUGUER VALUES
NORTH PINNACLES AREA

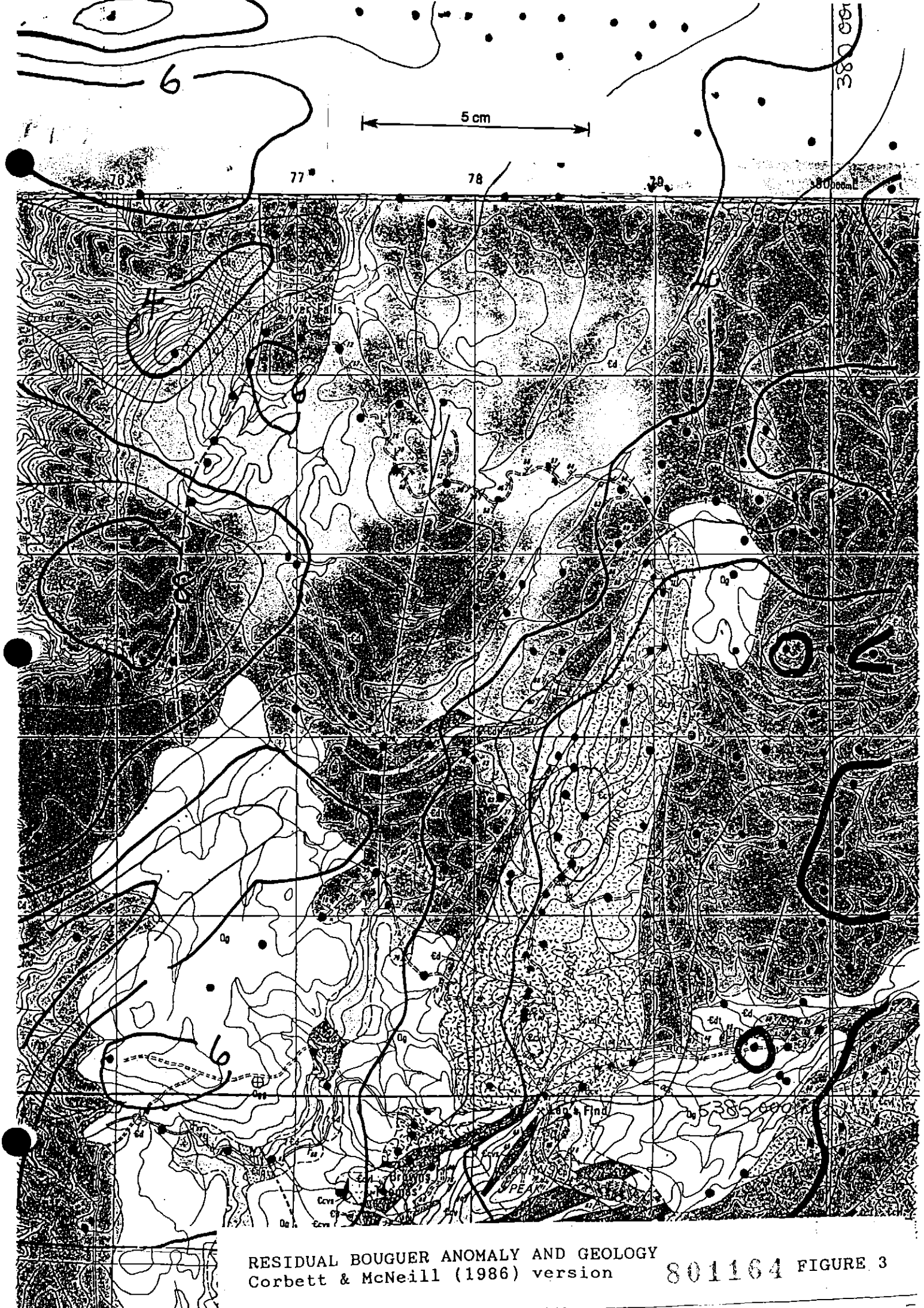
FIGURE 1



CONTOURS OF RESIDUAL BOUGUER ANOMALY
NORTH PINNACLES AREA
Processed using MANTLE91

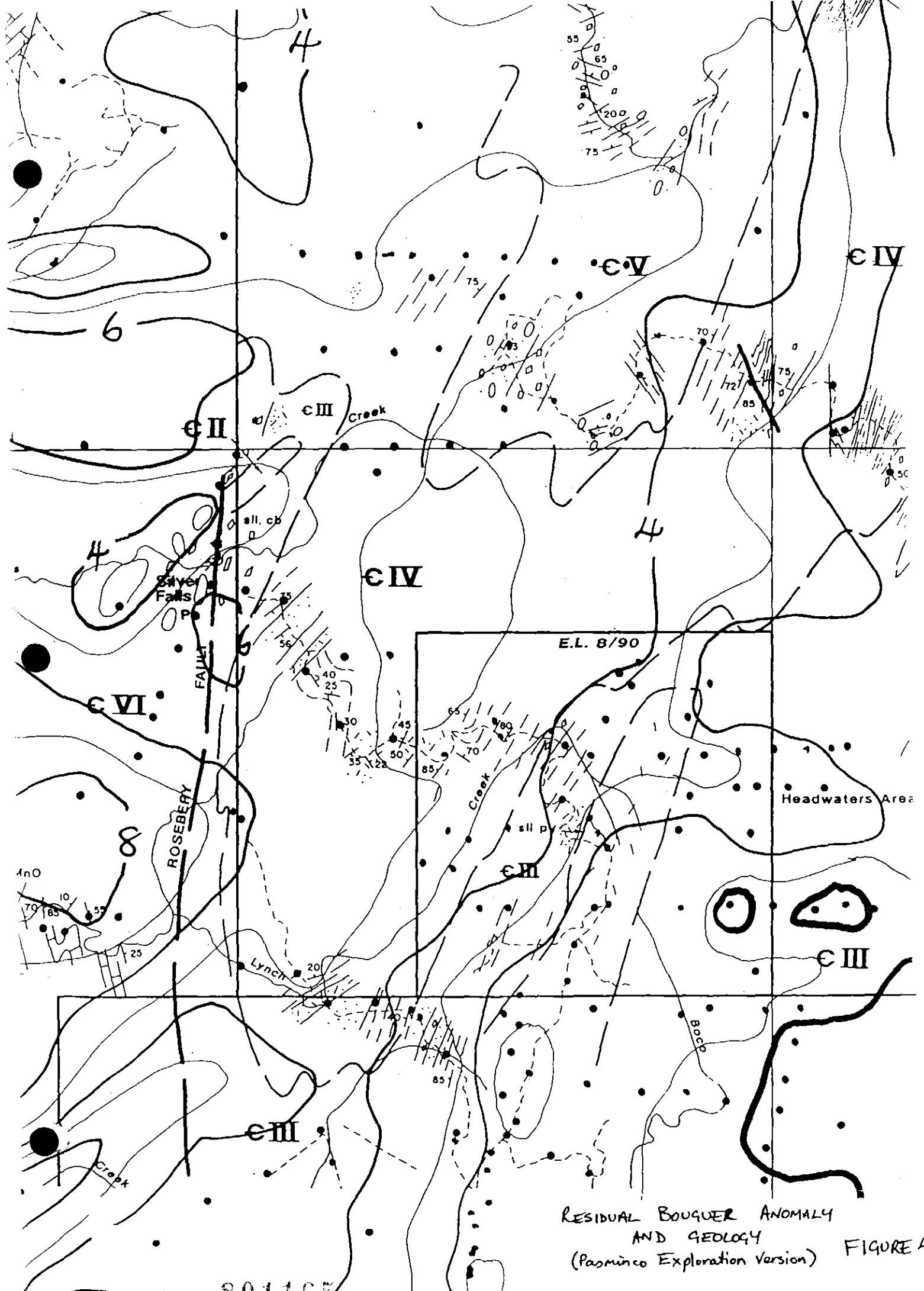
801163

FIGURE 2



RESIDUAL BOUGUER ANOMALY AND GEOLOGY
Corbett & McNeill (1986) version

801164 FIGURE 3



RESIDUAL BOUGUER ANOMALY
AND GEOLOGY
(Pasminco Exploration Version) FIGURE 4

801165

Appendix 9

Gravity-Magnetic Interpretation Update

LEAMAN GEOPHYSICS

Survey Review, Specification, Reduction, Interpretation
Gravity, Magnetic and Seismic Methods
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801167

INTERPRETATION UPDATE
BURNS PEAK - NORTH PINNACLES RIDGE REGION
EL 44/88, 2/90, 8/90

for
PASMINCO EXPLORATION

by
D.E. Leaman

April 1993

PINNACLE

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INTRODUCTION

This report considers aspects of the geological structure in the Burns Peak - North Pinnacles - Silver Falls area some 10 km north of Rosebery in western Tasmania. The region examined forms parts of EL 44/88 (Burns Peak), EL 2/90 (Bulgobac) and EL 8/90 (The Pinnacles). The location of the area examined and the relationships of these licence areas is shown in Figure 1 which presents the current, accepted public domain interpretation of the geology (Mines Department Mount Read Project Mapping).

Pasminco Exploration requested a brief review of current geophysical data in order to effect an update of previous interpretations (e.g. Leaman, 1990a, b; 1991a, b). The review has considered revised and improved gravity and magnetic databases and suggestions from recent mapping.

New mapping, by Roger Poltock for Pasminco Exploration, has been restricted to the North Pinnacles zone and, like the infilled gravity data base, the information has only been available since April 1993. Indeed, the final gravity traverse was not reduced until April 23. These delays and restrictions have limited the extent of this review given a licence renewal reporting date of May 8.

Some particular issues were posed for examination.

1. SILVER FALLS - NORTH PINNACLES. Recent mapping and interpretation by R. Poltock has implied a stratigraphic control on mineralisation north of the Burns Peak zone which extends into the Silver Falls area. Is such a structure and pattern feasible and continuous? Do the potential field data support such ideas?
2. THE ORIGIN OF THE LARGE MAGNETIC ANOMALY CENTRED AT 382 000 mE, 5390 000 mN. This feature dominates and distorts the magnetic field over a wide area. Various options for its source have been canvassed, including a porphyry sill or plug. Which are most likely?
3. THE RELATIONSHIP BETWEEN HOLLWAY HOST SEQUENCES AND CENTRAL VOLCANICS. Does the host sequence unconformably overlie or structurally or otherwise underlie the main body of volcanics? And are these structures related to the Pinnacles block?

Consideration of these issues forms the body of this report in so far as available time and data have allowed. Additional magnetic data has been recently acquired by Pasminco Exploration in the areas both east and west of the data set used, including the Silver Falls region. This has not been released by the contractor at the time of writing.

PREVIOUS WORK

Some previous work, outlining data available and its preliminary interpretation, is available. This report considers any necessary or essential refinements to these interpretations required by evolution of ideas, data bases, data coverage or new mapping.

All previous work (pre December 1991) was based on the extant gravity data base, utilised in both total Bouguer and residual Bouguer forms, and observed magnetic data at a nominal clearance of about 100 m (effectively 120 m).

Aspects of this previous work relevant to the particular issues (see Introduction) posed for this study are outlined below.

Figures 2, 3 and 4 have been drawn from Leaman (1990a) study of EL 44/88. Figures 2 and 3 indicate the nature of the magnetic field and the primary elements of its interpretation. The gross regional effect generating almost 300 nT is due to the large magnetic feature centred north of the sections (Issue 2) and is the bane of any detailed interpretation in the region. All previous interpretations have been forced to consider side aspects of this feature and attempt to remove the effects in order to examine the detail - spiky effects associated with the volcanics. Unless this can be done adequately there will always be some doubt attached to dip evaluations within the volcanics. No previous interpretation for Pasminco has been able to consider the entirety of the regional source due to survey and licence fragmentation. (This report represents a first attempt to redress this situation). The interpretations indicated that the gross effects would be best satisfied by a deep, very high contrast magnetic source. Only ultramafics appear to satisfy the required property conditions. Consideration of the more detailed aspects of the profiles then led to a view that the volcanics were depth limited and were present in wedge shapes with internal units dipping steeply to the wedge cut off. This pattern is consistent with thrusting on a large scale. While elements of the volcanics were inferred to be relatively non magnetic some discrete units are modestly magnetic. The anomalous responses; a generally noisy and sub linear pattern is associated with the volcanics, imply that these units virtually outcrop and yet they have yet to be identified and their properties explained by susceptibility surveys. This paradox must be resolved. Some volcanic units are clearly magnetised. But why? And what is the lithology involved?

These same interpretations imply that the Central Volcanics might well overlie the Hollway host sequence (Issue 3) although at the scale presented this is unclear. The Rosebery Fault does not appear in these sections and it may be relatively unimportant in the regional scheme in terms of its dislocation of major or magnetic units. Figure 4 stresses this view by suggesting some major cross cutting regional trends and repeated detachments within the region. Only in the Burns-Pinnacles area (Issue 1) does this pattern break down. The mapped volcanics in this area lack strong magnetic responses, there are no strong trends of any sort north of the main detachment (as described in Figure 4) and mineralisation is isolated.

The reason for these changes was (and perhaps still is) far from apparent.

Leaman (1990b) took a somewhat more regional view of the volcanics east of Burns Peak. Figures 5 and 6 demonstrate this. Figure 5 enhances the view shown in Figure 4 to quantify the thickness of volcanics present in the implied thrust and fold wedges and to nominate the likely location of the detachments. In this view the principal trend from near 376/5381 to 383/5387 (and beyond) is presented as a compound detachment with two structures in the Burns Peak zone. One of these would impose an eastward facing at the base of the Hollway Andesite (Issue 3). The other would isolate the Pinnacles rhyolite and suggest synclinal folding in order to explain the negligible response of this block of volcanics (Issue 1). The gravity interpretation shown in Figure 6 reinforces many of these characteristics. The volcanics are thin and wedged but there is a major change in gross structure near Burns Peak. Regional granites dominate the gravity field and must be included in all assessments.

Leaman (1991a) provided a further regional view of the area NE of Burns Peak. This is suggested in Figure 8. The location of regional profiles is shown in Figure 7. Leaman (1991b) also included additional regional assessments and incorporated some refinements. No other, or subsequent, evaluations have been undertaken even though the data bases have been greatly expanded, corrected and integrated. Figure 9 presents the latest view. Its location is shown in Figure 7. Figures 8 and 9 stress the regionally elevated nature of the magnetic field NE of Burns Peak even though neither profile offers a view of the main anomaly (Issue 2). Both solutions imply a strongly magnetic base to the section implying properties consistent with magnetic basalts or volcanics comparable to the Crimson Creek Formation and at least discontinuous slices of higher contrast - presumably ultramafics. These mafic units are mass limited and it is not possible to include large volumes of basalts. Both gravity sections have been anchored on Devonian granites for density and base level reference. Both sections stress the thin and wedge-like character of the volcanics and the existence of a deep trough or section near, or west of, the Pinnacles ridge (Issue 1). It will be noted that in each case it is the gravity interpretation which is most informative overall - but this is only achieved due to the independent control of one or two horizons by the magnetic analysis. Neither method should be used in isolation.

Leaman (1991b) attempted to consolidate, within the context of EL 2/90, the regional setting which appeared to be indicated by this series of limited interpretations and its impact on exploration targetting and explanation of known mineralisation. Figures 10 and 11 summarise the conclusions.

Figure 10 provides a refinement of the volcanic wedge form with its general confirmation of east facing detachment and concealment of half grabens containing Lower Cambrian, and much more magnetic, rocks. Ultramafics, effectively as a sheet, marked base of section. The magnetic profile again provided a side-swipe sample of the major central magnetic anomaly (Issue 2) and this is clearly linked to both

quartz porphyries (outcropping) and concealed ultramafics. The latter were considered the critical element. This interpretation is terminated east of the Pinnacles Ridge near the feature which had been termed a thrust limit (Figures 4, 5) and which is labelled a rift edge (Figure 11). This apparent contradiction reflects both the impact of the modelling completed and the slowly improving data bases, especially the gravity coverage. But there is no contradiction. Simply that the thrust front, or one of them, involving Central Volcanics has overlapped a major structural element in older or contemporaneous rocks. Note that even if the rocks are all of similar ages the volcanics are restricted to the blocks SE of the major rift stages and have been displaced from a zone in which basement was always high into a region where it was depressed due to extension. Leaman (1988) suggested that this zone also marks the limit of shallow Tyennan type basement and onset of thick Oonah type basement and that this boundary marks a primary rift onset structure. Figure 10 expands this view to suggest that this older structure has been greatly enlarged during the Cambrian and that the extension was focussed about it. The volcanic piles appear to have accumulated in the relatively shallow depressions inboard of this most active zone. They have been translated westward subsequently. Note that Figure 11 suggests a major rift trending NE with a width approximately equivalent to the distance between Silver Falls and Burns Peak (Issue 1).

This outline of previous work stresses some consistencies and some contradictions but no coherent study had been undertaken. The major problems are related to just what happens eastward from Silver Falls to Burns Peak and then into the main block of Central Volcanics. Can correlations be made? Just what is the mineralisation associated with? The key to all this lies in the position of the Pinnacles Ridge which has been assumed to be a piece of Central Volcanics and yet which has very different properties (see magnetics) and which lies within the axis of a major structure (magnetics) which is almost certainly a rift (gravity). This is Issue 1. Can it be resolved?

NEW DATA AND INNOVATIONS

At the time of writing new detailed aeromagnetic surveys adjacent to the Pinnacles area had been completed on behalf of Pasminco Exploration and results were expected. Late receipt of this data has limited deductions near Silver Falls. Other magnetic data have been reviewed and corrected for terrain effects and replotted at the realistic altitude of 120 m (Figure 12a) or as a residual after removal of a 1300 m level continuation (Figure 12b). The latter has the effect of sharpening and clarifying shallow source distributions but may be misleading to model due to uncertainties about what has been removed. None of these enhancements were available at the time of earlier studies. The relationship between basic geology and magnetic field is shown in Figure 12c.

Gravity coverage has been greatly improved since 1991 and it is used here in mantle-corrected form (Figure 13a, b) as a residual. Raw

Bouguer compilations obscure detail within the data set and provide little indication of anomaly relativities. No raw compilation should be used for image or other qualitative analysis and should only be modelled if a whole crustal element is also included.

The differences between the magnetic presentations should be noted. The residual version is more detailed and much of the large central anomaly has been removed. The removal is not complete and some ghosts persist. This reflects the complex frequency response of the feature and the likelihood that its source covers a sizeable depth range.

Important elements of the geophysics of the region may also be seen in Figure 14 which offers superposition of the gravity and magnetic data sets. This stresses some of the conflicts and agreements in the data sets.

The upgraded interpretation described below incorporates the best elements of the available data sets; using the observed and corrected magnetic field where overviews and relativity are required and the residual magnetic field where detail is sought. This leads to a shift in the relative zero position in both the maps and models and it is not valid to compare the curve fit parameters between each type. Each class must be fitted consistently as separate entities. All gravity interpretation uses the residual field but is also linked to the effect of the nearby granitoids in order to minimise ambiguity. This technique has been little used in western Tasmania to improve the resolution of the data set but the development of reasonably accurate granite models (Leaman & Richardson, 1989; unpublished research by Leaman Geophysics since 1990) now allows generation of second order refined residuals. This technique has been tested on the Rosebery Mine Lease.

Recent mapping in the Pinnacles area by R. Poltock has also led to some review of the stratigraphic correlations in the area and the structural setting. These are summarised in the sketch section provided in Figure 15. Although there is some doubt as to the exact position and associations near the Rosebery Fault the strongly magnetic character east of Silver Falls and north of the ridge are linked with rocks considered to be comparable with the Comstock Tuff and Tyndall Group and that these may overlie an equivalent to the White Spur Formation as defined south of Mt Read. The host sequence is considered to be stratigraphically controlled at the base of this sequence and the phyric rhyolite of the ridge forms an anticline. Note that this concept directly disagrees with the ideas shown on Figure 5. It is proposed that both the host sequence and underlying volcanics change in thickness westward such that the volcanics virtually disappear. Other Cambrian rocks underlie the faulted zone. These concepts, Issue 1, are directly tested below.

INTERPRETATION

The following discussion provides introductory comments based on previous work and direct implications from the data sets as now constituted and then examines some of the particular characteristics relevant to the issues defined for study. A select group of profiles has then been examined in order to resolve some of the issues.

GENERAL COMMENTS

The Silver Falls-North Pinnacles region

The Pinnacles region is magnetically quiet with the exception of the belt E and NE of Silver Falls. Very quiet. The character of the magnetic field is unlike that to the SE of Burns Peak, or NE of Silver Falls. This quiet-zone extends NE from the Rosebery Fault, and perhaps 1 or 2 km west of it, at 5382 to 5388 000 mN. The northern and southern limits of the quiet zone are exceptionally well defined (see Figures 12 and 14).

The northern boundary of the undisturbed field follows the mapped boundary of nominated Tyndall Group of Poltock and this view is much more consistent than any previous mapping - including that shown in Figure 1. Poltock's mapping may be suspect due south of Silver Falls where the folded unit trends N-S and may be offset. The magnetic field would suggest that the dislocations and arrangements are more complicated than shown in the sketch map now available. There is no doubt that this unit can be mapped magnetically.

The southern boundary is more complex. It is marked magnetically as a correspondence with the limit of mapped Central Volcanics although the exact limit of volcanic rocks or their correlates may be in some dispute. The southern boundary cuts across the exposure of the Hollway andesites immediately south of Burns Peak.

The northern and southern boundaries so well defined magnetically are essentially parallel but it is the southern boundary which attracts most interest at this time. Its orientation - as defined magnetically - trends directly to the Jack Fault system of the Que-Hellyer Block. I suggest that this feature is of profound exploration potential and interest. It has, after all, proven mineralisation at each end and its intersection near the Charter Fault may also be mineralised. The zone near 388 200 mE, 5391 500 mN should be reviewed.

(Given these associations some thought may also need to be given to the precise origin of the northern boundary which appears to be stratigraphic, or whether somewhere nearby there is something more fundamental. It will be less well known and perhaps covered due to limited access, basic geological knowledge or Tertiary cover).

But what is this magnetic feature? What is the structural or lithological cause? Why are the volcanics terminated or controlled by it or near it? Why is it so straight?

But, as with all rules, there is an exception. The volcanics of the Burns-Pinnacles Ridge volcanics, which have been directly correlated with the Central Volcanics, lie north of the southern feature. Why?

How? And why are these particular volcanics so magnetically bland? So bland the effect is distinctive. An effect which persists only to the projection of the southern trend a little north of Mt Kershaw.

The last listed question draws attention to a series of enigmas. The volcanics of the Central Volcanics are variably magnetised. Many anomalies are generated by them. Most are produced at shallow depths - presumably the base of weathering - with an implied susceptibility of about 0.0003 cgs. This is at least an order of magnitude greater than the normal peak values observed. Most property determinations are consistent with the implications of the Pinnacles Ridge rocks not the main complex. Why? There is no doubt about the anomalies, nor their implied source and depth limits. Unless we are comparing chalk and cheese. Are there perhaps two volcanic sequences?

Most properties currently used for appraisal and control within the volcanic sequences have been derived from outcrop and drilling on the west face of Mt Black and north face of Mt Hamilton and Mt Read. Both areas are remarkable for their high relief, large regional magnetic anomalies and negligible variations in shallow volcanic properties. The contrasting characteristics of smooth and noisy magnetic fields can be seen across Mt Black. Further the more quiet zones can be correlated with those regions shown in Figures 5, 6, 8 and 9 to contain thin volcanics. Are we really seeing something else in this magnetic response pattern?

Is there something fundamentally different between the main volcanic block north of Lake Rosebery and that north of Burns Peak? The possible setting of the Pinnacles material has not been discussed in previous interpretations.

The dominant magnetic anomaly in the region is centred on 383 000 mE, 5392 000 mN but is located between the regional magnetic features described above. The anomaly is crudely circular and its centre lies about midway along the quiet magnetic corridor between the Pinnacles Ridge and the Mt Charter Fault. The feature is large and distorts all other anomalies across a radius of about 8 km.

The relationship between this feature and the quiet magnetic corridor seems too definite to be coincidental.

Consideration of the gross features of this anomaly suggests that its source cannot lie near surface since there is nothing known with the requisite distribution. This does not exclude the possibility that the exposed quartz porphyries in the region may well contribute to the effect. Correlation of porphyry exposure with variations demonstrates that these rocks do contribute high frequency components within the magnetically quiet belt but seem quite unable to account for the overall effect (see also Leaman, 1991b).

The linkage between these first order magnetic elements may prove crucial for understanding the evolution of the region and any mineralising foci.

No previous analysis has, however, considered a complete profile across the crest of this anomaly and estimated the likely source distribution on that basis. More limited views (e.g. Figures 2, 3) or

partial regional views across the side of the feature (Figures 8, 9, 10) have implied ultramafics at depth.

ISSUE 1: SETTING OF NORTH PINNACLES RIDGE

The setting of the North Pinnacles Ridge has been examined in both regional and local contexts using the current corrected and detailed data sets. This has been done in order to confirm or deny implications from earlier work and to test some structural variations actually suggested by the distribution of anomalies as well as test the concept proposed by R. Poltock and sketched in Figure 15.

A regional setting is essential. Without it there is no possibility of resolving the many ambiguities this complex and ill-defined geology can pose given that the potential fields are in themselves inherently ambiguous unless rigorously employed.

Two profiles have been selected for detailed review, lines 7295 and 3875.

LINE 7295 is a NW-SE profile extending from 372 000, 5395 000 to 390 000 mE, 5380 000 mN. It begins at an outrigger exposure of the Meredith Granite and ends within view of the major exposures of the Granite Tor Granite such that the latter can be fully defined in terms of the end of the profile. The modelling is thus anchored to granite at each end. Density contrasts and geometries are thus readily fixed into quite small ranges.

The interpretation of this profile is shown in Figure 16.

This interpretation may be compared directly with those of Figures 6 and 8 as a direct successor. Any differences are in style and detail and not general concept. No other general concept has been found which will satisfy BOTH fields.

The general change in basement type is shown to occur just NW of Pinnacles and the thin volcanic wedges of the Mt Block area have been confirmed. The model also suggests a single tectonic style for all the blocks; namely asymmetric rifting and extension and later overlapping compression at high levels.

The implied Tyndall Group correlate is shown in section in the style of Poltock's section and while this dominates the magnetic field it is inconsequential gravimetrically. But there must be another block of material beneath and to the east of these exposures in the very zone which is magnetically quiet. Examination of the requirements of the gravity balance shows that any materials present must be less dense than the "normal" Dundas Group or volcanoclastics and certainly not volcanic in composition or density. The magnetics confirms that this is so even though limited burial (> 1 km) might disguise any magnetic response. The real indicator is provided by the absence of response by the Pinnacles material itself.

The magnetic model assigns a small contrast to this box-like slab of sedimentary material but the profile sideswipes the large central anomaly and other explanations may be more likely. The assigned susceptibility should be considered an absolute maximum; zero is more likely given the following discussion and Figure 10.

For the first time, however, a regional section can be created which contains all the elements of previous work and an explanation of the belt of quiet magnetic field - and a rift filled with sedimentary rocks. All these elements are coupled to show how the volcanics of

of the Central Volcanics Complex structurally overlap the margin of the rift. The issue here thus becomes a matter of age or structural relationships. Is this an unconformable or structural overlap?

If it is stratigraphic then it might be possible to find or predict the presence of further volcanics beneath the fold incorporating Tyndall Group, but above the rift onlap, on the northern side of the structure.

But if structural then some very different age and correlation, indeed genetic, issues are raised. These would include such matters as whether the volcanics piles are the same age as the rift sedimentation and perhaps only the upper members contain obvious volcanoclastics.

There is also the suggestion that the change in basement composition and structural control may be axial to the structure and hence the controlling feature in its development.

The implications of these matters are far reaching and might well do much to explain the differences in sedimentation and lithology long known to occur to the NE of Pinnacles Ridge, as near the Charter Fault and west of the Que River Mine.

Some of these topics have been considered in more detail along LINE 3875 (from 372 to 390 000 mE at 5387 500 mN).

Figures 17 and 18 present some of the options which may be seriously considered. Although the models have a substantial depth range the detail evident in Figure 15 is recognisable in the western half of the profile.

Figure 17 illustrates some of the issues as seen from the gravity viewpoint. The concepts illustrated have been derived from a translation of Figure 16. Note that the midpoints of each line mark the approximate intersection of the two profiles and that they should, therefore, be consistent at that point.

It should be noted here that the observed profile for line 7295 (Figure 16) is the presented residual from Figure 13 while that shown in Figure 17 is not. If Figure 17 employed the natural residuals it would not be possible to derive this model or lock it to line 7295 with the same curve fit parameters. This is because one line includes granites and the other does not. Consequently the effect of the surrounding granites was calculated for all the observation points along profile 5387 500 mN and the residual values were compensated for the deviation. Any resulting model calculation can thus proceed on the basis that no granite is involved (the effect has been incorporated in the "observed" profile) and the two profiles can be interlinked as a cross test.

When the same properties and implications are linked it is found that the more detailed gravity profile cannot be completely sustained by the regional model. Such a model is adequate to east and west of the Pinnacles Ridge but not in its immediate vicinity. The difference is several mgal and is shown in the upper part of Figure 17 (model M1).

This positive differential may be due either to an excess of denser Precambrian rocks, i.e., an extension too far east, or an hitherto unsuspected low density body. But where and what could this be?

If we accept that the Pinnacles mass is different - and it is magnetically - could it not also be different from other Cambrian units in density? No actual values are available but the implied

description and the association with porphyries does suggest that its bulk density could be as low as 2.62 gm/cc. A slightly higher bulk density is employed in model 2 (lower part of Figure 17) to show that this and a substantial volume at the junction in the basement can satisfy all the requirements of the gravity profile.

The magnetic profile for line 3875 poses some quite different tests and provides some independent checks. The distinctive character of the magnetic field west of the Rosebery Fault is marked, as is the spiky character over the Central Volcanics. The smooth zone between them is easily recognised. This profile is a residual form; the gross effects of the deep source have been removed and the profile only barely glances its effects in any event. Thus any imperfections in the regional separation as a result of high level continuation will not be critical. Every anomaly along the profile provides some constraint on what is possible.

The general wedge and separated source character of the volcanic wedges - there are at least three - is as noted previously (e.g., Figures 2, 3). But the analysis suggests an additional slice of comparable material at shallow depth beneath these major inferred detachments. This may take the form of an additional wedge, a sheet, or another detachment. Whichever is in fact the case this additional volume does not penetrate the main trough fill which remains identifiable and distinctive. A maximum susceptibility is indicated which may be influenced by the imperfectly compensated deeply magnetic unit responsible for the major anomaly of the region.

What is clear, however, is that the style of the solution will satisfy both data sets without much difficulty with properties which are either sustainable from known measurements or from direct inferences from anomalies and sources which outcrop (the MRV requirement).

An excellent curve fit can be obtained if some allowance is made for the local mafic content within the Oonah Formation. In this situation the volumes implied both gravimetrically and magnetically are consistent.

The porphyry-rhyolite volume inferred in gravity analysis is quite crucial to the magnetic interpretation. First it modifies the effect of the Oonah basement and second it has properties distinct from what may be termed normal volcanics or the upper volcanoclastic Cambrian rocks. There is no question about placing dense or more magnetic units in the region of the Pinnacles Ridge. They are not there. Something very different is. And that material is unlikely to be any associate of the Central Volcanics. Elements of this core margin intrusives or extrusives may well be partially exposed and represented by some of the porphyries to the NE - all of which are virtually non magnetic unless very locally altered.

This solution (Figure 18 lower) also allows a role for the Rosebery Fault in displacing the material with an offset of perhaps 1200 m. This motion to the west could well have produced some of the local folding which now forms the ridge by typical detachment reaction.

The implications are clear. Poltock's solution is viable, but only

at the Pinnacles itself or within the lower parts of the defined rift sequence. And the units involved are NOT Central Volcanics or any correlate. They may be much older depending on the actual relationships ultimately divined on the southern margin of the rift. But there can also be no doubt that the two marginal structures which define the rift are likely to be very important in an exploration and mineralisation context, especially since it is already known that the southern or eastern face was mineralised with the production and preservation of several substantial ore bodies.

Now it may be argued that Central Volcanics could still be involved as correlates in these positions on the basis of magnetics alone due to the effects of burial. This paradox is illustrated in Figure 19. Each of the profile represents increasing depth of burial and it is clear that if the volcanics were buried by 500 to 1000 m that their effect would not be recognised in terms of spikiness. But the total smoothed response would have to be compensated. It is this element coupled with the direct evidence that the Burns-Pinnacles materials are not magnetised like the normal volcanics which shows that simple burial is not a solution. And some of the material is directly exposed.

Thus, even without the indications of the gravity data, this option is simply not sustainable.

ISSUE 2: ORIGIN OF THE MAJOR RIFT ANOMALY

Previous work has canvassed many of the options in a partial analysis and found that it was most unlikely that any combination of low contrast or shallow sources could explain the gross effect. Thin slices of deeply buried ultramafics were offered as an explanation (see Figures 2, 3, 9, 10).

A SW-NE profile was selected along the axis of the quiet magnetic zone which fully defines the entire anomaly in so far as extant data permits. This profile, known as M7684, extends from 376 000 mE, 5384 000 mN through the anomaly crest at 382 000, 5390 000 to the Murchison Highway near Que River.

Figures 20, 21, 22 illustrate some of the possibilities which offer solutions or which have been proposed as solutions.

Figure 20 suggests what may be termed the shallow options. The upper model uses extreme values for the porphyry and its virtual exposure to show that neither the distribution or contrast of this lithology will ever account for the anomaly. There will also always be a problem at the edges of the body due to the low contrast and hence a conflict with the established changes in the surface geology which occur along this profile. As concluded in earlier work this is not a viable solution. At best, the altered portions of this unit may contribute to some local, high frequency parts of the magnetic field.

The lower part of Figure 20 considers the implications of increasing the magnetisation by an order of magnitude to that of glassy basalts such as present near Mt Charter. When this is done a solution is actually possible but is 7000 m of such basalt credible in the region

of the Pinnacles Ridge? An interesting but incredible solution which could only be accepted in the absence of other data, either geological or geophysical. Note that this solution is not sustainable gravimetrically. Seven kilometres of basalt would generate an anomaly across or along the rift of 30 mgal minimum!

Figure 21 considers two alternative mafic solutions. The upper solution based on the same contrast as the previous model has placed the mafic pile at considerable depth. Without a major contrast in thickness, however, this cannot generate the anomaly relief and is not a viable solution.

If, however, the contrast is trebled to that of a moderate to strongly magnetised basalt column of variable form then a good fit is possible.

The latter solution might even be of some interest in the absence of the gravity data which cannot allow it.

Ultramafics have previously been proposed as a solution even though the alternatives have never been tested gravimetrically. Two ultramafic options are shown in Figure 22. These clearly show that with any normal properties representative of these materials and with no thickness greater than those known to occur in typical exposures, as for example at Razorback or Serpentine Hill, there is no difficulty accounting for the spread or amplitude of the observed anomaly. The models indicate that the distribution of the mafic sources must be irregular and are not likely to be completely detached or isolated. Note that isolated sources are not easily arranged to generate a smooth response like that observed whereas a folded sheet can achieve this effect. The latter solution is wholly consistent with what is known of the ultramafics of western Tasmania; namely that they probably once occurred as a finite but small number of sheets covering wide areas during the Lower Cambrian and that this horizon now forms an effective marker which has been disrupted during the Cambrian extensions and folded subsequently.

It should also be noted that the depths inferred in the Pinnacles region are consistent with both the regional and local models shown in Figures 16, 17 and 18 for the likely base of the rift sequence. Of greater interest is the increasing depth indicated to the NE with a possible maximum in the Mt Charter area. This could also imply that the entire rift axis and sequence is much thicker in this part of the region and that association may be an important key to the localisation of mineralisation. The absence of data beyond the Murchison Highway limits evaluation of the possibilities NE of Mt Charter or Sock Creek.

But a definitive answer is also possible for the second issue. A folded sheet of ultramafics, beneath the rift column, is responsible for the observed regional anomaly.

It is likely that uplift and erosion has removed much of this material from the lateral sections and thus the anomaly reflects preservation and history. This also implies some relative ages for the materials both within and beyond the rift and suggests that the rift sequence is older than the main body of volcanics and was

deposited while the lateral cover was being eroded. All this must have happened prior to felsic volcanism along the margins and only the upper members interfinger and correlate. Even these linkages have now been confused by detachment above basement while the main rift column has been largely unaffected.

I infer that the main rift column is exposed in the zone adjacent to the Pinnacles and NE of Sock Creek.

CONCLUSIONS

Although limited time and analysis has been possible several important conclusions can either be made or inferred.

1. The Burns - Pinnacles Ridge trends N-S across a major structure which trends NE-SW.
2. The Ridge is sub parallel to a primary change in basement composition and depth and lies just east of the controlling structure.
3. The major NE-trending structure is a deep rift with mainly (inferred) sedimentary rocks to a depth of about 3 km below present surface. Other indicators would suggest that the rift package is about 2.5 km thick.
4. The base of the rift fill is marked by a strongly magnetised unit whose properties are consistent with ultramafics. This material is relatively thin (<300-500m) but essentially continuous and apparently folded.
5. Similar highly magnetised materials are present outside the rift but at much shallow depth and are much more disrupted. This is consistent with disruption of a once relatively universal marker by marginal uplift and erosion, and later half graben extensions.
6. The continuous layer of ultramafics deep in the rift account for the strong regional anomaly and its position with what is otherwise a very quiet magnetic zone. Various other possibilities, including contributions from quartz porphyries and various distributions of mafic rocks may be excluded.
7. The SE margin of the rift is now partially concealed by displaced Central Volcanics of the Mt Read Volcanics but the ghosts of the structure are marked by the offsets and bends of the Mt Charter Fault near Mt Charter and the Jack Fault near Que River and Hellyer. The Burns Peak mineralisation lies just inboard of the same structure which clearly has great potential.
8. The volcanics of the Mt Block and Boco region are different in properties and responses - and structural style - from those within the rift and north of its southern margin at Burns Peak. The rhyolites and other materials of the Burns - Pinnacles Ridge are thus inferred to be an older suite and possibly not related to the Mt Read Volcanics.
9. A large mass of acid material, possibly quartz porphyry underlies the ridge in the rift margin near the intersection with the ancient basement boundary. This appears to have been offset by the Rosebery Fault system and it is possible that some of the folding observed near the Pinnacles Ridge is related to this dislocation.

10. Packages of volcanoclastic rocks exposed NE of Burns Peak and the volcanics to the east appear to be dislocated slices from larger wedge-shaped piles and deposits. There are at least three detachments which affect the volcanics piles significantly and a fourth may be inferred within the upper part of the rift sequence. The latter structure may mark the onset of MRV volcanism and not represent a detachment. All piles and detachments face east although some internal members of the piles may dip steeply west. The detachments may be recognised from these relationships.
11. Any stratigraphic host relationships inferred in the region north of Burns Peak must be treated as local features on the basis of this work. It is unlikely that they will be traced or effective beyond the rift zone. But the relationship may apply as far north as Silver Falls and as far south as 377 000 mE, 5382 000 mN near the Rosebery Fault. This includes all the known mineralisation N and W of Burns Peak.
12. Insufficient analysis has been completed to determine whether the detachment which introduces the volcanics near the Hollway Sequence lies at the eastern or western boundary of the andesite. The most likely situation is that the volcanics - including the andesite - are on the detached slab and that its base is the western limit of the andesite. This structure would then overlies most of the host sequence and the rocks of the Pinnacles Ridge. Units within this detached wedge appear to dip steeply west.
13. There is scope for more analysis of the structures along the southern face of the rift defined since this zone has been clearly mineralised at key fracture intersections. Sub E-W and N-S elements are certainly involved.
14. A more comprehensive view of the Hollway Andesite is also required since the two suites of volcanics with their very different properties extend southward to Rosebery. The andesite offers a means of attack.
15. The northern face of the rift has received little attention, either by this study or any previous exploration, and its significance is unknown. Burial, by various younger materials, to the NE largely accounts for this ignorance but it may prove to be of exploration significance.
16. Further regional assessment is recommended after all newly acquired magnetic data has been assembled and combined with existing data. The gravity data base should also be compensated for the effects of regional granitoids prior to comparison with the magnetic data and further analysis. There is scope for considerable structural refinement.

Figure 24 summarises various elements of this interpretation upgrade to suggest the refined location of some of the structural elements and their possible associations. This view remains incomplete and inevitably tentative but the features identified by the potential fields must be understood and integrated if exploration of deep or concealed targets is to prove successful.

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801187

Report submitted on behalf of Leaman Geophysics

by

D. E. Leaman

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

Date: 30/4/93

801188

380 000 ME

5 cm

5390 000 MN

EL 2/90

EL 8/90

EL 44/88

5385 000 MN

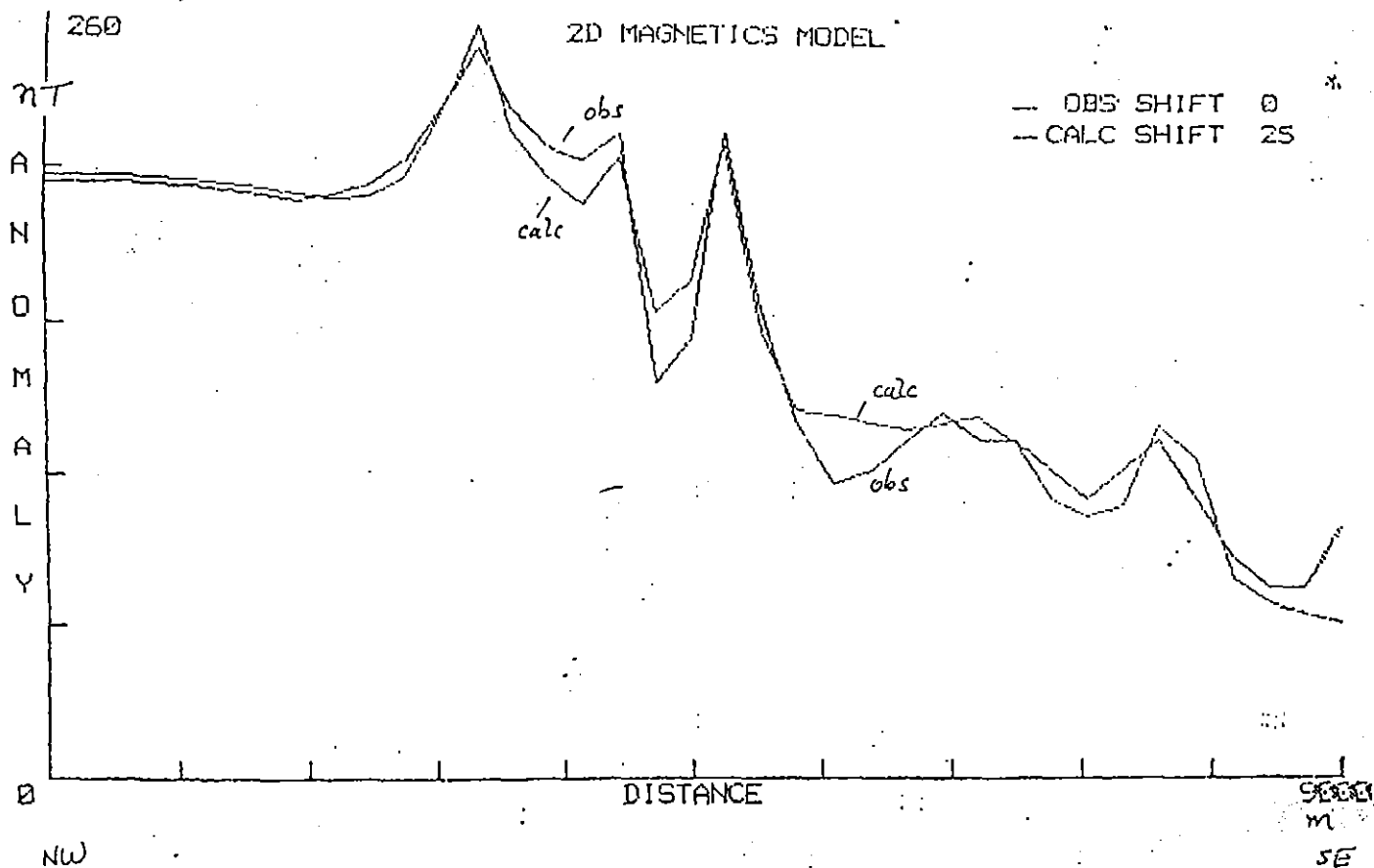
BOONE
PEAK

ANDERSON
CANYON

REGIONAL GEOLOGY - MRV MAPPING (MT BLOCK SHEET)
SHOWING LICENCE AREAS

FIGURE 1

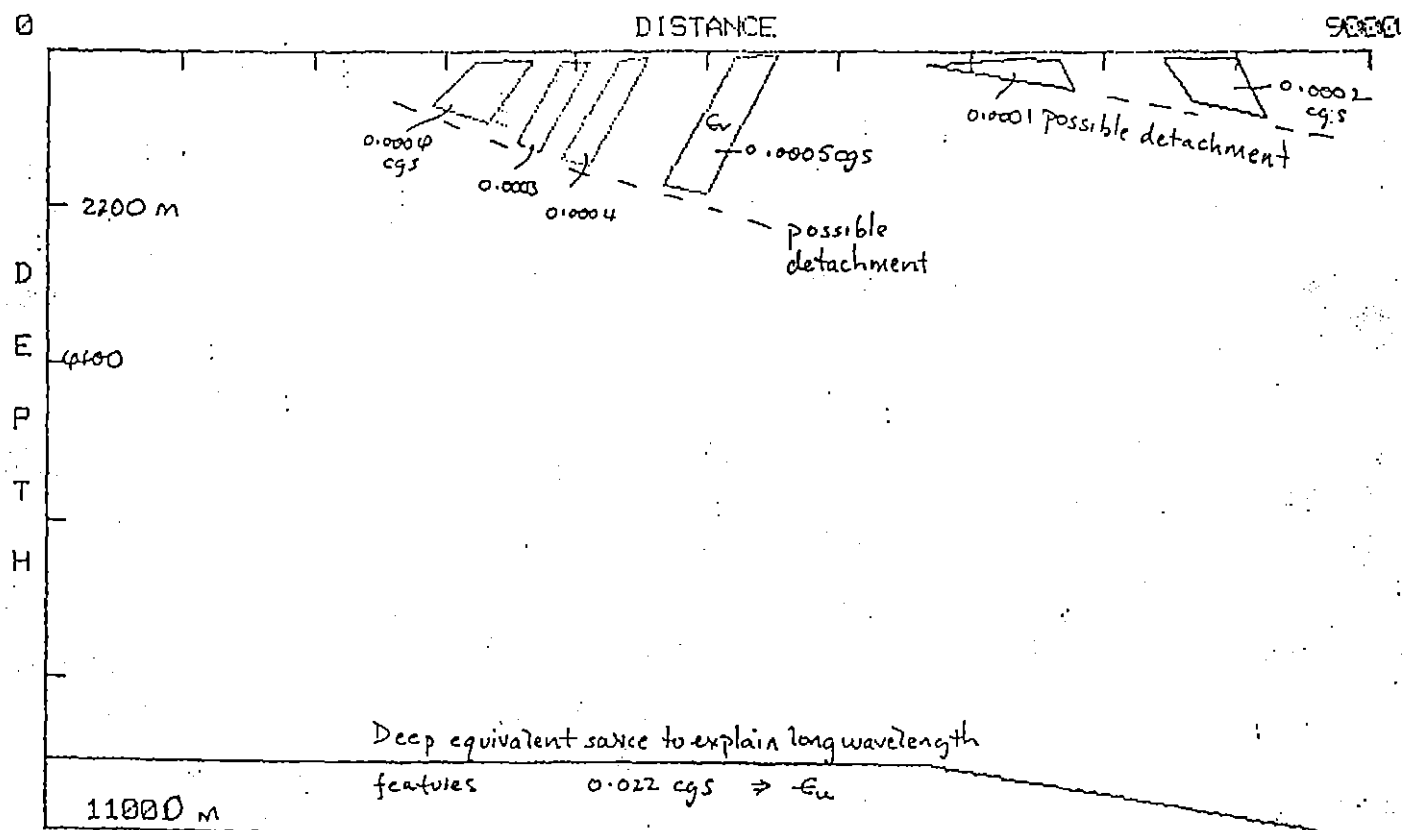
801189



BURNS PEAK 44/88 M2 3795/5388-3865/5381

(2)

5 cm



MAGNETIC MODEL PROFILE 2 EL 44/88

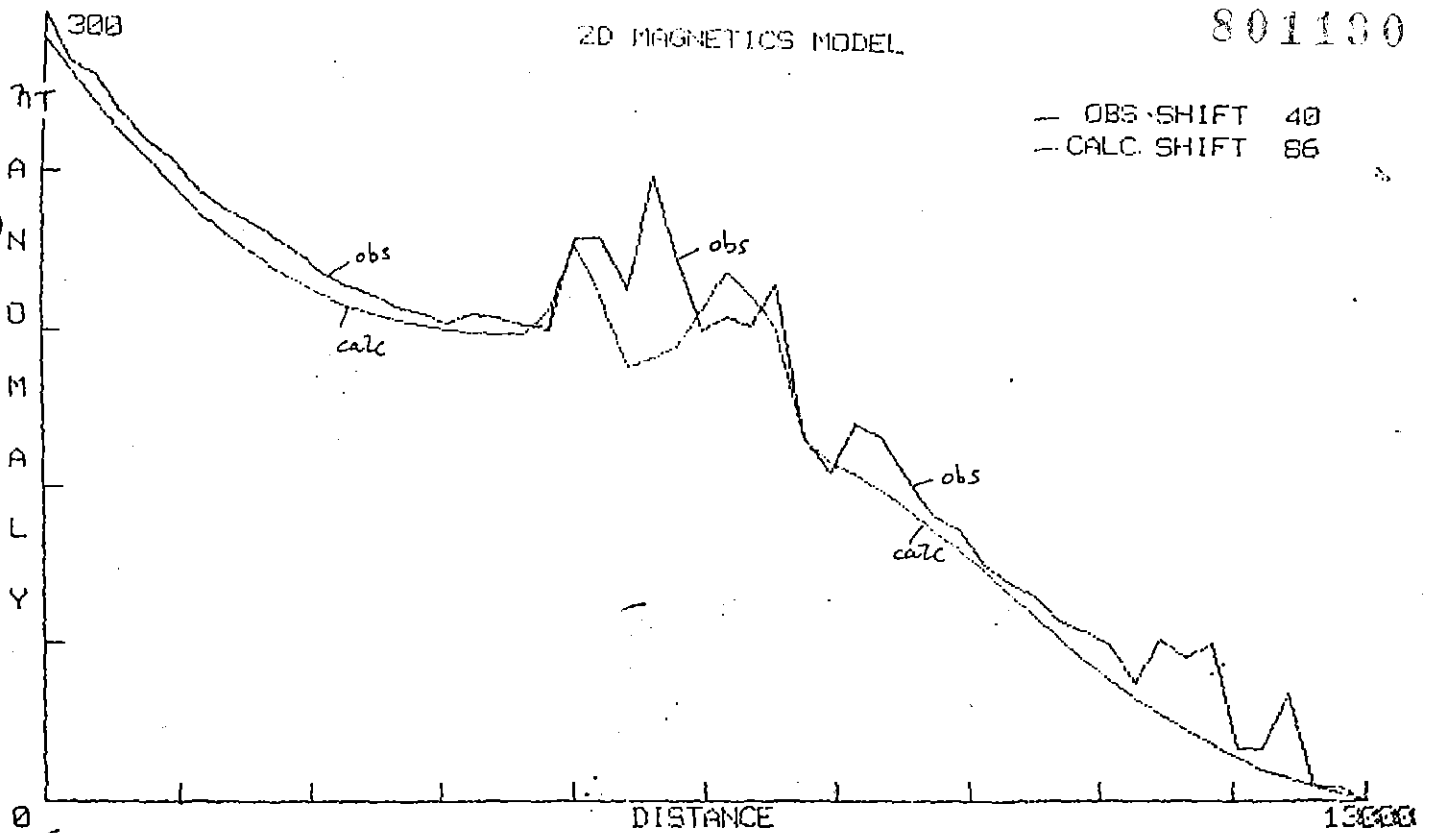
from Figure 8 (Leaman, 1990a)

old
(FIGURE 4)

new FIGURE 2

2D MAGNETICS MODEL

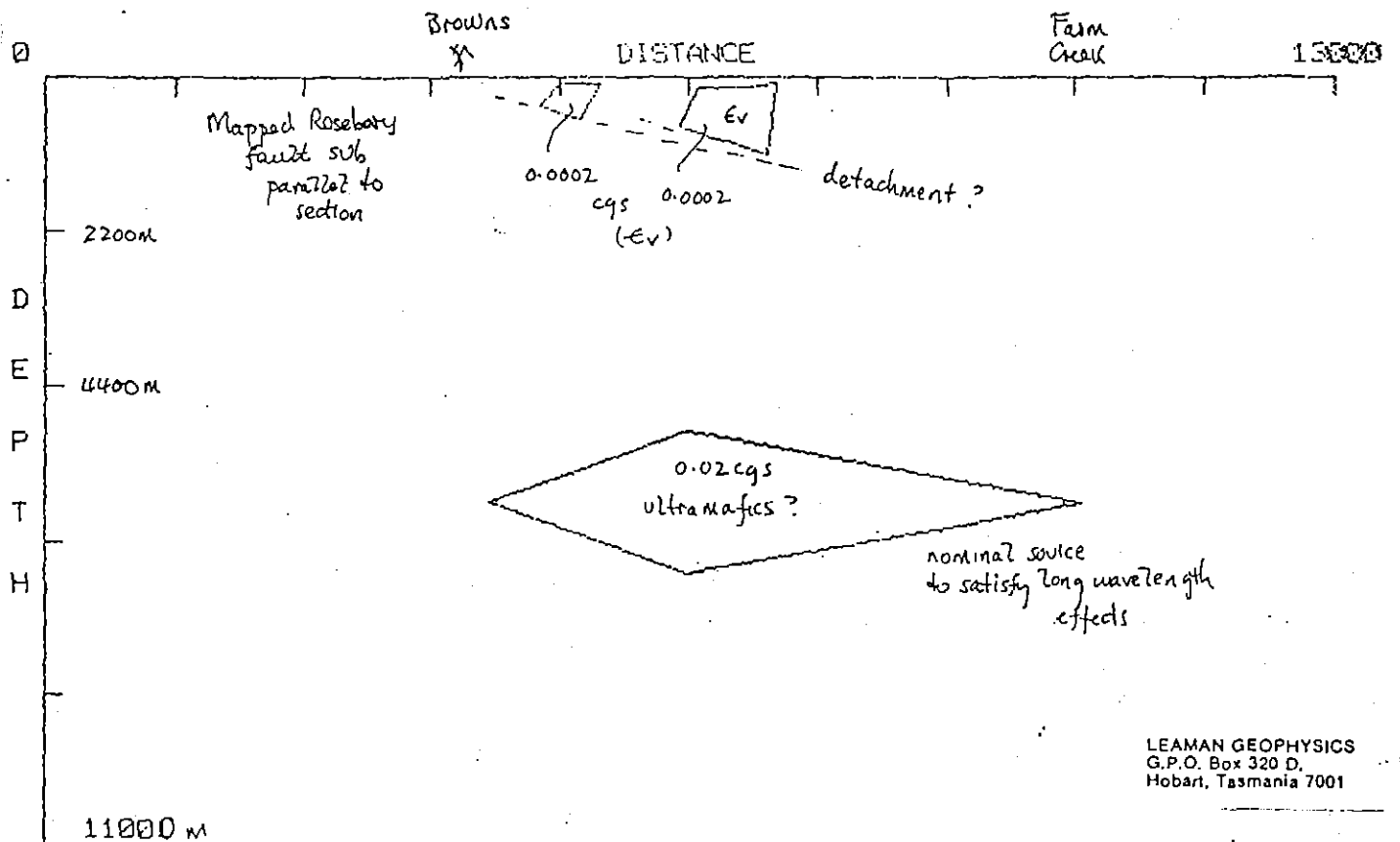
801100



BURNS PEAK 44/88 375/53875-3832/53783

①

5 cm



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

MAGNETIC MODEL PROFILE 1 EL 44/88

old
(FIGURE 7)

new FIGURE 3

LEAMAN GEOPHYSICS
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Hobart, Tasmania 7001

5385000 MN

385000 ME

2

380000

? Is mineralisation
action in this
area due to
remobilisation
on detachments?

375000 ME

from Figure 13B (Leaman, 1990a)

5 cm

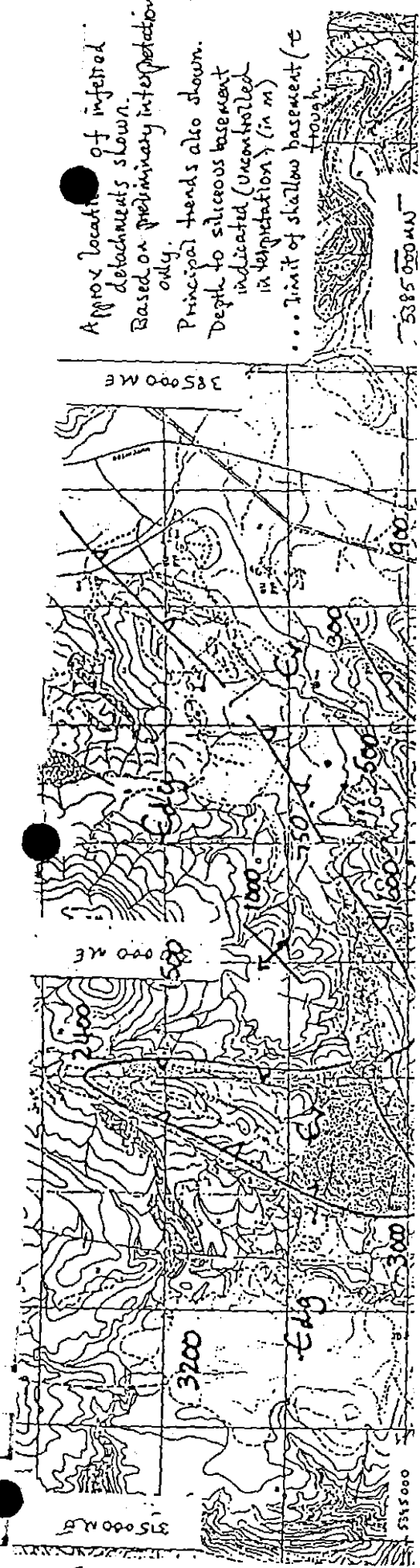
SUMMARY OF TRENDS AND LINEAMENTS
LABELLED INTERPRETED FEATURES

EL 44/88

(original
FIGURE 15a)
new FIGURE 14

801192

Approx location of inferred
detachments shown.
Based on preliminary interpretation
only.
Principal trends also shown.
Depth to siliceous basement
indicated (uncontrolled
interpretation) (in m)
... Limit of shallow basement (±
fathom).



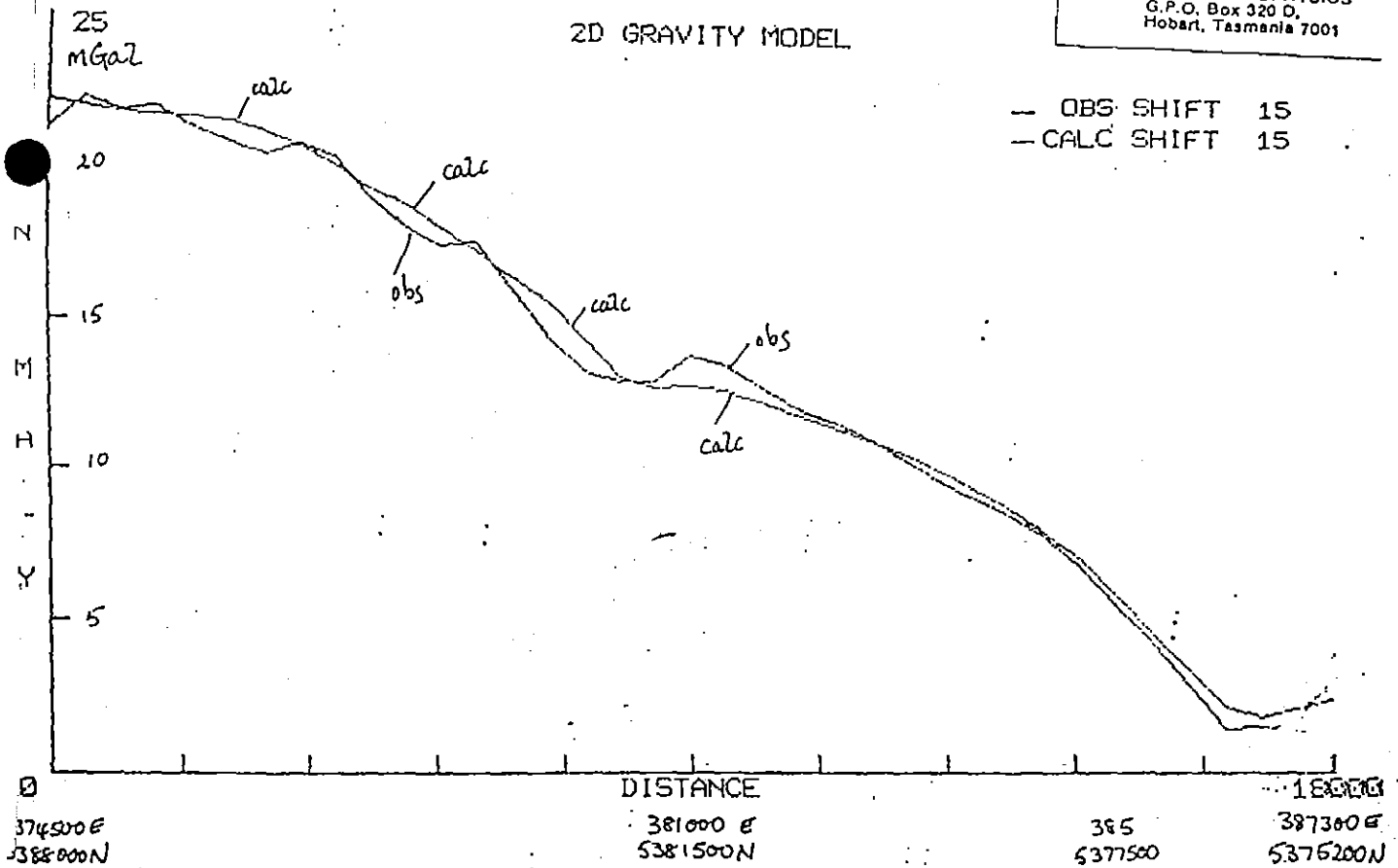
from Figure 15 (Leaman, 1990b)

new FIGURE 5

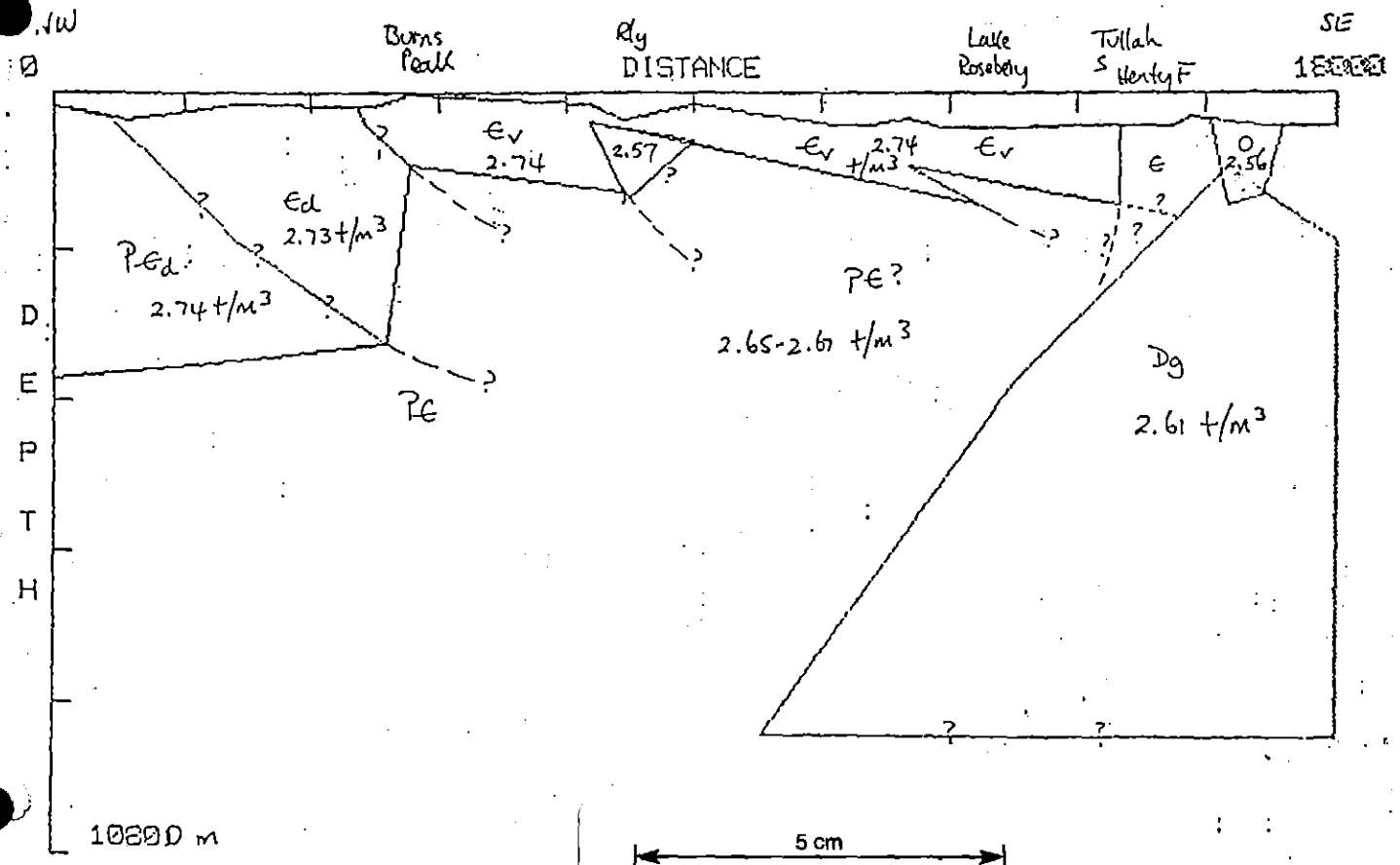
SUMMARY OF CURRENT INTERPRETATION

EL 44/88 BURNS PEAK ^{original}
(FIGURE 8)

2D GRAVITY MODEL



BURNS PEAK PROFILE 1 3745/388-3873/3752



from Figure 9 (Leaman, 1990b)

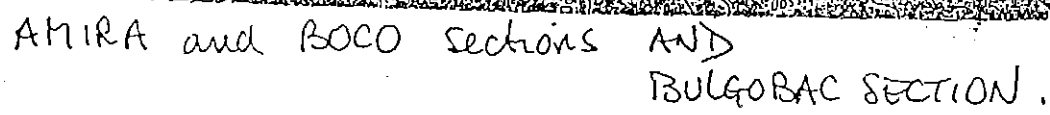
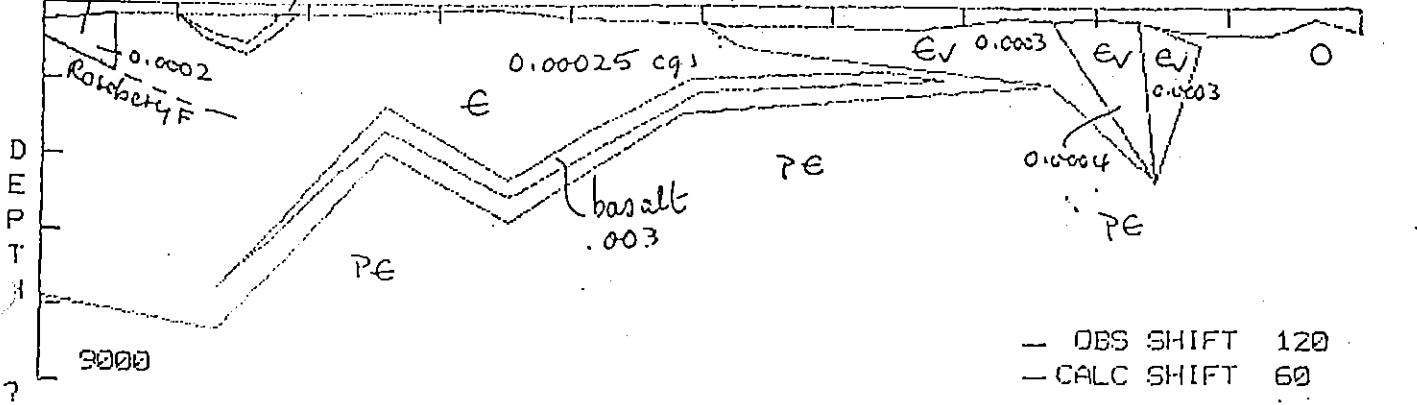
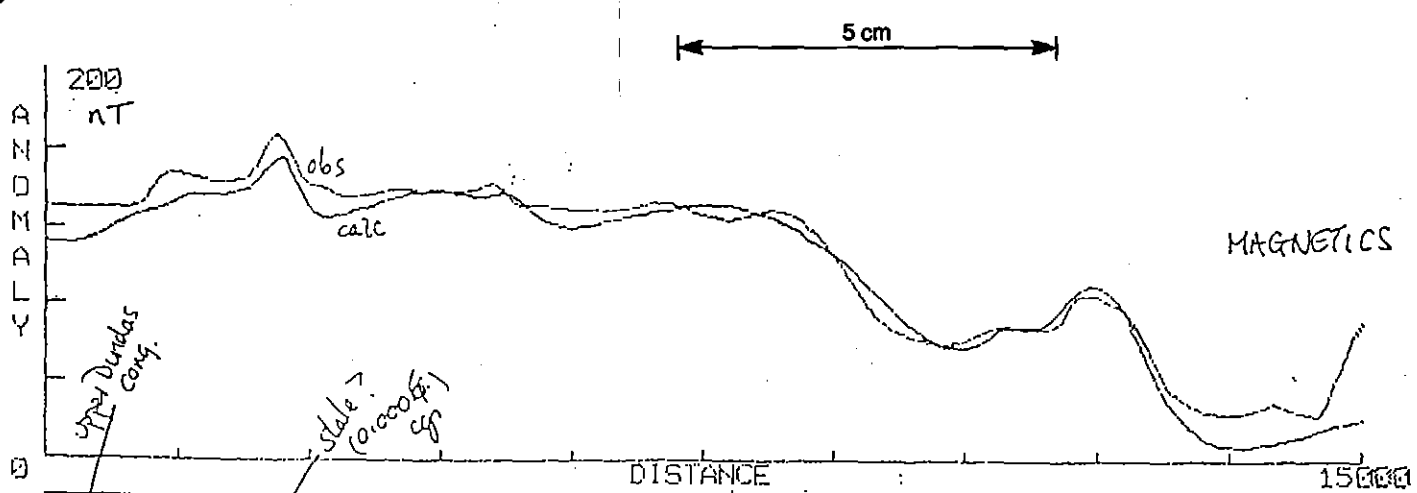
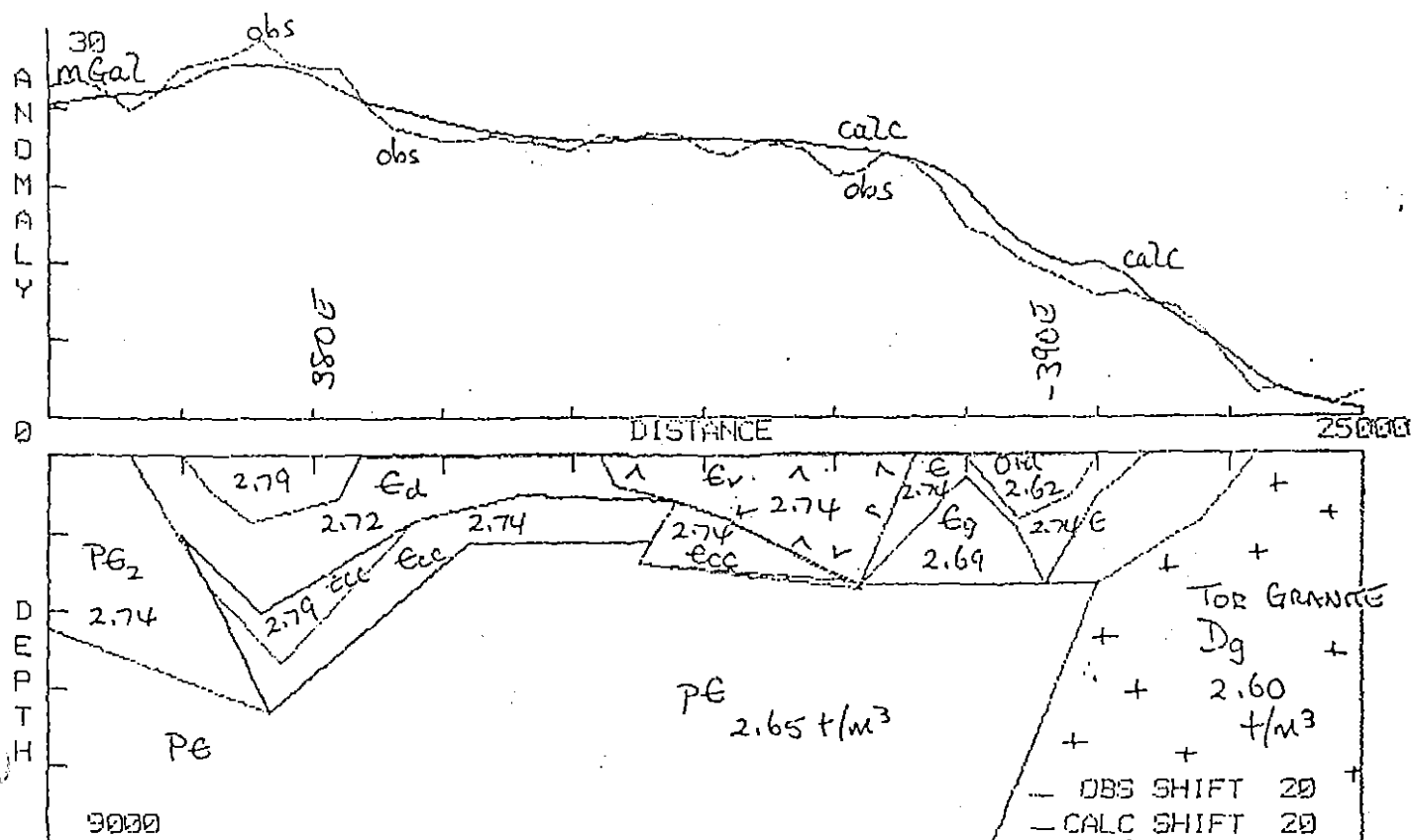


FIGURE 7



Aug 1
91

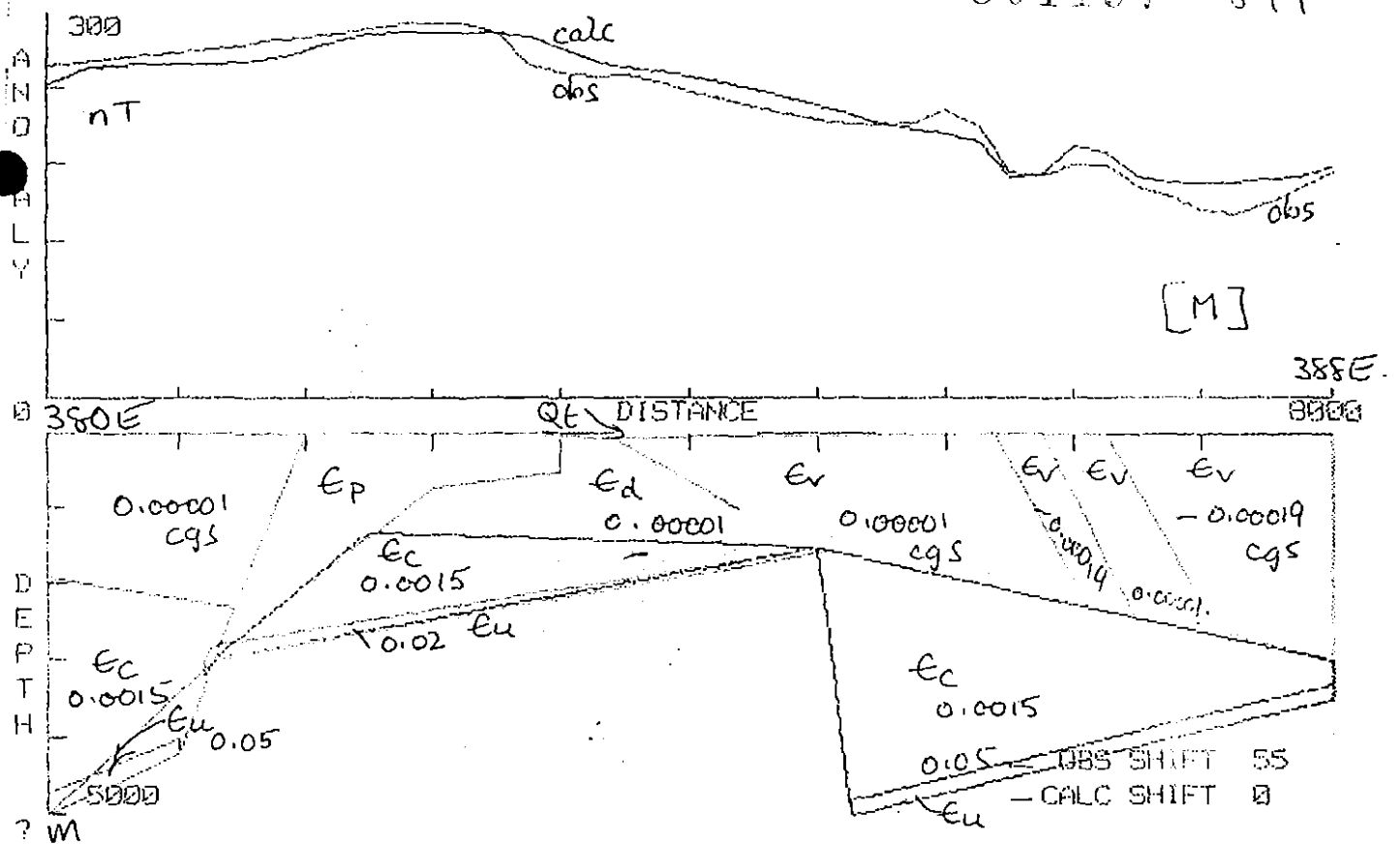
FIGURE 8



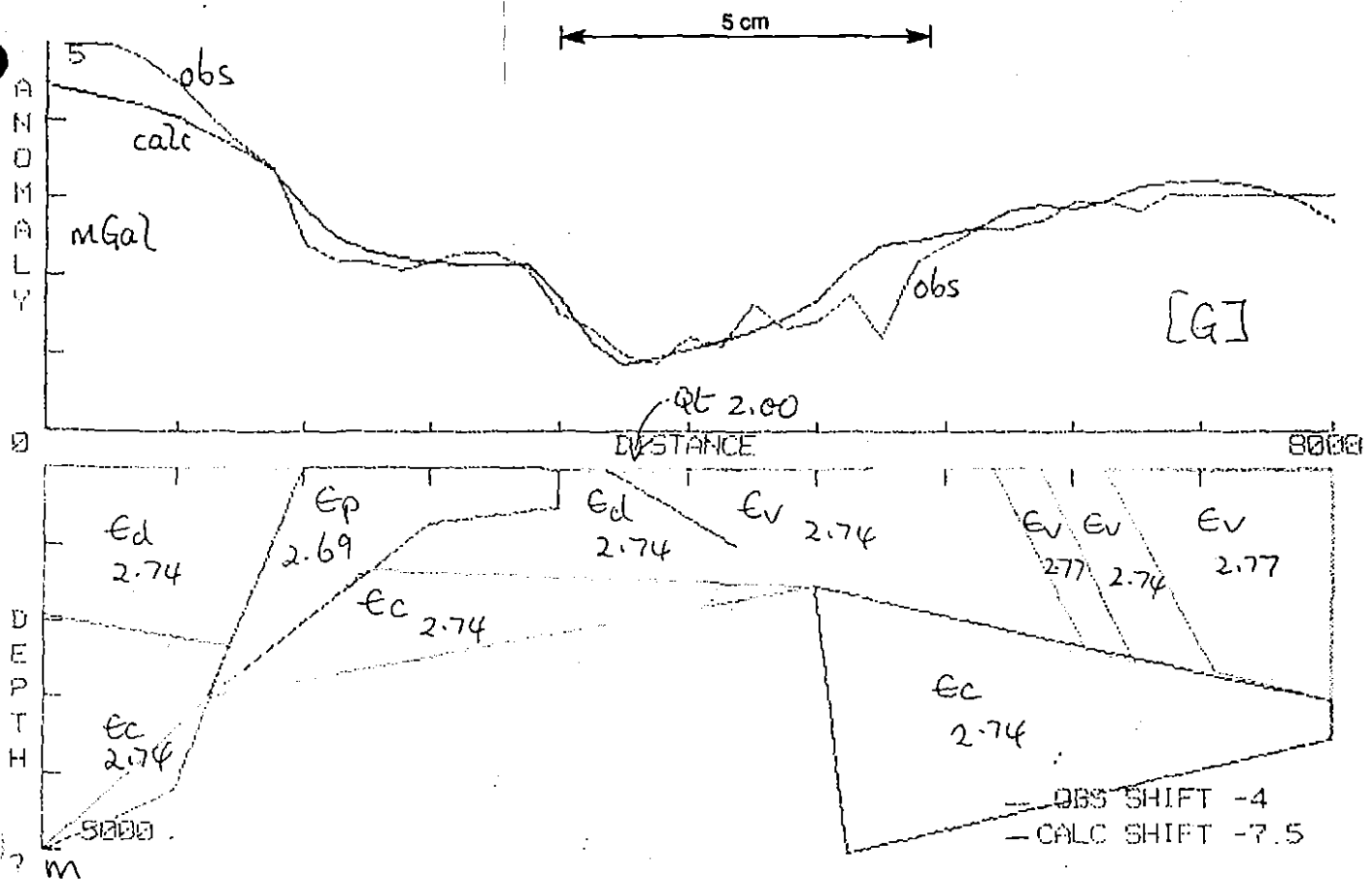
11 Oct 91

(original
FIGURE 10)

new FIGURE 9



5389 100N



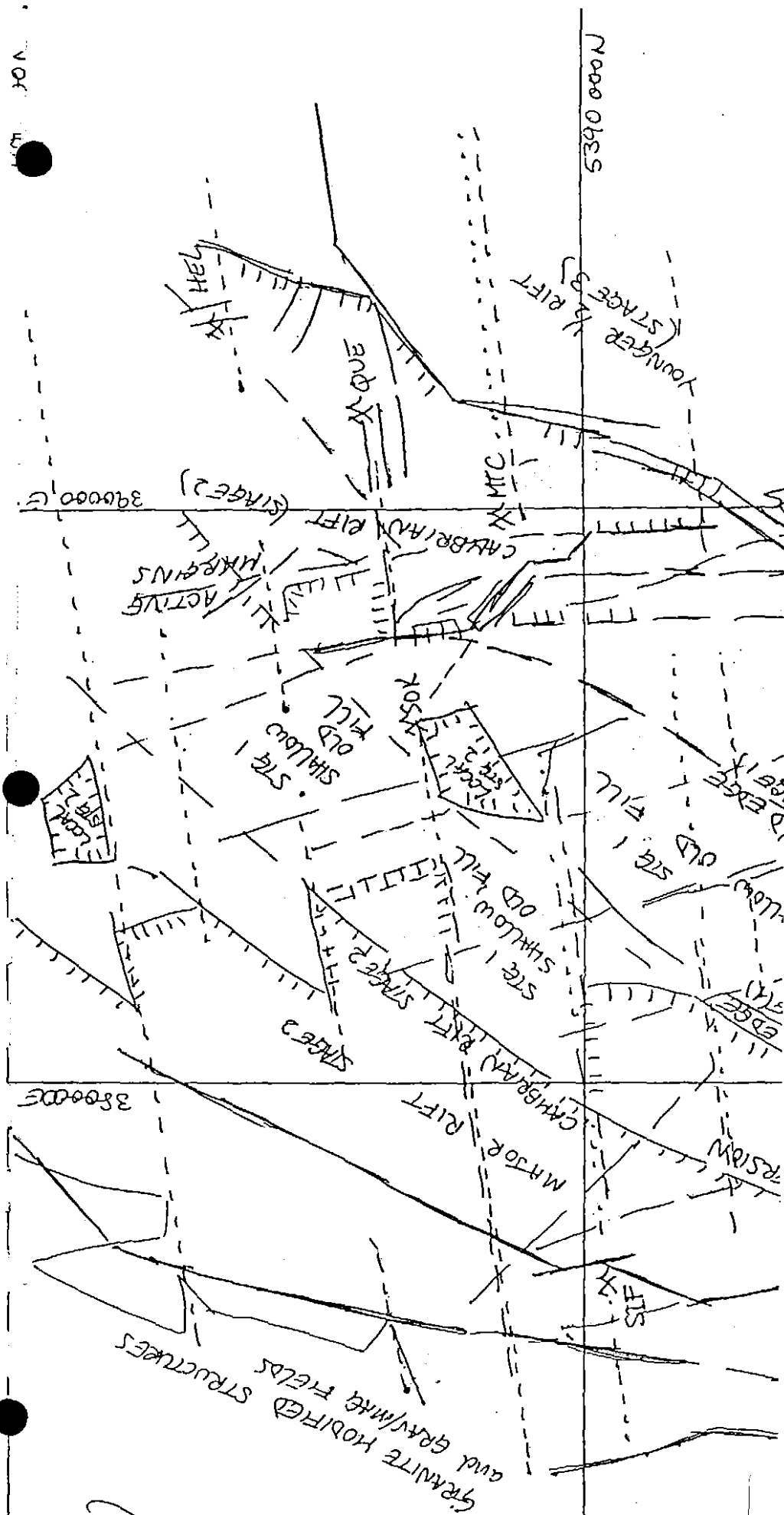
BOCO 891M, G
891MD3
891M3, G3

GRAVITY AND MAGNETIC INTERPRETATION 5389100 MN OPTION 2

(original)
FIGURE 12)

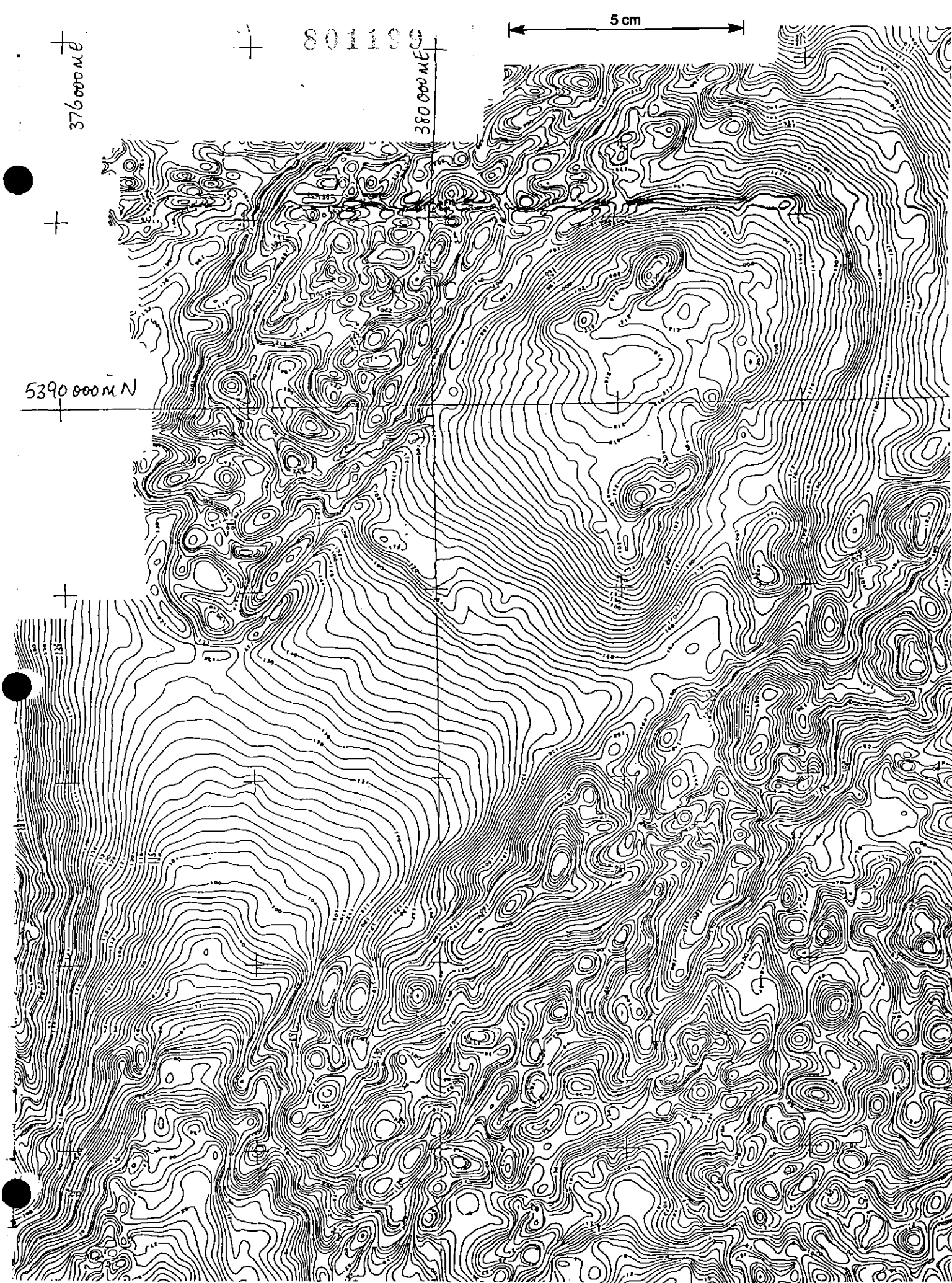
Dec 91

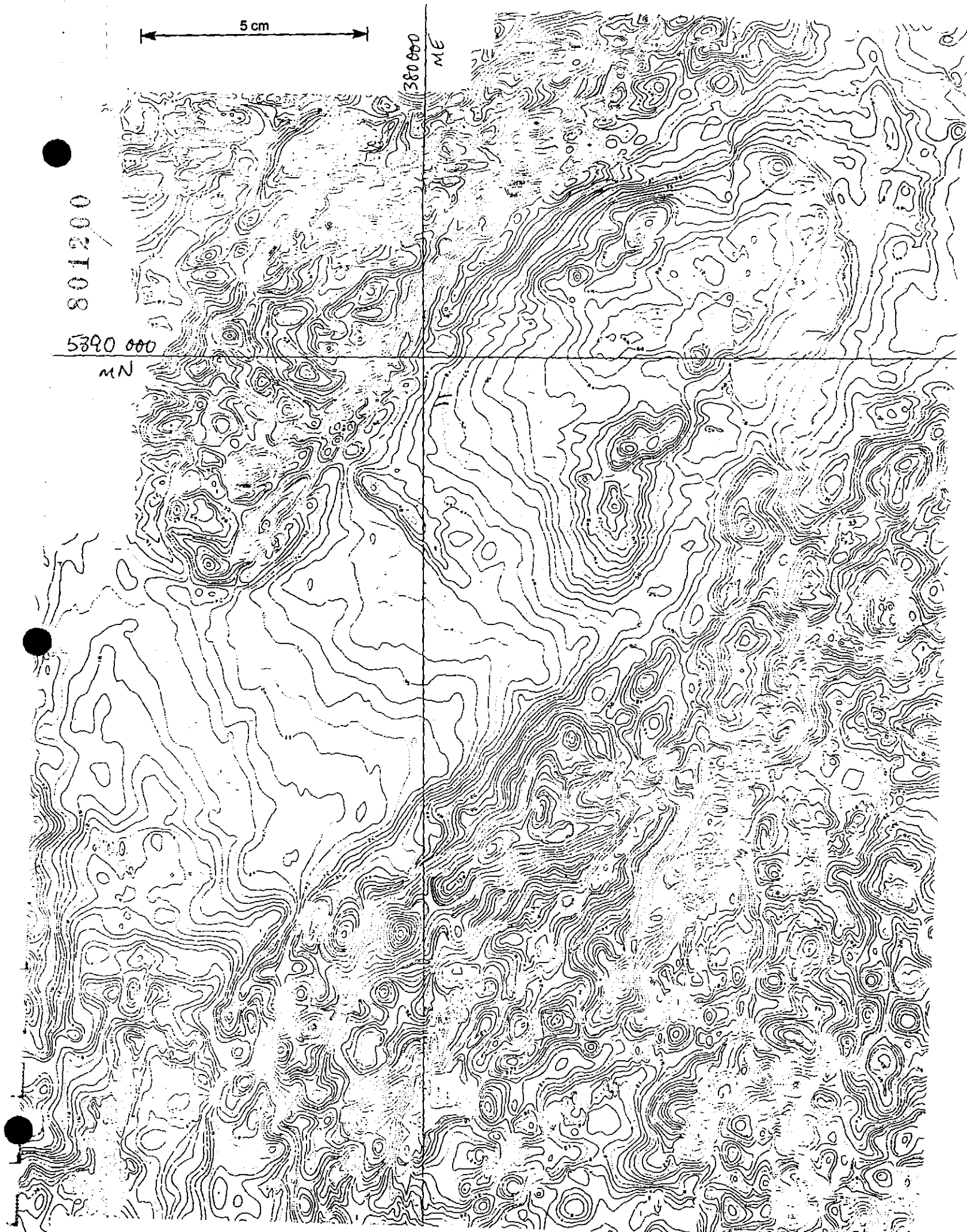
new FIGURE 10



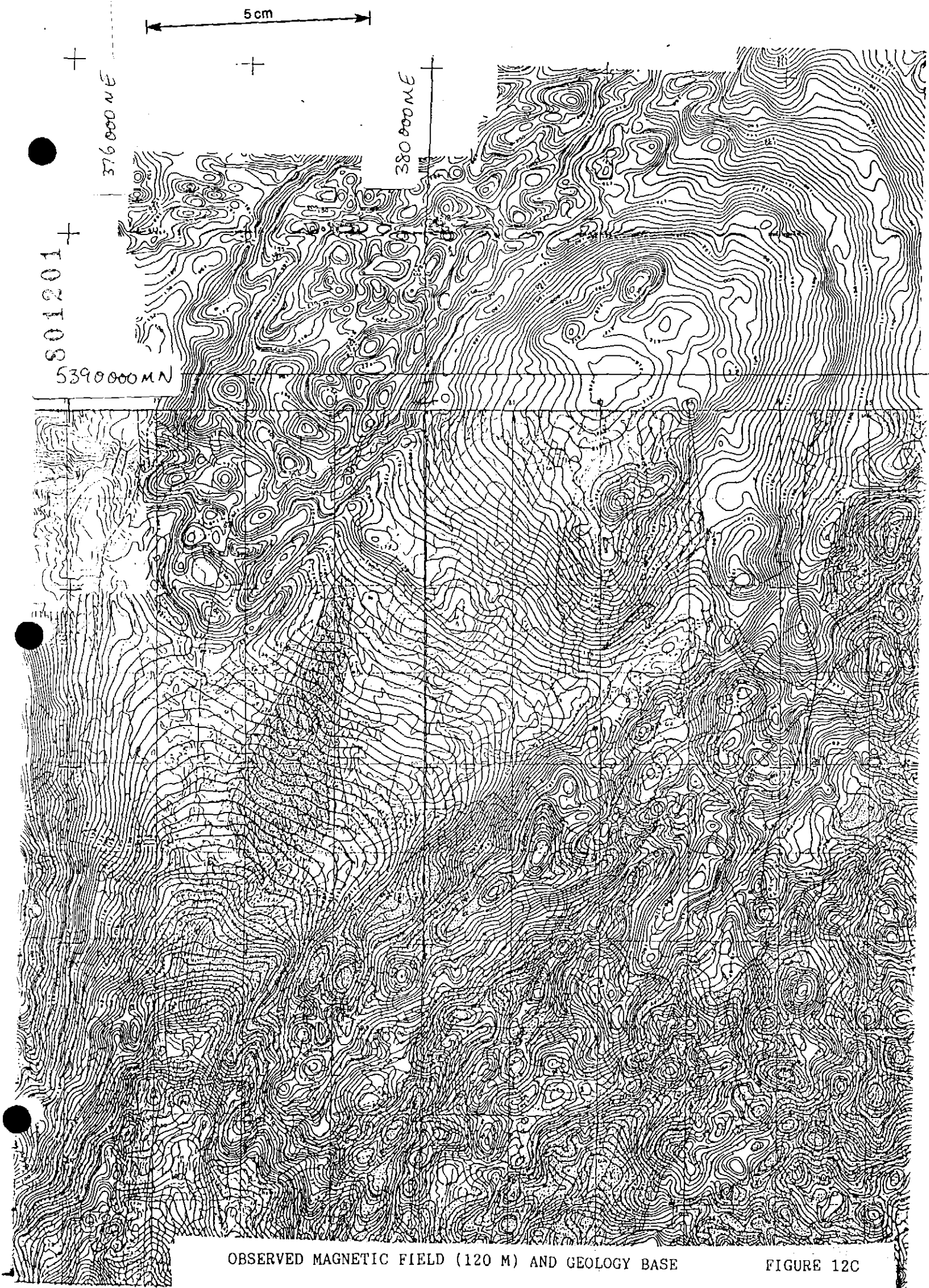
STRUCTURAL SUMMARY

FIGURE 11



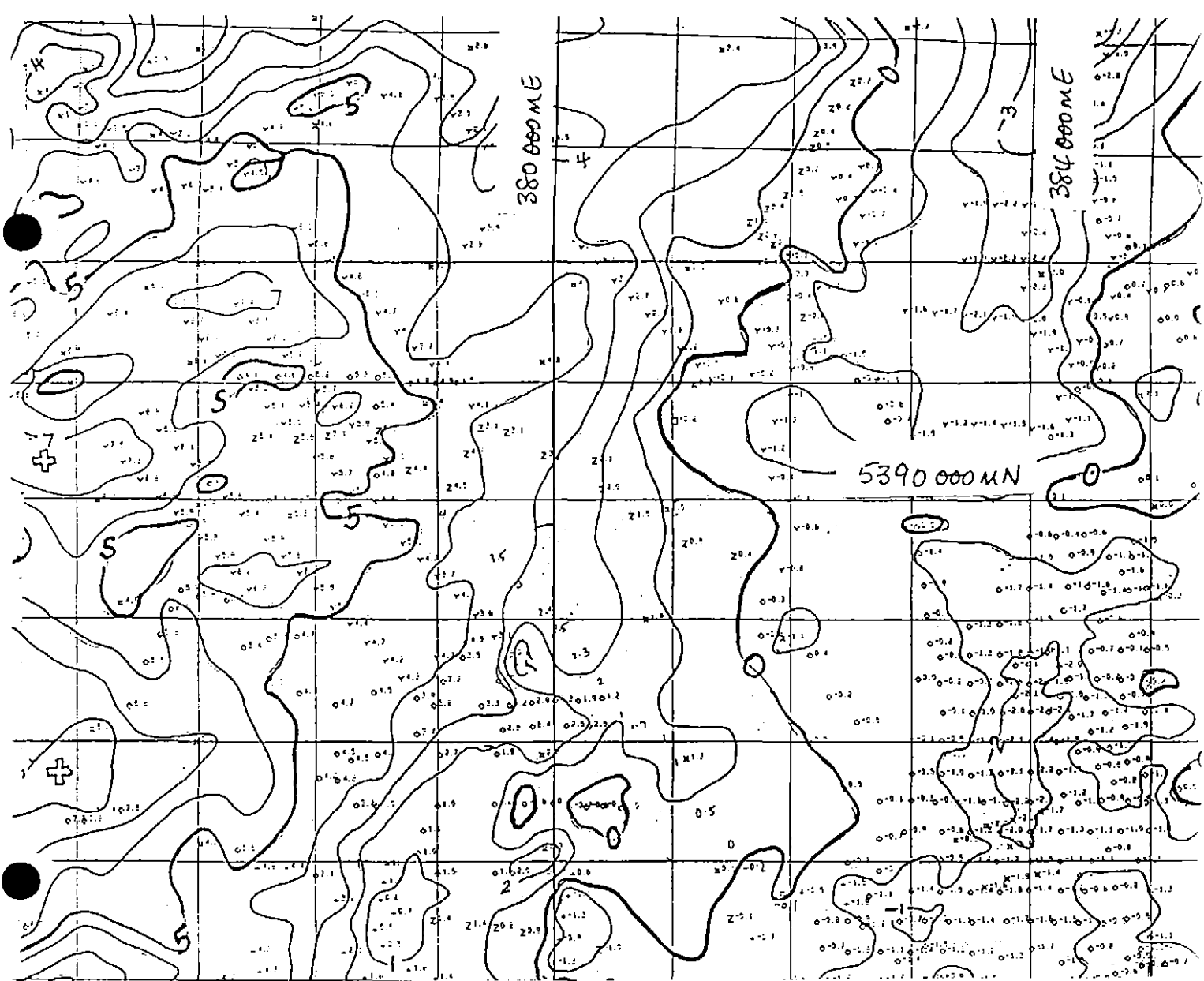


RESIDUAL MAGNETIC FIELD AFTER CORRECTION TO 120 TERRAIN CLEARANCE AND
REMOVAL OF 1300 M LEVEL CONTINUATION
FIGURE 12B



OBSERVED MAGNETIC FIELD (120 M) AND GEOLOGY BASE

FIGURE 12C

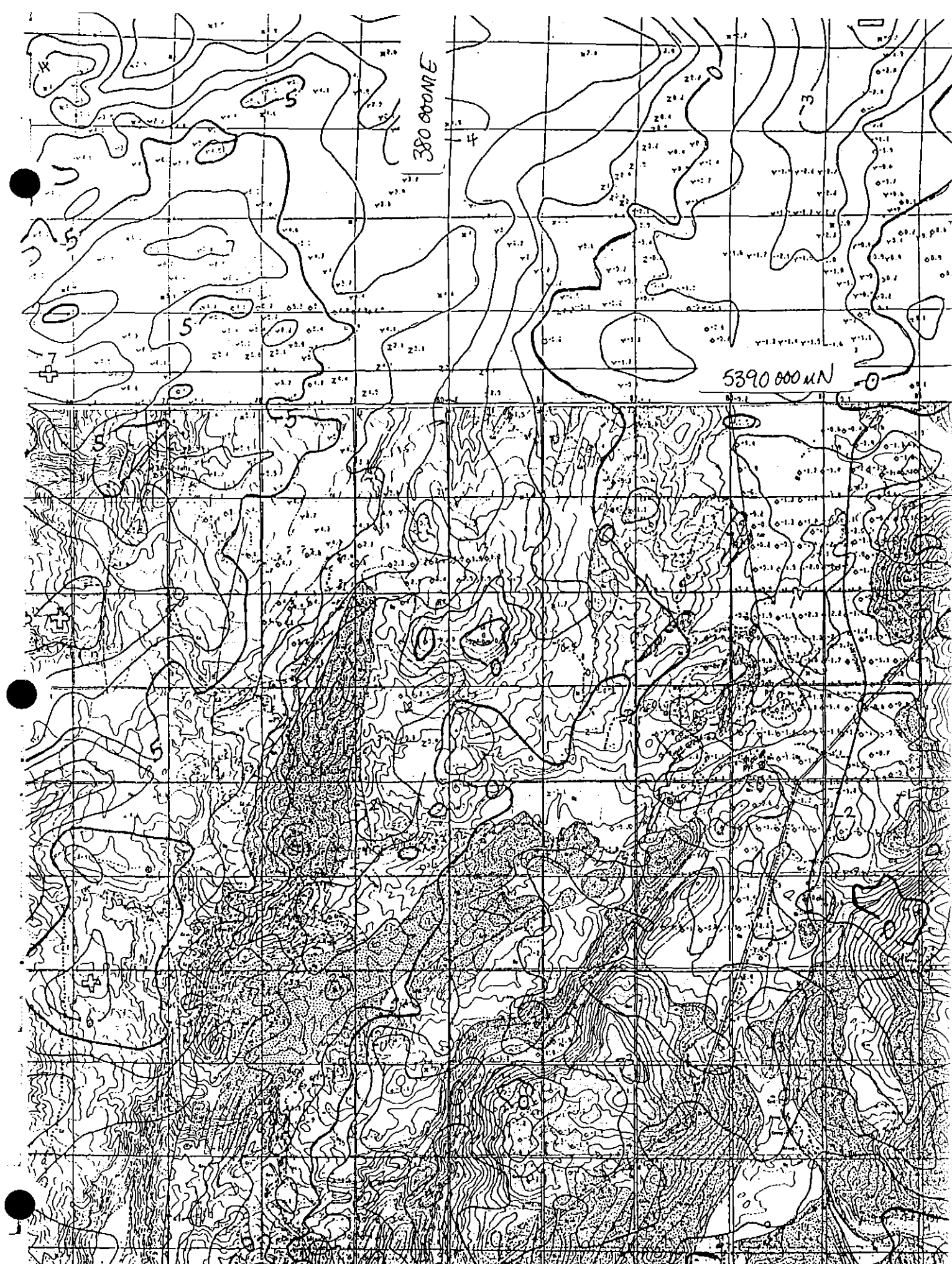


5 cm

801202

RESIDUAL BOUGUER ANOMALIES AFTER REMOVAL OF MANTLE MODEL (MANTLE91)
1 mgal contours, reduction density 2.67

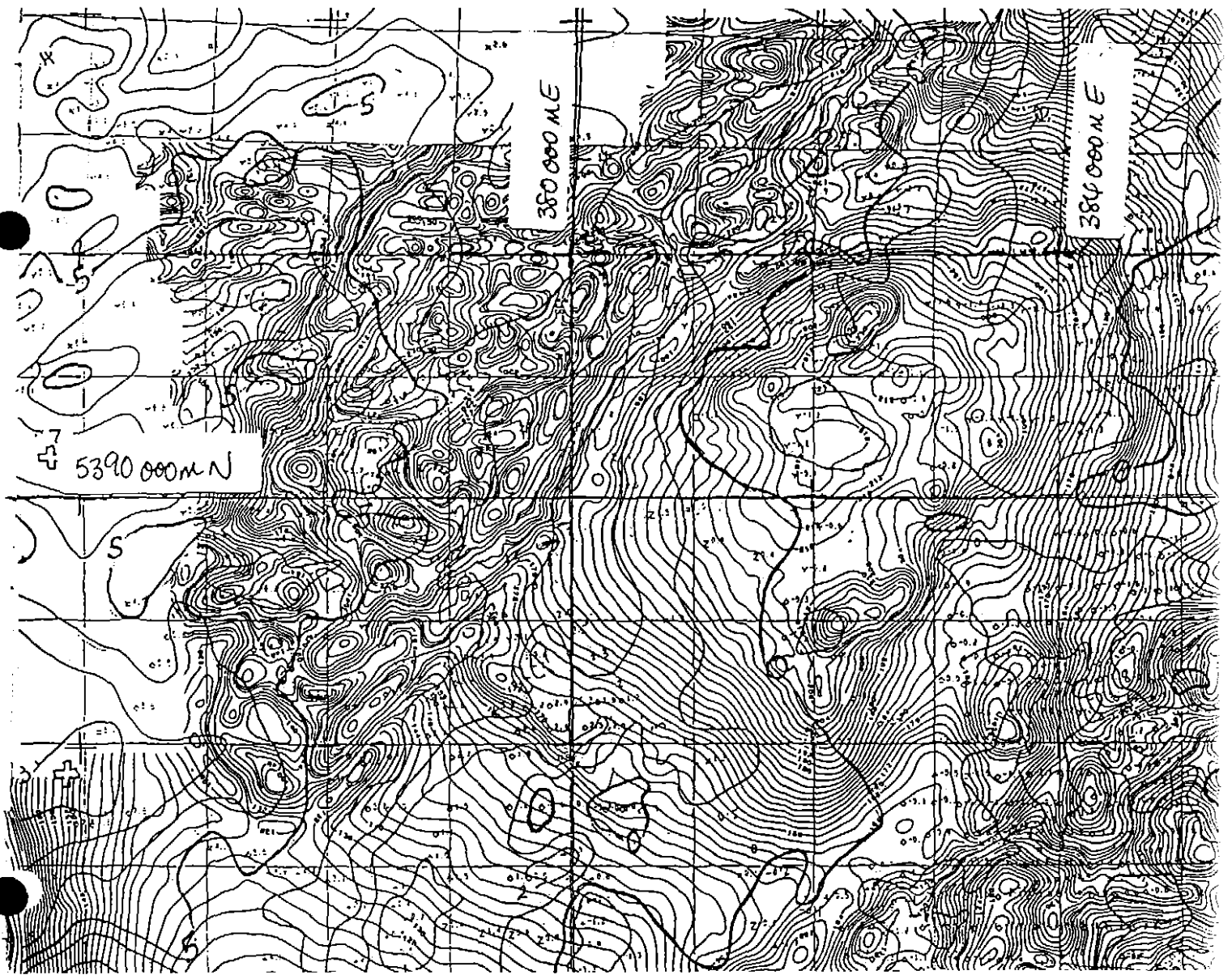
FIGURE 13A



RESIDUAL BOUGUER ANOMALIES AND GEOLOGY BASE

80120 FIGURE 13B

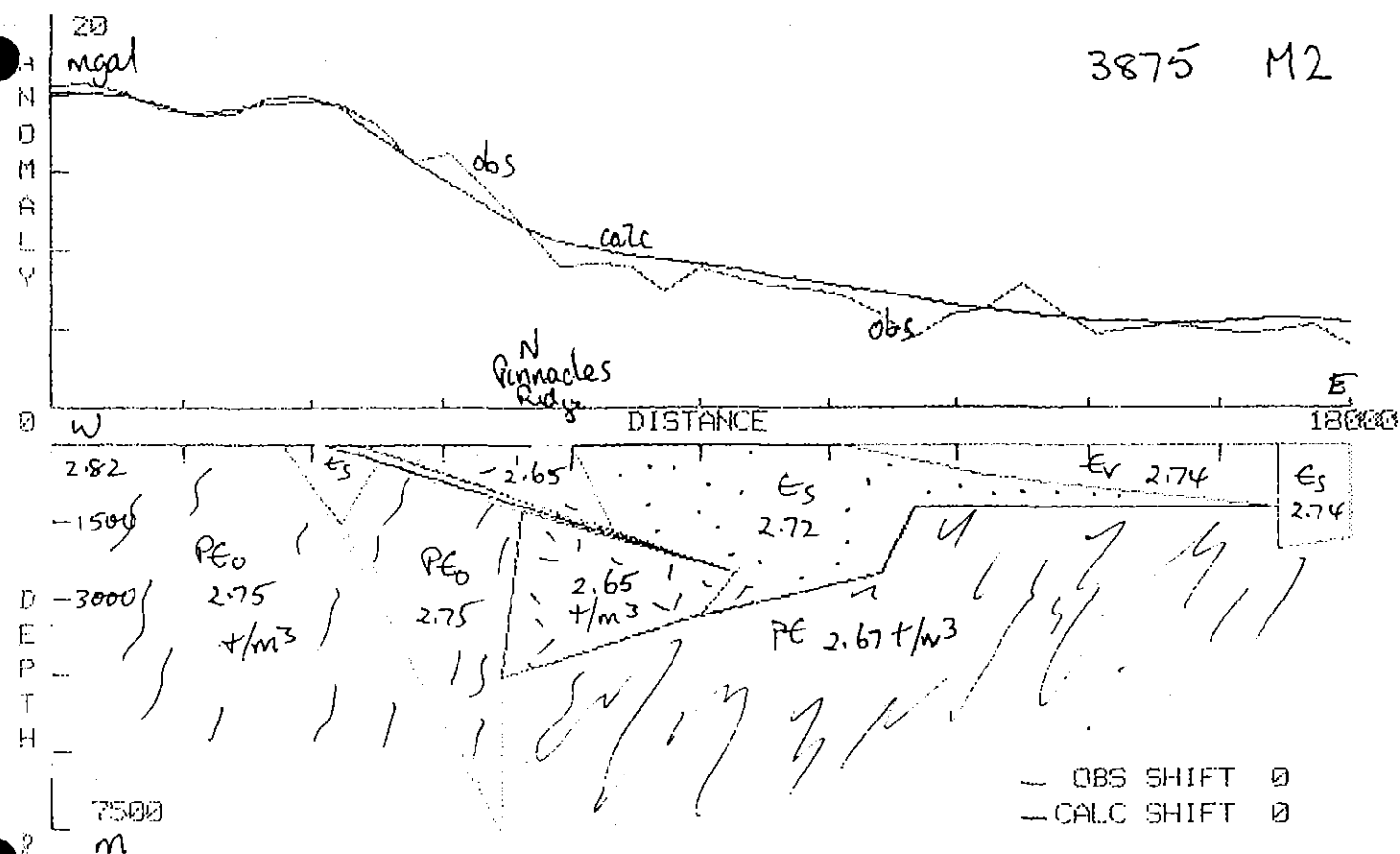
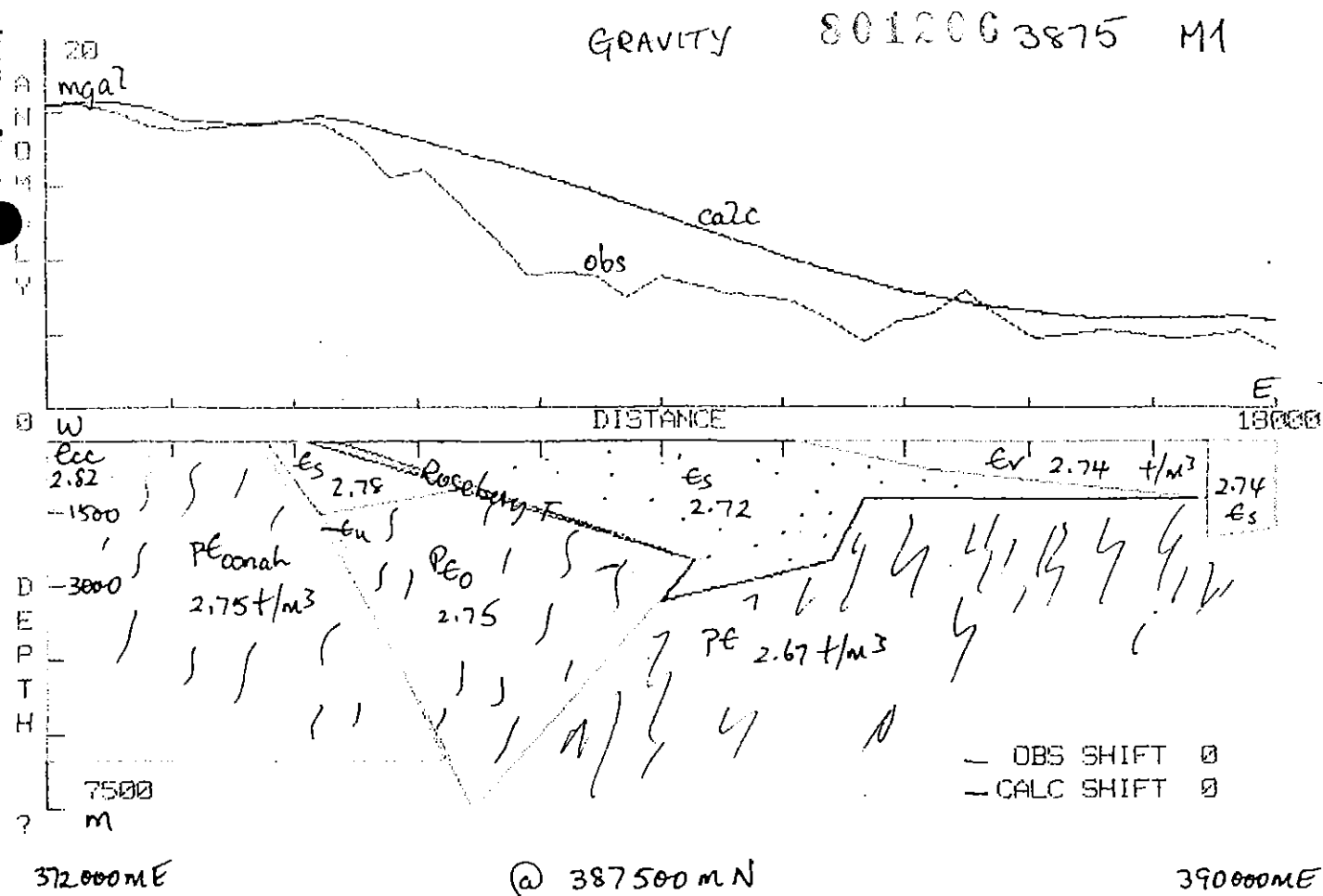
5 cm



801204

5 cm

COMBINATION MAP: RESIDUAL BOUGUER ANOMALIES AND OBSERVED MAGNETIC FIELD
FIGURE 14



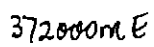
LINE 387 500 MN - GRAVITY MODELS

FIGURE 17

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

5 cm

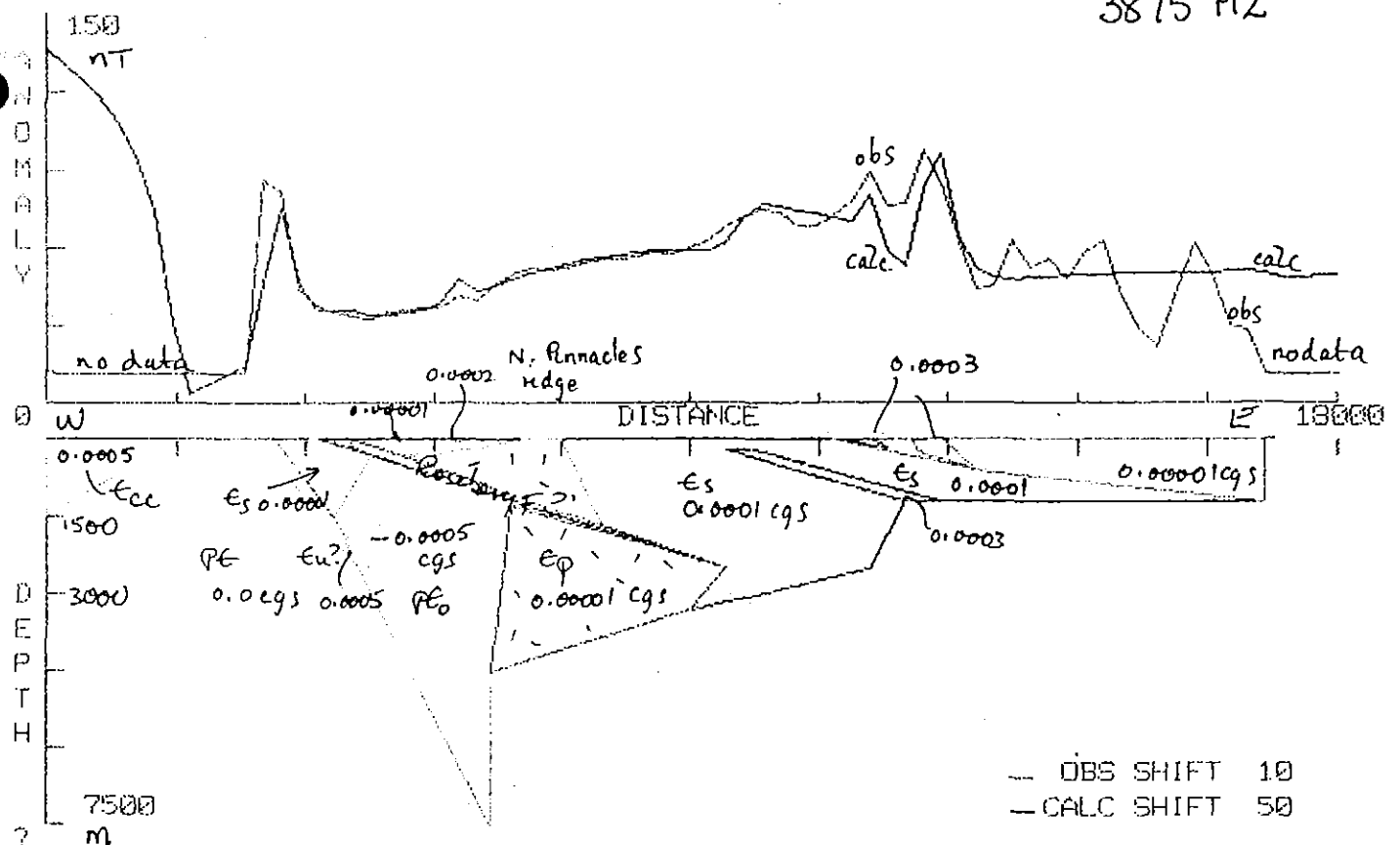
801207 3875 M2



(a) 387500 mN

390000 ME

3875 M2'



LINE 387 500 MN - MAGNETICS MODELS

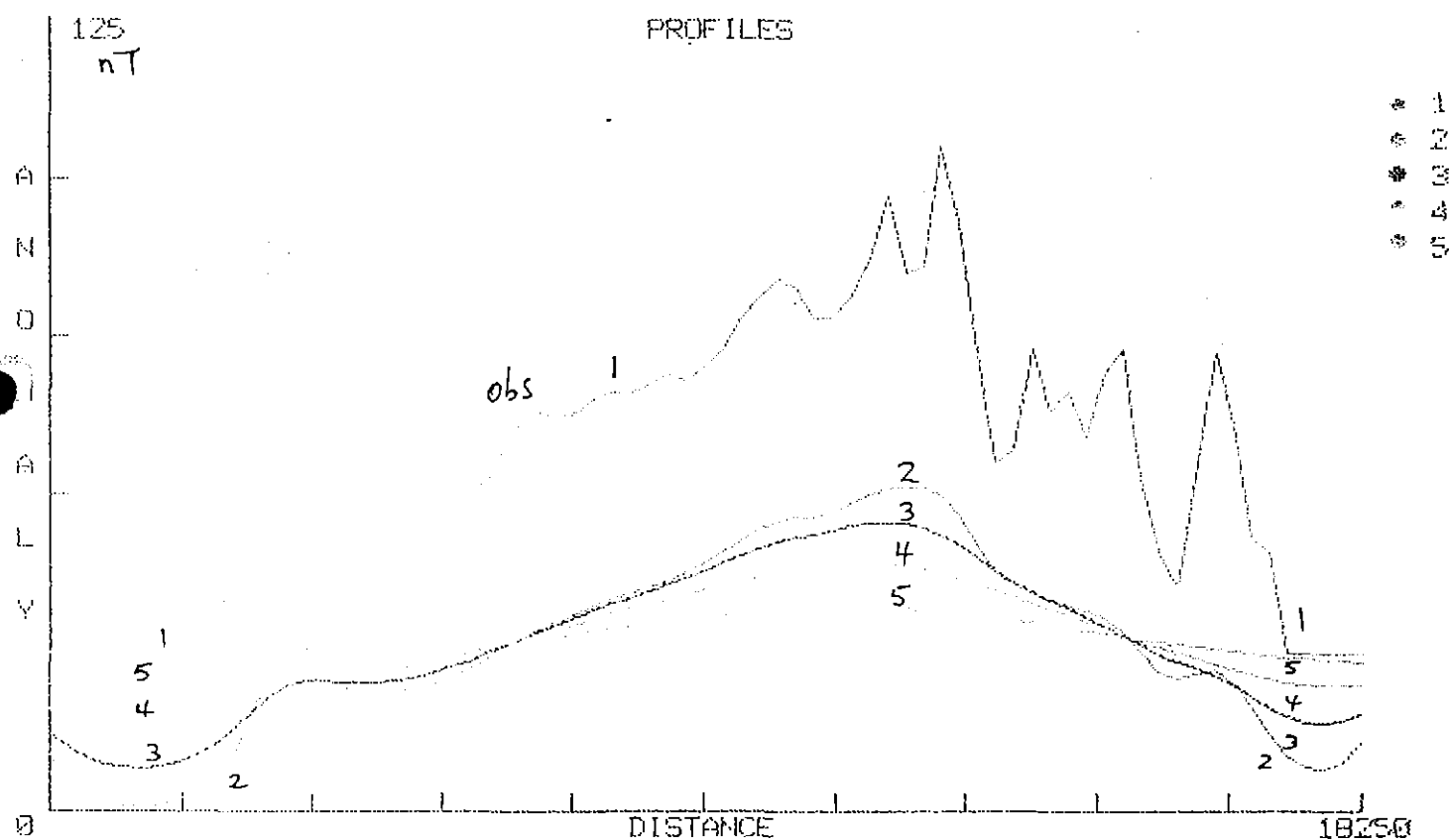
FIGURE 18

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

5 cm

1	B-N3875	PINNACLES 387500N
2	B-N387505	N3875 CONTINUATION 500M
3	B-N387510	N3875 CONTINUATION 1 KM
4	B-N387520	N3875 CONTINUATION 2 KM
5	B-N387540	N3875 CONTINUATION 4 KM

ZERO SHIFT - 23.99885

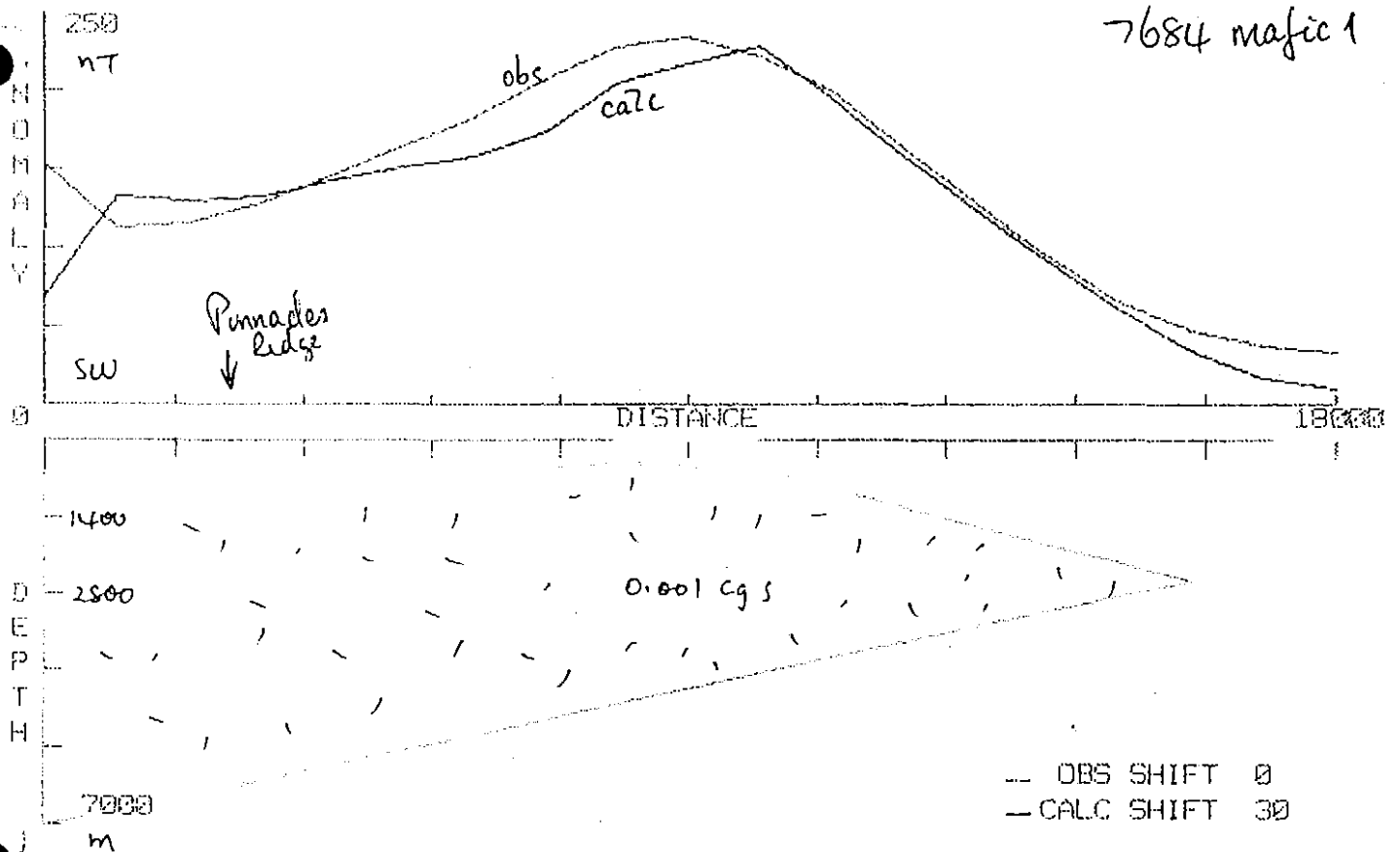
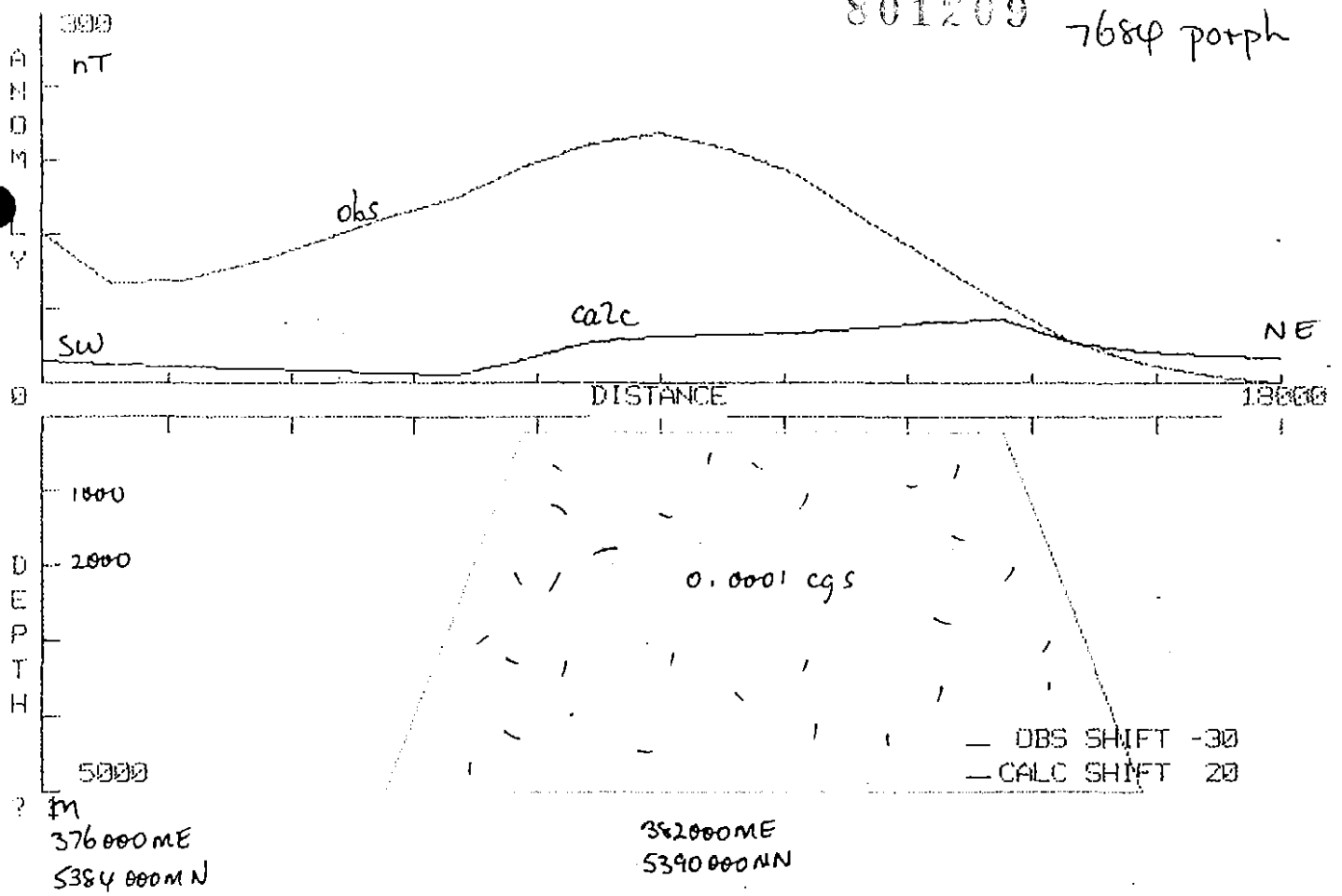


LINE 387 500 MN - EFFECT OF CONTINUATION OR DEPTH OF BURIAL

FIGURE 19

5 cm

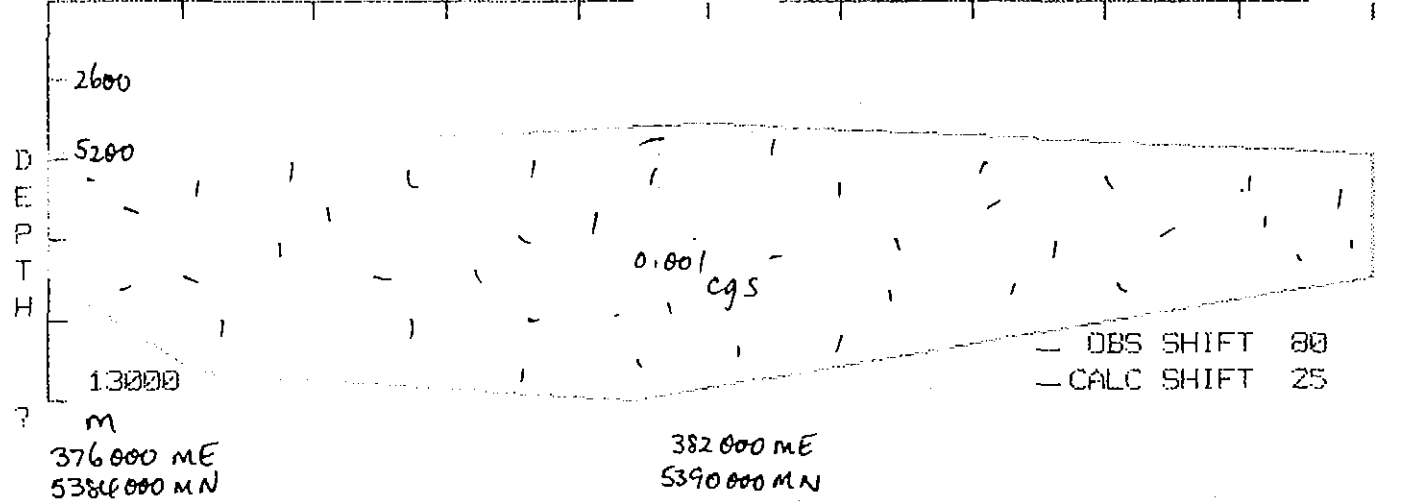
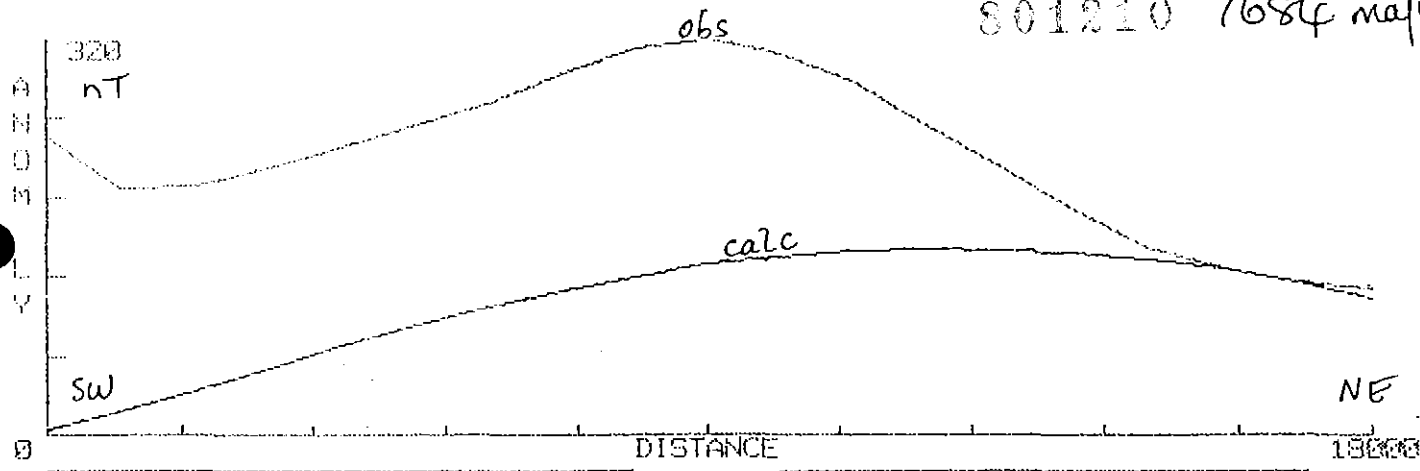
801209 7684 porph



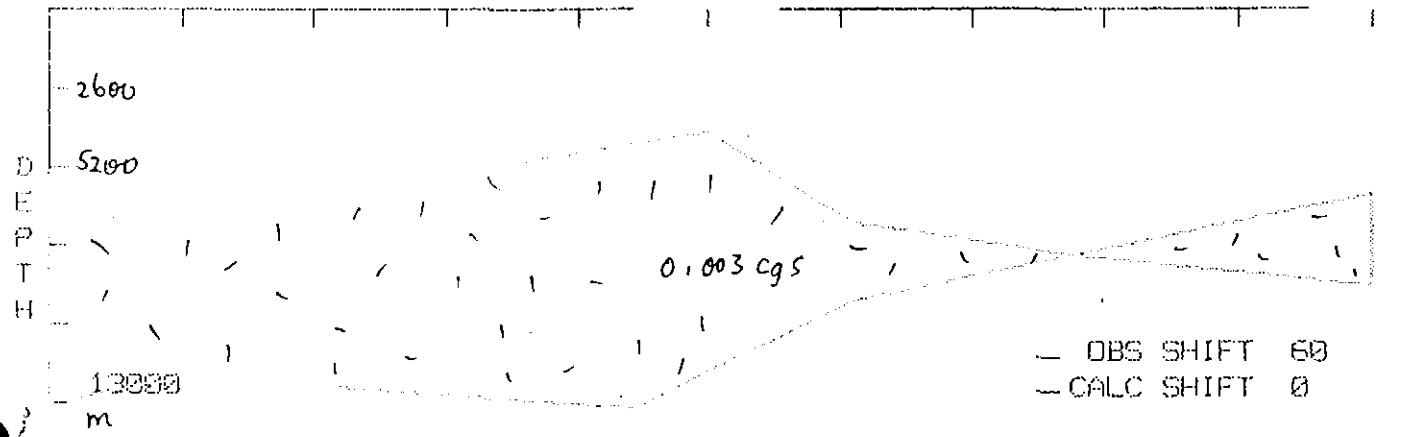
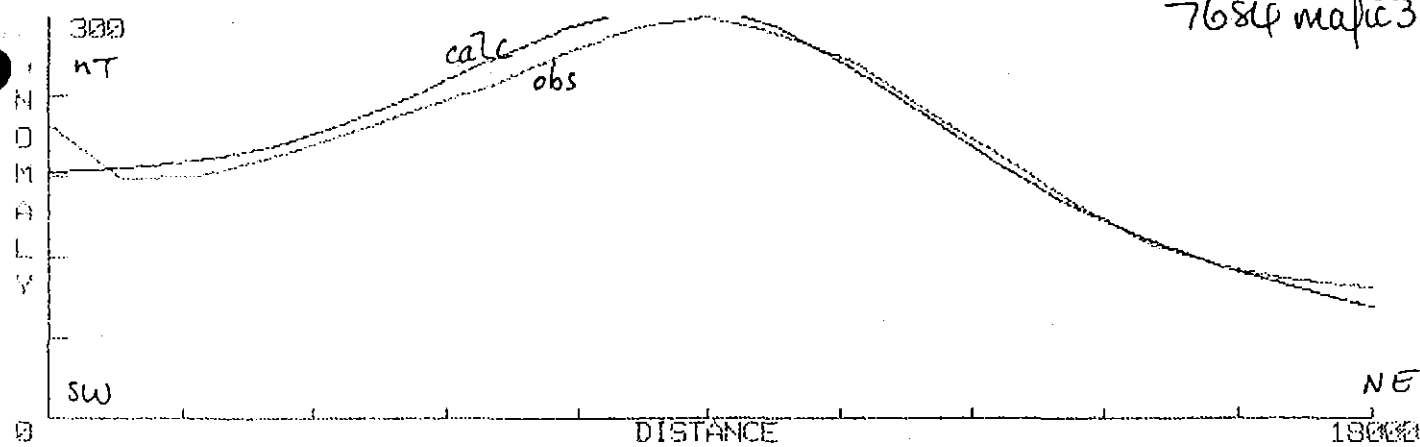
LINE 7684 - OPTIONS 1 AND 2 - REGIONAL MAGNETIC ANOMALY

FIGURE 20

801210 7684 mafic2



7684 mafic3

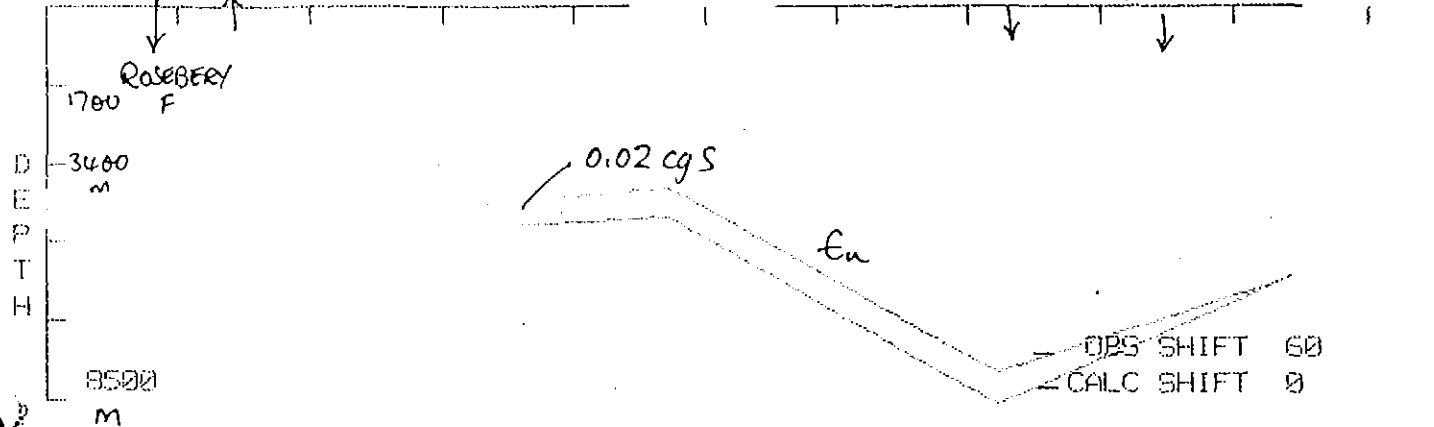
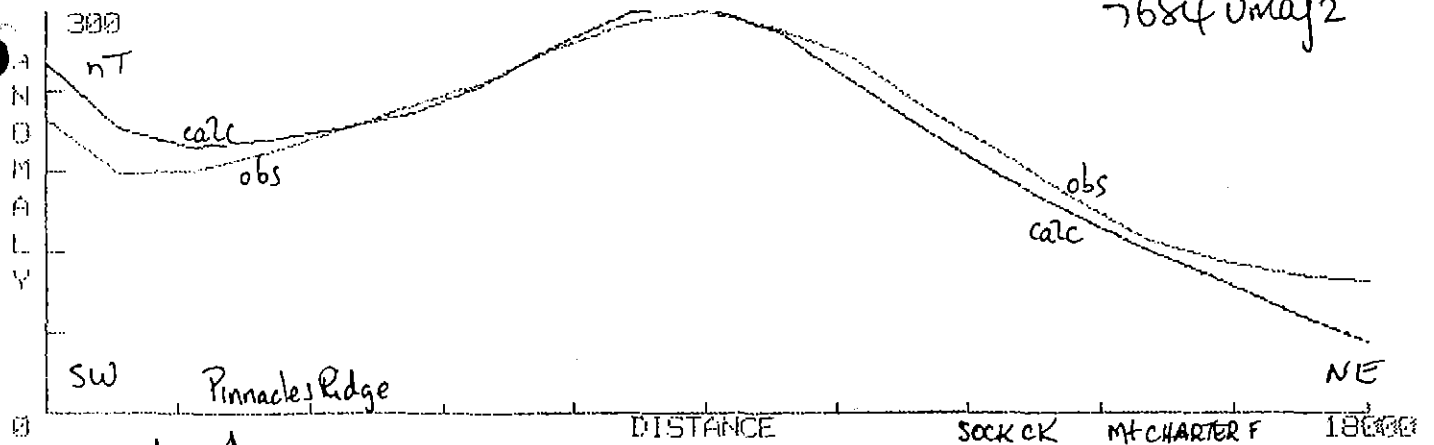
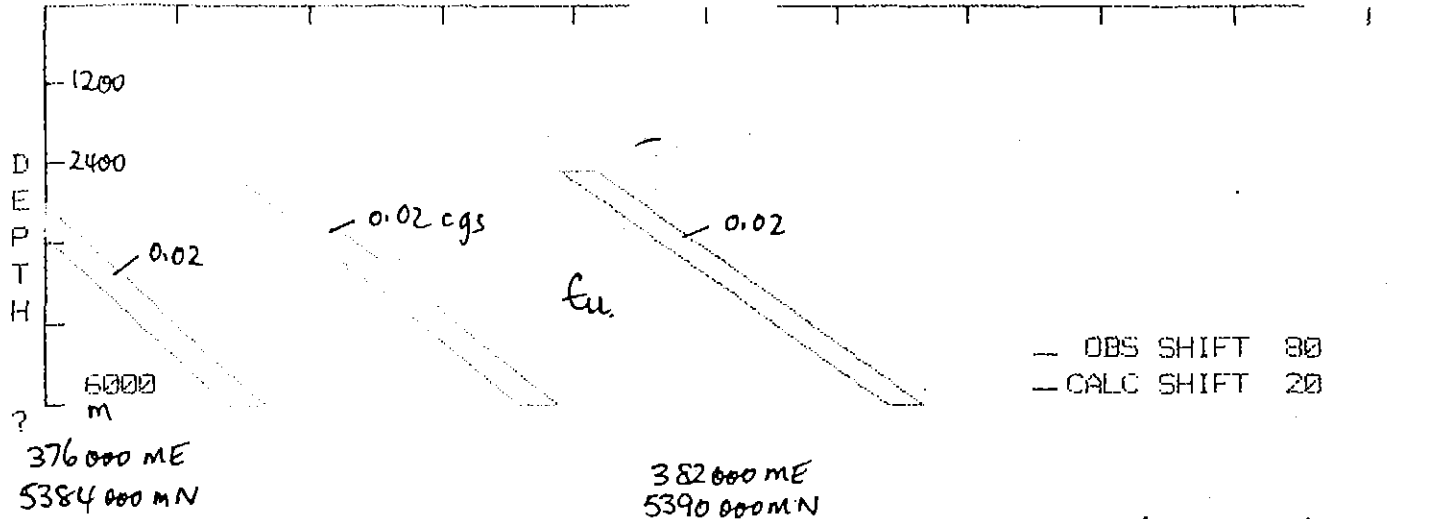
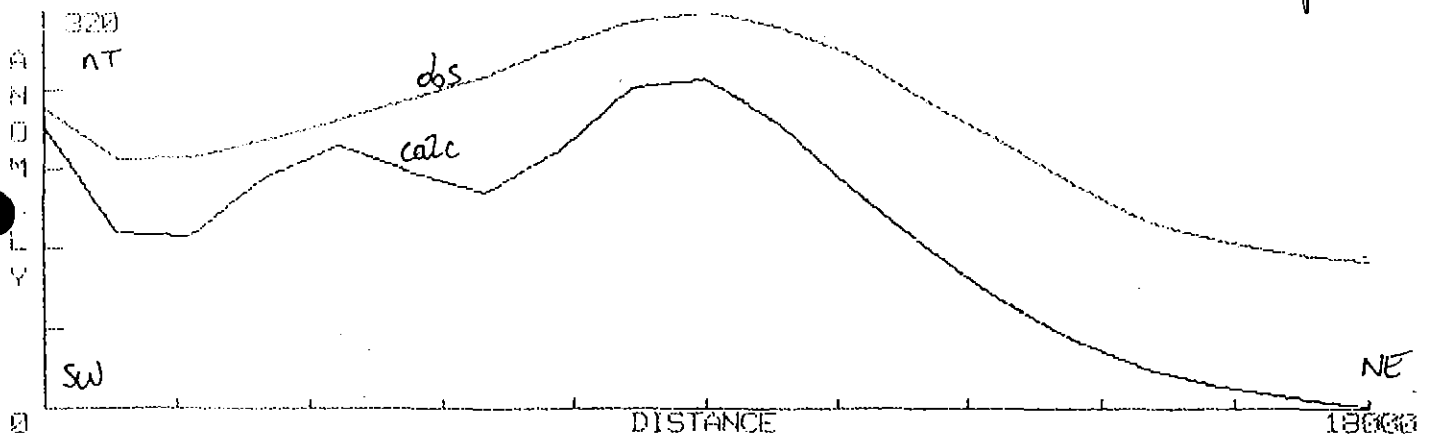


7684/az

LINE 7684 - OPTIONS 3 AND 4 - REGIONAL MAGNETIC ANOMALY

FIGURE 21

201211 7684 umaj1



LINE 7684 - OPTIONS 5 AND 6 - REGIONAL MAGNETIC ANOMALY

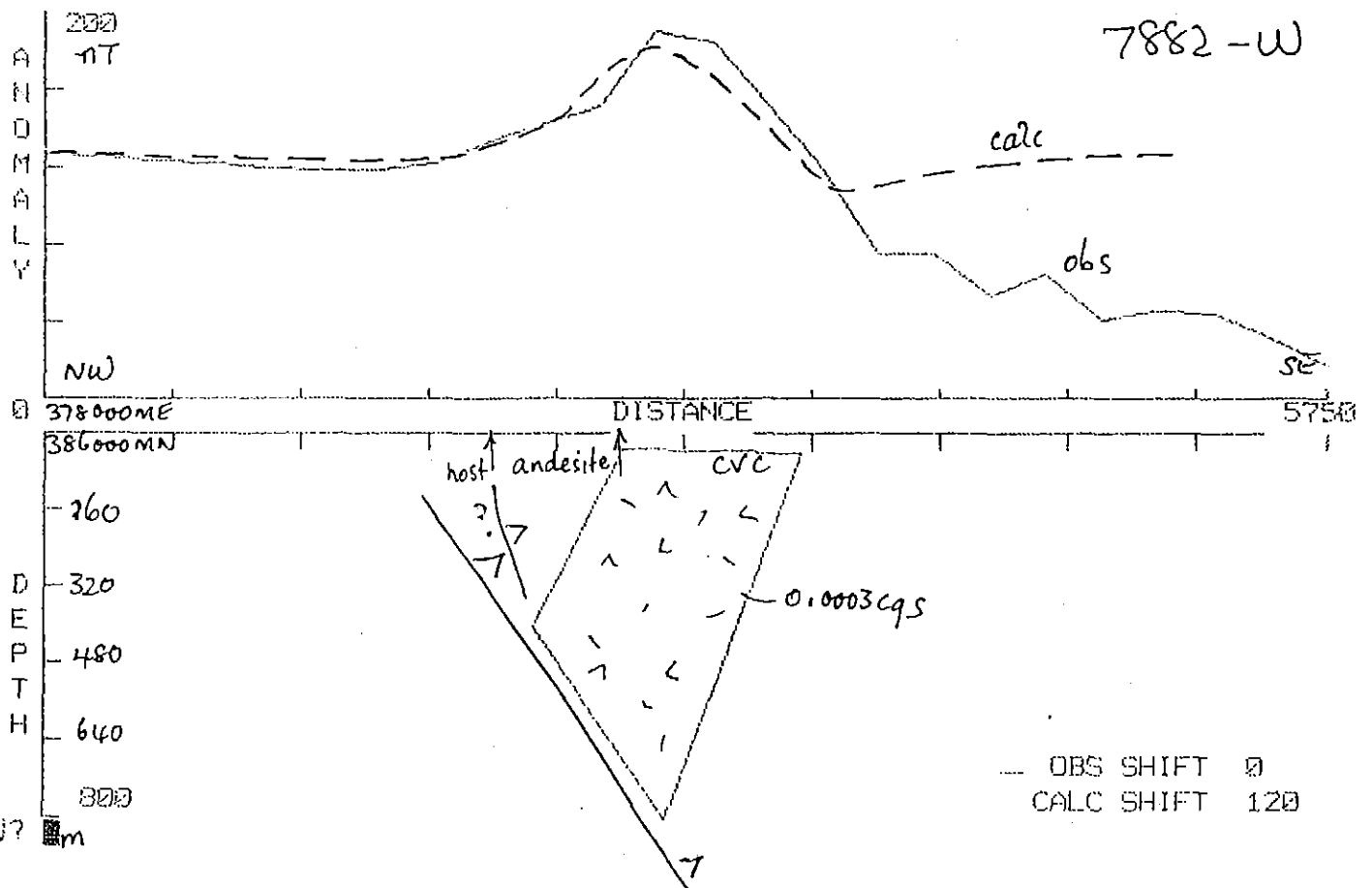
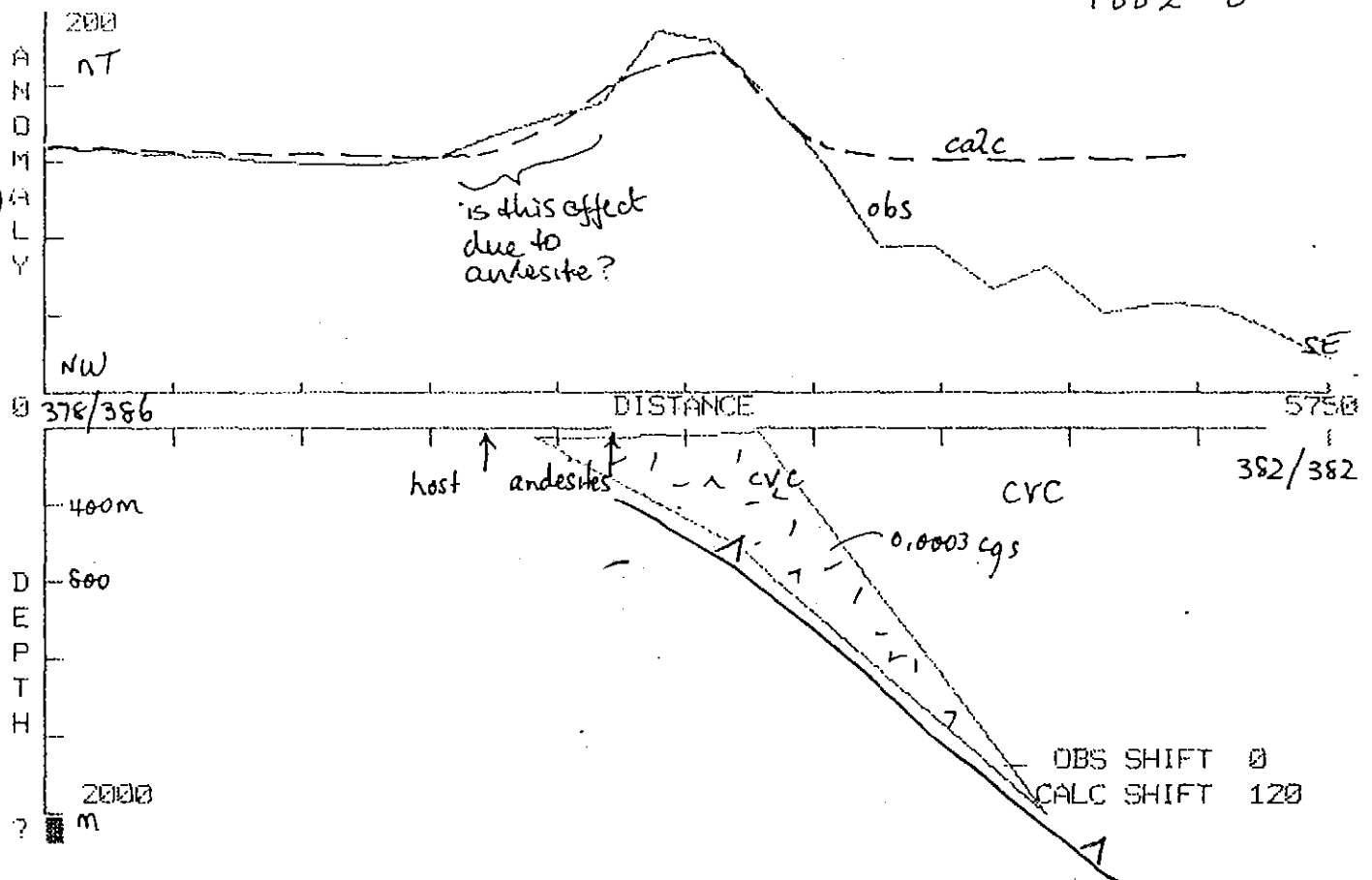
FIGURE 22

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

5 cm

801212

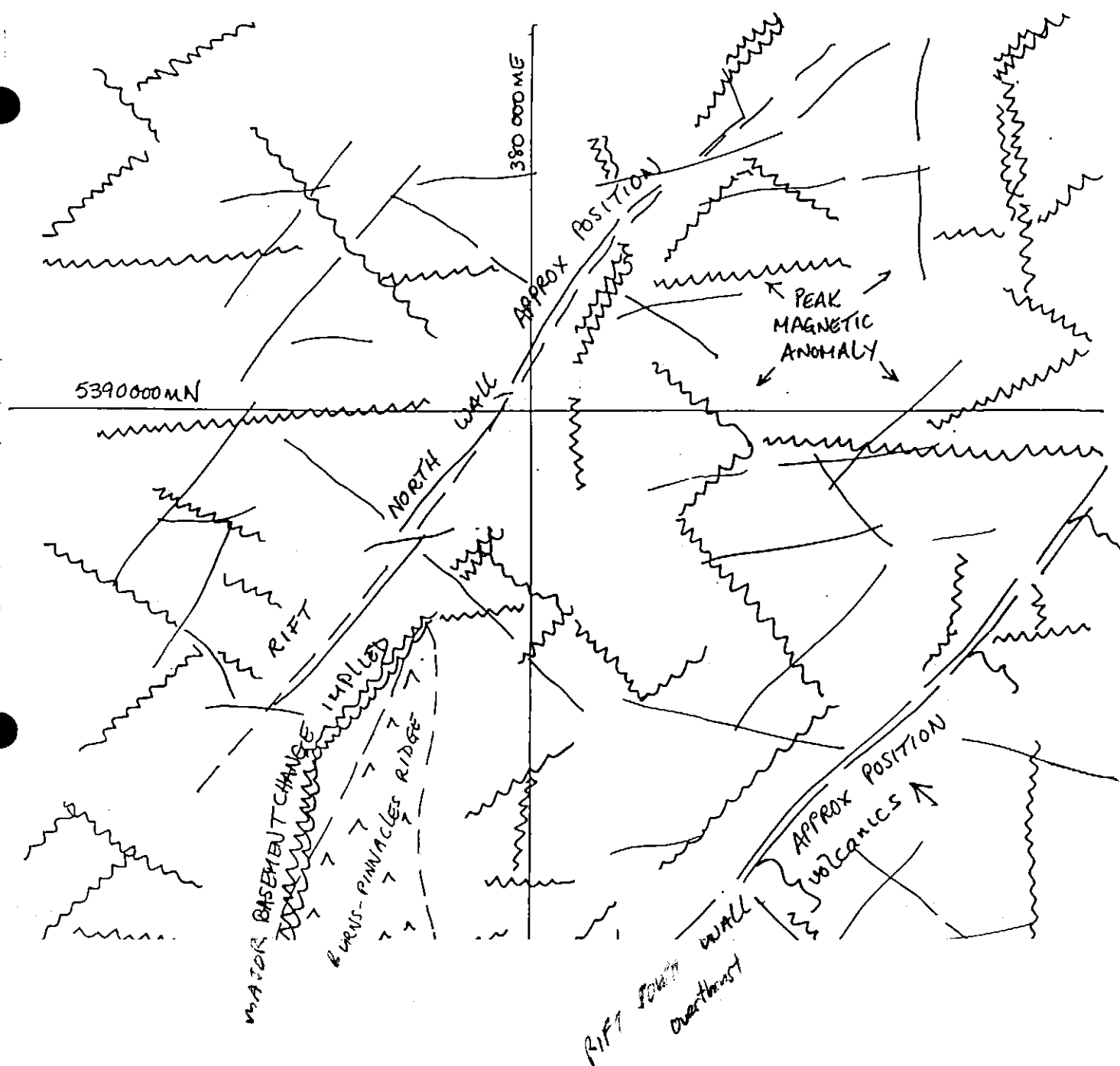
7882-E



HOLLWAY ANDESITE - POSSIBLE STRUCTURAL RELATIONSHIPS

FIGURE 23

5 cm



5 cm

SUMMARY OF MAJOR STRUCTURAL ELEMENTS

FIGURE 24

Appendix 10

Magnetic Physical Properties

Table 1.

MAGNETIC SUSCEPTIBILITY DATA FOR MAJOR ROCK UNITS
IN THE SILVER FALLS - SAWMILL CREEK AREA.

Unit	SI x 10 ⁻³	Cgs
<u>Southwell Subgroup</u>		
siltstone/sandstone	0.03 - 0.19	0.0000004 - 0.000002
polymict conglomerate	0.30 - 34.00	0.0000041 - 0.000430
<u>Tyndall Group</u>		
volcaniclastic	14.00 - 33.00	0.00018 - 0.000414
<u>White Spur Formation</u>		
siltstone	0.16 - 0.38	0.000002 - 0.000004
felsic mass flows	0.05 - 0.10	0.0000006 - 0.000001
<u>Pinnacles Rhyolite</u>	0.07 - 0.40	0.0000009 - 0.000005
<u>Quartz porphyry</u>	0.10 - 0.40	0.000001 - 0.000005
▪ ▪	0.70 - 6.00	0.0000087 - 0.000075