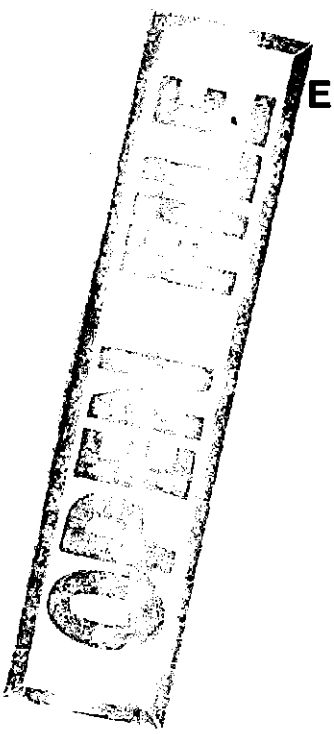
421001

ANNUAL REPORT
FOR
EL 44/88 – BURNS PEAK
1990
VOLUME 1



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ANGELA LORRIGAN
NOVEMBER 1990

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1.0 INTRODUCTION

This is the annual report on activity on the Burn's Peak EL 44/88.

The EL is located 10km north of Rosebery in the Mt Read Volcanics, Western Tasmania. The EL boundary and location are shown in FIG.1 & 1a.

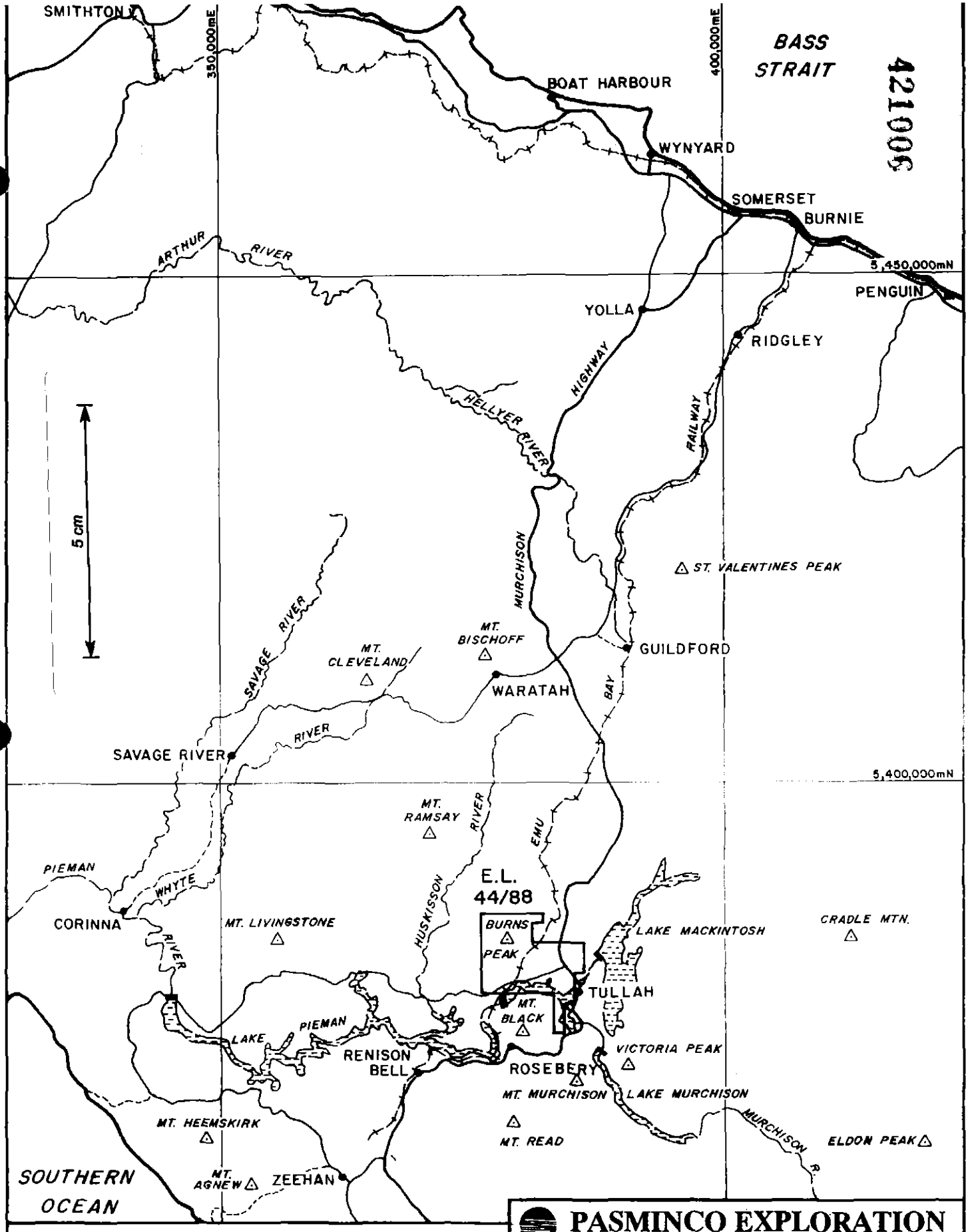
Work during the year has consisted of a major aeromagnetic and gravity survey. Five diamond drill holes have been completed. These have all been surveyed with down hole EM.

Geological mapping, rock chip sampling and wacker drilling programmes were also undertaken.

The most significant results of exploration have been:

1. Identification of probable alteration signatures from interpretation of the gravity and magnetic data.
2. Discovery of northward extensions of the Brown's Tunnel Sediments (which host mineralisation at Brown's Tunnel) under the Pinnacles rhyolite.
3. Intersections in diamond drill holes; of an extensive quartz sericite pyrite alteration zone below the Chester pyrite mine. This is devoid of base metals.

The location of the various project areas is shown in FIG.3.



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E.L. 44/88 – BURNS PEAK J.V.

REGIONAL GEOLOGY

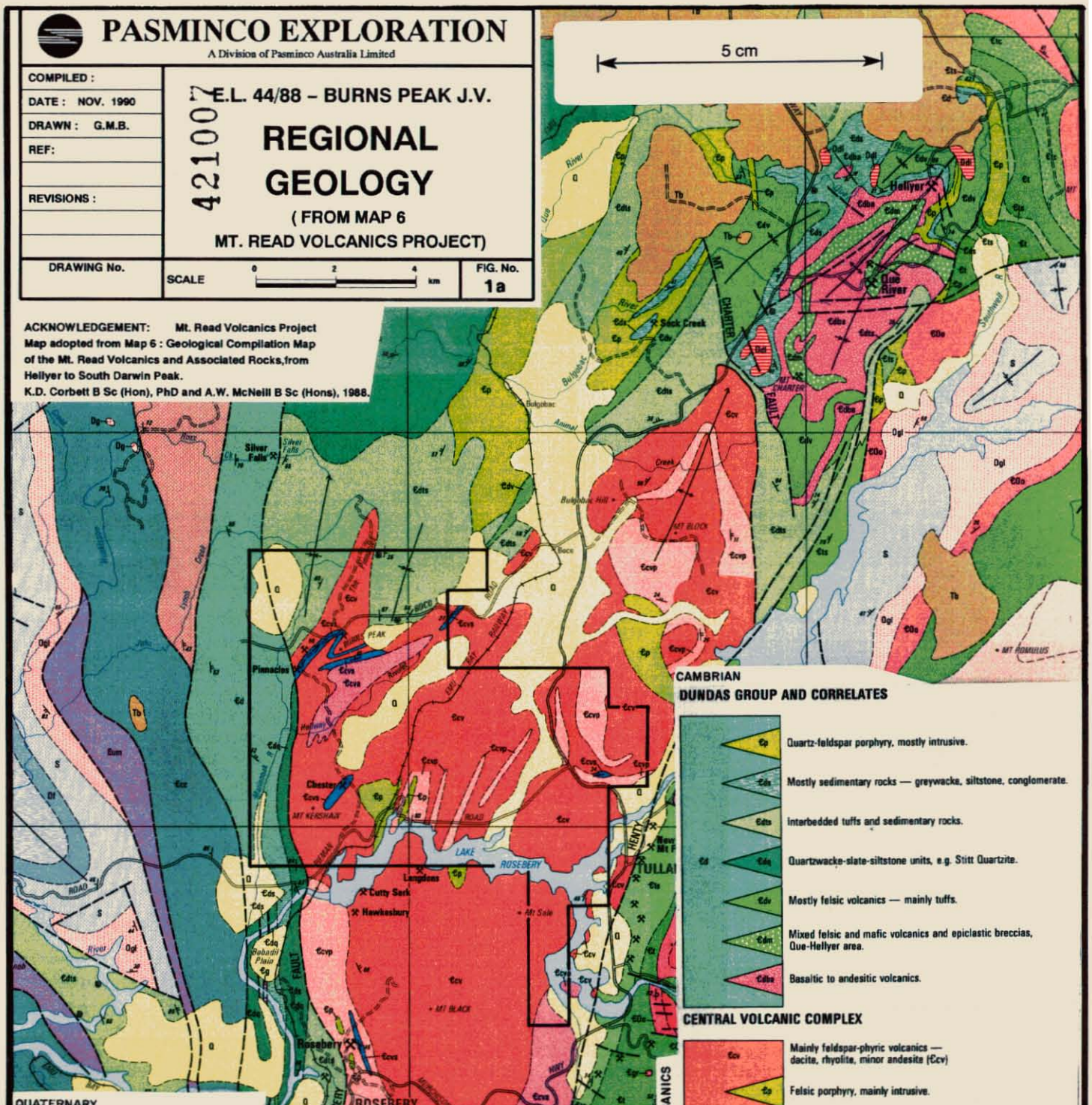
(FROM MAP 6

MT. READ VOLCANICS PROJECT)

FIG. No. 1a

5 cm

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



QUATERNARY

Q — Glacial deposits, alluvium, etc.

TERTIARY

Tb — Basalt.

DEVONIAN

Dd — Dolerite

DEVONIAN – SILURIAN

S-D
- Db — Bell Shale
- Df — Florence Sandstone
- S — Silurian

ORDOVICIAN

Ogl — GORDON GROUP limestone.

EARLY ORDOVICIAN - LATE CAMBRIAN

- €Oou — Upper sandstone sequence including Pioneer Beds (€Oou).
- €Oo — Undifferentiated conglomerate and sandstone (€Oo).
- €Oon — Newton Creek Sandstone (€Oon) — interbedded sandstone siltstone and conglomerate with marine fossils.

CRIMSON CREEK FORMATION

€cc — Mafic greywacke, mudstone, tholeiitic basalt.

UNASSIGNED CAMBRIAN UNITS

- €cvs — Volcano-sedimentary sequence.
- €s — Sedimentary sequence.
- €cvb — Basaltic-andesitic volcanics.

SUCCESS CREEK GROUP

€sc — Quartz sandstone, mudstone, siltstone with minor conglomerate and carbonate.

PRECAMBRIAN

- Pz — Quartzite-slate sequences — correlates of Oonah Formation.
- Pm — Metamorphosed sequences of Tyennan Region. Major lithological boundary trends shown.

CAMBRIAN

DUNDAS GROUP AND CORRELATES

- €p — Quartz-feldspar porphyry, mostly intrusive.
- €ds — Mostly sedimentary rocks — greywacke, siltstone, conglomerate.
- €dts — Interbedded tuffs and sedimentary rocks.
- €d — €dq — Quartzwacke-slate-siltstone units, e.g. Stitt Quartzite.
- €dv — Mostly felsic volcanics — mainly tuffs.
- €dm — Mixed felsic and mafic volcanics and epiclastic breccias, Que-Hellyer area.
- €dbs — Basaltic to andesitic volcanics.

CENTRAL VOLCANIC COMPLEX

- €cv — Mainly feldspar-phyric volcanics — dacite, rhyolite, minor andesite (€cv)
- €cp — Felsic porphyry, mainly intrusive.
- €cvp — Mainly pyroclastic rocks.
- €cvs — Sedimentary rocks, mainly shale and sandstone.
- €cva — Andesitic volcanics.

CAMBRIAN INTRUSIVE ROCKS

- €gr — Granite.
- €p — Felsic porphyry.
- €g — Gabbro.
- €um — Ultramafic rocks and serpentinite.

TYNDALL GROUP AND CORRELATES

- €t — Mainly quartz-feldspar-phyric volcanic and volcaniclastic rocks (€t).
- €ts — Mainly sedimentary rocks, including Farrell Slates.
- €tc — Mainly volcaniclastic conglomerate and sandstone.
- €vb — Sticht Range Beds — sandstone, siltstone, siliciclastic congl

2.0 TENURE

A successful tender application for the Burn's Peak EL (44/88) was made by EZ corporation (part of North Broken Hill Limited) and Noranda Pty Ltd in 1988.

On granting of the EL, Pioneer Minerals Australia Limited became a third joint venture member.

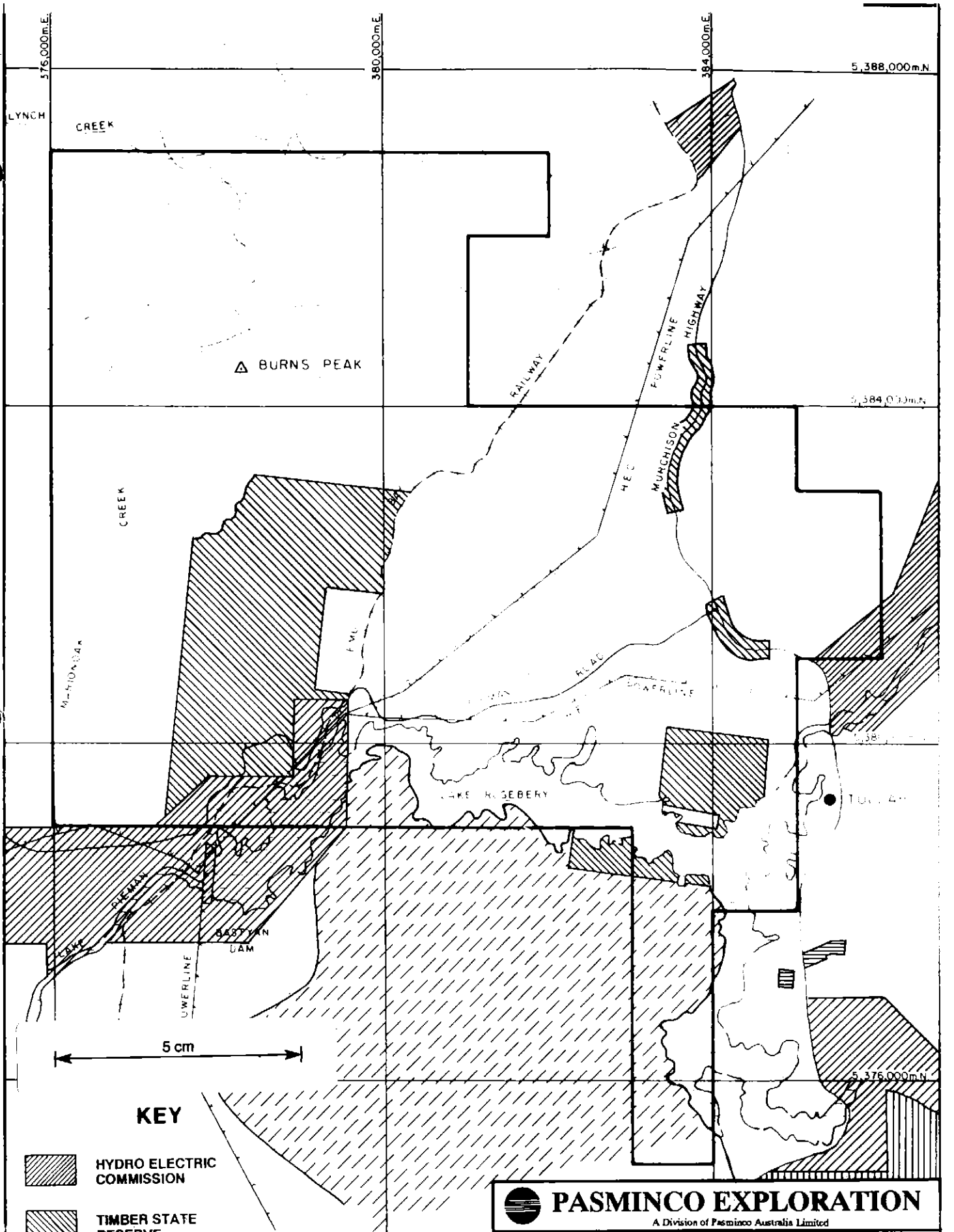
Tenure and expenses were shared equally between the three participating companies, with EZ as operators.

In 1987, with EZ corporation's entry into Pasminco Australia Limited, tenure and operating responsibilities on EL 44/88 also passed on to Pasminco.

Until August 1990, Geopeko, the exploration division of North Broken Hill Peko Ltd, administered and operated the EL under a contract arrangement. Since then Pasminco Exploration have taken over these responsibilities.

All expenses and tenure are still shared equally between the three joint venture partners. Pioneer Minerals Limited has now become Plutonic Operations Limited.

FIG.2 shows the EL boundary, the land use and ownership of the area covered by the EL is also shown.



KEY

- HYDRO ELECTRIC COMMISSION
- TIMBER STATE RESERVE
- NOMINATION FOR REGISTER ON NATIONAL ESTATE
- PRIVATE FREEHOLD LAND
- N.P. AND W.S. CONSERVATION AREA

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PASMINCO EXPLORATION
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BURNS PEAK – E.L. 44/88

LAND TENURE

FIG. No. 2

3.0 PREVIOUS EXPLORATION

Initial exploration in the area in the 1940's was undertaken in the Brown's Tunnel area by EZ.

The area was then covered in a regional programme by RTA Exploration during the 1950's.

From 1963 until 1987, the majority of the EL was part of EL 5/63. Owned and operated by Comstaff, until 1986. From 1986 – 1988, Comstaff entered a joint venture with BHP Minerals Limited, with BHP as operators.

The current joint venture, on EL 44/88, was initiated in 1988.

Details of previous exploration are found in BHP (1987) and Mathison and Lorrigan (1989).

4.0 WORK COMPLETED AND RESULTS OF EXPLORATION

4.1 General

4.1.1 WORK COMPLETED

Compilation of Old Geophysical Data

Raw data, sections and plans from old geophysical surveys on the EL were obtained and located on current base plans.

A list of all the data included in the compilation is appended. (Appendix 14).

Aeromagnetic Survey

An aeromagnetic survey was flown with E-W lines at 200m spacing. N-S tie lines were 1 000m apart and terrain clearance was 80m.

The survey was designed to give an overall view of the magnetic features of the EL, improving on the resolution available from the 1981 Mines Department survey.

Interpretation of data, to obtain lithological and structural information was undertaken by Leaman Geophysics. (Appendix 7)

Gravity Survey

Gravity readings were taken all over the EL at a nominal 500m spacing. A random (rather than grid) distribution of readings was achieved. This type of distribution serves to eliminate the bias toward inferred strike which occurs with a grid arrangement.

The survey was designed to be interpreted in conjunction with the magnetics to yield geological information as well as possible anomalous mass locations.

An interpretation of the gravity data was completed by Leaman Geophysics. (Appendix 8)

Integration of Gravity and Magnetics Data

Leaman Geophysics was engaged to combine information from the gravity and magnetics surveys. The aims of this work were:

1. To try and identify possible rock types beneath glacial cover.
2. To identify significant structures that may control or off-set mineralisation.
3. To identify areas which may have an anomalous alteration signature.

A report on this is in Appendix 9.

Magnetic Susceptibility Readings

Measurements of magnetic susceptibility were made on drill core from throughout the EL – BPD 62, 63, 64, 65; EAB 1, 2, 3 & 4 and BPD 67 & 68.

4.1 General (cont.)

4.1.2 RESULTS OF EXPLORATION, DISCUSSION & CONCLUSIONS

FIG.4 illustrates the structural features interpreted from both magnetic & gravity surveys, also areas of probable alteration. An attempt has been made to reconcile this interpretation with the known geology. This exercise is not complete, however FIG.5 is a section along the north – westernmost segment of the section line shown at the bottom of FIG.4.

All known geology based mostly on diamond drilling, has been put onto this section. Magnetic susceptibility data from drill core has also been taken into account.

Although this work is preliminary, the control from diamond drilling on this section is good. The geological information suggests that the frequency of thrust slices is not as high as that indicated by the geophysical interpretation. However some of the structures do exist. They explain observed discontinuities in the stratigraphy. Those that are thought to be "real" are shown on FIG.5 and on the 1:5 000 geological map (FIG.7).

Geological interpretation of the volume of rock directly below Burn's Peak and immediately to the east of it is still unresolved. At surface, the presence of andesite explains the magnetic signature in this area (magnetic susceptibility readings show that this lithology is marginally more magnetic than those to the west of it). However, the magnetic/gravity interpretation shows this unit dipping east. In the field it dips west. This contradiction means that something other than the andesite is probably below Burn's Peak and that another magnetic unit must occur east of the andesite. This area is not exposed in outcrop.

The relationship between the andesite east of Burn's Peak and andesites intersected in holes at Brown's Tunnel is at present unknown.

Other aspects of the regional geophysical interpretation which have been borne out by geological mapping and drilling are:

1. A N W – S E trending structure, N E of Chester. This structure appears to truncate the Hollway alteration zone (as shown in FIG 9). The magnetics indicate that it continues to the S E. If this is so, it probably also truncates the Chester alteration zone.

2. The extent of the Chester alteration zone. The strike of the main part of this zone is N E – S W, not N – S, as previously thought.

The key elements of the interpretation, with respect to base metals exploration are:

1. The Brown's Tunnel to Leo's Find area is truncated by thrust faulting at depth. This limits the depth extent of mineralised rocks in this region. In the east of the area (near Brown's Tunnel) truncation appears to occur approx. 700m below surface. In the west (near Burn's Peak) it may be 1 000m below surface.

2. An alteration signature does not exist for the mineralised region of Brown's Tunnel – Leo's Find.

3. A number of areas of possible alteration have been highlighted. These are shown on FIG.3 and FIG.4. One of these is the Chester area. Here the alteration which is obvious on the surface appears to extend to the north-east under glacial cover.

More work is required to follow up the aeromagnetic and gravity interpretations, particularly the areas of probable alteration.

The form that this work will take is outlined in section 5.0

Alteration Studies – Dr G Green (Appendix 10 & 11).

Samples of drill core were taken for petrological examination and oxygen isotope analysis. The purpose of these studies is to attempt to establish vectors towards increasing alteration within the stratigraphy drilled.

4.2 Brown's Tunnel - Yabby Creek - Leo's Find

4.2.1 WORK COMPLETED

Structural Mapping and Brief Report - Colleen Elliot (Appendix 16.)

The area from Brown's Tunnel, north to Boco Road was structurally mapped at 1:1 000 scale. The aim of the mapping was to identify structures that may have displaced possible host rocks or which may host or control mineralisation themselves.

Re-interpretation of the massive sulphides and their host rocks at Brown's Tunnel. Ian Mathison (Appendix 17). This detailed interpretation was designed to determine the continuity of lithological changes and of mineralisation in the Brown's Tunnel Area.

Diamond Drilling

Three diamond holes were drilled in the area: BPD 66, 69 and 70. Another (BPD 71) was in progress at the time of writing. All these holes were targeted on N E strike extensions of the stratigraphy that hosts the Brown's Tunnel mineralisation. FIG. 6 shows the location of these holes.

DHEM

Down hole EM surveys were undertaken on BPD 62, 63, 64, 65, 66 and EAF 11. These were interpreted by John Bishop (Mitre Geophysics). (Appendix 4 & 6).

At the time of writing, surveys on BPD 69 and 70 were in progress.

CSAMT

A brief review of the CSAMT data (from a survey done in March 1989) was undertaken prior to planning diamond drill holes BPD 66 and BPD 69. This was to determine whether the CSAMT could distinguish the sedimentary horizons that the holes were to be targeted on, from the surrounding and overlying, rhyolite lavas. (Appendix 5).

On Going Geological Interpretation

Interpretation of the geology has continued as information from drilling has become available.

Geological interpretation has been integrated with geophysical and geochemical information to develop drill targets.

4.2.2 RESULTS OF EXPLORATION, DISCUSSION AND CONCLUSIONS

Diamond Drilling

Diamond drilling this year has tested the Brown's Tunnel sediments (which host minor Au, Pb, Zn mineralisation) north of Boco Road.

This stratigraphy consists of a "package" from 10–80m wide, of siliceous, grey, Cherty shales and siltstones, fine–grained pumiceous volcaniclastics which lend themselves to strong sericite alteration and well sorted sandstones and conglomerate. In some places a vesicular andesite lava occurs towards the base of the sequence.

The sediments are in the main overlain by rhyolite lava and lava breccias. Beneath them are large volumes of medium – course grained pumiceous volcaniclastics.

All these drill holes intersected the Brown's Tunnel sediments. The results of the holes are summarised below. More detailed logs of the drill holes are in Appendix 2. The location of the holes is shown in FIG.6.

BPD 66 FIG.13

Target: The "Brown's Tunnel sediments" 40m north and 250m up dip of where BPD 62 intersected the sequence. This is 120m north along strike and 40m down dip of where the Comstaff hole, EAF 9, intersected 10m of massive sulphates.

Results: 46.0m (down hole) of the Brown's Tunnel Sediments were intersected. The top 8.9m of grey, bedded siliceous shales contained stringers of phyrite, chalcopyrite, galena and sphalerite. Minor, massive, bedded pyrite was also encountered. The sediments below these consist of course epiclastic conglomerate, grey shale and sandstone, they are younging to the west and are overlain by 157.3m (down hole) of rhyolite lava and lava breccias. These rocks contain sediment clasts near the base which are thought to have been assimilated when hot lava moved over the wet sediments.

The bottom contact of the sediments is faulted off. Beneath the fault is a thick sequence of pumiceous volcaniclastics.

Best Intersections:

Depth(m)	Au	Cu	Pb	Zn	Mn(ppm)	Rock Type
159–165	0.55	520	4750	2.57%	1190	Sediments

BPD 69 FIG.14

Target:

Brown's Tunnel sediments at the same RL and 160m north along strike of the intersection in BPD 66.

Results:

The hole intersected the Brown's Tunnel Sediments at 257.0m, below a massive sequence of rhyolite lavas and lava breccias, which incorporate 27.8m of sediments (which may be a block) and peperitic textures.

Spots of sphalerite are dissemented through some zones in the lavas. These appear to be associated with elevated concentrations of gold (>0.1 g/t). In places the lavas also contain >1% manganese.

The "Brown's Tunnel sediments" in this hole (from 257.0m - 317.9m) consist of interbedded shale, coarser sediments, pumiceous volcaniclastics and 1m of vesicular andesite lava. (304.8 - 305.8m). From 257.0 - 280.4, the shales contain small blebs and stringers of sphalerite and galena and some bedded pyrite. The pumiceous volcaniclastics exhibit strong sericite alteration. Below the "Brown's Tunnel Sediments" the hole entered a sequence of coarse - medium grained pumiceous volcaniclastics. Sphalerite occurs in patches through these, associated with silicification and post-cleavage, q-carb veining. It may (because of this) be a Devonian feature.

Best Intersections

Depth	Au	Cu	Pb	Zn	Mn(ppm)	Rock Type
110-112m	0.10	13	105	155	9800	Rhy Lavas
116-120m	0.12	32	71	625	7000	Rhy Lavas
128-129m	0.34	165	3150	4650	2100	Rhy Lavas
260-266	0.066	152	2830	6733	1193	sediments
360-362	<0.01	48	560	1.02	880	Pumiceous
362-364	<0.01	70	300	9200	9200	Volcaniclastics

BPD 70

Target: "Brown's Tunnel Sediments" 200m N, along strike and at the same R.L. as those intersected in BPD 69.

Result: The hole intersected the Browns Tunnel sediments from 303.2 to 319.8. These, and some of the underlying pumiceous volcaniclastics host stringers of quartz, carbonate, sphalerite and galena.

Best Intersection:

Results not yet available.

Extension of Drill Holes - DHEM & Alteration Studies

Down hole EM surveys and alteration studies were undertaken on drill holes and core from last years drilling programme. These, in theory, allow the volume of ground tested by each drill hole to be extended.

In addition to DHEM surveys of the Pasminco holes, an old Comstaff hole (EAF 11) was also surveyed. This was undertaken to try and resolve discrepancies between 2 previous surveys. It was concluded after this third effort, that the differences had arisen because the cable for one of the loops has been placed on different sides of the drill collar in different surveys.

The attempt to locate off hole conductors in BPD 62 - BPD 65 resulted in two weak responses. One from BPD 63 and the other from BPD 65.

The ore in BPD 63 indicated a weak, discrete, off-hole conductor, about 150m from the hole. Three drill holes on this section (FIG.10) give excellent geological control. Interpretation suggests that two shallow east dipping structures are present, sub-parallel to BPD 63. One of these is the Rosebery Fault. These structures are probably the cause of the off-hole response.

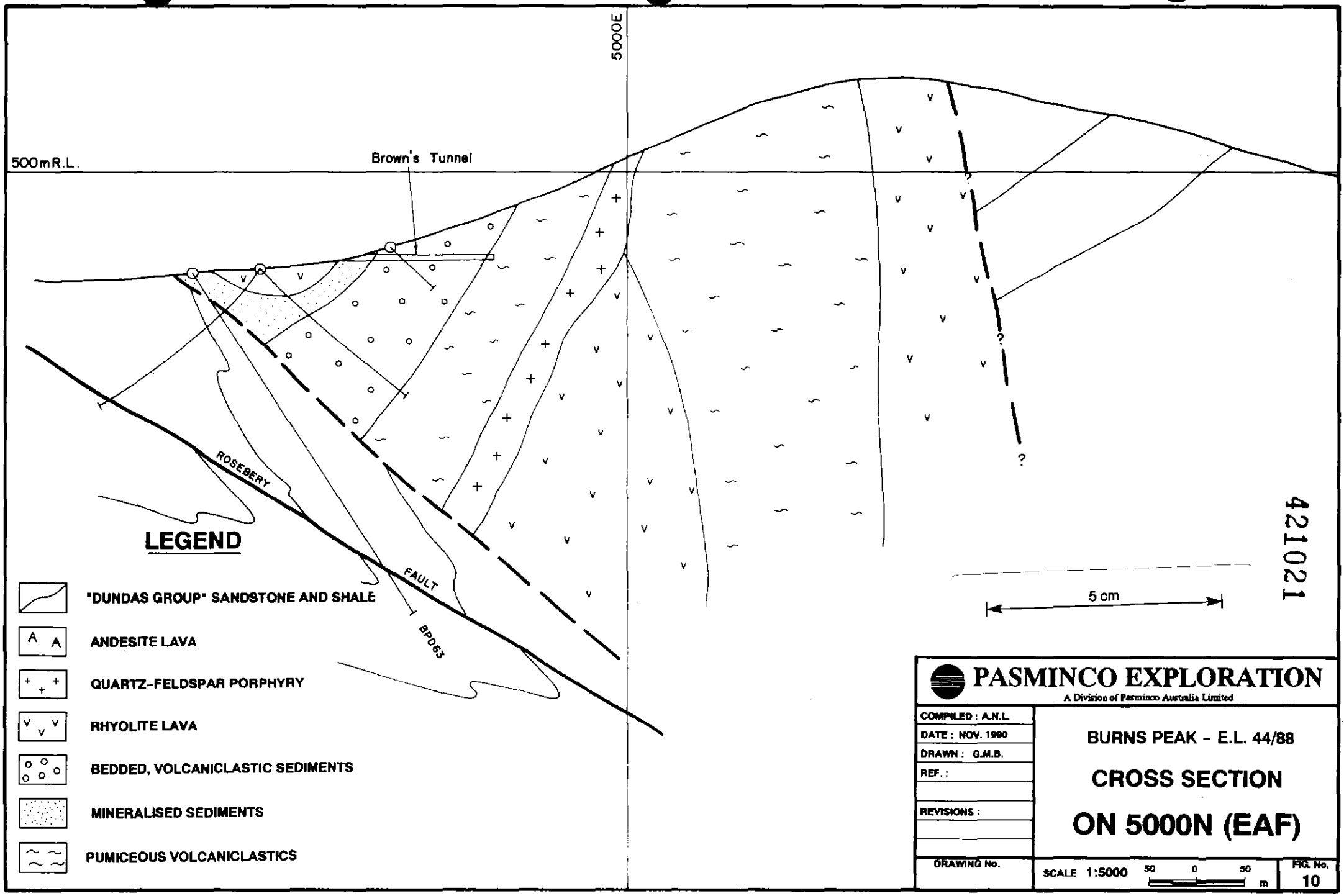
The response in BPD 65 was also weak. No discrete off-hole source could be defined for it. It is interpreted as a current channelling effect along the porphyry/sediment boundary. The full interpretation of these surveys is in Appendix 4 & 6.

Work by Dr G Green, using oxygen isotope analysis and petrology, to establish degrees of alteration in the drill core has located three main zones of alteration.

One of these is, not surprisingly, adjacent to the massive sulphide intersection in EAF 9. Intense alteration, indicated by strong seriticisation of feldspars and low $\delta^{18}0$ values occurs along strike from and below the mineralisation.

The two other zones of alteration, indicated primarily by $\delta^{18}0$ values of 10 or less are in sediments at the top of BPD 62 and in the volcaniclastics below the porphyry in BPD 65. Cross sections through these holes are shown in FIG.11 and 12. Weakly anomalous zinc values, particularly in BPD 65 coincide with the low $\delta^{18}0$ values.

This result lends greater prospectivity to the eastern limb of the interpreted Pinnacles Anticline.



PASMINCO EXPLORATION
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COMPILED : A.N.L.	BURNS PEAK – E.L. 44/88
DATE : NOV. 1990	CROSS SECTION
DRAWN : G.M.B.	ON 5000N (EAF)
REF. :	
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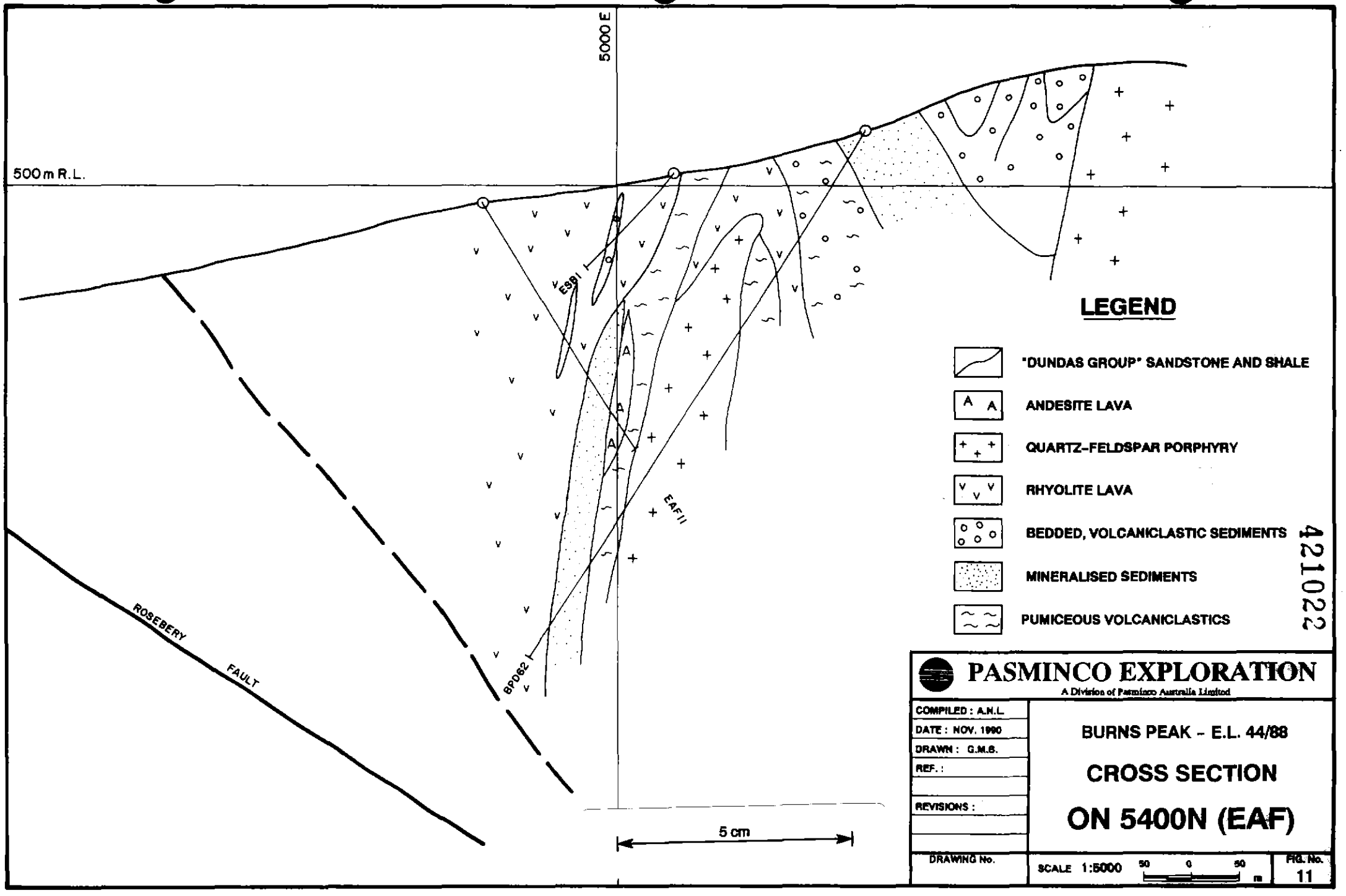
	FIG. No. 10


5000 E
500 m R.L.
ESB1
EAF11
BPD62
ROSEBERY
FAULT
5 cm
LEGEND
"DUNDAS GROUP" SANDSTONE AND SHALE
ANDESITE LAVA
QUARTZ-FELDSPAR PORPHYRY
RHYOLITE LAVA
BEDDED, VOLCANICLASTIC SEDIMENTS
MINERALISED SEDIMENTS
PUMICEOUS VOLCANICLASTICS
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PASMINCO EXPLORATION
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BURNS PEAK - E.L. 44/88
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11

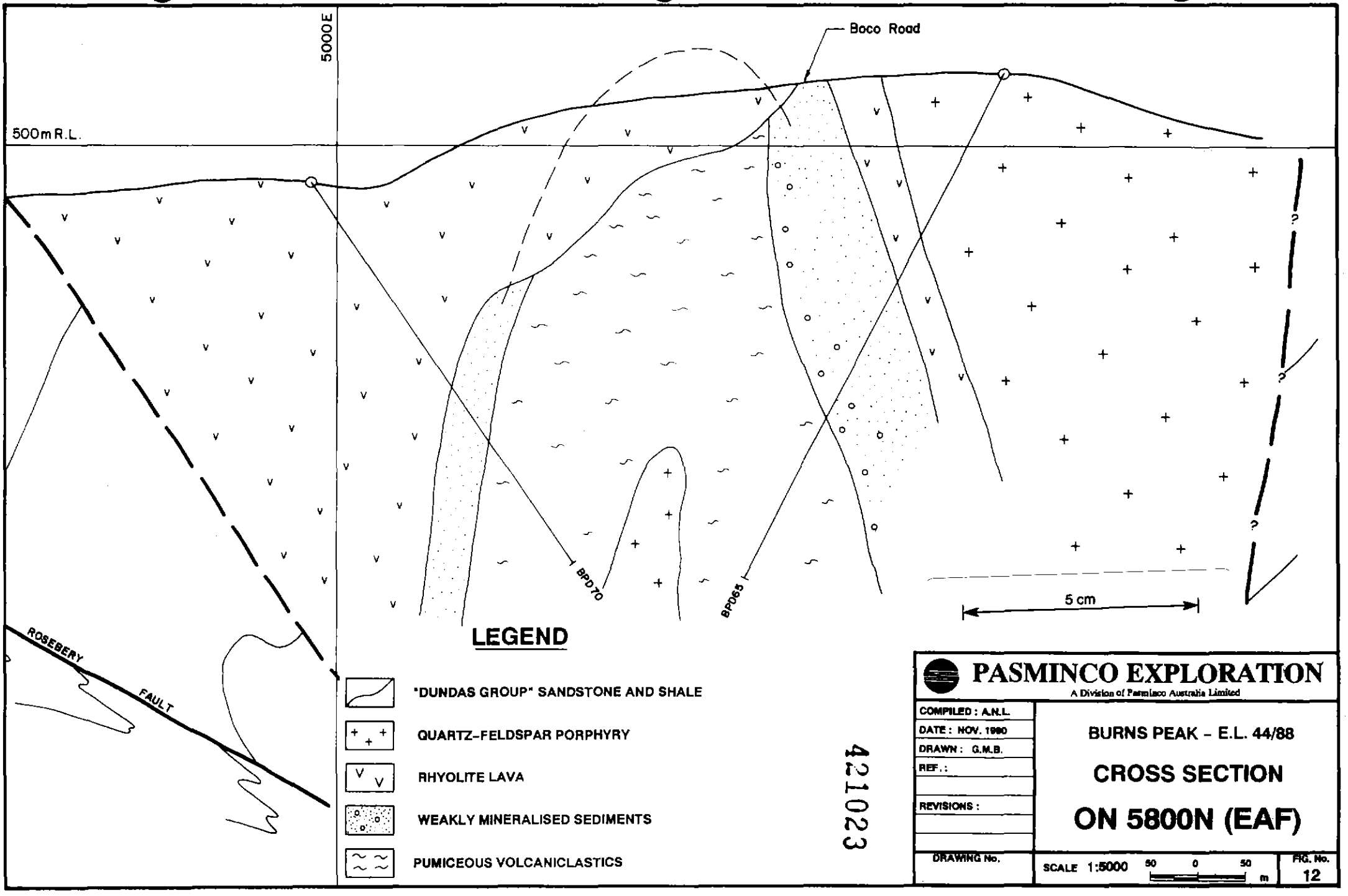

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	FIG. No. 12

Detailed work in the Brown's Tunnel Area

The work of Mathison (Appendix 18) and Elliot (Appendix 17) has increased the understanding of the mineralised Brown's Tunnel Area.

Detailed core logging, mapping and interpretation completed last year led to the following observations about the mineralisation:

The massive ore intersected in EAF 9, EAF 4 and EAF 10 is deformed and so are the rocks immediately adjacent to it.

There is a spatial relationship between ore and:-

1.Shear zones.

2.Pumiceous volcaniclastic units with intense sericite alteration.

3.An altered, vesicular andesite with peperite textures.

4.Cherty, siliceous shales.

The work of Elliot and Mathison has led to the following, additional, observations:

Cleavage and schistosity are not penetrative over the area, they are related to individual faults.

Faulting appears to have occurred primarily in sedimentary units.

A N.E.trending thrust occurs at the junction of Boco Road and Brown's Tunnel track. The thrust is thought to have steepened, the original movement on it having been east over west. At this stage it cannot be traced south.

The six outcrop and drill hole intersections of ore at Brown's Tunnel could not form a single continuous lens of sulphide. They may be disrupted by folding or faulting or may not have been a single lens to start with.

CSAMT Evaluation

Re-evaluation of CSAMT data in the Browns Tunnel area failed to indicate drilling targets beneath the rhyolite lavas north of Boco Road.(See Appendix 5.)

4.2.2 (cont)

Conclusions, Geological Interpretation

LITHOLOGIES

The current geological interpretation is shown in FIG.7 (plan) and FIG 5 & 10–12 (sections). Although the thickness and character of the rock types shown varies throughout the Brown's Tunnel – Leo's Find area, in gross terms, the stratigraphy is predictable.

The stratigraphic column is as follows:

Top	Rhyolite Lava (with some intrusive phases)
	Brown's Tunnel Sediments
	– siltstone
	– siliceous shale
	– vesicular andesite
	– minor sandstone & conglomerate
	Bedded volcaniclastic sediments
	pumiceous, massive volcaniclastics
Bottom	Rhyolite lava & quartz feldspar porphyry

The nature of the various units in the stratigraphy is described below:

QUARTZ FELDSPAR PORPHYRY

This rock is massive, with large quartz and feldspar phenocrysts in a fine – grained matrix. The margins of the porphyry often exhibit strong sericite and pink haematite alteration. The alteration generally extends 5–10m into adjacent rocks.

Fine –grained rhyolite (quartz and feldsper phyric) commonly surrounds the porphyry. Quartz veining is common within the porphyry, it is usually devoid of sulphides or precious metals, though chalcopyrite has occurred in places.

RHYOLITE LAVA

This rock is feldspar–phyric throughout and quartz phyric in patches. It occurs from the base to the top of the stratigraphy. It contains large zones of brecciation consistent with rapid chilling, probably the result of extrusion onto the sea floor.

Near the base of the lava, peperite textures are common and bands or rafts of sediments occur within the lavas. Flow banding is also a common feature. In places the lava appears to have cross cut some of the sediments.

This is evident in outcrop near the Leo's Find turn off on Boco Road.

Although the rock is described as a lava, it probably also occurs as a sill-like, shallow intrusive in places. It's common association with the quartz-feldspar porphyry and its similar chemical composition suggests that the two rocks may be part of the same magna, extruded and intruded at different places in the stratigraphy.

Alteration of the rhyolite consists of patches of silicification (quite often pink) and green patches of chlorite and sometimes, sericite alteration.

Patches of intense silicification may contain spots of sphalerite and are anomalous in gold (>0.1 g/t). This type of alteration occurs in rhyolite above the Brown's Tunnel sediments in BPD 69, it also occurs in the outcropping North Pinnacles rhyolite.

BROWNS TUNNEL SEDIMENTS

The thickness and composition of this group of rocks varies considerably, however they can be distinguished as a separate entity within the stratigraphy. Though their nature may change, their relationship to other units is consistent.

The rock type which is most commonly mineralised is a grey, siliceous siltstone or shale. It may contain bands of pyrite parallel to bedding.

Sphalerite and galena are commonly present, either as massive mineralisation or as stringers.

The pumiceous volcaniclastics may also be mineralised, this appears to be mostly in places where they are sheared (Thomas' Tunnel). These rocks are relatively fine-grained and often show intense sericite alteration. Siliceous nodules also occur within them. The origin of these is uncertain.

The other sediments in the sequence consist of sandstones through to conglomerates. The clasts are predominantly rhyolite and other sediments. Facings from grading and sometimes scours can be obtained from these sediments.

A fine grained, vesicular andesite unit also occurs in places in this sequence. It has very little lateral extent either down dip or along strike. It contains sediment clasts near its boundaries and at Brown's Tunnel it is strongly chloritised and mineralised with pyrite and chalcopyrite.

BEDDED VOLCANICLASTIC SEDIMENTS

These rocks occur on either side of the Browns Tunnel sediments, but are most commonly stratigraphically below them. They consist of well sorted rounded – sub angular clasts of rhyolite, dacite, sediments and sometimes pumice. Bedding is usually apparent and facings can often be obtained.

Alteration of these units varies according to clast size and type.

PUMICEOUS VOLCANICLASTICS

This unit varies in grain size though the composition is relatively consistent. Sericitised and chloritised wispy fragments, interpreted as pumice and acid volcanic clasts occur in a fine matrix.

No bedding is visible in this unit, which tends to be massive and relatively featureless. Patches of silicification occur in places, these cross-cut cleavage and some contain sphalerite, galena and pyrite.

STRUCTURE

The major structures present in the area are illustrated in FIG.7 and FIG 5. A thrust fault must exist between the Rosebery Fault and the Brown's Tunnel rocks on section 5000N. Such a structure explains the sudden change in rock type between drill holes on this section.

This structure has been inferred from the aeromagnetics interpretation, to continue northwards along the western boundary of the rhyolite. A similar structure has been interpretated on the eastern boundary of the rhyolite. It continues S W around the eastern margin of the porphyry. There is some field evidence for this structure in veining and shearing on the porphyry boundary and further south west where the thrust enters sediments.

Three large scale folds are also present:

1.A syncline has been identified in the Brown's Tunnel sediments or section 5000N.

2. The Pinnacles Anticline passes through the middle of the rhyolite. There is evidence for this structure in facings and dips on the surface and in drill holes.

3.A syncline to the west of the rhyolite, in Dundas group sediments. It appears to have been truncated against the easternmost thrust.

Numerous small-scale structures have been recognised in the Brown's Tunnel area, however it is not clear how much displacement has occurred on them. Because correlation between units is possible on a large scale in this area it has been assumed that displacement is not large.

MINERALISATION

Existing lead zinc mineralisation appears to be of four types:

Massive sulphides, which occur within the Brown's Tunnel sediments only.

Sulphides in veins and shears within the Brown's Tunnel sediments.

Sulphides in patches of silicification within the rhyolite and within the pumiceous volcaniclastics.

Sulphides in post cleavage quartz and carbonate veins throughout the sequence but most commonly, beneath the Brown's Tunnel sediments.

Because of the location of existing mineralisation, the best potential for tonnage appears to be within the Brown's Tunnel sediments.

The relationship between shearing and mineralisation is unclear. The best mineralisation is found within zones of intense shearing and deformation, though it is also confined to a particular stratigraphy. This situation is unlikely to be co-incidence.

There are two possible explanations:

1.Devonian deformation was most intense in areas of strongest alteration and these were the areas of mineralisation.

2.Devonian structures are reflecting structures that were present at the time of mineralisation and were perhaps a factor in localising mineralisation. The Devonian movements may have re-activated Cambrian structures.

Mineralisation within patches of silicification appears to be pre-cleavage, though this is a difficult thing to ascertain in hand specimen. If this is so in the rhyolites above the Brown's Tunnel sediments it may represent a continuation of some of the mineralisation fluids, through the sediments, possibly along pathways in the lava breccias, into the rhyolite.

In the pumiceous volcaniclastics this type of mineralisation may be interpreted as footwall-type alteration.

Vein mineralisation is generally post cleavage, though pre-cleavage veins are present ie. top of BPD 62. Post cleavage mineralisation is most abundant in the volcaniclastics below the Brown's Tunnel sediments. They may be a purely Devonian feature or they may reflect pre-existing mineralisation that has been re-mobilised.

4.3 Shale Basin

4.3.1 WORK COMPLETED

Mapping by Geopeko at 1:5 000 scale, along the costeans and roads. This mapping is part of FIG.6 & 7.

Rock chip samples were taken in the course of mapping. These were designed to test zinc anomalies reported by Comstaff. The location and assay results for these samples are in Appendix 1.

4.3.2 RESULTS OF EXPLORATION, DISCUSSION AND CONCLUSION

Geopeko mapping confirmed the mine's department 1:25 000 mapping, which shows the Shale Basin as a sequence of interbedded shales, sandstones and quartz-feldspar crystal sediments, folded into a synclinal structure.

Rock chip sampling failed to confirm zinc anomalies of the magnitude recorded by Comstaff (1984). It is not certain that the rock samples in this programme were the same as those sampled by Comstaff, however mapping did not locate significant alteration and the prospect has been down graded.

4.4 Boco Road

4.4.1 WORK COMPLETED

Wacker sampling in the area east of Leo's Find.

It was thought that folded repetitions of the Brown's Tunnel stratigraphy may by found in this area. A programme of wacker sampling was undertaken to try and locate such repetitions below fluvo-glacial sediments. Where these sediments are thick and where large boulders were encountered, a small diamond drill was used to get a sample of bedrock. Relocation of these holes is shown in FIG.6.

Rock Chip Sampling

Rock chip samples were taken along all the tracks in the Boco Road area. The aim of this was to identify a geochemical halo which may be peripheral to a massive sulphide ore body. In particular, the type of gold and silver anomalies surrounding the Rosebery ore body were sought. The location of these samples is shown in FIG.15. The assay results are in Appendix 1.

Honours Mapping

A student from the University of Tasmania undertook a project on the area. Mapping and geochemical studies were designed to test the theory that repetitions of the Brown's Tunnel rocks were to be found in the Boco Road area. Some of his mapping has been added to FIG.6.

4.4.2 RESULTS OF EXPLORATION, DISCUSSION AND CONCLUSIONS

The wacker sampling and diamond drilling programme was successful in obtaining bedrock samples. These samples were identified as siltstones and quartz-feldspar crystal sandstones, characteristic of the Dundas group. No significant alteration or mineralisation was identified in any of these samples.

The rock chip sampling identified areas anomalous in gold (0.2 - 1.3 g/t), silver (2 -10.5 g/t) and zinc (>1 000 ppm). These areas, however, are adjacent to a quartz-feldspar porphyry and an interpreted thrust fault. It is possible that one of these is what causes the anomalies, rather that proximaty to a massive sulphide.

Because some of the mineralisation is present in post cleavage quartz veins, the latter explanation is probably the most likely.

Mapping in the area has failed to establish any correlation between the Brown's Tunnel sediments and the sediments at Boco Road. The latter are more characteristic of the Dundas group sediments which are thought to be younger than the Brown's Tunnel rocks.

Geological interpretation of this area is difficult because the east-dipping Dundas group sediments appear to come to an abrupt halt against the Leo's Find quartz-feldspar porphyry. This observation is consistent with a major structure being present along the eastern side of the porphyry. The rocks in this area are deformed and silicified.

It is concluded that a high angle structure is present here and that the porphyry is uplifted relative to the Dundas Group Sediments. The location of this structure is shown in FIG.5, 7 & 12.

That the sulphur isotope signature is probably similar to the Cambrian VMS signature for deposits in the Mt Read volcanics. This work is preliminary, but the signature is definitely quite different from the Chester signature. This is significant, because in many other respects the Chester and Hollway alteration zones are similar. Both are rich in pyrite but low to depleted in all base and precious metals. Both occur predominantly in lavas (though at Chester there are significant exceptions) and both are associated with quartz-sericite alteration.

The geology at Hollway is still unresolved. The interfingering nature at the andesite and the acid lavas definitely occurs, but is difficult to explain. Hitherto unidentified epiclastic units are present but their extent is unknown. The completion of Ben Coutts honours work will contribute more to the understanding of the area. Other work will also be required here as part of the evaluation of gravity and magnetic anomalies. A number of these anomalies (shown in FIG.4) occur in or adjacent to the Hollway area. Work proposals will be discussed in section 5.

4.5 Hollway Area

4.6.1 WORK COMPLETED

Re-assay of BHP bedrock (wacker) samples for gold. The location and results are in Appendix 13.

Geological mapping and interpretation by Ben Coutts, an honours student at the University of Tasmania.

4.5.2 RESULTS, DISCUSSION & CONCLUSION

An extensive pyrite/sericite/quartz alteration zone in the Hollway area, had been sampled, beneath soil and glacial cover, during a BHP bedrock (wacker) drilling programme. These samples had not been assayed for gold.

It was thought that gold may work as a pathfinder to base metals in the alteration zone or that gold itself may be present in quantities large enough to make the area a gold prospect.

The results of the assays were disappointing. Only on sample was weakly anomalous with respect to gold (.101 g/t) and the rest were outstanding for their lack of gold, the zone may actually be depleted in gold relative to the surrounding rocks.

The work by Ben Coutts was in progress at the time of writing. His mapping and interpretation have been added to FIG.6, 7, 8 & 9. He has identified probable folds in the area and a N W - S E striking structure that appears to truncate the alteration zone.

The southerly extension of the N E - S W structure which bounds the Leo's Find porphyry has also been located in the N W of the area.

Other results of his work indicate the following:

That a mafic unit underlies the acid lavas S E of the Hollway andesite. This is indicated by mafic fragments in what appear to be explosion breccias in the acid rocks.

4.6 Chester

4.6.1 WORK COMPLETED

Geological Mapping

Outcrop and interpretation maps for the area were produced at 1:5000 scale. The Chester open cut mine was mapped in more detail, at 1:1000 scale. (FIG.8 & 24)

Rock Chip Sampling

These samples were taken at nearly all mapping locations and at regular intervals along most of the roads and tracks. All were slabbed, to enable better identification of rock types. They were assayed for Au, Cu, Pb, Zn, Ag, V, K, Ba, Ti, Mg, Ca, Mn & Fe. A relatively cheap I.P. technique was used to assay for the group of elements V to Fe. This was designed as a first pass method of perhaps distinguishing different rock types which alteration and weathering may have rendered unidentifiable. It was also thought that some trends in alteration may be highlighted. Rock chip locations are shown in FIG.16. Rock chip Assays are in appendix 1.

Diamond Drilling

Two diamond drill holes were targeted directly beneath the main part of the Chester alteration zone. A total of 937m was drilled in the area. The core was logged, split and sampled.

Geochemistry

Samples were taken at regular intervals down both drill holes. There were assayed for:

ELEMENT	METHOD	LABORATORY
Au	Fire Assay 1	Classic Laboratories
Cu, Pb, Zn, Mn	AAS 1	
Fe	AAS 1c	
Ti, Zr, Ba	XRF 1	
K, Ca, Mg, Na, Ag	AAS3/AAS4	

The samples were used to calculate an alteration index, (K+Mg/K+Mg+Ca+Na),K/Na and Ti/Zr ratios. These, and zinc, copper lead, iron and manganese values were plotted down the holes.

The Ti/Zr ratios were used to try and determine primary rock-type differences in very altered rocks. The other ratios were used to determine areas of greatest alteration. Base metals, iron and manganese were plotted to try and establish whether or not metal zoning occurs within or marginal to the alteration zone.

The graphical plots and raw data for each drill hole are in appendix 12.

This recent work was compared with some whole rock analysis on earlier Comstaff holes.

The graphical plots of these are also in Appendix 12.

Petrology

A total of 28 samples were taken from outcrops and from drill core for petrological examination by J Stolz (University of Tasmania), The petrological descriptions are in Appendix 3. The location of the samples is also shown there and on FIG.16

Geological Interpretation

The results of mapping, diamond drilling and geochemical analyses were combined to produce a geological interpretation.

4.6.2 CHESTER RESULTS, DISCUSSIONS AND CONCLUSIONS

Drill Hole Results

BPD 67 FIG.17

Target – To test the area directly below Chester Mine for base metal mineralisation.

Result – 4 zones of quartz–sericite–pyrite alteration were intersected, however these contain no base metals. Where anomalous zinc (>1 000ppm) occurs it is on the outer margins of these zones. The highest iron assays co–inside with or are on the margin of, the areas logged as most altered. These areas are also marked by high K/Na ratios.

The hole intersected predominately dacite lavas, with possibly some intercalated clastic units. These are difficult to define because of the alteration.

Best intersections:

Depth	Assays	Rock type
29–30	>3% Fe	Dacite lava
89–94.5	>3% Fe	Intensely altered & deformed sediments
181–183	1760ppm Zn, >3% Fe	Dacite lava
325–326	1560ppm Zn	Dacite lava
335–336	1820ppm Zn	Dacite lava
252–305	>3% Fe (ave.of samples @ 5m intervals)	Intensely–mod. altered & Deformed lava
370–371	1500ppm Zn	Dacite lava
380–381	>3% Fe	?Lithic sandstone
425–426	1500ppm Zn	Intensely–mod–alt. dacite lava
430–432	1220ppm Zn	Intensely–mod–alt. dacite lava
436–450	>3% Fe (ave.over samples @ 5m & 10m intervals)	Intensely altered & deformed ?sediment

BPD 68 FIG.18

Target – To test for base metal mineralisation beneath the S W Chester mine workings and the old Comstaff hole, CP3.

Results – The holes intersected predominantly altered dacite lavas, though pyritic cherty sediments occur in the top 3m of the hole.

The lavas are intensely altered to the bottom of the hole, though some areas are more altered than others. Where the primary rock types are no longer recognisable, the lithology has been called quartz–sericite schist.

More than 3% iron (most of it representing pyrite) occurs through most of the hole. Some patches are anomalous with respect to zinc (>1 000ppm). Some is in veins and some is in spots adjacent to pyrite mineralisation.

The relationship between alteration and pyrite mineralisation is more ambiguous than in BPD 67. Although the best pyrite mineralisation occurs in very altered rocks, some other areas of intense alteration (particularly silicification) are not as mineralised as less altered intervals.

Best Intersections_

Depth	Assays	Rock Type
0.240m	>3% Fe ave. on samples @ 5m intervals.	Altered sediments (top of hole) & dacite lavas
62–63	2100ppm Zn	Altered dacite lavas
93.5–94.5	2500ppm Zn	Altered dacite lavas
96.0–97.0	1150ppm Zn	Altered dacite lavas
115–116	1620ppm Zn	Altered dacite lavas
129–131	1500ppm Zn	Altered dacite lavas
150–151	1700ppm Zn	Altered dacite lavas
185–186	1700ppm Zn	Altered dacite lavas
190–191	4300ppm Zn	Altered dacite lavas
259–260	>3% Fe	Altered dacite lavas
279–280	>3% Fe	Altered dacite lavas
304–310	>3% Fe ave. on samples @ 5m intervals	Altered dacite lavas
339–470	>3% Fe ave. on samples @ 5&10m intervals	Altered dacite lavas
360–361	2550ppm Zn	Altered dacite lavas
370–371	1040ppm Zn	Altered dacite lavas
380–381	3200ppm Zn	Altered dacite lavas
385–386	2950ppm Zn	Altered dacite lavas

4.7.2 CHESTER – RESULTS, DISCUSSIONS AND CONCLUSIONS (cont.)

Geological Interpretation

LITHOLOGIES

The lithologies in the Chester area can be divided into 4 main classes. It should be noted that the rocks in this area are mostly impossible to identify in hand specimen and that much use has been made of geochemistry and petrology to identify and map out the lithological boundaries.

Ti versus V plots proved very useful in differentiating surface samples. It was found that most rocks from the area sampled fell into two main categories on the Ti–V graph.(FIG.23). These rock types were identified by petrological examination as being predominantly andesite – dacite lavas (called dacite from here on) or dacite–rhyolites (called rhyolites). Many of the rocks that fall in the rhyolite group are breccias and some are polymictic epiclastics, containing clasts of dacite. The presence of dacite clasts is reflected in the Ti, V values of some samples.

Ti/Zr ratios proved useful in characterising the dacite lavas in BPD 67 & 68. The ratio is very consistent for these rocks (see Appendix 12) and epiclastic units and mafic dykes can be identified where the ratio changes.

RHYOLITES

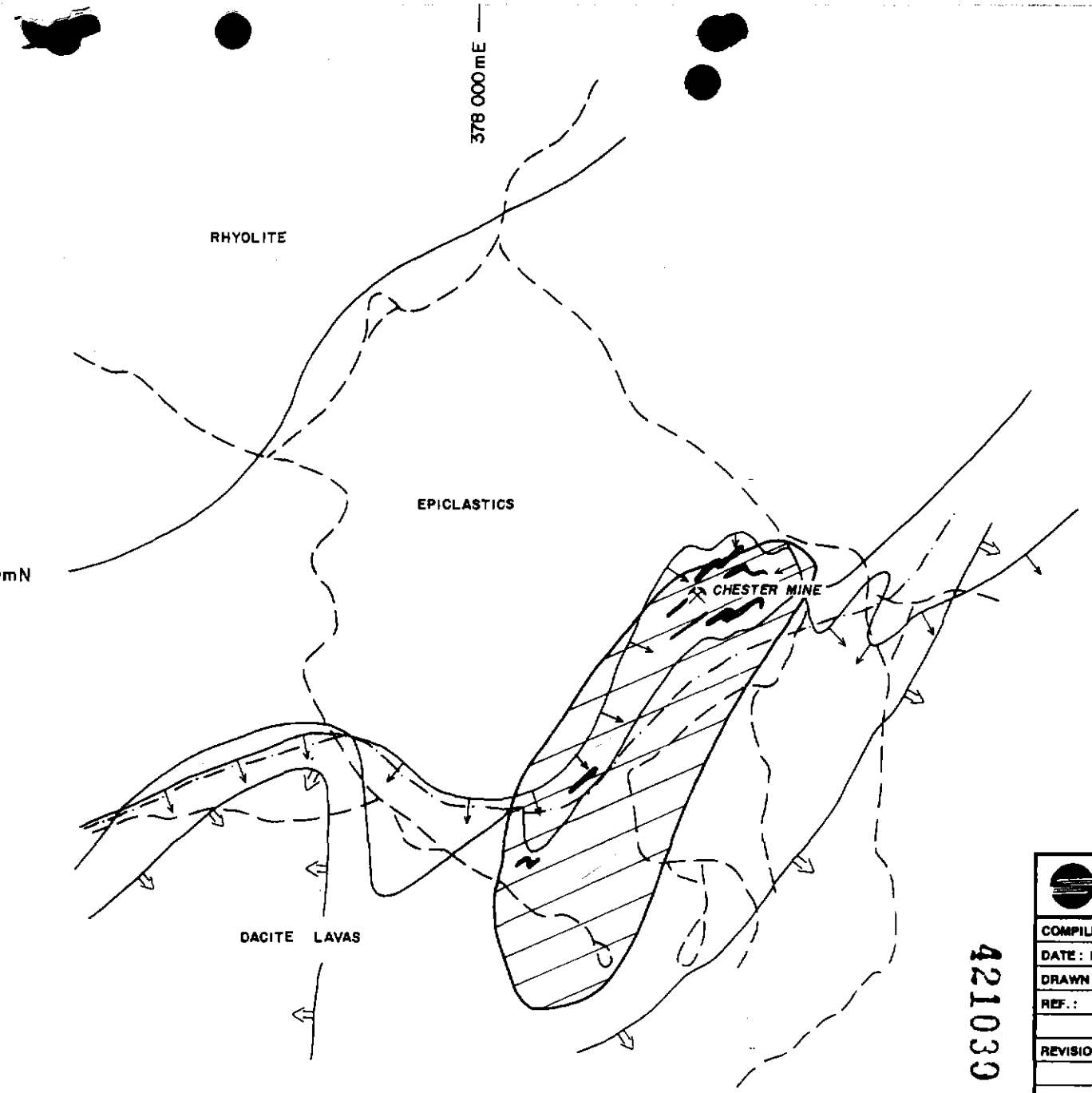
These are rocks with a fine–grained, siliceous matrix. They are feldspar and quartz phyric, with small phenocrysts, generally less than 1mm across.

They may be brecciated and are in places flow–banded. In other areas they are massive and have a consistent porphyritic texture, which may originate from shallow intrusive emplacement.

DACITE – RHYOLITE EPICLASTIC BRECCIAS

These rocks are coarse grained and fragments are angular to sub angular. Large flow–banded rhyolite clasts are found in places. It is often difficult to distinguish these rocks from the rhyolite lavas and they may interfinger in all directions.

This lithology was identified as an epiclastic by petrological work, which recognised different clast types in samples.



5 cm

LEGEND

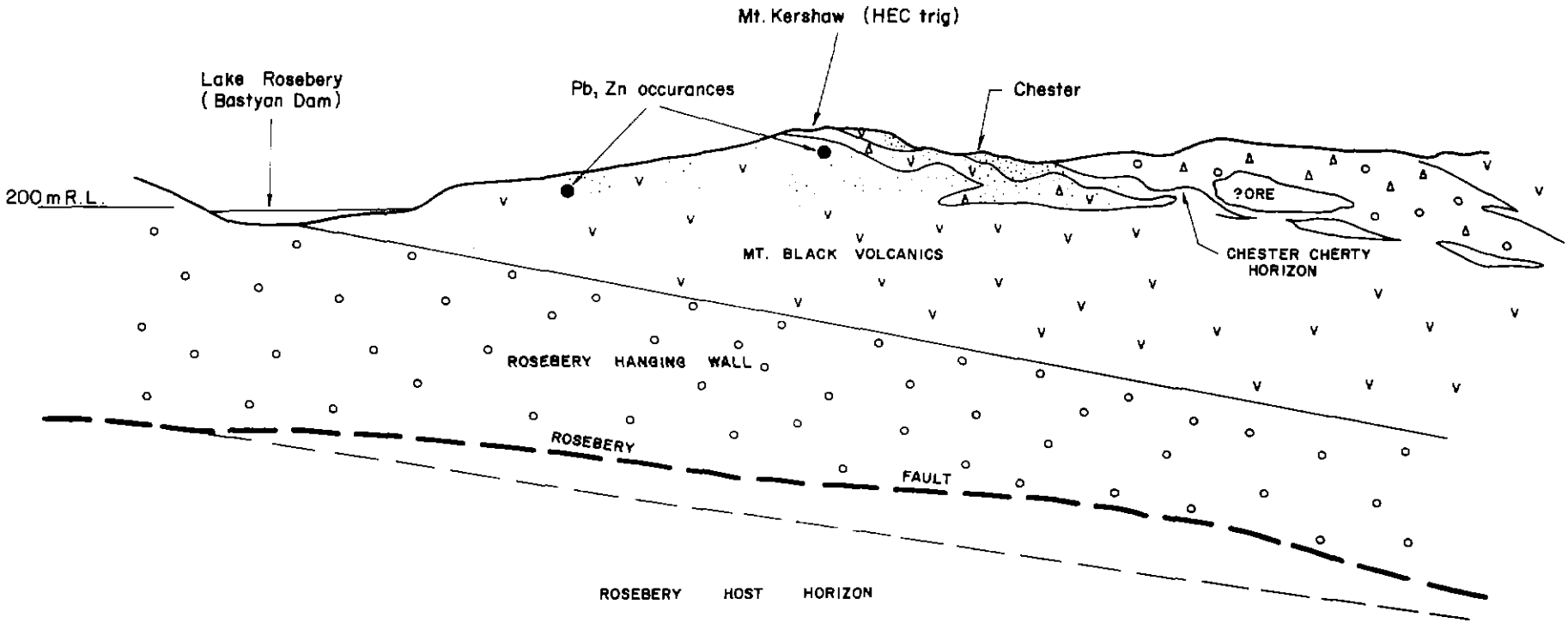
- MASSIVE PYRITE
- MAIN ALTERATION ZONE
- LITHOLOGICAL BOUNDARY
- TI/V FIELD BOUNDARY
- ROCK CHIP SAMPLES
  - > 2% IRON ON ARROW SIDE
  - >100ppm Zn ON ARROW SIDE
- ROAD

90-3203

421039

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	BURNS PEAK – E.L. 44/88
DATE : NOV. 1990	CHESTER AREA
DRAWN : G.M.B.	MINERALISATION AND
REF. :	ALTERATION SUMMARY
REVISIONS :	
DRAWING No.	SCALE 1:10,000 100 0 100 m
	Fig. No. 19



LEGEND

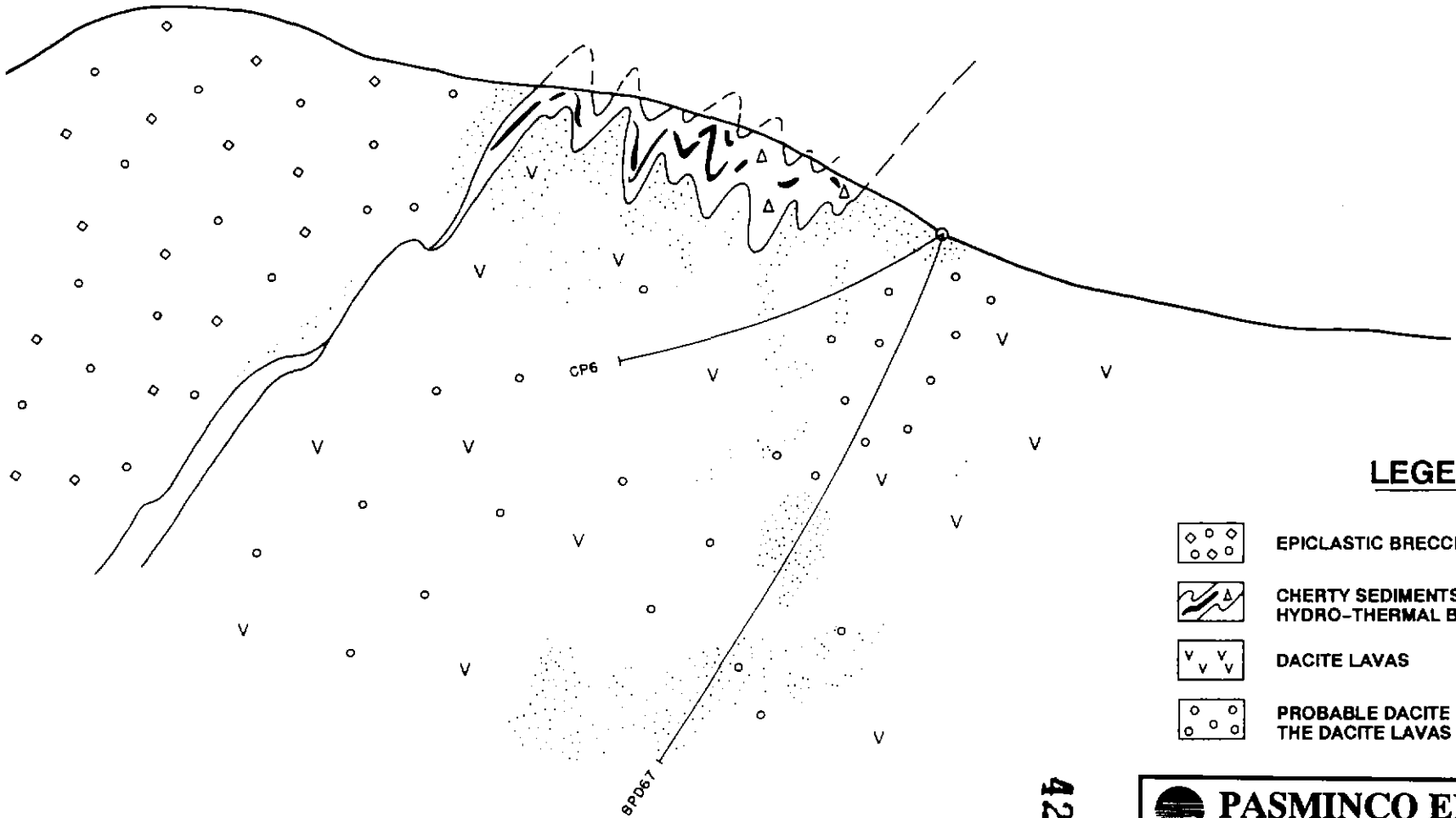
- LAVA AND SEDIMENTARY BRECCIAS
- LAVAS
- EPICLASTICS
- PYRITIC ALTERATION

421010

5 cm

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	BURNS PEAK – E.L. 44/88
DATE : NOV. 1990	LONGITUDINAL PROJECTION THROUGH
DRAWN : G.M.B.	**BASTYAN DAM AND CHESTER MINE AREA**
REF. :	
REVISIONS :	
DRAWING No.	SCALE 1:25,000 250 0 250 m
	FIG. No. 20



LEGEND

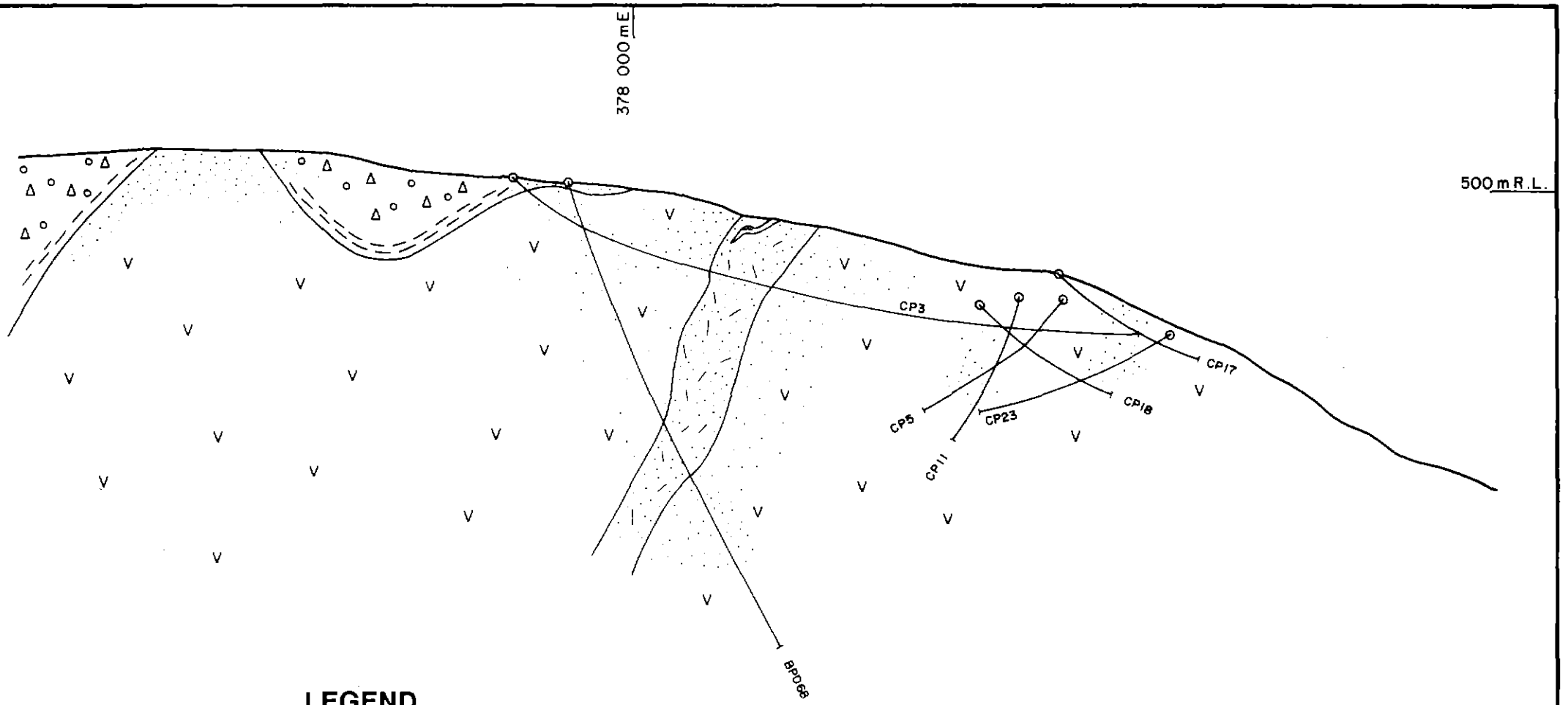
- EPICLASTIC BRECCIAS
- CHERTY SEDIMENTS WITH MASSIVE PYRITE & HYDRO-THERMAL BRECCIAS
- DACITE LAVAS
- PROBABLE DACITE EPICLASTICS WITHIN THE DACITE LAVAS

421041

5 cm

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	BURNS PEAK – E.L. 44/88
DATE : NOV. 1990	INTERPRETED GEOLOGY
DRAWN : G.M.B.	THROUGH BPD67
REF. :	
REVISIONS :	
DRAWING No.	SCALE 1:5000 (50 0 50 m)
	FIG. No. 21



LEGEND

- VERY INTENSE ALTERATION & PYRITE MINERALISATION
- DISSEMINATED PYRITE MINERALISATION
- EPICLASTICS
- CHERTY SEDIMENTS
- DACITE LAVAS

421043

5 cm

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	BURNS PEAK – E.L. 44/88
DATE : NOV. 1990	INTERPRETED GEOLOGY
DRAWN : G.M.B.	THROUGH BPD68
REF. :	
REVISIONS :	
DRAWING No.	SCALE 1:5000 (50 0 50 m)
	FIG. No. 22

CHERTY SEDIMENTS AND BRECCIAS AND SILTSTONES

These rocks are at their best at the Chester mine, but they also occur in the top of BPD 68. They are highly siliceous and grey, reflecting a high pyrite content. Bedding is often visible within them.

In the pyrite mine, sediments such as these are found folded and deformed and are often suspended in massive pyrite, forming pyrite–cherty sediment breccias.

On the edge of the mine and near the S W Chester workings, these sediments occur in close proximity to fine, bedded siltstones, which are still relatively siliceous. The relationship between these two groups of sediments in the field in unclear.

DACITE

These rocks were intersected by all the Comstaff holes in BPD 67 & 68.

In BPD 67, they were found to be intercalated with coarse sediments. The lavas are very altered and difficult to recognise in the Chester area. In the past they have been called everything from agglomerates to crystal tuffs.

They often have a brecciated appearance and since the alteration has overprinted this, it is probably a primary feature. Amygdaloidal zones are also common throughout these rocks.

In BPD 67, Ti/Zr ratios highlighted some of the zones of sediments, although in places the values did not differ from the lavas. The presence of sediments within this hole was confirmed by petrological work in which different clasts types were recognised.

Such zones of sediments were not identified in BPD 68 or in any of the Comstaff holes.

MAFIC DYKES

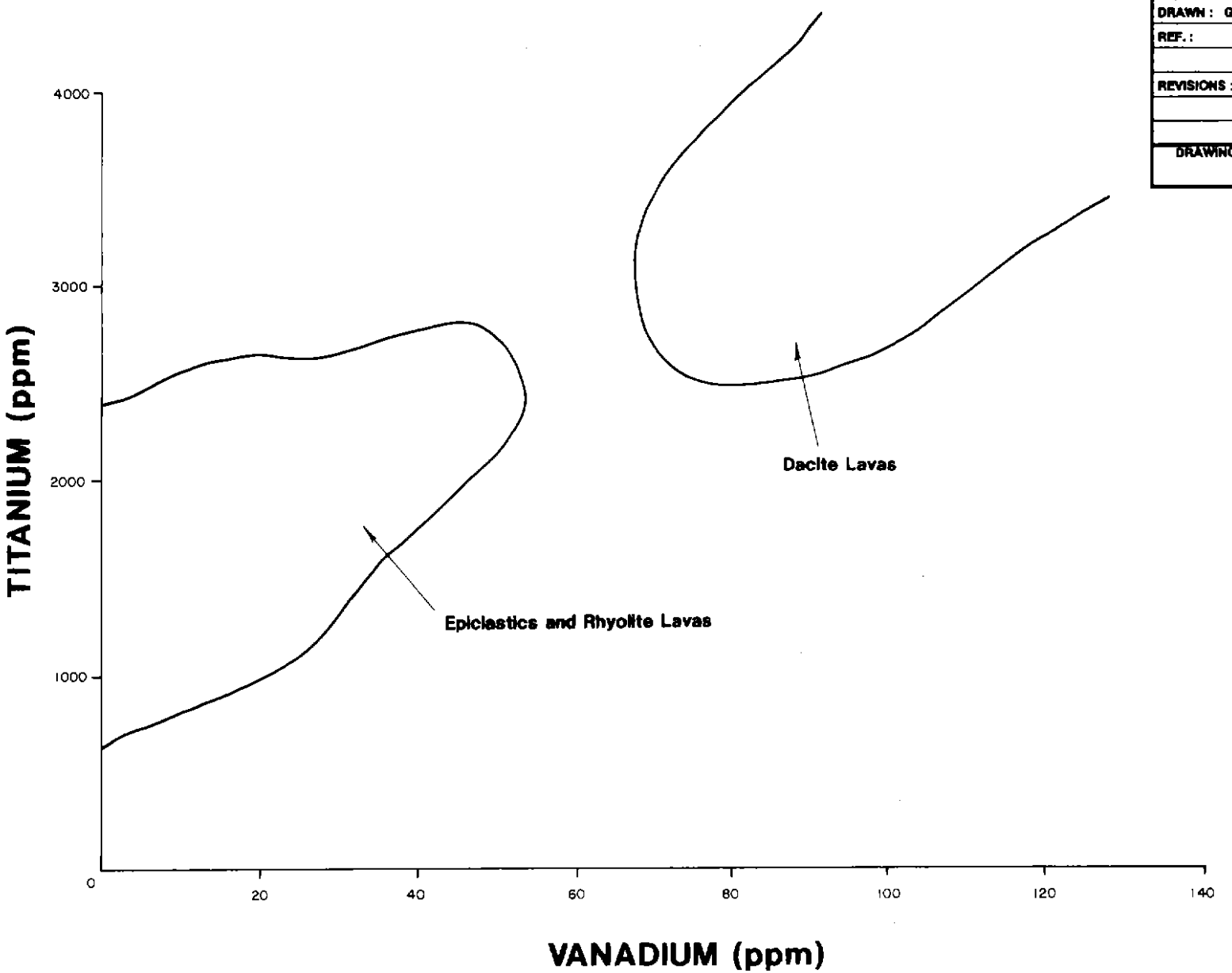
Dark green, fine grained, vesicular mafic dykes cross–cut all the other rock types.

STRUCTURE

Most of the information on the structure of the area has been gained indirectly (from plotting bedding readings and from aeromag. and gravity interpretation) rather than from direct observation.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	BURNS PEAK - E.L. 44/88
DATE : NOV. 1990	**Ti – V FIELDS**
DRAWN : G.M.B.	
REF. :	CHESTER ROCK CHIP SAMPLES
REVISIONS :	
DRAWING No.	SCALE
	FIG. No. 23



421044

Around and particularly, within the Chester mine, it is possible to measure dip and strike of bedding. However, because of the lack of continuity of units, this information does not make much sense when plotted straight onto the map. It is more beneficial to make a stereoplot of the data and gain an overview, or averaged view of the structure.

FIG.24 is a stereoplot of poles to bedding. 52 strike and dip measurements from the Chester mine and surrounds were plotted. The plot suggests that bedding is folded on an axis plunging 10^0 to 030^0 true. There is also a shallow, N-W dipping component.

Mapping in the mine has not resolved whether the main N-E trending axis is synclinal or anticlinal, however the rock type boundary between the dacite lavas and the Epiclastics suggest that the Chester mine sits on the western limb of a large scale fold, which has its closure E N E of the mine. This is also consistent with the observed N-W dipping component in the bedding.

It should be noted that within the mine and its surrounds, the rocks are strongly deformed. BPD 68 intersected strongly cleaved rocks beneath the S W Chester workings and a strong N E trending, E-dipping cleavage is found in outcrop around the mine. This appears to be overprinted by a more northerly trending cleavage in places.

Geophysical interpretations have suggested that a NE-SW striking structure truncates the Chester alteration zone, north of the Chester mine. So far no field evidence has been found for this structure, mainly because most of the area is covered with glacial debris.

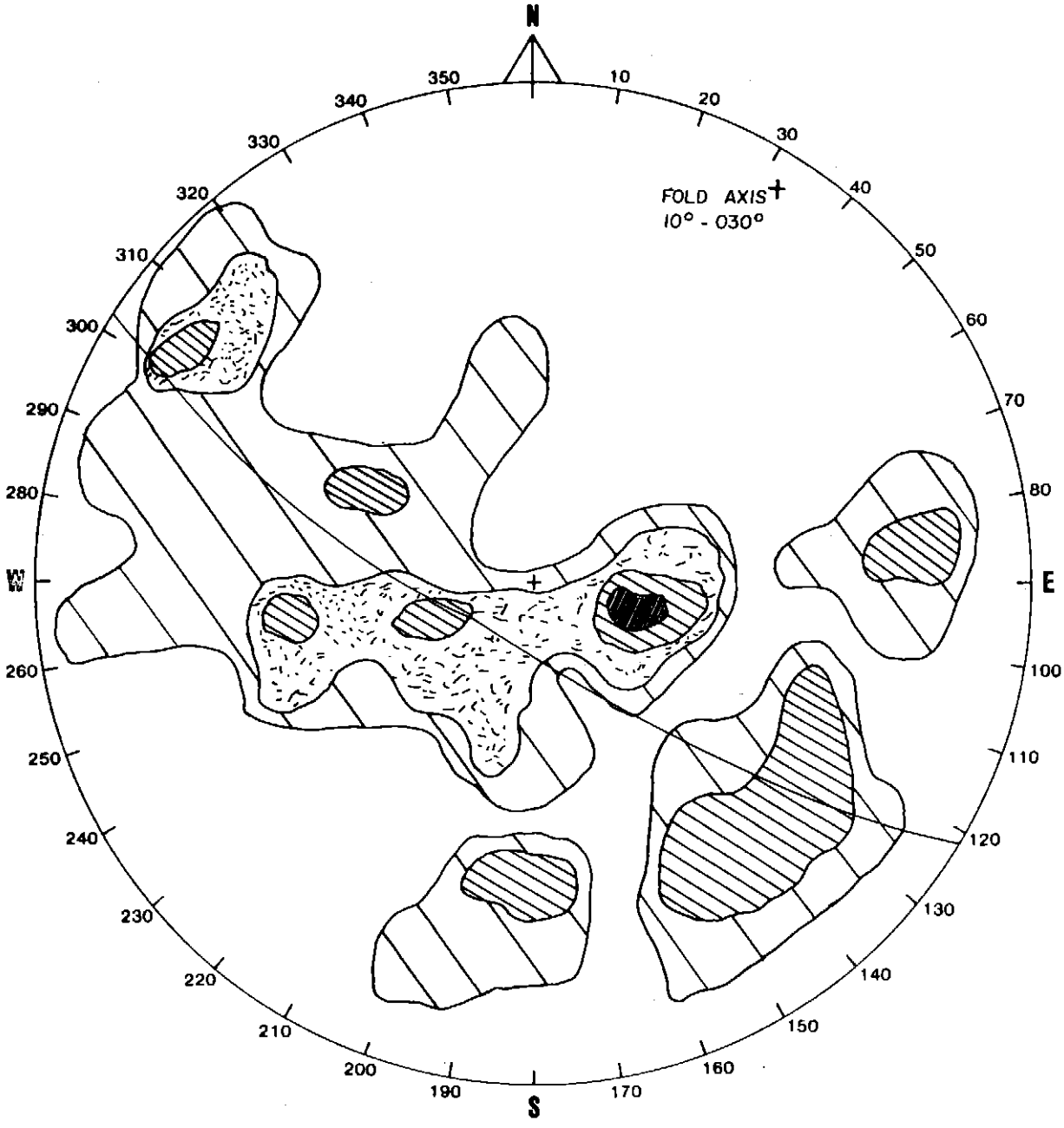
The Rosebery fault has been mapped West of the Chester area. It is thought to have a dip of approx. 40^0 in this area.

ALTERATION AND MINERALISATION

From geochemical analysis of core and rock chip samples, mapping (particularly in the mine area) and drill core logging, the following observations about alteration and mineralisation in the Chester area have been made:

1. In the Chester mine area, bedded, folded, cherty sediments are intersected with massive pyrite.
2. Cherty sediments are suspended in massive pyrite within the mine.

421046



NOTE : Equal area, projected to lower hemisphere

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	BURNS PEAK – E.L. 44/88
DATE : NOV. 1990	CHESTER MINE
DRAWN : G.M.B.	AND SURROUNDING AREA
REF. :	POLES TO BEDDING
REVISIONS :	
DRAWING No.	SCALE
	FIG. No. 24

3. A probable hydrothermal breccias occurs in the NE corner of the mine. It has a pyrite matrix and sub-rounded to sub-angular clasts of sediments, lavas and chert.
4. Pyrite content in rock chip samples decreases suddenly along (approx.) the dacite lava/epiclastic boundary, so does zinc content.
5. Petrological examinations for Comstaff and by J Stolz (for Pasminco) of the pyrite mineralisation surrounding Chester mine suggest that this mineralisation is pre-cleavage.
6. The pyrite alteration zone at Chester consists of the Chester mine and S W Chester workings. It strikes NE-SW and extends south from the dacite lava/epiclastic boundary. Away from the old workings the nature of the pyrite is disseminated and cubic. It is associated with sericite/quartz alteration.
7. Within the old workings and where the main part of the alteration zone has been drilled, it is depleted in gold, silver, copper, zinc and lead. Also sodium relative to potassium.
8. In BPD 67, the back ground zinc, copper and barium (measured as Ba/K x 100) values increase down hole. Within the most altered parts of this hole, there is not base metal mineralisation, however on the margins of the alteration lead, zinc and copper values are enhanced. The best alteration in this hole is marked by high K/Na ratios, and by pyrite mineralisation.
9. In BPD 68, the pyrite mineralisation and alteration is much more intense than in BPD 67. Background values for Fe content in BPD 68 are anomalous in BPD 67. Zinc enhancement occurs chiefly on the margins of the most altered zones in BPD 68, anomalous Cu (>30ppm) occurs also in the margins but also within the most altered zones.
The most altered part of BPD 68 (described as quartz-sericite schist in the log) is low in potassium and enriched in sodium relative to the surrounding, marginally less altered zones.
10. As well as an increase in alteration intensity and pyrite mineralisation between BPD 67 and BPD 68, there is an increase in background zinc, copper and lead values.

Graphical plots of Cu, Zn, Alteration Index, K/Na, Fe and (Ba/K) x 100 down the holes BPD 67 and 68 are in Appendix 12. It is from these that many of these observations are derived.

Barium is shown relative to potassium to try and highlight the barium which is in barite, not that which is an potassium feldspar.

The alteration index corresponds with alteration that can be observed in drill core, so does the K/Na ratio. This is perhaps better because it is not complicated by the addition of chlorite from late mafic dykes. Which cross-cut cleavage. Both these indices, however are low in the most intensy altered, K depleted and Na enhanced zones at BPD 68.

Some of the zinc and copper mineralisation occurs in veins which cross-cut cleavage, however sphalerite was also observed in core adjacent to pyrite, and probably pre-cleavage. The increase in background zinc from BPD 67 to BPD 68 and south east from the dacite lavas/epiclastics contact is very widespread and is probably a Cambrian, rather than Devonian feature.

CONCLUSIONS & INTERPRETATIONS

The petrological evidence as well as the observed intercalation of pyrite with chert in the mine suggests that the Chester mineralisation is Cambrian. The occurrence of the mineralisation on a lithological boundary strengthens this argument.

Because of the sudden cut-off in zinc and iron content across this boundary, the mineralisation is thought to be facing N-W.

If this facing is correct, the structural evidence suggests that the whole sequence at Chester is right way up and that the mineralised sequence is folded and occurs in a parasitic fold with vergence to the N E.

A change in the composition and style of the volcanics at the point in the stratigraphy where the pyrite mineralisation occurs, suggests some sort of stratigraphic control on the massive pyrite and underlying, disseminated mineralisation.

- Sampling of footwall alteration to try and determine a temperature regime by petrological observation, chlorite geothermometry and oxygen isotope analysis. Some of this work will be done by an honours student.

- Drilling of the best targets established by examination of the geophysical data and the above work.

5.0 WORK PROPOSED - 1991

5.1 General:

Work is required to establish whether structures and movements predicted by the geophysical model do exist. This will entail:

- Specific gravity measurements on core.
- Ground investigation of anomalies.
- Overlay of geochemical and previous geophysical data on the gravity/mag. information.
- Drilling of anomalies which are enhanced in prospectively by the above programme.

The geophysical data that has been compiled from past work will be plotted on 1:5 000 scale maps so that it can be overlayed on geological and geochemical maps.

The Burns Peak EL will be included in a regional photogrammetry survey being undertaken by Pasminco in the Rosebery area. This will enable updated and reliable base maps to be made. The current maps are enlarged from Lands Department 1:25 000 sheets which are outdated and incorrect in places. The survey data collected will be in digital form so that enlarged topographical maps will be readily available.

5.2 Browns Tunnel - Leo's Find-Yabby Creek

Further work in this area depends upon the outcome of the hole that is in progress, BPD 71.

However in general terms the programme will be as follows:

- If the Browns Tunnel sediments continue North, along strike, and continue to look prospective, test them by drilling on 400m centres.
- Try to intersect the sediments in the hinge of the Pinnacles anticline, if BPD 71 fails to do this.
- Use $\delta 0^{18}$ isotope data and petrology to determine the most prospective part of the sediments
- Use DHEM to look for off-hole conductors which may be due to sulphide mineralisation
- Drill the sediments where they appear to be most prospective (as determined by the above methods)

5.3 Shale Basin

No further work is proposed

5.4 Boco Road

The main area of interest here is where the gold/zinc anomaly occurs in rock chips on the S E side of Burns Peak (adjacent to the porphyry). The origin of this anomaly is uncertain. The proposed work programme is:

- Use lead sulphur isotopes and zinc numbers to establish whether the weak mineralisation has a Cambrian VMS signature.
- If the results of the above investigations are favourable a hole (approx 350m) will be drilled beneath the anomaly.

5.5 Hollway

Much of the work at Hollway overlaps with the general programme, as the main interest there is the possible alteration signatures S E and west of the Andesite. In addition to the methods already proposed to test these anomalies, the following work is required:

Mapping on the S W side of the andesite to determine the extent of the epiclastic horizons.

Mapping west of the Holloway area to tie it into the Southern Trenches – Browns Tunnel geology.

5.6 MacKintosh Bluff

This area on the eastern side of the EL consists of a pile of lavas and fragmental rocks close to the Henty Fault. It will be mapped in detail.

5.7 Chester

Some of the work here also overlaps with the general programme to prioritise gravity/magnetic anomalies.

The identification of a stratigraphic control to pyrite mineralisation at Chester opens up a target horizon to the north and south of Chester. The most prospective part of that horizon must be found. To do this the following work is proposed:

- Detailed sampling along the dacite lava/epiclastics boundary to try and determine whether base metal content is increasing to the S W (as suggested by the drilling results).

6.0 REHABILITATION

An on-going programme of rehabilitation of drill sites and tracks has been in progress throughout the year.

Tracks that are in regular use have been upgraded.

A survey of all roads, tracks, sites and costeans was undertaken during the year. Most of the earthworks had been carried out by Comstaff in the years 1963-1986. The purpose of the survey was to establish which of these areas had grown over already and which may need some form of rehabilitation. The results of the survey were plotted on two maps, these are in Appendix 15 with an accompanying report

A summary of the rehabilitation undertaken during the year in set out below:

Site	Work
BPD 62, 63 & 66 EAF 11, 13	Total rehabilitation of track & site, trees planted
BPD 65	Rehabilitation of site. Track left open.
Track from Boco Rd to Dam Rd.	Upgraded, with table drains at 10m intervals.

421053

7.0 EXPENDITURE

Total Expenditure; 30/10/89 - 30/10/90:	$489 521
Total Expenditure since issue; 6/11/88:	$1,024 080

8.0 REFERENCES

BHP (1988) Report on Relinquished Area
EL 5/63 - Report to Mines Department.

Mathison & Lorrigan (1989) Annual Report for EL 44/88, 1989
Report to Mines Department.

421055

APPENDIX 1.

ROCK CHIP SAMPLE RECORD

421056

Electrolytic Zinc Co. of A'asia Ltd
Rosebery - Tas.

ROCK SAMPLE LEDGER

PROJECT Burns Peak LOCALITY: Tas.
COLLECTED BY ANR DATE: Oct '89

Sample Number	A.M.G. Co-ordinates E	N	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	By	Reference	Rock-type (Microscopic)	Au	Cu	Fe%	Al%	Ti	K%	Mn	Mg%	Sn	Mo	Cr	W	Ba	Ta	V	Ag	Cu	Pb	Zn
	CHESTER	RIVULET								Metal Content (p.p.m. unless specified)																		
79701	"	"	R/C	Silicified Andesite (Breccia)	Ia					<0.01	2.5%	2.8	7.05	0.250	2.60	0.110	0.590	<20	<20	60	50	660	<50	65				
79704	"	"	R/C	" "	Ia					<0.01	5700	3.60	7.30	0.295	3.70	0.120	0.635	<20	<20	80	<20	860	<50	80				
79706	"	"	R/C	" "	Ia					<0.01	900	3.18	7.60	0.285	3.30	0.015	0.445	<20	<20	<50	<20	820	<50	80				
79707	"	"	R/C	py, sil alt in "stuff (Breccia)	tA					0.01	7600	1.85	6.95	0.240	3.60	0.050	0.425	<20	<20	60	90	840	<50	45				
79714	377668	5 381800	R/C				Au - FAI			0.01	<500	0.940	2.20	0.305	0.200	0.014	0.080	20	<20	<50	<20	80	<50	10	<1	8	4	25
79715	377703	5 381761	R/C				Au - W - ICP3			<0.01	<500	0.490	1.65	0.220	1.10	0.006	0.135	<20	<20	<50	<20	240	<50	10	<1	6	<4	10
79716	377745	5 381736	R/C				Ag - 4 Ac HNO3			0.02	500	1.22	5.90	0.130	3.80	0.024	0.465	<20	<20	60	<20	600	<50	10	<1	7	90	350
79717	377781	5 381695	R/C							0.02	700	2.12	7.15	0.140	3.0	0.024	0.460	40	<20	<50	<20	1200	<50	<10		11	18	30
79718	377804	5 381646	R/C				Classic Laboratories			<0.01	700	2.40	7.05	0.330	3.50	0.008	0.570	<20	<20	<50	<20	700	<50	70		9	28	36
79719	377832	5 381600	R/C				Jan 1990 Lab 2371			0.02	900	1.12	7.40	0.145	2.30	0.010	0.350	<20	<20	<50	<20	480	<50	10		11	14	28
79720	377830	5 381550	R/C				Feb 1990 Lab 2423			0.03	800	0.930	6.85	0.140	2.40	0.010	0.265	<20	<20	<50	<20	400	<50	10		6	10	17
79721	377844	5 381528	R/C							<0.01	800	1.31	6.90	0.345	4.10	0.016	0.385	20	<20	<50	<20	940	<50	80		5	12	12
79723	377935	5 381540	R/C							0.01	1700	1.42	7.80	0.215	3.00	0.012	0.385	<20	<20	<50	<20	1450	<50	<20		4	10	18
79724	377974	5 381518	R/C							<0.01	900	1.53	6.80	0.115	3.20	0.018	0.480	30	<20	<50	<20	900	<50	<10		4	10	19
79725	378019	5 381484	R/C	Chester Tracks.						0.01	1100	3.24	7.15	0.285	2.80	0.038	0.910	20	<20	<50	<20	560	<50	75		5	14	78
79726	378045	5 381449	R/C							0.01	800	1.33	6.40	0.390	3.80	0.036	0.365	20	<20	60	<20	1050	<50	85		8	14	38
79727	378054	5 381447	R/C							0.03	1200	1.35	7.10	0.335	3.80	0.058	0.410	30	<20	<50	<20	940	<50	65		4	44	80
79728	378090	5 381516	R/C							0.02	600	0.640	2.38	0.170	1.60	0.005	0.190	<20	<20	<50	<20	500	<50	<10		4	6	4
79729	378134	5 381548	R/C							<0.01	800	0.650	4.14	0.120	4.60	0.005	0.045	<20	<20	<50	30	980	<50	<10		9	115	190
79730	378186	5 381572	R/C							0.01	600	0.980	6.35	0.155	6.90	0.019	0.235	<20	<20	<50	<20	920	<50	10		6	40	8
79731	378205	5 381619	R/C							<0.01	<500	1.99	6.55	0.180	4.40	0.030	0.500	<20	<20	<50	<20	380	<50	15		10	50	115
79732	378220	5 381664	R/C							0.01	<500	0.890	2.94	0.140	2.00	0.010	0.235	<20	<20	<50	<20	190	<50	10		5	12	9
79733	378246	5 381712	R/C							0.01	600	1.68	6.05	0.140	3.40	0.013	0.280	<20	<20	<50	<20	1050	<50	15	1	4	16	22
79734	378290	5 381738	R/C							<0.01	<500	1.74	6.65	0.350	4.20	0.004	0.375	<20	<20	<50	<20	1100	<50	75	<1	4	8	9
79736	378373	5 381797	R/C							0.03	4000	1.87	7.50	0.175	3.60	0.028	0.550	<20	<20	<50	<20	1050	<50	10		6	15	28
79738	378448	5 381865	R/C							0.02	600	1.93	5.25	0.105	4.10	0.036	0.330	<20	<20	<50	<20	1200	<50	<10		6	10	24
79739	378481	5 381901	R/C							<0.01	4100	1.33	7.05	0.165	3.10	0.036	0.590	<20	<20	<50	20	920	<50	10		6	10	13
79740	378516	5 381932	R/C							<0.01	<500	0.92	4.22	0.090	2.60	0.009	0.380	<20	<20	<50	<20	720	<50	10		5	8	4
79741	378555	5 381950	R/C							<0.01	<500	0.590	4.58	0.130	2.50	.007	0.215	<20	<20	<50	20	1100	<50	<10		3	6	2
79742	378620	5 381962	R/C							0.03	<500	1.09	4.98	0.140	3.00	.007	0.445	<20	<20	<50	<20	860	<50	20		6	14	6

Smith Print Pty., 441822

421057

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: LOCALITY:

COLLECTED BY: DATE:

Sample Number	A.M.G.Co-ordinates E	A.M.G.Co-ordinates N	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	Thin or Polished Section By	Thin or Polished Section Reference	Thin or Polished Section Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Au	Cu	Pb	Zn	Ag	Mn
82318	378245	5384875	R/c	LEO'S FIND.			Ai + Fire	309		<0.008	5	65	115	0.5	95
82319	378227	5384865	R/c				Qu-Mn AAS	101.		0.024	25	425	80	2.0	600
82320	378205	5384854	R/c				Analabs	Dec '89		0.020	100	275	365	2.0	1325
82321	378194	5384829	R/c				O/N	5948		<0.008	5	15	85	0.5	265
82322	378179	5384827	R/c							"	5	10	65	0.5	275
82323	378160	5384821	R/c							0.014	10	125	185	1.5	980
82324	378140	5384821	R/c							0.013	10	80	100	0.5	460
82325	378118	5384819	R/c							0.009	10	55	70	<0.5	155
82326	378096	5384812	R/c							<0.008	10	50	75	0.5	305
82327	378067	5384802	R/c							<0.008	10	95	80	0.5	330
82328	378030	5384780	R/c							0.010	5	90	135	<0.5	50
82329	378012	5384772	R/c							<0.008	10	50	95	0.5	115
82330	377995	5384762	R/c							"	10	235	50	<0.5	945
82331	377977	5384749	R/c							"	10	55	85	0.5	100
82332	377960	5384740	R/c							"	15	45	95	<0.5	40
82333	377944	5384734	R/c							"	25	100	80	0.5	105
82334	377925	5384727	R/c							0.011	30	30	65	<0.5	300
82335	377905	5384723	R/c							0.016	55	455	735	0.5	230
82336	377889	5384722	R/c							0.003	5	5	25	<0.5	145
82337	377875	5384723	R/c							0.023	235	475	595	2.0	160
82338	377837	5384740	R/c							0.017	40	120	70	0.5	185
82339	378760	5385245	R/c							<0.008	5	40	55	<0.5	90
82340	378781	5385245	R/c							"	5	50	65	"	145
82341	378800	5385244	R/c							"	5	60.	40.	"	125
82342	378821	5385236	R/c							<0.008	10	150	150	<0.5	570
82343	378839	5385230	R/c								5	55	80	"	395
82344	378855	5385225	R/c								5	40	60	"	140
82345	378875	5385225	R/c								5	230	55	"	40
82346	378910	5385232	R/c								5	10	30	"	35
82347	378930	5385240	R/c								5	20	75	"	20
82348	378951	5385250	R/c							<0.008	5	30	105	"	40

Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Burns Peak. LOCALITY: Tas.
COLLECTED BY: ANR / PJ DATE: April '90.

Sample Number	A.M.G.Co-ordinates N	E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	Fe	V	Ca	Mg	Metal Content (p.p.m. unless specified) Au	Cu	Pb	Zn	Mn	Ti	K	Ba
22250	53 82300	3 77325	R/C				4.88	123	2400	1.93	0.001	35	15	170	1580	4430	1.49	797
22251	53 82340	3 77850	"				4.19	113	430	0.785	0.001	30	60	170	984	4010	2.21	1250
22252	53 82500	3 77910	"				4.43	107	3230	0.901	<0.001	25	15	135	1150	4060	1.96	705
BOCO ROAD											Au	Cu	Pb	Zn	Ag			
68464	53 85355	3 79865	R/C				Au - Fire 319				0.01	<5	5	15	<0.5			
68465	53 85365	3 79905	"				Cu - Ag AAS 319				<0.005	40	45	65	<0.5			
68466	53 85375	3 79920	"				Analab, March '90				0.006	35	25	135	<0.5			
68467	53 85380	3 79940	"				O/N 5.0002				0.009	40	85	85	<0.5			
68468	53 85385	3 79960	"								0.009	95	30	70	<0.5			
68469	53 85395	3 79980	"								0.007	40	15	70	<0.5			
68470	53 85400	3 79995	"								0.006	45	30	70	<0.5			
68471	53 85405	3 80010	"								0.010	75	30	70	<0.5			
68472	53 85405	3 80030	"								0.006	40	15	70	<0.5			
68473	53 85410	3 80045	"								0.007	105	5	65	<0.5			
68474	53 85415	3 80060	"								0.012	80	40	100	<0.5			
68475	53 85420	3 80075	"								<0.005	25	15	60	<0.5			
68476	53 85425	3 80090	"								0.006	60	125	45	<0.5			
68477	53 85435	3 80110	"								<0.005	10	60	210	<0.5			
68478	53 85440	3 80125	"								<0.005	20	30	45	<0.5			
68479	53 85445	3 80155	"								0.009	30	275	80	<0.5			
68480	53 85430	3 80210	"								<0.005	<5	20	70	<0.5			
68481	53 85425	3 80285	"								<0.005	10	80	165	<0.5			
68482	53 85425	3 80300	"								<0.005	5	45	200	<0.5			
68483	53 85425	3 80320	"								<0.005	10	100	155	<0.5			
68484	53 85425	3 80340	"								<0.005	<5	25	145	<0.5			
68485	53 85425	3 80360	"								<0.005	5	<5	130	<0.5			
68486	53 85425	3 80380	"								<0.005	15	5	90	<0.5			
68487	53 85430	3 80420	"								0.007	<5	15	10	<0.5			
68488	53 85435	3 80440	"								0.012	70	55	45	0.5			
68489	53 85440	3 80460	"								<0.005	20	140	50	<0.5			
68490	53 85450	3 80535	"								<0.005	10	45	110	<0.5			

th Print Ph.. 441822

421058

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT:
COLLECTED BY:
LOCALITY:
DATE:

Sample Number	A.M.G.Co-ordinates E	A.M.G.Co-ordinates N	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Au	Cu	Pb	Zn	Ag	Mn
82349	378 974	5 385 275	R/C	LEO'S FIND.			Au - Fire	309		0·009	15	615	70		30
82350	378 990	5 385 278	R/C				Cu - Mn AAS	101		<0·008	10	190	70	<0·5	190
82351	379 006	5 385 289	R/C				Analab Dec.	'89		0·009	10	130	115	11	700
82352	379 026	5 385 296	R/C				O/N 5048			0·011	10	235	125	11	435
82353	379 041	5 385 303	R/C							0·008	10	170	80	11	175
82354	379 064	5 385 305	R/C							0·009	10	50	60	11	300
82355	379085	5 385 308	R/C							0·014	5	25	55	11	90
82356	379 105	5 385 309	R/C							0·011	10	115	115	11	55
82357	379 121	5 385 300	R/C												
82358	379 142	5 385 290	R/C							0·012	10	35	<5	11	35
82359	379 159	5 385 280	R/C							0·008	5	50	40	11	100
82360	379 176	5 385 272	R/C							11	20	720	40	11	30
82861	379 195	5 385 263	R/C							<0·008	20	1050	45	0·5	65
82362	379 212	5 385 256	R/C							0·008	30	95	65	<0·5	150
82363	379 233	5 385 250	R/C							0·006	10	35	20	11	30
82364	379 251	5 385 239	R/C							0·008	15	95	40	11	55
82365	379 272	5 385 234	R/C							0·011	20	95	85	11	380
82366	379 293	5 385 234	R/C							0·010	15	25	70	-	170
82367	379 313	5 385 239	R/C							0·010	25	10	100	11	255
82368	379 331	5 385 246	R/C							0·011	70	180	175	<0·5	545
82369	379 351	5 385 253	R/C							0·010	10	35	30	0·5	40
82370	379 444	5 385 283	R/C							0·008	5	25	30	0·5	70
82371	379 465	5 385 287	R/C							0·009	15	15	40	<0·5	65
82372	379 485	5 385 293	R/C							11	10	65	80	11	145
82373	379 504	5 385 296	R/C							11	15	60	70	11	30
82374	379 598	5 385 325	R/C							11	45	60	70	0·5	60
82375	379 615	5 385 343	R/C							0·013	65	80	150	<0·5	85
82376	379 637	5 385 354	R/C							0·009	25	100	135	11	130
82377	379 655	5 385 355	R/C							0·010	15	105	140	0·5	120
82378	379 692	5 385 359	R/C							11	25	85	60	0·5	40
82379	379 713	5 385 376	R/C							0·01	25	245	115	<0·5	170

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421059

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Burn's Peak. LOCALITY: Tas.
COLLECTED BY: A.N.R./P.J./I.J.M. DATE: April '90

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	Thin or Polished Section: By	Thin or Polished Section: Reference	Thin or Polished Section: Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Au	Cu	Pb	Zn	Ag
BOCO	ROAD													
68491	53 85460	3 80555	R/C				Au - Fire 319			<0.005	<5	25	65	<0.5
68492	53 85470	3 80570	"				Cu-Ag AAS 319			<0.005	5	10	160	0.5
68493	53 85480	3 80585	"				Analabs March '90			<0.005	5	35	60	<0.5
68494	53 85490	3 80600	"				O/N 50002.			0.011	15	85	150	0.5
68495	53 85505	3 80625	"							<0.005	75	265	200	0.5
68496	53 85525	3 80675	"							<0.005	<5	25	40	<0.5
68497	53 85530	3 80695	"							<0.005	10	45	45	<0.5
68498	53 85540	3 80730	"							0.006	<5	<5	15	<0.5
68499	53 85545	3 80775	"							0.005	35	<5	135	<0.5
67575			"				As above			<0.005	12	240	135	1.0
67576			"							<0.005	5	400	280	1.0
67577			"							<0.005	<5	235	355	0.5
67578			"							<0.005	5	285	395	1.0
67579			"							0.006	10	335	445	1.0
67580			"							<0.005	10	335	285	1.0
67581			"							<0.005	10	500	235	1.5
67582			"							<0.005	5	95	170	1.5
67583			"							0.007	30	1050	340	1.5
78526	53 83280N	377460E	"	silicified lava / flow bx.										
78527	53 83235N	377455E	"											
78528	53 83200N	377445E	"											
72284	53 84950N	377050E	"											
72285	53 85300N	377440E	"	Qtz - feldspar ? x'tal sandstone	SENT FOR THIN SECTION	T				} J. Stolz Petrology Report.				
72286	53 85300N	377310E	"											
T78523	Beneath Bastyan Dam Railway Bridge.		"	Crystal sandstone / epiclastic	Thin Section	T				} J. Stolz Petrology Report				
T78522	BPD 63.		"	as above.	Thin Section	T								

Shale Basin.

Smith Print Ph., 441822

P.3.

421060

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Bens Block LOCALITY: Tas

COLLECTED BY: Ann DATE: Feb '90.

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	Thin or Polished Section By	Thin or Polished Section Reference	Thin or Polished Section Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Au	Cu	Pb	Zn	Ag	Mn	Ti	Ba	K	Fe	Ca	Al	Mg	Mo	Cr	W	Ta	Sr	V
82492	5379465	378000	R/c	Sediment/sst.			Au-Fire 314			0.005	5	60	600		260	1230	583	3.01	1.75	464		2510						10
82493	5379477	377970	R/c	Dacite Lava	Roaches Creek		Cu-Zn AMS 101			"	5	20	175		7837	1426	948	3.41	2.73	185		2181						20
82494	5379650	377900	R/c	"			Mn-Mg CRAES 301			"	5	20	470		352	3103	1135	3.48	3.33	773		2521						78
82495	5379700	377850	R/c	"			Analabs March '90.			"	5	10	175		883	1221	934	2.84	1.84	231		1765						17
82497	5379980	377800	R/c	Dacite Lava breccia			C/A 50/01			"	5	10	160		345	1848	1167	3.19	2.92	185		4044						26
82499	5380630	378060	R/c	Lava/Scal breccia S.W. Chester						"	10	5	55		33	856	564	2.68	2.47	95		173						32
44393			Multiple Grab	S.W. Chester Mine Workings			Au-Fire 314			0.080	400	10	10		52	914	183	0.32	19.00	260		0.011						14
44394			Rock/c.				Cu-Zn AMS 101			0.003	30	10	10		54	1220	972	1.75	2.45	375		0.049						26
44391			Grab	Strongs Adminrals.			Mn-Mg V 301			0.016																		
44392			Grab.				Analabs 5140 C/A 50/01			0.008																		
82221	5382850	377490	R/c		Holloway area		Au-Fire 314			0.001	30	5	145		2190	4540	700	1.01	5.78	9230		1.800						128
82222	5382820	377410	R/c				Cu-Zn AMS 101				40	35	75		652	2260	1000	2.47	1.76	5310		0.461						14
82223	5382450	377960	R/c				Mn-Mg V 301				30	10	45		119	2660	1180	3.70	1.44	423		0.325						44
82226	5382825	377990	R/c				Analabs March '90				35	15	245		1080	2620	532	1.68	4.07	353		1.300						122
82227	5382965	377850	R/c				C/A 50/01			0.001	40	45	535		988	2410	493	1.53	3.68	386		1.170						104
82228	5384000	378675	R/c							0.002	120	115	285		6940	6330	527	1.41	13.00	421		0.308						409
82230	5382700	377900	R/c							0.001	50	15	190		3110	6650	1010	1.90	6.02	22500		1.220						174
82231	5382700	378010	R/c							0.002	45	20	210		1850	6276	945	2.51	6.95	9770		1.380						171
82232	5382700	378060	R/c							0.001	130	10	570		5340	6600	918	2.21	6.14	5800		2.240						335
82233	5382790	378120	R/c							0.006	95	20	75		509	7550	1460	4.58	11.20	6770		0.617						376
82234	5382600	378090	R/c							0.001	40	10	195		2260	8720	897	2.91	6.06	2000		1.580						183
82236	5382900	378090	R/c							0.039	70	50	95		564	6840	1370	4.40	8.80	673		0.707						241
82240	5382575	378000	R/c							0.003	60	10	440		4630	7049	726	2.09	8.96	28000		2.850						391
82241	5382575	377980	R/c							0.005	30	25	40		200	4000	1280	3.91	1.87	3150		0.433						61
82242	5382470	377075	R/c							0.002	60	20	115		3652	4980	549	1.91	4.35	5990		1.550						128
82243	5382300N	377580	R/c							0.013	45	90	230		470	2080	1400	2.29	4.89	6010		1.890						62
82244	5382300	377770	R/c							0.002	30	10	110		848	3250	786	2.28	4.82	1320		0678						81
82246	5382100	378100	R/c							0.001	30	20	45		137	1480	689	3.24	1.79	350		0.434						13
82247	5383875	378140	R/c							0.001	110	55	215		2580	6020	234	0.17	9.99	200		0483						367
82248	5382380	377140	R/c							0.001	40	50	90		365	4950	711	3.50	3.83	6090		1.370						68
82249	5382300	377370	R/c							0.001	230	30	75		470	1040	576	1.71	1.64	3100		0.603						7

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421061

421062

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: LOCALITY:
COLLECTED BY: DATE:
T:
TED BY:

Sample Number	A.M.G.Co-ordinates E	N	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Au	Cu	Pb	Zn	Ag	Mn
79781	378715	5384310	R/C	LEO'S FIND			Au - Fire	509		0·016	10	130	90	<0·5	75
79782	378722	5384348	R/C	SEDIMENTS.			Cu, Pb, Zn, Ag, Mn			0·014	5	45	40	<0·5	60
79783	378730	5384331	R/C				AAS 509			0·017	10	50	55	<0·5	35
79784	378740	5384312	R/C							0·025	15	40	60	0·5	250
79785	378752	5384297	R/C				Analabs Dec '89			0·020	30	45	95	<0·5	700
79786	378760	5384275	R/C				O/N 5948			0·012	25	135	140	0·5	200
79787	378761	5384259	R/C							<0·008	20	60	50	0·5	70
79788	378765	5384238	R/C							<0·008	10	45	25	<0·5	130
79789	378770	5384220	R/C							0·015	20	95	40	|	100
79790	378775	5384201	R/C							0·014	20	40	75	|	115
79791	378780	5384180	R/C							<0·008	50	140	245	|	185
79792	378784	5384160	R/C							0·014	45	175	105	|	1475
79793	378632	5384646	R/C							0·010	10	60	25	|	100
79794	378622	5384563	R/C							<0·008	10	35	30	|	125
79795	378611	5384580	R/C							0·070	30	60	25	0·6	100
79796	378602	5384604	R/C							0·012	10	30	45	<0·5	70
79797	378595	5384620	R/C							0·017	10	35	40	0·5	150
79798	378581	5384626	R/C							0·013	5	80	60	<0·5	265
79799	378562	5384627	R/C							0·035	5	70	25	<0·5	40
79800	378541	5384629	R/C							0·044	10	20	55	<0·5	130
83401	378523	5384631	R/C				[illegible]			1·389	25	5	20	1·0	65
82402	378497	5384625	R/C							0·010	10	5	20	0·5	60
82403	378484	5384619	R/C							0·012	15	35	35	0·5	180
82404	378464	5384610	R/C							0·064	10	25	65	1·0	140
82405	378447	5384603	R/C							0·038	15	10	30	1·6	85
82406	378437	5384526	R/C							0·025	5	20	35	0·5	200
82407	378415	5384486	R/C							0·030	90	100	65	1·0	150
82408	378394	5384459	R/C							0·014	5	20	29	0·5	90
82409	378376	5384422	R/C							0·027	10	105	95	1·0	90
82410	378362	5384393	R/C							0·208	290	275	199	3·5	140
82411	378342	5384354	R/C							0·038	80	155	1600	1·0	340

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421063

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Burnie Peak LOCALITY: Tasmania
COLLECTED BY: ANK DATE: Dec '89

Sample Number	A.M.G. Co-ordinates N	E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Cu	Pb	Zn	Au	Ag	Mn	Al	Ba
	CHESTER MINE						Au - FA										
82210	Chester Tramway		R/C	Cherty, bnd. totally alt. py			Ag - AAS	2					<0.01	<1	80	4.80%	780
82211	"	"	R/C	Elvan: saccaroidal texture py			Mn - hv - ICP	3					"	1	50	3.80%	1700
82212	Bench A - Chester Mine		R/C	K-clay alt sil + py									"	1	160	2.25%	2100
82213	"	'	R/C	Sil alt to py ?beating			Classic Comlabs						"	1	50	4.00%	2950
82214	"	"	R/C	Sil alt felsic volcanics			Now	1989					"	2	240	1.71%	1950
82215	Fall off from Bench A		R/C	Siliceous nodules			O/N	PK 5947					"	<1	70	3.50%	860
82216	Bench G	Chester Mine	R/C	Pyrite/sil breccia									"	1	30	3.95%	660
72289	53 82100	77740	R/C	i Sparalt hm/mgt/chl volcaclastic			Au - Fire	313		20	70	75	<0.005	<0.5	530		
72290	53 82700	77770	"	recrypt. hm/mgt/chl alt.			Cu - Ag	AAS	101	10	<5	50	4	<0.5	1000		
72291	53 82720	77880	"	silicified unit py/sch/finch.			Mn	AAS	101	20	5	30	0.012	1.0	105		
72292	53 83400	77750	"	Sil. andesite ? bedding.			Analabs	5/90	O/N 50102	20	30	105	0.045	<0.5	1300		

Sample Number	Metal Content (p.p.m. unless specified): Ce	Cr	Fe	K	Mg	Mo	Sn	Ta	Ti	V	W
82210	1300	<50	1.08%	2.50%	2900	20	<20	<50	1600	20	<20
82211	600	<50	1.27%	1.80%	1050	20	40	<50	1050	<10	<20
82212	1000	<50	5700	1.10%	1200	<20	20	<50	1100	<10	<20
82213	<500	<50	1.51%	1.80%	1100	20	<20	<50	1450	<10	<20
82214	<500	50	7500	8000	400	<20	<20	<50	1200	<10	<20
82215	<500	<50	9800	1.80%	1500	<20	<20	<50	1000	10	<20
82216	<500	100	14.4%	1.70%	420	20	<20	<50	980	30	60

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Burnie Peak LOCALITY: Tasmania.
COLLECTED BY: A.N.R / P.J. / J.F. DATE: Feb '90.

Sample Number	A.M.G.Co-ordinates E	N	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Au	Cu	Pb	Zn	Ag	Mn	Ti	Ba
82380	379 733	5385 370	R/C	LEO'S FIND.						0.80	5	15	55	40.5	100		
82381	379 751	5385 364	R/C														
82382	379 770	5385 354	R/C														
82383	379 789	5385 343	R/C														
82384	379 812	5385 345	R/C														
82385	379 830	5385 348	R/C														
82386	379 849	5385 352	R/C														
				CHESTER RIVULET.													
79703				BLEG - Bulk Sed.													
79708				Stream Bed Sediments.													
79711	N	E															
78505	5381190	3782400E	R/C	Chester - Breccias North of						1.00	5	90	315		405	1923	2114
78506	5381140	3782000E	R/C	Chester Mine						0.01	5	185	265		232	2075	1493
78507	5381100	3781700E	R/C	Chester - Silicean with						<0.01	5	20	30		214	1648	1336
78508	5381020	3782600E	R/C	Chester minor diseem.						<0.01	5	<5	15		37	1207	727
78509	5381000	3782700E	R/C	Chester Ag.						0.001	5	<5	20		41	1592	905
78510	5381035	3783400E	R/C	Chester						<0.01	5	55	100		105	1964	1673
78511	5380730	3781400E	R/C	Chester - Pyritic rocks						0.002	5	5	25		<15	1327	838
78512	5380725	3781350E	R/C	& - SW of mine						0.005	20	<5	25		<15	1149	288
78513	5380880	3779650E	R/C							0.002	5	5	30		213	1889	1034
78514	5380825	3781300E	R/C							<0.001	5	15	25		63	1735	1161
78517	5380390	3771200E	R/C	Chester - 4N Costeau						<0.001	5	10	25		139	1725	1354
78518	5380390	3771300E	R/C							0.010	40	420	170		2331	4675	1080
82442	5380510	3772600E	R/C	Chester - North track out			Au -	Fire	3.9	<0.005	5	85	45		156	2916	2911
82443	5380515	3772700E	R/C	to Marionoad River.			Cu-Zn	AAS	101	"	25	35	270		380	3348	19144
82445	5380580	3773800E	R/C	Mostly Dacite Lavas.			Mn - V	ICP-ES	201	0.012	20	195	215		281	3037	3647
82447	5380595	3774800E	R/C				Analabs	March '90		<0.005	10	5	120		271	3607	1097
82448	5380740	3783400E	R/C	Chester - Vicinity of			C/N	58004		"	15	20	190		195	3261	807
82449	5380410	3783700E	R/C	SW Chester Workings						0.015	15	30	45		126	2840	2135
82450	5380485	3781400E	R/C	Pyritic Breccias, Cherts						<0.005	10	5	45		346	2730	954
82452	5380495	3781350E	R/C	and Dacite lavas.						0.006	20	20	20		57	8364	572

Sample Number	Metal Content (p.p.m. unless specified) K	Fe	Ca	Al	Mg	Mo	Cr	Ni	Zn	Sr	V
82380											
82381											
82382											
82383											
82384											
82385											
82386											
79703											
79708											
79711											
78505	4.4	1.52	197		4650						22
78506	5.2	1.68	197		7251						23
78507	3.5	1.05	143		5200						15
78508	2.8	1.15	130		1293						20
78509	2.7	1.14	95		1796						27
78510	3.1	1.47	85		4187						16
78511	<0.5	3.99	83		116						24
78512	0.6	8.18	73		86						21
78513	4.9	1.27	<50		2750						16
78514	5.1	0.51	<50		1950						12
78517	3.8	1.32	105		4835						10
78518	3.1	3.68	1014		9669						108
82442	4.4	1.81	170		4721						97
82443	4.51	3.81	1149		4377						97
82445	3.97	2.83	185		2962						86
82447	3.26	2.97	155		8517						104
82448	2.9	4.87	826		9563						112
82449	3.97	2.85	118		3215						197
82450	0.69	3.15	6238		5993						89
82452	1.81	6.30	864		1918						42

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421064

Kosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Bu 13 [illegible] Tas.

DATE: Jan '90.

Sample Number	A.M.G. Co-ordinates E	A.M.G. Co-ordinates N	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section: T or P	By	Reference	Rock-type (Microscopic)	Metal Content (p.p.m. unless specified): Au	Cu	Pb	Zn	Ag	Mn
82412	378380	5384322	R/C	LEO'S FIND SEDIMENTS.			Au-Fire 309			0.026	15	65	50	2.5	200
82413	378957	5384328	R/C				Cu, Pb, Zn, Ag, Mn			0.020	10	10	35	0.5	160
82414	378952	5384350	R/C				AAS 101			0.018	5	15	50	0.5	70
82415	378944	5384365	R/C				Analabs Dec '89			0.018	5	10	30	<0.5	50
82416	378933	5384382	R/C				O/N 5948			0.038	45	40	50	<0.5	105
82417	378916	5384396	R/C							0.020	5	1500	65	0.5	40
82418	378896	5384406	R/C							0.017	5	45	90	<0.5	120
82419	378880	5384423	R/C							0.018	5	75	115	0.5	150
82420	378466	5384459	R/C							0.023	20	95	35	0.5	220
82421	378381	5384163	R/C							0.020	90	285	340	<0.5	490
82422	378367	5384178	R/C							0.019	45	255	95	"	715
82423	378357	5384198	R/C							0.038	85	420	240	"	4700
82424	378344	5384210	R/C							<.008	125	710	280	"	1500
82425	378330	5384223	R/C							"	10	70	35	"	200
82426	378318	5384240	R/C							"	25	180	65	"	200
82427	378303	5384263	R/C							"	30	200	75	0.5	45
82428	378350	5384435	R/C							"	10	50	25	0.5	80
82429	378370	5384397	R/C							"	15	50	25	<0.5	50
82430	377977	5384070	R/C							"	10	90	70	"	300
82431	377994	5384035	R/C							"	10	30	80	"	580
82432	378095	5383983	R/C							"	80	30	160	"	1800
82433	378187	5384109	R/C							"	95	435	190	"	830
82434	378080	5384325	R/C							"	35	15	100	0.5	95
82310	378404	5384983	R/C				Au-Fire 309			0.093	15	75	85	0.5	140
82311	378385	5384972	R/C				Cu, Pb, Zn, Ag, Mn			0.090	10	45	35	0.5	25
82312	378368	5384963	R/C				AAS 301			<.008	35	265	235	<0.5	1050
82313	378325	5384943	R/C				Analabs Dec '89			0.012	10	25	110	1.0	365
82314	378304	5384930	R/C				O/N 5948.			<.008	10	255	255	<0.5	460
82315	378293	5384913	R/C							0.017	20	340	95	"	690
82316	378277	5384899	R/C							<.008	10	45	85	"	750
82317	378260	5384889	R/C							0.021	20	45	130	<0.5	740

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421065

Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Burn's Peak LOCALITY: Tas.
COLLECTED BY: ANR / PJ DATE: Jan '90.

Sample Number	A.M.G.Co-ordinates N	E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	By	Reference	Rock-type (Microscopic)
79743	378676	5 321 997	R/C				Au - FA1		
79748	378535	5 321 991	R/C				Cu - ICP3		
79749	378541	5 320 043	R/C	Chester - Mt Kershaw Area.			Ag - Zn AAS1		
79750	378527	5 320 089	R/C				Tungsten Hab		
79751	378513	5 320 134	R/C				Feb 1990		
79752	378487	5 320 186	R/C				Sm 3423		
79753	378444	5 320 198	R/C						
79754	378396	5 320 220	R/C						
	E	N							
79759	378644	5 384 529	R/C	LEO'S FIND. TRACKS			Au - Fire Assay 30g		
79760	378667	5 384 512	R/C				Cu, Pb, Zn, Ag, Mn		
79761	378680	5 384 504	R/C				AAS 30g.		
79762	378695	5 384 494	R/C						
79763	378715	5 384 434	R/C				Hina Labs. Dec '89.		
79764	378731	5 384 471	R/C				C/N 5748		
79765	378755	5 384 476	R/C						
79766	378773	5 384 475	R/C						
79767	378790	5 384 480	R/C						
79768	378807	5 384 489	R/C						
79769	378831	5 384 495	R/C						
79770	378852	5 384 486	R/C						
79771	378864	5 384 473	R/C						
79772	378875	5 384 446	R/C						
79773	378650	5 384 513	R/C						
79774	378661	5 384 495	R/C						
79775	378670	5 384 479	R/C						
79776	378677	5 384 463	R/C						
79777	378685	5 384 444	R/C						
79778	378691	5 384 425	R/C						
79779	378702	5 384 406	R/C						
79780	378710	5 384 387	R/C						

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Metal Content (p.p.m. unless specified)

Au	Cu	Fe	Al	Ti	K	Mn	Mg
<0.01	<500	1.05	6.35	0.260	3.70	0.007	0.445
<0.01	1500	0.660	5.55	0.155	3.30	0.012	0.405
0.03	<500	1.03	7.30	0.185	4.30	0.010	0.520
0.04	<500	1.20	7.70	0.325	4.10	0.009	0.550
<0.01	<500	2.84	8.25	0.340	3.70	0.015	0.900
0.03	<500	2.80	8.20	0.320	3.60	0.008	0.350
<0.01	<500	3.02	7.85	0.310	2.80	0.010	0.680
0.04	<500	4.54	8.15	0.310	2.80	0.016	0.960

Au	Cu	Pb	Zn	Ag	Mn
0.029	135	405	425	2.5	85
0.010	10	30	30	0.5	50
0.011	25	135	120	0.5	285
0.010	5	25	45	1.0	195
0.011	10	30	70	0.5	220
0.011	10	150	180	10.5	280
0.011	10	40	60	0.5	25
0.011	5	70	95	<0.5	160
0.012	10	45	120	0.5	480
0.014	15	45	96	0.5	360
0.012	5	25	220	<0.5	940
0.012	10	55	160	0.5	815
0.013	10	25	210	<0.5	390
0.012	10	60	135	0.5	165
0.020	45	320	50	0.5	25
0.014	40	185	140	<0.5	275
0.014	15	35	45	<0.5	40
0.015	10	65	150	"	335
0.015	10	60	125	"	325
0.015	10	200	115	0.5	330
0.015	5	65	50	<0.5	75
0.017	10	45	35	"	55

Sn	Mo	Cr	W	Ba	Ti	V
<20	<20	<50	<20	980	<50	50
40	<20	<50	40	840	<50	10
<20	<20	<50	<20	1050	<50	15
<20	20	<50	[illegible]	860	<50	90
<20	20	<50	50	880	<50	90
40	<20	<50	<20	920	<50	100
<20	20	<50	<20	660	<50	70
<20	40	<50	20	820	<50	90

Ag	Cu	Pb	Zn
<1	6	24	6
1	4	10	26
1	4	6	4
1	11	10	12
1	11	18	36
<1	34	14	7
1	32	18	34
1	15	16	50

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Electrolytic Zinc Co. of A'asia Ltd.
Rosebery, Tas.

ROCK SAMPLE LEDGER

PROJECT: Brants Rock LOCALITY: Tas.
COLLECTED BY: AMK DATE: Feb '90

Sample Number	A.M.G.Co-ordinates N	A.M.G.Co-ordinates E	Sample Type	Geological Description	Rock-type (Macroscopic)	Thin or Polished Section T or P	Thin or Polished Section By	Thin or Polished Section Reference	Thin or Polished Section Rock-type (Microscopic)	Metal Content (p.p.m. unless specified) Au	Cu	Pb	Zn	Ag	Mn	Ti	Ba
82453	5380200	3772400	R/C	Dacites, Grid Line o/c			Au - Fire	3107		0.041	160	95	165		653	3291	1222
82454	5380200	3774000	R/C	"			Cu, Pb, S	1601		0.021	15	10	25		61	1638	1336
82455	5379270	3777860	R/C	Dacite			Mn - ICP	201		0.026	15	90	9850		11 59	1949	983
82456	5379290	3777875	R/C	"			Au, Ag, Mo	1490		0.008	25	20	165		926	1976	614
82457	5379330	3778025	R/C	" Crusader Creek			C/A	5 Rock	1	"	5	10	100		596	1973	678
82458	5379380	3777765	R/C	Breccia						"	5	5	110		2057	1825	829
82459	5379440	3777655	R/C	?Dacite						"	5	40	155		2090	1543	801
82460	5381100	3778750	R/C	Epiclastic Breccia Grid Line						"	10	10	40		1140	2000	782
82462	5381100	3779090	R/C	Rhyolite Lava. Rock						"	15	5	605		893	3070	1391
82463	5381100	3779500	R/C	Dacite Lava Chips						"	5	5	65		405	3154	937
82464	5381100	3779640	R/C	Dacite Lava						"	5	<5	50		221	2645	70
82467	5381300	3778900	R/C	Lava breccia Grid	Chester					"	5	<5	25		93	1071	776
82468	5381300	3776720	R/C	Grey wacke fine	Area						50	<5	105		626	4141	334
82469	5381300	3776760	R/C	Conglomerate Rock Chips						"	30	5	85		224	4299	436
82470	5381300	3776840	R/C	Siliceous Sediments Grid							10	5	50		186	1658	224
82471	5381300	3776900	R/C	Float with dense Si org. line						0.015	10	90	20		65	1802	205
82473	5381300	3777000	R/C	Rhyolite Lava. Rock						<0.008	5	5	55		226	2279	397
82474	5381300	3777060	R/C	Rhyolite Lava Chips						"	5	10	55		453	2498	1339
82476	5381290	3775510	R/C	Rhyolite Lava -						"	10	5	25		176	1325	315
82477	5380300	3777523	R/C	Dacite Lava Breccia.						0.008	25	75	135		151	3500	1579
82478	5380300	3777215	R/C	?Rhyolite or Dacite Lava Aggregate						0.013	25	305	1350		334	3020	2388
82480	5380300	3776930	R/C	Sil. Rhyolite						<0.008	5	<5	160		584	1122	446
82481	5380300	3777000	R/C	Sil. Rhyolite. Rock Chips						0.044	5	10	50		352	2261	1187
82482	5380300	3771010	R/C	Sil Rhyolite Breccia						<0.008	5	5	80		522	2359	986
82483	5380300	3777300	R/C	Dacite Lava.						"	5	10	130		409	3867	385
82484	5380360	3777530	R/C	Andesite Dyke N. Marionad						"	60	40	220		1390	6687	283
82485	5380400	3777600	R/C	Dacite Lava Track						"	15	10	185		262	4174	1049
82486	5380400	3777605	R/C	Dacite Lava						"	5	45	135		147	3723	946
82489	5379400	3778007	R/C	Dacite Lava Roadworks						"	5	10	115		752	1720	1339
82490	5379405	3778005	R/C	" " Creek						0.069	30	140	2500		183	1435	1021
82491	5379450	3778010	R/C	Dacite Lava						<0.008	5	5	60		1736	1321	679

Sample Number	Metal Content (p.p.m. unless specified) K	Fe	Ca	Al	Mg	Mo	Cr	W	Ta	Sn	V
82453	2·81	0·14	306		5958						94
82454	2·56	2·75	163		1033						30
82455	3·89	2·98	396		3248						23
82456	2·33	3·41	366		3325						22
82457	3·41	2·83	449		3281						22
82458	3·58	3·71	472		4166						21
82459	3·51	2·84	163		3579						16
82460	3·00	1·92	223		5901						25
82462	2·82	3·36	2530		6756						81
82463	3·15	0·24	2376		7773						78
82464	2·98	3·22	570		3934						45
82467	2·39	1·38	280		3105						11
82468	6·05	5·16	1391		16100						103
82469	2·26	3·69	540		10500						118
82470	0·93	1·69	298		2445						25
82471	0·15	0·93	1015		880						25
82473	0·46	2·21	600		5468						24
82474	1·39	1·96	650		6441						22
82476	0·96	1·18	803		2752						11
82477	4·02	1·85	253		4177						104
82478	4·26	3·38	650		5066						80
82480	1·66	4·92	703		14300						105
82481	3·79	1·88	306		4571						15
82482	2·43	2·15	193		5423						14
82483	4·05	3·69	811		8517						92
82484	0·34	11·64	309		40800						396
82485	3·76	4·11	766		9963						114
82486	2·53	3·04	592		7082						85
82489	3·34	2·10	276		2940						14
82490	3·54	2·24	298		3127						10
82491	1·61	1·71	984		2170						10

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APPENDIX 2.

DRILL LOGS AND ASSAY RESULTS

BPD 65 – BPD 69

SUMMARY DRILL LOG

BPD 70

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** SUMMARY DRILL LOG

LOCALITY:- BURNS PEAK
LICENCE:- EL 44/88
DRILL HOLE:-BPD65
OBJECTIVE:-To test for mineralization in strike extensions of the Brown's Tunnel stratigraphy at Leo's Find
RESULT:- Traces of mineralization in interpreted host rocks at 302-304m, 322-324m and 356-364m.

DRILLING DETAILS	
Hole drilled by:-	Diamond Drill. Tas
Commenced:-	
Completed:-	26/09/89
Total Depth:-	594.0 m
Logged by:-	A. Lorrigan
Annotated by:-	
Hole size:-	
Hole condition:- (Casing etc in hole)	PVC (32mm) to EOH

COLLAR DETAILS	
Local grid	
5685	EAST
5730	NORTH
AMG Coordinates	
378534.9	EAST
5384868.9	NORTH
598.9	R.L.

DOWN HOLE SURVEY DATA

Survey Method:- S.Shot camera

DEPTH	DIP	AZ	DEPTH	DIP	AZ
0.0	60°	265	400.0	60°	275
50.0			450.0	60°	275
100.0	61.5°	266	500.0	60°	276
150.0	61°	268			
200.0	61°	270	All Bearings mag.		
250.0	60°	272	For AMG add 12		
300.0	60°	275	550.0	59°	278
350.0	60°	275	594.0	58°	279

METERAGE FROM	TO	ROCK DESCRIPTION	MINERALIZATION	SAMPLE NO.	FROM	TO	%REC	LNGTH	SIGNIFICANT ASSAYS Cu	Pb	Zn	Ag	Au	Mn
0.0	120.9	Quartz Feldspar Porphyry												
120.9	135.0	Quartz Feldspar Porphyry/sediment/Tuff Breccia												
135.0	198.1	Quartz Feldspar Porphyry												
198.1	201.6	Acid Lithic Tuff												
201.6	257.2	Coarse epiclastics & Volcaniclastic Breccia												
257.2	281.1	Acid Pumiceous Tuff												
281.1	282.4	Andesite Lava												
282.4	283.7	Rhyolite Lava												
283.7	356.0	Sequence of interbedded coarse epiclastics, bedded sandstones and cherty sediments. Cherty layers @ 300.8-302.7, 321.5-323.0, 335.5-337.0 with traces pyrite. Strong sericite alt. & shearing at 346-353m.	Traces of sphalerite in veins	82145	302.0	304.0		2.0	18	720	1960		0.21	720
				82153	322.0	324.0		2.0	20	96	160		0.12	1440
356.0	369.2	Acid Pumiceous Tuff	Sp, py & rare galena as small patches & in veins throughout. Up to 30% combined sulphides from 362.1 - 363.1	82167-82170	356.0	364.0		8.0	73	3012	3783		0.19	1582

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GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** SUMMARY DRILL LOG

METERAGE FROM	TO	ROCK DESCRIPTION	MINERALIZATION	SAMPLE NO.	FROM	TO	%REC	LNGTH	SIGNIFICANT ASSAYS Cu	Pb	Zn	Ag	Au	Mn
369.2	458.0	Sequence of interbedded coarse epiclastics and bedded shales & sandstone Shearing @ 453.5-453.8.	Scattered patches of sp, py & galena to 411m	82186-82194	394.0	412.0		18.0	186	3237	6044		<.01	1805
458.0	594.0 (EOH)	Acid pumiceous, siliceous tuffs. Galena, sphalerite & coarse, cubic pyrite. Could be a vein. Coarse quartz-carbonate vein @ 488.45-488.5m. Strong chlorite alteration in vicinity of sulphides.	Banded sulphides @ 488.5-488.8. Galena sp & coarse cubic py Probably vein mineralization.	82202	488.0	490.0		2.0	740	52	3.35%		<.01	6200

421070

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** SAMPLING SUMMARY

LOCALITY:- BURNS PEAK DRILL HOLE NUMBER:- BPD65 EL 44/88

METERAGE FROM	TO	SAMPLE NUMBERS	SAMPLE METHOD	PURPOSE	LABORATORY	METHOD	ELEMENTS DETERMINED
120.0	136.0	82131 - 82138	SPLIT CORE	ASSAY	CLASSIC LABS (Fire Assay)	FAI	Au
202.0	210.0	82301 - 82304				AAS	Cu, Pb, Zn, Mn
280.0	290.0	82139 - 82143					
300.0	328.0	82144 - 82155					
334.0	412.0	82156 - 82194					
412.0	418.0	82307 - 82309					
430.0	434.0	82305 - 82306					
450.0	460.0	82195 - 82199					
484.0	492.0	82200 - 82203					
	68.4	82070	½ or ¼ CORE	PETROLOGY	MINES DEPT		
	120.0	82071		OXYGEN ISOTOPES	DR. G. GREEN		
	120.7	82072		WHOLE ROCK GEOCHEM			
	124.5	82073					
	132.8	82074					
	187.7	82075					
	198.5	82076					
	221.0	82077					
	259.8	82078					
	270.3	82079					
	276.7	82080					
	281.1	82081					
	283.5	82082					
	303.6	82083					
	304.2	82084					
	320.4	82085					
	371.3	82086					
	383.4	82087					
	397.4	82088					
	408.5	82089					
	409.1	82090					
	410.2	82091					
	434.8	82092					
	489.0	82093					
	490.5	82094					
	504.2	82095					
	533.3	82096					
	591.3	82097					

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GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

M	TO	ROCK DESCRIPTION	MINERALIZATION	NO.	FROM	TO	%REC	LNGTH	Cu	Pb	Zn	Ag	Au	Fe	Mn
.0	4.0	TRICONE													
.0	20.0	QUARTZ FELDSPAR PORPHYRY	4.0-4.2 Fspar pink 4.0-20.0 Weathered, pale coloured, FeO on fracture surfaces												
.0	62.2	QUARTZ FELDSPAR PORPHYRY Reduce to NQ @ 46.5	20.0-45.0 Grey matrix minor FeO on fracture surfaces 45.0-50.7 Matrix bleached, pale buff colour. 50.7-50.8 Int chl alt of matrix 50.8-51.6 Bleached pale matrix. 51.6-62.2 Grey matrix, relatively unaltered.												
.2	120.9	?Autobrecciated QUARTZ FELDSPAR PORPHYRY. ?Flow banding/texture @ 65.5m 5-10% to core	62.2-120.9 Mottled brecciated appearance due to patches of int chl alt between zones of sil pink alt.												
.9	135.0	BRECCIA consisting of rounded to sub angular, very fine grained, grey, sediment clasts, fine grained, pink ?lava clasts and some brecciated quartz-feldspar porphyry. Matrix is fine, green, wispy and bends around clasts in places i.e. 130.9m.	120.9-130.5 Int ser alt. of the matrix and some clasts. Rare chl zones. Other clasts sil, some pink. 130.5-133.3 Int chl alt. Also qz/cb/pink vng (avg 1cm thick,2/m) 132.8-133.0 Broken ground. 133.0-135.0 Int ser alt. Minor puggy clay (grey) patches. Broken grnd	82131	120.00	122.00			72	46	48		0.03		920
				82132	122.00	124.0			28	120	58		-0.01		350
				82133.0	124.0	126.0			9	52	50		-0.01		280
				82134.0	126.0	128.0			15	28	155		0.04		290
				82135.0	128.0	130.0			22	38	82		-0.01		430
				82136.0	130.0	132.0			9	78	270		-0.01		2050
				82137.0	132.0	134.0			12	120	690		-0.01		2150
				82138.0	134.0	136.0			5	65	125		-0.01		510
.0	198.1	QUARTZ FELDSPAR PORPHYRY	135.0-142.5 Grey rel unalt porph. 142.5-156.9 Pink/grn col, mostly from ser or pink alt of fspars. Matrix buff col in places. 156.9-169.6 Predom pink col, fspars &												

421072

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

ROM	TO	ROCK DESCRIPTION	MINERALIZATION	NO.	FROM	TO	%REC	LNGTH	Cu	Pb	Zn	Ag	Au	Fe	Mn
			matrix pink. Qz/chl vns, avg 1 cm, 2/m 70-80° to core. 4cm qz vns @ 159.9 & minor cb. 168.6-168.9 zone qz/lime grn ser alt. 169.6-198.0 Grey rel unalt porph 172.5 zone qz/chl vns, avg 1cm 65° to core. 198.0-198.1 Pink alt of fspars on porph contact.												
98.1	201.6	Angular sericitic and chloritic fragments sparsely distributed in a fine buff matrix. ACID LITHIC TUFF Some "wispy" sericitic fragments, could be pumice.	?phlogopite or FeCO3 alt of matrix. Ser & chl alt of frags.												
01.6	213.6	Higher density of clasts, sericitic, chloritic, flattened and angular fragments, also rounded, silicified rhyolite fragments in a fine matrix. VOLCANICLASTIC BRECCIA.	Clasts chl, ser & sil alt. Matrix chl ser & ?phlogopite (buff) alt. Predom chl.												
13.6	257.2	EPICLASTICS ?rhyolite Mostly siliceous & sericitic ?pumice clasts. Also pyritic, fine-grained siliceous sediment & strongly chloritized clasts. Fine clastic matrix (coarser than 198.1-213.6) Density of clasts in this rock also higher. Clast sizes from <1mm to 300mm. Crenulations in matrix @ 211.4, Bedding @ 248.9 @ 25° to core. From 253m, chloritic flattened ?pumice fragments.	Int chl alt of some clasts (usually smaller clasts) Very int ser alt of some ?rhy clasts, others are pink & sil. Matrix is lt grey cb alt.. Small patches of red (Fe) cb alt. 225.1 15mm fracture filled with CO3, qz & ser @ 25° to core												

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GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

FROM	TO	ROCK DESCRIPTION	MINERALIZATION	NO.	FROM	TO	%REC	LNGTH	Cu	Pb	Zn	Ag	Au	Fe	Mn
286.9	287.4	Sorted TUFFACEOUS SEDIMENT containing ?pumice clasts and then into a poorly sorted ACID VOLCANICLASTIC, with large (up to 70mm) ?flow banded clasts, small sericitic ?pumice fragments and larger, sericitic clasts. The clasts sometimes have poorly defined boundaries and grade into the fine matrix.	Minor f.g. py assoc with some sil alt. Minor cb & mod chl & ser alt of some clasts & matrix. @ 286m, chl/cb/qz/ py - filled fract 25mm @ 40mm° to core	82142.0	286.0	288.0			8	18	25		-0.01		500
287.4	288.0	Very fine grained ?divitrified RHYOLITE TUFF - some sericite fragments interpreted as pumice.	Int ser alt thr'out												
288.0	300.8	Coarsely bedded VOLCANICLASTIC SEDIMENTS angular & wispy, chloritic & sericitic clasts. Sand-size matrix Some large clasts of underlying fine grained siliceous sediments. Good graded bedding indicating uphole facing @ 296.7. cba @ 50°.	Int-mod ser & chl alt of clasts. Cb alt thru matrix.	82143.0	288.0	290.0			2	14	30		-0.01		750
300.8	306.7	Bedded, fine grained siliceous & tuffaceous ARENITE. Distorted flame structure at 302.5 indicates uphole facing. Cherty sediments from 301.8-302.8. cba @ 55°.	Minor ser alt thru some beds. Sp stringers in cherty beds.	82144.0 82145.0 82146.0	300.0 302.0 304.0	302.0 304.0 306.0			11 18 34	45 720 360	40 1960 1300		0.07 0.21 0.08		1060 720 510
306.7	313.5	Coarse EPICLASTICS consisting mostly of strongly sericitic & chloritic clasts of irregular, slightly flattened, shape, with some siliceous, flow banded rhyolite clasts, in a fine, grey matrix.	Int ser & chl alt of most clasts.	82147.0 82148.0	306.0 312.0	308.0 314.0			13 14	50 52	86 82		-0.01 -0.01		1520 1380

421074

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

FROM	TO	ROCK DESCRIPTION	MINERALIZATION	NO.	FROM	TO	%REC	LNGTH	Cu	Pb	Zn	Ag	Au	Fe	Mn
257.2	281.1	Light green rock with fine matrix containing predominantly small, sericitic and chloritic fragments, often flattened, interpreted as pumice. Also some rounded, siliceous clasts No rhyolite clasts. A wavy, layered, texture is visible in many places ?ignimbrite. Strong layering @ 60° to core @ 271.6-271.7. ACID PUMICEOUS TUFF	Cb alt throughout of fspars, through matrix and in "splotches" from 273.5-281.1 Matrix is lt gr, prob ser alt with minor cb. Frags, all int chl & ser alt. Some irreg zones of sil thru matrix & rare, small patches of f.g. py.	82139.0	280.0	282.0			3	12	25		-0.01		1040
281.1	282.4	Dark green, homogenous, feldspar-phyric, lava or dyke. ANDESITE LAVA Interpreted as an andesite because of the relatively high chlorite content. Both contacts sharp @ 30 to core.	Mod-int chl alt. Fspars => cb or ser with cb rims.												
282.4	283.7	Light & dark green, siliceous, chloritic and sericitic rock with brecciated appearance. Rare quartz phenocrysts, feldspar phenocrysts and ?flow banding near bottom contact which is @ 35° to core. (parallel to contact) RHYOLITE LAVA	Int sil alt. Mod chl & ser.	82140.0	282.0	284.0			3	14	24		-0.01		1000
283.7	286.2	SEDIMENTARY BRECCIA Angular-subrounded, mostly chloritic, but some fine grained sedimentary clasts too. Fine matrix.	Int chl alt of most clasts. Mod ser alt of matrix.	82141.0	284.0	286.0			3	14	22		-0.01		820
286.2	286.6	Light green, fine, wavy layering @ 25° to core. ?RHYOLITE TUFF	Alt a mix of ser & sil zones. Layering defined by ser clvg												
286.6	286.9	Bedded ARENITE. Bedding @ 30° to core. Soft sediment deformation on uphole contact indicates younging uphole grades downhole into	Int chl alt of some clasts. Rest of rock wk-mod ser alt.												

42107S

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

FROM	TO	ROCK DESCRIPTION	MINERALIZATION	NO.	FROM	TO	%REC	LNGTH	Cu	Pb	Zn	Ag	Au	Fe	Mn
286.9	287.4	Sorted TUFFACEOUS SEDIMENT containing ?pumice clasts and then into a poorly sorted ACID VOLCANICLASTIC, with large (up to 70mm) ?flow banded clasts, small sericitic ?pumice fragments and larger, sericitic clasts. The clasts sometimes have poorly defined boundaries and grade into the fine matrix.	Minor f.g. py assoc with some sil alt. Minor cb & mod chl & ser alt of some clasts & matrix. @ 286m, chl/cb/qz/ py - filled fract 25mm @ 40mm' to core	82142.0	286.0	288.0			8	18	25		-0.01		500
287.4	288.0	Very fine grained ?divitrified RHYOLITE TUFF - some sericite fragments interpreted as pumice.	Int ser alt thr'out												
288.0	300.8	Coarsely bedded VOLCANICLASTIC SEDIMENTS angular & wispy, chloritic & sericitic clasts. Sand-size matrix Some large clasts of underlying fine grained siliceous sediments. Good graded bedding indicating uphole facing @ 296.7. cba @ 50°.	Int-mod ser & chl alt of clasts. Cb alt thru matrix.	82143.0	288.0	290.0			2	14	30		-0.01		750
300.8	306.7	Bedded, fine grained siliceous & tuffaceous ARENITE. Distorted flame structure at 302.5 indicates uphole facing. Cherty sediments from 301.8-302.8. cba @ 55°.	Minor ser alt thru some beds. Sp stringers in cherty beds.	82144.0 82145.0 82146.0	300.0 302.0 304.0	302.0 304.0 306.0			11 18 34	45 720 360	40 1960 1300		0.07 0.21 0.08		1060 720 510
306.7	313.5	Coarse EPICLASTICS consisting mostly of strongly sericitic & chloritic clasts of irregular, slightly flattened, shape, with some siliceous, flow banded rhyolite clasts, in a fine, grey matrix.	Int ser & chl alt of most clasts.	82147.0 82148.0	306.0 312.0	308.0 314.0			13 14	50 52	86 82		-0.01 -0.01		1520 1380

421076

FROM	TO	ROCK DESCRIPTION	MINERALIZATION	NO.	FROM	TO	%REC	LNGTH	Cu	Pb	Zn	Ag	Au	Fe	Mn
		places. Down the hole, thin cherty interbeds appear. Most exhibit soft sediment deformation Approx cba = 70°.	cherty areas. 349.2-349.6 broken grnd, qz/cb vng & clay alt.												
351.3	355.9	Bedded ARENITE green/grey beds, cba 45° @ 351.5 & 25° @ 355.5.	F qz stringers esp in finer, chertier beds. Some carry sp & py. Trace dissem py.	82164.0	350.0	352.0			9	140	280		-0.01		630
				82165.0	352.0	354.0			16	320	850		-0.01		260
				82166.0	354.0	356.0			12	80	130		-0.01		460
355.9	357.4	Zone of weak shearing Difficult to identify rock type, probably TUFFACEOUS SEDIMENTS. Some rounded cherty sediment clasts. Traces of bedding @ 50° to core	Int ser alt. Mod sil by stringers in places. Dissem py to 5% & sp/gn ?Bedded @ 357.25-357.27.	82167.0	356.0	358.0			45	980	3400		-0.01		1250
357.4	369.2	PUMICEOUS TUFF OR SEDIMENT. Very fine, siliceous matrix. Fragments sericite (?pumice) 1-40mm. Banding visible @ 366.2-367.2.	Frags ser matrix, sil esp to 363.3 Flecks of sp,gn & py thr'out. 40mm qz/cb vn. Carries coarse sp & gn @ 359.9 & 360 in a zone of nodular sil & pink alt @ 359.7-360.2 Zone of more int sp/gn min @ 362.1-363.1, up to 30% comb sulphides.	82168.0	358.0	360.0			56	3350	3450		0.13		1780
				82169.0	360.0	362.0			56	1720	1980		-0.01		1150
				82170.0	362.0	364.0			135	6000	6300		0.60		2150
				82171.0	364.0	366.0			12	250	280		-0.01		3500
				82172.0	366.0	368.0			8	310	370		-0.01		2950
369.2	388.2	Interbedded SILTSTONE, SANDSTONE & CHERTY SEDIMENTS. cba = 30° @ 370.7, 70° @ 377 & 65° @ 383.3. Facing on flame structure and reworked bed @ 380m indicates uphole younging	Stringers of cb/qz thr'out, avg 10/m, some carry traces sp & gn.	82173.0	368.0	370.0			40	920	2200		-0.01		4500
				82174.0	370.0	372.0			6	155	125		-0.01		4000
				82175.0	372.0	374.0			9	700	1760		-0.01		2900
				82176.0	374.0	376.0			8	670	1900		-0.01		1860
				82177.0	376.0	378.0			6	1020	2550		-0.01		2050
				82178.0	378.0	380.0			5	320	480		-0.01		2500
				82179.0	380.0	382.0			25	180	460		-0.01		2100
				82180.0	382.0	384.0			54	1160	2550		-0.01		1540
				82181.0	384.0	386.0			24	900	1440		-0.01		1120
388.2	392.8	Transition between very fine grained bedded sediments & coarse epiclastics. PUMICEOUS TUFFACEOUS SEDIMENT. Consists predominantly of tiny sericitic ?pumice fragments in a very fine ?ash matrix. Rare lithic clasts.	1% dissem py thr'out. Also sml patches of sp & gn fuzzy edge therefore thought to be alt, not clasts. Ser alt of fragments & to a lesser extent, matrix. Minor sil alt of matrix.	82182.0	386.0	388.0			24	1060	1680		-0.01		1120
				82183.0	388.0	390.0			140	3250	3700		-0.01		920
				82184.0	390.0	392.0			35	420	830		-0.01		1040

421077

GEOPEKO ROSE **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

FROM	TO	ROCK DESCRIPTION	MINERALIZATION	NO.	FROM	TO	%REC	LNGTH	Cu	Pb	Zn	Ag	Au	Fe	Mn
392.8	408.7	Fine grained TUFFACEOUS SEDIMENT grades downhole into coarser SANDSTONE. Still pumiceous fragments/clasts. Increased lithic fragments. Some pumice fragments have quartz-filled vesicles.	Ser & pink/sil alt of clasts. Wk ser alt of matrix. Sml, discrete patches sp & gn min (≈1% overall).	82185.0	392.0	394.0			14	380	760		-0.01		14
				82186.0	394.0	396.0			70	2700	3050		-0.01		16
				82187.0	396.0	398.0			170	4000	5200		-0.01		15
				82188.0	398.0	400.0			240	4600	7400		-0.01		21
				82189.0	400.0	402.0			180	5600	5900		-0.01		17
				82190.0	402.0	404.0			-1000	-1000	-1000		!n!		-10
				82191.0	404.0	406.0			250	3700	7300		-0.01		17
				82192.0	406.0	408.0			145	1000	4700		-0.01		18
408.7	410.4	ACID PUMICEOUS TUFF Wispy sericite, rarely vesicular pumice fragments in fine ash matrix.	Int ser alt of frags. 1% py dissem thr'out. Patches of 10% comb sp & gn as discrete small (2-10mm) zones of min	82193.0	408.0	410.0			260	4150	9000		-0.01		13
410.4	457.9	Coarse EPICLASTICS Clasts consist of vesicular pumice, sediments & siliceous ?rhyolite in a sandy-cherty matrix.	Sil/pink & ser alt of most clasts. Occas blebs of sp/gn min, assoc with cb & qz stringers. 432.6-433.5 zone of qz vng & int-mod chl alt. Minor shrg. 453.1-453.6 Zone of shrg @ 25° to core Qz/cb vng & alt with chl alt.	82194.0	410.0	412.0			170	145	5800		-0.01		24
				82195.0	450.0	452.0			190	32	2150		-0.01		20
				82196.0	452.0	454.0			165	135	630		-0.01		60
				82197.0	454.0	456.0			40	24	84		-0.01		19
457.9	594.0	?ACID PUMICEOUS TUFF consists of wispy, sericitic and chloritic zones, which vary in size from <1mm-200mm. The majority average 30mm long. Some of the larger ones have siliceous spots which may be in-filled vesicles. The rock has a nodular appearance throughout due to irregular siliceous patches. The remainder of the matrix is softer and very fine grained. Some sericitic and angular shapes ?ex-feldspar crystals.	457.9-458.0 Int chl alt & py on contact 458-467.4 Int ser alt of frags, matrix mod ser & sil alt pink/lt gr col. 467.4-474.8 Some broad patches of dk chl alt. These may just be frags lying parallel to core. Incr chl alt of all clasts. Otherwise as above. 474.8-486 Ser & ?cb alt of frags. Lt pink, mod sil alt of matrix.	82198.0	456.0	458.0			9	52	95		-0.01		36
				82199.0	458.0	460.0			6	42	70		-0.01		17
				82200.0	484.0	486.0			4	8	98		-0.01		35
				82201.0	486.0	488.0			6	14	210		-0.01		62
				82202.0	488.0	490.0			740	52	33500		0.01		62
				82203.0	490.0	492.0			13	4	220		-0.01		15

421078

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

OM	TO	ROCK DESCRIPTION	MINERALIZATION	NO.	FROM	TO	%REC	LNGTH	Cu	Pb	Zn	Ag	Au	Fe	Mn
		From 472.4 number and size of pumice clasts decreases, then gradually increases again downhole. @ 495m. a vague, wispy, layered texture.	486-489.3 Int chl alt. Qz, cb, coarse vng @ 488.8-488.9. 488.9-489.3 Massive banded, sulph with sp,gn & cpy. Coarse sp & py near vng. Bottom (downhole) contact chl alt, no vng, looks like a sharp sed contact. Sulphide banding consistent at 15°. 489.3-497.5 Mod ser alt of sml frags & matrix. Also sil, nodular alt & pink col of matrix. 497.5-506.6 Dk gr col due to matrix & frags being part ser part chl alt. 597.5-533 Pink col thr'out matrix also mod ser & sil alt of matrix. Mod ser & chl alt of frags. 533.0-564.9 Lt grey col, mod-int chl alt of frags. Wk-mod chl & sil alt of matrix. Spotted appear due to ?cb alt of ?fspars 564.9-567 Pink alt of matrix. Int ser alt in places. Cb/qz (c.g.) vng. 567-586 Mod chl alt of frags & mod chl/sil alt of matrix.												

421079

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

FROM	TO	ROCK DESCRIPTION	MINERALIZATION	NO.	FROM	TO	%REC	LNGTH	Cu	Pb	Zn	Ag	Au	Fe
			Int chl/ser alt @ 578.1-578.4. Minor cb/qz vng with assoc traces of c.g. py. 586-590.7 Int pink col of matrix ?haematite alt. Int ser & chl alt of frags. Mod sil of matrix. Cb/qz vng; avg 25° to core, 2-20mm thick, 4/m. Chl selvedges. 590.7-594 Mod chl alt of clasts & matrix. Wk pink & mod sil alt in matrix.											
		E.O.H.												

421080

421081

DIAMOND DRILL LOG

PROSPECT: Burn's Peak E.L. 44/88 **HOLE No.:** BPD 66

Set-up Azimuth: 090° mag. **Decl'n:** 50° **Final Depth:** 261.0m

Date Commenced: 23/4/1990 **Date Finished:** 22/5/1990

Purpose of Hole: To test for extensions down plunge and along strike, of the Brown's Tunnel mineralisation.

Result: 6m @ 0.55 g/t Au; 520 ppm Cu; 4750 ppm Pb; 2.59% Zn; 1190 ppm Mn. In bedded, grey, siliceous shales.

Contractor: Diamond Drilling Tasmania. **Hole Size:** HQ/NQ

Casing (m steel/pvc in hole): 261 m pvc

Co-ordinates: Local 5440 N 4900 E 485 m RL
AMG 5384772.7 N 77707.6 E 485.4 m RL

Surveyed by: West Coast Mining & Engineering Surveys (G. Watts) **Date:** 5/10/1990

DOWN HOLE SURVEY DATA:

Depth	Azimuth	Decl'n	Depth	Azimuth	Decl'n
53	090° (mag)	51°			
100	091 "	45			
150	096 "	46			
200	096 "	45			
250	096 "	44			

Survey Instrument: Eastman down hole camera.

SAMPLING INFORMATION:

421082

From	To	Element/Isotopes Petrology/etc.	Sample	Method	Lab	Date
85	87	Au	Split Core	Fire (FA 1)	Classic S.A.	July 1990
151	185					
191	193	Cu Pb Zn Mn		AAS 2		
200	220					
243	251					
0	261	Down hole E.M.	—	EM 37	Geoterrex	July 1990

421083

LOG SUMMARY BPD66

LOCALITY:- BURNS PEAK **DRILL HOLE NO:-** BPD66

00.0	44.8	Rhyolitic Breccia, probably mass flow deposit.
44.8	55.0	Bedded sediments and reworked epiclastics with shale clasts.
55.0	75.0	Mixing zone between lava and sediments. Distorted shale clasts in a partly flow banded, acid lava breccia.
75.0	86.1	Intermediate lavas, flow banded.
86.1	148.9	?Acid lavas, flow banded.
148.9	157.3	Sediments and Lava Breccia, with mod-strong sericite alteration.
157.3	166.6	Grey bedded, siliceous shales. All mineralized (mostly pyrite as stringers, some chalcopyrite stringers). Main mineralization is from 158.9-163.9. 10-50mm bands semi massive pyrite; stringers and veins of quartz, galena, chalcopyrite, pyrite and sphalerite.
166.6	201.0	Sharp boundary with shearing in sericitic zone from 166.5-166.6. Probably a fault boundary Polymict epiclastic.
201.0	204.2	Bedded fine-grained siltstone & shale. Very weak, fine grained pyrite mineralization in the shale.
204.2	204.3	Probable Fault Zone
204.3	216.6	Acid pumiceous & lithic tuffs with fragments of coarse quartz-feldspar porphyry. Highly sericitized.
216.6	243.8	Quartz Feldspar Porphyry
243.8	249.6	Acid Pumiceous and Lithic Tuffs. Intense sericite alteration.
249.6 End of Hole	261.0	Quartz Feldspar Porphyry

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

LOCALITY:- BURNS PEAK DRILL HOLE NUMBER:- BPD66

METERAGE FROM	TO	ROCK DESCRIPTION	MINERALIZATION	SAMPLE NO.
0.0	2.5	Tricone Oxidised Rubble	0-16m red and black colour. Broken and lightly oxidised. Black col from MnO on nearly all fracture surfaces.	
2.5	44.8	Start HQ Core Green and pink breccia clasts sub-rounded - angular, 2-100mm, consist mostly of fine grained, pink siliceous quartz feldspar rhyolite. Clast boundaries are often jagged and sometimes diffuse. Matrix is green with feldspar phenocrysts and quite often, quartz phenocrysts. In places it is flow banded. (examples @ 17-18m @ 35° to core; 32.8-32.9 @ 55° to core; 39.7-39.9 @ 20° to core). The banding is high-lighted by siliceous bands which resembles the clasts and are sometimes indistinguishable from them. In places, the matrix and clasts blend into one another and the pink, siliceous rock surrounds the normal matrix rock. Probably an epiclastic rock derived from a debris flow of material of chiefly Rhyolitic composition.	16-44.8 FeO & minor MnO on fracture surfaces. Fspars => pk, prob haematitic albite. Sil zones commonly contain etched out vughs which prob contained cb. Much of the matrix is mod ser alt.	
44.8	46.3	Bedded, well sorted sand-stone. Flame structures @ 46.6m indicate up hole facing. cba = 55° @ 44.8m = 40° @ 46.3m	Pk, sil alt of some clastic material. Sericite thru matrix Minor cb alt.	

421084

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

46.3	54.6	Sedimentary sequence as follows: 46.3-46.9 coarse debris flow deposit. Rhyolite fragments. 46.9-49.1 Coarse sandstone, mostly rhyolite fragments. Possible some sedimentary clasts, also some abraded quartz crystals. Pyrite clasts @ 48.7m. Clay-filled fault @ 48.2m (angle to core = 85°) Uphole grading. 49.1-54.2 Debris flow deposits, comprising sedimentary (shale) and volcanic (mostly rhyolite) clasts. Appears to fine uphole clasts from <1mm-80mm. 54.2-54.6 Bedded sandstones and shales cba 60° Very broken. Microfaulted boundaries between sandstone and shale.	As above, with int ser of some larger clasts. Also albite (pk) alt of fspar phenos.
54.6	74.9	Peperite ?Andesite lava, flow banded, banding disrupted and at various angles to the core (25-75°). Clasts of softly deformed cherty grey shale are spread through the rock. This lithology seems to have resulted from lavas mixing with wet sediments	Fspars in the lava => cb & minor ser. Chl & ser are concentrated in particular flow bands thru the lava. Py occurs in some of the cherty shale, especially round its margins. Some bands of pk, sil alt also.
74.9	79.4	??Intermediate lava (Uncertain of composition because of alteration) Feldspar phenocrysts throughout. Minor flowbanding (@ 25° to core at 75.4m). Very rare cherty, grey shale clasts.	Cb alt of fspars. Bleached & pk, with very wk ser alt & stronger cb alt of matrix. Stringers of qz/py/chl (1-2/m).
79.4	82.7	Faulted contact at 30° to core. Lava breccia	Sil thru't, contact marked by a qz vn

421085

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

				Au	Ag	Pb	Zn	Mn	From	To	
		with possible some sedimentary clasts (could be an alteration effect).	4mm wide at 30° to core. Int-mod ser alt & umbiquitous, wk cb.								
82.7	86.1	Flowbanded, ?intermediate lava. Flow banding 60° (@ 82.9m), 20° (@ 85.7m) to core.	Mostly pk, sil alt. with patches of int chl. Py parallel to flow banding at 85.2m. Minor qz-cb stringers +/- chl (8/m)	601	48	50	110	1120	85	86	82253
				<0.01	26	26	220	1740	86	87	82254
86.1	148.9	Reduce to NQ Core at 86.2m. Porphyritic ?Acid lava. Composition of lava unclear. Very fine-grained, siliceous matrix. ?Feldspar phenocrysts throughout. Contact at 86.1m is a very irregular shape. There appears to be minor mixing of 2 lavas here. Flow banded as follows: 93.2-93.8 25° to core 112.7-113.3 12° 119.1-119.7 70° 124.8-125.4 45° 128.6-132.5 55° 133.4-146.5 30-40° A zone of brecciation occurs from 96.8-107.2. Small patches of angular lava breccias occur, often with strong alteration of the matrix. There are also clasts of grey, cherty shale. Flow banding is disrupted 119.0-119.3 & 132.1-132.5 Angular breccia & disruption of flow banding.	Ser of fspars thru't Prob also sil, tho' this may be primary. 86.1-96.8 Buff col Wk ser alt. 96.8-99.3 Broken grnd, silica & cb alt of matrix. Int ser alt 99.3-105. Mixture of pk alt with minor ser (or chl) & areas of stronger ser. 105-148.9 Incrs'ing chl alt. down hole. 118-119.8 Siderite with some stringers of qz-cb.								
148.9	157.3	A mixture of sediments & lava breccia. Sedimentary clasts are rounded and increase down hole. Flow banding 155.3-155.5 at 45° to core.	Brecciated texture exaggerated by alt. Some patches of very strong ser alt next to zones of pk sil. Also patches of strong chl.	<0.01	36	15	130	1220	151	153	82255
				<0.01	11	135	165	2700	153	155	82256
				0.01	11	165	210	3900	155	157	82257

421086

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

				Ag	Cu	Pb	Zn	Mn	From	To	
		Some clasts have numerous feldspar phenocrysts.									
157.3	166.6	Grey cherty shale with zones of bedded pyrite. Bedding disrupted in many places by microfaults, which are found throughout. Strong cleavage developed from 159.1-159.4m at 40° to core. cba = 50° @ 159.3m 28° @ 161.6m 40° @ 162.7m	Bedded py & py as stringers thru't. 158.6-159.0' qz-cb vns with coarse grained sphalerite. Vns exhibit some banding, perpendicular to vn walls. 159.0-159.4 Bedded pyrite with qz, galena & barite. Shearing evident in strong clvge develmt in this zone. 160.5-162.5 Zone of disrupted, bedded py & qz-chalcopy-py vns. Some galena & sp also found in with the bedded py. 162.5-166.5 Stringers of py, chalcopy, galena & sp.	0.14	450	1560	4600	1.12%	157	159	82258
				0.72	6700	4500	3.25%	2450	159	161	82259
				0.78	8100	4250	3.35%	570	161	163	82260
				0.15	810	5500	1.11%	550	163	165	82261
				0.17	460	3850	6400	1080	165	167	82262
				<0.01	11	115	230	2200	167	169	82263
				<0.01	26	88	175	1600	169	171	82264
				<0.01	7	48	94	1560	171	173	82265
				0.01	11	54	120	1340	173	175	82266
				0.01	11	50	160	1220	175	177	82267
				0.01	17	62	430	1580	177	179	82268
				0.01	5	46	105	1680	179	181	82269
				<0.01	2	24	80	2950	181	183	82270
166.6	167.0	Probable Fault Zone Rock type unrecognisable due to shearing @ 50° to core. Small fragment of shale @ 167.0m.	Strong ser in centre of shear zone. This area bounded by qz/cb vn'g. Py, galena sp in the shale.	<0.01	5	20.	70	1260	183	185	82271
167.0	201.0	Coarse epiclastic sediments. consist most of siliceous & feldspar-phyric, volcanic, probably rhyolite, clasts. Large grey, cherty shale clast @ 172.5m. Clasts are sub-angular-angular, size varies from <1mm-300mm. In general terms, sediments are coarsening down hole, though large clasts occur throughout the interval. From 167.0-182.5m, matrix is lime and siliceous, with rare feldspar crystals.	Some clasts & most of the matrix are siliceous. Other clasts are very strongly ser. Col appears to be an indication of the relative strength of pk ser & grn ser alt 167.0-171.5m Pale grn/grey with some pk clasts. 171.0-184.4 Predom pink. 184.4-187.: Predom dark grn with some pk clasts. Some of matrix lt grey. 187.1-196.? Predom								

421087

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

				Au	Cu	Pb	Zn	Mn	From	To	Sample No.
		From 182.3-196.2m, it contains numerous feldspar clasts and looks in places, like a lava. From 196.2-201.0m Very coarse, some clasts rounded. Matrix fine & siliceous. Contains some shale clasts. Bottom contact at 25° to core. Flame structures indicate facing uphole.	dk grey-grn. 196.2-201.0 Grey with pk & grn clasts. 180.9-182.8 Strong qz/cb vn'g. Also strong ser alt around fracts & brokn ground. Possible Fault. Main vein is 25m wide at 5° to core. Other vns are 10-35mm & @ 40-35° to core.	0.01	<2	22	55	2350	191	193	82272
201.1	204.2	Interbedded Black Shale and well sorted sandstone Some rhyolite clasts visible in the sandstone Cba = 25° @ 201.1m; 45° @ 202.1. Sequence fining uphole from 202.1-201.1. Below that is massive shale and some coarse sandstone in broken ground.		<0.01	7	120	280	970	200	202	82273
				<0.01	12	175	230	1200	202	204	82274
				<0.01	4	230	420	730	204	206	82275
				<0.01	7	155	180	930	206	208	82276
				<0.01	<2	145	145	1060	208	210	82277
				<0.01	2	24	54	910	210	212	82278
204.2	216.6	Faulted contact @ 30° to core (slicken sides visible) to Acid, Pumiceous and Lithic Tuff Contains quartz-phyric rholite and porphyry fragments. These increase down hole. Other lithics are feldspar phyric only. Some are rounded. Most of the rock is matrix, which is fine, but probable small pumice fragments are visible in places.	Fault zone with int. ser alt from 204.2-204.2. Int ser alt. Pk sil alt of rhyolite/ porphyry frags. Concentric bleaching patterns round most of the rounded frags. Qz/cb/cht vn'g with trace sp at uphole contact. Qz cb vns at 204.2 & 210.2m @ 45° to core. Very rare, hairline stringers with trace of py & galena thru it.	<0.01	<2	10	70	790	212	214	82279
				<0.01	<2	14	28	990	214	216	82280
				<0.01	4	96	44	2250	216	218	82281
				<0.01	<2	42	240	1440	218	219	82282
216.6	245.8	Quartz Feldspar Porphyry Uphole contact @ 30° to core. Brecciation around contact zone with large clasts of porphyry in the buff.	216.6 220.1 Strong qz/cb vn'g vns are barren. 5-50mm. avg 8/m, 50-55° to core. 220.1-243.4 Wk ser alt with minor py/cb vn'g.								

EL 44/88 DRILL HOLE #88-6

4210881

GEOPEKO ROSEBERY **DIAMOND DRILL CORE RECORD** DETAILED DRILL LOG

				Ag	Cu	Pb	Zn	Mn	From	To	
243.8	249.6	Acid Pumiceous Lithic Tuff. Same as 204.2-206.6, but more altered. Uphole contact at 30° to core. Distinct pink and green colouring.	Very int. ser alt. Also concentric pk alt zone around rounded lithics. Traces of sp & galena in small stringers.	<0.01	<2	34	16	530	243	245	82283
				<0.01	12	55	140	2250	245	247	82284
				0.02	40	185	840	1680	247	249	82285
				<0.01	4	54	94	1820	249	251	82286
249.6	261.0	Quartz Feldspar Porphyry Contact at 35° to core. Mild brecciation.	249.6-249.9 PK with some mod int ser alt. 249.9-261.0 WK ser alt. Minor cb vn's.								

Dr. 44/86 DRILL HOLE [illegible]

421089

Key to Graphic Logs.

421090

From	To	Graphic Grainsize .06 .3 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description.
1.	2.	3.	4.	5.	6.	7.	8.

1+2. - Meterage columns; down hole depth in meters.

3. - Graphic; Width of column indicates grainsize, measured as the size of phenocrysts in volcanic rocks and the average clast size in clastic rocks. Occasional clasts discounted.

Rock Type Legend;

Intermediate + Acid Volcanics.

Intrusive

- Quartz-feldspar porphyry

Lavas

- Rhyolite or Dacite
- Dacite where there are both.
- Andesite

Volcaniclastics.

- Pumiceous Tuff
- Coarse epiclastic

Mafic Volcanics.

Intrusive

- Mafic dyke

Lavas

- Basalt

Sediments.

- Bedded shale
- " cherty sed.
- " sandstone or siltstone.
- " conglomerate
- Coarse epiclastic

Textures (shown here for rhyolite)

- Feldspar-phyric
- Pervasive
- vesicular/amygdaloidal
- Hyaloclastite
- Lava breccia
- Flow banded

Alteration/deformation (shown for rhyolite)

- Breccia (origin unknown)
- Alteration + Deformation (totally obscuring rock type)
- Alteration
- Deformation (partially obscuring rock type)
- "Spotty" Alteration
- Alteration + Deformation (totally obscuring rock type)

4. Structure
- Angle of core to bedding, cleavage etc. Stated in degrees. Parallel to core = 0°

5. Alteration
- Indicates type + intensity

Type:
- sil - Silica
- ser - Sericite
- cb - Carbonate
- chl - Chlorite
- sid - siderite
- tour - tourmaline
- pun - pumpellyite

Intensity:
- (sil) - Weak
- Sil - Moderate
- Sil - intense

6. Visible Mineralisation.
- Gn - galena
- Sph - sphalerite
- cpy - chalcopyrite
- as - arsenopyrite

7. Percent pyrite - visual estimate.

8. Full rock description - lithology, alteration + deformation.

421091

DIAMOND DRILL LOG

PROSPECT: Burn's Peak Tas. E.L. 44/88 HOLE No.: BPD 67

Set-up Azimuth: 290° mag. Decl'n: 70° Final Depth: 463·5

Date Commenced: 24/5/90 Date Finished: 26/6/90

Purpose of Hole: To test for base metal mineralisation beneath Chester Mine.

Result: A pile of moderately to intensely altered dacite lavas with some epiclastic horizons was intersected. Pyrite, but not base metal mineralisation was found.

Contractor: Diamond Drillers Tasmania Hole Size: HQ/NQ

Casing (m steel/pvc in hole): 463·5 m P.V.C.

Co-ordinates: Local ____ N ____ E ____ m RL
AMG 53 80918·9 N 378533·2 E 33·1 m RL

Surveyed by: W.C.M.E.S. (G. Watts, Rosebery) Date: Oct. 1990

DOWN HOLE SURVEY DATA:

Depth	Azimuth (mag.)	Decl'n	Depth	Azimuth	Decl'n
30	285°	70			
60	283°	68·5			
90	284°	67			
121·5	283°	66			
151·5	284°	63			
211	281°	61			
241	28°	60			
271·5	280°	60			
301·5	28°	58			
331·5	28°	59			
361·5	282°	58·5			
391	282°	58·5			
421·5	280°	58			

Survey Instrument: Eastman Camera

421092

SAMPLING INFORMATION:

From	To	Element/Isotopes Petrology/etc.	Sample	Method	Lab	Date
0 (1m sample every 10m)	463.5	Au Cu Pb Zn Mn Fe K Na Ca Ag Ti Zr Ba	Split Core	FA 1 AAS 1 AAS3/AAS4 XRF 1	Classic	July 1990.
	22.5 39.0 63.0 97.6 102.0 55.7 63.0 121.5 166.5	Petrology	Thin Section		J. Stolz C.O.D.E.S (Tas. Uni.)	July 1990
0	463.5	Magnetic Susceptibility.				August 1990
0	463.5	Sirotem			McSkimming	Nov. 1990.

DRILL LOG SUMMARY

From	To	Core Description	Significant Assays
0	28.4	Mod. altered. feldspar-phyric dacite lava breccia	29-30 >3%Fe
28.4	34.75	Mafic dyke.	35-36 "
34.75	64.6	Mod. alt. Lithic Sandstone.	
64.6	64.7	Mafic dyke	
64.7	88.0	Mod. alt. dacite lava.	
88.0	89.3	Mafic dyke.	
89.3	96.6	Mod. alt. feldspar-phyric dacite lava.	
96.6	104.5	Intensely altered ?sediments approaching a sericite-ft. schist. 10% pyrite	89-94.5 >3%Fe 97-100 High K/Na.
104.5	106.4	Mod. altered silicic, dacitic ash.	
106.4	108.8	Mafic dyke.	
108.8	109.4	Mod. alt. dacite lava	
109.4	109.8	Mafic dyke.	
109.8	136.3	Mod. alt. amygdaloidal dacite lava.	
136.3	139.3	Fault breccia	
139.3	141.6	Sheared, intensely altered dacite lava.	
141.6	142.1	Mafic dyke.	
142.1	160.8	Mod. alt. amygdaloidal feldspar phyric dacite lava.	
160.8	162.8	Mafic dyke.	
162.8	173.0	Mod. altered feldspar-phyric dacite lava.	181-183 1760ppm Zn 170-183 High K/Na.
173.0	175.3	Mafic dyke.	
175.3	175.9	Polymict breccia ?sedimentary.	
175.9	182.4	Quartz-sericite altered ?Volcaniclastic sediment.	181-183 >3% Fe
182.4	183.4	Mafic dyke.	

421094

DRILL LOG SUMMARY

From	To	Core Description	Significant Assays	
183.4	189.7	Deformed, silicified Lithic Sandstone.		
189.7	213.5	Silicified amygdaloidal + feldspar-phyric. Dacite Lava.		
213.5	224.1	Mafic dyke.		
224.1	250.6	Mod. alt. feldspar phyric dacite lava	325-326 335-336	1560 ppm Zn 1620 " "
250.6	253.6	Deformed & intensely qtz-sericite-altered ?dacite lava. 8-10% py.	252-269 252-305	High K/Na ave > 3% Fe
253.6	261.5	Mod. alt. feldspar-phyric dacite lava.		
261.5	263.5	Deformed - intensely qtz-sericite altered ?dacite lava		
263.5	268.2	Siliceous rock "cherty breccia".		
268.2	284.8	Mod. alt. dacite lava	370-371	1500 ppm Zn
284.8	285.7	Mafic dyke.		
285.7	295.2	Mod. alt. dacite lava		
295.2	295.6	Mafic dyke.		
295.6	367.2	Mod. altered dacite lava.		
367.2	406.5	?Lithic Sandstone	380-381	7.3% Fe
406.5	437.9	Intensely- mod. alt. amygdaloidal dacite lava.	425-426 430-432	1500 ppm Zn 1220 " "
437.9	449.5	Intensely qtz-sericite altered + deformed ?sediment 5-10% pyrite.	438-448 436-450	High K/Na 7.3% Fe (ave)
449.5	463.5 E.O.H.	Mod. altered amygdaloidal dacite lava.		

421095

Depth (m)

TRICONE 1.3
HQ core

Foliation at 32° to core.

-10

-20

28.4
-30

34.75

42.0
-40

Foliation 35-38° to core.

-50

-60

Silbands

Bands @ 32° to core

	Cb Chl (Sil)	Tricone – No Sample 1.3m Start HQ core
5		Breccia with homogenous, irregularly shaped, feldspar-phyric clasts. ?Lava Breccia of Dacite composition. Alteration enhances fragmental appearance. Zones of more intense chlorite or pyrite alteration impart a mottled appearance. Weak silicification in the matrix.
2		Rare fine grained, chloritic & pyritic ?clasts. i.e. 22.0m Also a clast of cherty nature @ 16.7. T72377 T.S. 22.5m Dacitic Lava. quartz in groundmass; apatite as microphenocrysts. Mod. Altered.
	Cb	Green, vesicular, fine grained Basic dyke. Top contact Broken, bottom @ 80° to core. quartz, carbonate ± haematite stringers throughout.
1	Cb Chl Sil.	?Dacite lava breccia or Sediment. Breccia clasts are chloritic, matrix is a buff colour and siliceous. T.S. 39.0m T72378. Probably a polymictic Lithic Sandstone. Wk-Mod. Alt.
1	Cb Chl Ser (Sil)	Feldspar-phyric ?Dacite lava or ?Sediment. Wispy, siliceous banding from 62.8-63.2. Sericite increases at the expense of chlorite, down the hole. Pyrite along siliceous band boundaries. Occasional lithic fragments. T.S. 55.7m; T72379 Lithic Sandstone variable ser, chl alt.
4		T.S. 63.0m; T72380 Fine grained Lithic Sandstone.

Scale 1:250.

HOLE NE - BPD 67

Depth (m)	Lithology Sketch (not to scale)	Structure	Alteration	Pyrite %	Rock Description / Petrology Notes
64.6					
64.7			ser sil (cb) (chl)	2-5	Green, Basic dyke.
70					Feldspar-phyric ?dacite lava. Feldspars altered to carbonate. Silica alteration pervades the rock, leaving behind "islands" of sericite alteration. Minor chlorite alteration Pervasive, but weak, carbonate alteration Pyrite mostly in siliceous zones.
80					
88.0		Both contacts @ 45° ↓	(cb)		Green, vesicular, basic dyke.
89.3					
90		93.8-94.2 py-qtz vein, 15° to core. 94.8 fracture @ 15° foliation fra 95m @ 40° to core	sil (ser) (cb) (chl)	5 increasing	Feldspar-phyric ?dacite lava. Increasing silicification from 94.5 T.S. 97.6, T72381 And-dac. lava Int. Alt.
96.6	97.1 98.6 100.1	40° 60° 30° Sil bands ≈ 15mm wide	sil ser (cb)	10	Altered & deformed ?sediments. Approaching a schist. Granular, siliceous texture. Sil. bands
100	100.3	Top boundary 46° Bottom " 42°	sil alb.	10	zone with sharp boundaries. Numerous pink spots (?alt. feldspars) and sil-filled voughs. (?vesicles)
104.5 Reduce To NQ Core		Alignment of vesicles & sericite on foliation @ 38° py ± hem. stringers.	ser sil (chl)	2	Siliceous rounded features are interpreted as relicts of recryst. glassy lava. Rock pink from 104.5. Sericite flecks throughout T.S. 102.0m; T72382 Altered silicic ?dacitic ash.
106.4		Top contact broken Bottom " 20° ± qtz-carb stringers	chl (cb)	5 (bottom contact)	Green Basic dyke - ?dacite
108.8					
109.4					
109.8		Top contact 10° Bottom " 30° not parallel.	sil ser (cb) rare spots ? fuchsite ?	3-5	Buff-light-green colour. Fine grained mass. Clear quartz ± carbonate, chlorite & haematite fills voughs, interpreted as amygdales here.
120		- fractures, filled with - blue amorphous silica.			Altered silicic ?dacitic ash or, more likely, Dacite/andesite lava. T.S. 121.5m T72383. Silicified Andesite/Dacite

Scale 1:200.

HOLE No. - BPD 67

5 cm

Depth (m)	Structure	Alt	Min	Rock Description / Petrology
	Sharp uphole boundary on alteration @ 15°	sil ser		Zone of differing alteration, grey colour with siliceous patches. Flecks of sericite.
136.6		sil ser (cb)	3-5	Return to buff - lt green alt. Closely packed, clear, Silica Spheres.
139.3	Tectonic / Fault Breccia	ser sil	3	Breccia, probably tectonic. Numerous fractures filled with sericite and amorphous silica.
141.6	Contacts 50°	sil ser		?Vesicular Dacite sheared + intensely altered. Nodules of silicification.
142.1	Folded qtz/chlor/py stringers throughout. F.A. 10° 147.5m, py band @ 5°	cb chl (sil)	3	Green, vesicular dyke. Fine ground mass. Rounded and flattened blebs of clear quartz - interpreted as amygdales. Amygdaloidal? Dacite Lava. Carbonate alteration probably siderite. Size of amygdales appears to fine up hole.
154.7		cb ser (sil)	5	?Feldspar-phyric, dacite lava. Looks brecciated at the top, with sericite-alt. fragments in a more siliceous matrix. Becomes more homogeneous down hole.
160.8	Blurred uphole contact @ 20° downhole @ 20°	cb chl		Green, mafic dyke.
162.8	band @ 30° Foliation defined by a network of py. @ 40°	cb ser (sil) chl.	5	Feldspar now carbonate. Chlorite alteration extends down hole out of the dyke. T.S. 1665 T72384. Silicified andesite-dacite.
173.0	Uphole contact 60° Downhole ~ 40°	chl cb	2	Green, vesicular, mafic dyke. Pyrite on bottom contact.
175.3				
175.9	Cleavage @ 40°	Ser cb Sil	3	Polymictic Breccia. - grey sil seeds (cherty) clasts, pink/sil. acid volc + sericite clasts. conglomerate. Deformed
181.3		ser sil	5	Quartz - sericite - altered ? Volcaniclastic pyrite - networks of veins.
182.4	chl/carb/py veins 182.3-182.5 40° or 20°	sil ser	Tr Sp. @ 181.6-181.8	Quartz - sericite altered Fragmental appearance. Could have been a sediment. Possible py clast @ 181.4
183.4	Uphole 60° downhole 40° uphole contact 60° downhole 40°		3	Lithic Sandstone. / Green Mafic Dyke.

Scale 1:100.

HOLE No. -

5 cm

Depth (m.)	Grain Size (mm)	Structure	Alt.	Cu / Pb / Zn %	Pyrite %	Rock Description / Petrology	Samples
189.7			Sil Cb		5	Deformed + silicified ?Lithic sandstone. Possible fragmental texture. 187.5 - 190.1	
190		Brecciation ?Fault @ 205.5	Sil Cb (Chl) rare spots of ?fuchsite		3	Grey rock, fine, homogeneous groundmass. Numerous quartz & carbonate-filled vughs ?amygdales. Vesicular ?dacite lava.	
200							
207.5						gradational boundary	
		q-carb veins 207.5-211.5. 40° to core. Networks of infilled fractures	Sil Cb ?Sid ?fuchsite spots		3-7	Textures removed by alteration + deformation. Homogeneous, siliceous rock. ?Silicified dacite lava.	
210							
214.1		Upholde contact 30°; Downhole 35° Both parallel to cleavage.				Green mafic dyke	
230			Ser Sil Cb ?Sid		3-5	Feldspar-phyric ?dacite lava. feldspars now carbonate / quartz. Strong brecciated appearance, 228-234m.	
240		241.2 Weak Shearing 35°			2415 1-3		
250							

Scale 1:250.

HOLE No:- BPD 67. page 4 of 8

5 cm

Depth (m)	Structure		Rock Description / Petrology Sample
250	250.6		
	253.6	Sil Ser.	8-10 Deformed ?dacite lava. Strong silica + sericite alteration.
		Sid (Sil) (Ser) rare spots fuchsite	1-2 Feldspar-phyric ?dacite lava. Feldspars now carbonate, prob. siderite.
260	261.5	Brecciated 260-261.5. Strong cleavage 45°.	
	263.0		2-5 Deformed + altered ?lava.
		Sil (Sid) (Ser)	5-10 Increasingly siliceous rock. Patches of "cherty breccias" - with rounded sil. fragments, many have purple colour. Siliceous band 2653-2654. Altered sediment.
	268.2	- sil band - 15-20°	
270		Qtz-carb vein 282.7. Broken ground 283.8-284.0	Altered ?dacite lavas. Textures obliterated except for ex-feldspar phenocrysts @ 276.5-277.8. Some dark green-black patches of chlorite. Also some sericite patches. Major alteration is silica.
		Sil Ser (chl) (Sid)	1-3
280		Bleached contact @ 30°	
	284.8		8 Alteration makes rock difficult to identify.
	285.7		Green Mafic dyke.
		contact 50° Slightly cross-cuts cleavage which is 30° 2859-367.5 is a zone of qtz-carb veining. Intensity of veins + orientation varies from 60-80°. Most dip the same way as cleavage, others conjugate. Some contain chlor ?related to dykes. Sid Sil (chl) (Ser)	2 Feldspar-phyric ?dacite lava. Stronger siderite alteration.
290		contacts @ 35°	
			Green, mafic dyke.
300			
310			

Scale 1:200.

HOLE No:-

5 cm

Depth (m)	Grain Size (mm)	Structure	Alt.	Py %	Rock Description / Petrology / Samples
320		Zone of late (post cleavage) veining.	sil chl (sid) (ser)	1-3	Feldspar-phyric ?dacite lava. Brecciated appearance ?lava breccia. Clasts frequently more siliceous than the matrix. Alteration variable, a lot of chlorite overprinting from late stage veins. Some siliceous zones have a pink tinge. Colour predom. dark green, though areas of stronger sideritic alteration are buff colour.
330		Veins @ 318.5, 322.1 have altered margins extending 4cm into host.			
340		Veins ar ~2mm, 30-25° to core.			
		Cleavage 40°	sil chl	1	
342					Rock becomes coarser grained. Sil-filled vughs. Strong sil. top contact, strong chl.
350					Feldspar-phyric ?dacite lava. Predom. colour dark green.
		High density chl/cb/sil veins ≈20/m.	chl cb.		
360		Some ± chlorite ?dyke assoc. Bleaching around veins 364.9-367.0		1	
367.2					
367.4			sil cb chl sil.		?Dacite lava clear-qtz-filled blebs ?amygdales. Diffuse boundaries.
370			ser sid sil	1 inc to 3 d/h.	Probably a Lithic Sandstone cherty clasts and aggregates of feldspar (⇒CO_3) throughout

Scale 1:200.

5 cm

HOLE No:- BPD67

Depth	Grain Size (mm) 16 5 2 1 ⅛	Structure	Alt.	Py %	Pyrite %	Rock Description / Petrology Sample
						Patch strong chlor + coarser by 400·4 – 400·53. Probably a clast.
380			Ser sid sil			
390						
400			chl Ser sid sil			/
406·5						
410			chl sid sil		2 inc to 3	Rock has a brecciated appearance Clasts more siliceous than matrix, they are cloud-shaped. Matrix fine chlorite + siderite
420						Rock contains fine clear qtz-filled vughs, thought to be vesicles/amygdales.
427·35					10	Variably silicified ?dacite lava.
430			Sil Ser sid ↓ inc intensity		2-3	? Vesicular dacite lava. qtz - filled blebs Fine qtz - ser - sid matrix. Even, no fol - phenos.
437·9						

Scale 1:200.

5 cm

HOLE No:- BPD 67

Depth (cm)	Grain Size (mm) 64 32 16 8 4 2 1 ½ ¼	Structure	Alt	Py/Pl	Pyrite %	Rock Description / Petrology	Sample
440	R	Shearing @ 40°	sil ser cb rare thick sil		5	Altered & deformed. "Nobby" appearance	
					10	Breccia @ 437.9-438 with angular, vein-type qtz & in a sericite matrix. Cherty fragments from 440m. Probably a sediment.	
449.5		Shearing @ 45°					
450	V	Weak cleavage @ 45°.	sid chl sil		3	Rock with fine ground mass and apparent vesicles, filled by clear quartz. Vesicular dacite lava.	
460	V						
463.5		END OF HOLE.					

Scale 1:20.

HOLE No:- BPD 67.

5 cm

421103

BPL 67

.mple No.	From	TO	Au;ave	Cu	Pb	Zn	Ag
82287	4	6	0.04		30	68	38
88	9	10	<0.01		13	88	50
89	14	15	<0.01		10	32	60
90	19	20	<0.01		14	20	62
91	24	25	<0.01		7	20	72
92	29	30	<0.01		4	22	125
93	35	36	<0.01		6	20	94
94	40	41	<0.01		13	20	62
95	45	46	<0.01		4	15	75
96	50	51	<0.01		22	18	78
97	55	56	<0.01		8	18	68
98	60	61	<0.01		11	48	50
99	61	62	<0.01		7	100	45 <1
82300	62	63	<0.01		25	58	36 <1
78701	69	70	<0.01		11	22	48
2	74	75	0.01		14	22	62
3	79	80	<0.01		7	22	195
4	84	85	<0.01		6	15	62
5	89	90	<0.01		17	16	110
6	93.5	94.5	0.01		24	38	68 <1
7	96	97	<0.01		10	18	18
8	97	98	<0.01		15	10	8 <1
9	98	99	<0.01		13	18	70 <1
78710	99	100	<0.01		9	14	15
11	100	101	<0.01		11	20	12
12	101	102	<0.01		11	18	14
13	105	106	<0.01		19	12	15
14	110	111	0.02		17	15	20
15	115	116	<0.01		10	25	35
16	120	121	0.01		5	20	38
17	125	127	<0.01		7	45	32 <1
18	127	129	<0.01		5	60	32
19	129	131	<0.01		5	36	28
78720	135	136	<0.01		16	12	46
21	140	141	<0.01		8	16	70 <1
22	145	146	<0.01		8	8	28
23	150	151	<0.01		3	15	54 <1
24	155	156	<0.01		24	18	56
25	160	161	<0.01		12	15	790 <1
26	165	166	<0.01		11	16	260
27	170	171	<0.01		17	14	120
28	175	177	<0.01		22	36	96
29	177	179	<0.01		15	36	78 <1
78730	179	181	<0.01		20	155	710
31	181	183	<0.01		28	125	1760
32	185	186	<0.01		12	32	40 <1
33	190	191	0.01		4	50	52
34	195	196	0.01		6	160	100 <1
35	200	201	<0.01		7	36	84
36	205	206	<0.01		4	34	290
37	210	211	<0.01		6	34	50
38	215	216	<0.01		15	470	340
39	220	221	0.01		19	175	300

421104

Sample №	From	To	Au. Avg.	Cu	Pb	Zn	Ag
78740	225	226	<0.01	10	36	78	1
41	230	231	<0.01	7	230	38	1
42	235	236	<0.01	15	155	145	1
43	240	241	<0.01	40	190	670	1
44	245	246	<0.01	22	100	180	<1
45	250	252	<0.01	44	88	60	2
46	252	254	<0.01	15	70	74	1
47	259	261	<0.01	2	44	470	1
48	261	263	<0.01	6	12	30	<1
49	263	265	<0.01	2	6	10	<1
78750	265	267	<0.01	7	10	8	1
51	267	269	0.01	14	22	10	1
52	275	276	<0.01	62	25	64	<1
53	280	281	<0.01	17	15	58	1
54	286	287	<0.01	10	26	250	1
55	295	296	<0.01	105	76	88	1
56	305	306	<0.01	16	74	86	1
57	315	316	<0.01	11	38	25	1
58	325	326	<0.01	80	62	1560	1
59	335	336	<0.01	58	38	1520	<1
78760	345	347	<0.01	18	75	80	1
61	350	351	<0.01	8	16	92	1
62	360	361	<0.01	30	35	62	1
63	370	371	0.01	16	240	1550	2
64	380	381	<0.01	9	35	780	1
65	385	386	<0.01	3	16	55	<1
66	390	391	<0.01	5	12	60	1
67	395	396	<0.01	6	15	50	1
68	400	401	<0.01	7	16	64	1
69	410	411	<0.01	6	26	86	1
78770	420	421	<0.01	7	35	105	1
71	425	426	<0.01	40	370	1500	<1
72	430	432	<0.01	45	32	1220	1
73	432	434	0.01	18	22	62	1
74	434	436	<0.01	19	50	210	1
75	436	438	<0.01	42	52	680	1
76	438	440	<0.01	15	18	46	1
77	440	442	<0.01	7	14	135	1
78	442	444	<0.01	11	30	30	1
79	444	446	<0.01	13	28	330	1
78780	446	448	<0.01	16	46	460	1
81	448	450	<0.01	17	35	200	1
82	450	452	<0.01	18	22	230	1
83	460	462	<0.01	18	18	115	1

421105

Sample No.	Fe	Ti	Zr	Ba	Ti/Zr
82287	18700	2900	220	730	6.4482759
88	22000	2900	195	770	7.5862069
89	31000	2900	190	490	10.689655
90	22500	2850	195	630	7.8947368
91	24500	2750	190	500	8.9090909
92	44500	5300	72	820	8.3962264
93	30500	2550	170	510	11.960784
94	21500	2300	170	420	9.3478261
95	22000	2550	175	580	8.627451
96	23500	2450	175	630	9.5918367
97	25000	2500	185	520	10
98	25500	2700	180	510	9.4444444
99	21500	2250	180	590	9.5555556
82300	26000	2550	175	500	10.196078
78701	26500	2600	180	510	10.192308
2	24500	2600	185	570	9.4230769
3	24000	2850	195	690	8.4210526
4	21500	2400	180	600	8.9583333
5	30500	3700	280	690	8.2432432
6	41500	2850	170	770	14.561404
7	22000	2500	180	1100	8.8
8	21000	2800	185	1140	7.5
9	24000	2950	210	990	8.1355932
78710	21500	2800	195	960	7.6785714
11	28500	2800	500	1020	10.178571
12	26000	2800	190	1060	9.2857143
13	22500	2550	180	1400	8.8235294
14	21000	2650	180	960	7.9245283
15	22000	2600	185	800	8.4615385
16	21500	2600	190	670	8.2692308
17	23000	670	195	760	34.328358
18	23000	2750	195	690	8.3636364
19	25500	2750	185	640	9.2727273
78720	25500	2550	180	720	10
21	21500	2950	185	930	7.2881356
22	23000	2600	180	690	8.8461538
23	19700	2500	175	680	7.88
24	22000	1000	180	910	22
25	26500	3300	145	840	8.030303
26	28000	2700	180	940	10.37037
27	27000	440	185	1160	61.363636
28	35000	3200	170	890	10.9375
29	26500	2800	185	790	9.4642857
78730	28000	2750	185	580	10.181818
31	35500	4450	165	840	7.9775281
32	25000	2800	185	730	8.9285714
33	29000	2550	175	740	11.372549
34	24000	2700	180	700	8.8888889
35	24500	2450	180	500	10
36	24000	2600	190	670	9.2307692
37	26000	3100	180	680	8.3870968
38	28500	2600	180	580	10.961538
39	23000	2700	185	590	8.5185185

421106

Sample No.	Fe	Ti	Zr	Ba	Ti/Zr
82287	18700	2900	220	730	13.181818
88	22000	2900	195	770	14.871795
89	31000	2900	190	490	15.263158
90	22500	2850	195	630	14.615385
91	24500	2750	190	500	14.473684
92	44500	5300	72	820	73.611111
93	30500	2550	170	510	15
94	21500	2300	170	420	13.529412
95	22000	2550	175	580	14.571429
96	23500	2450	175	630	14
97	25000	2500	185	520	13.513514
98	25500	2700	180	510	15
99	21500	2250	180	590	12.5
82300	26000	2550	175	500	14.571429
78701	26500	2600	180	510	14.444444
2	24500	2600	185	570	14.054054
3	24000	2850	195	690	14.615385
4	21500	2400	180	600	13.333333
5	30500	3700	280	690	13.214286
6	41500	2850	170	770	16.764706
7	22000	2500	180	1100	13.888889
8	21000	2800	185	1140	15.135135
9	24000	2950	210	990	14.047619
78710	21500	2800	195	960	14.358974
11	28500	2800	500	1020	5.6
12	26000	2800	190	1060	14.736842
13	22500	2550	180	1400	14.166667
14	21000	2650	180	960	14.722222
15	22000	2600	185	800	14.054054
16	21500	2600	190	670	13.684211
17	23000	670	195	760	3.4358974
18	23000	2750	195	690	14.102564
19	25500	2750	185	640	14.864865
78720	25500	2550	180	720	14.166667
21	21500	2950	185	930	15.945946
22	23000	2600	180	690	14.444444
23	19700	2500	175	680	14.285714
24	22000	1000	180	910	5.5555556
25	26500	3300	145	840	22.758621
26	28000	2700	180	940	15
27	27000	440	185	1160	2.3783784
28	35000	3200	170	890	18.823529
29	26500	2800	185	790	15.135135
78730	28000	2750	185	580	14.864865
31	35500	4450	165	840	26.969697
32	25000	2800	185	730	15.135135
33	29000	2550	175	740	14.571429
34	24000	2700	180	700	15
35	24500	2450	180	500	13.611111
36	24000	2600	190	670	13.684211
37	26000	3100	180	680	17.222222
38	28500	2600	180	580	14.444444
39	23000	2700	185	590	14.594595

421107

Sample Nº	Fe	Ti	Zr	Ba	Ti/Zr
78740	29000	3550	260	630	13.653846
41	27500	2450	185	450	13.243243
42	25000	2550	185	510	13.783784
43	28000	2600	180	500	14.444444
44	23500	2559	190	580	13.468421
45	27500	2500	210	820	11.904762
46	34500	2550	185	660	13.783784
47	25500	2500	190	700	13.157895
48	31000	2250	145	400	15.517241
49	21500	790	210	560	3.7619048
78750	35000	3050	180	550	16.944444
51	40500	3000	185	880	16.216216
52	22000	2500	190	770	13.157895
53	28000	2500	190	700	13.157895
54	49500	4550	98	810	46.428571
55	36000	1800	165	460	10.909091
56	31500	2700	200	580	13.5
57	27000	2600	180	550	14.444444
58	21500	2450	190	580	12.894737
59	23000	2450	175	700	14
78760	28500	1820	185	490	9.8378378
61	25500	2900	200	510	14.5
62	27500	2850	190	720	15
63	27500	2800	185	1420	15.135135
64	30000	1940	170	550	11.411765
65	26500	2300	180	700	12.777778
66	24500	260	190	780	1.3684211
67	28000	2600	185	730	14.054054
68	33000	2450	160	980	15.3125
69	27500	2350	180	630	13.055556
78770	24500	2450	185	600	13.243243
71	21500	2600	210	600	12.380952
72	25000	2700	270	880	10
73	23000	2500	180	870	13.888889
74	27500	430	180	780	2.3888889
75	31000	2650	170	880	15.588235
76	34000	480	195	1040	2.4615385
77	29000	2800	185	1640	15.135135
78	28000	2850	190	1000	15
79	41000	2650	185	1140	14.324324
78780	43000	2900	185	980	15.675676
81	35500	2750	185	1220	14.864865
82	26000	2350	185	670	12.702703
83	28000	2600	180	860	14.444444

421108

	Mn	Na	K	Ca	Mg
78740	3450	16300	27500	38000	13400
41	2350	20500	29000	26000	6800
42	3000	14800	24500	21500	8700
43	4350	17100	26500	26000	11000
44	3400	16600	31500	21000	10000
45	1400	2950	40000	6100	7100
46	790	470	38500	7300	8200
47	2100	11300	33500	12100	11600
48	90	560	40000	690	5500
49	30	610	39000	820	3600
78750	35	510	38000	530	3900
51	75	470	76500	810	5500
52	2250	15800	40000	29500	10200
53	2600	17500	51500	27000	11300
54	4300	4050	57000	41000	28500
55	7000	25500	26500	31500	14100
56	3850	26000	23500	24500	9700
57	4600	17800	29000	19100	7100
58	3550	22500	24000	25500	8400
59	3100	22500	19400	24000	10600
78760	1920	24500	22500	24500	10700
61	1420	29500	18700	6400	7400
62	3950	22000	31000	18900	7800
63	2150	9600	64000	11000	10400
64	4400	25500	29500	20000	11900
65	3350	24500	33500	22000	10800
66	2900	20500	30500	19800	12100
67	2700	23500	23000	20000	11000
68	5200	16800	21500	26500	10300
69	4050	21500	24000	23500	12800
78770	3800	25000	21000	22500	13900
71	3200	25000	24000	21000	10300
72	4550	19100	36000	21500	9200
73	4550	19000	26500	20500	7900
74	3500	18500	22000	13700	8500
75	1520	6900	35000	5300	7600
76	150	540	68000	1250	5400
77	800	560	70500	1160	8400
78	84	550	69500	590	5300
79	830	550	61500	1520	9900
78780	1300	490	51000	1720	14900
81	2100	4100	59500	7300	10400
82	5200	22000	45000	19800	10500
83	3450	30000	19900	20000	7100

421109

Sample No.	Mn	Na	K	Ca	Mg
82287	20	5700	41000	105	6300
88	20	15300	35500	420	5200
89	1120	18700	31000	730	9200
90	520	19600	28000	500	9100
91	880	14800	35500	1660	10100
92	1880	20500	24500	50000	15300
93	1020	22500	19700	28000	11000
94	910	25000	19700	26500	8300
95	1240	17200	27000	28500	9600
96	1060	16300	22500	27000	10300
97	890	21000	23500	27500	10400
98	820	21500	26500	24000	8600
99	920	19900	27500	25000	8100
82300	850	23000	22500	24000	7000
78701	940	22000	28000	25500	8700
2	930	21500	24500	24000	9600
3	990	17800	31500	29000	10200
4	970	19400	28500	25000	9500
5	1400	16600	23500	23000	14000
6	2800	13600	28500	42000	10200
7	340	4900	38000	6000	5400
8	42	560	41000	630	4350
9	30	490	30500	650	4200
78710	35	550	40000	440	4800
11	330	5600	39500	5000	5900
12	230	5300	41500	1920	5500
13	640	11700	33000	100	5500
14	1440	18300	30000	185	6100
15	2150	15900	31000	180	8400
16	1340	620	35500	185	7800
17	200	580	37500	1260	5200
18	200	680	38500	1760	4000
19	1950	570	35000	32500	8200
78720	1100	13900	29000	22500	9700
21	1200	3450	36500	25500	10600
22	1150	16300	35000	29000	6100
23	1440	10000	33000	19800	8700
24	2300	520	39000	25000	8900
25	3050	1300	42500	13400	11500
26	6400	400	40500	18700	10800
27	2750	420	40500	9200	10900
28	680	440	40000	5900	7500
29	420	430	37000	4550	6400
78730	350	380	39000	4550	8400
31	3450	400	38500	30500	13100
32	2150	19800	28500	17000	6600
33	1600	16100	30000	16400	7000
34	2900	2400	27500	24500	6800
35	1960	25500	25000	24500	7000
36	1520	28500	24500	17400	7300
37	1950	24000	29500	24000	5500
38	3650	15100	30500	17800	8000
39	3750	13600	30000	26000	9400

421110

Sample No.	Ba/K	A.I.	K/Na
82287	1.7804878	89.068826	7.1929825
88	2.1690141	72.13754	2.3202614
89	1.5806452	67.41573	1.657754
90	2.25	64.86014	1.4285714
91	1.4084507	73.47728	2.3986486
92	3.3469388	36.083409	1.195122
93	2.5888325	37.807882	0.8755556
94	2.1319797	35.220126	0.788
95	2.1481481	44.471446	1.5697674
96	2.8	43.101183	1.3803681
97	2.212766	41.140777	1.1190476
98	1.9245283	43.548387	1.2325581
99	2.1454545	44.223602	1.3819095
82300	2.2222222	38.562092	0.9782609
78701	1.8214286	43.586698	1.2727273
2	2.3265306	42.839196	1.1395349
3	2.1904762	47.118644	1.7696629
4	2.1052632	46.116505	1.4690722
5	2.9361702	48.638132	1.4156627
6	2.7017544	41.039236	2.0955882
7	2.8947368	79.926335	7.755102
8	2.7804878	97.44306	73.214286
9	3.2459016	96.819196	62.244898
78710	2.4	97.837956	72.727273
11	2.5822785	81.071429	7.0535714
12	2.5542169	86.68388	7.8301887
13	4.2424242	76.540755	2.8205128
14	3.2	66.135385	1.6393443
15	2.5806452	71.016583	1.9496855
16	1.8873239	98.17481	57.258065
17	2.0266667	95.868882	64.655172
18	1.7922078	94.570538	56.617647
19	1.8285714	56.640881	61.403509
78720	2.4827586	51.531292	2.0863309
21	2.5479452	61.932939	10.57971
22	1.9714286	47.569444	2.1472393
23	2.0606061	58.321678	3.3
24	2.3333333	65.241079	75
25	1.9764706	78.60262	32.692308
26	2.3209877	72.869318	101.25
27	2.8641975	84.234677	96.428571
28	2.225	88.224368	90.909091
29	2.1351351	89.70649	86.046512
78730	1.4871795	90.579018	102.63158
31	2.1818182	62.545455	96.25
32	2.5614035	48.817803	1.4393939
33	2.4666667	53.23741	1.863354
34	2.5454545	56.045752	11.458333
35	2	39.02439	0.9803922
36	2.7346939	40.926641	0.8596491
37	2.3050847	42.168675	1.2291667
38	1.9016393	53.921569	2.0198675
39	1.9666667	49.873418	2.2058824

421111

Sample No	Ba/K	A.I.	K/Na
78740	2.2909091	42.962185	1.6871166
41	1.5517241	43.499392	1.4146341
42	2.0816327	47.769784	1.6554054
43	1.8867925	46.526055	1.5497076
44	1.8412698	52.465234	1.8975904
45	2.05	83.882458	13.559322
46	1.7142857	85.735267	81.914894
47	2.0895522	65.839416	2.9646018
48	1	97.326203	71.428571
49	1.4358974	96.752214	63.934426
78750	1.4473684	97.578016	74.509804
51	1.1503268	98.463016	162.76596
52	1.925	52.565445	2.5316456
53	1.3592233	58.527493	2.9428571
54	1.4210526	65.492149	14.074074
55	1.7358491	41.598361	1.0392157
56	2.4680851	39.665472	0.9038462
57	1.8965517	49.452055	1.6292135
58	2.4166667	40.298507	1.0666667
59	3.6082474	39.215686	0.8622222
78760	2.1777778	40.389294	0.9183673
61	2.7272727	42.096774	0.6338983
62	2.3225806	48.68256	1.4090909
63	2.21875	78.315789	6.6666667
64	1.8644068	47.640967	1.1568627
65	2.0895522	48.788546	1.3673469
66	2.557377	51.387214	1.4878049
67	3.173913	43.870968	0.9787234
68	4.5581395	42.343542	1.2797619
69	2.625	44.987775	1.1162791
78770	2.8571429	42.354369	0.84
71	2.5	42.714819	0.96
72	2.4444444	52.680653	1.8848168
73	3.2830189	46.549391	1.3947368
74	3.5454545	48.644338	1.1891892
75	2.5142857	77.737226	5.0724638
76	1.5294118	97.619364	125.92593
77	2.3262411	97.866534	125.89286
78	1.4388489	98.498815	126.36364
79	1.8536585	97.182523	111.81818
78780	1.9215686	96.755249	104.08163
81	2.0504202	85.97786	14.512195
82	1.4888889	57.040082	2.0454545
83	4.321608	35.064935	0.6633333

421112

DIAMOND DRILL LOG

PROSPECT: Burn's Peak Tas. E.L. 44/88 HOLE No.: BPD68

Set-up Azimuth: 090° (mag.) Decl'n: 75° Final Depth: 473·5

Date Commenced: 27/6/1990 Date Finished: 27/7/1990

Purpose of Hole: To test for base metal mineralisation beneath the S.W. Chester zone of pyrite mineralisation and alteration.

Result: An extensively altered zone was intersected with pyrite, but no base metal mineralisation.

Contractor: Diamond Drilling Tasmania (Zeehan) Hole Size: HQ/NQ

Casing (m steel/pvc in hole): 3m. steel at top ; 473·5m PVC .

Co-ordinates: Local ____ N ____ E ____ m RL
AMG 53 80544·7 N 377946·2 E 514·7 m RL

Surveyed by: W.C.M.E.S. (G. Watts, Rosebery) Date: Oct. 1990.

DOWN HOLE SURVEY DATA:

Depth	Azimuth(mag)	Decl'n (°)	Depth	Azimuth	Decl'n
32	90	74			
59·5	90	70			
90	90	69			
119	90	68			
150	93	66			
180	92	65			
210	95	66			
240	95	64·5			
270	96	65			
290	97	65			
320	110	64			
380	110	63			
410	111	63			
443	114	62			
470	115	62			

Survey Instrument: Eastman Camera

SAMPLING INFORMATION:

421113

From	To	Element/Isotopes Petrology/etc.	Sample	Method	Lab	Date
94 196 254 266 (2m samples)	129 208 256 408	Au Cu Pb Zn Ag	Split Core	FA 1 AAS 1 AAS 2	Classic	Oct. 1990.

421114

DRILL LOG SUMMARY

From	To	Core Description	Significant Assays
0	89.9	Coarse Rhyolite Breccia	
89.9	92.6	Bedded sandstone + ash.	110-112 0.10g/t Au 116-120 0.12g/t Au
92.6	172.0	Coarse Rhyolite Breccia	128-129 0.34g/t Au
172.0	199.8	Sandstone + silt-stone	
199.8	209.5	Peperite - Rhyolite lava	
209.5	257.0	Rhyolite lava	
257.0	280.4	Interbedded shale, coarser sediments + pumiceous tuff. Bedded pyrite ± traces of galena - sphalerite in shales. Tuff highly sericitised.	260-266m; .066g/t Au 152ppm Cu; 2830ppm Pb; 6733ppm Zn.
280.4	292.9	Highly sericitised acid pumiceous tuff.	
292.9	294.3	Bedded grey shale	

421115

DRILL LOG SUMMARY

From	To	Core Description	Significant Assays	
294·3	304·8	Coarse sedimentary breccia.		
304·8	305·8	Bedded grey shale (siliceous) and sandstone.		
305·8	317·9	Strongly sericitised and silicified acid pumiceous tuff.		
317·9	403·3	Variably altered volcaniclastics.	360-362 362-364	1.02% Zn. 9200ppm Zn
403·3	420·5	Quartz feldspar porphyry.		
		End of Hole		

Structure	Alt	Py %	Pyrite %	Rock Description / Petrology / Sample
Tricone 3.0 Start HQ coring @ 30m				Highly weathered, very broken ground ? Rhyolite lava breccia.
Broken ground				Breccia composed of quartz-feldspar phyric fragments. The alteration of the fragments varies, some are pink, siliceous and angular, others are strongly sericite-altered, foliated and have indistinct boundaries. Clast size varies from 2-70 mm. Some clasts are flow-banded. The rock is probably a lava breccia, with fragments having initially the same composition but experiencing different alteration. The other possibility is that it is ser epiclastic and that the sericitic fragments were highly vesicular prior to alteration. Some of the quartz in these fragments looks more like vesicle in-filling than phenocrysts.
20.0	ser sil (cb)			The breccia is clast-supported with a fine siliceous matrix identifiable in places.
22.3 chlorite-q vng.				
30.1 intense sil-qtz alteration with qtz stkwk matrix.	sil			Rhyolite lava Breccia.
1-4mm qtz-carb veins, 2/m. Some with specks of pyrite + sphalerite.		Traces Sp, Gn in veins.		
55.4	ser sil (cb)			
56.4				This interval is predominantly sericitic fragments. Rx. grainsize is smaller, matrix is f.g. silica.

Scale 1: 250.

HOLE No: BPD 17

5 cm

Depth.	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description.
-70			Ser sil (cb)			Pink + green Rhyolite Lava Breccia.
-80		78.3 Cb+sil stringers. 79.3 arc 40° Bkn ground.		Tr. Sp, gn		
		86.5 Zone of late stage 86.7 jig-saw brecciation. 40°		Tr. Sp.		
h ucc to NQ at 89.7 -90	89.9 91.1	Core - bedding 50°.				Upward fining sandstone to ash bedded sediments. Grey colour.
	92.6			94.7		
-100			Ser sil cb.	Rar gn, sp.		Pink and green Rhyolite Lava Breccia.
					Tr. dis.	As above, though clast size is smaller.
-110		cb+ sil veining, intense	Sil cb. Ser			Below 152.2 the pink, silicified clasts become rare and the rock consists predominantly of sericite patches / clasts in a fine silica/sericite ground mass.
-120			Ser sil cb (chl)			Carbonate alteration is more intense and enhances the altered feldspar phenocrysts. In places these are stretched out along cleavage.

Scale 1:250

5 cm

Depth.	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description.
		129.1 5-10mm quartz veins 20°.	Ser Sil Cb (Cal)	Sp in veins	Py in veins	Occasional spots of sphalerite between 94.7 & 122.6 may be associated with the carbonate alteration.
140						
150						
160						
170						
172.0		Contact 5° wavy shape.				
		172.8 Bdg 25°	Ser			
		173.6 Bdg 25° disp. cb microlin. @ 80°.	Sil (Cb)			Upward fining sandstone / siltstone. Clasts are silica + sericite altered rhyolite and bedded sediments.
180		174.8 late stage qtz-cb vein 45mm 26°.				
		174.8 - 192.4 Fine cb vns.				

Scale 1:250

HOLE No:- BPD 69

5 cm

421119

Depth.	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description.
190		and minor lithic. Lyfm all angles. 192.6 ? Fault 193.0 Bedding	ser			Matrix base, grey, siliceous (weakly). Overall colour; grey, pink and green. 196.0 - pyrite ? clast. 191.6 - Sphalerite ? clast.
		1753 Bedding 20°	Ser Sil			
200	1998	Contact 50°	sil ser	Tr Sp.	Tr-1%	Looks like a zone of mixing between rhyolite lava and sediments. Pyrite textures. Sediments are incorporated in the pink, qtz + fd- phyric lava + give it a fragmental appearance.
210	2095		Sil (cb) (clt)			
						Pink, flow-banded, quartz and feldspar-phyric rhyolite lava. Feldspars highlighted by late carbonate alteration. Chloritic + siliceous bands to define flow banding.
220		Flat banding (consistently) 25°	-			
230				2357 Tr Sp in vn.		
240						5 cm
		2448				
		2452	Sil	tr sp gn	1%	2453 - Zone of autobrecciation. 2468
250						

Scale 1:250

HOLE No:- BPD67

Depth.	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description.
	V V V V		Ser (Sil) (Carb) (Clay)			254.2 / 254.3 Breccia zone of probable autobrecciation.
257.0			Chl (Cc)		3 (tdd)	'Package' of sediments that correspond with the 'Browns Tunnel Host Rocks'. They consist of bedded dark grey to black shales coarser sediments and highly sericitised pumiceous tuff, The tuff has been identified as such by Geoff Green's petrological work on BPD 62 (sample @ 529.5 BPD 62)
260			Sil Ser	Sp Gn	10	
262.2		core - bedding angles: 261.1 - 65° 258.5 - 75° 251.1 - 65°	Ser	Sp Gn	5	
269.0			Ser Chl Sil		1	
270						
275.8	A A A					A vesicular andesite sill disseminated pyrite mineralisation and fragments of sil. sediments within it occurs below the sediments.
280						
280.4		Fault contact 35° to c.a. Highly fractured e.g. pyrite. Contact 50° Many fracturing has different orientations. ~30, 22.5.	Ser Carb (Silt) Ser Chl Sil	Tr Sp.	Con tact	The sediments are highly silicified, with bedded pyrite stringers up to 1cm in width. Highly sericitised, silicified ? tuff. Pale siliceous patches.
283.1						Dark pumiceous tuff. Many fractures with irregular planes. Lots of alteration. Some shale clasts & sed. rip ups. Pale green highly sericitised with sil. 'nodules'. Bedded grey shale, strongly alt. on contact.
290						
292.9						
294.3		contact 35°	Chl & Sil		Contact	
			Sil Ser (clay)			Coarse sedimentary breccia. Polymictic. Mostly angular rhyolite + bedded sediment clasts. Fine siliceous matrix.
300						
304.8						
305.8		Bedding 11° Cleavage 20° Bedding 50°	Ser Sil	Tr Sp, Gn	2 1	Banded greenstone Pale green and light grey. Mixture of strongly sericitised tuff and grey shale. Tuff bands truncated by shale bands + cavities on the foliation.
310						

Scale 1: 2

HOLE No:- [illegible] page 3 of 4

5 cm

421121

Depth.	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description.
312.9 313.5			313.5			Spots of pink sil ± pyrite throughout. Some of the shale is pyritic.
			sil			From 312.9 - 313.5, pink sil alteration replaces sericite alt.
			ser	Tr Sp (vein)		Below 313.5, shale is no longer present.
317.9			chl			Upward fining ?volcaniclastic, with siliceous pink rhy. clasts ± small, wispy, chlorite clasts. ?pumice. Minute wisps of cb. Some sil. alteration spots. (<0.10mm)
320		Foliation 30° defined by cb + ser.	Chl Sil Cb			
326.0		Sharp contact @ 45° ung. Fault 45°	pink sil patch			Pink + green feldspar-rich volcaniclastic. Numerous dark green, chloritic, flattened clasts. Remnant feldspars (now carbonate) are highly visible within the chloritic patches and in the matrix, which is fine, and sericitic or siliceous.
330			cht (ser)		Tr	
		Strong foliation? Is accentuated by carbonate ± ser.	338.2			Apparent change in lithology is probably only a change in alteration.
340						Siliceous banding, parallel to cleavage from 346.3 - 346.2.
			sil	346.5 Zn in sil. bnds.		Colour pale green.
350		350.0. ↓ foliation @ 46°				
			356.6 pink sil ser (cb)			Pale green, fine unit ± siliceous banding which has consistent orientation. There is also wispy layering in sericite fragments which not concordant with the siliceous bands. (ie. 359.1)
360		Siliceous layering @ 45°				
364.2		259.1m in fault @ 364.2 20mm disp. 15°	chl (sil)	Py, Gn in sil	3	Pink - dk green coarser fragments (up to 40mm) made of chlorite ± ser (now sil) phenos.
		364.2-370.5 consid ung. Siliceous layering 45°	(sil) (cb)	patch		Pale green, fine unit ± sil. bands.
370 370.5			370.5 sil ser (cb)			
372.5		372.5 Fault, orig 30ne.	372.5			Pink - dk green coarser

Scale 1: [illegible] HOLE No:- [illegible]; page [illegible] of 7

5 cm

Depth.	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description.
380						chloritic fragments. The size of the fragments changes throughout, but grading indicating facing is not evident.
			pink sil	fr		
			chl	Sp, Gn		
			(ser)	unsil zones		Spherulite occurs in siliceous zones throughout, especially from 360.0 to 364.2, where it corresponds with a zone of pink alteration.
			(cb)			
390					5	The siliceous zones are parallel to bedding (sil layering) in places but in other places they look to be cross-cutting. Here is also in association with carbonate, suggesting min. may be Devonian
400			400.5			
			ser (sil) 403.1 (chl)		3	Pink on contact.
403.3			ser			
			cb			
			(chl)			Quartz-feldspar porphyry.
410			(sil)			Euhedral quartz + feldspar crystals in a pink, siliceous groundmass.
420						END OF HOLE.
420.5						
430						

Scale 1: [illegible] HOLE No.:- [illegible] page 1 of 1

5 cm

421123

DIAMOND DRILL LOG

PROSPECT: Burn's Peak Tas. EL 44/88 HOLE No.: BPD 69

Set-up Azimuth: 090° (mag) Decl'n: 50 Final Depth: 420·5

Date Commenced: 2/8/90 Date Finished: 6/9/90

Purpose of Hole: To test extensions of the Brown's Tunnel stratigraphy for base metal mineralisation.

Result: Brown's Tunnel Stratigraphy from 257·0 - 280·4 m. Minor sphalerite 260·5 - 264·8 m & 361·0 - 362·7.

Contractor: Diamond Drillers Tas. (Zeehan) Hole Size: HQ/NQ

Casing (m steel/pvc in hole): 420·5m P.V.C.

Co-ordinates: Local 5600N N 4840 E ____ m RL
AMG 53 84937·2 N 377675·7 E 460·2 m RL

Surveyed by: W.C.M.E.S. (G.Watts, Rosebery) Date: Oct. 1990.

DOWN HOLE SURVEY DATA:

Depth	Azimuth (° mag)	Decl'n	Depth	Azimuth	Decl'n
52	92	48			
100	95	46			
151	96	45			
202	100	44			
253	100	43			
304	102	42			
355	103	41·5			

Survey Instrument: Eastman Camera.

SAMPLING INFORMATION:

421124

From	To	Element/Isotopes Petrology/etc.	Sample	Method	Lab	Date
94	129	Au	Split Core	FA 1	Classic	Oct. 1990.
196	208	Cu Pb Zn		AAS 1		
254	256	Ag		AAS 2		
266	408					
(2m samples)						

421125

DRILL LOG SUMMARY

From	To	Core Description	Significant Assays
0	89.9	Coarse Rhyolite Breccia	
89.9	92.6	Bedded sandstone + ash.	110-112 0·10g/t Au 116-120 0·12g/t Au
92.6	172.0	Coarse Rhyolite Breccia	128-129 0·34g/t Au
172.0	199.8	Sandstone + siltstone	
199.8	209.5	Peperite - Rhyolite lava	
209.5	257.0	Rhyolite lava	
257.0	280.4	Interbedded shale, coarser sediments + pumiceous tuff. Bedded pyrite ± traces of galena - sphalerite in shales. Tuff highly sericitised.	260-266m; ·066g/t Au 152ppm Cu; 2830ppm Pb; 6733ppm Zn.
280.4	292.9	Highly sericitised acid pumiceous tuff.	
292.9	294.3	Bedded grey shale	

DRILL LOG SUMMARY

From	To	Core Description	Significant Assays	
294·3	304·8	coarse sedimentary breccia.		
304·8	305·8	Bedded grey shale (siliceous) and sandstone.		
305·8	317·9	Strongly sericitised and silicified acid pumiceous tuff.		
317·9	403·3	Variably altered volcaniclastics.	360-362 362-364	1.02% Zn. 9200ppm Zn
403·3	420·5	Quartz feldspar porphyry.		
		End of Hole		

Tricone

3.0 Start HQ coring @ 3.0m

10

13.0

20

30

40

50

55.4
58.4

Broken ground

ser sil (cb)

20.0

21.5 chlorite-q veng.

1.1 late-stage precipitation with qtz matrix.

sil

1-4mm qtz-carb veins, 2/m. Some with specks of galena + sphalerite.

ser sil (cb)

Traces Sp, Gn in veins.

Scale 1:250.

Rock Description / Lithology

Highly weathered, very broken ground
? Rhyolite lava breccia.

Breccia composed of quartz-feldspar phyric fragments. The alteration of the fragments varies, some are pink, siliceous and angular, others are strongly sericite-altered, foliated and have indistinct boundaries. Clast size varies from 2-10 mm. Some clasts are flow-banded. The rock is probably a lava breccia, with fragments having initially the same composition but experiencing different alteration. The other possibility is that it is an epiclastic and that the sericitic fragments were highly fractured prior to alteration. Some of the quartz in these fragments looks more like vesicle infilling than phenocrysts.

The breccia is clast-supported with a fine siliceous matrix identifiable in places.

Rhyolite Lava Breccia.

This interval is predominantly sericitic fragments. Av. grainsize is smaller. Matrix is f.g. silica.

HOLE No:- BPD 69

5 cm

421128

Depth.	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description.
			Ser silt (cb)			Pink + green. Rhyolite lava Breccia.
70						
		78·3 Cb + sil stringers. 79·3 are 40° B.a. ground.		Tr. Sp, gn		
80						
		86·5 Zone of late stage fig-saw brecciation. 40°		Tr. Sp.		
h ware to NQ at 89.7		Core - bedding 30°				
90	89·9					
	91·1					Upward fining sandstone to ash, bedded sediments. Grey colour.
	92·6					
				94·7		
			Ser sil cb.	Rare 40°. +		Pink and green Rhyolite lava Breccia.
100						As above, though clast size is smaller.
					Tr. dis.	
		cb + sil veining, intense	Sil cb Ser			Below 152·2 the pink, silicified clasts become rare and the rock consists predominantly of sericite patches / clasts in a fine silica/sericite groundmass.
110						
			Ser sil cb (chl)			Carbonate alteration is more intense and enhances the altered feldspar phenocrysts in places these are stretched out along cleavage.
120						

Scale 1:250

HOLE No:- BPD 69. page 2 of 7

5 cm

Depth.	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description. 421129
180		129.1 5-10mm quartz veins 20°.	Ser sil cb (alt)	Sp in veins		Occasional spots of sphalerite between 94.7 & 122.6 may be associated with the carbonate alteration.
140						
150						
160						
170						
172.0		Contact 5° wavy shape. 172.8 Bdg 25° 173.6 Bdg 25° disp. on microfract. @ 80°. 174.8 late stage qtz-cb vein 45mm 26°. 174.3 - 192.4 Fine cb vns.	Ser Sil (cb)			Upward fining sandstone / siltstone. Clasts are silica + sericite altered rhyolite and bedded sediments.
180						

Scale 1:250

HOLE No:- BPD 69 page 3 of 7

5 cm

Depth.	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description. 421130
190		and minor fits. 4/m all angles.				Matrix fine, grey, siliceous (locally). Overall colour; grey, pink and green.
		192.6 ? Fault	Sil			196.0 - Pyrite ? clast.
		193.0 Blanket.				191.6 - Sphalerite ? clast.
		175.3 Bedding 20°	Ser Sil			
200	199.8	Contact 50°	Sil Ser	Tr Sp	Tr-1%	Looks like a zone of mixing between rhyolite lava and sediments. Peperite textures. Sediments are incorporated in the pink, qtz + fel-phyric lava & give it a fragmental appearance.
210	209.5		Sil (ctb) (clt)			
						Pink, flow-banded, quartz and feldspar-phyric rhyolite lava. Feldspars highlighted by late carbonate alteration. Chloritic + siliceous bands define flow banding.
		Flow banding consistently 35°				
230						
				233.7 Tr Sp in vn.		
240						
			244.9 Ser 245.2	tr sp gn	1%	245.3 - Zone of autobrecciation. 246.8
250						

Scale 1:250

HOLE No:- BPD69

5 cm

421131

Depth.	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description.
	V V V V		Ser (Sil) (Chl) (Cb)			
257.0			Chl (Cb)		3 (odd)	254.2 – 254.3 Breccia, zone of probable autobrecciation.
260			Sil Ser	Sp gn	10	'Package' of sediments that correspond with the 'Browns Tunnel Host Rocks' They consist of bedded dark grey to black shales coarser sediments and highly
262.2		Core - bedding angles: 261.4 - 65° 258.5 - 75° 254.2 - 65°	Ser	Sp gn	5	
269.0			Ser Chl Sil		1	sericitised pumiceous tuff, The tuff has been identified as such by Geoff Green's petrological work on BPD 62 (sample @ 529.5 BPD 62).
270						
275.8	A A A					A vesicular andesite with disseminated pyrite mineralisation and fragments of sil. sediments within it occurs below the sediments.
280						
280.4		Fault contact 35° w/ Chl vng & g. pyrite. Contact 55° wavy banding has different orientations. ~35, 28, 5.	Ser Chl (Sil)	Tr Sp.	5 on fit.	The sediments is weakly mineralised, with bedded pyrite + minor Sp + gn in recrets.
283.1			Ser Cb Sil			Highly sericitised, sheared ? tuff. rare siliceous patches.
290						Acid pumiceous tuff. Wavy banding within changes orientation, possibly due to deformation. some shale clasts + Sil. ? spilli. pale green highly sericitised with Sil. nodules.
292.9						
294.3		Cont/bdg 30°	Chl Cb Ser		Contact	Bedded grey shale, strongly alt. on contacts.
			Sil Ser (clasty)			Coarse sedimentary breccia. Polymictic. Mostly angular rhyolite + bedded sediment clasts.
300						Fine siliceous matrix.
304.8						
305.8		Cb - filled fault on contact 70° Cleavage 30° Banding 50°	Chl Ser Sil	Tr Sp, gn	2 1	Bedded sandstone Pale green and light grey. Mixture of strongly sericitised tuff and grey shale. Tuff wraps around the shale which pinches + swells on the foliation.
310						

Scale 1: 250

HOLE No:- BPD 69 page 5 of 7

5 cm

421132

Depth	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description.
313.5						Specks of pink ?alt'n spots throughout. Some of the whole is pyritic.
						Fr. 314.9-317.9 pink sil alteration bands + dk.
317.9						Broken 315.5, sil + pyrite veining.
320		Fracture 30° rejoined by cb + ser.				Pyritic + chloritic banding + dk green clasts with siliceous pink rims. Clasts small, wispy, chlorite clasts. Fine. Minute wisps of cb. Some sil. alteration spots. (10-10mm)
326.0		Sharp contact @ 45° ung. Fault 45°	pink sil patches			Pink + green feldspar-rich volcaniclastic. Numerous dark green, chloritic, flattened clasts. Remnant feldspars (now carbonate) are highly visible within the chloritic patches and in the matrix, which is fine, and sericitic or siliceous.
330		Strong foliation and chloritic into			Fr	
340			337.2			Apparent change in lithology is probably only a change in alteration.
				346.5 Zn in sil bnds.		Siliceous banding, parallel to cleavage from 346.3-346.8.
						Colour pale green.
350		350.0 ↓ foliation @ 45°			1	
			356.6 pink Sil ser (cb)			Pale green finer unit ± siliceous banding which has consistent orientation. There is also wispy layering in sericite fragments which not concordant with the siliceous bands. (ie. 354.1-356.6)
360		Siliceous layering @ 45°				
364.2		359.1m m/fault @ 364.2 20mm disp. 15°	Py, Gn in sil patches Chl (sil) (ser) (cb)		3	Pink-dk green coarser fragments (up to 40mm) made of chlorite ± feldspar (now cb) phenos.
370	370.5	364.2-370.5 chloritic ung. Siliceous layering 45°	370.5 Sil ser (cb)			Pale green, finer unit ± sil. bands.
372.5		372.5 Fault, ung 30ms.	372.5			Pink-dk green coarser

Scale 1:250

HOLE No:- BD67 page 6 of 7

5 cm

Depth.	Grain Size (mm) .06 .5 2 8 32	Structure	Alt.	Cu Pb Zn	Pyrite	Rock Description.
380			pink sil chl (ser) (cb)	fr $\mathcal{S}$, Gn in sil zones		chlorite fragments. The size of the fragments changes throughout, but grading indicating facing is not evident. Sphalerite occurs in siliceous zones throughout, especially from 360.0 to 364.2, where it corresponds with a zone of pink alteration. The siliceous zones are parallel to bedding (sil layering) in places but in other places they look to be cross-cutting. Here is also an association with carbonate, suggesting min. may be Devonian
390			(cb)		5	
400			400.5 ser (sil) 403.1 (chl)		3	Pink on contact.
403.3	+		ser cb (chl) (sil)			Quartz feldspar porphyry. Euhedral quartz + feldspar crystals in a fine, siliceous groundmass.
410	+					
420	+					END OF HOLE.
430.5						
430						

Scale 1: HOLE No:- page 1 of 1

5 cm

ASSAY RESULTS

Sample	From	To	Au	Ag	Cu	Pb	Zn	Mn
78920	306	308	<0.01	1	6	160	300	1020
21	308	310	"	2	5	350	380	1140
22	310	312	0.01	2	5	480	420	1540
23	312	314	"	1	7	760	420	1280
24	314	316	"	<1	3	62	110	1500
25	316	318	"	<1	145	100	600	930
26	318	320	0.04	<1	19	165	240	970
27	320	322	0.01	<1	5	38	94	1180
28	322	324	<0.01	<1	<2	46	110	1650
29	324	326	0.01	<1	5	46	110	2050
78930	326	328	<0.01	<1	3	20	68	1380
31	328	330	"	<1	5	18	48	1360
32	330	332	N.A	"	5	18	56	1580
33	332	334	0.01	"	3	20	82	1520
34	334	336	"	"	3	26	40	1460
35	336	338	<0.01	"	5	16	40	1450
36	338	340	"	"	5	22	92	1380
37	340	342	"	"	3	28	120	2500
38	342	344	"	"	4	50	140	2650
39	344	346	"	"	62	400	310	1680
78940	346	348	0.01	"	18	330	500	1420
41	348	350	<0.01	"	5	220	650	1900
42	350	352	"	"	3	88	160	2400
43	352	354	"	"	8	100	270	1820
44	354	356	"	"	6	40	120	2950
45	356	358	"	"	7	82	210	1900
46	358	360	"	"	14	115	1560	760
47	360	362	"	"	48	560	10002	880
48	362	364	"	"	70	300	9200	770
49	364	366	"	"	10	135	370	2050
50	366	368	"	"	82	980	1420	2100

ASSAY RESULTS

Sample	From	To	Au	Ag	Cu	Pb	Zn	Mn
79951	368	370	0.01	<1	13	175	580	2500
52	370	372	0.01	"	7	270	370	1220
53	372	374	<0.01	"	8	770	270	2000
54	374	376	<0.01	"	9	200	380	3700
55	376	378	0.01	"	4	92	180	2050
56	378	380	<0.01	"	11	70	135	940
57	380	382	0.01	"	15	70	310	920
58	382	384	0.01	"	15	220	820	1100
59	384	386	0.01	"	22	105	510	1840
79960	386	388	0.01	"	46	1020	1840	1100
61	388	390	0.01	"	96	2250	2350	1380
62	390	392	0.01	"	44	150	630	1220
63	392	394	0.01	"	13	610	1240	2450
64	394	396	0.01	"	18	340	2200	2600
65	396	398	<0.01	"	16	300	660	4350
66	398	400	"	"	11	125	155	3350
67	400	402	0.02		28	260	540	4350
68	402	404	0.01	"	22	290	500	3100
69	404	406	0.01	"	5	115	42	2200
79970	406	408	0.02	"	5	32	64	2300

421136

ASSAY RESULTS

Sample	From	To	Au	Ag	Cu	Pb	Zn	Mn
79870	94	96	<0.01	<1	26	20	54	1660
71	96	98	"	"	26	54	68	1350
72	98	100	"	"	13	24	56	1820
73	100	102	"	"	6	35	58	3100
74	102	104	"	"	4	56	120	4700
75	104	106	"	"	36	180	240	1.0%
76	106	108	0.02	"	10	210	280	1.0%
77	108	110	<0.01	"	12	75	105	3850
78	110	112	0.10	"	13	105	155	9800
79	112	114	0.01	"	17	52	70	6100
80	114	116	0.02	"	17	130	280	8900
81	116	118	0.13	"	32	130	1050	7000
82	118	120	0.11	"	32	84	200	7000
83	120	122	0.07	"	16	90	190	8200

421137

ASSAY RESULTS

Sample	From	To	Au	Ag	Cu	Pb	Zn	Mn
78884	122	124	0.05	< 1	13	165	290	4600
85	124	126	0.02	"	4	88	90	2150
86	126	128	<0.01	"	18	145	160	2300
87	128	129	0.34	"	165	3150	4650	2100

ASSAY RESULTS

Sample	From	To	Au	Ag	Cu	Pb	Zn	Mn
78888	196	198	<0.01	<1	6	40	68	1920
78889	198	200	0.01	1	9	330	400	5100
78890	200	202	<0.01	<1	7	35	58	1780
78891	202	204	0.06	1	6	48	110	1480
78892	204	206	<0.01	<1	6	34	65	1450
78893	206	208	0.01	<1	6	48	110	1260

ASSAY RESULTS

Sample	From	To	Au	Ag	Cu	Pb	Zn	Mn
78894	254	256	<0.01	<1	6	26	200	3800
95	256	258	"	2	34	140	660	2950
96	258	260	0.04	4	85	1100	3450	4800
97	260	262	0.11	7	155	3250	6500	670
98	262	264	0.06	10	195	4000	9000	1450
99	264	266	0.03	4	105	1300	4700	1460
78900	266	268	0.03	2	32	500	1640	2550
901	268	270	0.04	1	9	290	560	6700
902	270	272	0.03	4	130	1500	5600	2700
03	272	274	0.04	2	25	550	1600	1640
04	274	276	0.06	2	76	660	930	2200
05	276	278	0.03	2	185	580	1260	1.2%
06	278	280	<0.01	1	80	190	360	1.01%
07	280	282	0.03	1	16	400	830	3750
08	282	284	0.01	<1	7	220	560	2150
09	284	286	0.01	<1	5	78	680	1360
78910	286	288	0.01	<1	6	145	270	1040
11	288	290	0.01	<1	6	230	370	1580
12	290	292	<0.01	1	4	72	2750	1200
13	292	294	"	1	28	165	2450	1120
14	294	296	"	<1	3	65	180	1450
15	296	298	"	"	4	78	220	1740
16	298	300	"	"	5	76	145	1280
17	300	302	0.01	"	<2	20	44	1100
18	302	304	<0.01	"	4	22	105	1260
19	304	306	0.01	1	36	370	1060	1240

421140

Summary Log - BPD 70

From	To	Rock Type	Mineralisation.
0	232	Feldspar + quartz -phyric rhyolite lava breccias with some flow banded rhyolite intervals.	
232	241.6	Sandstone	
241.6	244.3	Highly sericitised rock with fine wispy layering. Occasional sedimentary clasts.	
244.3	247.3	Conglomerate + siltstone.	
247.3	259.4	Rhyolite lava breccia	
259.4	259.8	Sandstone	
259.8	303.2	Rhyolite lava + lava breccia.	
303.2	317.8	Sandstone + conglomerate	"Brown's Tunnel" Sediments. galena, sphalerite + pyrite in quartz-carbonate stringers.
317.8	317.9	Fault breccia.	
317.9	319.8	Fine grained, weakly siliceous shale.	
319.8	329.0	Sandstone with some pumice fragments	Spots and patches of sphalerite at irregular + widely spaced intervals.
329.0	495.8	Coarse volcaniclastic with pumice fragments.	

421141

APPENDIX 3.

PETROLOGY REPORT ON ROCKS FROM THE CHESTER AREA

J STOLZ (C O D E S - UNIVERSITY OF TASMANIA)

421142

PETROLOGICAL REPORT ON SAMPLES FROM THE CHESTER AREA, WESTERN TASMANIA

by

Joe Stolz

Department of Geology,

University of Tasmania, G.P.O. Box 252C,

Hobart, Tasmania 7001.

Petrographic Notes on 9 Samples from the Chester Prospect

Sample 78524 Sericitized and silicified andesite

This is a fine-grained, altered silicic volcanic with large elongate and arcuate patches of quartz which appear to be aligned subparallel. There are some relatively large (1 - 2 mm) diamond shaped patches of chlorite which are probably pseudomorphs after original amphibole, and also some patches which resemble prismatic sections through amphibole. These are often associated with reasonably large (0.2 - 0.3 mm) prismatic apatite microphenocrysts which have a slightly mottled appearance due to abundant fine inclusions. The large elongate and angular to arcuate patches of quartz exhibit significant recrystallization and subgrain development towards the margins of the patches, but often have an elliptical core which has some optical continuity. There are also some tabular aggregates of recrystallised quartz which are likely pseudomorphs after primary plagioclase phenocrysts.

The groundmass is dominated by fine xenoblastic quartz grains (about 0.1-0.2 mm diameter), and abundant patches and veins of sericite which is often associated with pale chlorite and subordinate siderite. The sericite alteration cuts across the dark green chlorite patches and is often closely associated with fine veins of pale brown chlorite. Siderite also partly replaces residual opaque oxides (probably magnetite microphenocrysts).

Comments

The feldspar has largely, if not completely, been obliterated from this sample and replaced by silica. The presence of some chlorite pseudomorphs after amphibole and quartz pseudomorphs after feldspar, together with the presence of apatite microphenocrysts suggests that this rock was originally of intermediate (andesitic) composition. Apatite is an extremely rare phenocryst phase in very silicic rocks which typically have less than 0.05 wt. % P_2O_5, and it is more common in intermediate rocks which often have higher P_2O_5 contents than basalts. Apatite is also relatively resistant to the effects of hydrothermal alteration, but it can become mobilised under the most extreme conditions of alteration. Pervasive silicification and sericitization has been accompanied by some chlorite and carbonate (siderite) alteration.

Sample T78525 Dacite or Andesite Lava

This sample contains euhedral plagioclase phenocrysts which are partially replaced by chlorite and sericite, and less commonly by silica. Extensive sericite veining of the plagioclase phenocrysts along cleavage and fractures appears to cross-cut and therefore post-date the patchy chlorite alteration of the plagioclase.

Apatite and opaque microphenocrysts (0.05 - 0.1 mm) are associated with the plagioclase phenocrysts and are set in a variably altered groundmass. There are also some ovoid patches of recrystallised quartz which appear to be amygdales.

The least altered parts of the groundmass are dominated by very fine-grained (<0.1mm) xenoblastic feldspar and quartz intergrowths. In contrast, other domains have been extensively replaced by fine intergrowths of sericite and quartz. The section examined contains a small lithic fragment of a finer grained lava characterized by abundant fine laths of plagioclase, and extensive sericite and chlorite alteration.

Comment

This rock is significantly less altered than T78524. The plagioclase is only partly altered to chlorite and sericite, and there is less silicification. The large quartz aggregates are clearly amygdales and not phenocrysts. The phenocryst assemblage (plagioclase and apatite) is the same as for T78524 and they may therefore be similar rocks. As the phenocrysts are largely euhedral and unbroken, and are dispersed in a relatively homogeneous vesiculated groundmass, the textural evidence supports the interpretation that this was a lava. The groundmass in this sample appears slightly more silicic than T78524, although that may simply reflect the less extensive alteration. However, both specimens have experienced a similar early chloritic alteration, and a later, stronger sericitic alteration. The sericite shows a strong preferred orientation which suggests it preceded the Devonian metamorphism, and therefore would be interpreted as a Cambrian alteration rather than due to younger granite-related fluids.

Sample T79706 Dacitic Lava

This specimen is a variably altered dacitic or andesitic lava. The least altered domains are characterized by euhedral phenocrysts of plagioclase (albite, 0.5 - 2.0 mm) which exhibit only very slight alteration to sericite or clay minerals. The plagioclase phenocrysts occur in glomeroporphyritic aggregates together with some relatively coarse patches of recrystallized quartz which appears to be due to alteration. The least altered parts of the groundmass consist of extremely fine-grained (<<0.05 mm) xenoblastic aggregates of quartz and feldspar with minor chlorite. Wispy and more massive patches of sericite have replaced other portions of the groundmass, and pyrite (0.05-0.2 mm) is disseminated throughout the altered and relatively unaltered domains. The pyrite has partially broken down to limonite resulting in some Fe-staining along cleavage planes.

The sericitic alteration of fractured phenocrysts and some coarser grained (0.2-0.3mm) aggregates of quartz and feldspar takes the form of fine veinlets surrounding individual grains or groups of grains thereby imparting a granular or pseudoclastic texture to the rock.

Comment

This rock does not exhibit any evidence of primary quartz phenocrysts or apatite microphenocrysts. The occurrence of abundant plagioclase phenocrysts in a relatively silicic groundmass is consistent with the interpretation that this rock represents a dacitic lava. It is probably more silicic and somewhat more evolved than both T78524 and T78525.

Sample T82453 Andesitic or Dacitic Lava

A dominant feature of the rock is the presence of large (2-5 mm diameter) ovoid pods of recrystallised quartz. The cores of the pods sometimes contain patches of chlorite, and their overall form and distribution is consistent with them being amygdales rather than phenocrysts. The rock appears aphyric, although this may partly be due to alteration. There are no obvious feldspar phenocrysts which feature so prominently in all the other volcanics amongst these samples. However, there are a number of feldspar grains separated by veinlets of sericite which appear to be in optical continuity, and which may be portions of the same phenocryst.

The siliceous amygdales are set in a groundmass of xenoblastic quartz and feldspar, and abundant sericite and chlorite. The latter two phases define the cleavage and represent a very fine-grained, pervasive alteration product of the groundmass. In addition, there is some limonite replacing pyrite and Fe-staining along the cleavage planes. Some of the relatively coarse grained quartz in the groundmass has also probably been introduced during the main alteration event, and the increase in grain size is a result of the regional metamorphism.

Comment

As the coarse quartz grains are in fact amygdales, the rock is clearly volcanic. The absence of quartz phenocrysts, and the overall abundance of feldspar in the groundmass (where not replaced by sericite, chlorite or carbonate) suggests that the rock was a relatively evolved andesite or dacite lava. It has experienced quite strong alteration, involving the addition of sericite, chlorite, quartz, carbonate and minor pyrite.

Sample T82458 Dacitic or Andesitic Lava

Sparse euhedral pseudomorphs after phenocrysts of plagioclase (1 - 3 mm long) have been completely replaced by sericite, chlorite and carbonate. The phenocryst pseudomorphs are set in a very fine-grained recrystallized groundmass of feldspar and quartz which exhibits variable alteration to sericite and chlorite. Patches of the groundmass which are relatively free of sericite and chlorite alteration appear quite siliceous some of the quartz, particularly that which occurs in xenoblastic aggregates may be the result of silicification.. The remainder of the groundmass shows either wispy very fine sericite alteration or pervasive sericitization and chloritization which imparts a cleavage to the rock. The most intensely altered patches also have minor pyrite (or limonite pseudomorphs after pyrite), and Fe-staining due to these breakdown products.

Comment

The very siliceous character of the least altered patches of the groundmass appear to reflect an original quite silicic volcanic rock, although some silica has probably been added. The presence of plagioclase phenocrysts, but absence of quartz as a phenocryst phase suggests a dacitic composition rather than a rhyolite. The presence of sparse euhedral pseudomorphs of plagioclase is also good evidence that the rock was erupted as a lava rather than deposited as a volcaniclastic or epiclastic.

The dominant sericite, chlorite, silica pyrite alteration is likely to have been imposed during the Cambrian as the alteration phases exhibit a preferred orientation which is probably due to the Devonian greenschist facies metamorphism. However, there are several narrow (0.1 mm wide) chlorite veins which transgress the dominant cleavage direction and may be related to younger granite-derived fluids.

Sample T82460 Epiclastic or Debris-Flow Deposit

This rock is composed predominantly of angular silicic volcanic clasts (up to at least 1 cm across) with a finer matrix composed of recrystallised quartz and feldspar.The dominant clast type is characterised by sparse euhedral plagioclase phenocrysts set in a groundmass of finer-grained xenoblastic plagioclase and quartz, and variable amounts of chlorite and sericite. Other less common clasts include an apparently aphyric type dominated by flow-aligned plagioclase laths and interstitial chlorite. Some relatively large green chlorite patches may represent altered ferromagnesian microphenocrysts but their form is not diagnostic of a specific phase. There was also one rhyolitic inclusion noted which contained phenocrysts of quartz and alkali feldspar in a very fine-grained silicic groundmass. Pervasive wispy sericitic and chloritic alteration had affected all clast types and the matrix.

Comment

The presence of several clast types in this specimen suggests a clastic sedimentary origin, although the dominance of dacitic volcanic fragments indicates derivation from one major lithological source. The variability in clast size and the angular nature of the clasts suggests rapid deposition from some type of debris flow with very little sorting.

Sample T82465 Andesitic Dyke Rock

This specimen is characterised by abundant interlocking tabular crystals of plagioclase (1 - 2 mm long) in glomeroporphyritic aggregates. These occur in a slightly finer groundmass (0.5 mm) with interstitial green chlorite patches which are probably after original ferromagnesian minerals.

This rock has experienced a relatively low grade of hydrothermal alteration. The fluids appear to have migrated initially along grain boundaries and because of the relatively coarse grain size most grains are rimmed by finer veinlets of sericite. Minor sericitization of the interiors of feldspar grains has also occurred along cleavage planes and fractures.

Comment

The texture and mineralogy of this specimen suggest it was emplaced as a high-level intrusive (dyke) of andesitic composition. A low intensity episode of hydrothermal alteration has caused relatively minor alteration of primary plagioclase to sericite along grain boundaries, and this does not appear to have been accompanied by significant silicification.

Sample T82467 Autoclastic Breccia or Hyaloclastite

This rock is a breccia composed of angular siliceous volcanic fragments up to at least several centimetres in size. There appears to be only one clast type which has subhedral plagioclase phenocrysts (1 - 2 mm) which are partly carbonated and sericitized. These are set in fine-grained groundmass of xenoblastic quartz and feldspar with abundant wispy sericite characterised by a strong preferred orientation. The mineralogy and texture of these clasts are very similar to other dacitic or evolved andesitic lavas described.

Some of the fragments have interlocking concentric veinlets of sericite which probably represent sericite replacing volcanic glass along perlitic fractures. This structure is partly obscured by recrystallization of the glass to quartz-feldspar aggregates. Some of the fragments also contain vesicles lined with a narrow rim of quartz and filled with recrystallised quartz, chlorite and feldspar. The material filling the vesicles may originally have been fine volcanic ash (glass).

The matrix between the clasts is composed of very fine-grained recrystallised quartz and feldspar, which is probably the equivalent of the material that filled the vesicles. The matrix appear to exhibit less intense sericitic alteration than the slightly coarse-grained clasts.

Comment

The presence of only one clast type in this rock is inconsistent with a debris flow origin unless it was derived from a single volcanic unit. The most likely origin is as an autoclastic breccia or hyaloclastite deposit of a dacitic lava flow. Deposits of these types derived from silicic magmas can be very similar, making it very difficult to distinguish between them.

Sample T82500 Dacitic or Evolved Andesitic Lava

Euhedral plagioclase phenocrysts (1 - 2 mm) occur in glomeroporphyritic aggregates and are partly altered to carbonate, sericite and chlorite along cleavages and fractures. These are set in a fine-grained groundmass (<0.1 mm) consisting of xenoblastic aggregates of feldspar and quartz with minor chlorite. Highly irregular and wavy patches of sericite and carbonate have replaced large portions of the groundmass imparting to it a granular or pseudofragmental texture. The rock doesn't appear to have experienced strong silicification based on the relatively homogeneous character of the least altered groundmass patches.

Comment

If the assumption that the relatively siliceous groundmass is a primary feature is correct, this specimen would have been a porphyritic silicic lava. As with many of the previous specimens, it probably has a dacitic or evolved andesitic composition as quartz phenocrysts are absent. The strong sericite alteration has profoundly modified the macroscopic and microscopic textural characteristics of the rock.

Comment

The rock compositions are impossible to evaluate precisely on the basis of thin section examination. However, the presence of plagioclase and apatite phenocrysts in several of these samples, and the general absence of quartz phenocrysts strongly supports the dacite-andesite compositional range suggested. If you have any chemical data for these rocks it would be useful to calculate Ti/Zr values (i.e. TiO_2 wt % x 5995)/Zr (ppm). Values in the range 12 - 20 would indicate dacitic compositions, whereas values in the range 20 - 60 are more typical of andesites in the Mount Read Volcanics. These values should not have been affected by the hydrothermal alteration.

421149

PETROLOGICAL REPORT No. 2 ON SAMPLES FROM THE CHESTER, STERLING VALLEY AND ARTHUR RIVER AREAS, WESTERN TASMANIA

by

Joe Stolz

Department of Geology,

University of Tasmania, G.P.O. Box 252C,

Hobart, Tasmania 7001.

PETROGRAPHIC NOTES ON 11 SAMPLES FROM THE CHESTER, STERLING VALLEY AND ARTHUR RIVER AREAS

Sample No. 72287

This specimen is composed of large subangular fragments of silicic (rhyolite/rhyodacite) volcanic clasts up to at least 3 x 1 cm mixed with more felsic andesite/dacite clasts. The rhyolitic clasts are composed of subhedral quartz phenocrysts (0.5 mm diameter) which sometimes show evidence of partial resorption and cracking, but they are not extensively fractured as they would be if they represented products of ash-flow eruptions. The quartz phenocrysts are accompanied by subhedral plagioclase phenocrysts (which are partly altered to sericite and clay minerals) in a very fine grained recrystallised groundmass of quartz and feldspar which shows patchy sericite and chlorite alteration. The quartz phenocrysts appear to be rimmed by a sericite-free halo of fine-grained quartz and feldspar.

Relatively coarse grained clasts consist of plagioclase phenocrysts (with minor sericitisation and kaolinisation) in a groundmass (0.1-0.2 mm) dominated by intergrown subhedral plagioclase crystals with some interstitial chlorite and sericite, and minor quartz and opaques. The mineralogy of these clasts suggests an andesitic composition. Both clast types are set in a very fine grained matrix (<0.05 mm) of quartz, feldspar and sericite.

The bimodal nature of the clast lithologies indicates an epiclastic origin for the rock. It is poorly sorted, and the fragments are not well rounded or strongly altered indicating limited transportation and rapid deposition possibly as some sort of submarine mass-flow deposit. In addition to the primary clastic nature of the rock, there appear to be some superimposed pseudofragmental characteristics caused by the subsequent sericitic alteration.

Sample No. 78505

This is a clearly an epiclastic rock composed of a variety of silicic volcanic fragments in a silica-, sericite- and chlorite-altered matrix of detrital quartz and feldspar. It consists of angular to subrounded clasts, some of which are very fine-grained aggregates of quartz and feldspar with occasional anhedral plagioclase phenocrysts, and others which are distinctly flow banded and variably oriented. The relict flow-banding is most apparent in plane polarised light where it is depicted by fine parallel bands of sericite. Under crossed nicols the banding is less

obvious due to extensive recrystallisation of the clasts to relatively coarse-grained xenoblastic aggregates of quartz. There are also clasts with similar mineralogy and grainsize that are not flow banded.

Sericitic alteration is widespread, dominantly along clast boundaries but also permeating along grain boundaries within the clasts. The rock has two major clast types which have experienced variable recrystallisation. Both the very fine grained siliceous type and the coarser flow-banded type were probably originally glassy fragments of dacitic lavas. Fragmentation probably occurred by autobrecciation or quench fragmentation during the submarine extrusion of silicic magma.

Although the clasts may all have similar compositions, their different textural characteristics suggest a different thermal history during devitrification and recrystallisation. This does not necessarily indicate separate sources and an epiclastic origin, but this, coupled with the rounding of some of the fragments seems more consistent with some reworking rather than an origin as a lava breccia.

Sample No. 78506

This is another fragmental rock composed of angular clasts of silicic volcanic material in a matrix of smaller fragments of the same material, together with broken crystal detritus and fine grained quartz and feldspar which probably represents recrystallised volcanic ash.

Some of the clasts display flow-banding which is depicted by elongate recrystallised quartz grains and fine parallel bands of sericite. In places the clasts and matrix have been replaced by carbonate which encloses relict rounded grains of quartz and minor disseminated crystals of pyrite. In zones where the carbonate is absent, there is some sericite alteration evident along grain boundaries. The carbonate alteration therefore appears to post-date and to have obliterated the weak sericitic alteration.

The clast types are essentially identical with those in sample 78505 (i.e. fine grained aggregates of quartz and feldspar, and relatively coarse-grained xenoblastic aggregates (0.1-0.2 mm) of the same phases. The comments about an epiclastic origin for sample 78505 apply equally to this specimen, and their close similarity of clast types and textures strongly suggests that they form part of the

same depositional unit. The major difference arises from the superimposed carbonate alteration in this specimen which is not evident in 78505.

Sample No. 79033

This is a fine-grained pervasively altered rock which retains very little evidence of its original mineralogy and composition. It consists of abundant, fine sericite which is moderately strongly aligned to depict a cleavage, and xenoblastic recrystallised grains of quartz (0.1-0.2 mm) with minor (1-2%) disseminated pyrite.

Feldspar seems to have been completely replaced by quartz and sericite, so considerable addition of silica is suggested, but there is no obvious evidence of carbonate alteration. The sericite depicting the cleavage wraps around anhedral quartz grains and cubes of pyrite. In addition, some sericite crystals appear to have grown oblique to the cleavage in pressure shadows adjacent to the pyrite. This provides good evidence that the pyrite was developed pre-cleavage, probably concomitant with the sericite, suggesting that this represents a pre-Devonian (Cambrian) alteration event.

Unfortunately because the alteration has been so pervasive, I have no way of assessing what the original composition of the rock was. If it were important to know the pre-alteration composition, I would suggest using immobile element geochemistry. However, there is no guarantee that either or both Ti and Zr will not be at least partly redistributed in rocks this severely altered.

Sample No. 78517

These have to be the least distinctive and most frustrating rocks to identify in handspecimen. However, in thin section occasional small, angular grains of quartz (<0.1 mm) are scattered through a weakly altered, extremely fine-grained silicic groundmass. The least altered patches of groundmass are essentially free of sericite and consist of finely intergrown xenoblastic grains of quartz and feldspar. In plane polarised light the outlines of shards or arcuate fragments are apparent, whereas moderately extensive sericitisation of other parts of the groundmass obscures these structures.

I interpret this as a clastic rock which is relatively well sorted but has experienced limited transportation. The angular shard-shaped clasts are considered to be recrystallised fragments of silicic volcanic glass derived by reworking of hyaloclastite deposits. They were possibly deposited from turbidity

currents initiated by slumping of unconsolidated fragmental material on the flanks of a submarine volcano. The sparse angular quartz grains are consistent with fracturing of quartz phenocrysts and rapid quench fragmentation of glassy rhyolitic lavas during submarine eruptions.

The fine sericite throughout the rock defines a weak cleavage and was probably caused by a Cambrian alteration system.

The rock is not a lava as there is no evidence of euhedral or subhedral phenocrysts, and if the rock was originally all glass we might expect some evidence of spherulitic devitrification textures.

Sample No. 82474

This specimen contains a few pseudomorphs of recrystallised quartz aggregates after feldspar phenocrysts set in a groundmass which varies from very fine-grained xenoblastic quartz aggregates to more coarsely recrystallised quartz-rich aggregates with variable amounts of interstitial sericite. The sericite often occurs as coarse interlocking plates which do not appear to be a replacement product of flattened pumice fragments. In detail, the sericite is quite wispy near the margins of the mica-rich patches and grades into pervasive fine veins of sericite which define the principal cleavage through the rock.

The concentration of coarse sericite in patches and bands imparts a fragmental appearance to the rock, but there is no evidence that this reflects a primary fragmental feature that has been emphasised by alteration. Rather, it seems more likely that the pseudofragmental textures are the result of heterogeneous alteration of an originally homogeneous glassy lava. The alteration has been quite intense though as original feldspar phenocrysts have been completely replaced by silica.

The favoured interpretation is that the rock was originally a glassy dacitic lava that experienced quite strong hydrothermal alteration.The absence of quartz phenocrysts argues against a more siliceous (rhyolitic) composition, however silica has clearly been very mobile during alteration and it is possible that euhedral quartz phenocrysts may have been modified by this process. There are no other phases such as apatite which might indicate that the rock originally had a more mafic composition.

Sample No. 82482

This rock is considered to be an epiclastic rock rather than a lava, but represents reworked material derived from the quench fragmentation or autobrecciation of silicic lavas. It consists of abundant angular to subrounded quartz and feldspar grains in a matrix of finer grained recrystallised quartz and feldspar with abundant interstitial sericite.

In addition, there are some rounded, recrystallised, fine grained quartz-feldspar-rich fragments, and some coarser grained (0.1-0.2 mm) quartz-rich clasts. The fine grained silicic matrix of the rock is laced by pervasive fine sericite which rims clasts and grain boundaries. The sericite crystals are aligned quite strongly depicting the cleavage. There is also some disseminated fine-grained pyrite.

Superimposed on the clastic textures and sericitic alteration is a chloritic alteration which appears to be restricted to a series of randomnly oriented and cross-cutting veins. Although the chlorite alteration appears to be restricted to the fractures (unlike the sericitic alteration), it also appears to be a pre-cleavage alteration event as individual chlorite crystals within the veins are strongly aligned parallel to the sericite crystals outside the veins.

Sample No. 82492

This rock contains sparse tabular euhedral microphenocrysts of plagioclase (0.2 mm long) which are set in a variable grainsize groundmass. Very fine grained parts of the groundmass represent slightly recrystallised aggregates of quartz and feldspar after devitrified silicic volcanic glass. Relatively coarse grained patches (0.1-0.2 mm) are more quartz-rich and indicate some silica has been introduced.

Strongly aligned fine crystals of sericite are pervasive through the rock and define a moderate cleavage. The cleavage is cross-cut by narrow (0.5-2.0 mm) sphalerite-bearing quartz veins which were clearly introduced after the deformation (i.e. they probably represent Devonian vein mineralisation).

The host to this vein-style mineralisation is interpreted to originally have been a glassy dacite lava that has experienced weak hydrothermal alteration, deformation and subsequent veining by granite-related hydrothermal fluids.

Sample No. 67585

This specimen is an altered andesite composed of relatively abundant subhedral phenocrysts of plagioclase (0.5-1.5 mm) set in a finer feldspar-rich groundmass. There are also several quite large (0.5 mm long) prismatic phenocrysts of apatite, and chlorite pseudomorphs after original ferromagnesian phases (probably pyroxene or amphibole) which occur both as phenocrysts and in the groundmass. Plagioclase phenocrysts show partial alteration to chlorite and clinozoisite and some sphene is associated with chlorite the aggregates.

The groundmass is dominated by fine-grained xenoblastic plagioclase with interstitial chlorite, clinozoisite and minor opaques. In addition, there is some fine sericite and discrete veins of quartz. The groundmass appears to contain a small amount of interstitial quartz which is probably primary, but most of the quartz in the rock has been introduced in veins.

The rock is a porphyritic andesite which has experienced lower greenschist facies metamorphism and minor sericitic alteration.

Sample No. 67587

This sample appears to be a fine-grained, sedimentary rock of volcanic derivation. Extremely fine-grained layers (about 2-3 mm thick) of recrystallised quartz and chlorite alternate with slightly coarser grained xenoblastic aggregates of quartz with minor chlorite. Several of the finer grained layers are quite rich in chlorite which is aligned parallel to the bedding. The coarser grained layers contain occasional significantly larger angular grains of quartz and feldspar together with angular to rounded lithic fragments of the same mineralogy which sometime exhibit flow-banding.

Disseminated opaques are sparsely distributed, and there are several cross-cutting quartz-sericite veins, but the rock does not appear to be strongly altered.

This sample probably represents fine silicic volcanic material produced during quench fragmentation of rhyolitic lavas. The fine hyaloclastite material was probably deposited from turbidity currents following slumping on the flanks of a submarine volcano.

Sample No. 72288

This rock is clearly sedimentary. It is composed of angular quartz grains (typically 0.05-0.1 mm) and accessory rounded grains of detrital zircon set in a fine-grained yellow-brown matrix. The dominant phase in the matrix has a low to moderate positive relief (relative to quartz) and a very low birefringence - it is probably kaolinite (zeolite was a possibility but should have negative relief).

The rock also contains some elongate, flattened clasts of finer-grained sedimentary material (siltstone) which contains fine angular quartz grains in a matrix dominated by clay minerals. These fragments are only 1-2 mm long in the section, but larger dark coloured lithic fragments are also apparent in the handspecimen.

The source of these sedimentary "balls" is difficult to assess without seeing the field relationships (I'm not sure I would do any better if I did though !), but their mineralogy sounds similar to that of their host so perhaps they were locally derived.

421157

PETROLOGICAL REPORT ON SAMPLES FROM THE CHESTER AREA, WESTERN TASMANIA

by

Joe Stolz

Department of Geology,

University of Tasmania, G.P.O. Box 252C,

Hobart, Tasmania 7001.

Sample 72385 Rhyodacitic lava / porphyry

This rock contains relatively abundant phenocrysts of quartz and plagioclase feldspar. The quartz phenocrysts (1 - 4 mm) vary from subhedral to angular and many display minor marginal resorption effects. Some of the larger quartz phenocrysts exhibit delicate embayment structures. Subhedral to euhedral phenocrysts of albitic plagioclase occur separately and in glomeroporphyritic aggregates with other plagioclase phenocrysts. They show moderate alteration to clay minerals with very minor sericite alteration.

The phenocryst phases occur in a fine but variable groundmass dominated by quartz and feldspar with lesser amounts of chlorite, sericite and minor sphene, apatite and zircon. There are also some larger aggregates of chlorite and secondary Fe-oxide which may be after original ferromagnesian phases.

Some areas of the groundmass are very fine-grained xenoblastic aggregates of quartz and feldspar which may represent weakly recrystallised devitrified silicic volcanic glass. These grade into slightly coarser-grained patches of groundmass with more tabular feldspar crystals intergrown with xenoblastic quartz. The textural characteristics of the plagioclase appear to be relict igneous textures. It is not unusual to find grain size and textural variations of this type in the groundmass of lavas and high-level intrusives.

The coarser aggregates within the groundmass exhibit some intergranular sericite and chlorite alteration.

The overall textures of the rock suggest that it is volcanic in origin or possibly a very high-level intrusion. However, there is no evidence of reworking or redeposition. The delicately resorbed quartz crystals are unlikely to have survived transportation and the general ratio of large crystals (phenocrysts) to groundmass is more typical of a volcanic than an epiclastic which would be expected to show a greater degree of sorting and removal of fine grained material.

Sample T78522 Crystal lithic sandstone

Sample T78522 contains angular to subhedral quartz phenocrysts, some of which show delicate resorption textures. However, most of the phenocrysts are xenoblastic and have experienced significant subgrain development. Plagioclase crystals are less common and they more typically occur as subangular, single, dispersed grains.

In contrast to T72385, this rock is distinctly fragmental. It contains angular fragments (several mm up to 1 cm) of silicic volcanic rock, which include homogeneous very fine-grained quartz-feldspar rich aggregates that probably represent devitrified and recrystallised silicic glass. Some fragments enclose less angular phenocrysts of quartz and feldspar. The matrix of the larger fragments is composed of smaller lithic fragments of the same composition and angular fragments of quartz and feldspar. Crystal and lithic fragment boundaries are often characterised by fine veinlets of chlorite and sericite. It could be argued that the chlorite and sericite alteration has imparted a pseudofragmental structure to this rock. However, adjacent fragments often show a sharp contrast in grain size and phenocryst content in contrast to the gradational variations in grain size of the groundmass in T72385.

I would favour this sample being called a crystal lithic sandstone or epiclastic derived by reworking silicic volcanic material similar in composition to T72385. This may have been fragmented during autoclastic brecciation or hyaloclastic eruption in a submarine environment.

Sample T78523 Crystal lithic sandstone

This specimen contains sparse angular quartz grains but relatively abundant subhedral to angular plagioclase crystals (0.5 - 2 mm). Some of the crystals occur within very fine-grained recrystallised silicic volcanic fragments (devitrified glass). One relatively large clast (~5 mm) is chlorite-rich and has a weak banding delineated by alternating chlorite and quartz-rich bands, which may be depicting original flow-banding in the fragment. Most of the remaining lithic fragments are xenoblastic aggregates of quartz and feldspar of variable grain size. Boundaries between clasts are evident where there is a sharp change in grain size but in other parts of the rock the grain size exhibits more gradational variation.

Fine veinlets of pale green chlorite outline some individual crystal and lithic fragments and may also be responsible for the development of some pseudofragmental textures. The recrystallised nature of the rock and the similarity of the lithic fragments make it difficult to be confident that this is indeed a true fragmental rock, although much of the evidence supports this interpretation. Consequently I would argue that it is more closely affiliated with T78523 than T72385, although both T78522 and T78523 may have been derived by reworking of a volcaniclastic similar in composition to T72385.

421161

CHESTER DRILL CORE BPD67

Sample T72377 (22.8 m - Dacitic lava)

This rock contains sparse subhedral to euhedral plagioclase phenocrysts which are typically rimmed by sericite, although the sericite alteration is not extensive. These phenocrysts occur in a groundmass of tabular crystals of plagioclase, xenoblastic quartz, minor euhedral apatite, variable amounts of chlorite and sericite and some disseminated opaque minerals (probably pyrite). The groundmass exhibits considerable variability in grain size from 0.1 - 0.2 mm to much less than 0.01 mm. The very fine-grained patches resemble devitrified and recrystallised quartz-feldspar-chlorite aggregates after original silicic volcanic glass.

This rock has experienced moderate hydrothermal alteration resulting in the widespread development of sericite with some chlorite and pyrite. The patchy and wispy nature of the sericite development in particular is probably responsible for the 'apparent' clastic textures evident in hand specimen (check hand specimen). Although I could find no evidence in the thin section examined for the presence of primary clastic textures, the level of alteration and variable recrystallisation make it very difficult to recognise such features in this rock.

On balance, I favour the interpretation that this rock represents a lava, which may be intermediate in composition between dacite and andesite, based on the abundance of quartz in the groundmass and the appearance of apatite as a microphenocryst phase.

Sample T72378 (39.0 m - Lithic sandstone)

Sample T72378 has some mineralogical similarities to T72377 but has distinctive textural features. One distinctive feature is the presence of relatively large (typically >2 mm) aggregates of interlocking tabular plagioclase crystals which contain some associated microphenocrysts of apatite. Many of these plagioclase-rich aggregates exhibit extensive carbonate alteration. The aggregates are generally rounded and appear to be lithic fragments of an intermediate to silicic high-level intrusive. An alternative interpretation is that they represent glomeroporphyritic aggregates of plagioclase-rich cumulate material in a lava host. However, there appear to be other types of lithic fragments in the rock which make it polymict and hence clastic in origin. For example, there are rounded fragments composed of subhedral plagioclase phenocrysts in a xenoblastic fine groundmass of quartz, feldspar and chlorite. There are also distinctive rounded clasts which are plagioclase-phyric are very fine-grained with relatively abundant disseminated opaque minerals (probably pyrite), as well as some other coarser-grained aggregates of xenoblastic chlorite and quartz and subhedral plagioclase microphenocrysts.

Another distinctive lithic type is characterised by an unusual abundance of prismatic apatite crystals associated with xenoblastic plagioclase, chlorite and opaques. This probably represents a clast derived from a high-level andesitic intrusive. Some of the quartz-feldspar-rich clasts also appear to have a weak flow banding delineated by aligned plagioclase microphenocrysts.

The matrix appears to be dominated by xenoblastic feldspar, quartz and chlorite of varying grain size with variable amounts of opaques and carbonate. The opaques (most likely pyrite) together with sericite tend to be concentrated in fine irregular veinlets which generally appear to follow clast boundaries.

This rock is clearly epiclastic and consists of reworked clasts of a variety of silicic to intermediate volcanic and subvolcanic rock types. It has experienced low to moderate grades of hydrothermal alteration, resulting in the passage of fluids dominantly through the matrix or interstices between the clasts and the deposition of sericite and pyrite. The carbonate alteration is more pervasive, extending throughout the rock and dominantly replacing plagioclase which occur as phenocrysts within clasts and in the matrix.

Sample T72379 (55.7 m - Lithic sandstone)

This specimen is quite similar to T72378 but contains a slightly greater proportion of the coarser-grained igneous clasts. These are composed of interlocking laths of plagioclase (0.2 - 0.5 mm) with interstitial quartz and chlorite and minor prismatic apatite. The plagioclase typically exhibits carbonate alteration.

Individual clasts are typically 1 - 3 mm in the section examined. There is also one relatively large (several cm long) finer-grained clast apparent in hand specimen. This is composed of interlocking subhedral to euhedral laths of plagioclase with interstitial quartz, sericite, chlorite and relatively abundant disseminated opaques. Many of the other clasts have similar mineralogy and grain size although some are devoid of opaques.

Chlorite and sericite alteration is variable in intensity and most strongly developed along clast boundaries. As with T72378, the carbonate alteration is more pervasive. There is also a narrow (0.3 mm wide) carbonate-chlorite vein cutting across the section which suggests that the carbonate alteration may be a relatively late (? Devonian) feature. On the other hand, the sericite and some of the chlorite define a moderate cleavage indicating they were produced during a pre-deformation alteration event.

This is a clastic rock (crystal lithic sandstone) derived by reworking of acid to intermediate volcanic and subvolcanic lithologies.

Sample T72380 (63.0 m - Lithic sandstone)

Sample T72380 is also a clastic rock and is very similar to both T72378 and T72379. The relatively coarse-grained clasts abundant in the latter two samples are also present in this rock but they are less abundant. The proportion of clasts to matrix seems to be considerably lower in this sample compared with the previous two. The matrix is composed of abundant angular to subrounded plagioclase and quartz fragments and finer xenoblastic quartz, feldspar and chlorite. Sericite is also abundant in the matrix and often occurs as fine veinlets or rimming individual grains.

Carbonate alteration has also partially replaced plagioclase in the lithic fragments and matrix and pyrite, although concentrated in veinlets, is also disseminated throughout the rock.

This sample is a lithic sandstone of volcanogenic origin and probably represents a finer facies variant of the lithologies represented by T72378 and T72379.

Sample T72381 (97.6 m - Altered andesite-dacite lava)

This rock has experienced strong hydrothermal alteration resulting in extensive replacement of the original phases by quartz, sericite and pyrite. The subparallel alignment of the sericite crystals throughout the rock, including in veinlets which crosscut the foliation, indicate that the sericite alteration predated the deformation. The specimen is dominantly composed of xenoblastic quartz grains which are typically rimmed by sericite, with lesser amounts of relict plagioclase feldspar, disseminated pyrite, and occasional prismatic crystals of apatite. There are also several relatively large (2 - 3 mm) irregular patches of sericite. The granular texture of the rock is attributable to the significant silicification and subsequent recrystallisation coupled with the development of sericite rims around quartz aggregates. It is not considered to reflect an original clastic texture. The larger patches of sericite probably reflect more intense localised alteration patches. There are a few relict plagioclase crystals which may have been microphenocrysts and some other tabular crystal forms which are now largely quartz and/or sericite, but may have originally been plagioclase phenocrysts.

The extensive nature of the alteration which this rock has experienced makes it very difficult to assess its precursor. However, the presence of occasional relict prismatic apatite microphenocrysts suggests a volcanic rock with a composition in the andesite-dacite range.

Sample T72382 (102.0 m - Altered silicic ? dacitic ash deposit)

This rock is also dominantly composed of quartz, sericite and pyrite but it is texturally quite distinct from the preceding sample.

The ovoid patchy character of the rock which is apparent in hand specimen is due to the presence of wispy patches of sericite surrounding rounded relatively quartz-rich aggregates. These ovoid pods are generally very fine-grained xenoblastic quartz with sericite and pyrite, and appear to be relicts of an originally recrystallised glassy lava which has experienced patchy hydrothermal alteration. The cores of some of the ovoid aggregates, and a cross-cutting pyrite-rich vein, consist of coarser-grained aggregates of quartz, pyrite and muscovite. Some of these may represent vesicles which were later filled by the hydrothermal alteration phases, although it is difficult to be convinced by this interpretation. They may simply represent more coarsely recrystallised patches of the same groundmass, a feature which is not uncommon in these sorts of rocks.

The rock contains no obvious relict phenocrysts, and while it conceivably represents an altered glass silicic lava, it may also have been a fine silicic ash deposit produced during an explosive submarine eruption.

There is no evidence of apatite phenocrysts in this rock, which would support an intermediate composition, however, if it was an ash deposit, we would not necessarily expect these to be present. Hence this deposit could be similar in composition to the enclosing lava units.

T72383 (121.5 m - Silicified andesite-dacite)

This sample is composed of quartz, sericite, pyrite, carbonate and occasional stumpy, euhedral microphenocrysts of apatite. The groundmass is dominated by very fine-grained xenoblastic quartz, with abundant sericite and patches of carbonate.

Ovoid patches of xenoblastic quartz appear to be filling original vesicles in the rock. there are also some similar sized aggregates of quartz which have a rectangular or tabular form which probably represent completely replaced plagioclase phenocrysts.

The thin section is also traversed by several narrow (1 mm) veins which are relatively enriched in opaques, probably pyrite, compared with the groundmass. The veins also contain carbonate, sericite and elongate quartz crystals which generally have their c-axis normal to the vein margin.

The not uncommon presence of euhedral apatite microphenocrysts in this thin section, together with its amygdaloidal structure support the idea that this rock was a lava of dacitic to andesitic composition that has been extensively silicified and sericitised probably by a predeformational hydrothermal event.

T72384 (166.5 m - Silicified andesite-dacite)

This sample contains some tabular aggregates of carbonate which represent pseudomorphs after plagioclase microphenocrysts, and several aggregates of quartz with a similar form, which may also be after plagioclase. These occur in a relatively fine-grained groundmass rich in xenoblastic quartz and sericite with some carbonate and disseminated opaques. The sericite crystals are subparallel and define a weak cleavage through the rock, indicating that the alteration was pre-deformation.

Prismatic microphenocrysts of apatite are also evident throughout the groundmass. Hence this rock is closely comparable with several of the samples described above (eg T72381 and T72383), and was most likely a lava of andesite to dacite composition.

Some of the quartz grains throughout the groundmass exhibit a brown stain around their margins in plane polarised light which has tended to produce shard-type textures. However, this seems to be purely a pseudofragmental texture. While the evidence that this sample represents a lava is not as strong as for the previous sample (T72383), the similar mineralogy and recognition of pseudomorphed phenocrysts supports this interpretation.

COMMENT

Sample T72385 appears to be igneous and may be a high-level intrusive as you suggest, however the two associated samples (T78522 and T78523) show strong evidence of reworking and a clastic origin.

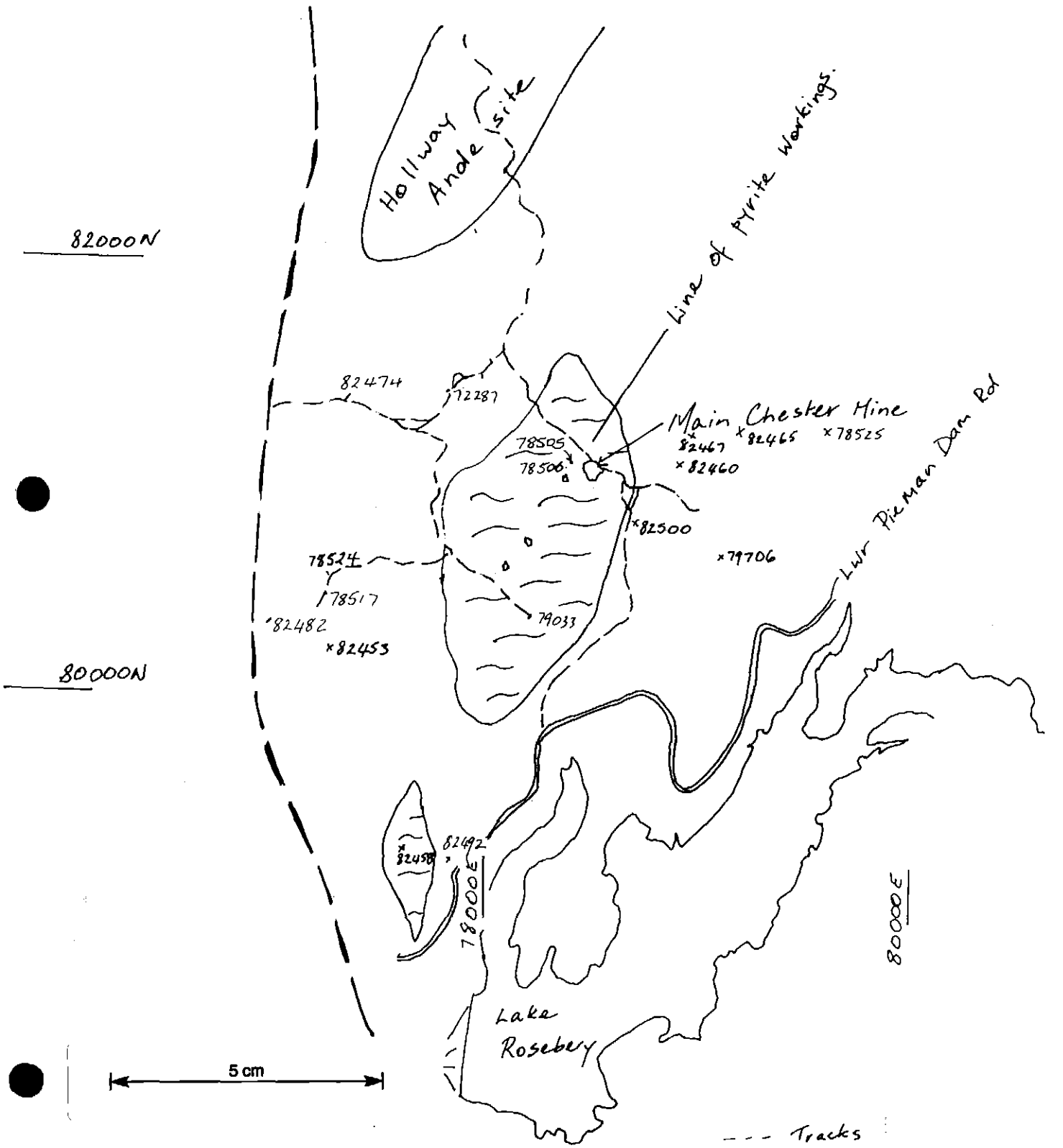
The drill hole samples include lavas and reworked units with a range of source components, some of which appear to be locally derived. All of the samples show significant hydrothermal alteration and there is some suggestion that the intensity of alteration increases in the deeper samples from drill hole BPD67.

The intensity of the alteration (especially the strong silicification) makes it difficult to accurately assess the composition of the volcanics. The best evidence is provided by the presence of relict apatite microphenocrysts in most of the lavas. Apatite is quite resistant to replacement by hydrothermal phases, and although it can be introduced as a hydrothermal phase in some instances, this is relatively rare. In addition, the form and distribution of the apatite in these rocks is more consistent with it being a primary igneous phase.

The relative abundance of apatite in the lavas is also quite interesting in terms of the overall chemical character of the volcanic package. P2O5 (and apatite) tend to be more enriched in lavas of alkaline affinity (e.g. Hellyer andesites/basalts). If you

have any Ti/Zr data for these rocks it would be interesting to make a comparison with the available Mt Read data.

421170



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Petrological Samples

Location Map.

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90-3203A

APPENDIX 4.

"FURTHER DHEM SURVEYS AT BURN'S PEAK

(EL 44/88)

RESULTS FOR SURVEYS ON DRILL HOLES

BPD 62 - BPD 65 AND EAF 11

DR J R BISHOP DEC 1989

421172

MITRE GEOPHYSICS PTY LTD
MINERAL EXPLORATION AND ENGINEERING CONSULTANTS
BUGGS LANE ELLIOTT TASMANIA 7325 PHONE 004-363143

FURTHER DHEM SURVEYS AT BURNS PEAK (E.L. 44/88)

for

North Broken Hill Peko Ltd

by

Dr J.R. Bishop

GPK/MG89/16
Dec., 1989

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Figure 16. EM field patterns. EAF11: loops 1 & 2.

SUMMMARY

Down-hole electromagnetic (DHEM) surveys have been carried out down four exploration holes in the Pinnacles area of E.L. 44/88. Weak responses were recorded down two of the holes: BPD63 and BPD65. No definite, confined conductor was interpreted for the latter, but a poorly conducting ribbon shaped source is suggested for the former, lying in close proximity beneath the hole at a down hole depth of around 280-290m. Further surveying of this conductor from more loops is recommended if there is any geological encouragement for follow up work.

A fifth hole, EAF11, was re-surveyed with a Zonge receiver to allow comparison between this equipment and other DHEM systems. Results very similar to the original Sirotem survey were obtained and an explanation is suggested for the discrepancies previously noted between the Sirotem and a later EM37 survey.

INTRODUCTION

Four exploration holes, BPD's 62, 63, 64 & 65, recently drilled by Geopeko into the 'Pinnacles' mineralised zone, have been surveyed with DHEM using EM37. Another hole, EAF11, which had been previously surveyed with Sirotem and EM37, was resurveyed with the Zonge system for comparative purposes.

This report presents the results and gives an interpretation for the surveys down all five holes. Because of the possibility of zinc-rich, poorly conducting massive sulphides in this region (Bishop, 1989), the results have been 'over interpreted' with a quantitative analysis being carried out on two very weak anomalies.

SURVEY DETAILS

The loop layouts for the DHEM surveys are shown in Figure 1. The loop numbering continues on from earlier surveys in this area which used loops 1 to 6 (Anon., 1988).

Holes BPD62, BPD63, BPD64 & BPD65 were surveyed by Geoterrex in November, 1989 using an EM37 system at 25Hz which gives 20 channels of data between approximately 0.1 and 7msecs. One or two loops were used for each hole, depending upon the coupling. The results were plotted by Geoterrex in their usual manner and reductions of the originals are given in Figures 2 to 5.

Hole EAF11 was surveyed from two holes by Zonge also in November, 1989. A GDP-16 receiver was used with a Sirotem probe at 16Hz. This provides 25 channels between ~2.2usecs and ~12msecs *. The results were plotted by Zonge using a logarithmic amplitude scale and are reproduced here in Figure 6.

A summary of the survey details is given in Table 1.

INTERPRETATION

BPD62

BPD62 was surveyed from two loops: numbers 12 & 13. The EM field directions for these loops in the plane of the hole are shown in Figure 7#. Loop 13 provides good coupling to any mineralisation at a high angle to the hole on the western side of the anticline and loop 12 would couple well with any shallow sulphides on the

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* Actual times vary from survey to survey, depending upon the various delay times in the system.

The hole directions for all of the EM field sections are based on the collar survey points only. Some flattening of the holes undoubtedly occurred.

eastern side of the structure (see drill hole section in Rosenhain and Mathison, 1989).

There is some 'character' in the early channels at the end of hole BPD62 from the loop 12 survey (Figure 2a), however any off-hole conductor near the bottom of the hole (below 570m) would produce a negative trending response. The raised (positive) values are probably related to the changes in rock type; ie, slightly more current flow in the sedimentary sequences than in the porphyry. Similarly, the slightly depressed values at late times (channels 11-15) near the top of the hole (centred on 160m) are also interpreted to be due to more current in the same(?) sequence on the eastern side of the anticline. (Note in Figure 7 that the EM field generated by loop 12 is 'down' (ie negative) at the top of the hole and 'up' (ie positive) at the bottom of the hole, hence the difference in direction of these in-hole responses.)

The higher values at the top of the hole in the BPD62 - loop 13 profile (Figure 2b) are due to self-response of the probe. This is often observed in resistive conditions when the loop edge is close to the probe. Again, slightly elevated values were recorded through the less resistive sediments.

To summarise: no responses of interest were recorded down BPD62.

BPD63

BPD63 was also surveyed from two loops: numbers 7 & 8. The EM field directions for these loops in the plane of the hole are shown in Figure 8. The two loops provide opposing field directions and are close to orthogonal near the bottom of the hole, thus providing effective coupling to conductors in any orientation.

The results from loop 7 (Figure 3a) show a very weak anomaly centred at 295m in early times (channels 1 to 7). An off-hole source is indicated and since a poorly conducting massive sulphide deposit is considered to be a distinct possibility, the response has been interpreted.

Removal of background levels from the first six channels of the loop 7 results reveals a rapidly decaying response with a 'cross-over' near 320m (Figure 9). A similar treatment was given to the loop 8 data (Figure 10). This shows no anomaly at 320m, but does indicate a positive response at around 210m, which corresponds with a negative response in the loop 7 residual profile at the same depth. These complementary responses indicate an in-hole source (ie a conductor intersected by the drill hole) and they can be confidently ascribed to the black shales intersected between 192m and 210m. (Note that these are very small responses; not identifiable in the 'raw' profiles.)

The lack of a response in the loop 8 results at ~320m (Figure 3b) suggests a steeply dipping body with minimal coupling to loop 8. Figure 11 shows a steeply dipping ribbon shaped conductor beneath the drill hole which produces a response comparable to the observed results. This body is close to the hole (approximately 10m) and probably lies within the breccia intersected between 274m and 301m. A steep dip is required to produce the minimal coupling with loop 8, thus the relatively shallow dipping Rosebery Fault, which was intersected at around 316m, is an unlikely source. To produce these results, a low conductance of 5 Siemens was used. The strike length of 500m is not critical but a short dip length (75m was used) is required to produce the cross-over shaped anomaly. (This is another argument against the Rosebery Fault as a source: if conductive, one would expect a much larger down dip extent.) No attempt has been made to find the best possible fitting model to the observed data, since, if the source is considered to have potential, further DHEM surveys will be required to better locate and analyse the conductor.

To summarise: a weakly conducting body, close to and beneath BPD63 has produced a small amplitude anomaly. The source is close to the Rosebery Fault (which was intersected by BPD63), but it appears to have a much steeper dip and only a limited depth extent. A source other than economic massive sulphides seems likely.

BPD64

BPD64 was surveyed by one loop: number 11. Figure 12 gives the EM field distribution for this loop and shows that a good coupling would be achieved with any conformable conductors dipping steeply to the east. It also shows that the field has an upward or positive direction for the lower half of the hole.

The survey recorded very low values reflecting the resistive host rocks (Figure 4). Unexpectedly, the results are mostly negative over the length of the hole (for the lower half, self response would be positive as would any host rock response). Some other source must be invoked and energisation of black shales in the foot wall of the Rosebery Fault (or the Fault itself) could give rise to the observed negative values.

To summarise: negative values indicate a (distant) external conductor, however a regional feature such as black shales are the likely cause.

BPD65

BPD65 was surveyed by one loop: number 14. Figure 13 shows that the field directions are nearly parallel to the hole over all of its length, thus providing a good coupling to any conductor lying at a high angle to the hole.

The survey recorded positive values (as expected). A slight depression can be seen in the early times centred at 360m (Figure 5). Processing of the data to remove the background response reveals a rapidly decaying anomaly, centred at about 360m down the hole (Figure 14). The negative-going response indicates an off-hole source and thus, although a very weak conductor is indicated, further evaluation is warranted.

If a conductor conformable with the steep easterly dip of the local stratigraphy is assumed, then a large current filament is required to fit the field data (400m x 400m in the model shown in Figure 15). With much flatter dips, quite small sources could provide a reasonable match to the observed results. However for such an early-time weak response, 'current-channelling' is the most likely cause. This is a uni-directional flow of current roughly paralleling the transmitting loop which concentrates in large conductors. The centre of this flow of current would be located close to that of the top edge of the plate model.

To summarise: a weak response in the first few channels is interpreted as being due to current channelling in a less resistive unit of the volcaniclastic sediments. Computer modelling assuming an inductive plate source, positions the current at about 50m to the east of the hole at a down hole depth of 360m. An economic conductor is unlikely.

EAF11

EAF11 had been surveyed by Sirotem for the previous lease holders BHP. It was then surveyed with EM37 for Geopeko, to compare the two systems. Quite different results were obtained; particularly for the loop 2 results. The hole has been re-surveyed with Zonge's GDP16 attached to a Sirotem probe, using the same two loops (numbers 1 & 2) as for the earlier surveys. Figure 16 shows the EM field patterns for these two loops.

The Zonge survey produced results very similar to the original Sirotem data, the main exception being a much reduced negative-going response centred at 100-120m on the loop 2 data. This is possibly due to early time base Sirotem recording at earlier times*, or to slightly different positioning of the transmitter cable.

Further examination of the Sirotem and EM37 data from this hole (shown in Bishop, 1989) suggests that, although the drill hole is shown located beneath the northern edge of loop 1 in Figure 1, for the Sirotem (and Zonge) survey, the cable was laid to the

---

* An exact comparison of the Zonge and Sirotem times is not possible without knowing the ramp off-time for the Sirotem system since Sirotem measures time from the beginning of the ramp and Zonge (I understand) from the end of the ramp.

south of the collar and for the EM37 to the north, hence the differences in polarity of the (self-)responses near the top of the hole. The negative-trending responses at 100-120m in the Sirotem channels (and to a lesser extent, in the Zonge) can then be correlated with the positive response in channels 1 and 2 of the EM37. These 'anomalies' are possibly due to the loop - drill hole geometry whereby the drill hole crosses the migrating current ring over this time range, giving rise to a false anomaly (as described by Macnae and Staltari, 1987; figure 4).

To summarise: surveying of EAF11 with Zonge equipment gave results very similar to the original Sirotem survey. Re-examination of the Sirotem and EM37 data suggests that the differences in the results for loop 2 may be explained by the transmitter cable passing on different sides of the hole collar. No responses of potential economic interest were recorded.

CONCLUSIONS AND RECOMMENDATIONS

None of the DHEM surveys recorded any good, well defined anomalies, but weak responses down BPD63 and BPD65 were interpreted as being due to off-hole conductors. A quantitative evaluation of these two anomalies indicated very weak sources. For BPD65, no discrete conductive source was indicated; rather, current channelling within the volcaniclastic sediments (or along a contact) is the likely cause of the response. The source for the response down BPD63 may be of more interest, since modelling has indicated a discrete, weakly conducting source, possibly within altered volcanics. If sufficient enthusiasm can be raised for this target on geological grounds, further DHEM surveying is recommended down BPD63, using different loop positions.

The trial survey down EAF11 showed that the Zonge equipment was working and was capable of producing results comparable to other DHEM systems. Some problems with sign convention were encountered during acquisition of the data and it is recommended that Zonge, and other contractors, be required to use probe calibration equipment for polarity confirmation as described by Buselli et al (1987).

J.R. Bishop
Dec., 1989.

REFERENCES

Anonymous, 1988. E.L. 5/63. Final report on relinquished area: results of exploration for 1987-88 and a summary of activities for the period 1963-1988. BHP company report.

Bishop, J.R., 1989. Interpretation of electromagnetic surveys at Burns Peak (E.L. 44/88). Mitre Geophysics report 89/03 for Geopeko.

Buselli, G., Pik, J.P. and Ferris, R.H., 1987. Calibration and polarity of Sirotem down-hole probes. Exploration Geophysics 18, 401-404.

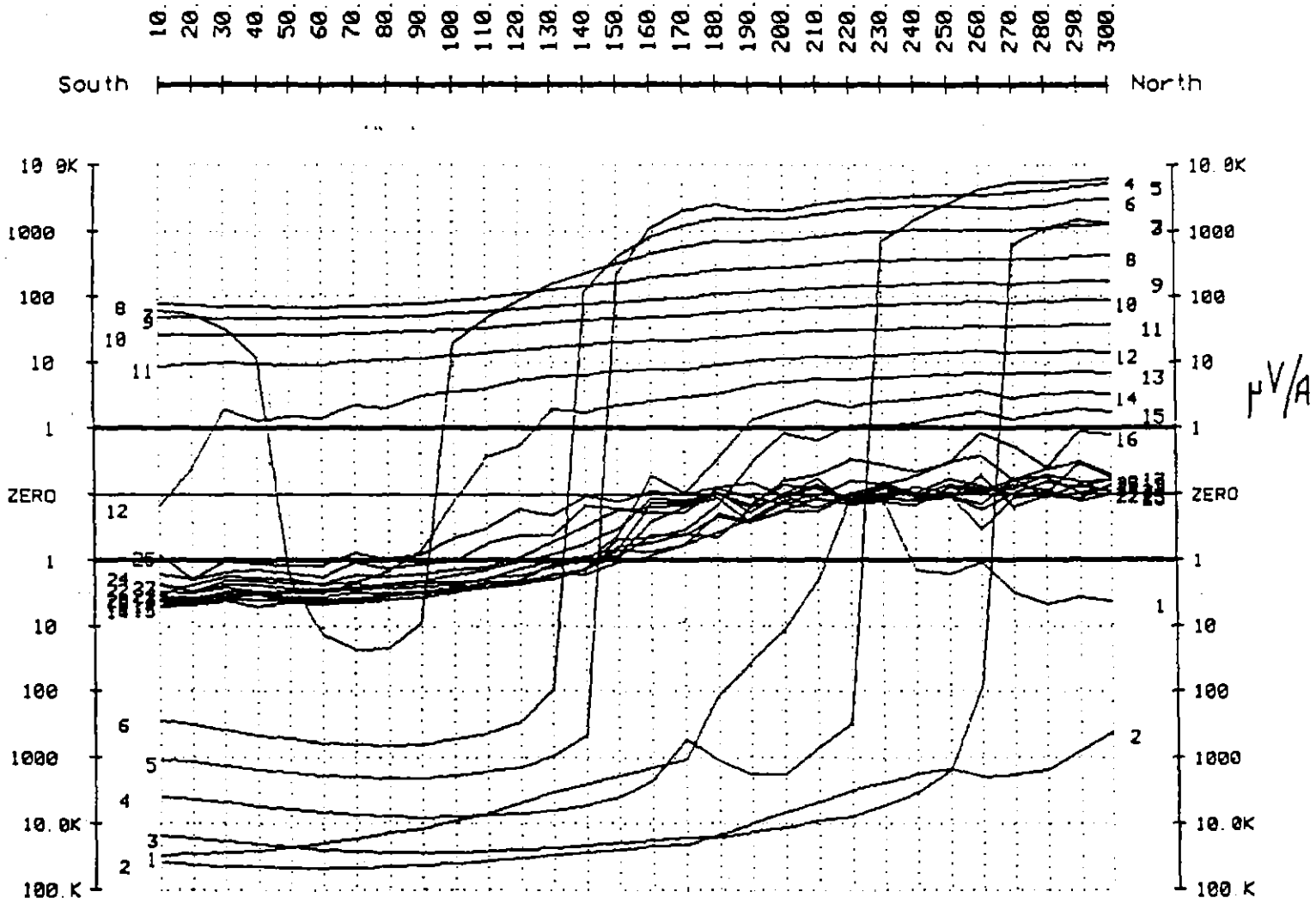
Macnae, J. and Staltari, G., 1987. Classification of sign changes in borehole TEM decays. Explor. Geophysics 18, 331-339.

Rosenhain, A.N. and Mathison, I.J., 1989. E.L. 44/88 Burns Peak. Annual report on exploration activity January 1989 - October 1989. Geopeko company report.

Table 1

BURNS PEAK DHEM SURVEY DETAILS

	Hole No.	Tx Loops	Survey depth /E.O.H.	Contractor	System	time base	Survey date	Purpose
(1)	BPD62	12 & 13	610/659	Geoterrex	EM37	25Hz	11/89	To test for northern extension of Brown's Tunnel mineralisation.
(2)	BPD63	7 & 8	420/426	Geoterrex	EM37	25Hz	11/89	To test for extension of Thomas' Tunnel mineralisation at depth.
(3)	BPD64	11	318/322	Geoterrex	EM37	25Hz	11/89	To test interpreted host rocks in the Southern Trenches area.
(4)	BPD65	14	480/596	Geoterrex	EM37	25Hz	11/89	To test interpreted host rocks on eastern side of Pinnacles anticline.
(5)	EAF11	1 & 2	300/314	Zonge	GDP-16 + Sirotem probe	16Hz	11/89	To compare Zonge system with EM37 and Sirotem (previously surveyed).



Survey by: Zonge
(job no. 962)
date: Nov. '89.

current: 8 Amps
freq : 16 Hz
delay : 2·2 μsec

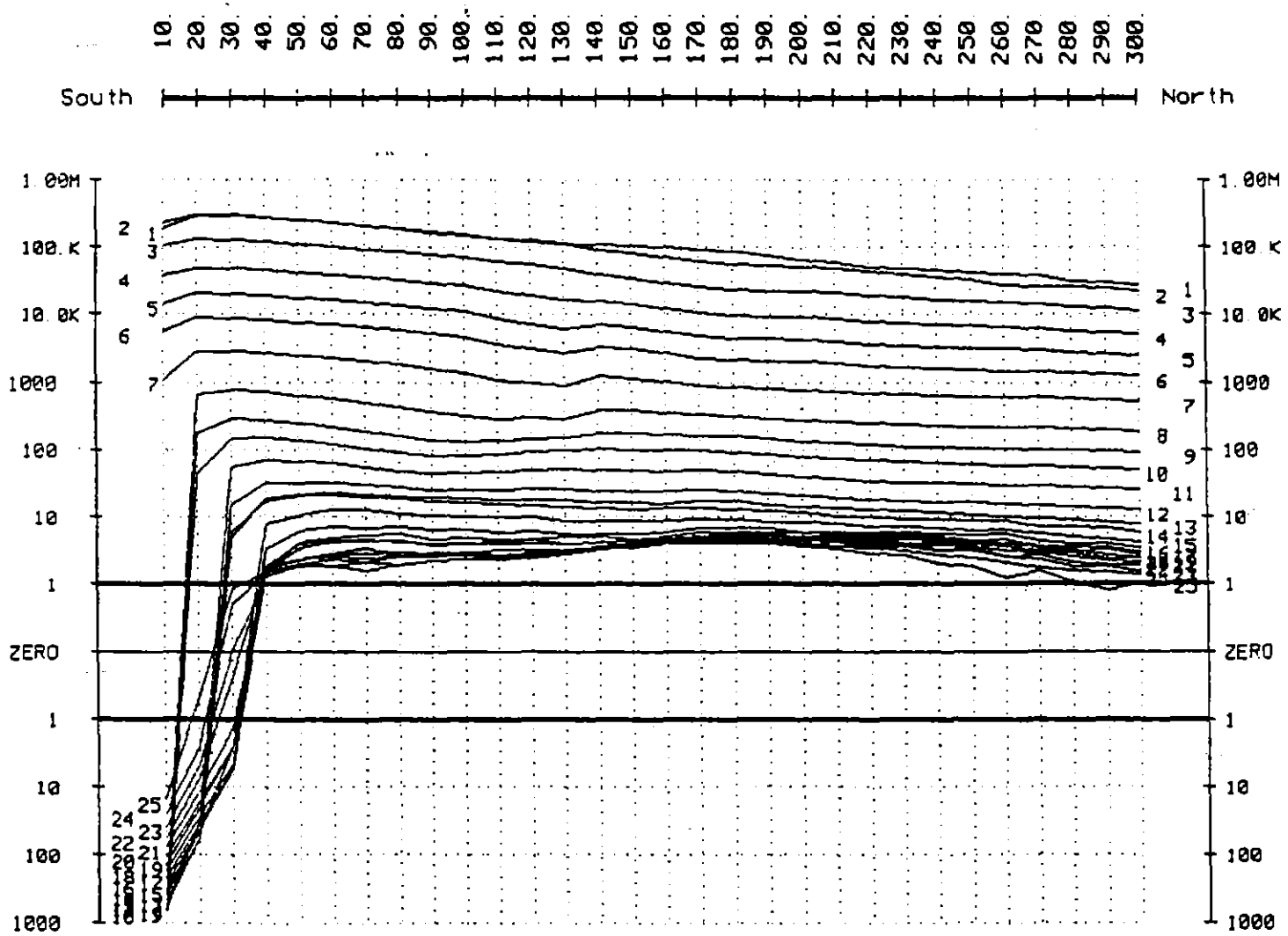
4211183

Burns Peak, E.L. 44/88.
OHEM SURVEYS

EAF11 – loop 1

ref: GPK/MG89/16

Fig. 6a.



Survey by: Zonge
(job no. 962)
date: Nov. '89.

current: 8 Amps
freq. : 16 Hz
delay : 2·2 μsecs

4211184

Burns Peak, E.L 44/88.
DHEM SURVEYS

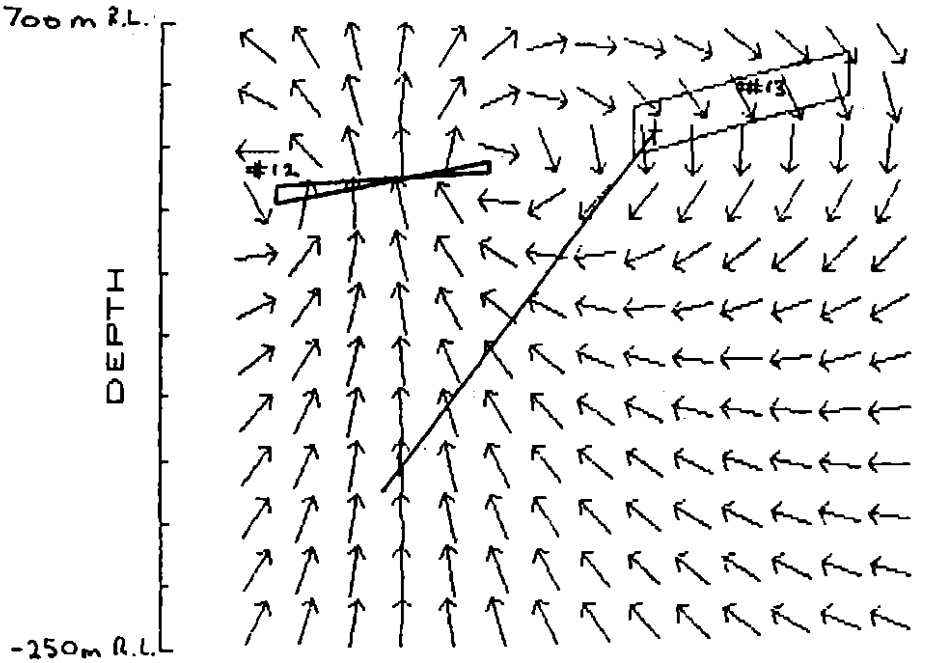
EAF11 - loop 2

ref: GPK/MG89/16

Fig. 6b.

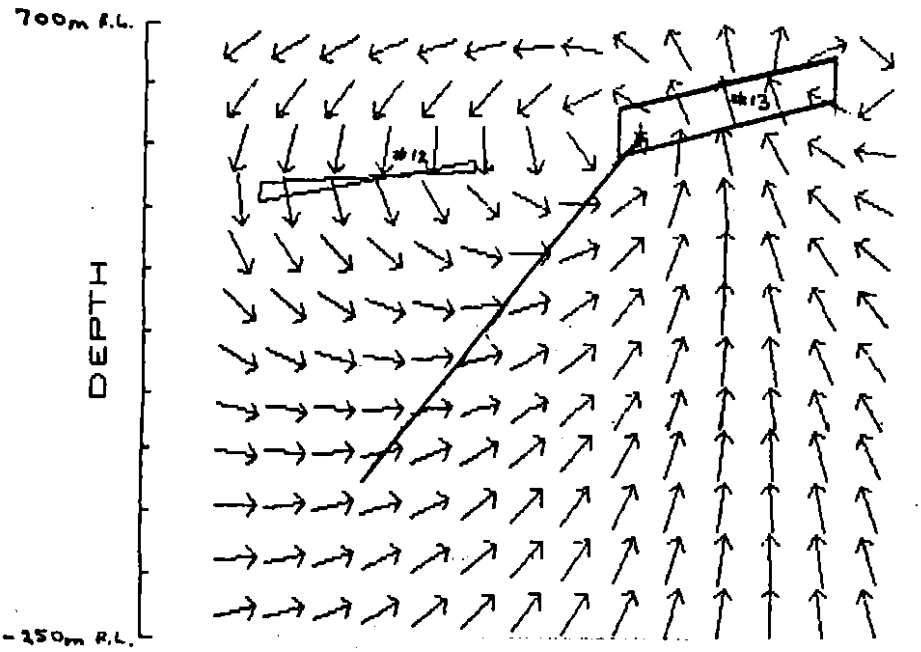
421185

FILE BPD62.CON: BURNS PEAK EM37
Projected Section from (5481.1N, 4638.5E) on Bearing 89.9 Length 951.0



Field of Loop 12.

Projected Section from (5481.1N, 4638.5E) on Bearing 89.9 Length 951.0



Field of Loop 13.

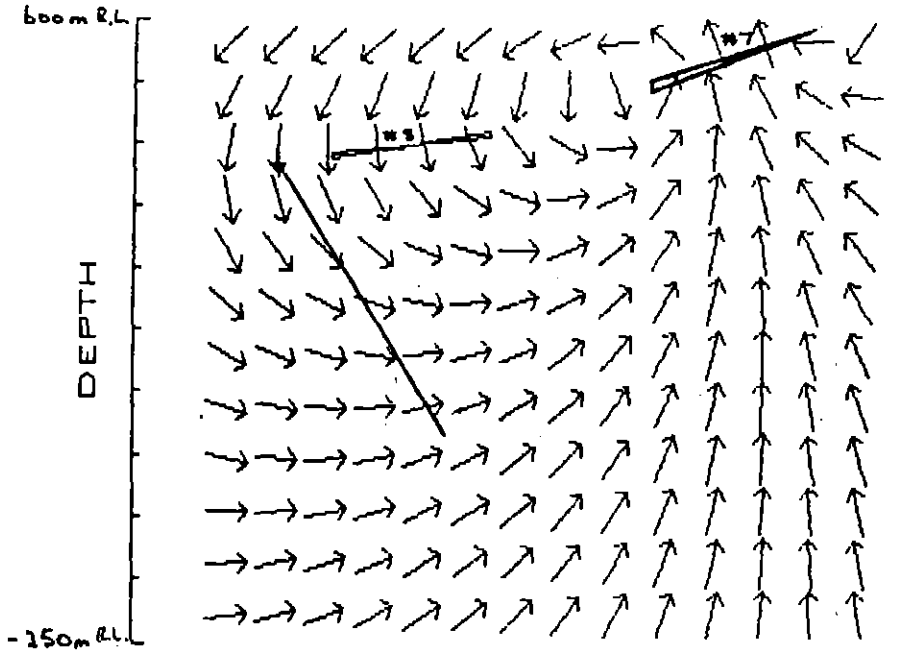
Burns Peak, E.L. 44/8
EM Field Patterns
BP062: Loops 12 & 13

ref: GPK/MG89/16

Fig. 7

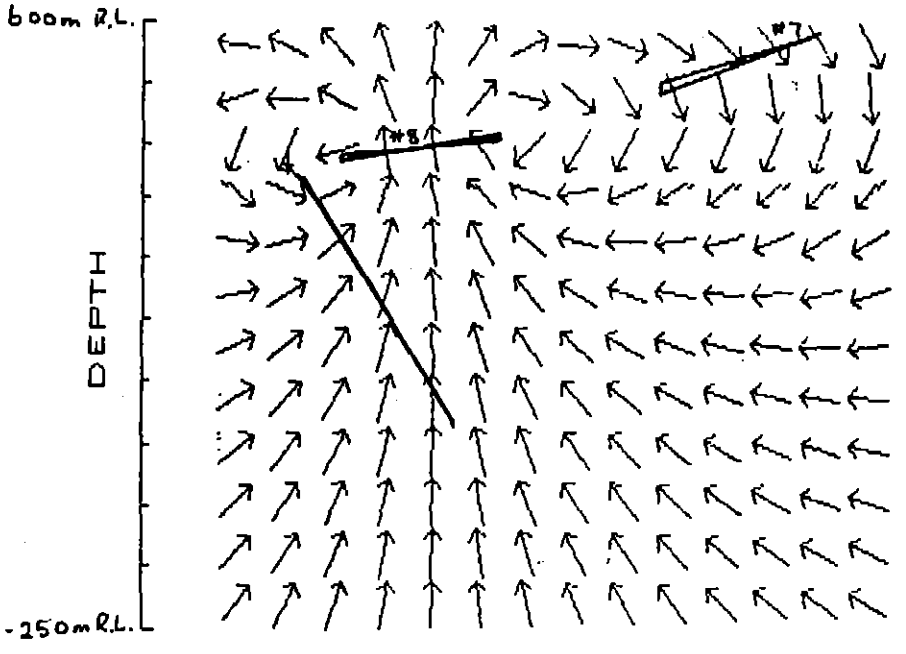
421186

Projected Section from (5000.6N, 4443.8E) on Bearing 89.8 Length 850.5



Field of Loop 7.

Projected Section from (5000.6N, 4443.8E) on Bearing 89.8 Length 850.5



Field of Loop 8.

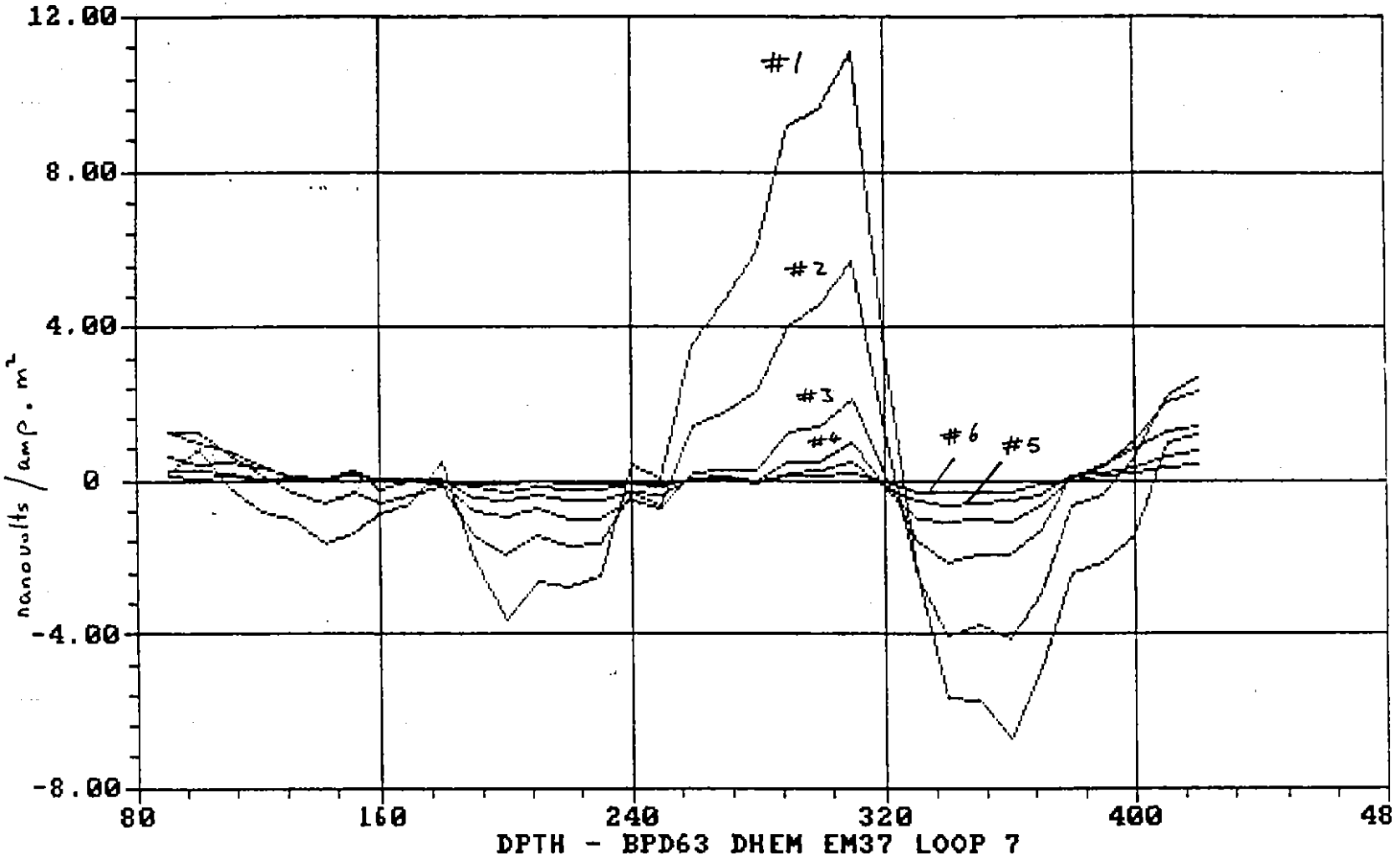
Burns Peak, E.L. 44/88

EM Field Patterns

BPD63: Loops 7&8.

ref: GPK/MG89/16

Fig. 8.



channels 1 to 6 - background subtracted

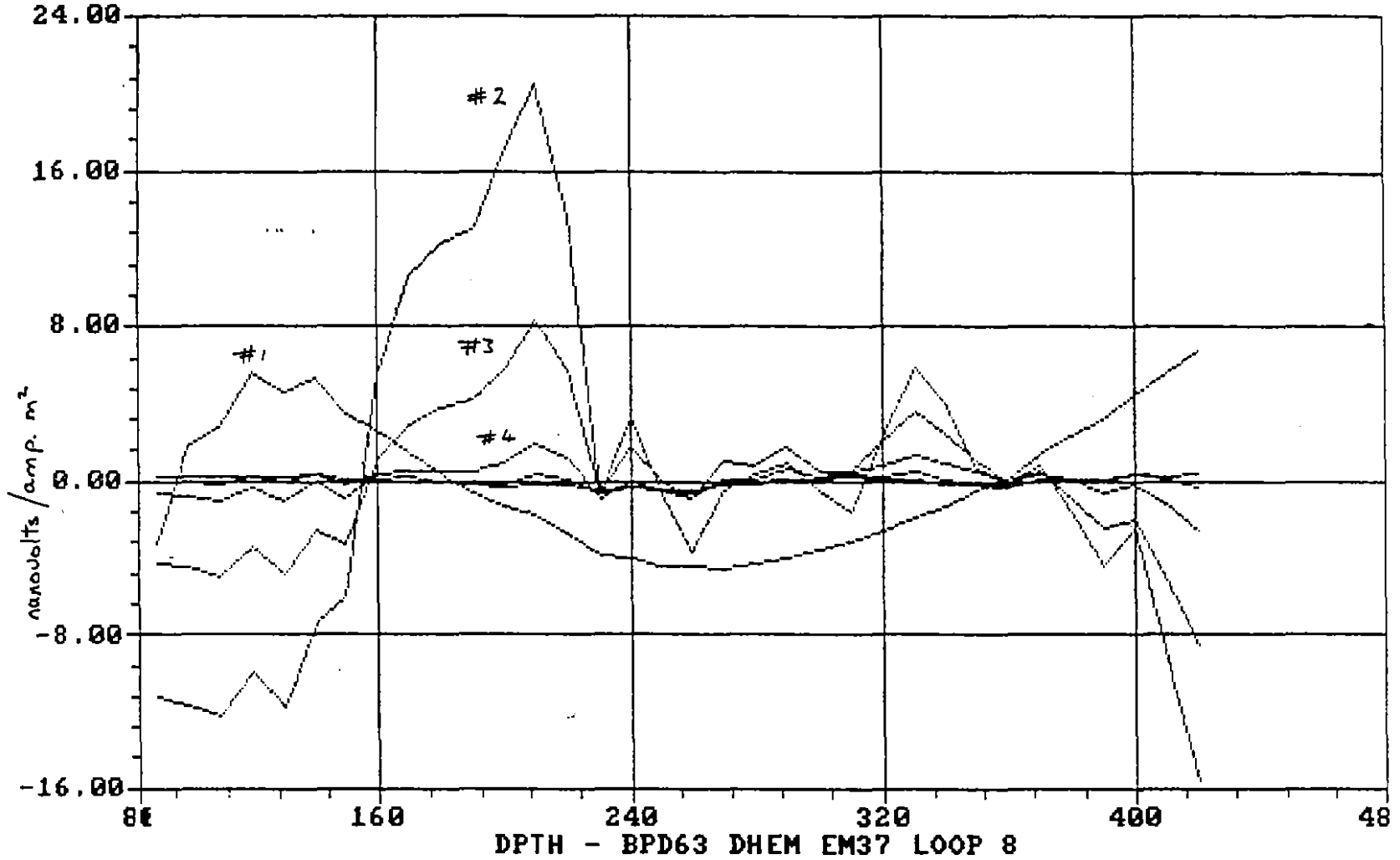
Burns Peak, E.L. 44/88
DHEM SURVEYS

BP063 - Loop 7
Residual Profile

ref: GPK/MG89/16

Fig. 7.

421137



421188

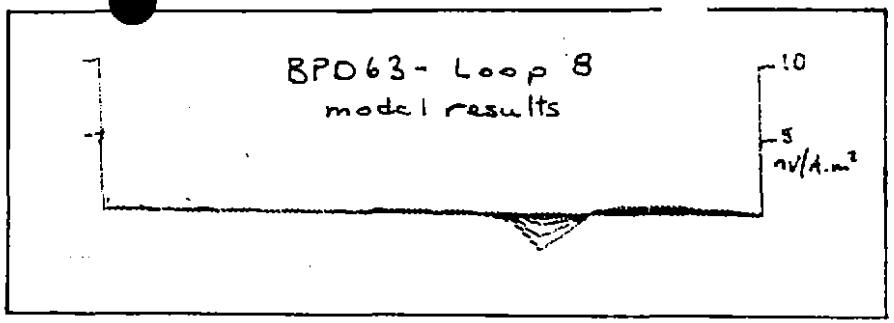
channels 1 to 6 - background subtracted

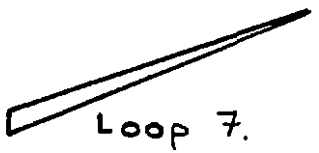
ref: GPK/MG89/16

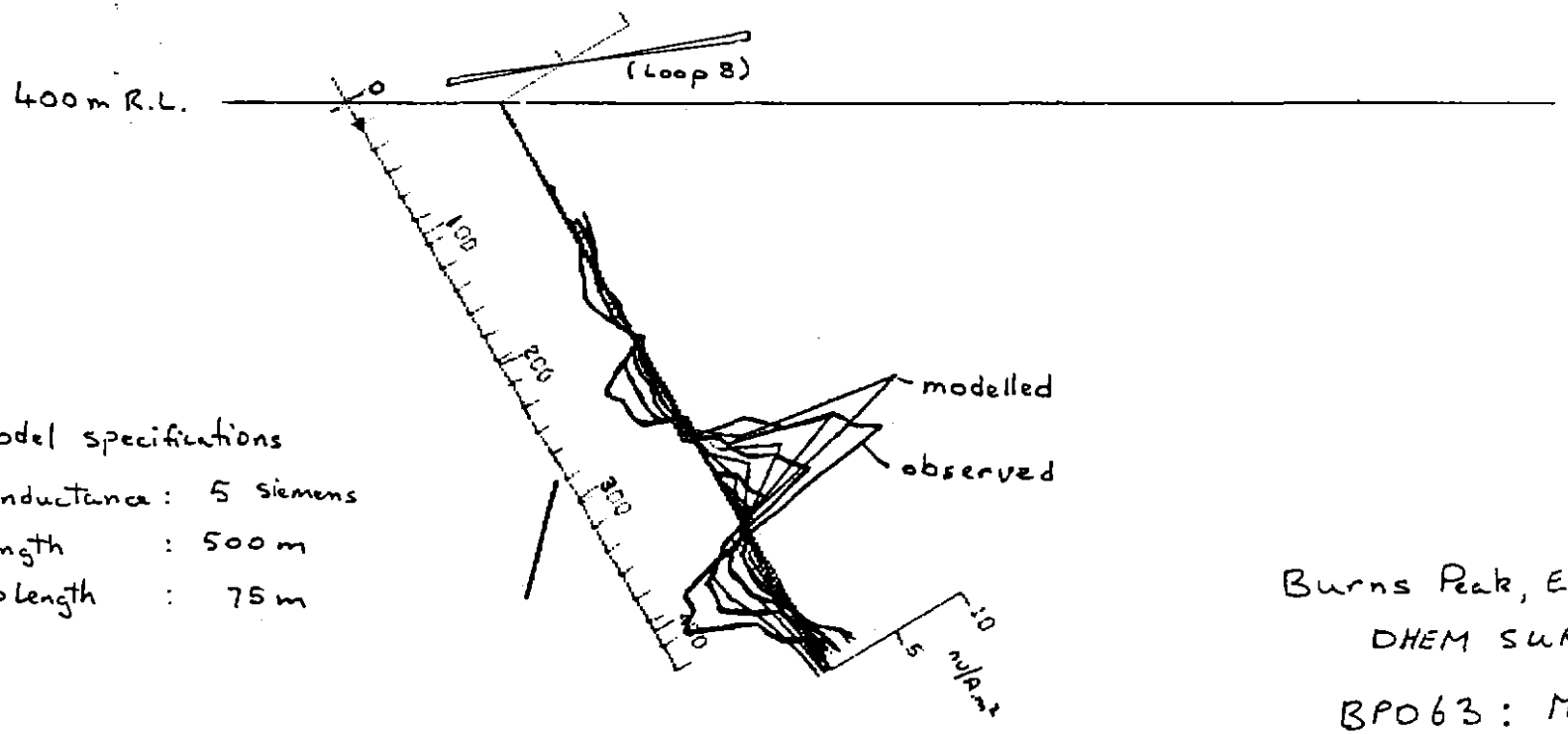
Burns Peak, E.L. 44/88
DHEM SURVEYS

BPD63 - Loop 8
Residual Profile

Fig. 10.







model specifications

conductance : 5 siemens

length : 500 m

dip length : 75 m

421189

Burns Peak, E.L. 44/88.

DHEM SURVEYS

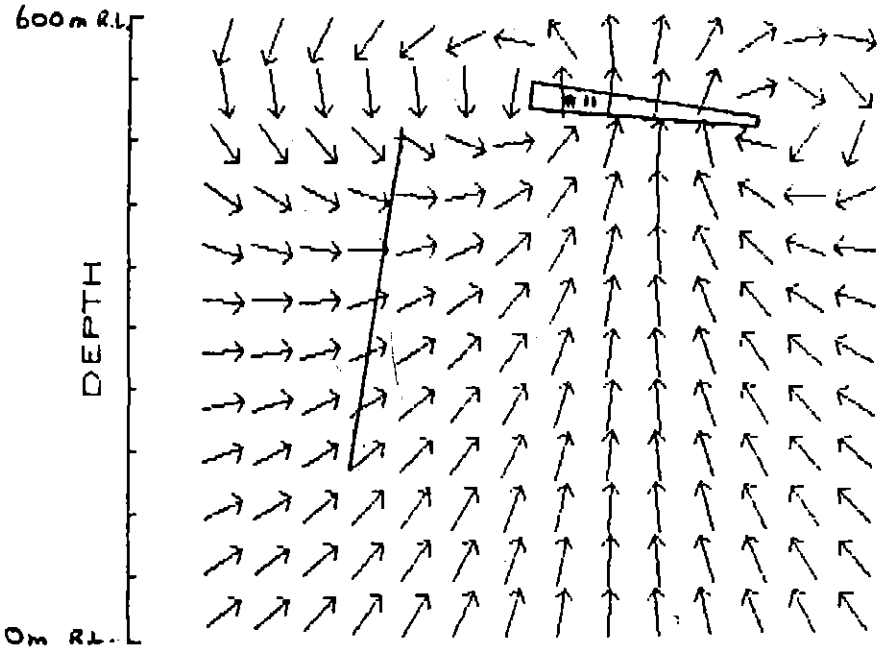
BPD63 : Modelling Results

ref: GPK/MG89/16

Fig. 11.

421190

Projected Section from (4499.9N, 4685.7E) on Bearing 89.5 Length 600.3



Field of Loop 11

Burns Peak, E.L. 44/88.

EM Field Patterns

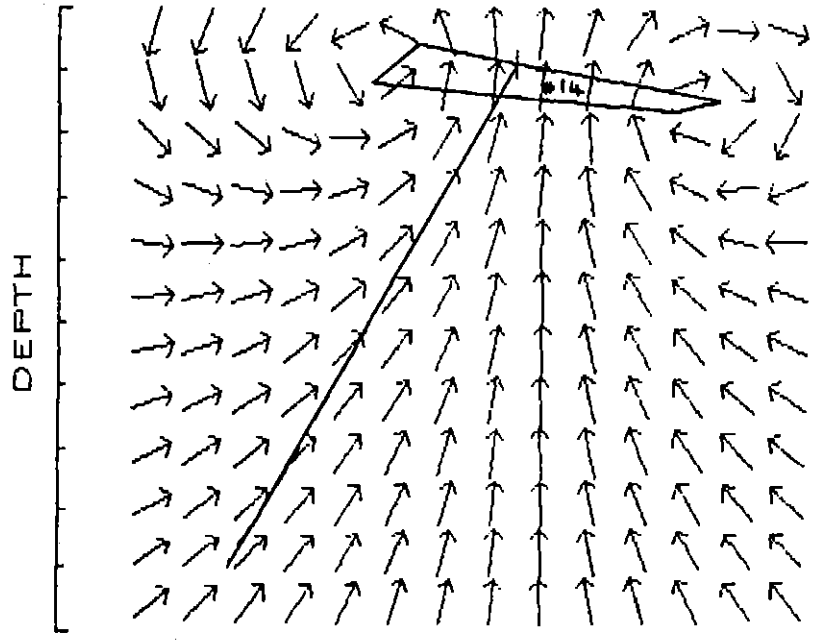
BPD64 : Loop 11.

ref: GPK/MG89/16

Fig. 12.

421191

Projected Section from (5713.8N, 5338.8E) on Bearing 98.1 Length 658.1



Field of Loop 14

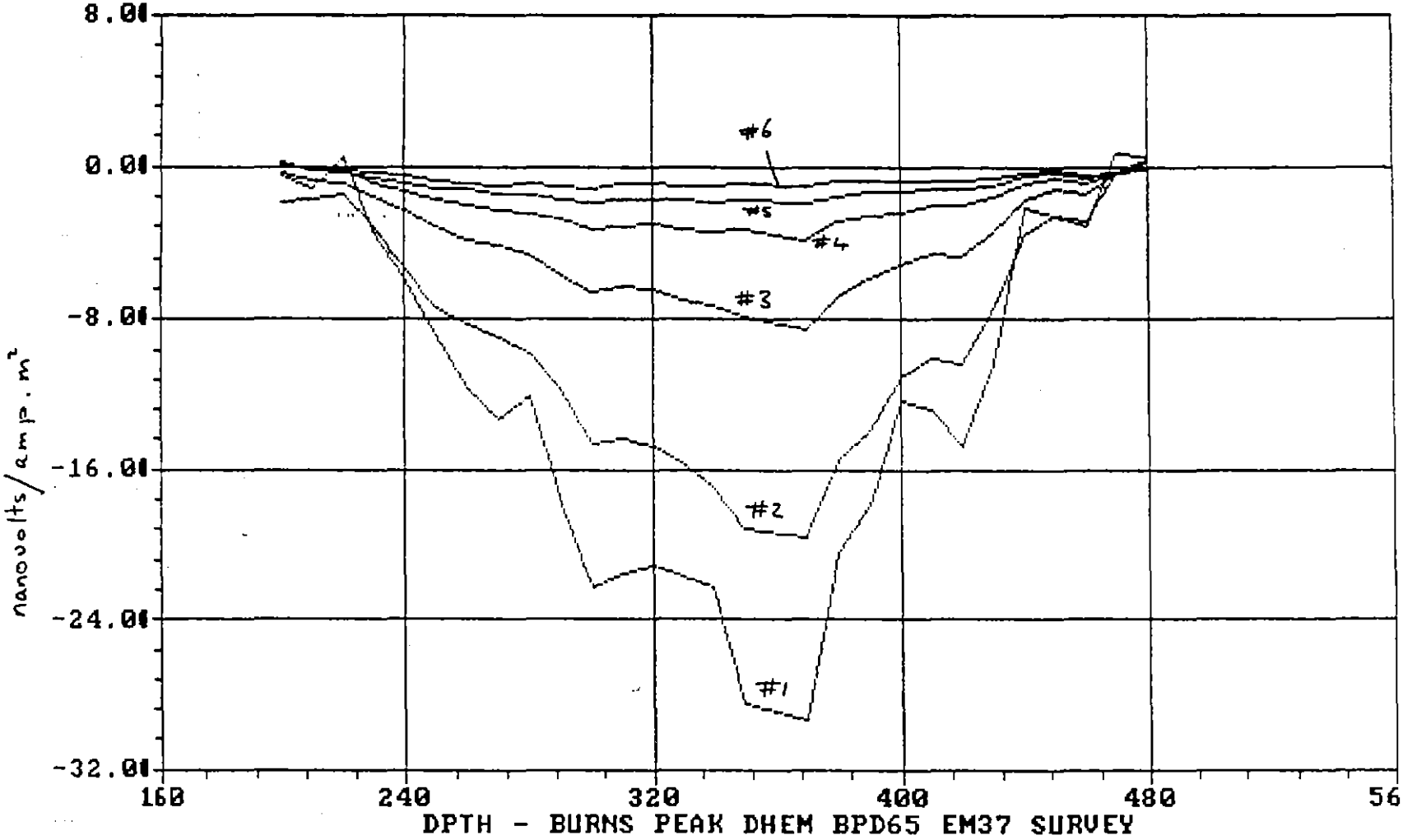
Burns Peak, E.L. 44/88

EM Field Patterns

BPD65 : Loop 14.

ref: GPK/MG89/16

Fig. 13.



channels 1 to 6 - background subtracted

Burns Peak, E.L. 44/88
DHEM SURVEYS

BPD65 - Loop 14
Residual Profile

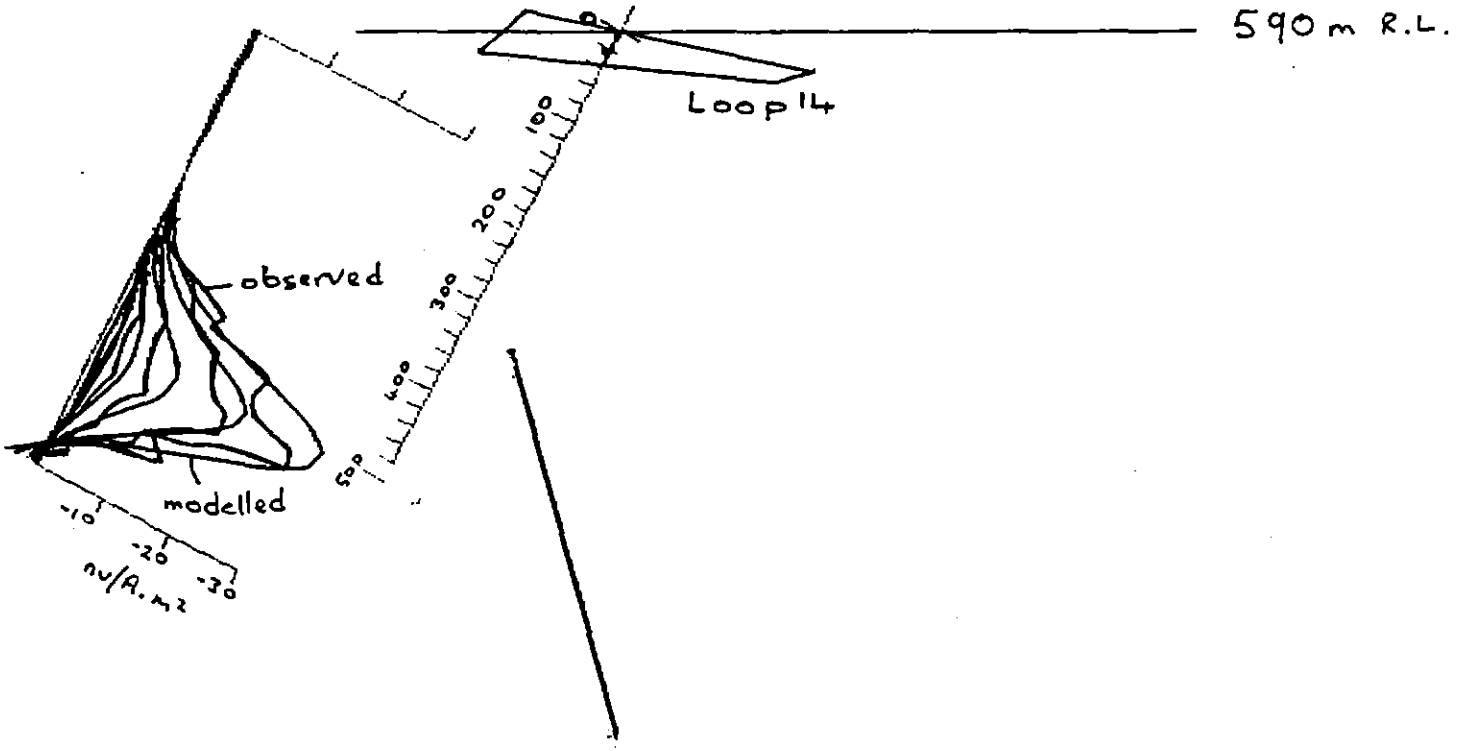
Fig. 11

ref: GPK/MG89/16

4211192

model specifications

conductance : 1·5 Siemens
length : 400 m
dip length : 400 m



4211193

Burns Peak, E.L. 44/88.
OHEM SURVEYS

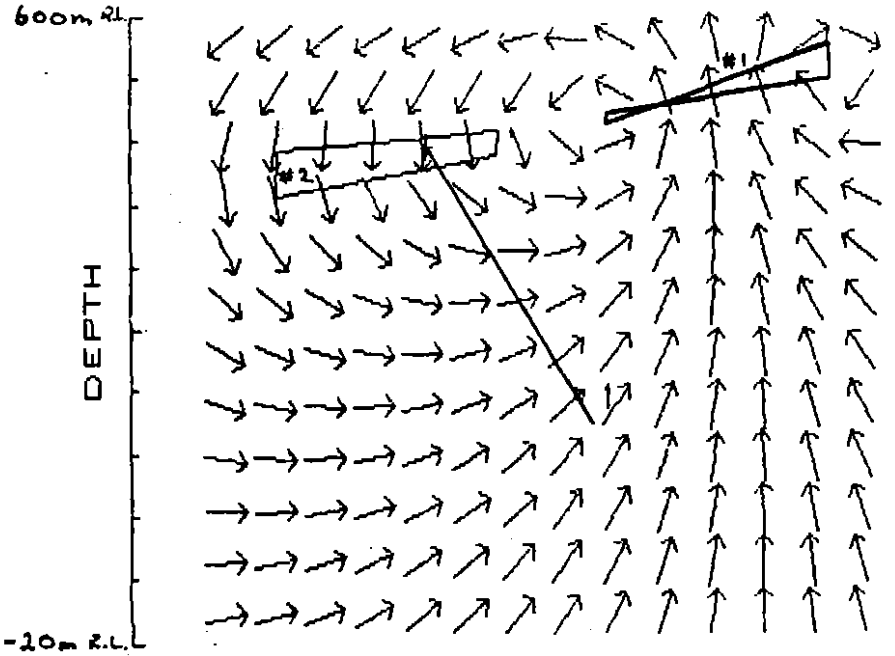
BPD 65: Modelling Results

ref: GPK/MG89/16

Fig. 15.

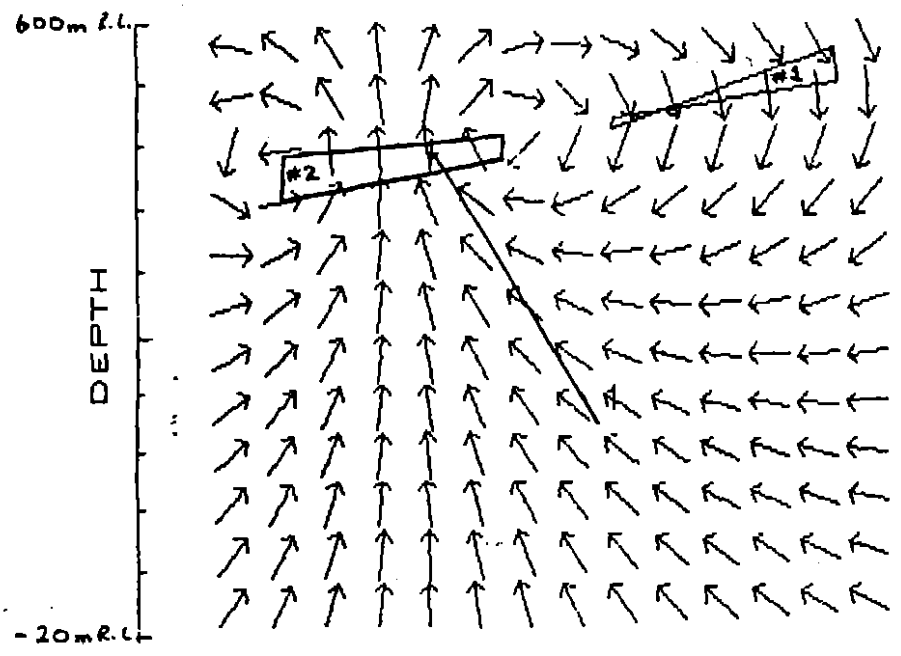
421194

Projected Section from (5399.4N, 4632.8E) on Bearing 89.9 Length 618.4



Field of Loop 1.

Projected Section from (5399.4N, 4632.8E) on Bearing 89.9 Length 618.4



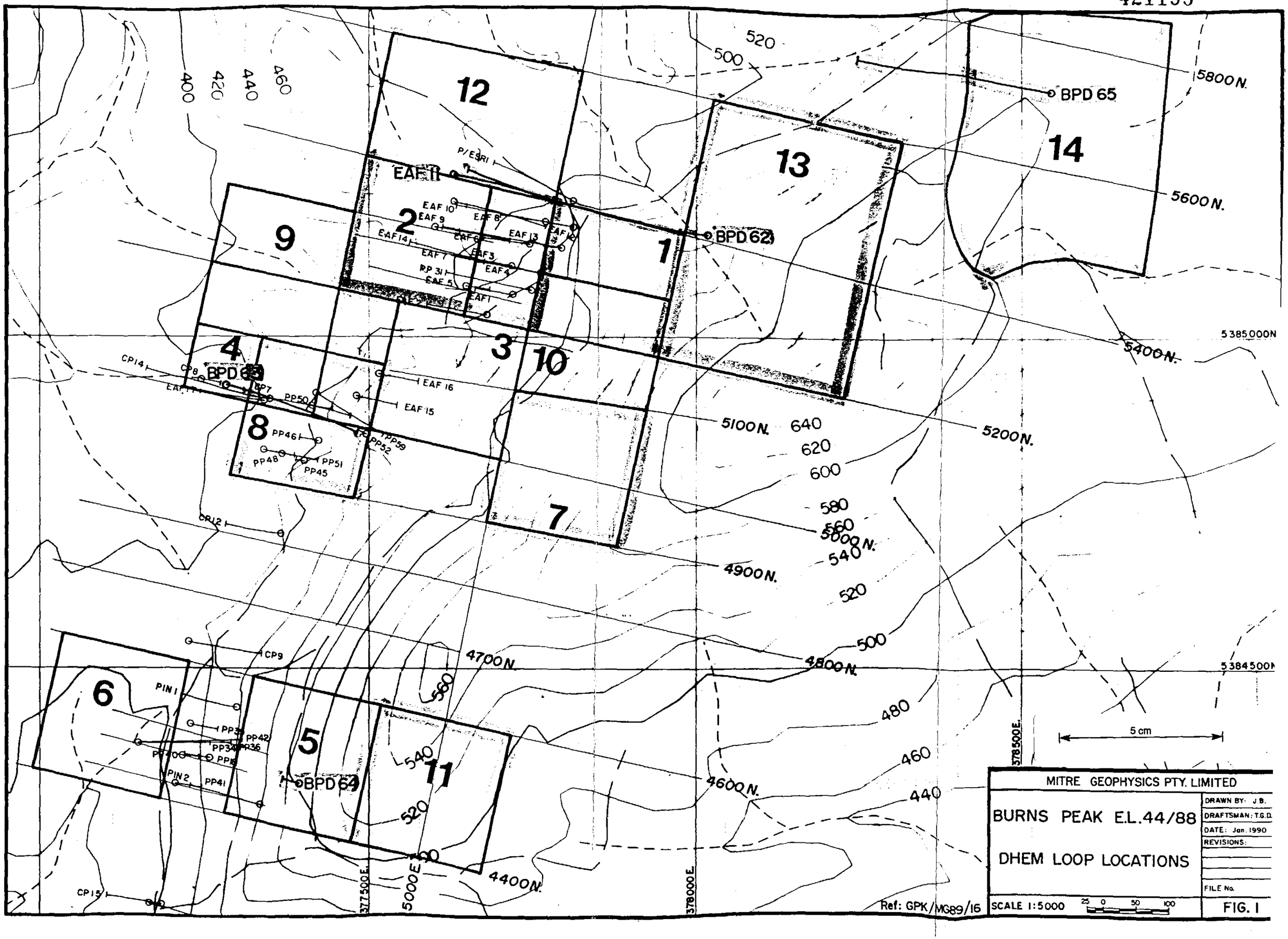
Field of Loop 2.

Burns Peak, E.L. 44/88.
EM Field Patterns
EAF11 : Loops 1&2.

ref: GPK/MG89/16

Fig. 16

421195



MITRE GEOPHYSICS PTY. LIMITED

BURNS PEAK E.L.44/88

DHEM LOOP LOCATIONS

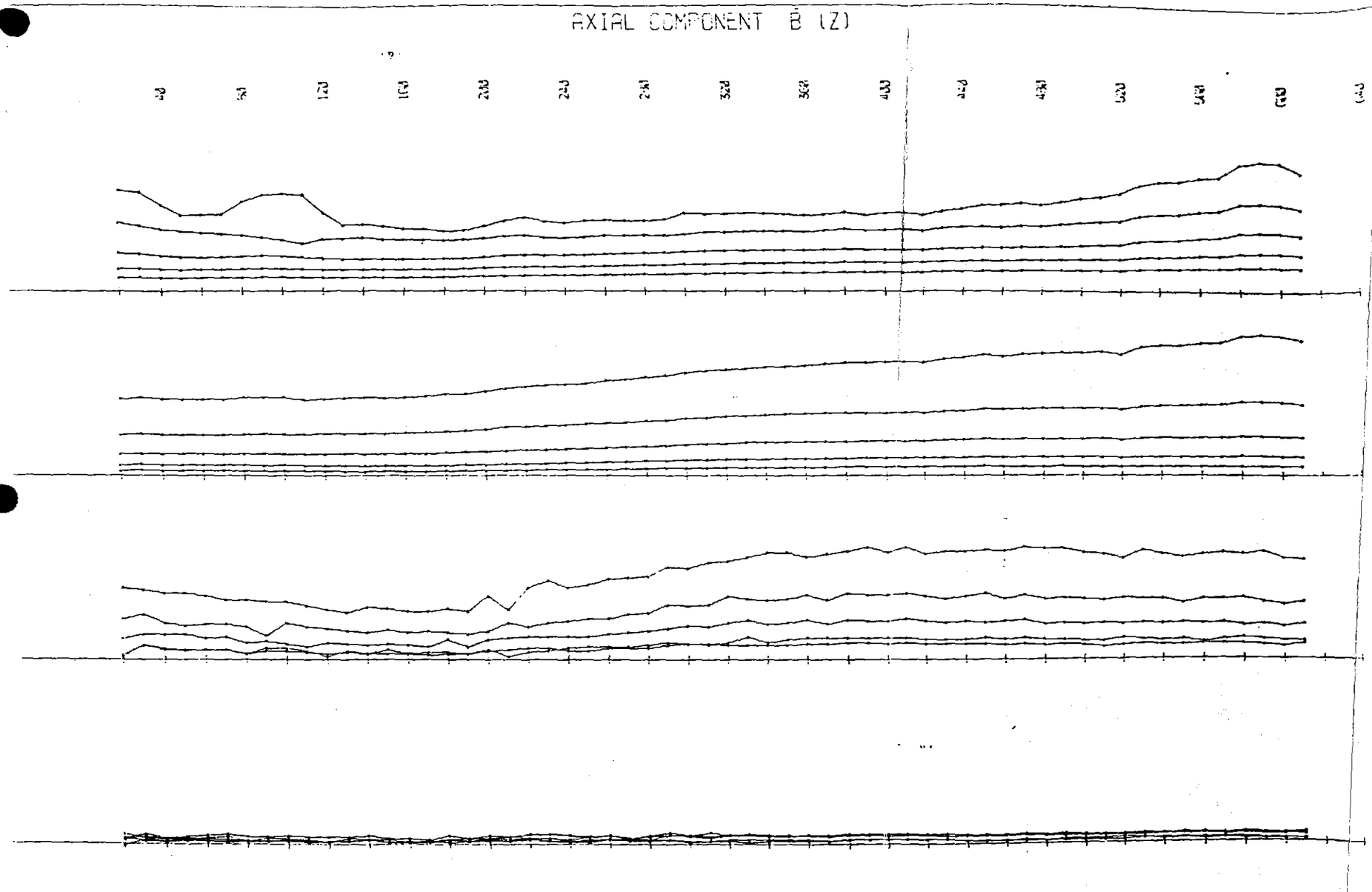
DRAWN BY: J.B.
DRAFTSMAN: T.G.D.
DATE: Jan. 1990
REVISIONS:
FILE No.

SCALE 1:5000 25 0 50 100

FIG. 1

Ref: GPK/MG89/16

421196



EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP CORNERS	:	356200N 7477E
		356720N 356332E
TX LOOP SIZE	:	522 m X 422 m
TX TURN OFF TIME	:	206 microsecs.
FIRST GATE TIME	:	99.0 microsecs.
CURRENT	:	12.6 amps
FREQUENCY	:	25 Hz.
INTEGRATION TIME	:	1024 cycles
SYNC MODE	:	
HORIZONTAL SCALE	:	
SURVEYED BY	:	PE
DATE	:	30/11/1989

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJEC A-1-

CLIENT	:	GROPEKO
PROJECT	:	BOREHOLE EM37
AREA	:	BURNS PEAK
BOREHOLE	:	BPD62
TX LOOP	:	12

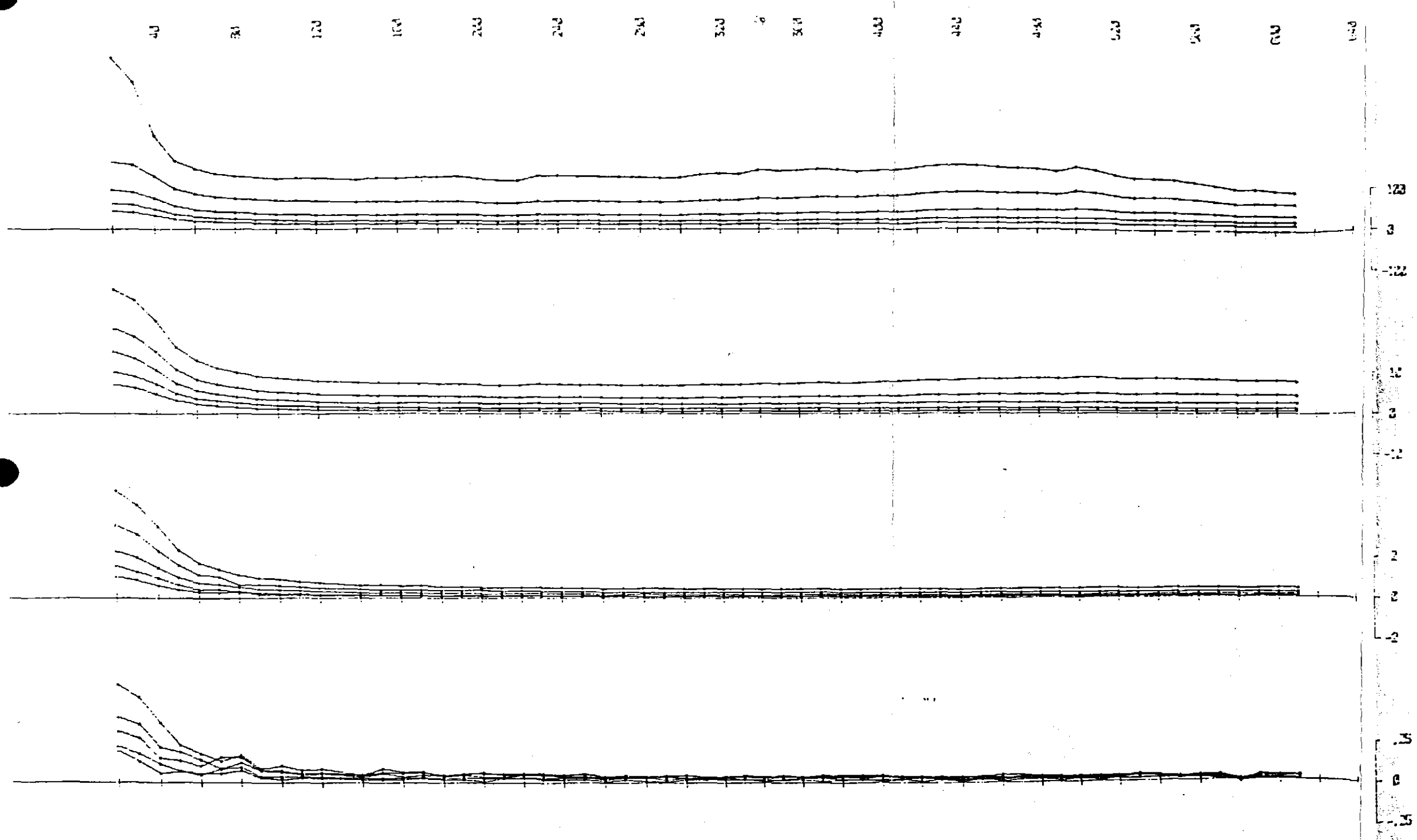
Burns Peak, E.L. 44/88
DHEM SURVEYS
BPD62 - loop 12

ref: GPK/HG89/16

Fig. 2a

421197

AXIAL COMPONENT B (Z)



EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED I
SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B

TX LOOP TYPE	:	SQUARE
	:	SQUARE
TX LOOP SIZE	:	338 m X 422 m
TX TURN OFF TIME	:	232 microsecs.
FIRST GATE TIME	:	58.0 microsecs.
CURRENT	:	10.2 amps
FREQUENCY	:	25 Hz.
INTEGRATION TIME	:	1224 cycles
SYNC MODE	:	
HORIZONTAL SCALE	:	
SURVEYED BY	:	PF
DATE	:	89/11/1989

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.	PROJECT 4-14

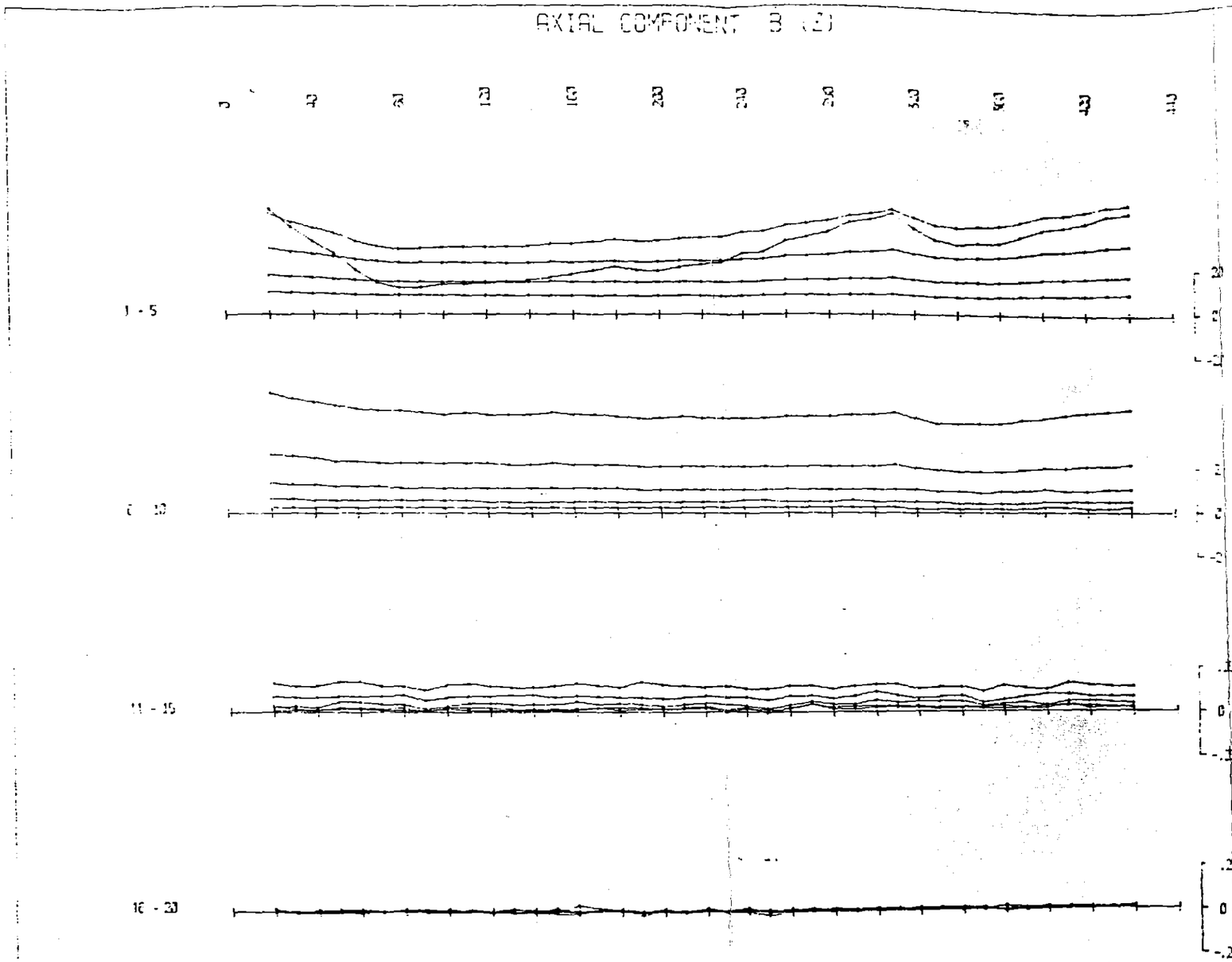
CLIENT	:	GEOPEKO
PROJECT	:	BOREHOLE EM37
AREA	:	BURNS PEAK
BOREHOLE	:	BDP62
TX LOOP	:	13

Burns Peak E.L. 44/88.
DHEM SURVEYS
BPD62 - loop 13

ref: GPK/MG89/16

Fig. 2b.

421198



EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

nanovolts per metre squared

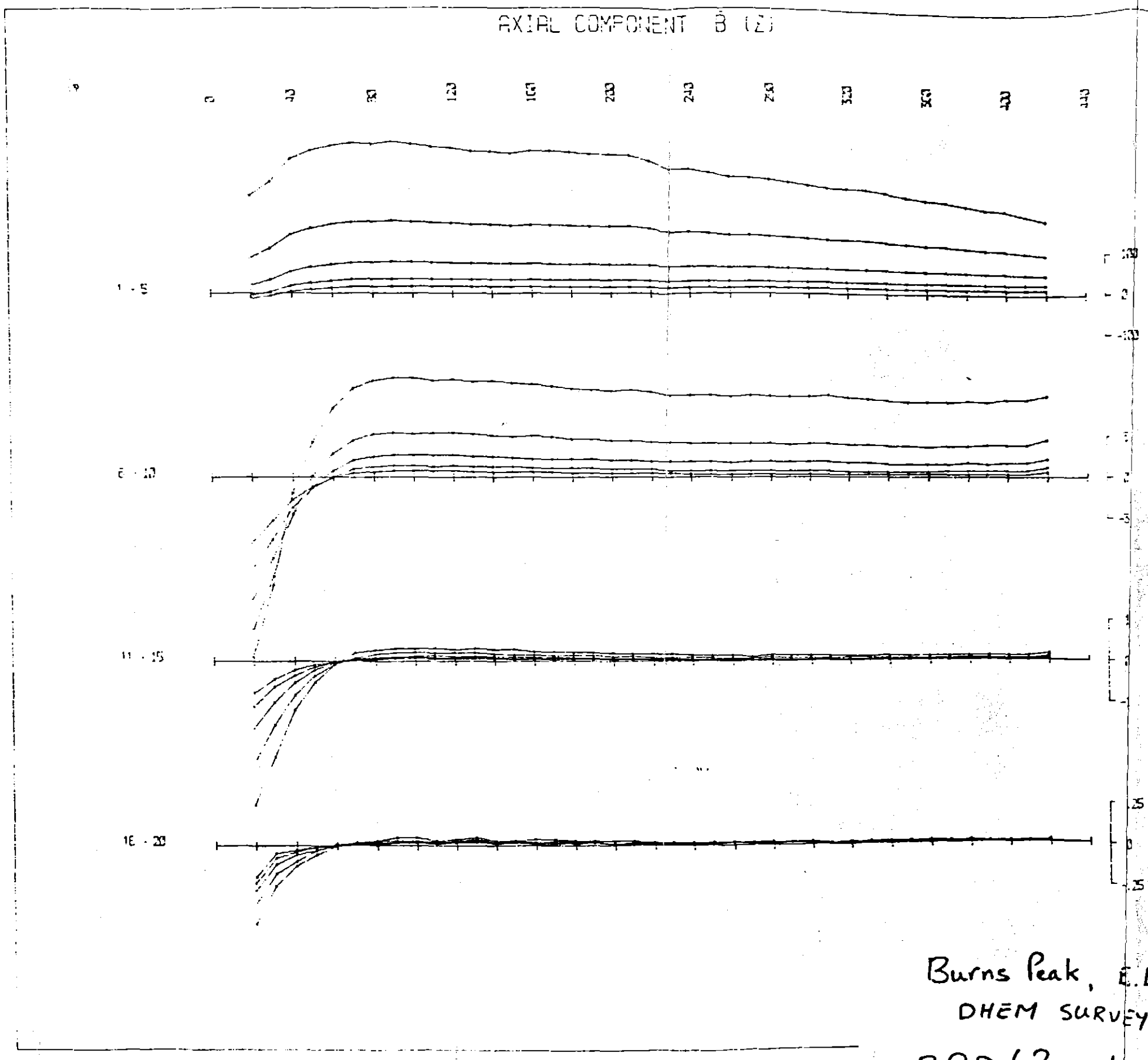
TX LOOP CORNERS	0498308	7503305
	7501308	7503005
TX LOOP SIZE	: 300 m X 300 m	
TX TURN OFF TIME	: 145 microsecs.	
FIRST GATE TIME	: 68.5 microsecs.	
CURRENT	: 16.5 amps	
FREQUENCY	: 25 Hz.	
INTEGRATION TIME	: 1024 cycles	
SYNC MODE	:	
HORIZONTAL SCALE	:	
SURVEYED BY	: BG	
DATE	: 09/11/1999	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJECT NO. 4-14

CLIENT : GEOPEKO
PROJECT : BOREHOLE EM37
AREA : BURNS PEAK
BOREHOLE : BPD 63 4
TX LOOP : 7

Burns Peak, E.L. 44/88.
DHEM SURVEYS
BPD63 - loop 7
ref: GPK/MG89/16 Fig. 3a.

421199



EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	0480DN	0480E
	0510DN	0410E
TX LOOP SIZE	: 200 m X 200 m	
TX TURN OFF TIME	: 150 microsecs.	
FIRST GATE TIME	: 56.5 microsecs.	
CURRENT	: 15.7 amps	
FREQUENCY	: 25 Hz.	
INTEGRATION TIME	: 1024 cycles	
SYNC MODE	:	
HORIZONTAL SCALE	:	
SURVEYED BY	: BG	
DATE	: 09/11/1989	

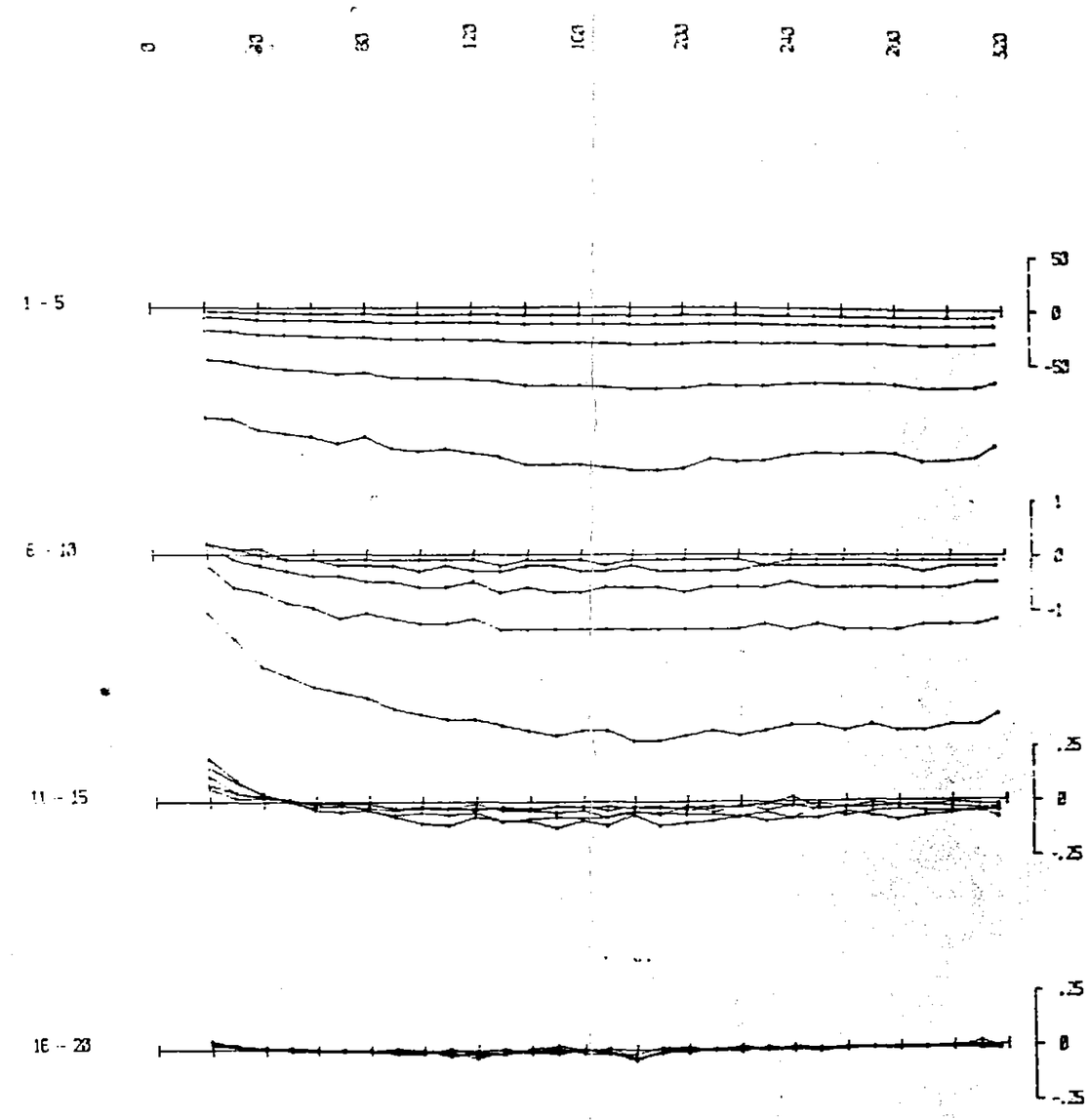
SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJECT NO. J-13

CLIENT : GEOPEKO
PROJECT : BOREHOLE EM37
AREA : BURNS PEAK
BOREHOLE : BPD 63 4
TX LOOP : 8

Burns Peak, E.L. 44/88.
DHEM SURVEYS
BPD63 - loop 8.
ref: GPK/MG89/16 Fig 3b.

421200

AXIAL COMPONENT B (Z)



EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

TX LOOP SIDES	: 04420N	04380E
	: 04680N	05120E
TX LOOP SIZE	: 280 m X 280 m	
TX TURN OFF TIME	: 116 microsecs.	
FIRST GATE TIME	: 68.5 microsecs.	
CURRENT	: 15.5 amps	
FREQUENCY	: 25 Hz.	
INTEGRATION TIME	: 1024 cycles	
SYNC MODE	:	
HORIZONTAL SCALE	:	
SURVEYED BY	: PF	
DATE	: 09/11/1999	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD. | PROJECT NO. A-13

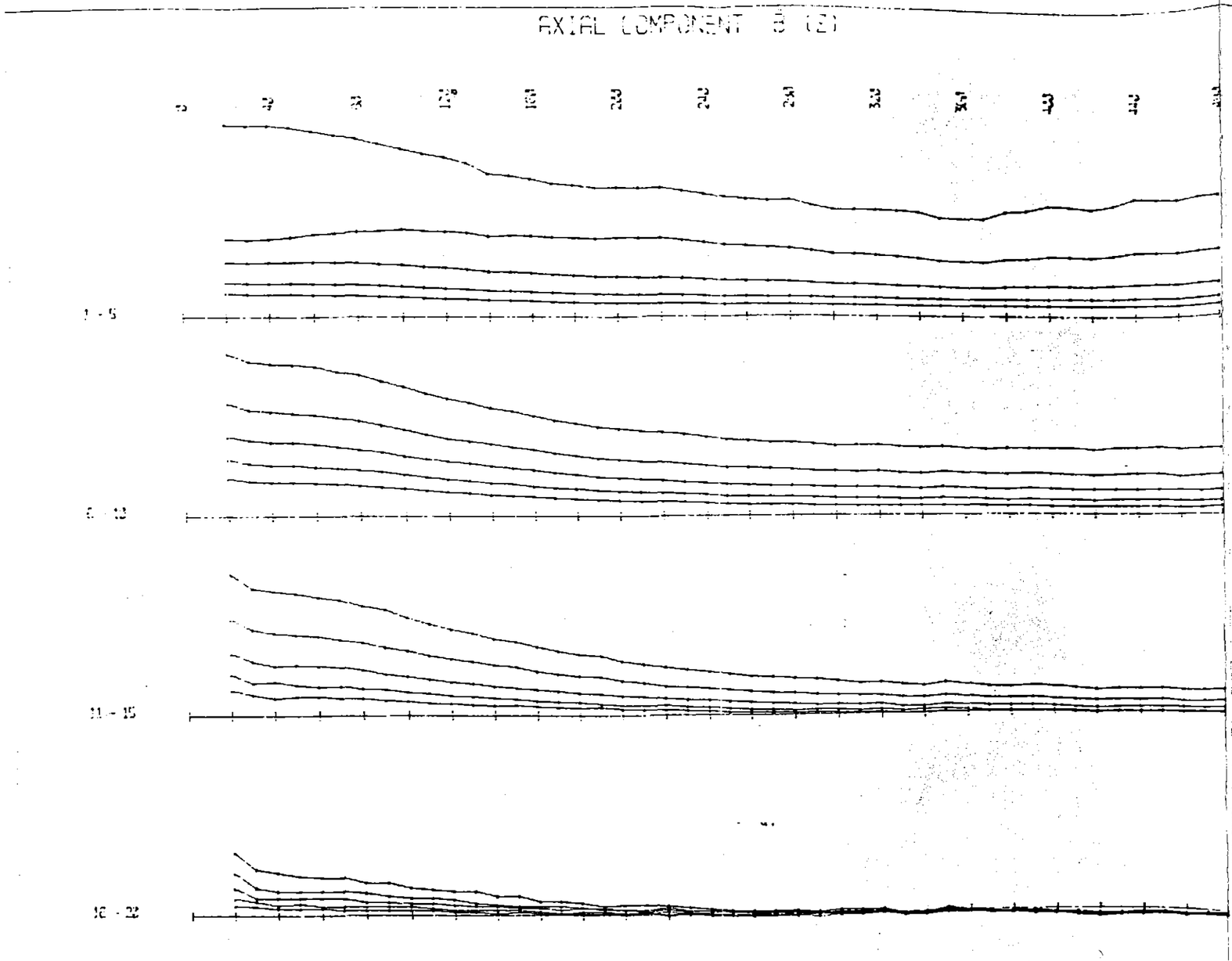
CLIENT	: GEOPEKO
PROJECT	: BOREHOLE EM37
AREA	: BURNS PEAK
BOREHOLE	: BPD 64
TX LOOP	: 11

Burns Peak, E.L. 44/88.
DHEM SURVEYS
BP064 - loop 11

ref: GPK/MG89/16

Fig. 4.

421201



EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY B

TX LOOP SIZE	450m X 300m
TX TURN OFF TIME	210 microsecs
FIRST GATE TIME	88.5 microsecs
CURRENT	15.7 amps
FREQUENCY	25 Hz.
INTEGRATION TIME	1024 cycles
SYNC MODE	
HORIZONTAL SCALE	
SURVEYED BY	PF
DATE	89/11/1940

SURVEYED AND COMPILED BY GEOTERREX DIV. LTD. | PROJECT NO. 4-13

CLIENT : GEOPEKO
PROJECT : BOREHOLE EMF
AREA : BURNS PEAK
BOREHOLE : BDP65
TX LOOP : 14

Burns Peak, E.L. 44/88.
DHEM SURVEYS
BPD65 - loop 14
ref: GPK/MG 89/16

fig. 5.

421202

APPENDIX 5.

BURN'S PEAK CSAMT SURVEY

MEMO; J BISHOP TO A ROSENHAIN JUNE 1990

421203

Memorandum to: A. Rosenhain

from: J. Bishop

date: 7/6/90

Subject: Burns Peak CSAMT Survey

Angela,

I have re-examined the four lines of CSAMT data with particular reference to the 'host horizon' defined by EAF9, BPD66 and other drill holes and which you have marked out on a 1:5,000 geology map. The host horizon coincides with a well defined but shallow zone of lower resistivity (ZLR) on line 5400N. To the south, on line 5200N, a somewhat weaker ZLR lies 70m to the west of the horizon. To the north, on line 5600N, there is little indication of its presence (a very weak ZLR lies some 70m to the west). On line 5800N, the zone passes to the west of the survey coverage.

You noted that the horizon contains some (black?) shales and questioned whether the survey should have detected them. Indeed it should if they are thick enough and sufficiently conductive (the more conductive, the less width required). The survey results would suggest that they are not very conductive, but an idea of their conductivity can be obtained from laboratory measurements of core samples. This does not appear to have been done and is recommended. (A number of ore samples, plus a suite of rocks from BPD62 have been measured.)

It is emphasised that all of the ZLR's defined by the Burns Peak CSAMT survey are weak and near surface. They do not indicate any significant concentration of massive sulphides. This interpretation has been recently reinforced by the test survey over the Rosebery mine, which produced very clear responses (although it was not able to differentiate between ore and the overlying shales) and by a number of very interesting responses obtained from surveys elsewhere on the mine lease.

Thus I would like to repeat the conclusions made in my original report; namely, I believe that it is most unlikely that an economic ore deposit lies within the CSAMT coverage at Burns Peak and that there is little geophysical encouragement for drilling within the surveyed area.

J.R. Bishop

421204

APPENDIX 6.

"REPORT ON DHEM SURVEY

BURN'S PEAK EL 44/88 BPD 66"

MITRE GEOPHYSICS JULY 1990

421205

MITRE GEOPHYSICS PTY LTD
MINERAL EXPLORATION AND ENGINEERING CONSULTANTS
BUGGS LANE ELLIOTT TASMANIA 7325 PHONE 004-363143

REPORT ON DHEM SURVEY, BURNS PEAK, E.L. 44/88

DDH BPD66.

for

Pasminco Exploration, Tasmania

Survey Details

A DHEM survey was carried out down DDH BPD66 in May, 1990. The hole was drilled to test the northern extension of the Burns Peak mineralised horizon and it intersected a 10m section of sub-economic sulphides which included thin zones of massive pyrite between 157 and 167m. The surveys were carried out by Geoterrex, using the EM37 system at a 25hz repetition rate. Two 300m x 360m loops were used (Figure 1). Following on from previous surveys (Bishop, 1989a), these were numbered '15' and '16'. Loop 15 was maximum coupled to the expected target, while loop 16 was minimum coupled (Figure 2). Thus mineralisation at any attitude should have been energised. (Geoterrex called loop 15, no. 2 and loop 16, no 1.) The total depth of the hole was 261m and it was surveyed to 250m from both loops.

Interpretation

The results were disappointing, with flat responses from both loops. The loop 15 response is all negative, with an offset of around $-0.2nv/A\text{-}m^2$ (Figure 3). Minor 'ripples' occur in the first two channels around 160m, but these would not be noticed except that they coincide with the mineralised intersection. The loop 16 response is all positive, except for the latest

channels, where the negative offset (0.2nv/A-m^2) dominates (Figure 4). In both profiles, values are low, indicating resistive conditions.

CONCLUSIONS AND RECOMMENDATIONS

The results are as expected for a drill hole in resistive ground with no significant sized conductor in close proximity. The offsets have altered the sign in the last few channels of the loop 16 data, but have not otherwise adversely affected the results.

In an attempt to quantify a "...significant sized conductor in close proximity...", I have modelled two bodies. Based on petrophysical measurements listed in Bishop (1989b), the rather low conductivity of 1 S/m has been used for both models. The first model is a 100,000 tonne tabular body at a distance of 20m from the hole. A small, rapidly decaying response is indicated (Figure 5). This would only be seen on the first three or four channels. (The scale of the response amplitude is the same as for the loop 16 results.) At a distance of 50m, the response would probably not be recognised. Figure 6 shows a 1,000,000 tonne deposit at 100m from the hole: the response is clearly registered on the first seven channels and would be seen on later channels plotted at the usual smaller scales. Given the resistive conditions at Burns Peak, these should be quite realistic models. (A similar shape to this response can perhaps be seen -or imagined? -in the first two channels of the loop 15 data, but one would hesitate to recommend any further investigation on such a subtle feature.)

A 10m station spacing was used for these surveys and although this is quite close enough for detecting any significant conductor, a smaller interval through mineralised sections is recommended so that any local responses may be better defined.

J.R. Bishop
July, 1990.

421207

REFERENCES

Bishop, J.R., 1989a. Further DHEM surveys at Burns Peak (E.L. 44/88). Mitre Geophysics report 89/16 for Geopeko.

Bishop, J.R., 1989b. Interpretation of electromagnetic surveys at Burns Peak (E.L. 44/88). Mitre Geophysics report 89/03 for Geopeko.

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Figure 1. BPD66: DHEM loop locations.

Figure 2. BPD66: EM field patterns; loops 15 & 16.

Figure 3. BPD66: EM37 profile; loop 15.

Figure 4. BPD66: EM37 profile; loop 16.

Figure 5. BPD66: DHEM Modelling (i).

Figure 6. BPD66: DHEM Modelling (ii).

421208

15 12 16 9 2 1 13 14 4 3 10 7 8 6 5 11

BPD 65 BPD66 BPD 62 BPD 63 BPD 64

EAF 11 EAF 9 EAF 8 EAF 13 EAF 12 EAF 14 EAF 6 EAF 3 EAF 4 EAF 2 EAF 1 EAF 16 EAF 15

CP14 CP8 CP7 CP12 CP9 CP15

PP50 PP46 PP48 PP51 PP45 PP52 PP59 PP39 PP42 PP36 PP40 PP38 PP41

PIN 1 PIN 2

400 420 440 500 520 540 560 580 600 620 640 480 460

5800N. 5600N. 5400N. 5385000N 5200N. 5100N. 5000N. 4900N. 4800N. 5384500N 4700N. 4600N. 4400N.

377500E. 5000E 378000E. 378500E.

5 cm

Ref: PET/HG90/09

MITRE GEOPHYSICS PTY. LIMITED

BURNS PEAK E.L.44/88

DHEM LOOP LOCATIONS

DRAWN BY: J.B.
DRAFTSMAN: T.G.D.S.
DATE: July 1990
REVISIONS:
FILE No.

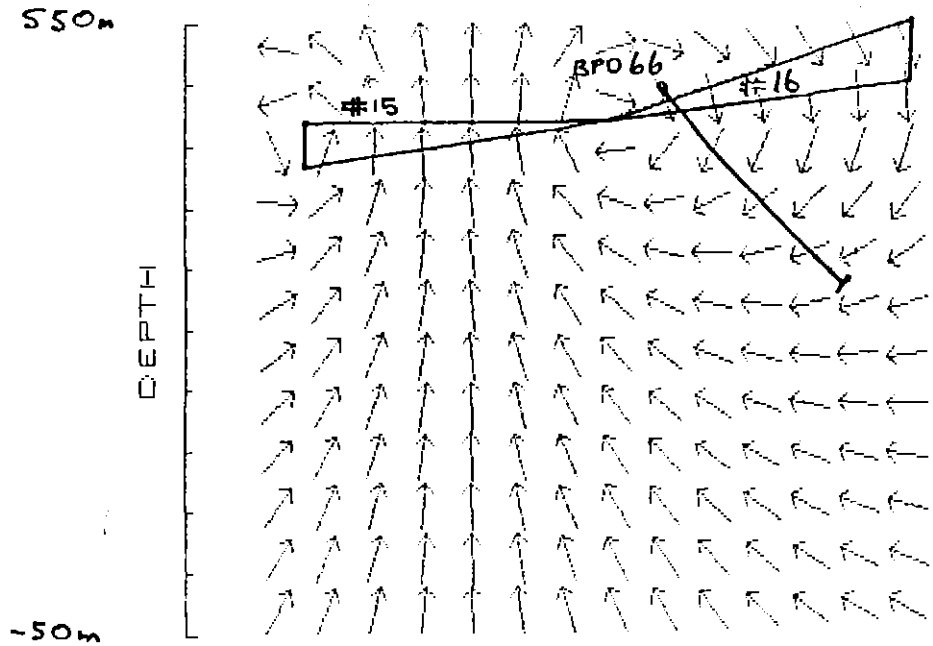
SCALE 1:5000 25 0 50 100

FIG. 1

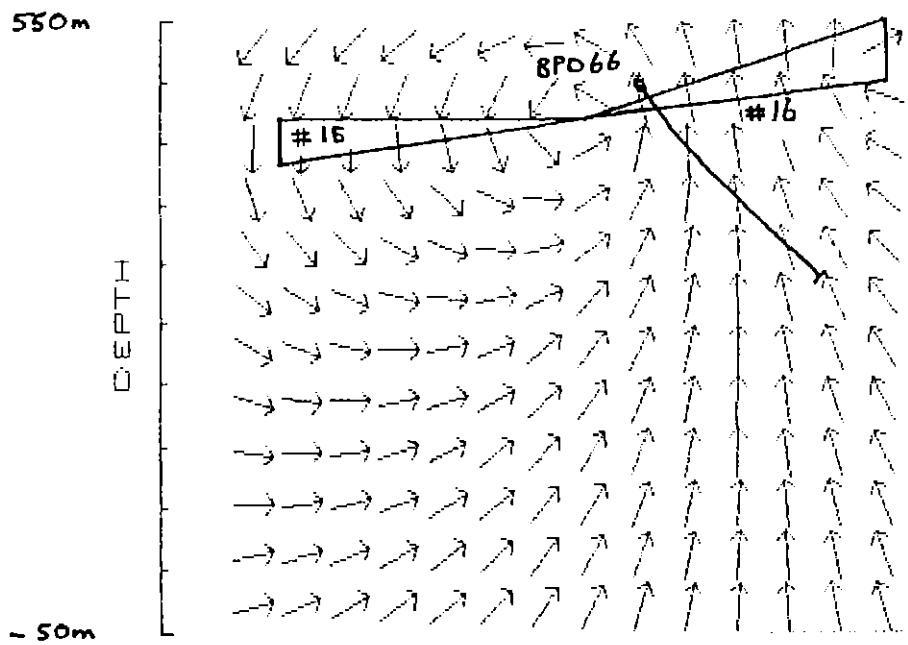
*

Projected Section from (5440.0N, 4500.0E) on Bearing 90.0 Length 670.0

421209



Loop #15.



Loop #16

* 'EAF' grid coordinates.

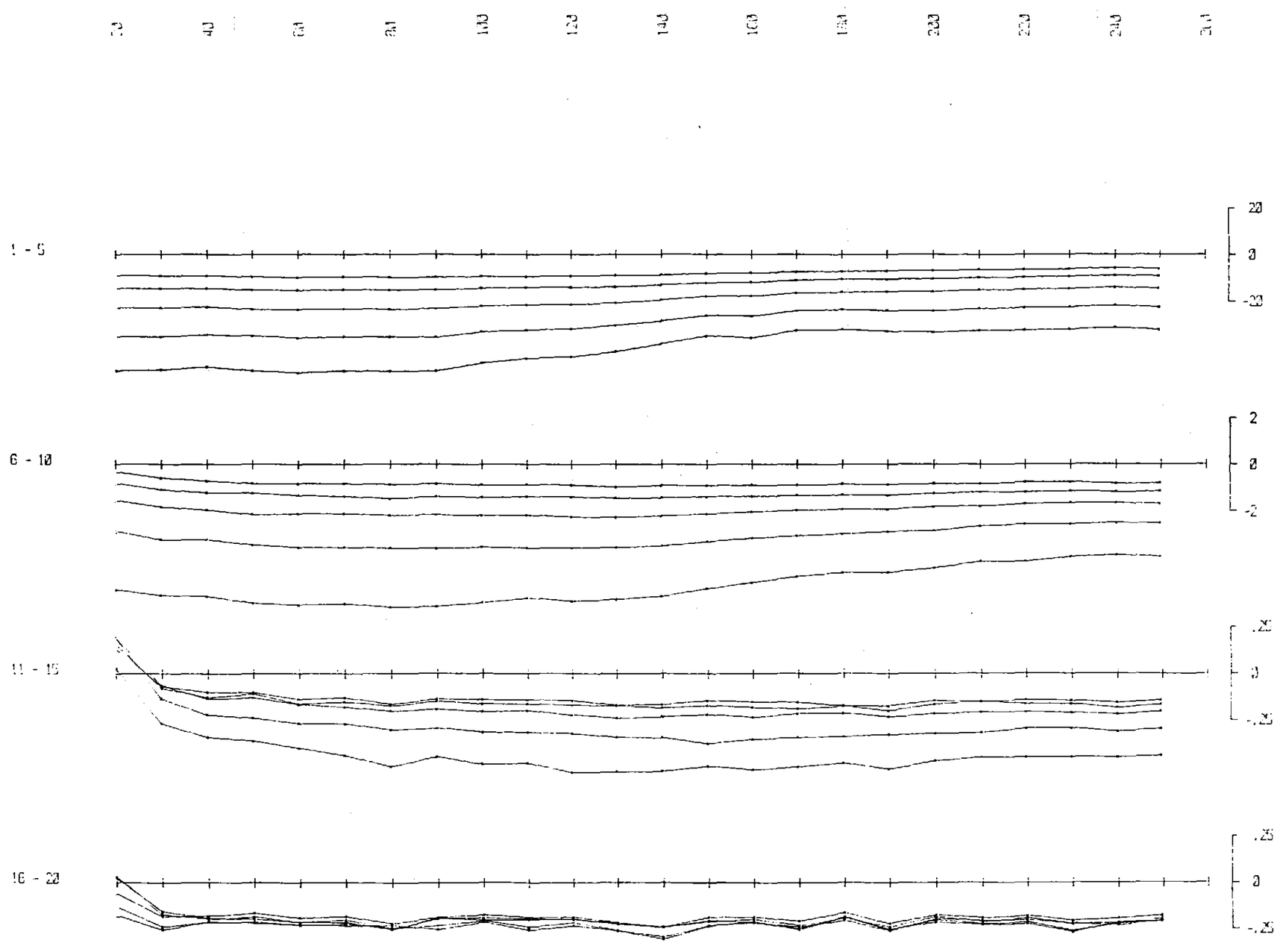
Burns Peak, E.L. 44/88.
DHEM
DDH BPD 66
EM Field Patterns
Loops 15 & 16

ref: PET/MG90/09

fig. 2.

421210

AXIAL COMPONENT B (Z)



Burns Peak
DHEM
BP066: Loop 15.

ref: PET/MG90/09

nanovolts per amp metre squared

EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (dB/dt)

5 cm

6 - 10

TX LOOP SIDES	: 5243N	4553E
	: 5603N	4553E
TX LOOP SIZE	: 300 m X 360 m	
TX TURN OFF TIME	: 210 microsecs.	
FIRST GATE TIME	: 93.5 microsecs.	
CURRENT	: 16.4 amps	
FREQUENCY	: 25 Hz.	
INTEGRATION TIME	: 1024 cycles	
SYNC MODE	: CRYSTAL	
HORIZONTAL SCALE	: 1:1000	
SURVEYED BY	: DHJF	
DATE	: 05/07/1990	

16 - 20

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 4-136

CLIENT : Geoteko

PROJECT : Burns Peak

AREA : Tullah Tas

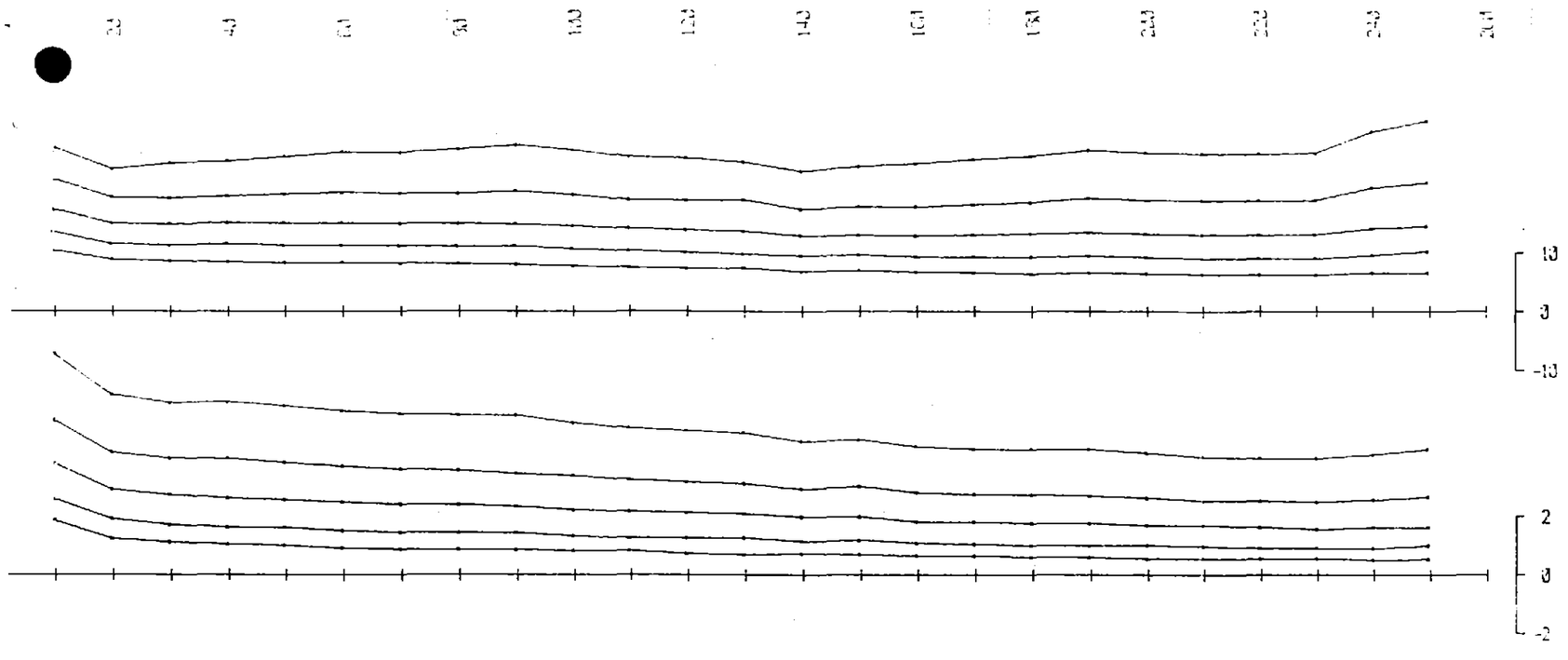
BOREHOLE : BP066 G

TX LOOP : 2

fig. 3.

421211

AXIAL COMPONENT B (Z)



EM-37

BOREHOLE SURVEY

ELECTROMOTIVE FORCE INDUCED BY SECONDARY FIELD

TIME DERIVATIVE OF FLUX DENSITY (B)

5 cm

nanovolts per amp metre squared

TX LOOP SIDES	:	5243N	4953E
		5603N	5153E
TX LOOP SIZE	:	333 m X 363 m	
TX TURN OFF TIME	:	225 microsecs.	
FIRST GATE TIME	:	33.5 microsecs.	
CURRENT	:	16.7 amps	
FREQUENCY	:	25 Hz.	
INTEGRATION TIME	:	1024 cycles	
SYNC MODE	:	CRYSTAL	
HORIZONTAL SCALE	:	1:1000	
SURVEYED BY	:	DGSF	
DATE	:	06/07/1990	

SURVEYED AND COMPILED BY GEOTERREX PTY. LTD.

PROJECT NO. 3-156

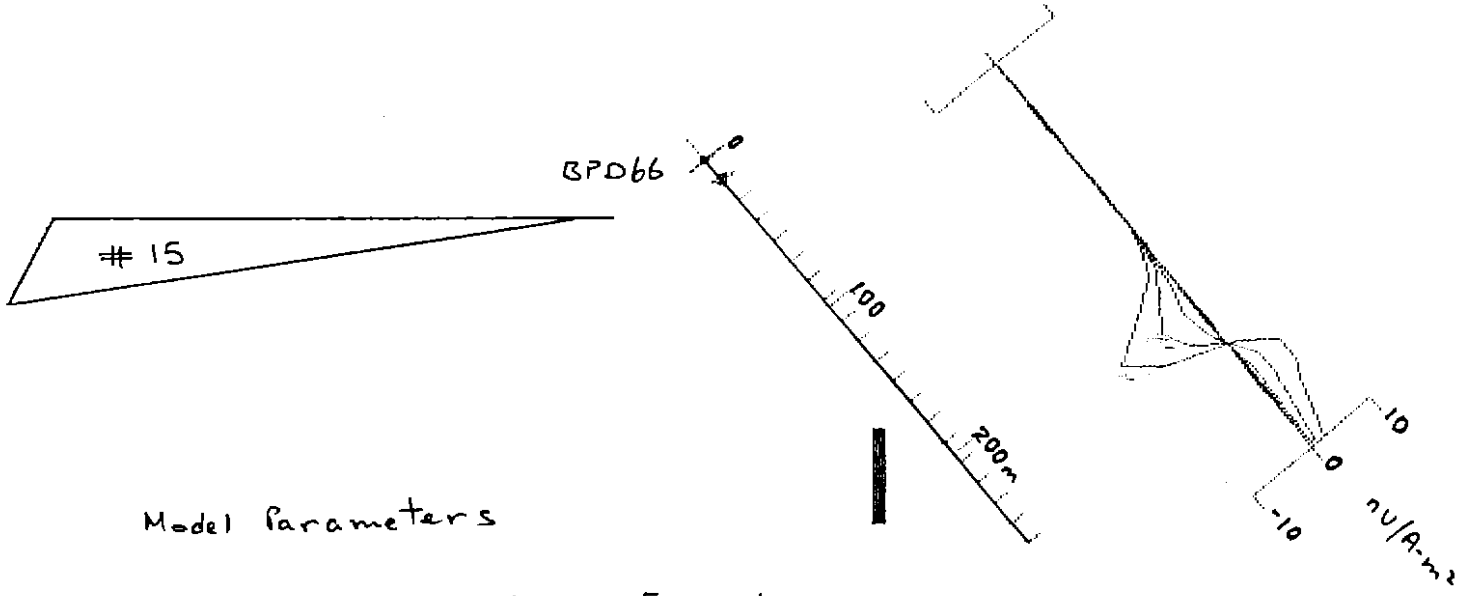
CLIENT	:	Geevoka
PROJECT	:	Burns Peak
AREA	:	Tullah Tas
BOREHOLE	:	BP066 4
TX LOOP	:	1

Burns Peak DHEM

BP066 : Loop 16.

ref: PET/HG90/09

fig. 4.



Model Parameters

Dimensions : 100m long x 50m deep
x 5m wide x 4 t/cm
= 100,000 tonnes

Distance from
drill hole : 20m.

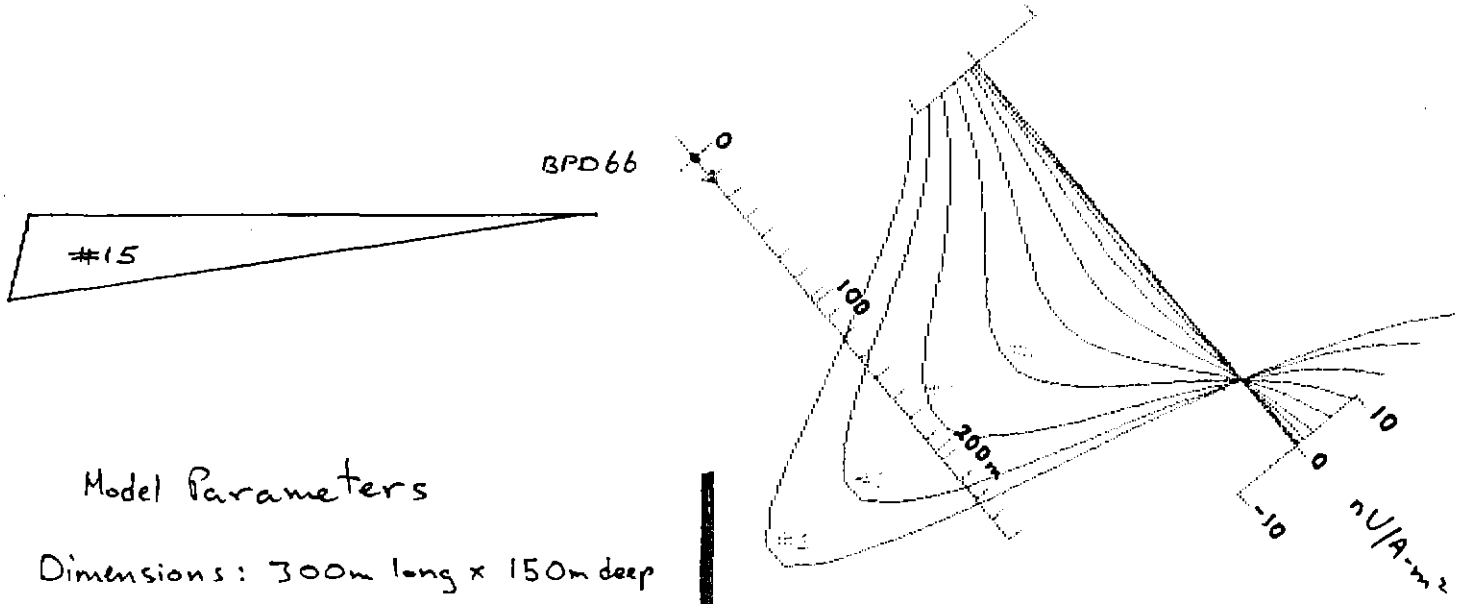
Conductance : 5.5

421212

Burns Peak E.L. 4488.
BPD66
DHEM Modelling
(i)

ref: PET/MG90/...

Fig. 5



Model Parameters

Dimensions: 300m long x 150m deep
x 5.5m wide x 4t/c.m.
= 1,000,000. tonnes

Distance from
drill hole: 100m.

Conductance: 5.5 S

421213

Burns Peak, E.L. 44/88
BPD66
DHEM Modelling
(ii)
Fig. 6.

421214

APPENDIX 7.

AEROMAGNETIC SURVEY

EL 44/88 BURN'S PEAK

ACQUISITION REPORT

(INCLUDING PRELIMINARY INTERPRETATION)

DR D E LEAMAN MAY 1990

421215

LEAMAN GEOPHYSICS

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

Registered Office:
21 ZOMAY. AVENUE, DYNNYRNE, TAS. 7005
All Correspondence to:
G.P.O. BOX 320 D, HOBART, TAS. 7001.
TELEPHONE: (002) 24 0319
FACSIMILE: (002) 23 3194

AEROMAGNETIC SURVEY
EL 44/88 BURNS PEAK

ACQUISITION REPORT
(INCLUDING PRELIMINARY INTERPRETATION)
for
GEOPEKO

by
Dr. D.E. Leaman

May 1990

BURNSPK2

421216

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421217

SUMMARY

A new high resolution helicopter aeromagnetic survey of the Burns Peak region has provided confirmation of gross structures inferred from more regional coverage and shown that many alteration and unit characteristics have not been recorded previously.

This report describes specification and acquisition of the survey. It also includes a discussion of possible implications but further interpetation requires some re-examination of specific features observed at, or near, known mineralised sites and use of observed rather than processed data. Digital records are not yet available.

The most obvious features of the magnetic field trend NE-SW. These clearly reflect compositional variations within the volcanic piles. Other trends and lineaments can be recognised. These display NW-SE and sub E-W orientations approximately. It is not possible to define the relative significance of these features due to their variable presentation in different image or contour displays. 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 associated with mineralisation. Chester is confirmed to lie on such a feature.

The largest responses observed in the survey area can be associated with mafic members of the Cambrian sequence, either ultramafic rocks and gabbros west of the area or similar materials at depth - presumably in fault-controlled slices, beneath the exposed volcanic pile which covers the bulk of the licence area. Some assessment of the contribution of these to the total magnetic field will form an essential part of any more detailed study.

Mineralised sites present some consistent characteristics; the magnetic field is subdued and the associated rocks are either non magnetic or altered. Major trend intersections or projections of concealed structures occur nearby. Several other structures intersect or parallel the Rosebery Fault. Mineralisation and alteration is associated with a flanking structure which occurs up to 1 km east of the mapped fault. This feature occurs within the andesitic mass east of Pinnacles and on the eastern side of Mt Kershaw near Chester. The Pinnacles mineralisation may have been remobilised and transferred along such structures.
Alteration style responses are indicated SW of Chester (subject to confirmation when data available) and near Browns Tunnel.

The magnetic data available imply that a number of large faults are present and that these have blocked out the volcanics and also sliced and depth limited them. This interpretation is consistent with the regional gravity analysis. Complete structural analysis of this area will depend on an interlocked evaluation of both this magnetic survey and an infilled gravity coverage. Gravity data may also clarify estimation of altered rock volumes.

421218

INTRODUCTION

EL 44/88, Burns Peak, is located north of Lake Rosebery in western Tasmania (Figure 1). It is less than 10 km north of Rosebery and includes the Chester and Pinnacles mineralisation.

Gravity and magnetic data in the area were reviewed by Leaman (1989). Results indicated that these data sets could reveal much information about structural setting and control within the area and further surveys were recommended. The regional data available were shown to lack resolution due to line spacing or terrain clearance excesses.

This report describes the detailed aeromagnetic survey proposed. 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. A detailed, high resolution survey was specified.

The report outlines survey specification, presents the results of survey and provides a preliminary outline of implications and interpretation. Further work will be required in some areas after receipt and analysis of raw data.

SPECIAL NOTE:
This is a preliminary report provided to assist site evaluation and undertake a planned drilling programme. The maps of magnetic field supplied as Figures 3 and 4 are subject to minor adjustment by the contractor and no flight records or located data files have been supplied at the time of preparation of this report.
Details of any revisions or additional comments will be supplied as an Addendum when this information is available.

The delay, by the contractor, in supplying this information has meant that this report contains limited discussion of alteration signatures and profile analysis.

MAGNETIC SURVEY

SPECIFICATION

Specifications for the survey were determined by the previous experience provided by the Mines Department survey (Leaman, 1986) 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 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 little 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: 200 metres E-W
Tie line spacing: 1000 metres N-S
Nominal terrain clearance: 100m.
Sample interval: < 10 m.
Magnetometer sensitivity: < 0.1 nT.

The line balance and orientation reflects the general form of the terrain and the need to define sub E-W or NW-SE and SW-NE trends as suggested by gravity surveys and 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).

421220

SURVEY

The survey was flown in February and March 1990 by Geo Instruments Pty Ltd under the supervision of Zoltan Beldi using a G-813 proton precession magnetometer in a towed bird and a GR 3001 spectrometer with 16.8 l capacity.

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.

Total line coverage was about 500 km. Line recovery and line location details are presented in Map 1 (folder).

PROCESSING

Flight path digitising, processing, gridding and mapping were performed by Pitt Research Pty Ltd of Sydney.
IGRF 1985 was removed from the data and a scalar of 5000 nT added to residual data.
The stability of gridding and acquisition was tested by preparation of pixel image maps which expose line misties. The many cross ties generated by this survey were adjusted by spline interpolations in both directions.

A contour interval of 5 nT was selected for the primary presentation (Map 3 - folder) as a compromise separation able to provide a reasonable amount of detail in areas with subtle variations in magnetic field. 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: 25000 scale.

Figure 4 provides colour pixel image versions of the magnetic data. Some other image presentations have not yet been released but will be included in an Addendum to this report.

All images were prepared by Pitt Research Pty Ltd.

Maps used as bases, or overlays, derived from Corbett & McNeill (1986) are included as Figure 5.

COMPARISON WITH PREVIOUS DATA

The previous regional survey described by Leaman (1986, 1989) has been reproduced as Figure 2 and may be compared with the new survey (Figure 3). Contour intervals are comparable.

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 eastern exposures of the volcanics, the shoulder and compound detail on large anomalies and the differentiation of responses in the Burns Peak and Chester areas.

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 two large sub E-W alteration corridors (approx 5380 200 and 5384 750 mN) and NE-SW offsets within the area of volcanics at least partly covered by Quaternary materials. Preliminary study of gravity data suggested Precambrian basement at moderate depth.

Alteration responses were not recognised.
The regional gravity solutions prepared for a joint venture meeting in November, 1989 have been reproduced here as Figures 14, 15 and 16. These diagrams are relevant to understanding of the area and evaluation of the new magnetic survey (below).

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.

All styles of presentation (as supplied by the contractor by May 8, 1990) have been reviewed. Further discussion is included in the Addendum.

FIGURE 3 presents the residual magnetic field in contoured form (with and without geological basemap).

The Burns Peak survey has revealed significant variations within the Mt Read Volcanics between Mt Black and Boco Siding. North of Mt Sale and east of Farm Creek the magnetic character of the volcanics is extremely variable with production of anomalies of moderate relief. Similar character may be observed in the area centred on 381 000 mE, 5382 000 mN. Northeast of this zone, and NE of Chester, the field is more disturbed and anomalies are of greater amplitude. All anomalies have some sources within the exposed volcanics. A much larger response may be observed between Cutty Sark and Langdons south of Lake Rosebery; regional data show that this feature extends virtually to Rosebery.

This disturbed behaviour can be contrasted with the stable character, implying uniform or much reduced (no) contrast, for volcanics between Langdons and Mt Sale and the area immediately north of Lake Rosebery, as well as within the belt from Mt Kershaw to Pinnacles and then NE through Burns Peak.

Consideration of the mapping of Corbett and McNeill (1986) does not provide any ready explanation for the variability described. If the responses are lithologically controlled then the mapping is in error or incomplete. Although several variants of the volcanics are indicated there is no consistent response pattern or apparent correlation. (There may be subtler relationships than can be reproduced in contour maps but this can only be checked when the actual survey observations are available) Further, the responses are not significantly modified by burial of the volcanics - due to glacial or alluvial cover.

These enigmatic relationships are further stressed by the responses associated with the volcanics up to 1 km from the Rosebery Fault - as mapped, in the mass N of Leo's Find, and in the zone from Pinnacles to the east of Leo's Find. The rocks in this entire belt present as virtually non magnetic or very uniformly magnetic and essentially comparable to the surrounding Dundas Group.

The largest anomalies have a relief of about 150 nT but most volcanic character is of the order of 40 to 50 nT. Subtle character is less than 10 to 15 nT.

Other lithologies generate unusual responses. The andesites near Burns Peak are variably magnetised but there are some clear geometric effects. Most of the material is relatively non magnetic. This is unexpected.

Felsic sequences and host units offer no magnetic contrast with the surrounding volcanics on the basis of the presentation now available. Any change in properties or field character must be verified by inspection of the observed profiles.

The very large anomaly at the western margin of the survey has not been fully defined but is related to mafic and ultramafic rocks within the adjacent Huskisson structure. These materials extend to the Hatfield Fault (about 375 000 mE) but are not evident further east.

Some cultural anomalies can be identified. For example, at the Bastyan Dam and the new railway bridge nearby.

The colour image (Figures 4A, B) of the magnetic field reinforces these distinctions and reveals the existence of regional effects. There are at least four.

1 The field is generally of reduced intensity south of 5380 500 mN and a trend just north of east can be recognised which separates the northern and southern parts of the area - in terms of magnetic character. The hinge line - or corridor - visibly diminishes any N-S axis within the volcanics at about 379 500 mE. It is probably also related to the termination of the large anomaly associated with the rocks west of the Hatfield Fault.
2 The Hatfield anomaly is the largest feature but is restricted to the western edge of the EL.
3 Another significant source occurs a little beyond the northern edge of the licence area at 382 000 mE. This has produced a nearly linear NE-SW gradient across the NW quadrant. Variations within this gradient are quite subtle. This gradient and effect does not persist east of the major NE-SW anomaly axis which dominates the surface character of the field.
4 The character of the magnetic field east of this diagonal axis is highly variable but distinct from all other zones in terms of apparent amplitudes.

Figure 4 also stresses aspects of structural continuity although the contour presentations are unambiguous. The inferred trends and block characteristics are summarised in Figure 13. The primary elements of the magnetic field as observed do not correlate with most of the lithological and structural distributions suggested by Corbett & McNeill (1986), but offer much more information on unit continuity, which is patchy, and termination.

This lack of immediate correlation for so many features and volcanic members requires investigation. Most of the differences are apparent in the eastern half of the licence area.
The nature of correlations within the western part of the licence is described below.

Figure 6 presents the magnetic field in the Chester- Pinnacles region.
This figure shows that the bulk of the Dundas Group offers little contrast with the volcanics adjacent to the Rosebery Fault south of Pinnacles and also east of Pinnacles. There are some isolated magnetic sources within the Dundas Group but these are unusual. There is little suggestion that the magnetic field has differentiated the difference between Dundas Group and the volcanics across the Rosebery Fault. The true magnetic margin of the volcanic pile occurs up to 700 m east of the mapped fault. This behaviour occurs from Leo's Find to Mt Kershaw and implies either that the volume of volcanics immediately east of the fault is very limited or that the rocks have identical properties. The latter is most unlikely and not supported by features such as that observed NW of Mt Kershaw. This anomaly is clearly sourced within the Dundas Group and below the Rosebery Fault. This is consistent with the regional gravity models (Figure 15).
Anomalies in the region of Browns and Thomas are subtle and direct correlations are not possible with the available contour presentation. It does appear, however, that there is a local loss of contrast - implying alteration - centred on Browns.
The field displays an ENE trend (approx 80-85 degrees) from a little south of Pinnacles, across the andesites. There is no direct correlation with the mapped and exposed andesites other than south of the headwaters of Hollway Rivulet and perhaps near 378 800 mE, 5383 700 mN. Neither margin of the andesitic mass, nor its protrusion toward Burns Peak, is reflected in the magnetic data.
This entire pattern implies that the effective western margin of the volcanic pile lies along the arc 380, 5384 - 378, 53833 - 3775, 5382 - 378, 5380. A relatively low angle detachment such as suggested in Figures 14 to 16 would be consistent with this and would mean that two quite different groups of volcanics have been juxtaposed.
There is no obvious explanation for the character of the field NE of Chester, nor why this does not extend SW toward Mt Kershaw - unless there are truncations and a detachment as suggested above.
The magnetic field displays some anomalous lows W and SW of Chester and these are consistent with local alteration. This feature is centred on 378 000 mE, 5380 500 mN - on the principal E-W axis so obvious in Figure 4 (see Figure 13). Some localised positive anomalies occur within the area mapped as altered volcanics. Such responses are not consistent with what is known of the alteration character of the Mt Read Volcanics but might be an indicator of alteration, another lithology or even mineralisation if oxide transfer has occurred. The spot anomaly at 378 050 mE, 5379 850 mN should be located and local lithologies checked.

There is also a change in grain within the area south of the main E-W feature at 5380 500 mN. Anomalies trend more N-S onto Mt Black.

Some of the issues raised by inspection of the data and discussed above have been reviewed by quantitative evaluation. This has been very preliminary and based on the contour maps in lieu of profile observations. The tests made were designed to provide information on the nature and depth of the principal sources, whether and by what means regional effects can be separated, and whether structural or stratigraphic information can be extracted. No detailed rock property or alteration study is possible with the present data.

Five profiles were drawn across the licence area and an array of models was tested. These profiles sample all primary features.

Profile locations are shown in Figure 5.

Profile 1. (Figure 7)
The regional elements of the field are apparent. The changes in gradient show that the regional sources are complex or multiple. One lies west of the section. Tests have shown that it is not possible to associate the high frequency character mid profile with a locally deeper penetration of the sources and maintain a shift differential of less than 50 nT. All models show that this differential should be less than 30 nT for this survey (the difference between the IGRF and the assigned base value for the survey).
A large, deep and geologically unrealistic source has been included to account for the overall amplitude of the regional effect and its form. These calculations indicate that any future work must first define the actual shape of this body, estimate its response and remove it from the observations. 3D methods must be used. Simple 2D methods force unrealistic forms but these have been used to provide a background reference. They should not be treated as fact or a true guide to source form. The deep source within the section is, beyond any doubt, of high contrast and almost certainly ultramafic in composition.
The model presented in Figure 7 shows the response for two isolated sources within the volcanics. These imply moderate contrasts and limited volumes. Depth limitation is essential. The pattern of limitation appears to be systematic and certainly consistent with the current gravity models. Such sources also suggest a northerly facing or dip.

This model suggests that it is possible to map discrete volcanic units and infer their attitudes, and that there is a detachment east of the Rosebery Fault.
Note that the Rosebery Fault, as mapped, does not cross this section.

Profile 2. (Figure 8)
This profile parallels Profile 1 but is less affected by the deep source problem since it is nearer the centre of symmetry of the response. The solution confirms the implications derived for Profile 1 but indicates that there are two distinct blocks within the volcanics or that there has been some repetition. Sources are mappable and depth limited with a generally northerly dip in the western portion and a southerly dip in the eastern part of the area. Such patterns could result from large scale folding with a plunging anticlinal axis near the SW-NE diagonal of the area or may be due to detachment translation.

Profile 3. (Figures 9 and 10)
This profile samples the near N-S features in the region of Lake Rosebery. Structures in this area are different from those observed north of the lake.
The model (Figure 9) shows a deep source contribution and this is required to achieve a consistent match with other profiles. It is probably not necessary and merely an artifact of 2D modelling. The model does, however, suggest a dipping body of moderate contrast at moderate depth. This material is not exposed, unlike the volcanic sources assessed in profiles 1 and 2. The fit is imperfect and designed only to show basic requirements. Other more local features are implied at 2000 and 7000 m and these are typical of surface volcanics.
Many solutions were attempted for this profile but the presence of high contrast slabs deep beneath the Mt Black volcanics would indicate a continuity or repetition of the Sticht Beds or Crimson Creek Formation.

Figure 10 presents an alternative view. Addition of a 25 to 40 nT shift would make a good fit (consistent with other profiles) without any need to consider a deep source - although the effect of ultramafics to the west is not disguised. Again the top of the source is not exposed, it is at least 400 m deep and clearly a major lithological variation. It is almost certainly mafic in origin and would imply some repetition of deep structure beneath a detached zone carrying the Mt Black volcanics (see Figures 14 and 15).
All models calculated indicate very steep dips for the source of the principal anomaly.

Profile 4. (Figure 11)
This profile was calculated in order to examine the regional effects of the deep source free of any interference from the volcanic pile or Dundas Group.
Although 2D methods are not appropriate they have certainly confirmed the likely depth and contrast for such deeply placed material. It is either ultramafics or iron ore. But, in company with other profiles, it appears to be an irregular slab form. Other profiles indicate bending or bulging of this wedge. A folded thrust slice would seem the best solution. The average depth is 6 km. No other pattern can satisfy the gradients for this profile using simple methods. A 3D model could be expected to refine this conclusion.

An anticlinal slice of quartz porphyry was included to satisfy the local increase in gradient near Bulgobac.

Profile 5. (Figure 12)
This S-N profile confirms many of the implications of profiles 1, 2 and 3. It stresses the bend required in the deep source. It may be noted that this hinge, which must be only the grossest approximation of source shape, occurs in the region of the principal intersection of major corridors across the area.
Dips of shallow volcanic blocks replicate the implication of other sections. Such blocks are exposed but depth limited. The large southern body represents a glancing section of the body shown in Figures 9 and 10 and, as a result, imperfectly reproduces the response.

Figure 13A presents many of the trend patterns identified in the data while Figure 13B summarises the conclusions of this preliminary study. There are several major structures in the Burns Peak area.
General trends patterns group NW-SE, NE-SW and some E-W. These have all been recognised before in western Tasmania (eg Leaman, 1986) but not with the clarity and definition which this new survey affords. It is also clear that the NW-SE structures are youngest and deform or truncate other trends.
This study also suggests that the regional gravity view of these volcanics is valid; they are sliced by at least two low angle structures and it can be argued that there are at least three or four distinct chunks of section or volcanics in the area. They are not easily linked stratigraphically.

The data available for this review were not final, nor in final digital form for detailed examination of profiles. Alteration characteristics are not easily assessed but the type of character seen elsewhere in the Mt Read Volcanics has been suggested west of Chester and near Pinnacles. The largest volume of altered rock appears to lie between Chester and Mt Kershaw and not south of Chester as implied by surface mapping. There are some anomalously positive features within the mapped alteration south of Chester but these may be lithological in origin and may not be relevant either to mineralisation or alteration variations. They should, nevertheless, be checked. The proximity of the Chester alteration to intersections of the main E-W feature and the strong NW-SE truncations indicates a target zone. The characteristics of this zone suggest that it would be possible to model the altered volume.

No evidence can be recognised within the current presentations for alteration within the volcanics adjacent to the Henty Fault in the far east of the area although the responses at 385 000 mE, 5382 700 mN may be important. The major E-W structure intersects the Henty Fault zone at approximately 382 000 mE, 5381 500 mN. This is an area worthy of much attention.

CONCLUSIONS AND RECOMMENDATIONS

The new high resolution survey of the Burns Peak area will be able to resolve many geological issues. Although the present work has been restricted by the non availability of raw data or located data, 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. There are three and perhaps four distinct blocks of material and it will not be a simple matter to correlate and re-locate them should one prove to be a syngenetic carrier.

The Rosebery Fault is one of several sub-parallel structures and probably represents only the most westward extent of the detached volcanics. The primary detachment lies some distance east of it.

It is not clear what controls might be associated with the mineralisation in the Pinnacle area but the Chester area is more distinctive and associated with what appears to be a large volume of alteration. This alteration is located west, rather than south, of Chester.
The distribution of mineralisation in the Pinnacles-Browns-Leos zone may indicate remobilisation or re-formation up dip along a detachment zone. Chester, with its larger apparent volume of alteration, and direct structural associations may be a much better target.
All of these conclusions require some verification and further analysis. Verification may take the form of surface location of the noted anomalous areas or measurement of susceptibilities. The latter are needed to confirm implied contrasts and will be essential to any detailed study in the Browns Tunnel area where variations in the magnetic field appear to be very subtle.

Further interpretation of structural or stratigraphic elements should only be undertaken after definition of a source form which satisfies the regional effects. This need not be a true solution but it must be one which satisfies all long wavelength responses and thus allows creation of a residual field. Failure to do this may render detailed interpretation of the low magnetic relief zone between Chester and Pinnacles very suspect. This process simply requires generation of a 3D deep source solution comparable to that used to produce gravity residuals - a process which has transformed insights into the meaning of the gravity field at local levels.

Additional or specific quantitative analysis should follow completion and inspection of the infill gravity survey now under way. This may well emphasize one, or other, of the altered zones.

421229

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Leaman, D.E., 1986. Interpretation and evaluation report on the 1981 West Tasmania Aeromagnetic Survey. Mt Read Volcanics Project Report Mines Dept. Tasm.

Leaman, D.E., 1989. Review. Gravity and magnetic data. EL 44/88 Burns Peak. Report for North Broken Hill-Peko by Leaman Geophsysics.

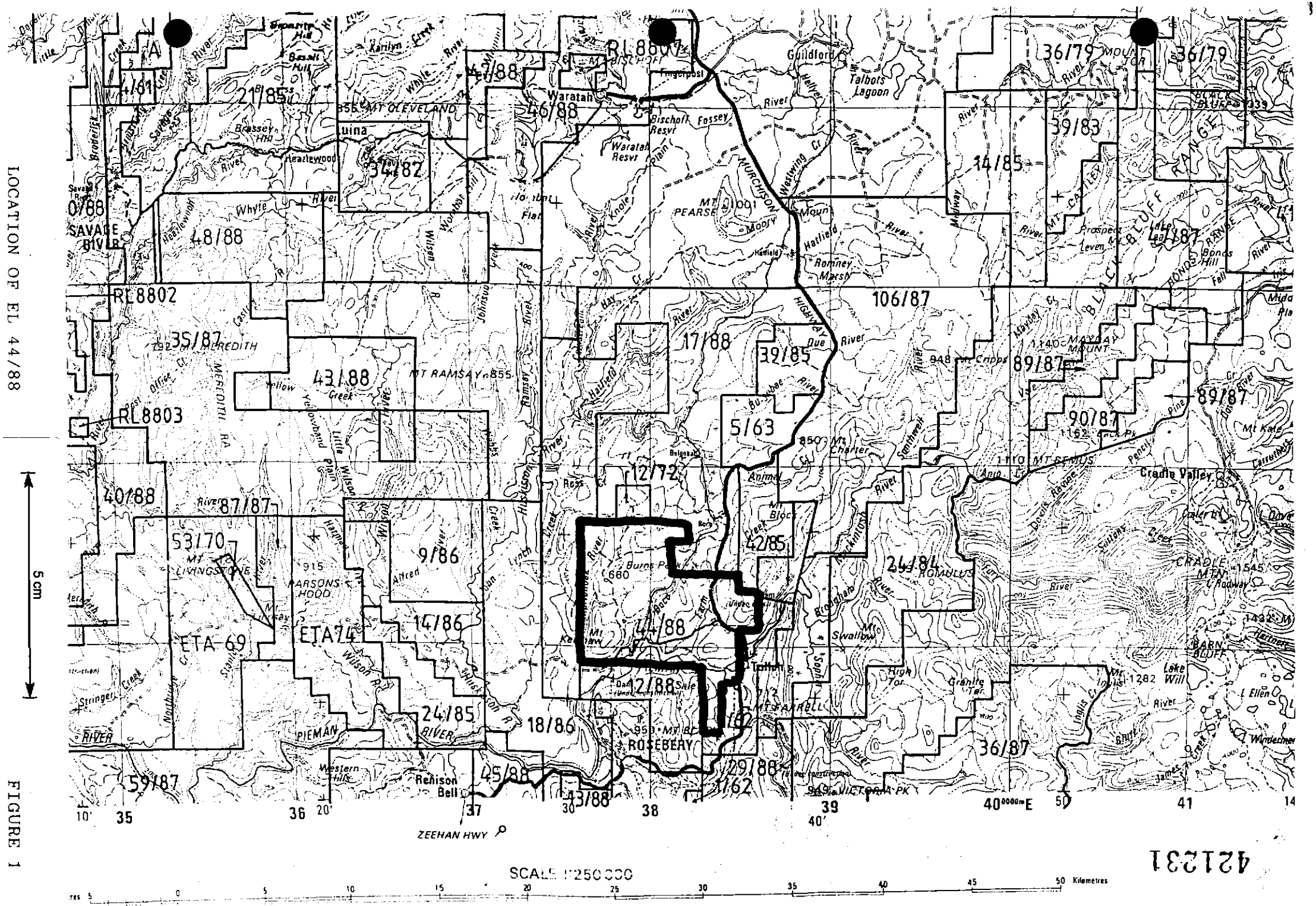
421230

Report submitted on behalf of
Leaman Geophysics
by

D. Leaman

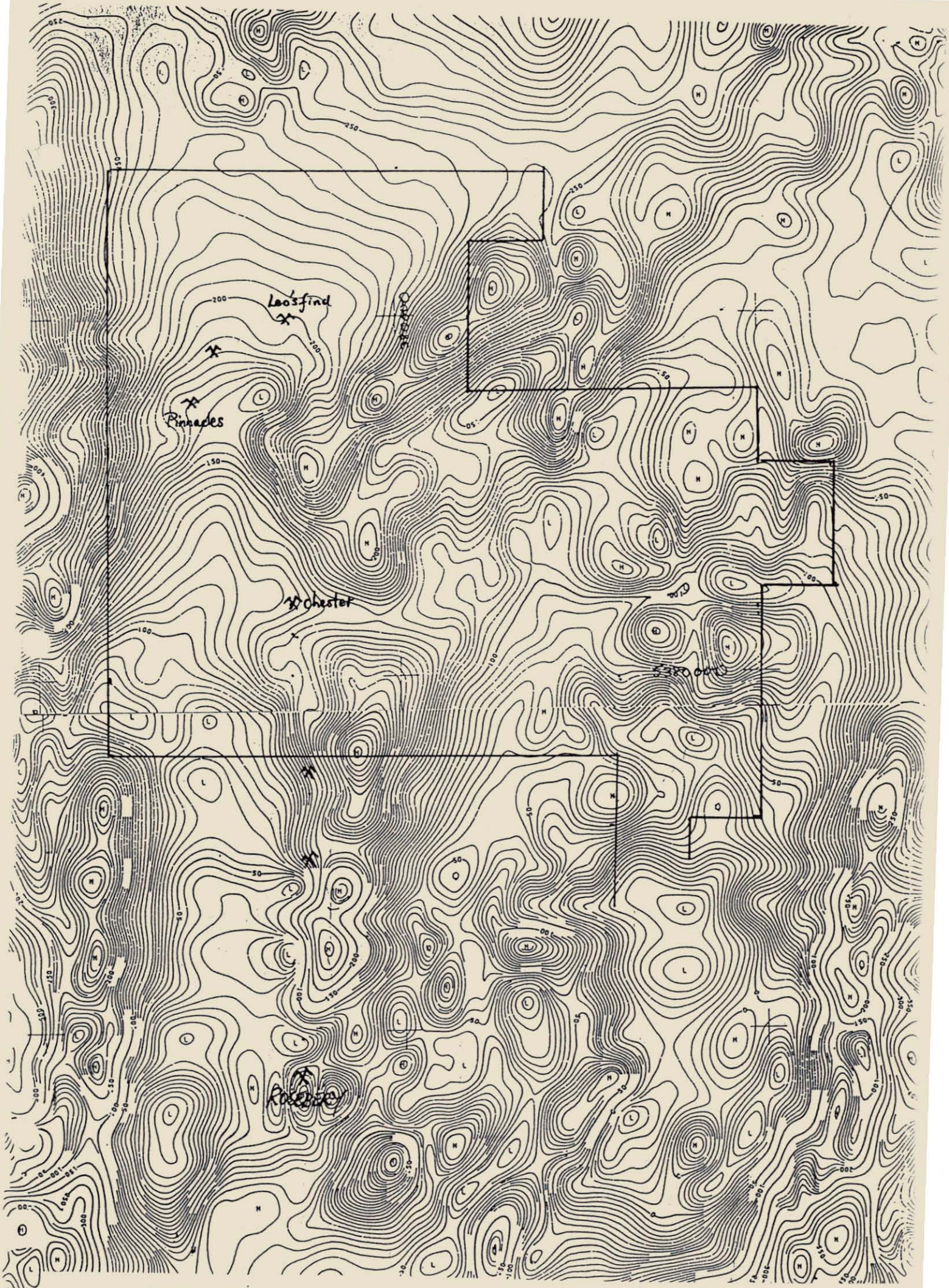
Dr. D.E. Leaman, B.Sc., Ph.D
M.Aus.I.M.M., M.M.I.C.A

14-5-90



LOCATION OF EL 44/88

FIGURE 1



DETAIL OF MAGNETIC FIELD EL 44/88

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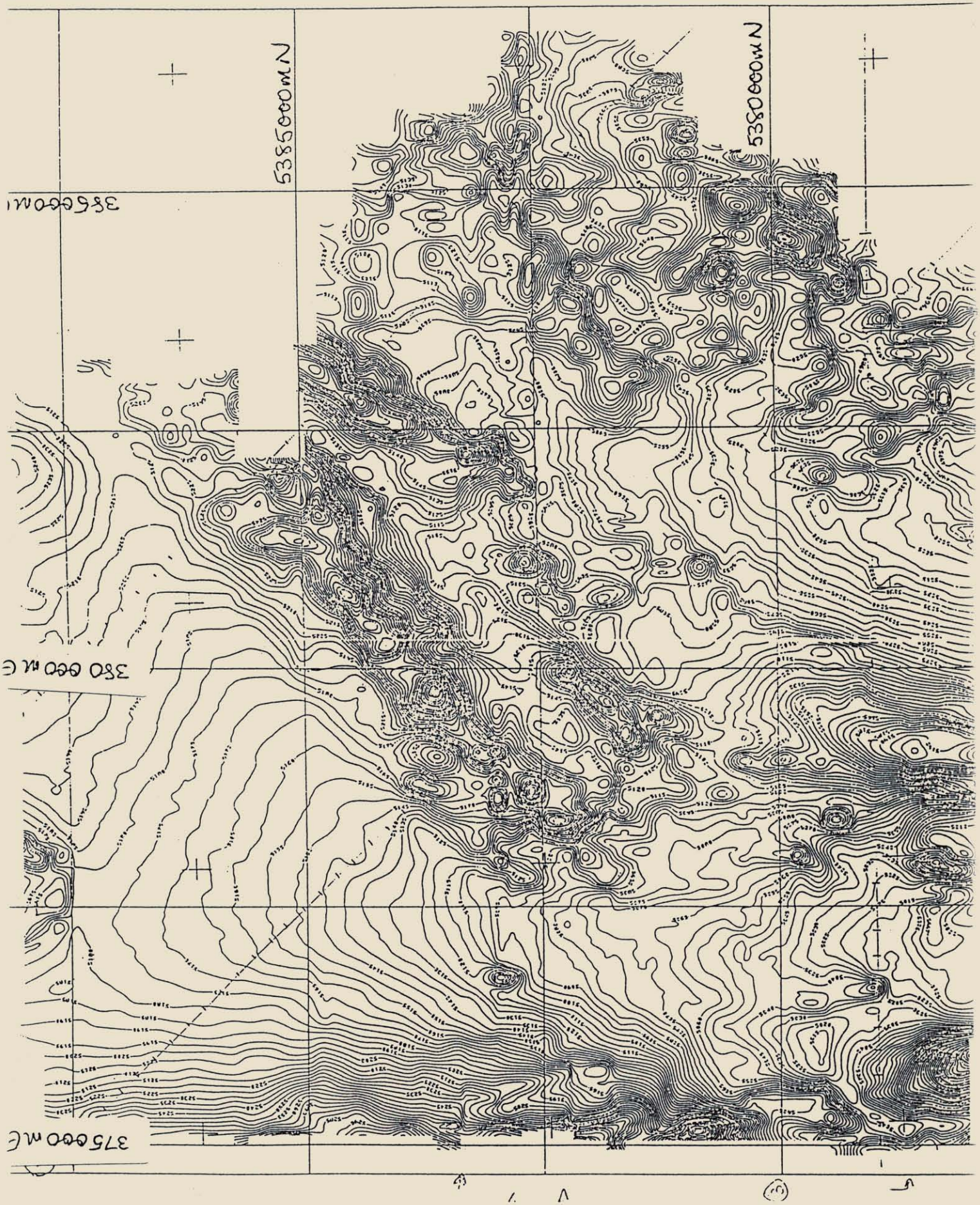
FIGURE 2

421233



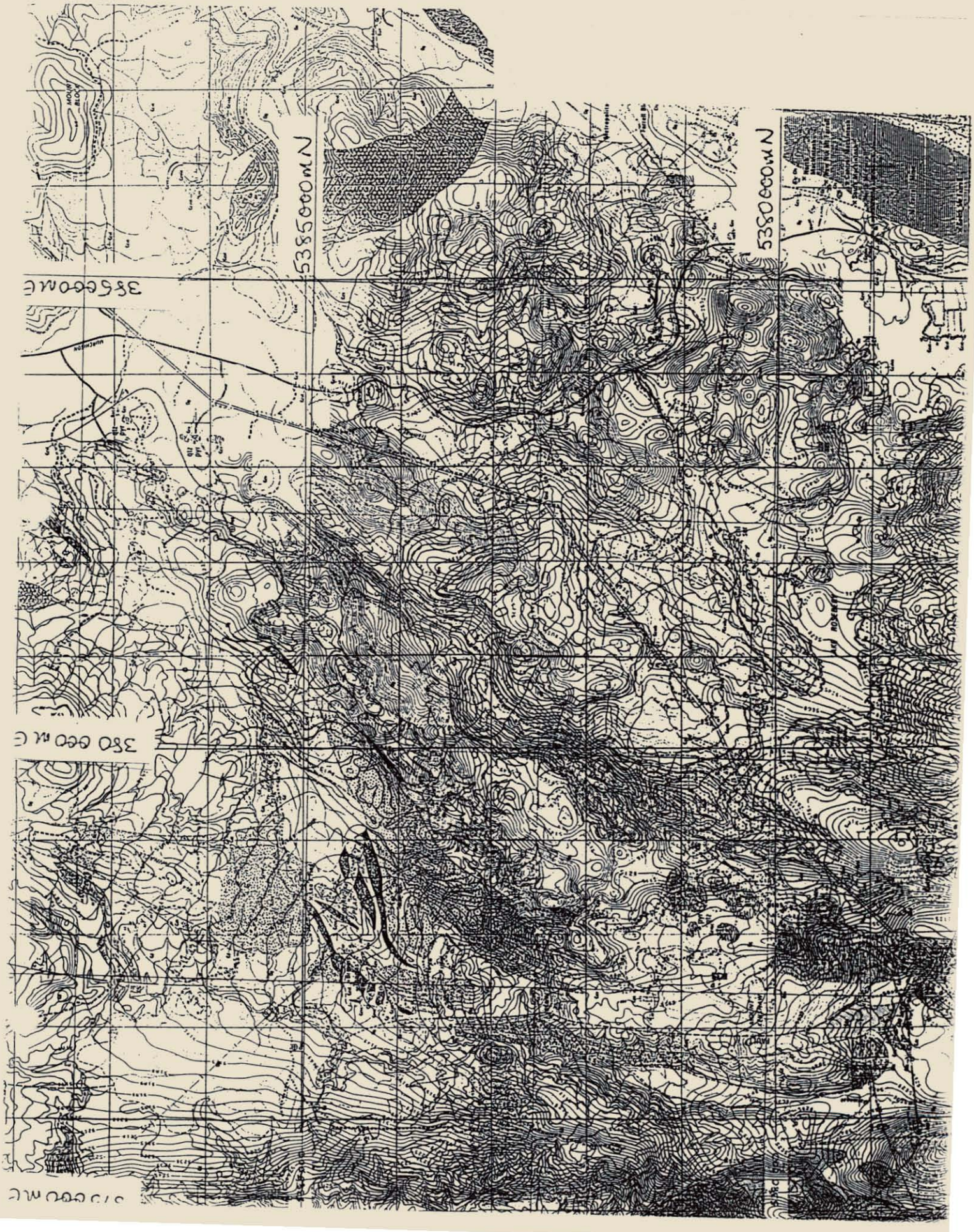
CONTOURS OF RESIDUAL MAGNETIC FIELD

FIGURE 3A

421234

CONTOURS OF RESIDUAL MAGNETIC FIELD
(Basemap after Corbett & McNeill, 1986)

FIGURE 3B



421235

BASEMAP (FROM CORBETT & MCNEILL, 1986) SHOWING LOCATION OF MODELLED PROFILES

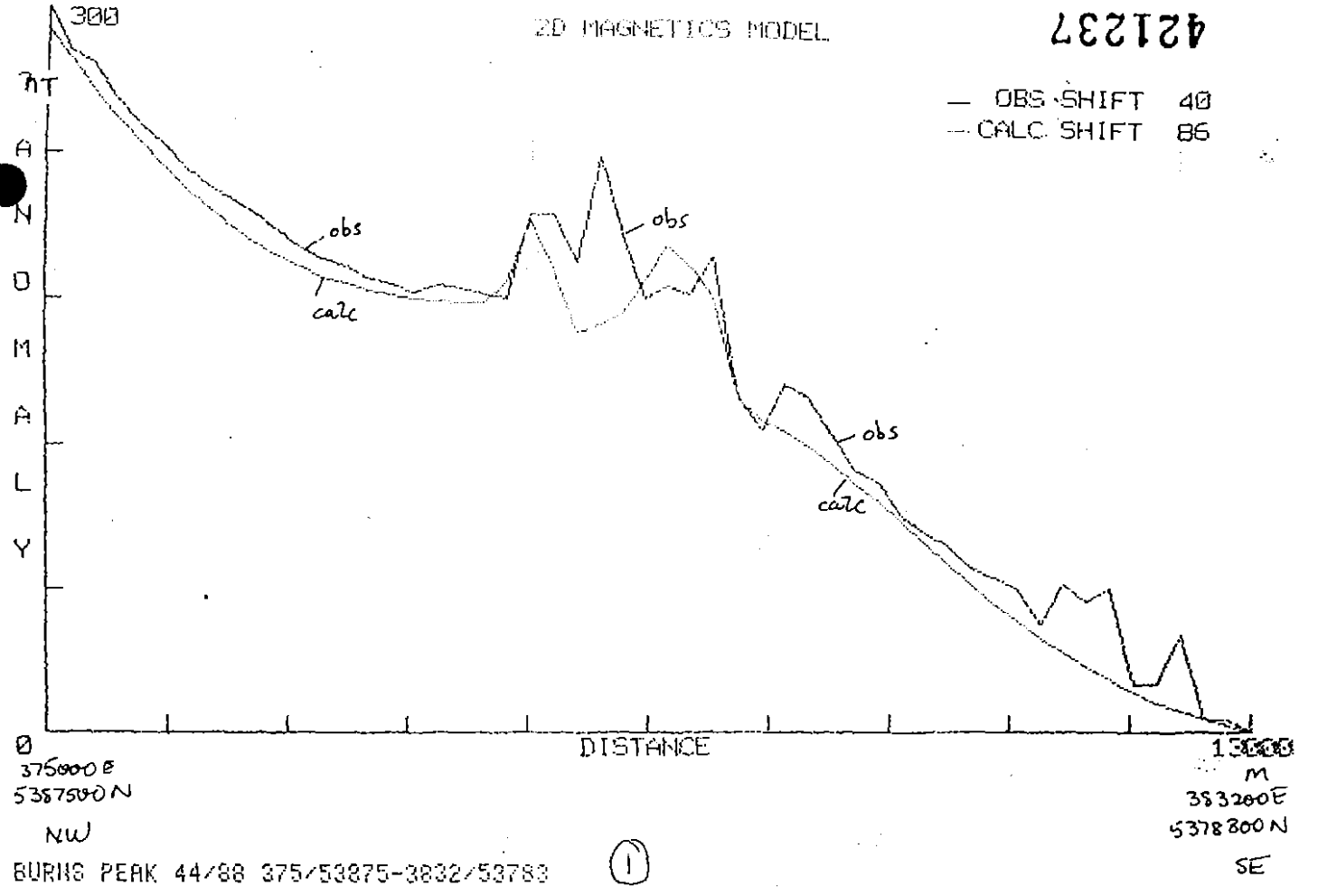
FIGURE 5

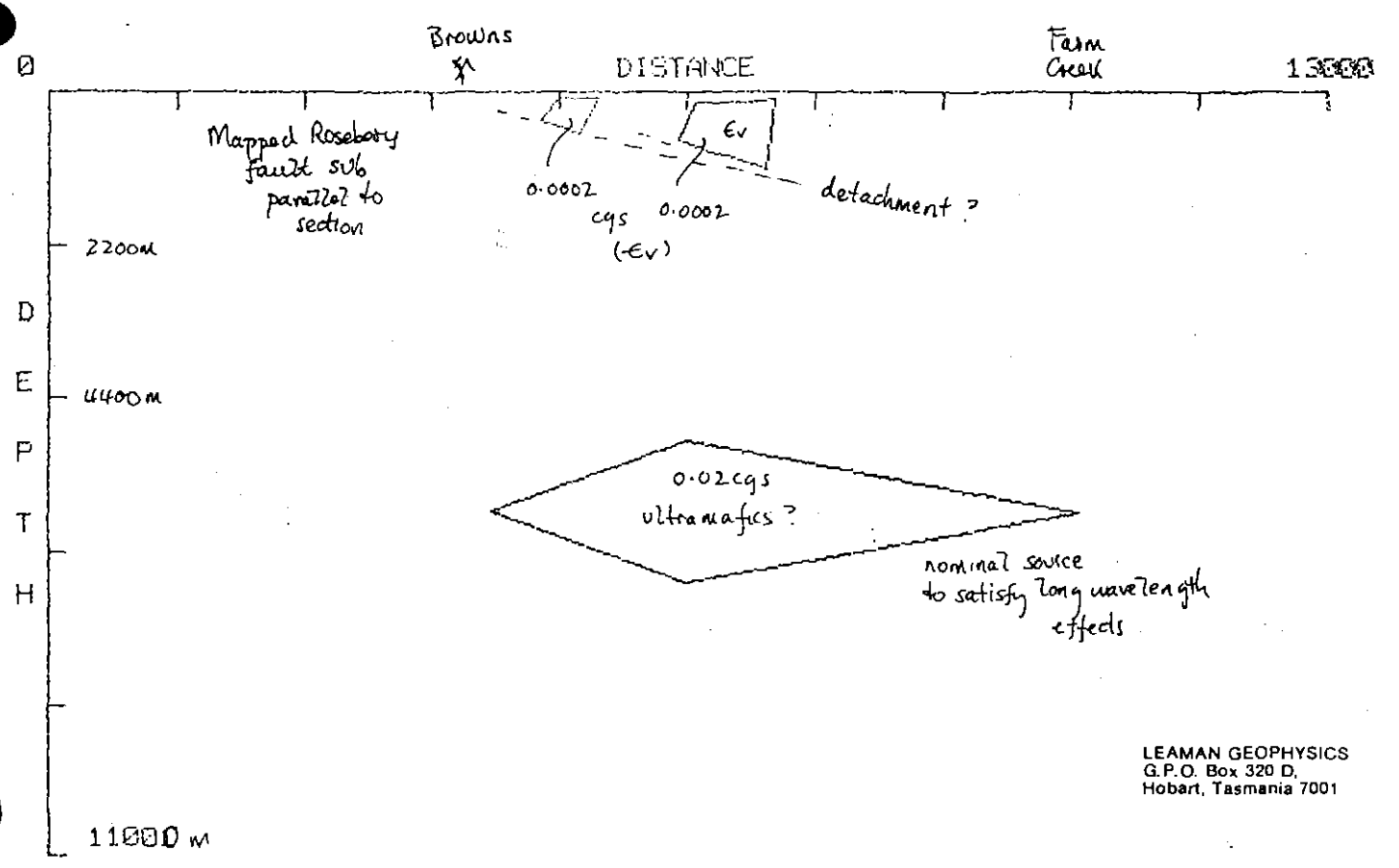
DETAIL OF MAGNETIC FIELD IN CHESTER-PINNACLES AREA
EL 44/88

FIGURE 6

421236

421237





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MAGNETIC MODEL PROFILE 1 EL 44/88 FIGURE 7

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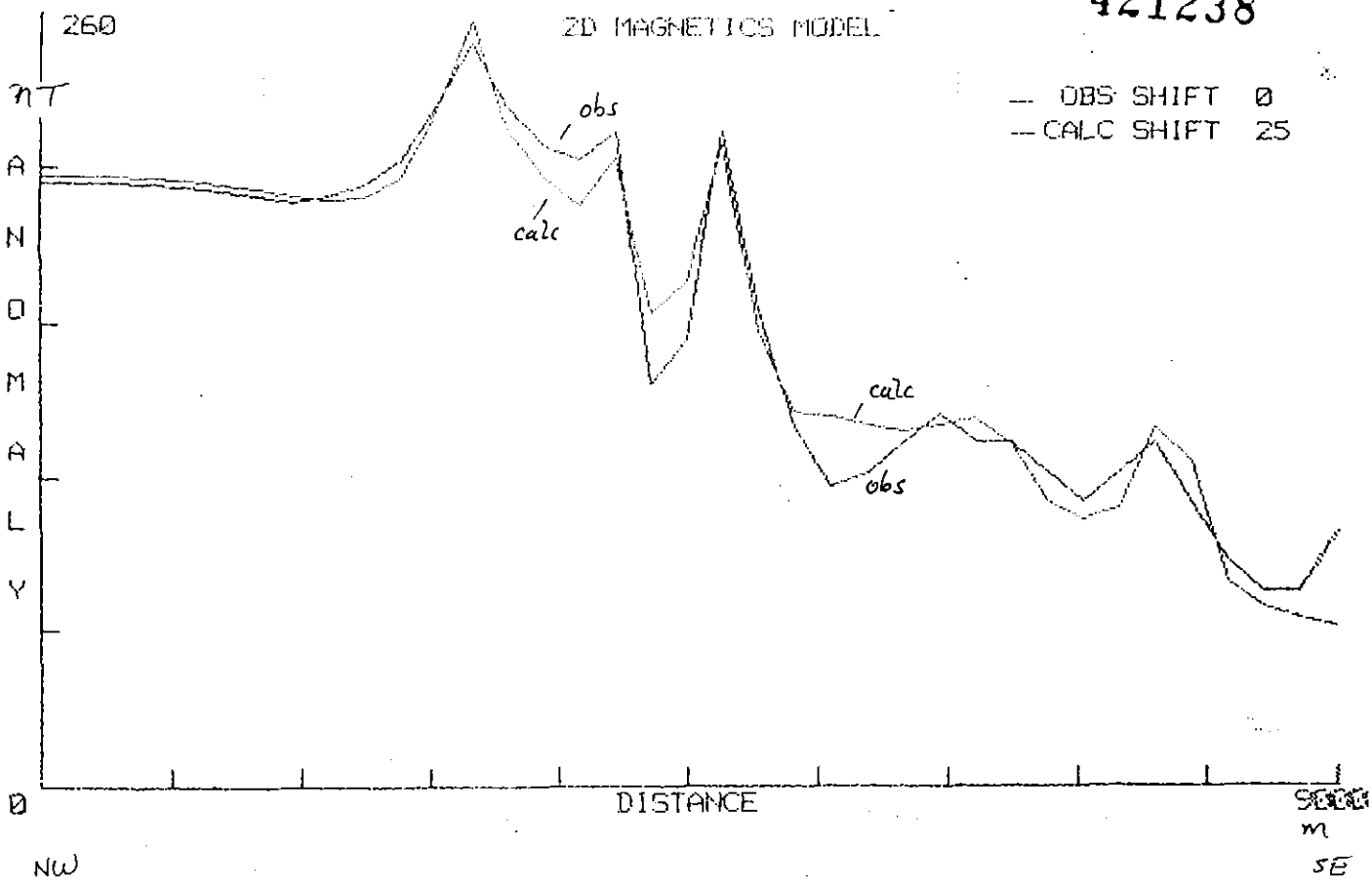
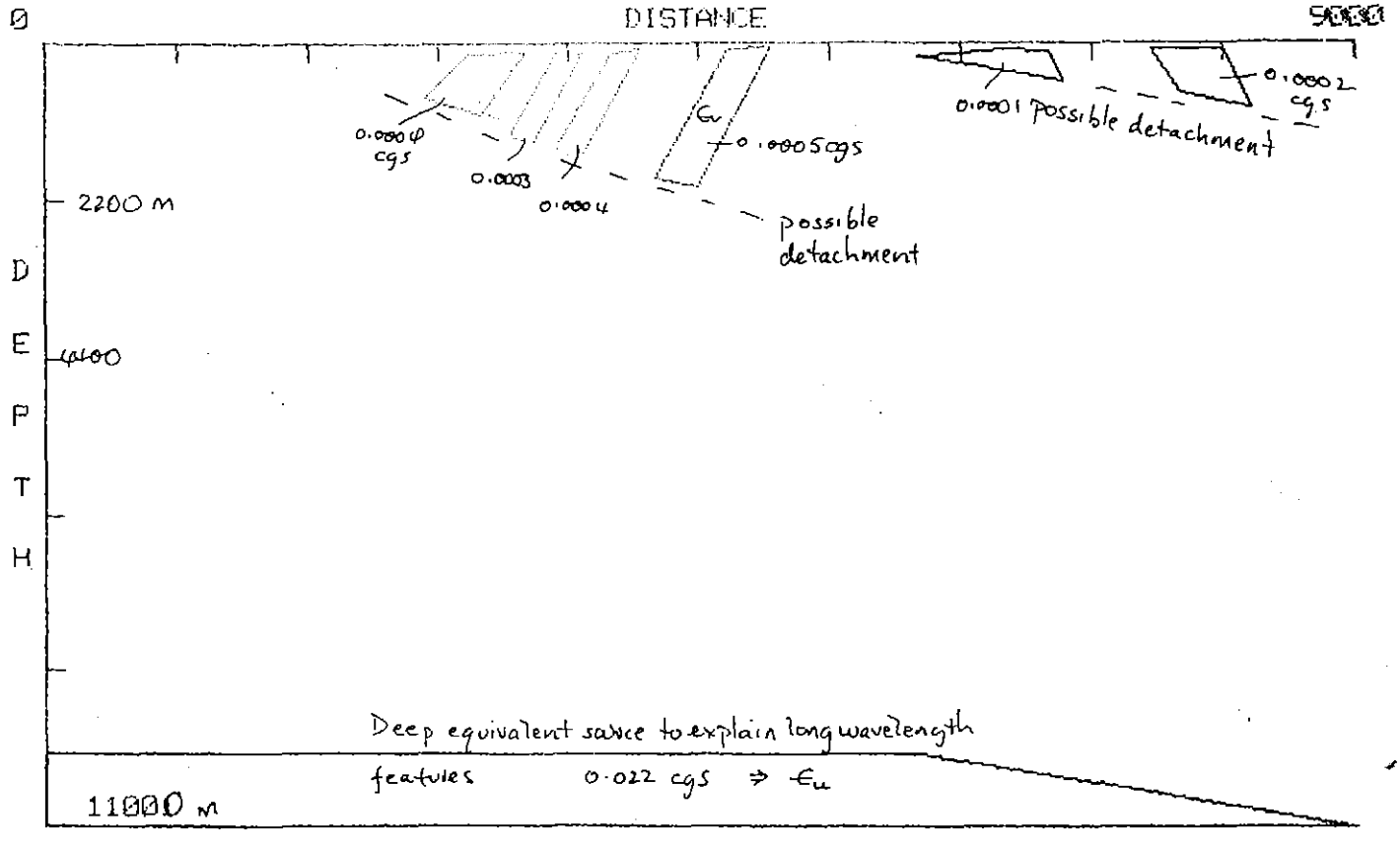
421238



BURNS PEAK 44/88 M2 3795/5388-3865/5381 (2)



MAGNETIC MODEL PROFILE 2 EL 44/88 FIGURE 8

BURNS PEAK M3 5379N 375-385E

421239

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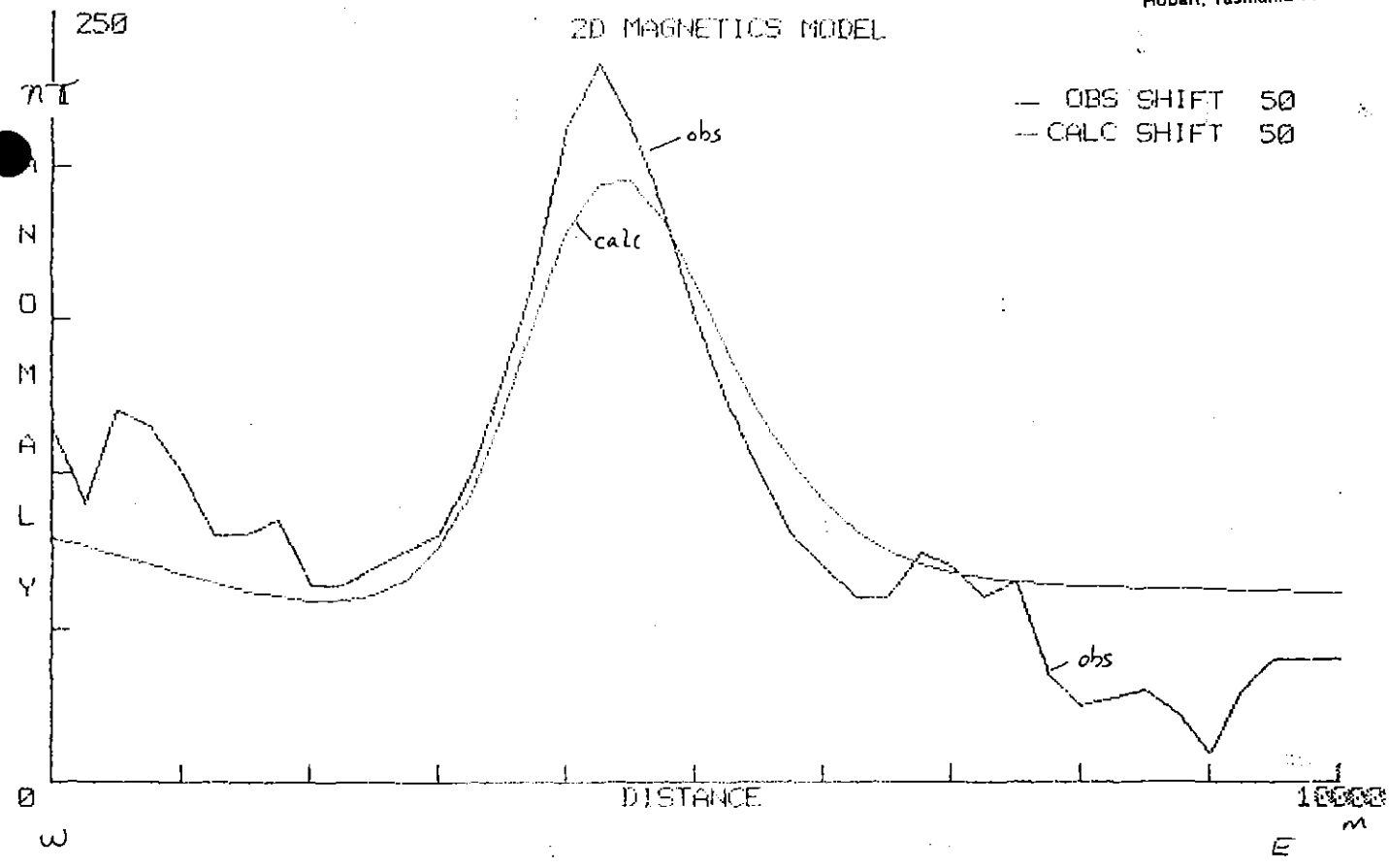

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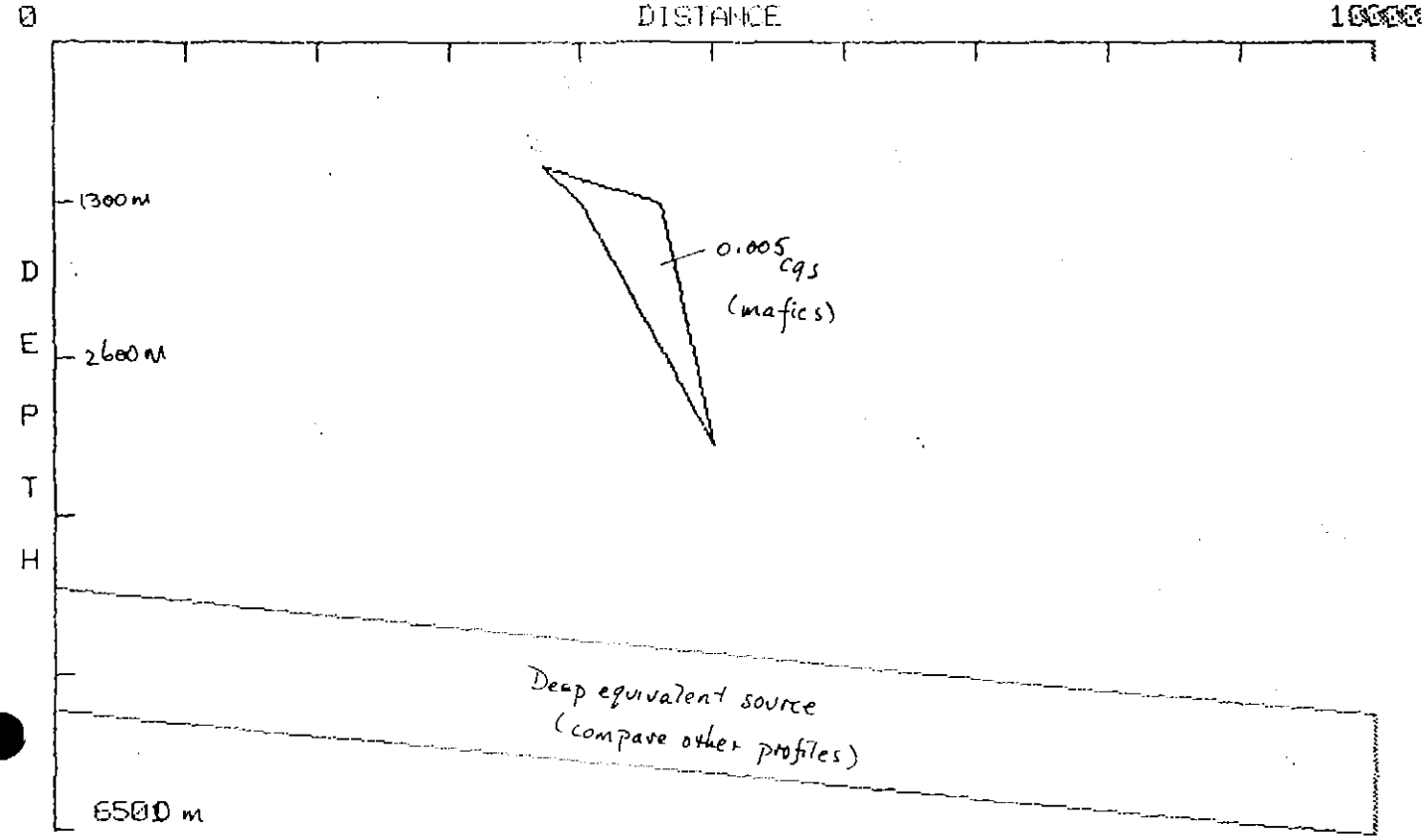
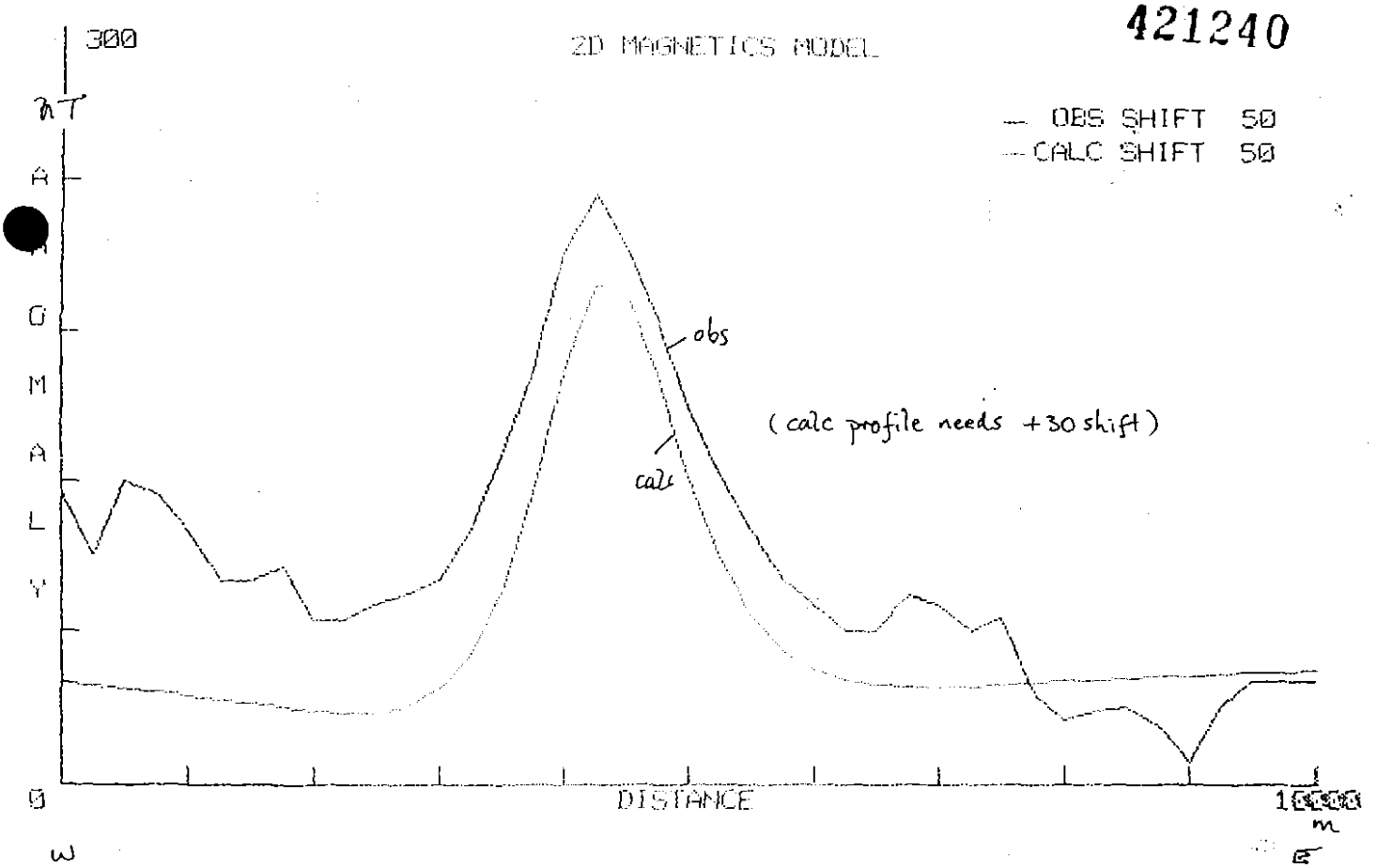


MAGNETIC MODEL PROFILE 3 VERSION 1 EL 44/88 FIGURE 9

421240



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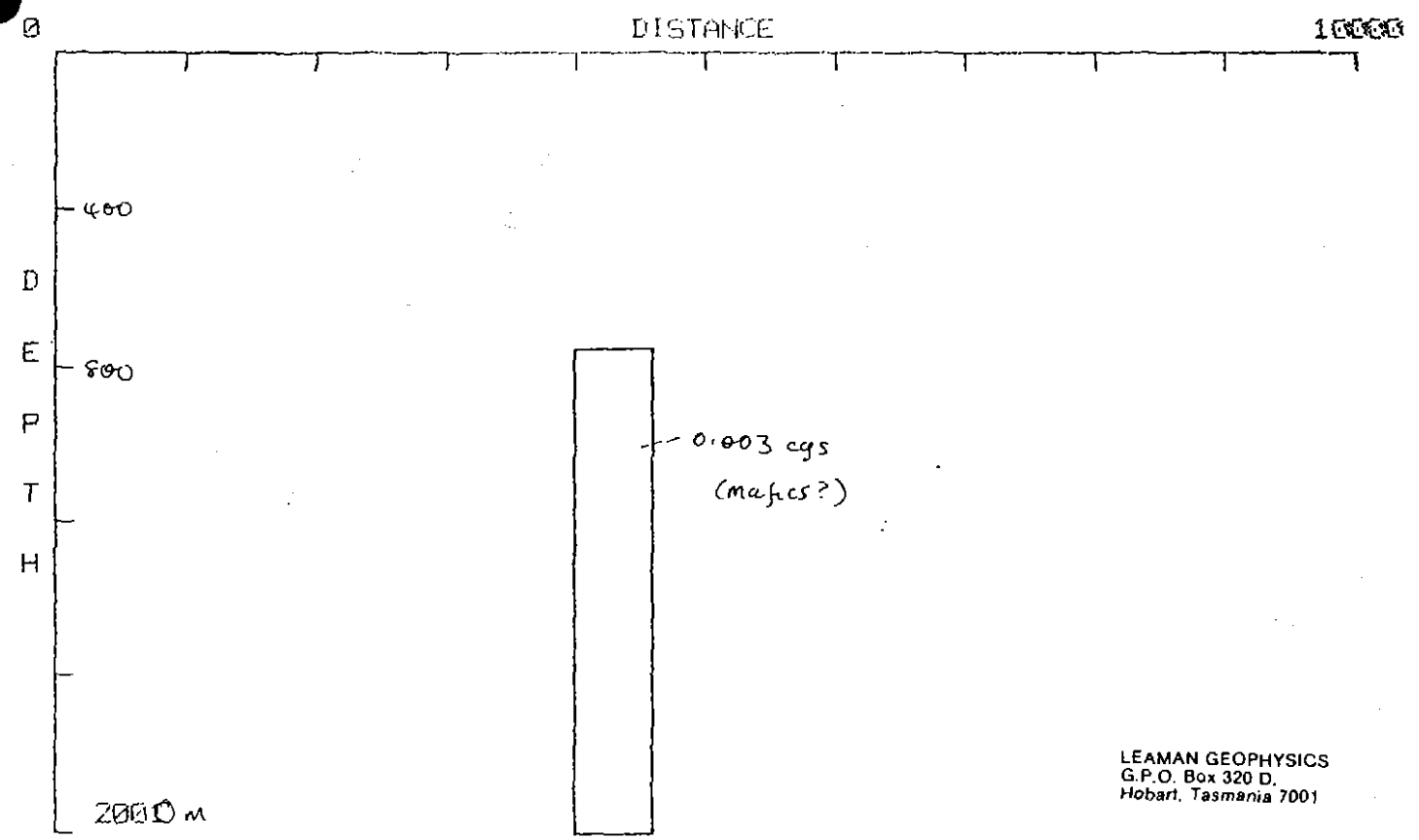

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MAGNETIC MODEL PROFILE 3 VERSION 2 EL 44/88 FIGURE 10

421241
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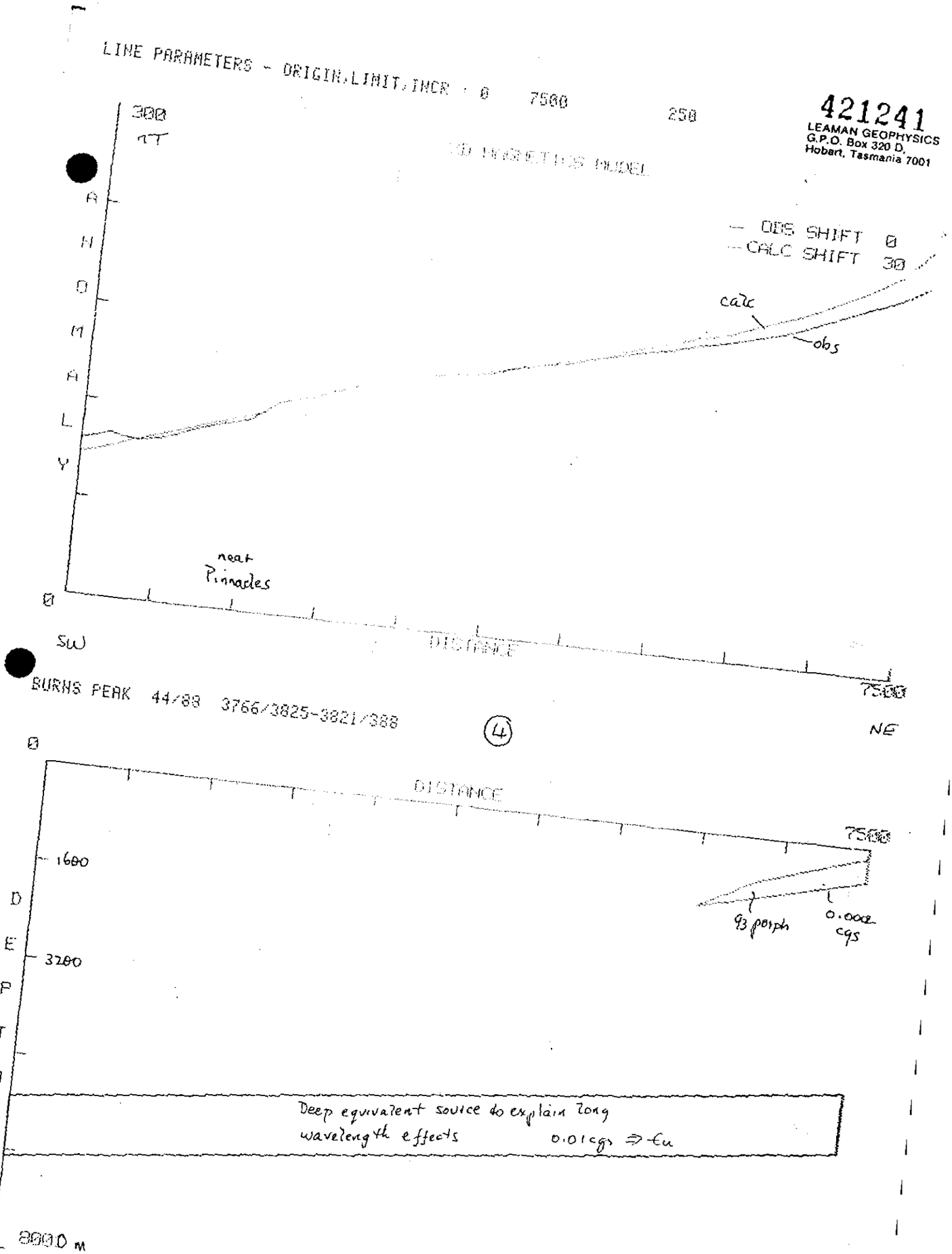

MAGNETIC MODEL PROFILE 4 EL 44/88

FIGURE 11

421242

LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 10000 250

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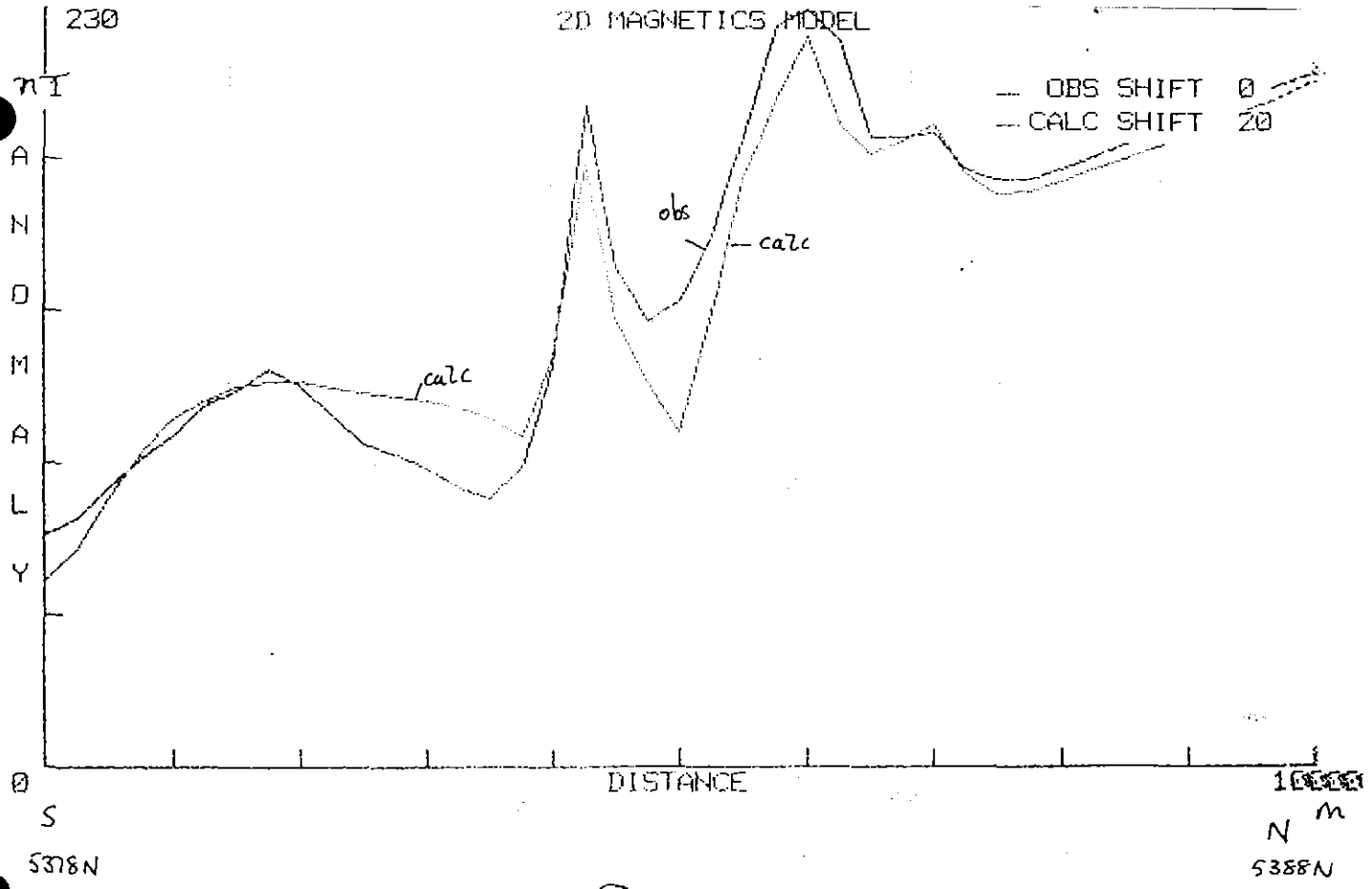
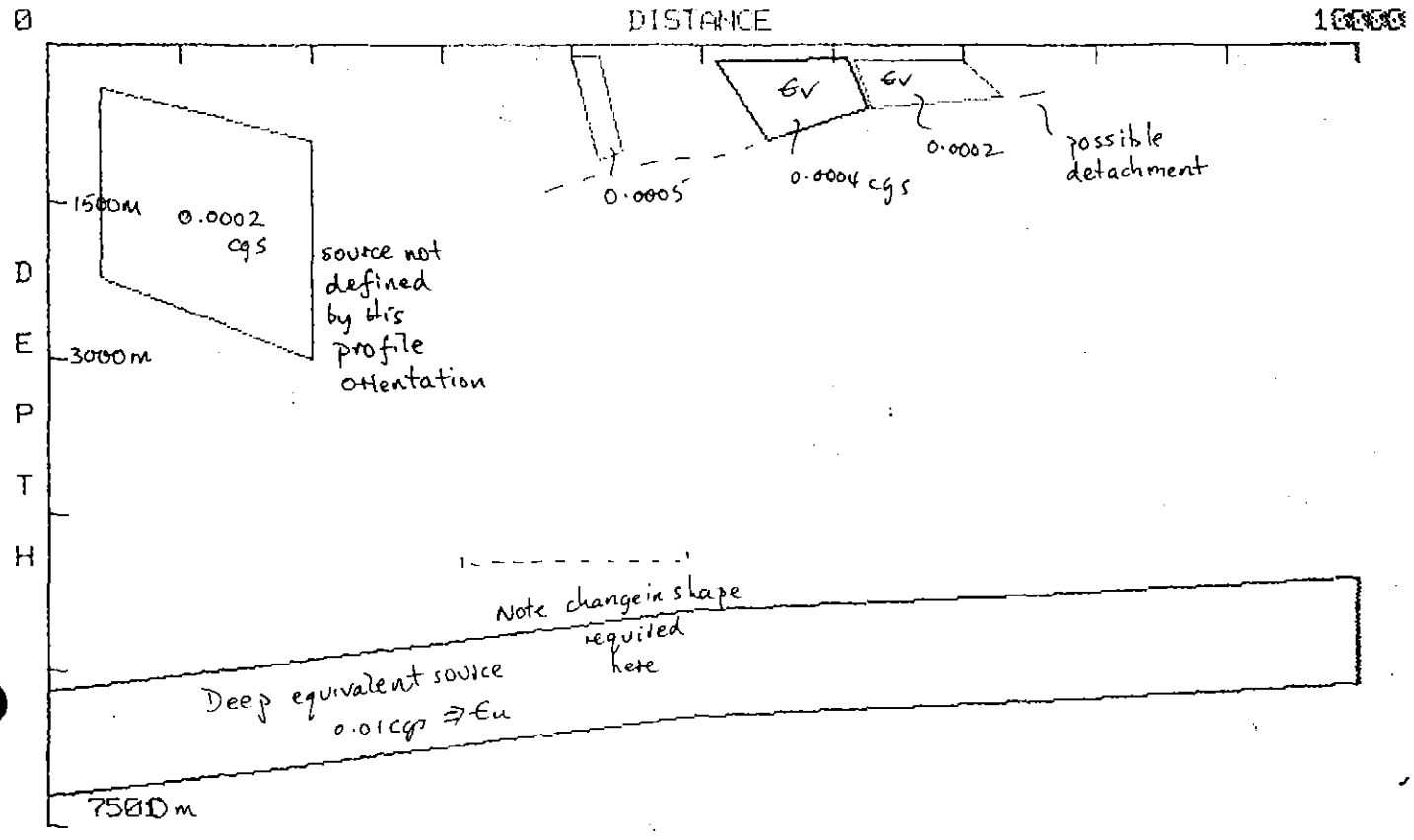


BURNS PEAK 44/88 380E 5378-5388N (5)



MAGNETIC MODEL PROFILE 5 EL 44/88 FIGURE 12

421243

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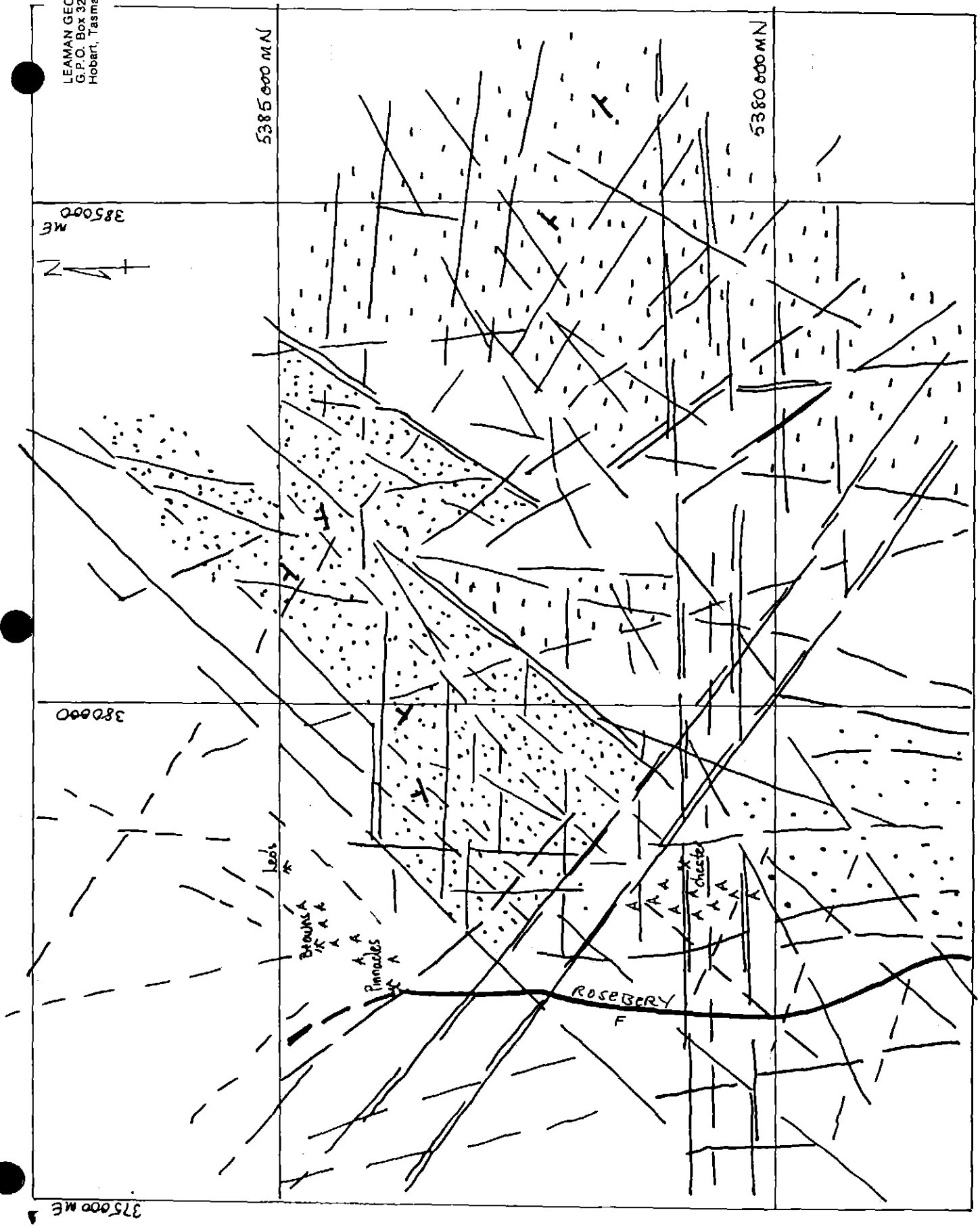

SUMMARY OF TRENDS AND LINEAMENTS EL 44/88 FIGURE 13A

421241

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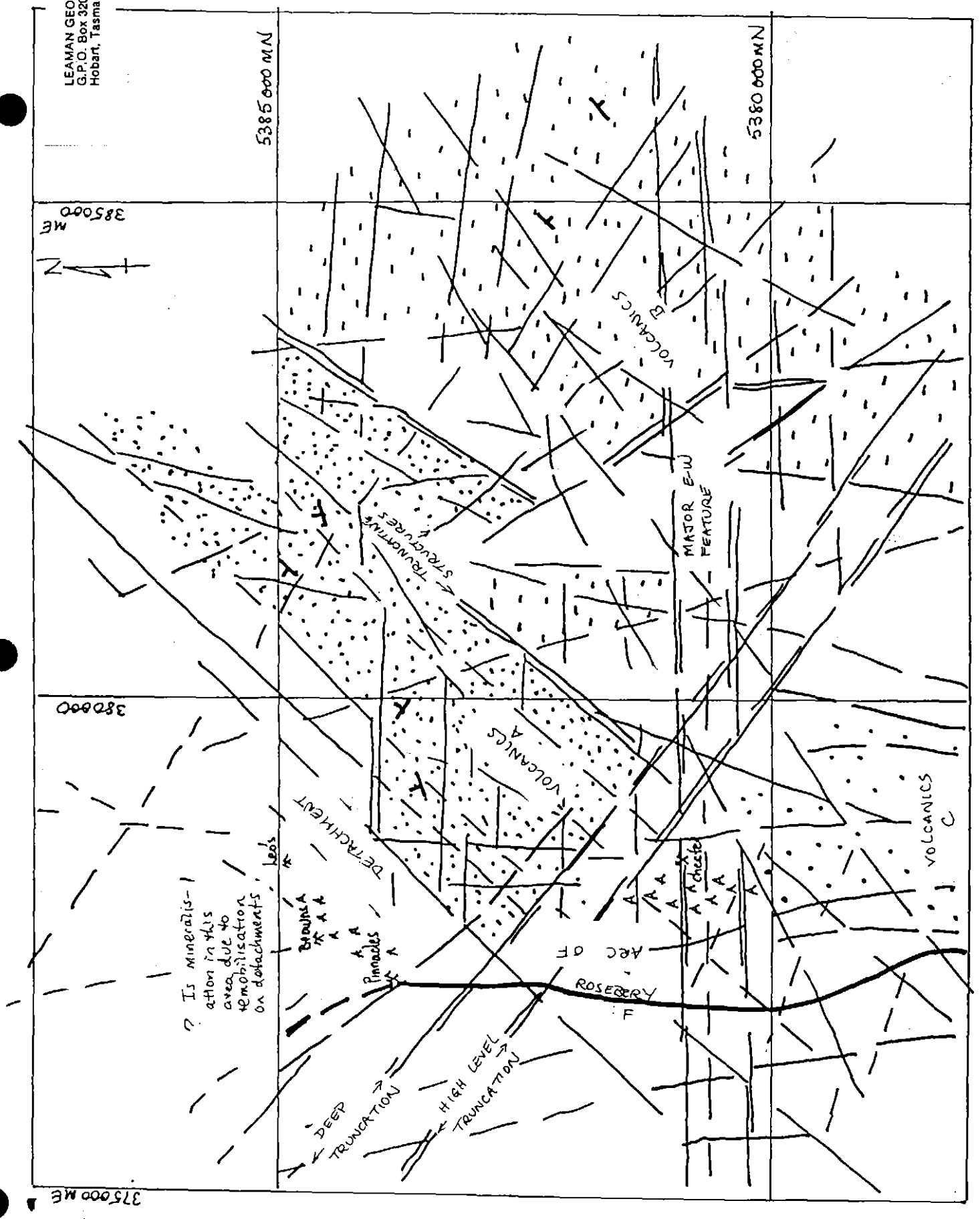

SUMMARY OF TRENDS AND LINEAMENTS EL 44/88
LABELLED INTERPRETED FEATURES

FIGURE 13B

421245

LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 30000 1000

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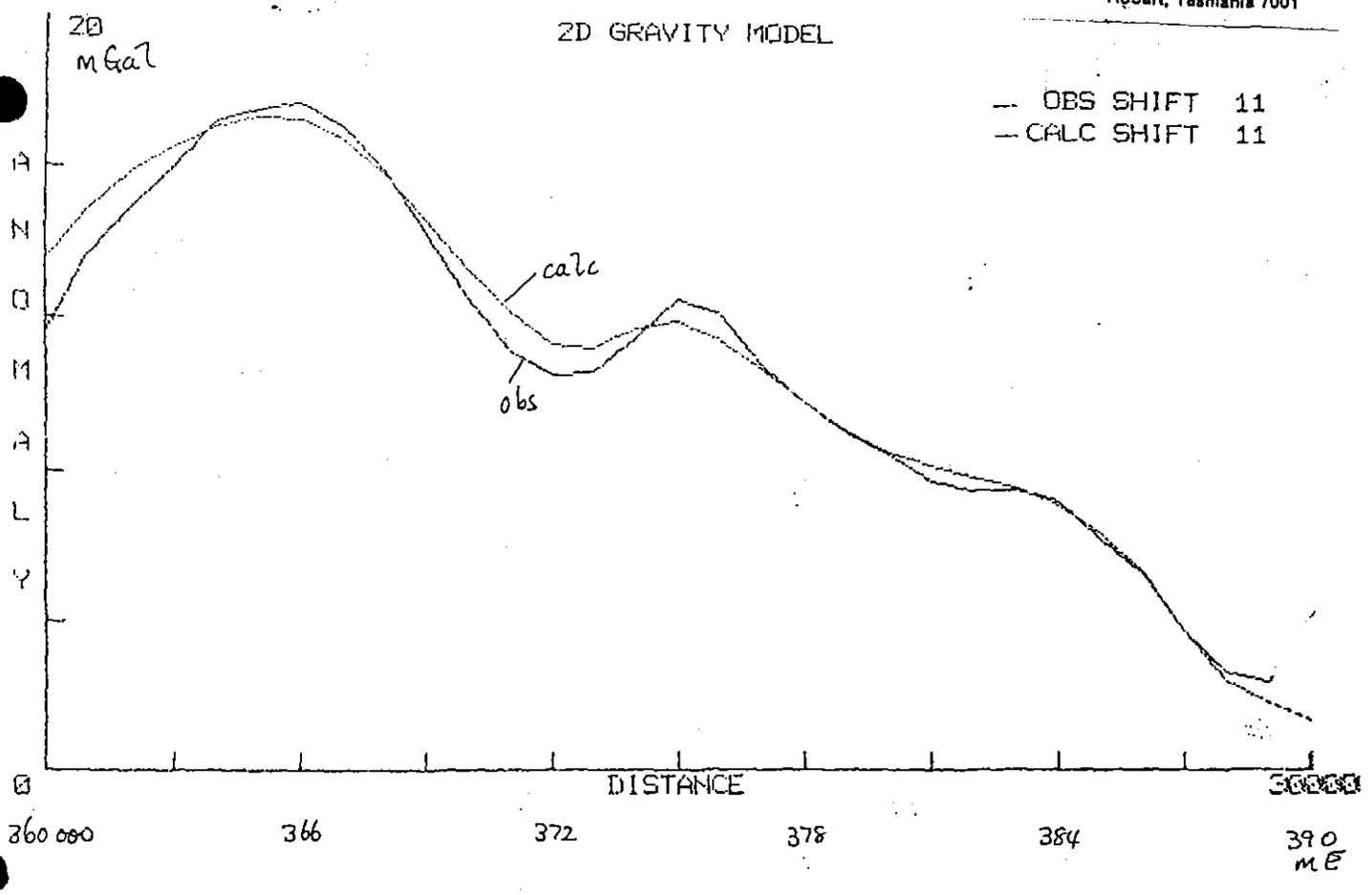
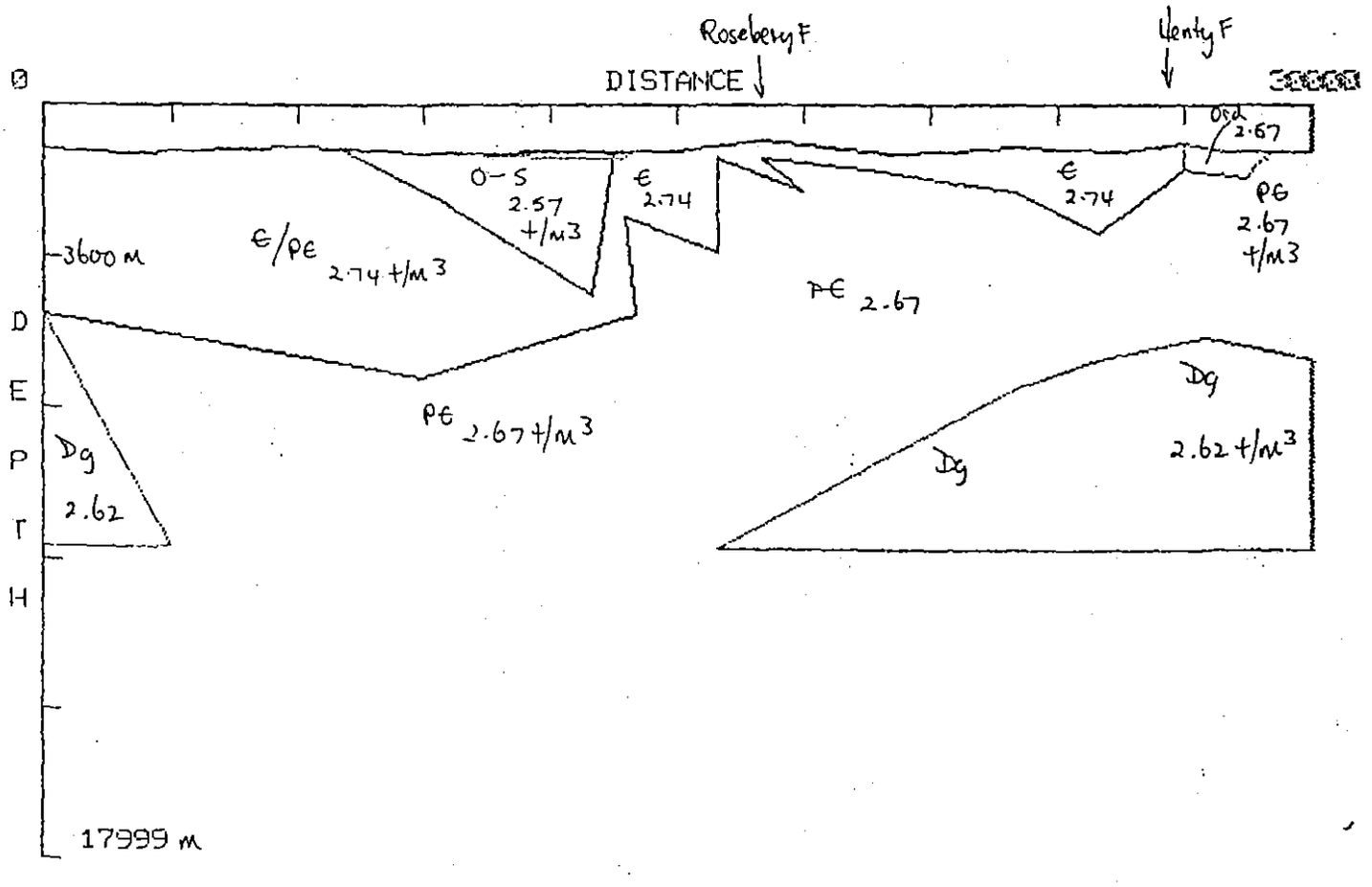


ROSEBERY REGION 5380N 360-390E 1275M REFERENCE



2D REGIONAL GRAVITY MODEL 5380 000 MN FIGURE 14

421246

LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 30000 1000

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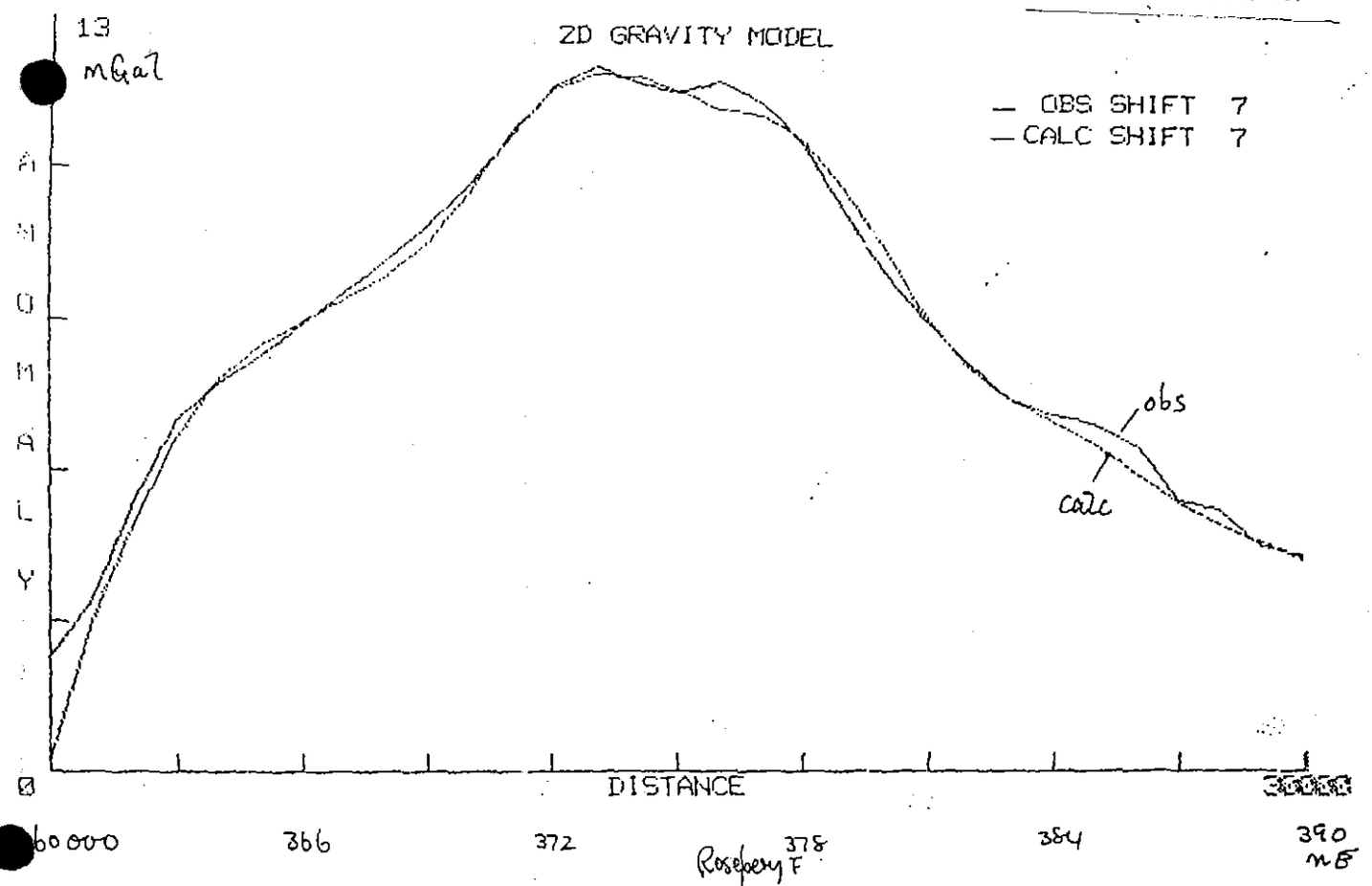
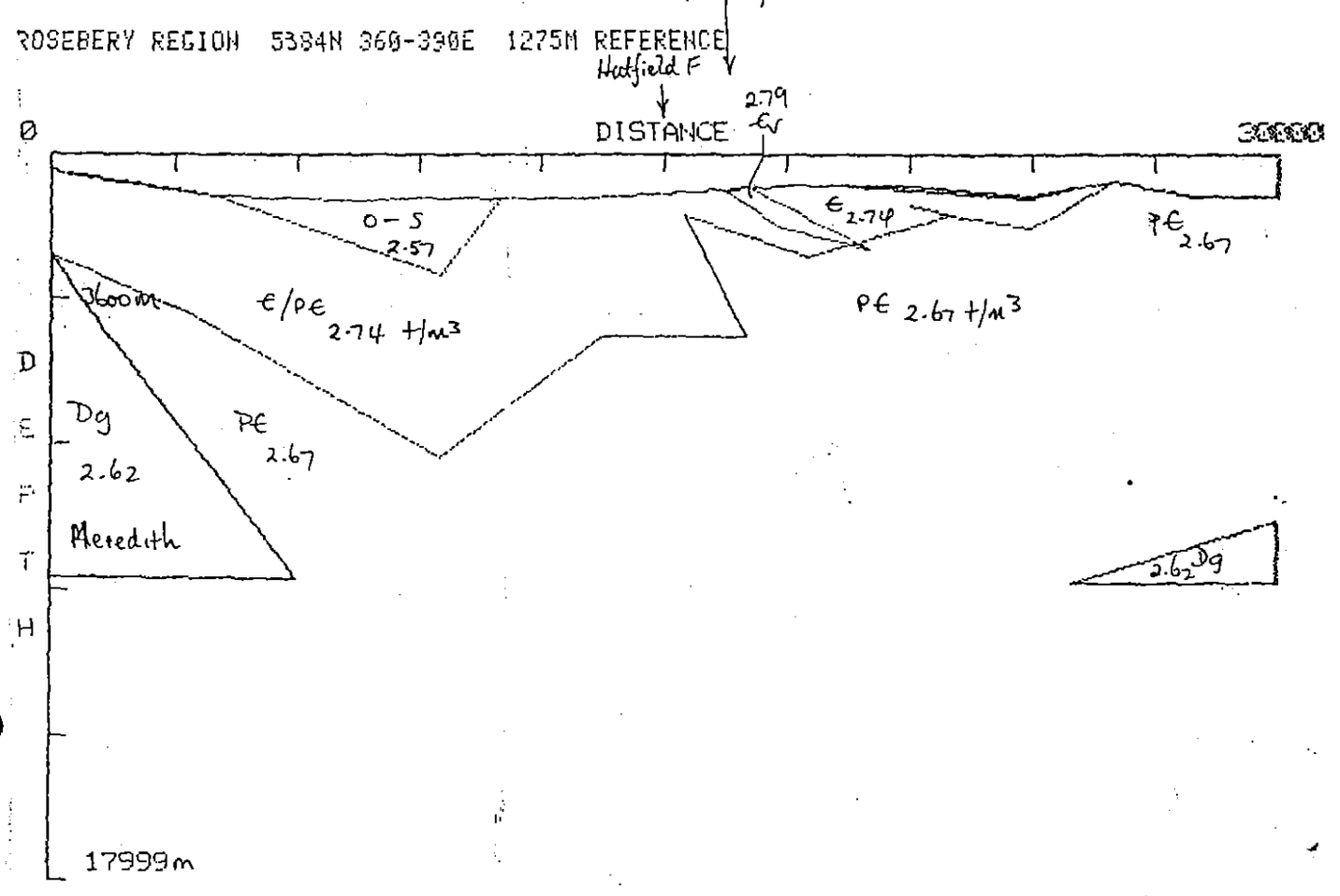
G.P.O. Box 320 D,
Hobart, Tasmania 7001





2D REGIONAL GRAVITY MODEL 5384 000 MN FIGURE 15

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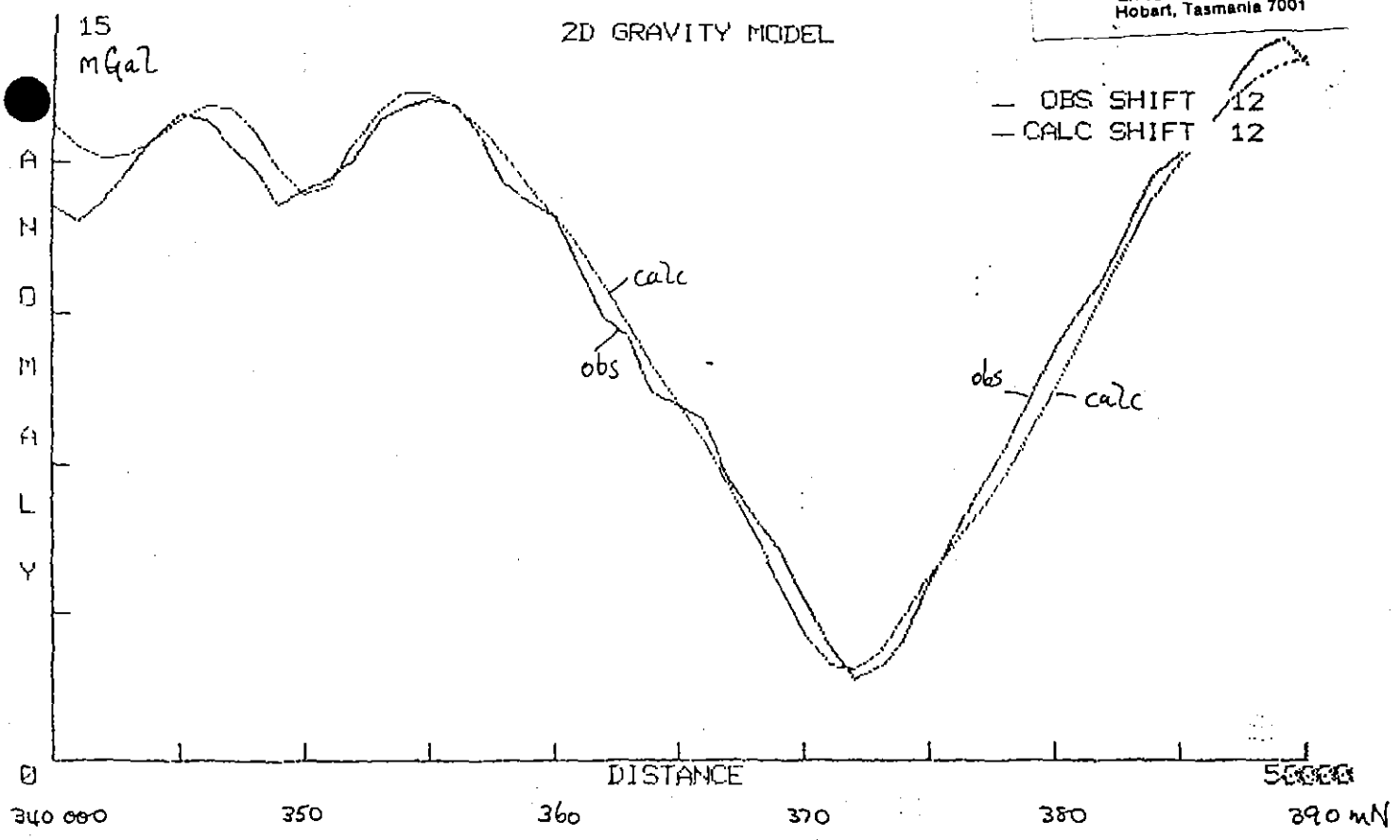
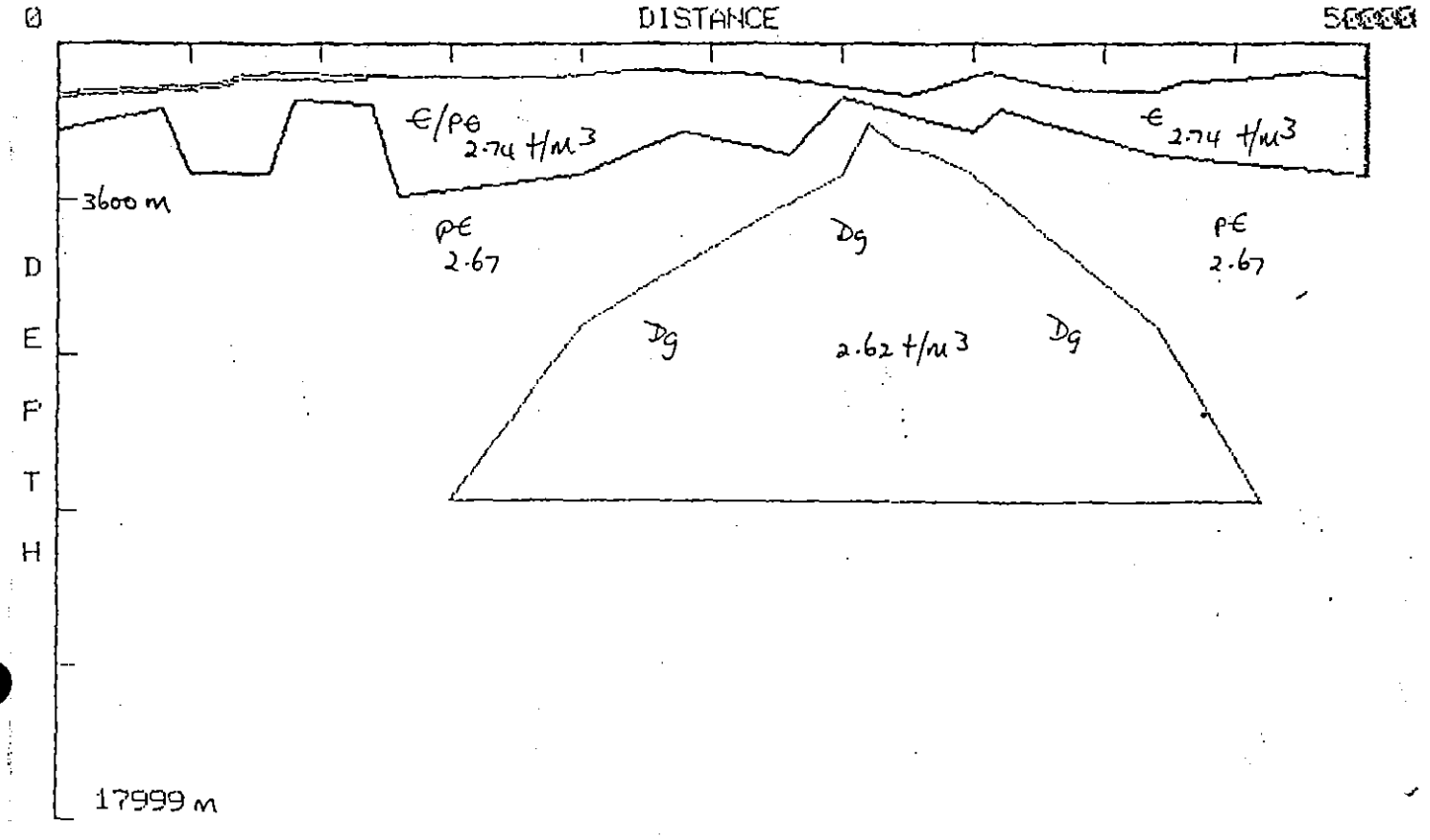


ROSEBERY REGION 380E 340-390N 1275M REFERENCE

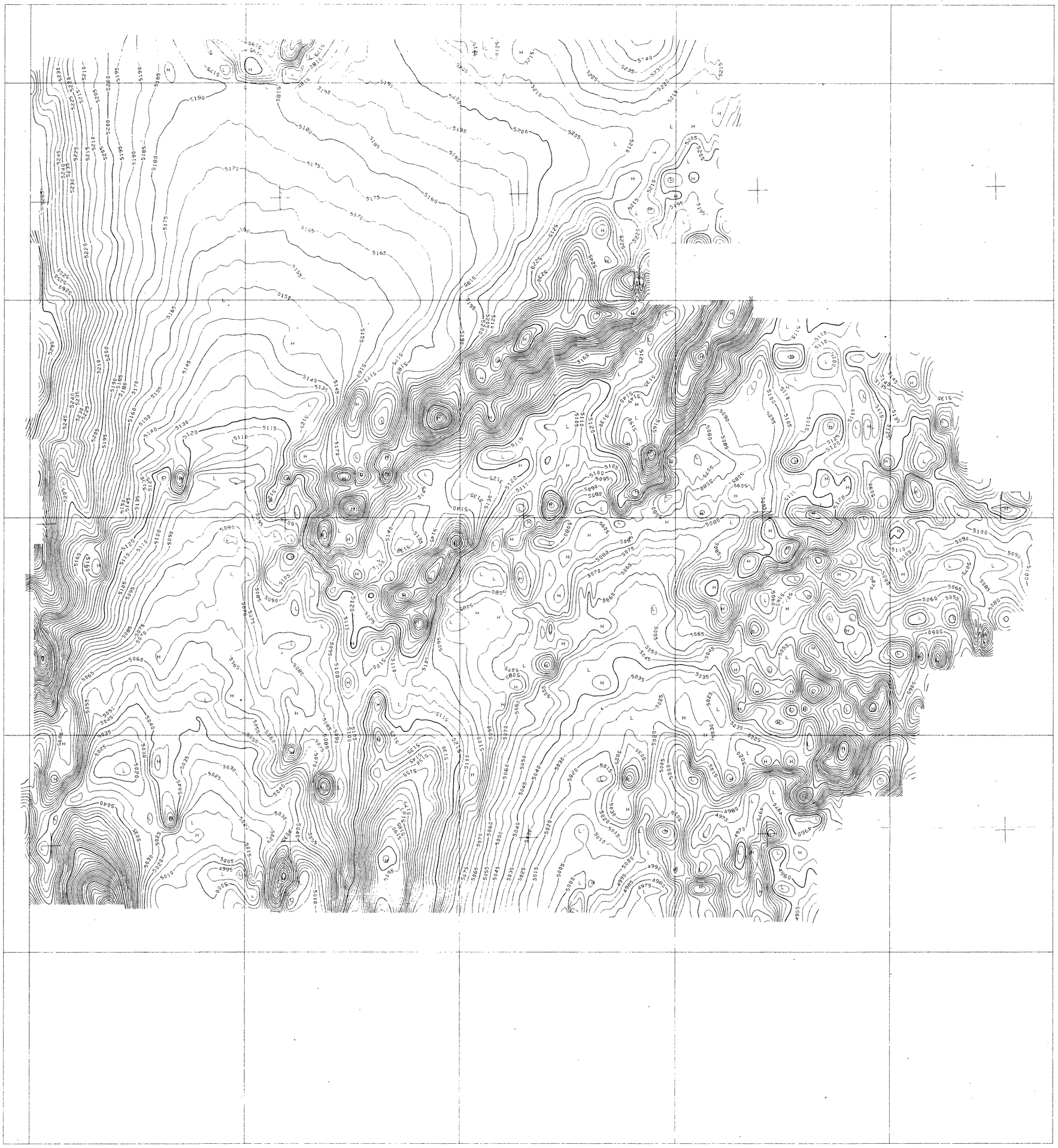


2D REGIONAL GRAVITY MODEL 380 000 ME FIGURE 16

BURNS PEAK

375000 E
145 30
377500 E
145 32
380000 E
145 34
382500 E
145 36
385000 E
145 38

5387500 N
41 40
5385000 N
41 42
5382500 N
41 44
5380000 N
5377500 N



145 30
375000 E
145 32
377500 E
145 34
380000 E
145 36
382500 E
145 38
385000 E

5 cm

421248 90-3203.

PROCESSING AND MAPPING

Data processing and mapping performed by Pitt Research Pty Limited during April 1990

The IGRF component has been removed from the measured magnetic data

Map grid size, 50 metres

SURVEY SPECIFICATIONS:

Survey Area: EL 44/88 Burns Peak

Flown by Geo Instruments Pty Ltd, February 1990, Job Number 9004.

Nominal Terrain Clearance of Detector in Bird at 80 metres.
Nominal Line Spacing Traverse Lines 200 metres.
Tie Lines 1000 metres.

Recording Interval: Magnetics 0.48 seconds
Spectrometer 0.96 seconds

Magnetometer: G-813 Proton Precession Magnetometer in a towed bird. Sensitivity 0.1 nT.

Spectrometer: GR3001 with detector volume of 16.8 litres.

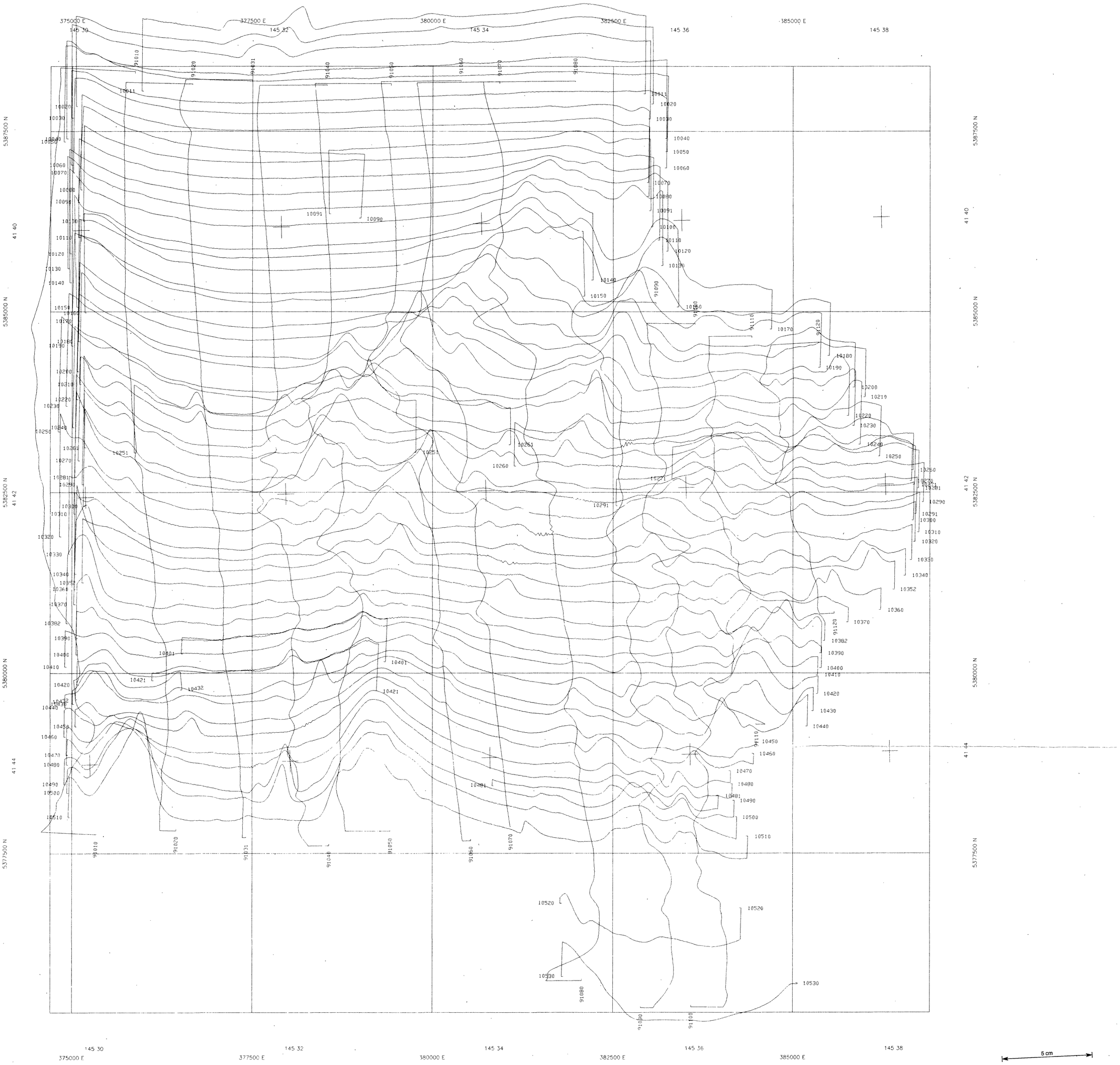
Data Recording: Geo Instruments 2000 Digital to Disk.

Flight path record by colour video VHS PAL.
Flight line recovery by transfer to 1:10 000 scale control maps.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED :	E.L. 44/88 – BURNS PEAK J.V.
DATE : NOV. 1990	RESIDUAL MAGNETIC CONTOURS
DRAWN :	CONTOUR INTERVAL: 5nT
REF:	
REVISIONS :	
DRAWING No.	SCALE 1:25,000 (500 0 500 METRES) FIG. No.

BURNS PEAK



5 cm

PROCESSING AND MAPPING:

Data processing and mapping performed by Pitt Research Pty Limited during April 1990.

421249 **90-3203.1**

SURVEY SPECIFICATIONS:

Survey Area: EL 44/88 Burns Peak

Flown by Geo Instruments Pty Ltd, February 1990, Job Number 9004.

Nominal Terrain Clearance of Detector in Bird at 80 metres.
Nominal Line Spacing: Traverse Lines 200 metres.
Tie Lines 1000 metres.

Recording Interval: Magnetics 0.48 seconds
Spectrometer 0.96 seconds

Magnetometer: G-813 Proton Precession Magnetometer in a towed bird. Sensitivity 0.1 nT.

Spectrometer: GR3001 with detector volume of 16.8 litres.

Data Recording: Geo Instruments 2000 Digital to Disk.

Flight path record by colour video VHS PAL.
Flight line recovery by transfer to 1:10 000 scale control maps.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED :
DATE : NOV. 1990
DRAWN : G.M.B.
REF:
REVISIONS :
DRAWING No.

E.L. 44/88 – BURNS PEAK J.V.

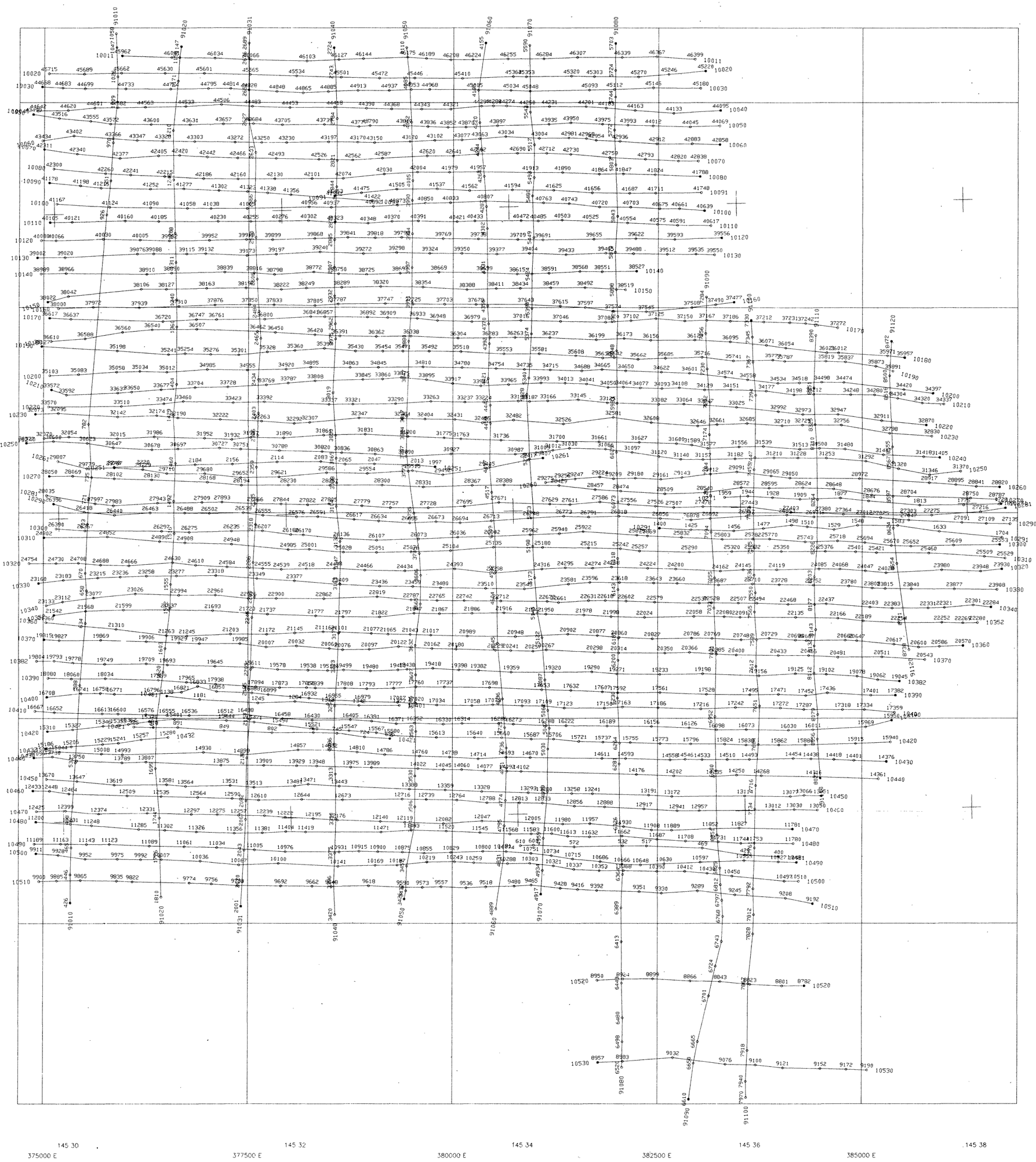
RESIDUAL MAGNETIC PROFILES

PROFILE SCALE: 200nT/cm

SCALE 1:25,000 (500 0 500 METRES)

FIG. No.

BURNS PEAK



PROCESSING AND MAPPING:

Flight path digitising, data processing and mapping performed by Pitt Research Pty Limited during April 1990.

SURVEY SPECIFICATIONS:

Survey Area: EL 44/88 Burns Peak

Flown by Geo Instruments Pty Ltd, February 1990, Job Number 9004.

Nominal Terrain Clearance of Detector in Bird at 80 metres.
Nominal Line Spacing: Traverse Lines 200 metres.
Tie Lines 1000 metres.

Recording Interval: Magnetics 0.48 seconds
Spectrometer 0.96 seconds

Magnetometer: G-813 Proton Precession Magnetometer in a towed bird. Sensitivity 0.1 nT.

Spectrometer: GR3001 with detector volume of 16.8 litres.

Data Recording: Geo Instruments 2000 Digital to Disk.

Flight path record by colour video VHS PAL.
Flight line recovery by transfer to 1:10 000 scale control maps.

421250 **90-3203.**

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED :	E.L. 44/88 – BURNS PEAK J.V.
DATE : NOV. 1990	AEROMAGNETIC SURVEY
DRAWN : G.M.B.	FLIGHT LINES
REF:	
REVISIONS :	
DRAWING No.	SCALE 1:25,000 (500 0 500 METRES) FIG. No.

421251

APPENDIX. 8

GRAVITY SURVEY

EL 44/88 BURN'S PEAK

ACQUISITION REPORT

(INCLUDING PRELIMINARY INTERPRETATION)

DR D E LEAMAN AUGUST 1990

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

Registered Office:
21 ZOMAY. AVENUE. DYNNYRNE. TAS. 7005
All Correspondence to:
G.P.O. BOX 320 D. HOBART. TAS. 7001.
TELEPHONE: (002) 24 0319
FACSIMILE: (002) 23 3194

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GRAVITY SURVEY
EL 44/88 BURNS PEAK

ACQUISITION REPORT
(INCLUDING PRELIMINARY INTERPRETATION)
for
PASMINCO MINING

by
Dr. D.E. Leaman

August 1990

BURNSPK3

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SUMMARY

Regional gravity coverage of the Burns Peak region north of Lake Rosebery in western Tasmania has been upgraded by increasing the average station density from about 1 station per square kilometre to 2 generally and about 4 in the vicinity of Chester and Pinnacles.

The additional data has confirmed earlier indications of a relatively thin volcanic pile resting, probably, on Precambrian basement. It has also shown that the true margin of Dundas Group sedimentation is largely concealed beneath the western parts of the pile. Improved resolution has demonstrated that many conflicting regional trends are present and that the volcanics within the licence area either form part of two or three distinct geological regimes, are massively dislocated, or both. The volcanics of Mt Black proper, Mt Black west, the Chester-Pinnacles area, north of Lake Rosebery, or south of Mt Block are structurally and possibly lithologically distinctive. Each zone is limited by an E-W, NE-SW or NW-SE lineament or fracture system.
Many of these features, as defined gravimetrically, ignore indications or positions of mapped surface structures.

Preliminary consideration of the data suggests that the volcanic pile is made up of several large slices with basal detachments which generally dip to the south east. Subsidiary slices inferred to be thrust related are almost certainly present. The primary thrust stack inferred has been folded and the amplitude of folds affecting the volcanic pile may exceed 2 km. The entire thrust stack in the Chester-Pinnacles region has been pushed westward across the original basement-Dundas Trough margin by at least 3 km. The bounding structure is folded and ultimately extends north toward Mt Charter.
Thrusting and folding of the pile has produced extremely variable thicknesses or depth to pre-pile rocks which are presumed to be Precambrian basement of Tyennan type. Gravity data show that whatever underlies the pile must be siliceous and generally possess a bulk density of 2.67 t/cu m or less. The basement has been inferred to lie at depths between 500 and 2500 m east of the major basin boundary north west of Lake Rosebery. Devonian granites affect the gravity field in the south eastern portion of the licence but are not involved in any structures within the licence area.

The principal known mineralised sites within the area have also been assessed. Additional coverage around Chester indicates that previous workings lie on the north eastern side of a significant alteration zone and that any positive anomalous mass is further north east. Total anomaly relief, from alteration low to local high, is about 4.6 mGal. A similar pattern is ghosted in the Pinnacles region but the anomaly relief is only about 1 mGal.
In each case a similar pattern of anomalies can be traced by a series of images, such as might be produced by stretching or distortion of a single object, to the south east. In the case of Chester the original image - assuming that block motion has been from the south east - is much reduced whereas that in the Pinnacles zone is increased.

These observations may mean that the bulk of the Chester mineralisation occurs near Chester while the occurrences in the Pinnacles-Leo's Find area are merely samples stripped from a source 2 km away. The original vents for each each site or zone of mineralisation will, in each case, be separated from current exposures which will not therefore reflect or be associated with the sourcing fracture system. Each site, or anomalous trend, is associated with a NW-SE cross cut of the thrust stack and may be associated with a primary near E-W trend.

Most of the conclusions of the present study must be considered preliminary and should be supported by further infill of the coverage and more comprehensive analysis in the region of the possibly dislocated mineralised belts. This will be essential for proper location of blind targets for which there may be little surface expression. Any associated alteration will be concealed by the implied structures.

Preliminary interpretation has also exposed some anomalously low density sections within the volcanic piles south east of Leo's Find and west of Mt Sale. These cannot be explained by any known lithological variation within the piles, nor by any mapped alteration, even though the densities imply deep, localised alteration. Each of the largest sites recognised bears a consistent relationship to the known mineralisation at Chester and Pinnacles - they lie to the south east adjacent to the major NW cross cutting trend.

There is clearly scope for complete re-appraisal of mineralisation within the Burns Peak area given the preliminary conclusions. Previous exploration at both Chester and Pinnacles may well have been mis-directed and the alternate sites, down structure, must be investigated.
The results suggest that gravity methods, coupled with magnetic methods, are essential to any structural resolution and can provide the necessary guidance. Some further additional coverage is recommended near suspected alteration zones and sites of possible concealed mineralisation.

INTRODUCTION

EL 44/88, Burns Peak, is located north of Lake Rosebery in western Tasmania (Figure 1). It is less than 10 km north of Rosebery and includes the Chester and Pinnacles mineralisation.

Gravity and magnetic data in the area were reviewed by Leaman (1989). Results indicated that these data sets could reveal much information about structural setting and control within the area and further surveys were recommended. The regional data available were shown to lack resolution due to coarse station spacings (1 km) in the gravity case and line spacing or terrain clearance excesses in the magnetics case.

The new aeromagnetic survey designed to overcome these deficiencies has already been reported (Leaman, 1990).

Leaman (1989) concluded that the known mineralisation at both Chester and Pinnacles may lie near an old basin margin which had been concealed by westward movement of a thrust stack within the pile of Mt Read Volcanics. Elements of such a stack were not defined. It was also suggested that the volcanic cover on basement may be quite thin but this was not quanitified. Some major NW-SE, NE-SW and E-W trends were suggested.
Previous surveys have not been detailed enough to allow appraisal of the mineralised areas but there were suggestions of distortion in the gravity field near Chester.

This report describes the more detailed gravity survey proposed to assist resolution of these issues. It was intended that it form a supporting role for full appraisal of the magnetic data.

The principal aims of this survey were to
a) increase resolution of the location and relationships of any basin margin underlying the volcanics,
b) confirm gross structural relationships within the volcanic pile and any abnormal trend offsets,
c) define major structural trends or lineaments,
d) allow combined gravity-magnetic interpretation of pile structures,
e) confirm suggestions or presence of anomalous character in the mineralised areas about Chester and Pinnacles.

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

The work represents an evolution of ideas and interpretation from Leaman (1989) and models, not reported separately, presented to a joint venture meeting in late 1989. These models have been reproduced here as Figures 2, 3 and 4.
It is intended as a development, not a final statement, in order to contribute to immediate exploration needs and to indicate directions for, and possibilities of, further analysis.

GRAVITY SURVEY

SPECIFICATION

Leaman (1989) utilised extant Tasmanian data base information but was lacking in resolution for all specific purposes. The nominal 1 km station spacing was, however, able to define all primary structures and trends. Since the principal uses of the gravity survey were to provide structural information about the pile and to assess any anomalous character near the mineralised areas a general upgrading was essential. A modest improvement in coverage based on available access or previously cut lines was suggested overall with increased station density in the Chester Pinnacles area.
The general spacing was reduced from 1000 to 250 m in the mineralised areas and to perhaps 500 m where access permitted elsewhere.

The survey was to be barometrically levelled using the methods of Leaman (1984) but with control provided by any available surveyed sites, such as drill pads. This specification reflected the structural objectives of the survey.
The entire survey was to be corrected and reduced compatibly to state data base form so that all available data could be combined for review.

SURVEY

The survey was undertaken in three stages.

1. Around Lake Rosebery, by Highland Exploration, between April 7-8, 1990. Station numbers: 3300-3339. Meter: Worden 913 with scale constant 0.09598.
2 By Highland Exploration, between April 23 and June 10 using LaCoste meter G616 with scale constant 1.0198. Station numbers 3001-3228.
3 By Peko staff based in Rosebery, between June 25 and July 11 using LaCoste meter G586 with scale constant 1.0281. Station numbers 3243-3299.

All stations were tied to local bases (on state datum) at Tullah: 8051.9902, observed gravity of 980274.89 mGal, and Rosebery: 8051.9906, 980281.24 mGal (Richardson & Dix, 1986).

Most stations were established at levelled sites within extant grids and few elevations were barometrically determined. Most barometric determinations were rejected in any event due to failure to link base and roving barometers or cross tie control points. The latter factor is crucial to reliable measurements (see Leaman, 1984).

Loop duplications and links were adequate but rarely good for survey units 1 and 2. All problems could be traced to poor

operator technique and resulted in an overall drift-corrected precision in observed gravity of 0.05 mGal approximately. 0.03 mGal was achieved for unit 3. Most survey loops followed tracks or previously cut lines.

All stations were terrain corrected for a radius of 22 km using a refined Hammer graticule method. The corrections range from 0.3 to 9 mGal with a median value of about 0.9 mGal. The rare extreme values occur at ridge crest pinnacles. These values must be considered minima due to lack of operator notes about near station conditions. Few sites are thought to have been affected by this omission and all corrections were based on 1:10000 scale maps for inner zone calculations. All types of topographic features are associated with observed points and there is no bias toward valley or ridge sites.

The overall precision of the survey is estimated at about 0.1 mGal and reflects the provision of surveyed elevations for the most part. Most errors are related to meter readings, minor terrain correction uncertainties and, where relevant, to barometric levels - although only about 2% of the survey is affected in this way.

PROCESSING

All data has been reduced using a density of 2.67 t/cu m. This, coupled with use of the 1930 ellipsoid equation, yields full compatibility with the state data base. The density approximates basement density in the region.

The Bouguer anomalies have also been compensated for crustal or gross continental sources using the method of Leaman & Richardson (1989) - essentially a rigorous isostatic correction. The method allows adjustment of individual stations and provides a true residual Bouguer anomaly. Only upper crustal sources are retained in this data set.

No other data processing is implicit in either Bouguer or residual Bouguer anomaly compilations; both are reproducible and free of any interpretive bias.

DATA PRESENTATION

Compilation of all available data in Bouguer anomaly form is provided in Map 1 (at 1:20000) (and Figure 6 at 1:50000). All station locations are shown.
Residual Bouguer anomalies are provided in Map 2 (1:25000) and Figure 7 (1:50000).

All data have been tabulated in Appendix 1.

COMPARISON WITH PREVIOUS DATA

The previous available regional residual Bouguer anomaly assessment has been reproduced as the base in Figure 5. This presentation included the effect of the mantle but excluded the effect of ocean water - or about 1 mGal overall. The general forms are recognisable and comparable with those shown in Figure 7. The contour interval is identical.

The original survey can be seen to have provided a reasonably reliable view of the gravity 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 may be noted along the entire length of the westernmost belt of the volcanics within the licence area. Additional definition north of Lake Rosebery within the centre of the area is also evident.

The detail afforded by the 250 m nominal coverage near the mineralised sites is clearly valuable (below). There is clearly scope for further improvement and the following discussion considers the implications of the present upgrading and whether other areas might benefit.

Character correlation of the older data was used to suggest two large sub E-W alteration corridors (approx 5381 000 and 5385 500 mN) while the relatively abrupt change from values of about -2 mGal to +4 mGal which does not correlate with the volcanics in any way was used to suggest a major underlying basement or basin junction. Preliminary study suggested Precambrian basement at moderate depth.

FEATURES OF THE GRAVITY FIELD

Consider the residual anomalies (Figure 7, Map 2).

Several major elements may be recognised.

1 A N-S zone of positive anomalies dominates the area west of 377 000 mE and is associated with rocks of the Crimson Creek Formation, Dundas Group and undifferentiated Precambrian (see Figure 7B and Corbett & Mc Neill, 1986).

2 A marked N-S gradient extends from a point a little west of the Bastyan Dam to the west of Burns Pinnacles. There is only partial correlation of this effect with mapped boundaries and it intensifies within the Dundas Group rocks north of Pinnacles.

3 A primary NE-SW gradient extends from about 374 000 mE, 5376 000 mN through Chester and toward Boco. The intensity of the effects diminishes toward Boco and is best developed between

Lake Rosebery and Mt Black. This grain is hardly reflected in extant mapping south of the lake but there are suggestions of it north of the lake. The railway follows a valley cut close to this trend.

4 The N-S and NE-SW patterns enclose a wedge which is open to the north and which includes a variety of materials at surface; volcanics, and Dundas Group N and NE of Leo's Find.

The general relationships suggest that the origin of these features lies beneath the exposed and mapped rocks.

5 A NE-SW gradient extends across the Tullah area and this can be associated with the Henty Fault Zone and the Granite Tor Granite. The sharpening gradient south of Tullah reflects nearness of granite.

Most other patterns are unexpected.

6 E-W trending features are evident at about 5379 000, 5383 000 and 5385 500 mN. The continuity of some of these features has not yet been established but the first two listed appear to extend across the entire area while the third is only indicated east of 380 000 mE. The definition may be approximate and may reflect data coverage.

7 The gravity field is generally negative and quite uniform across the expanse of volcanics between Mt Block and Mt Black. There is minor variation between 0 and -3.5 mGal but a large platform effect is evident. These values are not consistent with volcanic suites whose bulk density exceeds both the Bouguer assumption and nearby basement rocks.

8 The gravity field steps down to the south near Lake Rosebery and platform values of -2 mGal become at least -6 mGal. The change corresponds with Lake Rosebery and the significant negative values lie on Mt Black. Although the data coverage on this part of Mt Black is not good the result is unexpected if the mountain is presumed to consist of a thick pile of volcanics, or to be underlain by substantial andesitic units. The effect is not consistent with either of these options.

9 Strong local positive effects occur adjacent to the Henty Fault Zone north and south of Tullabardine Creek. These are consistent with thick pods of volcanics but are spatially restricted.

10 Repeated anomaly nose patterns occur SE of both Chester and Pinnacles mineralised areas. E.g., 378 800, 5381 000 to 380 000 mE, 5380 000 mN and 379 000, 5385 000 to 379 800 mE, 5383 400 mN. Each pattern consists of a negative element to the SW and a posite element to the NE.

11 Several NW-SE trends are also visible. These can be identified near the nose patterns noted above but do extend, if subtly, across the entire licence area.

PRELIMINARY INTERPRETATION

The discussion provided here is intended as an outline of the possible application and significance of the available gravity data and is a considerable advance on any previous analysis.

It must be stressed, however, that in this complex area the present work is indicative only and much refinement and detailing - both in terms of augmenting survey and analysis - will be required before an acceptable appraisal can be established. This report offers ideas and suggestions of possible future directions.

The preliminary conclusions and anomaly presentations defined will be combined and compared with preliminary magnetic analysis in another report in order to assess the implications of data acquired in the first part of 1990. This integration will guide the 1990-1 exploration season. Each data set has been considered independently initially in order to test the kinds of solutions implied from the individual viewpoint of the particular data set.

This interpretation is in two parts; consideration of the gross origin of the features of the field as described above, and assessment of possible anomalous character in areas known to be mineralised.

The more regional aspects of the gravity field have been assessed by basic modelling of a profile array of seven lines (Figure 8). This set is the minimum necessary to establish any patterns or conclusions but is insufficient for reliable definition of specific elements. The two dimensional methods used should be replaced by 3D methods for specific feature review.

LINE 1. (FIGURE 9)

This line extends SE across the licence area and samples most of the principal gradients.
Examination of the form of the observed profile suggests that it results from two primary sources; the granite to the south east and a dense sequence to the north west. The effect of the positive contrast is evident about mid section after the granit effect approaches an asymptote of about -3 mGal. Rapid thickening of either the volcanics or the underlying rocks, or both, occurs west of this point (approximately the railway). The disposition of surface materials demonstrates that the bulk of the positive effect is sourced in Dundas Group rocks or other materials which lie west of the Rosebery Fault (as mapped by Corbett & McNeill, 1986).
It is possible that a thinned version of the Dundas Group underlies the volcanics at Burns Peak but gravity data alone cannot distinguish such materials. Gravity methods can only

suggest the probable total thickness of material of elevated density with respect to the less dense section beneath. Note that the residual anomalies do not allow any inclusion of basement rocks which might raise the bulk density much in excess of 2.67 t/cu m. Some limits may be imposed upon the contrasts to be employed by the presence of granite whose bulk density is not significantly disputed and by property measurements from the volcanic pile which suggest that the suite must possess a bulk density of no less than 2.73 or 2.74 t/cu m. Since the volcanics exist, are exposed, and must be included in the models their very presence at the nominated density means that the rocks beneath must be very siliceous. The only significant ambiguity in this, and other models, attaches to the presumed thickness of volcanics since the bulk density of the underlying rocks is not known with certainty and thus the mass balance is uncertain. The likely error is unlikely to exceed more than a few hundred metres and the inferred shape of the structures is unaffected by any such assumptions. These issues will probably be settled and controlled by the first hole to penetrate the volcanics.

The dense section to the west may include correlates of the Oonah Formation and there are suggestions that the Dundas Group sequence is marginally less dense. The shape of the sequence fill and its structuring cannot be established by simple modelling but is grossly suggested in Figure 9.

The form of the base of the volcanic pile is approximate and may be composed of slices, as shown, or by curved fold-like forms where the total thickness is similar.
The model includes the faulted Ordovician section east of Tullah and the Granite Tor Granite as projected into this area. Assumptions about the granite seem reasonable but a more detailed model of this granite might assist detailed review of the SE quadrant of the EL.

The most interesting aspect of this profile occurs near the railway line. The anomalies are relatively negative and no form of folding or faulting can explain this if the feature is presumed to originate at the interface between basement to the pile and the pile itself - the contrasts are insufficient - and the volcanics are continuously exposed. An additional source must be presumed. Various styles of solution are offered for this problem throughout the model set but in all cases a significant volume of low density (<2.60 t/cu m) is required. This cannot be related to granitoids since the volume is always too narrow or depth limited and therefore incompatible with stock forms.
The particular low density feature sampled by this profile lies at 379 500 mE, 5383 000 mN and is at the south-eastern most extension of the Leo's Find nose pattern. Is it due to massive alteration deep in, or beneath, the volcanic pile? The overall anomaly distribution is not well defined in this zone since this area was thought to be too distant from the mineralised areas.

LINE 2. (FIGURE 10)

Line 2 displays many of the elements of line 1 but all are of lower contrast. The possible relationship between volcanics and Dundas Group is suggested near the western end of the profile. Gravity methods, as noted above, cannot unambiguously distinguish volcanics and Dundas Group. The non volcanic rocks rapidly thicken westward. The volcanic pile, though probably faulted and folded, is rarely more than 1000 m thick.

Note that all profiles are fitted using neutral curve fit parameters and are internally consistent as an array. This means that they offer a possible and realistic solution compatible with the requirements of a true residual data set.

LINE 3. (FIGURE 11)

This N-S line samples the broad shelf of anomaly south of Boco where volcanics are widely exposed. The change of gradient due to approach of the granite is evident. Minor effects or variations in the profile can be associated with local variations in the volcanics although these have yet to be mapped, or modelled.

The model suggests a large slab of volcanics within this zone north of Lake Rosebery and very rapid thinning south of it onto Mt Black. This is required independently of any effect induced by the granite.

LINE 4.

No diagram is included due to modelling problems caused by the lateral influence of the distant granite and the acute intersection with all sub-volcanic structures. The latter are not consistent with 2D modelling assumptions.

LINE 5. (FIGURE 12)

Modelling of line 5, as presented in Figure 12, may be compared with that of Figure 4 which provides a more regional perspective. The general characteristics of the profile are satisfied by the models but that of Figure 12 has received the benefit of the new data. High relief effects, due to variations within the Dundas Group or the volcanics have not been assessed specifically.
Note that the mapped limit of the volcanics in the northern part of the section are not distinguished in any way and that the data merely reflect the total thickness of the Cambrian rocks.

The sharp gradient and relative negative anomaly near 5382 000 mN, however, if of particular interest (near intersection with line 1). This pairing of features can only be explained by a

juxtaposition of positive and negative contrasts.
The local volcanics, if the source, must include materials with density in excess of 2.81 t/cu m and also much less than 2.61 t/cu m. The gradients, though imperfectly defined, also suggest that the contrasts apply at quite shallow depths. Possibly, but not necessarily from surface. The volcanic pile must be thin in any event in this region.
The figures suggests a zone of massive alteration. The volume shown must be the minimum possible.

LINE 6. (FIGURE 13)

Line 6 illustrates some of the issues related to modelling of non N-S or NW-SE lines. The observed profile has been affected by the distant granite but this does not appear in the section. The effect of the granite, as determined by profiles generally normal to the granite, has been calculated for this line position and removed. Between 2 and 4 mGal adjustment was required along the line. The adjustment was not linear.

Modelling of the corrected profile is shown. The section intersects the Chester zone and the anomalous local character is evident. The profile minimum occurs near the intersection of lines 1 and 5 in the zone inferred to contain very thin volcanics or some significant alteration product, or low density sequence. This profile suggests that a fit is possible with negligible thickness of volcanics.

The low anomaly zone also corresponds with onset of the rapidly thickening Cambrian section which is ultimately exposed to the west beneath the edge of the volcanic pile. The pile also thins toward Mt Block.

LINE 7. (FIGURE 14)

This profile samples the major anomalies west of the volcanic pile and the largest negative effect within it - west of Mt Sale on Mt Black.

The model suggests that the volcanics are generally thin and probably folded. Local thickening east of Mt Sale is distinguished as a residual effect contrasted against the more regional granite-induced reponse.

The major positive anomaly west of the licence area is associated with a very thick Dundas Group, or similar, sequence. The limit of this sequence lies at least 3 km east of the outcrop limit of the volcanics.

The anomalous character on Mt Black has been modelled by a large column of low density material. This is shown extending to the surface but this is not established by present data or modelling. The effect can not be explained by simple thinning of the volcanic pile only.

The gross implications of this analysis have been summarised in Figure 15. While the present work allows deduction of possible thrusts or folds - or combinations of these - there seems little doubt that the Mt Read Volcanic pile is locally very thin (< 1 km) and that its faulted NW margin reflects a displacement westward across Dundas Group rocks. This interpretation suggests that most of this displacement has occurred in the zone SW of Boco Siding and is maximised near Pinnacles. Gross trends are also indicated. Most motion has been from the SE and all thrust slices have been folded.

An important zone involving both the old basin margin (?) or edge of basement, and more recent dislocation lies near the route of the railway between Lake Rosebery and Boco. This zone includes the mapped nick point on the Rosebery Fault at Bastyan Dam.

Additional detail could be extracted from the available data but full benefit of such effort depends on examination of exposed volcanics in anomalous areas in order to provide some control.

The crucial anomalies appear to be the sizeable negative effects, as on Mt Black and near 380 000 mE, 5382 500 mN. These cannot be explained structurally with current control and information and may not be due to geometric forms. Associated gradients are too steep to be associated with likely basement materials. Granites cannot provide suitable sources. Structural emplacement of the only rocks of suitable density (Ordovician) is not feasible and would be too localised. The only reasonable explanation would appear to be deep seated alteration columns which extend at least to the base of the volcanics.

If these features do reflect alteration then the association with major lineaments may be significant. The Chester effect (378 300, 5380 400), the near railway effect (380 500, 5382 500) and the SW Boco effect (382 400, 5385 300) are aligned along or near, and certainly parallel, the concealed structure which marks the junction between shallow basement, thin Cambrian (all types) and thick Cambrian sequences. All three are associated with subtle but recognisable NW-SE trends and much more definite E-W features (approx 5379 500, 5382 700 and 5385 500 mN). All comments are made within the general resolution of the data distribution.
Other lesser features may be present at 381 500, 5381 500 and 383 500, 5383 500. An ill defined feature near 377 400, 5379 500 may be of the same type - and would fall on the same trend as the well defined features. A smaller feature of this type may occur at Bastyan Dam. The anomalous structure on Mt Black near Mt Sale may have a geometric explanation but more data would be required to confirm this.
Clearly all sites should be inspected although there is no extant evidence that surface exposures in any way account for the anomalous character observed. It is more likely that the gravity field is responding to more significant but concealed changes, here inferred to be due to alteration.

MINERALISED SITES

The gravity field in the region of Chester is shown in Figure 16. Chester Mine is located about midway between a rib of positive anomaly and a very localised negative effect. Both features are defined adequately although there is scope for more control east of Chester.
The abrupt negative effect is located within the mapped alteration zone at Chester but the positive effect lies east of most known information in an area which includes porphyry to the south but is till covered elsewhere. There is no evidence that the response is related in any consistent way with the occurrence of porphyry nearby. The anomaly pattern is consistent with a true mineralisation response, with alteration to the west and the main target mass to the east.

The Chester pattern is repeated about 1 km to the south east but in subdued form. The alteration response equivalent is of lower amplitude and the change may indicate less mass and alteration or increased depth of burial. The more subdued response, centred at 380 000, 5380 000, is closer to the primary lineaments.
The pattern of anomalies is consistent with effects to be expected if a single mineralised site were sliced from the south east and a significant part were translated to the north west.

A contrary view is presented near Pinnacles (Figure 17). The subtlest pattern is repeated near Leo's Find where mineralisation is known but the principal effect is near 380 000, 5383 150. There is scope for considerable improvement in definition of these effects. The pattern is again consistent with slicing and translation of a single deposit to the north west but the present compilation would suggest that more of the target has been left at the original site than has occurred at Chester.
These sites and concepts must be further explored and tested.

The gravity field and its patterns in the Pinnacles area is not affected by any mapped surface distribution of distinct volcanics and the possibility of confusion, which requires clarification at Chester, is unlikely. There is no correlation between the lobe anomaly forms and the andesites, for example, as might be expected. Further definition of the forms is advised however.

Alteration has also been noted near Farm Creek. Insufficient data are available in this area to make substantial judgments but a relative negative feature has been observed nearby and the alteration is at the approximate northing of the southernmost major E-W lineament. The general correlation with a local but sizeable negative anomaly may well establish the validity of the alteration suggestions made above.

CONCLUSIONS AND RECOMMENDATIONS

Improved gravity coverage of the Burns Peak area has confirmed the general conclusions based on regional data and generally sharpened the structural information base. The data is able to suggest fold and thrust patterns but the present coverage and analysis is not yet extensive enough for detailed definition. A very complex structural regime is indicated and the volcanic pile is no longer a coherent simple mass.

The western front of the volcanic pile has been structurally displaced to the west by several kilometres and has disguised or concealed a major boundary between inferred Precambrian basement and Cambrian sequences. The pile rarely exceeds a thickness of one kilometre on the basement shelf.

Detachment structures have controlled the distribution of many segments of the pile and most movements appear to have been from the southeast. Re-arrangements of the volcanics has confused past exploration and complicates evaluation of the pile for targetting purposes.

These issues are demonstrated in both the Chester and Pinnacles areas. At Chester there is evidence of a negative anomaly associated with mineralisation and alteration and a positive anomaly is present nearby which does not appear to have a simple lithological origin. The pattern is reproduced more subtly to the south east.

At Pinnacles the images are reversed and the gravity field indicates that the exposed mineralisation is insignificant. The stronger anomaly image is concealed to the southeast.

Both sites, and responses, imply northwesterly movement and perhaps slicing of a mineralised vent zone. Such a conclusion would mean that past and current exploration has been misplaced and that the targets are concealed and south east of each site. The zone northeast of the Chester Mine, where the anomaly peaks, must also be reviewed.

These relationships suggest that exploration cannot be advanced in this region without sound understanding of the structure at all scales.

The possible implications of anomaly character observed at or near both Chester and Pinnacles are such that the gravity coverage must be further improved. Anomaly forms and locations must be crystallized. Similar infill may be justified near Farm Creek.

Extant drilling information should be compiled in order to check geological assumptions, and especially the nature of rock properties within the unaltered and altered volcanics. Any hole near the paths inferred to map the detachment deformations of mineralisation must be reviewed.

The present interpretation is preliminary and should be integrated with magnetic interpretation before any further analysis is undertaken. There is clearly scope for such analysis.

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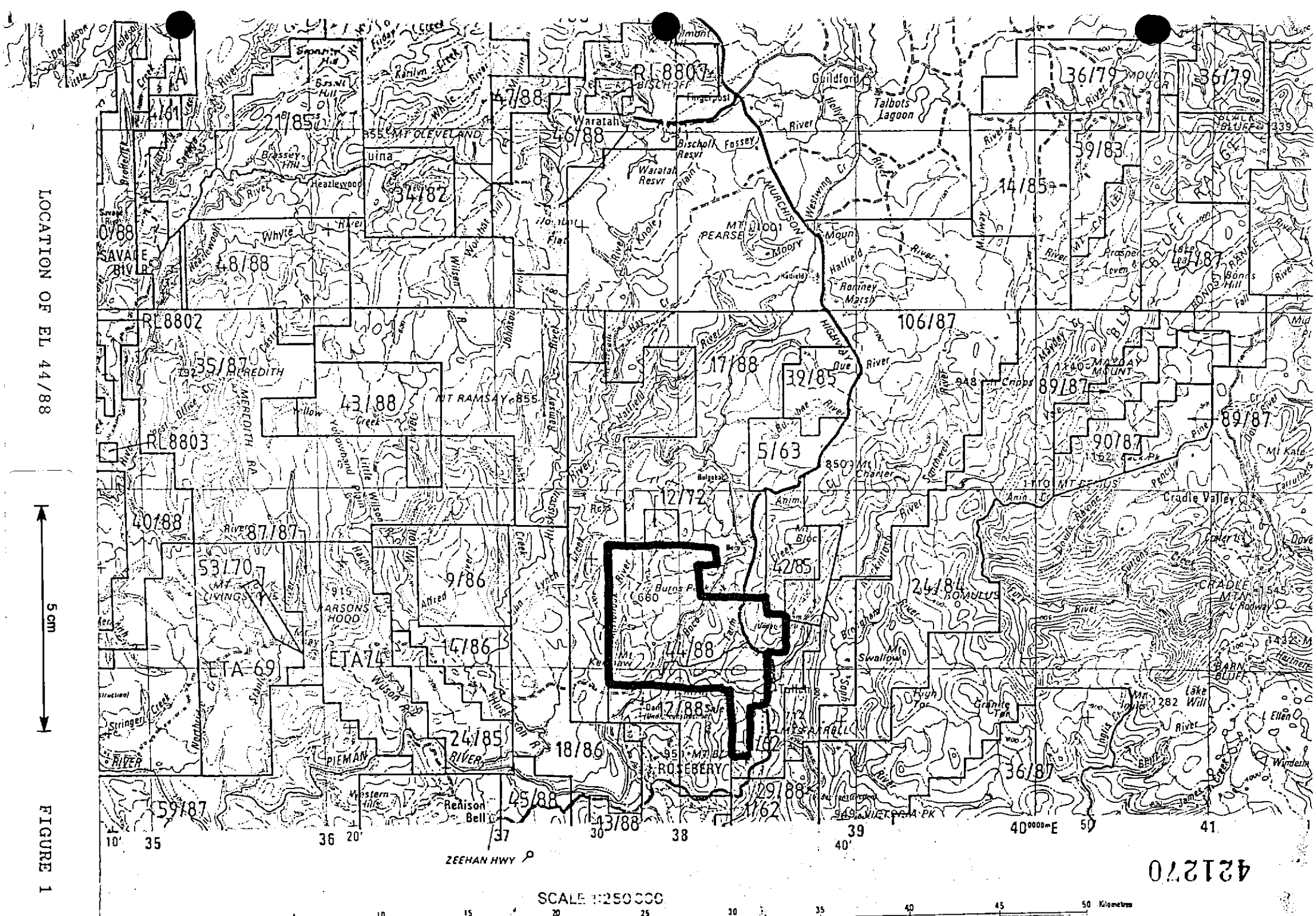
421269

Report submitted on behalf of
Leaman Geophysics
by

D. Leaman

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

27-Aug 90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MT OLEVELAND
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BISCHOFF
Talbots Lagoon
Waratah
Waratah Resvr
Bischoff Fossey Resvr
Rainey Marsh
Cradle Valley
MT ROMULUS
MT CRADLE
BARN BLUFF
Lake Will
Lake Lea
Lake Ellen
Pieman River
Meredith River
Murchison Hwy
Hellyer River
Arthur River
Wilson River
Franklin River
Henty River
Que River
Crotty
Zeehan
Dundas
Renison Bell
Western Hills
Mt Charter
Mt Block
Mt Kelly
Mt Kaye
Mt Ida
Mt Jukes
Mt Sedgwick
Mt Murchison
Mt Owen
Mt Donaldson
Mt Dundas
Mt Heemskirk
Mt Youngbuck
Mt Read
Mt Lyell
Mt Huxley
Mt Farrell
Mt Black
Mt Kate
Mt Pencil Pk
Mt Victoria Pk
Mt Bluff
Mt Lorne
Mt Ellen
Mt Windsor

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LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 30000 1000

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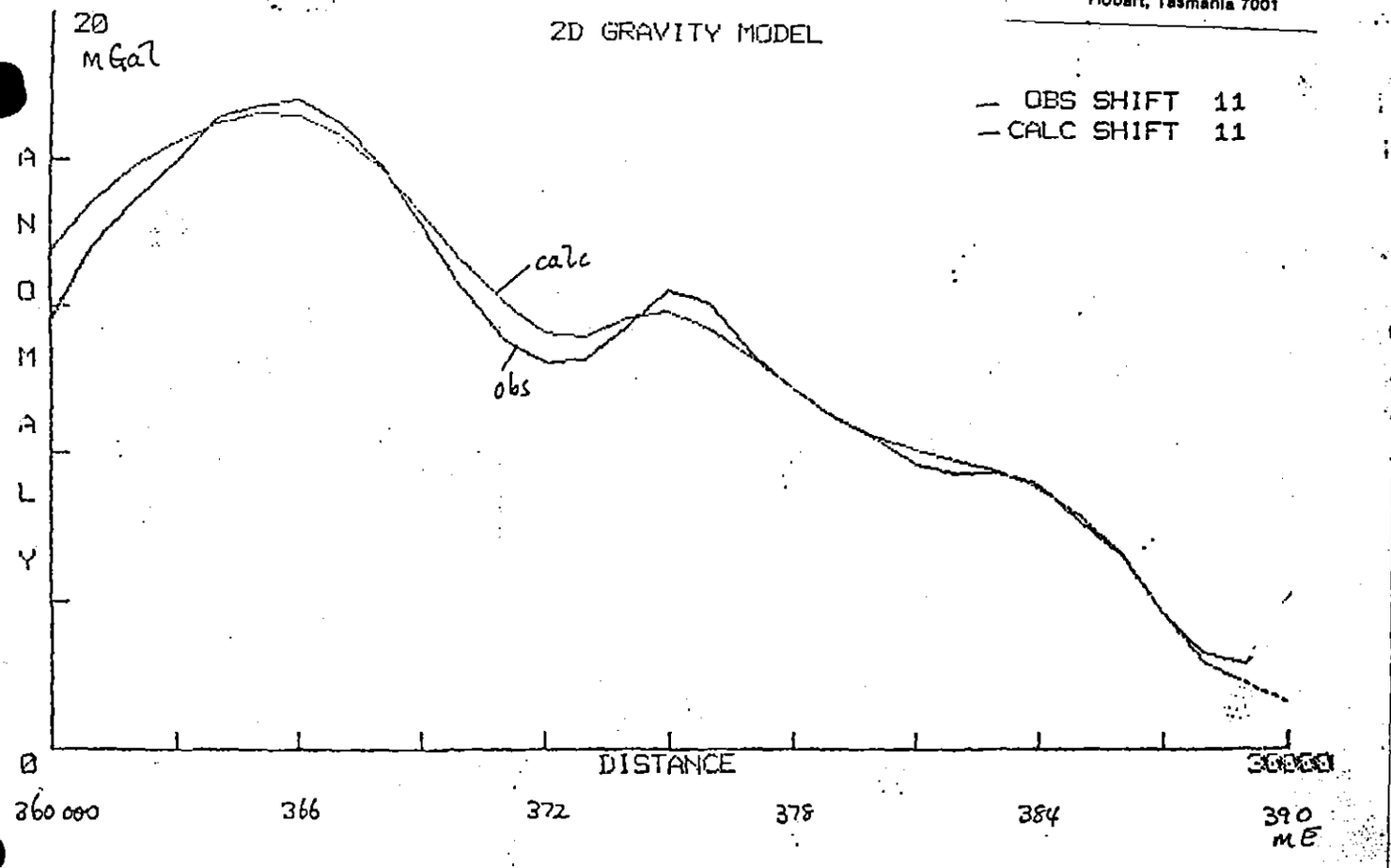
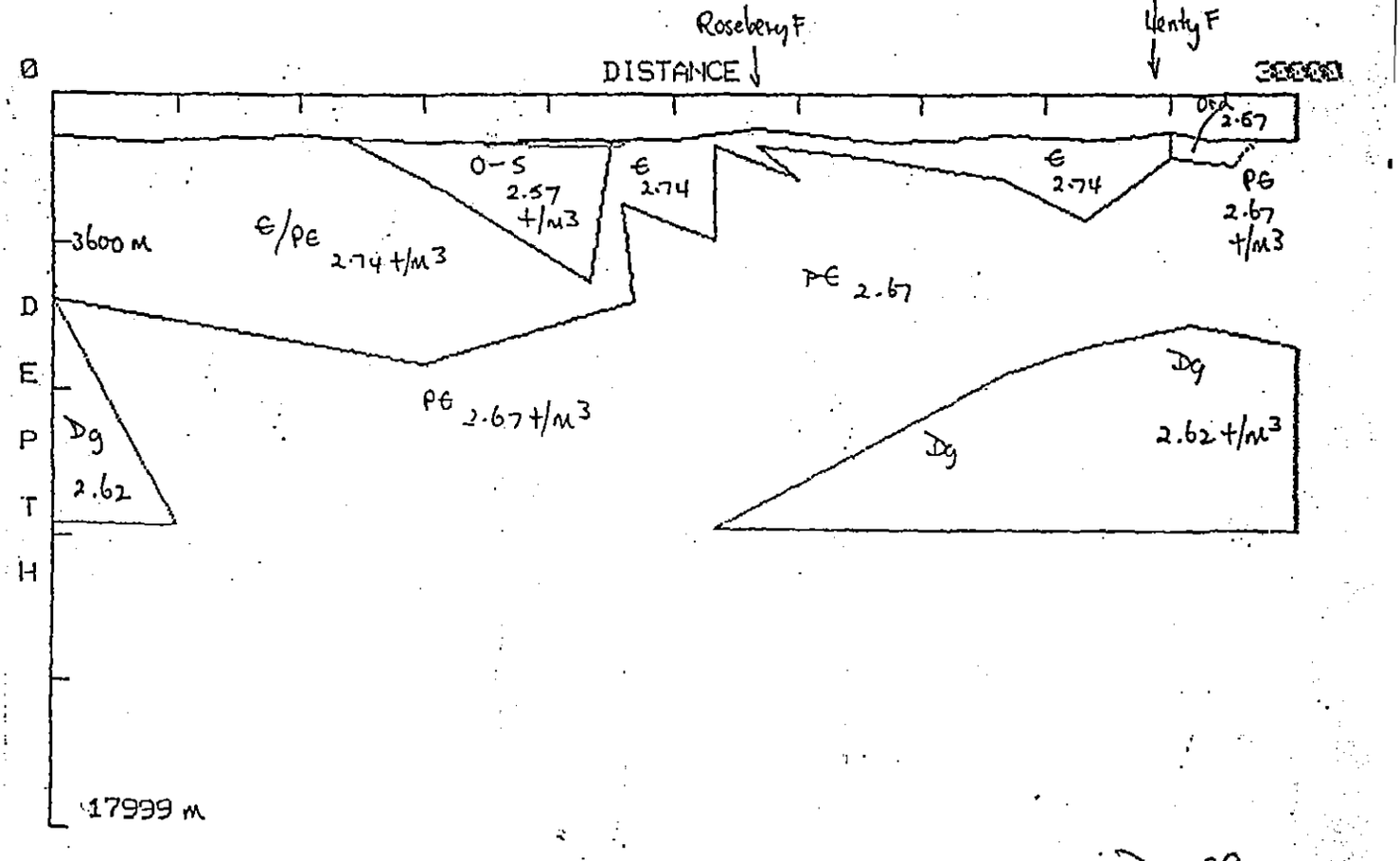


ROSEBERY REGION 5380N 360-390E 1275M REFERENCE



Dec 89

2D REGIONAL GRAVITY MODEL 5380 000 MN FIGURE 2

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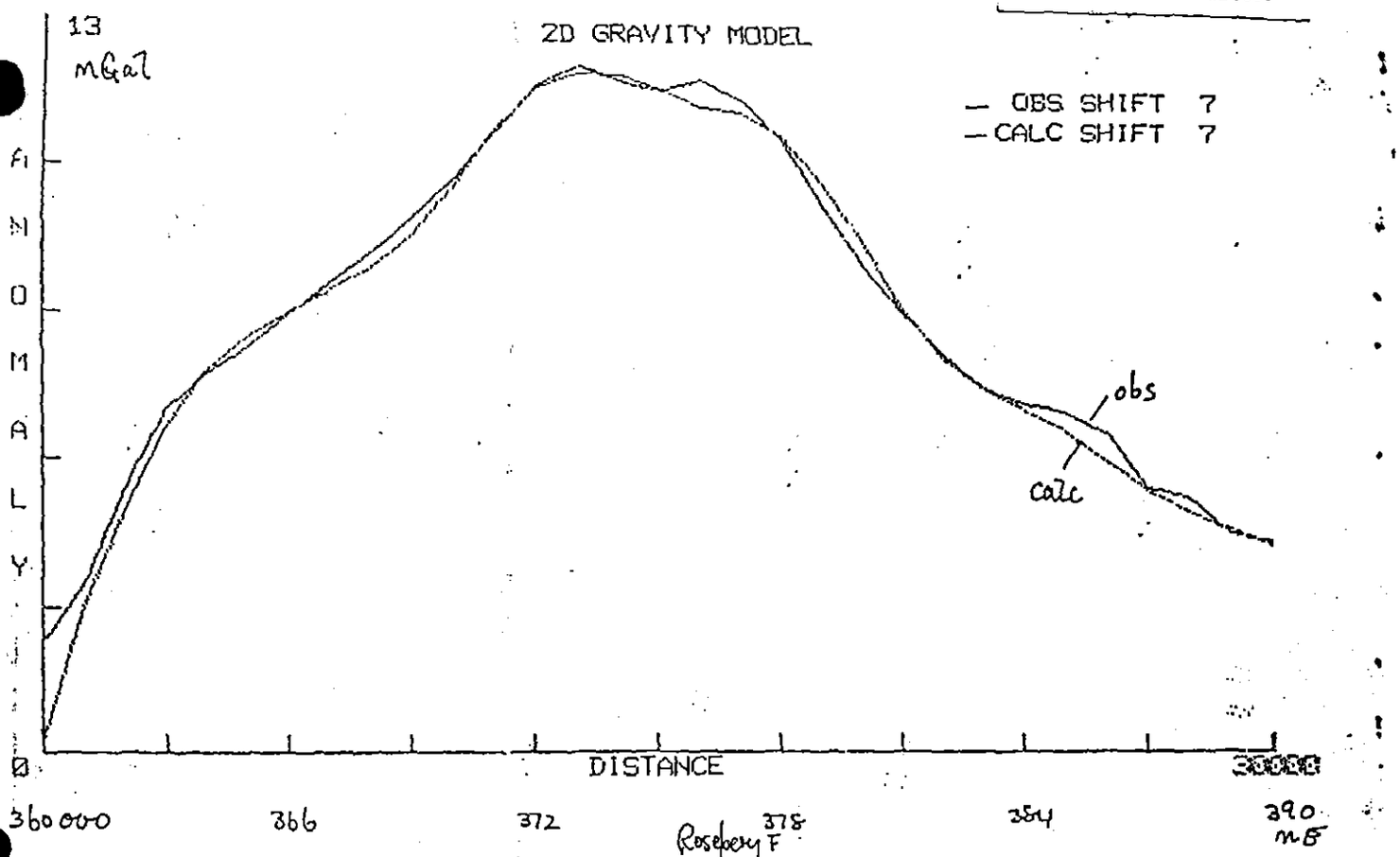

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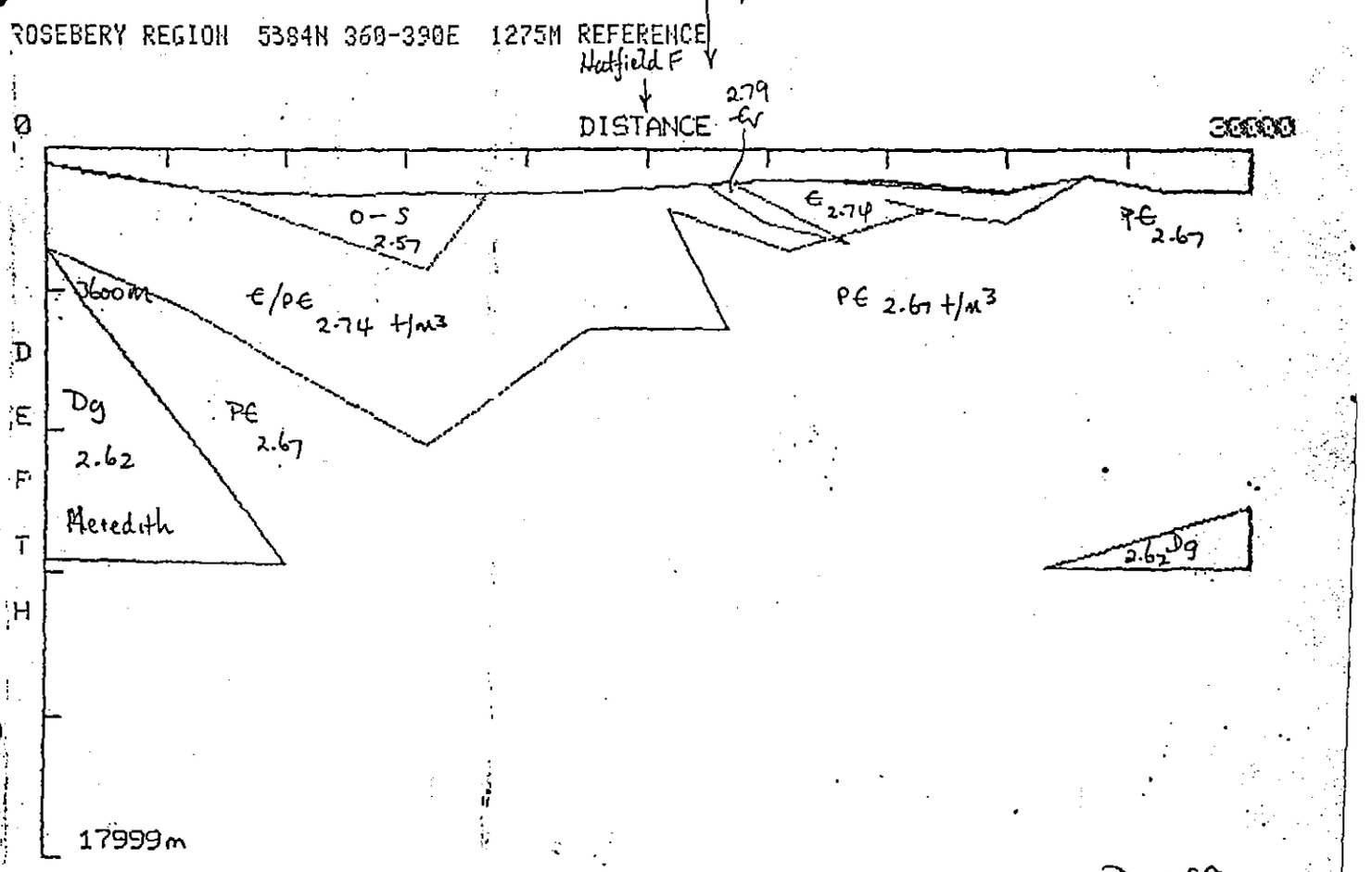

Dec 89

2D REGIONAL GRAVITY MODEL 5384 000 MN FIGURE 3

LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 50000 1000

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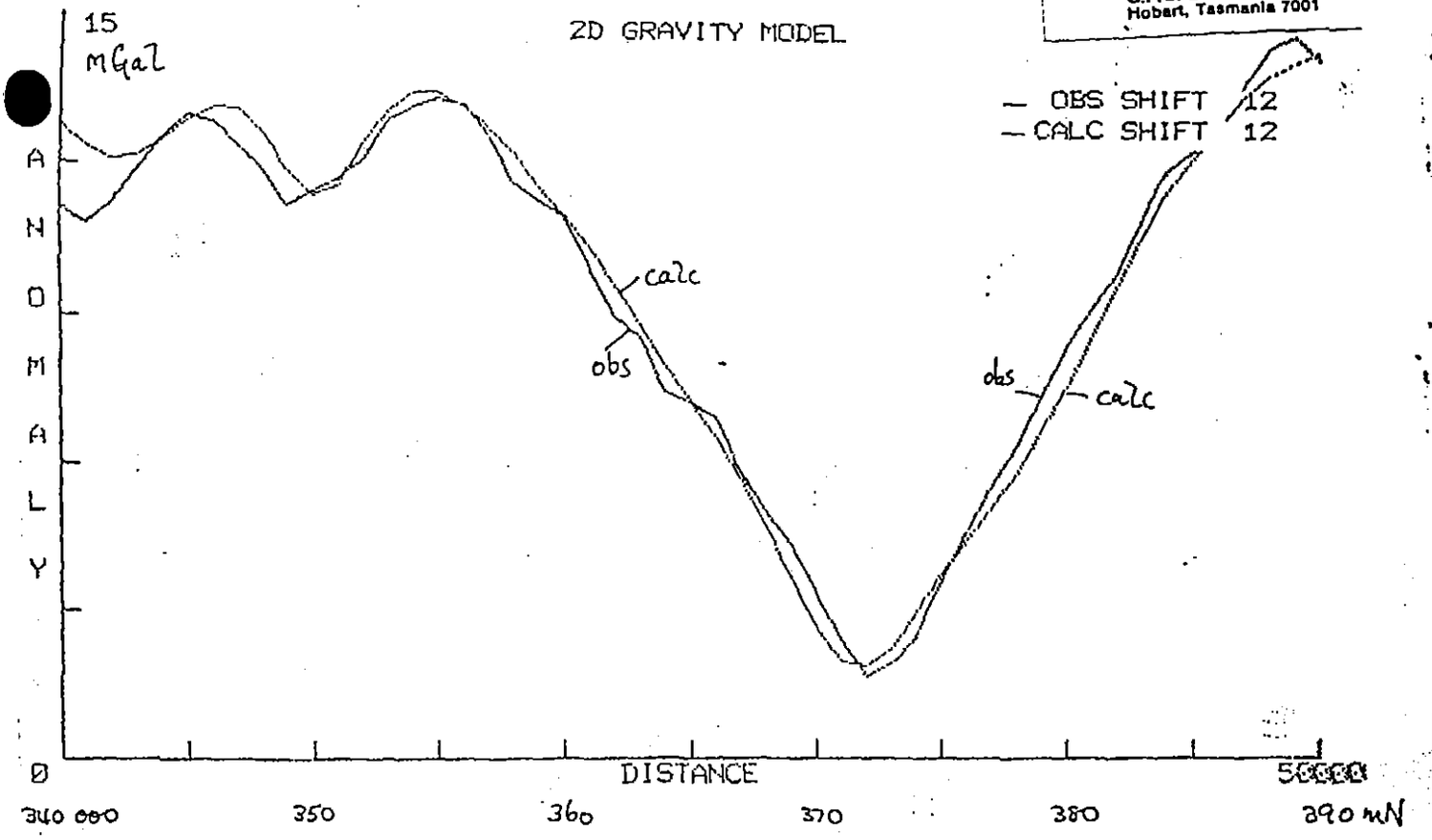
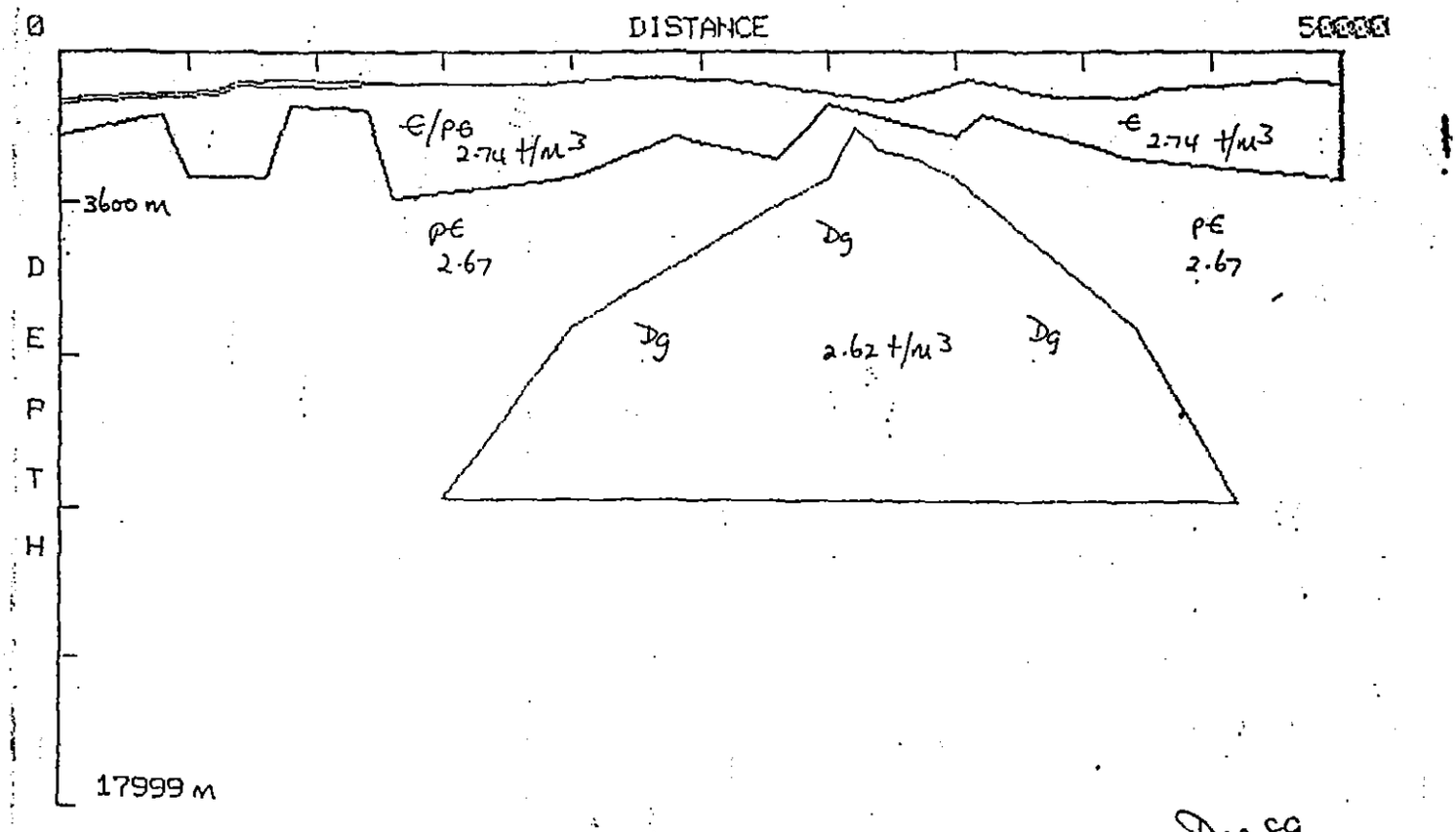


ROSEBERY REGION 380E 340-390N 1275M REFERENCE



Dec 89

2D REGIONAL GRAVITY MODEL 380 000 ME FIGURE 4

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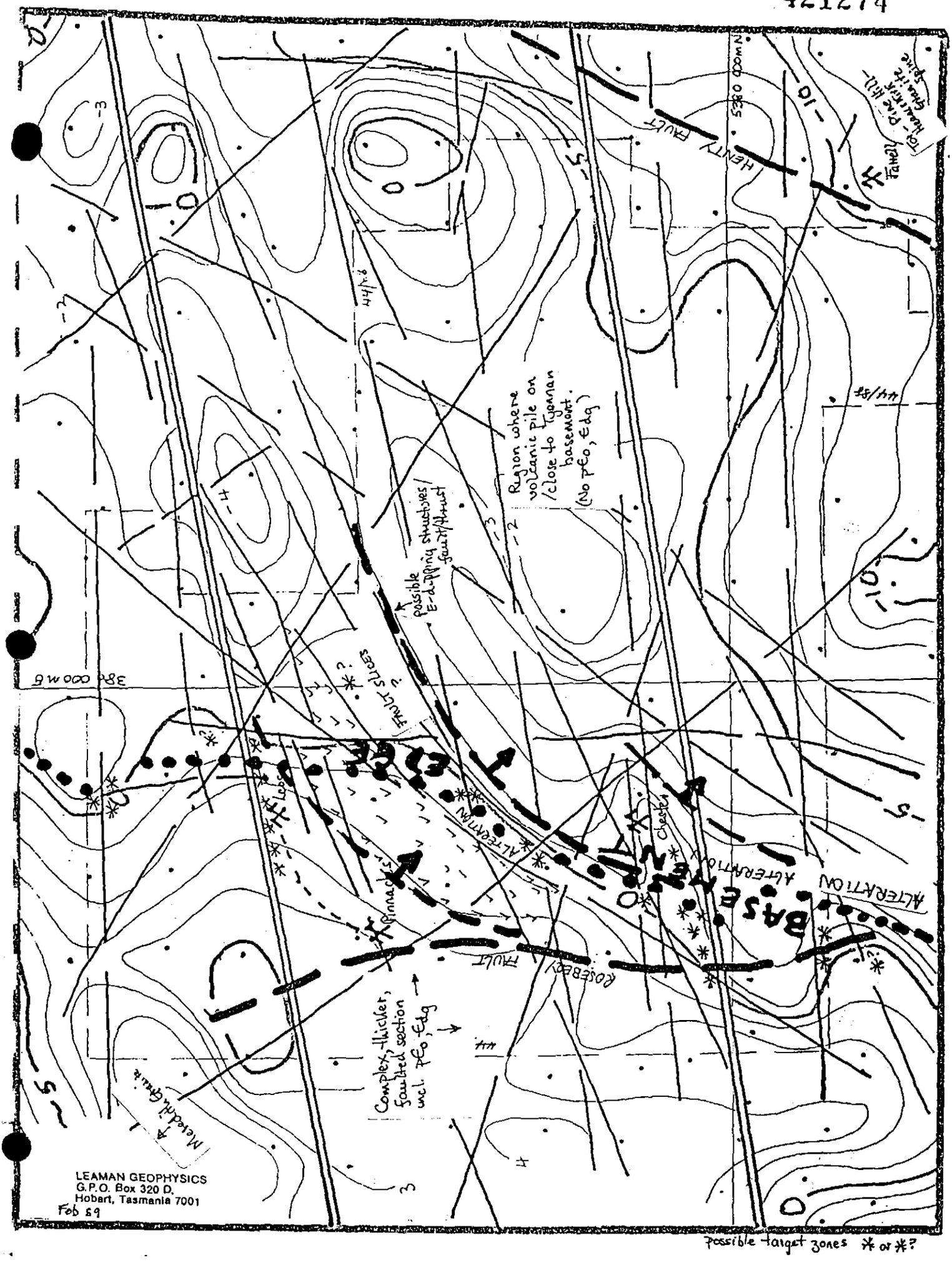
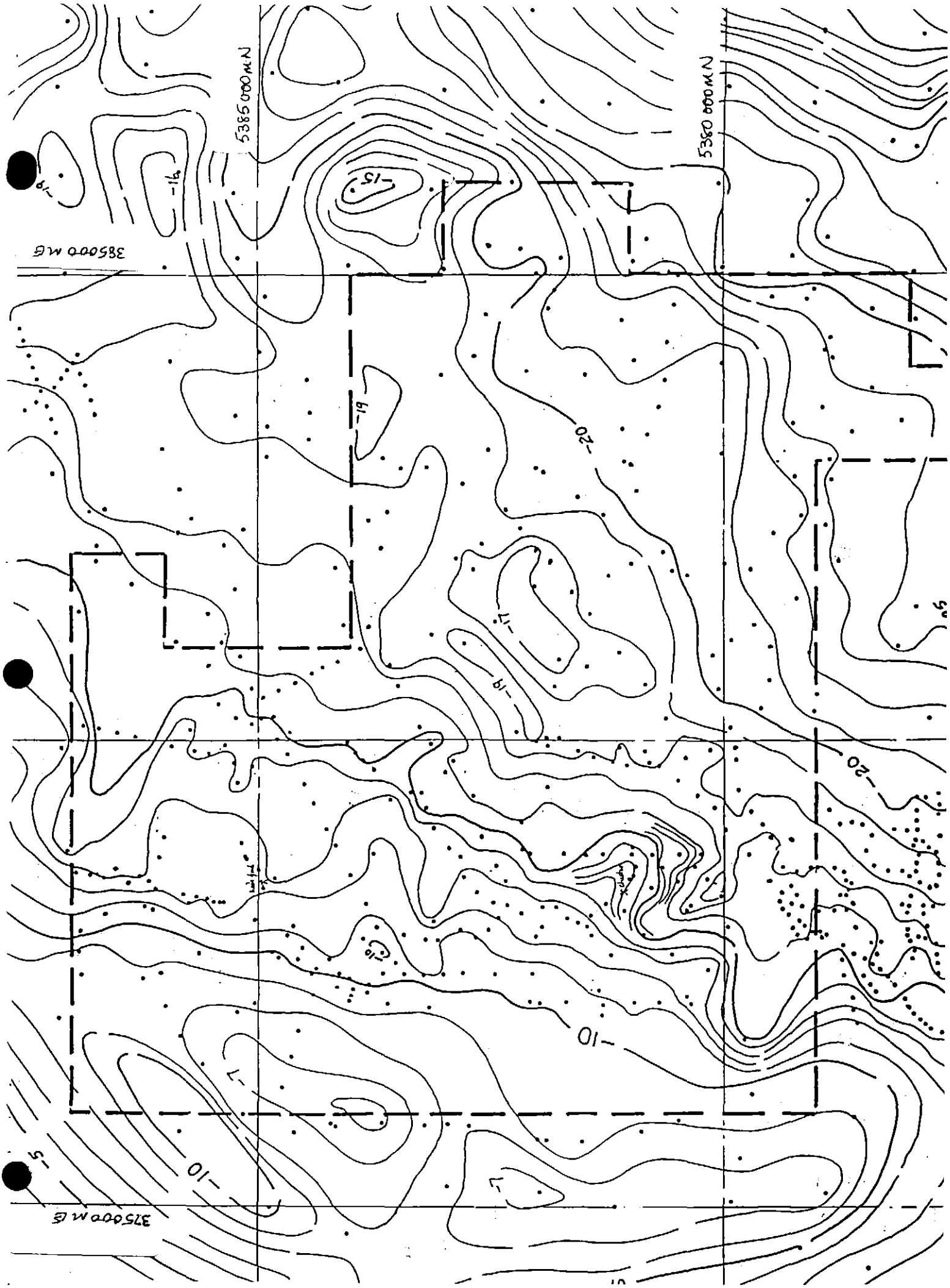


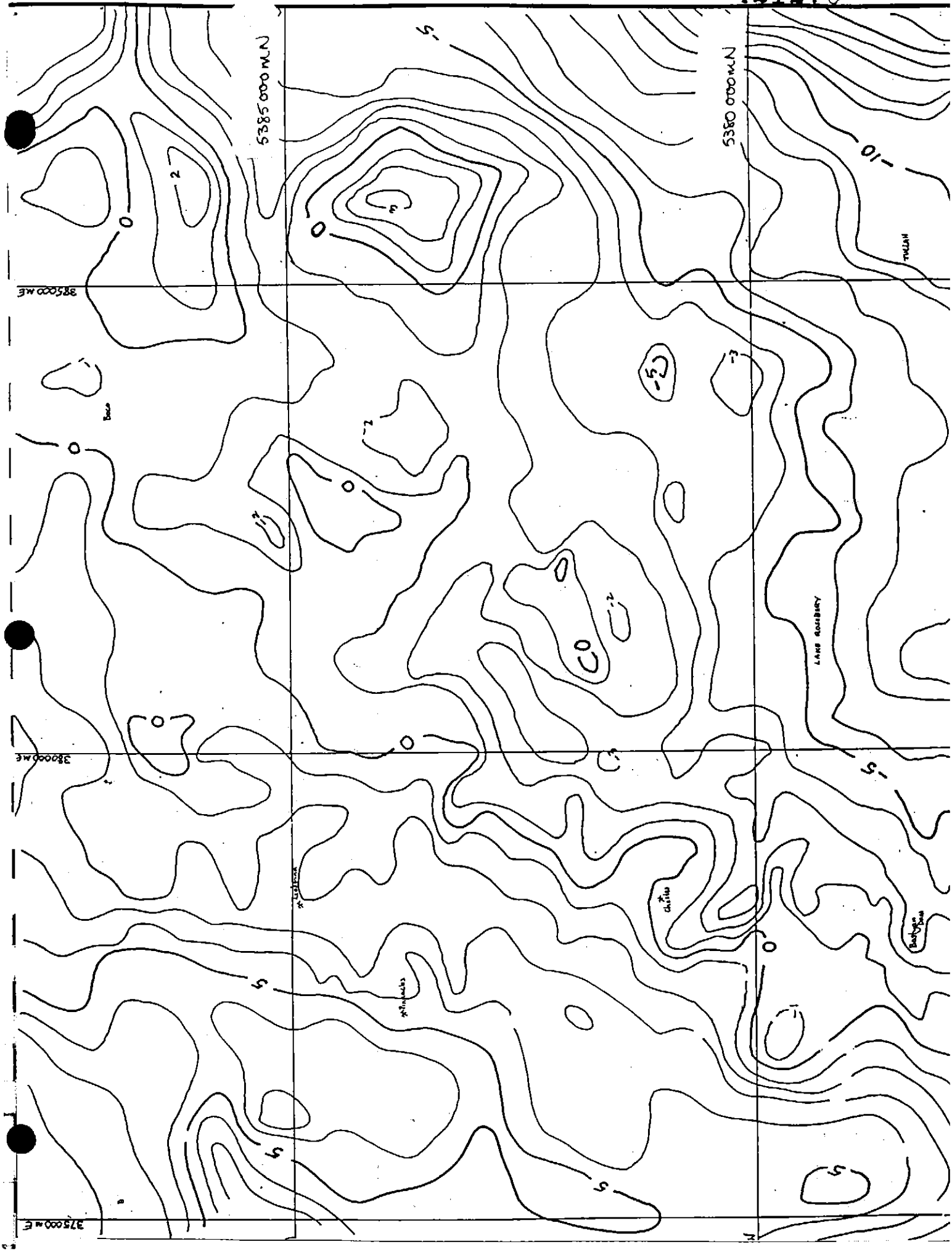
RESIDUAL BOUGUER ANOMALIES AND INTERPRETATION SUMMARY
FIGURE 5

Feb 89



BOUGUER ANOMALY 2.67 t/cu m EL 44/88 FIGURE 6
(cōntour interval 1 mGal) See also map 1

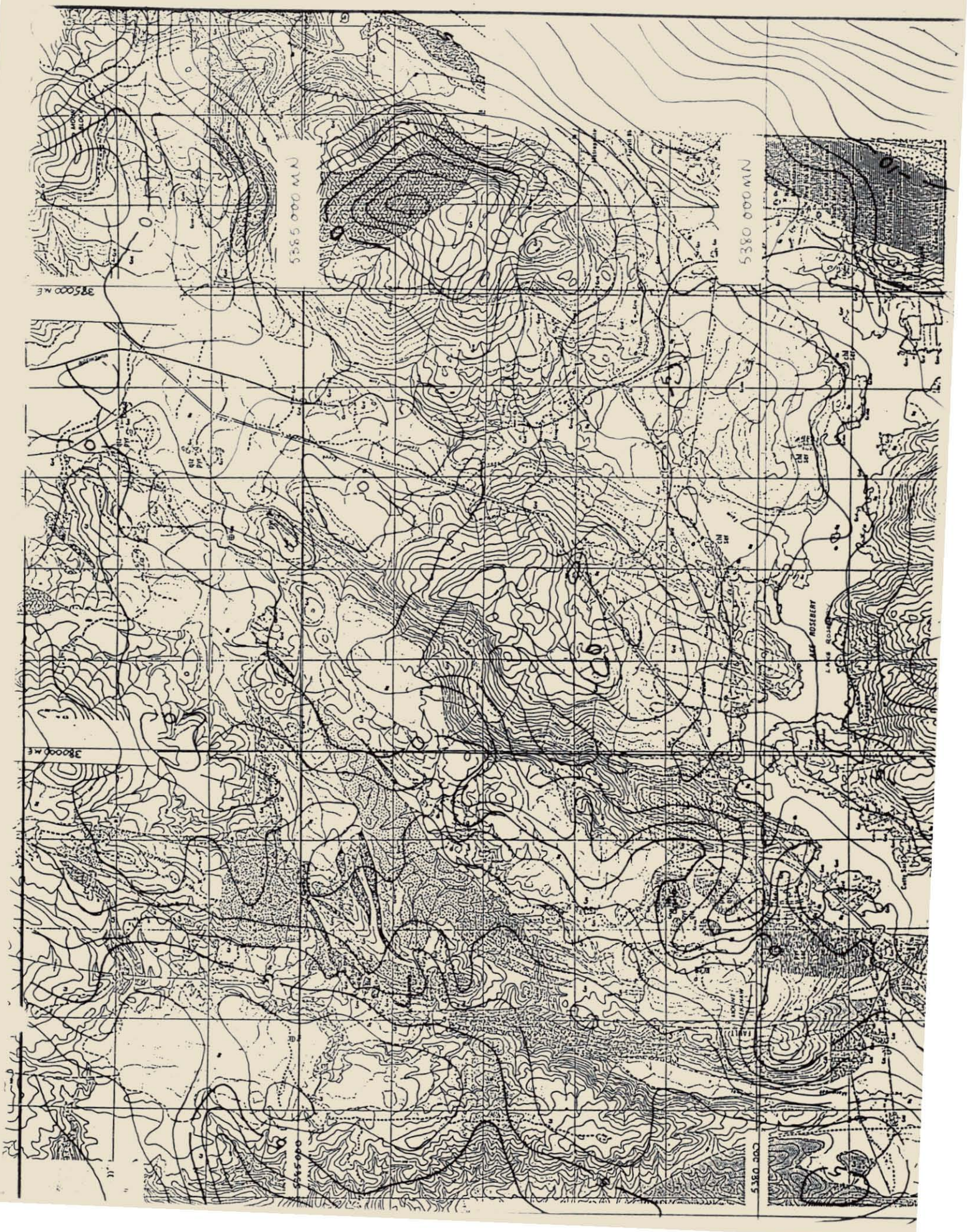
421275



RESIDUAL BOUGUER ANOMALY (after Mantle 88) FIGURE 7A
(Contour interval 1 mGal) See also map 2

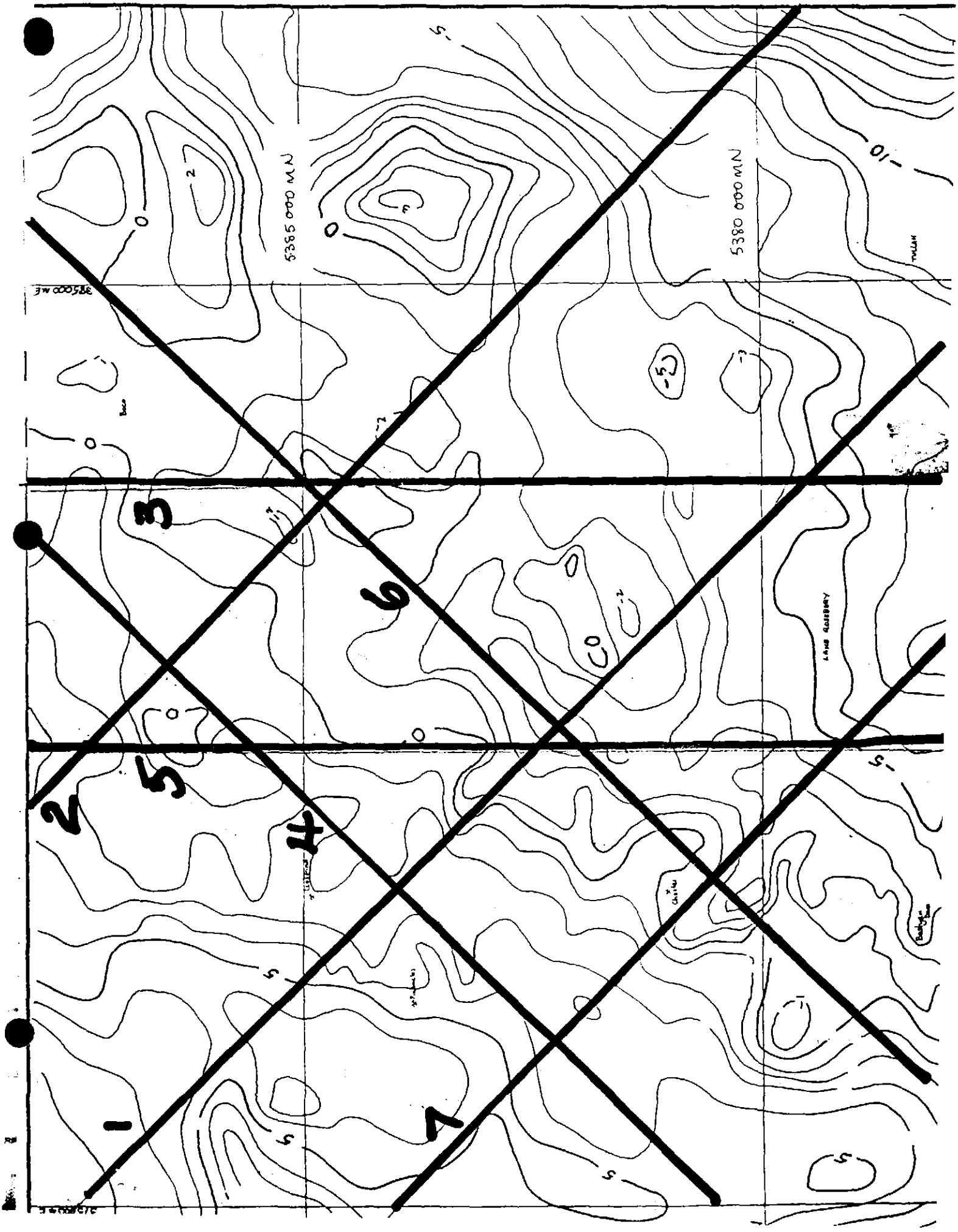
RESIDUAL BOUGUER ANOMALY EL 44/88 BURNS PEAK FIGURE 7B
(Base map after Corbett & McNeill, 1986)

421277



LOCATION OF MODELLED PROFILES: EL 44/88 BURNS PEAK FIGURE 8

421278



LINE PARAMETERS - ORIGIN,LIMIT,INCR - 0 10000 500

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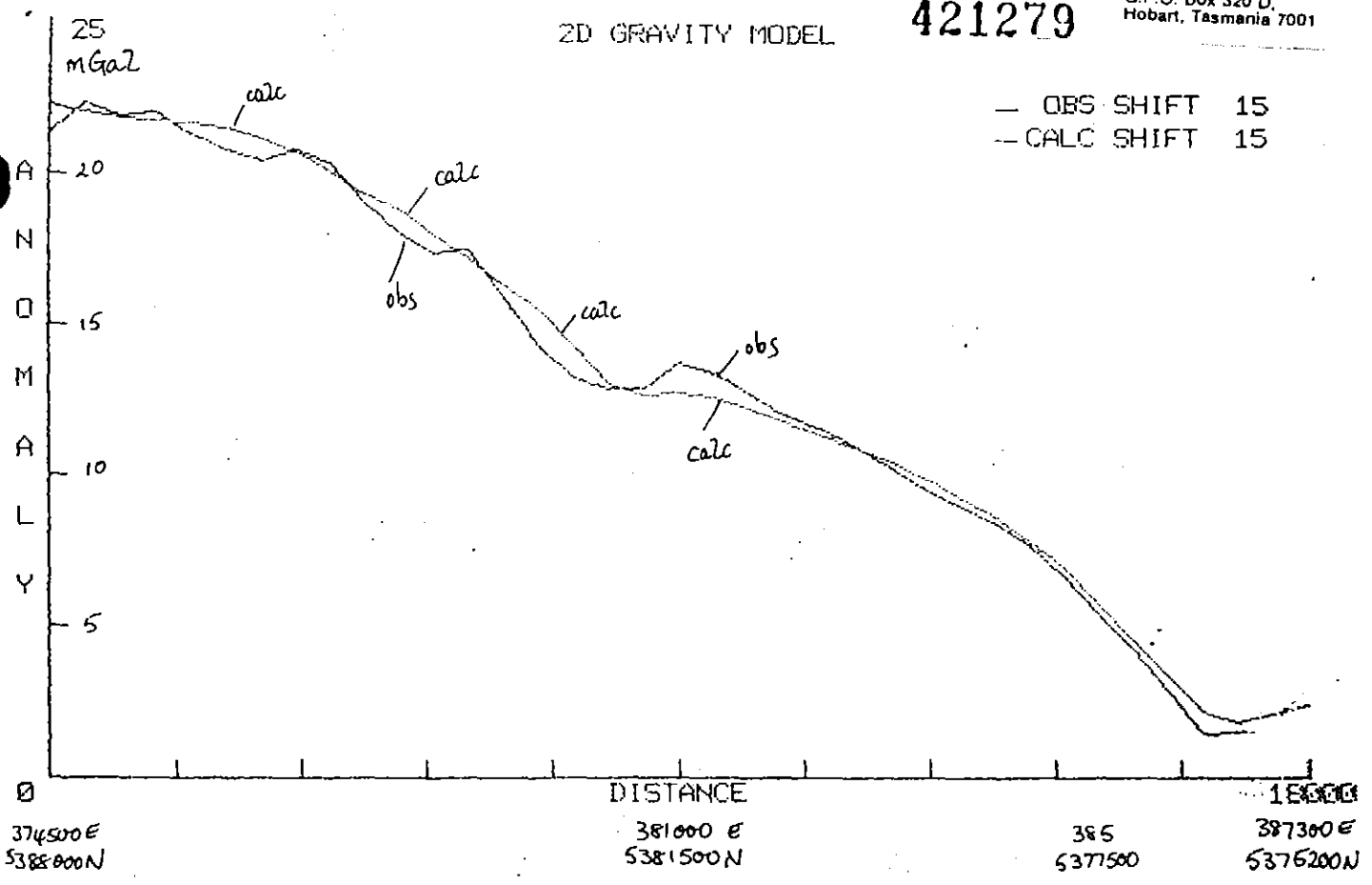
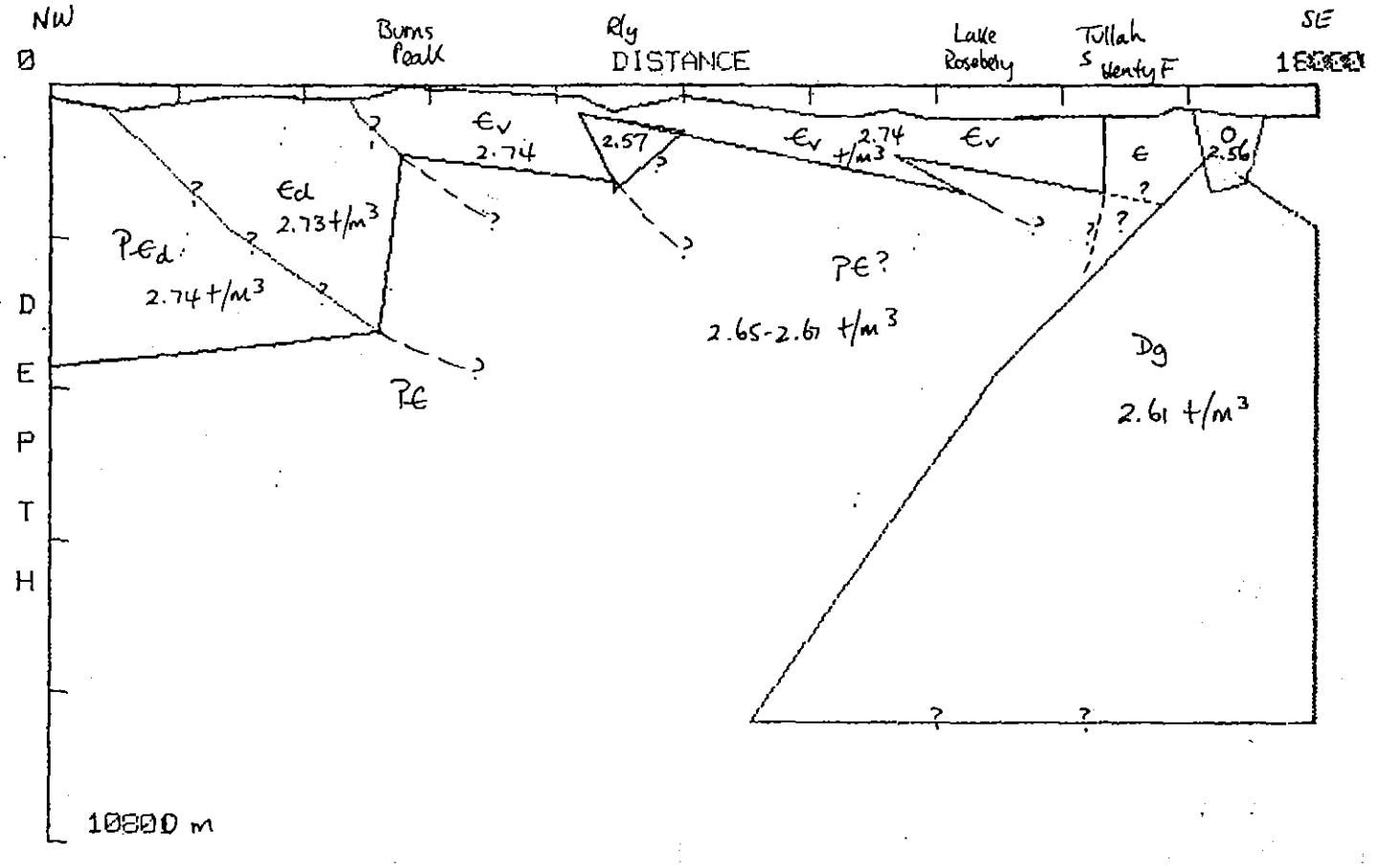


BURNS PEAK PROFILE 1 3745/388-3873/3752



2D-GRAVITY MODEL LINE 1 EL 44/88 BURNS PEAK FIGURE 9

LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 12000 500

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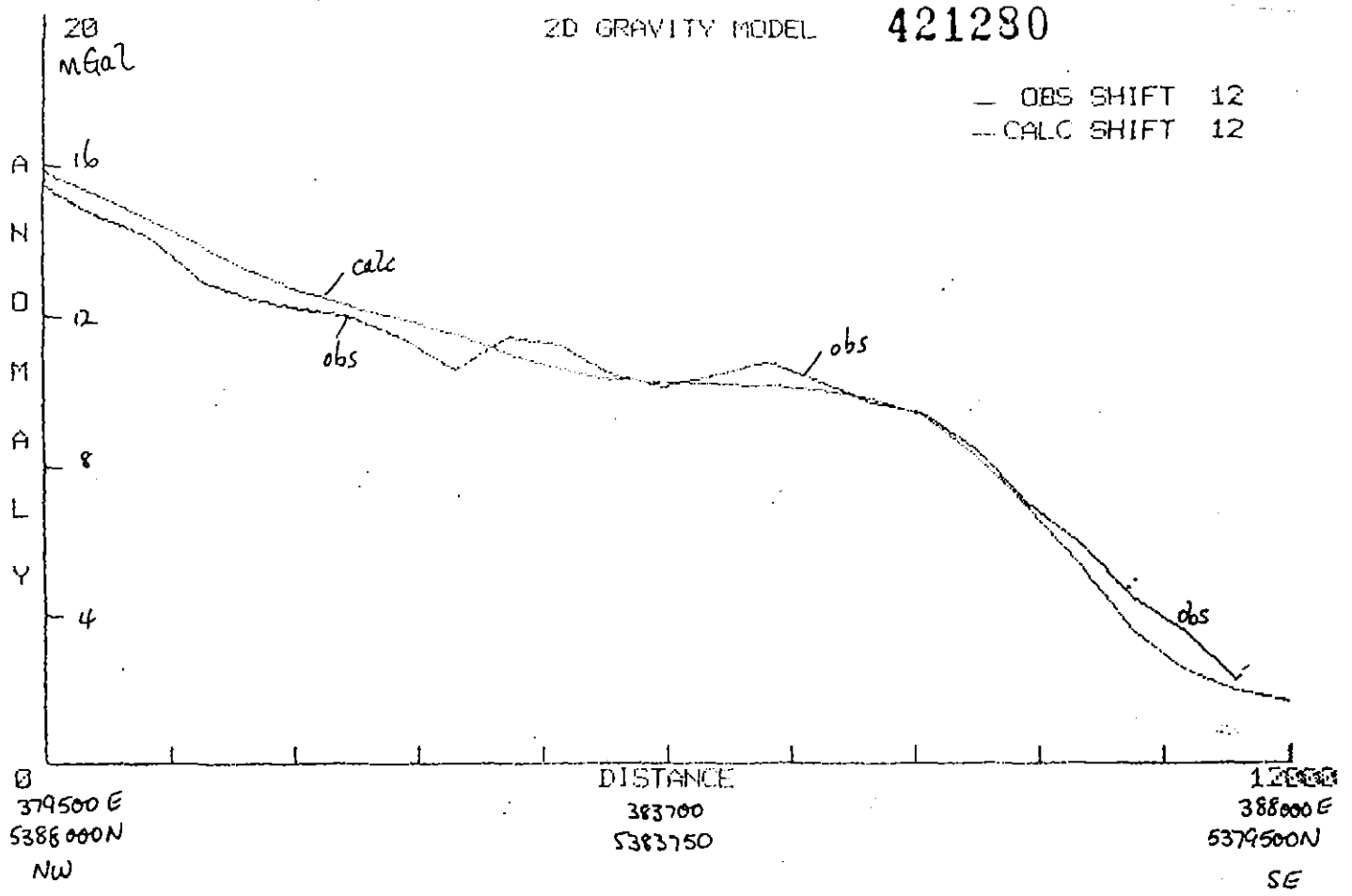
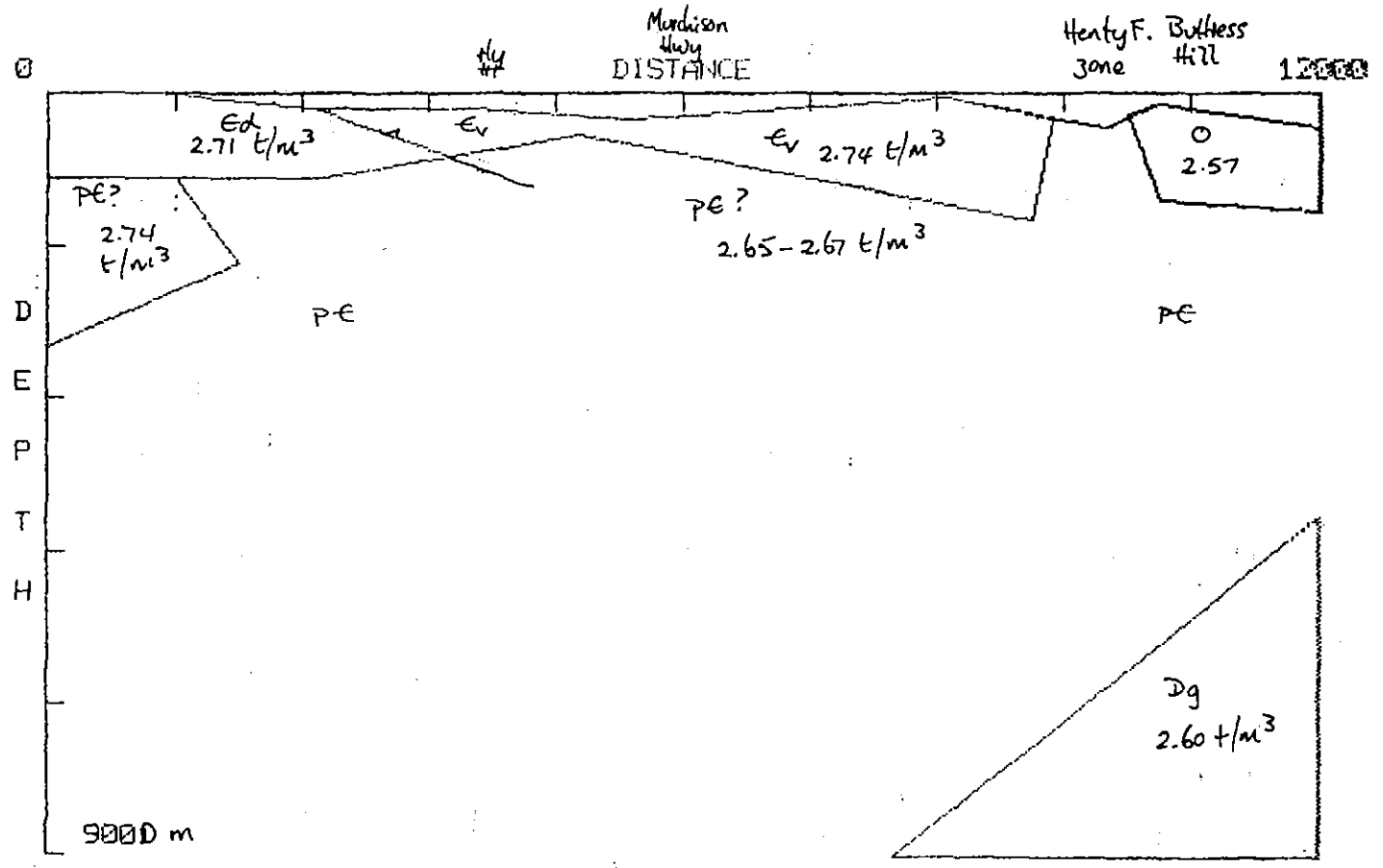


BURNS PEAK PROFILE 2 3795/388-388/3795



2D GRAVITY MODEL LINE 2 EL 44/88 BURNS PEAK FIGURE 10

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LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 12000 500

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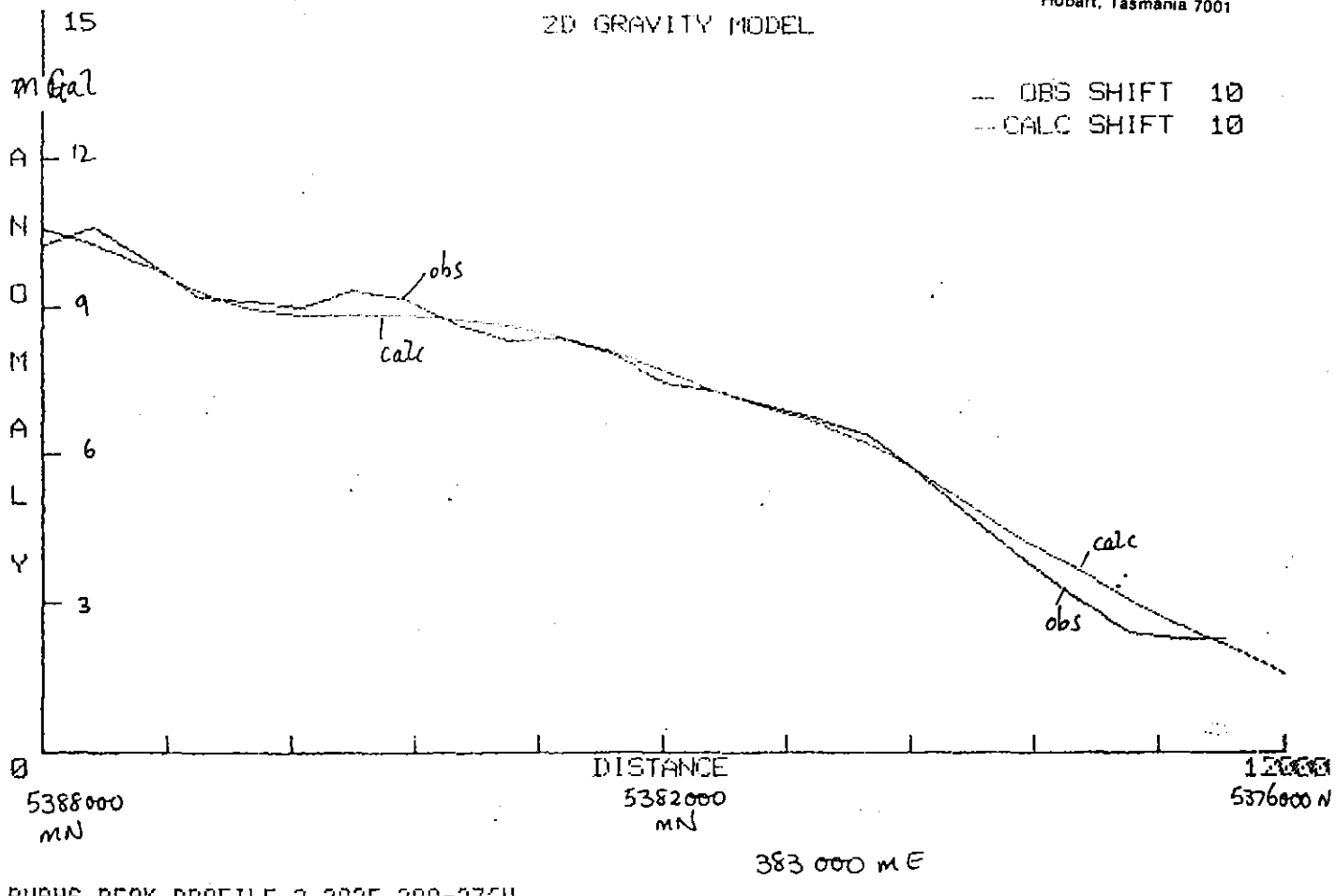
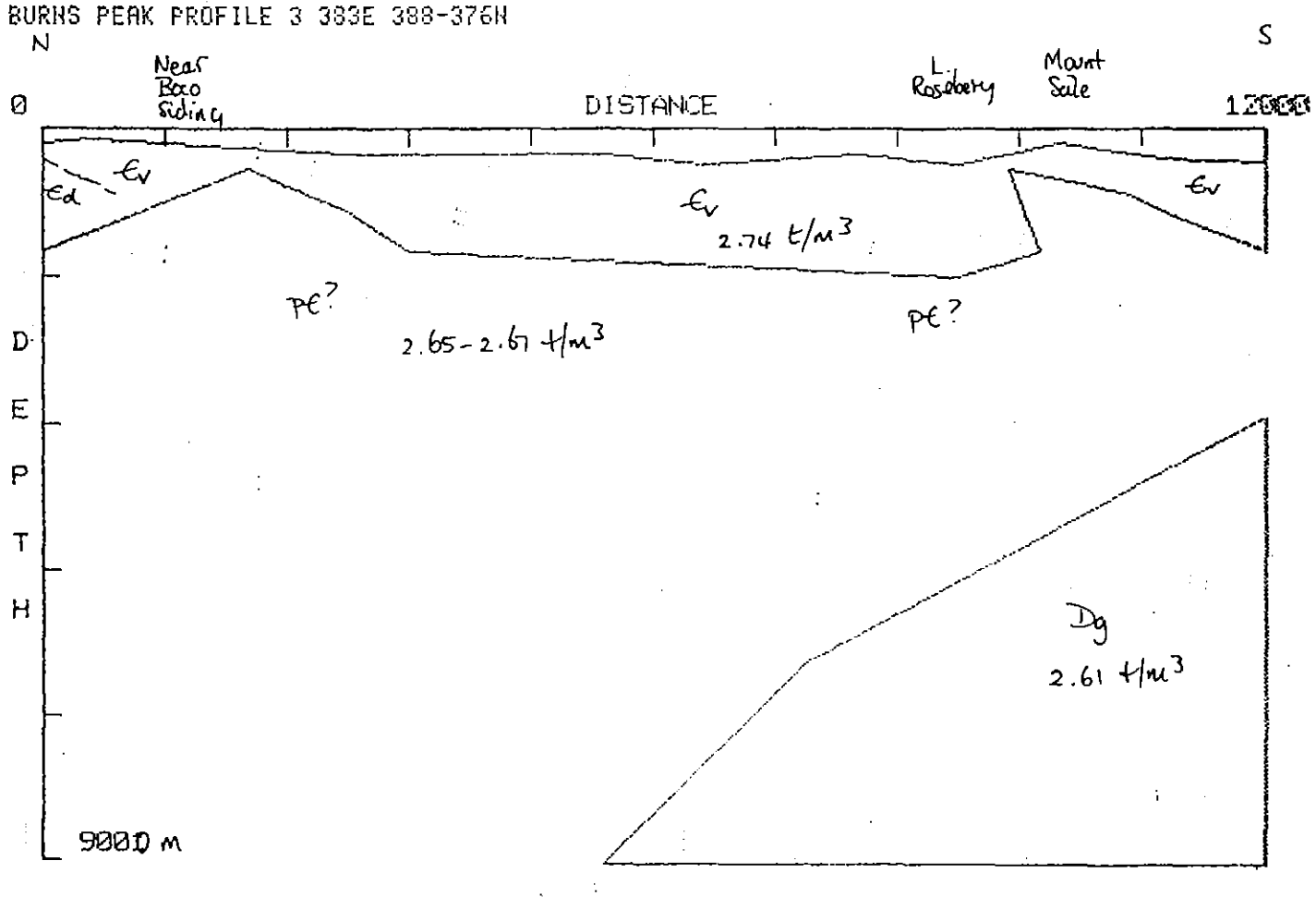
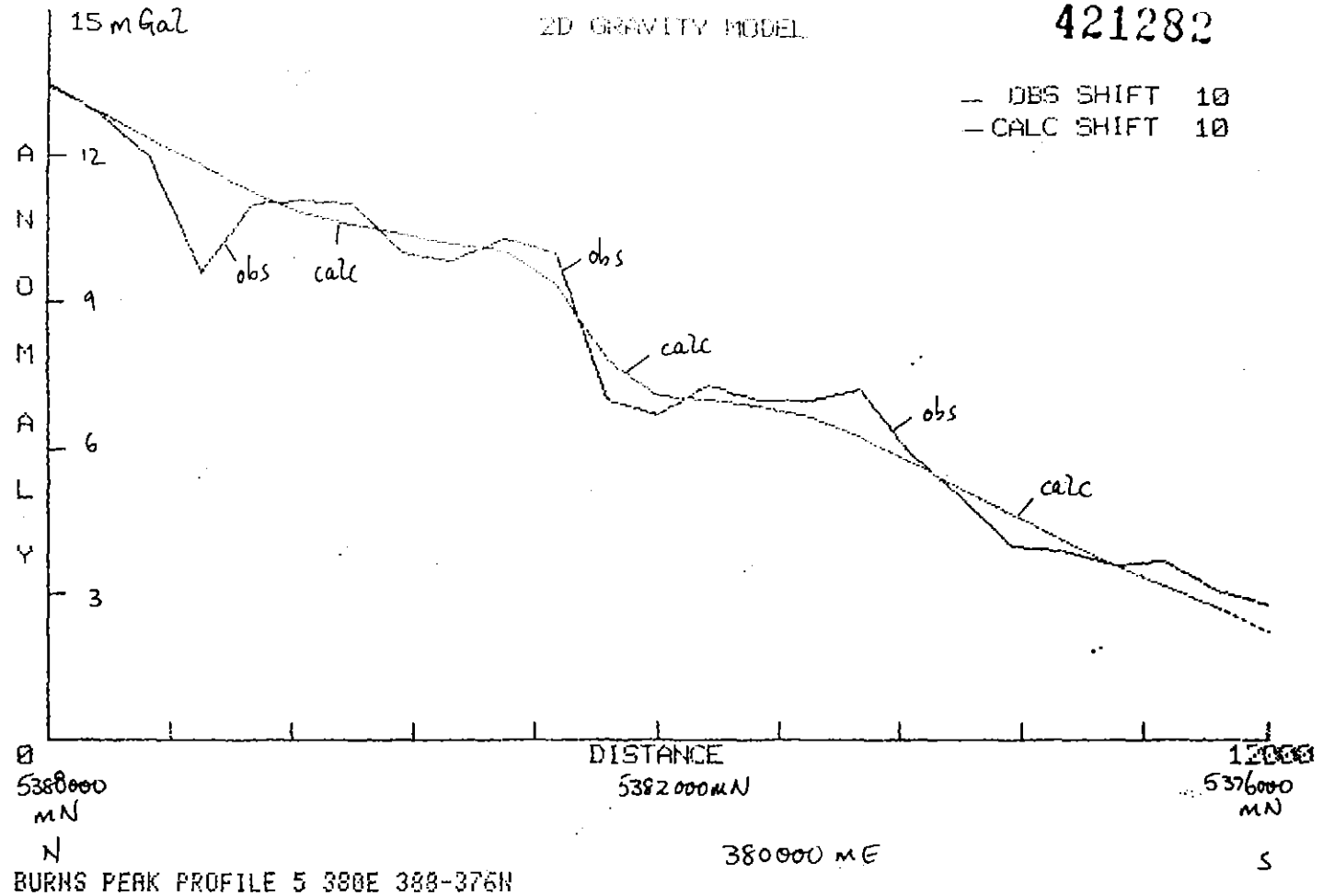
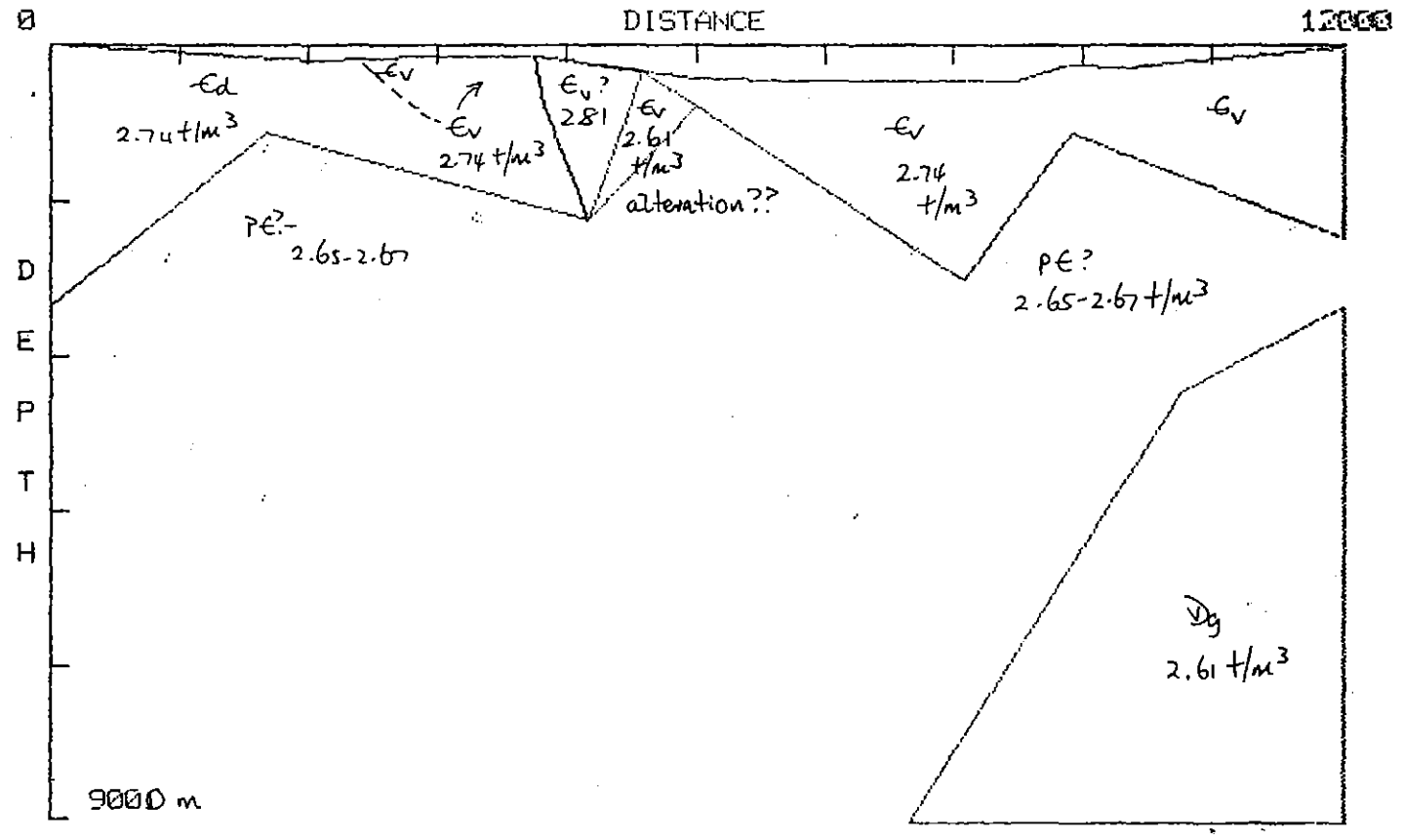




2D GRAVITY MODEL LINE 3 EL 44/88 BURNS PEAK FIGURE 11



BURNS PEAK PROFILE 5 380E 388-376N
K8=-.12



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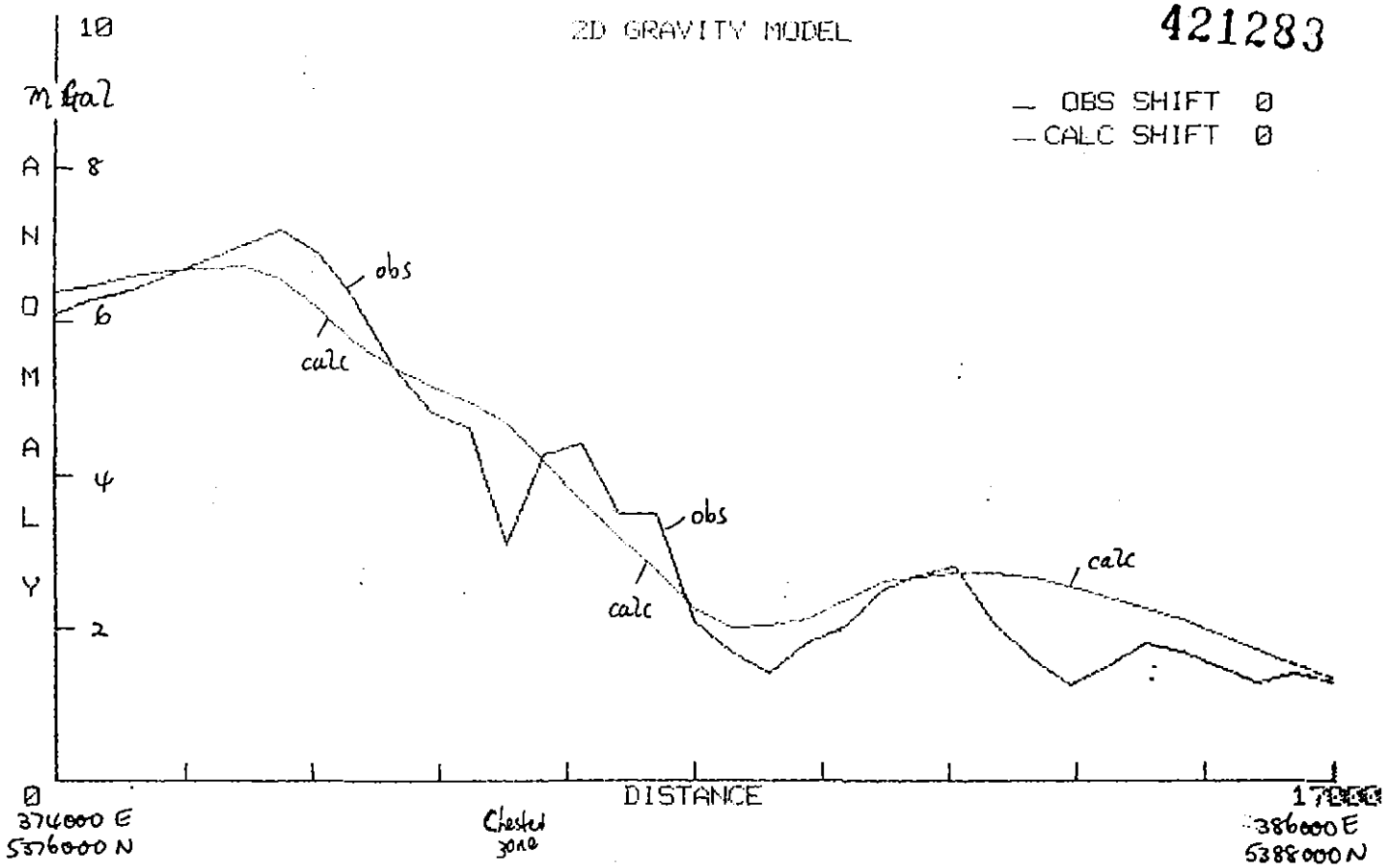
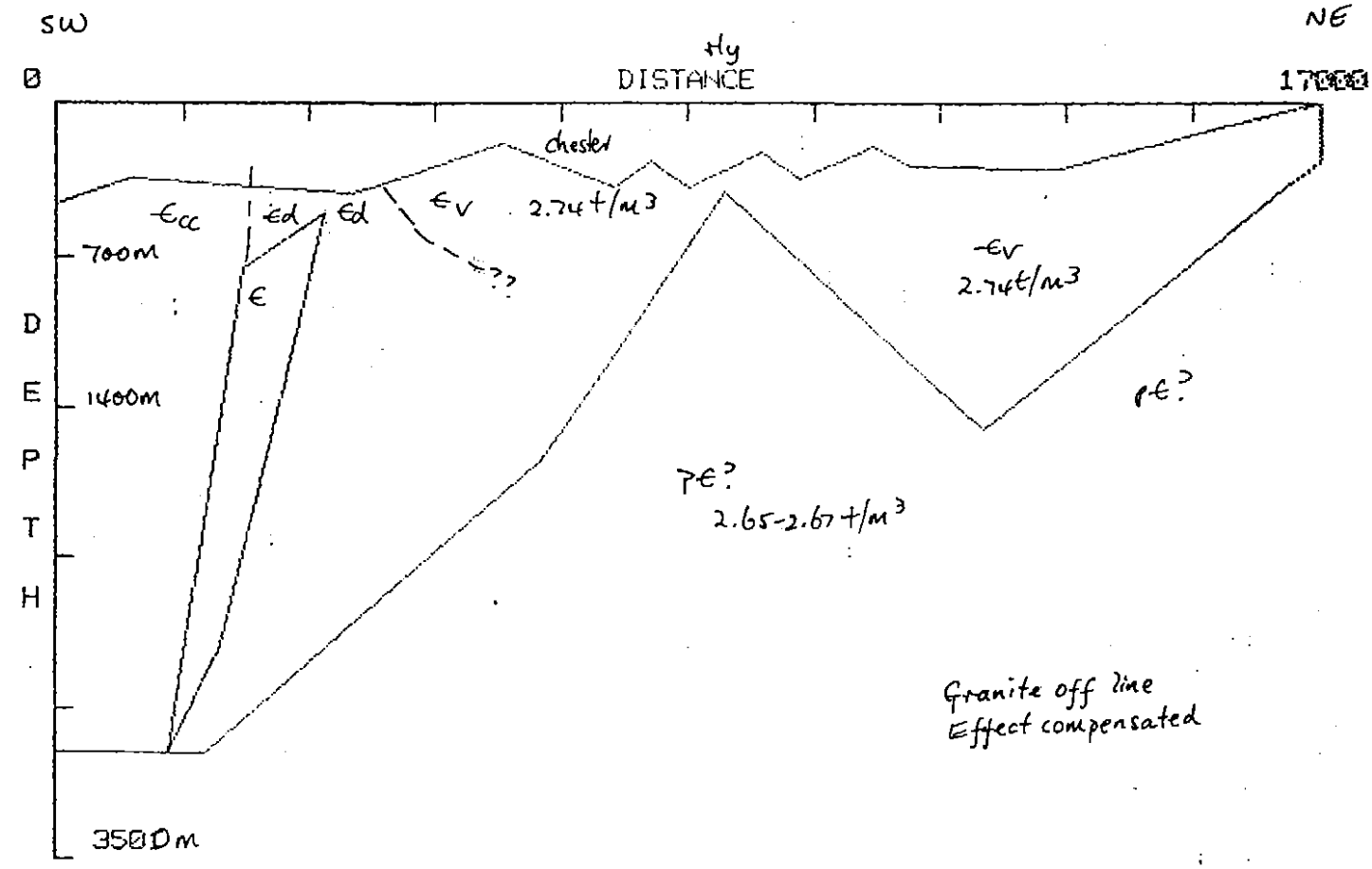
2D-GRAVITY MODEL LINE 5 EL 44/88 BURNS PEAK FIGURE 12



BURNS PEAK PROFILE 6 374/376-386/388



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2D-GRAVITY MODEL LINE 6 EL 44/88 BURNS PEAK FIGURE 13

LINE PARAMETERS - ORIGIN.LIMIT.INCR : 0 15000 500

421604

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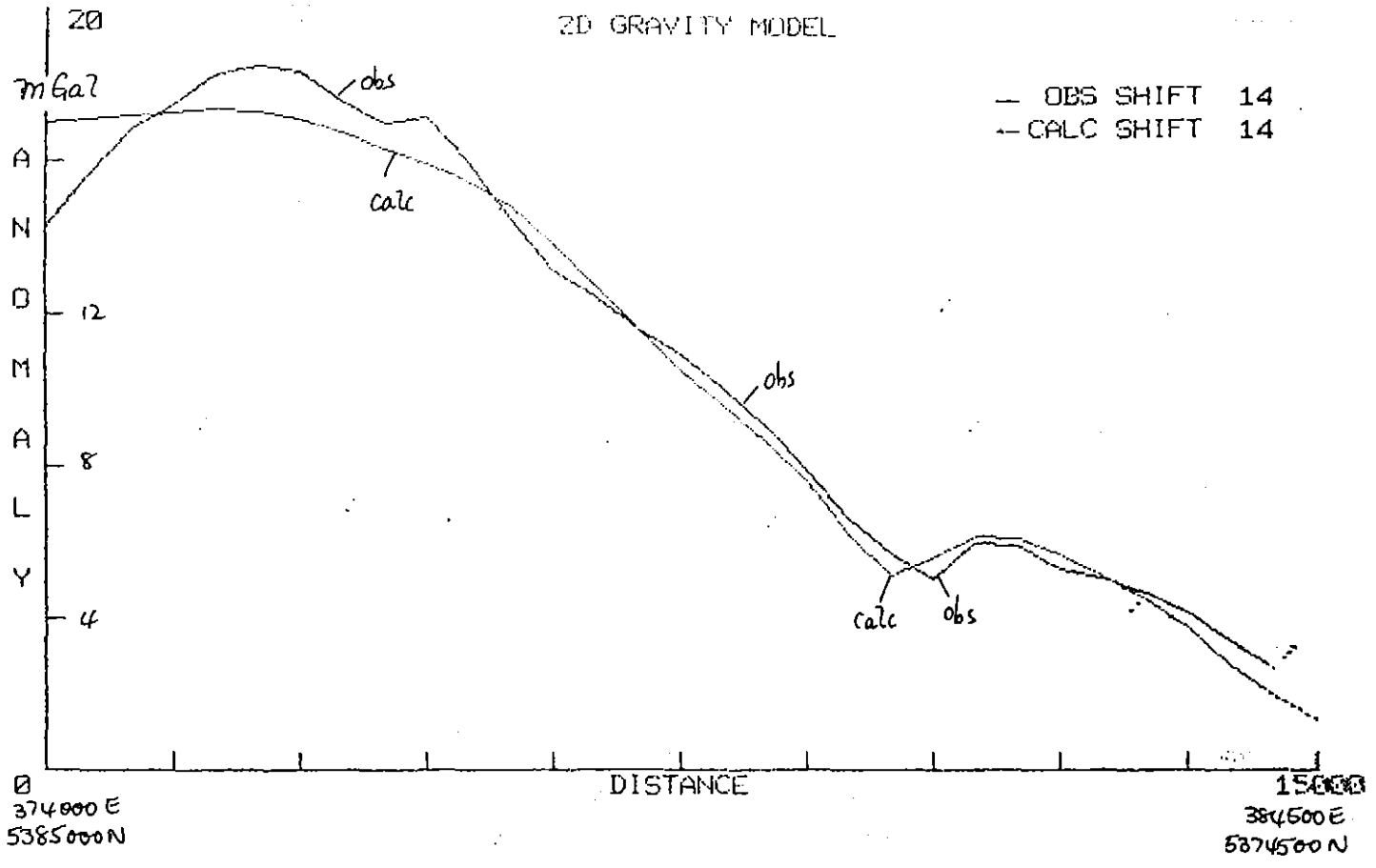

BURNS PEAK PROFILE 7 374/5385-3845/3745
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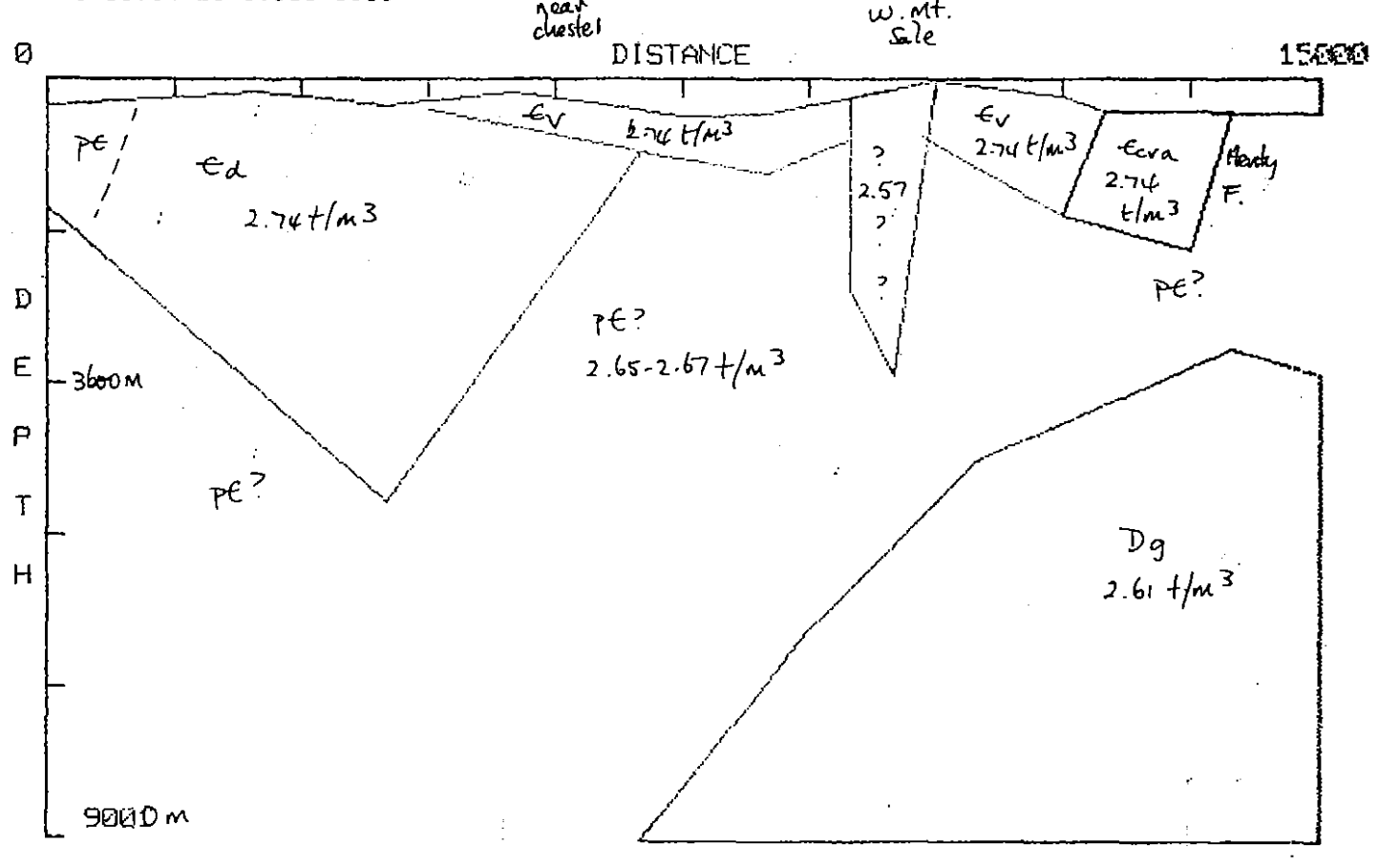
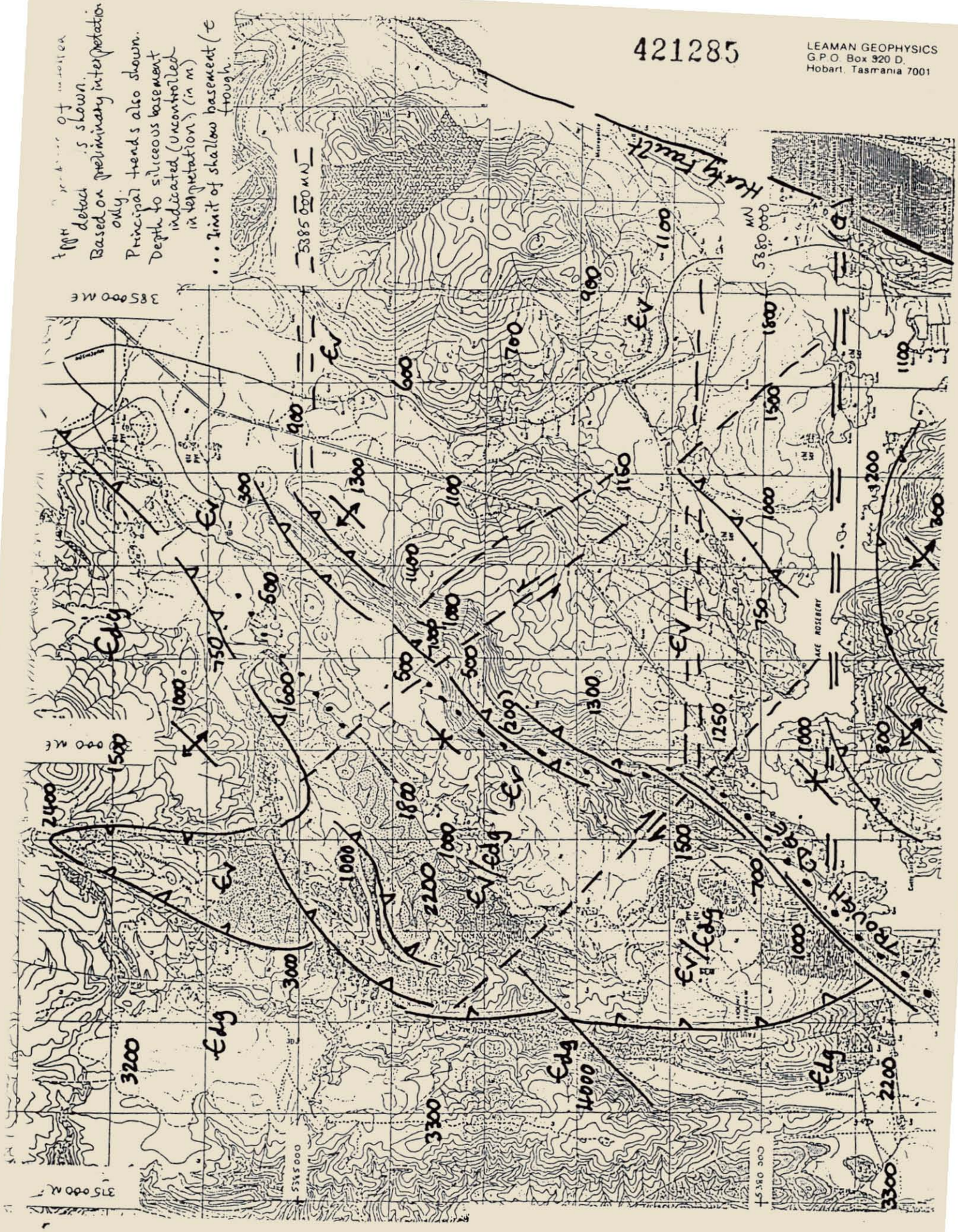
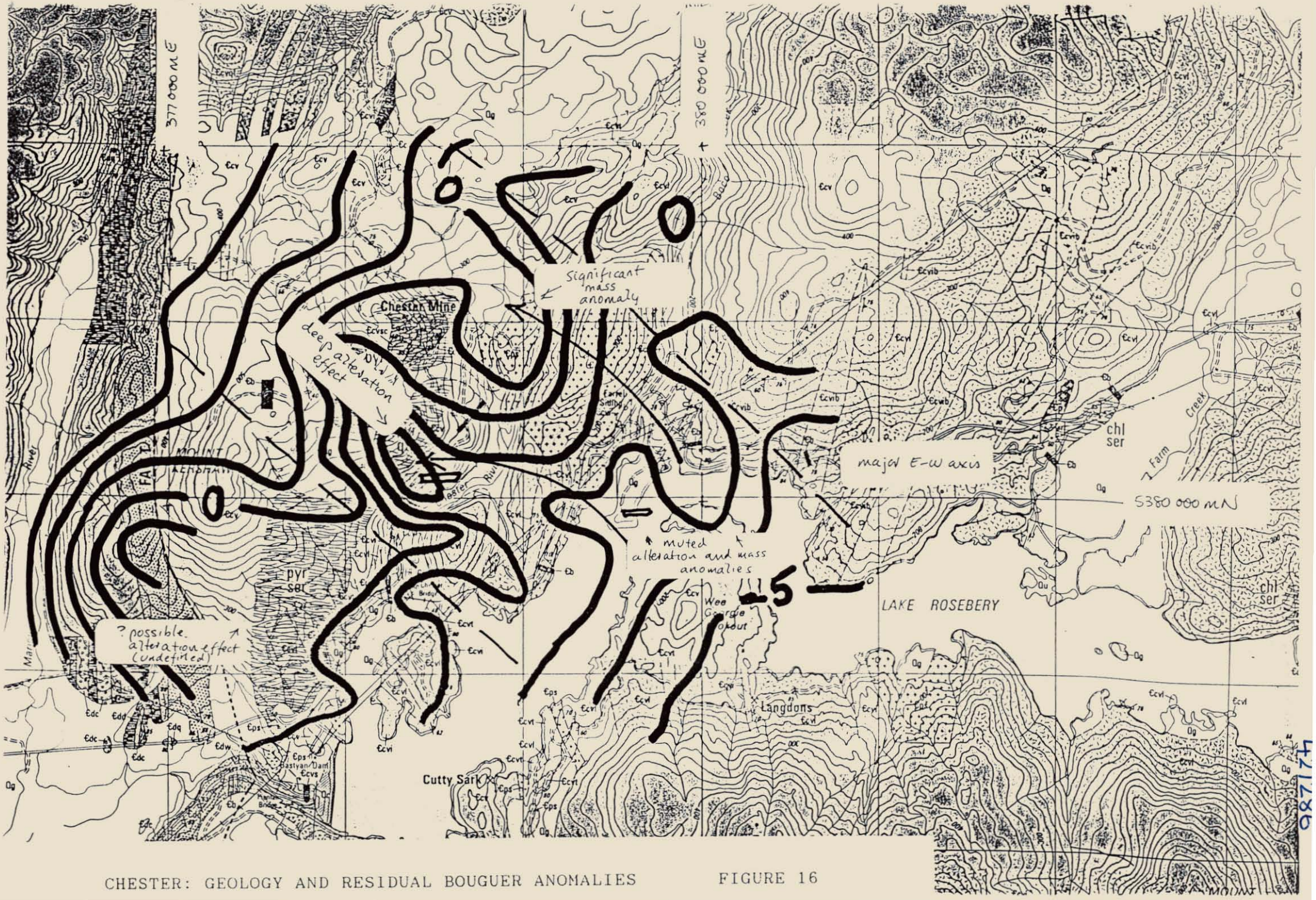


2D GRAVITY MODEL LINE 7 EL 44/88 BURNS PEAK FIGURE 14



SUMMARY OF CURRENT INTERPRETATION EL 44/88 BURNS PEAK

FIGURE 15



CHESTER: GEOLOGY AND RESIDUAL BOUGUER ANOMALIES FIGURE 16

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PINNACLES: GEOLOGY AND RESIDUAL BOUGUER ANOMALIES FIGURE 17

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APPENDIX

TABULATION OF GRAVITY DATA BASE

INCLUDING STATE DATA BASE STATIONS AND NEW SURVEY

375 000 mE

380 000 mE

385 000 mE

5386 000 mN

5380 000 mN

5375 000 mN

-5 -10 -7 -10 -10 -15 -19 -16 -9 -20 -16 -15 -25 -7 -10 -14 -10 -19 -17 -20 -30 -20 -35 -25 -30 -35 -39 -40 -15

Hook find

Chester

421289

5 cm

90-3203.

BOUGUER ANOMALY

$\rho = 2.67$ t/m³

EL 44/88 BURNS PEAK

Scale 1:20 000

Contour interval : 1mGal

Data Sources: -TASGRAV, MTREAD data bases
-New Survey

Compilation - Keaman Geophysics, Hobart August 1990

MAP 1

375000 mE

380000 mE

385000 mE

5385 000 mN

5380 000 mN

Leos Find

Pinnacles

Chester

Boco

Bastyan Dam

LAKE ROSEBERY

TULLAH

421290

5 cm

EL 44/88 BURNS PEAK

RESIDUAL BOUGUER ANOMALY

Compilation by Leaman Geophysics Aug 1990

Processing using Mantle 88 separation

MAP 2

421291

APPENDIX 9.

INTEGRATION OF INITIAL INTERPRETATION GRAVITY AND MAGNETIC DATA EL 44/88 BURN'S PEAK

DR D E LEAMAN SEPT 1990

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

Registered Office:
21 ZOMAY, AVENUE, DYNNYRNE, TAS. 7005
All Correspondence to:
G.P.O. BOX 320 D, HOBART, TAS. 7001.
TELEPHONE: (002) 24 0319
FACSIMILE: (002) 23 3194

421292

INTEGRATION OF INITIAL INTERPRETATION GRAVITY AND MAGNETIC DATA

EL 44/88 BURNS PEAK

for
PASMINCO MINING

by
Dr. D.E. Leaman

September 1990

BURNSPK4

421293

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INTRODUCTION	1
SUMMARY OF PREVIOUS RESULTS	1
DISCUSSION	
Structure	3
Faults	4
Lineaments	4
Alteration	5
Mineralisation	7
CONCLUSIONS AND RECOMMENDATIONS	8
REFERENCES	9

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1 Location of EL 44/88, Burns Peak
2 Magnetic field and geology base
3 Detail of magnetic field near Chester-Pinnacles
4 2D magnetic model, magnetic profile 2
5 Summary of magnetic interpretation
6 Residual Bouguer anomaly and geology base
7 2D gravity model, gravity profile 1
8 Summary of gravity interpretation
9 Detail of gravity field in Chester area
10 Detail of gravity field in Pinnacles-Leo's Find area

Extracts from Map 1 with geology base
11 NW quadrant including Pinnacles-Leo's Find
12 SW quadrant including Chester
13 SE quadrant including Farm Creek
14 NE quadrant including Boco south

MAPS

1 Integration of preliminary interpretation (in folder)

421294

SUMMARY

Preliminary interpretations restricted to individual data sets were prepared following completion of a new, high resolution aeromagnetic survey and a regional gravity infill survey of the Burns Peak area.
Each interpretation was intended as an outline of information which might be extracted from the data sets and is not exhaustive. Preliminary conclusions of the separate analyses indicated that previous ideas about the structure of the area and the implications for exploration must be reconsidered. Further assessments must be based on review of the preliminary implications, extant geological and drilling information, and additional control derived from further mapping and rock property determinations.

This report attempts an integration of the preliminary interpretations in order to evaluate correlations or conflicts and focus the nature and style of any further interpretation or acquisition required.

The two data sets provide a generally consistent view of the structuring within the volcanics although many details remain unresolved. The volcanic pile is clearly folded and multiply thrust with most movement being westward. Primary detachments are located near the extensions of the Rosebery and Mt Charter Faults, around Mt Black and Mt Sale, and along the axis from Farrell Siding to Boco Siding.
The volcanic pile rests on possible Precambrian basement east of the Farrell-Boco axis and Dundas Group west of it. Although the thickness of volcanics is variable due to the complex structuring and original character of the pile it rarely exceeds two kilometres and may, in places, be less than 400 m.

Each major detachment zone may be composed of several minor structures. The presence of multiple detachments means that each mineralised site must be carefully reviewed to determine whether it represents the bulk of the original deposit or merely a stretched and deformed fragment. It is possible that mineralisation in both the Pinnacles and Chester regions has the form of deformed fragments torn from an original site to the southeast of present exposures.
Gravity data suggest that mineralisation in the Pinnacles area is not significant and that most of any remanent mineralised target lies 2 km southeast of Leo's Find whereas the same data suggest that most of the mineralised target in the Chester area lies close, but northeast of, Chester itself. Each site, its exposed and concealed parts, is associated with alteration. Both data sets down rate the Pinnacles-Leos' Find area in terms of alteration responses but both define the intense alteration southwest of Chester. This is shown to be localised.

More regional effects, presumed to be due to large scale alteration, have also been inferred from the gravity data. These are associated with more specific evidence based on primary lineaments, mapped alteration, and mineralisation. Many of these zones are now concealed due to thrusting of the volcanics but may be linked to the concealed parts of the Chester and

Pinnacles anomalies.

Both data sets display similar orientations for major and minor lineaments and anomaly terminations or extensions. The magnetic data set provides more detailed information but many features correspond directly. Many elements are fragmental within each data set but combine to reveal extensive fracture systems. Many of these features are generated within the volcanic pile but others are clearly deep seated and regional.
Primary trends have orientations which are approximately E-W and NE-SW. Secondary trends are NW-SE. The trend and lineament pattern within the volcanic area is different from that, more subtly, suggested within the Dundas Group rocks to the north and west.

Few large faults have been mapped in this area but many are implied by the structural patterns extracted. The Rosebery Fault, and its extensions, represents part of the lower thrust system. Many other comparable features are likely above it.

Definite relationships may be suggested between known mineralisation and alteration, and inferred alteration and mineralisation, and the structural and lineament patterns. Most such sites occur near E-W lineaments or corridors and their intersection with the primary NE-SW and NW-SE axes. This association may be coincidental but must be seriously considered by future exploration. Problems with such correlations are related to the entirely displaced character of much of the volcanic pile and the scale of displacement from original or vent positions. Movements of up to 2 km have been suggested near the known mineralised sites. Other altered sites may, however, be due to much younger fluid passage which has utilised the primary basement fracture system and thus be local and irrelevant to exploration for primary base metal sulphide deposits.
Each alteration zone inferred or known must, however, be reviewed within the structural context now evolving.

There is scope for much further work within the Burns Peak licence. The available magnetic data can provide considerable structural information but some mapping, discussion and rock property studies are advised first.
The gravity survey should be locally infilled near each zone where alteration has been inferred, and around the possibly concealed original sites for the Chester and Pinnacles mineralisation.
Complete structural interpretation using these data sets will require staged, controlled modelling with considerable geological feedback. This is a very complex area.

There is also much scope for testing local ideas since various options may persist beyond each phase of drilling. Implications should be tested for consistency against the relevant data set by asking the question "are the data consistent with such a geological solution, and if not, what is more likely?"

421296

INTRODUCTION

Preliminary interpretations of gravity and magnetic data collected within the Burns Peak region during the first half of 1990 have been reported by Leaman (1990a, b). Each report includes an outline of survey specifications, processing and results.

The interpretations provided form the first stage of a evolutionary interpretation process and presented general implications .The implications were such that much geological and rock property feed back is required to ensure that all possible options are efficiently managed within the life of the licence. The inferences drawn at an early stage of review were such that the need for this process was immediately recognised and only a preliminary or provisional basic interpretation was supplied pending review and evaluation.

This report forms part of this process and is intended as an integrated summary of the preliminary work already undertaken. The integration was directed toward unification of ideas developed separately from the individual data sets as well as providing some attempt to resolve conflicts and suggest or confirm paths for further work or exploration.

Compilations of the magnetic field are shown in Figures 2 and 3. Residual Bouguer anomalies are shown in Figure 6.

OUTLINE OF PREVIOUS RESULTS

Preliminary magnetic interpretation (Leaman, 1990a) suggested that the Mt Read Volcanics of the Burns Peak area are present as relatively thin wedges of material rarely more than 2000 m thick and often much less than 500 m (Figure 4). Several wedges were identified and approximately located. Assuming consistent magnetisation directions for elements of the volcanic pile it was also possible to infer folding in some wedges. The pile is underlain by a non magnetic, or uniformly magnetised, sequence. Certain members of the volcanic sequence could be shown to be more magnetic than others and patterns in the distribution of the related responses of the magnetic field can be used to define faults or thrusts. Most of these structures are oriented NW-SE or NE-SW. Not all structures are parallel and some appear to override others at an acute angle (see Figure 5).
Many units are ignored by the magnetic field, including the andesites south of Leo's Find. This suggests that these rocks are either very thin or non magnetic.

The Rosebery Fault displays no significant response and the volcanics within a few hundred metres of it are either very thin or different in composition or state from those further east. There is evidence that these volcanics form part of a separate slice of volcanics and are also thin (see Figure 3).

Classic alteration effects can be observed near Chester but only one restricted zone can be defined as extremely altered. This lies immediately south west of the old Chester Mine.

Gross trends and lineament corridors based on magnetic data are summarised in Figure 5. Many elements are not continuous but do possess extensions and alignments.

The gravity interpretation (Leaman, 1990b), although inevitably less detailed, supports the general structural view extracted from the magnetic data. The residual anomalies are consistent with relatively thin slices of volcanics although the gravity estimates of thickness are often greater than those determined magnetically. This reflects the inability of the method to separate volcanics from Dundas Group rocks without more detailed data or analysis. The style of the gravity-based solutions is compatible with those derived magnetically (compare Figures 4 and 7).
The general pattern of lineaments and trends is also comparable although the location of gravity features is of variable reliability due to the differences in station spacing within the area. Many gravity features infill gaps within the magnetic alignments (compare Figures 5 and 8) but all trend patterns are grossly reproduced.

The zone near Chester, identified magnetically as deeply altered, is also reflected in gravity data. The correspondence is complete (compare Figures 3 and 9). Several other altered zones, some of which may be within or beneath the volcanics, were also identified. Others near the Bastyan Dam are incompletely surveyed.
Various patterns repeat within the gravity field and suggest that displacement, or partial displacement, of sources may have occurred. These may affect location of mineralisation near Pinnacles and Chester and the design of future exploration programs (see Figures 9 and 10).

Neither interpretation can be considered complete or adequate at the present time but both do suggest the structural styles which must be considered in this area, and the location and volume of alteration zones. Initial review of the gravity data imply an anomalous mass east of Chester Mine and deep alteration west of it. This must be tested.

All elements of the two preliminary interpretations have been summarised in Map 1 (also reproduced in four parts as Figures 11 to 14).
This compilation reveals the extensive and consistent nature of the trend and lineament patterns and the systematic, and presumably non random, association with known and inferred mineralised and altered sites.

The implications of this summation are discussed below.

DISCUSSION

The preliminary interpretation of magnetic and gravity data within the Burns Peak licence has directed attention toward five issues.

- gross structure
- faults
- lineaments
- alteration
- mineralisation

STRUCTURE

Both data sets imply are relatively shallow base for the volcanic pile although the magnetic data may define an horizon or structure within the pile. The gravity data are unambiguous and imply a relatively variable thickness of section which could only be composed of normal Cambrian rocks (Crimson Creek Formation, Dundas Group, Mt Read Volcanics ..) overlying a low density sequence. Since volcanics are exposed these clearly form a part, or most, of the Cambrian sequence - east of the axis from Farrell to Boco Sidings. West of this axis the section is far thicker and almost certainly composed mainly of units other than Mt Read Volcanics. The map suggests estimates of the thickness of Cambrian rocks (depth to basement? - B) or volcanics alone (V). The distinction allows for some use of the magnetic data to subdivide the sequence. This division presumes that the lowest volcanic unit has been differentiated.
The nature of the sub-Cambrian rocks or basement can only be inferred. It must have a bulk density less than 2.65-2.67 t/cu m and be effectively non magnetic. Rocks comparable with Tyennan Precambrian or the Ordovician sequence have such properties; they are not consistent with Oonah Formation. The most likely material is Tyennan Precambrian and this has been assumed.

While some doubt must persist about the reliability of the depth estimates pending more rock property information and some absolute control the style of the structure is much more certain. Each block is folded, as shown by different magnetic facings and waviness in gravity models, and possesses an overall west to east asymmetry consistent with thrust or fault slices. The relationship between the volcanics and the Dundas Group supports this view.
The structural concept is indicated in Figures 4 and 7 and summarised in integrated form on Map 1. The section on the map relates possible thrusts and deep structural controls in a manner consistent with lineament corridors.
It must be stressed that the section expresses a concept and that the linkages of structures shown has yet to be proven although these are based on the present interpretation. There is scope for considerable checking, detailing and revision.

FAULTS

The principal mapped fault within the area is known as the Rosebery Fault. It marks the boundary between the volcanic pile and the Dundas Group rocks to the west. A similar structure extends SW from Mt Charter and enters the licence area north of Boco Siding.
Neither data set disputes the general location and style presumed for this large scale reverse fault. Both sets imply that the volcanic rocks immediately adjacent to it are thin and not more than a few hundred metres thick. The anomaly and trend patterns do, however, suggest that the fault is made up of several structures with similar style (see Map 1). The lobe of volcanics which make up Burns Pinnacles lie above such a structure and overlie Dundas Group rocks. The distinctive properties of the volcanic within a kilometre east of the fault boundary suggest that the composition of the volcanics within the slice above the basal fault system differs from those south east of the andesites exposed south of Burns Peak or east of Chester.

Map 1 also suggests the possible general locations for other reverse faults. Many interfaces can be inferred from the preliminary interpretations. These group at moderate (45 degrees) or low (<15 degrees) angles. Much more work would be required to establish the most likely positions and angles. Many detachments are implied around the face of Mt Black, along the axis between Farrell and Boco Sidings and near Farm Creek.

Possible high angle structures appear to be generally absent other than near the Henty Fault Zone or within the units beneath the volcanic pile. The junction between the Dundas Group rocks and the presumed Precambrian basement is of this type and a basin or trough margin is indicated. Deformed normal faults may be present. This structure is now much disrupted but its general location is indicated by the regional gravity gradients which trends NE-SW but which disperses northward. The Map suggests that the structure is degenerated and dislocated north of Chester.

LINEAMENTS

Consistent lineament and trend patterns have been recovered from each data set. Although the compilation shown in Map 1 must be considered somewhat subjective it nevertheless provides an outline of anomaly content orientation. Many features are identified by both data sets within the limits of resolution and many others are defined by an assembly of trend fragments. The patterns within parts of the volcanic pile, and beyond it, are often characteristic and consistent with the dislocated and re-arranged nature of the gross structure.
The weighting, dominance and continuity of the features is suggested by the line weights and lenght used in the Map.
Several orientations are reliably recognised; E-W, NW-SE, NE-SW.

421300

ALTERATION

Mapping by Corbett & McNeill (1986) in the Burns Peak region has defined

a) a substantial belt of pyritic-sericitic alteration extending north from the Bastyan Dam to the Chester Mine (E-g?-f),
b) a small area of chorite-sericite alteration west of Farm Creek (382 000 mE, 5380 500 mN) (J),
c) chlorite-sericite alteration at two sites north of Lake Rosebery (383 400, 5379 400; 384 300, 5379 200) (K, M),
d) pyritic alteration at 382 500, 5385 300 (H).

Map 1 shows the location of these sites and all others identified or suspected on the basis of current interpretation. These are enclosed, as are mineralised sites or possible targets, by a heavy broken line and labelled with an upper or lower case letter. An upper case letter at an altered site reflects previous mapping and exposure. Lower case letters relate to inferred alteration.

Cursory examination of magnetic data reveals some evidence of local signature modification consistent with the mapped areas. Reentrant and local depressions of the field may be observed SW of Chester. The effect is greatest along a NNW-SSE alignment from 378 300, 5380 250 to 377 950, 5381 000 (E) with a minimum width of at least 400 m. Local extensions from this effect extend to the north and northeast. While there are suggestions of positive alteration changes, where for example iron has been introduced into a unit previously lacking in it resulting in increase in magnetisation, within the southward extension of the mapped alteration zone there is no substantial subtractive alteration - as normally characteristic of mineralised volcanics - evident at the present level of review.

The materials north and south of Mt Kershaw and west of the altered zone are distinctive and less magnetised than other parts of the volcanics - and may be equivalent to the Rosebery footwall sequence. No clear alteration effect is observed in these units other than SE of Pinnacles. This has not been shown in published mapping but extends from 377 500, 5382 900 to 378 400, 5383 800 and partly involves andesites (c). This is a zone known to be structured and to included several inferred detachments based on the preliminary structural analysis.

Any alteration signature in Farm Creek (J) is unclear without detailed examination and correction of all observed profiles but it may extend to about 5379 500 mN.
No such patterns are evident by inspection alone near the other lake sites (K, M).
The small patch of pyritic alteration south of Boco Siding was not covered by the Burns Peak magnetic survey but it lies along strike from a strong local effect (possibly a fault/shear) which extends SW to Lake Rosebery near 379 000, 5380 000 (see Map 1).

Gravity data offer a more definitive view although this was not appreciated until some modelling of the response character was attempted. This showed that large scale negative residual effects were in many cases due to unexpected bulk property changes and not due to structure or unit thinning. Examples were identified near 380 500, 5382 500 (o); 381 500, 5381 500 (i); 384 000, 5381 000 (l), Mt Sale (n)(refer Map 1).

Lesser effects, on strike from (o) surround the pyritic alteration south of Boco (H). This effect may be open into the Boco region.
A more abrupt response was noted near Farm Creek (J) but about 300 m E of the mapped alteration. The field is also distorted near the alteration north of Lake Rosebery (K, M) but the gravity survey lacks sufficient detail for any proper evaluation or description of these features.

There is little doubt about the Chester alteration (E), however. A marked and abnormal negative effect is associated with the same zone noted magnetically. Silicification is implied. The conclusion and correlation between gravity effect and alteration might be considered suspect on the basis of gravity data alone but the gravity result followed magnetic analysis and is more marked. The gravity data also imply that the effect extends toward Lake Rosebery to the ESE near 379 500, 5379 700. The anomaly crosses the grain of the volcanic pile and is not lithologically dependent.
A secondary effect may be present near the Chester Bridge (378 500, 5379 500) and extend west - but it is not defined due to lack of data.
None of the effects described above can be associated or ascribed to influences or origins within tills or other covering materials.

Similar but reduced effects may be observed near Pinnacles at 377 500, 5383 500 (c) and these are consistent with part of the magnetic responses in the same region. The effect appears rather discontinuous (a data coverage problem?)
Another possible effect extends SE from Leo's Find across strike into the andesites and area of poor data coverage. Other responses which may be of this type occur at 379 500, 5383 000 and 380 300, 5380 500. The first of these sites may include effects from covering materials although the pattern is not consistent with this.

Interpretation has suggested that some major effects have been induced in the gravity field which imply gross basement alteration. Some of these appear neutral in orientation although this may be an artifact of the coverage, others are aligned NE-SW (Farrell-Boco axis, f-e-o-H/h, see Map 1) or NW-SE (Leo's Find) and WNW-ESE (Chester). Leaman (1990b) and Figures 9 and 10 describe the possible relationships and offsets at these last two sites (also below).
Examination of Map 1 also shows that there is a strong correlation between E-W lineaments or major trend intersections

either with this orientation, or between others, and altered sites. The patterns inferred are not random but the significance of any particular site has yet to be established by other means including more detailed interpretation of the present data.

MINERALISATION

KNOWN mineralisation is concentrated in the Pinnacles-Leo's Find and Chester areas with sites such as Langdons (380 300, 5378 900) and Cutty Sark (378 700, 5378 500) just beyond the licence to the south. Altered areas, while sometimes pyritic, are not considered here (see previous section).

No magnetic response has been definitely associated with mineralised sites at this stage. None seem possible within the Pinnacles area - the field variations are subtle and well defined. This is not the case near Chester - especially north east and east of the mine - where relatively small anomalies up to 30 nT are present and adjacent to the principal alteration effect to the west and the major lithological change to the east.

Gravity responses are more consistent and believable although the coverage leaves much to be desired. No significant response has been recorded in the Pinnacles zone but there is a small positive excursion south of Pinnacles itself (north of the alteration effect, c) at 377 500, 5383 500 (C).
A much larger anomaly has been observed at Chester, also north to northeast of the alteration effect AND east of the mine. This is the same general location as the magnetic response. Neither response matches the distribution of the porphyry in this region and seems independent of it.

Although there is no significant positive anomaly near Leo's Find there is a pair of anomalies (+/-, B,b; see Map 1) facing SE. This effect is duplicated, with greater relief, nearly 2 km SE (Figure 10 and a,A in Map 1). This reproduction is intriguing because the volcanics exposed between these sites are strongly magnetised and clearly outcrop. The duplicated effect has been explained by deformation and extension of mineralisation along a detachment at shallow depth.
At Chester the duplicate anomaly is of lower relief (see Figure 9 and E-D to e-d in Map 1). Leaman (1990b) argued that these patterns implied that the bulk of the mass and target is near Chester in the Chester case and near the concealed site in the Leo's Find case.
In each case the original site presumed lies near or on a primary E-W corridor and at the intersection of this with the inferred location of the basin margin faulting or limit of the basement shelf. Subsequent deformation of the volcanic pile has resulted in a westward shift of the primary ore bodies. This radical concept and explanation must be supported by further groundwork, analysis and other methods but may prove crucial to further exploration.

CONCLUSIONS AND RECOMMENDATIONS

Preliminary interpretation of the improved magnetic and gravity coverage of the Burns Peak region has demonstrated that these methods may unravel many of the structural and exploration paradoxes of such a complex area. There is clearly scope for more detailed and specific analysis but the data will allow this provided sound feedback paths involving other methods and especially geological mapping and review are established.

The volcanics of the area are folded and multiply thrust and are, overall, relatively thin. The average thickness is of the order of 1000 m. The volcanics largely overlie probably Tyennan Precambrian basement but are folded with it and basement involved thrusts with a sense of movement from the east or south east have transferred a part of the volcanic pile westward across the primary basin boundary which includes deposition of the Dundas Group.
These same thrusts may well have deformed at least two massive base metal sulphide deposits.

Principal targets for mineralisation, today, may lie in the Chester region, south of Pinnacles and southeast of Leo's Find. Other sites, associated with large alteration (?) anomalies, are worthy of further examination but many lack positive gravity components. This alteration may be due to more recent fluid transfer in major conduits post deformation.

Major conduits have been identified and all are associated with marked lineament corridors. Established mineralisation, or its likely site of origin, occurs near the intersection of such features. Lesser sites, involving known or inferred alteration, is also related to such lineaments or subsidiary intersections.

The geological implications of the present review must be considered. Further refinement will depend on the collection of lithological or physical property data and identification of particular structures. A mapping-interpretation feedback cycle is recommended.
Each inferred alteration zone must be inspected although it should be recognised that some of these may be concealed beneath overthrust sections. The present work suggests that some repetitions do occur (Map 1) and establishment of some stratigraphy or property texture may enable separation of the thrusts. Further analysis of magnetic data, and acquisition of gravity data, should be considered in the vicinity of each alteration zone now defined. Further coverage is advised south of Mt Kershaw and in the eastern and central parts of the licence area.
Additional gravity coverage is also recommended in the region of the anomalies thought to be related to mineralisation near Pinnacles, Leo's Find (SE) and Chester (SE).

421304

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Leaman, D.E., 1990 b. Gravity survey, EL 44/88, Burns Peak. Acquisition report (including preliminary interpretation). Report for Pasminco Mining by Leaman Geophysics, August.

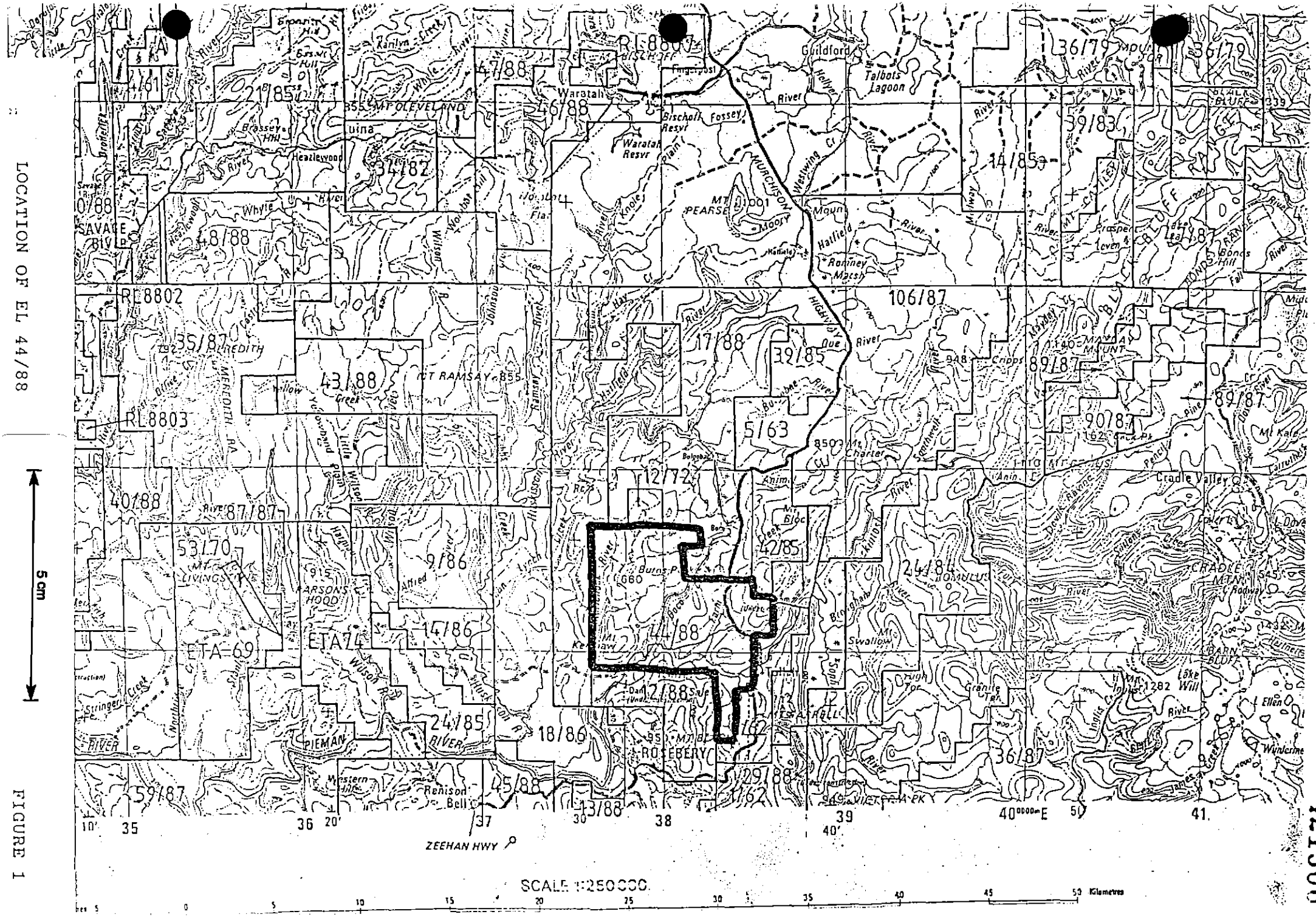
421305

Report submitted on behalf of
Leaman Geophysics
by

D. Leaman

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

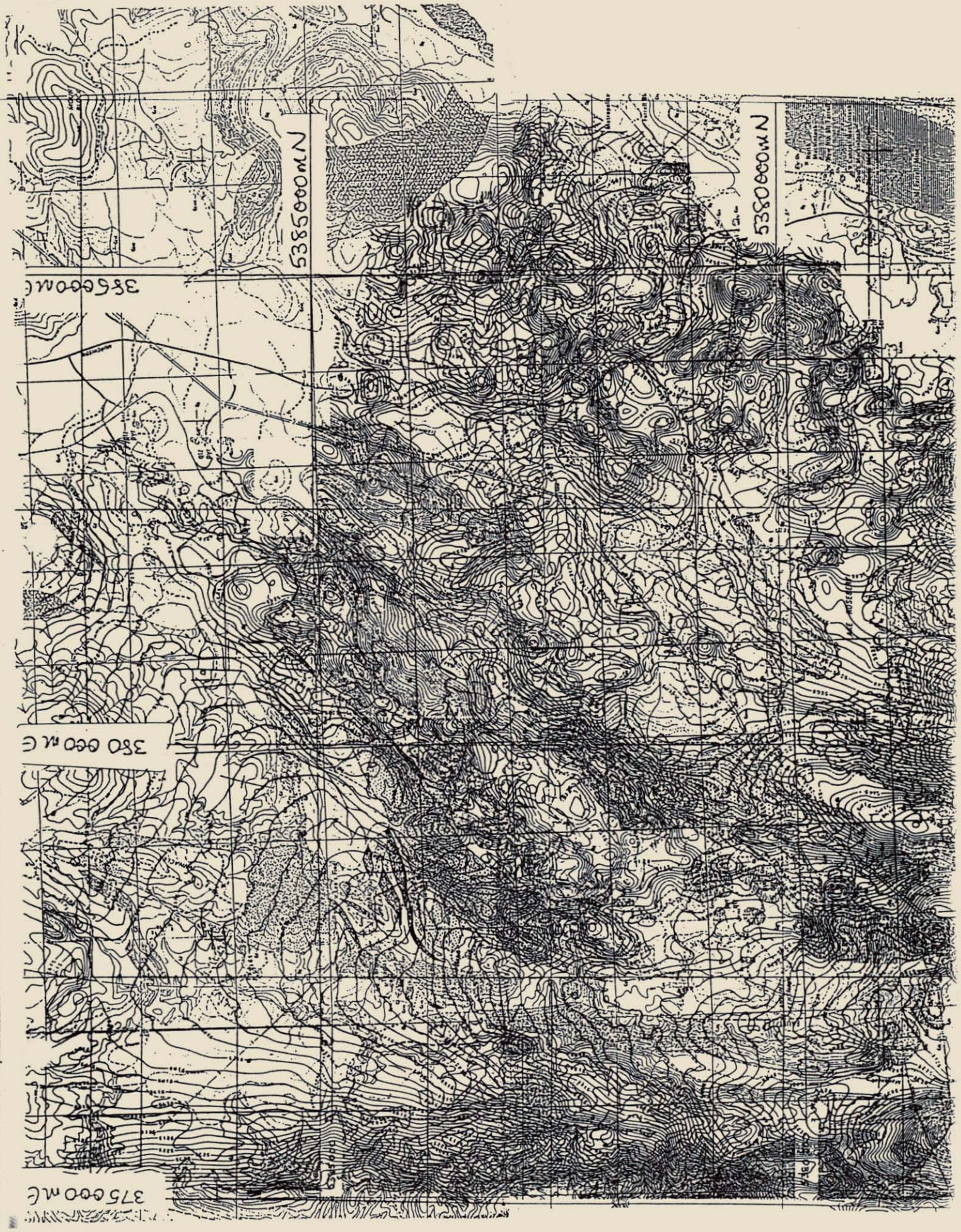
Sept 7, 1990


LOCATION OF EL 44/88
5 cm
FIGURE 1
421306
SCALE 1:250000
ZEEHAN HWY
Guildford
Waratah
Talbots Lagoon
Bischoff
Fossey
Waratah Resvr
Mt Pearse
Hurchison
Westwing Ct
Hellyer River
Whyte River
Heazlewood
Brassey Hill
Mt Cleveland
Savage River
Meredith Range
Mt Ramsay
Mt Livingstone
Parsons Hood
Pieman River
Roseberry
Renison Bell
Western Tier
Stringer Creek
Wilson River
Donaldson
Cradle Valley
Cradle Mtn
Barn Bluff
Lake Will
Mt Kate
Mt Swallow
Granite Tor
Pencil Pine
Ellen
Wyndarra
Bonds Hill
Crapps
Charter
Hallfield
Rodney Mace
Buttons P
Mt Black
Mt Jukes
Mt Sedgwick
Mt Murchison
Mt Owen
Mt Read
Mt Darwin
Mt Huxley
Mt Tyndall
Mt Lyell
Mt Farrell
Mt Dundas
Mt Zeehan
Mt Sophia
Mt Youngbuck
Mt Donaldson

CONTOURS OF RESIDUAL MAGNETIC FIELD
(Basemap after Corbett & McNeill, 1986)

421307 FIGURE 2

from Figure 3B (Leaman, 1990a)



DETAIL OF MAGNETIC FIELD IN CHESTER-PINNACLES AREA
EL 44/88

FIGURE 3

from Figure 6 (Leaman, 1990a)

421308

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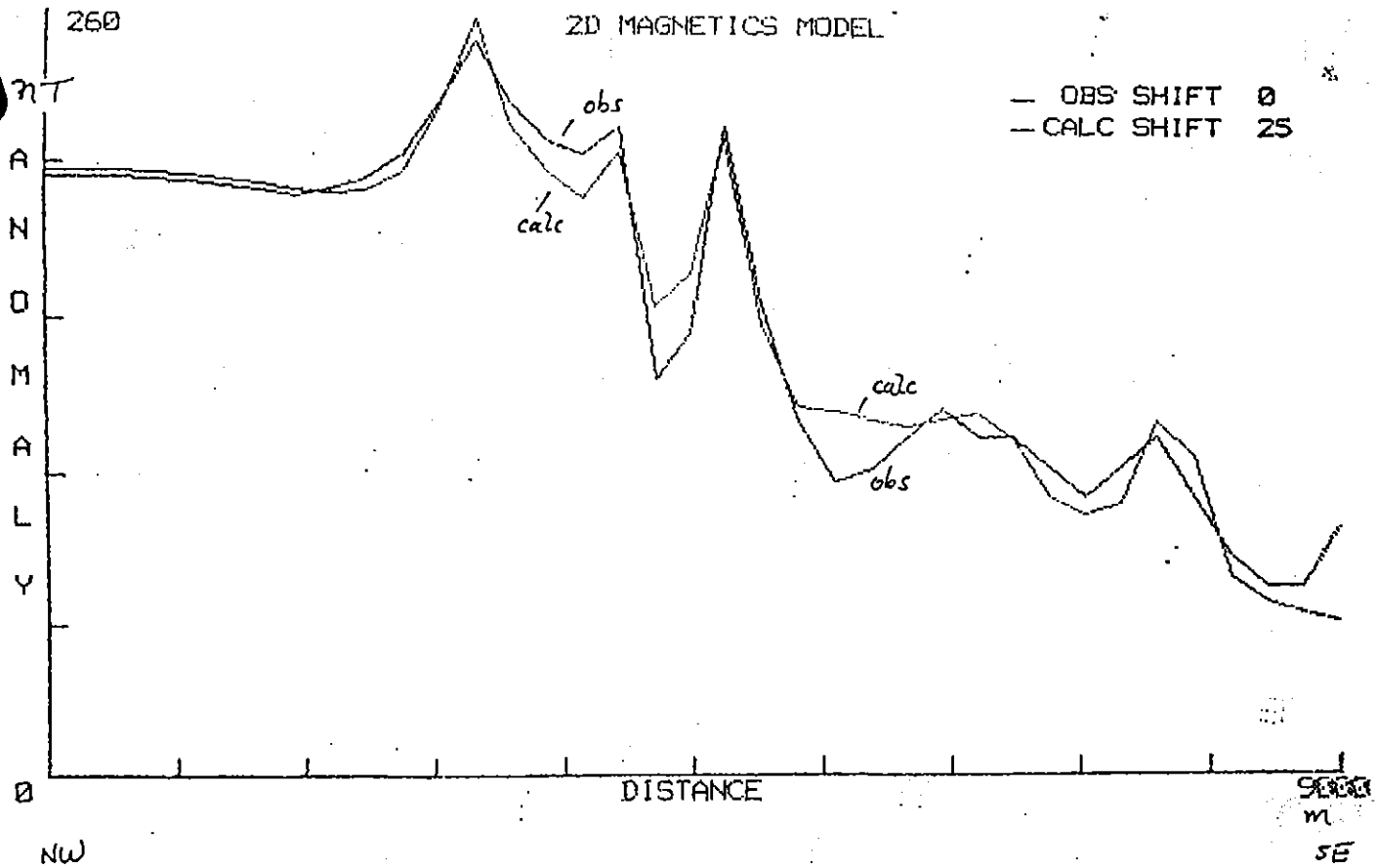
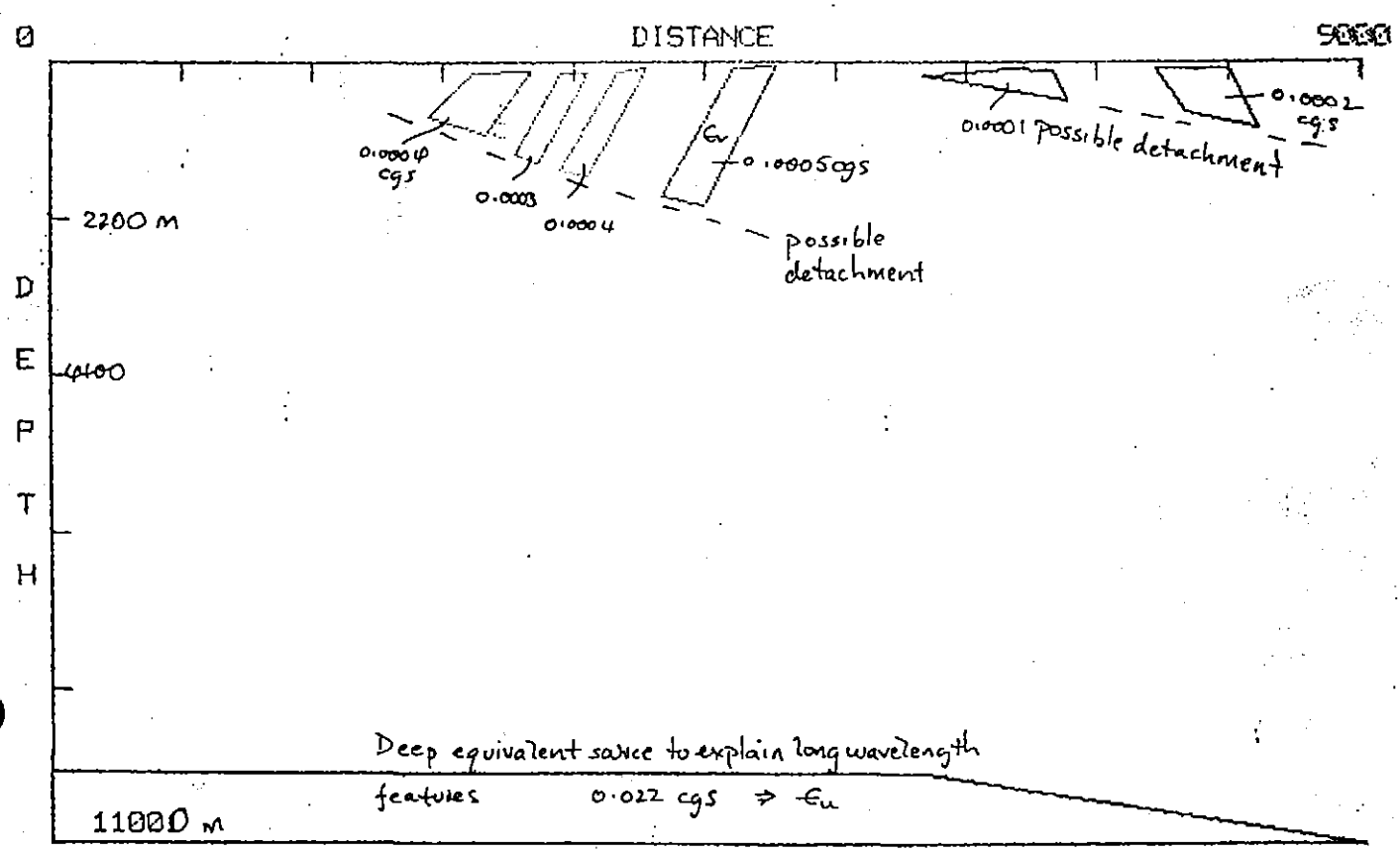
G.P.O. Box 320 D,
Hobart, Tasmania 7001

421309



BURNS PEAK 44/88 M2 3795/5388-3865/5381 (2)



MAGNETIC MODEL PROFILE 2 EL 44/88 FIGURE 4

from Figure 8 (Leaman, 1990a)

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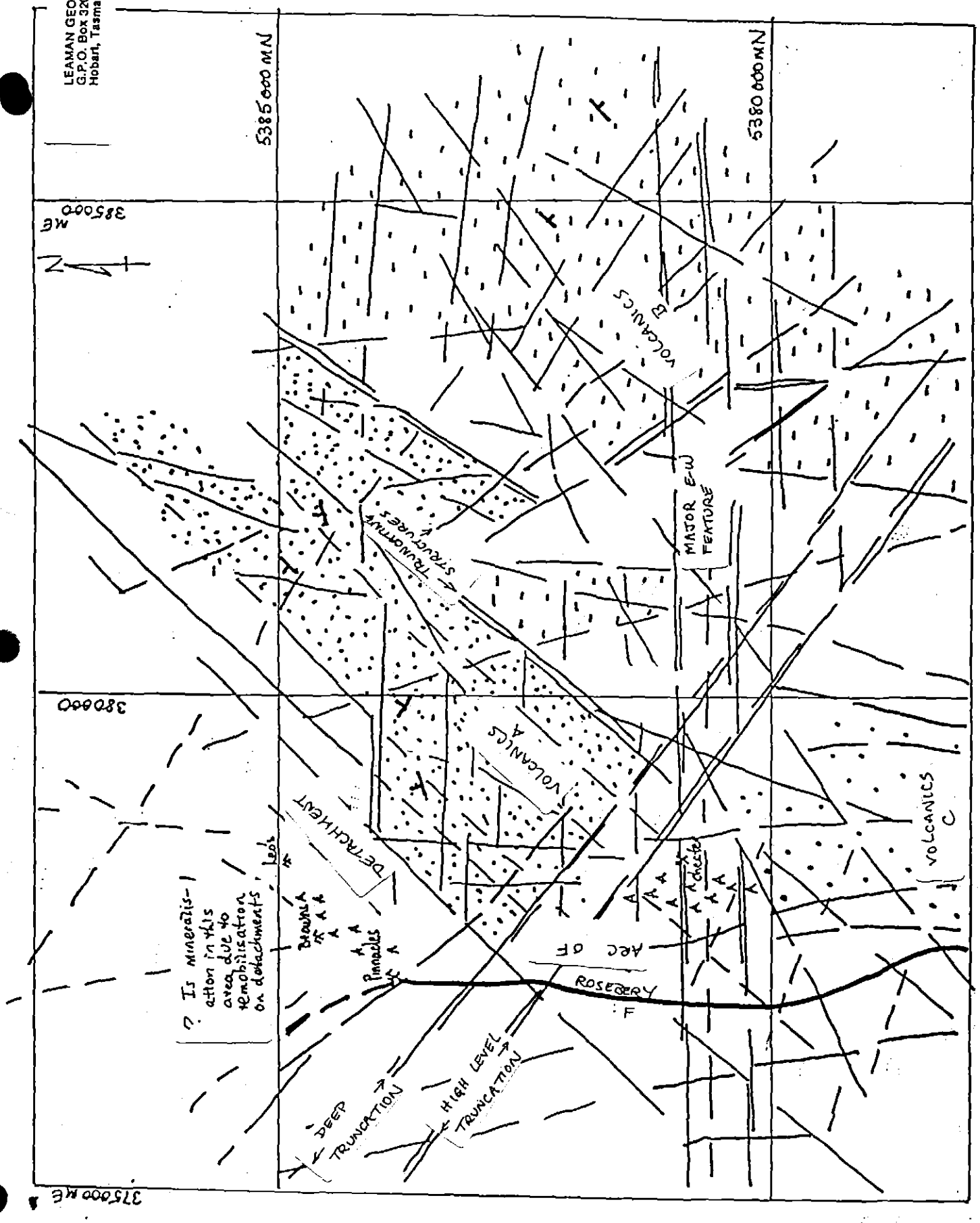
421310



from Figure 13B (Leaman, 1990a)

SUMMARY OF TRENDS AND LINEAMENTS EL 44/88
= LABELLED INTERPRETED FEATURES

FIGURE 15

421311

RESIDUAL BOUGUER ANOMALY EL 44/88 BURNS PEAK FIGURE 6
(Base map after Corbett & McNeill, 1986)
(from Figure 7B, Leaman (1990b))

LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 18000 500

421312

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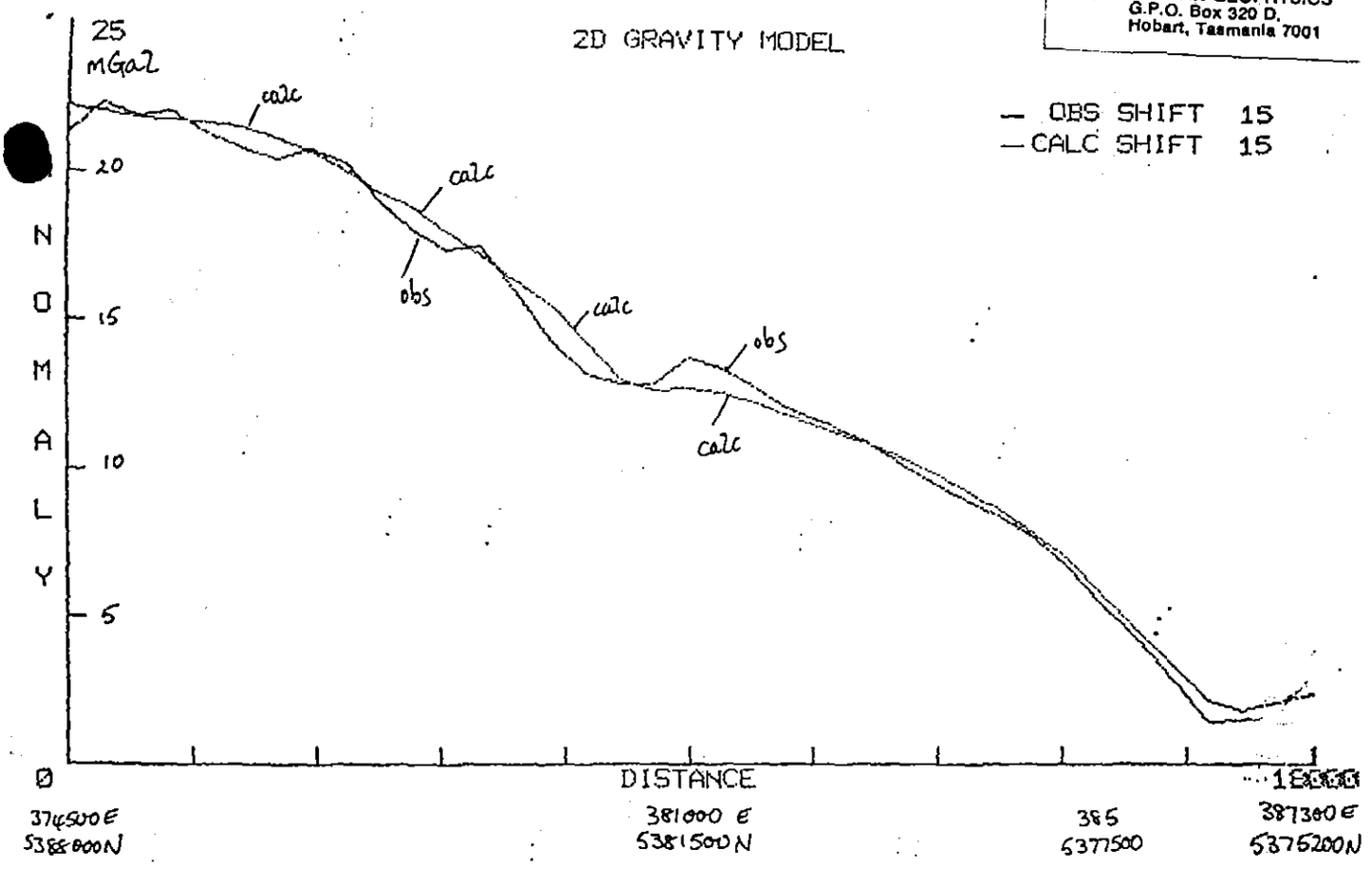
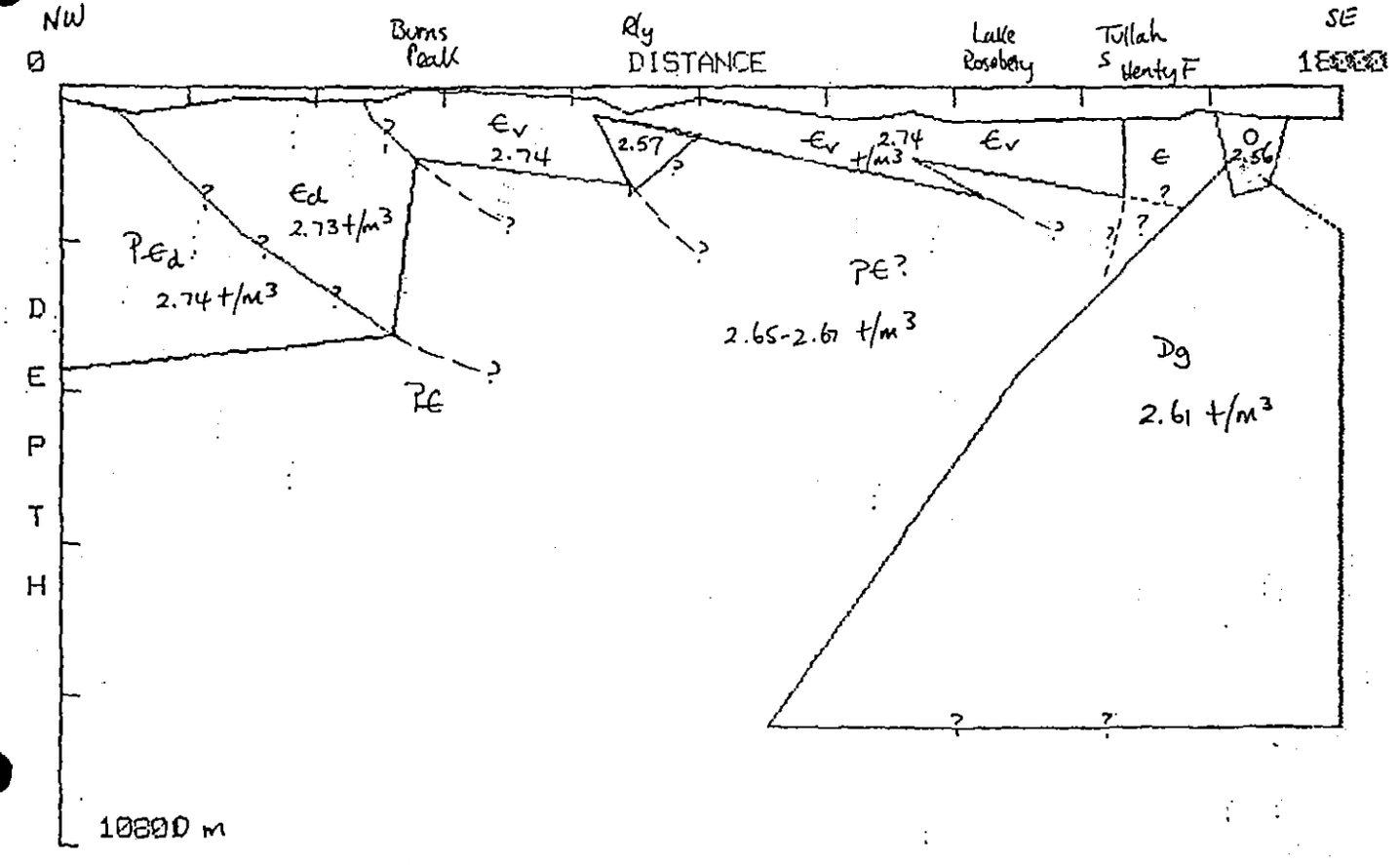


BURNS PEAK PROFILE 1 3745/388-3873/3752



from Figure 9 (Leaman, 1990b)

2D GRAVITY MODEL LINE 1 EL 44/88 BURNS PEAK FIGURE 7

421313

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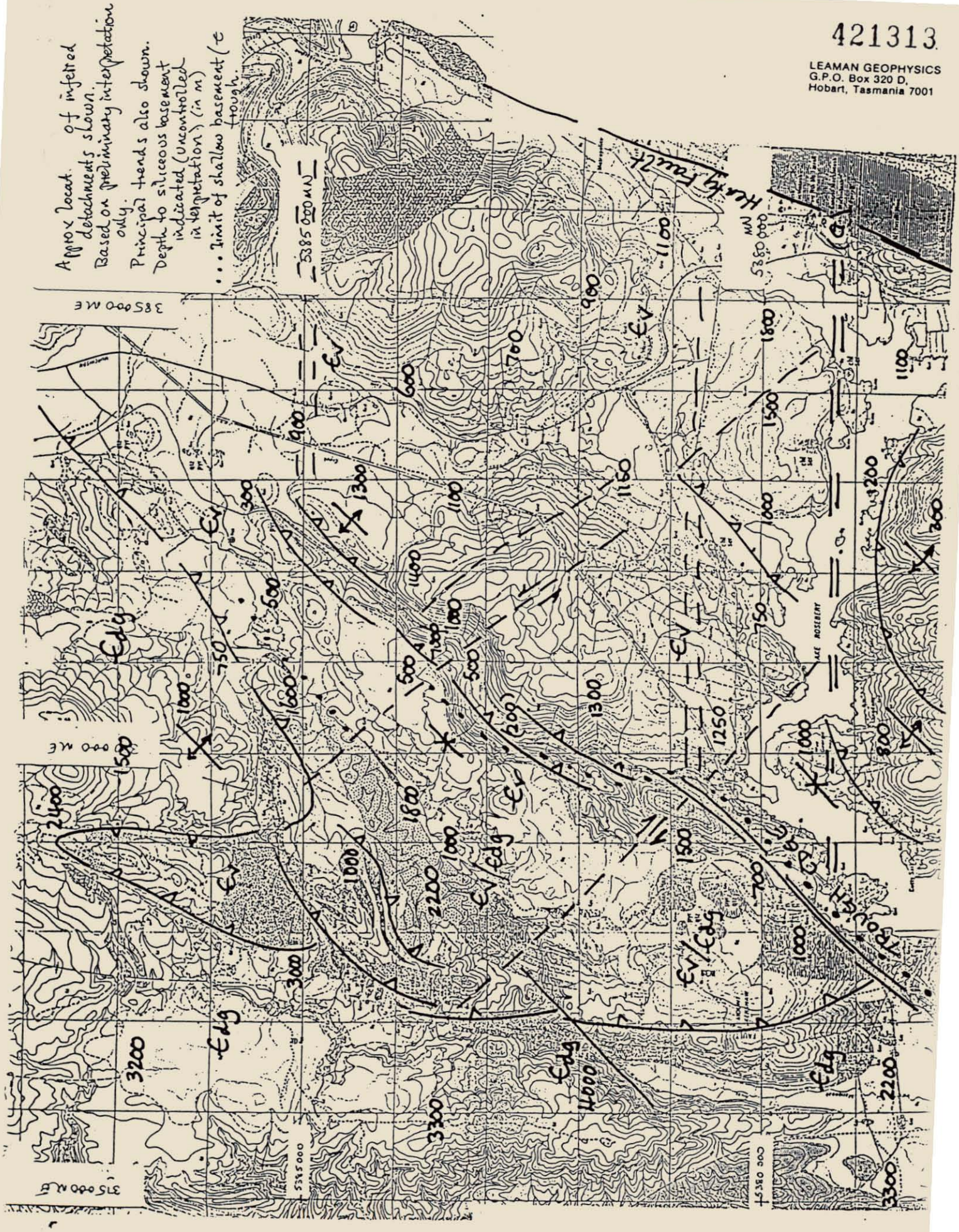


from Figure 15 (Leaman, 1990b)

SUMMARY OF CURRENT INTERPRETATION EL 44/88 BURNS PEAK

FIGURE 8

from Figure 16 (Leaman, 1990 b)

CHESTER: GEOLOGY AND RESIDUAL BOUGUER ANOMALIES FIGURE 9

421314

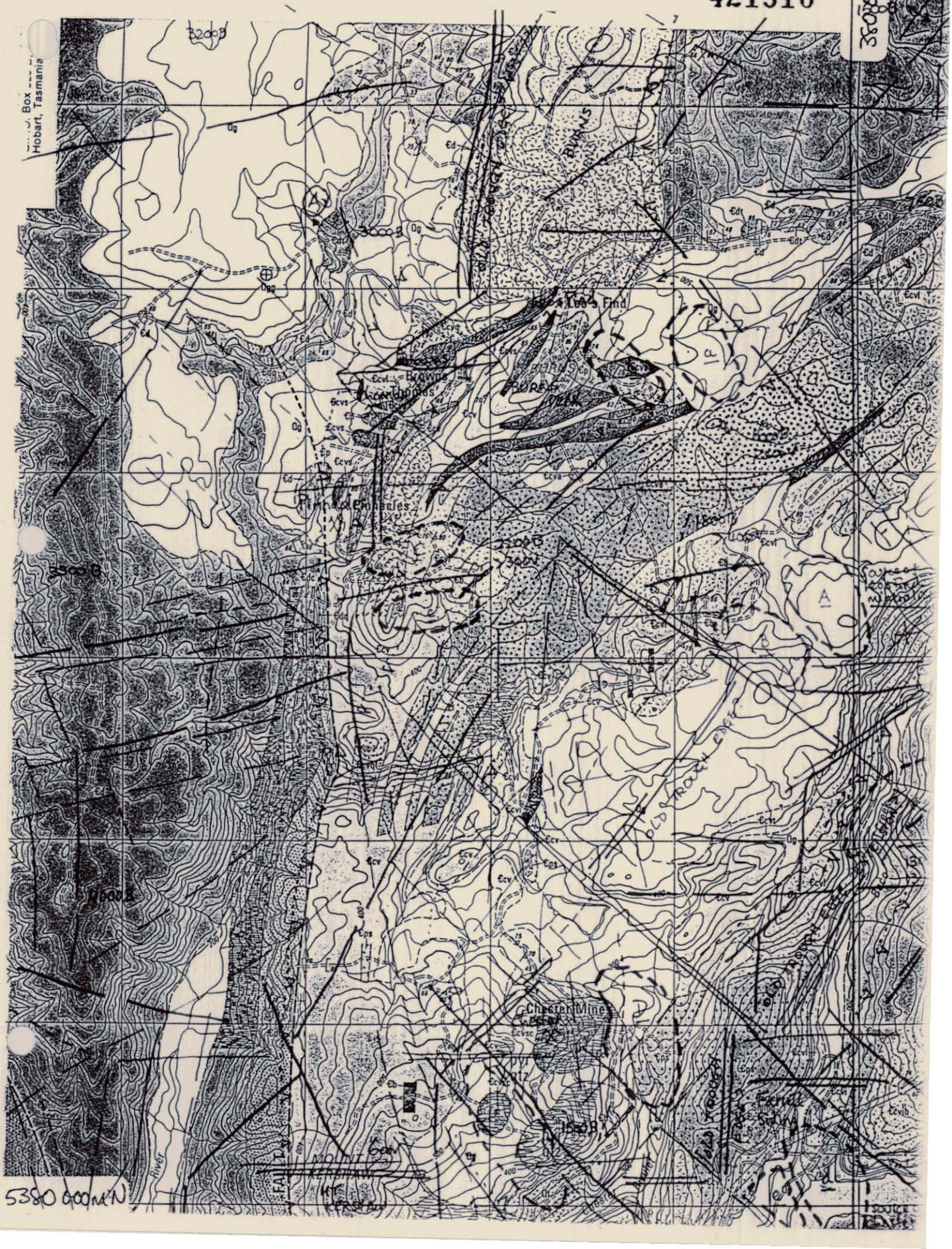
PINNACLES: GEOLOGY AND RESIDUAL BOUGUER ANOMALIES FIGURE 10

from Fig 17 (Leaman, 1990b)

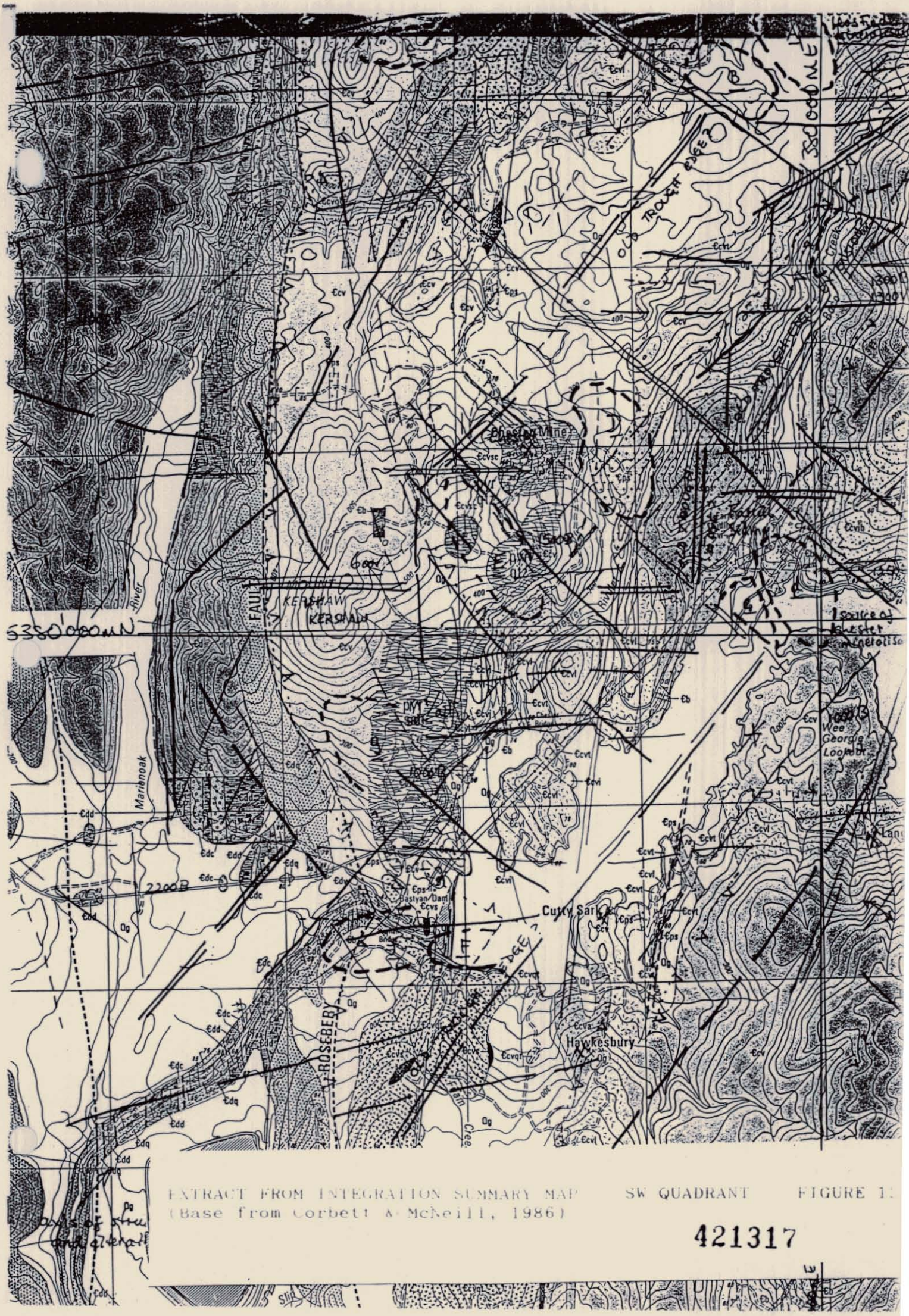
421315

EXTRACT FROM INTEGRATION SUMMARY MAP — NW QUADRANT — FIGURE 11
(Base from Corbett & McNeill, 1986)

421316



5380 GOODMAN



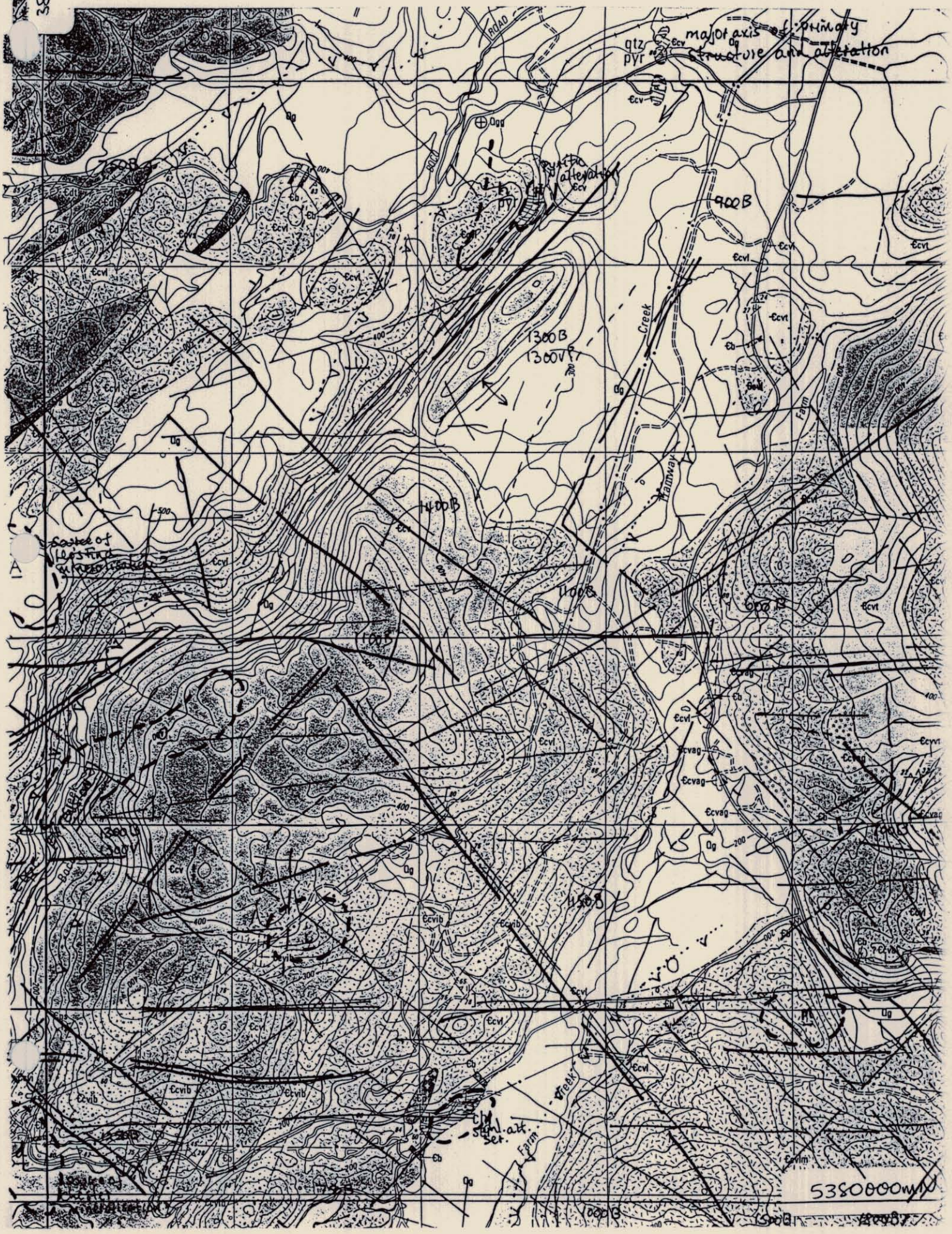
EXTRACT FROM INTEGRATION SUMMARY MAP SW QUADRANT FIGURE 1:
(Base from Corbett & McKeill, 1986)

421317

LAKE ROSEBERY
ROSEBERY
Wee George Lookout
Langdons
SALE MOUNT SALE
Farm
Creek
5380 000 N
421318

EXTRACT FROM INTEGRATION SUMMARY MAP NE QUADRANT FIGURE 11
(Base from Corbett & McNeill, 1986)

421319



GRAVITY DATA BURNS PEAK - EL 44/88

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
7303.0895	372148.6	381819.6	178.68	980.283450	980.332666	0.28	-13.79
7303.0902	375550.7	377622.1	166.50	980.291860	980.336102	0.30	-11.19
7303.1053	379722.7	385097.4	476.28	980.222360	980.330126	0.17	-13.90
7303.1054	387919.4	384489.9	222.25	980.262090	980.330724	1.20	-23.72
7303.1067	377755.5	378400.5	157.44	980.286710	980.335504	0.43	-17.40
7303.1068	386493.3	378174.3	477.22	980.209910	980.335803	2.45	-29.57
6750.2173	385283.3	375822.8	171.72	980.270880	980.337685	1.04	-31.99
6750.2174	385401.0	378860.2	168.04	980.274080	980.335235	0.77	-27.33
6750.2176	383910.8	384407.6	284.59	980.256000	980.330739	0.37	-18.39
8551.3362	387830.0	375170.0	542.00	980.185654	980.338245	8.78	-37.19
8551.3363	387300.0	375070.0	180.00	980.261005	980.338319	3.05	-38.86
8551.3364	386390.0	375030.0	542.00	980.189058	980.338340	5.70	-36.96
8551.3365	385320.0	375100.0	177.00	980.268163	980.338269	1.15	-34.14
8551.3367	383540.0	375920.0	157.00	980.277807	980.337584	1.35	-27.55
8551.3368	384970.0	375910.0	176.00	980.270819	980.337611	0.95	-31.22
8551.3369	385880.0	376280.0	212.00	980.259797	980.337324	1.59	-34.24
8551.3370	387000.0	375740.0	177.00	980.260846	980.337774	2.85	-39.26
8551.3371	387870.0	376100.0	316.00	980.234690	980.337495	2.69	-37.96
8551.3372	389840.0	375750.0	285.00	980.239163	980.337802	0.68	-41.90
8551.3375	389890.0	377180.0	235.00	980.247778	980.336648	3.50	-39.15
8551.3376	389200.0	377090.0	220.00	980.254077	980.336712	1.46	-37.90
8551.3377	387700.0	377120.0	226.00	980.249914	980.336669	4.96	-37.34
8551.3380	384790.0	377170.0	170.00	980.274183	980.336592	0.87	-28.10
8551.3381	384170.0	376880.0	164.00	980.276828	980.336818	0.92	-26.81
8551.3382	381370.0	377450.0	649.00	980.176729	980.336320	6.06	-25.86
8551.3383	380230.0	377810.0	529.00	980.206428	980.336014	3.60	-21.92
8551.3384	381000.0	378150.0	360.00	980.238903	980.335750	1.45	-24.58
8551.3385	381420.0	377950.0	461.00	980.218687	980.335917	2.47	-24.07
8551.3386	384530.0	377940.0	162.00	980.278046	980.335967	0.84	-25.22
8551.3387	385030.0	377950.0	168.00	980.274273	980.335965	0.88	-27.77
8551.3388	386440.0	377930.0	460.00	980.213137	980.335999	2.50	-29.87
8551.3389	386780.0	377530.0	687.00	980.164629	980.336327	7.93	-28.61
8551.3390	387080.0	377800.0	554.00	980.188738	980.336112	5.53	-32.86
8551.3391	387730.0	377870.0	228.00	980.250673	980.336064	4.75	-35.79
8551.3399	375990.0	376050.0	87.00	980.302585	980.337377	0.60	-17.08
8551.3400	376900.0	376000.0	194.00	980.280722	980.337430	1.29	-17.26
8551.3401	377870.0	375750.0	351.00	980.246879	980.337645	2.40	-19.32
8551.3402	377850.0	376970.0	342.00	980.249934	980.336660	1.37	-18.08
8551.3403	376890.0	376950.0	188.00	980.282758	980.336663	1.93	-15.00
8551.3404	375850.0	376930.0	88.00	980.303633	980.336665	0.53	-15.19
8551.3405	375500.0	379850.0	171.00	980.291633	980.334303	0.31	-8.73
8551.3406	376190.0	379730.0	161.00	980.292532	980.334409	0.51	-9.70
8551.3407	376780.0	379790.0	93.00	980.299879	980.334369	0.87	-15.33
8551.3408	377990.0	379980.0	192.00	980.280183	980.334232	1.05	-15.23
8551.3409	379030.0	379980.0	202.00	980.275041	980.334247	1.57	-17.90
8551.3411	376530.0	375120.0	160.00	980.288019	980.338135	1.03	-17.61
8651.1148	371900.0	375070.0	114.00	980.300867	980.338110	0.27	-14.55
8651.1149	374170.0	375370.0	141.00	980.294159	980.337900	0.46	-15.55
8651.1630	386920.0	379000.0	537.00	980.192702	980.335142	7.09	-29.71
8651.1631	387120.0	379950.0	452.00	980.213257	980.334378	4.80	-27.41
8651.1632	387950.0	382080.0	548.00	980.185234	980.332669	12.33	-27.30
8651.1633	386900.0	381230.0	227.00	980.258929	980.333342	2.93	-26.83
8651.1635	370700.0	378280.0	175.00	980.288049	980.335501	0.44	-12.59
8651.1636	372000.0	378320.0	164.00	980.288279	980.335488	0.41	-14.54
8651.1637	373180.0	379100.0	124.00	980.298052	980.334875	0.31	-12.12
8651.1638	374550.0	379230.0	238.00	980.277218	980.334790	0.69	-10.07

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
8651.1639	371140.0	377040.0	93.00	980.304611	980.336509	0.33	-13.28
8651.1640	372540.0	376520.0	91.00	980.305090	980.336948	0.36	-13.60
8651.1834	386120.0	376960.0	400.00	980.222870	980.336778	5.07	-30.15
8651.1835	386930.0	377000.0	614.00	980.176200	980.336756	7.35	-32.42
8651.2021	371310.0	380580.0	225.00	980.275830	980.333654	0.14	-13.43
8651.2022	372810.0	380630.0	140.00	980.291743	980.333635	0.22	-14.14
8651.2024	372500.0	386150.0	130.00	980.298621	980.329176	0.59	-4.39
8651.2025	373320.0	384950.0	171.00	980.292092	980.330156	0.67	-3.76
8651.2026	372910.0	387810.0	212.00	980.281710	980.327843	0.96	-3.47
8551.5822	378910.0	375110.0	504.00	980.211947	980.338176	4.10	-22.98
8551.5823	378840.0	375910.0	531.00	980.208384	980.337529	4.40	-20.29
8551.5829	382000.0	375000.0	484.00	980.217803	980.338307	1.96	-23.33
8551.5831	379740.0	376050.0	500.00	980.211439	980.337429	5.14	-22.49
8551.5832	380810.0	376070.0	753.00	980.159260	980.337427	5.08	-24.95
8551.5833	380740.0	377000.0	673.00	980.176734	980.336675	4.33	-23.21
8551.5844	381870.0	375900.0	519.00	980.209672	980.337578	4.07	-21.74
8551.5845	381850.0	377000.0	490.00	980.214240	980.336690	2.40	-23.66
8551.5850	380040.0	376980.0	521.00	980.209437	980.336682	2.94	-21.81
8651.7013	383000.0	376750.0	237.00	980.260658	980.336907	2.77	-26.86
8651.7014	384870.0	379030.0	157.00	980.278461	980.335091	0.80	-24.95
8651.7015	385780.0	379050.0	222.00	980.264493	980.335087	0.99	-25.94
8651.7016	386000.0	380030.0	224.00	980.264352	980.334299	1.31	-24.58
8651.7017	385150.0	380970.0	190.00	980.271881	980.333529	0.98	-23.30
8651.7018	385960.0	380980.0	192.00	980.270236	980.333531	1.01	-24.52
8651.7019	382970.0	381050.0	183.00	980.276854	980.333436	0.67	-19.92
8651.7020	384070.0	380970.0	275.00	980.255704	980.333515	0.73	-22.99
8651.7021	383060.0	380000.0	314.00	980.250722	980.334285	1.44	-20.36
8651.7022	384040.0	380000.0	255.00	980.263233	980.334297	0.85	-20.06
8651.7023	383740.0	383870.0	299.00	980.252921	980.331170	0.49	-18.94
8651.7024	383140.0	383950.0	306.00	980.251953	980.331098	0.58	-18.37
8651.7025	382930.0	383180.0	272.00	980.259595	980.331716	0.92	-17.70
8651.7026	382030.0	381970.0	385.00	980.238821	980.332681	1.75	-16.38
8651.7027	380930.0	381130.0	387.00	980.238549	980.333344	2.15	-16.52
8651.7028	384000.0	381990.0	225.00	980.266523	980.332691	1.24	-20.67
8651.7029	381880.0	380970.0	274.00	980.259699	980.333486	1.20	-18.69
8651.7030	381870.0	379980.0	160.00	980.281460	980.334285	0.60	-20.75
8651.7031	382890.0	382020.0	267.00	980.259313	980.332652	1.03	-19.79
8651.7032	381060.0	379920.0	269.00	980.258223	980.334323	2.50	-20.69
8651.7033	379850.0	380840.0	165.00	980.280520	980.333564	1.84	-18.75
8651.7034	383910.0	383030.0	314.00	980.250045	980.331850	1.31	-18.73
8651.7035	381940.0	382880.0	546.00	980.203261	980.331945	2.82	-18.45
8651.7036	384060.0	385910.0	362.00	980.239874	980.329528	0.53	-17.92
8651.7037	384150.0	384970.0	366.00	980.240081	980.330288	0.55	-17.66
8651.7038	385060.0	377100.0	172.00	980.272643	980.336652	0.94	-29.24
8651.7039	384820.0	375950.0	162.00	980.274024	980.337577	0.96	-30.73
8651.7040	383020.0	384880.0	299.00	980.254632	980.330346	0.52	-16.38
8651.7041	380850.0	381770.0	484.00	980.219269	980.332827	2.59	-15.76
8651.7042	385900.0	383120.0	531.00	980.206072	980.331803	5.00	-16.27
8651.7043	385880.0	383970.0	590.00	980.194895	980.331117	5.25	-14.91
8651.7044	385070.0	385980.0	397.00	980.232871	980.329485	2.15	-16.37
8651.7045	384760.0	384900.0	299.00	980.250167	980.330352	2.08	-19.29
8651.7046	385160.0	385180.0	326.00	980.244123	980.330131	2.68	-19.20
8651.7047	385870.0	385250.0	355.00	980.236800	980.330084	3.20	-20.25
8651.7048	386080.0	385850.0	541.00	980.203374	980.329603	4.40	-15.40
8651.7049	383720.0	387000.0	400.00	980.232053	980.328644	0.80	-17.11
8651.7050	384050.0	387970.0	412.00	980.228218	980.327866	0.90	-17.70

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Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
8651.7051	384070.0	389000.0	393.00	980.231104	980.327035	0.67	-17.95
8651.7053	383070.0	387930.0	402.00	980.232016	980.327885	0.62	-16.17
8651.7054	382860.0	387200.0	492.00	980.215039	980.328471	1.20	-15.45
8651.7055	381930.0	388850.0	523.00	980.207266	980.327128	0.72	-16.26
8651.7057	383130.0	388950.0	391.00	980.232561	980.327063	0.60	-16.99
8651.7059	381930.0	386730.0	439.00	980.226272	980.328838	0.80	-15.41
8651.8155	382160.0	388000.0	449.00	980.223697	980.327817	0.46	-15.34
8651.8156	381380.0	386920.0	502.00	980.214325	980.328678	0.74	-14.86
8651.8160	380770.0	389000.0	610.00	980.193927	980.326991	0.37	-12.69
8651.8162	387960.0	388080.0	678.00	980.174948	980.327827	1.40	-18.10
8651.8163	387850.0	386160.0	663.00	980.169590	980.329375	7.73	-21.62
8651.8164	387710.0	387040.0	676.00	980.176443	980.328663	3.67	-15.56
8651.8165	387250.0	387800.0	704.00	980.171376	980.328044	2.92	-15.25
8651.8157	381110.0	387860.0	543.00	980.206955	980.327916	0.60	-13.54
8651.7067	377200.0	382000.0	399.00	980.243155	980.332591	1.60	-9.35
8651.7068	375000.0	384900.0	206.00	980.277606	980.330220	1.72	-10.38
8651.7069	374720.0	384080.0	229.00	980.276844	980.330878	1.02	-7.97
8651.7070	375220.0	383000.0	250.00	980.273489	980.331757	0.96	-8.13
8651.7071	375160.0	382000.0	315.00	980.262914	980.332563	0.80	-6.89
8651.7072	375000.0	381200.0	255.00	980.274917	980.333206	0.87	-7.26
8651.7073	377940.0	388810.0	563.00	980.207907	980.327106	0.22	-8.22
8651.7075	377960.0	386920.0	497.00	980.219568	980.328631	0.53	-10.76
8651.7079	375820.0	385880.0	398.00	980.240546	980.329441	0.41	-10.19
8651.7081	375140.0	378930.0	213.00	980.284942	980.335040	0.44	-7.76
8651.7082	375930.0	378610.0	184.00	980.289849	980.335310	0.28	-8.99
8651.7083	377000.0	378600.0	177.00	980.288074	980.335333	0.63	-11.81
8651.7084	377890.0	378950.0	186.00	980.282029	980.335062	1.07	-15.38
8651.7085	375060.0	379950.0	212.00	980.284180	980.334216	0.44	-7.90
8651.7086	376980.0	388000.0	477.00	980.228010	980.327746	0.38	-5.52
8651.7087	376120.0	388100.0	507.00	980.223340	980.327654	0.60	-3.98
8651.7089	374950.0	388900.0	227.00	980.276920	980.326992	0.73	-4.69
8651.7090	374950.0	387950.0	368.00	980.250506	980.327758	0.80	-4.06
8651.7093	380100.0	385730.0	461.00	980.224468	980.329621	0.55	-13.92
8651.8081	381140.0	383140.0	259.00	980.259648	980.331725	2.80	-18.33
8651.8082	379970.0	381950.0	225.00	980.267492	980.332669	2.28	-18.64
8651.8083	378840.0	380980.0	250.00	980.268354	980.333437	1.60	-14.31
8651.8084	378180.0	381070.0	465.00	980.225724	980.333355	1.55	-14.61
8651.8085	378000.0	381980.0	355.00	980.249943	980.332618	0.49	-12.35
8651.8086	379060.0	383130.0	406.00	980.238130	980.331705	0.60	-13.11
8651.8087	379760.0	382940.0	504.00	980.215573	980.331868	0.92	-16.23
8651.8088	379880.0	384000.0	468.00	980.224176	980.331014	0.26	-14.52
8651.8089	380180.0	385090.0	430.00	980.230410	980.330138	0.33	-14.81
8651.8090	380920.0	385200.0	499.00	980.214586	980.330059	0.49	-16.82
8651.8091	383120.0	386020.0	356.00	980.241943	980.329427	0.38	-17.08
8651.8092	382220.0	385850.0	372.00	980.238816	980.329552	0.60	-16.96
8651.8093	382250.0	385140.0	458.00	980.219937	980.330126	0.76	-19.33
8651.8094	381070.0	385880.0	386.00	980.237849	980.329513	0.73	-15.00
8651.8095	383870.0	376000.0	155.00	980.277737	980.337524	1.20	-28.10
8651.8096	381860.0	384180.0	291.00	980.254982	980.330895	2.10	-16.57
8651.8097	385080.0	380000.0	157.00	980.277394	980.334311	0.93	-25.11
8651.8098	384970.0	375020.0	174.00	980.270806	980.338329	1.10	-32.20
8651.8101	385000.0	382000.0	467.00	980.218150	980.332696	3.20	-19.48
8651.8102	385000.0	383000.0	522.00	980.207635	980.331889	3.61	-17.96
8651.8103	385080.0	384000.0	567.00	980.197515	980.331083	3.48	-18.55
8651.8104	386000.0	382250.0	508.00	980.208529	980.332507	4.11	-19.94
8651.8105	377900.0	383900.0	496.00	980.222077	980.331068	1.09	-10.33

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Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
8651.8106	377860.0	383060.0	422.00	980.237143	980.331745	0.65	-10.94
8651.8107	377930.0	384700.0	509.00	980.219989	980.330422	0.71	-9.59
8651.8108	378780.0	385160.0	523.00	980.216436	980.330063	0.36	-10.38
8651.8109	378780.0	383800.0	413.00	980.237725	980.331160	0.51	-11.68
8651.8110	378720.0	382080.0	433.00	980.231148	980.332548	0.52	-15.70
8651.8111	377230.0	380400.0	486.00	980.222420	980.333883	3.22	-12.64
8651.8112	377070.0	381320.0	420.00	980.238171	980.333138	1.89	-10.47
8651.8113	377150.0	383190.0	403.00	980.242369	980.331630	0.80	-9.19
8651.8114	377270.0	384030.0	423.00	980.238899	980.330954	0.53	-8.32
8651.8115	377110.0	385240.0	395.00	980.244696	980.329975	0.45	-7.13
8651.8116	376000.0	385190.0	464.00	980.232062	980.330000	0.50	-6.16
8651.8117	375900.0	384240.0	444.00	980.235979	980.330765	0.29	-7.16
8651.8118	384150.0	378880.0	160.00	980.279378	980.335203	0.73	-23.62
8651.8119	383000.0	378850.0	160.00	980.279513	980.335212	1.28	-22.95
8651.8120	381920.0	378780.0	160.00	980.278651	980.335254	2.03	-23.10
8651.8121	371000.0	379080.0	180.00	980.286132	980.334860	1.36	-11.96
8651.8122	380330.0	379020.0	160.00	980.280220	980.335039	1.43	-21.92
8651.8123	379910.0	379880.0	163.00	980.282422	980.334339	1.80	-18.06
8651.8124	379230.0	378870.0	160.00	980.283233	980.335145	1.57	-18.87
8651.8125	388600.0	382840.0	229.00	980.258515	980.332064	1.27	-27.23
8651.8126	388080.0	381980.0	228.00	980.257206	980.332751	2.79	-27.91
8651.8127	387890.0	380000.0	228.00	980.254078	980.334347	2.46	-32.96
8651.8128	390000.0	382060.0	228.00	980.255408	980.332711	0.92	-31.54
8651.8129	389910.0	379000.0	228.00	980.253175	980.335179	2.02	-35.14
8651.8130	387750.0	378930.0	231.00	980.251782	980.335209	3.70	-34.29
8651.8131	389930.0	383140.0	229.00	980.258027	980.331838	1.05	-27.72
8651.8132	389940.0	384170.0	228.00	980.257507	980.331007	1.02	-27.63
8651.8135	388980.0	385730.0	230.00	980.260811	980.329736	2.15	-21.53
8651.8136	388300.0	384750.0	235.00	980.262016	980.330518	1.77	-20.51
8651.8137	388000.0	383980.0	239.00	980.261829	980.331136	1.15	-21.15
8651.8138	387110.0	384130.0	325.00	980.240987	980.331004	3.06	-23.03
8651.8139	386900.0	381960.0	201.00	980.266224	980.332752	1.45	-25.54
8651.8140	387030.0	383020.0	211.00	980.265466	980.331899	2.25	-22.68
8651.8141	375880.0	382990.0	468.00	980.230036	980.331774	1.42	-8.26
8651.8142	375710.0	381940.0	497.00	980.223168	980.332619	2.32	-9.36
8651.8143	375830.0	380910.0	400.00	980.243013	980.333452	2.80	-8.95
8651.8144	375910.0	380500.0	326.00	980.259398	980.333784	1.15	-9.11
8651.8145	385000.0	387030.0	412.00	980.228239	980.328636	1.88	-17.47
8651.8146	385020.0	388220.0	601.00	980.189307	980.327676	2.65	-17.49
8651.8147	386140.0	387950.0	688.00	980.171842	980.327909	2.25	-18.47
8651.8148	386070.0	387090.0	692.00	980.171208	980.328602	1.62	-19.64
8651.8149	387000.0	387130.0	730.00	980.162283	980.328581	4.27	-18.41
8651.8154	386070.0	388900.0	492.00	980.211428	980.327141	0.77	-18.16
8651.8173	389720.0	388920.0	649.00	980.176548	980.327171	3.65	-19.30
8651.8175	388990.0	387920.0	560.00	980.191448	980.327969	4.00	-22.36
8651.8176	388850.0	387150.0	455.00	980.215542	980.328589	2.26	-21.28
8651.8177	388210.0	388940.0	693.00	980.171073	980.327136	0.86	-18.87
8651.8998	388940.0	388080.0	596.00	980.184393	980.327839	4.10	-22.10
8651.8198	377050.0	387950.0	486.00	980.224751	980.327788	0.44	-6.99
8651.8199	377020.0	387150.0	429.00	980.235095	980.328433	0.45	-8.50
8651.8200	378450.0	388470.0	544.00	980.211032	980.327387	0.23	-9.11
8651.8185	387200.0	384840.0	474.00	980.211744	980.330432	2.48	-22.96
8651.8186	387260.0	386200.0	651.00	980.177462	980.329335	3.33	-20.47
8651.3039	383808.0	387150.0	401.10	980.230867	980.328524	0.67	-18.09
8651.3040	383830.0	387129.0	400.80	980.230887	980.328541	0.67	-18.14
8651.3041	383852.0	387109.0	400.70	980.230937	980.328558	0.69	-18.11

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
8651.3042	383874.0	387089.0	400.40	980.230957	980.328574	0.69	-18.16
8651.3043	383896.0	387068.0	399.80	980.231216	980.328591	0.68	-18.05
8651.3044	383918.0	387048.0	399.20	980.231366	980.328608	0.67	-18.05
8651.3045	383941.0	387028.0	398.80	980.231665	980.328624	0.66	-17.85
8651.3046	383963.0	387007.0	398.50	980.231586	980.328642	0.65	-18.02
8651.3047	383985.0	386987.0	398.30	980.231775	980.328658	0.64	-17.89
8651.3048	384007.0	386967.0	397.80	980.231945	980.328674	0.66	-17.82
8651.3049	384029.0	386946.0	397.50	980.232035	980.328692	0.70	-17.76
8651.3050	384051.0	386926.0	397.40	980.232195	980.328708	0.74	-17.60
8651.3051	384073.0	386906.0	397.30	980.232215	980.328724	0.84	-17.52
8651.3052	383787.0	387168.0	400.10	980.230937	980.328509	0.66	-18.21
8651.3053	383764.0	387187.0	400.40	980.230807	980.328494	0.64	-18.28
8651.3054	383741.0	387207.0	399.90	980.230887	980.328477	0.65	-18.28
8651.3055	383717.0	387224.0	399.90	980.230807	980.328463	0.64	-18.35
8651.3056	383696.0	387245.0	399.30	980.231007	980.328446	0.65	-18.24
8651.3057	383673.0	387264.0	399.50	980.231007	980.328430	0.66	-18.18
8651.3058	383653.0	387286.0	399.70	980.230997	980.328412	0.67	-18.12
8651.3059	383630.0	387305.0	400.60	980.230837	980.328397	0.66	-18.10
8651.3060	383607.0	387325.0	399.90	980.231116	980.328380	0.65	-17.95
8651.3061	383584.0	387345.0	399.10	980.231386	980.328364	0.66	-17.81
8651.3062	383562.0	387364.0	398.40	980.231486	980.328348	0.63	-17.86
8651.3063	383626.0	387337.0	399.60	980.231076	980.328371	0.64	-18.05
8651.3064	383616.0	387364.0	399.70	980.231246	980.328349	0.62	-17.86
8651.3065	383605.0	387392.0	399.90	980.231226	980.328326	0.62	-17.82
8651.3066	383591.0	387418.0	398.80	980.231186	980.328305	0.59	-18.08
8651.3067	383579.0	387446.0	398.80	980.231256	980.328282	0.57	-18.01
8651.3068	383566.0	387472.0	398.30	980.231346	980.328261	0.59	-17.98
8651.3069	383554.0	387500.0	398.90	980.231526	980.328238	0.57	-17.67
8651.3070	383542.0	387526.0	398.10	980.231466	980.328217	0.57	-17.87
8651.3071	383529.0	387553.0	398.10	980.231566	980.328195	0.58	-17.74
8651.3072	383516.0	387580.0	397.80	980.231646	980.328173	0.57	-17.71
8651.3073	383504.0	387606.0	397.50	980.231765	980.328152	0.56	-17.63
8651.3074	383489.0	387633.0	397.00	980.231925	980.328130	0.56	-17.55
8851.6719	383291.0	387149.0	399.00	980.232784	980.328518	0.71	-16.54
8851.6720	383319.0	387159.0	394.80	980.233466	980.328510	0.69	-16.69
8851.6721	383347.0	387169.0	395.10	980.233600	980.328503	0.67	-16.51
8851.6722	383375.0	387179.0	395.20	980.233533	980.328495	0.65	-16.57
8851.6723	383404.0	387188.0	395.70	980.233389	980.328488	0.64	-16.62
8851.6724	383433.0	387198.0	395.60	980.233389	980.328480	0.65	-16.62
8851.6725	383461.0	387209.0	395.40	980.233082	980.328472	0.64	-16.97
8851.6726	383489.0	387219.0	395.20	980.232948	980.328464	0.64	-17.14
8851.6727	383517.0	387230.0	394.40	980.232554	980.328456	0.65	-17.67
8851.6728	383546.0	387239.0	396.00	980.232497	980.328449	0.65	-17.41
8851.6729	383575.0	387249.0	397.20	980.232314	980.328441	0.66	-17.33
8851.6730	383603.0	387259.0	397.90	980.231997	980.328433	0.66	-17.51
8851.6731	383631.0	387269.0	398.60	980.231681	980.328426	0.66	-17.68
8851.6732	383660.0	387280.0	400.40	980.231326	980.328417	0.67	-17.66
8851.6733	383688.0	387289.0	399.60	980.231326	980.328410	0.67	-17.81
8851.6734	383717.0	387300.0	399.60	980.231143	980.328402	0.67	-17.98
8851.6735	383745.0	387310.0	400.00	980.231066	980.328394	0.68	-17.96
8851.6736	383773.0	387320.0	399.40	980.231172	980.328386	0.68	-17.97
8851.6737	383802.0	387331.0	399.30	980.231114	980.328378	0.68	-18.04
8851.6738	383831.0	387341.0	399.40	980.231018	980.328370	0.69	-18.10
8851.6739	383859.0	387351.0	400.90	980.230500	980.328363	0.69	-18.31
8851.6740	383888.0	387359.0	402.80	980.230270	980.328357	0.70	-18.15
8851.6741	383915.0	387369.0	403.30	980.230212	980.328349	0.70	-18.10

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
8851.6742	383946.0	387377.0	405.40	980.229742	980.328343	0.71	-18.14
8851.6743	383976.0	387384.0	404.40	980.230001	980.328337	0.72	-18.07
8851.6744	384004.0	387392.0	404.90	980.229982	980.328331	0.73	-17.97
8851.6745	384033.0	387400.0	405.40	980.229934	980.328325	0.75	-17.89
8851.6746	384064.0	387408.0	405.70	980.230030	980.328319	0.77	-17.71
8851.6747	384093.0	387415.0	406.30	980.229752	980.328314	0.79	-17.85
8851.6748	384123.0	387423.0	406.30	980.229771	980.328308	0.80	-17.81
8851.6749	384150.0	387431.0	406.10	980.229876	980.328302	0.81	-17.73
8851.6750	384180.0	387439.0	406.50	980.229876	980.328296	0.82	-17.64
8851.6751	384209.0	387447.0	406.70	980.229924	980.328290	0.83	-17.53
8851.6752	384238.0	387454.0	407.40	980.229790	980.328284	0.84	-17.51
8851.6753	384268.0	387463.0	407.70	980.229656	980.328278	0.86	-17.56
8851.6754	384297.0	387470.0	407.50	980.229713	980.328272	0.89	-17.51
8851.6755	383793.0	386837.0	393.30	980.232948	980.328776	0.63	-17.83
8851.6756	383764.0	386825.0	393.60	980.232890	980.328786	0.64	-17.83
8851.6757	383735.0	386816.0	394.00	980.232852	980.328793	0.64	-17.80
8851.6758	383707.0	386809.0	394.60	980.232669	980.328798	0.63	-17.88
8851.6759	383677.0	386800.0	396.60	980.232497	980.328805	0.63	-17.66
8851.6760	383650.0	386792.0	396.50	980.232554	980.328811	0.62	-17.64
8851.6761	383620.0	386783.0	397.50	980.232545	980.328818	0.61	-17.47
8851.6762	383591.0	386775.0	399.40	980.232170	980.328824	0.61	-17.48
8851.6763	383563.0	386767.0	400.10	980.232218	980.328830	0.62	-17.29
8851.6764	383535.0	386758.0	401.00	980.232209	980.328837	0.62	-17.13
8851.6765	383506.0	386751.0	399.20	980.232506	980.328842	0.63	-17.18
8851.6766	383478.0	386742.0	399.20	980.232545	980.328849	0.63	-17.15
8851.6767	383807.0	386855.0	393.20	980.232928	980.328762	0.64	-17.85
8851.6768	383832.0	386867.0	393.20	980.232900	980.328753	0.64	-17.87
8851.6769	383854.0	386885.0	393.50	980.232861	980.328739	0.65	-17.82
8851.6770	383877.0	386900.0	394.60	980.232631	980.328727	0.66	-17.81
8851.6771	383901.0	386913.0	395.70	980.232487	980.328717	0.68	-17.71
8851.6772	383927.0	386925.0	397.20	980.232189	980.328707	0.68	-17.70
8851.6773	383955.0	386921.0	397.40	980.232113	980.328711	0.70	-17.73
8851.6774	383983.0	386911.0	397.00	980.232228	980.328719	0.71	-17.69
8851.6775	384010.0	386901.0	396.80	980.232324	980.328728	0.72	-17.63
8851.6776	384037.0	386897.0	396.40	980.232401	980.328731	0.73	-17.62
8851.6777	384062.0	386889.0	396.60	980.232449	980.328738	0.75	-17.52
8851.6778	384091.0	386883.0	396.40	980.232554	980.328743	0.76	-17.45
8651.7094	379920.0	387110.0	589.00	980.199952	980.328505	0.40	-12.28
8651.7095	379890.0	387890.0	645.00	980.189180	980.327875	0.33	-11.48
8651.7096	379160.0	388750.0	548.00	980.207792	980.327171	0.20	-11.38
8651.7097	379640.0	388710.0	554.00	980.204521	980.327210	0.27	-13.44
8651.7102	374700.0	386410.0	228.00	980.277352	980.328998	1.75	-5.05
8751.2528	373010.0	375550.0	115.00	980.299650	980.337738	0.33	-15.14
8751.2529	370560.0	376150.0	203.00	980.283817	980.337218	0.35	-13.12
8751.2530	373680.0	377100.0	116.00	980.299200	980.336497	0.28	-14.20
8751.2531	370180.0	378370.0	107.00	980.302794	980.335421	0.82	-10.76
8751.2532	371880.0	378390.0	142.00	980.292452	980.335430	0.65	-14.40
8751.2533	372890.0	378300.0	123.00	980.296794	980.335517	0.26	-14.27
8751.2534	373120.0	379100.0	118.00	980.296994	980.334874	0.31	-14.36
8751.2535	374100.0	379060.0	196.00	980.283297	980.334921	0.53	-12.54
8751.2536	374310.0	378480.0	228.00	980.276828	980.335392	0.75	-12.97
8751.8396	378980.0	386010.0	485.00	980.220649	980.329380	0.60	-12.72
8751.8397	377180.0	386010.0	447.00	980.233013	980.329355	0.48	-7.93
8751.8398	378210.0	386180.0	536.00	980.212326	980.329232	0.82	-10.64
8751.8399	378810.0	387050.0	650.00	980.185572	980.328538	0.88	-14.21
8751.8400	378980.0	387950.0	579.00	980.201729	980.327814	0.58	-11.60

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
8851.1004	370100.0	381020.0	110.00	980.304911	980.333281	0.25	-6.48
8851.1005	370500.0	381880.0	112.00	980.301277	980.332593	0.32	-8.97
8851.1006	370150.0	382710.0	115.00	980.301476	980.331918	0.33	-7.49
8851.1008	370610.0	384480.0	123.00	980.296834	980.330496	0.40	-9.07
8851.1009	370550.0	388430.0	159.00	980.287011	980.327308	0.52	-8.50
8851.1012	372480.0	388900.0	146.00	980.294828	980.326957	0.76	-2.65
8851.1013	372420.0	388180.0	137.00	980.297204	980.327537	0.80	-2.59
8851.1014	372140.0	386000.0	132.00	980.299081	980.329292	0.63	-3.62
8851.1015	371130.0	385270.0	125.00	980.296854	980.329866	0.56	-7.87
8851.1016	372550.0	386830.0	133.00	980.299120	980.328628	0.67	-2.68
9052.3001	378416.0	384974.0	566.93	980.205931	980.330208	0.77	-11.98
9052.3002	378285.0	385425.0	584.08	980.201088	980.329842	0.91	-12.94
9052.3003	378291.0	385452.0	581.76	980.201710	980.329820	0.89	-12.78
9052.3004	378306.0	385523.0	569.04	980.204514	980.329763	0.85	-12.46
9052.3005	378343.0	385706.0	555.98	980.207645	980.329616	0.87	-11.73
9052.3006	378369.0	385840.0	554.06	980.207492	980.329508	0.85	-12.17
9052.3007	378406.0	386021.0	557.46	980.206992	980.329363	0.80	-11.91
9052.3008	378426.0	386120.0	569.59	980.204045	980.329283	0.86	-12.33
9052.3009	378626.0	385037.0	545.82	980.210143	980.330160	0.62	-12.02
9052.3010	378729.0	385146.0	525.66	980.214334	980.330073	0.47	-11.86
9052.3011	378905.0	385192.0	531.98	980.212315	980.330039	0.53	-12.54
9052.3012	379559.0	385258.0	475.59	980.221799	980.329994	0.42	-14.22
9052.3013	379792.0	385282.0	449.36	980.227295	980.329978	0.51	-13.78
9052.3014	379957.0	385380.0	431.32	980.230691	980.329901	0.53	-13.83
9052.3015	380254.0	385252.0	432.94	980.229539	980.330009	0.44	-14.87
9052.3016	380283.0	385135.0	443.31	980.227448	980.330103	0.46	-14.99
9052.3017	380223.0	384982.0	454.09	980.225419	980.330226	0.37	-15.11
9052.3018	380243.0	384842.0	458.85	980.224746	980.330339	0.36	-14.97
9052.3019	380077.0	384677.0	480.48	980.220177	980.330470	0.32	-15.45
9052.3020	379972.0	384049.0	482.11	980.220422	980.330976	0.29	-15.42
9052.3021	379807.0	383920.0	470.87	980.222941	980.331077	0.37	-15.14
9052.3022	379680.0	383782.0	455.24	980.226643	980.331187	0.50	-14.49
9052.3023	379547.0	383661.0	430.58	980.232027	980.331283	0.52	-14.04
9052.3024	379391.0	383608.0	425.28	980.234454	980.331324	0.55	-12.66
9052.3025	379456.0	383396.0	456.40	980.226683	980.331496	0.56	-14.47
9052.3026	379435.0	383257.0	459.30	980.223828	980.331607	0.59	-16.84
9052.3027	379239.0	383213.0	446.16	980.227163	980.331640	0.57	-16.14
9052.3028	378321.0	385593.0	548.99	980.209225	980.329707	0.87	-11.61
9052.3039	378550.0	386296.0	596.12	980.197865	980.329143	0.91	-13.10
9052.3030	378485.0	386432.0	586.07	980.199874	980.329032	0.82	-13.04
9052.3031	378533.0	386678.0	591.70	980.198681	980.328834	0.77	-12.98
9052.3033	378587.0	386979.0	586.83	980.199946	980.328592	0.87	-12.33
9052.3034	378561.0	386828.0	590.08	980.199018	980.328714	1.01	-12.60
9052.3035	378020.0	384653.0	540.00	980.211968	980.330462	0.78	-11.48
9052.3036	377804.0	384565.0	499.81	980.220657	980.330530	0.76	-10.79
9052.3037	377660.0	384266.0	484.33	980.223583	980.330769	0.71	-11.20
9052.3038	377505.0	384165.0	470.76	980.226887	980.330848	0.79	-10.57
9052.3039	377434.0	384058.0	467.57	980.227693	980.330934	0.63	-10.63
9052.3040	377660.0	384266.0	484.33	980.223665	980.330769	0.75	-11.08
9052.3041	378640.0	386567.0	601.93	980.196438	980.328926	1.13	-12.94
9052.3042	378535.0	384869.0	598.90	980.198222	980.330294	1.08	-13.17
9052.3043	379982.0	382046.0	229.53	980.266056	980.332592	2.41	-18.98
9052.3044	380078.0	382240.0	234.61	980.264975	980.332437	2.47	-18.84
9052.3045	379752.0	380815.0	197.16	980.262079	980.333583	1.87	-30.85
9052.3046	379997.0	381910.0	225.98	980.267688	980.332702	2.25	-18.31
9052.3047	380013.0	381784.0	222.52	980.268391	980.332804	2.36	-18.28

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
9052.3048	379857.0	381580.0	215.84	980.269982	980.332967	2.13	-18.40
9052.3049	379926.0	381909.0	269.10	980.260366	980.332702	2.31	-17.09
9052.3050	379556.0	380502.0	186.81	980.277599	980.333833	1.72	-17.77
9052.3051	379724.0	380733.0	194.13	980.275621	980.333648	1.81	-18.03
9052.3052	379732.0	381055.0	202.48	980.273571	980.333389	1.94	-18.05
9052.3053	379759.0	381209.0	206.70	980.272603	980.333265	2.02	-17.98
9052.3054	379809.0	381425.0	211.97	980.271746	980.333091	2.22	-17.43
9052.3055	379525.0	380212.0	181.03	980.277732	980.334066	1.67	-19.06
9052.3056	379093.0	379587.0	177.44	980.280649	980.334565	1.37	-17.64
9052.3057	379265.0	380116.0	190.26	980.278038	980.334140	1.51	-17.17
9052.3058	379400.0	380295.0	187.80	980.277997	980.333997	1.60	-17.46
9052.3059	378330.0	380054.0	239.54	980.266637	980.334177	2.01	-18.41
9052.3060	378525.0	380212.0	275.21	980.261018	980.334053	1.79	-17.11
9052.3061	378652.0	380336.0	291.14	980.258479	980.333954	1.72	-16.49
9052.3062	378665.0	380720.0	275.91	980.262364	980.333644	1.61	-15.40
9052.3063	378779.0	380999.0	260.89	980.265872	980.333421	1.60	-14.63
9052.3064	378637.0	380954.0	290.90	980.259815	980.333455	1.77	-14.65
9052.3065	380895.0	380114.0	185.44	980.276111	980.334164	1.26	-20.32
9052.3066	381748.0	380394.0	197.12	980.273582	980.333949	0.87	-20.72
9052.3067	382663.0	380926.0	170.89	980.277803	980.333532	0.79	-21.33
9052.3068	383326.0	381080.0	190.26	980.274877	980.333416	0.69	-20.43
9052.3069	383907.0	381486.0	195.79	980.273143	980.333096	0.75	-20.69
9052.3070	382928.0	380972.0	183.92	980.275988	980.333498	0.70	-20.63
9052.3071	383268.0	380822.0	202.44	980.272674	980.333624	0.82	-20.31
9052.3072	383544.0	380700.0	239.87	980.265046	980.333726	0.76	-20.74
9052.3073	383847.0	380639.0	244.02	980.264088	980.333779	0.90	-20.79
9052.3074	384528.0	381088.0	192.63	980.271960	980.333426	1.82	-21.76
9052.3075	385369.0	380818.0	188.74	980.271756	980.333654	0.91	-23.86
9052.3076	381806.0	380557.0	240.13	980.265556	980.333818	1.17	-19.86
9052.3077	382096.0	380996.0	261.08	980.261559	980.333468	1.25	-19.30
9052.3078	382017.0	380657.0	243.89	980.264791	980.333740	1.21	-19.77
9052.3079	381604.0	381273.0	198.41	980.276172	980.333238	0.71	-17.33
9052.3080	385001.0	380487.0	217.75	980.267504	980.333917	0.90	-22.68
9052.3081	384264.0	380609.0	241.70	980.263884	980.333809	0.92	-21.46
9052.3082	384674.0	380519.0	256.75	980.260600	980.333887	0.88	-21.90
9052.3083	382398.0	381299.0	269.74	980.259744	980.333227	1.42	-19.01
9052.3084	382599.0	381573.0	270.45	980.259071	980.333009	1.51	-19.23
9052.3085	382864.0	381950.0	274.73	980.257980	980.332708	1.14	-19.55
9052.3086	383112.0	382519.0	275.50	980.257480	980.332252	1.81	-18.77
9052.3087	379849.0	385539.0	411.30	980.234332	980.329771	0.53	-14.00
9052.3088	379887.0	385708.0	469.43	980.222207	980.329636	0.65	-14.43
9052.3089	379939.0	385937.0	456.47	980.225225	980.329452	0.68	-13.75
9052.3090	379991.0	386148.0	482.03	980.218413	980.329282	0.42	-15.63
9052.3091	380037.0	386345.0	485.07	980.217944	980.329124	0.51	-15.25
9052.3092	380078.0	386531.0	502.85	980.213967	980.328974	0.46	-15.63
9052.3093	380119.0	386710.0	490.34	980.216465	980.328830	0.48	-15.43
9052.3094	380157.0	386891.0	558.67	980.204330	980.328685	0.67	-13.78
9052.3095	379748.0	385085.0	431.31	980.231354	980.330136	0.37	-13.57
9052.3096	379881.0	384732.0	462.39	980.224817	980.330423	0.39	-14.26
9052.3097	380014.0	384804.0	474.97	980.221738	980.330367	0.40	-14.80
9052.3098	383057.0	383918.0	316.03	980.249424	980.331122	0.56	-18.97
9052.3099	383027.0	383637.0	322.29	980.248424	980.331349	0.62	-18.91
9052.3100	382915.0	383480.0	314.76	980.250372	980.331474	0.86	-18.33
9052.3101	382442.0	383600.0	341.79	980.246028	980.331371	1.10	-17.01
9052.3102	382727.0	382816.0	356.82	980.241725	980.332007	1.78	-18.31
9052.3103	382455.0	382352.0	442.27	980.223971	980.332378	2.17	-19.24

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
9052.3104	382257.0	382198.0	441.43	980.224522	980.332500	2.24	-18.90
9052.3105	381890.0	381883.0	388.19	980.237095	980.332749	1.71	-17.58
9052.3106	381570.0	381634.0	391.64	980.236320	980.332946	1.65	-17.94
9052.3107	381342.0	381453.0	409.25	980.232200	980.333089	1.86	-18.53
9052.3108	380926.0	381128.0	379.82	980.238635	980.333346	2.10	-17.90
9052.3109	380570.0	380849.0	356.08	980.243397	980.333566	2.39	-17.74
9052.3110	380228.0	380624.0	306.49	980.252575	980.333743	1.90	-18.98
9052.3111	383228.0	384462.0	284.03	980.256175	980.330686	0.35	-18.29
9052.3112	383361.0	384882.0	299.12	980.253024	980.330348	0.39	-18.10
9052.3113	383473.0	385228.0	320.00	980.248333	980.330071	0.41	-18.38
9052.3114	378159.0	382204.0	358.93	980.248955	980.332440	0.51	-12.37
9052.3115	378222.0	381974.0	354.06	980.249618	980.332626	0.45	-12.91
9052.3116	378205.0	381830.0	345.16	980.251494	980.332742	0.46	-12.89
9052.3117	378105.0	381698.0	351.55	980.250495	980.332847	0.52	-12.68
9052.3118	378045.0	381578.0	347.55	980.251290	980.332943	0.61	-12.68
9052.3119	378020.0	381510.0	357.18	980.249322	980.332998	0.66	-12.76
9052.3120	377928.0	381454.0	368.33	980.247007	980.333042	0.86	-12.72
9052.3121	378777.0	381493.0	318.00	980.253238	980.333022	1.06	-16.17
9052.3122	377906.0	382060.0	311.95	980.258000	980.332553	0.51	-12.68
9052.3123	378106.0	382455.0	323.96	980.255134	980.332237	0.53	-12.85
9052.3124	377975.0	382561.0	320.57	980.256756	980.332149	0.60	-11.74
9052.3125	378237.0	382365.0	367.59	980.247242	980.332311	0.52	-12.24
9052.3126	378492.0	382381.0	405.79	980.238839	980.332302	0.55	-13.09
9052.3127	378953.0	382628.0	448.87	980.229008	980.332108	0.61	-14.19
9052.3128	378536.0	382839.0	378.07	980.244366	980.331933	0.62	-12.58
9052.3129	378271.0	382510.0	373.87	980.245743	980.332194	0.55	-12.36
9052.3130	377929.0	383470.0	486.87	980.223706	980.331415	0.78	-11.15
9052.3131	377886.0	383245.0	446.85	980.231874	980.331596	0.80	-11.02
9052.3132	377508.0	383473.0	477.11	980.226245	980.331407	1.32	-9.99
9052.3133	377507.0	383252.0	498.10	980.220483	980.331585	1.62	-11.50
9052.3134	377503.0	383057.0	457.76	980.229049	980.331742	1.81	-10.84
9052.3135	377499.0	382853.0	402.56	980.241327	980.331907	1.16	-10.23
9052.3136	377631.0	383572.0	489.58	980.223961	980.331329	1.08	-9.98
9052.3137	377727.0	383699.0	485.64	980.225215	980.331227	0.92	-9.56
9052.3138	377434.0	384058.0	467.57	980.227785	980.330934	0.96	-10.21
9052.3139	377336.0	384002.0	446.38	980.232832	980.330977	0.66	-9.68
9052.3140	377294.0	383858.0	450.02	980.233036	980.331093	0.55	-8.98
9052.3141	377227.0	384039.0	417.35	980.239318	980.330946	0.49	-9.04
9052.3142	377368.0	384184.0	422.55	980.237809	980.330831	0.54	-9.36
9052.3143	377283.0	384426.0	394.10	980.243846	980.330635	0.46	-8.81
9052.3144	377516.0	384444.0	431.61	980.235096	980.330623	0.48	-10.14
9052.3145	377372.0	383852.0	483.22	980.224348	980.331099	0.47	-11.22
9052.3146	377508.0	383694.0	492.80	980.222757	980.331228	0.81	-10.72
9052.3147	377185.0	383640.0	404.49	980.241816	980.331268	0.82	-9.06
9052.3149	378362.0	382696.0	376.20	980.245314	980.332046	0.57	-12.16
9052.3150	378536.0	382839.0	378.07	980.244417	980.331933	0.60	-12.55
9052.3151	378722.0	382852.0	389.81	980.241327	980.331925	0.65	-13.27
9052.3152	378669.0	382477.0	428.08	980.233934	980.332226	0.57	-13.51
9052.3153	377876.0	382698.0	336.86	980.254115	980.332037	0.64	-11.02
9052.3154	377956.0	382869.0	379.09	980.245916	980.331900	0.69	-10.72
9052.3155	377869.0	383101.0	423.52	980.236432	980.331712	0.65	-11.32
9052.3156	378120.0	381456.0	361.98	980.248149	980.333043	0.69	-13.00
9052.3157	378255.0	381274.0	351.54	980.249067	980.333192	0.73	-14.24
9052.3158	378519.0	381021.0	334.92	980.251127	980.333400	1.61	-14.78
9052.3159	377707.0	381238.0	420.90	980.236830	980.333213	1.29	-12.30
9052.3160	378847.0	382982.0	405.48	980.238013	980.331821	0.60	-13.45

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
9052.3161	378076.0	383150.0	411.80	980.236473	980.331675	0.66	-13.54
9052.3162	379124.0	382203.0	475.23	980.222360	980.332454	0.58	-16.03
9052.3163	379404.0	382718.0	480.89	980.220565	980.332042	0.70	-16.18
9052.3164	379653.0	383005.0	459.20	980.224980	980.331814	0.62	-15.88
9052.3165	379933.0	383159.0	507.10	980.216231	980.331693	0.76	-14.95
9052.3166	380123.0	383266.0	488.49	980.218903	980.331609	0.86	-15.75
9052.3167	377664.0	384593.0	462.50	980.228774	980.330505	0.72	-10.03
9052.3168	377601.0	384667.0	466.75	980.227846	980.330444	0.65	-10.13
9052.3169	377680.0	384770.0	469.82	980.226918	980.330362	0.73	-10.29
9052.3170	378538.0	380997.0	334.52	980.225307	980.333419	1.91	-40.40
9052.3171	380553.0	385093.0	436.11	980.228886	980.330141	0.46	-15.01
9052.3172	380454.0	384956.0	451.64	980.225847	980.330250	0.40	-15.16
9052.3173	380539.0	384803.0	476.21	980.220443	980.330375	0.38	-15.87
9052.3174	380630.0	384623.0	475.95	980.220718	980.330521	0.46	-15.72
9052.3175	380722.0	384429.0	511.34	980.213314	980.330679	0.51	-16.26
9052.3176	380785.0	384312.0	522.89	980.210633	980.330774	0.50	-16.78
9052.3177	380861.0	384170.0	525.74	980.209919	980.330890	0.61	-16.94
9052.3178	380996.0	383921.0	498.71	980.215201	980.331093	0.85	-16.94
9052.3179	381206.0	383811.0	424.75	980.229151	980.331184	1.25	-17.23
9052.3180	380577.0	383503.0	471.68	980.219708	980.331424	2.71	-16.22
9052.3181	380782.0	383600.0	480.21	980.217822	980.331349	0.91	-18.15
9052.3182	379057.0	384289.0	473.64	980.224022	980.330769	0.53	-13.05
9052.3183	379333.0	384436.0	480.97	980.222717	980.330655	0.47	-12.85
9052.3184	379525.0	384542.0	477.79	980.222717	980.330572	0.42	-13.45
9052.3185	378886.0	384197.0	459.20	980.227193	980.330841	0.55	-12.77
9052.3186	378579.0	384035.0	457.61	980.227571	980.330968	0.69	-12.69
9052.3187	378252.0	383862.0	467.00	980.226908	980.331103	0.65	-11.68
9052.3188	378013.0	383738.0	462.70	980.229121	980.331200	0.66	-10.40
9052.3189	377496.0	382512.0	359.74	980.250372	980.332182	0.74	-10.31
9052.3190	377325.0	381371.0	402.20	980.241439	980.333101	1.42	-11.12
9052.3191	377195.0	381326.0	402.01	980.242020	980.333135	1.57	-10.47
9052.3192	377199.0	381711.0	398.14	980.242714	980.332824	1.63	-10.16
9052.3193	377197.0	382111.0	398.80	980.241847	980.332502	1.41	-10.80
9052.3194	377493.0	382094.0	368.61	980.248628	980.332519	0.71	-10.67
9052.3195	377192.0	380394.0	466.78	980.226326	980.333887	3.19	-12.55
9052.3196	377192.0	380720.0	447.65	980.232108	980.333624	2.44	-11.02
9052.3197	377192.0	380978.0	452.75	980.230640	980.333416	2.21	-11.50
9052.3198	377715.0	380585.0	529.18	980.213274	980.333740	3.31	-13.06
9052.3199	377554.0	380198.0	485.71	980.222166	980.334050	3.71	-12.63
9052.3200	378171.0	380410.0	474.46	980.220483	980.333888	2.77	-17.30
9052.3201	377910.0	380884.0	515.60	980.214966	980.333502	1.61	-15.50
9052.3202	378776.0	381329.0	289.15	980.260559	980.333154	1.05	-14.67
9052.3203	378777.0	381493.0	318.80	980.254798	980.333022	0.96	-14.55
9052.3204	378782.0	381738.0	418.74	980.233342	980.332824	0.77	-16.34
9052.3205	378783.0	382125.0	423.57	980.234433	980.332512	0.55	-14.21
9052.3206	378778.0	380795.0	246.03	980.269319	980.333585	1.83	-14.04
9052.3207	378776.0	380498.0	236.44	980.270318	980.333825	1.92	-15.08
9052.3208	378771.0	380268.0	216.79	980.273806	980.334011	1.86	-15.70
9052.3209	378436.0	380799.0	365.24	980.244978	980.333578	1.91	-14.84
9052.3210	378485.0	380525.0	367.08	980.243805	980.333799	2.22	-15.57
9052.3211	378771.0	379758.0	213.60	980.275662	980.334422	1.43	-15.32
9052.3212	378228.0	380379.0	481.44	980.219168	980.333914	2.56	-17.48
9052.3213	377997.0	379274.0	182.14	980.280343	980.334802	2.28	-16.35
9052.3214	377889.0	378957.0	180.78	980.282056	980.335057	1.66	-15.78
9052.3215	377759.0	378785.0	167.37	980.286094	980.335194	1.70	-14.48
9052.3216	379791.0	380417.0	191.40	980.276926	980.333904	1.83	-17.50

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
9052.3217	383518.0	384427.0	295.11	980.253921	980.330718	0.36	-18.39
9052.3218	383848.0	384454.0	308.30	980.251280	980.330700	0.39	-18.39
9052.3219	383720.0	383738.0	268.17	980.258602	980.331276	0.46	-19.47
9052.3220	380380.0	385445.0	413.36	980.233465	980.329854	0.41	-14.67
9052.3221	381059.0	385376.0	427.39	980.229641	980.329919	0.47	-15.74
9052.3222	381360.0	385539.0	408.71	980.233179	980.329792	0.46	-15.75
9052.3223	381634.0	385270.0	422.12	980.230334	980.330013	0.55	-16.09
9052.3224	380797.0	385555.0	406.31	980.233975	980.329771	0.50	-15.37
9052.3225	377688.0	384804.0	482.79	980.224715	980.330335	0.72	-9.93
9052.3226	377211.0	385057.0	418.57	980.238778	980.330124	0.48	-8.53
9052.3227	376905.0	384618.0	378.41	980.248282	980.330474	0.57	-7.19
9052.3228	378935.0	379500.0	190.00	980.279721	980.334633	1.26	-16.28
9052.3243	380550.0	381825.0	394.00	980.235078	980.332778	2.46	-17.74
9052.3244	377886.0	383245.0	446.85	980.231665	980.331596	0.70	-11.33
9052.3245	377770.0	384890.0	460.00	980.229126	980.330267	0.67	-9.98
9052.3246	378100.0	385050.0	531.00	980.213540	980.330142	0.86	-11.28
9052.3248	384111.0	382684.0	315.75	980.249030	980.332132	1.26	-19.73
9052.3249	384562.0	382555.0	359.50	980.240383	980.332242	1.41	-19.73
9052.3250	381652.0	382015.0	397.52	980.235613	980.332640	1.77	-17.06
9052.3251	382055.0	383690.0	441.00	980.225815	980.331293	1.48	-17.25
9052.3253	375882.0	384225.0	446.54	980.235880	980.330777	0.37	-6.69
9052.3254	375889.0	383667.0	412.15	980.243272	980.331228	0.89	-5.99
9052.3255	375875.0	383242.0	455.26	980.233372	980.331570	1.22	-7.42
9052.3256	375875.0	382775.0	471.08	980.229804	980.331947	1.48	-7.99
9052.3257	375720.0	382034.0	490.16	980.225065	980.332543	2.10	-8.96
9052.3258	375693.0	381560.0	490.37	980.224026	980.332925	2.91	-9.53
9052.3259	375810.0	384663.0	455.62	980.233145	980.330423	0.42	-7.23
9052.3260	376291.0	384788.0	418.88	980.240764	980.330329	0.47	-6.70
9052.3261	376639.0	384665.0	389.38	980.246141	980.330433	0.55	-7.15
9052.3262	382096.0	385376.0	399.34	980.234318	980.329933	0.60	-16.46
9052.3263	382361.0	385806.0	386.42	980.235562	980.329590	0.61	-17.41
9052.3264	382686.0	385839.0	355.43	980.241627	980.329567	0.42	-17.60
9052.3265	382475.0	386642.0	476.36	980.216850	980.328917	0.88	-17.48
9052.3266	382447.0	386806.0	497.31	980.212912	980.328784	1.00	-17.04
9052.3267	382097.0	386738.0	463.11	980.221014	980.328834	0.85	-15.87
9052.3268	381676.0	386355.0	444.80	980.224921	980.329138	0.82	-15.90
9052.3269	378355.0	385482.0	580.37	980.202210	980.329797	0.83	-12.59
9052.3270	377754.0	385678.0	456.13	980.229300	980.329631	0.73	-9.87
9052.3271	377523.0	386073.0	418.51	980.237669	980.329309	0.56	-8.75
9052.3272	377469.0	386249.0	420.00	980.237268	980.329166	0.53	-8.75
9052.3273	378294.0	385778.0	564.42	980.205870	980.329557	0.87	-11.78
9052.3274	378228.0	386236.0	539.37	980.210887	980.329187	0.90	-11.29
9052.3275	378169.0	386670.0	499.10	980.219739	980.328836	0.73	-10.19
9052.3276	377753.0	386947.0	484.14	980.224078	980.328607	0.51	-8.78
9052.3277	377510.0	386944.0	459.71	980.229537	980.328606	0.49	-8.15
9052.3278	378504.0	386191.0	580.58	980.201912	980.329227	0.86	-12.24
9052.3279	378759.0	386094.0	535.51	980.211165	980.329309	0.69	-12.11
9052.3280	378979.0	386022.0	491.93	980.219503	980.329370	0.67	-12.43
9052.3281	381290.0	382470.0	439.00	980.226936	980.332268	1.41	-17.56
9052.3282	381030.0	382795.0	393.00	980.234071	980.332002	1.53	-19.09
9052.3283	382115.0	382609.0	499.88	980.213180	980.332166	2.40	-18.25
9052.3284	381835.0	382705.0	471.00	980.219338	980.332085	2.81	-17.28
9052.3285	380807.0	381481.0	400.36	980.235140	980.333059	1.70	-17.46
9052.3286	377169.0	386007.0	447.60	980.232765	980.329357	0.42	-8.12
9052.3287	376842.0	385847.0	461.85	980.230143	980.329482	0.42	-8.07
9052.3288	376537.0	385630.0	471.26	980.228642	980.329653	0.41	-7.90

Station No	East (m)	North (m)	Elev (m)	Gobs	Gtheo	Terr Corr	B.A. (mGal)
9052.3292	379926.0	381909.0	269.33	980.259999	980.332702	2.33	-17.40
9052.3293	379477.0	381905.0	383.39	980.240137	980.332699	1.18	-15.97
9052.3294	383947.0	382113.0	231.15	980.265798	980.332591	0.91	-20.42
9052.3295	384636.0	381886.0	326.55	980.245452	980.332783	1.89	-21.21
9052.3296	384816.0	381825.0	391.96	980.232498	980.332835	2.36	-20.87
9052.3297	385164.0	381752.0	449.01	980.220520	980.332898	3.44	-20.61
9052.3298	385275.0	382162.0	495.52	980.211206	980.332569	3.25	-20.64
9052.3299	385293.0	382480.0	489.64	980.211576	980.332312	3.91	-20.51
9052.3301	378590.0	378780.0	158.53	980.285034	980.335209	1.65	-17.34
9052.3302	378590.0	379240.0	158.62	980.285020	980.334838	1.60	-17.02
9052.3303	378940.0	379295.0	158.85	980.284580	980.334798	1.72	-17.25
9052.3304	379220.0	379710.0	158.88	980.284004	980.334467	1.46	-17.75
9052.3305	379460.0	379850.0	158.92	980.283018	980.334357	1.76	-18.32
9052.3306	379775.0	379870.0	158.48	980.282869	980.334346	1.81	-18.50
9052.3307	379905.0	380130.0	158.59	980.282881	980.334138	1.85	-18.21
9052.3308	380120.0	379935.0	158.82	980.281989	980.334298	1.80	-19.27
9052.3309	380530.0	380065.0	159.64	980.281206	980.334198	1.29	-20.30
9052.3310	380325.0	379615.0	161.18	980.281302	980.334559	1.43	-20.12
9052.3311	380630.0	379525.0	158.63	980.280985	980.334636	1.72	-20.73
9052.3312	380490.0	379000.0	158.30	980.280462	980.335057	1.80	-21.66
9052.3313	380935.0	379080.0	158.96	980.280111	980.334999	1.66	-21.96
9052.3314	380990.0	379510.0	158.12	980.280942	980.334653	1.71	-20.90
9052.3315	381220.0	379685.0	159.00	980.280488	980.334514	1.89	-20.86
9052.3316	381520.0	379225.0	158.73	980.280221	980.334890	1.60	-21.85
9052.3317	381925.0	378780.0	159.65	980.278220	980.335254	1.99	-23.64
9052.3318	382300.0	378920.0	158.86	980.279522	980.335146	1.90	-22.48
9052.3319	382390.0	379170.0	158.66	980.280285	980.334946	1.80	-21.65
9052.3320	382800.0	378845.0	159.00	980.278778	980.335213	1.48	-23.68
9052.3321	382810.0	379250.0	159.07	980.280020	980.334887	1.37	-22.21
9052.3322	383400.0	379260.0	158.72	980.279275	980.334886	1.10	-23.29
9052.3323	383300.0	378620.0	158.82	980.279185	980.335402	1.22	-23.76
9052.3324	383580.0	378920.0	158.90	980.279670	980.335163	1.01	-23.23
9052.3325	383780.0	378400.0	158.47	980.279042	980.335586	0.95	-24.42
9052.3326	384100.0	378840.0	158.52	980.279151	980.335235	0.80	-24.10
9052.3327	384740.0	379100.0	158.82	980.278292	980.335033	0.76	-24.74
9052.3328	384760.0	379480.0	159.05	980.277769	980.334727	0.90	-24.77
9052.3329	385180.0	379260.0	158.47	980.277276	980.334910	0.83	-25.63
9052.3330	384640.0	378400.0	160.40	980.278105	980.335597	0.74	-25.20
9052.3331	383420.0	378100.0	158.48	980.278447	980.335823	2.36	-23.84
9052.3332	383920.0	376980.0	158.24	980.277632	980.336734	1.10	-26.88
9052.3333	383360.0	376600.0	159.38	980.277262	980.337033	1.37	-27.05
9052.3334	383480.0	375980.0	158.56	980.277550	980.337535	1.42	-27.38
9052.3335	383760.0	375860.0	158.64	980.277647	980.337636	1.35	-27.44
9052.3336	383900.0	376140.0	158.24	980.277887	980.337411	1.11	-27.29
9052.3337	383960.0	376720.0	158.87	980.277588	980.336944	1.00	-27.11
9052.3338	382220.0	379480.0	158.53	980.280721	980.334693	0.97	-21.82
9052.3339	381820.0	379720.0	158.60	980.280720	980.334494	0.80	-21.78

421332

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Registered to | Date

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ANGELA LORRIGAN

NOVEMBER 1990

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APPENDIX 10.

SECOND REPORT ON THE PINNACLES PROJECT

DR G GREEN NOV 1989

421333

GRG03:JH

SECOND REPORT ON PINNACLES PROJECT

GEOFFREY R. GREEN

1. Work Done

43 polished thin sections have been studied from drill holes BPD 62, BPD 63, BPD 64, EAF 9 and EAF 18. Descriptions are included in the Appendix.

9 rocks analysed.

8 rocks have been submitted for oxygen isotope analyses.

2. Petrography: Primary textures and alteration

2.1 Primary textures

Texture preservation of the rocks examined in the Pinnacles area is generally better than at Rosebery or Hercules, enabling fairly confident identification of primary lithology in about 75% of specimens.

This has resulted in correction of a number of misidentifications from preliminary core examination. I had interpreted rocks in BPD 62 from 167.5 to 224 m as lavas: thin sections at 203.2 and 217.3 m show pumiceous textures. Similar misidentification of lavas in my field logs in BPD 62 from 646.5 to 658.5 m were made: in thin section the rock is clearly a pumice-shard vitric tuff.

In general, there are many rocks with fine (< a few mm) pumice and shard-bearing rocks that look like coherent lavas in hand specimen. Identification of these rocks is made difficult by the lack of large pumice clasts.

Conversely BPD 64 at 96.0 m was identified in hand specimen as a feldspar-quartz pumiceous tuff, it is in fact a flow-banded lava.

2.2 Palaeo-environment

Ignimbrites have figures prominently in discussions of Pinnacles geology (e.g. Gregory, 1986). Only one example of a welded tuff has been identified (as a clast in a resedimented breccia in EAF 9 @ 125.2 m), evidence of a subaerial source area, but not a depositional site, for the rock.

In the thin sections examined, where shards have been identified they are discrete and undeformed. Tube pumice is the predominant pumice variety. Graded bedding is observable in epiclastic units in BPD 62, and is a useful facing criterion. Many of the thicker volcaniclastic units appear to have been emplaced as mass flows. In situ volcanics are mainly lavas or lava breccias. These features, together with the lack of evidence for reworking by traction currents, are consistent with deposition in a deep submarine setting.

2.3 Alteration

The same criteria applied to alteration assemblages at Rosebery and Hercules have been used to describe alteration assemblages at Pinnacles. These include estimation of proportion of minerals in thin section, interpretation of timing of alteration and mineralisation with respect to deformation and particular attention to the nature of alteration of feldspars. In general I would agree with Gregory's (1986) statements: "Wall rock alteration is dominated by extensive silicification and fine grained disseminated pyrite" and "Chlorite with some associated pyrite forms a local alteration overprint (my ?) close to exhalative positions".

In BPD 62, extensive K-feldspar replacement of plagioclase phenocrysts is

present in the upper part of the hole (Fig. 1). This style of alteration has been observed peripheral to footwall alteration zones in a number of Tasmanian VMS deposits, although I have seen similar alteration in the hanging wall of Kuroko deposits. Downhole thin passes into albitised plagioclase (the regional norm for the MRV) in the rhyolite and quartz feldspar porphyry and then into more proximal sericite and carbonate-plagioclase replacement textures in the west-facing rocks downdip from the mineralisation in Brown's Tunnel. Facing evidence front the drill hole is consistent with the interpreted anticline somewhere in the rhyolite or the quartz-feldspar porphyry, but the thin sections suggest that the K-feldspar bearing rocks are epiclastics derived from felsic lavas, whereas there are more vitric tuffs at depth in the hole. If the two sections on either side of the quartz feldspar porphyry are equivalent, then the alteration downhole would appear to be more proximal to a hydrothermal vent.

The alteration in BPD 63 (Fig. 2) is less impressive, and appears to be localised near the downhole contact of the quartz feldspar porphyry. (I still have to examine rocks near the sphalerite-galena intersection at 284 m). The alteration around 197 m might be the down-dip extension of the Thomas Tunnel VMS system, but it is more probably a localised system, with sericitisation strongly developed within the porphyry. Rocks further down the hole have albite with only minor alteration until the Rosebery Fault is approached where there is stronger sericitisation.

Alteration in BPD 64 (Fig. 3) is dominated by silicification in rocks below the lower quartz-feldspar porphyry intersection. This is similar to silicification in EAF 18 above, but despite intensive microscope examination no gold was seen in the mineralised intersection (BPD 64, 229.6). This is hardly surprising: the gold mineralisation in the Southern Trenches area appears to be concentrated over a very small interval (see later).

The most promising alteration in the three holes is that in BOD 62. If there is no evidence to the contrary, there might be some potential for mineralisation to the north of BPD 64.

The only significant chloritisation in the area is in the footwall of massive sulphide mineralisation. In EAF 9 this was only a minor intersection because of the oblique intersection of the drill hole to the alteration pipe, and also possibly because of faulting.

In general, the alteration zonation appears to be similar to that in the Hercules and Rosebery areas. A notable analogy is the occurrence of K-feldspar alteration which appears to mark the periphery of footwall alteration zones in a number of Tasmanian VMS systems. The most significant difference is the extensive overprinting silicification.

3. Mineralisation

Two styles of mineralisation are present in the area:

(i) Massive sulphide mineralisation.

(ii) Disseminated and veinlet gold and base metal mineralisation probably associated with silicification and quartz veining.

More extensive petrography has indicated that silicification and quartz ± carbonate veining and associated minor base metal mineralisation largely predates cleavage development in the rocks. This style (ii) mineralisation is apparently an overprint on VMS-related alteration, although silicification in the footwall of EAF 9 is probably an integral part of the alteration pipe. In a number of sections from BDP 62 and BDP 63 minor base metal mineralisation is associated with quartz veining (82016, 82041, 82041; Appendix 1),

suggesting the silicification event, at least in part, post-dated porphyry emplacement.

The gold mineralisation is clearly associated with the silicification, although the petrographic search for gold in this study has been disappointing, with only one grain of gold found in a sample from EAF 18 (82052) which was from a 1 metre interval which assayed 26.6 g/t Au and was also high in base metals. The gold was in quartz immediately adjacent to sphalerite which accords with descriptions given in Gregory (1986), who also reported gold in sphalerite. In previous work in the Pinnacles area, I have also seen relatively coarse gold (24 x 18 μm) adjacent to a galena inclusion in pyrite as well as finer grains in quartz from a sample from Brown's Workings north of Brown's Tunnel. In both this instance, as well as in EAF 18, the gold was associated with silica veining although the host rocks were not the strongest silicified in the area. (See Analyses, Table 1). It is clear the silicification and gold mineralisation is not exhalative, although it could be syn-diagenetic. Metal zoning in EAF 18 is interesting, with most metals having fairly symmetrical distributions around the high gold sample. This is in accord with core observations from EAF 18 and PIN 2 in which the strongly silicified rocks seemed to be symmetrically surrounded by zones of sericitisation. In contrast in EAF 9 the alteration (strongly chloritised footwall) and metal distributions (Fig. 4) are strongly asymmetric although the picture in this hole may be complicated by faulting.

In short the controls on the gold mineralisation remain poorly understood. Although broadly stratabound, the association with post-depositional silicification and the apparent symmetry of the metal zoning suggest a structural control might be important.

4. Geochemistry

The results (Table 1) have just been received and have not been studied in detail. Some points which can be made are:

1. In terms of $Zr/Ii0_2$ ratio the footwall rocks in EAF 9 plot near the andesite/dacite boundary on a Floyd and Winchester plot. This is borne out by the high Cr values of these rocks (≈ 100 ppm), although the andesites are not as Cr-rich as most from the Que Hellyer Volcanics. The sample from CP 7 (82055 has a higher Zr/TiO_2 ratio which would place it in the dacite field.

The strong silicification in EAF 18 is particularly apparent in 82050. In addition to the extremely high SiO_2 content, the very low Al_2O_3, TiO_2 and Zr values indicate silica enrichment of at least 100%.

5. Conclusions

The petrographic work has indicated that the silicification and associated gold mineralisation is epigenetic or at earliest syn-diagenetic, but essentially pre-dates deformation. Oxygen isotope analyses now in progress will help determine the nature of this mineralisation.

In terms of potential for VMS deposits, the most proximal style of alteration in the three recently drilled holes examined is from BPD 62. Some consideration might be given to exploration at depth north of Brown's Tunnel.

6. Reference

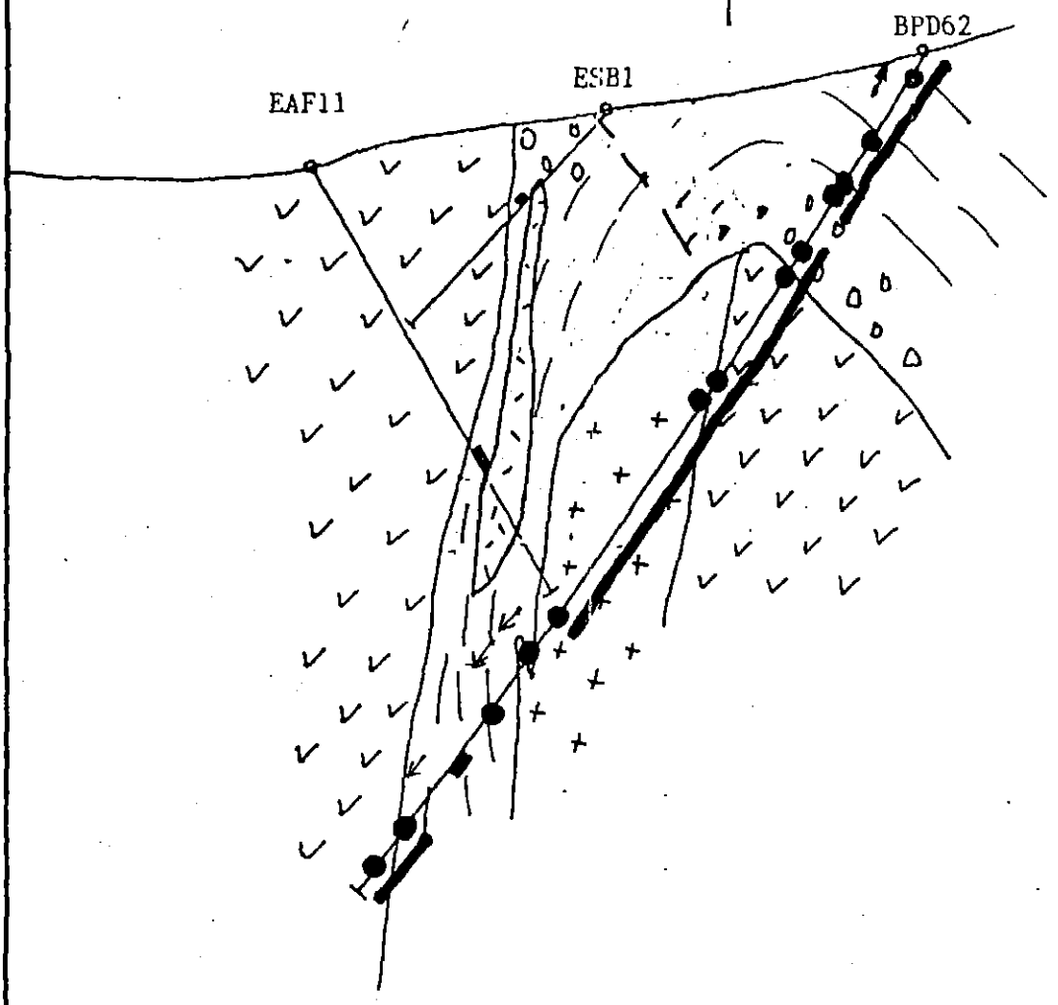
Gregory, P.W. 1986. Some geological aspects of massive and disseminated base metal mineralisation in The Pinnacles area, North West Tasmania.
In Large. R.R. (ed.) The mOUnt Read Volcanics and associated ore deposits, 43-44. Geol.Soc.Aust.Tasm.Div., Hobart.

421339

PLAGIOCLASE ALTERATION

- ALBITE
- K-FELDSPAR
- SERICITE
- CARBONATE

5000E



Mineralization

5 cm

QF Porphyry

0 100 200m

Rhyolite

?Andesite & Chert

Shale, Chert, Pyroclastics
Bedded Sediments
Includes Host Horizon

GEOPEKO

PROJECT EL44/88 BURNS PEAK

BPD62 SECTION

5400N

Author: D.G.

Scale: 1:5000

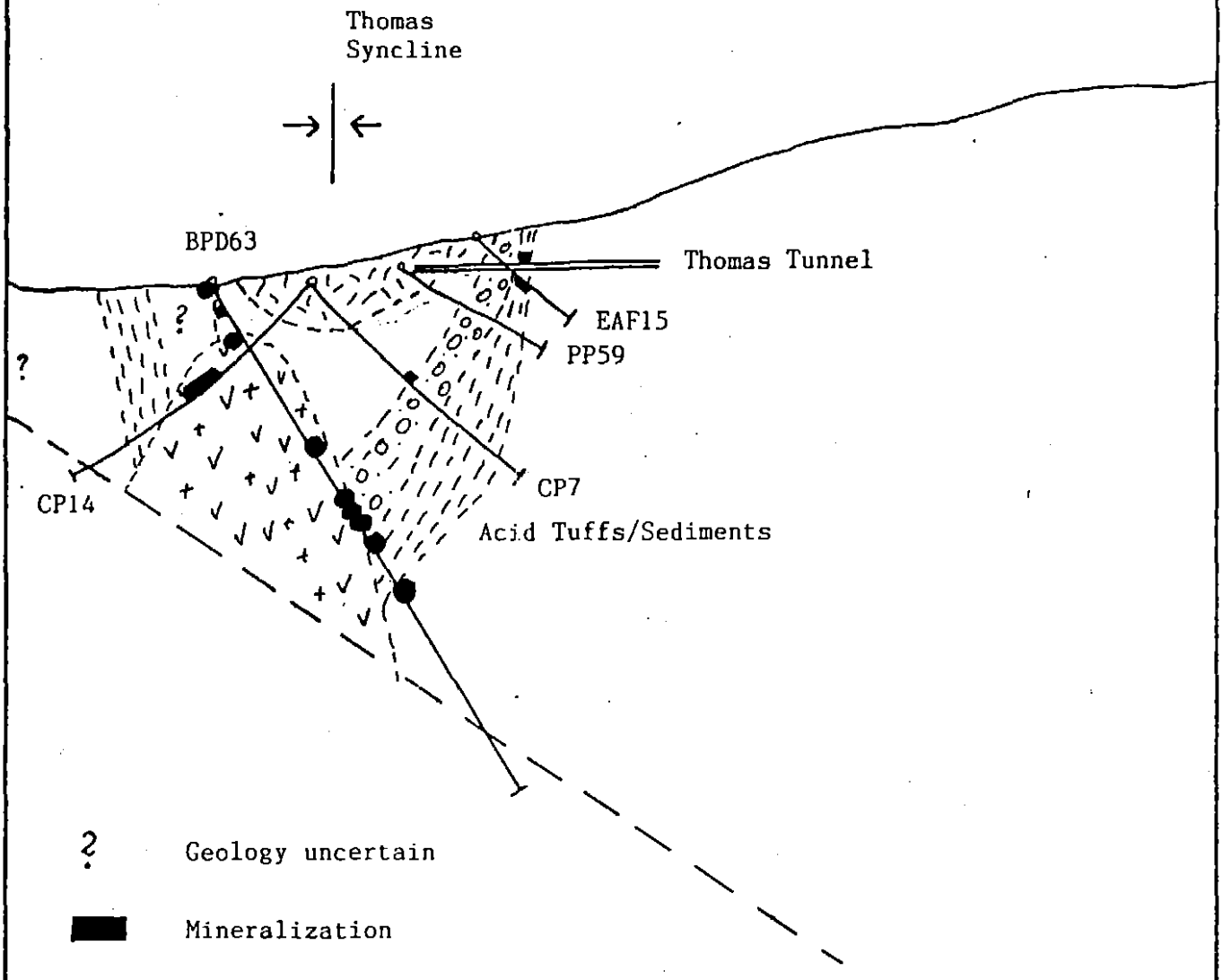
FIG. 1

5000E

421340

PLAGIOCLASE ALTERATION

- ALBITE
- SERICITE



? Geology uncertain

Mineralization

QF Porphyry +
Rhyolite + Epiclastic Flanks

Shale

5 cm

0 100 200

Andesite

Bedded Tuffs

Mass Fl... P...

GEOPEKO

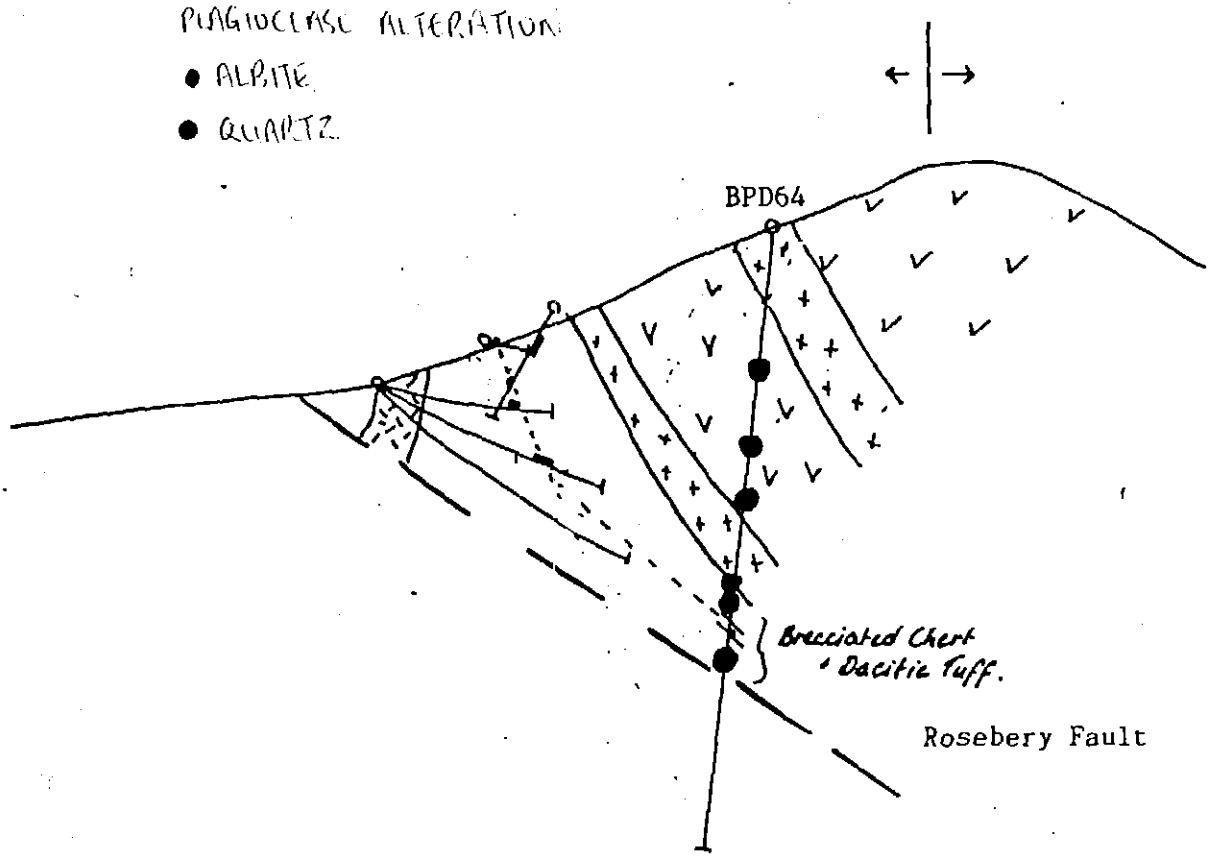
PROJECT EL44/88 BURNS PEAK	
BPD63 Section 5000N	
Author: AR	FIG. 2

421341

5000E

PLAGIOCLASE ALTERATION

- ALBITE
- QUARTZ



Mineralization

Rhyolite

QF Porphyry

Andesite

Mineralized Horizon

5 cm

0 100 200m

GEOPEKO

PROJECT EL44/88 BURNS PEAK	
BPD64 SECTION 445ON	
Author: D.G. Scale: 1:5000	FIG. 8.3

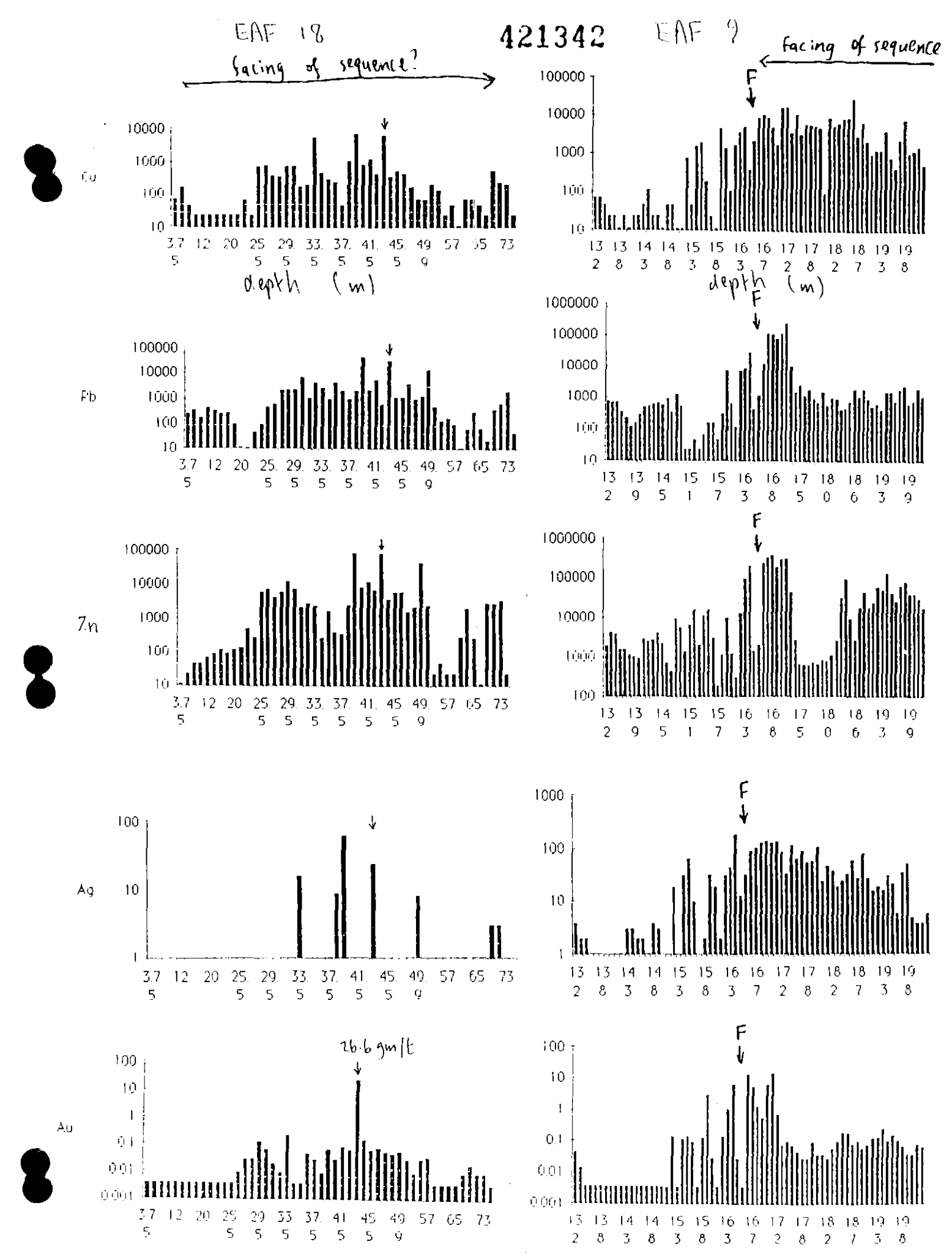


Fig. 4

Metal distribution in EAF 18 compared with EAF 9

TABLE 1

	SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	K2O	Na2O	SO3	P2O5	CO2	H2O+	LOI	ppm Zr
82031	57.72	0.75	15.80	1.74	3.10	0.67	2.19	2.55	5.18	0.36	1.71	0.37	4.48	3.30	7.58	185.
82032	55.70	0.71	15.35	1.42	3.50	0.77	2.49	3.87	4.79	0.25	0.55	0.37	6.01	2.69	8.46	185.
82050	89.36	0.27	4.04	1.46	0.64	0.01	0.30	<0.01	0.93	0.23	2.43	0.13	0.13	1.25	1.36	66.
82052	77.66	0.39	10.51	0.38	1.50	0.01	0.72	<0.01	3.18	0.40	3.17	0.17	0.12	2.48	2.50	145.
82053	76.65	0.63	10.99	0.63	1.20	0.03	0.85	0.05	3.48	0.30	2.57	0.21	0.23	2.37	2.55	115.
82054	74.35	0.40	11.38	2.59	0.77	0.04	0.61	<0.01	3.45	0.36	2.38	0.14	0.25	2.71	2.95	220.
82055	67.38	0.43	14.89	0.90	3.00	0.15	1.98	0.10	0.29	6.59	0.09	0.22	0.06	1.52	1.33	210.
82065	69.49	0.41	10.96	0.56	3.10	0.11	0.97	0.59	3.65	0.82	6.71	0.23	0.84	3.49	4.08	140.
82066	78.58	0.29	11.46	1.13	0.64	0.08	0.64	0.08	3.72	0.27	0.37	0.17	0.37	1.77	2.14	210.

Cr ppt.

896756 99

896757 96

421343

421344

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82001

Location : BPD 62 20.5m

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Lapilli grade fragmental textures with fragments of perlitic lava and pumice to 2 cm preserved in silicified areas although textures somewhat obscured by 30% groundmass sericite 15% feldspar crystals to 2 mm. Probable epiclastic breccia.

Mineralogy (and estimated proportions) :

qz 53% K-feldspar 15% sericite 30% opaques 2%

Mineralisation (relation to cleavage) :

Euhedral pyrite - one grain 200 μm, most < 50 μm.
Trace rutile.

Alteration (inclusions in feldspars, veining etc.):

Primary plagioclase totally replaced by mottled K-feldspar which shows only very minor studding by v. fine sericite.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421345

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82003

Location : BDP 62 70.0

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Similar epiclastic with discrete, some moderately rounded volcanic fragments (including a conspicuous snowflake texture clast). About 10% coarse feldspars (to 2.5 mm) and one corroded primary quartz.

Mineralogy (and estimated proportions) :

63% qz 10% Kfs, 7% carbonate, 20% K-mica, trace opaques

Mineralisation (relation to cleavage) :

<1% pyrite to 0.1 mm. Trace rutile

Alteration (inclusions in feldspars, veining etc.):

Plagioclase totally altered to K-feldspar which is moderately stockeled by carbonate. Carbonate veinlets common, largely restricted to silicified volcanic fragments.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421346

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: 72004 Field No.: Co. No.: 82004

Location : BPD 62 106.9

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Very coarse grained epiclastic with ½ of section taken up with a snowflake-textured, flowbanded dacite with an outsize (5mm) feldspar phenocryst. Siliceous groundmass contains small (1 - few mm) size fragments of volcanics, pumice.

Mineralogy (and estimated proportions) :

Quartz ~75% K-feldspar 10%, K-mica 10%, carbonate 5%, opaques <1%

Mineralisation (relation to cleavage) :

Few grains of euhedral pyrite (to 0.6mm), one has mica beard. Minor rutile.

Alteration (inclusions in feldspars, veining etc.):

Silicified groundmass ± patchy sericite. Net impression that silicification post-dates sericitisation (which predates cleavage formation) ~~Dot~~ Few patches of 2ndary quartz (vug fill?). Plagioclase replaced by K-feldspar. Silicification largely restricted to groundmass (snowflake dacite clast unaffected). Weak carbonate replacement of K-feldspar. Few patches of carbonate. Few minor quartz veinlets.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421347

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82005

Location : BPD 107.45

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Poorly preserved - one 7 mm bounded fragment of microflake dacite. Crystal rich epiclastic - 7% broken quartz phenocrysts and 15% sericitised feldspars. One PE-derived quartz-mica schist fragment.

Mineralogy (and estimated proportions) :

Quartz 47%, K-mica 30%, K feldspar 15%, pyrite 5%, carbonate 3%, trace rutile, spl

Mineralisation (relation to cleavage) :

Large pyrite fractured, fracture healed with fibrous quartz. Other pyrites have mica beards. ⇒ pyrite is pre-cleavage. A few patches of ~~quartz~~ vuggy quartz cored by galena. These ~~are~~ also predate cleavage (mica beards adjacent) Few fine sphalerite grains (~~then~~ one enclosed by K-feldspar phenocryst. Some pyrite of replacement origin.

Alteration (inclusions in feldspars, veining etc.):

K-feldspar moderately carbonate-altered. Strong sericitisation of groundmass K feldspars are plagioclase replacements.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421348

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82007

Location : BPD 62 162.28 m.

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Feldspar (10%) - phyric, perlitic dacite lava.

Mineralogy (and estimated proportions) :

~80% quartz, 10% ab, ~15% K-mica, <5% chlorite

Mineralisation (relation to cleavage) :

≤1% euhedral pyrite (⌀ 0.2mm), minor rutile

Some pyrite has atoll texture

Alteration (inclusions in feldspars, veining etc.):

Very fine grained groundmass - qz - K-mica - chlorite, possibly some alkali feldspar.

Few patches of purplish brown birefringent chlorite after ferromag.

Albite virtually inclusion-free (very fine and sparse sericite)

In places has patchy texture (incipient K-feldspar replacement?).

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421349

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82008

Location : BPJ 62 162-28

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : ~ 5% 1mm feldspar phenocrysts in altered groundmass. Some hints of perlitic texture, fragments. Possibly a brecciated (autoclastic) lava.

Mineralogy (and estimated proportions) :

~ 67% quartz, 5% albite, 10% chlorite, 15% K-mica, 2% carbonate

Mineralisation (relation to cleavage) :

~1 % fine grained euhedral pyrite. Minor rutile. Trace of minute chalcopyrite inclusions (10 μm) in altered feldspar.

Alteration (inclusions in feldspars, veining etc.):

Feldspars weakly ~~moderately~~ to strongly altered by sericite or carbonate. Groundmass granular quartz and very fine grained sericite and near isotropic (Fe/Fe+Mg ≈ 50) chlorite. Some chlorite patches may be secondary, others after ? pyroxene.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

MRVP – ISOTOPE & ALTERATION STUDY 421350
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 87010

Location : BPD 62 203.2

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Difficult to be certain, because of alteration, but some carbonate-rich patches have bubble and tube pumice textures - bubble walls preserved by sericite, quartz, or carbonate and some shards discernable in groundmass. Possibly a pumiceous vitric tuff. Carbonate rich bodies to 6mm across. Certainly are not vesicle fillings

Mineralogy (and estimated proportions) :

Quartz 40%, K-mica 40%, carbonate 20%, sphene ~1%.

Mineralisation (relation to cleavage) :

Trace euhedral pyrite (to 0.2 mm). More abundant scattered rutile

Alteration (inclusions in feldspars, veining etc.):

No feldspar relics seen.

Quartz - carbonate - sericite (precleavage)

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421351

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82011

Location : BPD 62 217.3

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Textures better preserved than in 82010. Clearly a pumiceous tuff, with ~~pumiceous~~ pumices preserved in both the carbonate blebs (to 7mm) and the very fine grained K-mica-quartz matrix a few fine phenocryst quartz fragments (to 0.3 mm)

Mineralogy (and estimated proportions) :

50% sericite, ~35% quartz, 10% carbonate, ~1% pyrite, ~1% rutile

Mineralisation (relation to cleavage) :

~1% pyrite with well developed mica beards, max. size ~0.2 mm
Some pyrite associated with rutile.

Alteration (inclusions in feldspars, veining etc.):

Pre-cleavage. Unsure whether carbonate blebs represent individual pumice clasts or patches of carbonate infilling & cross cutting individual pumices. Clearly syn-diagenetic alteration.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421352

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 81014

Location : BDP 62 254.4

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Quartz-feldspar porphyry. Quartz phenocrysts ~10%, plagioclase glomerocrysts ~ 20% in snowflake texture groundmass. Phenocrysts to 5 mm.

Mineralogy (and estimated proportions) :

Quartz 60%, feldspars, 30%, 5% carbonate, 3% sericite.

Mineralisation (relation to cleavage) :

Minor pyrite euhedra to 0.6 mm surrounded by blue birefringent chlorite, carbonate. A few pyrite euhedra contain minute inclusions of galena and rutile. Minor rutile

~~Pyrite and base metal sulphides~~

Alteration (inclusions in feldspars, veining etc.):

Very weak sericitisation of plagioclase.
~5% patchy carbonate in groundmass. Quartz-carbonate veinlets. Patchy secondary quartz in groundmass.
Minor fine sericite along fractures. Trace chlorite associated with pyrite.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421353

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82016

Location : BPD 62 455-25

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Quartz-feldspar porphyry as for 82014.

Mineralogy (and estimated proportions) :

50% quartz, ~30% feldspar, 7% K-mica, 10% carbonate, 3% sulphides, trace chlorite

Mineralisation (relation to cleavage) :

Largely restricted to quartz-carbonate veinlets and their peripheries. Veinlets contain chalcopyrite, galena, sphalerite, tetrahedrite and pyrite. Sphalerite not affected by chalcopyrite disease. Quartz veins strained, in part recrystallised to granular aggregates.

Alteration (inclusions in feldspars, veining etc.):

Very minor sericite and carbonate shedding of albite phenocrysts. Quartz-albite and quartz-carbonate veinlets minor irregular fine carbonate veinlets fringed by sericite. Patches of secondary quartz

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421354

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82018

Location : BPD 62 489.4

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : 15% feldspar phenocrysts to 3.5 mm
Fine grained strongly sericitised groundmass with sericite planes orientated differently between fragments. Probable lava breccia, possibly pumiceous pyroclastic.

Mineralogy (and estimated proportions) :
36% quartz, 36% K-mica, 25% carbonate, 3% albite

Mineralisation (relation to cleavage) :
Trace very fine grained pyrite and rutile.
Carbonate veinlet contains a few pyrite euhedra up to 0.1 mm.

Alteration (inclusions in feldspars, veining etc.):
Feldspars almost totally sericitised, lesser carbonate alteration. Just enough feldspar left to retain framework, euhedral shape. ~25% of slide irregular, patchy carbonate veinlet, probably syndiagenetic.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421355

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 87019.

Location : BPD 62 498.3

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures :

fine carbonaceous pyritic siltstone.

Mineralogy (and estimated proportions) :

Mineralisation (relation to cleavage) :

Quartz-carbonate-sphalerite veinlet crosscut folded carbonaceous stylolites. ? Post- or late syn-cleavage veining and mineralisation. Sphalerite, minor galena and pyrite. Sphalerite clear. Complicated relationship: also see tiny carbonate veins which cut mineralised quartz veins offset by stylolites: mineralisation could be precleavage.

Alteration (inclusions in feldspars, veining etc.):

See above.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421356

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: ~~37~~ Field No.: Co. No.: 87021

Location : BPD 67 529.5

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Pumiceous tuff : most of rock altered but one very clear rounded cherty tube pumice (1.5mm). One siliceous patch has very well preserved siliceous shards (mostly plate-like, some bubbles). Patches of carbonate and K-mica few mm across probable replace. feldspars (one has a little relict albite, another has an apatite inclusion)

Mineralogy (and estimated proportions) :

44% quartz, 44% K-mica, 10% carbonate, 2% opaques

Mineralisation (relation to cleavage) :

~ 2% opaques. Very fine pyrite grains to 50 μm, some with atoll texture. Mica boards adjacent to some of the coarser ones. Trace rutile.

Alteration (inclusions in feldspars, veining etc.):

Total carbonate (sericite) alteration of feldspars. Strongly sericitised groundmass.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421357

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82024

Location : BPD 62 629.4

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Looks like snowflake texture autoclastic dacite lava Plagioclase-phyric - 20% glomero crysts to 4.5 mm some ± chloritised ferromagnesians.

Mineralogy (and estimated proportions) :

Quartz ~47%, albite 20%, carbonate, 15 %, K-mica 15%, opaques 3%

Mineralisation (relation to cleavage) :

Irregular ramifying pyrite veinlets, probably pre-cleavage consist of minute euhedra 10 to 40 μm associated with rutile and sericite.

Alteration (inclusions in feldspars, veining etc.):

Feldspars weak to moderate carbonate alteration

Quartz and carbonate veinlets

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421358

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82025

Location : BP1)62 655.5

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Pumiceous silicic ash/l. Tube pumice, coherent silicic fragments, some well preserved shards.

Mineralogy (and estimated proportions) :

45% quartz, 45% K-mica, 9% carbonate, ~1% opaques

Mineralisation (relation to cleavage) :

~1% disseminated rutile: some rutile + carbonate after sphene; few grains of chalcopyrite (to 20 μm); one composite with bornite(?) in small secondary patch of quartz + chlorite.

Alteration (inclusions in feldspars, veining etc.):

Pre-cleavage quartz-carbonate veinlets and earlier carbonate veinlets.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

MRVP – ISOTOPE & ALTERATION STUDY 421359
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82026

Location : EAF 9 ~~2-3-1~~ 125.2

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : ~~Por~~ Polymict breccia - mostly quartz-feldspar plagioclase ~~porphyritic~~ lava and probable welded tuff, both dacitic, one chloritic feldspar-plagioclase andesite texture with feldspar microlites in groundmass.

Mineralogy (and estimated proportions) :

- 50% quartz, 8% white mica, 5% chlorite, 25% albite, 10% carbonate

Mineralisation (relation to cleavage) :

Trace very fine grained (to 0.1 mm.) pyrite euhedra and framboids.

Alteration (inclusions in feldspars, veining etc.):

Very weak sericitisation of feldspars. Predeformation quartz-carbonate veinlets.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421360

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 81027

Location : EAF 9 1547

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Silicification has destroyed most primary textures, apart from quartz phenocrysts in 60% of rocks. In islands where sericite is preserved, see relict feldspars and snowflake and fine grained textures. Maybe a primary polymict breccia. (quartz phenocrysts are not evenly distributed)

Mineralogy (and estimated proportions) :

50% quartz, 20% white mica, 15% carbonate, 15% sulphides

Mineralisation (relation to cleavage) :

Sulphides associated with carbonate and quartz in irregular veinlet with coarse quartz rim. Very pale brown sphalerite with relics of amber growth zones. With tetrahedrite and minor chalcopyrite near margin. Minor sphalerite, pyrite in quartz patches

Alteration (inclusions in feldspars, veining etc.):

Relict feldspars only seen in sericitic islands - replaced by coarse quartz and minor mica. Extreme silicification.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421361

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82029

Location : EAF 9 160.9

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Granular quartz - sericite groundmass (lava-like) . ~10% relict feldspars

Mineralogy (and estimated proportions) :

50% quartz, 40% K-mica, 6% carbonate, ~3% sulphides.

Mineralisation (relation to cleavage) :

Most in precleavage veinlets : pyrite, chalcopyrite, sphalerite galena. Some free pyrite grains with pressure shadows of quartz: coarser grains have cpy inclusions.

Alteration (inclusions in feldspars, veining etc.):

Feldspars largely retain their euhedral shapes but are totally replaced by quartz, carbonate and sericite (some have apatite inclusions). Precleavage sericite-rimmed quartz-carbonate

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

MRVP – ISOTOPE & ALTERATION STUDY 421362
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 87029

Location : EAF 9 197.9

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Feldspar phenocrysts totally replaced by quartz, but retain euhedral shape. Patches ~~Most~~ feldspar plagioclase volcanic, some fine grained cherty patches

Mineralogy (and estimated proportions) :
50% quartz. 20% sericite, 30% sulphides.

Mineralisation (relation to cleavage) :
Most sulphides in pre-cleavage veins and fracture fillings these have irregular shapes and ~~and~~ adjacent quartz pressure shadows and mica beards. Pale brown sphalerite rimmed and veined by ~~gal~~ pyrite. Minor chalcopyrite inclusions, zones of disease Sphalerite in veinlet to 3 mm wide.

Alteration (inclusions in feldspars, veining etc.):
Feldspars totally silicified. Spotty quartz - sericite texture in groundmass. Base metal veinlets not associated with quartz apart from pressure shadows

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421363

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

82031

Mines Dept. No.: ~~82076~~ Field No.: Co. No.: ~~82076~~

Location : EAF 9 ~~1250L~~ 213-1

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : None preserved. Patchy quartz texture may reflect silicified snowflake texture.

Mineralogy (and estimated proportions) :

35% K mica, 30% quartz, , carbonate 15%, sulphides ~ 10% trace apatite.

Mineralisation (relation to cleavage) :

Pyrite disseminated throughout. Has mica beards and rarer quartz pressure shadows.

Pale brown sphalerite in quartz-carbonate veinlet : ~~variably~~ minor ~~disrupted~~ opaque zones where cut by thin carbonate veinlets, fractures. Inclusions of galena and pyrite. Trace very fine chalcopyrite in veinlet.

Alteration (inclusions in feldspars, veining etc.):

Preclevage quartz and quartz-carbonate veining largely barren base metal sulphides.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

MRVP – ISOTOPE & ALTERATION STUDY 421364
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82032

Location : (52) EAF 9 218.2

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Very little preserved. Jigsaw-like breccia with angular quartz-sericite-carbonate fragments in fine grained chloritic matrix. Some feldspar-shapes preserved: totally sericitized and surrounded by carbonate. Some replaced by quartz. Some possible vesicles filled by quartz. Possibly a lava breccia.

Mineralogy (and estimated proportions) :

quartz 50%, K-mica 25%, carbonate 22%, 3% opaques

Mineralisation (relation to cleavage) :

Irregular very fine grained pyrite (< 0.1 mm), minor rutile.

Alteration (inclusions in feldspars, veining etc.):

Feldspars totally replaced (see above)

Minor quartz and carbonate veinlets (pre-cleavage)

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

421365

Mines Dept. No.: Field No.: Co. No.: 82073

Location : EAF 9 760 m.

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Quartz-feldspar porphyry, quartz and feldspar phenocrysts to 1-2 mm. Fine grained groundmass, probable lava.

Mineralogy (and estimated proportions) :

Quartz - 69%, K-mica - 20%, carbonate 10%, ~1% pyrite

Mineralisation (relation to cleavage) :

A few coarse pyrite grains to 0.6 mm with adjacent quartz fibres and mica beards :- predeformation. Some pyrite in irregular quartz-carbonate vein. Pyrite inclusion free. Trace rutile.

Alteration (inclusions in feldspars, veining etc.):

Feldspars totally replaced by K-mica and carbonate. Patchy sericite in groundmass.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421366

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82034

Location : BPD 63 6.7 m.

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Fs phenocrysts and glomerocrysts to 3mm (20%) in a fine grained ~~glassy~~ groundmass with pilotaxitic feldspar microlaths. Typical andesite lava texture.

Mineralogy (and estimated proportions) :

albite 30%, chlorite 20%, K-mica 20%, quartz 20% Minor sphene, rutile

Mineralisation (relation to cleavage) :

No sulphides

Alteration (inclusions in feldspars, veining etc.):

Chlorite veinlet (precleavage). K-mica in groundmass forms a mesh-like texture. Albite has only very minor inclusions of K-mica. In short, alteration negligible.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

421367

Mines Dept. No.: Field No.: Co. No.: 81035

Location : BPD 63 31.5

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : None observable.

Mineralogy (and estimated proportions) :

Pyrite 40%, quartz 40%, K-mica 20%

Mineralisation (relation to cleavage) :

Pyrite brecciated healed with fibrous quartz and mica. Pyrite is inclusion free. Very minor sphalerite in quartz. Minor rutile in mica.

Alteration (inclusions in feldspars, veining etc.):

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421368

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 8204

Location : BPD 63 147.7

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Quartz-feldspar porphyry. Fine groundmass. Quartz phenocrysts to (20%) to 5 mm, feldspar (15%) glomerocrysts to 3.5 mm.

Mineralogy (and estimated proportions) :

Quartz 55%, white mica 20%, albite (15%), carbonate 7%, opaques

Mineralisation (relation to cleavage) :

Small patches of chalcopyrite rimmed by tetrahedrite (1mm) and patches. very minor galena in strained quartz veinlets ± minor pyrite (300 μm) in sericitised zones cross cutting quartz phenocrysts. Other quartz-carbonate veins continue through quartz phenocrysts Veining, mineralisation pre- to syn-deformation

Alteration (inclusions in feldspars, veining etc.):

Moderate carbonate-sericite alteration of feldspars. Moderate groundmass sericitisation, mostly fracture-controlled. ±. Quartz-carbonate veinlets are irregular & discontinuous. Mineralisation sometimes associated with these, but mostly with coarse vuggy quartz patches.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421369

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82042

Location : BPD 63 187.0

Hand Specimen (82643 BPD 63 188.2 is very similar)

Primary textures : ± strong anastomising mica cleavage developed

Mineralogy and alteration :

Thin section

Primary textures : Quartz feldspar porphyry similar to 82041.

Mineralogy (and estimated proportions) :

Mineralisation (relation to cleavage) : minor pyrite to 0.1mm.
Some areas of quartz veins (particularly near margins) strongly sutured & partly recrystallised. Some centres of veins preserve euhedral intergrowths.
However veining appears to be dominantly pre- or syn-deformational. Trace v. fine grained cpy, sph in quartz veinlet.

Alteration (inclusions in feldspars, veining etc.):
Strong veining by quartz and quartz-carbonate veinlets. Near veinlets (through most of section) feldspars totally sericitised (or ser + carb. altered). In places albite is only moderately sericitised. ~~Some~~

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421370

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82043

Location : BPD 63 188.7 m.

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Quartz phenocrysts (20%), feldspar phenocrysts (~10%) totally sericitised (or sericitised altered) in fine grained cherty-sericite groundmass. Impossible to tell if lava or intrusive.

Mineralogy (and estimated proportions) :

Quartz, 60%, sericite 30%, carbonate 5%, pyrite <1%

Mineralisation (relation to cleavage) :

Traces very fine grained (≤ 0.1 mm) pyrite and rutile.

Alteration (inclusions in feldspars, veining etc.):

Precleavage carbonate and more common quartz-carbonate veinlets

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421371

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82045

Location : BPD 62 197.4 m

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Strong deformation of slate and crystal tuff - all feldspars replaced, some primary quartz. Very chaotic rock.

Mineralogy (and estimated proportions) :

Mineralisation (relation to cleavage) :

Patches of weakly chalcopyrite - diseased honey coloured sphalerite, associated with patches of quartz, deformed carbonate and carbonate veinlets. Slate pyritic, carbonate-rich.

Alteration (inclusions in feldspars, veining etc.):

Strong bright green chlorite alteration in tuff adjacent to shale - may have given rise to fuchsitic green colour. Strong carbonate alteration in tuff. Feldspars totally replaced by carbonate or sericite.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421372

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82046

Location : BPD 63 219.0

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures :

feldspar (plag.) to 1.5 mm in fine grained siliceous groundmass. Fewer quartz phenocrysts. Possible lava breccia? although one clast similar to tube pumice seen.

Mineralogy (and estimated proportions) :

quartz, albite, carbonate, 1% opy

Mineralisation (relation to cleavage) :

Quartz associated with arsenopyrite in strongly sutured some arsenopyrite euhedra have pressure shadows of quartz adjacent. Arsenopyrite to 0.6 mm.
Minor disseminated rutile and very fine grained pyrite

Alteration (inclusions in feldspars, veining etc.):

Albite fresh - weakly studded with sericite and carbonate.
Veining of carbonate (strained plumose extinction) with quartz veins. Arsenopyrite associated with quartz.
Groundmass totally silicified virtually only mica left is as inclusions in albite.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421373

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 87048

Location : BPD 63 260-3

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Crystal rich (plagioclase 30%), lithic - crystal epiclastic (probably), Very minor pleochroic quartz. Groundmass textures obscure

Mineralogy (and estimated proportions) :

albite 30%, carbonate 25%, quartz 30% Kmica 5%, sphalerite 10%

Mineralisation (relation to cleavage) :

Reddish-brown sphalerite in quartz-carbonate vein and in pa carbonate patches. In one place sphalerite is fractured, fractures healed by fibrous quartz. Sphalerite has minor inclusions of galena and pyrite; virtually undiseased

Alteration (inclusions in feldspars, veining etc.):

Groundmass consists of recrystallised & sutured quartz, albite, carbonate. Weak (to moderate rarely) carbonate and sericite alteration of albite

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421374

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82049

Location : BPD 63 313.0

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Only primary textural feature recognisable with confidence are quartz phenocrysts 10%. Patches of silicified have variable texture and grainsize - very fine to fine chert with coarser quartz textures in places reminiscent of sucrosic texture - possibly a ~~fragmental~~ volcaniclastic rock.

Mineralogy (and estimated proportions) :

Quartz 50%, K-mica 40%, carbonate 10%.

Mineralisation (relation to cleavage) :

Very minor pyrite. Largest grain 0.3 mm has quartz pressure shadows. Minor rutile.

Alteration (inclusions in feldspars, veining etc.):

Strong sericitisation of groundmass with superimposed cherty silicification. Sutured quartz - carbonate veinlets and patches of carbonate with strained spherulitic extinction.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421375

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82050

Location : EAF 18 36.35

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures :

Very little primary texture preserved. Some hints of tube pumice texture and perlitic cracking in areas of slide with enough mica left to preserve textures.
Volcanic clastic.

Mineralogy (and estimated proportions) :

90% quartz, 5% mica, 5% pyrite

Mineralisation (relation to cleavage) :

Pyrite has pressure shadows. Most quartz veinlets annealed into polygonal aggregates. Minor cpy, gn in quartz veinlet.

Alteration (inclusions in feldspars, veining etc.):

Essentially complete silicification. Quartz veinlets either polygonised or sutured aggregates.

CONCLUSION: Silicification pre cleavage

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

MRVP – ISOTOPE & ALTERATION STUDY 421376
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 87052

Location : EAF 18 43.8

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Fine grained chert with a few recognisable shards to a few mm. (Also deformed quartz veinlets with shard-like shapes)
Probably an ashy siltstone.

Mineralogy (and estimated proportions) :
Quartz 78%. Mica 15%, sphalerite, 2% pyrite 5%,

Mineralisation (relation to cleavage) :
One particle of sphalerite 4.5 × 1.5 mm. & Cpy-diseased mm galena inclusions common. One tiny gold grain in qtz adjacent to sph. (6 × 2 μm).
Fine grained pyrite 50-100 μm. Some has mica beards or quartz pressure shadows.

Alteration (inclusions in feldspars, veining etc.):
Minor quartz veining, silicification textures as for 87050

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421377

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82053

Location : EAST 14 44-2

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : fine grained siltstone, a few platy shards.

Mineralogy (and estimated proportions) :

quartz 70%, mica 20%, sphalerite 2%

Mineralisation (relation to cleavage) :

Sphalerite in deformed quartz vein. Sphalerite has quartz pressure shadows adjacent and cleavage micas impinge on vein. Sphalerite honey brown, disease rim where cpy, gn and pyrite are common.

Alteration (inclusions in feldspars, veining etc.):

Less silicification than 82050, 82052.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

MRVP – ISOTOPE & ALTERATION STUDY 421378
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 87054

Location : EAF 14 73.0

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Good preservation of shard, tube and flattened pumice textures by sericite.
- Pumiceous vitric tuff.

Mineralogy (and estimated proportions) :
45% K-mica, 48% quartz, 5% pyrite, 2% other sulphides

Mineralisation (relation to cleavage) :
Pyrite (to 1mm) has good pressure shadows adjacent
Base metal sulphides (sphalerite, diseased rims, trace cpy) in sutured quartz veins. Occasional pressure-shadow-like textures in quartz adjacent to sha sphalerite in veinlets

Alteration (inclusions in feldspars, veining etc.):
Silicification confined to veinlets and minor patches

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421379

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82058

Location : BPD 64 96.0.

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Banded texture with banding on scale of 0.5 to 1 mm consists of alternating mica-rich domains and layers rich in granular rounded quartz grains 0.1 mm across which occasionally coalesce. Layering is not of deformational origin and lies at an angle of 50° to the weakly developed cleavage. Original nearly aphyric flow banded lava. A few former feldspars rpl. by granular

Mineralogy (and estimated proportions) :

White mica 64%, quartz 36%, opaques 1%.

Mineralisation (relation to cleavage) :

Trace very fine grained pyrite and rutile.

Alteration (inclusions in feldspars, veining etc.):

feldspars replaced by granular quartz, minor sericite and opaques.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421380

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82059

Location : BDP 64 148·1

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Unequivocal vitric-crystal tuff. Clear platy, blocky and bubble rim shards preserved as quartz in sericite-quartz matrix: average size about 0.35 mm. Crystals of plagioclase (av. ~ 0.4 mm) >> quartz comprise about 10% of rock. Very little pumice.

Mineralogy (and estimated proportions) :

white mica 40%, quartz 15%, albite 10%, pyrite 1%, chlorite 2%, carbonate 2%
trace sphene, zircon

Mineralisation (relation to cleavage) :

Pressure shadows, mica bends against pyrite.

Pyrite disseminated throughout rock: 0.2 to 0.4 mm, not associated with veinlets, inclusion free or with minor rutile inclusions. Trace chalcopyrite in quartz veinlet. Rutile disseminated and in margins of feldspars.

Alteration (inclusions in feldspars, veining etc.):

Albite little altered. Rare carbonate inclusions, more commonly very weak white mica clouding. Variety of vein types: quartz-carbonate-folded with mica bends; chlorite-carbonate, bladed quartz (after sulphate). All are precleavage.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421331

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 92061

Location : BPD 64 193·5

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : About 15% each of quartz and plagioclase phenocrysts up to 5·5 mm in strongly altered groundmass: probably originally a granoblastic texture.

Mineralogy (and estimated proportions) :

Quartz 55%, albite 15%, carbonate 14%, white mica 11%, chlorite ~~5%~~, 5%
opaques 2%

Mineralisation (relation to cleavage) :

~~Mostly in veins, feldspar phenocryst margins~~

Only opaque is rutile, mainly associated with sericitic seams

Alteration (inclusions in feldspars, veining etc.):

Pre- and post-cleavage quartz carbonate veinlets widespread. Rock strongly fractured with network of sericite seams anastomosing through rock. Groundmass strongly altered - semi opaque with fine quartz, carbonate and chlorite predominating between sericite seams.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421382

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 81065

Location : BPD 64 229.6

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Very few recognisable. Rock is strongly sheared and brecciated quartz sericite schist. Occasionally see patches of quartz about 1 mm across pseudomorphing feldspar, rarer quartz phenocrysts and occasional shard-like shape. Possibly a tuff or epiclastic.

Mineralogy (and estimated proportions) :

quartz 45%, white mica 40%, carbonate 5%, sphalerite 5%, pyrite 5%

Mineralisation (relation to cleavage) :

Sphalerite as coarse patches to 6mm in quartz carbonate veins and patches of quartz surrounded by pressure shadows and mica beards. Pyrite (mostly 0.1 to 0.2 mm) has adjacent mica beards or pressure shadows clearly pre-deformational. Sphalerite warm brown colour, weakly diseased at margins where minor galena is intergrown.
Pyrite is inclusion free: unassociated with sphalerite.

Alteration (inclusions in feldspars, veining etc.):

Patchy texture with coarse blocky quartz(± carbonate) - probably mainly disrupted vein material, fine grained chert and with strongly cleaved mica patches. Degree of silicification not nearly as severe as in EAF 18.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421383

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 81066

Location : BPD 64 2357

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : vitric-crystal tuff. Most of slide has beautifully preserved siliceous shards and tube pumice clasts and rarer feldspars (pseudomorphed by granular quartz) in micaceous matrix. Occasional patches of quartz result in total destruction of textures.

Mineralogy (and estimated proportions) :

Quartz 65%, mica 30%, carbonate 2%, sulphides 3%.

Mineralisation (relation to cleavage) :

Sphalerite in precleavage quartz vein, diseased near margin, minor galena. Pyrite (to 0.5 mm) associated with silicified patches & ? pseudomorphed feldspars with quartz pressure shadows, mica beards. Pyrite inclusion free. Minor galena in veinlet, rutile disseminated throughout.

Alteration (inclusions in feldspars, veining etc.):

Quartz ± carbonate veining and patchy silicification precleavage.

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

MRVP – ISOTOPE & ALTERATION STUDY 421384
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 87067

Location : BPD 64 247.7.

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Rhard-rich silicic tuff similar to 82065
Similar superb textural preservation. No evidence of feldspar pseudomorphs. Similar patches of quartz (± carbonate) overprint & destroy textures.

Mineralogy (and estimated proportions) :

quartz 45%, chlorite-mica 27%, carbonate 15%, sphalerite 3%, pyrite <1%

Mineralisation (relation to cleavage) :

Sphalerite – in deformed quartz-carbonate vein.
Only minor granular pyrite.
Sphalerite dull brown in transmitted light diseased strongly at grain rims with a few coarser blebs of chalcopyrite (to 0.6mm) and pyrite. Rare galena.

Alteration (inclusions in feldspars, veining etc.):

Preclevage quartz-carbonate veining cut by pre- or syn-cleavage carbonate veins. Patchy quartz ± carbonate alteration

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421385

MRVP – ISOTOPE & ALTERATION STUDY
PETROGRAPHY

Mines Dept. No.: Field No.: Co. No.: 82069

Location : BPD 64 289.6

Hand Specimen

Primary textures :

Mineralogy and alteration :

Thin section

Primary textures : Pumiceous vitric-crystal tuff. Compared with 82067 more pumice, clear silicified ~~fp~~ feldspars

Mineralogy (and estimated proportions) :

Quartz 55%, Sericite 38%, Carbonate 5%, Pyrite 2%

Mineralisation (relation to cleavage) :

~2% pyrite (0.1 to 0.4 mm) with ~~fp~~ beautiful quartz pressure rhodans. Few blebs of fine grained chalcopyrite in quartz veinlet. Minor rutile.

Alteration (inclusions in feldspars, veining etc.):

Precleavage strongly deformed quartz and quartz-carbonate veinlets

CONCLUSION:

$\delta^{13}C$ $\delta^{18}O$ $\delta^{34}S$ Probe :

Whole rock analysis

421336

APPENDIX 11.

INTERPRETATION OF OXYGEN DATA FROM THE PINNACLE AREA

DR G GREEN APRIL 1990

421387

INTERPRETATION OF OXYGEN DATA FROM THE PINNACLES AREA

$\delta^{18}O$ values of 10.5‰ or less are recorded in rocks from the upper part of DDH BPD62 and also characterise all six samples analysed from BPD65. Such values are typically associated with VMS- related alteration and imply temperatures of fluid-rock interaction of 184°C or more. $\delta^{18}O$ values less than 9.5‰ imply temperatures of alteration at water:rock ratios of >10 of more than 202°C. Such temperatures of alteration in massive sulphide systems typically occur within 200m of mineralisation, but are not specific to a particular "ore horizon" as indicated by the low $\delta^{18}O$ values throughout BPD65. In fact in the immediate vicinity of a massive sulphide there may be a local reversal of the low $\delta^{18}O$ values related to localised silicification, as indicated by the data from EAF9.

From experience at Rosebery, in areas remote from the effects of overprinting Devonian mineralisation (specifically to the north of the A and B lenses) the low $\delta^{18}O$ values recorded in BPD62 and BPD65 are restricted to areas less than 200m from ore, although rocks with similar $\delta^{18}O$ values occur in altered rocks in the Rosebery Lodes- Koonya area where no significant massive sulphide deposit has yet been intercepted. (The effects of later Devonian alteration are unlikely to be as significant at Pinnacles, but in any case their effect would be to increase whole rock $\delta^{18}O$ values.

Critical parameters which may help in the recognition of a potential ore horizon in **felsic rocks** within 200m of mineralisation include the following:

1. SO3 contents of more than 0.5% present in about 20% of the rocks. These tend to be concentrated near the ore horizon. Values >0.2% may extend for 300m near the ore horizon.
2. MnO contents of 0.5% or more are present in about 25% of samples within 200m of ore. They are not always associated with a specific horizon, but generally occur near the ore horizon.
3. Zn contents of 100ppm or more occur in about 45% of samples.
4. As contents of 100ppm or more are found in about 25% of samples and are usually concentrated near the ore horizon.
5. Ba contents of >1500 ppm occur in 20% of rocks. Significantly Ba contents of this level are not recorded from the Rosebery Lodes- Koonya area. However care is required: Ba tends to correlate with K and an area should not necessarily be discounted on the basis of the Ba content.
6. MgO values >1% occur in 35% of samples.
7. Na2O contents <0.2% occur in 20% of cases - the other elements seem to offer broader haloes

421338

In particular, S and As extend the furthest distance, but are restricted to the vicinity of the ore horizon. Care must be taken at these low concentrations because of the possibility of contamination by later veining. Spot As highs in particular must be regarded with suspicion. Support from the other elements such as Ba and Mn would tend to upgrade any anomalies. Oxygen isotopes offer the broadest haloes both in a lateral and in a stratigraphic sense, and therefore should be combined with traditional geochemistry for more precise target definition. It is important to note that these remarks refer specifically to felsic rocks.

Geoffrey R. Green
19/4/90

421389

APPENDIX 12.

GEOCHEMICAL DATA FOR CHESTER AREA

BPD 67, 68 AND OUTCROP

421390

BR 67

Sample No.	From	TO	Au;ave	Cu	Pb	Zn	Ag
82287	4	6	0.04		30	68	38
88	9	10	<0.01		13	88	50
89	14	15	<0.01		10	32	60
90	19	20	<0.01		14	20	62
91	24	25	<0.01		7	20	72
92	29	30	<0.01		4	22	125
93	35	36	<0.01		6	20	94
94	40	41	<0.01		13	20	62
95	45	46	<0.01		4	15	75
96	50	51	<0.01		22	18	78
97	55	56	<0.01		8	18	68
98	60	61	<0.01		11	48	50
99	61	62	<0.01		7	100	45 <1
82300	62	63	<0.01		25	58	36 <1
78701	69	70	<0.01		11	22	48
2	74	75	0.01		14	22	62
3	79	80	<0.01		7	22	195
4	84	85	<0.01		6	15	62
5	89	90	<0.01		17	16	110
6	93.5	94.5	0.01		24	38	68 <1
7	96	97	<0.01		10	18	18
8	97	98	<0.01		15	10	8 <1
9	98	99	<0.01		13	18	70 <1
78710	99	100	<0.01		9	14	15
11	100	101	<0.01		11	20	12
12	101	102	<0.01		11	18	14
13	105	106	<0.01		19	12	15
14	110	111	0.02		17	15	20
15	115	116	<0.01		10	25	35
16	120	121	0.01		5	20	38
17	125	127	<0.01		7	45	32 <1
18	127	129	<0.01		5	60	32
19	129	131	<0.01		5	36	28
78720	135	136	<0.01		16	12	46
21	140	141	<0.01		8	16	70 <1
22	145	146	<0.01		8	8	28
23	150	151	<0.01		3	15	54 <1
24	155	156	<0.01		24	18	56
25	160	161	<0.01		12	15	790 <1
26	165	166	<0.01		11	16	260
27	170	171	<0.01		17	14	120
28	175	177	<0.01		22	36	96
29	177	179	<0.01		15	36	78 <1
78730	179	181	<0.01		20	155	710
31	181	183	<0.01		28	125	1760
32	185	186	<0.01		12	32	40 <1
33	190	191	0.01		4	50	52
34	195	196	0.01		6	160	100 <1
35	200	201	<0.01		7	36	84
36	205	206	<0.01		4	34	290
37	210	211	<0.01		6	34	50
38	215	216	<0.01		15	470	340
39	220	221	0.01		19	175	300

421391

Sample Nº	From	To	Au. Avg.	Cu	Pb	Zn	Ag
78740	225	226	<0.01	10	36	78	1
41	230	231	<0.01	7	230	38	1
42	235	236	<0.01	15	155	145	1
43	240	241	<0.01	40	190	670	1
44	245	246	<0.01	22	100	180	<1
45	250	252	<0.01	44	88	60	2
46	252	254	<0.01	15	70	74	1
47	259	261	<0.01	2	44	470	1
48	261	263	<0.01	6	12	30	<1
49	263	265	<0.01	2	6	10	<1
78750	265	267	<0.01	7	10	8	1
51	267	269	0.01	14	22	10	1
52	275	276	<0.01	62	25	64	<1
53	280	281	<0.01	17	15	58	1
54	286	287	<0.01	10	26	250	1
55	295	296	<0.01	105	76	88	1
56	305	306	<0.01	16	74	86	1
57	315	316	<0.01	11	38	25	1
58	325	326	<0.01	80	62	1560	1
59	335	336	<0.01	58	38	1520	<1
78760	345	347	<0.01	18	75	80	1
61	350	351	<0.01	8	16	92	1
62	360	361	<0.01	30	35	62	1
63	370	371	0.01	16	240	1550	2
64	380	381	<0.01	9	35	780	1
65	385	386	<0.01	3	16	55	<1
66	390	391	<0.01	5	12	60	1
67	395	396	<0.01	6	15	50	1
68	400	401	<0.01	7	16	64	1
69	410	411	<0.01	6	26	86	1
78770	420	421	<0.01	7	35	105	1
71	425	426	<0.01	40	370	1500	<1
72	430	432	<0.01	45	32	1220	1
73	432	434	0.01	18	22	62	1
74	434	436	<0.01	19	50	210	1
75	436	438	<0.01	42	52	680	1
76	438	440	<0.01	15	18	46	1
77	440	442	<0.01	7	14	135	1
78	442	444	<0.01	11	30	30	1
79	444	446	<0.01	13	28	330	1
78780	446	448	<0.01	16	46	460	1
81	448	450	<0.01	17	35	200	1
82	450	452	<0.01	18	22	230	1
83	460	462	<0.01	18	18	115	1

Sample No.	Fe	Ti	Zr	Ba	Ti/Zr
82287	18700	2900	220	730	13.181818
88	22000	2900	195	770	14.871795
89	31000	2900	190	490	15.263158
90	22500	2850	195	630	14.615385
91	24500	2750	190	500	14.473684
92	44500	5300	72	820	73.611111
93	30500	2550	170	510	15
94	21500	2300	170	420	13.529412
95	22000	2550	175	580	14.571429
96	23500	2450	175	630	14
97	25000	2500	185	520	13.513514
98	25500	2700	180	510	15
99	21500	2250	180	590	12.5
82300	26000	2550	175	500	14.571429
78701	26500	2600	180	510	14.444444
2	24500	2600	185	570	14.054054
3	24000	2850	195	690	14.615385
4	21500	2400	180	600	13.333333
5	30500	3700	280	690	13.214286
6	41500	2850	170	770	16.764706
7	22000	2500	180	1100	13.888889
8	21000	2800	185	1140	15.135135
9	24000	2950	210	990	14.047619
78710	21500	2800	195	960	14.358974
11	28500	2800	500	1020	5.6
12	26000	2800	190	1060	14.736842
13	22500	2550	180	1400	14.166667
14	21000	2650	180	960	14.722222
15	22000	2600	185	800	14.054054
16	21500	2600	190	670	13.684211
17	23000	670	195	760	3.4358974
18	23000	2750	195	690	14.102564
19	25500	2750	185	640	14.864865
78720	25500	2550	180	720	14.166667
21	21500	2950	185	930	15.945946
22	23000	2600	180	690	14.444444
23	19700	2500	175	680	14.285714
24	22000	1000	180	910	5.5555556
25	26500	3300	145	840	22.758621
26	28000	2700	180	940	15
27	27000	440	185	1160	2.3783784
28	35000	3200	170	890	18.823529
29	26500	2800	185	790	15.135135
78730	28000	2750	185	580	14.864865
31	35500	4450	165	840	26.969697
32	25000	2800	185	730	15.135135
33	29000	2550	175	740	14.571429
34	24000	2700	180	700	15
35	24500	2450	180	500	13.611111
36	24000	2600	190	670	13.684211
37	26000	3100	180	680	17.222222
38	28500	2600	180	580	14.444444
39	23000	2700	185	590	14.594595

421393

Sample №	Fe	Ti	Zr	Ba	Ti/Zr
78740	29000	3550	260	630	13.653846
41	27500	2450	185	450	13.243243
42	25000	2550	185	510	13.783784
43	28000	2600	180	500	14.444444
44	23500	2559	190	580	13.468421
45	27500	2500	210	820	11.904762
46	34500	2550	185	660	13.783784
47	25500	2500	190	700	13.157895
48	31000	2250	145	400	15.517241
49	21500	790	210	560	3.7619048
78750	35000	3050	180	550	16.944444
51	40500	3000	185	880	16.216216
52	22000	2500	190	770	13.157895
53	28000	2500	190	700	13.157895
54	49500	4550	98	810	46.428571
55	36000	1800	165	460	10.909091
56	31500	2700	200	580	13.5
57	27000	2600	180	550	14.444444
58	21500	2450	190	580	12.894737
59	23000	2450	175	700	14
78760	28500	1820	185	490	9.8378378
61	25500	2900	200	510	14.5
62	27500	2850	190	720	15
63	27500	2800	185	1420	15.135135
64	30000	1940	170	550	11.411765
65	26500	2300	180	700	12.777778
66	24500	260	190	780	1.3684211
67	28000	2600	185	730	14.054054
68	33000	2450	160	980	15.3125
69	27500	2350	180	630	13.055556
78770	24500	2450	185	600	13.243243
71	21500	2600	210	600	12.380952
72	25000	2700	270	880	10
73	23000	2500	180	870	13.888889
74	27500	430	180	780	2.3888889
75	31000	2650	170	880	15.588235
76	34000	480	195	1040	2.4615385
77	29000	2800	185	1640	15.135135
78	28000	2850	190	1000	15
79	41000	2650	185	1140	14.324324
78780	43000	2900	185	980	15.675676
81	35500	2750	185	1220	14.864865
82	26000	2350	185	670	12.702703
83	28000	2600	180	860	14.444444

	Mn	Na	K	Ca	Mg
78740	3450	16300	27500	38000	13400
41	2350	20500	29000	26000	6800
42	3000	14800	24500	21500	8700
43	4350	17100	26500	26000	11000
44	3400	16600	31500	21000	10000
45	1400	2950	40000	6100	7100
46	790	470	38500	7300	8200
47	2100	11300	33500	12100	11600
48	90	560	40000	690	5500
49	30	610	39000	820	3600
78750	35	510	38000	530	3900
51	75	470	76500	810	5500
52	2250	15800	40000	29500	10200
53	2600	17500	51500	27000	11300
54	4300	4050	57000	41000	28500
55	7000	25500	26500	31500	14100
56	3850	26000	23500	24500	9700
57	4600	17800	29000	19100	7100
58	3550	22500	24000	25500	8400
59	3100	22500	19400	24000	10600
78760	1920	24500	22500	24500	10700
61	1420	29500	18700	6400	7400
62	3950	22000	31000	18900	7800
63	2150	9600	64000	11000	10400
64	4400	25500	29500	20000	11900
65	3350	24500	33500	22000	10800
66	2900	20500	30500	19800	12100
67	2700	23500	23000	20000	11000
68	5200	16800	21500	26500	10300
69	4050	21500	24000	23500	12800
78770	3800	25000	21000	22500	13900
71	3200	25000	24000	21000	10300
72	4550	19100	36000	21500	9200
73	4550	19000	26500	20500	7900
74	3500	18500	22000	13700	8500
75	1520	6900	35000	5300	7600
76	150	540	68000	1250	5400
77	800	560	70500	1160	8400
78	84	550	69500	590	5300
79	830	550	61500	1520	9900
78780	1300	490	51000	1720	14900
81	2100	4100	59500	7300	10400
82	5200	22000	45000	19800	10500
83	3450	30000	19900	20000	7100

Sample No.	Mn	Na	K	Ca	Mg
82287	20	5700	41000	105	6300
88	20	15300	35500	420	5200
89	1120	18700	31000	730	9200
90	520	19600	28000	500	9100
91	880	14800	35500	1660	10100
92	1880	20500	24500	50000	15300
93	1020	22500	19700	28000	11000
94	910	25000	19700	26500	8300
95	1240	17200	27000	28500	9600
96	1060	16300	22500	27000	10300
97	890	21000	23500	27500	10400
98	820	21500	26500	24000	8600
99	920	19900	27500	25000	8100
82300	850	23000	22500	24000	7000
78701	940	22000	28000	25500	8700
2	930	21500	24500	24000	9600
3	990	17800	31500	29000	10200
4	970	19400	28500	25000	9500
5	1400	16600	23500	23000	14000
6	2800	13600	28500	42000	10200
7	340	4900	38000	6000	5400
8	42	560	41000	630	4350
9	30	490	30500	650	4200
78710	35	550	40000	440	4800
11	330	5600	39500	5000	5900
12	230	5300	41500	1920	5500
13	640	11700	33000	100	5500
14	1440	18300	30000	185	6100
15	2150	15900	31000	180	8400
16	1340	620	35500	185	7800
17	200	580	37500	1260	5200
18	200	680	38500	1760	4000
19	1950	570	35000	32500	8200
78720	1100	13900	29000	22500	9700
21	1200	3450	36500	25500	10600
22	1150	16300	35000	29000	6100
23	1440	10000	33000	19800	8700
24	2300	520	39000	25000	8900
25	3050	1300	42500	13400	11500
26	6400	400	40500	18700	10800
27	2750	420	40500	9200	10900
28	680	440	40000	5900	7500
29	420	430	37000	4550	6400
78730	350	380	39000	4550	8400
31	3450	400	38500	30500	13100
32	2150	19800	28500	17000	6600
33	1600	16100	30000	16400	7000
34	2900	2400	27500	24500	6800
35	1960	25500	25000	24500	7000
36	1520	28500	24500	17400	7300
37	1950	24000	29500	24000	5500
38	3650	15100	30500	17800	8000
39	3750	13600	30000	26000	9400

Sample No.	Ba/K	A.I.	K/Na
82287	1.7804878	89.068826	7.1929825
88	2.1690141	72.13754	2.3202614
89	1.5806452	67.41573	1.657754
90	2.25	64.86014	1.4285714
91	1.4084507	73.47728	2.3986486
92	3.3469388	36.083409	1.195122
93	2.5888325	37.807882	0.8755556
94	2.1319797	35.220126	0.788
95	2.1481481	44.471446	1.5697674
96	2.8	43.101183	1.3803681
97	2.212766	41.140777	1.1190476
98	1.9245283	43.548387	1.2325581
99	2.1454545	44.223602	1.3819095
82300	2.2222222	38.562092	0.9782609
78701	1.8214286	43.586698	1.2727273
2	2.3265306	42.839196	1.1395349
3	2.1904762	47.118644	1.7696629
4	2.1052632	46.116505	1.4690722
5	2.9361702	48.638132	1.4156627
6	2.7017544	41.039236	2.0955882
7	2.8947368	79.926335	7.755102
8	2.7804878	97.44306	73.214286
9	3.2459016	96.819196	62.244898
78710	2.4	97.837956	72.727273
11	2.5822785	81.071429	7.0535714
12	2.5542169	86.68388	7.8301887
13	4.2424242	76.540755	2.8205128
14	3.2	66.135385	1.6393443
15	2.5806452	71.016583	1.9496855
16	1.8873239	98.17481	57.258065
17	2.0266667	95.868882	64.655172
18	1.7922078	94.570538	56.617647
19	1.8285714	56.640881	61.403509
78720	2.4827586	51.531292	2.0863309
21	2.5479452	61.932939	10.57971
22	1.9714286	47.569444	2.1472393
23	2.0606061	58.321678	3.3
24	2.3333333	65.241079	75
25	1.9764706	78.60262	32.692308
26	2.3209877	72.869318	101.25
27	2.8641975	84.234677	96.428571
28	2.225	88.224368	90.909091
29	2.1351351	89.70649	86.046512
78730	1.4871795	90.579018	102.63158
31	2.1818182	62.545455	96.25
32	2.5614035	48.817803	1.4393939
33	2.4666667	53.23741	1.863354
34	2.5454545	56.045752	11.458333
35	2	39.02439	0.9803922
36	2.7346939	40.926641	0.8596491
37	2.3050847	42.168675	1.2291667
38	1.9016393	53.921569	2.0198675
39	1.9666667	49.873418	2.2058824

421397

Sample No	Ba/K	A.I.	K/Na
78740	2.2909091	42.962185	1.6871166
41	1.5517241	43.499392	1.4146341
42	2.0816327	47.769784	1.6554054
43	1.8867925	46.526055	1.5497076
44	1.8412698	52.465234	1.8975904
45	2.05	83.882458	13.559322
46	1.7142857	85.735267	81.914894
47	2.0895522	65.839416	2.9646018
48	1	97.326203	71.428571
49	1.4358974	96.752214	63.934426
78750	1.4473684	97.578016	74.509804
51	1.1503268	98.463016	162.76596
52	1.925	52.565445	2.5316456
53	1.3592233	58.527493	2.9428571
54	1.4210526	65.492149	14.074074
55	1.7358491	41.598361	1.0392157
56	2.4680851	39.665472	0.9038462
57	1.8965517	49.452055	1.6292135
58	2.4166667	40.298507	1.0666667
59	3.6082474	39.215686	0.8622222
78760	2.1777778	40.389294	0.9183673
61	2.7272727	42.096774	0.6338983
62	2.3225806	48.68256	1.4090909
63	2.21875	78.315789	6.6666667
64	1.8644068	47.640967	1.1568627
65	2.0895522	48.788546	1.3673469
66	2.557377	51.387214	1.4878049
67	3.173913	43.870968	0.9787234
68	4.5581395	42.343542	1.2797619
69	2.625	44.987775	1.1162791
78770	2.8571429	42.354369	0.84
71	2.5	42.714819	0.96
72	2.4444444	52.680653	1.8848168
73	3.2830189	46.549391	1.3947368
74	3.5454545	48.644338	1.1891892
75	2.5142857	77.737226	5.0724638
76	1.5294118	97.619364	125.92593
77	2.3262411	97.866534	125.89286
78	1.4388489	98.498815	126.36364
79	1.8536585	97.182523	111.81818
78780	1.9215686	96.755249	104.08163
81	2.0504202	85.97786	14.512195
82	1.4888889	57.040082	2.0454545
83	4.321608	35.064935	0.6633333

421398

BD 68

From	TO	Sample No.	Au Avg.	Ag	Cu	Pb	Zn	
4	6	78784	<0.02	<1		13	20	26
9	10	85	<0.02		1	13	30	22
14	15	86	<0.02		1	7	26	40
19	20	87	0.02	<1		4	28	12
24	25	88	0.06	<1		5	32	14
29	30	89	<0.02		1	2	22	24
35	36	78790	0.02	<1		6	18	48
40	41	91	<0.02	<1		3	24	26
45	46	92	<0.02	<1		5	24	76
50	51	93	0.06	<1		5	14	76
55	56	94	<0.02	<1		7	70	38
60	61	95	<0.02		1	7	90	880
61	62	96	<0.02	<1		8	62	330
62	63	97	<0.02		1	9	1020	2100
69	70	98	<0.02	<1		7	290	490
74	75	99	<0.02	<1		11	48	42
79	80	778801	<0.02	<1		6	76	195
84	85	2	0.02	<1		7	180	450
89	90	3	<0.02		1	5	32	56
93.5	94.5	4	<0.02		1	18	170	2500
96	97	5	<0.02		1	10	260	1150
97	98	6	<0.02	<1		15	84	150
98	99	7	<0.02	<1		10	105	240
99	100	8	0.02	<1		28	36	110
100	101	9	<0.02	<1		32	38	82
101	102	78810	<0.02	<1		45	42	52
105	106	11	0.02	<1		24	130	240
110	111	12	0.02		1	17	180	135
115	116	13	0.02		1	11	300	1620
120	121	14	0.02		1	22	110	100
125	127	15	<0.02		1	7	340	570
127	129	16	<0.02		1	9	160	500
129	131	17	<0.02		1	18	590	1500
135	136	18	<0.02		1	11	70	32
140	141	19	<0.02	<1		7	34	12
145	146	78820	<0.02	<1		6	64	56
150	151	21	<0.02		1	10	660	1700
155	156	22	0.02		1	17	170	290
160	161	23	0.04	<1		19	50	220
165	166	24	<0.02		1	40	40	560
170	171	25	<0.02	<1		40	25	170
175	177	26	<0.02	<1		20	16	130
177	179	27	<0.02	<1		16	16	74
179	181	28	0.04		1	14	125	220
181	183	29	<0.02		1	16	185	360
185	186	78830	<0.02		1	16	230	1700
190	191	31	<0.02		1	12	290	4300
195	196	32	0.02	<1		44	60	100
200	201	33	0.02	<1		19	38	12
205	206	34	0.06	<1		13	35	6
210	211	35	0.06	<1		12	28	4
215	216	36	<0.02		1	5	20	570
220	221	37	<0.02		1	30	18	400

421399

From	To	Sample No	Au	Avg.	Ag		Cu		Pb		Zn
225	226	38		0.04	<1			22		30	5
230	231	39		0.06	<1			8		15	5
235	236	78840		0.02	<1			7		15	1
240	241	41	<0.02		<1			6		8	1
245	246	42	<0.02		<1			2		16	9
250	252	43		0.02	<1			4		22	1
252	254	44	<0.02		<1			5		12	1
259	261	45	<0.02		<1			3		18	1
261	263	46		0.04	<1			3		16	1
263	265	47		0.04	<1			3		6	1
265	267	48		0.02	<1			2		4	1
267	269	49	<0.02		<1			2		2	1
275	276	78850	<0.02		<1			4		10	3
280	281	51	<0.02		<1			9		110	44
286	287	52	<0.02		<1			7		22	13
295	296	53	<0.02		<1			5		8	3
305	306	54	<0.02		<1			7		66	210
315	316	55	<0.02		<1			11		78	250
325	326	56		0.02			1	12		26	175
335	336	57	<0.02		<1			22		15	58
345	347	58		0.02	<1			5		10	155
350	351	59		0.02	<1			38		15	280
360	361	78860		0.02			1	78		100	2550
370	371	61		0.02			1	12		58	1040
380	381	62		0.02	<1			18		320	3200
385	386	63	<0.02				1	15		380	2950
390	391	64	<0.02		<1			22		20	24
395	396	65		0.02	<1			12		26	510
400	401	66	<0.02		<1			10		20	860
410	411	67	<0.02		<1			13		38	180
420	421	68		0.12	<1			10		25	740
425	426	69	<0.02		<1			7		15	32
430	432	78870	<0.02		<1			5		16	220
432	434	71	<0.02		<1			5		10	300
434	436	72		0.04	<1			12		44	480
436	438	73		0.02	<1			26		16	320
438	440	74		0.06	<1			10		10	58
440	442	75		0.04	<1			7		12	2

Sample No.	Mn	K	Na	Ca	Mg
78784	40	23400	900	200	600
85	20	27600	1000	300	800
86	30	29400	1100	200	1000
87	20	31400	1200	700	1000
88	30	30400	1200	700	1200
89	10	31000	1100	600	1300
78790	40	31400	1200	700	1500
91	20	30200	1100	900	1700
92	200	30800	1000	800	8800
93	240	31800	1000	1300	9500
94	420	31000	2700	5100	6000
95	1450	29200	4100	14200	12300
96	340	30400	1300	4000	11000
97	1050	27800	6200	11700	7900
98	2050	27400	7200	17900	10900
99	130	31600	1600	2400	4900
778801	2450	27400	2000	20000	12100
2	2250	28000	3100	12800	10400
3	150	29400	1600	1400	5500
4	2600	25600	1900	17200	14600
5	2600	25800	4400	21800	11300
6	1750	24400	9700	16700	10300
7	1850	21800	8500	22600	11600
8	540	28200	5200	4000	8400
9	2750	21200	12000	23600	10200
78810	2550	21400	13700	23200	9500
11	2400	20400	8300	23600	11500
12	1600	28400	3100	14200	5400
13	5400	26600	3000	22800	12200
14	6400	25400	2800	28400	12600
15	4100	26600	3100	13900	10400
16	5300	25600	3000	17700	11600
17	6100	25000	3200	17000	11200
18	120	26400	4200	1600	1800
19	70	24600	4400	1700	1100
78820	70	24000	5200	1300	1900
21	3600	22200	3700	24000	11800
22	280	25400	4100	2100	6200
23	260	27600	3800	2000	6000
24	130	25800	3900	1600	3100
25	110	23800	3800	1500	2200
26	30	22200	3600	1100	600
27	130	25200	4500	1400	2700
28	3600	14600	4800	35800	8800
29	2600	17200	5600	25800	8200
78830	3100	16400	5600	31000	7800
31	2750	16600	5800	26400	8600
32	140	19600	7000	2200	1700
33	60	12800	12100	2200	50
34	60	15700	9100	1600	400
35	60	8300	13700	2400	50
36	2300	6700	7500	7300	38000
37	3750	6300	8200	48200	23000

Sample Nº	Mn	K	Na	Ca	Mg
38	70	7700	12400	2100	200
39	70	8300	14800	2700	200
40	30	8600	14700	2400	50
41	20	6200	11200	2000	50
42	30	5800	9200	1500	50
43	30	7100	13200	2100	50
44	20	7900	11800	1900	50
45	30	9900	13500	2600	200
46	20	13300	5100	1400	300
47	30	14800	3700	1300	50
48	10	7700	1500	1200	50
49	20	19700	2800	1200	50
78850	180	29600	2700	1200	600
51	120	31200	1900	1900	3400
52	70	30600	2400	1500	2300
53	60	31200	2000	1500	2100
54	3250	22200	7600	35400	9300
55	5400	26600	10800	22800	16000
56	4450	26400	9500	12700	15700
57	1050	2600	16900	4200	4700
58	2000	21000	21200	13600	5600
59	4200	22800	16600	16300	10400
78860	2250	25600	11700	8900	8500
61	4200	17000	21600	15600	14800
62	880	35200	900	2400	4500
63	600	35600	900	2800	8000
64	70	2100	500	800	1900
65	3450	34200	1700	6100	7400
66	660	36000	1000	2100	3700
67	120	35800	900	1400	2500
68	320	34400	900	1800	3100
69	480	37600	1000	3600	3800
78870	7400	25400	6500	16300	13100
71	6600	23200	9900	14800	15000
72	5000	21800	16700	31200	7300
73	1650	11800	2400	15500	5100
74	360	34600	1100	2400	4300
75	100	28000	1000	1400	1400

Sample No.	Fe	Ti	Zr	Ba
78784	67000	2300	175	500
85	10800	2700	210	710
86	57000	2700	210	660
87	44600	3200	200	690
88	47000	3500	200	700
89	44200	3200	200	810
78790	36600	3200	200	760
91	46000	3200	195	840
92	36400	3200	195	990
93	37000	3300	195	1050
94	39000	3100	180	2000
95	29600	3000	175	1260
96	33000	3300	185	1360
97	33800	3200	180	1100
98	30800	3100	185	870
99	32600	3200	200	880
778801	30200	2900	180	830
2	28400	3100	180	890
3	55000	3000	185	850
4	49200	2900	165	1150
5	30000	3000	180	970
6	36400	3100	190	820
7	32400	3000	175	1080
8	30000	3300	210	110
9	27400	3000	180	920
78810	30400	3000	185	790
11	29600	2900	180	800
12	34200	3300	195	1020
13	31600	3000	180	1020
14	32600	2900	170	1060
15	36200	3100	185	1140
16	31200	3000	180	1200
17	32800	3000	175	1250
18	34400	3300	200	870
19	28000	3300	200	920
78820	33800	3100	195	950
21	34200	3000	175	1240
22	38000	3300	195	1520
23	31800	3300	195	1540
24	31000	3000	190	1400
25	36000	3000	180	1180
26	31000	2900	175	1250
27	39600	3300	200	1500
28	35200	2600	150	1820
29	38000	3100	175	1720
78830	36000	2900	170	1600
31	37200	3000	170	1500
32	44200	3300	190	1480
33	56000	3300	200	1040
34	42200	3400	195	870
35	40400	3300	210	570
36	70000	7300	84	620
37	63000	6000	66	820

421403

Sample No	Fe	Ti	Zr	Ba
38	37800	3000	190	550
39	15800	3500	220	420
40	14400	3400	240	690
41	18200	3000	210	330
42	42600	3100	210	195
43	22400	3200	210	360
44	28800	3200	210	280
45	9600	3300	230	320
46	44600	3200	210	260
47	28200	3200	210	690
48	1800	3600	230	630
49	2100	3400	230	175
78850	26600	3200	210	430
51	43400	3100	200	720
52	37200	3200	210	610
53	9900	3000	210	620
54	23800	2700	170	710
55	25000	3000	190	980
56	31800	3100	200	1050
57	27600	3300	200	960
58	34600	3100	190	910
59	32800	3000	175	960
78860	33000	3100	190	1040
61	31600	3000	195	670
62	32400	3100	190	1200
63	41000	3100	190	1520
64	23400	1900	195	1420
65	36000	3100	175	1340
66	37400	3200	190	1280
67	46000	3100	190	1260
68	36600	3000	190	1320
69	36800	3200	195	1280
78870	29800	3000	180	1020
71	32200	3100	185	920
72	29600	3000	180	1020
73	18900	1600	170	1520
74	32600	3100	175	2650
75	54000	2900	170	1420

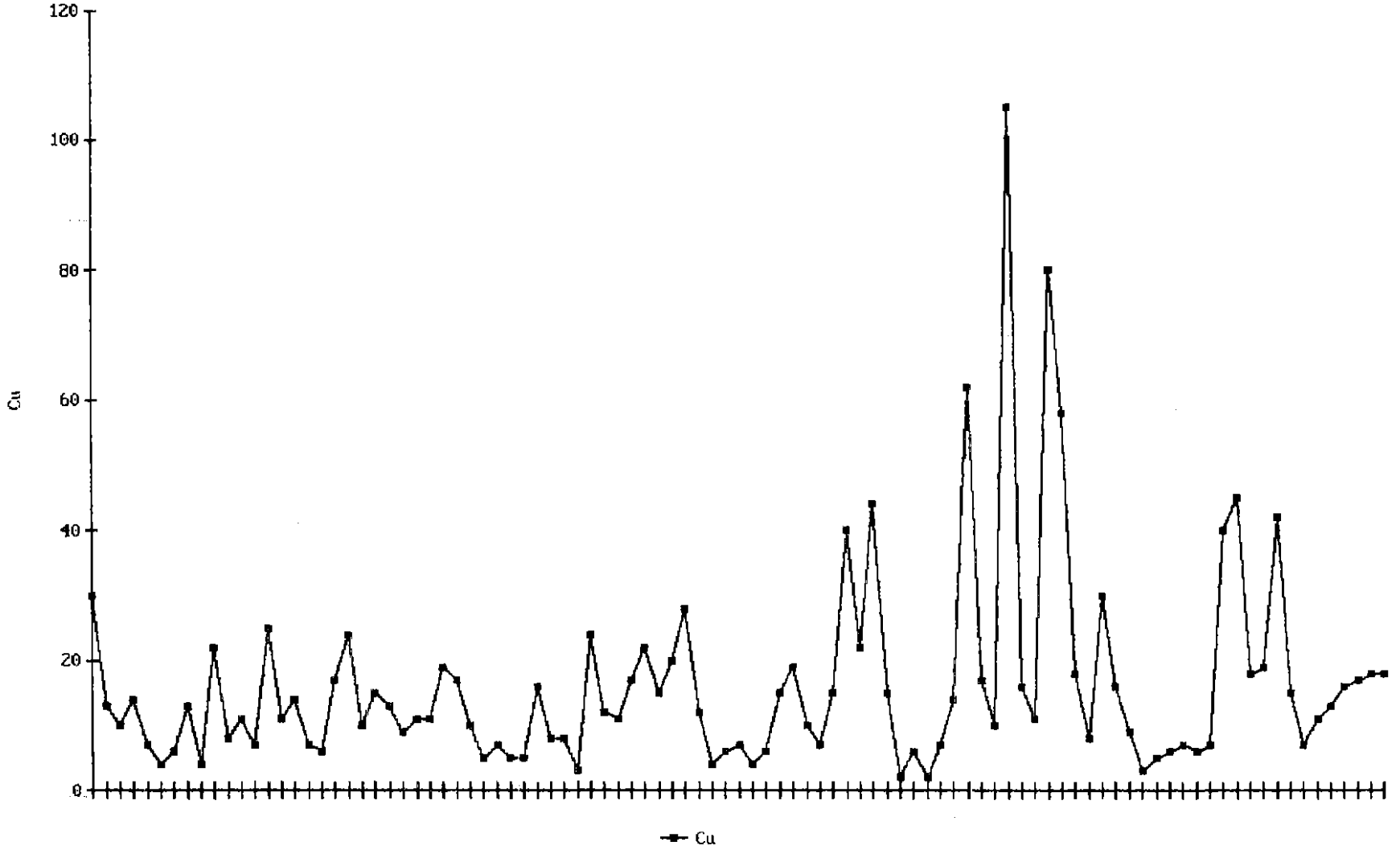
Sample No.	Ti/Zr	Ba/K	A.I.	K/Na
78784	13.142857	2.1367521	95.61753	26
85	12.857143	2.5724638	95.622896	27.6
86	12.857143	2.244898	95.899054	26.727273
87	16	2.1974522	94.460641	26.166667
88	17.5	2.3026316	94.328358	25.333333
89	16	2.6129032	95	28.181818
78790	16	2.4203822	94.54023	26.166667
91	16.410256	2.781457	94.100295	27.454545
92	16.410256	3.2142857	95.652174	30.8
93	16.923077	3.3018868	94.724771	31.8
94	17.222222	6.4516129	82.589286	11.481481
95	17.142857	4.3150685	69.397993	7.1219512
96	17.837838	4.4736842	88.650964	23.384615
97	17.777778	3.9568345	66.604478	4.483871
98	16.756757	3.1751825	60.410095	3.8055556
99	16	2.7848101	90.123457	19.75
778801	16.111111	3.0291971	64.227642	13.7
2	17.222222	3.1785714	70.718232	9.0322581
3	16.216216	2.8911565	92.084433	18.375
4	17.575758	4.4921875	67.790894	13.473684
5	16.666667	3.7596899	58.609795	5.8636364
6	16.315789	3.3606557	56.792144	2.5154639
7	17.142857	4.9541284	51.782946	2.5647059
8	15.714286	0.3900709	79.912664	5.4230769
9	16.666667	4.3396226	46.865672	1.7666667
78810	16.216216	3.6915888	45.575221	1.5620438
11	16.111111	3.9215686	50	2.4578313
12	16.923077	3.5915493	66.144814	9.1612903
13	16.666667	3.8345865	60.06192	8.8666667
14	17.058824	4.1732283	54.913295	9.0714286
15	16.756757	4.2857143	68.518519	8.5806452
16	16.666667	4.6875	64.248705	8.5333333
17	17.142857	5	64.184397	7.8125
18	16.5	3.2954545	82.941176	6.2857143
19	16.5	3.7398374	80.81761	5.5909091
78820	15.897436	3.9583333	79.938272	4.6153846
21	17.142857	5.5855856	55.105348	6
22	16.923077	5.984252	83.597884	6.195122
23	16.923077	5.5797101	85.279188	7.2631579
24	15.789474	5.4263566	84.011628	6.6153846
25	16.666667	4.9579832	83.067093	6.2631579
26	16.571429	5.6306306	82.909091	6.1666667
27	16.5	5.952381	82.544379	5.6
28	17.333333	12.465753	36.5625	3.0416667
29	17.714286	10	44.71831	3.0714286
78830	17.058824	9.7560976	39.802632	2.9285714
31	17.647059	9.0361446	43.902439	2.862069
32	17.368421	7.5510204	69.836066	2.8
33	16.5	8.125	47.32965	1.0578512
34	17.435897	5.5414013	60.074627	1.7252747
35	15.714286	6.8674699	34.151329	0.6058394
36	86.904762	9.2537313	75.12605	0.8933333
37	90.909091	13.015873	34.189032	0.7682927

421405

Sample	Ti/Zr	Ba/K	A.I.	K/Na
38	15.789474	7.1428571	35.267857	0.6209677
39	15.909091	5.060241	32.692308	0.5608108
40	14.166667	8.0232558	33.592233	0.585034
41	14.285714	5.3225806	32.133676	0.5535714
42	14.761905	3.362069	35.347432	0.6304348
43	15.238095	5.0704225	31.848552	0.5378788
44	15.238095	3.5443038	36.720554	0.6694915
45	14.347826	3.2323232	38.549618	0.7333333
46	15.238095	1.9548872	67.661692	2.6078431
47	15.238095	4.6621622	74.811083	4
48	15.652174	8.1818182	74.162679	5.1333333
49	14.782609	0.8883249	83.157895	7.0357143
78850	15.238095	1.4527027	88.56305	10.962963
51	15.5	2.3076923	90.104167	16.421053
52	15.238095	1.9934641	89.402174	12.75
53	14.285714	1.9871795	90.48913	15.6
54	15.882353	3.1981982	42.281879	2.9210526
55	15.789474	3.6842105	55.905512	2.462963
56	15.5	3.9772727	65.474339	2.7789474
57	16.5	36.923077	25.704225	0.1538462
58	16.315789	4.3333333	43.322476	0.990566
59	17.142857	4.2105263	50.226929	1.373494
78860	16.315789	4.0625	62.340037	2.1880342
61	15.384615	3.9411765	46.086957	0.787037
62	16.315789	3.4090909	92.325581	39.111111
63	16.315789	4.2696629	92.17759	39.555556
64	9.7435897	67.619048	75.471698	4.2
65	17.714286	3.9181287	84.210526	20.117647
66	16.842105	3.5555556	92.757009	36
67	16.315789	3.5195531	94.334975	39.777778
68	15.789474	3.8372093	93.283582	38.222222
69	16.410256	3.4042553	90	37.6
78870	16.666667	4.015748	62.805873	3.9076923
71	16.756757	3.9655172	60.73132	2.3434343
72	16.666667	4.6788991	37.792208	1.3053892
73	9.4117647	12.881356	48.563218	4.9166667
74	17.714286	7.6589595	91.745283	31.454545
75	17.058824	5.0714286	92.45283	28

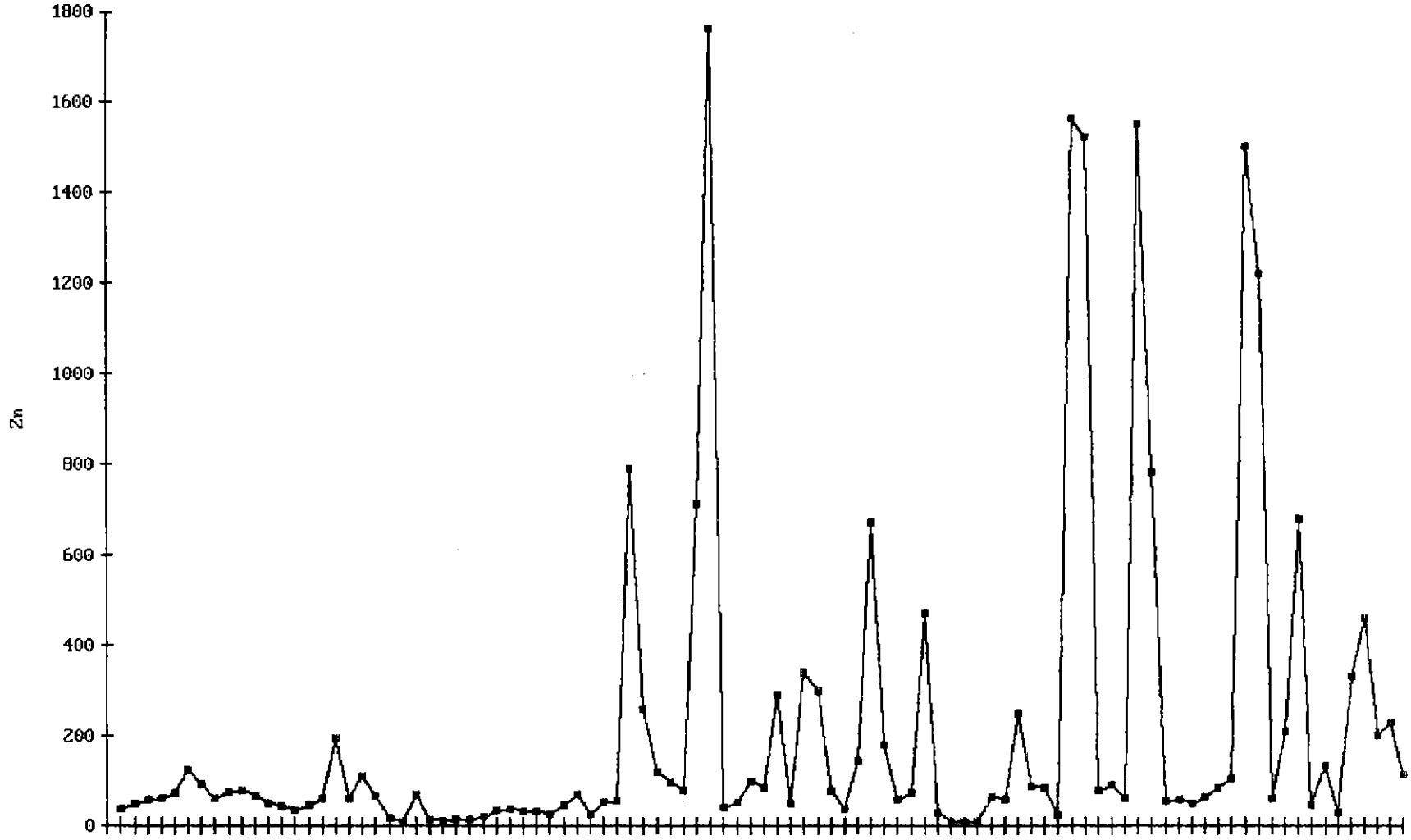
421406

Chester - E.L. 44/88
BPD 67

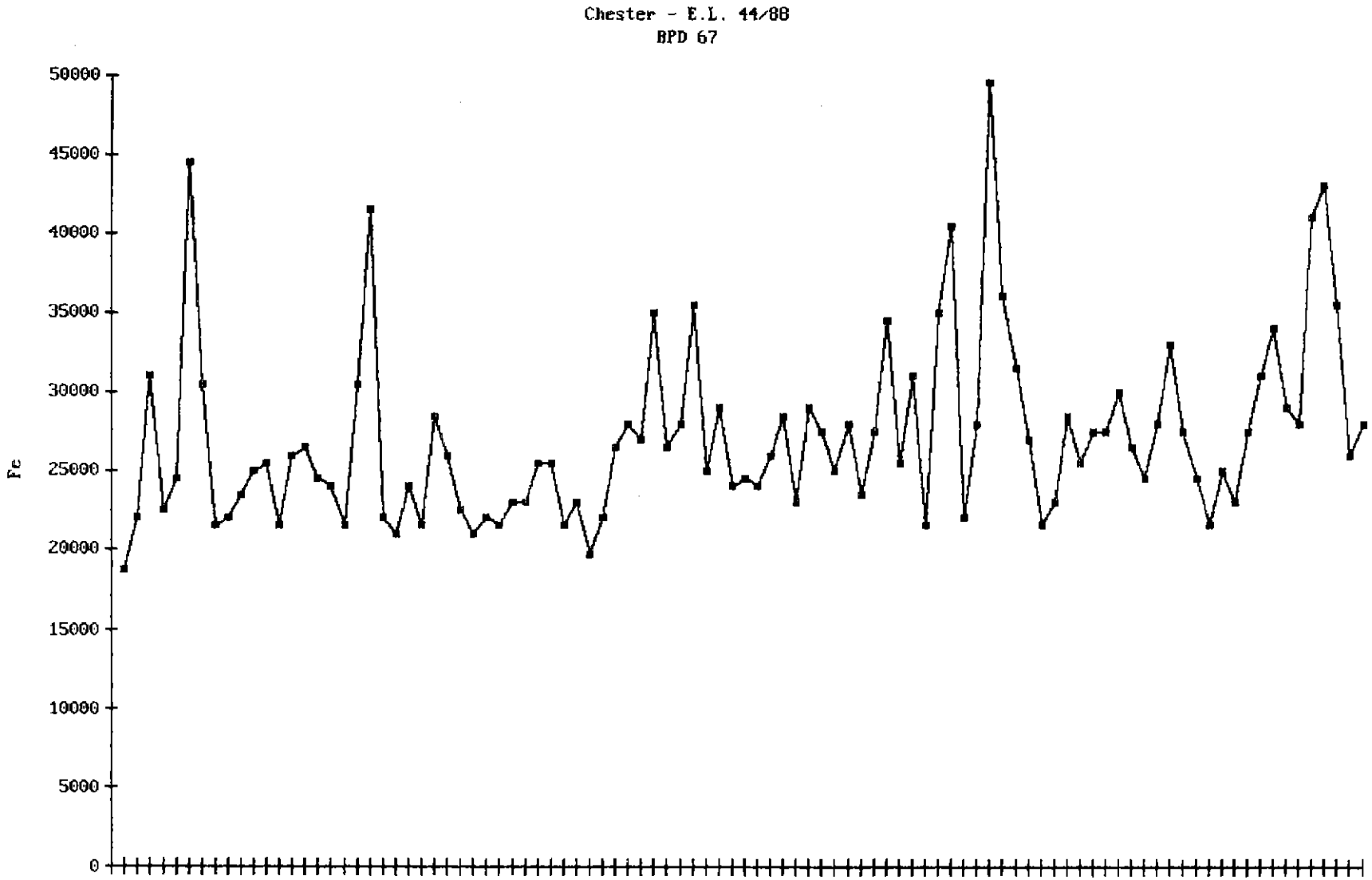


421407

Chester - E.L. 44/88
BPD 67



421408


Chester - E.L. 44/88
BPD 67
Fe
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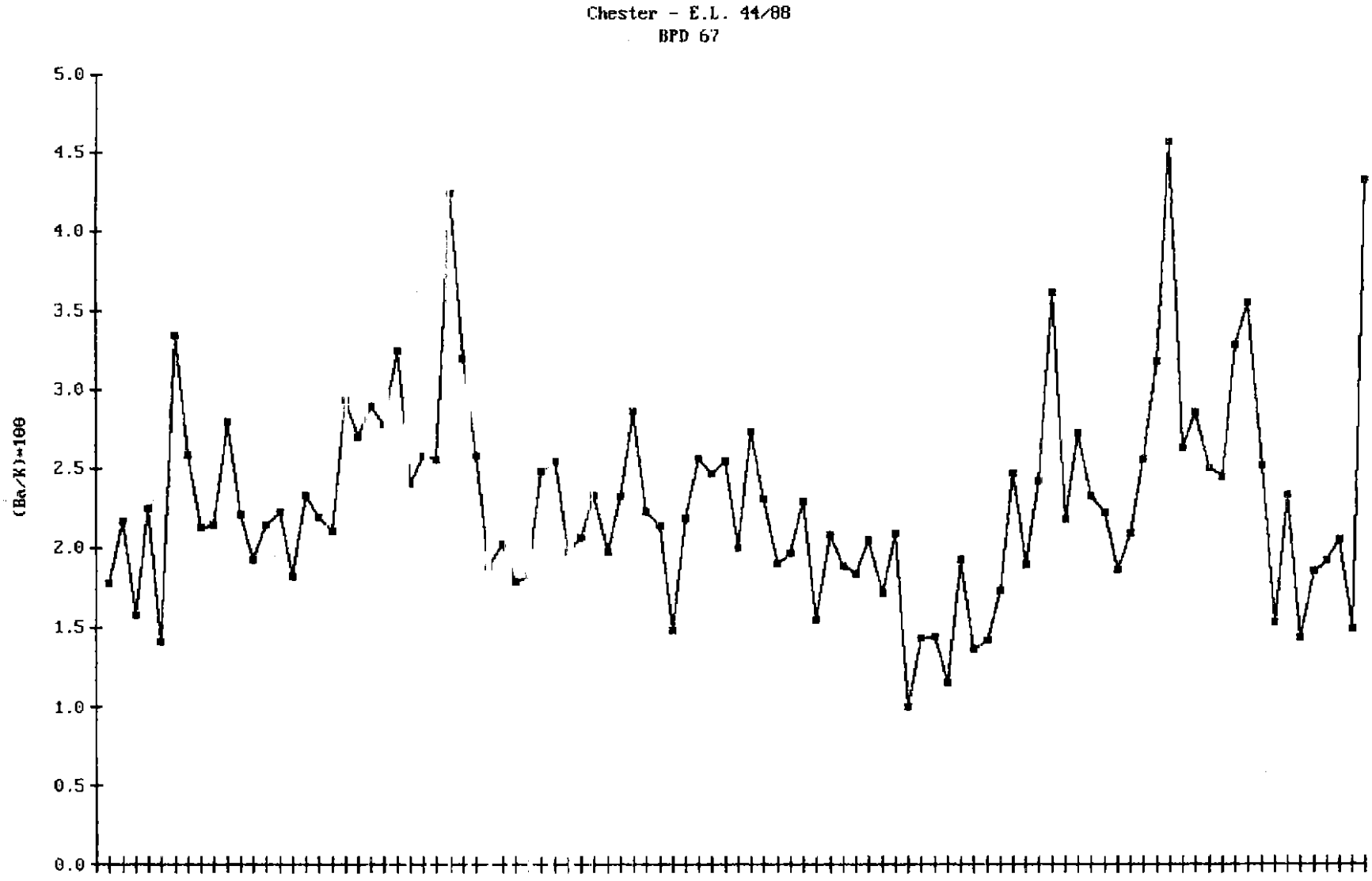
35000
30000
25000
20000
15000
10000
5000
0

421409



421410

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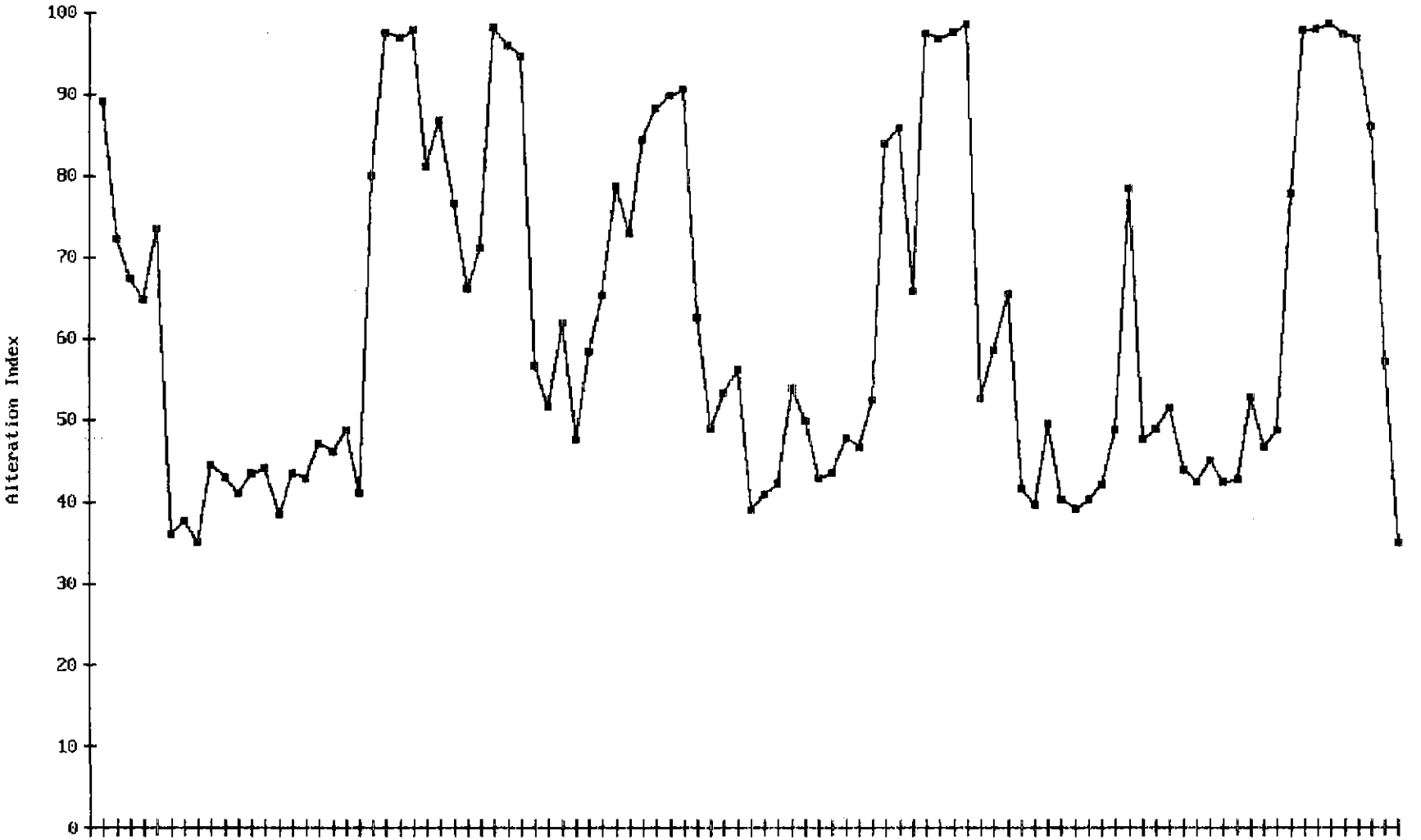
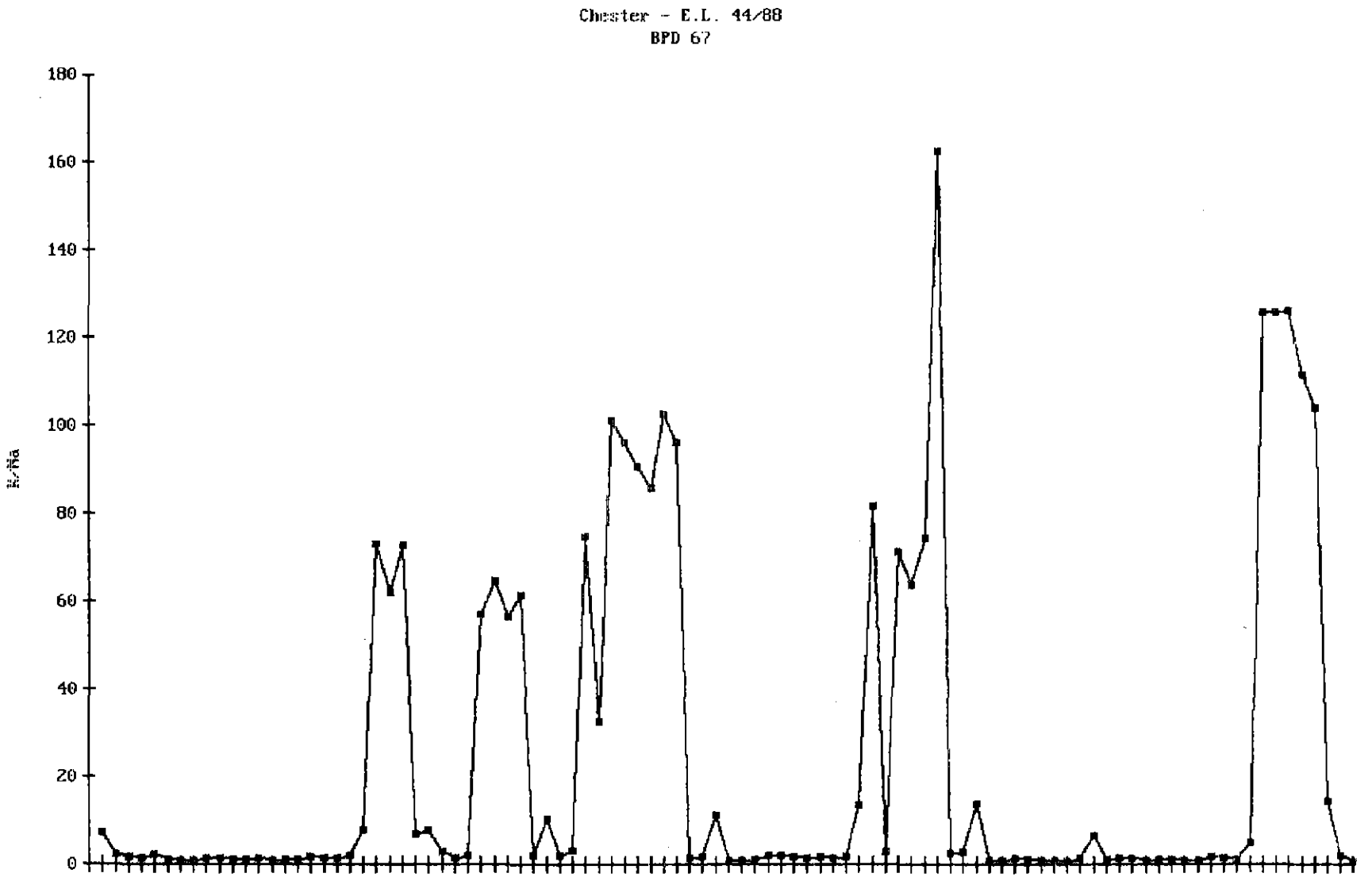


4214111



421412

Chester -E.L. 44/88
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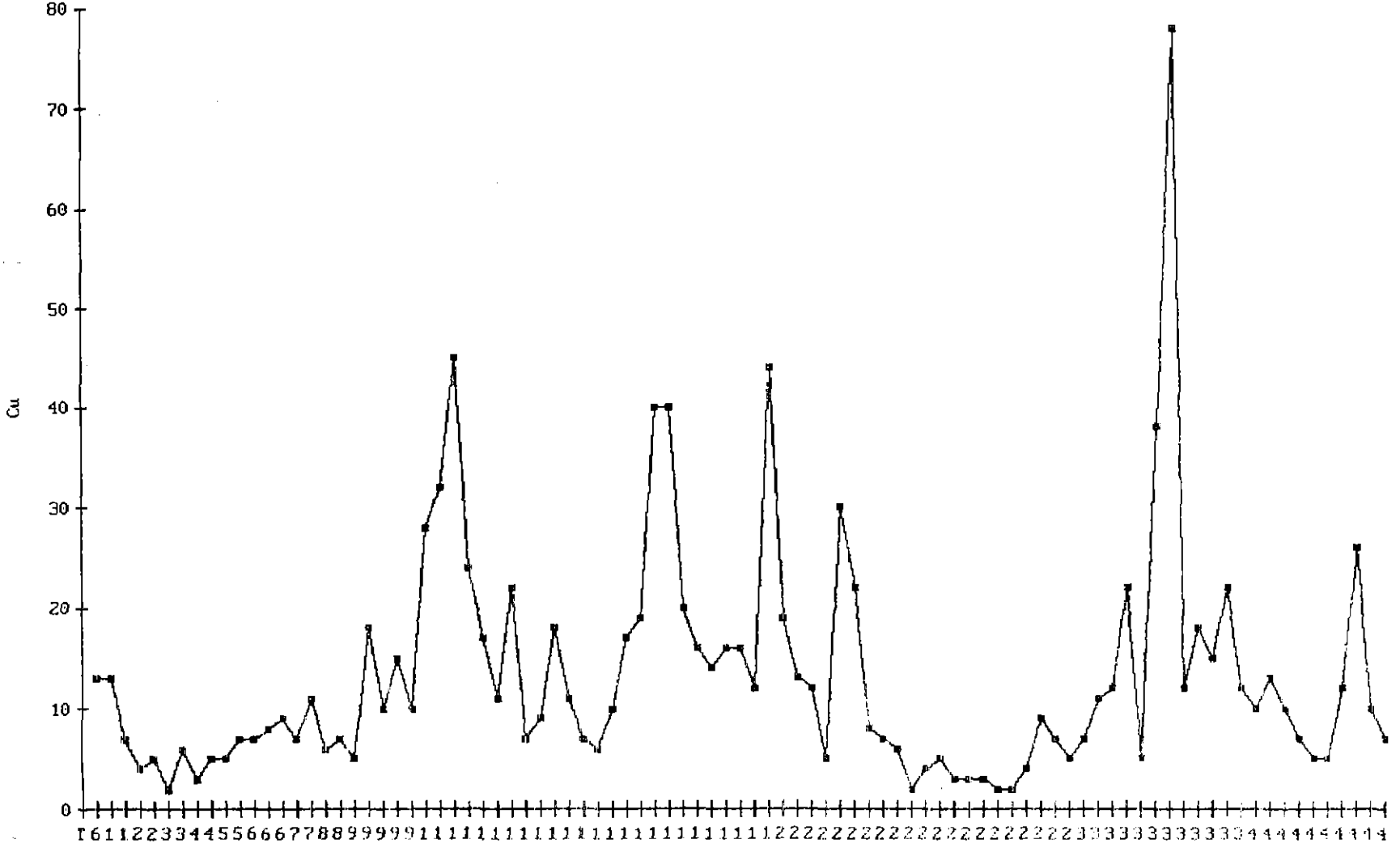

421413

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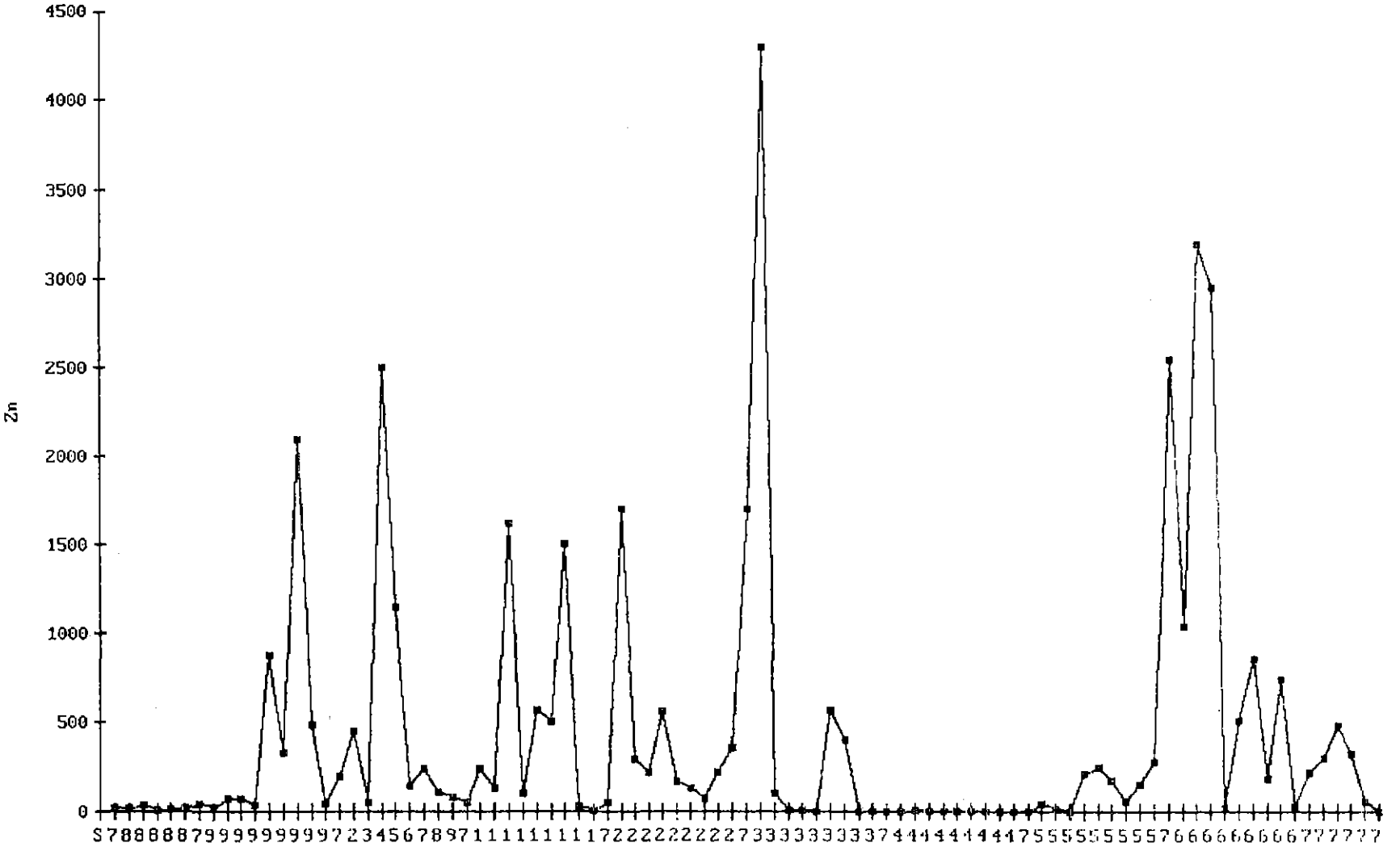
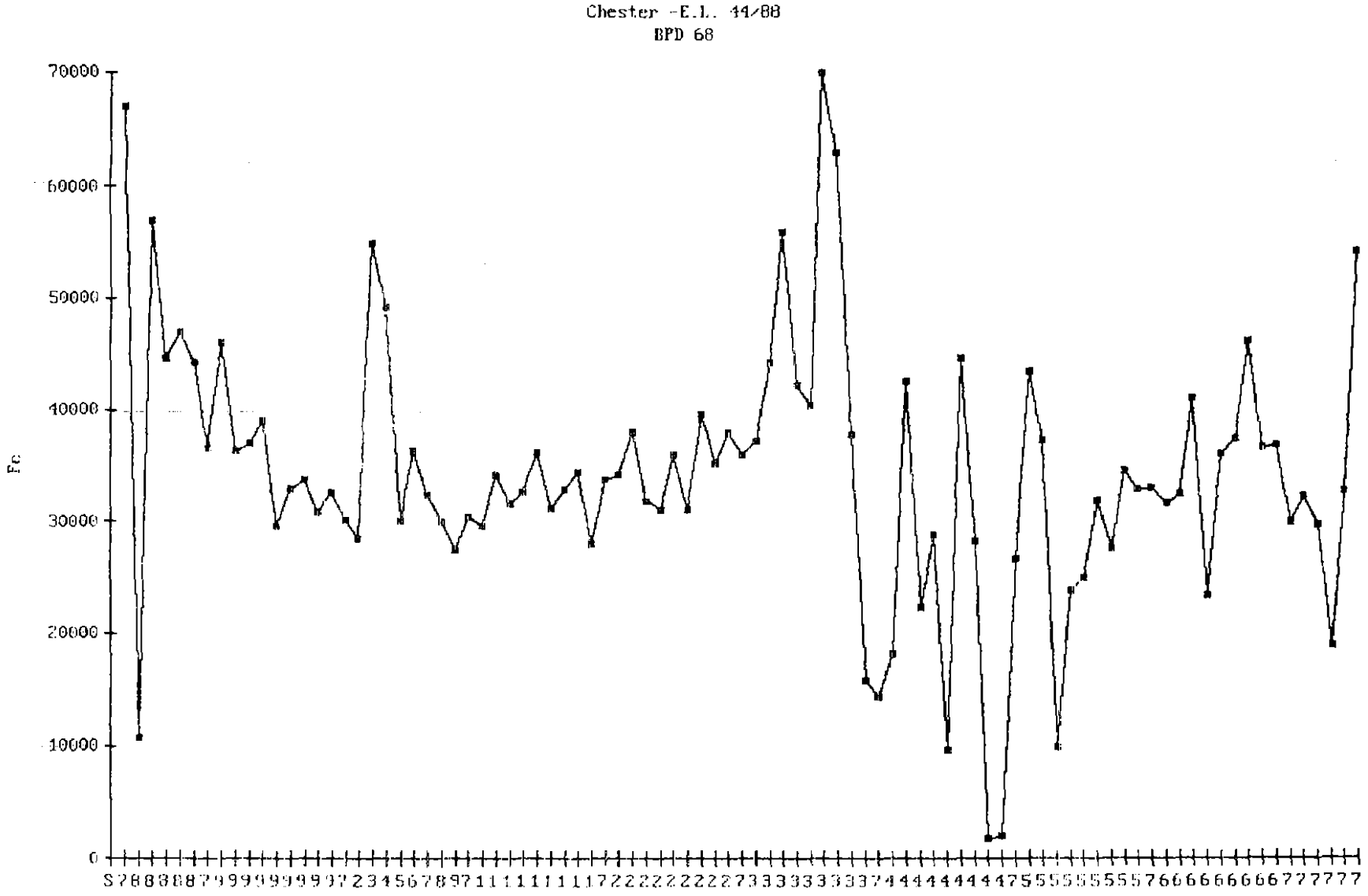


421414


Chester -E.L. 44/88
BPD 68
Fe
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60000
50000
40000
30000
20000
10000
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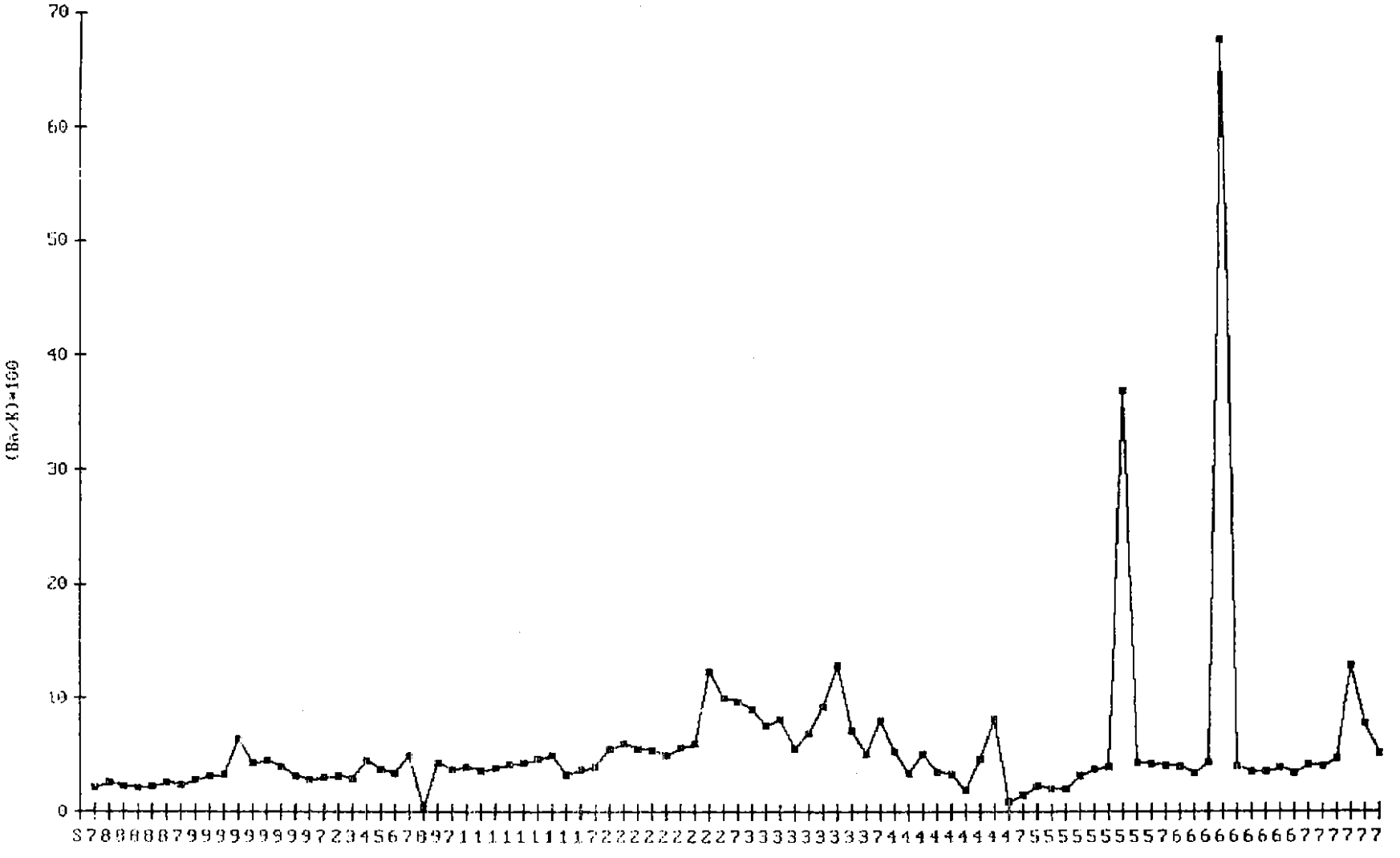
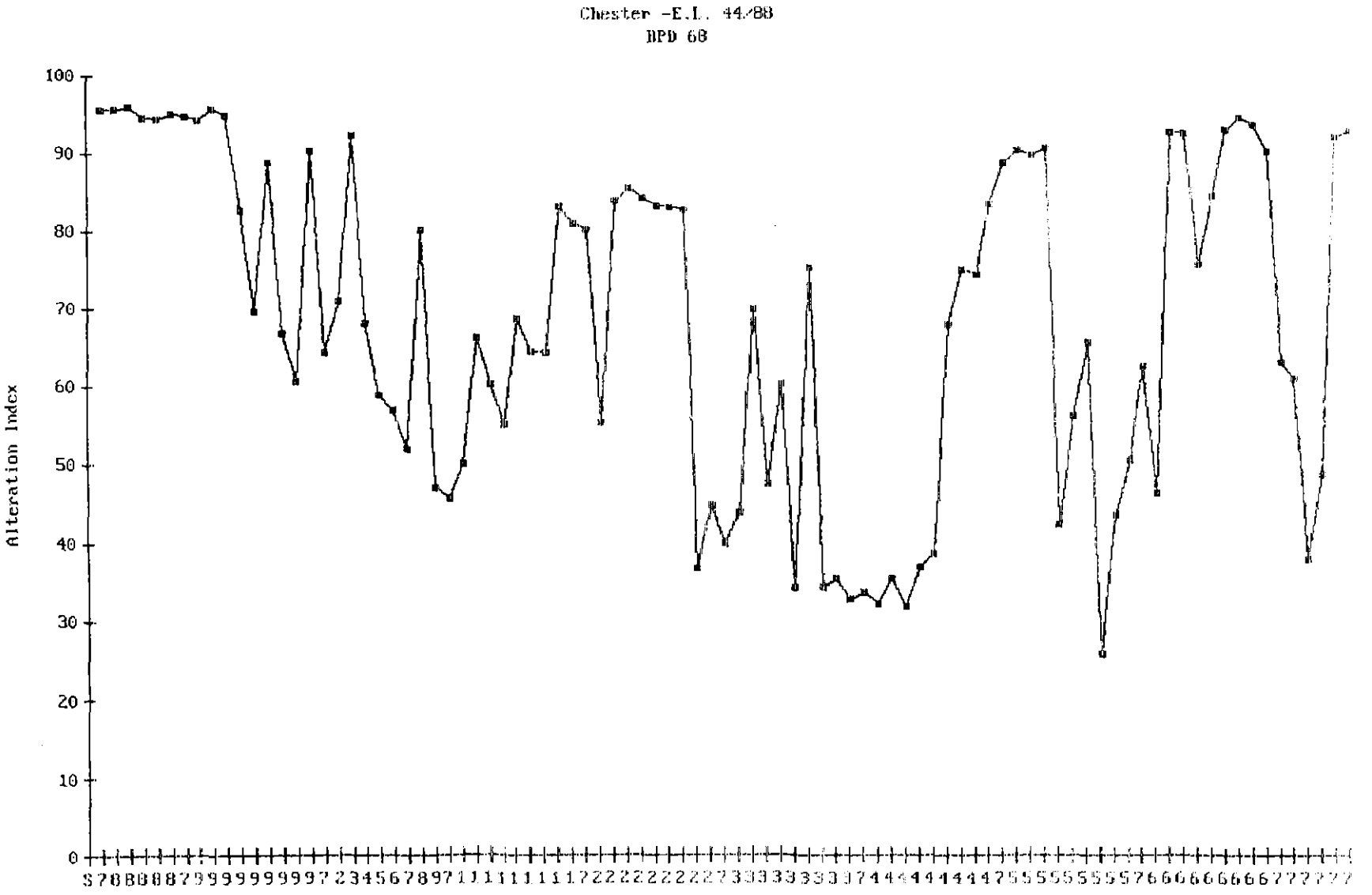
421415

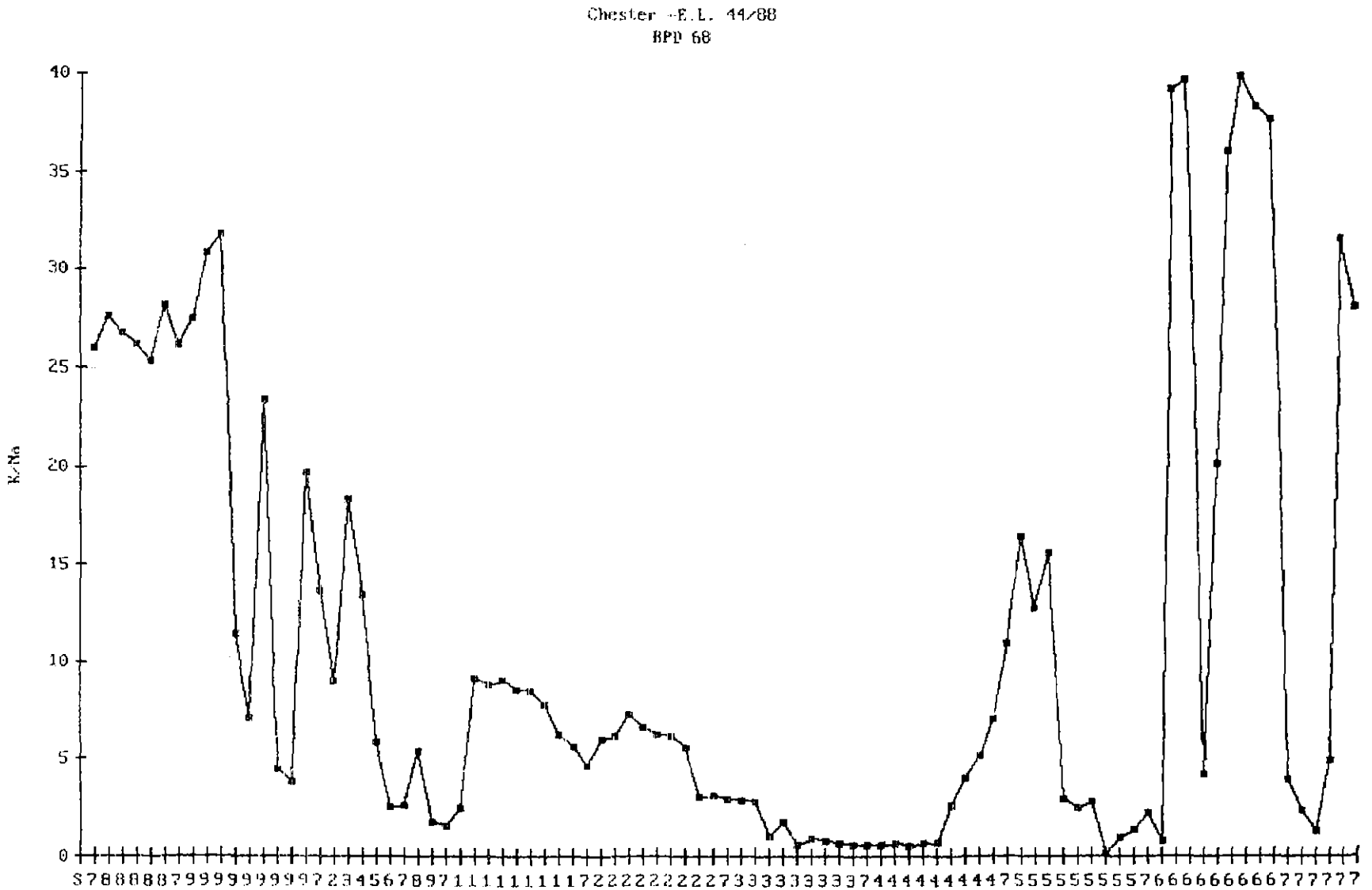
Chester -E.L. 44/68
BPD 68



421416


Chester -E.I. 44/88
BPD 68
Alteration Index
100
90
80
70
60
50
40
30
20
10
0

4214417


Chester -E.L. 44/88
BPD 68
K/Na
40
35
30
25
20
15
10
5
0
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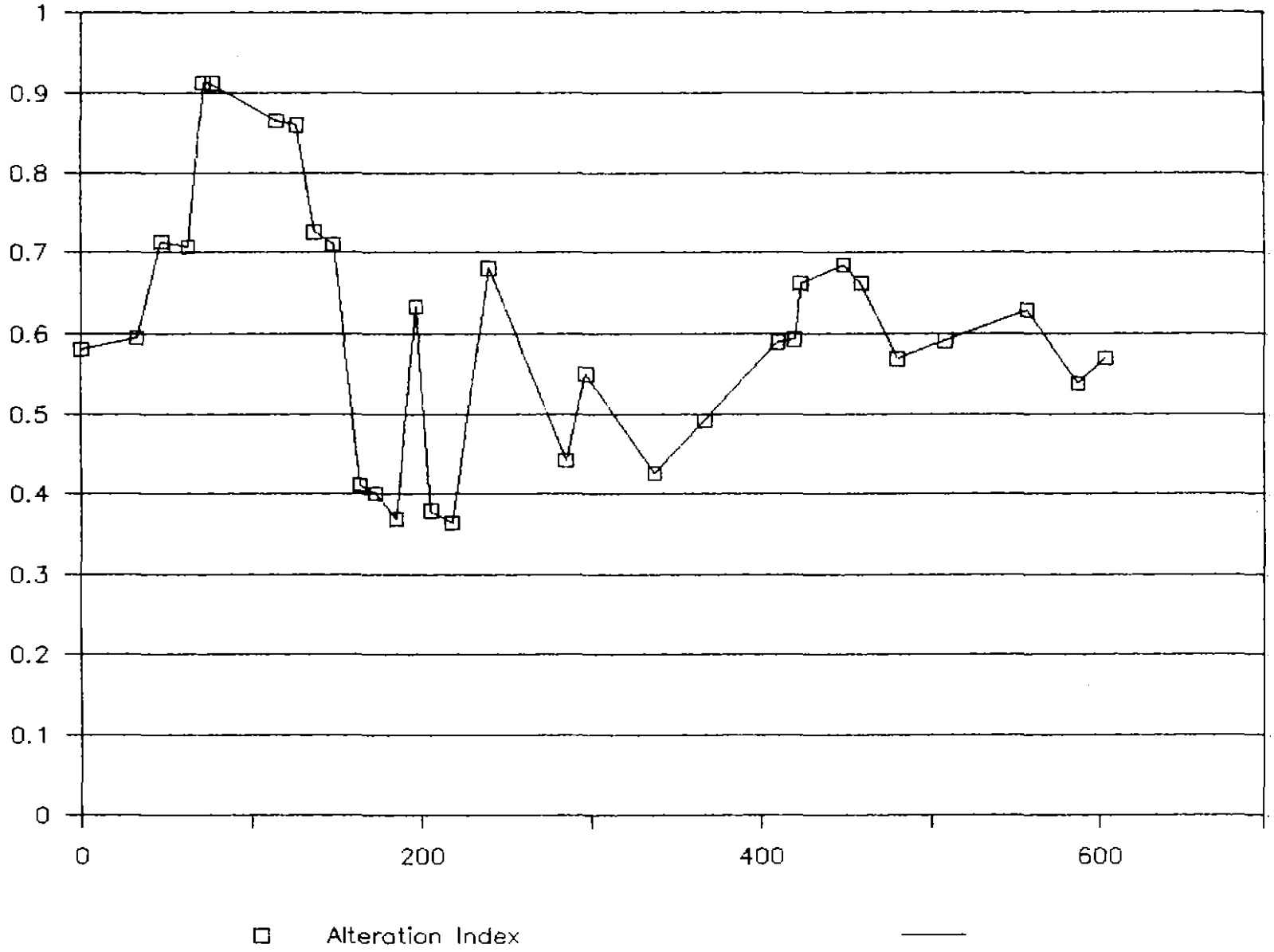
421418

CP 3 Alteration Index

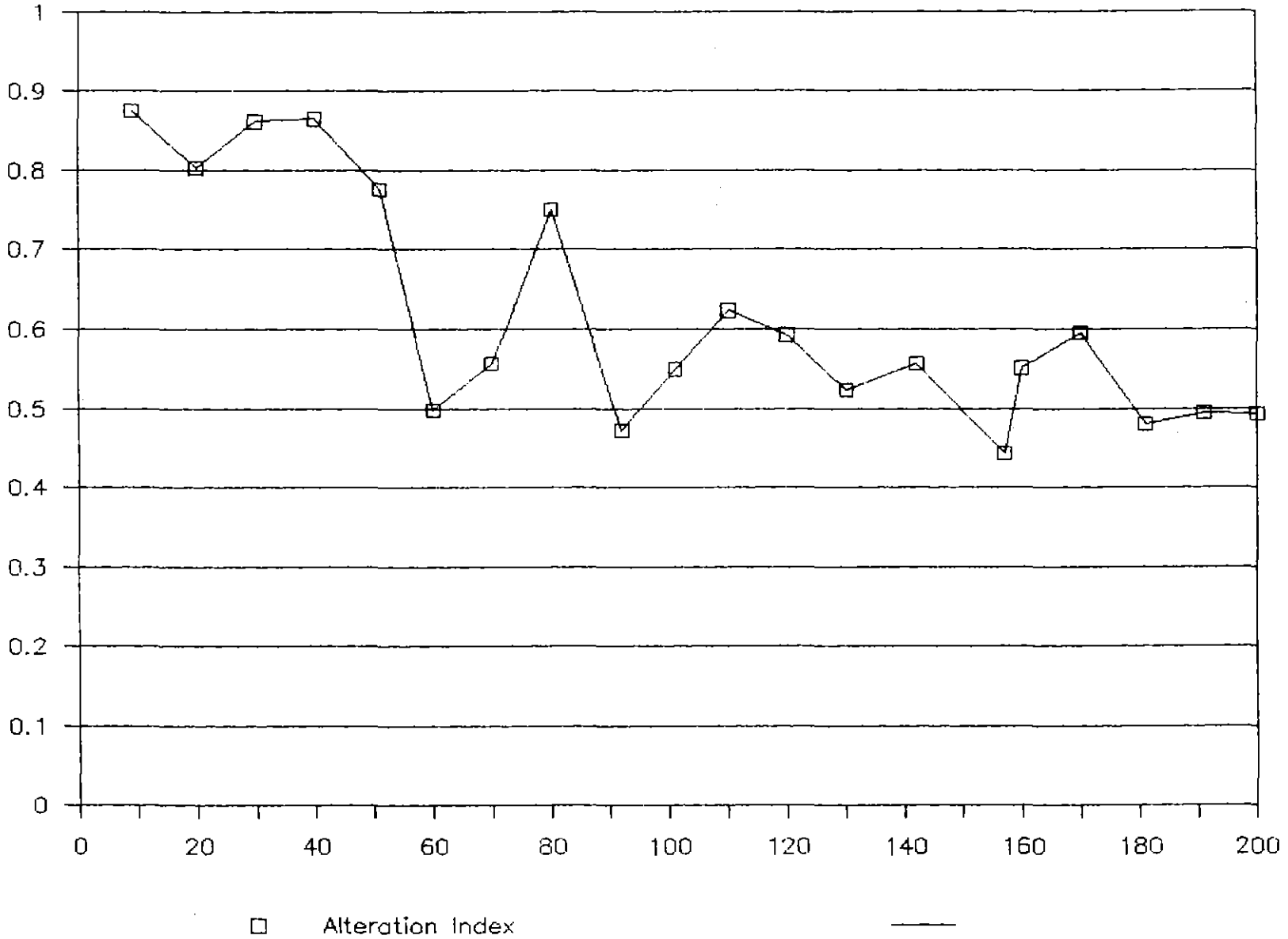
(K2O+MgO)/(+K2O+Na2O+CaO+MgO)



421419

CP 16 Alteration Index

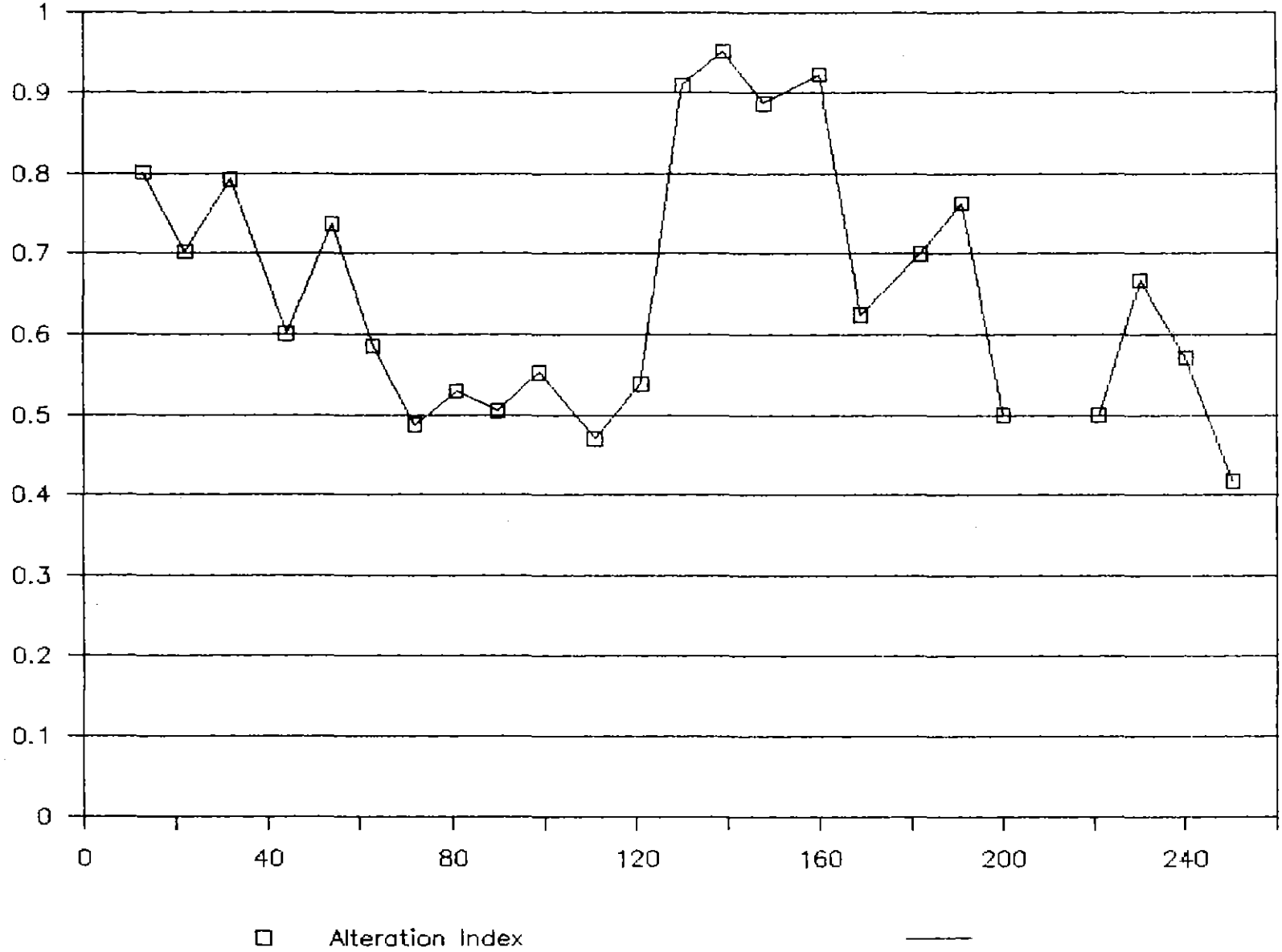
(K2O+MgO)/(+K2O+Na2O+CaO+MgO)



421420

CP 4 Alteration Index

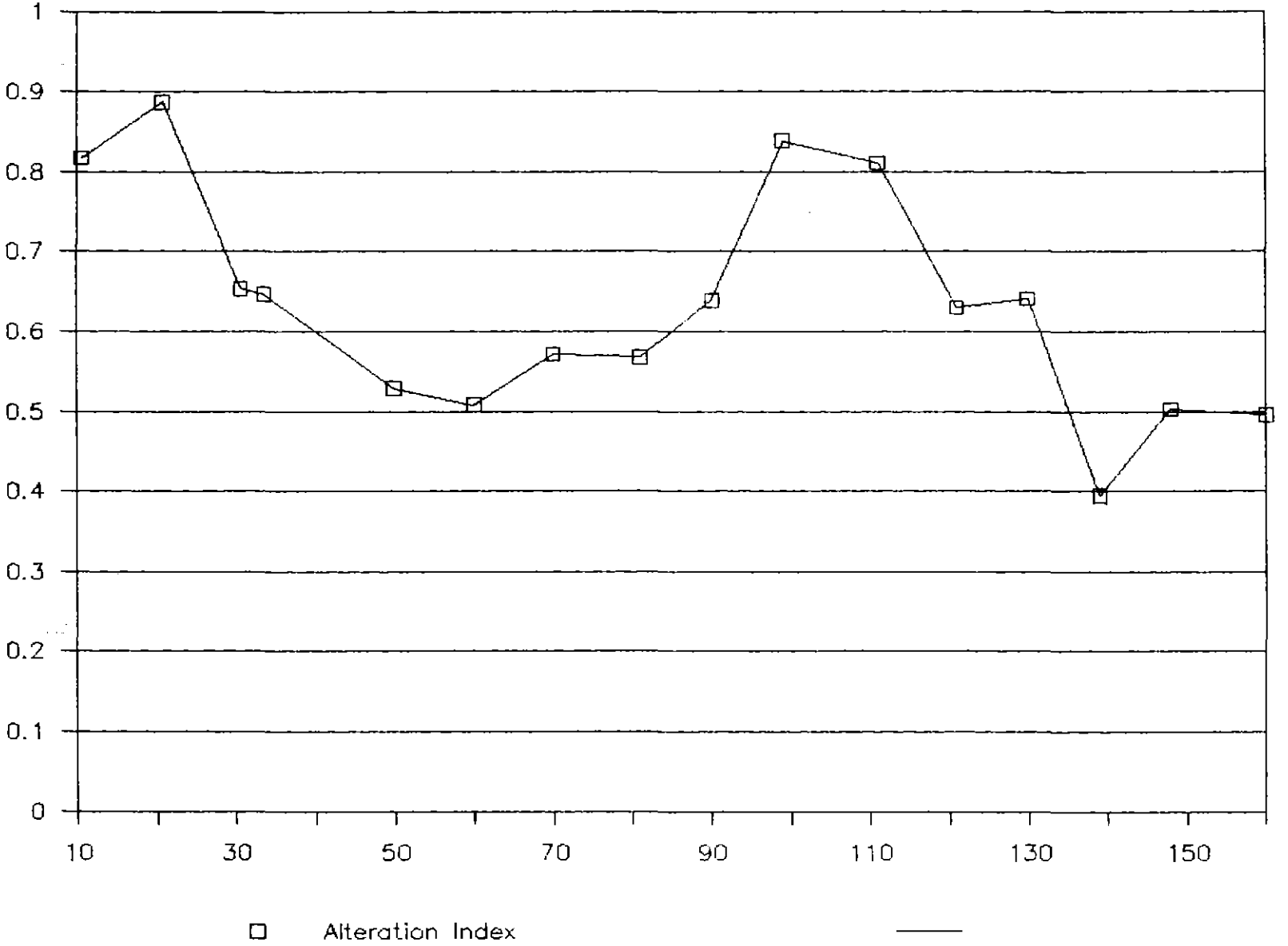
(K2O+MgO)/(+K2O+Na2O+CaO+MgO)



421421

CP 5 Alteration Index

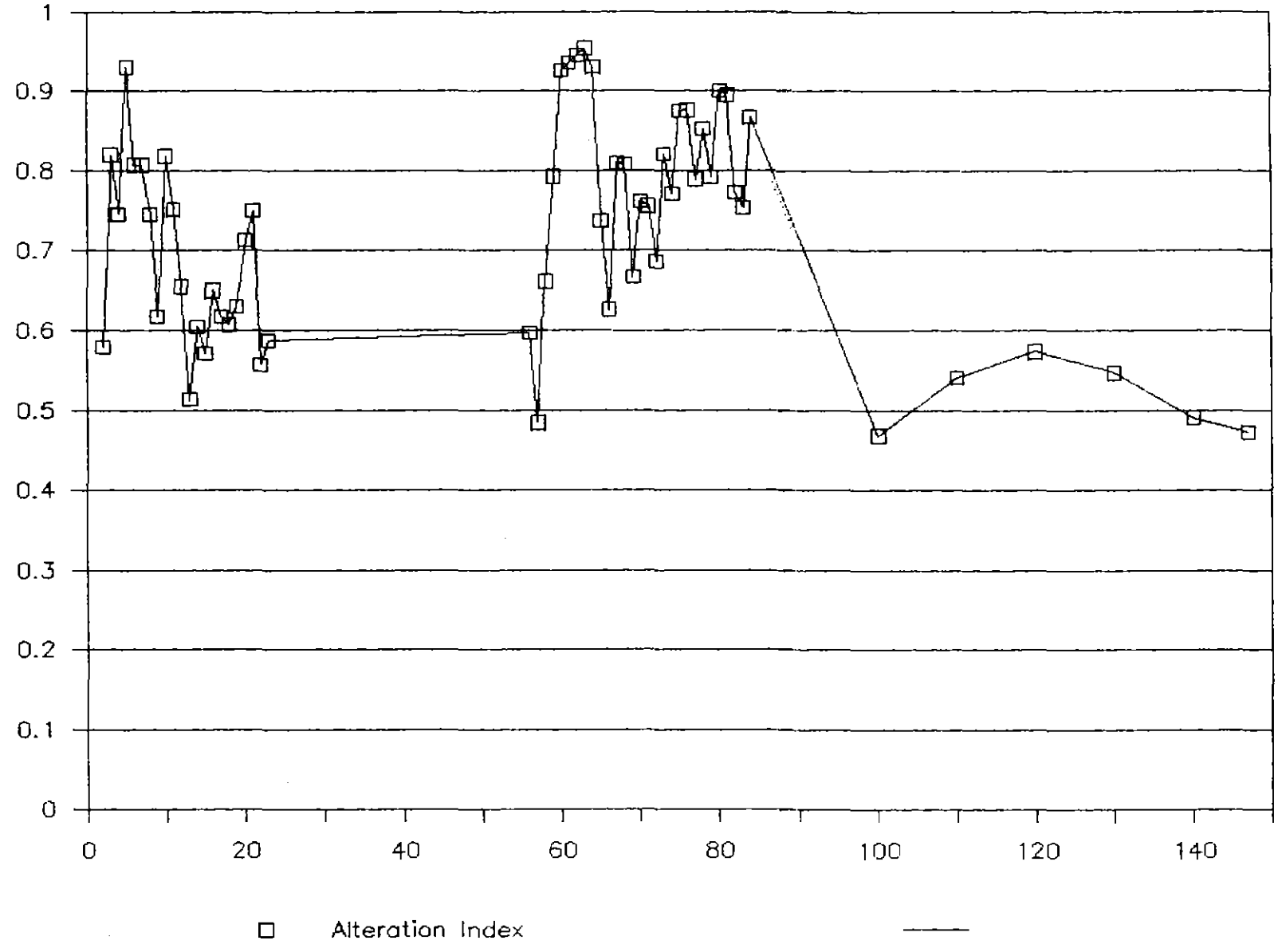
(K2O+MgO)/(+K2O+Na2O+CaO+MgO)



421422

CP 18 Alteration Index

(K2O+MgO)/(+K2O+Na2O+CaO+MgO)



421423

APPENDIX 13.

RE-ASSAY OF BHP WACKER SAMPLES FROM THE HOLLWAY ALTERATION ZONE FOR GOLD

RESULTS AND LOCATIONS

ANALABS

A division of MacDonald Hamilton & Co. Pty. Ltd.

Phone (09) 458 7999 — 52 Murray Road, Welshpool, W.A. 6106 — Telex AA92560

ANALYTICAL REPORT No. 27.3.08.06745

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

Wacker Re sample Holway

Mr A Lorrigan
Geopeko
P O Box 180
Rosebery
Tas 7470

ORDER No.	PROJECT
5948	Burn's Peak

DATE RECEIVED	RESULTS REQUIRED
19/12/89	ASAP

No. OF PAGES OF RESULTS	DATE REPORTED	No. OF COPIES	TOTAL No. OF SAMPLES
19	29/12/89	1	464

STATE OF SAMPLES		PRE-TREATMENT							ANALYSIS		
REF BELO.	SAMPLE NUMBERS	DRY	CRUSH	SPLIT	PUL-VERISE	SIEVE	OTHER SEE REMARKS	NONE	REFER TO ANALYSIS SECTION	PREPARATION	METHOD
	Various	PU	Prep: 005						Au,AuChk/309		

RESULTS TO

Mr A Lorrigan
Geopeko
P O Box 180
Rosebery
Tas 7470

RESULTS TO

REMARKS

Re-assay of Holway Wacker Samples for Au.

STATE OF SAMPLES		ANALYSIS — PREPARATION				ANALYSIS — METHOD	
whole core	WC	perchloric acid	A1	cold acid	CA	atomic absorbtion	AAS
split core	SC	hydrochloric acid	A2	specific sulphide	SS	x-ray fluorescence	XRF
cutting	CU	nitric acid	A3	other mixed acids	Ma	spectrophotometry	SPEC
	Ro	aqua regia	A4	alkaline attack	AA	colorimetry	COL
	SO	nitric-perchloric	A5	volatilization	VO	chromatography	CHR
	PU	HF mixture	A6	ignition	IG	titration	TTN
	WA	HF under pressure	A7	pressed powder (XRF)	PP	other chemicals means	CHEM
tissue	TI	fusion	A8	glass fusion (XRF)	GF	miscellaneous	MISC
stream sediment	SS					fluorescence	FLUOR
heavy mineral	HM					inductively coupled plasma	ICP

AUTHORISED OFFICER

421424

421425

ANALABS

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

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	1 OF 19

TUBE No.	SAMPLE No.	Au	AuChk	N	E
1	9052	<0.008	<0.008		
2	9053	<0.008	–		
3	9054	<0.008	–		
4	9055	<0.008	–		
5	9056	<0.008	–		
6	9057	<0.008	–		
7	9058	0.017	–		
8	9059	<0.008	–		
9	9060	0.016	–		
10	9061	<0.008	–		
11	9062	<0.008	–	8490ON	77760E
12	9063	<0.008	–	"	77775
13	9064	<0.008	–		77795
14	9065	<0.008	–		77805
15	9066	<0.008	–		77815
16	9067	<0.008	–		77825
17	9068	<0.008	–		77835
18	9069	<0.008	–		77845
19	9070	<0.008	–		77855
20	9071	<0.008	–		77865
21	9072	<0.008	–		77875
22	9073	<0.008	<0.008		77885
23	9074	<0.008	–		77900
24	9075	<0.008	–		77920
25	9076	<0.008	–		77940

AMG co-ords (Chester, EAD grid - Hollway area)

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

421426

ANALABS

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

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	2 OF 17

TUBE No.	SAMPLE No.	Au	AuChk	N	E	
1	9077	<0.008	–	82300	78220.	
2	9078	<0.008	–	"	240	
3	9079	<0.008	–	"	260	
4	9080	<0.008	–	"	280	
5	9081	<0.008	–	"	300	AMG co-ords. (Chester, EAD grid – Hollway Area)
6	9082	<0.008	–	"	320	
7	9083	<0.008	<0.008	"	340	
8	9084	<0.008	–	"	360	
9	9088	<0.008	–	"	440	
10	9089	<0.008	–	"	78460	
11	9090	<0.008	–	14805	3750E	
12	9091	<0.008	–	1460	"	
13	9092	<0.008	–	1440	"	
14	9093	<0.008	–	1420	"	Local co-ordinates. (EAB Grid - Hollway Area).
15	9097	<0.008	–	1380	"	
16	9098	<0.008	–	1360	"	
17	9099	<0.008	–	1340	"	
18	9100	<0.008	–	1320	"	
19	9101	<0.008	–	1300	"	
20	9102	<0.008	–	1280	"	
21	9103	<0.008	–	1260	"	
22	9104	<0.008	–	1240	"	
23	9105	<0.008	–	82700N	77860	AMG co-ords. (Chester, EAD grid Hollway)
24	9106	<0.008	<0.008	"	77840	
25	9107	<0.008	–		77820	

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	3 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9108	<0.008	–	82700N	77800E					
2	9109	<0.008	–	82700N	77880E					
3	9110	<0.008	–	"	77900					
4	9111	<0.008	–	"	77920					
5	9112	<0.008	–	"	77940					
6	9113	<0.008	–	"	77960		AMG Grid (Chester - EAD grid Holloway)			
7	9114	0.009	–	"	77980					
8	9115	<0.008	–	"	78000					
9	9116	<0.008	–	"	78020					
10	9117	<0.008	–	"	78040					
11	9118	<0.008	–	"	78060					
12	9119	<0.008	–	"	78080					
13	9120	<0.008	–	"	78100					
14	9121	0.030	–	"	78120					
15	9122	<0.008	<0.008	"	78140					
16	9123	<0.008	–	"	78160					
17	9124	<0.008	–	"	78180					
18	9126	<0.008	–	"	78200					
19	9127	<0.008	–	"	78220					
20	9128	<0.008	–	"	78240					
21	9130	<0.008	–							
22	9131	<0.008	–							
23	9139	<0.008	–							
24	9140	<0.008	–							
25	9141	<0.008	–							

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	4 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9142	<0.008	–							
2	9143	<0.008	–							
3	9144	<0.008	<0.008							
4	9145	<0.008	–							
5	9146	<0.008	–							
6	9147	<0.008	<0.008							
7	9148	<0.008	–	82300N	78580E					
8	9149	<0.008	–	"	78600E					
9	9150	<0.008	–	"	78620E					
10	9151	<0.008	–	"	78640E					
11	9152	<0.008	–	"	78660E					
12	9153	<0.008	–	"	78680E					
13	9154	<0.008	–	"	78700E					
14	9155	0.108	0.134	"	78720E					
15	9156	<0.008	–	"	78740E					
16	9157	<0.008	–	"	78760E					
17	9158	<0.008	–	"	78780E					
18	9159	<0.008	–	"	78800E					
19	9160	<0.008	–	"	78820E					
20	9161	<0.008	–	"	78840E					
21	9162	<0.008	–	82500N	78100E					
22	9163	<0.008	–	"	78080E					
23	9164	<0.008	<0.008	"	78060E					
24	9165	<0.008	<0.008	"	78040E					
25	9166	<0.008	–	"	78020E					

AMG co-ords (Chester-EAD grid Hollway)

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	5 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9167	<0.008	–	82500N	78000E					
2	9168	<0.008	–	"	77980E					
3	9169	<0.008	–	"	77960E					
4	9170	<0.008	–	"	77940E		AMG co-ordinates.			
5	9171	<0.008	–	"	77920E					
6	9172	<0.008	–	"	77900E		(Chester EAD grid			
7	9173	<0.008	–	"	77880E		Holway Area)			
8	9174	<0.008	–	"	77860E					
9	9175	<0.008	–	"	77840E					
10	9176	0.063	0.073	"	77820E					
11	9177	<0.008	–	"	77800E					
12	9178	<0.008	–	"	77780E					
13	9179	<0.008	–	"	77760E					
14	9180	<0.008	<0.008	"	77740E					
15	9181	<0.008	–	"	77720E					
16	9182	0.101	0.104	"	77700E					
17	9183	<0.008	–							
18	9184	<0.008	–							
19	9185	<0.008	–							
20	9186	<0.008	–							
21	9187	<0.008	–							
22	9188	<0.008	–							
23	9189	<0.008	–							
24	9190	<0.008	–							
25	9191	<0.008	–							

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	6 OF 14

TUBE No.	SAMPLE No.	Au	AuChk							
1	9192	0.009	–							
2	9193	0.010	–							
3	9194	<0.008	–							
4	9197	<0.008	–							
5	9198	<0.008	–							
6	9199	0.012	–							
7	9200	0.020	0.011							
8	9201	0.009	–							
9	9202	0.010	–							
10	9203	<0.008	–							
11	9204	0.010	–							
12	9205	0.010	–							
13	9206	0.010	–							
14	9207	0.018	0.016							
15	9208	0.022	–							
16	9209	0.011	<0.008							
17	9210	0.010	–							
18	9211	0.013	–							
19	9212	0.010	–							
20	9215	0.012	–							
21	9216	0.013	–							
22	9217	0.015	–							
23	9218	0.013	–							
24	9219	0.013	–							
25	9226	<0.008	–							

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	7 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9227	<0.008	–							
2	9228	<0.008	–							
3	9229	0.034	–							
4	9230	<0.008	–							
5	9231	<0.008	–							
6	9232	<0.008	–							
7	9233	<0.008	–							
8	9234	<0.008	–							
9	9235	<0.008	–							
10	9236	<0.008	–							
11	9237	0.022	–							
12	9238	<0.008	–							
13	9239	<0.008	–							
14	9240	<0.008	<0.008							
15	9301	<0.008	–	82100N	78400E					
16	9302	<0.008	–		78380					
17	9303	<0.008	–		78360					
18	9304	<0.008	<0.008		78340					
19	9305	<0.008	–		78320					
20	9306	<0.008	–		78300					
21	9307	<0.008	–		78280					
22	9308	<0.008	–		78260					
23	9309	0.011	–		78240					
24	9310	0.009	–		78220					
25	9311	0.009	–		78200					

AMG co-ords. (Chester FAD grid Holloway Area)

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.

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	8 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9312	0.009	–	82100N	78180E					
2	9313	<0.008	–		78160					
3	9314	0.010	–		78140					
4	9315	<0.008	<0.008		78120					
5	9316	<0.008	–		78100					
6	9317	<0.008	–		78080		AMG	Co-ords		
7	9318	<0.008	–		78060		(Chester	EAD grid		
8	9319	<0.008	–		78040			Hallway Area)		
9	9320	<0.008	–		78020					
10	9321	<0.008	–		78000, 77980, 960					
11	9322	0.010	–		77940					
12	9323	0.009	–		77920					
13	9324	0.009	–		77900					
14	9325	<0.008	–		77880					
15	9326	<0.008	–		77860					
16	9327	0.010	–		77840					
17	9328	0.011	–		77820					
18	9329	0.019	–		77800					
19	9330	0.018	–		77780					
20	9331	0.016	<0.008		77760					
21	9332	0.009	<0.008		77740					
22	9333	0.011	–		77720					
23	9334	<0.008	–		77700					
24	9335	<0.008	–		77680					
25	9336	<0.008	–		77660					

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	9 OF 17

TUBE No.	SAMPLE No.	Au	AuChk	N						
1	9337	0.024	–	82100N	77640E					
2	9338	<0.008	–		77620					
3	9339	<0.008	–		77600					
4	9340	<0.008	<0.008		77580					
5	9341	<0.008	–		77560					
6	9342	<0.008	–		77540					
7	9343	<0.008	–		77520					
8	9344	<0.008	–		77500					
9	9345	<0.008	–		77480					
10	9346	<0.008	<0.008		77460					
11	9347	<0.008	–		77440					
12	9348	<0.008	–		77420					
13	9349	<0.008	–		77400					
14	9350	<0.008	–		77380					
15	9351	<0.008	–		77360					
16	9352	<0.008	–		77340					
17	9353	<0.008	–		77320					
18	9354	<0.008	–		77300					
19	9355	<0.008	–		77280					
20	9356	<0.008	–		77260					
21	9357	0.024	–		77240					
22	9358	<0.008	–		77220					
23	9359	<0.008	–		77480E					
24	9360	<0.008	–		77460					
25	9361	<0.008	–		77440					

AMG co-ords (Chester EAD grid Hollway)

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	10 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9362	<0.008	<0.008	82300N	77420E					
2	9363	<0.008	–	82300N	77400E					
3	9364	<0.008	–	82300N	77500					
4	9365	<0.008	–		77520					
5	9366	<0.008	<0.008		77540					
6	9367	0.032	–		77560					
7	9368	0.026	–	82500N	77480					
8	9369	0.030	–		77500					
9	9370	0.020	–		77520					
10	9371	<0.008	–		77540					
11	9372	<0.008	–		77560					
12	9373	<0.008	–		77580					
13	9374	<0.008	–		77600					
14	9375	<0.008	–		77620					
15	9376	<0.008	–		77640					
16	9377	<0.008	–		77660					
17	9378	<0.008	–		77680					
18	9379	<0.008	–		77700					
19	9380	<0.008	–	82700N	77500					
20	9381	<0.008	–		77520					
21	9382	<0.008	–		77540					
22	9383	<0.008	–		77560					
23	9384	<0.008	–		77580					
24	9385	<0.008	–		77600					
25	9386	<0.008	–		77620					

AMG co-ords. (Chester EAD grid Holliday)

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	11 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9387	<0.008	<0.008	82700N	77640E					
2	9388	<0.008	–		77660					
3	9389	<0.008	–		77680					
4	9390	<0.008	–		77700					
5	9391	<0.008	–		77720					
6	9392	<0.008	–		77740					
7	9393	<0.008	–		77760					
8	9394	<0.008	<0.008		77780E					
9	9395	<0.008	–	82900N	77800E		AMG co-ords.			
10	9396	<0.008	–		77820E					
11	9397	<0.008	–		77840E		(Chester EAD grid			
12	9398	<0.008	–		77860E		Holloway)			
13	9399	0.011	0.013		77880E					
14	9400	<0.008	–		77900E					
15	9501	<0.008	–		77920E					
16	9502	<0.008	–		77940					
17	9503	<0.008	–		77960					
18	9504	<0.008	–		77980					
19	9505	<0.008	–		78000					
20	9506	<0.008	–		78020					
21	9507	<0.008	–		78040					
22	9508	<0.008	–		78060					
23	9509	<0.008	–		78080					
24	9510	<0.008	0.017		78100					
25	9511	0.010	–		78120					

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	12 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9512	<0.008	<0.008	8290ON	7814OE					
2	9513	<0.008	—		7816O					
3	9514	<0.008	—		78180					
4	9515	0.013	—		78200	AMG co-ords.				
5	9516	0.011	<0.008		78220	(Chester EAB grid				
6	9517	<0.008	—		78240	Holliday)				
7	9518	<0.008	—		78260					
8	9519	<0.008	—		78280					
9	9520	<0.008	—		78300					
10	9521	<0.008	—		78320					
11	9522	<0.008	—		78340					
12	9523	0.011	—		78360					
13	9524	<0.008	—	[illegible]	[illegible]					
14	9525	<0.008	—	3550E	580S					
15	9526	0.009	<0.008		580S					
16	9527	<0.008	—		600S	EAB grid co-ords.				
17	9528	<0.008	—		620S	Holliday Area.				
18	9529	0.015	—		640S					
19	9530	<0.008	<0.008		660S					
20	9531	<0.008	—		680S					
21	9532	<0.008	—		700S					
22	9533	<0.008	—		720S					
23	9534	<0.008	—		740S					
24	9535	<0.008	—		760S					
25	9536	0.025	—		780S					

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	13 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9537	0.013	–	3550N	800S					
2	9538	<0.008	–		820					
3	9539	<0.008	–		840					
4	9540	<0.008	–		860					
5	9541	<0.008	–		880		EAB grid co-ords			
6	9542	0.012	<0.008		900		Holloway Area.			
7	9543	0.009	0.015		920					
8	9544	0.012	–		940					
9	9545	0.010	–		960					
10	9546	0.011	–		980					
11	9547	<0.008	–		1000S					
12	9548	<0.008	<0.008		1020S					
13	9549	<0.008	–	8290N	7834OE					
14	9550	<0.008	–		320					
15	9551	0.016	–		300					
16	9552	0.010	–		280					
17	9553	0.018	–		260		AMG co-ords.			
18	9554	0.015	–		240		Chester – EAD grid			
19	9555	<0.008	–		220		Holloway Area.			
20	9556	<0.008	–		200					
21	9557	<0.008	–		180					
22	9558	<0.008	–		160					
23	9559	<0.008	–		140					
24	9560	<0.008	–		120					
25	9561	<0.008	–	8230ON	7820OE					

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	14 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9562	<0.008	–	82300N	78180E					
2	9563	<0.008	<0.008		160					
3	9564	<0.008	–		140					
4	9565	<0.008	<0.008		120					
5	9566	<0.008	–		100					
6	9567	<0.008	–		080					
7	9568	<0.008	–		060					
8	9569	<0.008	–		040		AMG co-ords			
9	9570	<0.008	–		020		Chester EAD grid			
10	9571	<0.008	–		78000E		Holliday Area			
11	9572	<0.008	–		77980					
12	9573	<0.008	–		960					
13	9574	<0.008	–		940					
14	9575	<0.008	–		920					
15	9576	<0.008	–		900					
16	9577	<0.008	–		880					
17	9578	<0.008	–		860					
18	9579	<0.008	–		840					
19	9580	<0.008	<0.008	82900N	77660E					
20	9581	<0.008	–		680					
21	9582	<0.008	–		700					
22	9583	<0.008	–		720					
23	9584	<0.008	–		740					
24	9585	<0.008	–		760					
25	9586	<0.008	–		780					

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

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ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	15 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9587	<0.008	–	83100N	77840E					
2	9588	<0.008	–		860					
3	9589	<0.008	<0.008		880					
4	9590	<0.008	–		900					
5	9591	<0.008	–		920					
6	9592	<0.008	–		940					
7	9593	0.020	0.024		960		AMG co-ords			
8	9594	0.013	–		980		Chester EAD grid			
9	9595	0.011	–		78000E		Halfway			
10	9596	<0.008	–		020					
11	9597	0.011	–		040					
12	9598	<0.008	–		060					
13	9599	<0.008	–		080					
14	9600	<0.008	–		78100E					
15	9601	<0.008	0.010		120					
16	9602	0.009	–		140					
17	9603	0.009	–		160					
18	9604	0.010	–		180					
19	9605	<0.008	–		200					
20	9606	0.010	–		220					
21	9607	0.011	–		240					
22	9608	0.022	<0.008		260					
23	9609	0.013	–		280					
24	9610	<0.008	–							
25	9611	<0.008	–							

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

421440

ANALABS

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

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	16 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9612	<0.008	–							
2	9613	<0.008	–							
3	9614	<0.008	–							
4	9615	0.011	–							
5	9616	<0.008	–							
6	9617	<0.008	–							
7	9618	<0.008	–							
8	9619	<0.008	–							
9	9620	<0.008	<0.008							
10	9621	<0.008	–							
11	9622	<0.008	–							
12	9623	<0.008	–							
13	9624	<0.008	–							
14	9625	<0.008	–							
15	9626	<0.008	–	83300N	78160E					
16	9627	0.010	<0.008	83300N	78140E					
17	9628	<0.008	–		120					
18	9629	<0.008	–		100					
19	9630	<0.008	–		080					
20	9631	<0.008	–		060					
21	9632	<0.008	–		040					
22	9633	<0.008	–		020					
23	9634	<0.008	–		78000E					
24	9635	<0.008	–		77980					
25	9636	<0.008	–		960					

AMG co-ords.
Chester – EAD grid
Holliday

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

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ANALABS

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

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	17 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9637	<0.008	–	83300N	7940	AMG co-ords				
2	9638	<0.008	–		920	Chester – EAB grid				
3	9639	<0.008	–		900	Holliday				
4	9640	<0.008	–	3350E	800S					
5	9641	<0.008	–		780S					
6	9642	<0.008	–		760S					
7	9643	<0.008	–		740S					
8	9644	<0.008	–		720S	EAB co-ords.				
9	9645	<0.008	–		700S	Holliday.				
10	9646	<0.008	–		680S					
11	9647	<0.008	–		660S					
12	9648	<0.008	–		640					
13	9649	<0.008	–		620					
14	9650	<0.008	–		600					
15	9651	<0.008	–		580					
16	9652	<0.008	–		560					
17	9653	<0.008	–		540					
18	9654	<0.008	<0.008		520					
19	9655	<0.008	–		500					
20	9656	<0.008	–		480					
21	9657	<0.008	–		460					
22	9658	<0.008	<0.008		440					
23	9659	<0.008	–		420					
24	9660	<0.008	–		400					
25	9661	<0.008	–		380					

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

421442

ANALABS

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

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5548	18 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9662	<0.008	--	3350E	360S					
2	9663	<0.008	--		340	EAB grid co-ords				
3	9664	<0.008	--		320	Holliday				
4	9665	<0.008	--		300					
5	9666	<0.008	--		280					
6	9667	<0.008	<0.008		260					
7	9668	<0.008	<0.008		240					
8	9669	<0.008	--	3150E	200S					
9	9670	<0.008	--		220					
10	9671	<0.008	--		240					
11	9672	<0.008	--		260					
12	9673	<0.008	--		280					
13	9674	<0.008	--		300					
14	9675	<0.008	<0.008		320					
15	9676	<0.008	--		340					
16	9677	<0.008	--		360					
17	9678	<0.008	--		380					
18	9679	<0.008	--		400					
19	9680	<0.008	--		420					
20	9681	<0.008	--		440					
21	9682	<0.008	--		460					
22	9683	<0.008	--		480					
23	9684	<0.008	--		500					
24	9685	<0.008	--		520					
25	9686	<0.008	--		540					

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

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ANALABS

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

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	27.3.08.06745	29/12/89	5948	19 OF 19

TUBE No.	SAMPLE No.	Au	AuChk							
1	9687	<0.008	–	3150E	560S					
2	9688	<0.008	–		580					
3	9689	<0.008	–		600					
4	9690	<0.008	<0.008		620		EAB grid coords			
5	9691	<0.008	<0.008		640		Holliday.			
6	9692	<0.008	–		660					
7	9693	<0.008	–		680					
8	9694	<0.008	–		700					
9	9695	<0.008	–		720					
10	9696	<0.008	–		740					
11	9697	<0.008	<0.008		760					
12	9698	<0.008	–		780					
13	9699	<0.008	–		800					
14	9700	<0.008	–		820					
15										
16										
17										
18										
19										
20										
21										
22										
23	DETECTION	0.008	0.008							
24	UNITS	ppm	ppm							
25	METHOD	309	309							

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

421444

APPENDIX 14.

LIST AND LOCATION OF GEOPHYSICAL SURVEYS IN THE CHESTER-PINNACLES AREA

B TAYLOR JAN 1990

All geophysical surveys carried out in the Chester/Pinnacles area (EL 5/63) are compiled in folders 1, 2, 3 and 4. In the inside of folder 1 is a detailed summary of the extent of all surveys and a map showing the positions and names of all grids within EL 5/63.

Folder 1 contains surveys on E.A.B. - East Chester and E.A.D. Chester Metric Grid.

Folder 2 contains surveys on E.A.A. - Chester/Pinnacles and E.A.F. - Pinnacles.

Folder 3 contains surveys on A.S.G. - 1968 Auger Sampling Grid.

Folder 4 contains two Airborne E.M. Surveys.

In the inside pocket of each folder is an index showing the type of survey, its coverage, results, and summaries and interpretations where available.

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GEOPHYSICAL COMPILATION EL44/88 BURNS PEAK

SUMMARY OF EXTENT OF SURVEYS
COMSTAFF AND BHP SURVEYS

GRID	SURVEY TYPE	DATE	EXTENT			
E.A.B.	S.P.	1980	L1930S	1600	-	800
			2130S	1600	-	800
			2340S	1600	-	940
			2540S	1900	-	1000
			2750S	1900	-	1000
			2950S	1900	-	1000
			3150S	1750	-	1240
			3350S	1400	-	00
			3550S	500	-	00
	I.P.	1980	L3750S	1600W	-	350W
			3550S	1600W	-	450E
			3350S	1650W	-	700W
			3150S	1800W	-	750E
			2950S	1700W	-	400E
			2750S	1650W	-	550E
			2540S	1300W	-	450E
			2340S	1500W	-	900W
			2340S	150E	-	700E
			2130S	1600W	-	600E
			1930S	1500W	-	400E
			1730S	1400W	-	400E
			1530S	1400W	-	400E
	Ground Magnetics	1980	L3950S	400W	-	390E
			3750S	920W	-	0
			3550S	1400W	-	660E
			3350S	1400W	-	0
			3150S	1400W	-	820E
			2950S	1980W	-	0
			2750S	1920W	-	700E
			2540S	1900W	-	20E
			2340S	1920W	-	780E
			2130S	1820W	-	20E
			1930S	1760W	-	640E
E.A.D.	Magnetics	1974	0	00	-	1140E
			1N	00	-	1140E
			2N	00	-	940E
			5N	00	-	1160E?
			7N	00	-	2060E
			8N	00	-	1920E
			9N	00	-	1420E
			10N	00	-	1260
			11N	00	-	2320
			14N	00	-	2100
			15N	00	-	1140
			16N	00	-	1160
			18N	00	-	1140
			19N	00	-	1140

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E.A.D.	E.M.	1974	L 9N	1010E -	60E
			10N	1010E -	60E
E.A.D.	Ground Magnetics	1978	L 00N	0 -	1700W
			200N	0 -	1620W
			400N	0 -	1640W
			600N	0 -	1600W
			800W	0 -	1600W
			1000W	0 -	1500W
			1200W	0 -	1300W
			1400W	0 -	1240W
			1600W	0 -	1280W
			1800W	0 -	1160W
			1900W	0 -	1140W
			2000W	0 -	1160W
			2300W	0 -	1100W
			2800W	0 -	940W
			3100W	0 -	1000W
E.A.D.	I.P.	1974	0	90E -	870E
			1N	90E -	1530E
			2N	90E -	840E
			3N	90E -	960E
			4N	90E -	960E
			5N	90E -	960E
			6N	90E -	960E
			6N	1320E -	1860E
			7N	90E -	960E
			8N	90E -	1290E
			9N	90E -	2000E
			10N	90E -	960E
			11N	90E -	1320E
			12N	90E -	960E
			13N	90E -	960E
			14N	90E -	960E
			15N	90E -	1410E
			16N	90E -	960E
			17N	90E -	960E
			18N	90E -	960E
			19N	90E -	960E
E.A.D.	S.P.	1974	0	00 -	960E
			1N	00 -	940E
			2N	00 -	850E
			3N	00 -	960E
			4N	00 -	960E
			5N	00 -	960E
			6N	00 -	900E
			7N	00 -	1100E
			8N	00 -	1020E
			9N	00 -	1100E
			11N	00 -	1000E
			12N	00 -	1020E
			13N	00 -	940E
			14N	00 -	1000E

			15N	00 - 920E
			16N	00 - 960E
			17N	00 - 980E
			18N	00 - 980E
			19N	00 - 960E
E.A.A.	Ground Magnetics	1979	1200N	1000E - 3600E
			1000N	1000E - 3300E
			0800RN?	2000E - 3300E
			0800N	1000E - 3300E
			0600N	1000E - 3350E
			0400N	1000E - 3450E
			0200N	1000E - 3450E
			1000N	1000E - 2600E
			0200S	1000E - 2420E
			0415S	1000E - 1750E
			0600N?	1000E - 1500E
			0800	1000E - 1250E
E.A.F.	I.P.	1974/75	10S	10.2W - 19.8W
			12S	10.2W - 19.8W
			14S	10.2W - 19.8W
			16S	10.2W - 19.8W
			18S	10.2W - 19.8W
			20S	11.8W - 19.8W
			22S	10.2W - 19.8W
			24S	10.2W - 19.8W
			26S	10.2W - 19.8W
E.A.F.	PULSE E.M.	1977	14S	10.2W - 16.8W
			16S	10.2W - 19.5W
			18S	13.9W - 19.5W
			26S	11.9W - 18.0W
E.A.F.	CRONE E.M.	?	20S	10.5W - 19.3W
			22S	10.5W - 19.5W
			26S	10.5W - 19.3W
E.A.F.	Ground Magnetics	19/6/84	4200N	4280E - 5500E
			4400N	4280E - 5500E
			4600N	4280E - 5480E
			4800N	4300E - 5500E
			5000N	4300E - 5500E
			5200N	4080E - 5700E
			5400N	4500E - 5900E
			5600N	5420E - 5900E
			5800N	5420E - 5860E
			6000N	5420E - 5900E
			6200N	3860E - 5880E
E.A.F.	Ground Magnetics	11/4/84	4840N	4800E - 5200E
			4920N	4800E - 5200E
			5000N	4800E - 5200E
			5080N	4840E - 5200E
			5160N	4800E - 5200E
			5000E	4840N - 5160N

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A.S.G. I.P.	1971	42S	2650W -	00
Northern		50S	3000W -	00
Grid		60S	3000W -	1450W
		70S	2900W -	1500W
A.S.G Baseline		00	166S -	184S
A.S.G.		165S	2900W -	00
Southern		175S	1200W -	400W
Grid		185S	200E -	2200E
A.S.G. I.P.	1972	135S	300W -	00
		115S	400W -	00
		85S	300W -	00
		70S	300W -	00
		42S	300W -	00
		20W	400W -	00

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APPENDIX 15.

BURNS'S PEAK

EL 44/88

REHABILITATION PROGRAM

H RAE JUNE 1990

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BURNS PEAK

EL 44/88

REHABILITATION PROGRAM

H. RAE
JUNE 1990

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INTRODUCTION	1
Recommendations for Rehabilitation Work	2
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Roads on EL 44/88 not maintained by Geopeko	4
Explanation of Reference Nos. - Sheet 1	5
Explanation of Reference Nos. - Sheet 2	13

PLANS

Rehabilitation Plan - Sheet 1

Rehabilitation Plan - Sheet 2

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BURNS PEAK EL 44/88

REHABILITATION PLAN

INTRODUCTION

The purpose of this rehabilitation plan is to promote a systematic and cost effective approach for a rehabilitation program for EL 44/88.

There is a need for a co-ordinated plan to rationalise the use of *equipment, labour and time* required to carry out this program.

Identify and upgrade major access roads, establish test areas to find the optimum method for promoting revegetation and liaison with the Mines Dept. to capitalize on the availability of earth moving equipment will greatly assist the implementation of the plan.

The rehabilitation plan should be updated as work is completed and can be added to if further areas requiring rehabilitation are identified.

H. Rae
Geological Technician
Rosebery

Report and Maps compiled June 1990.

RECOMMENDATIONS FOR REHABILITATION WORK ON EL 44/88

1. Continue removal of rubbish from lease; old PVC pipe, 44 gallon drums etc.

2. Spread fertilizer on areas where revegetation is marginal.

3. Employ slashed vegetation techniques on areas where revegetation is marginal.

4. Establish test areas to determine optimum amount of fertilizer to use, slashed vegetation versus area left bare, etc.

5. Establish main access routes, block off roads no longer required.

6. Improve drainage on all roads.

7. Use excavator in preference to bulldozer for majority of rehabilitation work.

8. Ensure contractors on lease leave no rubbish, and do not empty sump oil on ground etc.

9. Assess costeans for purposes of geological interest and promote regrowth in costeans deemed to be of little interest.

10. Liaise with Mines Dept re: rehabilitation of old workings and availability of excavator to carry out work.

REHABILITATION WORK CARRIED OUT ON EL 44/88

1. 26th September, 1989 - Drill pads BPD62, 63, & 65; excavator re-contoured soil and reduced pad size to minimum access.

2. 27th September, 1989 - Drains dug by excavator on access road to Leo's Find and BPD62.

3. 27th September, 1989 - Log drain put in near Thomas's Tunnel and road upgraded with excavator.

4. 27th September, 1989 - Mine tailing from Thomas's Tunnel contoured around BPD63, creek diverted to original course.

5. Rubbish left by previous contractors being removed from lease.

6. 25th May, 1989 - 1 tonne of fertilizer purchased for use on rehabilitation areas.

7. Numerous cross drains put in with pick and shovel.

ROADS ON EL 44/88 NOT MAINTAINED BY GEOPEKO

1. Road to Burns Peak trig station, maintained by Surveyor General's Dept.

2. Road to Mt Kershaw trig station, maintained by Surveyor General's Dept.

3. Hydro Electric Commission access roads (reference numbers 1B to 10B, Sheet 2).

BURNS PEAK EL 44/88

REHABILITATION PLAN

EXPLANATION OF REFERENCE NOS.

AREA	COMMENTS
1. Drain needed on road, shovel and pick.	
2. as above	
3. as above	
4. Road cut up through vehicles turning onto access to BPD65. Drain needed, dozer to repair.	
5. Drain needed on road, shovel and pick.	
6. Road can be closed, alternative & better access available.	
7. Drain needed. 10m drop to main road, should be closed.	
8. Road no longer used, ti tree ~1m high growing on road.	
9. Best access to Leo's Find/BPD65.	
10. Drainage needed.	
11. Road impassable, drainage needed. Dozer needed to repair. Deep ruts on road.	
12. Revegetation on road. Ti tree and eucalypt over 1m high.	

13. Excavator could replace soil/spoil and close road.

14. Creeks running down road, need diverting. Need sleepers to divert water as no soil. Rock outcrop.

15. Old driller dam could be filled by excavator.

16. Drill hole EAB1. Good revegetation, ti tree, eucalypt and acacias. Could use fertilizer.

17. Road could be closed. Well advanced revegetation. Eucalypts over 3m tall.

18. John Wally cut (costean). Sides of cut revegetating well, not much growing on bottom. Drainage needed, sleepers etc as water running down bedrock.

19. Road to Burns Peak trig station, 2 drains needed - pick and shovel. Bulldozer needed for lower section. Road maintained by Surveyor General.

20. Costean - revegetation good. Ti tree, acacias and eucalypts ~ .5m.

21. Short road - 7m long. Excavator could pull in banks to fill in pond.

22. Road could be closed, alternative access available.

23. Drill hole EAF11. Excavator could reduce size of pad considerably.

24. Drains needed, could be dug with shovel and pick.

25. 10m long road, excavator could fill in, 5 min work.

26. Road very steep gradient.
27. Impassable to vehicles.
28. Drains needed. Road could be closed, alternative access available. Good revegetation on road. Ti tree and eucalypt ~ 2m high. Road ends in 2m drop to drill hole CP10.

29. Drill pad, not much soil/spoil left for contouring. Some revegetation, Ti tree, eucalypt and acacias under .5m high. Fertilizer would help.

30. Costean - very good revegetation.

31. Road very overgrown. Eucalypts over 3m high.

32. Unused drill pad. Starting to revegetate. Not much soil left for excavator to replace. Could use fertilizer.

33. Deep ruts on road, not impassable but should be filled. Drains needed.

34. Southern Trenches. Some revegetation.

35. Road impassable. Dozer needed to fill in ruts, etc. Drains needed - sleepers should be laid (corduroyed).

36. Dam built by Warren for BP064, should be knocked

down. Excavator would be best.

37. Old track? - revegetated track.

38. Cross drains.

39. Cross drains.

40. Costean - good revegetation.

41. Some revegetation, not much; no soil left. Deep scouring from run off, no where else for water to go.

42. Culvert needed for runoff from costean.

43.

44. *Priority. Costean crosses road. Deep scouring. Road being washed away, will need culvert. Not much regeneration in costean, will need excavator & sleepers to build drains for run off.

45. Cone Hill Rd - major access track. Deep scouring and wash aways, needs dozer to repair. Road impassable at present. Will need drainage to divert runoff.

46. Road in reasonable condition. Good revegetation over 1m high and thick.

47. Road completely overgrown.

48. Road impassable, washouts, scouring etc. Would need dozer to fix. Best to close off road as alternative access is available.

49. See 45.

50. Cleared area, unused drill pad. Some revegetation, mostly moraine shrubs. Excavator could smooth out banks etc. Application of fertilizer and slashed vegetation may promote revegetation.

51. Dozer drive could be filled in by excavator, mostly rock and scree.

52. Short unused road, could be filled in by excavator. There is sufficient soil/spoil.

53. Cross drain needed.

54. Costean, some revegetation; may benefit from application of fertilizer. Excavator could re-contour spoil.

55. Road overgrown with bracken, ferns, etc. Very good revegetation, vehicle access should be restricted.

56. Road impassable due to large tree fallen over road, good revegetation.

57. See 56.

58. Road needs 2 cross drains dug.

59. Cross drains required. Road has been ripped up by rig being pulled over it. Bulldozer could repair.

60. Road overgrown, good revegetation.

61. Road overgrown, good revegetation.

62. Road overgrown, good revegetation, sump on road needs draining.

63. Costean, good revegetation.

64. EAB4 - road and pad overgrown, good revegetation.

65. Road is no longer used, no soil left to fill deep ruts and scouring on road. If access not required road should be closed.

66. Steep hill, needs cross drains, deep ruts and scouring would need filling.

67. Culvert required.

68. Culvert required.

69. Road to costean passable, small bog near Hollway Creek requires caution. Road should be closed unless access required.

70. Costean, good revegetation.

71. EAF15 - no spoil left for contouring. Some revegetation, may benefit from application of fertilizer.

72. EAF16 - some revegetation, could benefit from application of fertilizer.

73. Culvert required.

74. Small dam filled by runoff from Brown's Tunnel.

75. Drains needed.

76. Excavator could contour, spoil area would benefit from fertilizer.

77. EAF 8, 6, 4 - spoil could be re-contoured by excavator. Very poor revegetation, may benefit from application of slashed vegetation and fertilizer.

78. EAF12 - excavator could reduce size of pad - some revegetation, mainly eucalypts and heath, fertilizing would be beneficial.

79. EAF13 - as above.

80. EAF11 - excavator could reduce size of pad. Would benefit from slashed vegetation and application of fertilizer.

81. Road to EAF5 impassable. Cross drains required to divert water. Road should be closed if not required.

82. Road to BPD62 needs cross drains and windrows broken to divert water.

83. Creek crosses road, may become impassable. Culvert required if vehicle access to BPD62 desirable.

84. Deep ruts and scouring - dozer/excavator could repair. Cross drains needed to divert water.

85. Road could be closed.

86. Old sump, excavator could fill in.

87. Road overgrown, good revegetation - ti tree, banksia over 1m tall.

88. Costean - good revegetation.

89. Road blocked by fallen tree.

90. Road overgrown, mainly ti tree and cutting grass. Cross drains needed.

91. Road becomes boggy in wet weather. Cross drains may fix.

92. Road into Silver Falls. Generally in good condition, cross drains where required, some parts rough where bedrock protrudes.

BURNS PEAK EL 44/88

REHABILITATION PLAN

EXPLANATION OF REFERENCE NOS.

	AREA	COMMENTS
1.	Cross drains need to be dug on Chester Rd where necessary.	
2.	Hole in Hollway Ck bridge needs to be filled, water draining down road onto bridge needs to be diverted.	
3.	Hollway Rd needs cross drains dug where necessary.	
4.	Wash out (DIP) needs culvert and fill.	
5.	Large permanent pools on road. Road needs draining, crosses low lying creek, drainage may be difficult to achieve.	
6.	See 5.	
7.	Road impassable due to deep ruts, could be fixed with excavator or dozer, cross drains needed at regular intervals. Apart from deep ruts, road in reasonable condition.	
8.	Road impassable due to fallen trees, good regrowth of cutting grass, ti tree and eucalypts. Road should be closed if access not required.	
9.	Costean. Very good revegetation in and around costean. Ti tree, eucalypt and myrtle, some regrowth over 3m tall.	

Water running down costean would be difficult to divert.

10. Road to Mt Kershaw trig needs extensive cross drains and breaking of windrows on bends. Road is passable and in reasonable condition.

11. CP3 drill site. Poor revegetation. Applications of slashed vegetation and fertilizing may assist regrowth.

12. Culvert or log drain required. Road scoured to bed rock, large washout needs back filling.

13. Section of road needs drains dug. Road in reasonable condition, however is deteriorating with water scouring to bed rock, most cross drains require excavator to dig them.

14. Sections of road in reasonable condition and is passable to vehicles. Cross drains required on some sections.

15. Very boggy area, road almost impassable. Would need to be corduroyed if vehicle access required, remainder of road in reasonable condition. Good regrowth on some sections.

16. Large tree (Myrtle) across road, vehicle access to CP3 impossible.

17. Large volume of water running down road, deep scouring and rock outcrops

make road impassable. Large cross drain required to divert water. Road will have to be back filled if vehicle access required. Excavator would be ideal as plenty of loose fill on sides of road.

18. Road in fair condition. A lot of moss on road and good revegetation on some sections, ti tree, cutting grass, eucalypt and some myrtle. Unless vehicle access is required, best blocked off and allowed to rehabilitate.

19. Road impassable due to good regrowth of ti tree and cutting grass. Best blocked off.

20. CP17 drill pad. Some fill still remains for excavator to re-contour, slow revegetation may benefit from application of slashed vegetation and fertilizer.

21. Good revegetation on road. Best closed and left to rehabilitate.

22. Steep incline, road needs cross drains. Road almost impassable due to deep ruts, alternative access available. Road should be closed.

23. Steep incline. Road needs cross drains and windrows broken at regular ~10m intervals. Road in reasonable condition.

24. Road impassable due to deep ruts and scouring, requires table drain to divert water. Road should

be closed unless vehicle access required.

25. Roads completely overgrown with cutting grass, ti tree and eucalypts. Impassable to vehicles.

26. Road impassable due to deep ruts and scouring, table drain required to channel water. Road should be closed unless vehicle access required.

27. Road in good condition, some drains required.

28. This section of road almost impassable due to large rock outcrops and all road fill washed away. Large cross drain at top of incline needed to divert water, outcrop will need blasting to improve vehicle access.

29. This section of road in good condition. Cross drains should be dug where needed.

30. Very steep incline, old cross drains need to be re-opened and windrows broken to divert water. Road in reasonable condition.

31. Road almost impassable due to rock outcrop and loose fill. Outcrop needs blasting to repair.

32. Section of road requires cross drains to divert water. Road in reasonable condition.

33. Drill hole CH3 access road and drill pad overgrown, good revegetation.

34. Drill holes CP19 and CP20 - some revegetation, would benefit from application of fertilizer.

35. Drill holes CP21 and CP22 - some revegetation, would benefit from application of fertilizer. No spoil left to contour.

E.L. 44/88 BOUNDARY

538700N

538500N

538400N

538300N

376500E

MARIONDAH RIVER

BURNS PEAK

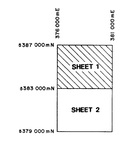
CONE HILL

Browns Tunnel

Thomas Tunnel

LEGEND

- Major access track.
- Superfluous track/access.
- Roadwork requiring bulldozer.
- Possible dieback area.
- Large log across track.
- Rejuvenated Vegetation
- Rejuvenated rainforest.
- No access.
- 64 Reference numbers for report notes.
- Lease boundary
- Watercourse
- Road
- CP 9 Drill hole
- Costean



SHEET INDEX

5 cm

90-3203.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	E.L. 44/88 – BURNS PEAK J.V.
DATE : FEB. 1990	
DRAWN : N.W.D.S.	**AREAS IDENTIFIED FOR REHABILITATION**
REF:	
REVISIONS :	SHEET 1
DRAWING No.	SCALE 1:5000 (100 0 100 200 METRES) FIG. No.

421470

5383000N
5382500N
5382000N
5381500N
5381000N
5380500N
5380000N
5379500N
376500E
377000E
377500E
378000E
378500E
379000E
379500E
380000E
380500E
381000E

E.L. 44/88 BOUNDARY

Chester Dam

Mt. Kershaw

Mt Kershaw Trig.

CP6 CP23 CP18 CP17 CP16 CP19 CP20 CP21 CP22

CH1 CH2 CH3

Power lines

LAKE ROSEBERY

LAKE ROSEBERY

LEGEND

- Major access track.
- Superfluous track/access.
- Roadwork requiring bulldozer.
- Possible dieback area.
- Large log across track.
- Rejuvenated Vegetation
- Rejuvenated rainforest.
- No access.
- 64 Reference numbers for report notes.
- Power transmission line
- Watercourse
- Road
- Railway
- Drill hole
- Outcrop
- Lease boundary

SHEET INDEX

376 000mE 381 000mE
5387 000mN
SHEET 1
5383000mN
SHEET 2
5379 000mN

5 cm

421471

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED: A.N.L.	E.L. 44/88 – BURNS PEAK J.V.
DATE: AUG. 1989	AREAS IDENTIFIED FOR REHABILITATION
DRAWN: T.G.F.	SHEET 2
REF:	
REVISIONS:	
DRAWING No.	SCALE 1:5000 (100 0 100 METRES) FIG. No.

421472

APPENDIX 16.

STRUCTURAL GEOLOGY OF THE BROWN'S TUNNEL AREA BURN'S PEAK W.TAS

C G ELLIOT APRIL 1990

421473

Structural Geology of the Brown's Tunnel area, Burns Peak, Western Tasmania

Mapping and report by:
Colleen G. Elliott, PhD
Department of Earth Sciences
Monash University
Clayton, Vic. 3168

April 20, 1990

421474

Introduction

Detailed mapping at a scale of 1:1000 near Brown's Tunnel in March, 1990, reveals that the local geometry is fault controlled and that multiple generations of fault movement have disrupted strata. The network of overprinting faults and the lack of outcrop prevent the tracing of any given fault or stratigraphic horizon over even short distances but the style of deformation is quite clear: Anastomosing faults chop rock units into tapered lozenges with limited lateral extent. No medium- or large-scale folds have been observed, and possible grading in volcano-sedimentary units indicates a consistent direction in facing across the map area.

[Note: all orientation data given in this report are expressed with respect to true north]

Structural style at Brown's Tunnel

Bedding and Lithologic Distribution:

The rocks of the Brown's Tunnel area are intermediate to acid volcanic and volcanogenic rocks which vary between structureless and intensely deformed over distances of less than ten metres. Bedding measurements in the Brown's Tunnel area have a wide scatter in orientation but have a general trend of approximately 020°/90° (lower hemisphere equal area projection enclosed). There is a swing in trend across the area from NNE in the south to NE in the north.

Near DDH EAF5, a quartz- and feldspar-phyric rock containing pyrite, galena and sphalerite is exposed. A similar unit is poorly exposed 30m to the east, above Brown's Tunnel itself. The mineralized unit (or units) contains rounded clasts of dark chert and sulphide minerals which show no evidence of a pre-existing cleavage. The dominant schistosity in the rock overprints clasts and matrix alike. The unit appears to be a primary breccia and is possibly a mass flow unit. If the mineralized unit is primary, the trace of the unit should be roughly parallel to bedding. At DDH EAF5, for example, the mineralized unit is truncated to the east and north by fault planes on which the magnitude of displacement is unknown but its continuation to the south and west probably trends parallel to the local bedding at approximately 020°.

Because no primary geopetal structures were observed, the facing direction of the rocks of the Brown's tunnel area is uncertain. In the southern and northern parts of the mapped area, however, there are rock sequences that might be interpreted as fining-upwards, volcaniclastic, depositional units. These units consist of red-weathered, massive, coarse-grained, altered, feldspar-phyric, fragmental rocks with lithic clasts that grade into grey-green, bedded, tuffaceous sandstones and shales. Each one of these units has one or two faulted margins, and no scoured bases or other primary depositional

structures have been observed. If these are graded depositional units and if it can be assumed that grain size decreases upwards, then the rocks can be said to young towards the west except at the south of the map area where the graded units fine towards the east. The east-grading units are part of a fault-bounded sliver that lies between west-grading blocks and do not represent the upright limb of a map-scale fold. Even if the units are not normally graded, the consistent grading direction along Boco road indicates that there are no map-scale folds. If the units *are* normally graded, the bulk of the strata in the area must be overturned, ie, the strata dip towards the east but become younger towards the west.

Cleavage:

There are two types of cleavage: 1) a schistosity, and 2) a spaced fracture cleavage. Neither cleavage is penetrative over the map area. The schistosity is a close-spaced parting on sericitic planes with a mean trend of 020°/90° (lower hemisphere equal area projection enclosed), but some variation from this orientation occurs. It is typically irregular and anastomosing on all scales and only occurs in and around fault zones. Some massive exposures contain no visible cleavage at all. The fracture cleavage is less well developed and appears to overprint the schistosity. It has no consistent orientation and again appears to have been developed in association with individual faults.

Faults:

Faults are present at all scales from >30m wide, schistose, shear zones to <3mm wide, discrete, brittle fracture planes. Some of the latter have no apparent associated cleavage, but most faults are zones of cleavage development. The overprinting sequence of faulting observed along the Boco Road west of the Brown's Tunnel access road is; 1) brittle faults, marked by quartz veins and quartz fault fibres, overprinted by 2) brittle faults with sericitic fault fibres, overprinted by 3) steep to vertical brittle faults trending NE with no fibres but with a well developed schistosity. Faults trending ESE deflect the cleavage, as in the large outcrop on the eastern corner of the intersection between the Boco Road and the Brown's Tunnel access track, and are later than the others. The faults which control the geometry of the exposed mineralization near DDH EAF5 are also late - they cut folds which fold the schistosity.

Along the Boco Road, where exposure is almost continuous, a 35m fault zone at the intersection of the Boco Road and the access track to Brown's Tunnel is expressed by intense schistosity and close-spaced, small-scale fault planes trending approximately 040°. The rocks are dominantly gray green and black layered clastic volcanogenic sediments overlaying massive coarse-grained volcanogenic fragmental rocks to the east. There is a penetrative

steep stretching lineation defined by elongate sericitic minerals and "pressure shadow" fibres on pyrite crystals. The movement sense on the fault zone is dominantly east-side-up as indicated by many small offsets in beds and by the angular relationship between the cleavage and individual fault planes. The cleavage is either older than or the same age as the fault. The master fault within this exposure is locally marked by a cataclasite layer up to 20 cm thick with shallowly north-plunging slickenside stria at the contact with the wallrock. The cataclasite zone is steeply west dipping and seems to be truncated by steeper east dipping faults. There is no clear overprinting relationship between the shallow stria and the steep stretching lineation but the cataclasite itself must predate the east-side-up movement (steep) because it contains the steep stretching lineation. Other shallowly plunging stria overprint the stretching lineation indicating a complex sequence of fault motions. The geometry of the zone fits that of a steepened thrust fault on which the pre-steepening movement would have been westerly directed (east-side-up).

The lack of continuous exposure prevents tracing this fault over any large distance. The zone of intense deformation appears to die out to the SW along strike and does not seem to link up with a similar fault which trends 020° near DDH EAF5. This latter fault, however, is also approximately 30m wide and appears to have an east-side up displacement, as indicated by fold asymmetry, fault plane mineral fibres, and bedding/cleavage/fault plane relationships. Sulphide mineralization is exposed in the fault zone near DDH EAF5. At this location schistosity is folded and the small-scale NS- and SE-trending faults seem to overprint NE-trending faults.

The exposed NE-trending faults, especially those associated with enhanced cleavage development, have varying widths of sedimentary rock slices along them. This suggests that faulting occurred primarily within sedimentary units and it is possible that the sedimentary rocks host the main detachment of a now steepened thrust system.

The youngest faults trend ESE (approximately 120°) and cut across all other structures. The 120° fault along the old Boco track west of DDH ESB1 is exposed as a narrow healed fracture across which different rocks types are juxtaposed. The other 120° faults are not exposed but are inferred from the discordance of units across zones of non-exposure, from the presence of ESE-trending fracture cleavage, and from the bending of older fault planes and cleavage into a ESE orientation alongside a 120°-trending zone of non-exposure. These faults appear to have right-lateral displacement on the order of 10m or more and probably have significant effect on the present disposition of mineralized bodies. Because the faults do not tend to be exposed and because the wall rocks contain limited displacement-related strain it is not possible to trace these faults with any certainty. On the map

421477

enclosed with this report the ESE faults are shown to die out but they may extend further than depicted.

The map geometry shown on the interpretation map demonstrates the style of deformation more than the actual distribution of given beds or units. Observation on the outcrop scale shows that there is a mosaic of small-scale faults of unknown significance on the map scale. It is probable that the displacement on these small-scale faults is not large, but they may offset the mineralized unit such that it cannot be traced as a continuous layer.

Folds:

Deformation in the area mapped is fault dominated rather than fold dominated. Small-scale folds are rare and occur only within fault zones. On the map scale, the marked warping in cleavage and layering was produced by faulting, and cleavage trends follow the shape of lozenge-shaped fault blocks.

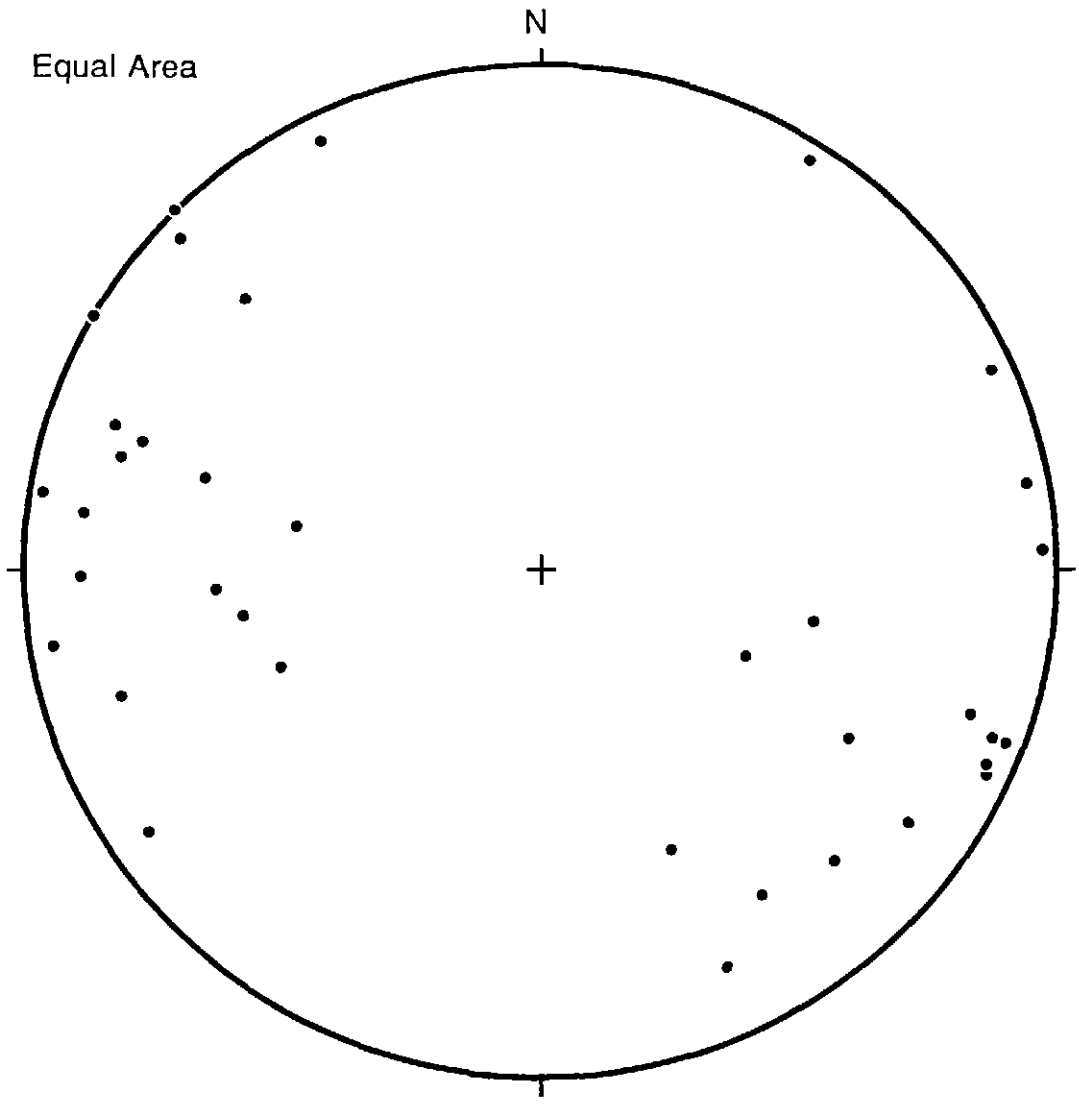
Exploration Recommendations

1) Surface exploration might be aided by improvement of exposure immediately along strike of the mineralization exposed at DDH EAF5. Bedding and schistosity trends at this location, and for approximately 80m along strike on either side, are approximately 020°. Because previous costains lie along a 040° trend from DDH EAF5 there is virtually no rock exposed along strike of the known mineralized horizon. If sulphide mineralization is primary then it makes the most sense to try to trace it parallel to bedding trends on the surface.

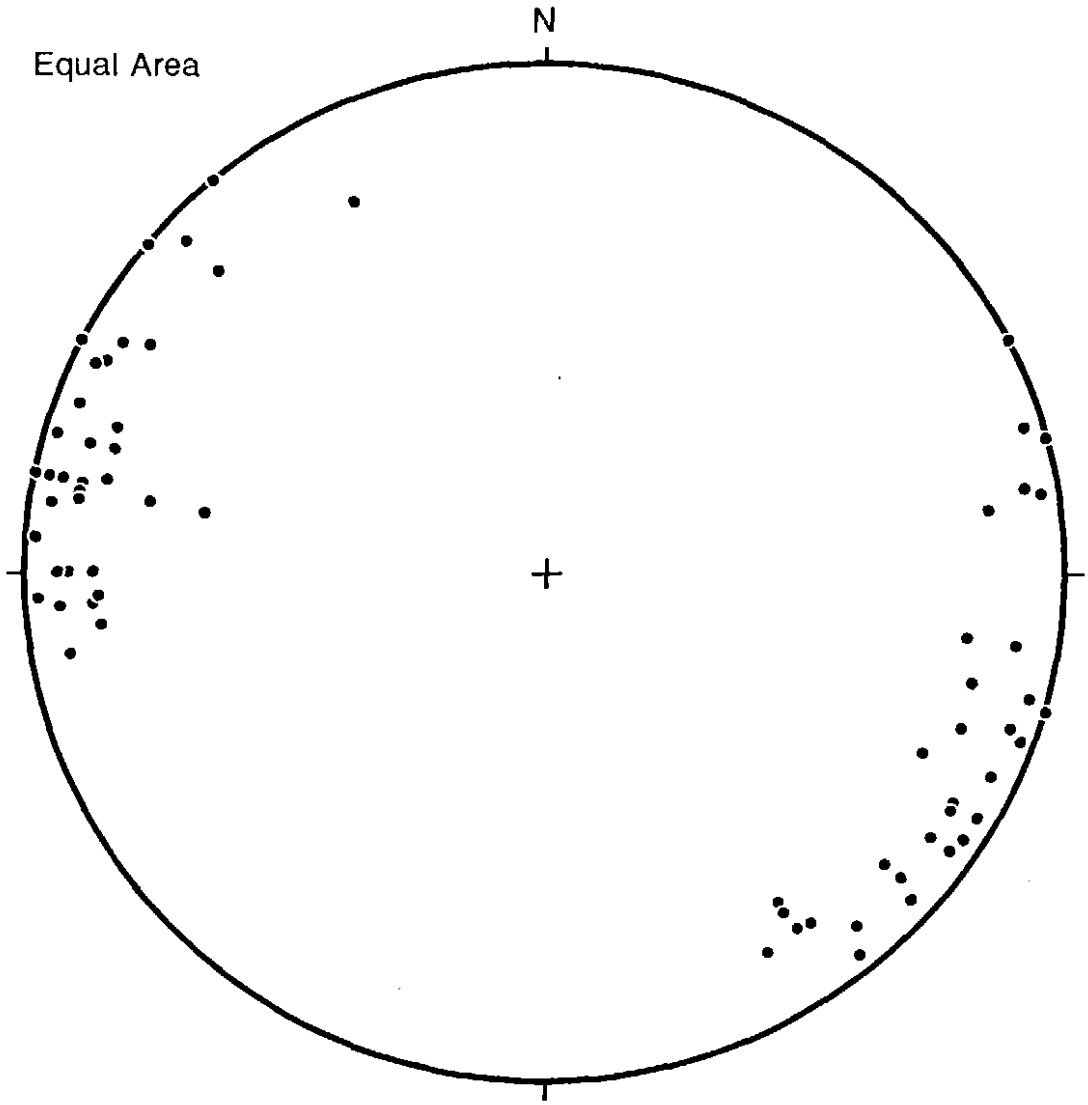
2) Subsurface data should be re-examined and re-interpreted taking into consideration the style of deformation in the area. New cross-sections can be constructed using orientation data measured on the surface.

3) Regional structural mapping will better constrain the regional geometry and outline large-scale structural trends. The evidence for east-over-west thrusting near Brown's Tunnel allows for the possibility of regional stratigraphic repetition and thus the repetition of mineralized horizons. The regional significance of the apparently graded units near Brown's Tunnel also needs to be examined in a larger context, especially if it is demonstrated that rocks in the area are overturned.

421478



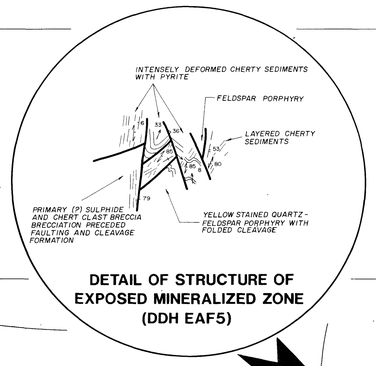
35 bedding measurements,
Brown's Tunnel.
Mean bedding orientation = 022°/90°



76 schistosity measurements,
Brown's Tunnel.
Mean schistosity orientation = 015°/85°E

377 200mE | 377 300mE | 377 400mE | 377 500mE | 377 600mE | 377 700mE | 377 800mE | 377 900mE | 378 000mE | 378 100mE | 378 200mE

s385 100mN | s385 000mN | s384 900mN | s384 800mN | s384 700mN | s384 600mN | s384 500mN | s384 400mN



DETAIL OF STRUCTURE OF EXPOSED MINERALIZED ZONE (DDH EAF5)

INTRUSIVE (?) SILICEOUS QUARTZ - FELDSPAR PORPHYRY

FAULT ZONE WITH MIXED SEDIMENTARY ROCKS AND MASSIVE FELDSPAR-PHYRIC TUFF

BPD66 | BOCO | ESBI | EAF5 | ROAD

LEGEND

- VS — LAYERED VOLCANOGENIC SANDSTONE, SILTSTONE SHALE AND CHERT
- At — MASSIVE FELDSPAR-PHYRIC TUFF – SOME EXPOSURES GRADATIONAL WITH LAYERED VOLCANOGENIC SEDIMENTS
- QFP — MEDIUM TO FINE-GRAINED MASSIVE QUARTZ -FELDSPAR PORPHYRY
- MS — PRIMARY (?) SULPHIDE AND CHERT CLAST BRECCIA

LITHOLOGIC CONTACT
LIMIT OF OUTCROP
FAULT
FAULT PLANES WITH DIP AND SLIP STRIA – REVERSE, NORMAL, STRIKE – SLIP, DISPLACEMENT UNKNOWN
DIRECTION OF GRADING IN TUFF
BEDDING, FACING UNKNOWN
SCHISTOSITY
FRACTURE CLEAVAGE
STRETCHING LINEATION
BEDDING FORM SURFACE LINES
SCHISTOSITY FORM SURFACE LINES

5 cm

421480 90-3203.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : C.G.E.	E.L. 44/88 – BURNS PEAK J.V.
DATE : NOV. 1990	BROWN'S TUNNEL AREA
DRAWN : G.M.B.	STRUCTURAL GEOLOGY
REF:	INTERPRETATION
REVISIONS :	
DRAWING No.	SCALE 1:1000 (20 0 20 METRES) FIG. No.

421431

APPENDIX 17.

BROWNS TUNNEL MASSIVE SULPHIDES

INTERPRETATION

I MATHISON APRIL 1990

421432

Massive Sulphides —
Geological Interpretation

I. Mathison. April 1990.

3.4 Massive Sulphides - Geological Interpretation (See figs 3 - 7)

None of the features measured plotted as a regular surface on the long section. No believable structural contours could be drawn. However, the data collected was useful for qualitative interpretations of the mineralization. The following observations are considered significant:-

* Massive sulphide mineralization is associated with a small body of vesicular andesite lava.

* Structural and stratigraphic data all suggest that the massive sulphide mineralization occurs as a series of very small, slump folded, discontinuous lenses which occur at different stratigraphic level within a host sedimentary sequence.

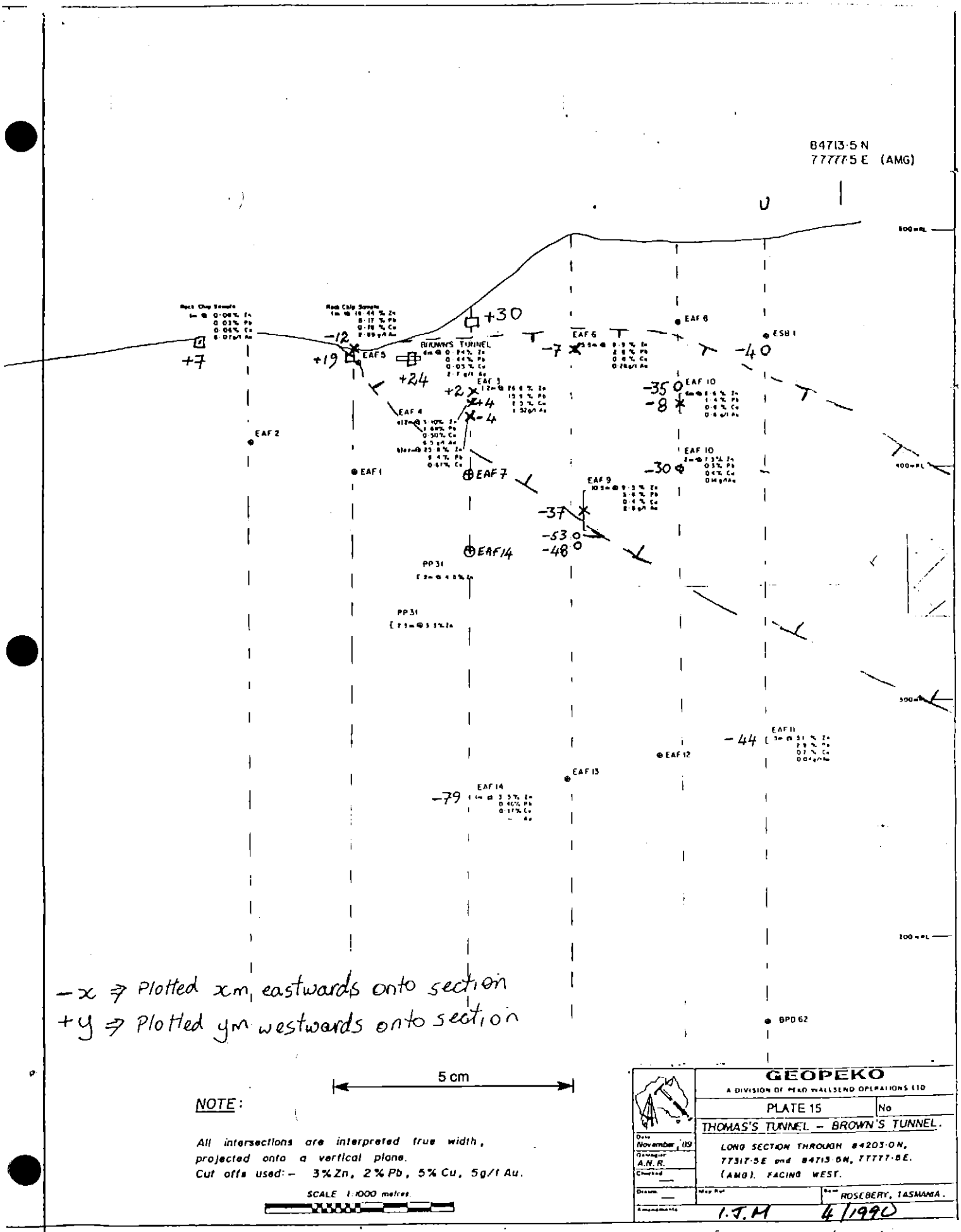
* Disseminated mineralization occur stratigraphically above (west of) and below (east of) this andesite lava.

* Andesite lava breccias occur stratigraphically above (west of) the massive sulphide mineralization. These also carry disseminated sulphide mineralization described by earlier workers as feeder zones. Current interpretations suggest andesite intrusions into wet, weakly mineralized sediments.

* No massive sulphides have yet been intersected down dip from the body of andesite lava. Deeper holes intersected disseminated mineralization and intense alteration within a sequence of sediments and pumiceous acid tuffs down dip from the andesite.

* The hanging wall rhyolite west of the mineralized sequence interfingers with the sediments. These sediments and acid lava breccias are weakly mineralized.

421484



−x ⇒ Plotted xm eastwards onto section
+y ⇒ Plotted ym westwards onto section

NOTE:

All intersections are interpreted true width, projected onto a vertical plane.
Cut offs used:- 3% Zn, 2% Pb, 5% Cu, 5g/t Au.

SCALE 1:1000 metres

GEOPEKO
A DIVISION OF PEKO WALLSEND OPERATIONS LTD

PLATE 15 | No

THOMAS'S TUNNEL - BROWN'S TUNNEL.

LONG SECTION THROUGH 84203·0N, 77317·5E and 84713·0N, 77777·8E. (AMG). FACING WEST.

Date: November '89
Surveyor: A.N.R.
Checked: —
Drawn: —
Amendments: I.T.M 4/1990

Map Ref: —
Area: ROSEBERY, TASMANIA.

Fig 3

× Massive Sulphides - Centre of Mineralization
○ Disseminated Sulphides = ? VMS type
□ High Gold. (>5g/t)
— — — Interpreted limit of Massive Sulphides

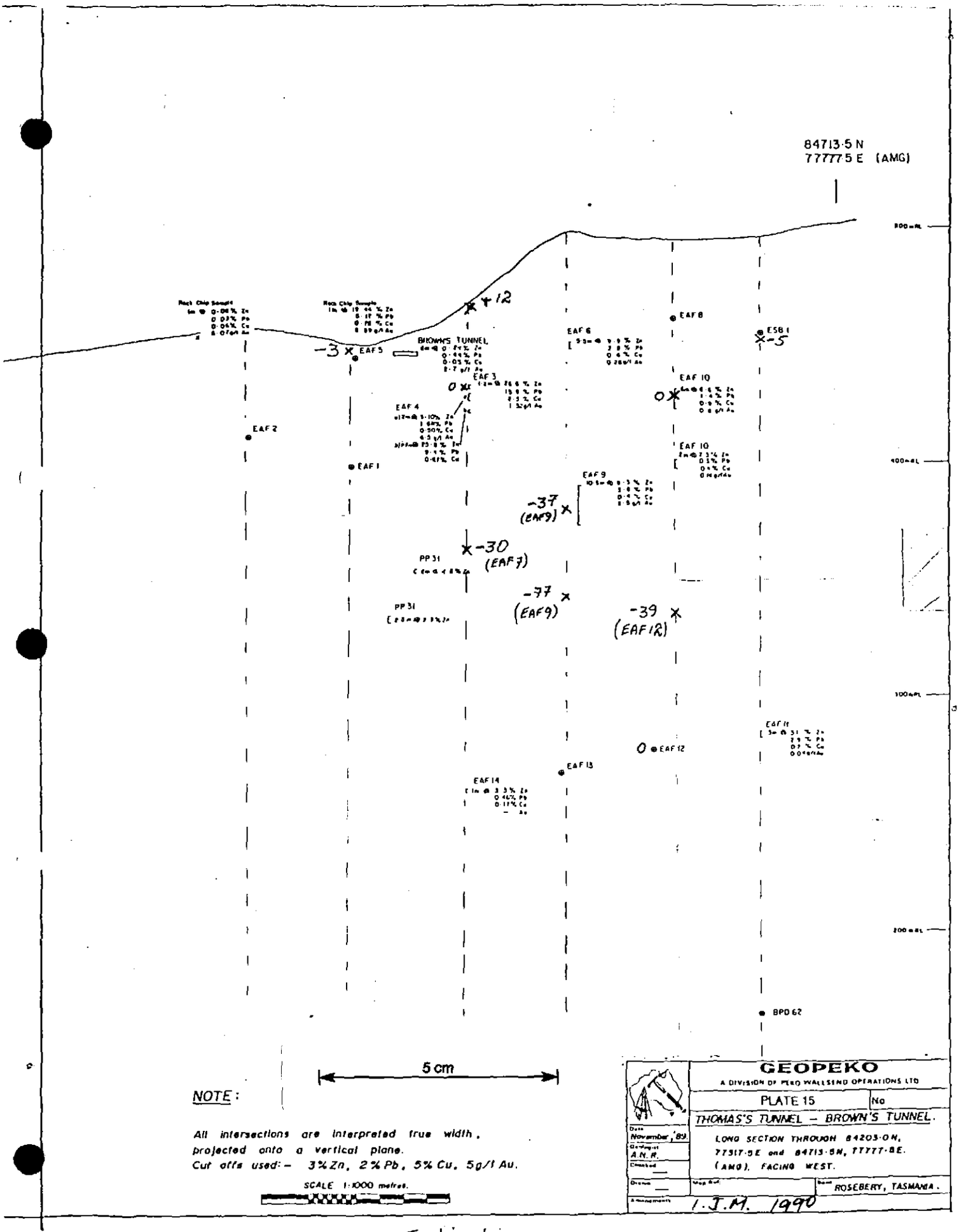


Fig 4

Foliation

-x Projected x metres from behind section

+y Projected y metres from in front of section

N/D* Core logs require checking - foliation not ...

421486

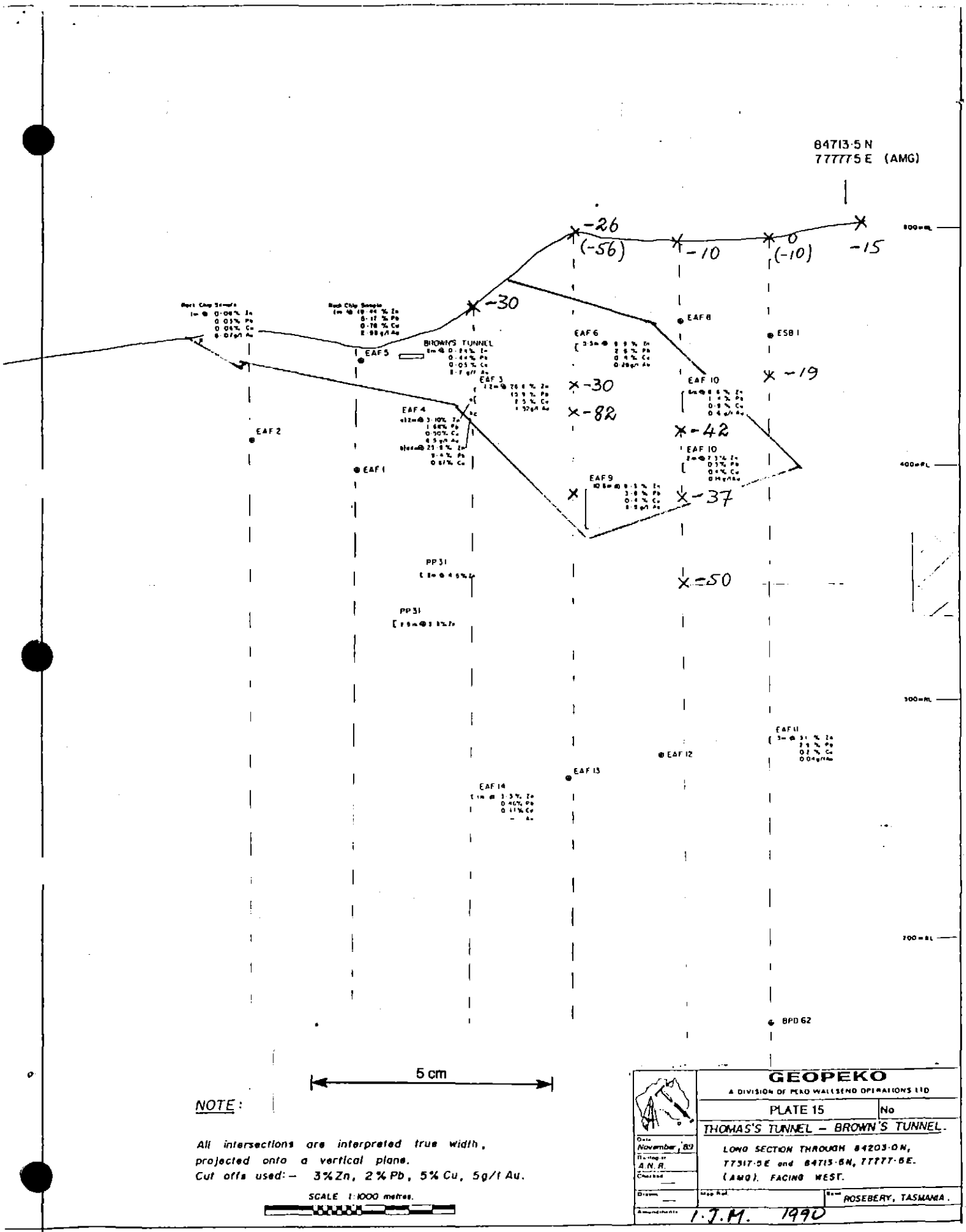


Fig 5

Base of H/W Rhyolite

$-x$ Projected x metres from west of section

$+y$ Projected y metres from east of section

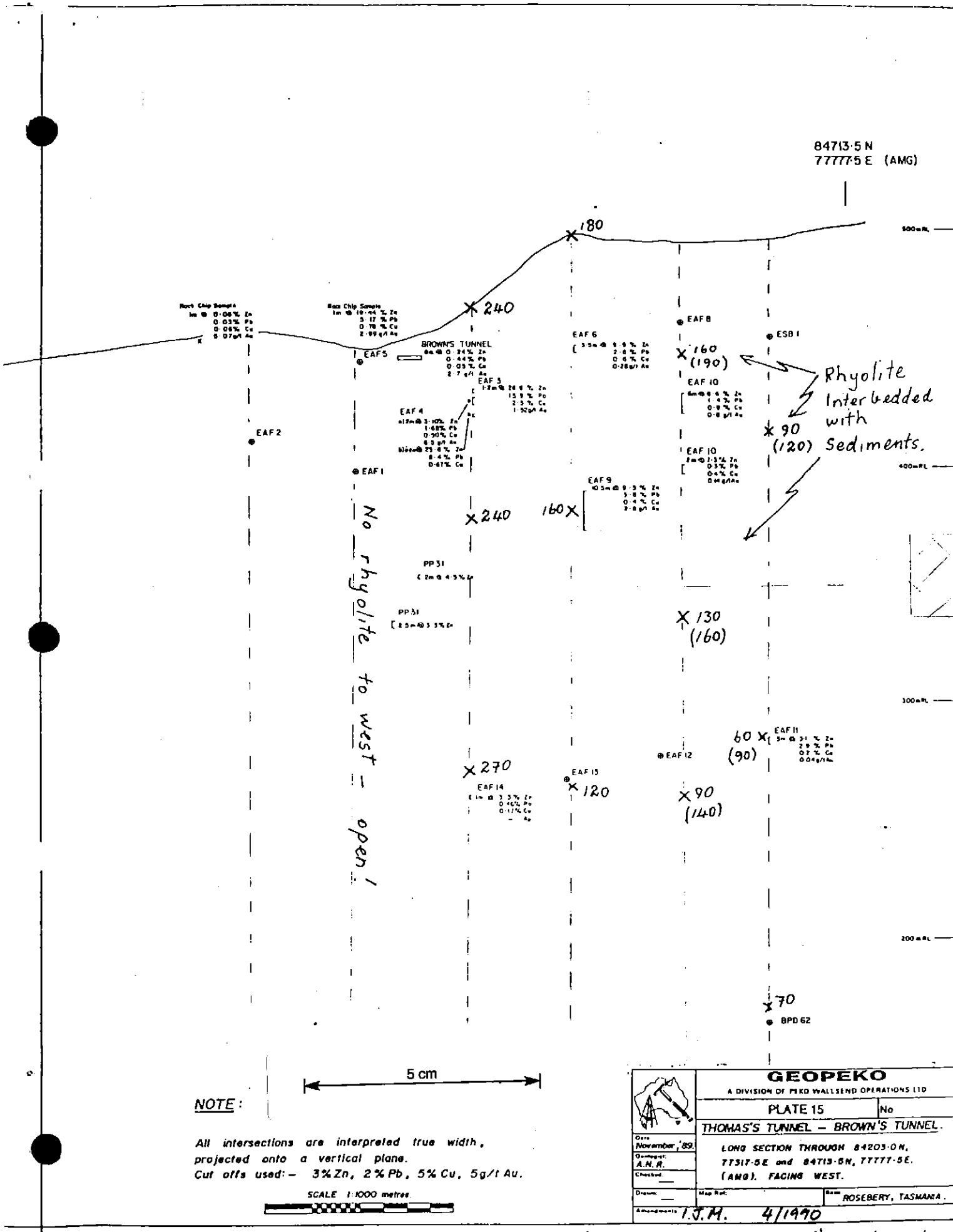


Fig 6

True Thickness of "Host Sequence" Sediments
Footwall pumiceous tuff to ? H/W Rhyolite

421438

LEGEND

- Structural Feature.
- Bedding Trends.
- Mineralisation.
- Mafic Dyke.
- Probable Alteration Anomalies (interpreted from gravity & magnetics).
- M — Minor gravity/magnetic anomalies.

+	QFP	Quartz-Feldspar Porphyry.
		Undifferentiated Acid-Int. Volcanics.
	Ia	Andesite.
	Mb	Basalt.
	VC	Volcaniclastics.
	Sed	Sediments, Shales, x'tal Sandstone.
	lAr	Rhyolite Lavas.
	VS	Sediments, Volcaniclastics.
		Browns & Chester Host Rocks.

PASMINCO EXPLORATION

A Division of Pasminco Australia Limited

COMPILED : A.N.L.	E.L. 44/88 – BURNS PEAK J.V.
DATE : NOV. 1990	
DRAWN : N.W.D.S.	**PROSPECT AREAS**
REF:	
REVISIONS :	
DRAWING No.	SCALE 1:25,000 — FIG. No. 3

5 cm

0 500 1000 1500 2000 2500 metres

380 000mE

385 000mE

5 385 000mN

5 380 000mN

E.L. BOUNDARY 44/88

E.L. BOUNDARY 44/88

NTH. PINNACLES

SHALE BASIN

BOCO ROAD

YABBY CREEK

LEOS FIND

BROWNS TUNNEL

STH. TRENCHES

HOLLWAY EAST

HOLLWAY

RAILWAY

MACINTOSH BLUFFS

CHESTER

MT. KERSHAW

ROSEBERY FAULT

?Old Growth Structure?

BOCO ROAD

RAILWAY LINES

HIGHWAY

MURCHISON HIGHWAY

POWER

BAY

EMU

HEC

PIEMAN ROAD

ROSEBERY LAKE

TULLAH

THOMAS

BROWNS

BURNS PEAK

PINNACLES

CHESTER

MOUNT KERSHAW

BASTYAN DAM

CUTTY SARK

HAWKESBURY

Sed

lAr

Ia

lA/ II

QFP

VS

VC

Mb

M

NOTE: Geology interpreted from

- Geological mapping.
- Magnetic & Gravity interpretation (Leaman 1990).
- Geological interpretation (G. Purvis 1989-90). (South of E.L. Boundary).
- Mt. Read Volcanics Project, 1:25,000 geological map. (Corbett & McNeill - 1986).

(Patterns and relationships of trends within Dundas Group area differ from volcanics area).

Boco Siding

Major axis of primary structure and alteration.

Pyritic alteration.

Highway

BOUNDARY E.L. 37/89

BOUNDARY E.L. 44/88

BOUNDARY E.L. 12/88

375 000m.E.

380 000m.E.

385 000m.E.

5 385 000m.N.

5 380 000m.N.

Secondary axis.

Axis.

Major axis.

Axis of structure and alteration.

Secondary axis.

3200 B

3000 B

1500 B

750 B

900 B

1300 B
1300V?

1600 B
>400 V

1800 B
>400V

2200 B
>300V

1400B

1100 B

600 B

3300 B

4000 B

1300 B
1300 V

700 B
>500V

900 B

1150 B

1100 B

1500B

600V

1250 B

750 B

1000 B

1500 B

1800 B

1000 B

2200 B

800 B

300B?

A

B

C

c

D

E

F

f

g

O

i

J

K

L

M

a

b

d

e

h

H

n

Leo's Find

Browns

Thomas

BURNS PEAK

Pinnacles

Source of Leos Find mineralisation?

OLD TROUGH EDGE?

OLD TROUGH EDGE EXTENSION?

Chester

Farrell Siding

MOUNT KERSHAW

Source of Chester mineralisation?

chl. alt. ser.

py. ser./ alt.

chl. ser./alt.

LAKE ROSEBERY

Langdons.

Bastyan Dam

Cutty Sark.

Hawkesbury

MOUNT SALE

TULLAH

Murchison

North Mackintosh.

New North Mount Farrell.

Central Mackintosh.

South Mackintosh.

North Mount Farrell.

Mount Farrell Mine.

South Mount Farrell

Dutton's Show

Central Farrell.

Secondary structural axes.

Murchison Extended.

Murchison River Mine

North Murchison.

South Murchison.

Osborne

385N 378E 383N 380E 381N 382E 379N 384E

A — B

BURNS PEAK

Browns

R.L.500m.

(Sea Level) 0

R.L.-500m.

R.L.-1000m.

Rosebery Fault

Dundas Group

Magnetic Unit target zone ??

Major alteration - another unit ?

Magnetic Units

K offline

"Chester" along strike

EW. NW.

NE. NW.

NW.

EW.

€v

€d

p€?

LEGEND

V/H = 1.

(a) = Surface alteration observed/inferred.

€v = Mount Read Volcanics.

€d = Dundas Group.

p€ = Pre-Cambrian Basement.

N.B.: The above section is based on preliminary gravity and magnetic models for profile 1.
It suggests structural styles and depth scale but further analysis is essential. Inferred thrust patterns are consistent with all current data and analysis but the solution is not necessarily unique. Projections indicate location of major lineaments or fracture intersections. (a) = surface known or inferred alteration zones. Note relationship between such sites and basement fractures inferred. Note also that age of alteration is not established by such correlations.

LEGEND

Magnetic trends. [Scale of feature indicated by line frequency, length, etc.

Gravity trends. [Scale of feature indicated by line frequency, length, etc.

D d — Anomalous areas (Incl. alteration and mineralisation possible). (Upper and lower case characters relate to particular features, in report).

750 B = Depth of inferred (pre-Cambrian or sub-Cambrian) rocks (basement), (in metres).

>500V = Thickness (min.) of volcanics, (in metres).

= Normal dip and fold symbols.

= Thrust inferred.

5 cm

0 500 1000 1500 2000 2500

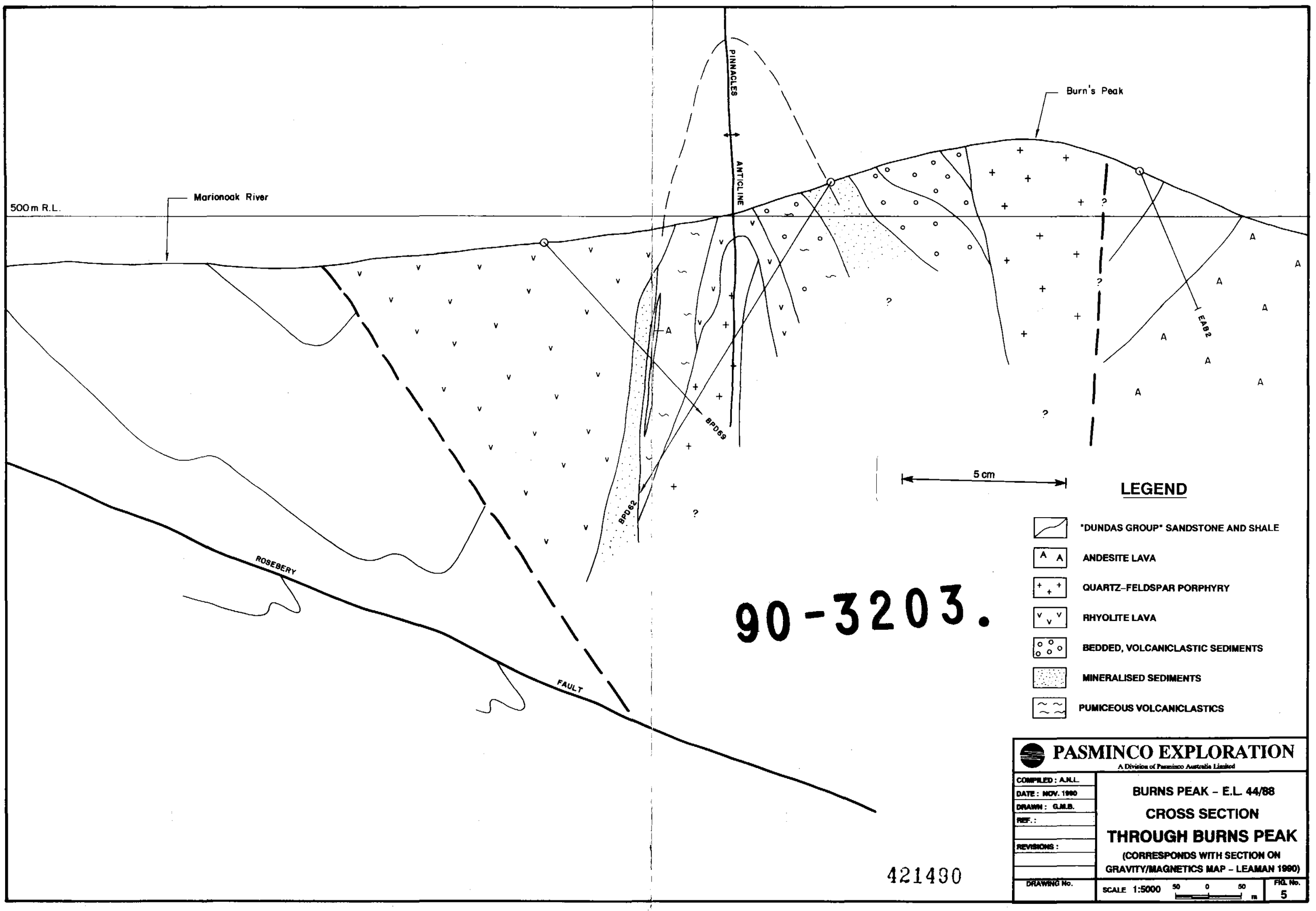
metres

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : D.L.	E.L. 44/88 – BURNS PEAK J.V.
DATE : NOV. 1990	PRELIMINARY GRAVITY AND MAGNETIC INTERPRETATION
DRAWN : N.W.D.S.	
REF: D. Leaman	
Report Sept. 1990.	
REVISIONS :	
DRAWING No.	SCALE 1:25 000 — FIG. No. 4

90-3203.

421480



90-3203.

421490

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	BURNS PEAK – E.L. 44/88
DATE : NOV. 1990	CROSS SECTION
DRAWN : G.M.B.	THROUGH BURNS PEAK
REF. :	(CORRESPONDS WITH SECTION ON GRAVITY/MAGNETICS MAP – LEAMAN 1990)
REVISIONS :	
DRAWING No.	SCALE 1:5000 50 0 50 m — FIG. No. 5

LEGEND

1.Colour

pl	pale
dk	dark
pk	pink
rd	red
bn	brown
or	orange
yl	yellow
gn	green
bk	black
wh	white
cm	cream
pp	purple

2.Cleavages

w.clvd	(weakly cleaved)
clvd	(moderately cleaved)
s.clvd	(strongly cleaved)

3.Igneous Grain Size

fg	< 1 mm
mg	1–5 mm
cg	5–50mm
vcg	> 50mm

4.Sediment Grain Size

argillites		< 0.06 mm	rudites	<	2 mm
arenites -	vfg	0.06 0.12 mm	gr (granule)	2	4 mm
	fg	0.12 0.25 mm	pb (pebble)	4	64 mm
	mg	0.25 0.50 mm	cob (cobble)	64	256 mm
	cg	0.50 1.00 mm	bld (boulder)	>	256 mm
	vcg	1.00 2.00 mm			

5.Igneous Rock Classification

	Av	Undifferentiated Acid Volcanic		
10	tA	Acid tuff	rhyolite	r
6	lA	Acid Lava	rhyodacite	r d
6	iA	Minor Acid Intrusives	dacite	d
19	+ + +	Major Acid Intrusives	GR granite	
			QFP quartz feldspar porphyry	
	Iv	Undifferentiated Intermediate Volcanic		
51	It	Intermediate tuffs	trachyte	t
47	Il	Intermediate lava	latite	l
47	iL	Minor Intermediate Intrusives	andesite	a
41	DI	Major Intermediate Intrusives		
60	B	Basic Volcanics	basalt	b
54	dB	Minor Basic Intrusives	dolerite	d
54	GB	Major Basic Intrusives	Gabbro	
64	U	Ultramafic Rocks		

6.Sedimentary Rock Classification

27	VS	Volcaniclastic Seds	Sv	Volcanogenic Seds
28	Srd	Rudites	Scon	conglomerate
			Sbx	Breccia (Sedimentary)
		Sar arenites <15% matrix	Sqtz	orthoquartzite
			Sqar	quartz arenite
			Sfar	feldspar arenite
33	Sst	sandstones	Slar	lithic arenite
		Sak arkose	Svar	volcanic arenite
		Swk wackes	sqwk	quartz wacke
		sgwk greywacke	sfwk	feldspathic wacke
		>15% matrix	slwk	lithic wacke
			svwk	volcanic wacke
			Sslt	Siltstone
23	Sag	Argillites	Ssh	Shale
			Sbs	Black shale
34	Slst	Limestone		
34	Sdol	Dolomite		
31	Sif	Iron Information	Sct	Chert
31	Sev	Evaporite	4 Sfgl	Fluvoglaciats
			4 Sgl	Glacial deposits
			4 Salv	Alluvium

7.SCH Undifferentiated Metamorphic

8.Silicates

q	quartz
kf	K-feldspar
ab	albite
pf	plagioclase
a	amphibole
px	pyroxene
b	biotite
c	chlorite
s	sericite
e	epidote
to	tourmaline
f	feldspar
hb	hornblende
t	talc

9.Sulphides,Oxides

bwk	boxwork
gos	gossan
h	haematite
mag	magnetite
lim	limonite
bn	bornite
cp	chalcopyrite
sp	sphalerite
gn	galena
py	pyrite
po	pyrrhotite
asp	arsenopyrite
Mn	Mn-oxides
Fe	Fe-oxides
tet	tetrahedrite

10.Carbonate,etc

cb	carbonate
sid	siderite
cl	calcite
dol	dolomite
rh	rhodochrosite
ba	barite
ti	rtuorite
shl	scheelite
Au	gold
lx	Leucoxene

11.Textures

lava		bm	bombs	f	flow brecciated
lt	lithic tuff	pm	pumice	vns	veins
xt	crystal tuff	fm	fiamme	xbd	cross-bedded
vt	vitric tuff		(length cm)	tkbd	thick-bedded
lpt	lapilli tuff	P	porphyritic	tnbd	thin-bedded
ag	agglomerate	a	amygdaloidal	ib	inter-bedded
af	ash flow	ves	vesicular	lam	laminated
ashfl	ash fall	sph	spherulitic	bx'd	brecciated
bx	breccia	wld	welded	stg	staining
qtz±ag	quartz eyes/augen	rwk'd	reworked	rnd	rounded || bio	bedded	fr	fragments	mav	massive
sch	schistose	cl	clasts	wthd	weathered
fld	filled	bnd	banded	cav	cavities
		rb	flow banded	i/b	interbedded
		num	numerous	fr-app	fragmented appearance

12.Alteration

alb	albite	(ser)	weak
cb	carbonate	ser	strong
chl	chlorite		
ser	sericite		
kao	kaolin		
epi	epidote		
sil	siliceous		
cty	charty		

13.Structure

——	Fault Plane
——	Bedding
——	Cleavage
——	Joint
—→	Plunge
—↑↓—	Facing & Class
~~	Unconformity
⟨⟩	Outcrop
——	Interpreted boundary
~~	Shearing
——	Flow banding

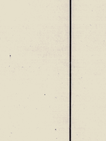
14.Mineralization

diss	() disseminated (%)
str	stringer
mas	massive

(Sbx) (Ilo) Rock type in brackets confirmed by petrology

15.Topographical Features

	Road
	Track: vehicle, foot
	Railway, tramway
	River, creek
	Waterfall
•5.5m	Drill Hole & Depth
	Drill Hole
	Old mine, pit
	Thin Section
△1.4m	Trig, spot height
	Dump or scree



5 cm

SHEET INDEX

NOTE SOURCE - Comstaff Mapping 1984 10 %
BHP Mapping 1986 5 %
Geopeko / Pasminco Mapping 1988-90 50 %
R. Reid (Tas. Uni.) 1990 5 %
B. Coutts (Tas. Uni.) 1990 10 %

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	E.L. 44/88 – BURNS PEAK J.V.
DATE : NOV. 1990	
DRAWN :	421491
REF:	**OUTCROP GEOLOGY**
REVISIONS :	**SHEET 1**
DRAWING No.	SCALE 1:5000 (100 0 100 200 METRES) FIG. No. 6

90-3207.1

E.L.44/88 BOUNDARY

ROSEBERY FAULT

BURNS PEAK

CONE HILL

HOLLWAY

Higgins Creek

Manionook

Rivulet

Browns Tunnel

Thomas Tunnel

Railway

Boy Creek

Emu Baco

5800E

5600N

5400N

5000N

LEGEND

DUNDAS GROUP

- Predominantly Shales, Siltstones.
- Predominantly Quartz-feldspar crystal volcaniclastic.
- Andesite lava.

CENTRAL SEQUENCE

- Rhyolite lava (& lava breccia).
- Siliciceous Shale pumiceous volcaniclastics, Siltstone, often mineralised.
- Bedded volcaniclastic Sandstones & Conglomerates.
- Pumiceous volcaniclastics, often weakly mineralised.
- Quartz Feldspar Porphyry.

- Bedding, strike & dip trend.
- Fault.
- Inferred fault.
- Anticlinal Axis.
- Synclinal Axis.

NOTE: Incorporating some interpretation by B. Coutts (Tas. Uni.) 1990 – Hollway Area.

5 cm

SHEET 1

SHEET 2

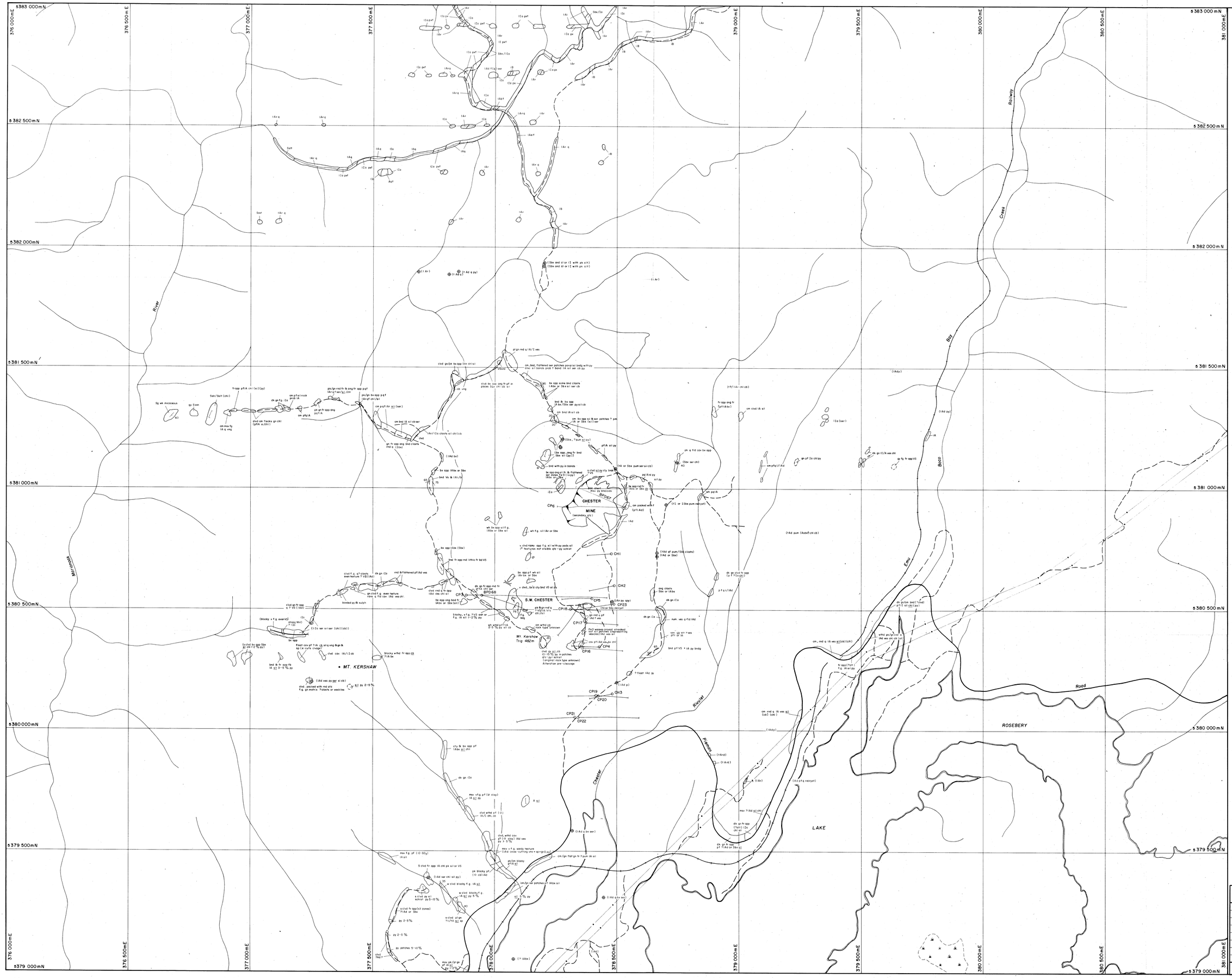
SHEET INDEX

90-3203.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED: A.N.L.	E.L. 44/88 – BURNS PEAK J.V.
DATE: NOV. 1990	**GEOLOGY INTERPRETATION**
DRAWN: N.W.D.S.	SHEET 1
REF:	
REVISIONS:	
DRAWING No.	SCALE 1:5000 (100 0 100 200 METRES) FIG. No. 7

421492



LEGEND

1.Colour

pl	pale
dk	dark
pk	pink
rd	red
bn	brown
or	orange
yl	yellow
gn	green
bk	black
wh	white
cm	cream
pp	purple

2.Cleavages

w.clvd	(weakly cleaved)
clvd	(moderately cleaved)
s. clvd	**(strongly cleaved)**

3.Igneous Grain Size

fg	< 1 mm
mg	1–5 mm
cg	5–50mm
vcg	> 50mm

4.Sediment Grain Size

argillites		< 0.06 mm	rudites	< -	2 mm
arenites –	vfg	0.06 - 0.12 mm	gr (granule)	2 -	4 mm
	fg	0.12 - 0.25 mm	pb (pebble)	4 -	64 mm
	mg	0.25 - 0.50 mm	cob (cobble)	64 -	256 mm
	cg	0.50 - 1.00 mm	bld (boulder)	> -	256 mm
	vcg	1.00 - 2.00 mm			

5.Igneous Rock Classification

	Av	Undifferentiated Acid Volcanic		
10	tA	Acid tuff	rhyolite	r
6	lA	Acid Lava	rhyodacite	r d
6	IA	Minor Acid Intrusives	dacite	d
19	+ +	Major Acid Intrusives	GR granite	
			QFP quartz feldspar porphyry	
	Iv	Undifferentiated Intermediate Volcanic		
51	It	Intermediate tuffs	trachyte	t
47	Il	Intermediate lavs	latite	l
47	IL	Minor Intermediate Intrusives	andesite	a
41	DI	Major Intermediate Intrusives		
60	B	Basic Volcanics	basalt	b
54	IB	Minor Basic Intrusives	dolerite	d
54	GB	Major Basic Intrusives	Gabbro	
64	U	Ultramafic Rocks		

6.Sedimentary Rock Classification

27	VS	Volcaniclastic Seds	Sv	Volcanogenic Seds	
28	Srd	Rudites	Scon	conglomerate	
			Sbx	**Breccia (Sedimentary)**	
			Sar	arenites	Sqtz orthoquartzite
				<10% matrix	Sqar quartz arenite
					Sfar feldspar arenite
33	Ssat	sandstones			Slar lithic arenite
			Sak	arkose	Svar volcanic arenite
			Swk	wackes	sqwk quartz wacke
			sgwk	greywacke	sfwk feldspathic wacke
				>15% matrix	slwk lithic wacke
					svwk volcanic wacke
			Salt	Siltstone	
23	Sag	Argillites	Ssh	Shale	
			Sbs	Black shale	
34	Slst	Limestone			
34	Sdol	Dolomite	Sct	Chert	
31	Sif	Iron Information	4	Sfgl Fluvoglacials	
31	Sev	Evaporite	4	Sgl Glacial deposits	
			4	Salv Alluvium	

7.SCH Undifferentiated Metamorphic

8.Silicates

q	quartz	bwk	boxwork
kf	K-feldspar	gos	gossan
ab	albite	hm	haematite
pf	plagioclase	mag	magnetite
a	amphibole	lim	limonite
px	pyroxene	bn	bornite
b	biotite	cp	chalcopyrite
c	chlorite	sp	sphalerite
s	sericite	gn	galena
e	epidote	py	pyrite
to	tourmaline	po	pyrrhotite
f	feldspar	asp	arsenopyrite
hb	hornblende	Mn	Mn-oxides
t	talc	Fe	Fe-oxides
		tet	**tetrahedrite**

9.Sulphides,Oxides

10.Carbonate,etc

cb	carbonate
sid	siderite
cl	calcite
dol	dolomite
rh	rhodochrosite
ba	barite
fl	fluorite
shl	scheelite
Au	gold
lx	Leucoxene

11.Textures

lava		bm	bombs	f	flow brecciated
lt	lithic tuff	pm	pumice	vns	veins
xt	crystal tuff	fm	flamme	xbd	cross-bedded
vt	vitric tuff		(length cm)	tnbd	thick-bedded
lpt	lapilli tuff	P	porphyritic	tnbd	thin-bedded
ag	agglomerate	a	amygdaloidal	ib	inter-bedded
af	ash flow	ves	vesicular	lam	laminated
ashfl	ash fall	sph	spherulitic	bx'd	brecciated
bx	breccia	wld	welded	stg	staining
qe/aug	quartz eyes/augen	rwk'd	reworked	**rnd**	**rounded**
		fr	fragments	**mav**	**massive**
bc	bedded	cl	clasts	**wthd**	**weathered**
schistose		bnd	banded	**cav**	**cavities**
fld	**filled**	fb	flow banded	**l/b**	**interbedded**
		num	numerous	**fr-app**	**fragmented appearance**

12.Alteration

alb	**albite**	**(ser)**	**weak**
cb	**carbonate**	**ser**	**strong**
chl	**chlorite**		
ser	**sericite**		
kao	**kaolin**		
epi	**epidote**		
sil	**siliceous**		
cty	**cherty**		

13.Structure

- Fault **Plane**
- Bedding
- Cleavage
- Joint
- Plunge
- Facing & Class
- Unconformity
- Outcrop
- Interpreted boundary
- Shearing
- **Flow banding**

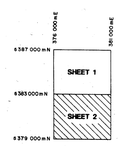
14.Mineralization

diss	() disseminated (%)
str	stringer
mas	massive

(Sbx) ((1)o) Rock type in brackets confirmed by petrology

15.Topographical Features

- Road
- Track; vehicle, foot
- Railway, tramway
- River, creek
- Drill Hole
- Old mine, pit
- **Thin Section**
- Trig, spot height



SHEET INDEX

NOTE SOURCE :- Geology mapping Jan. - Mar. 1990
- B. Coutts - Tas. Uni. Jan. 1990

90-3203.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	E.L. 44/88 – BURNS PEAK J.V.
DATE : NOV. 1990	**OUTCROP GEOLOGY SHEET 2**
DRAWN : G.M.B.	
REF:	
REVISIONS :	
DRAWING No.	SCALE 1:5000 (100 0 100 METRES) FIG. No. 8

421493

E.L.44/88 BOUNDARY

CHESTER

MT. KERSHAW

ROSEBERY

LAKE

Mt. Kershaw Trig 482m

Chester Dam

Railway Creek

Boco Bay

Road

Lines Emu

Reuter Pasmin

Chester River

Mortimore River

CH1 CH2 CH3

CP1 CP2 CP3 CP4 CP5 CP6 CP7 CP8 CP9 CP10 CP11 CP12 CP13 CP14 CP15 CP16 CP17 CP18 CP19 CP20 CP21 CP22 CP23

BP001 BP002

LEGEND

- Andesite Lava.
- Rhyolite – shallow intrusive.
- Rhyolite – lava.
- Cty. Sediments – cherty, layered.
- Sediments – siltstone.
- Sediments – coarse epiclastics.
- Dacite Lava.
- Rocks on the arrow side of this boundary have >2% Fe.
- Band of pyrite.
- Zone of very intense alteration and pyrite mineralisation.
- Basic dykes.

5cm

90-3203.

SHEET INDEX

SHEET 1

SHEET 2

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.
DATE : NOV. 1990
DRAWN : G.M.B.
REF:
REVISIONS :
DRAWING No.

E.L. 44/88 – BURNS PEAK J.V.

GEOLOGY INTERPRETATION

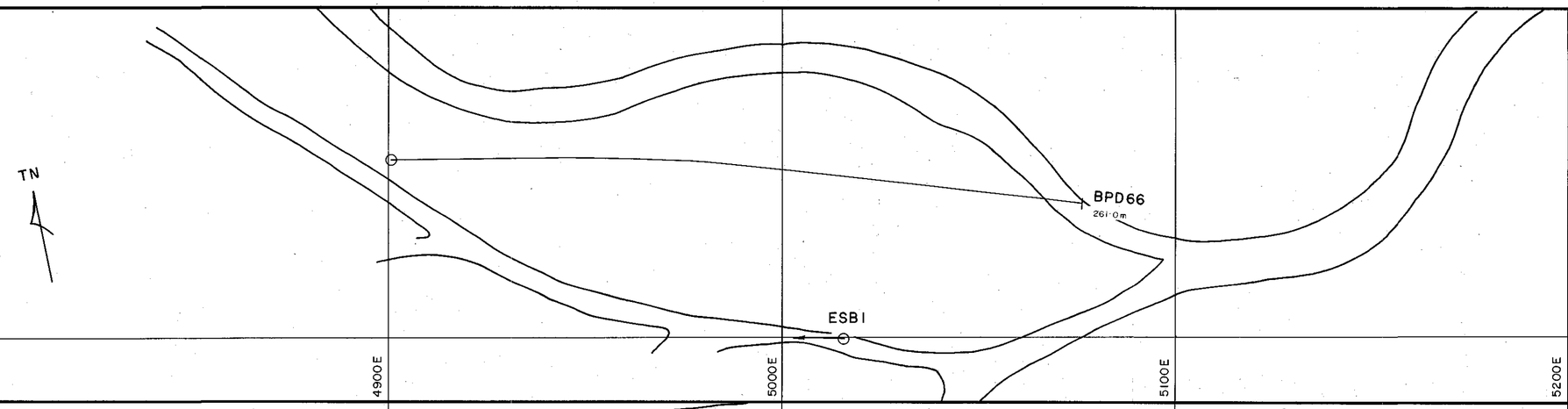
SHEET 2

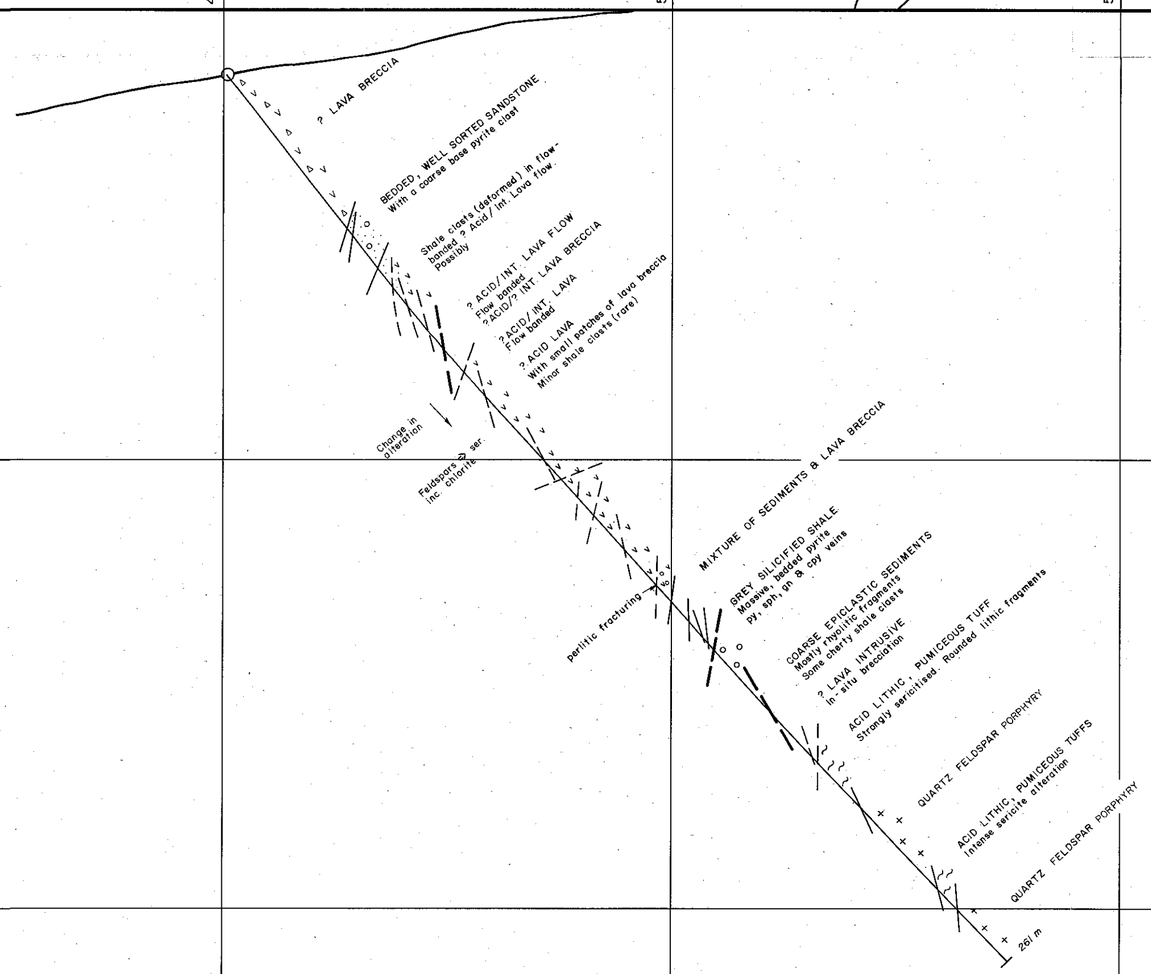
SCALE 1:5000 (100 0 100 METRES)

FIG. No. 9

421494

PLAN





LEGEND

- PREDOM. SANDSTONE
- LAVA FLOWS (Probably Acid)
- LAVA BRECCIA
- PREDOM. SHALE
- COARSE SEDIMENTS
- ACID, PUMICEOUS TUFF
- QUARTZ-FELDSPAR PROPHYRY

- SHEARING
- FAULT
- GEOLOGICAL CONTACT
- BEDDING
- BEDDING FACING
- CLEAVAGE
- DYKE

90-3203.

5 cm

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	E.L.44/88 – BURNS PEAK J.V.
DATE : OCT. 1990	BROWN'S TUNNEL AREA
DRAWN : G.M.B.	**CROSS SECTION ON 5440N (EAF GRID)**
REFERENCE :	
REVISIONS :	
DRAWING No.	SCALE 1:1000 (20 0 20 METRES)
	FIG. No. 13

421495

PLAN

5600N

TN

4700E 4800E 4900E 5000E 5100E 5200E 5300E

500m R.L.

400m R.L.

300m R.L.

200m R.L.

100m R.L.

BPD69

RHYOLITE LAVA BRECCIA (FLO - PHYRIC)

SANDSTONE & ASH

100m

RHYOLITE LAVA BRECCIA (FLO - PHYRIC)

SILTSTONE & SANDSTONE

? Sphalerite clast
? Pyrite clast

200m

FLOW BANDED RHYOLITE LAVA (FLO - PHYRIC)

INTERBEDDED SHALE, SILTSTONE, SANDSTONE & TUFF
Wk & Sp & Wk min Bedding Pyrite

ACID PUMICEOUS TUFF
Highly sericitised

BEDDED GREY SHALE

COARSE SEDIMENTARY BRECCIA

300m

MIXTURE OF XENOLITHIC-SERICITISED TUFF & SHALE, SILICEOUS SHALE
Bedded

VOLCANICLASTIC SEDIMENT
Upward Fining

COARSE VOLCANICLASTIC SEDIMENT WITH SOME FINER INTERVALS
Siliceous pebbles throughout coarser sediments sericitised

400m

QUARTZ FELDSPAR PORPHYRY

RDD 5

BPD 69

LEGEND

- PREDOM. SANDSTONE
- LAVA FLOWS (Probably Acid)
- LAVA BRECCIA
- PREDOM. SHALE
- COARSE SEDIMENTS
- ACID, PUMICEOUS TUFF
- QUARTZ-FELOSPAR PROPHYRY
- SHEARING
- FAULT
- GEOLOGICAL CONTACT
- BEDDING
- BEDDING FACING
- CLEAVAGE
- DYKE

90-3203

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	E.L.44/88 – BURNS PEAK J.V.
DATE : OCT. 1990	YABBY CREEK AREA
DRAWN : G.M.B.	**CROSS SECTION ON 5600N (EAF GRID)**
REFERENCE :	
REVISIONS :	
DRAWING No. 421496	SCALE 1:1000 (20 0 20 METRES) FIG. No. 14

5 cm

376 000mE
376 500mE
377 000mE
377 500mE
378 000mE
378 500mE
379 000mE
379 500mE
380 000mE
380 500mE
381 000mE

5 387 000mN
5 386 500mN
5 386 000mN
5 385 500mN
5 385 000mN
5 384 500mN
5 384 000mN
5 383 500mN
5 383 000mN

Higgins Creek

E.L.44/88 BOUNDARY

Marramook River

Rivulet

HOLLWAY

BURNS PEAK

CONE HILL

Browns Tunnel

Thomas Tunnel

Emu Bay Railway

Boco Creek

BPD 70
BPD 69
BPD 66
BPD 65
BPD 64
BPD 63
BPD 62

EAF 1
EAF 2
EAF 3
EAF 4
EAF 5
EAF 6
EAF 7
EAF 8
EAF 9
EAF 10
EAF 11
EAF 12
EAF 13
EAF 14
EAF 15
EAF 16

EAB 1
EAB 2
EAB 4

CP 1
CP 2
CP 2W
CP 5
CP 7
CP 9
CP 10
CP 12
CP 14

PP 34
PP 36
PP 39
PP 40
PP 41
PP 42
PP 45
PP 46
PP 48
PP 51
PP 52
PP 59

PIN 1
PIN 2

KEY

⊗ Rock Chip Sample

5 cm

SHEET 1
SHEET 2

SHEET INDEX

90-3203.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED: A.N.L.	E.L. 44/88 – BURNS PEAK J.V.
DATE: NOV. 1990	SAMPLE LOCATIONS
DRAWN: N.W.D.S.	SHEET 1
REF:	
REVISIONS:	
DRAWING No.	SCALE 1:5000 (100 0 100 200 METRES)
	FIG. No. 15

421497

E.L. 44/88 BOUNDARY

CHESTER MINE

* MT. KERSHAW

Mt. Kershaw Trig 482m

CHESTER

ROSEBERY

LAKE

Chester Dam

Mathinna River

Flowerdale River

Emu Bay Railway

Boco Creek

Road

N.B.– Numbers preceded by the letters D,TA,A,T are all Comstoff Samples.
e.g.– D 9051
TA 950
A 20
T 402

⊗ = Sample Location.

Posminco Samples shown thus:–
79015 = Rock Chip Sample
P79707 = Panned Concentrate Sample.
W79707 = Water Sample.
S 79707 = Bulk Stream Sediment Sample.

5 cm

SHEET INDEX

90-3203.1

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	E.L. 44/88 – BURNS PEAK J.V.
DATE : NOV. 1990	**SAMPLE LOCATIONS**
DRAWN :	**SHEET 2**
REF:	
REVISIONS :	
DRAWING No.	FIG. No. 16
SCALE 1:5000	0 50 100 METRES

421498

W

E

LINE OF SECTION - BEARING 105° MAG.

81 100 N
78 105 E

80 895 N
78 600 E

TN

BPD67
463.5m

CHESTER OPEN CUT

CP6 (c.o.h. 300.0m)

PLAN

400m R.L.

300m R.L.

200m R.L.

100m R.L.

00m R.L.

CHERT BRECCIAS PACKED WITH SUB ROUNDED CHERT CLASTS

CHERT BRECCIA SCATTERED GREY CLASTS IN PYRITE MATRIX

BASIC DYKE

BEDDED CHERT, R.F.G. SEDIMENTS WITH MASSIVE PYRITE
Intense s/f's. Strongly deformed

CHERTY ? SEDIMENTS
Intense Py & s/f str.

Adit

FELDSPAR-PHYRIC ?DACITE LAVA BRECCIA

POLYMICTIC LITHIC SANDSTONE

Siliceous Banding

ALTERED ?SEDIMENTS & DACITE ASH

VESICULAR ? DACITE LAVA

FAULT, TECTONIC BRECCIA

BRECCIA COMPRISING ROUNDED SILICIFIED SEDIMENT & LAVA CLASTS

ROCK TYPE MASKED BY ALTERATION

ALTERED & DEFORMED ROCK GRADES DOWN INTO VESICULAR DACITE LAVA

FELDSPAR-PHYRIC ?DACITE LAVA

ROCK TYPE MASKED BY ALTERATION & DEFORMATION

VESICULAR ?DACITE LAVA

? LITHIC SANDSTONE RARE CHERTY CLASTS

ROCK TYPE MASKED BY ALTERATION
SHEARED QUARTZ & CHERTY FRAGMENTS
? SEDIMENTS

LEGEND

- MAFIC DYKE
- DEFORMED/ALTERED CLASTIC
- DEFORMED/ALTERED LAVA
- QUARTZ-SERICITE-PYRITE SCHIST
- FELDSPAR-PHYRIC DACITE LAVAS
- VESICULAR, GLASSY DACITE LAVAS
- DACITE LAVA BRECCIA
- FINE CLASTIC ROCK
- COARSE CLASTIC ROCK
- SHEARING
- FAULT
- GEOLOGICAL CONTACT
- BEDDING
- BEDDING FACING
- CLEAVAGE
- DYKE

5 cm

90-3203.

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	E.L.44/88 – BURNS PEAK J.V.
DATE : OCT. 1990	CHESTER AREA
DRAWN : G.M.B.	**CROSS SECTION THROUGH BPD67**
REFERENCE :	
REVISIONS :	
DRAWING No.	SCALE 1:1000 (20 0 20 METRES)
	FIG. No. 17

421499

80 550N
78 000E

80 500N
78 180E

S.W. CHESTER WORKINGS
QUARTZ - PYRITE - SERICITE SCHIST
FOLDED SEDIMENTS

500m R.L.
400m R.L.
300m R.L.
200m R.L.
100m R.L.

SEDIMENTS
FELDSPAR-PHYRIC DACITE LAVA
CHERTY SEDIMENTS Layered
GREEN MAFIC DYKES
ALTERED SEDIMENTS With fine layering
GREEN MAFIC DYKES
FELDSPAR-PHYRIC DACITE LAVA
VESICULAR DACITE LAVA
GREEN MAFIC DYKE
FELDSPAR-PHYRIC DACITE LAVA
FD-PHYRIC DACITE LAVA
VESICULAR DACITE LAVA
FELDSPAR-PHYRIC DACITE LAVA
GREEN MAFIC DYKE
CLASTIC-DEFORMED FELDSPAR-PHYRIC DACITE LAVA
GREEN MAFIC DYKE
FELDSPAR-PHYRIC DACITE LAVA
GREEN MAFIC DYKE
DEFORMED ? DACITE LAVA
GREEN MAFIC DYKE
QUARTZ - SERICITE - PYRITE SCHIST (ID rock type unknown)
GREEN MAFIC DYKE
FELDSPAR-PHYRIC DACITE LAVA
GREEN STRONGLY CHLORITE-ALTERED FELDSPAR-PHYRIC ? DACITE LAVA
GREEN MAFIC DYKE
FELDSPAR-PHYRIC DACITE LAVA
VESICULAR DACITE LAVA
FD-PHYRIC DACITE LAVA
FINE GRAINED ? ALT DACITE
FD-PHYRIC AND VESICULAR DACITE LAVA
FD-PHYRIC DACITE LAVA
VESICULAR DACITE LAVA
FELDSPAR-PHYRIC DACITE LAVA
FD-PHYRIC DACITE LAVA
VESICULAR DACITE LAVA
FD-PHYRIC DACITE LAVA
FELDSPAR-PHYRIC DACITE LAVA
GREEN MAFIC DYKE
MAFIC DYKE
FELDSPAR-PHYRIC DACITE LAVA
MAFIC DYKE
FD LAVA
MAFIC DYKE
FELDSPAR-PHYRIC DACITE LAVA
FELDSPAR-PHYRIC DACITE LAVA
FELDSPAR-PHYRIC DACITE LAVA
STRONGLY DEFORMED ? DACITE LAVA
FELDSPAR-PHYRIC DACITE LAVA
GREEN MAFIC DYKE
CLASTIC SEDIMENTS
VESICULAR DACITE LAVA
DEFORMED CLASTIC SEDIMENTS
GREEN MAFIC DYKE
QUARTZ - SERICITE - PYRITE SCHIST (ID rock type unknown)
DACITE LAVA
VESICULAR DACITE LAVA
FELDSPAR-PHYRIC DACITE LAVA
VESICULAR DACITE LAVA
FELDSPAR-PHYRIC DACITE LAVA
Clay rich gouge
Air blast may contact
473.5m
BPD68
CP3
CP17
CP18
CP23
CP5
CP11

LEGEND

- MAFIC DYKE
- DEFORMED/ALTERED CLASTIC
- DEFORMED/ALTERED LAVA
- QUARTZ-SERICITE-PYRITE SCHIST
- FELDSPAR-PHYRIC DACITE LAVAS
- VESICULAR, GLASSY DACITE LAVAS
- DACITE LAVA BRECCIA
- FINE CLASTIC ROCK
- COARSE CLASTIC ROCK

- SHEARING
- FAULT
- GEOLOGICAL CONTACT
- BEDDING
- BEDDING FACING
- CLEAVAGE
- DYKE

5 cm

90-3203.

80 550N, 78000E
CP3
BPD68
80 500N, 78 180E
LINE OF SECTION - BEARING 90° MAG.

E

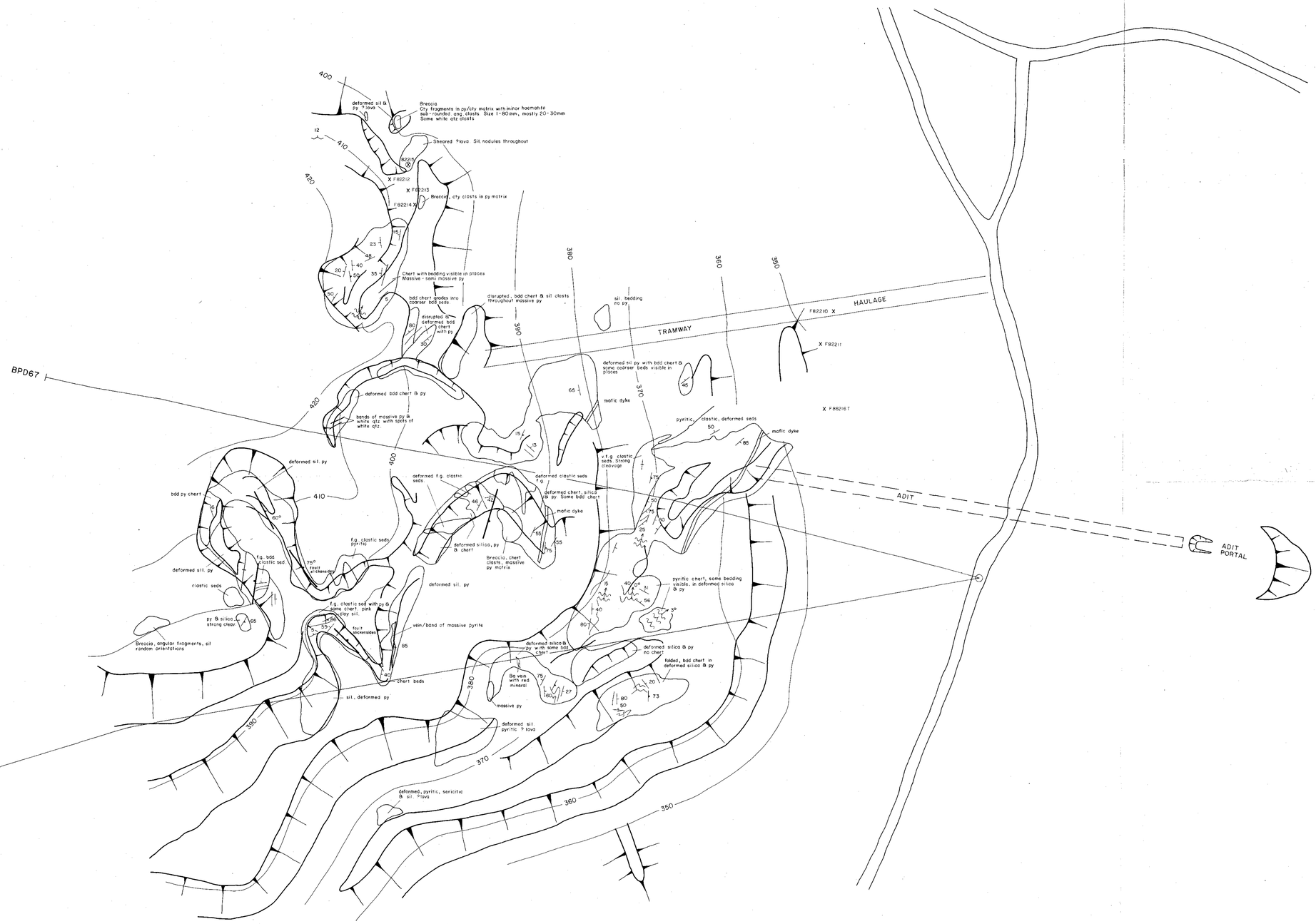
PLAN

W

PASMINCO EXPLORATION
A Division of Pasminco Australia Limited

COMPILED : A.N.L.	E.L.44/88 – BURNS PEAK J.V.
DATE : OCT. 1990	CHESTER AREA
DRAWN : G.M.B.	**CROSS SECTION THROUGH BPD68**
REFERENCE :	
REVISIONS :	
DRAWING No.	SCALE 1:1000 (20 0 20 METRES)
	FIG. No. 18

421500



LEGEND

- Fault
- Bedding
- Bedding Trends
- Cleavage
- Outcrop Boundary
- x F88210 Float Sample
- Rock Chip Sample

5 cm

90-3203.1

PASMINCO EXPLORATION A Division of Pasminco Australia Limited	
COMPILED : A.N.L.	E.L. 44/88 – BURNS PEAK J.V.
DATE : NOV. 1990	CHESTER MINE AREA
DRAWN : G.M.B.	OUTCROP GEOLOGY
REF:	
REVISIONS :	
DRAWING No.	SCALE 1:500 10 0 10 METRES — FIG. No. 25

421501