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<b>MINES</b>	
File Ref. E.L. 19/90	
15 JUL 1991	
Doc. Ref.	
Action Officer	Initials
REFER TO	
COVER SHEET	
30.6.91	
Resubmit to	Date

TCP  
91-2274

RELINQUISHMENT REPORT  
 EXPLORATION LICENCE  
 EL 19/90 - WILMOT  
 SEPTEMBER 1990 - JULY 1991

**MICROFILMED**

P.A.JONES                  June, 1991  
 Phil Jones and Associates  
 for NORANDA PTY LTD.

30.6.91

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#### SUMMARY AND CONCLUSIONS

This report details exploration activities in EL 19/90 for the twelve months ending June 1991.

The Wilmot tenement covers a portion of the Cambrian Mount Read Volcanics and lies on the northern edge of the Moina Granitoid related mineral district.

The area was considered prospective for volcanogenic gold and basemetals, however the vast majority of these prospective sequences are either masked by younger cover rocks or by Tertiary flood basalts.

Mineral production in the past was limited to gold from the Bell Mountain alluvial field, an estimated 113.4 Kg's were produced between 1890 and 1892. The field straddles the southern tenement boundary.

The tenement area has been prospected since the 1890's for gold, silver and lead. More recently CRA Exploration Ltd and Asarco (Australia) Pty Ltd have explored the tin, tungsten, gold, copper, lead and zinc potential under EL 7/73. The only prospect located was the Wilmot copper anomaly in the north of the tenement. Cyprus completed reconnaissance mapping and sampling surveys in the Bell Mountain area returning weakly anomalous areas which were not thought to be significant and were not followed up.

Noranda contracted Leaman Geophysics to conduct a review of available geophysical data (magnetics, gravity and radiometrics) the results of which proved negative and when collated with Noranda's reconnaissance mapping data, helped downgrade the tenements prospectivity. Possible pluton related mineralization defined by Leaman does not fit Noranda's Economic Model and hence the tenement is to be relinquished.

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146° E

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# TASMANIA

## BASS STRAIT



- ✈ Airport
- Railway
- Power Station

5 cm

50 km

# Project Location

## RECOMMENDATIONS

Given that exploration programmes on the adjacent Noranda tenement ( 10/88 - Lake Barrington ) failed to define anomalous trends ( at Cethana and Staverton ) striking westwards into the Licence and that geophysical interpretation studies failed to identify exploration targets, it is recommended that no further exploration should be carried out and the tenement be relinquished.

#### TARGET CONCEPT AND OBJECTIVES

The primary exploration target on EL 19/90 - Wilmot was a poly-metallic volcanogenic massive sulphide ( V M S ) body, similar to those found at the Rosebery, Que and Hellyer Mines. Large hydrothermal alteration zones within Noranda's adjacent EL ( Cethana and Staverton ) may represent haloes around similar sulphide bodies which were thought to extend westward into the Wilmot tenement beneath younger sequences and Tertiary cover. A secondary, although equally important target, is for a volcanic - hosted gold deposit. Although there are no type deposits in production within the Mount Read Volcanics ( M R V ), two major gold occurrences within the M R V are being pursued at depth to ascertain their viability. The Henty Prospect appears to be a volcanic hosted deposit which has been partly controlled and / or overprinted by major basement structural features (Henty Fault) and the South Hercules deposit is more akin to a gold rich low grade basemetal occurrence adjacent to a mined out massive sulphide.

Major basement structures exist within the EL and possible extensions to known hydrothermal alteration zones encountered in the adjacent EL were thought to exist and these were the major target areas for gold and basemetal exploration.

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## LOCATION AND ACCESS

Exploration Licence 19/90 - Wilmot is located 25 kilometres south west of Devonport a major city and port on the north coast of Tasmania. The property is centred on and south west of the town of Wilmot which is a service town for the major agricultural and forestry industries in the area.

The licence is connected via a network of major bitumen roads to all major town and ports in Tasmania and access within the tenement is good with numerous gravel and bitumen roads prevalent.

An excellent power and water source is available in the area through the extensive hydroelectric schemes. The area has an annual rainfall of from 120 cm to 200 cm depending on location. In general the farming (grazing and cropping) land is flat to hilly with the prospective areas being more hilly to rugged.

## DESCRIPTION OF THE PROPERTY AND OWNERSHIP

Exploration Licence 19/90 - Wilmot, of 117 square kilometres in area was granted to Noranda Pty Ltd for a period of 12 months from August 03, 1990.

The tenement is bound by the following co-ordinates:

Commencing at the north east corner of the area whose grid co-ordinates are 434 000 metres E. 421 000 N. thence grid south to 5 417 000 metres N. grid west to 431 000 metres E. again grid south to 5 415 000 metres N. again grid west to 430 000 metres E. again grid south to 5 413 000 metres N. again grid west to 429 000 metres E. again grid south to 5 412 000 metres N. again grid west to 428 000 metres E. again grid south to 5 409 000 metres N. again grid west to 426 000 metres E. again grid south to 5 408 000 metres E. grid north to 5 409 000 metres N. aforesaid again grid west to 423 000 metres E. again grid north to 5 410 000 metres N. again grid west to 421 000 metres E. again grid north to 5 415 000 metres N. aforesaid again grid west to 420 000 metres E. again grid north to 5 420 000 metres N. grid east to 425 000 metres E. aforesaid again grid north to 5 421 000 metres N. aforesaid again grid east to the point of commencement.

A pre-existing Mining lease, 1308 P/M, totalling 3 hectares is located in the northern portion of the licence and covers a stone and gravel deposit held by T.D. & J.D. Murfett.

A 55.7 Hectare portion of the licence is also excluded from exploration as it has either State Reserve or Crown Reserve status. The tenement is otherwise made up of Crown Land, State Forests, Private Property and very minor land being vested in the Hydro-Electric Commission.

AMG 456800E,  
5441350N

5000



AMG REFERENCE POINTS ADDED

<b>noranda</b>	
EL. 19/90 WILMOT	
<b>LOCATION PLAN</b>	
DRAWN BY: TGDS	
DRAFTSMAN: TGDS	
DATE: July 89	
REVISIONS:	
FILE No.	
SCALE 1:250 000	
FIG. 1	

5 cm

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#### HISTORY AND EXPLORATION TO DATE

The Wilmot tenement is located on the northern edge of the Moina mineral field. This area has been prospected since the 1890's. One of the earliest discoveries was the Bell Mountain alluvial goldfield which is located on the southern edge of the licence and produced approximately 113.4 kilograms over a life of two years. During this period of prospecting the Washington silver mine was located. The lode has been worked on two adit levels producing 5.1 tonnes of galena (Jennings 1979).

The main mining activity in the district was located two kilometers southwest of the tenement at Moina. Tin and tungsten were sporadically mined from vein systems during the period 1893 to 1957 (Jennings, 1979).

More recently the area was explored as part of EL 7/73 by Asarco (Barker, 1975) and later as a joint venture with CRAE (Clementson, 1983). EL 7/73 was relinquished by CRAE in 1985.

Asarco concentrated their efforts exploring the Cambrian volcanics for base metals. Exploration was initiated with a regional stream geochemical program, locating the Wilmot and Barrington copper anomalies (Barker, 1975 and 1976), the latter is located less than one kilometer east of EL 19/90 in Noranda's adjacent Lake Barrington Tenement.

CRAE entered as a joint venture partner in 1976 following up Asarco's initial work at the Wilmot anomaly with detailed stream geochemistry, grid based mapping, soil and rock geochemistry, magnetics, VLF and EM. Copper mineralization was shown to be associated with brecciated and tourmalinized microgranite (Clementson, 1983). No further work was carried out and the mineralization was not assessed for gold.

Cyprus Minerals Pty Ltd conducted a reconnaissance style programme designed to assess the licences' potential for gold and basemetal mineralization. Stream sediment and rock chip sampling surveys were completed as well as reconnaissance geology surveys. Minor weakly anomalous gold values were returned from Lincoln Creek, however, no anomalous basemetal values were returned and the program was terminated.

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## REGIONAL GEOLOGY

The Wilmot Licence covers a portion of the Cambrian Mount Read Volcanics and lies on the northern edge of the Moina granitoid related mineral district.

The basement sequence in the Wilmot region includes the Fossey Mountain Trough portion of the Cambrian Mount Read Volcanics (MRV). These latter volcanics importantly host five polymetallic ore deposits; Mt Lyell, Rosebery, Hercules, Que River and Hellyer and one volcanic related gold deposit - Henty. These calc-alkaline volcanics which form the Mount Read Arc, extend in a belt over 150 kilometers long from Elliott Bay in the South west, up through Queenstown and Hellyer and then continue easterly around the northern flank of Mount Roland toward Deloraine. The 10 - 15 kilometers wide belt which flanks the western margin of the Precambrian Tyennan Geanticline is divided into three main lithofacies.

The central belt sequence (CV) comprises rhyolitic to andesitic subaerial and subaqueous intrusive and extrusive volcanics and lacks notable sedimentary horizons. Previous interpretations by Mines Department geologists (Corbett et al) had placed virtually all of the known volcanogenic mineralization within this central belt of massive volcanics. More recent studies by Corbett, Large and others have shown that the majority of deposits now occur within the time equivalent Tyndall Group / Southwell Subgroup / Western sequence rocks.

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These units flank the central volcanic sequence on the western side by volcano - sedimentary marine sequences ( western sequence) and to the north and east by a mixed sequence of volcanoclastic sediments, rhyolitic quartz crystal tuffs and lavas with minor intermediate volcanics (Southwell Subgroup and Tyndall Group rocks). The western sequence rocks grade westward into fossiliferous middle late Cambrian turbiditic successions of the Dundas Group.

Late Cambrian shallow marine and terrestrial siliciclastic Roland Conglomerates unconformably overlie or are thrust over the older volcanic sequences. Siluro-Ordovician siliciclastic sediments and carbonates conformably overlie the Roland Conglomerate.

This period was followed by widespread folding and faulting which culminated in the intrusion of the Devonian Dolcoath Granite. The steep margins to the granite and rocks adjacent to it are now dotted with numerous tin, tungsten, molybdenum and gold prospects.

Large flood basalt sheets were erupted on to an eroded surface during the Tertiary, infilling many valley areas. Continuing erosion via streams and glaciation has left the present day rugged and incised relief.

#### GEOLOGY OF THE PROPERTY

The geology in the northern portion of the licence is poorly understood and the most up to date published mapping is of 1958 vintage, Sheffield sheet, published at 1:63,360 scale. Mapping by the Department of Mines during the Mount Read Volcanic Project was completed over the southern portion of the tenement and presented as sheet 9 at a scale of 1:25,000 (Winterbrook - Moina Area).

The vast majority of the licence is concealed by 'cover' rock either young, Ordovician - Silurian siliciclastics or Tertiary basalts, with only minor windows of prospective Cambrian sequences being mapped.

The largest window occurs in the vicinity of Bell Mountain where acid tuffaceous and minor volcanic and lava (andesitic) units appear to be intruded by large quartz - feldspar porphyries. These units appear to be overlain by more volcanoclastic units including pebble conglomerates and sandstones. These units appear to be Tyndall and possibly Dundas Group equivalents. No evidence of hydrothermal alteration similar to that at Cethana was observed in the Bell Mountain area.

Ordovician Roland Conglomerate - Moina Formation (sandstones) rocks occur in faulted contact to the volcanic / sediment sequences, sometimes thrust faulted. These cover rocks are relative open folded into east-west trending anticlinorial axes the cores of which host the Cambrian units.

Devonian granite outcropping south of the EL has produced significant contact aureole effects within the Ordovician siliciclastic sediments. Aureole mineralogy varies from silicification through to muscovite epidote - chlorite - actinolite alteration.

Blanketing the remainder of the licence is the extensive Tertiary Basalt sequence. This unit is of variable thickness due to being extruded on to an incised surface. The present day topography is a product of Pleistocene glaciation and more recent stream erosion.

## MINERALIZATION

Styles of mineralization occurring within or adjacent to the tenement some of which are considered prospective can be subdivided into two genetic groups.

## Volcanogenic (Cambrian)

- \* Basemetal deposits  $\pm$  gold and silver at Cethana, Staverton and Mt Jacob both east and west of the tenement.
- \* Copper - gold mineralization associated with felsic intrusives and tourmalinized breccias at Wilmot and Barrington Copper Prospects.
- \* Gold mineralization at Gog Range associated with felsic volcanics and major structures.

## Granitoid (Devonian)

- \* vein style gold, silver and lead
- \* skarn type gold.

## WORK CONDUCTED BY NORANDA

Work conducted during the August 1990 to July 1991 period entailed a review and synthesis of previous data and the completion of a regional interpretive study of existing aeromagnetic / radiometric and gravity data by Dr. D. Leaman.

## Geophysics

Dr. D. Leaman of Leaman Geophysics was contracted to review the available aeromagnetic / radiometric and gravity data for the Wilmot Region including the adjacent Lake Barrington and Preston areas. This was an attempt to gain information to aid our geological and structural understanding of this complex area, perhaps leading to the definition of additional prospective target areas (Appendix 1.) requiring more detailed work.

The basic review clarified a number of major structural issues within the tenement. The gravity and magnetic data sets are clearly coherent and complementary and Leaman was able to suggest concealed structural and lithological patterns which were previously unrecognized. Most known mineralization in the north west portion of the area can be associated with the more radioactive, siliceous materials located in the Nielta Gradient. All the old prospects fall within the envelope of raised radiometric response, however, none of the anomalous zones appear to be volcanogenic related and appear to be associated with Cambrian Plutonism. Leaman suggests possible potential of porphyry style mineralization associated with the discrete Cambrian plutons, although he states they are small in areal extent.

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A large granodiorite intrusive located to the north of the licence, would appear to be Devonian in age and large enough to swamp the overall data set making definition of the smaller Cambrian plutons and volcanics much more difficult.

Two large areas of possible volcanic material, most likely of andesitic composition, lying adjacent to and perhaps controlled by an ENE trending major basement suture ( similar ilk to the Henty Fault System ) were also highlighted. The western volcanic pile appears to be truncated to the NE by the possible Devonian granodiorite intrusion or possibly by a large Cambrian porphyry which must have a prominent siliceous cap. The eastern anomaly lies due north of the Lake Barrington Copper prospect which itself lies on a N - S trending structure which may also cut this buried (approx. 500 m depth) volcanic pile.

Anomalous structural trends defined in the eastern and adjacent EL such as the Cethana, Staverton and Erriba gradients do not appear to strike westward onto the Wilmot Licence. This downgrades the potential of the tenement as has Leaman's observations in the NW of the tenement where, he states that none of the known mineralization (Nietta - Preston) in this area is definitely volcanogenic in origin since all sited could be associated with igneous intrusions.

Reconnaissance mapping has also shown no evidence of the Cethana or Staverton alteration zones extending into EL 19/90 and this, in conjunction with Leaman's results, led to the significant downgrading of the prospectivity of the licence.

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## EXPLORATION POTENTIAL

The Wilmot Licence was applied for initially to protect the western portion of the Lake Barrington tenement as it was thought the prospective Cethana and Staverton alteration zones extended beneath younger sequences and Tertiary basalt cover westward into the area of EL 19/90.

Work by Leaman and reconnaissance mapping has since downgraded the potential of the tenement as no clear evidence of mineralization associated with Cambrian volcanics has been observed. Most of the anomalous geophysics appears related to Cambrian and Devonian plutonism, as well as major basement structures and intersecting linears.

These possible targets do not fit the Noranda Economic Model and hence the tenement is to be relinquished.

*PA Jones* : 3/7/91

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## APPENDIX 1.

Regional Interpretation of Gravity - Magnetic /  
Radiometric Data

Wilmot Area

**LEAMAN GEOPHYSICS**

Survey Review, Specification, Reduction, Interpretation  
Gravity, Magnetic and Seismic Methods  
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REGIONAL INTERPRETATION  
GRAVITY AND MAGNETIC DATA

EL 19/90 WILMOT - BARRINGTON AREA

for  
NORANDA PTY LTD

by  
Dr. D.E. Leaman

July 1991

WILMOT

Although the quality and coverage of available gravity and magnetic data in the vicinity of EL 10/88, 19/90 (Lake Barrington and Wilmot) is variable this review leaves little doubt that the data sets and methods can resolve many issues related to the prospectivity or structure of the area.

Both data sets imply, but cannot fully resolve, high contrast mafic units north of the Staverton Prospect and near Nietta. Thrusts involving ultramafics are indicated and some complex repetition of the sequence should be anticipated. Thickened volcanic piles, perhaps more andesitic, should be expected.

It can be shown that the large Devonian Dolcoath Granite is terminated near Cethana and that the effects of its emplacement control or fracture system barely extend into the area but would account for at least some of the schistose alteration extending NW from Cethana. The granite is enclosed by a thermal alteration halo about 800 m wide and it is likely that most Devonian mineralisation or overprinting occurs in or near this range from the granite contact.

It is suggested, therefore, that mineralisation north of the Cethana shear zone, including Staverton, is Cambrian in origin. Extant data do not permit evaluation of rock formation/property alteration, possible mineralisation responses or detailed structure and boundary mapping.

Both data sets suggest the presence of at least two small granitoids of variable composition in the Nietta region. Implied properties and scale are consistent with Cambrian intrusives. Both methods can be used to map them although it is possible that part of the magnetic responses are compound and may involve some alteration effects. The intrusives appear to be aligned N-S. A large Devonian (?) granodiorite appears to underlie this entire sequence at shallow depth and may control observed mineralisation.

Gross regional ENE and N-S trends may be observed but data resolution is inadequate to properly relate these features to sites of economic interest.

It is recommended that the data coverage be improved and that refined analysis be attempted in light of encouraging results with current information.

The Lake Barrington area which has been reflowed magnetically with new specifications and infilled by gravity survey should be re-examined in detail to provide full analysis of signatures, rock properties and structure including rock volumes capped by Tertiary rocks. Detailed survey of prospects such as Staverton may also yield useful results within the regional framework and may directly assess the extent of any mineralisation present.

Any results would be relevant to the adjacent areas but the Wilmot area requires extensive infill of the gravity coverage.

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## INTRODUCTION

The Wilmot-Barrington area is located in central NW Tasmania (Figure 1) and includes Cambrian volcanic and sedimentary rock suites and Lower Ordovician conglomerates and sandstones. Some Tertiary basalts and sediments obscure parts of these sequences which generally are very poorly exposed. Mapping is old and lacking in detail (e.g., Jennings & Burns, 1958; Jennings et al, 1959 and Bamford & Green, 1988 based on the above). Available geological mapping does indicate that the region is structurally complex and mineralised although the nature of most known mineralisation or its controls remains hypothetical.

Mineralisation near Cethana (area 1) indicates a Cambrian lead isotope signature with a superimposed Devonian alteration assemblage. This is consistent with primary base metal mineralisation associated with the various volcanics intruded by the Devonian Dolcoath Granite. The Dolcoath Granite is exposed on the shores of Lake Cethana but the work of Leaman & Richardson (1989a) has shown that the granite exposed represents only a small fraction of the total cross section of this body. A large intrusive may well have played a major role in remobilisation or emplacement of mineralisation.

South of Beulah (area 2), where a further granitoid is exposed, some gold and barytes mineralisation has long been known. This intrusion has also been presumed to be Devonian in age. The granite study referenced above has suggested that this may also be the tip of a very large compound pluton with a significant proportion of granodiorite. Such a body could extend as far west as Nietta.

Knowledge of the form and distribution of Devonian, or Cambrian, granitoids in the area is an important factor in appraisal of mineralisation and assessment of these materials forms the basis of this report. Similarly, any regional overview of gross structures, including thrusting, which might have repeated segments of target volcanics and, indeed, the nature and distribution of the volcanics forms a secondary element in the assessment reported.

Available magnetic data has also been reviewed for indications of alteration or mineralisation signatures.

This report attempts to relate information and exploration requirements in the Barrington area (EL 10/88) to the exploration of the geologically similar areas to the west (EL 19/90, Wilmot). EL 10/88 is a small EL but it includes a range of Cambrian materials partially concealed by basalt - and it is mineralised. Any correlations between gravity/magnetic data and these elements is of regional significance.

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## DATA USED FOR ANALYSIS

Magnetic data in the region was extracted from the 1986 Mines Department aeromagnetic survey of north Tasmania (Bishop, 1987). This is the most recent public domain data available and provides coverage of the entire area. Contour presentation of this data is shown in Figure 2.

The survey was flown with north-south flight lines 500 m apart. The sampling was about 40 m. The specified terrain clearance was 150 m but this was rarely achieved in EL 10/88.

In the Lake Barrington portion clearances were extreme (> 400 m) due to drainage patterns, the Round Mountain ridge and HEC transmission lines. This results in an uncertain presentation in Figure 2. Basalt caps on interfluves and extreme clearances over valleys have distorted the data base and much detail and resolution related to pre Tertiary materials has been irrecoverably lost.

Similar problems apply elsewhere.

These issues have prohibited useful correction and compensation of the data for flight path variation. Sample profiles, based on the contour compilation, have been generated but these can only indicate gross structural features.

Other magnetic surveys have been examined with a view to recovering lost detail. A survey by Shell during the last decade terminated at 528 000 mE and 5408 000 mN in the region but excluded the Cethana region. Older surveys have more uncertain specification and acquisition parameters and provide no improvement.

Gravity data, from the TASGRAV and MTREAD data bases of the Mines Department, is limited in coverage in this region. Stations are indicated in Figure 3 and Map 1. The Bouguer anomaly values have been converted into residual values (Map 2) using the geological crustal concept known as MANTLE-88 (Leaman & Richardson, 1989b). This process removes the deep crustal contribution to the Bouguer anomalies and simplifies analysis in terms of shallow sources (up to 5 km deep). This improvement in resolution and application is largely neutralised by the gappiness in extant data.

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## BACKGROUND INFORMATION

Geological information has been drawn from Jennings & Burns (1958), Jennings et al (1959) and Bamford & Green (1988). This mapping is old and limited by relatively poor exposure of many units. Large areas are also covered by Tertiary materials. Cambrian and Ordovician rocks dominate the licence and the Cambrian suites include an array of volcanic units (lava and pyroclastics) with a range of compositions.

Previous geophysical work has either been superficial, using magnetics, prospect oriented using electrical methods, or regional. Examples of regional analysis applicable to EL exploration include the review of granite forms by Leaman & Richardson (1989a). Prospect surveys have been described by Jones (1989).

The regional granite study has indicated that the Dolcoath Granite is a more significant body than mapping or exposure would suggest and that it is distinct from the three Dove Granite bodies exposed further south. This study also showed that the granite exposures centred on Beulah are unusual and idiosyncratic and part of a compound intrusion. The Beulah intrusions have been presumed to be Devonian in age by previous workers. Various granite and granodiorite or monzonite compositions have been recorded in the Dove Granite bodies and at Beulah while the Dolcoath Granite is an adamellite. Each granite type possesses distinctive magnetic and density contrasts. The igneous plutons, of different volumes and crustal penetration, contrast with the intruded sedimentary and volcanic sequences.

Known properties may be summarised as follows but there is a need for more extensive sampling in order to confirm appropriate value ranges.

Unit	Density (t/cu m)	Susceptibility (cgs)
Tertiary sediment	2.0	0.0
basalt	2.7- 3.0 fresh	0.0-0.006
Jurassic dolerite	2.75-3.0 fresh	0.0-0.005
Permian units	2.35-2.65	0.0
Devonian granite	2.62-2.64	0.0
Silurian units	2.55-2.65	0.0
Ordovician units	2.55-2.65	0.0-0.0005
Cambrian sedimentary	2.65-2.77	0.0-0.0002
volcanics	2.65-2.85	0.0005-0.005
ultramafics	2.55-3.1	0.0-0.02
granitoids	2.59-2.72	0.0-0.003
Precambrian	2.65-2.67	0.0-0.0005

## INTERPRETATION

The Barrington area (EL 10/88) has been used to guide understanding of the effects of Devonian granitoids, miscellaneous volcanics and the large positive anomalies in the northern part of the Wilmot region. Map 2 shows that this extends into the Barrington area. Similar sources may be proposed in each case. This possibility has been argued and tested.

The Nietta-Wilmot area (EL 19/90) with its known mineralisation in the NW portion and the constraints and implications of such occurrences has also been reviewed.

The aim, in each case, has been to test a range of propositions, check for commonality, and suggest a general explanation for the gross features of the gravity field since it is this data which directs attention toward clearly important structural lineations of crustal magnitude.

## LAKE BARRINGTON REGION

## Introduction

Interpretation of data in the Lake Barrington area has involved consideration of qualitative and quantitative implications of each data set and their integration into a structural synthesis. The available data and basemap control limit this integration. A profile-based assessment of anomaly or alteration characteristics is precluded by lack of resolution and detail along the magnetic profiles due to excessive ground clearance.

## Gravity interpretation

A refined version of the granite forms inferred by Leaman & Richardson (1989) has been produced after three dimensional modelling. A coarse 3D model was tested by Leaman (1988) after extensive 2D modelling in NW Tasmania (e.g. Leaman & Richardson, 1989). This 3D model was used to test and confirm the crustal concept and has been used as basic stock for the refined version presented here as Figure 4. The detailed refinement of the 3D model has been based on 18 profiles at various orientations and, in particular, one profile along the Forth River at Staverton. The model of the entire pluton is close to the limit of resolution with the available data. The 3D profile calculation fit is shown in Figure 5. Note that 3D models generate a 9 mgal profile shift differential between observed and calculated profiles. The consistency of this fit differential is a test of the reliability of the model and the coherence of the geological

and rock property assumptions used to generate it. The profiles also show how dominant the effect of this pluton is. All other sources are minor by comparison.

The 3D model shows that the granite has a relatively flat but undulating crest and roof whose pinnacles are associated with mineralisation between Cethana and Moina. The margins of the pluton are very steep. The intrusion is generally extended east-west but is terminated a little east of Lake Cethana.

Note that these comments apply to the entire granite even though only a small part of the model are shown in Figure 4. The information is deduced because no 3D model can be restricted to only part of an anomalous source; the entire body must be assessed, even if the detail extracted may vary around it. The Cethana termination of the pluton is super detailed but the shape varies smoothly, unlike its form near Moina. The observed profile, acquired at ground level, has been differentially continued to an absolute level of 800 m above sea level so that the model may include the irregular interactions between its upper surface and the irregular topography. The only limitations on this process, the method or the solution relate to the quality and coverage of the basic survey.

Two dimensional appraisal of the Lake Barrington profile, undertaken to provide some evaluation of other minor sources, yields similar and consistent results. There is insufficient geological or gravimetric information to enable realistic 3D modelling of any other unit or structure. The shift differential is again about 9 mgal and any variation from this value would indicate a serious deficiency in the interpretation.

Other sources are suggested in Figure 6 which were initially inferred by magnetic interpretation. It is clear that density variations within the Cambrian sequence are either minor or that units are relatively thin with respect to the coarse station spacing. NW of Lake Barrington there is evidence of a major variation and the abnormally positive residual values (Figure 3) suggest a mafic complex or pile. There is little surface evidence of this although some minor mafic exposures were flooded by Lake Barrington (see Jennings et al, 1959). The profile avoids any complications which might be introduced by the Tertiary rocks which cap the interflaves.

#### Magnetic interpretation

Inspection of the magnetic contour map reveals a number of sizeable anomalies, most of which are associated with basalt-capped areas. Subtle character or smooth gradients are evident elsewhere. Numerous high frequency, but moderate amplitude effects may be observed where basalt is exposed. Many of these responses occur as couplets and most are limit-of-source effects. Their resolution has been enhanced by the reduced

terrain clearances in these elevated areas. Responses related to Cambrian rocks are broad scale and relatively gentle and direct inspection does not enable certain resolution of geometric effects induced by the basalt.

Few direct response correlations may be made between "mapped" Cambrian units and the magnetic field due to lack of detail and Tertiary or Ordovician cover.

Felsic lavas west of Cethana provide a clear correlation but few other systematic correlations can be made. Near Gowrie Park only parts of the undifferentiated sequence are magnetic and there is no clear match with outcrop or mapping indications.

South of Roland the Beulah Formation (Ebf) is strongly magnetised but the anomaly extends far beyond mapped limits. Nearer Lake Barrington the same unit is not magnetic. There may be several explanations but the response pattern is not induced by deficiencies in the magnetic survey. Either the available mapping is faulty (possible), inconsistent (probable), important changes occur within the unit (also possible), or deeper structurally controlled sources are also present (also possible). Some of these factors could be assessed within the EL with a better survey. Note that this formation contains mafic materials and should be moderately magnetic. Therefore any correct mapping of it coupled with a loss of contrast implies bulk alteration. This may have occurred near Lake Barrington. If this inference can be proven then the prospectivity of the region between the Staverton and Lake Barrington prospects will be considerably increased.

Other Cambrian units appear to be non magnetic.

The largest magnetic anomaly in the region occurs south of Wilmot to the northwest of Lake Barrington and may be correlated with the large positive residual Bouguer anomalies in the same area.

The Dolcoath Granite yields a neutral response. Modelling has shown (below) that the neutral field value is about 1850 nT. Many of the associated anomalies nearby are contact effects; that near the Cethana Dam is typical. The anomaly pattern around Cethana is modified and displays a NW-SE trend. This effect is not due to flight patterns, although it has probably been modified in amplitude by clearance variations, and appears to correlate with a schistose alteration zone and the limit of the shelving roof of the granite beneath (see Figures 4 and 6).

In order to test some of the possible explanations for character in the magnetic field a profile along the Forth valley was modelled. This is in the same location as the gravity profile and is free of direct Tertiary effects. Some secondary geometric character may be present, however.

Various approximate solutions are shown in Figures 7, 8, 9 and 10. These were selected to demonstrate issues involved in both geology and modelling procedure. Figures 7 and 8 contrast dipping sources at the north end of Lake Barrington. Note that these are not exposed. Whatever solution is preferred high contrasts are implied - consistent only with massive basalts/mafics, or in the case of the larger anomaly, ultramafics. In Figures 7 and 8 the observed to calculated shift differential is about 230 nT implying a neutral field at about 2000 nT. Note that the contractors have added such a value to the mean of their observations but this does not mean that the appropriate normal field values were either observed, used as a base reference or recovered. In my opinion the addition of such a scalar to residual values derived from the IGRF function is misleading when the assigned base reference value is not quoted. With this fit shift, however, it is quite impossible to match the zone between 5 and 9 km; especially if the sources dip south. Modelling of the simpler field patterns near Beulah (below) indicate a differential of about 100 nT and a neutral field value of 1850 nT. When the profile is recalculated with this shift scale and the sources adjusted appropriately much better correlations are achieved (Figures 9, 10). These observations show how it is possible to obtain different solutions and how they can be separated. Note that there is only one geology and any solution must be geologically believable. Reliability and resolution is enhanced if some part of the model can be tied to exposed fact but this is not easy to do in this area due to data and mapping problems and lack of information on source properties.

The Figures suggest the nature of sources near Lake Cethana. The three dimensional shape of the granite and the contact zone makes appraisal difficult unless analysis is detailed but the style is clearly established. The granite shape, from gravity analysis, has been used and a thermal contact skin about 800 m thick applied. This may be demonstrated around the intrusion and above the roof but it is certainly more irregular than modelled here. The anomaly at 1.5 km near the Cethana Dam must be due to anomalous alteration about the contact and the source is not incompatible with Moina style mineralisation. Unfortunately it is just outside the EL. A suggestion of the shape of felsic volcanics is also included at this end of the profile.

The issues posed by the northern end of the profile can not yet be fully resolved. Various options have been displayed in Figures 7 to 10 but it is not easy to demonstrate a southerly dip for the high contrast sources which have to be material of Beulah Formation composition at least. If the lower shift differential is accepted it is almost impossible to justify this for the body at 9.5 km. It is possible that the sources represent limbs of a syncline since the larger anomaly is best

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fitted with a southerly dip although this may be an illusion due to geometric factors. All gross dip indicators suggest two sources dipping north. The mapping of Jennings et al (1959) showing slices of dolerite or gabbro at the projected position of the northern body is wholly consistent. The volumes implied for these sources are relatively small and each must possess a moderate to high contrast. It seems likely that the best solution is north dipping, high contrast slices. This would imply thrust sheets involving ultramafics and considerable repetition of sequence along Lake Barrington. The termination of sources at shallow depth is consistent with such structures.

#### WILMOT REGION

In the Wilmot region the gravity field contains some very large and persistent features. The entire northern part of the area, extending east to Barrington, is relatively negative but the effect is relatively subtle (Map 2). Strong positive effects rim this and one of these has been examined above and implied to be related to sectional repeats within the Cambrian series and to involve mafic rocks.

Magnetic data are less definitive and require far more care and inspection before any conclusions can be drawn. A critical portion of the magnetic data is shown in Figure 11 and the corresponding radiometric coverage is shown in Figure 12.

Only a portion of the region is considered in any detail in this report. This contains all the primary elements of the area with minimal interference from Tertiary covering effects.

As stated in the introduction the object of this review has been simply to assess gross source characteristics, identify patterns and infer zones in which detailed analysis may be justified.

Neither the Barrington nor Wilmot areas are highly mineralised, although each contains materials which might be expected to carry economic mineralisation. This lack of previous substantial mining history may mean that explorers have overlooked a style of mineralisation which may be different from those normally perceived and that targets have therefore not been recognised or sought.

The data presented in the Maps and Figures 11 and 12 reveal several anomalous and apparently inconsistent facets between the diverse data sets and the geophysical data and the base mapping. A more extreme and regional view of the aeromagnetic data was provided by Bishop (1987) due to scaling.

The magnetic field displays many high amplitude responses; notably south of Watts LO, near the Leven River and south of Warringa. Parts of these are due to Tertiary basalt but most basalt effect can be separated. Closer examination in the Castra

and Nietta area suggests that this is not as significant as implied by the lower level Shell survey. Comparison of data sets is not ambiguous on this point.

The disposition of anomalies W and SE of Watts LO and east of Mt Minnie shows that the source of most variation lies within, or beneath, the Cambro-Ordovician rocks exposed. In these areas the basalt, if present, contributes no more than 25% of any combined effect observed usually as relatively high frequency noise or localised features.

The large responses, trending E-W, from 412 to 419 000 mE at 5422 000 mN, and 420 to 426 000 mE at 5419 000 mN, can be associated with Palaeozoic rocks. These features have asymmetric anomaly forms and distinct boundaries. Those boundaries correlate with some topographic features or stream segments but no subdivisions mapped within the presumed dominantly felsic rocks of the south of the EL can be correlated. The orientation of magnetic features often crosses the grain of the geology as mapped.

The two primary magnetic features (defined above) are offset and a marked discontinuity can be observed in the magnetic field near 420 000 mE. Evidence of a nearly N-S break can be recognised within the basalt responses W of Warringa. No mapped features reflect this change.

These observations suggest that the near surface geology is not representative of the section as a whole and that some important units and structures are either not exposed or have not been mapped. While the latter option is possible it is less likely than the former and there are only two ways to produce such a conclusion.

Either the exposed near surface geology has been detached, perhaps in a series of thrust sheets; or the anomalies are due to older units within fold cores or large igneous bodies and their marginal effects.

The few prospects known to me, Castra (422 800, 5423 000), Crosby Creek (420 600, 5421 000) and Preston Silver (422 200, 5424 000) have been related to magnetic field character. The nature of the data available precludes review of any subtle links or relationships, especially in absence of any corrections for clearance variations during acquisition, but no obvious variations or indications of gross alteration effects is evident in association with either Crosby Creek or Preston Silver although some response may occur at Castra. This latter variation may reflect deeper sources and lithological changes not yet fully defined.

The magnetic data do not, in general, correlate well with the indicated geology.

Correlation between basemap geology and RADIOMETRICS is also erratic and inconsistent. None of the major trends or faults identified in mapping are evident with the possible exception of

a fault segment NW of Watts LO. Nor is there any systematic correlation between counts and basalt-covered areas. Marked differences may be observed between the responses from the Warringa, Nietta, Mt Minnie and Watts LO vicinity basalts. The last three zones present "normal" responses. It may be noted that the magnetic response for the Warringa basalts is also exceptional. See Figures 11 and 12

Responses from Cambrian rocks are also variable and there is often little distinction between exposed Cambrian and Ordovician units. The array of correlations suggests that the counts reflect more than surface disposition of elements.

The most obvious radiometric anomalies occur in the centre of the area (near 420, 421) and SW of Mt Minnie where Cambrian rocks including quartz porphyries are exposed. There is no direct correlation between response and mapped rock type and the breadth of effect suggests that the source is more general than any surface exposure. In the central and Mt Minnie zones the anomalies are limited by abrupt gradients which are apparently not related to any flight or terrain effect.

A comparable, but less obvious, response may be noted west of the Leven River at about 5422 000 mN. Raised count levels in this zone may be correlated with the magnetic response; both are terminated at 5420 500 mN in the south although there is some divergence in source termination to the north. No such approximate correlation applies to the eastern Mt Minnie or central zones.

The largest responses are directly associated with mapped quartz porphyry in the centre and east of the area and by implication it could be suggested that all three zones of raised response reflect presence of comparable or related units. If this is assumed then the lack of systematic magnetic response is difficult to explain. The reduction in count level and increase in magnetic response westward must mean a gross change in composition of the source.

The occurrence of other monzonitic or dioritic rocks west and south west of the Crosby Creek prospect, quartz porphyry, and radiometric anomaly and the change in radiometric character certainly indicates that variability in lithology and lack of mapping definition limit correlations and evaluation.

The GRAVITY data set (Maps 1, 2) provides a simpler view of the region. A major NW-SE trend is evident which correlates with mapped faulting but in all other respects this presentation is as unexpected and inconsistent as the other data sets. There is no obvious reason why the field should be high NW of Nietta, or low south of Mt Minnie and along the Leven River. While the detailed character of the field might be transformed by infill coverage the general variations cannot be dismissed. It will be noted that there are no systematic responses from blocks of any rock group. The Tertiary materials do not contribute in any significant way to the compilation shown in Maps 1 and 2.

This means that the gravity field reflects concealed structures or sources. Most secondary anomalies are transverse to the exposed structural grain. Note the anomaly trend along the Leven River; other data sets trend E-W and the geology ESE.

It may be observed that the varied occurrences of quartz porphyries and sundry other acid-intermediate materials occur where the Bouguer anomalies are lowest or on the gradients of such anomalies. The larger bodies certainly occur where values approach minima. The local negative anomaly along the Leven River at 416 000 mE, 5423 000 mN is exceptional as explained below. The more regional negative effects, although poorly defined, indicate the presence of large volumes of igneous rock. The normal density range for Cambrian rocks is relatively narrow and averages about 2.74 t/cu m although some andesitic or mafic members may exceed 2.80 t/cu m. Rocks of granodiorite-monzonite-diorite compositions have densities of 2.68 to 2.71 t/cu m. Thus it is possible to generate negative anomalies with such materials where these intrude felsic or other Cambrian materials. Ordovician rocks, with the exception of the Gordon Limestone, may also generate negative effects but in this area this correlation is only possible near 420, 423.

The above discussion suggests that the various anomalies presented are related to igneous rocks of moderate to large volume but of variable and somewhat erratic composition and properties. There is no systematic suggestion of structural detachment or direct correlation of normal stratigraphic or structural units systematically folded given the indications of exposed fold and fault systems.

The implications of previous regional study should also be considered.

Leaman & Richardson (1989a) defined a granite known as the Beulah Granite on the basis of variable and relatively subtle responses in the Preston - Beulah region of NW Tasmania. Granite (?) occurrences at Beulah were mapped by Jennings et al (1959) and considered Devonian in age. The composition was revised to granodiorite by Collins and Williams (1986). Leaman & Richardson (1989a) examined several regional profiles across this region and seven transect the area reviewed in this report (lines 2, 5, 8, 12, 18, 24 and 26). In every case there are negative gravity responses in association with either the Beulah occurrences or the mineralised sites of the area. Leaman & Richardson (1989a) were limited to regional study but considered that there must be a large but variable mass of possibly predominantly granodiorite composition in the region. They inferred that it might be Devonian and comparable with the intrusive of NE Tasmania and have a gold affinity. Magnetic data were not studied but in the region around Beulah it can be shown that the material must have a density of about 2.7 t/cu m and be variably but quite strongly magnetised; in part reversely magnetised. The average intensity of magnetisation is there some +/- 0.001 cgs or more than 300% greater than the uniform properties of the established Devonian granodiorites.

The properties inferred for the Beulah Granite, at Beulah, thus appear more consistent with the Cambrian granitoids.

However, recent work in NE Tasmania has suggested that there is a range of granodiorite properties for the Devonian granitoids and, indeed, at least three primary compositions. One of these is strongly magnetised.

The issue of properties is not, therefore, critical unless it can be shown that a particular composition is a mineralising, or mineralised agent.

Leaman & Richardson (1989a) suggest that the granitoid is less than 2 km deep over a wide area near Preston.

Quantitative interpretation of the data described has focussed on the issues raised in the above comments.

In particular

1. Can a single granitoid account for the anomalies observed? If so, what is its composition and properties? Are these consistent with Devonian or Cambrian granitoids?
2. Are multiple granitoids implied?
3. Can modelling exclude any structural detachment option?
4. Can any igneous or structural features be defined and related to mineralisation?
5. Do any inferred property variations limit further analysis of any data set?
6. Do any rock suites present anomalous behaviour?

Several profiles across the gravity and magnetic maps were selected and modelled in order to assess the likely origin of the features and their sources. It is not possible to model the radiometric data.

Many of these profiles proved uninterpretable in the time allocated for this review and no discussion of them is offered here. Samples of profiles for which solutions were found are presented and these illustrate the options and problems presented for ALL profiles.

The magnetic data were sampled directly from the contour presentation (Figure 11) but the gravity data shown in Map 1 were filtered using the MANTLE-88 procedure of Leaman & Richardson (1989b). This process provides true residuals. The residual anomalies have been interpreted using two dimensional methods. Such methods yield approximate results but, given the quality of the data base in this area, no more reliable approach is justified. Use of the residuals places considerable demands upon the interpreter, the geological data base and density

information. More positively, however, it restricts solution options.

Consider magnetic profile M2 (Figure 13).  
From 416 000 mE, 418 000 mN to 419 000 mE, 425 000mN

The profile extends across the major magnetic anomaly traversed by the Leven Gorge and terminates in the basalt cap south of Warringa. The profile is representative of the western half of the area.

Exhaustive tests show that the profile character cannot be easily explained by simple source geometries such as fold cores, folded units, faulted folded units or anything comparable.

An important aspect of the evaluation is disguised by the curve fit parameters (upper right hand corner). Experience with this data set has shown that the base reference for the survey was about 100 to 130 nT offset from the IGRF function used to provide residual magnetic values for contouring. Thus the calculated values must exceed any observed values by this amount where a scalar shift of 2000 nT has been applied to the data to obtain wholly positive numbers. This value was removed for modelling purposes. When the curves fit with about 100 nT shift offset then feasible solutions have been obtained.

When the anomalies are considered with respect to this crucial condition it is found that the profile is difficult to match. Substantial negatively magnetised sources are required and these cannot be produced by overturning in this area. Sedimentary units and folding solutions can be excluded.

The source or sources must be igneous and variable.

The model shown in Figure 13 suggests that the source may take the form of a folded sheet of variable composition although many refinements are possible. The contrasts indicated are forced by observed gradients and are believable in terms of Cambrian intrusives and are associated with limited depth ranges. No deep or massive magnetic plutons are implied or feasible.

An alternative rendering of this solutions would be to describe the folded sheet as the thermally altered halo of a major but non magnetic pluton. This level of alteration could only be associated with a large Devonian pluton.

The gravity data have been examined in order to attempt a separation of these possibilities (below).

When the distribution of intermediate rocks and porphyry is related to the profile several other possibilities are suggested but these lithologies cannot directly explain the responses. All occurrences of the porphyry are essentially non magnetic (Figure 11). So is the monzonite. The source of magnetic anomalies is either within or below these intrusions.

The curve fit is imperfect reflecting an interim solution and multiple sources and properties. These problems are exacerbated in the eastern half of the area and have not been resolved. The modelling completed does suggest that contrasts are not related

to any exposed members of a stratigraphic sequence or any concealed members. The contrasts have limited source depth range and are quite high, consistent only with intermediate igneous or altered mafic rocks. There is no evidence, however, for any massive high contrast mafic accumulation.

Only one gravity profile has been included.

Gravity profile 2 (G2) (Figures 14 and 15).  
From 419 000 mE, 5417 000 mN to 427 000 mE, 5425 000 mN.

This profile samples the principal gravity gradient in the region. Contrasting solutions are offered.

In Figure 14 the profile is explained by a large folded segment of abnormally dense Cambrian material, andesite perhaps, and an extension of a granodiorite slab from the northeast. This slab must have more silicic protrusions or underlie older silicic rocks. Porphyries are exposed on this alignment. Tertiary and Ordovician rocks produce minor modifying effects and are not significant.

Figure 15 suggests an alternative mass balance excluding a slab of granodiorite - presumed Devonian. Any minor intrusive must be very siliceous but of limited volume. Such a rock mass would not be magnetic; the granodiorite might be, and would also produce a metamorphic halo effect. Consideration of the magnetic field in this area south of Mt Minnie indicates that the magnetic character expected in association with either granodiorite or alteration is not observed. This conclusion is based on the presumption that the granodiorite must possess relatively strong magnetic properties and this need not necessarily be the case. Original research in NE Tasmania, as yet incomplete, indicates that the less magnetic granodiorites are either mineralised or have introduced mineralisation, notably gold.

There is absolutely no suggestion of a large adamellitic or granitic pluton.

Can these conflicting models be unified? It is clear that more extensive magnetic modelling is necessary and that the gravity data base should be infilled in order to trace elements of each solution across the region. The geological map must also be upgraded.

However, gravity profile G2 (Figure 15) coupled with observations of the magnetic field suggests that a relatively small acid intrusion may account for the observations in the eastern half of the area. This body is not strongly magnetised but may be negatively magnetised. There is no evidence for the irregular magnetic field character associated with thermal metamorphism which supports the inference that the mass is limited. Radiometrics from the area SW of Mt Minnie supports this conclusion; elevated values are centred on the porphyry exposures but are limited to the general area of negative gravity anomaly.

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The issues are not so clear cut in the western half of the area. The gravity anomaly near the Crosby Creek porphyry is more positive and it may be associated with more dioritic or andesitic material. Magnetic responses in this area are also quite different, of moderate contrast but variable sign. This material is also strongly radioactive.

West of the Leven River the preferred solution would seem to be a group of variable but small intrusions of intermediate composition. A deep and large mass of granodiorite - presumed Devonian, would not be associated with a simple negative magnetic anomaly and would produce a uniform distribution of metamorphic halo anomalies unless its roof form was irregular, or it was a less magnetic composition. This is an issue not yet resolved. These patterns would not be restricted to the steeply dipping north face.

The fundamental issue, however, is declared by the gravity data. What produces the strong relatively negative field in the north of the area; small bodies and sediment related sources cannot. A large pluton must be present in the region generally and such a source can only be Devonian in age given our present understanding of Tasmanian geology. Accepting a large volume body and excluding light granite types we must conclude that a large granodiorite is present. It is variable in composition and physical properties and may well be made up of several individual plutons.

The present work cannot be considered definitive but the conclusions taken cumulatively with other work within the confines of the "Beulah Granite" of Leaman & Richardson (1989a) strongly suggests that this body is composed of a number of relatively small and quite variable bodies. Many are intermediate in composition.

The variability of the properties of this material is consistent with a Cambrian suite but the scale of the intrusions is an order of magnitude too large. This does not exclude the presence of such small Cambrian plutons in the area and elements of porphyry may be reflections of these; or they may be capping phases of larger bodies. Much more work is necessary.

Most known mineralisation can be associated with the more radioactive, siliceous materials of the eastern half of the area. All old prospects fall within the envelope of raised radiometric response and I suspect that more recent finds east of Crosby Creek do as well. This suggests that only the more acid, less magnetic and low density mini-plutons are significant terms of base metal and barytes mineralisation.

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The more intermediate compositions implied for the western half of the area which lack strong radiometric responses may be associated with gold since there is some suggestion that this pattern may extend south to the Black Bluff region.

On the basis of this work it would appear that none of the known mineralisation in this area is definitely volcanogenic in origin since all sites could be associated with igneous intrusions. If these intrusions are, indeed, small then the prospectivity of the area is very limited. Other Cambrian intrusives have not produced large or economic deposits.

The present work indicates that there is no coherent structural pattern within this region and that field character has been determined by the peculiarities of the sources rather than superimposed controls. No obvious primary controls of the location of known mineralisation are evident.

## CONCLUSIONS

Basic review of gravity and magnetic data in the Barrington - Wilmot areas has clarified a number of structural issues and shown that more information could be extracted using these methods provided some additional data was provided.

In the Barrington area:

The Devonian Dolcoath Granite has been defined in some detail. It is a very large, high contrast intrusion with a thermal halo about 1 km wide. Beyond this distance changes in rock properties are minimal. It seems probable that most mineralisation of Devonian origin, or superimposition of Devonian signatures, will be restricted to this halo. A schistose alteration zone near Cethana occurs above the steeply plunging north wall of the pluton.

Data available preclude any assessment of mineralisation or alteration signatures within exposed Cambrian units.

Magnetic data do, however, reveal at least two concealed mafic-ultramafic units which have shallow dips and little thickness. Thus slices are implied and the corollary of repeated sections along the Forth River follows.

Significant lineaments cross the region and may well reflect fundamental controls on intrusion and mineralisation. It is possible that Cambrian granitoids occur in the region about the Dolcoath Granite.

In the Wilmot area:

Localised mineralisation appears to be related to the upper surfaces of small granitoids. Their unusual properties and varied composition is consistent with small Cambrian plugs. They appear to lie in the roof of a very large mass of granodiorite which itself may be variable in composition. Igneous influences of these types, coupled with the major crustal features which trend ENE and N-S across the region suggests that much scope exists for an array of mineralisation types. It is quite possible that previous explorers have sought inappropriate mineralisation styles for this environment. The entire area must be rethought and comprehensive analysis undertaken.

Further data acquisition is recommended in each sub area; magnetics and gravity around Barrington, and gravity elsewhere. Some rock property determinations are also desirable. Detailed analysis of such data could be expected to resolve many persistent structural questions and assist geological mapping.

## RECOMMENDATIONS

Given that gravity and magnetic techniques can provide useful information in this complex area and that the present interpretation is based on far from ideal data some acquisition is recommended. The potential uses for improved surveys are indicated.

## Lake Barrington area:

- 1: Analyse new aeromagnetic data with high quality specifications. This is now available. Vet drape data acquired for mapping purposes, formation characteristics and alteration and possible mineralisation signatures. Differentially continue data to fixed level of 700 and 1000 m. This will allow appraisal of Tertiary-covered areas, terrain effects and structural relationships. If required this version of the data could also be used for detailed 3D modelling.
- 2: Interpret gravity data base. The upgraded gravity coverage can be used to support structural assessments and cross-control magnetic interpretation.
- 3: Undertake a trial gravity detailed survey of the Staverton Prospect or some other mineralised site for which geology, geochemistry or any other indicator indicates prospectivity. If undertaken at Staverton lines should be along contours and tied at 100 m intervals. Stations at 15 m interval in order to ensure redundancy and expose problems. A line separation of 50 m across an area of 500 by 500 m centred on the target site. Full terrain correction required. Such a survey may well define targets or further exploration.

## Wilmot area:

- 1: Infill gravity survey regionally to about 1 km spacing and about 500 m within the EL. Review structural implications.
- 2: Check magnetic properties of Cambrian suites and materials near gold prospects.
- 3: Differentially continue extant magnetic data to a true drape at the nominal specification of the survey for detailed profile examination and to a fixed level of about 1100 m for more accurate structural appraisal.

## REFERENCES

- Baillie, P.W., Williams, P.R., Seymour, D.B., Lennox, P.G., & Green, G.R., 1986. St. Valentines. 1: 50000 geological map sheet. Dep. Mines Tasm.
- Bamford, A.L., & Green, G.R., 1988. Cethana. Metallic mineral deposits map sheet. 1: 50000. Mt Read Volcanics Project. Dep. Mines Tasm.
- Bishop, J., 1987. Interpretation of the North Tasmania Aero-magnetic survey. Mt Read Volcanics Project Rept. Dep. Mines Tasm.
- Collins, P.L.F., & Williams, E., 1986. Metallogeny and tectonic development of the Tasman Fold Belt System in Tasmania. Ore Geology Reviews. 1: 153-201.
- Jennings, I.B., & Burns, K.L., 1958. Middlesex 1: 633360 Geological map. Dept. Mines Tasm.
- Jennings, I.B., Burns, K.L., Mayne, S.J., & Robinson, R.G., 1959. Sheffield. 1: 63360 geological map sheet. Dep. Mines Tasm.
- Leaman, D.E., 1980. Applied Geophysics in Tasmania - summary of surveys. Unpub. Rep. Dep. Mines Tasm. 1980/41.
- Leaman, D.E., & Richardson, R.G., 1989 a. The granites of west and northwest Tasmania - a geophysical interpretation. Bull. geol. Surv. Tasm., 66.
- Leaman, D.E., & Richardson, R.G., 1989 b. Production of a residual gravity field map for Tasmania and some implications. Exploration Geophysics, 20, 181-184.
- Richardson, R.G., & Leaman, D.E., 1987. TASGRAV. The Tasmanian gravity data base. Unpub. Rep. Dep. Mines Tasm. 1987/02.

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361043

Report submitted on behalf of Leaman Geophysics

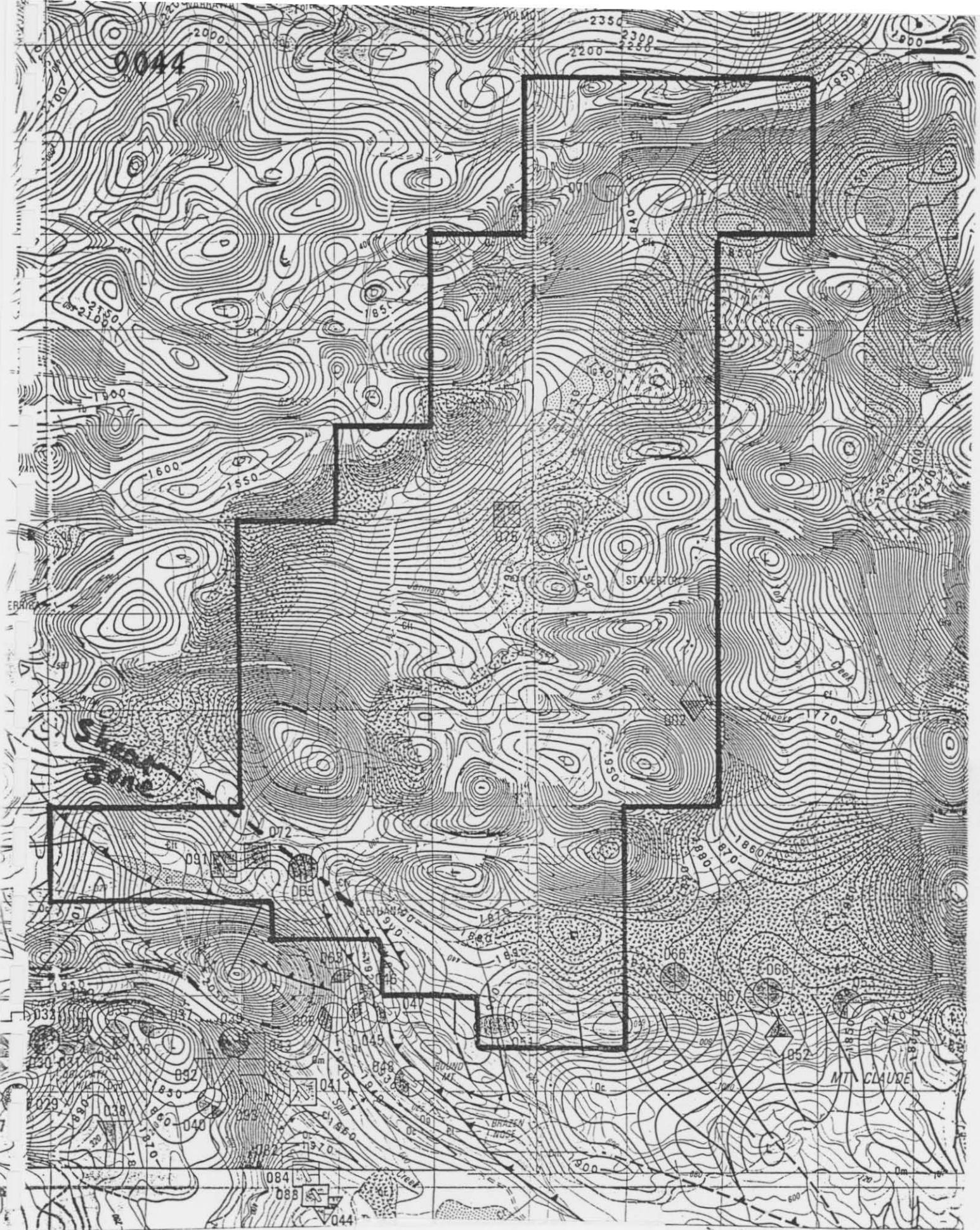
by



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

Date: 1-7-91





EL 10/88 . GOWRIE PARK TOTAL MAGNETIC FIELD INTENSITY  
 LAKE BARRINGTON AREA  
 Geology base from Bamford & Green (1988)  
 Magnetic data by Department of Mines

361045

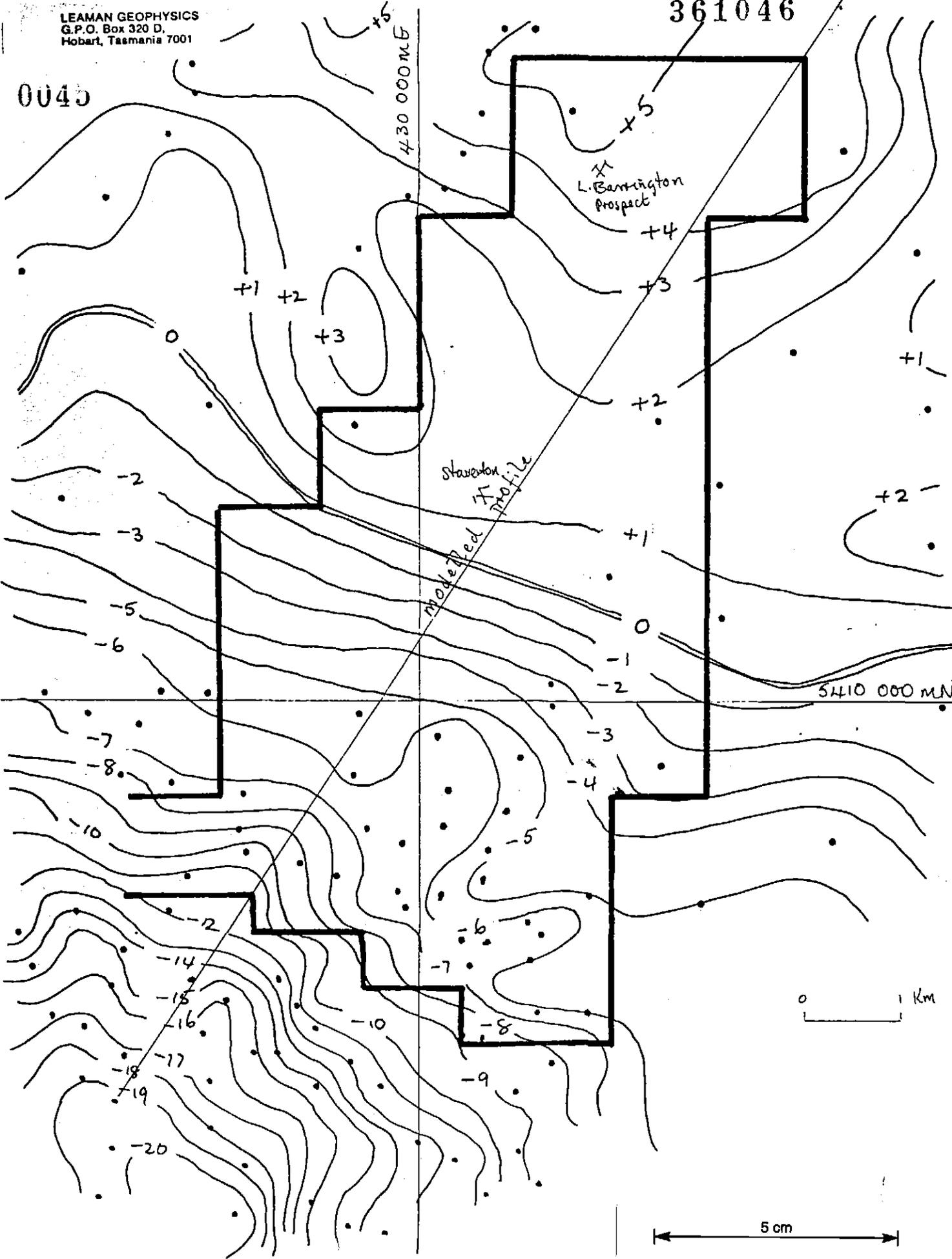
FIGURE 2

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430 000 MB

5410 000 MN

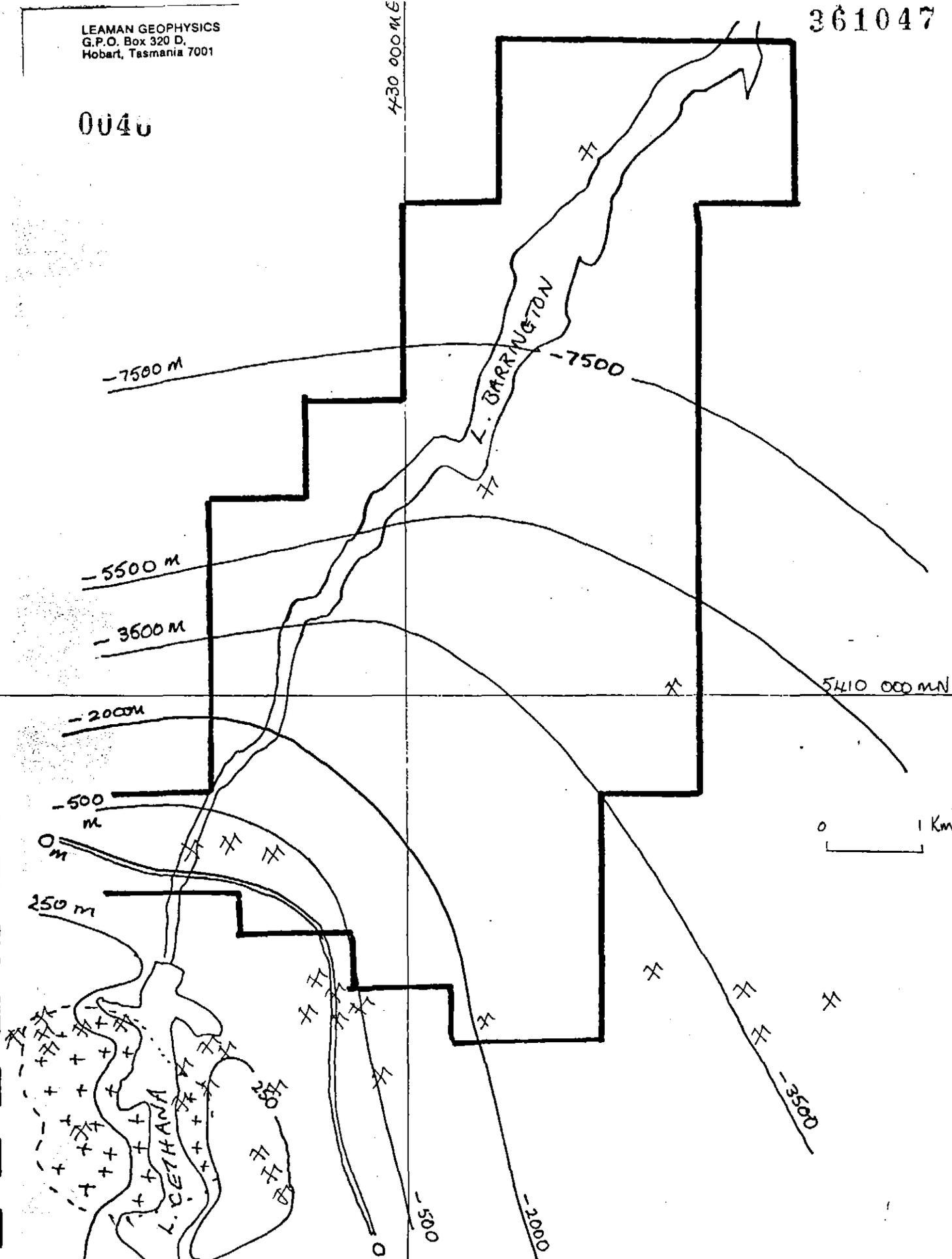


EL 10/88 GOWRIE PARK RESIDUAL BOUGUER ANOMALY  
LAKE BARRINGTON AREA  
Regional separation using MANTLE-88 (Leaman, 1988)

FIGURE 3

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430 000 M E



EL 10/88 GOWRIE PARK 3D MODEL OF DOLCOATH GRANITE  
LAKE BARRINGTON AREA

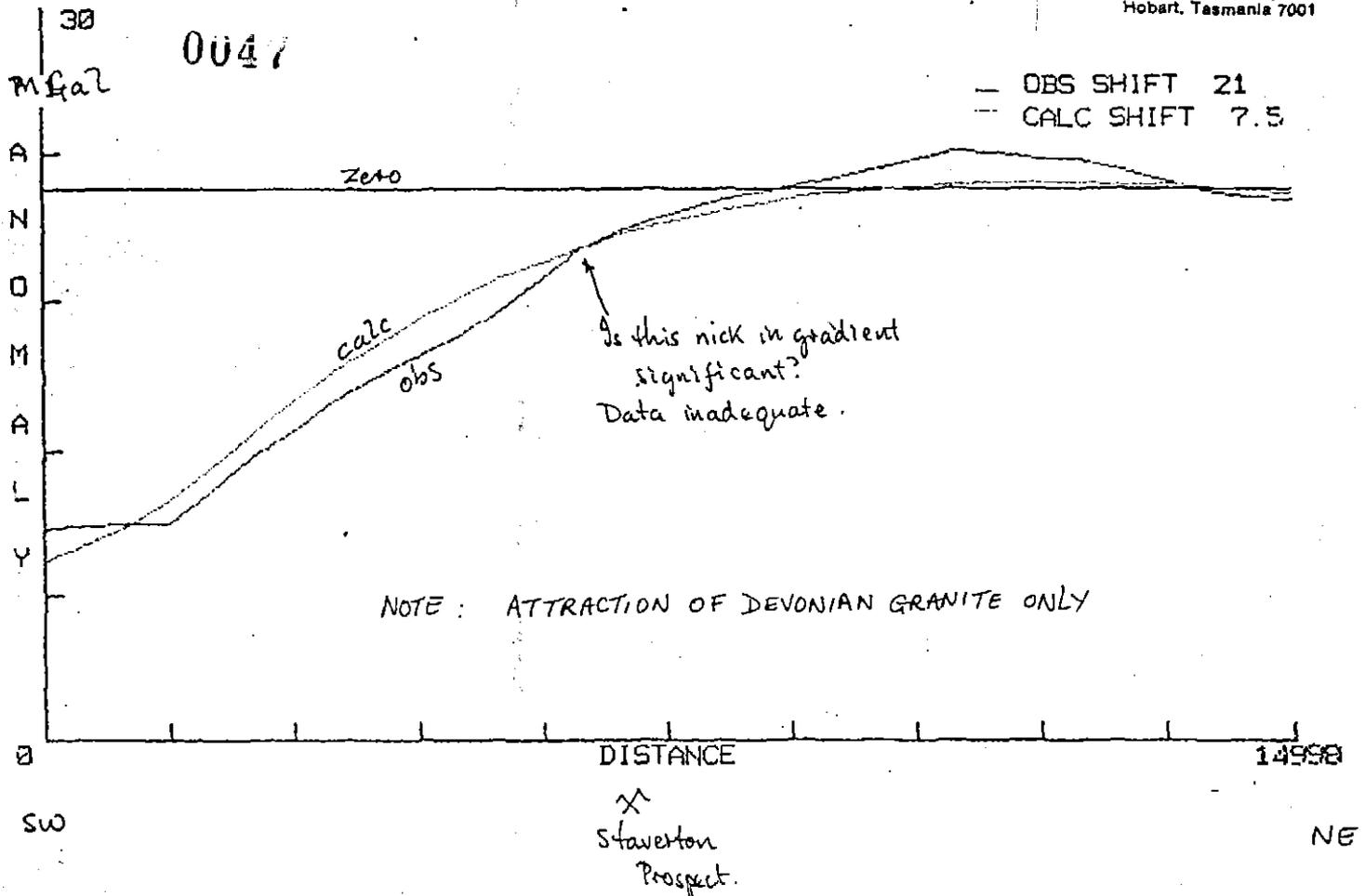
Note that only a portion of a model of the entire granite is displayed. Contours relative to sea level of upper or outer granite surface.

5 cm

FIGURE 4

ZERO SHIFT 22.52799

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Hobart, Tasmania 7001



ZERO SHIFT 22.52799

Differential:  $22.53 - (21 - 7.5) = 9.03 \text{ mGal}$ .

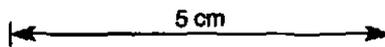
For granite profile: see Figures 4 and 6.

EL 10/88  
(GRAVITY)

GOWRIE PARK  
LAKE BARRINGTON AREA

3D PROFILE COMPARISON FORTH RIVER

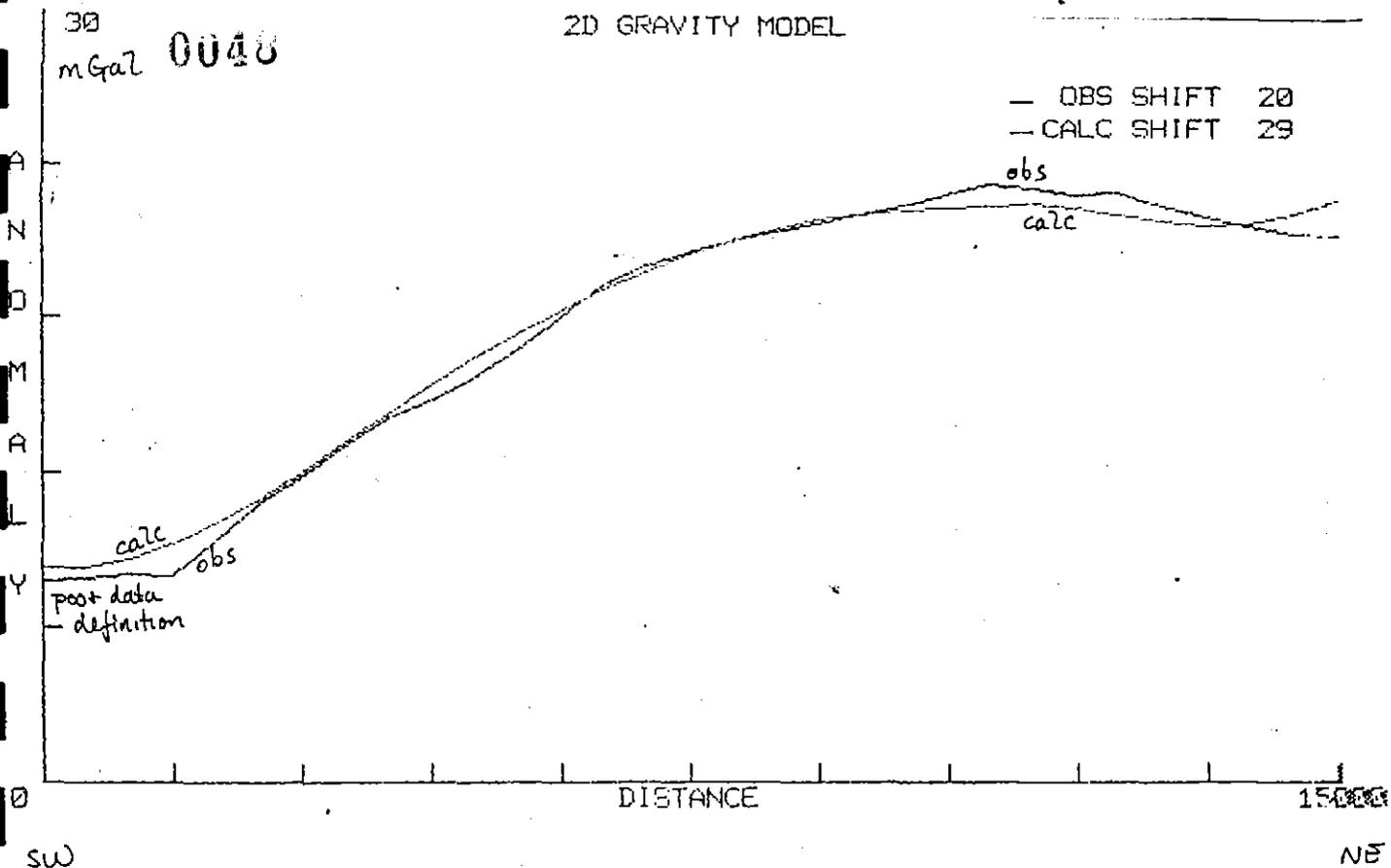
FIGURE 5



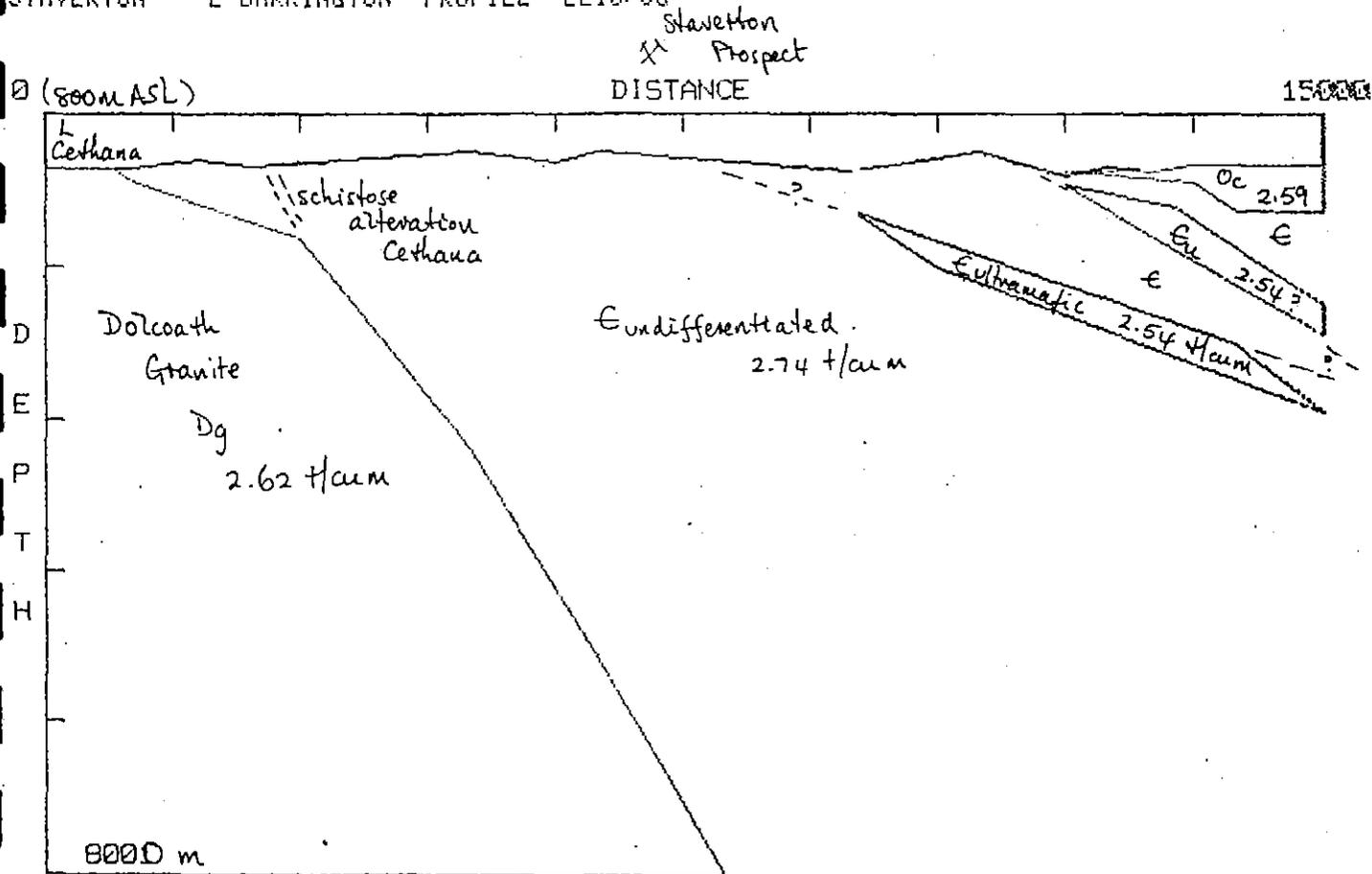
LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 15000 500

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Hobart, Tasmania 7001

2D GRAVITY MODEL



STAVERTON - L BARRINGTON PROFILE EL10/88

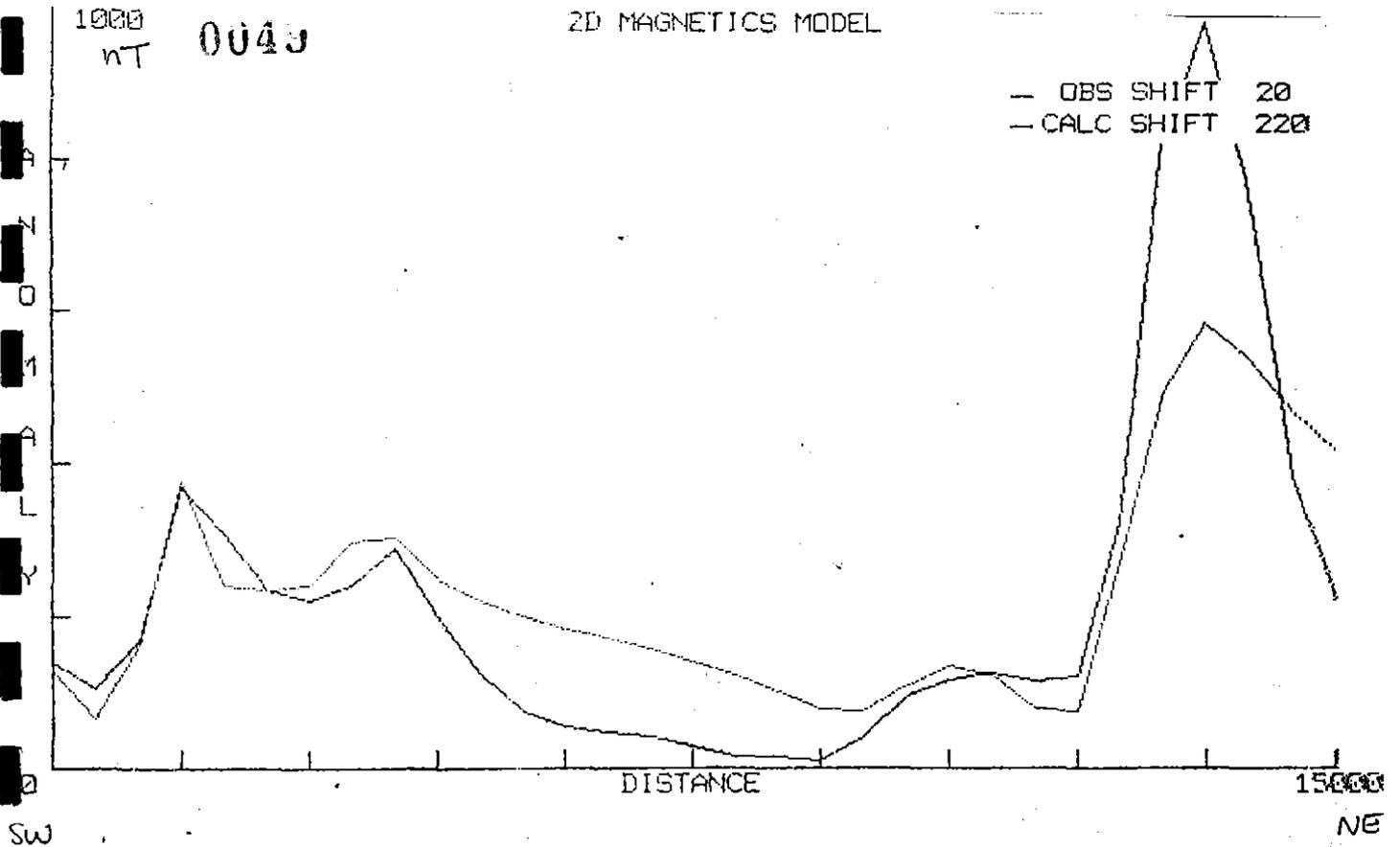


EL 10/88 GOWRIE PARK 2D GRAVITY MODEL - FORTH RIVER  
LAKE BARRINGTON AREA

FIGURE 6

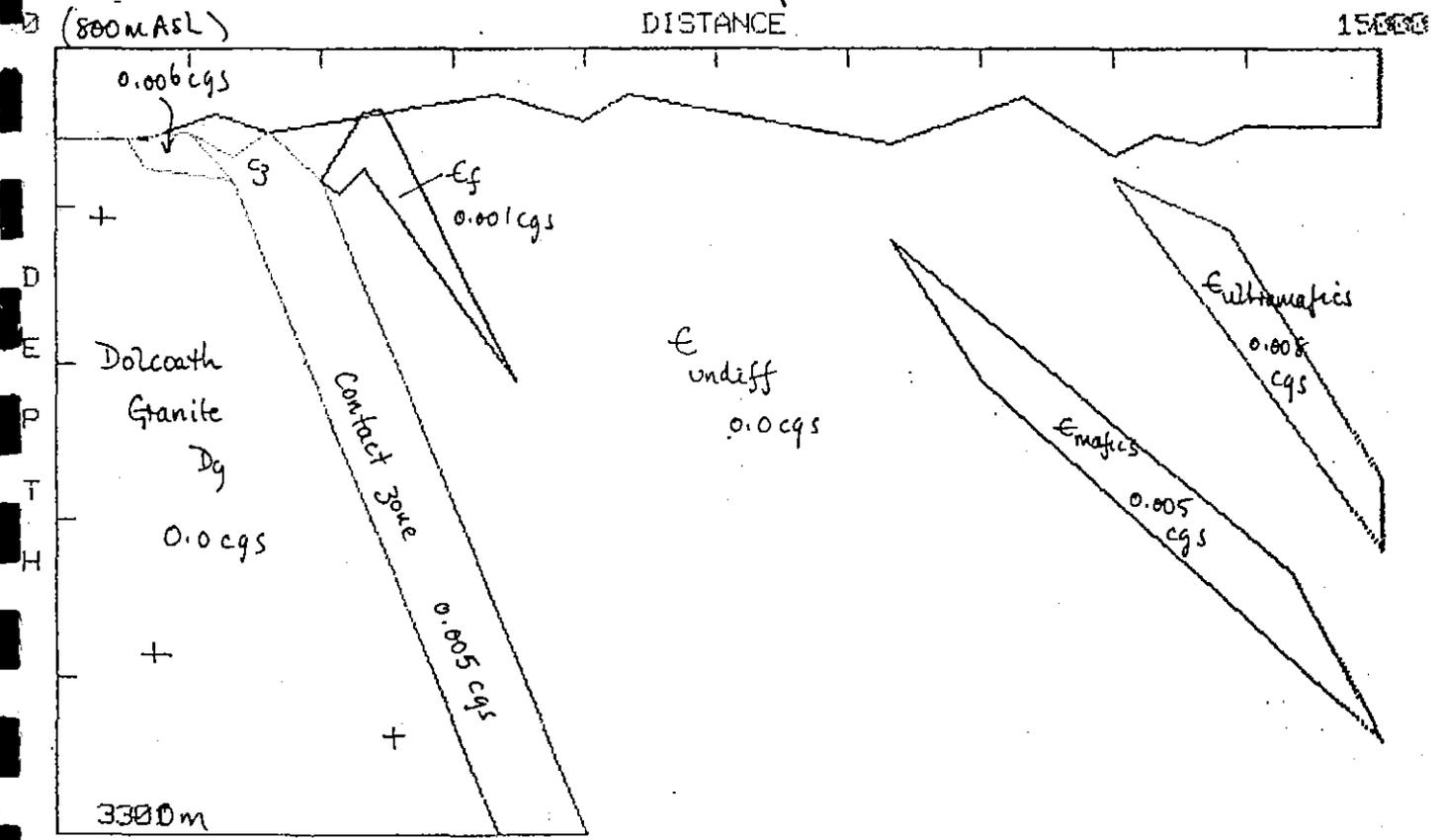
STAVERTON - L BARRINGTON PROFILE EL10/88

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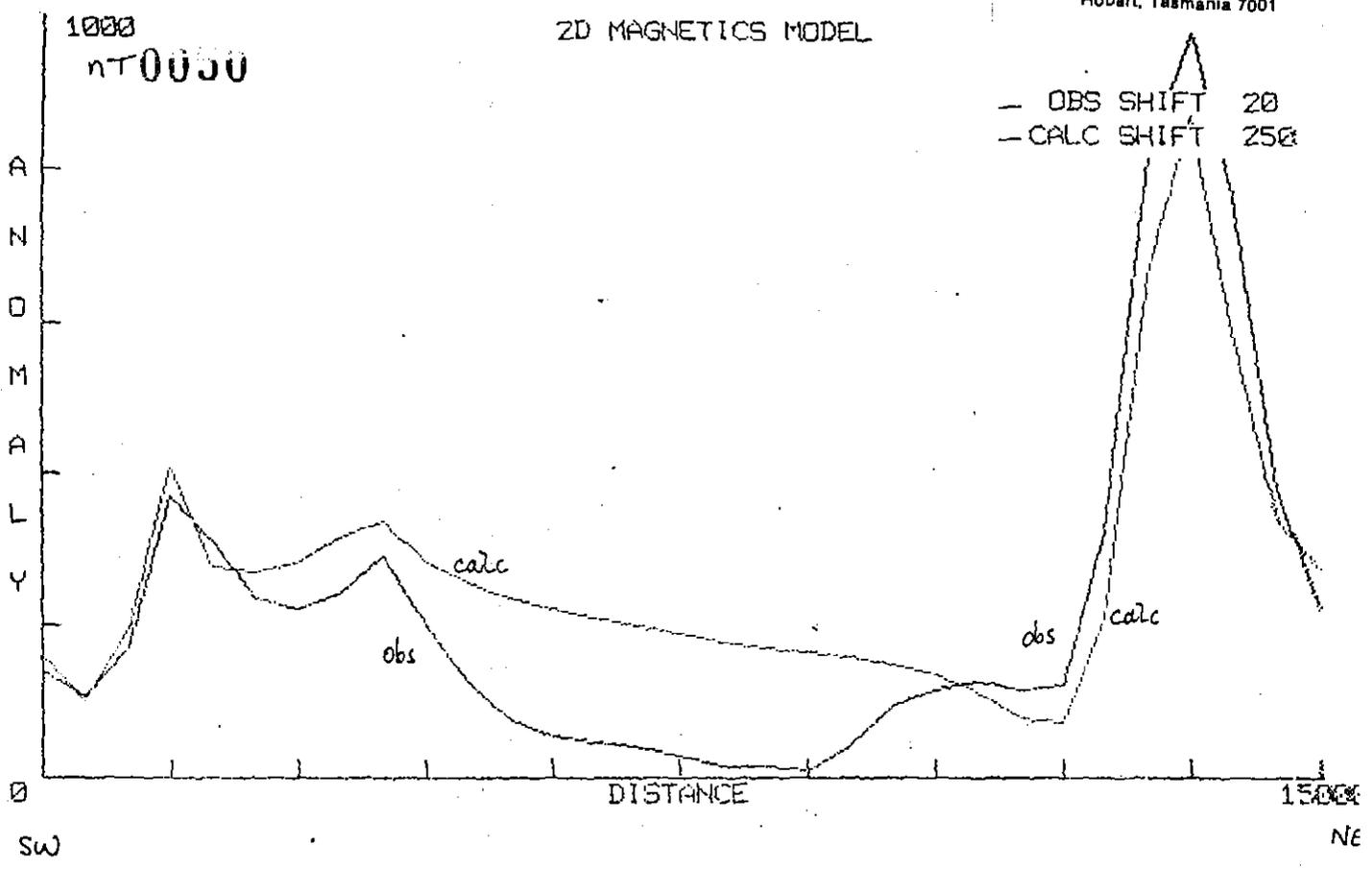


STAVERTON - L BARRINGTON PROFILE EL10/88

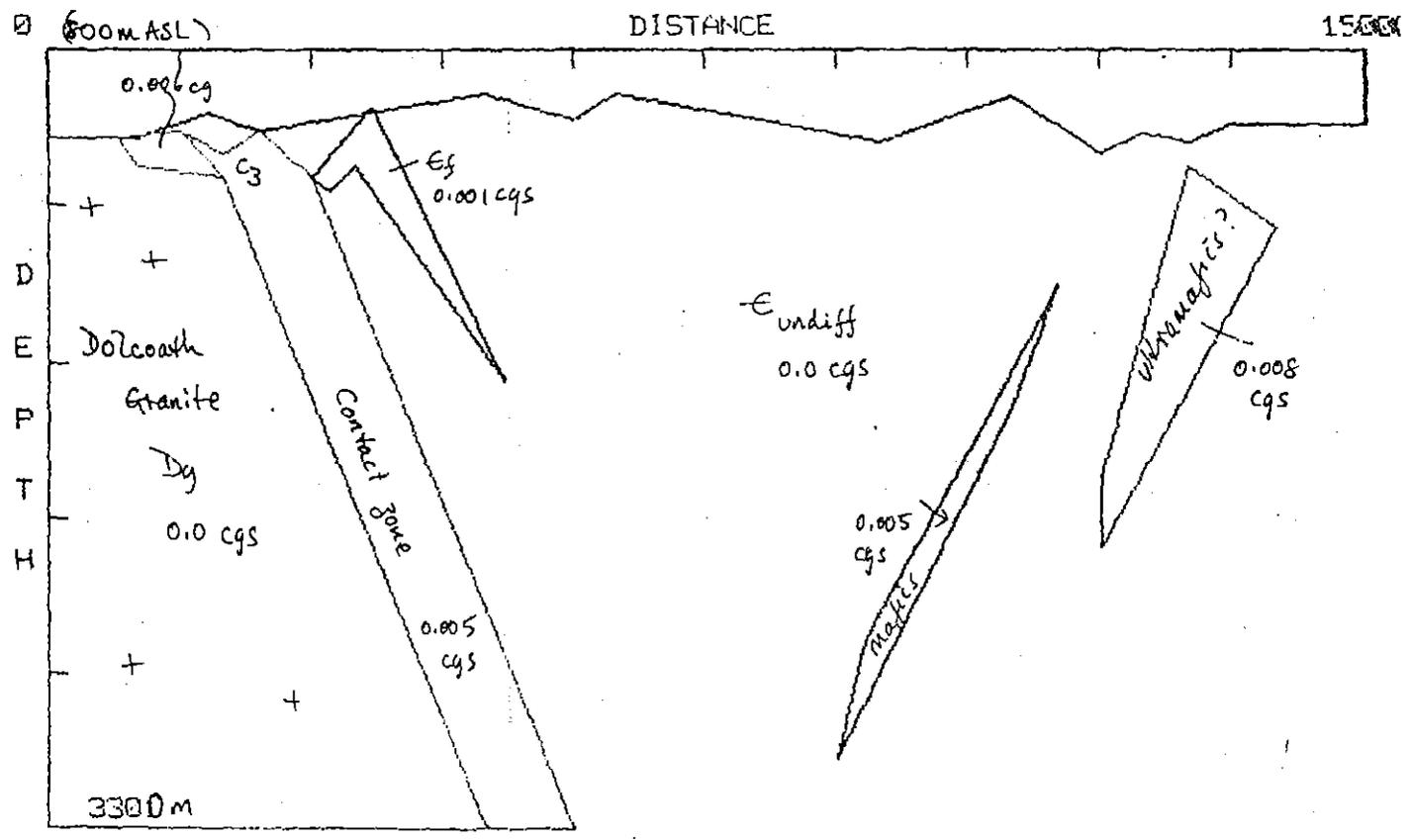
X Staverton Prospect



EL 10/88 GOWRIE PARK 2D MAGNETICS MODEL - FORTH RIVER  
LAKE BARRINGTON AREA  
SHIFT MATCH OPTION 1, NORTH DIPS



STAVERTON - L BARRINGTON PROFILE EL10/88  
 Skeleton Prospect  
 X



EL 10/88 GOWRIE PARK 2D MAGNETICS MODEL - FORTH RIVER  
 LAKE BARRINGTON AREA  
 SHIFT MATCH OPTION 1, SOUTH DIPS

FIGURE 8

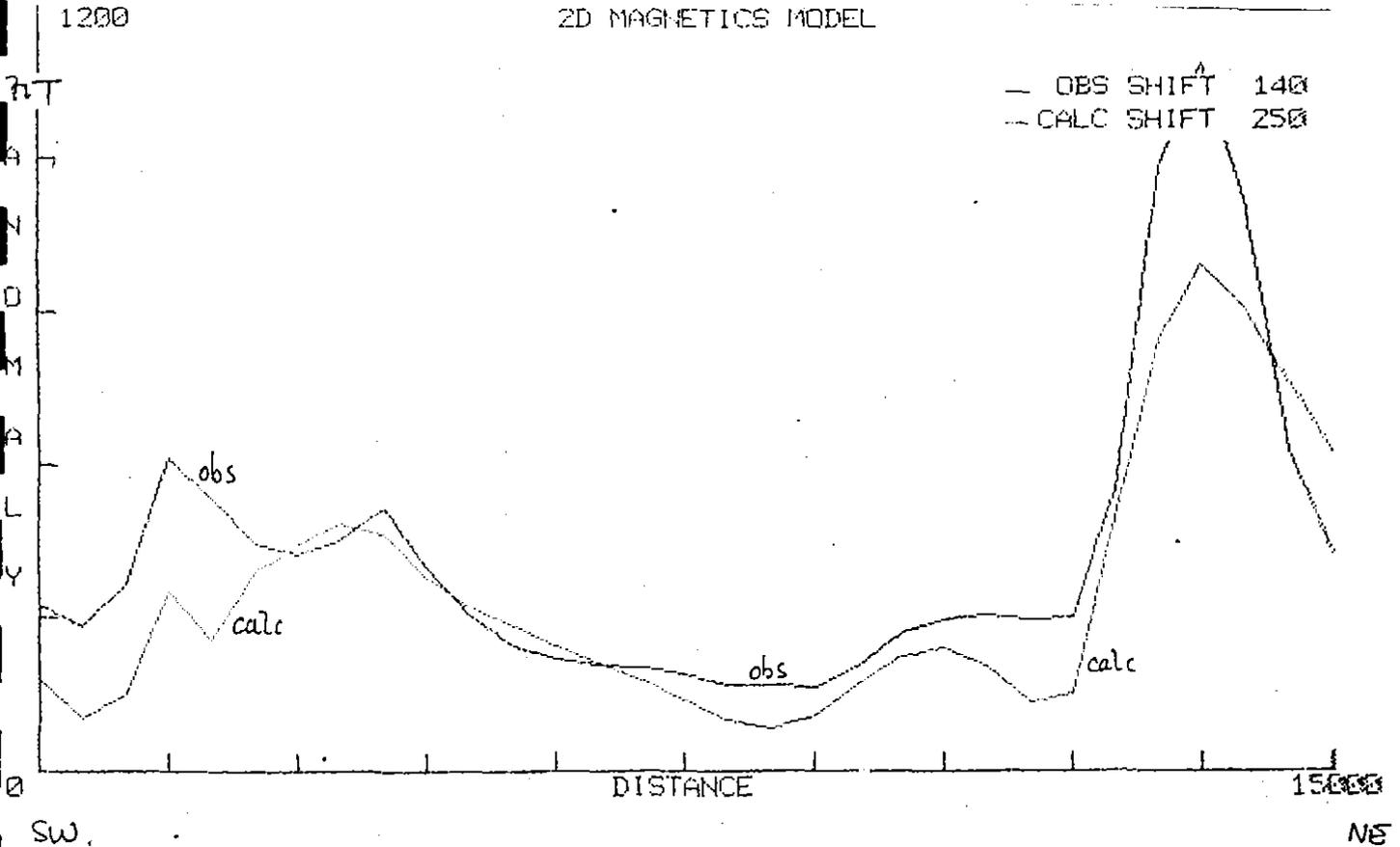
0051

361052

LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 15000 500

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

2D MAGNETICS MODEL

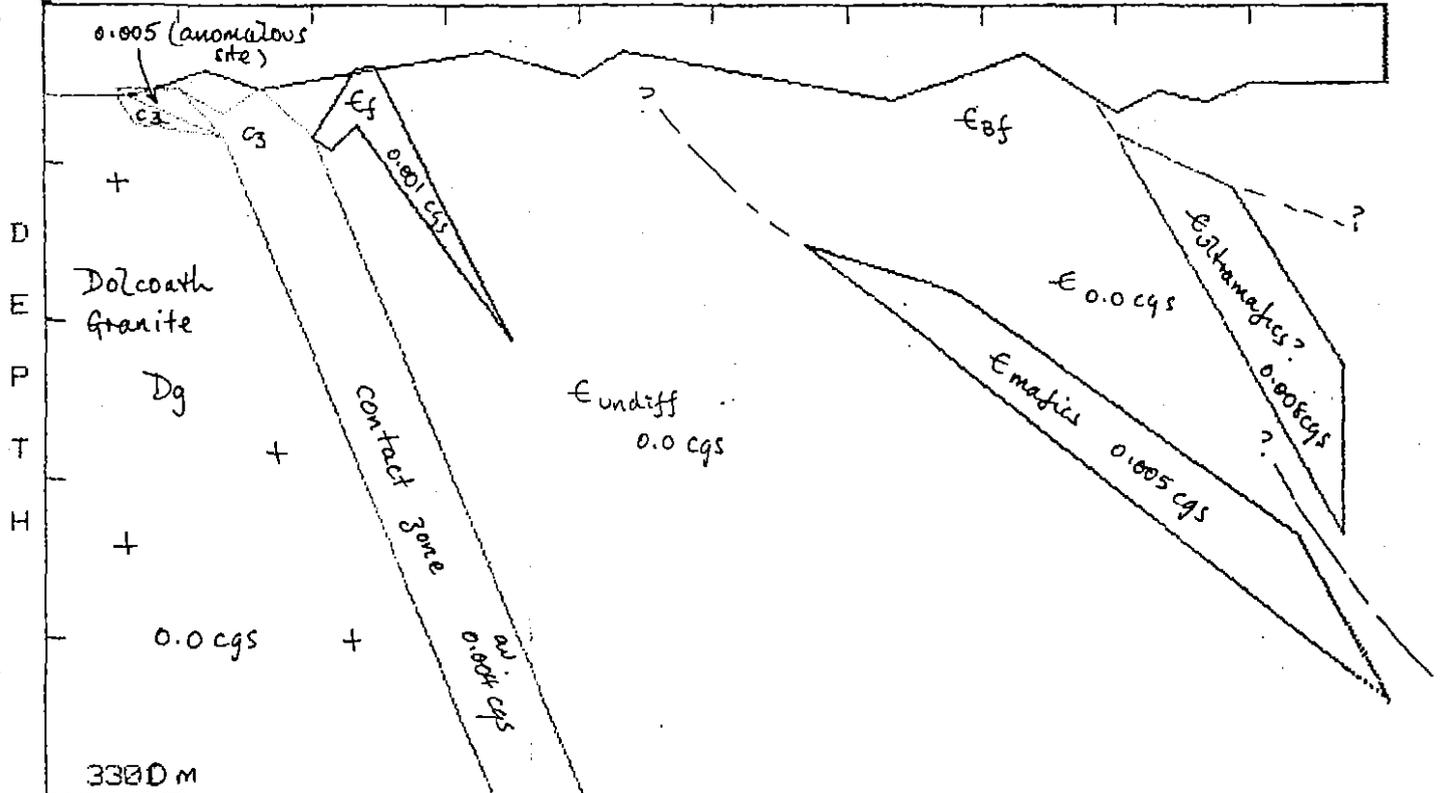


STAVERTON - L BARRINGTON PROFILE EL10/88

Staverton Prospect

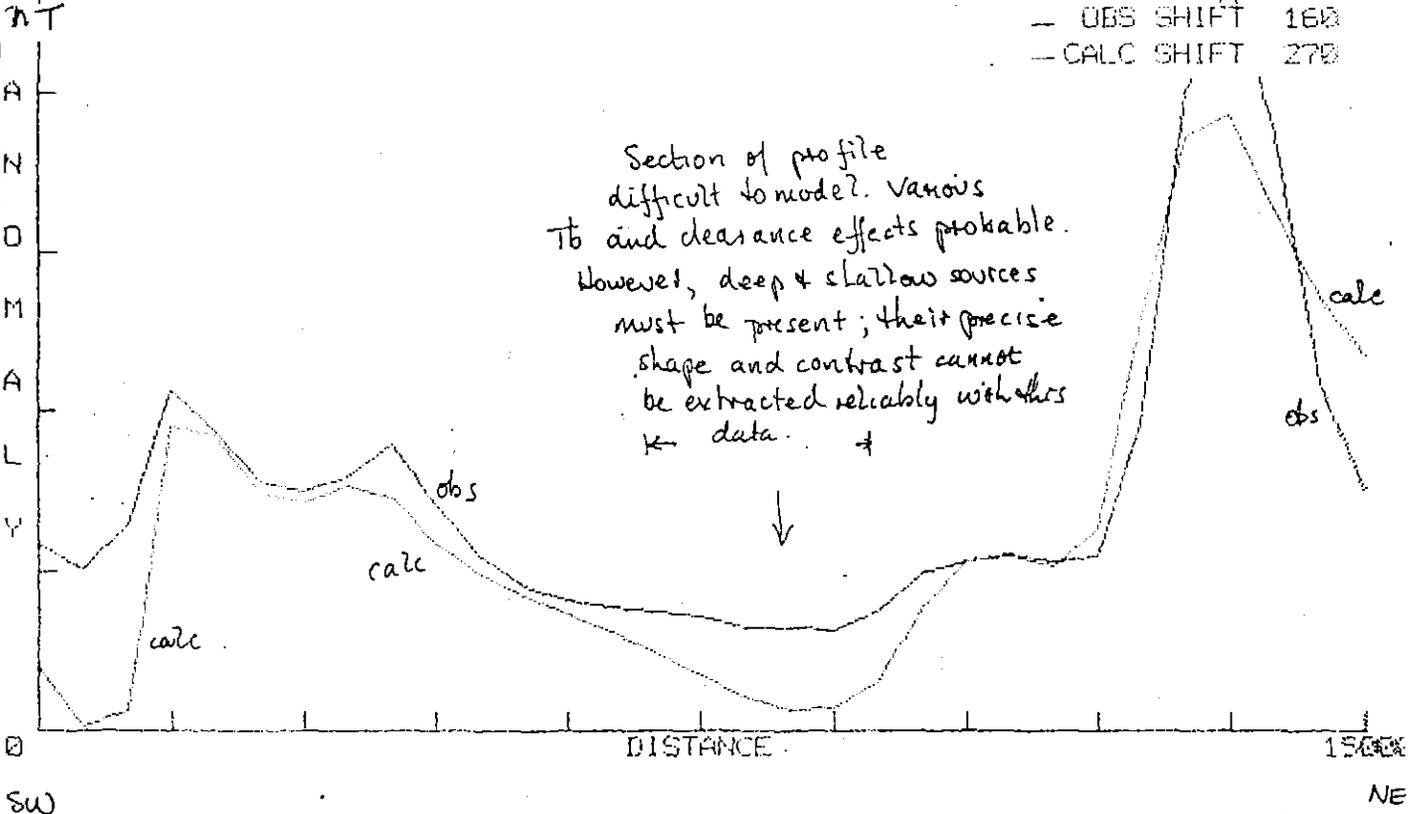
L. Barrington Prospect

(300m ASL) DISTANCE 15000

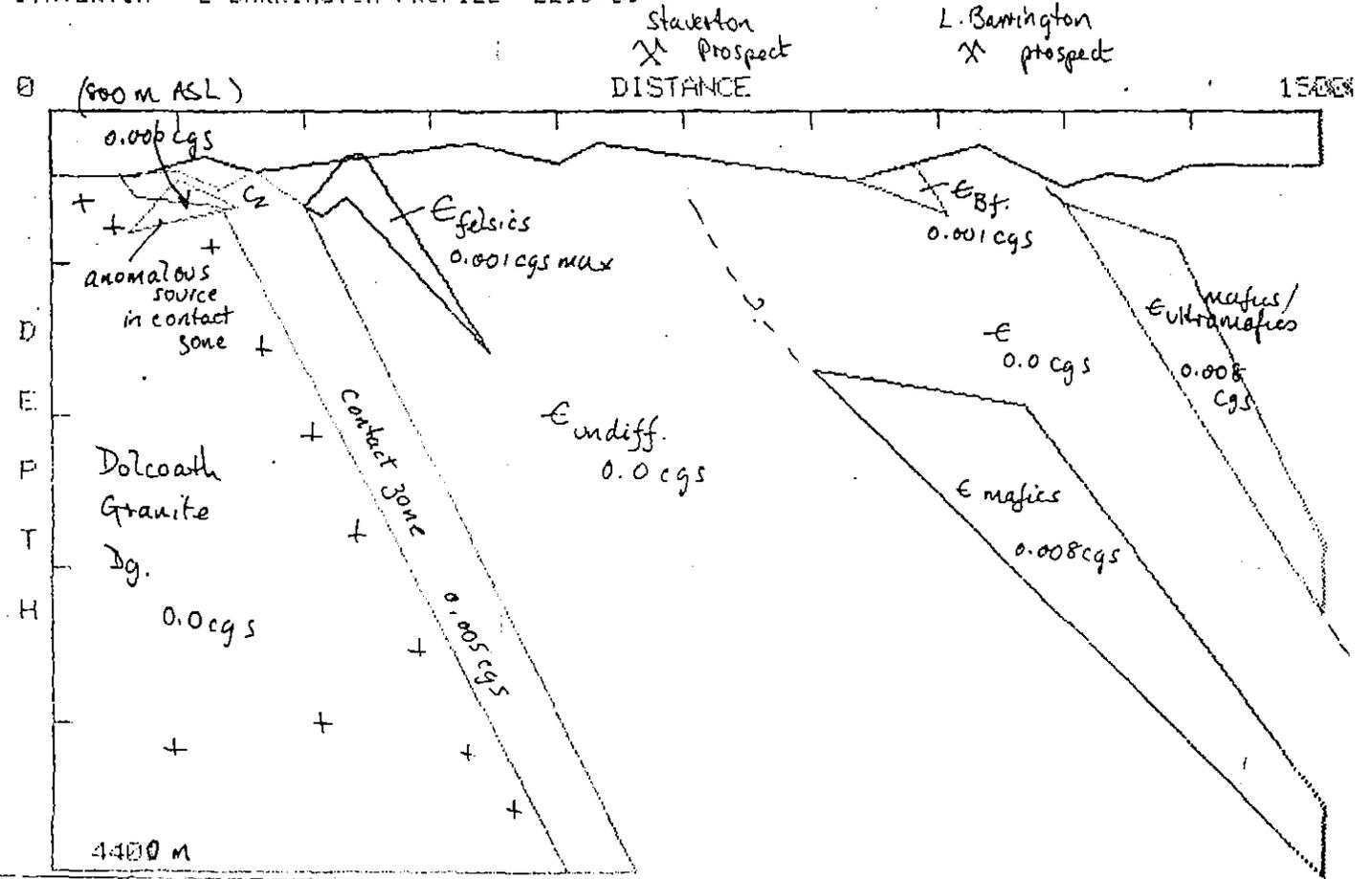


2D MAGNETICS MODEL

1200 0052



STAVERTON - L BARRINGTON PROFILE EL10/88



361053

0053



425000M

420000M

424E  
ME

4201  
ME

416E  
ME

361054

EL 19/90 WILMOT 1:50000  
FIELD

GEOLOGY BASE AND TOTAL MAGNETIC  
FIGURE 11

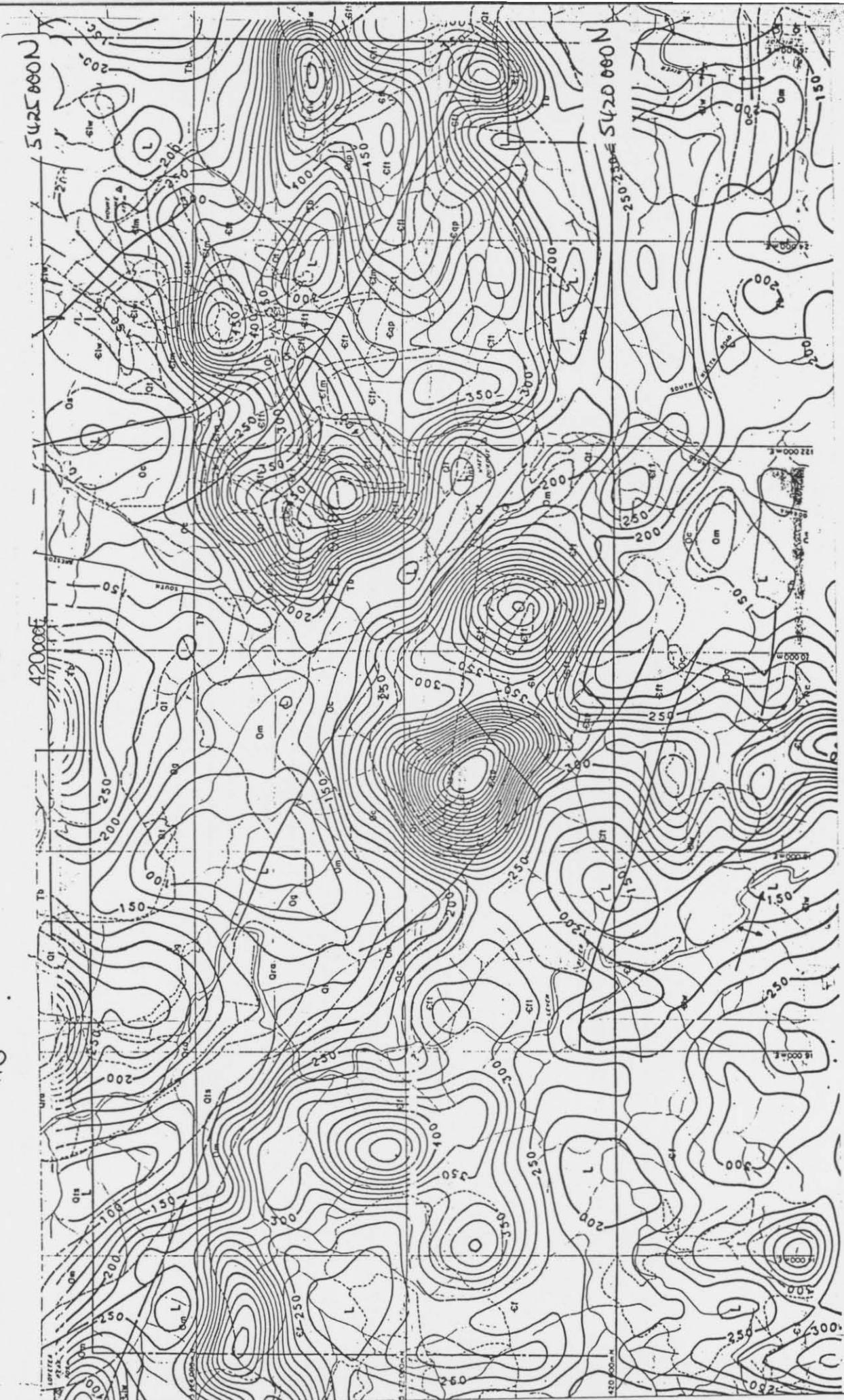


0054

624000  
ME

620000  
ME

616000  
ME



EL 19/90

WILMOT 1:50000  
RADIOMETRICS

GEOLOGY BASE AND TOTAL COUNT  
FIGURE 12

361055

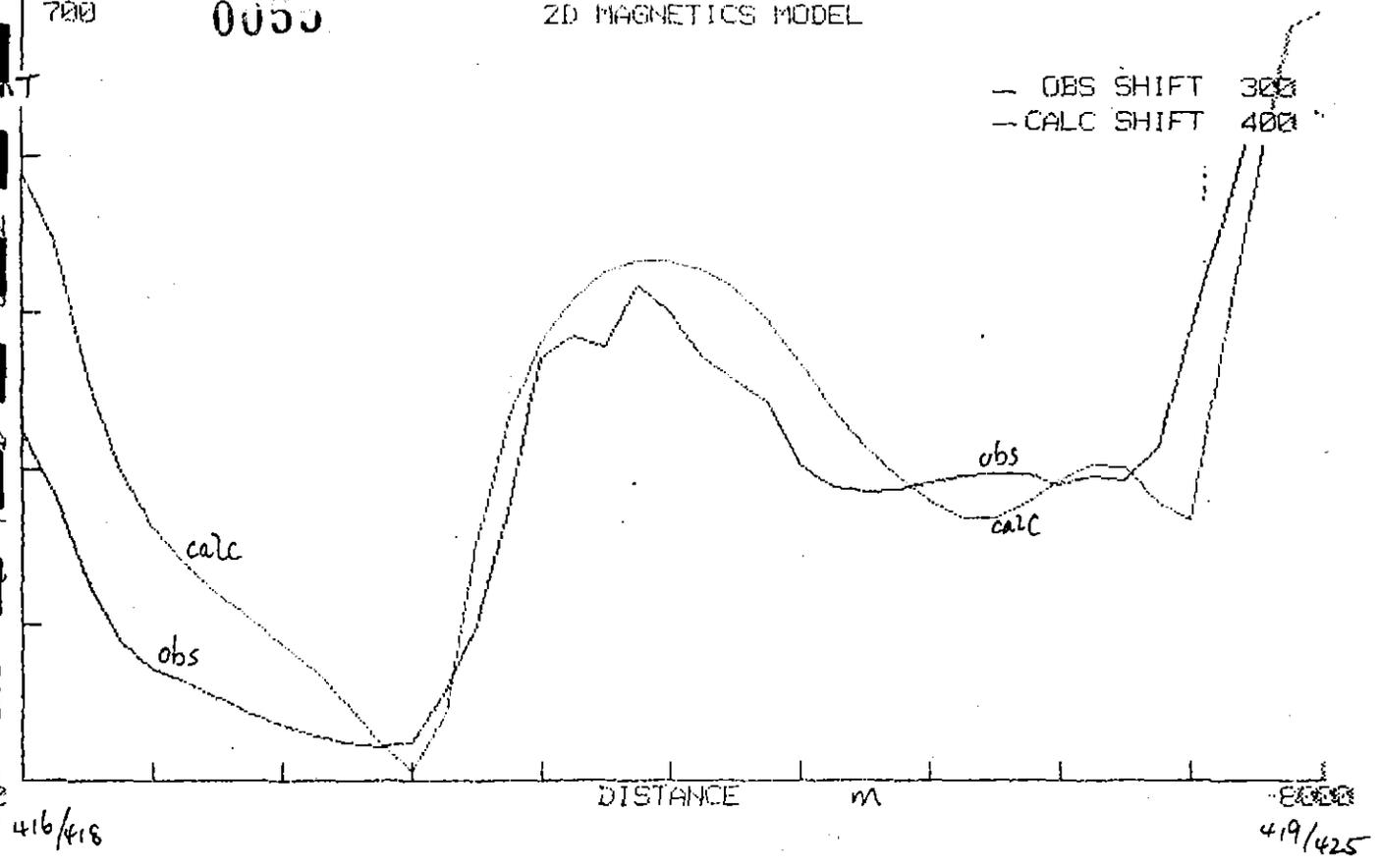
5 cm

361056

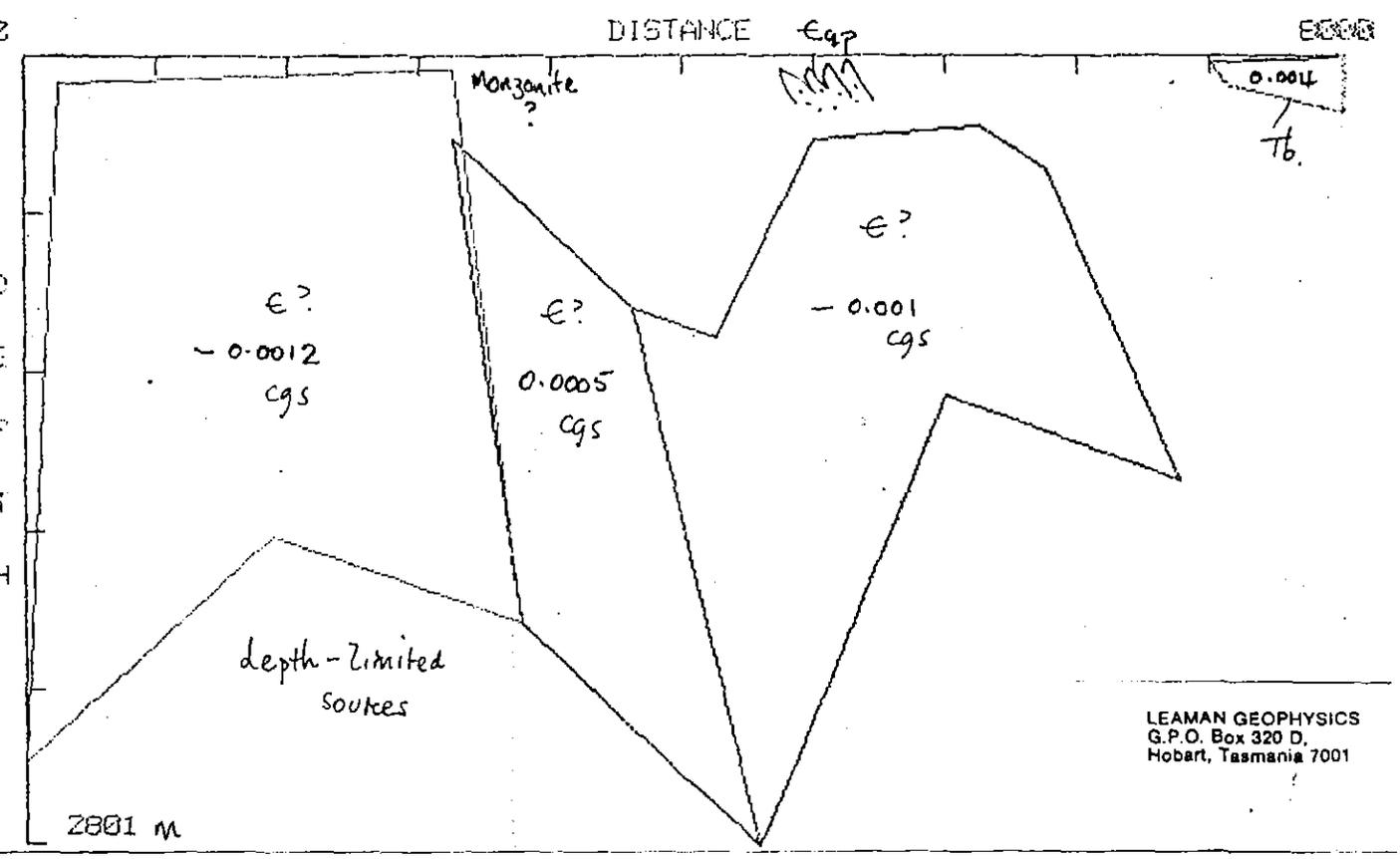
2D MAGNETICS MODEL

0055

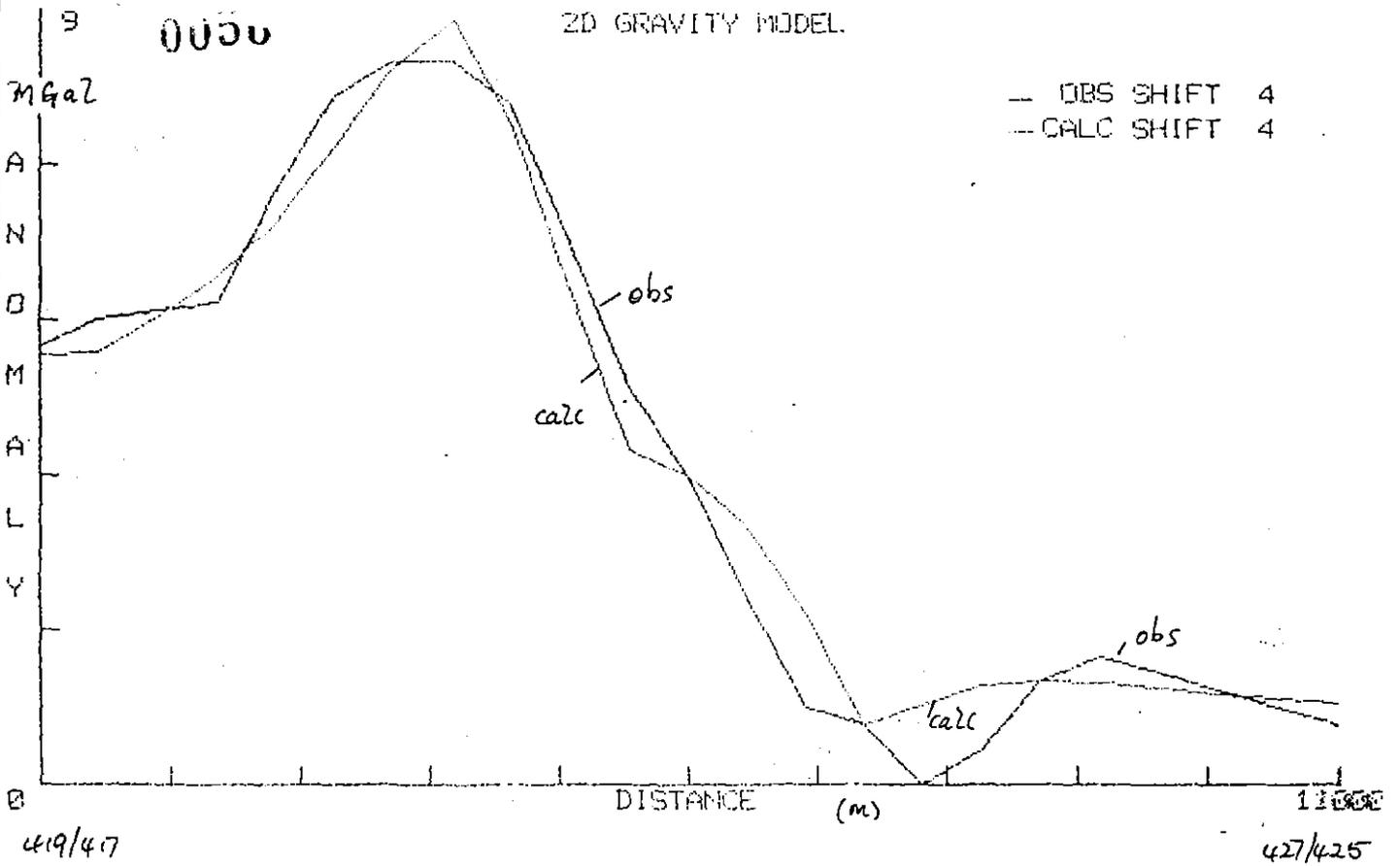
- OBS SHIFT 300  
- CALC SHIFT 400



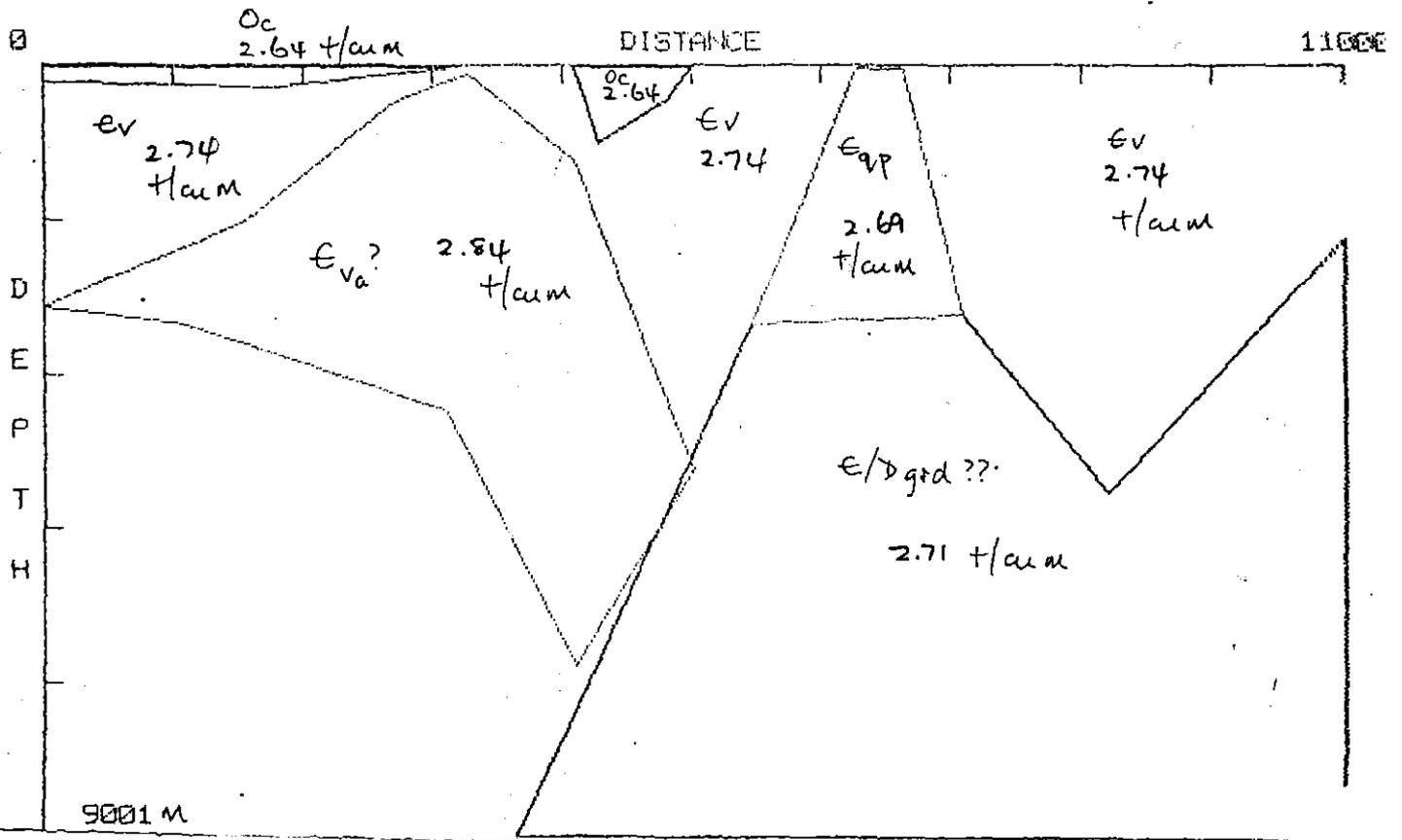
PRESTON LINE 2 416/418-419/425



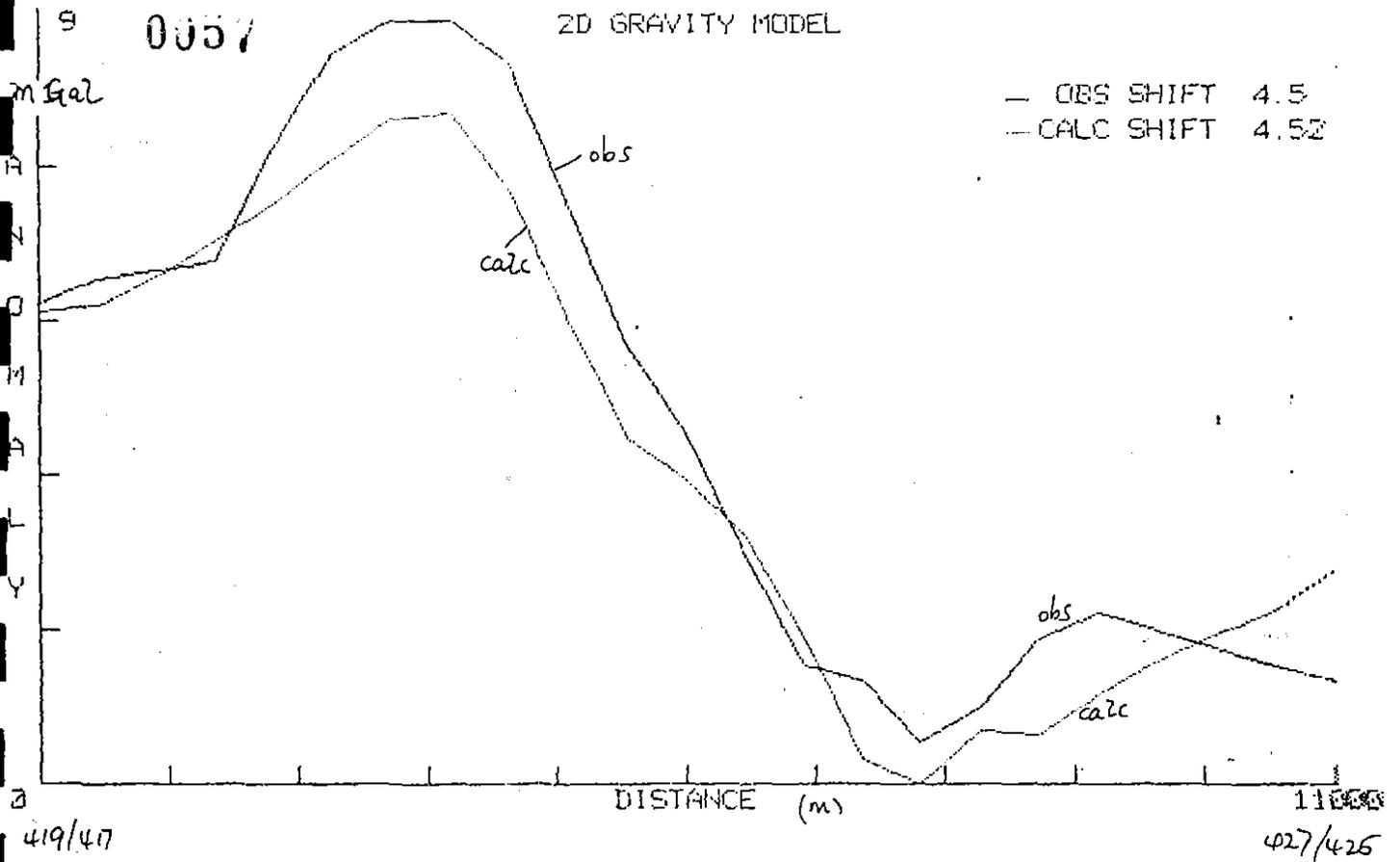
LEAMAN GEOPHYSICS  
G.P.O. Box 320 D,  
Hobart, Tasmania 7001



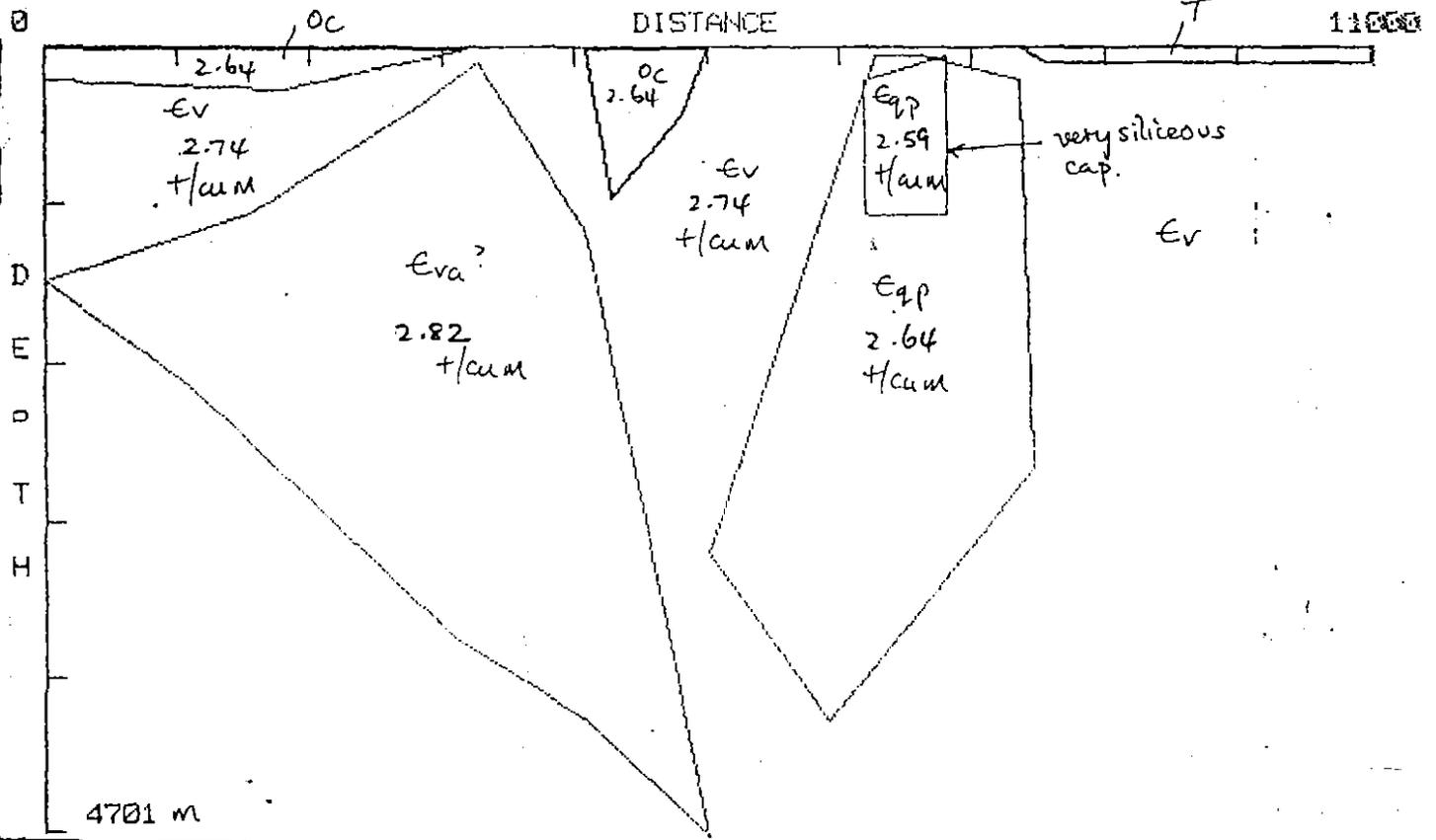
PRESTON LINE 2 419/417-427/425

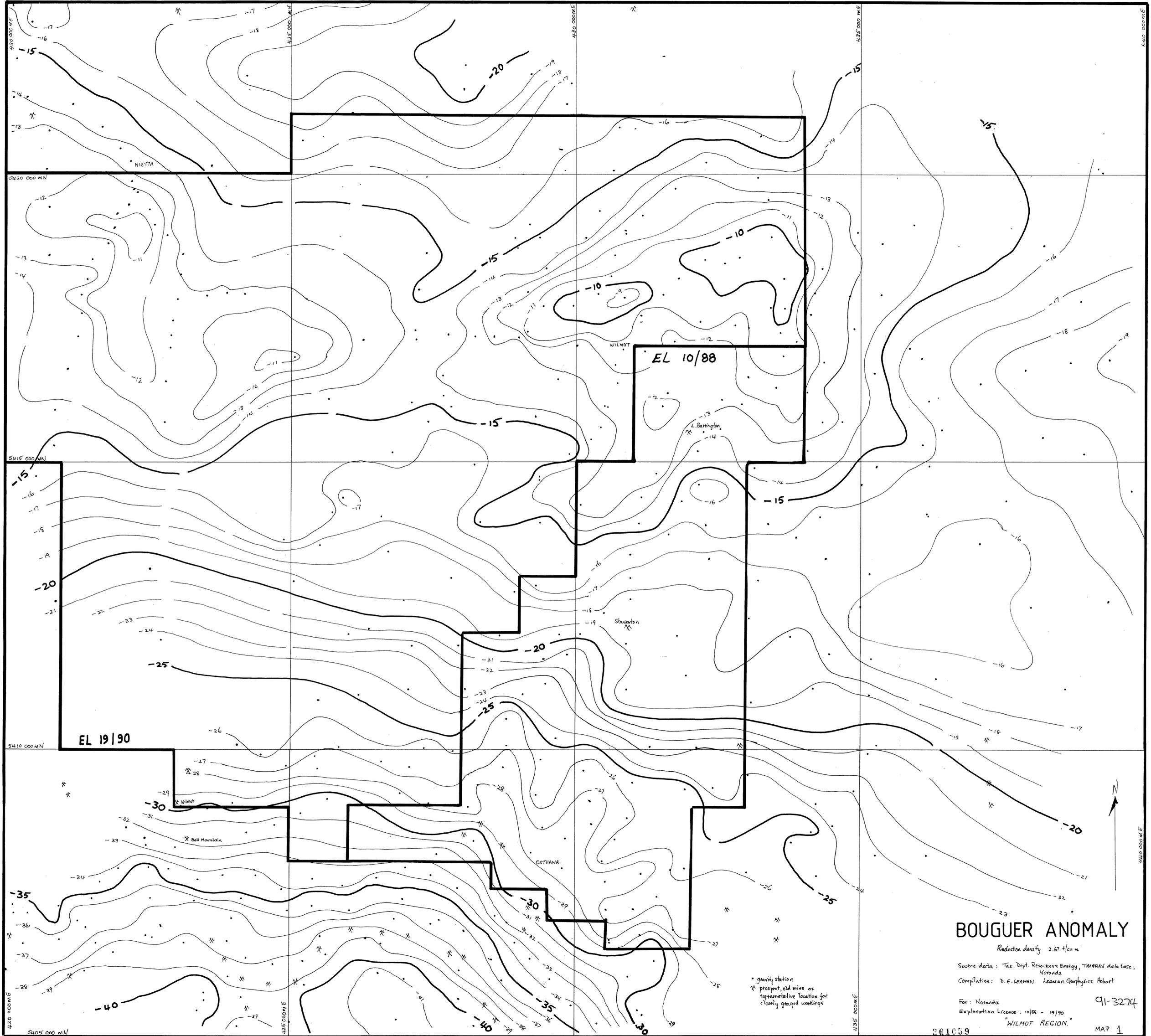


LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 11000 500



PRESTON LINE 2 419/417-427/425  
 K6=-.1





# BOUGUER ANOMALY

Reduction density 2.67 t/cm<sup>3</sup>

Source data: Tas. Dept. Resources Energy, TASGRAN data base; Noranda

Compilation: D. E. LEAMAN Leaman Geophysics Hobart

For: Noranda

Exploration licence: 10/88 - 19/90

"WILMOT REGION"

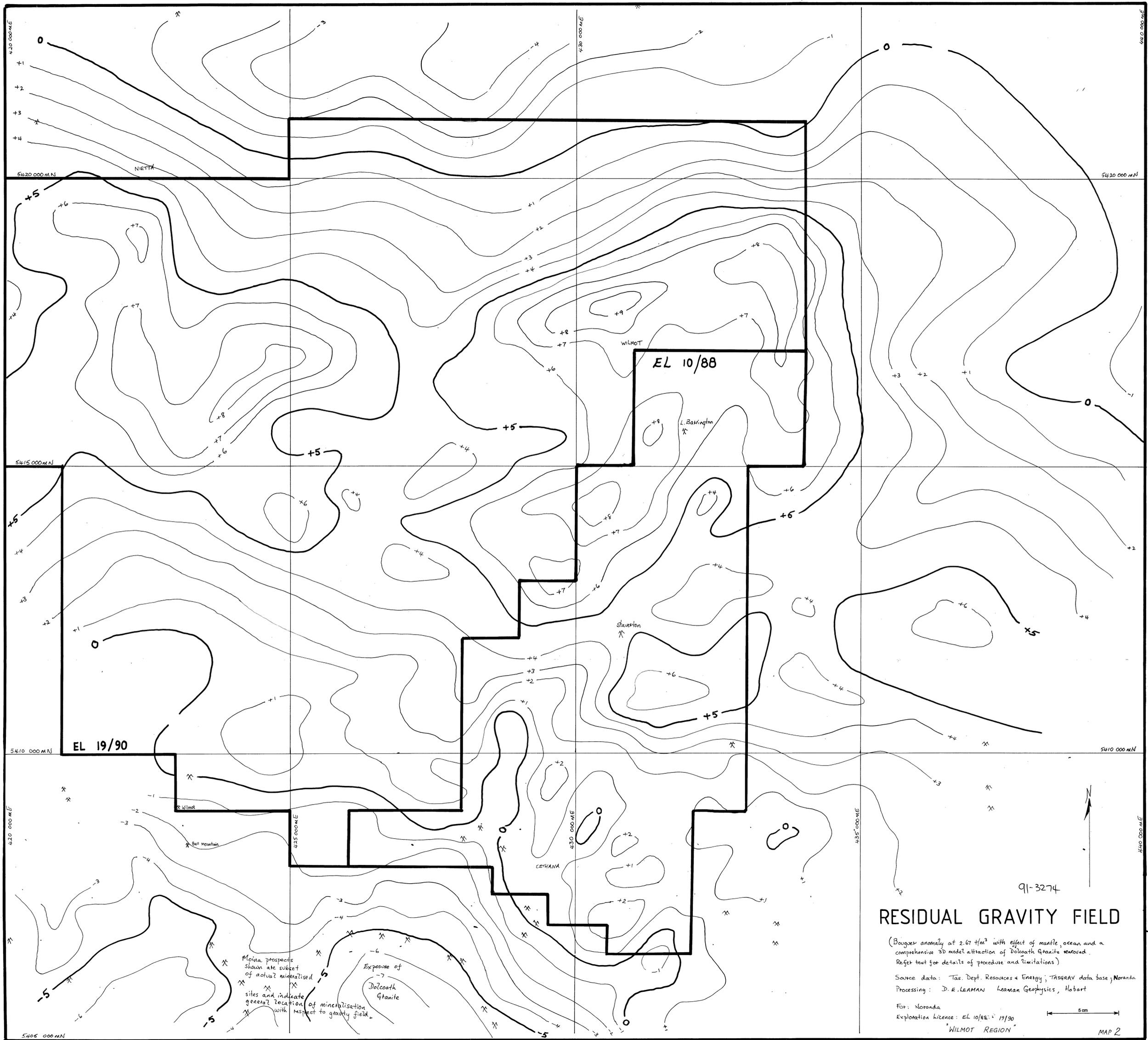
91-3274

MAP 1

261059



\* gravity station  
 \* prospect, old mine or  
 \* representative location for  
 \* closely grouped workings



Molva prospects shown are subset of actual mineralised sites and indicate general location of mineralisation with respect to gravity field.

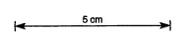
Exposure of Dolcoath Granite

91-3274  
**RESIDUAL GRAVITY FIELD**

(Bouguer anomaly at 2.67 t/m<sup>3</sup> with effect of mantle, ocean and a comprehensive 3D model attraction of Dolcoath Granite removed. Refer text for details of procedure and limitations)

Source data: Tas. Dept. Resources & Energy; TASGRAV data base; Noranda  
 Processing: D. E. LEAMAN Leaman Geophysics, Hobart

For: Noranda  
 Exploration licence: EL 10/88; 19/90



WILMOT REGION