

Mt Read Volcanics Project
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Preliminary interpretation report:

1985 West Tasmania aeromagnetic
survey

(Macquarie Harbour south to Elliott Bay)

by D. E. LEAMAN



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MOUNT READ VOLCANICS PROJECT:

PRELIMINARY INTERPRETATION REPORT
1985 WEST TASMANIA AEROMAGNETIC SURVEY
(Macquarie Harbour South to Elliott Bay)

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1: SUMMARY

The results of the 1985 aeromagnetic survey by the Department of Mines between Macquarie Harbour and Elliott Bay are presented together with a preliminary interpretation. The survey extends the 1981 regional coverage, at comparable specification, southward such that all Cambrian rocks in central west Tasmania have been covered by an internally consistent high quality magnetic survey. The new survey augment was flown as a nominal drape at 150 m with a line separation of about 500 m. Terrain effects are thought to be insignificant for this survey but, as this interpretation was provided before digital data tapes were available, no evaluation has been undertaken.

Qualitative interpretive comments are provided for the entire survey area, although quantitative assessment has been restricted to six profiles, in order to review possible source contributions and gross structure. This approach is consistent with the nature of extant geological information suitable for interpretive control and is designed to assist first order structural appreciation of the region and define any obviously anomalous elements.

The dominant anomalies are related to a belt of mafic volcanics (Mainwaring Group) which extend from near Birch Inlet to Diorite Point. The apparent eastern margin of this belt is steeply dipping, probably faulted in part, and marks the axis for rapid thinning of the Cambrian succession. Anomalies sourced beneath the Tertiary covered area suggest that a much thinner sequence is overlain by a variable cover.

There is considerable evidence for zones of detachment west of the mafic sequence. Some major faults inset Precambrian rocks south of Cape Sorell which had been multiply overthrust across much of the Cambrian sequence. Elsewhere, Tertiary and Ordovician deposition appears to have been partly controlled by rejuvenations of the basement structures which define the eastern side of the axis of Cambrian deposition and activity.

While many lineaments are evident in raw data presentations some are not precisely located or are obscured by near surface detail. Processing is advised before such features can be properly assessed. NE and NW trending lineaments are most common but major dislocations within Precambrian and, to a lesser extent, Cambrian rocks are hinged about nearly E-W features which are not obvious in surface mapping.

This report presents a survey assessment and an indicative interpretation. Although not a final statement, and intended as a contribution to structural appreciation of the area, it has identified some peculiarities. Most are associated with unexpected or inconsistent anomaly patterns across Lewis River Volcanics. Processing and updated geological input is advised before extended analysis can be justified. Extraction of subtle features coupled with an assessment of gross effects and related field distortions may be profitable where Dundas Group and Lewis River Volcanics are exposed.

2: INTRODUCTION

The coverage of the 1985 Department of Mines aeromagnetic survey is shown in Figure 2. It extends from 5300 000 mN (southern limit of Macquarie Harbour) to a little south of Elliott Bay (5225 000 mN) and from the coast to 395 000 mE. The region has been surveyed previously by various exploration companies (refer Leaman, 1973, 1980). Only the Lyell-EZ and BHP Co surveys have approached the scale and consistent coverage offered by the 1981 Mines Department survey and this addition. Unfortunately detailed specifications and results are no longer available for older surveys but a nominal drape at 150 m was attempted. All other lesser, and more recent, surveys, are fragmental in terms of coverage and specification. The 1981 survey sought to redress this situation by providing a modern, regional skeleton with capacity to allow detailed infill or extension where explorers felt desirable. This survey completes coverage of the southern part of the Mt Read Volcanics.

This report was commissioned as part of the Mt Read Volcanics Project. It was recognised that a total, quantitative evaluation was not possible within the time frame of the project and more limited objectives were set. These were :-

- i) to provide general qualitative interpretation for the survey.
- ii) to examine a few key areas in detail to test if regional signatures or property variations are recognisable and to provide some stand-alone examples of more complete interpretation.
- iii) to concentrate on issues associated with the structure and composition of the Mt Read Volcanics south of Macquarie Harbour.

This report cannot be an exhaustive treatment due to its preparation prior to availability of all observations, limited time and the unsatisfactory geological basemap on which to build. It has, therefore, been titled preliminary. Some effort has been made to extract bulk estimates of rock properties from the anomalies, which can be contrasted with the measurements summarised by Hudspeth (1986), and define unit distributions to aid future mapping.

This report forms only one unit in the Mt Read Volcanics Project regional appraisal. Others include interpretation of the 1981 aeromagnetic survey to the north (Leaman, 1986a), to the far north and north west (Bishop, 1986) and collation of rock properties (Hudspeth, 1986). All reports may be reviewed in conjunction with the ore deposit signature study (Bishop et al, 1986) and gravity interpretation (Leaman, 1986b). The early release of this report reflects data availability and the need to provide some interpretive conclusions at an early phase of the project. Revisions indicated by gravity data (in acquisition at time of writing) will be described in the gravity study report although some provisional comments are offered in Appendix 1. No magnetics results from the property determination programme were available by May 1986.

3: SURVEY DETAILS

The survey was flown by Geometrics International Corporation during November 1985. The survey area had been nominated as a useful extension of the primary 1981 survey (see Leaman, 1986a) for the purposes of the Mt. Read Volcanics Project. The specifications match those of the original survey which were designed to provide good results for regional analysis, to be reproducible for survey extensions or infill and which could be processed into other formats with minimal loss in resolution or detail.

Since the original survey was intended to form the basis of a more extensive survey (funds permitting), and complement rather than replace detailed surveys by explorers, a line spacing of 500 m (+/- 100m) was selected as the minimum separation able to resolve most first and second order structures. This may be contrasted with detailed surveys where 100 to 150 m is desirable.

The survey was flown with fixed wing aircraft to minimise costs and increase coverage. The aircraft was fitted with three G813 proton precession magnetometers and recording equipment (Geometrics G714 digital recorder and radar altimeter). Flight lines were east west or approximately normal to principal geological structures. North-south tie lines 10 km apart were observed. Magnetometer sensitivity was 0.2 nT and the nominal sample spacing 30 m.

The most critical specifications were related to terrain clearance and other elevation data. A nominal clearance of 150 m (or an envelope of 50 to 250 m) was specified for several reasons. If the drape could be flown then a high resolution result of direct benefit for mapping purposes would be obtained outright. Secondly, no detail would be lost by flying close to the ground as in fixed height presentations, since fixed height surveys would either have to be flown at different elevations in various parts of the area or at a height often too high to retain details on units elsewhere. It is not known, at the time of writing, how well this specification was met for this survey but no problems were anticipated due to the low to moderate relief of the area.

Recovery was based on continuous tracking colour video to topographic maps at 1:50 000.

The observed data were corrected for misties and diurnal variation with flight path recovery to industry standard. Flying was not attempted on days when the field was disturbed (4-5 nT/5 mins). The International Geomagnetic Reference Field was subtracted (updated to Dec 1985), a 2000 nT shift added and the results plotted. No other corrections were performed and the data was gridded on a 100 m cell and filtered using a 150 m radial polynomial filter before contouring. No attempt was made to compensate for any varying terrain clearance or terrain anomalies and spurious or modified anomalies may be included in the original presentation.

These are not considered likely or serious in this survey (contrast Leaman, 1986a).

The data was to be supplied by the contractor in four forms:-

- i) flight path plots,
- ii) stacked profile plots (e.g., Figures 8, 12, 17),
- iii) contour maps (e.g. Figures 1, 2, 4, 5, 11, 16),
- iv) digital magnetic tape (not available as at May, 1986).

The contour interval is variable but 5 nT was used in areas of low magnetic relief. This tends to enhance minor anomalies at the expense of larger features (compare with profiles, e.g., Figures 16, 17). Intervals include 5, 10, 50, 100 and 250 nT.

This report presents, in much reduced form, only the compilations for the residual magnetic field. Copies of other plots and magnetic field plots at scales of 1:50 000, 1:100 000 and 1:250 000 are available from the Department of Mines. Three sheets comprise each plot.

Various processing options are available. These include regional-residual separations, recontouring, correction to uniform terrain clearance by line or area and transformation to fixed level. Interpretive options include trend, susceptibility or first and second derivative analysis.

Coverage of the 1981 survey was incomplete over the central part of Macquarie Harbour. This deficiency has now been overcome as part of the 1985-6 programme. The relevant survey fragment was presented as Figure 3-4 in Leaman (1986a). It is not discussed in this report.

4: INTERPRETATION

4-A: GENERAL

i) Introduction

Interpretation has been restricted to a general commentary and to a few specific issues due to time constraints on this phase of the Mount Read Volcanics Project. The commentary and chosen issues were selected to augment other literature in the public domain (e.g., Corbett & Brown, 1975; Hermann, 1985) and to provide guidance and leads for extensions of this project. Many options are currently limited by the quality of regional mapping available for this survey area.

ii) Geology

The geology of the area covered by the survey discussed in this report is not well known. The body of this interpretation depends on the 1:250 000 regional maps of Corbett & Brown (1975) and Williams & Corbett (1977) augmented by the mapping of Geopeko north of Elliott Bay (Hermann, 1985). Much of the regional mapping depends on photo interpretations and work by exploration companies prior to 1975 (esp. Corbett (1968) and Hall et al (1969)). There is little uniformity in presentation and no guarantee of structural or stratigraphic consistency. Only the work by Geopeko is at a standard comparable with mapping in the bulk of the West Coast Range (e.g., Corbett, 1984).

Hermann (1985) lists five principal units in the Cambrian sequence. These include:

1. The Lewis River Volcanics, considered equivalent to the Central lava belt of Corbett (1981) are essentially acid-intermediate, up to 7000 m thick and believed to be in unconformable or faulted contact with basement. The Wart Hill Pyroclastics lie near the top of the sequence.
2. A Western Volcanic Sequence, considered equivalent to the Western sequence of Corbett (1981) is predominantly rhyolitic but includes shales and tuffs 1500 m thick.
3. Mainwaring Group, 2500 m thick, composed of basic tuffs, lavas, phyllite and slates.
4. Dundas Group correlates, more than 1000 m thick, consisting of greywacke, siltstone and argillite.
5. Tyndall Group equivalents, 100 to 150 m thick, of epiclastics appear to lie unconformably on Lewis River Volcanics.

All units are considered to dip and young westward north of Elliott Bay although the alteration and deformation present makes identification of true dip and bed tops uncertain. At least 900 m of Lower Ordovician materials overlie the Tyndall Group. Microgranites have been intruded near the contact between Cambrian and Precambrian rocks east of the Hudson River and other granites (including pink and white types) of probable late Cambrian or early Ordovician age are exposed on the coast at Elliott Bay.

The effect of limited exposure and complex deformation on mapping uncertainty is unknown and the apparent conflicts in facing between the Spero and Wanderer Rivers may reflect outcrop difficulties or overturning of the sequence as observed along the coast further south (Corbett, 1968). Extant maps (e.g. Figure 3) suggest other apparent conflicts between the north and south of the survey area. The Ordovician at Mt. Osmund and Birch Inlet overlies different volcanic sequences. This suggests either absence of sequence, thinning from north or south (and westward from Precambrian basement) or major structural displacements between the two regions leading to either removal of part of the Cambrian sequence prior to deposition of the Ordovician rocks. Options include uplift and/or thrusting. Major fault breaks between parts of the section are evident at Elliott Bay. Similar juxtapositions occur in the range north of Queenstown.

Few other direct inferences are possible based on available mapping and this interpretation considers gross structural and stratigraphic correlations only in order to contribute an improved understanding of the region and any anomalous zones.

Metamorphosed Precambrian rocks are exposed east of the Cambrian Mt Read Volcanics axis. Precambrian rocks of unknown relationships are exposed within apparent fault blocks south of Cape Sorell and Macquarie Harbour.

The Owen Conglomerate of late Cambrian-Early Ordovician age unconformably or disconformably overlies the Cambrian or Precambrian sequences. Some of these relationships were described above. The Ordovician Gordon Limestone Subgroup overlies the conglomerate (where present) with varying degrees of conformity. The Siluro-Devonian Eldon Group consisting of mudstones, quartzites conformably overlies the Ordovician.

All units have been folded several times in their history, the latest orogeny being in the late Middle Devonian. Massive intrusion of granites accompanied this event. Permo-Triassic rocks of the Parmeener Super Group were deposited on the irregular topography of the early Permian and were later intruded by Jurassic dolerites. Remnants of these post Carboniferous rocks occur near Pt Hibbs. Tertiary materials cover a substantial area south of Macquarie Harbour east of Birch Inlet. The nature of the deposits is unknown.

iii) Materials and properties

Rock units within the region were outlined briefly in the previous section. Very few units possess significant magnetic properties. The first attempt to collate these properties was made by Leaman (1973). These early results suggested that the ultramafics, some of the volcanic units and magnetite-bearing tuffs would generate most anomalies and that these units could be mapped magnetically. Susceptibility data was collected but no attempt was made to measure remanent magnetisations. These deficiencies are being overcome (Hudspeth, 1986) but no results were available for this interpretation. Inferences from anomaly studies and available

results have been summarised in Table 1 (reproduced from Leaman, 1986a). Where sufficient data are available it will be noted that the inferences lie within measured ranges with few exceptions. This indicates that the bulk values should be employed for modelling and anomaly assessment. In several notable cases, for example Tertiary and other basalts, the inferred value of effective contrast exceeds the measured susceptibility but not the observed susceptibility plus a reasonable allowance for the remanence using an average value for the Koenigsberger ratio. Sample measurements, where available, and bulk field inferences have been compared in the table.

The Precambrian sequences are essentially non magnetic and associated with stable fields and gentle, smooth gradients. Many anomalies can be related to "quartzite - pelite" boundaries or "mineralogically complex" units. These units tend to be less than 500 m thick. More highly metamorphosed units are more magnetic and locally may have contrasts of 0.0025 to 0.004 cgs. Garnet-bearing units are readily identified but existing mapping does not permit consistent explanations for all lithology-anomaly associations.

Most sedimentary (turbidite) Cambrian units have little obvious magnetic signature although no area of such materials is free of anomalies. These tend to be small and isolated suggesting local intrusives, minor extrusive content or mineralisation. Acid - intermediate rocks yield a slightly noisier field but only rarely is the effect in excess of 100 nT. Basic - intermediate volcanics are more distinctive with an anomaly relief sometimes in excess of 1000 nT.

Other Palaeozoic materials are non magnetic.

Younger materials, such as Jurassic dolerite, generate a distinctive anomaly style but are not significant in this area.

The values ultimately used in modelling must be treated as very approximate bulk estimates at this stage. Most have been derived directly from anomaly characteristics with allowances for indicated surface distribution of the particular lithology (where exposed). Contrasts are relative.

SI and cgs unit relationships are not provided in the table but an example of their equivalence and use of either system was provided by Leaman (1986a - Section 4-F-i, page 78).

TABLE 1

Unit age/group	Magnetic properties Measured			Inferred Effective Contrast	
	Susceptibility x10 cgs	Magnetisation μ Gauss	K	lab	field
.....					
TERTIARY					
sediments	-	-	-	0	0
basalts	0-1.7	0-10000	20	5-6	3-6
JURASSIC					
dolerite	0-5	100-7000	1-5	4-7	2-7
PERMO-TRIASSIC					
	-	-	-	0	0
DEVONIAN					
Meredith/Heemskirk/Pine Hill/Qz porph			-	0	0
Contact alteration zones					0-3
Housetop granodiorite	0-0.3			0-.3	0-.3
skarn	0-0.5			0-.5	0-.5
	0-80			0-80	
ORDOVICIAN TO DEVONIAN					
Gordon/Eldon Gps	-	-	-	0	0
CAMBRIAN					
Tyndall Gp					2-3
Dundas Gp	0-0.2				0-1
Crimson Ck Fm	0-8				0-3
Success Ck Fm	0-0.2				0-1
Gabbros	0-1				3-5
Volcanic seq				.6-1.5	
Porphyry	0-0.8			.5-1	
Murchison gr	2-3				2-3
Serp Hill complex	0.3-6+				0-20
PRECAMBRIAN					
Deep Ck volcs	0-7				0-10
Qzite/phyllite	0.06/0.02				0-.5
Donah Fm					0-1
altered					1-2

4-B: REGIONAL COMMENTARY

The following notes provide a generalised, regional interpretation of the magnetic field. Correlations or contrasts with available geological mapping have been emphasised but the comments do not constitute a final interpretive statement. Terrain-sourced features and deficiencies in overall mapping may limit the reliability of some correlations. While these are not thought significant for this survey the effects have not been assessed.

Although Cambrian-related features have been treated expansively the entire coverage is described. The discussion refers to Figures 2 and 4 in particular. Figure 2 carries geological-geographical base material (from 250 000 geological map series) and a magnetic field overlay which can be related to the anomaly maps (Figures 1, 5, 11, 16). This set of Figures allows features to be related to discussion and geology as well as allowing review of data presentations free of obscuring reference material. Labelled anomaly numbers (Figure 4) are consistent with those of Corbett et al (1982) and Leaman (1986a).

As implied in the discussion of rock properties (Section 4-A) there are several distinct geological-magnetic field regimes within the surveyed area. The magnetic field is generally quiet and relatively few units generate a significant response (refer Figures 8, 12, 17).

Regime 1: The high frequency noisy field of basaltic materials (Mainwaring Gp). This is evident south and west of Macquarie Harbour. The result is unique; the anomalies dominate Figure 1.

Regime 2: Other high amplitude anomalies reflect ultramafics such as south of Asbestos Point (8)

Regime 3: Compositional variations within the Precambrian rocks produce minor but mappable anomalies.

Regime 4: Most other minor anomalies are related to Cambrian rocks. The response is governed by sensor clearance, exposure or lithology. Some magnetite rich tuffs, local igneous content or alteration generates the observed responses. Very small residual anomalies are associated with variants of Lewis River Volcanics and Dundas Group.

Regime 5: Subdued anomalies beneath Tertiary or Ordovician - covered areas. The size of anomalies reflect the composition of the concealed material and thickness of cover.

The contour presentations stress the subtle gradients which pervade the large tracts of non magnetic rocks. Typical gross, systematic variations are often of the order of 125 nT across 10 or more kilometres. These effects imply that those units which are magnetic, and often subtly so in total, are usually present in substantial volumes with a considerable depth range. The Cambrian rocks west of 385 000 mE must represent the tip of a very large volume of material in order to generate regional tail effects of the magnitude evident south of Moores Valley.

Various anomalies have been labelled for ease of discussion

(Figure 4). The numbering system extends that used by Leaman (1986a) and, where appropriate, is consistent with it. Anomalies 6, 8, 9, 11 are extensions of features noted further north. Label patterns (e.g., 8A to 8H, 8AA to 8FF) have been used to draw attention to related features.

Anomalies 6 and 6A are associated with the fault(?) zone between Precambrian and Cambrian rocks but the field is apparently more disturbed north of this structure. The sizeable gradient across the Precambrian block (toward 8) is largely induced by geometric and contrast effects at 8 to 8AA. Although there are some faint herring bone suggestions in this gradient there are also some indications of small anomalies with amplitudes of no more than 20 nT. These might be equivalent to smoothed forms of features noted northwest of 6 but are less pronounced because the exposed lithologies north of 6 are slightly magnetic.

Anomalies 8, 9 and 11 were described in some length by Leaman (1986a) due to the problems imposed by complex structure, unknown properties and apparently unexplained location (esp 9, 11). This survey extension has clarified many of these issues since 9 is clearly associated with the faulted, offset block of Cambrian volcanics southwest of Birch Inlet while 11 may mark the general eastern limit of the Cambrian belt - which also coincides with the limit of Tertiary cover. This concordance is discussed below.

Anomaly 8/8A at the northern limit of the survey is compound (also Leaman, 1986a) but two principal components are separable. One, 8 - 8AA, extends southwest toward Pt. Hibbs and marks the complex faulted zone containing mafic volcanics, ultramafics and Ordovician rocks. The other, 8A - 8F, generally trends south toward Sandy Point and is related to predominantly mafic sequences. The correlation can be made near Mainwaring River (8F) and west of Birch Inlet (8B, 8C). Anomaly 9 can be correlated with the faulted continuation of the same sequence (at 9A). The gradients associated with 9 - 9A demonstrate that Cambrian rocks are covered by a very thin, uneven Tertiary veneer east of Birch Inlet. This is generally true of the entire belt in the region of the Spero and Wanderer Rivers (8D, 8E).

The anomaly pattern around the anticline - syncline west of the southern end of Birch Inlet (8B, 8C, 9A) is consistent with the mapping available; the stable gradient over the axis of the structure reflects a triangular pod of Ordovician material. The anomalies suggest that the structure is a relatively local aberration on a gross N-S axis extending from 9, 9A to 8D, 8E... The trend and dislocation pattern further west is more interesting. The southern part of the mafic belt bulges westward (8F) and this is mirrored by many small sources in the adjacent rocks (8FF). Note, however, that sources of type 8FF parallel only section 8F and coalesce near 8E. A similar effect may be observed for sources 8EE and 8C-8D. The sources for anomaly groups 8DD/8EE are more en-echelon but possess a gross NNE trend overall. The segments are aligned NNW and parallel the belt 8C-8D until features 8BB firmly establish the overall trend before terminating on trend 8-8AA. Apparently isolated occurrences of ultramafics near Pt. Hibbs are confirmed by the anomaly distribution but the overall pattern

implies complex structuring. It is possible that other mafic rocks are present, even Mainwaring Gp, reintroduced by overturning of a large syncline containing Dundas Group in its core. This possibility is sketched in Figure 18 where two possible axes have been suggested near the coast.

The observations suggest the presence of at least two slightly magnetic units within the predominantly sedimentary sequences overlying (relationship not established for entire length, see above) the western, mafic volcanics. The sequence is disrupted leading to a break up of the source pattern (e.g., 8DD, 8EE, 8FF), and is also detached from the main series north of 8E creating the non stratigraphic source relationships. Key trend alignments and unit orientations are rotated or associated with this northing (approx 5270 000 mN) and the main mafic sequence also changes in width and magnetic character. Many of these features are clearly seen in Figure 5. The zone between 8C and 8D is also anomalous, being more disturbed than similar zones nearby.

Noting the apparent juxtaposition of basal Ordovician to different parts of the Cambrian succession (also p. 6) I have inferred that the western margin of the mafic belt from 8A to 8E is faulted and possibly thrust with a normal relationship retained only south of 8E, 8FF. Similar conclusions may be inferred for the faulted zone 8-8AA. The last feature terminates and dislocates other structures. The repeated association of basal Ordovician and mafic volcanics in the fault zone, and in the folds, coupled with the change in trend and character from 8AA to 8BB (and possibly 8EE) indicates initial dislocations no younger than Lower Ordovician. Early thrusting followed by much later faulting and folding may account for this association but this also means that a portion, at least, of the thrust is contained in the complex fault zone at 8. This may account for the curious inset blocks of Precambrian basement. This style of structure was alluded to by Leaman (1986a) when describing the Cape Sorell region. It is quantitatively reviewed in section 4-C (Figures 6, 7, 9).

Anomalies 11B and 11C are continuations of anomaly 11 (Leaman, 1986a) which, due to the presence and orientation of the Tertiary "basin", was not easily explained. This survey shows, however, that the indicated eastern margin of the Tertiary basin (?) is also the virtual eastern limit for significant magnetic units. Exposures east of this zone and south of the 8C-8D disturbance (above) are offset and greatly thinned. Anomalies 11-11C are aligned with the axis of the eastern face of the West Coast Range further north and could only be generated by Cambrian sources. Their disposition reflects those zones in which the Tertiary, and any Ordovician or Silurian, cover is thinnest and defines the eastern limit of significant Cambrian deposition. Presuming that only the mafic sequence (8A, 9) could generate these anomalies and that it is not deeply buried at 11B then the western boundary near Birch Inlet must either be strongly faulted with throws in excess of 1 km, dip steeply east east of 375 000 mE (and not west as elsewhere) or reflect some combination of structures. Near Birch Inlet the sequence does dip east although this solution cannot be maintained south of Moores Valley (see earlier discussion on the significance of this northing). The irregular anomaly pattern between 9, 9A, 8D, 11B and 11C indicates that the structure is not simple and that cross section, thickness and depth of source materials are somewhat

variable. Profiles in the region of 11B are shown in Figure 8. Disrupted elements comparable to those west of Birch Inlet coupled with a generally thinning sequence and variable cover could explain the distribution and certain aspects of this hypothesis have been tested (Section 4-C).

Anomalies sourced within the Precambrian rocks do not appear to form any consistent relationship with units as presently mapped. This may indicate that more detailed lithological variations are critical rather than gross errors in mapping. These problems are illustrated by the following notes.

ANOMALY 70 appears to be related to platy quartzite in the Elliott Range but distribution is inconsistent with mapping and, if so, may indicate property alteration southeastward along the Elliott Range. ANOMALY 71 is an extended feature which probably defines the anticlinal axis between the King Billy and Elliott Ranges. Its location suggests that the axis is up to 2 or 3 km east of the inferred mapped position. An integrated basement source, based on lithology-anomaly relationships south of King Billy Range, could reflect any combination of quartzite/pelite/platy quartzite units comparable to materials near Mt. Lewis or north of Western Plains. Continuation or smoothing of the observed field in the region of Mt. Lewis could yield a result similar to either part of anomaly 71. The high amplitude northern part of 71 implies a change in the depth of burial (Figure 11).

ANOMALY 73 is an extended, compound feature associated with the southern face of King Billy Range and near the Twins. Most of the feature can be related to pelitic rocks. Sharper features do not possess obvious mapped sources. The northernmost feature extends to the Gordon River beneath relatively thin Ordovician section. This group of features could, when continued or buried, yield both parts of 71 (Figures 2, 11).

ANOMALY 74 is similar to the peak parts of 73 and is wholly unexplained by existing mapping in a quartzite area.

ANOMALY 75 represents a small group of features at Mt. Lewis. These appear to be related to the boundaries of the pelitic series.

ANOMALY 76 east is related, apparently, to quartzites but may in fact be sourced by the same material generating the peak responses in 73.

ANOMALY 81 is another group, near Moores L.O. which appear to be associated with pelite boundaries. Moderate amplitude anomalies can be correlated with pelites but the larger features do not possess wholly convincing relationships.

ANOMALIES 83 and 84 are essentially similar to 81.

ANOMALY 85 near Nth Broken Hill cannot be related to any mapping suggestion.

ANOMALY 90 is a relatively subdued anomaly group across the Lawson Range and apparently wholly associated with quartzites.

ANOMALY 91 is another pattern comparable with 81, 83 and 84.

These comments suggest either some inadequacy in mapping or appreciation of source types and lithological - magnetic variations within a given rock type class - e.g., quartzite. It is notable that all sharp gradient features within 75, 81, 83 and 84 lie north east of one particular pelite boundary which extends from Mt. Jean toward Hazel Hill (see Figure 18). The elevated general response in blocks

75-84 and 91 may reflect a volumetric increase in pelite content.

Several anomalies can be directly related to Cambrian rocks north of Moores Valley (72, 76 west, 78, 79). Sizeable anomalies have been observed along the D'Aguilar Range (72), at Thirkell Hill (77), at Hazel Hill (76W) (Figures 11, 12) and at Moores Valley (79) itself. While part of the response at 72 may be affected by topographic considerations its termination near Innes Peak (and the similar depletion of 77 northward) are not explained by any single, simple lithologic or structural changes. No consistent result is possible if it is presumed that variously plunging sources account for the responses. Some topographic effects or clearance deviations may have enhanced the anomaly at the northern end of the D'Aguilar Range (72) but this is not established. The continuity implied by regional mapping and moderate, consistent westerly dips is not matched by the magnetic field. Alternatively, a unit within a kilometre of the western boundary of undifferentiated rocks Cambrian between D'Aguilar Range and Thirkell Hill is substantially altered in the region of Innes Peak. Review of the character of 73, 8BB, 8DD and 8D shows that a NNW-SSE effect is superimposed on an E-W effect in this region. These deductions may be significant (see Section 4-G, Leaman, 1986a). NE-SW faulting mapped is also reflected in the magnetic field. Comparable properties may be observed at Hazel Hill and within the same stratigraphic positions across the fault which offsets this basal sequence. The NNW-SSE corridor through Innes Peak modifies the entire response. Another anomalous areas lies between Hazel and Thirkell Hills at Hales River. While faulting may have contributed to property changes and there is evidence of geometric effects, pending more detailed geological information and 3D structure block modelling, the material east of the river appears abnormal.

ANOMALY 79 is the natural extension of 8F and the general easterly curl of the mafic belt (see below) while 78 is probably the same structure slightly offset and much more deeply buried. It is probably similar to 11C. The loss of all character midway along the trend 11C to 78 confirms the presence of a cross cutting influence leading to contrast loss.

The character of the magnetic field across the Cambrian rocks south of Moores Valley is distinctive. It is virtually non anomalous (see Figures 16, 17). There is a simple gradient, generated west of Mt. Osmund, which extends as far east as the Wanderer River (80) and North Broken Hill (85). This shows that the bulk of the undifferentiated Lower Cambrian (Lewis River Volcanics) is essentially non magnetic. There are variations, some of which may prove to be important, with residual amplitudes of 10 to 40 nT. Several can be related to the microgranite boundary east of the Hudson River while those south and east of Mt. Osmund may be related to mineralisation (see mapping described by Hermann, 1985).

The mafic volcanics south of Moores Valley generate a more streaky anomaly pattern (8F-8H) than further north (8D-8E). This is consistent with thinner or more isolated magnetic members or an opposing facing. Present mapping is inconclusive and some further field work is recommended. Anomaly 8G may simply reflect exposed volcanics west of a substantial fault but this is unlikely since the Tertiary cover in this region cannot be related to any anomaly

variations (See Figures 2, 16). Anomalies 86, 79 and 78 most probably define the eastern limb of a syncline plunging northward. This view is supported by modelling (below).

Minor mineralisation has been recognised within the Lewis River Volcanics, Mainwaring Group and Dundas Group rocks but it is not possible to directly relate the present survey to these occurrences, all apparently minor, in the absence of more detailed coverage and the actual observations. Historically, most prospecting has been directed at relatively obvious positive anomalies which, in most instances, have been associated with abnormal magnetite levels in granites or pyroclastics. Signature studies (Leaman in Bishop et al, 1986) indicate that more subtle pairings (high in larger low) or obscure alteration effects are the features requiring follow up study.

The mineralisation near Voyager 19 (Geopeko nomenclature, Hermann, 1985) lies near 86. The anomalies here are at least partly due to faulting and a gross NE-SW variation. The NE effect which terminates the mafic belt has been mapped as a fault zone. Anomalies 87, 87A and possibly 88 may be due to some more mafic contributions or to thermal alteration about the granite at Low Rocky Point. 87 and 87A probably reflect block limited occurrences of Wart Hill Pyroclastics although an isolated exposure of granite occurs within this zone. 88 is directly related to compositional variations within the coastal granite (white versus pink). The granite is easily recognisable. Several small but marked anomalies can be observed within the Lewis River Volcanics. 89 is an example. The absence of any clear stratigraphic patterns suggests that these effects are due to localised faulting and rock boundary effects or mineralisation. The anomaly group, of which 89 is part, contains several NW-SE elements while forming a gross NE-SW trending block. Neither orientation is consistent with extant mapping or observed strikes.

4-C: STRUCTURE MODELLING

In order to test as many of the qualitative inferences noted in the previous section several profiles were examined. Particular implications for gross structural patterns and property variations, including suggested contrasts, were considered. As only a few days were allocated to the entire report this modelling study is necessarily limited. Many aspects remain highly ambiguous and the application of other methods will resolve many problems. Appendix one describes some very preliminary gravity interpretation within this region.

LINE 20120 (approx 5295 000 mN) Figures 6, 7, 19.

Two options for line 20120 have been presented. These were intended to stress potential ambiguities and issues unresolved with this level of treatment.

Model A. This contains a slightly magnetic western section and a shallow, relatively low contrast eastern section. The body of the solution, from 9000 to 19000 m, reflects geological constraints as mapped. A complex anticline-syncline couplet readily accounts for the two large anomalies. Magnetic, presumed mafic, rocks lie near the apparent top of the Cambrian section. The bulk of the Cambrian section could possess contrasts of 0.0015 to 0.002 cgs but more likely values are less than 0.0005. Ultramafics, and the complex fault zone generally, could present a contrast in excess of 0.004 cgs. The fault zone containing the ultramafics has probably been folded into the body of the section.

The area covered by Tertiary sediments may conceal a thick wedge of low contrast materials, a thin wedge of high contrast material or some combination. The minimum thickness for Tertiary and Ordovician cover is about 200 m. The complete section is folded back.

In model B the high contrast mafics can be shown to be folded back but a thick, low contrast section could lie beneath. This cannot be determined with any precision magnetically. Irrespective of solution type the shelf anomaly (11 parts) shows that some wedging and thinning must occur. This is consistent with absence of, or thin sequences of, Cambrian rocks east of this zone. The calculated response, while not an ideal fit on this profile, could be present on profiles crossing other parts of 11B (Figure 8).

The magnetic method alone cannot resolve the compound issues of cover thickness, thickness of section or its content between anomalies 9 and 11 but the general form is indicated.

Another key issue lies west of 364 000 mE where segments of the Precambrian basement blocks are shown to be volume limited and must be underlain by magnetic materials which dip east, either in bulk (model A) or with high contrast members (model B). Assessment of total thickness is uncertain magnetically. Model B can be used to suggest a sequence of Lewis River Volcanics, mafic volcanics and possibly two thrusts - one highly disrupted but juxtaposing Ordovician rocks and mafics while the other was responsible for the

entire detachment of large parts of the basement. The models allow Precambrian material (virtually non magnetic material) to extend eastward beneath the mafic/ultramafic zone but above the concealed (repeated?) magnetic section. Thrusting is implicit in this zone however the present models and properties are explained and the complexity of the fault zone (8) is produced by superimposed faulting and Devonian folding.

The models translate into the following geological relationships even though many details are not precisely described. A large part of the Cambrian section is repeated and overlain by slabs of basement. Dislocation has occurred near the top of a thick mafic member and this enables a magnetic reconstruction of the structure. The dislocation, presumably a thrust originally, has been faulted and this has reinforced the confusion in the zone containing the ultramafics as well as introducing fragments of Ordovician rocks. The Cambrian section thins rapidly onto the Precambrian basement near 380 000 mE. The principal axis for Cambrian volcanic piles and sedimentation lies west of 375 000 mE.

All the general conclusions above are supported by the gravity data although the latter suggest, probably more realistically and certainly compatibly within the gross relative resolution of the two potential methods, a much thicker pile overall. This serves only to stress the detachment of the basement blocks.

LINE 20270 (approx 5287 500 mN) Figure 9.

The features recognised along line 20120 are essentially repeated. Comparable dislocation and fold patterns are implied. The solution offered is simpler and more convincing than 20120 model B (Figure 7) west of the mafic axis (373 mE). The ultramafics are more easily separated and the requirement of a repeated, high contrast/low contrast deeper section well defined. A similar thrust - fault superposition can be extracted. The gross synclinal arrangement, with probable down faulted axis, of the eastern part of the section is also demonstrable. A small anticline was included along a projected extension of the D'Aguilar Range to indicate the effect of introduction of a thin Cambrian sequence. There is evidence of such a structure in Guy Fawkes Rivulet.

An important issue in this section relates to the small anomaly near 375 000 mE since the source is at very shallow depth. The Tertiary cover is locally much less than 200 m since the source of this feature is sub vertical and must lie within Ordovician rocks of the syncline. Oxides and alteration along a fault zone is the probable explanation. An array of contrasts can be identified within the primary anomalous block. A substantial volume of undifferentiable but slightly magnetic Precambrian materials are also indicated.

LINE 20390 (approx 5281 500 mN) Figure 10.

The interpretation offered is consistent with previous lines overall and can be used to suggest major faulting and other displacement near the ultramafic belt even though a strongly magnetised unit is absent below them - however emplaced. Note, however, that a combination of high and low contrast materials (as in model B, line 20120, Figure 7) could be equivalent. The coastal

structuring near Pt. Hibbs cannot be resolved in detail with the present data but a moderate displacement can be inferred. The disturbed area at Pt. Hibbs lies immediately south of a zone which disrupts the main mafic belt (8C-8D) and disorients the major structures mirrored by anomaly 8.

East of the syncline the solution is uncertain due to depth factors. The structure could be dislocated, as in the model, or continuously thinning at greater depth. The main anomaly is complex but part of the block deviates from the pattern further north at about 370 000 mE. The anomaly near 387 000 mE reflects exposure within the Lower Cambrian sequence on the D'Aguilar Range. Much of the Precambrian section is also slightly magnetic but no attempt has been made to resolve details within it. The bulk contrast implies that several units possess significant contrasts.

LINE 20540 (approx 5274 000 mN) Figures 13, 20.

This model contains the main sedimentary part of the Cambrian section and this is only slightly magnetic. The ultramafics, or extensions of them, are insignificant. The syncline deforming the mafic units, and which are presumed overlain by Ordovician and Silurian materials, is consistent with other profiles. The eastern limb is not easily incorporated irrespective of assumptions about the effective contrast of the Cambrian section. Figure 13 offers a solution with a deep but thin high contrast mafic member as the only source for the anomalies observed. It is an excessive source volume - contrast product which excludes the likely, but large volume of low contrast volcanic pile beneath as exposed north of Elliott Bay. As inferred qualitatively this part of the sequence is massively altered and properties destroyed. Complete definition of the resultant contrast and its distribution north and east of Thirkell Hill would be possible with extant data but is beyond the scope of this report.

Some suggestion of raised local contrasts within the Precambrian basement is also included in the model. Only a gross approximation is offered to account for overall trends and some units are clearly more strongly magnetised.

LINE 20930 (approx 5254 500 mN) Figure 14.

All elements of the structure inferred in previous sections are present but compressed into a compound and possibly overturned whole. All materials are less magnetic.

This section, south of the inferred Moores Valley axis (see page 10 and Figure 18) is distinctive and superficially unlike those north of Moores Valley. The mafic rocks are much less magnetised (0.002 vs 0.004+ cgs) and compound. Anomalies 8G, 8H are due to separable units. Mapping supports a steep westerly dip away from a pair of large faults. East of the faults in the region of Mt. Osmund a synclinal core of Ordovician materials rests on Lewis River Volcanics. These are much less magnetic than most other Cambrian rocks. The model suggests the minimum volume for these materials by using a contrast consistent with units further north. The profile match also shows this to be so. A several kilometre thickness of material, at contrast of 0.0003 to 0.0005 cgs, is implied.

The model stresses the significant character of the major

fault(s) west of Mt. Osmund, feature(s) recognisable on all other profiles, while demonstrating the fundamental change in structure across Moores Valley and in particular its effect on unit content east of the fault and overall structure west of the fault. Mafic materials are probably absent east of 376 000 mE while other volcanics are present in a thick pile. West of 375 000 mE the section is west dipping but north of Moores Valley these units are east dipping.

LINE 21120 (approx 5240 500 mN) Figure 15.

Simple magnetic modelling of sections near this northing cannot be especially informative since field variations are subtle and generally three dimensional. More detailed treatments are practicable and essential. Features near the margins of the exposed granites are exceptional. Modelling indicates that the granite bodies may be essentially tabular although the dips of all contacts are not well defined. Some boundaries are also faulted. The more pronounced anomaly on the western side of the intrusion may reflect normal alteration effects. Comparable responses appear to have been recorded around the microgranite at the eastern end of Elliott Bay.

The model also suggests a bulk contrast for a large part of the Precambrian basement near the coast.

There is a coherent pattern to the interpretation offered by these limited models and the comments in Section 4-B which preceded them.

The sequence is complex and folded and may even be wholly overturned to the south. The Cambrian succession thickens rapidly westward from the exposed Precambrian basement of the Prince of Wales Block but the relationship between section thickening, and indeed the units themselves, is confused by major dislocations which date from late Cambrian times. Thrusting and subsequent faulting has produced the anomalously isolated Precambrian blocks south of Macquarie Harbour. More than one thrust is implied. The extent of Cambrian granites is not established but the volume appears limited. Contrasts within the main mafic series of Cambrian volcanics decreases southward. While the thickness of the Tertiary cover cannot be reliably estimated the anomaly patterns indicate a patchiness consistent with a filled drainage system and a typical maximum thickness of 150 to 400 m.

4-D: INFERRED ROCK PROPERTIES

The following table lists bulk contrast estimates deduced during the modelling process. While there is some evidence that remanence effects are significant for certain members of the mafic and ultramafic associations most anomalies can be accounted for directly using simple induction assumptions. Even in these cases, however, the effective or apparent contrast deduced, may be somewhat higher than susceptibility measurements would indicate. Some constructive interference of magnetisation effects is to be anticipated.

Precambrian:

General contrasts are less than 0.0001 to 0.0002 cgs although certain pelites and quartzites may have contrasts in excess of 0.0005 to 0.0007 cgs.

Cambrian:

Acid to intermediate volcanics	- max 0.002 cgs
Mafic volcanics	- 0.0025 to 0.0065 cgs
Mafic/ultramafic units	- 0.0045 to 0.015 cgs
Other sequences	- max 0.0015 cgs
	- implied bulk max 0.0003 cgs
Granite	- max 0.00015 cgs
(margins)	- 0.0002 cgs

Predominantly sedimentary sequences are virtually non magnetic but a significant and variable content of isolated flows, tuffs and similar materials may generate a moderate contrast when integrated from depths in excess of 500 m.

Other rocks:

Ordovician, Silurian and Tertiary rocks are non magnetic for all practical purposes unless alteration about fault zones or similar structures has induced localised, structurally controlled effects.

5: SYNTHESIS

Figure 18 attempts consolidation of many of the issues raised in this interpretation and relates them regionally. An array of inferred magnetic lineaments has been superimposed on the regional assessment of rock units. Many lineaments are not recognisable in the known distribution of materials and structures but are clearly suggested by pattern offsets in the magnetic field. In general, most geological boundaries, including faulted contacts, generate minimal magnetic responses. There are only two exceptions; boundaries to units or structures containing mafic or ultramafic materials (8). In such examples (e.g., 8A-8H) there is direct correlation between magnetic anomalies and mapped geology. Unfortunately many of these boundaries are covered by Tertiary sediments, or occur in areas lacking exposure and are unmappable. This survey indicates the extent of such units. It also suggests where significant lithological variations occur within the Precambrian basement. While available mapping indicates a range of lithologies and there is a varied and inconsistent magnetic response to them it remains possible to separate gross blocks as being more magnetic, and probably more pelitic, than others. The dislocations between such blocks and the mafic belt define many fundamental structures.

The lineament pattern inferred is consistent with that deduced further north (Leaman, 1986a). Although most lineaments trend NNW-SSE to NW-SE or NE-SW at least three zones containing major E-W features are evident. The NW or NE trend systems are directly mirrored in the regional maps. The E-W corridors are not.

The gross distribution of structures and structural blocks inferred accounts for the general distribution of Lower Palaeozoic rocks and Tertiary sedimentation. South of Moores Valley Tertiary sediments occupy a trough or warp near the junction of one basement block and a Cambrian trough. Some rejuvenation of a NW structure is implied. North of Moores Valley similar controls are indicated for the eastern side of the Tertiary "basin". The basin, so called, may be an eroded sag at the junction of large basement structures. There is evidence that this eastern boundary was also active in Cambrian times. The western margin is not well defined and while Palaeozoic movements are inferred it is possible that the Tertiary materials simply onlap older rocks west and south of Birch Inlet. The character of the magnetic field suggests that such deposits are quite thin - often much less than 100 m thick. This interpretation does not preclude a marked thickening of Tertiary material at, or near, the fault zone which disrupts the axis of the syncline on the eastern side of the mafic belt.

The axis of deposition of Cambrian materials lay west of 380 000 mE and although there has been considerable block movement the main body of the Cambrian sequence still lies west of 370 000 mE. The total thickness cannot be established magnetically without some anomaly filtering and selection but is certainly in excess of 5

kilometres. Apparent inliers of Precambrian basement south of Cape Sorell are faulted in place but could not have been presented with the existing relationships unless previously overthrust over much of the Lower Cambrian sequence. The presence of ultramafics in or near critical points indicates that these materials virtually define at least one surface of detachment. The existence of inconsistent relationships between various Cambrian and Ordovician rocks indicates that more than one detachment, possibly splintered, is involved. Certainly there is evidence for considerable Late Cambrian deformation.

Relatively few belts of anomalous properties or inconsistent magnetic characters are evident at this level of study. Four are marked in Figure 18. Mineralisation is associated with that near Wart Hill. One zone, lies deep within the synclinal axis just north of Moores Valley and is unlikely to prove of economic significance as a result. The anomalous fading of anomalies northward from Thirkell Hill, westward from Hazel Hill and southward from the D'Aguilar Range - all within equivalents of the Lewis River Volcanics - may be hints for useful exploration. The present survey coupled with some revised mapping should allow appraisal of any geometric, structural and alteration effects involved (see comments on methodology in Leaman, 1986a, Sect 4-C). This style of appraisal may be of benefit within the Lewis River Volcanics north of Elliott Bay or in the Dundas Group north of Urquhart River, especially near any of the inferred E-W lineaments.

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APPENDIX 1
PRELIMINARY GRAVITY INTERPRETATION

The brief notes in this appendix are based on an incomplete gravity coverage. Two profiles, at virtually natural scale, have been presented after basic modelling and these may be compared with the appropriate magnetic models (Figures 6, 7, 13). The final version of these models, and description of the gravity field, is to be found in Leaman (1986b).

The gravity data are more geologically comprehensive but generally support the style of the magnetic interpretation with respect to thrusting, structural forms and the location of the principal axes of Lower Palaeozoic deposition. The Cambrian granites appear to be depth restricted pods broken by thrusting and are not definitively recognised in magnetic studies.

The gravity profiles are distinctive and contain a sizeable step along the western side of the gross syncline concealed by Tertiary sedimentation as revealed by the magnetic models. The step reflects the massive accumulation of Cambrian rocks, at least 8 or more kilometres thick, and stresses the relative volumetric insignificance of the Precambrian inliers south of Cape Sorell. Tertiary sedimentation is relatively minor, apparently channelled and locally up to 350 m thick.

026029

400 E
+
5300

+
5260

+
5280

+
5270

5270N +
360E

AIRBORNE SURVEY SPECIFICATIONS

INSTRUMENTS - 3 BR-10 proton precession spectrometer
in field storage and zero time
Stability: ± 0.2 at
300 seconds

ACQUISITION INTERVAL - 1000 gamma ray spectrometer
pulse - 10.8 microsec
0.8 - 2.40 MHz
1.20 - 1.30 MHz
1.40 - 1.40 MHz
2.40 - 2.40 MHz
500 counts

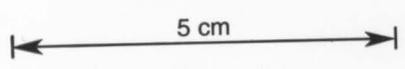
SPECTROMETER -

DATA RECORDING - Spectroscopic FTS acquisition system
Digital to magnetic tape
All detectors in operation at 1500
Scans per line 2000
File time 10 sec

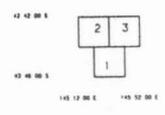
GROUND TRUTH DATA -

FLIGHT LINE RECORD -

SHEET THREE
RESIDUAL MAGNETIC CONTOUR
Grid station refers to Australia Map Grid Zone 55
Derived from aerial photos at 1:50000
Magnetic - uncorrected
and to line transfer
0000 - 0000 in 0.0000
1000 - 1000 in 0.0000
2000 - 2000 in 0.0000
3000 - 3000 in 0.0000
4000 - 4000 in 0.0000
5000 - 5000 in 0.0000
6000 - 6000 in 0.0000
7000 - 7000 in 0.0000
8000 - 8000 in 0.0000
9000 - 9000 in 0.0000
10000 - 10000 in 0.0000



5240 N +
370 E

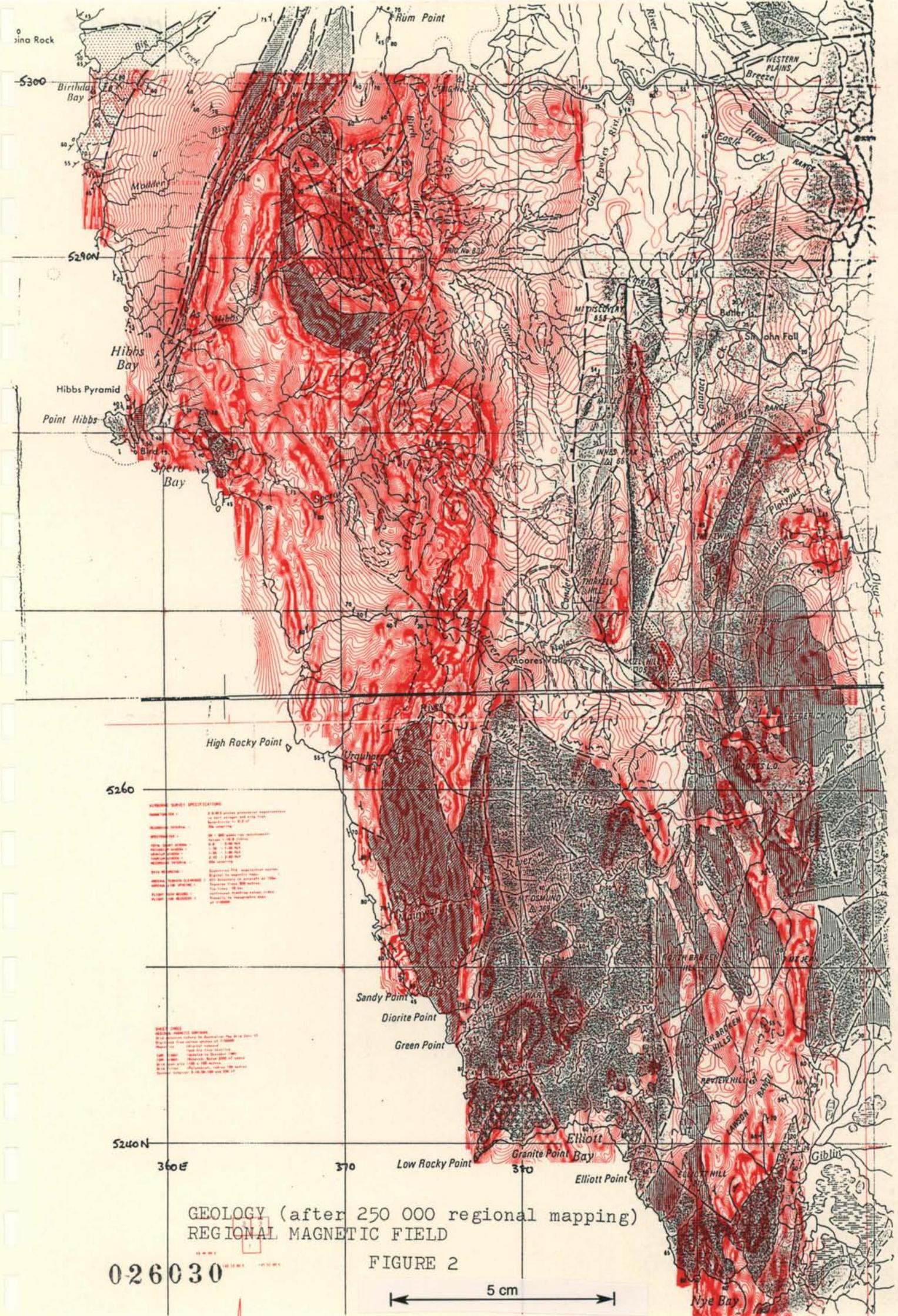


RESIDUAL MAGNETIC FIELD
(Birch Inlet to Elliott Bay)

FIGURE 1



142 40 00 E 142 40 30 E
142 40 00 S 142 40 30 S
Scale 1:50000

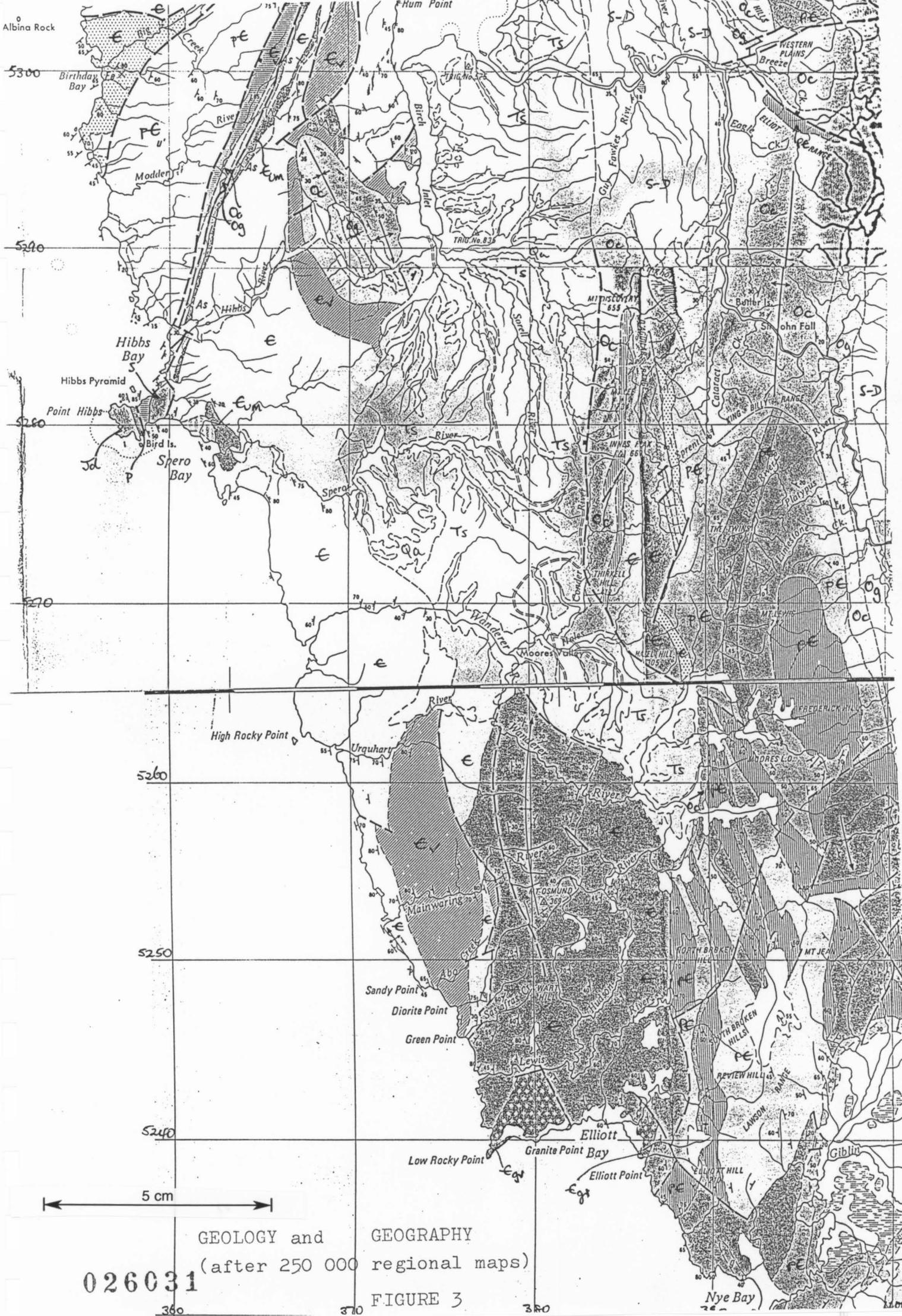


GEOLOGY (after 250 000 regional mapping)
REGIONAL MAGNETIC FIELD

FIGURE 2

026030

5 cm

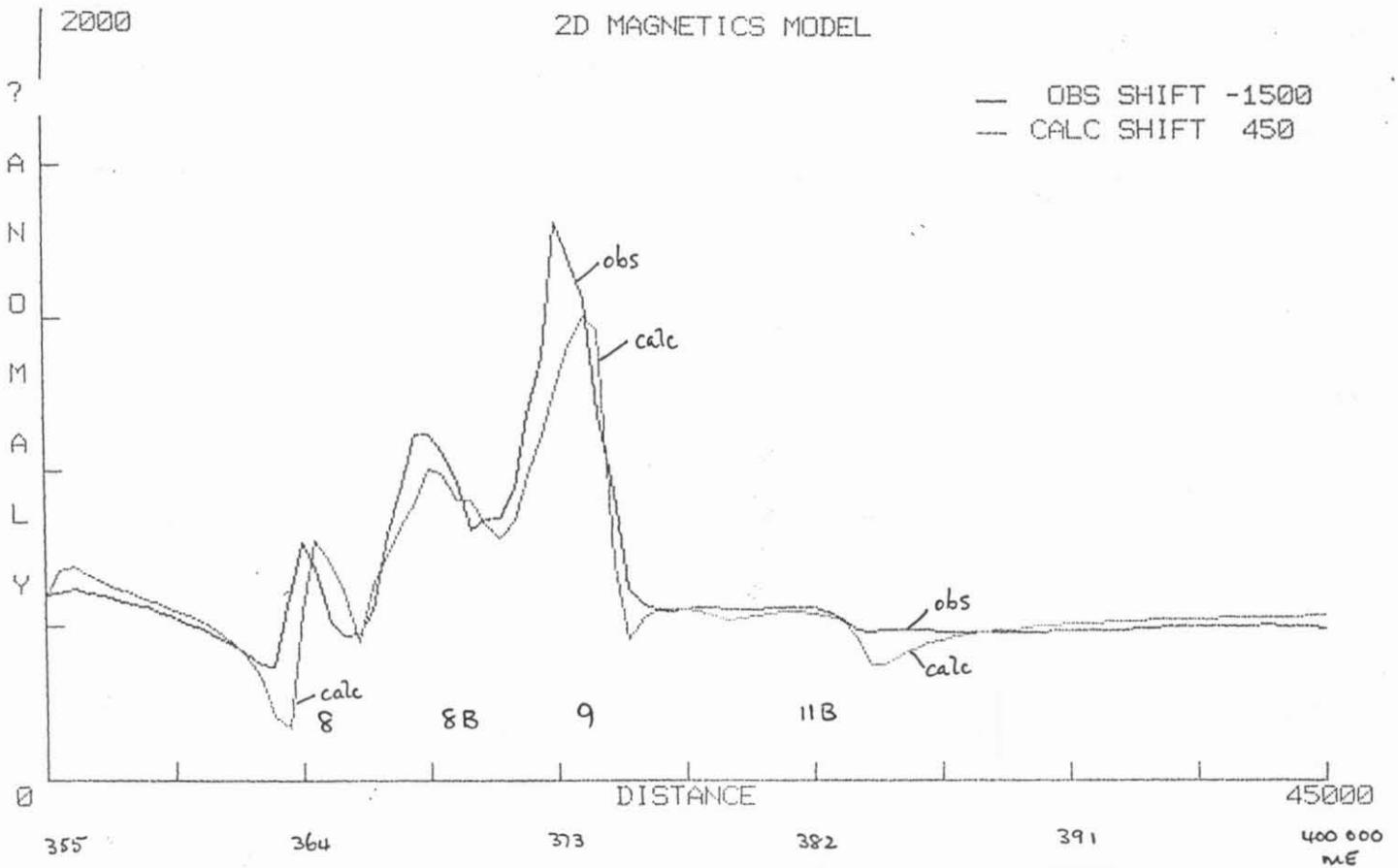


GEOLOGY and GEOGRAPHY
 (after 250 000 regional maps)
026031
 FIGURE 3

LEAMAN GEOPHYSICS

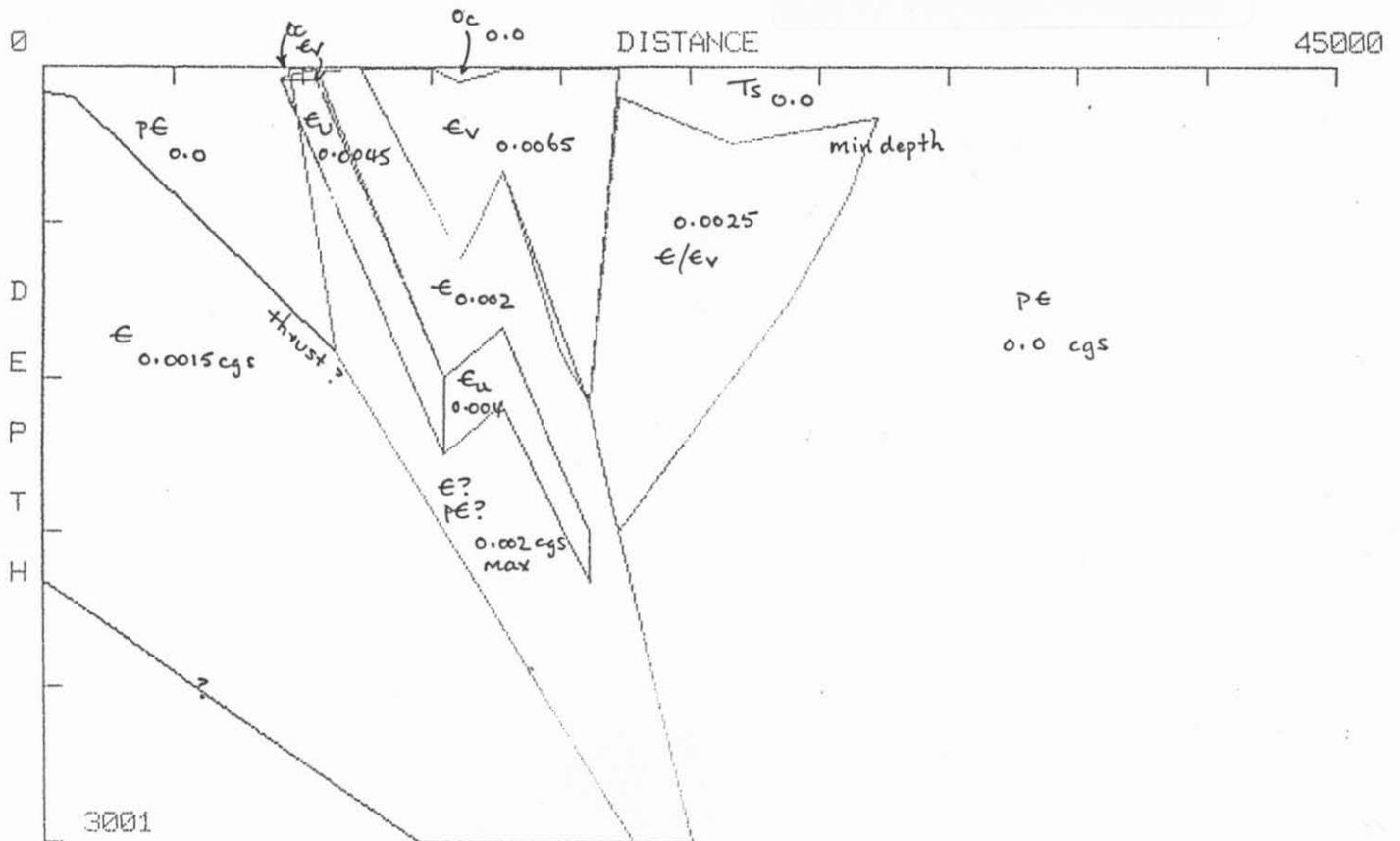
Survey Review, Specification, Reduction, Interpretation
Wide Experience Most Methods
Specialties:- Gravity, Magnetics, Seismic Methods

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TELEPHONE: (002) 47 8849



SW TAS MAGNETICS LINE 20120 355-400E/5295N

5 cm



026034

2D MODEL

LINE 20120

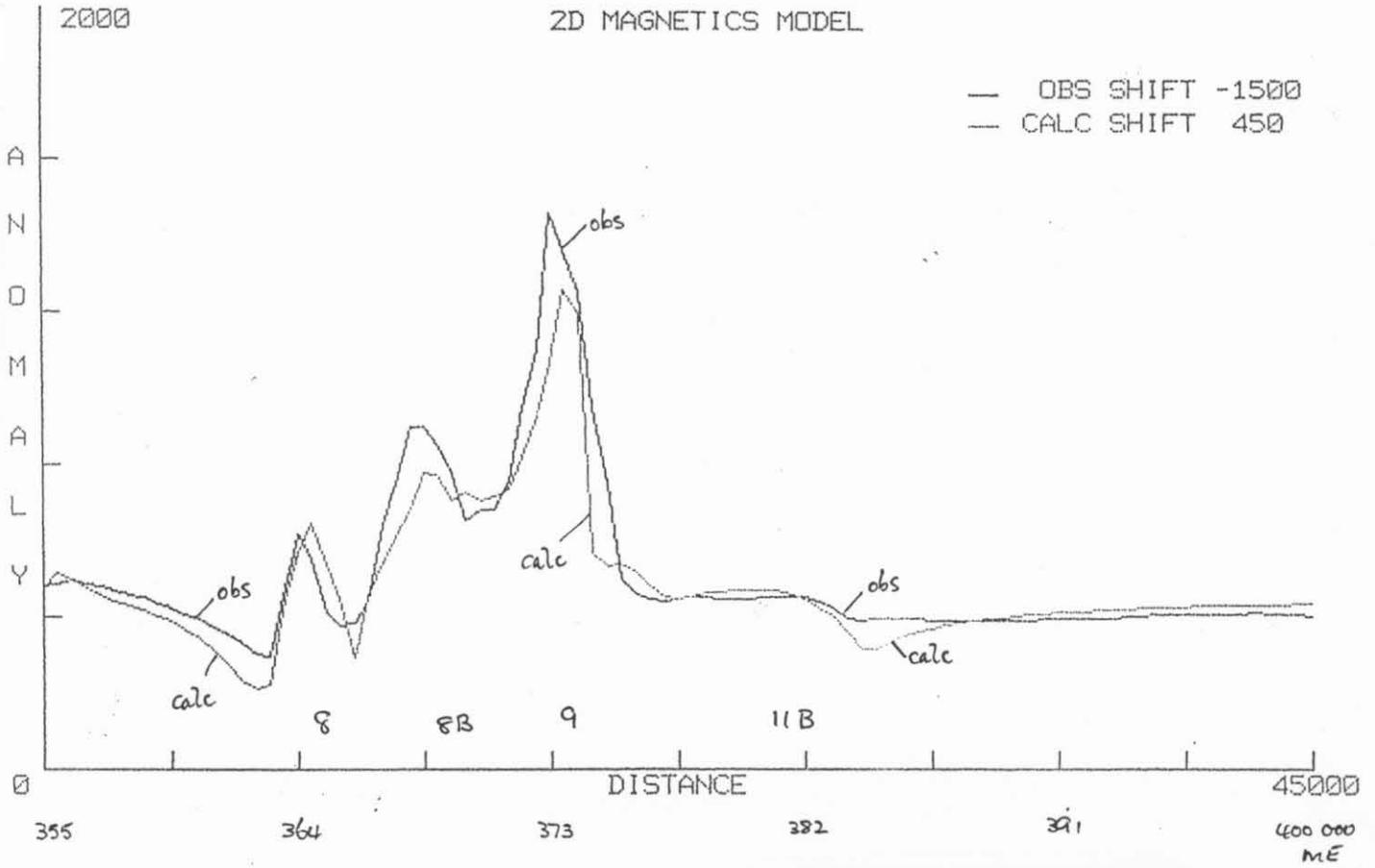
VERSION A

FIGURE 6

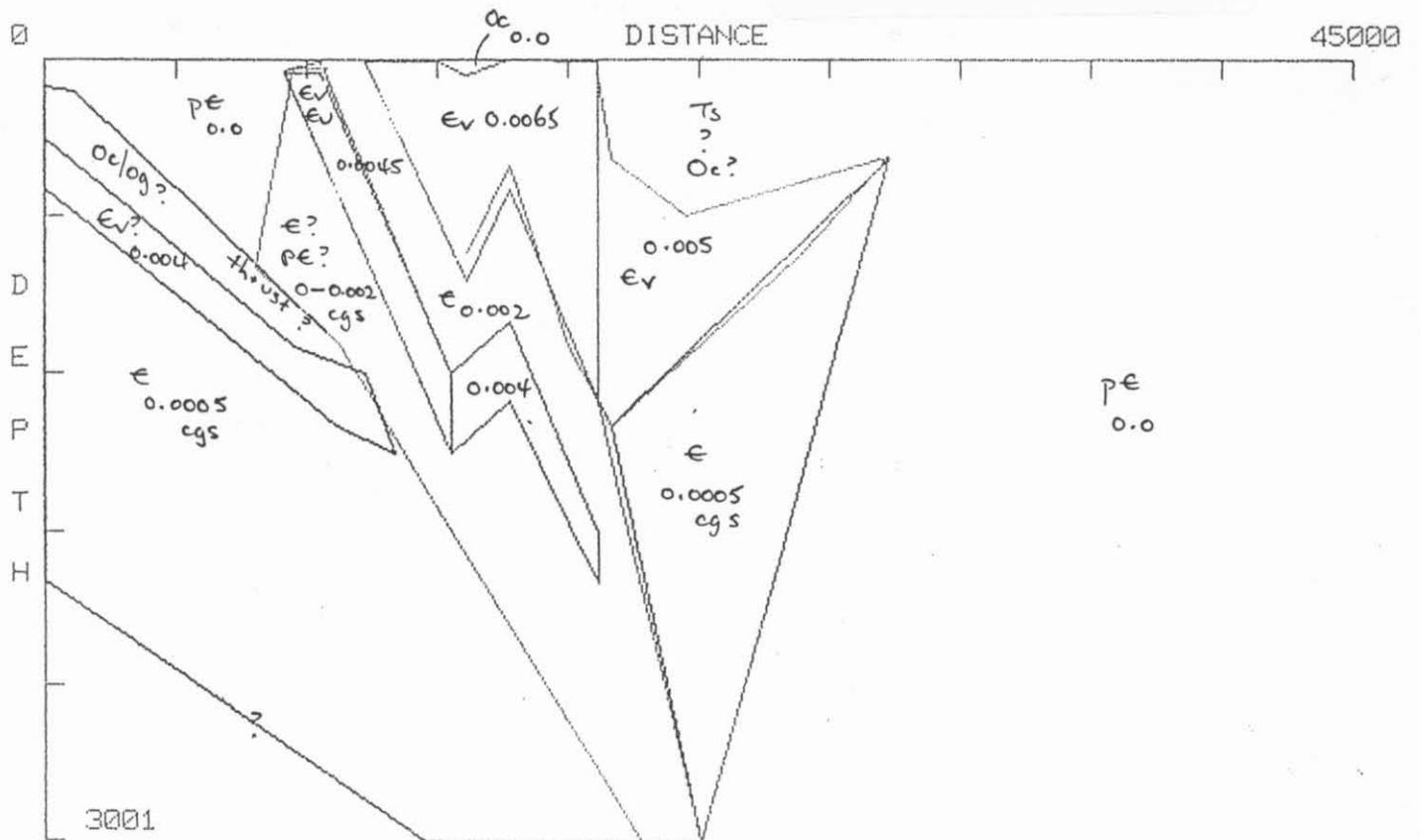
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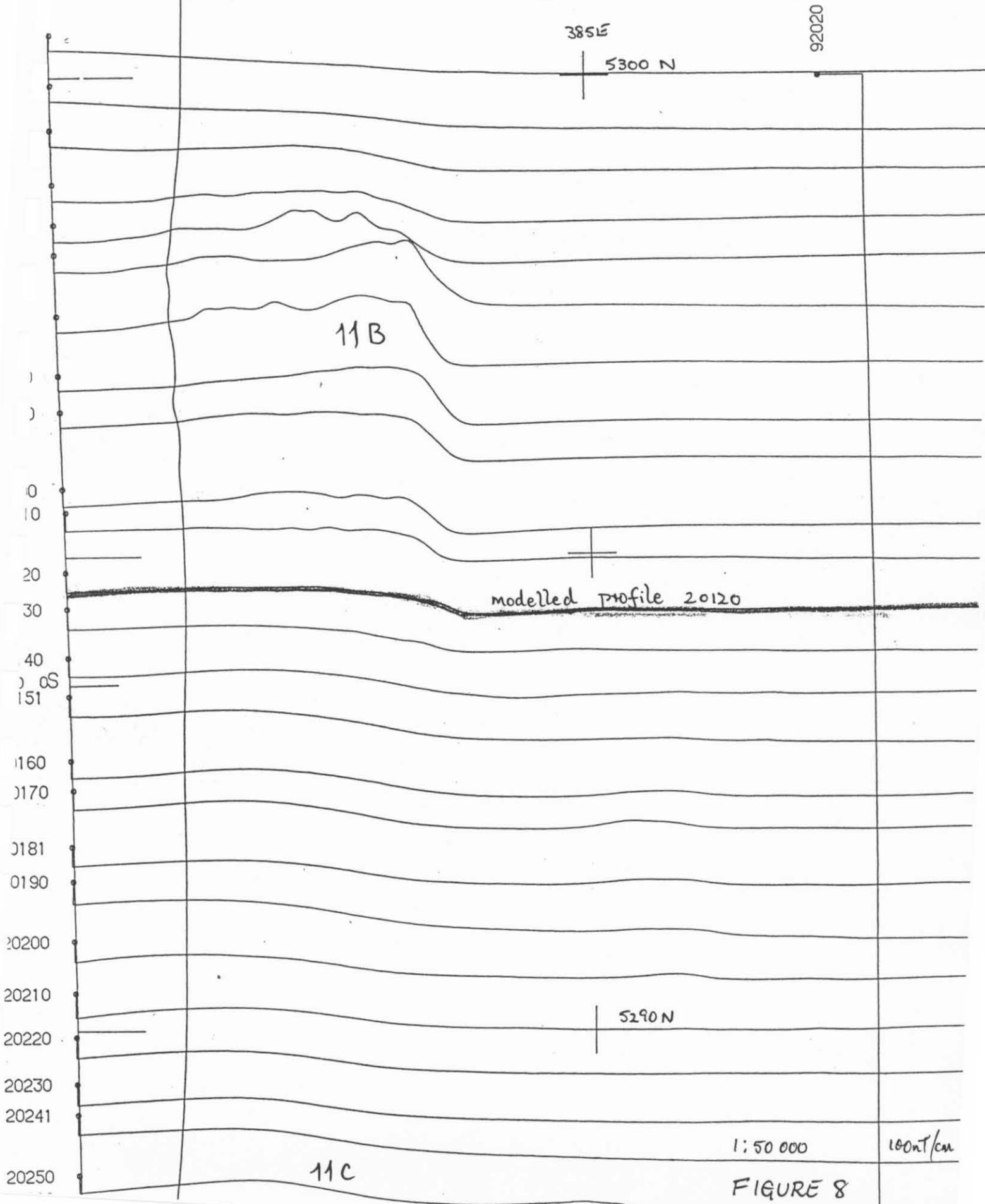
SW TAS MAGNETICS LINE 20120 355-400E/5295N



5 cm

026036

PROFILES ACROSS ANOMALY 11B



1:50 000

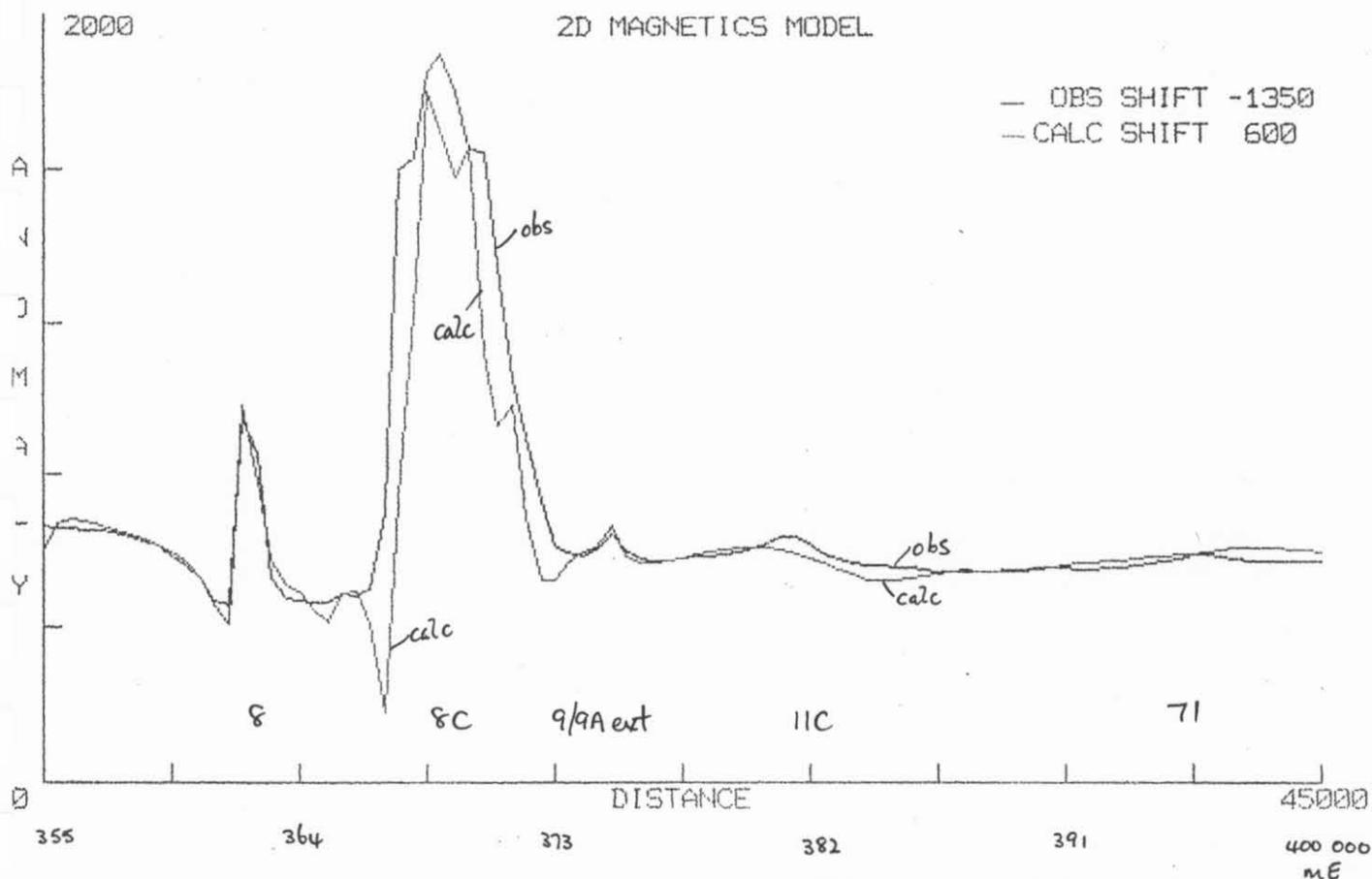
100nT/cm

FIGURE 8

LEAMAN GEOPHYSICS

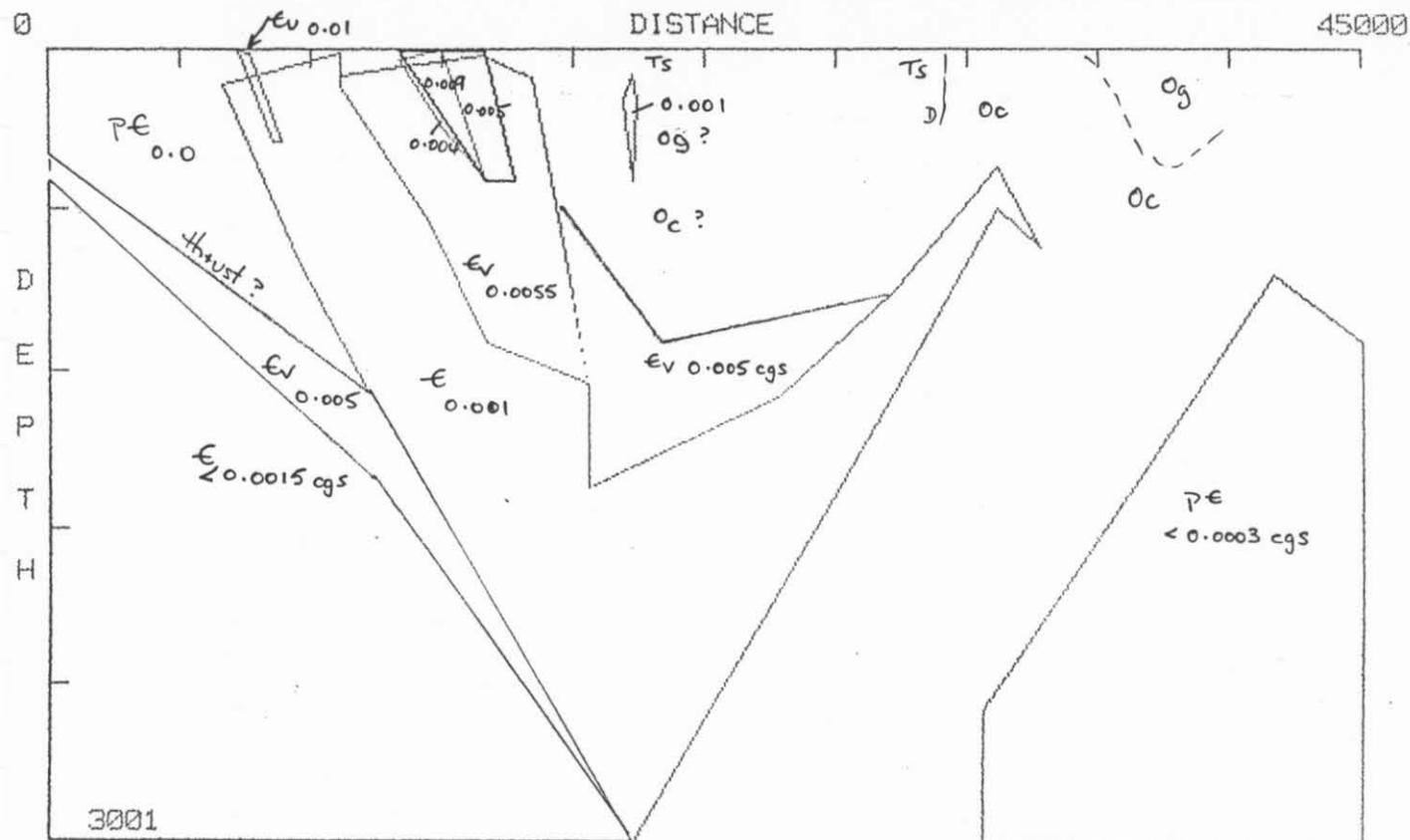
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SW TAS MAGNETICS LINE 20270 355-400E/52875N
MORE SUBTHRUST E + PE ADJ

5 cm



2D MODEL

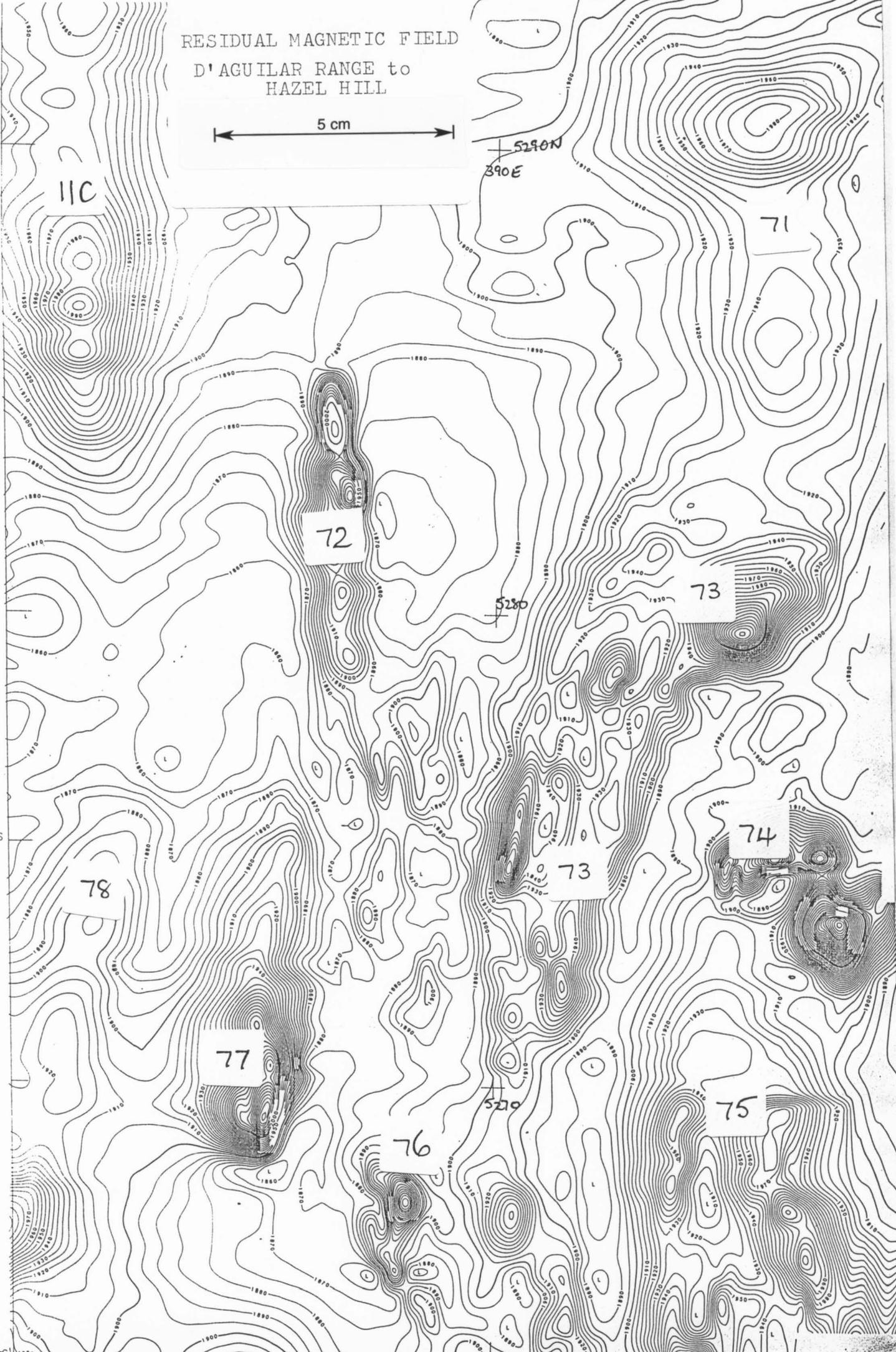
LINE 20270

FIGURE 9

026039

RESIDUAL MAGNETIC FIELD
D'AGUILAR RANGE to
HAZEL HILL

5 cm



42 8 B

42 46 051
145 32 0E

1:100 000

145 40 0E

FIGURE 11

026040

5 cm

LINE 20390

72

385 E

5280 N
390 E

73

5275 N

LINE 20540

77

73

77

5270 N

PROFILES:
D'AGUILAR RANGE to
HAZEL HILL
100mT/cm

1:50000

76

FIGURE 12

LEAMAN GEOPHYSICS

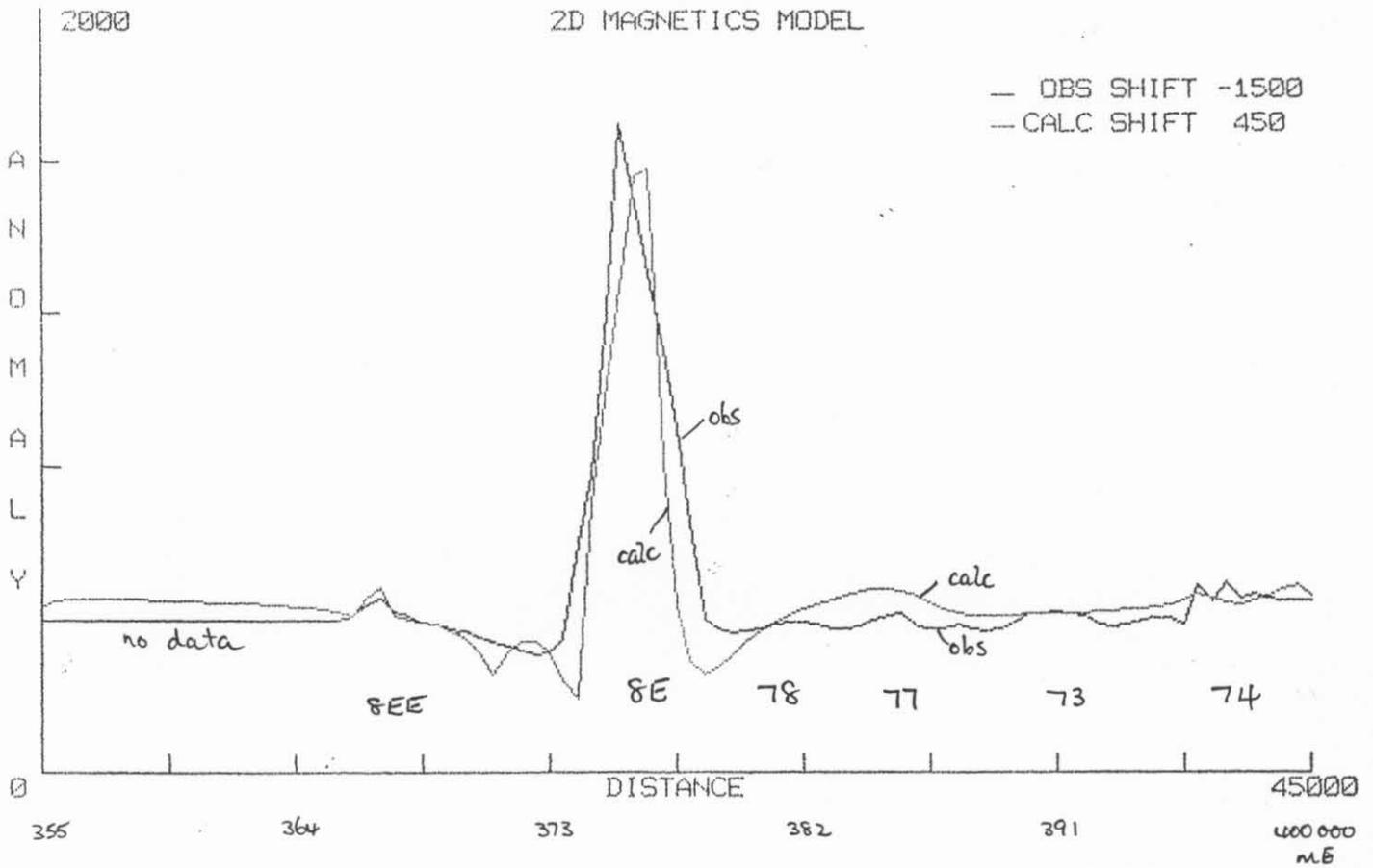
Survey Review, Specification, Reduction, Interpretation
 Wide Experience Most Methods
 Specialties:- Gravity, Magnetism, Seismic Methods

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All Correspondence to:
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TELEPHONE: (002) 47 8849



SW TAS MAGNETICS LINE 20540 355-400E/5274N
 NEAR SURFACE E VOLCS

5 cm

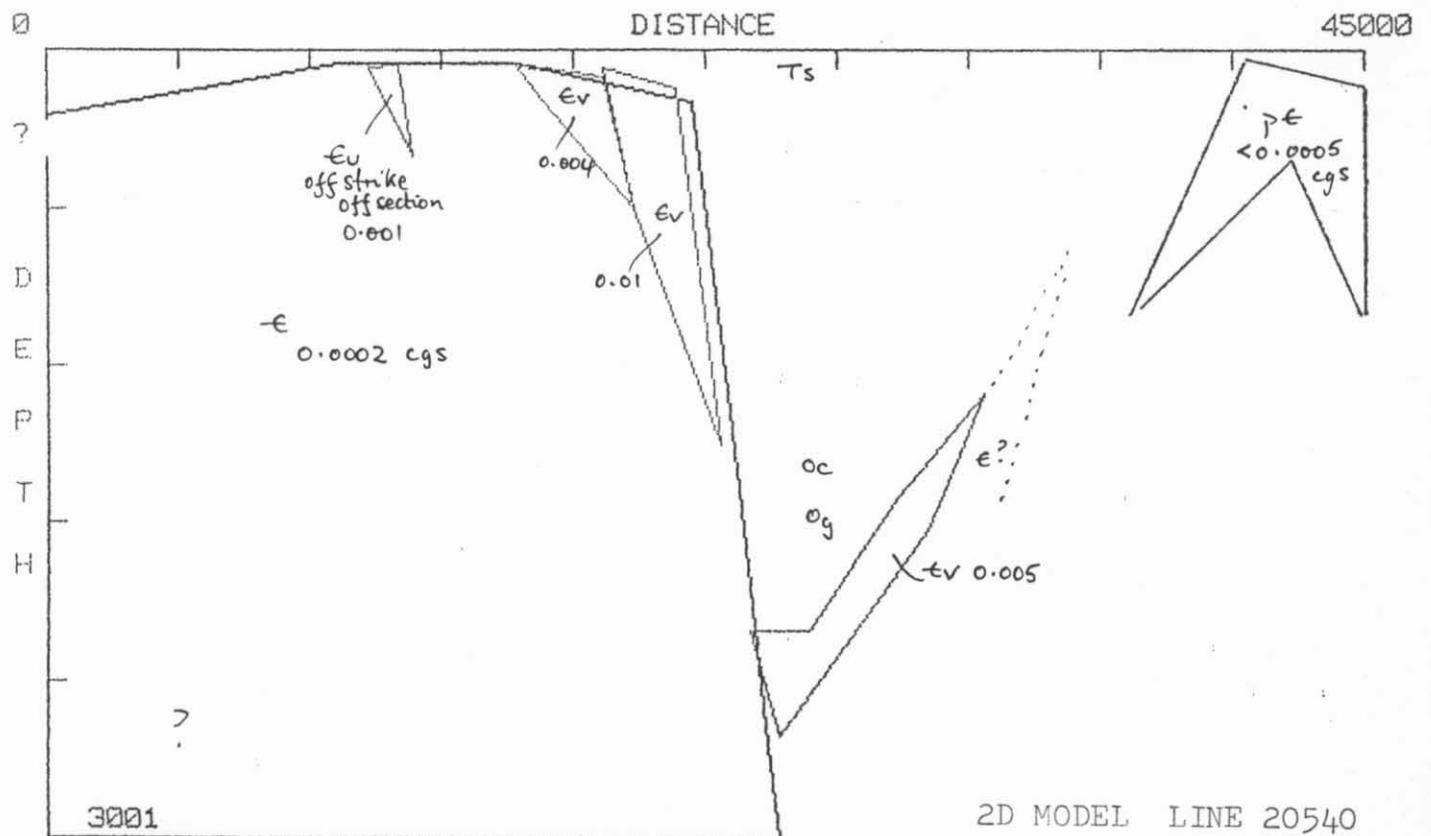


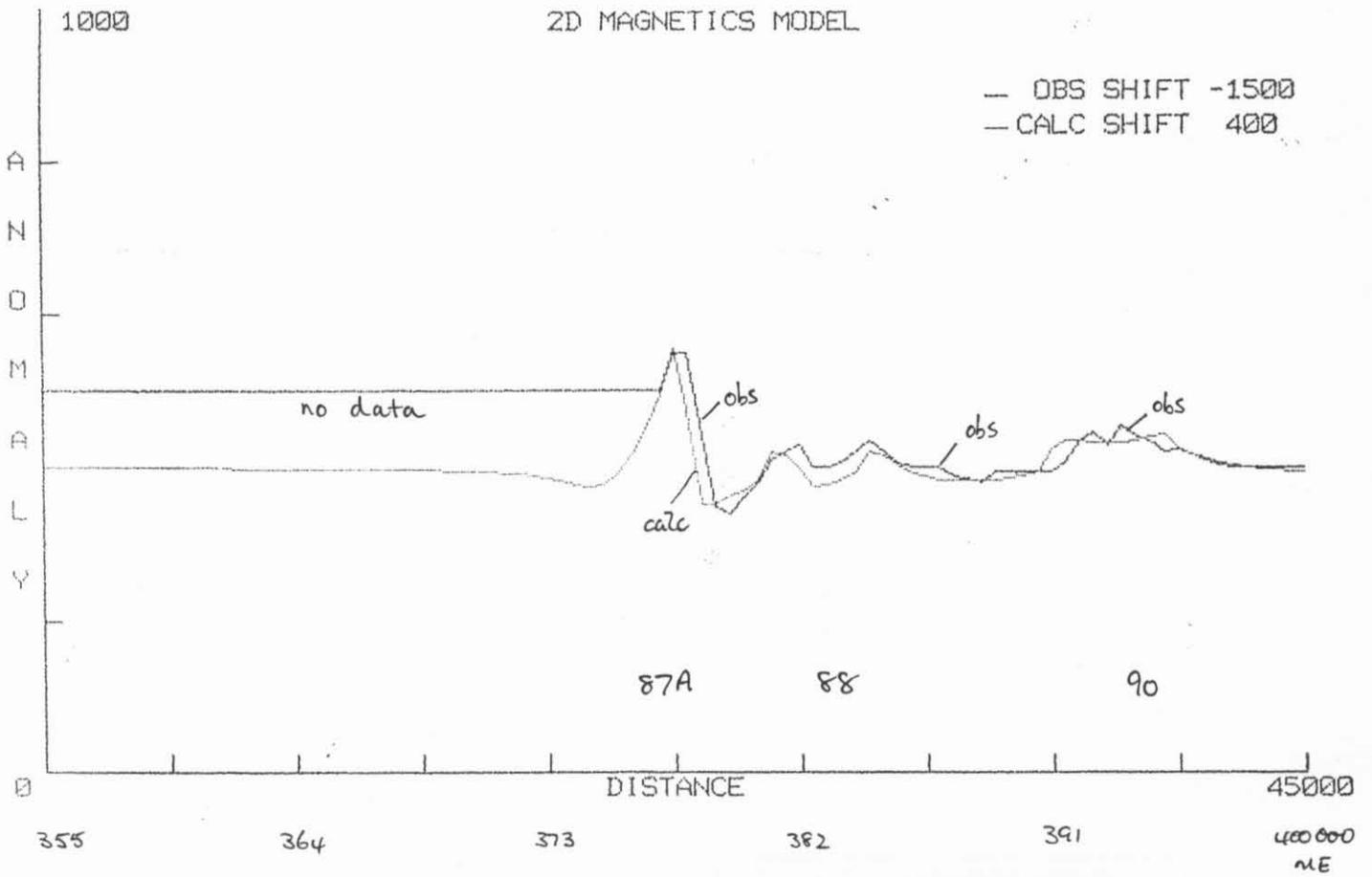
FIGURE 13

LEAMAN GEOPHYSICS

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026043

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SW TAS MAGNETICS LINE 21211 355-400E/52405N

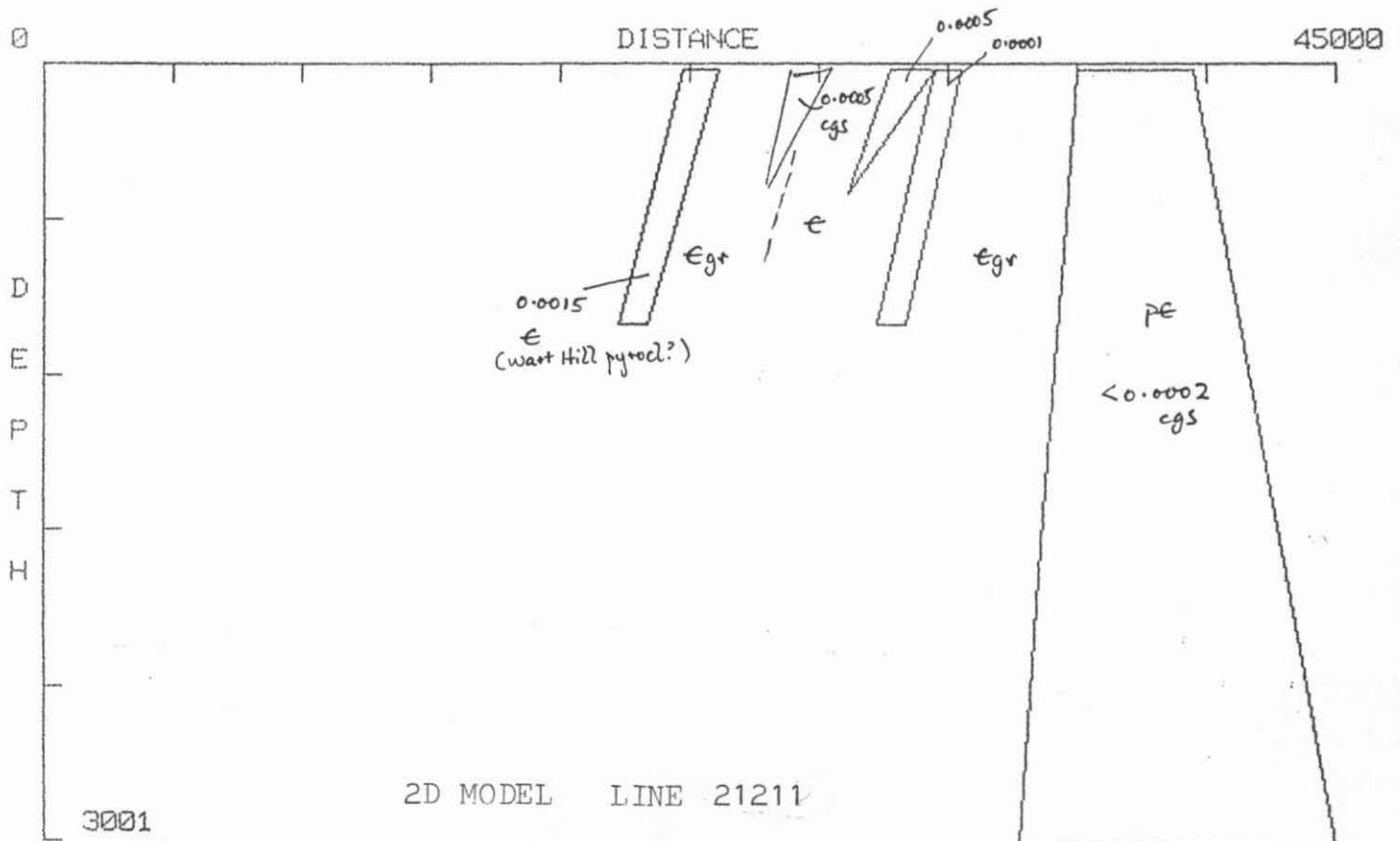
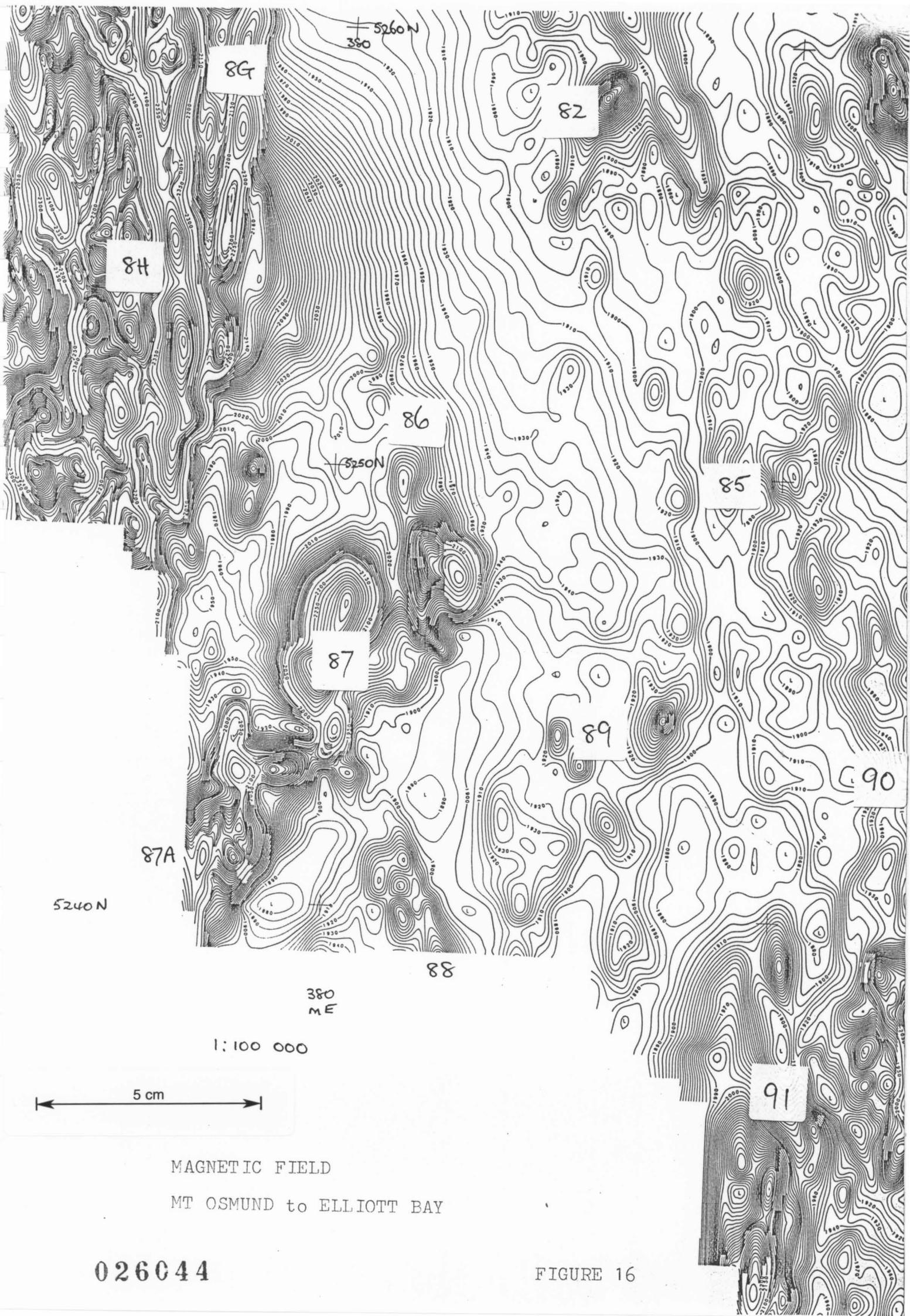


FIGURE 15



MAGNETIC FIELD

MT OSMUND to ELLIOTT BAY

026044

FIGURE 16

5 cm

026045

PROFILES: 1:50000

MT OSMUND to ELLIOTT BAY

100nT/cm

86

380E

5250N

385E

86/H

87E

87

5245N

11
21121

21131

87

21141

21151

21161

21171

21181

21191

21201

21211

LINE 21211

5240N

87A

88

285E

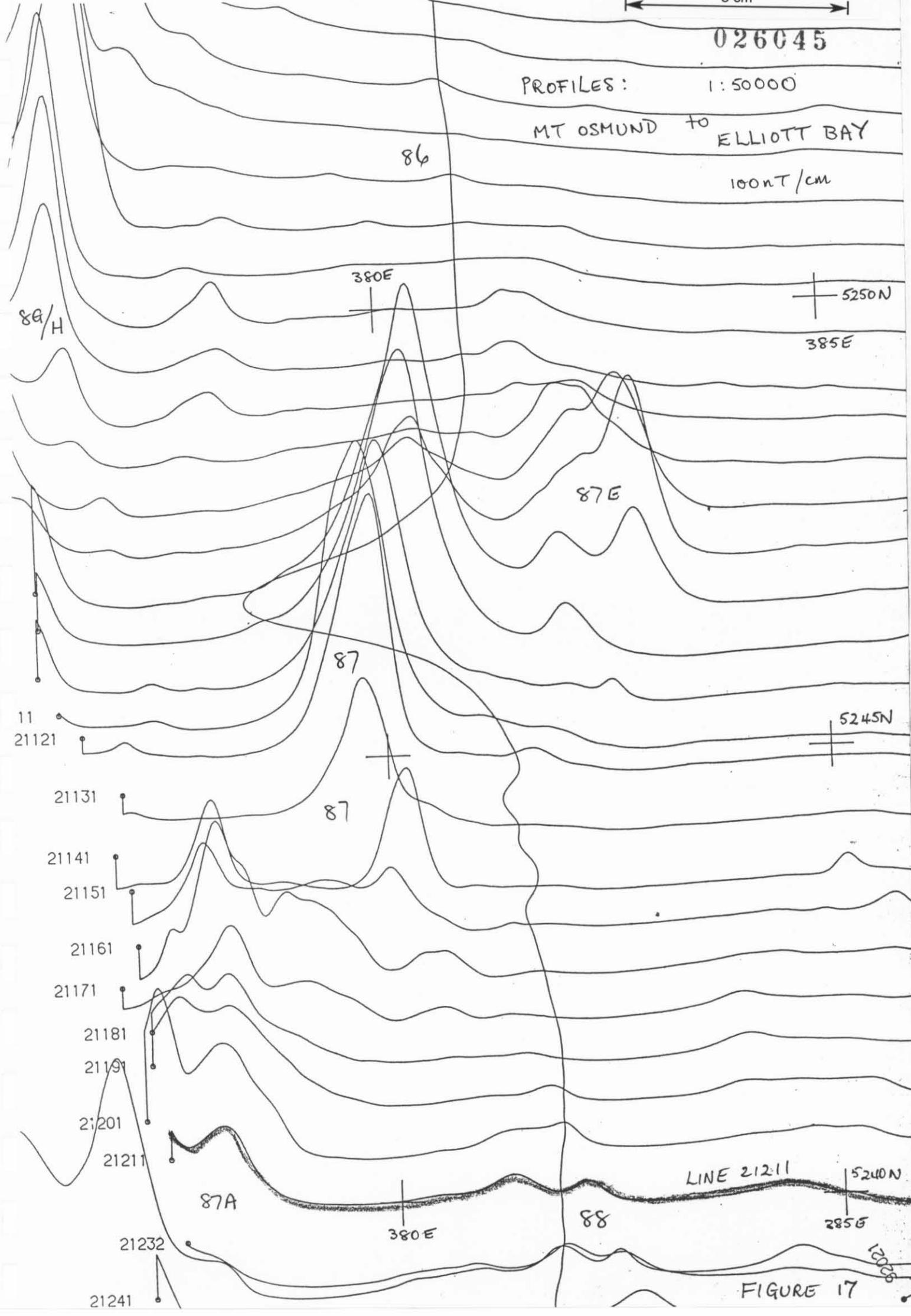
21232

380E

21241

FIGURE 17

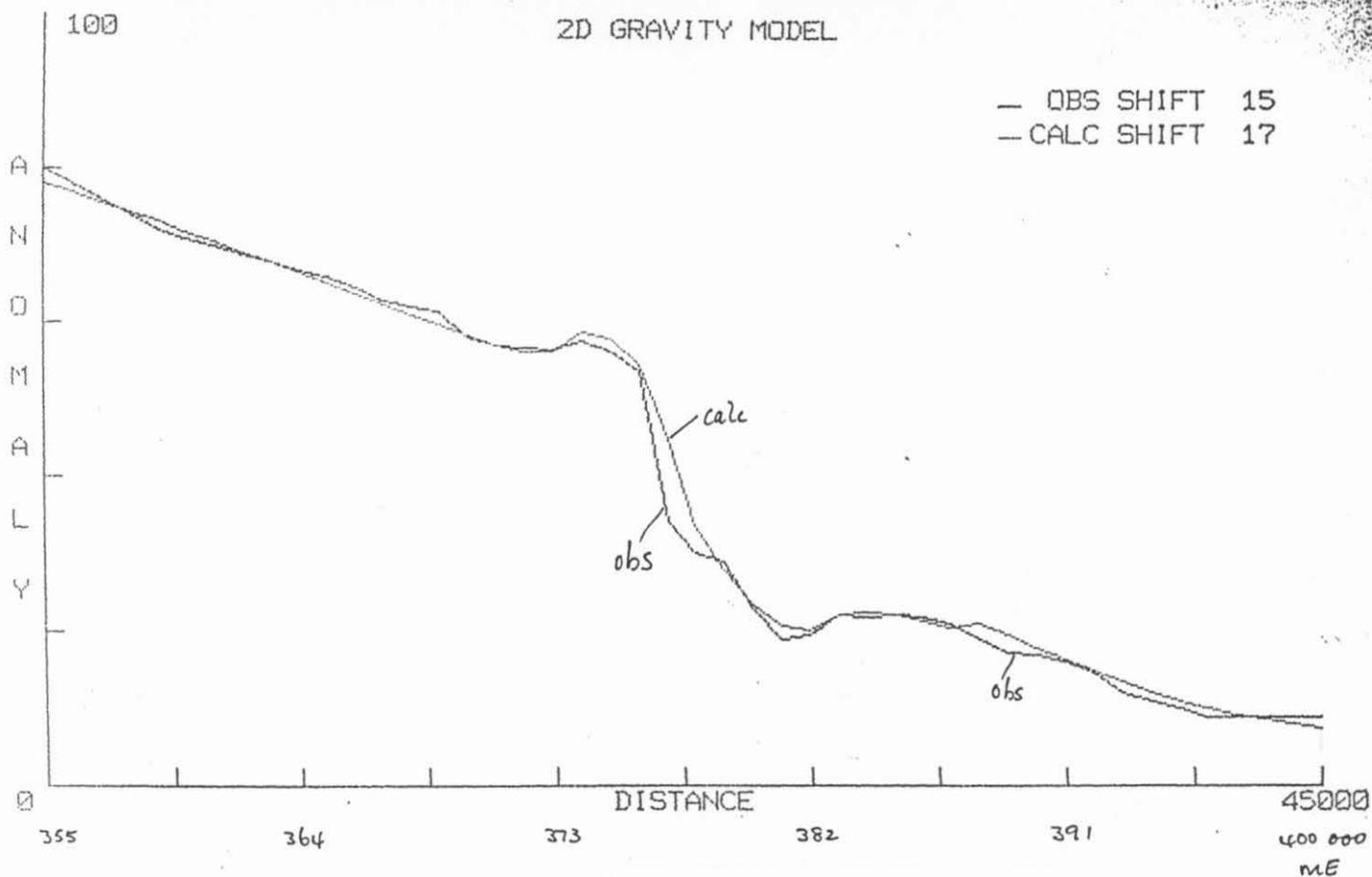
5202E



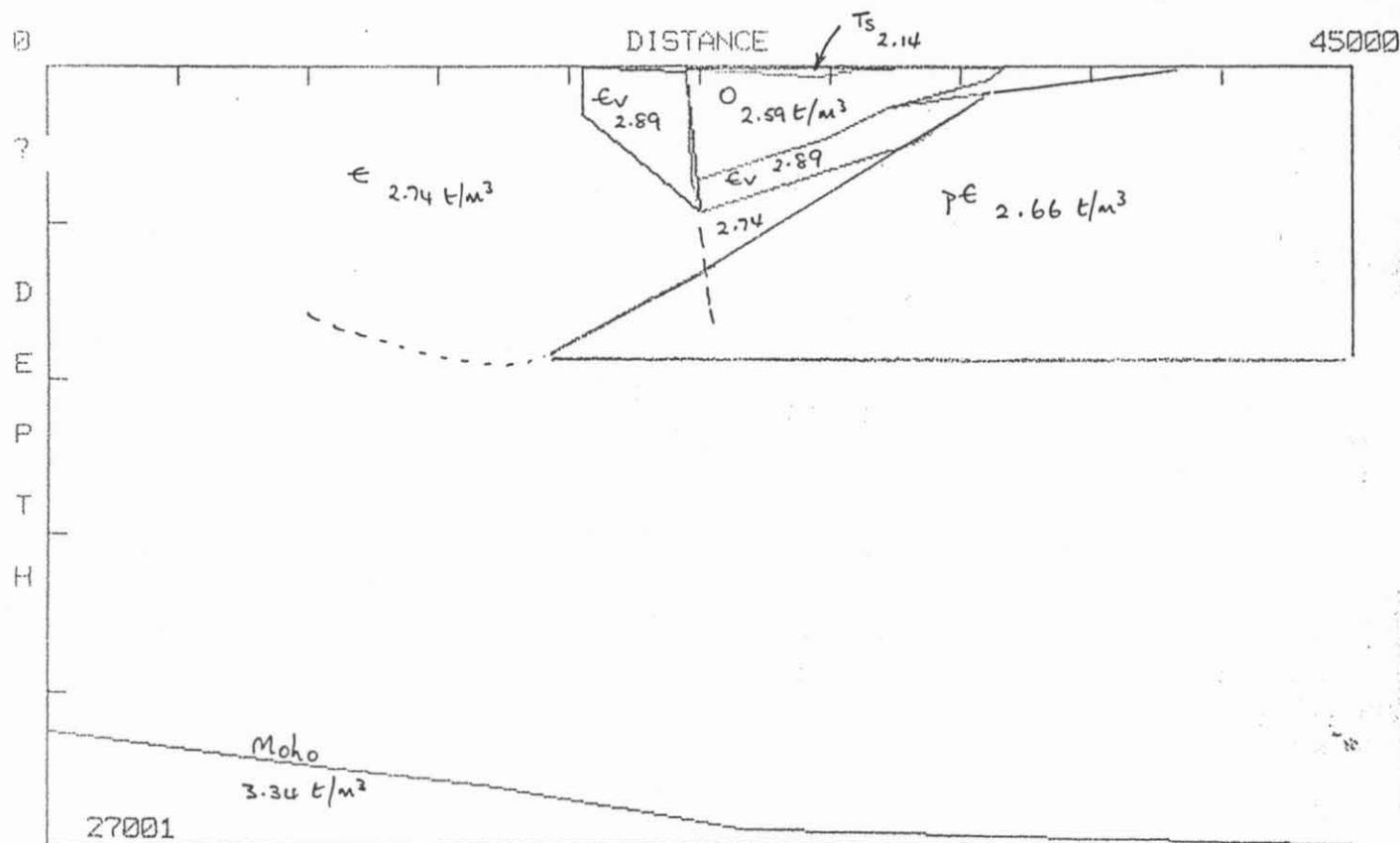
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SW TAS BOUGUER ANOMALY 355-400E/5274N
 DEEPER TERT



2D GRAVITY MODEL (preliminary) LINE 20540

FIGURE 20

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

May 12, 1986.