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TENEMENT INFORMATION

EL 22/87 (Trowutta) of 183 km² (Figure 1 & Plan 1) was granted to Aureole Resources Pty. Ltd., Winston Resources Pty. Ltd. and Sierra Nevada Resources Pty. Ltd. on 15 November 1987. Aureole Resources is operator.

The area comprises (guide only) : -

75.6 km ²	Private Property
97.4 km ²	State Forest
9.1 km ²	Crown Land
1.0 km ²	Julius River Forest Reserve and part of Lake Chisholm Forest Reserve

and excludes : -

0.7 km ²	Trowutta Caves State Reserve
1.2 km ²	Crown Reserves
22 ha	Mining Lease 56M/85

EXPLORATION PHILOSOPHY AND OBJECTIVES

Aureole's primary target is to explore for platinum group metals, gold, and base metals, hosted mainly in receptive rocks along the eastern margin of the Smithton Trough. Anomalous base metal and platinum values have been reported for mafic volcanics and carbonates from the district. The intense aeromagnetic anomalies along the trough margin correspond in part to known mafic volcanics and may also indicate the presence of ultramafics within early Cambrian sequences.

SUMMARY OF WORK COMPLETED IN YEAR 1

Activity in Year 1 has included : -

- (a) Review of previous exploration and compilation of a 1:50,000 interpretative map of the EL based on available data.

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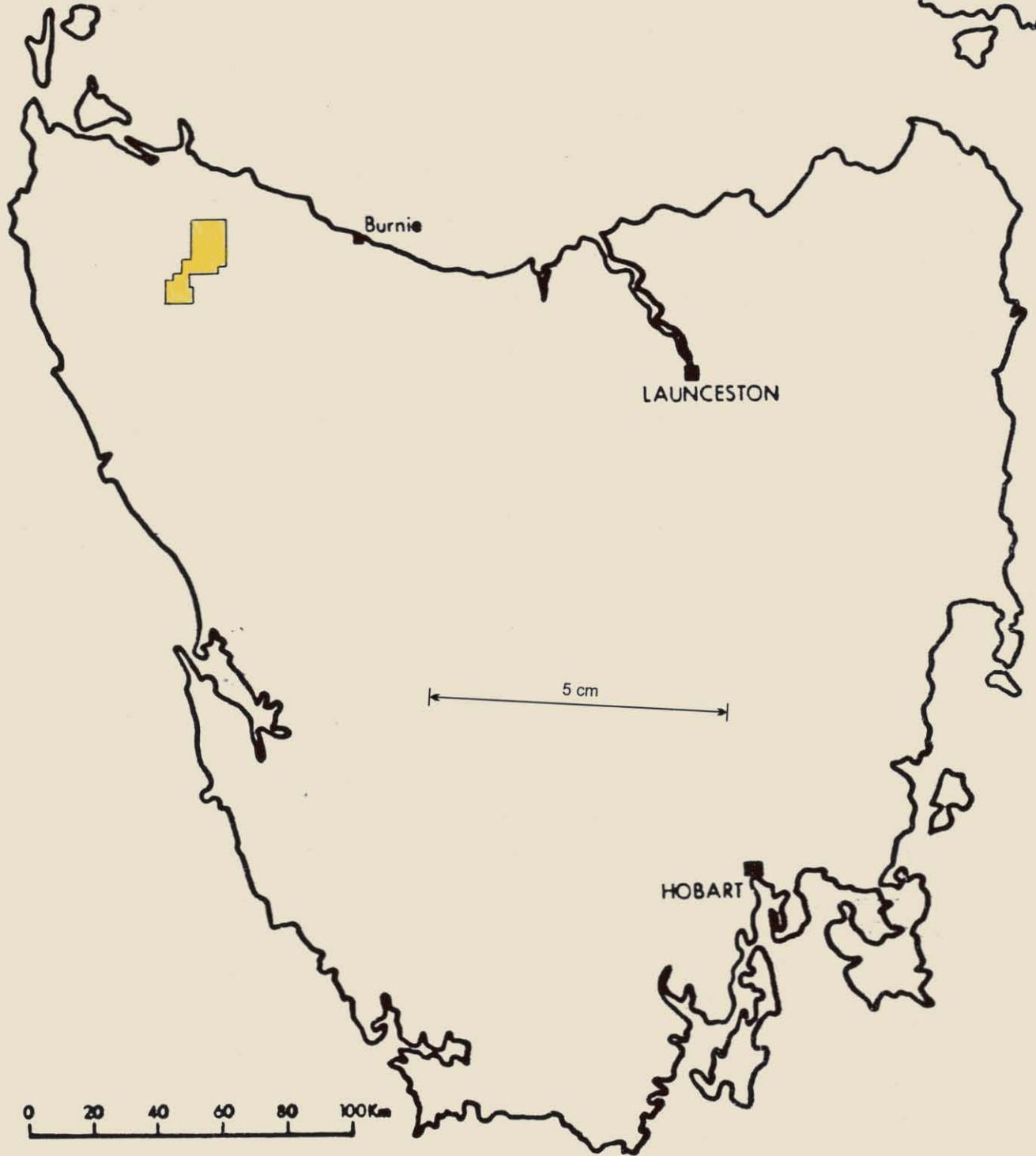
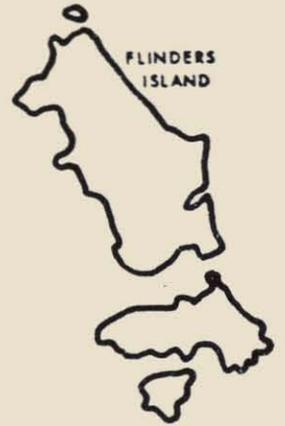
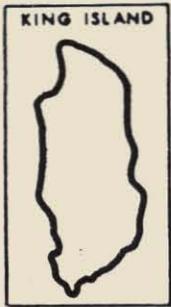


Figure 1. Location Map - EL 22/87, Trowutta

- (b) Evaluation of regional geophysics to high grade prospective areas for mafic and ultramafic rocks and to assist in structural interpretation of the tenement.
- (c) Reconnaissance geological mapping to confirm broad rock types, coupled with regional rock chip sampling and assaying for Cu, Pb, Zn, As, Ag, Au & Pt.
- (d) Petrological studies of selected rock types.

SPECIFIC SURVEYS

Literature Review of Previous Exploration

The Smithton Trough has seen regional exploration activity since the mid 1960's. Locally detailed exploration has occurred since 1977, conducted mainly by CRA Exploration Pty. Ltd. and BHP Pty. Co. Ltd.

During the mid 1960's, Pickands Mather & Co. International held EL 12/65 over a large part of north-west Tasmania, including EL 22/87. An extensive regional stream geochemical survey was conducted and although a number of geochemical anomalies were detected, and some resampling occurred later, no further work was undertaken (Anon., 1966).

An investigation of chromite occurrences in the Salmon River area, 10-12 km west of EL 22/87 was conducted by Ocean Mining and Exploration N.L. in 1969. Seventy-three holes were drilled, with two showing economic grades (Volker, 1969). No detailed geology was done.

In 1972, ANZ Exploration Co. took out EL 6/72 over an area north of the Arthur River. Anzeco's primary target appeared to be tungsten, based on the similarity between the dolomite and dolomitic sediments observed on the EL and the carbonates on King Island (Kinnane, 1972). A panned concentrate survey and mapping programme was completed and approximately 100 samples were collected and analysed for Cu, Pb, Zn, Cr, W, Mo and Sn. Several anomalies were obtained, most of which were attributed to Tertiary sediments and black shales. Some tungsten anomalies around Trowutta were recommended for follow-up.

CRA commenced investigations in EL 21/77, the northern part of which included EL 22/87. The target was shale-hosted lead - zinc deposits, following recommendations (Legge, 1980) that the Rocky Cape rocks showed some similarities in stratigraphic and tectonic style to the Selwyn Basin, Canada. Computer reprocessing of previous stream sediment data (Weir, 1982) indicated that the Trowutta-Dempster plains district was a prime target having elevated values of lead (18 ppm), zinc (125 ppm), copper and cobalt. A programme of reconnaissance mapping, including a photogeological interpretation of the country between the Arthur and Pieman River Valley (Carey, 1981), rock chip sampling and stream sediment geochemistry was undertaken in the northern part of EL 1/77 (Weir, 1982). A density of one stream sediment sample per 2 km² was achieved. Lead - zinc stream sediment anomalies were obtained at Julius River [349433] (340 ppm Pb; 2,500 ppm Zn) and Stephens Rivulet [280427] (440 ppm Pb; 1,000 ppm Zn; 180 ppm Cu; 260 ppm Ni; 130 ppm Co), the latter being about 3 km east of EL 22/87. An arsenic anomaly was picked up in the Sumac Rivulet area [372392] (89 ppm As; 480 ppm Ni; 107 ppm Co; 580 ppm Zn) and a lead anomaly (195 ppm Pb) was obtained from Wents Creek [367445] near Lake Chisholm.

Follow up of the Julius River anomaly included detailed stream sediment sampling, gridding, 'C' horizon soil sampling and ground geophysics. It was concluded that the anomaly was derived from a disseminated source within the dolomite or from minor shears (Weir, 1983). Resampling of the other three anomalies failed to repeat the initial anomalous lead and arsenic values.

CRA Exploration relinquished the northern part of EL 1/77 in 1983 concluding that the black shale sequences exposed at the eastern margin of the trough are too thin to have produced economic mineralisation from brines (Weir, 1983).

EL 10/79 was operated as a joint venture by CRAE and Mineral Holdings Australia Pty. Ltd. (Anon., 1985). The southernmost portion of EL 10/79 overlaps EL 22/87. The target was initially dolomite, but when some anomalous gold and platinum values were obtained, greater emphasis was given to the metals aspect of exploration. Grades of 3.09 g/t [410732] and 4.06 g/t Au with 0.46 g/t Pt [408726] were obtained from dolomite chip sampling and, although resampling returned results of only 0.04 g/t Pt, the partners concluded that there was a significant gold occurrence in the dolomites. However, EL 10/79 was relinquished in 1984 with no follow-up work.

In response to some CRAE tin stream sediment anomalies located during 1977, and some INPUT aeromagnetic anomalies detected by Esso in 1973, CRA Exploration took out EL 12/80 in an area just south of EL 22/87 (Dickson, 1985). The northern margin of an altered Cambrian basalt produced soil geochemical anomalies of lead (4,050 ppm), zinc (1,100 ppm) and gold (50 ppb) [340275]. Within the basalt, anomalous copper (560 ppm), zinc (125 ppm), manganese (2,800 ppm) and gold (65 ppb) were reported (Weir, 1985). These assay results represent the best soil geochemical results obtained from the Rocky Cape Block. CRAE proposed a Besshi-style mafic volcanic hosted Cu-Zn-Au mineralisation within the basalt and a carbonate hosted Pb-Zn mineralisation at the northern margin of the block. Ground EM work failed to establish any significant conducting bodies attributable to the presence of sulphides and CRAE relinquished the EL in August 1985 (Dickson, 1985).

BHP Co. Pty. Ltd. obtained EL 18/80, which overlaps EL 22/87 on the eastern side, to explore for carbonate-hosted cassiterite (Anon., 1983). While several aeromagnetic anomalies were investigated, one anomaly, which lies within the eastern margin of EL 22/87 [423650], was not accessed due to thick scrub. The EL was relinquished in 1983 due to poor results and difficult access.

Further exploration for tin/tungsten skarn type mineralisation was carried out by the EZ Co. Ltd. on EL 52/80 (Ferguson & Mathieson, 1987). EL 52/80 lies to the west of Smithton and includes a small part of the northernmost section of EL 22/87. No evidence of granitic intrusives was located. The EL was relinquished in 1982.

EL 15/86 lies to the north-west of EL 22/87 and was investigated by EZ Co. Pty. Ltd. Interest in a poorly exposed haematitic ironstone body occurring within the Cambrian sediments resulted in 3 costeans being excavated and 63 samples taken (McDonald, 1982). One gold value (17 ppb, fire assay), three arsenic anomalies and one silver anomaly (6 ppm) were obtained. EZ concluded however that there was no association between the ironstone body and precious or base metal mineralisation.

Evaluation of Regional Geophysics

Aureole has completed a regional interpretation of existing aeromagnetic and gravity data over the southern part of the Smithton Trough, with particular reference to the possible mafic piles in the Cambrian sequence along the eastern margin of the Trough within EL 22/87. The interpretation, by D.E. Leaman, is included as Appendix 1 to this report.

The main conclusion of the study is that the combined gravity and magnetic anomaly in the Edith Creek - Roger River - Trowutta area is best explained as a very thick, steeply dipping, pile of massive basaltic volcanics. The accumulation occurs near the intersection of several major structures. A vent is implied. Leaman (Appendix 1) also infers rock densities of more than 3.00 t/m^3 for parts of the pile, which may therefore contain ultramafics.

No other features of EL 22/87 were identified as having the same prospectivity for mineralisation, although more gravity data would assist in determining whether other thick volcanic piles with possible ultramafics occur along the eastern margin of the Trough.

Reconnaissance Rock Chip Geochemistry

Thirty-nine samples including Cambrian mafic lavas, volcanoclastic sediments, vein quartz and carbonates were collected from throughout the tenement. Brief sample descriptions and locations are presented in Table 1, and locations shown in Plan 1.

Particular attention was given to the mafic volcanics and volcanoclastic sediments in the Edith Creek - Trowutta area, where Leaman (Appendix 1) has indicated a major volcanic pile (and possible vent) is present. Samples 7-28 and 37-39 were collected from this area (Table 1 and Plan 1). Samples 12-25 were collected on a traverse down Drive Creek.

Twenty-four samples were selected for assay for Cu, Pb, Zn, Ag, As, Au and Pt. Original assay results are listed in Appendix 2, and average assay results for major rock types are presented in Table 2.

Table 3 shows threshold element values adopted for the main rock types on EL 22/87 based on the assay results of this and previous regional surveys (e.g., Weir, 1983).

Copper : Consistently elevated anomalous copper values were returned from the Cambrian mafic lavas throughout the tenement. This is not unexpected since native copper has been reported in these rocks throughout the district. Native copper, either disseminated throughout the rock or associated with carbonate veins and blebs, was recorded in tholeiitic basalt during the present survey in the Drive Creek area at [410615] and [406618] (Samples AT10 and AT26; Appendix 3).

With the exception of anomalous copper assay for basalt on the Sumac Road near the Arthur River [323454], all the anomalous or elevated copper values were returned from tholeiitic lavas and associated volcanoclastics in the extreme north of the tenement, along Trowutta Road and near Edith Creek.

The highest copper value (280 ppm) was returned from a basalt at [374575].

Lead : mafic lavas and volcanoclastics from the Drive Creek area near Edith Creek show consistently elevated lead values, but only one anomalous assay (55 ppm, sample AT 21 at [402612]). A dolomite near the Julius River bridge [344420] returned an elevated value (40 ppm).

Zinc : Most Cambrian mafic lavas and volcanoclastics are elevated in zinc, as is the dolomite near the Julius River Bridge [344420]. A highly altered, ferruginous, MnO_2 -rich sediment overlying the dolomite at the same locality produced the highest zinc assay (1250 ppm) and a tuffaceous sandstone in Drive Creek [404609], the second highest value (275 ppm).

Silver : No anomalous or elevated values were recorded; all samples returned <0.5 ppm.

Arsenic : With the exception of one chalcedony vein in Cambrian sediments near the Julius River bridge [344420] showing elevated arsenic (13 ppm), all samples returned background values of less than 8 ppm. The highest background values (5-7 ppm) were mainly from Cambrian lavas and volcanogenic sediments.

Gold : A single anomalous gold value of 40 ppb was recorded from a composite sample of weathered basalt at the Sumac Road at [337417]. Several mafic lavas and volcanoclastics showed elevated gold to 10 ppb.

Platinum : Platinum should on average be more abundant than gold in mafic igneous rocks. No anomalies or elevated values were recorded. A high background (14 ppb, together with elevated gold of 10 ppb) occurred in a composite basalt sample on the Sumac Road [377417]. This same location returned the highest gold value of the survey (40 ppb).

Petrological Studies

Aureole has started a petrological and chemical study of the mafic volcanics of El 22/87. Petrological descriptions of five samples are available so far (Table 1 and Appendix 2). Four of the samples (AT10, AT25, AT26, AT39) are from the Edith creek - Drive Creek area, and one (AT32) is from the Sumac Road.

Three samples from the former area are tholeiitic basalts and the fourth a crystal-lithic tuff with tholeiitic affinities. All four show petrological similarities to the lower Cambrian Crimson Creek type lavas in the Dundas Trough.

Sample AT32 is a relatively fresh sample of mafic lava from generally weathered, fractured and possibly brecciated lavas in a road cutting at [337417]. The rock has been identified in thin section as a boninite (Appendix 2). Its relationship with the mafic lavas in the Cambrian succession - including the tholeiitic basalts near Edith Creek - has not been established.

Boninites are rare in Tasmania and have previously been described only from the Heazlewood-Zeehan area of the Dundas Trough.

Samples AT10 and AT26 (tholeiitic basalt) show trace amounts of native copper, chalcopyrite, pyrite and galena (?) in polished thin section. Locally the sulphides are associated with carbonate veins, blebs and amygdules.

CONCLUSIONS AND RECOMMENDATIONS

Aureole, through its Year 1 activities of structural - geophysical interpretation, reconnaissance rock chip sampling and petrology has not varied its exploration philosophy but has upgraded the prospectivity of parts of the tenement.

Leaman's geophysical interpretation shows that mafic volcanics extend throughout the Smithton Trough but are thickest in an upturned wedge or pile near Edith Creek. The volcanics appear tightly folded along the eastern edge of the Duck River Fault, which is a major regional feature. Precambrian Rocky Cape Group rocks to the west are overthrust along the Marrawah Thrust (Plan 1), and the Cambrian sequences (in a broad anticlinal dome west of the Duck River Fault), continue to the south and southwest beneath the overthrust Precambrian.

Significantly, the geophysical interpretation, although based partly on sparse gravity data, suggests that in the Edith Creek area, rock densities greater than 3.00 t/m^3 are likely to occur. Ultramafics therefore may constitute part of the thick accumulation in that area, and may extend further along strike.

The reconnaissance geochemistry reaffirms the elevated base metal values of the mafic lavas recorded by previous explorers, and it may be significant that the highest values occur in the Edith Creek area where the lavas appear thickest and a vent is postulated. It may also be significant the the boninite on the Sumac Road returned the highest gold and platinum values of the survey. The relationship between the boninite, tholeiitic basalts and possible ultramafics warrants further investigation.

PROPOSED FUTURE EXPLORATION

Further activities in Year 2 on EL 22/87 will probably consist of all or part of the following : -

- (a) **Acquisition of further gravity data.** Present spacings of about 1 value per several km^2 are an inadequate base for detailed interpretation. The proposed coverage may extend over the whole tenement as part of a combined survey on EL 21/87, or may concentrate on the established gravity/magnetic anomaly in the Edith Creek area.
- (b) **Detailed assessment of gravity data,** coupled with existing magnetics, over the Edith Creek area in particular.

(c) Detailed mapping and sampling of the tholeiitic basalts at Edith Creek where the Year 1 work established anomalous base metal values associated with trace free copper and sulphides.

(d) Mapping and sampling of the boninite on the Sumac Road.

The aim of Year 2 work is to investigate the detailed structural relationships between the various mafic rocks and possible ultramafics, leading to target definition for Year 3 drilling. This will test the concept that copper-gold mineralisation is associated with particular mafic rock facies, and that the anomalous platinum reported from the district is sourced from buried ultramafics associated with the mafic lavas.

Table 1. Rock sample descriptions, EL 22/87.

Locations are shown on Plan 1. "PTS" or "a" following description indicates polished thin section or assay (Cu, Pb, Zn, Ag, As, Au, Pt) respectively. Specimens indicated as "PTS" have been petrologically studied (Appendix 2). Assay results of those indicated "a" are listed in Appendix 3.

Sample No.	AMG	Description	Labwork
AT7	411614	10m channel sample in sheared, weathered, lithic tuff	a
AT8	411614	10m channel sample in sheared, weathered, lithic tuff	a
AT9	410615	5m composite sample. Volcanic-clastics and chalcedony veins	a
AT10	410615	Fresh, tholeiitic basalt with carbonate patches	a, PTS
AT11	410615	Composite sample : vein quartz and volcanoclastic host	a
AT12	405609	Weathered, amygdaloidal basalt	a
AT13	405609	Fresh, porphyritic basalt	
AT14	405069	Fresh, porphyritic basalt with amygdaloidal carbonate, trace sulphides	a
AT15	404609	Tuffaceous sandstone	a
AT16	403610	Weathered, amygdaloidal basalt	a
AT17	403610	Weathered, amygdaloidal basalt chloritised, with chalcedony veins	a
AT18	402611	Fresh basalt	
AT19	402611	Limonitic vein quartz	a
AT20	402612	5m channel sample in weathered, amygdaloidal basalt	a

Sample No.	AMG	Description	Labwork
AT21	402612	5m channel sample in weathered, amygdaloidal basalt	a
AT22	401613	Weathered basalt	a
AT23	407614	Moderately fresh, amygdaloidal basalt	
AT24	401614	Limonitic vein quartz with minor chlorite (?)	
AT25	400615	Fresh, amygdaloidal meta-tholeiitic basalt	PTS
AT26	406618	Fresh, tholeiitic basalt	PTS
AT27	407613	Basalt	
AT28	323454	Fresh basalt	a
AT29	330456	Weathered basalt	a
AT30	337417	10m composite sample - weathered basalt	a
AT31	337417	10m composite sample - weathered basalt	a
AT32	337417	Fresh boninite	PTS
AT33	344420	Dolomite with trace sulphides, native copper (?)	a
AT34	344420	Weathered, ferruginous siltstone, claystone	a
AT35	344420	Chalcedony veins (in siltstone)	a
AT36	344420	Chalcedony veins and siltstone (volcanogenic?)	a
AT37	374575	Weathered basalt	a
AT38	376578	Thin weathered basaltic vein in siltstone	a
AT39	374582	Crystal-lithic tuff	PTS

Table 2. Average assay values for major rock types, EL 22/87.

Rock Type	No. of Samples	Average assays (range in brackets)						
		Cu ppm	Pb ppm	Zn ppm	Ag ppm	As ppm	Au ppb	Pt ppb
Mafic lavas (mainly thol. basalts)	14	140 (25-280)	35 (20-55)	120 (35-195)	<5 -	4 (2-7)	13 (<5-40)	7 (2-14)
Tuffs, volcaniclastics	4	180 (165-200)	43 (30-65)	149 (100-275)	<5 -	<1 -	<5 -	4 (2-6)
Limonitic qz, chalcedony	4	51 (20-80)	25 (<5-40)	50 (25-90)	<5 -	6 (<1-13)	4 (<5-10)	<1 -
Siltstone, claystone	1	100	30	1250	<5	4	10	<1
Dolomite	1	15	40	65	<5	5	5	<1

Table 3. Selected Element Thresholds, EL 22/87.

B - background

E - elevated

A - anomalous

E LAVAS, VOLCANICLASTICS

	Cu ppm	Pb ppm	Zn ppm	Ag ppm	As ppm	Au ppb	Pt ppb
B	<100	<25	<100	<0.5	<8	<5	<25
E	100-200	25-50	100-250	0.5-2.0	8-20	5-10	25-50
A	>200	>50	>250	>2.0	>20	>10	>50

E SEDIMENTS

	Cu ppm	Pb ppm	Zn ppm	Ag ppm	As ppm	Au ppb	Pt ppb
B	<50	<25	<100	<0.5	<10	<5	<5
E	50-100	25-50	100-250	0.5-2.0	10-30	5-10	5-10
A	>100	>50	>250	>2.0	>30	>10	>10

E CARBONATES

	Cu ppm	Pb ppm	Zn ppm	Ag ppm	As ppm	Au ppb	Pt ppb
B	<20	<10	<50	<1	<5	<5	<5
E	20-40	10-20	50-100	1-2	5-10	5-10	5-10
A	>40	>20	>100	>2	>10	>10	>10

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BALFOUR-TROWUTTA AREA
NORTH WEST TASMANIA

EVALUATION OF REGIONAL GEOPHYSICS
IMPLICATIONS SPECIFIC TO EL 22/87

by
Dr. D.E. Leaman
for
Aureole Resources

September 1988

BALFOUR

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SUMMARY

Regional, conceptual analysis and review of available gravity and magnetic data in the Smithton - Balfour region of north west Tasmania was undertaken to provide an overview of this little understood region. In the absence of uniform or detailed mapping some perspective on structure, structural control, mineralising sources, potential host rocks and prospectivity was sought in broad terms. Such perspective is necessary if a reasonable exploration and relinquishment programme is to be accomplished.

Although the data sets, especially gravity, leave something to be desired - and should be upgraded in the near future - it is clear that established mineralisation has a locus at Balfour. Copper and tin mineralisation near Balfour have always appeared enigmatic and, as a result, the prospectivity of the area has not been appreciated. The present work shows that the mineralisation can be readily explained but that the structural setting is complex.

The available data cannot resolve details of the cupola or spine which projects from the Pieman granite toward Mt Balfour but this mass, at some 2 km maximum depth, has controlled most of the mineralisation near Balfour. E-W fracture systems near its northern tip have also played a part in the location of vein systems. Tin mineralisation appears to be directly related to the nose of granite while the copper prospects are aligned along a fracture system which is sympathetic to a major thrust and which is mineralised in the region where the granite has intruded rocks of the Smithton Trough beneath the overthrust Precambrian Temma sequence.

Materials of the Smithton Trough extend west of Balfour but are concealed by up to 3 km of Precambrian rocks. All units are folded consistently with the patterns which can be inferred from the exposed part of the Trough but the overall thickness of the Trough section is rarely more than 3 km. Mafic rocks, basalt and spilite, extend right across the Trough but the data indicate that these rocks are rarely massive or present as thick piles.

The Edith Creek-Roger River-Trowutta region is exceptional in terms of the volume of massive basaltic volcanics and a pile seems likely. This accumulation occurs near the intersection of several major structures and a major vent is implied. Densities in excess of 3.00 t/cu m have been inferred for parts of the accumulation and it is possible that some ultramafics might be included. If geochemical studies in this area can establish raised trace levels of exotic elements then the approximate location of the source has already been established. Further analysis will, however, be required for adequate structural appraisal.

INTRODUCTION

The Balfour - Trowutta area (Figure 1), indeed much of the Smithton Trough, has attracted limited previous exploration. Little mineralisation is known outside the immediate environs of Balfour but traces of exotic and precious metals have been recorded from the rocks of, or adjacent to, the Trough.

Aureole Resources has acquired EL 21 and 22/87 (see Figure 1) with special emphasis on precious metals although it was thought there may be some potential for base metals.

The initial programme on these licences has been directed toward a better understanding of structural setting and general distribution of mineralisation. This report forms a significant part of such appraisal. Gravity and magnetic data have been used to formulate an assessment of potential sources of mineralisation, nature of primary structures and fracture styles and patterns.

Geological control and mapping information tends to be patchy, old or of doubtful reliability (e.g., Williams and Turner, 1973). Significant geophysical or structural contributions have been dependent on magnetic or gravity data. Bishop (1986) provided an outline of magnetic coverage, tests of data presentation and a description of principal anomaly features. Leaman (1989 b) combined this information with the TASGRAV data base to generate a first order view of crustal structures and Precambrian and Lower Palaeozoic relationships in NW Tasmania. The study reported here is built on that foundation.

This report provides a regional analysis relevant to both licence areas held by Aureole Resources and the treatment was intended to assist appraisal of features within the held areas. It also contains specific comments on those features which are of particular importance to the prospectivity of EL 22/87.

DATA

The magnetic data used were acquired by the Bureau of Mineral Resources to specifications comparable to those of Tasmanian Mines Department surveys in western Tasmania. Lines were flown E-W with a spacing of about 500 metres and a ground clearance of 150 metres. The sample spacing is of the order of 50 m. Survey details and a range of presentations of the magnetic field have been given by Bishop (1986). Extracts from this compilation are shown in Figures 4A and 4B. The relief presentation provides an indication of trends and key features while the contour maps offer a smoothed quantitative outline for evaluation.

A clearer presentation of anomaly character is provided by the profiles of Figures 5A to C. These samples, about 2.5 km apart, of the survey show how much the contour presentation, and its gridding bias, have filtered some important character. A subset of these profiles, based on each fourth or fifth observation, have been used for regional modelling. This has limited resolution of near surface features but such detail is not justified so early in a regional programme or exploration and cannot, in any event, be properly assessed without a coarser framework and evaluation of major geometric and source effects. Bishop (1986) has offered little information of this type which might assist structural evaluation.

The gravity data used were extracted from the Mines Department TASGRAV data base (Richardson and Leaman, 1987). This area has not been favoured by any recent surveys and coverage is relatively poor. Most stations were observed as part of the BMR statewide helicopter survey of fifteen years ago. The station spacing is of the order of 7 km. This naturally limits definition and resolution of sources and structures. Figure 2 has been reproduced from a Mines Department compilation prepared for the new volume of the Geology of Tasmania and, although slightly smoothed, provides a regional outline of the gravity field. The data in this form was interpreted by Leaman (1988 b) to generate a view of the Smithton Trough and the nature of the adjacent Precambrian rocks.

The regional interpretation suggested that the rocks of the Smithton Trough were gently folded and never more than 3 or 4 km thick. This estimate was a refinement of work by Richardson (1987). The Precambrian rocks to the east form a crustal unit of siliceous basement style while those nearer the coast (west and north west of Balfour) which appear similar at surface are certainly different on crustal scale. Two solutions have been offered for this enigma; a varied but not exposed denser and more magnetic lithology, or the surface materials are not representative of the Precambrian of the area. No Tasmanian Precambrian rocks possess the combination of magnetic and density properties required and it has to be concluded that the

surface rocks are atypical of the section. The possibility that these were overthrust on the rocks of the Smithton Trough was mooted but not established. The style of structure implied was described for similar but smaller Precambrian blocks at Cape Sorell (Leaman, 1988 a).

Two other issues are relevant to the present study. Leaman (1988 b) indicated that the present gravity data, in the format used, could not resolve with certainty any granites in the Balfour area and thus the tin mineralisation there may be anomalous. (The format was derived from Figure 2 and not raw data.) The gross, regional study, however, also defined a general integrated form for the Moho across NW Tasmania and this was subsequently checked and refined independently. This concept was then presented as Mantle 88 (Leaman, 1988 c) and may now be used to generate the crustal component of the regional field. Calculation of this component essentially frees the residual from all effects other than shallow geology or granites and means that the process and reliability of interpretation is transformed. The residual map generated for the stations in the Smithton - Balfour area is presented in Figure 3. This map forms the basis of the present interpretation and contains no crustal component.

GENERAL ANALYSIS

FEATURES OF THE POTENTIAL FIELDS

This brief commentary suggests those features of the fields which appear unusual or of geological interest and which any satisfactory interpretation must evaluate and account. Some have direct lithological or formational origin but others may be geometric. Explanation and assessment may reveal those elements which are abnormal and of exploration interest.

The gravity field presented in Figure 3 contains few high amplitude or high frequency features since the station spacing is coarse. There are four principal elements. A strong NE-SW gradient bisects the area; north of it the field is generally positive and but is negative to the south - until the Arthur Lineament is approached. It is strongly negative south of Balfour and there is generally no equivalent massive positive feature. The strong gradient near the coast at 5415 000 mN can be associated with the northern boundary of the Pieman Granite but the lesser continuation of this gradient lies within the Rocky Cape core but significantly east of a line of small magnetic anomalies (see Figure 4A).

A more subtle NW-SE gradient also bisects the area but the effect is only obvious near the intersection with the Arthur Lineament south east of Balfour. Rocks of the Smithton Trough and the coastal Precambrian materials west of them present comparable anomalies. This pattern is disturbed only near Marrawah and at Edith Creek. The large positive anomaly near Edith Creek has a magnetic analogue. Both are localised. The general response of the Temma or coastal Precambrian rocks can be contrasted with that of Rocky Cape core rocks which present a slightly negative anomaly. Slightly negative values are wholly consistent with known density information which suggests a bulk density of about 2.65 t/cu m for these rocks. Negative values result from use of 2.67 t/cu m in the Bouguer reduction.

The features of the magnetic field are best viewed in Figure 4B. The rocks of the body of the Smithton Trough are essentially non anomalous although, importantly, the field is not flat but increases westward. This property persists to the coast, at least. The major anomalies south of Smithton and north of Balfour can be related to a sequence of mafic volcanics. Some of the larger anomalies NE of Marrawah are of similar origin. No ready explanation is, however, possible for the features within the coastal Precambrian block or the more subtle alignments within the Rocky Cape Block. The opposing character of the trends is stressed by this presentation.

TRENDS

Subjective assessments of trends, offsets and alignments evident in Figures 2, 3, 4A and 4B have been compiled in Figure 6. The clearest presentation of many features is offered by the relief view of the magnetic field. There is little evident in the derivative formats provided by Bishop (1986) which is not apparent in Figure 4B. The gravity data lack equivalent definition but major elements can be recorded. Some features appear offset from magnetic features. The separation may be real or it may reflect up to 3.5 km error in plotting position due to coarse station spacings. Most weight has therefore been assigned to magnetic features in all subsequent discussion and conclusions but it must be noted that the gravity data do reflect major structural or lithological changes even if imperfectly located.

The peak gravity-magnetic feature near Edith Creek occupies a critical position. The exposed mafic volcanic suite is distinguishable as a whole and many members can also be recognised. Not all of these are shown in Figure 6.

It is clear that dyke swarms within the Rocky Cape Group to the east of Balfour reflect a persistent trend set and the E-W features mapped near Balfour are related to gross structural controls.

GRAVITY INTERPRETATION

Seven profiles were randomly selected which encompass all significant aspects of the residual field. Resolution is restricted by assumptions about densities (not especially critical here) and coverage. The data have proven so valuable in their implication that this interpretation represents the maximum reasonable extraction of information.

A range of options has been tested in each case until a uniform density pattern was recovered which also generated consistent relationships both in geological terms and shift parameters. The latter are shown in the upper right of each figure. In this study a differential between observed and calculated profiles of one mGal was noted. This is wholly believable since the residual (obs) profile was created using the crustal shape and excluded the regional effects of ocean water nearby. The effect of water amounts to about 1.25 mGal in this area.

Line 320E (Figures 7A and 7B) tackles the problems of the western Precambrian block and the major negative anomaly south of Balfour. The mass balance depends on near neutral Precambrian responses and a continuity of Smithton Trough materials. The bulk density of the latter can only be estimated at this stage in the absence of reliable sampling and property determinations. Two solutions have been offered. In each case it is clear that

the rocks of the Smithton Trough must be continuous and that the western Precambrian (south of Marrawah and east of Temma) dip shallowly over them. Thrusting is the only solution. A bulk contrast of about 2.76 t/cu m has been assumed for the Trough sequence. This is based on the established mafic and dolomitic content. Each of these lithologies could be expected to possess bulk densities in excess of 2.80 t/cu m and any interbedded mudstones or shales in excess of 2.74 t/cu m. The value used may thus understate the contrast and overstate the thickness of section, but the form of the solution is relatively unambiguous.

The distinct step in anomaly near 5430N, the site of intersection of NE-SW or E-W trends (see Figure 6) represents offset of the trough section (Figure 7A) or its absence (Figure 7B). In either case the ultimate negative depression south of 5410N cannot be explained by other than a large negative contrast or rock volume and the extension of this line onto the Pieman Granite leaves little doubt as to the origin of the response.

No solution could be found which explained the anomaly forms using granite alone in the absence either of continued trough section or a dense metamorphic halo.

Line 330E (Figure 8) reinforces these comments for a profile more distant from the apparent granite. It does appear that either the granite is dominant at this easting or the slab of overthrust material is terminated. The granite is certainly overpowering but it would be possible to find solutions comparable to Figures 7A or B although the volume of Trough material would be much reduced and the granite interpreted at shallower depth. Improved coverage is required for complete resolution of this problem. The slab form of the Trough section north of Balfour reflects orientation of the profile along a fold axis and consistent residual values. The thrust is much steeper in this region.

Line 340E (Figure 9) presents an oblique view of the rocks near the margin of the Smithton Trough and the large anomaly near Edith Creek. The section confirms the subtle negative contrast of the Rocky Cape Group basement (available determinations suggest a maximum density of 2.65 t/cu m) although there is a contrasting and ill-defined denser core. The content and form of the mafic volcanic section cannot be resolved in detail but there are alternations of massive, high density members and the densest accumulation is in the Edith Creek - Trowutta area.

Line 5430N (Figure 10), although not ideally located with respect to the granite implied beneath - or south of - Balfour, nevertheless confirms the implications of lines 320 and 330E (Figures 7 and 8). A stepped, overthrust slab of Trough sequence is present and possibly intruded by the granite. The general form of the profile reflects the nearness of a large cupola or spine and is not related to any subtle variations in Precambrian rocks. The implied granite density of 2.62 t/cu m is consistent with a typical Devonian adamellite or "tin" granite. The abrupt

increase in anomaly at the east end of the profile reflects nearness of the rocks of the Arthur Lineament and a major change in lithology.

Although the anomaly steps near 325E are not well defined the model easily generates their form.

Line 5440N (Figure 11) samples the apparently narrow closure at the south end of the Smithton Trough. The form of the anomaly is clearly independent of the exposed materials, notably Precambrian west of 324E, and related to the shape (of folding) of the Trough section. The deficiency east of the margin based on mapped limits indicates a possible mapping flaw, a faulted or very steeply dipping marginal contact for at least 200 m. The discussion assumes a reasonable validity for the data set and contours based on it.

Line 5450N (Figure 12) confirms the general form implied at 5440N and tests the possibility of a steeper margin near 340E. The model also provides a more substantial test of the thrust concept. The model also includes a test of the effect of the Middle/Upper Cambrian rocks of the syncline axis as exposed near Christmas Hills. These modify basal depth estimates by about 200 m. No other stratification can be inferred with certainty using extant gravity data. The Figure comments a stratigraphy within the Trough fold but details cannot be resolved. The density distribution is compatible. It is clear that some of the model boundaries near South Trowutta are artificial and that the dense volcanic members interfinger with the sequence as a whole. The presence of such members and estimates of their contrast are only reliably noted where fold limbs are steeply dipping and sub horizontal situations offer little scope for resolution, especially when data spacing with respect to the fold wavelength is coarse.

Line 5460N (Figure 13) confirms the implications of lines 5440, 5450N and shows that the exceptional anomaly near Edith Creek is related to a thick, steeply dipping, dense mafic pile within the Trough sequence. The pile is tightly folded and may not persist far to the west (see also comments above). The small fold shown near the contrast contact is an essential element of the model and the style of structure near the primary trend intersection and pinch point between Roger River and Edith Creek (see Figures 4A, B; 6).

The observed anomaly is exceptional and localised and fortunately based on some additional coverage. It can be accepted as a real feature whose effect diminishes rapidly to the north - as seen in extensions of the data base. Proper definition of structures around the pinch point and the volume of dense mafic rocks is dependent on acquisition of additional observations.

The model also suggests that the dolomitic sequences thin rapidly onto the Precambrian basement but a steep margin may be disguised beneath the section near Nabageena.

MAGNETIC INTERPRETATION

Only four profiles were examined. Each was based on actual data (E-W lines) and no attempt was made to generate profiles by interpolation from Figure 4A. Note that the magnetic models/profiles are shorter than their gravity counterparts and relate only to the eastern half of the equivalent gravity model. A consistent shift differential of 50 nT is required to balance all solutions with the effective base level of the survey.

Line 5430N (Figure 14) contains four features; a near base level plateau to the east, a large depression, two spikes and a broad rise to the west.

The eastern base level response indicates that the western magnetic part - essentially the mafic component of the Smithton Trough sequence - is terminated near 332E. The spikes represent local and probably very narrow sources (dykes or oxidised fractures) whose location may ultimately be crucial to understanding of control of mineralisation.

Assessment of the low anomaly zones shows that no source near this section can generate it and comparison with other profiles (Figure 5C) indicates that the effect is a geometric response from sources exposed to the north.

Line 5440N (Figure 15) samples the volcanic section and shows that only about half of the section at this northing is either mafic or volcanic. The envelope indicated, and folded into the Trough, is based on response limits. No continuity can be established within the east-dipping limb but the bulk contrast establishes significant mafic content and implies continuity or overlap of some mafic members.

Line 5450N (Figure 16) which samples more of the Trough section than the previous line shows that significant mafic units do persist across the fold. The crude shape modelled could be refined but the mismatch has been presented in order to demonstrate just how, and how much, sources related to observed patterns in the field - even when sub horizontal and not easily resolved gravimetrically. Note that at this northing the mafic section is at least two thirds massive, magnetic volcanics. A clearer view of the variations in flow content, volume and response can be gauged from these models and comparison with profiles (Figures 5A to C). The features of Figures 4A and B can thus be converted into surface mapping guides for exposed volcanics and substantial igneous members.

Line 5460N (Figure 17) transects the sequence near the structural constriction south of Edith Creek (see Figures 4A, B; 6) and provides a broad assessment of structural form. The model provides an indication of the envelope containing mafic rocks. Although the profile fit is imperfect near 338E (it is equivalent to that on profile 2380, 2.5 km south - see Figure 5A) the general style is evident. That such a solution should fit the adjacent profile further removed from the structural

constriction suggests a valid formal solution unsatisfactory in terms of fine detail only.

STRUCTURAL INTEGRATION

The gravity-magnetic models, although based on data sets of differing quality and assessing different aspects of the stratigraphy and structure, are consistent. It is possible to insert the magnetic envelope for the volcanics within the mass envelope of the gravity model for the Trough sequence and also demonstrate equivalent structural forms for each envelope.

The mafic suite is continuous across the Trough.

The large magnetic anomalies and mass anomaly north of Trowutta and west and south of Edith Creek are related to a massive pile of volcanics or a relative absence of intercalated sediments. The observation of responses west of the Duck River Fault at Edith Creek, and to a lesser extent near Ekberg Creek, represents offset and tight folding near the fault. In each case major cross structures or intersections are established or inferred (see also trends, Figure 6).

Both data sets are consistent with a thrust solution for the western Precambrian rocks and for continuations of the Smithton Trough to the SW. It is certainly not a closed off or pinched out structure near Balfour. The Trough sequence is folded and the pattern of folds implied is suggested in Figure 18. This is consistent with exposures and shows that the domal structures north of Marrawah lie on a plunging anticlinal axis which persist beneath the thrust block. Figure 18 also suggests the thickness of the thrust cap.

Although the data, methods and models which are the basis for this diagram are not ideal they do show that the thrust surface is irregular and probably faulted or folded. The changes in form of the surface can be correlated with major trends evident in all data (compare Figure 6).

The present work, made possible by the availability of a sound regional separation - Mantle 88 (Leaman, 1988 c), has established that the Pieman Granite extends into the Balfour region and intrudes a concealed extension of the Smithton Trough.

Relatively modest magnetic trends or alignments of anomalies can be related to discontinuities within the overthrust block or the concealed sequence and indicate alteration or some fracture systems. These features are thus valid indicators of fluid transfer and several are obviously associated with the limits of the granite spine.

DISCUSSION
MATTERS SPECIFIC TO EL 22/87

The present interpretation does not immediately vary exploration concepts in the Trowutta region. No significant mineralisation is known along the eastern margin of the Smithton Trough with the exception of the Balfour area - and that is now shown to be highly prospective as a result of the the present work.

Exploration has been targetted toward general assessment of the volcanic sequence and location of any possible ultramafic content with concomitant occurrences of PGM elements or gold. Traces of such elements have been reported from the Smithton Trough but their origin has never been established. It is possible that the trace occurrences recorded represent reworking of primary deposits perhaps 30 km to the east.

This study and previous mapping indicate that the volcanic sequence is essentially mafic. There is no evidence of acid or intermediate lavas in the sequence. This review has, however, established that the igneous content of the section is variable and may range from 200 to in excess of 1000 metres. Further data and an extended analysis would be required to properly define the volcanic sequence. This work shows that gravity and magnetic methods can do so.

The largest accumulation of mafic materials occurs in the Edith Creek-Roger River-Trowutta area. The igneous rocks are massive and dense and very thick. Parts of the sequence exceed 3.0 t/cu m and it is possible that more than basalt or spilite flows are present. The localisation of extremely thick and dense mafic rocks near the intersection of major trends evident in all data suggests a major vent or source for the mafic sequence. Such a site could be expected to possess anomalous trace or other mineralisation and could well be the source for the trace PGMs found in the Trough. This possibility must be examined in detail.

CONCLUSIONS

Regional assessment of available gravity and magnetic data in the Smithton - Balfour region has established that the

- 1 mafic volcanics are continuous across the Smithton Trough,
- 2 Trough rocks extend to the SW beneath an overthrust slab of Precambrian rocks,
- 3 exposed fold patterns persist beneath the thrust which is itself distorted,
- 4 thrust is generally low angle although the high angle side of the sheet may be developed a little east of Balfour,
- 5 most substantial mafic accumulations occur in the Trowutta North region and may be mafic piles,
- 6 possible mafic piles are tightly folded and disrupted between Roger River and Edith Creek,
- 7 Pieman Granite extends into the Balfour region,
- 8 impressed fracture sets are either parallel to the Trough axis (and margin of the Rocky Cape Group basement) or oblique to the thrust. There are several large sub E-W features and many other critical intersections or changes in structural style or scale are related to these,
- 9 many lesser magnetic features and trends can be associated with implied faults and fracture alteration,
- 10 Although the mafic rocks do not appear to be major sources of mineralisation generally the substantial pile near Trowutta may be associated with a major vent. Such a site may well have sourced exotic elements.

RECOMMENDATIONS

There is little scope for improved resolution using the extant gravity data base although the potential of the magnetic data has not been exhausted. This interpretation shows, however, that the two methods must be coupled if all aspects of the structure are to be defined.

It is therefore essential that the gravity coverage be improved.

A nominal station spacing of 1 to 2 km is the maximum desired spacing for any useful resolution of the form of the volcanic pile and inter-related structures. The preferred spacing for infill coverage leading to target definition is 0.5 to 1 km. 3D analysis will be required for reliable interpretation of the form of the volcanic pile and the complex fold and fault structures impressed upon it.

Existing aeromagnetic data is probably adequate for comprehensive appraisal of the volcanic pile and, in tandem with gravity interpretation, resolution of the vent axis or abnormal alteration. Even so it is likely that some surface coverage may be advisable to support implications of unit thickness and location and all work must be supported by some property determinations. This acquisition could be coupled with a geochemical sampling programme designed to establish whether the rocks in the region of the pile are anomalous in PGMs or other metals.

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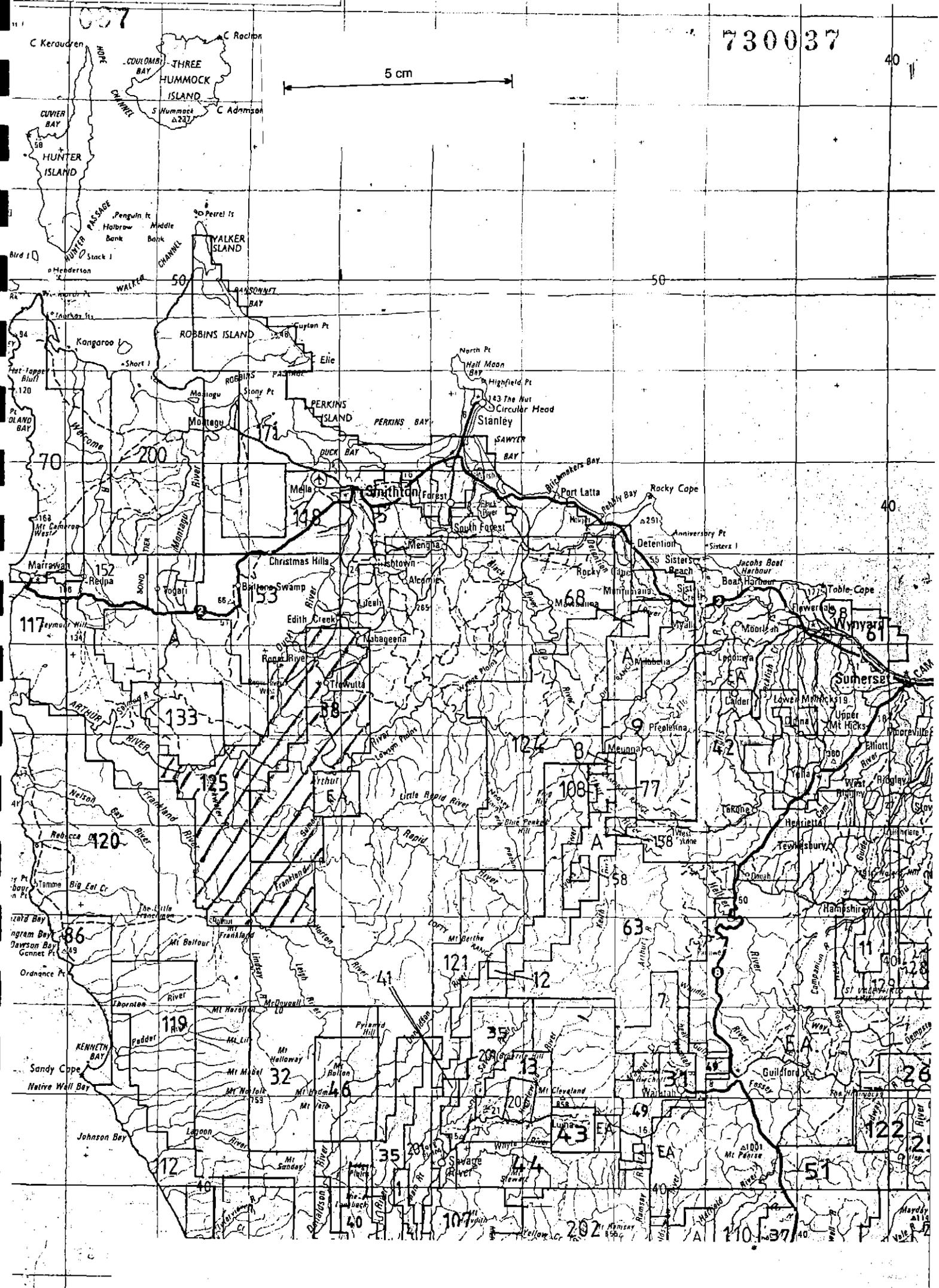
Report submitted on behalf of
Leaman Geophysics
by

D. Leaman

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

26/9/88

5 cm



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250000mE

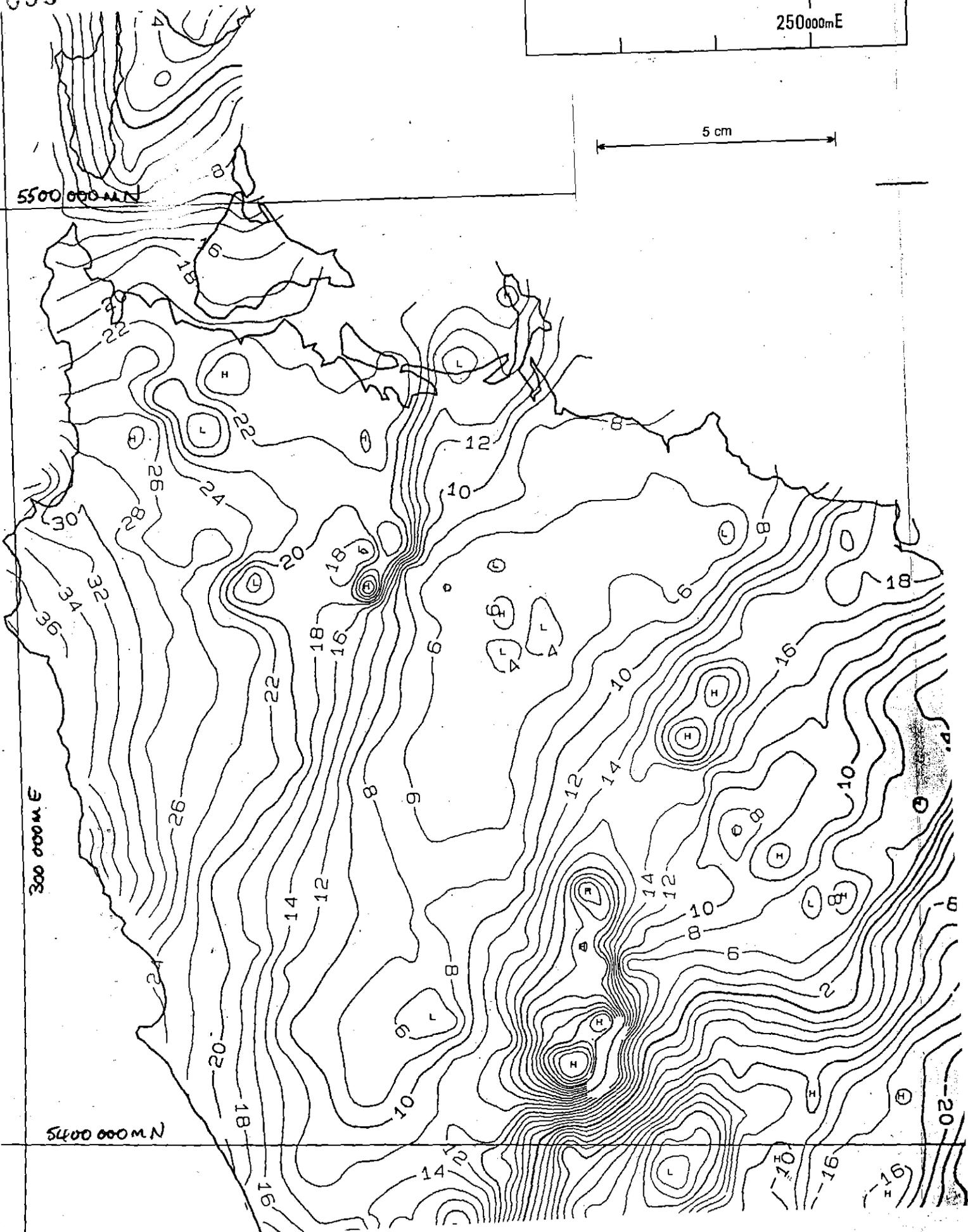
5 cm

5500 000 M N

5500 000 M N

300 000 M E

5400 000 M N



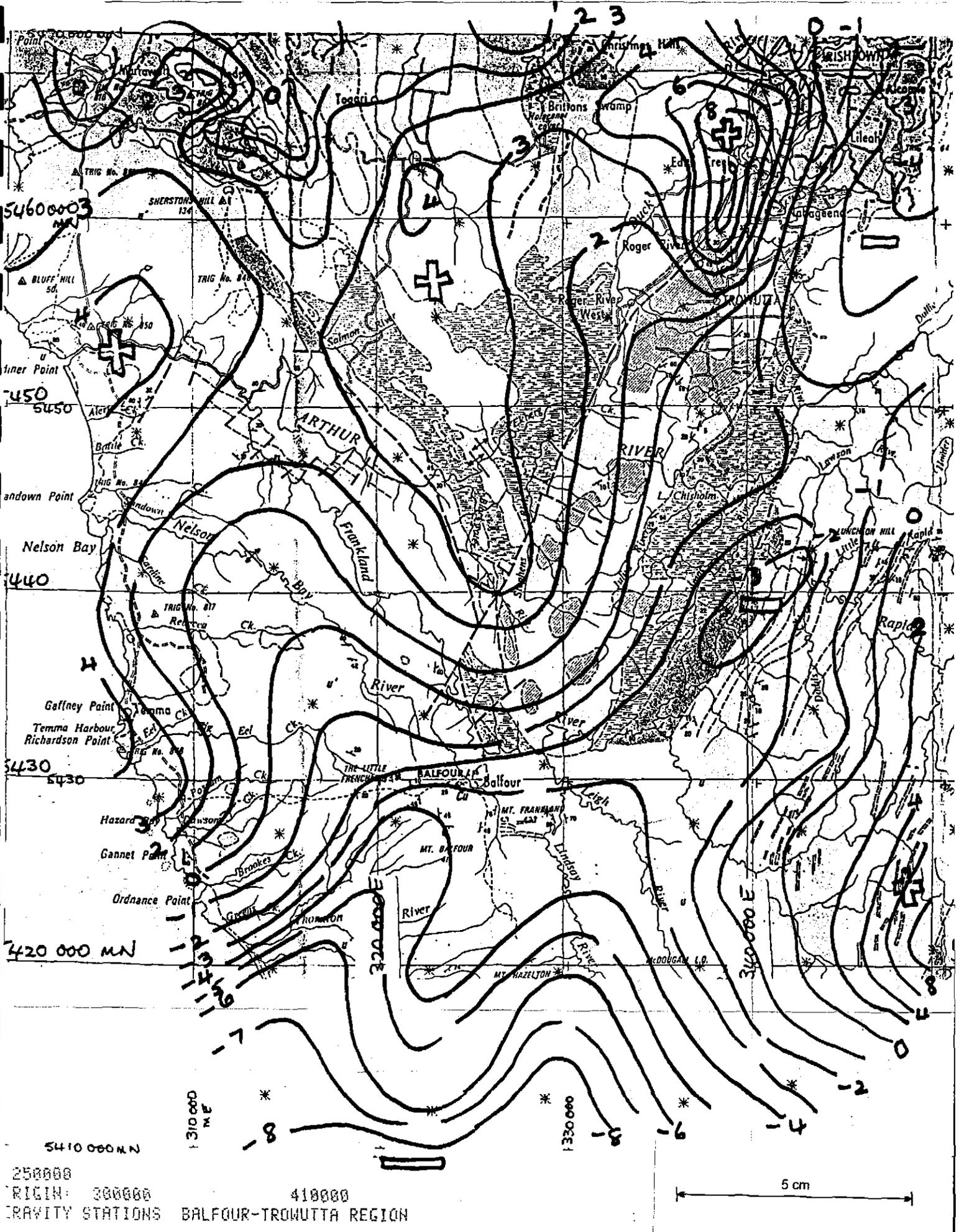
BOUGUER ANOMALY MAP 1:500 000 MINES DEPARTMENT COMPILATION
(2 mGal interval, density 2.67 t/cu m)

FIGURE 2

RESIDUAL BOUGUER ANOMALY SMITHTON-BALFOUR REGION
(separation based on Mantle88, Leaman (1988c))

FIGURE 3

(in mGal)



250000
 ORIGIN: 300000 410000
 GRAVITY STATIONS BALFOUR-TROWUTTA REGION

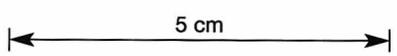
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CONTOURS OF TOTAL MAGNETIC FIELD
(refer Bishop, 1986)

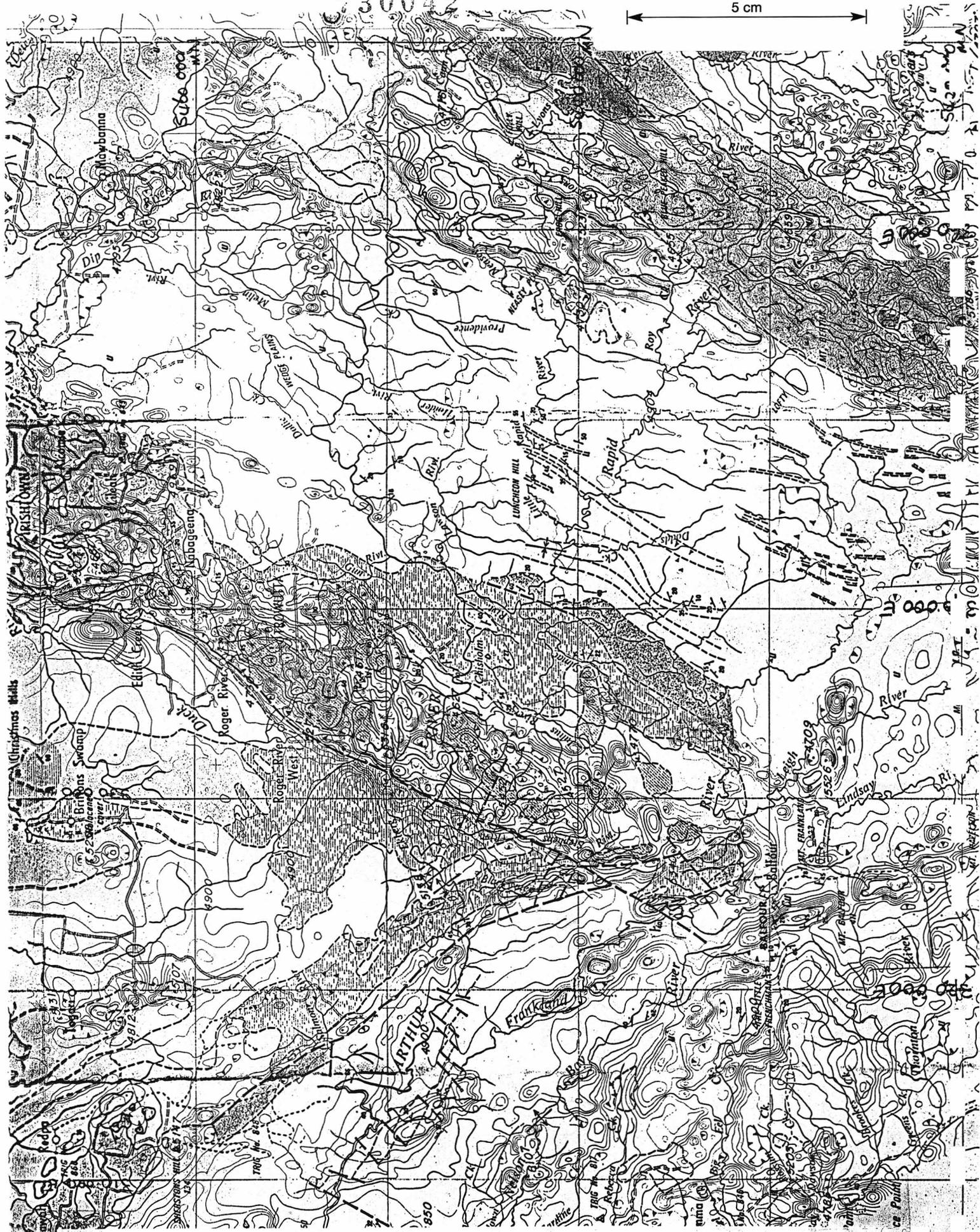
BMR SURVEY

FIGURE 4A



30042

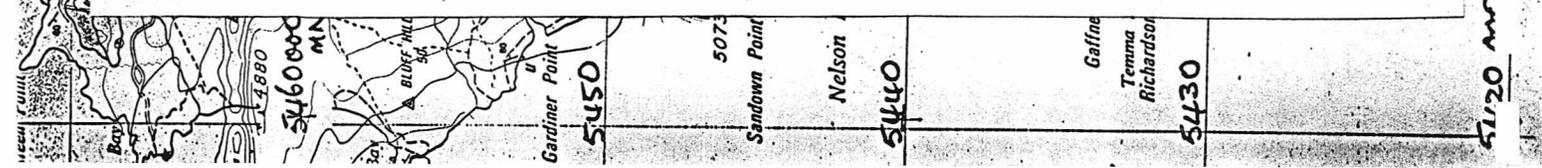
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CONTOURS OF TOTAL MAGNETIC FIELD
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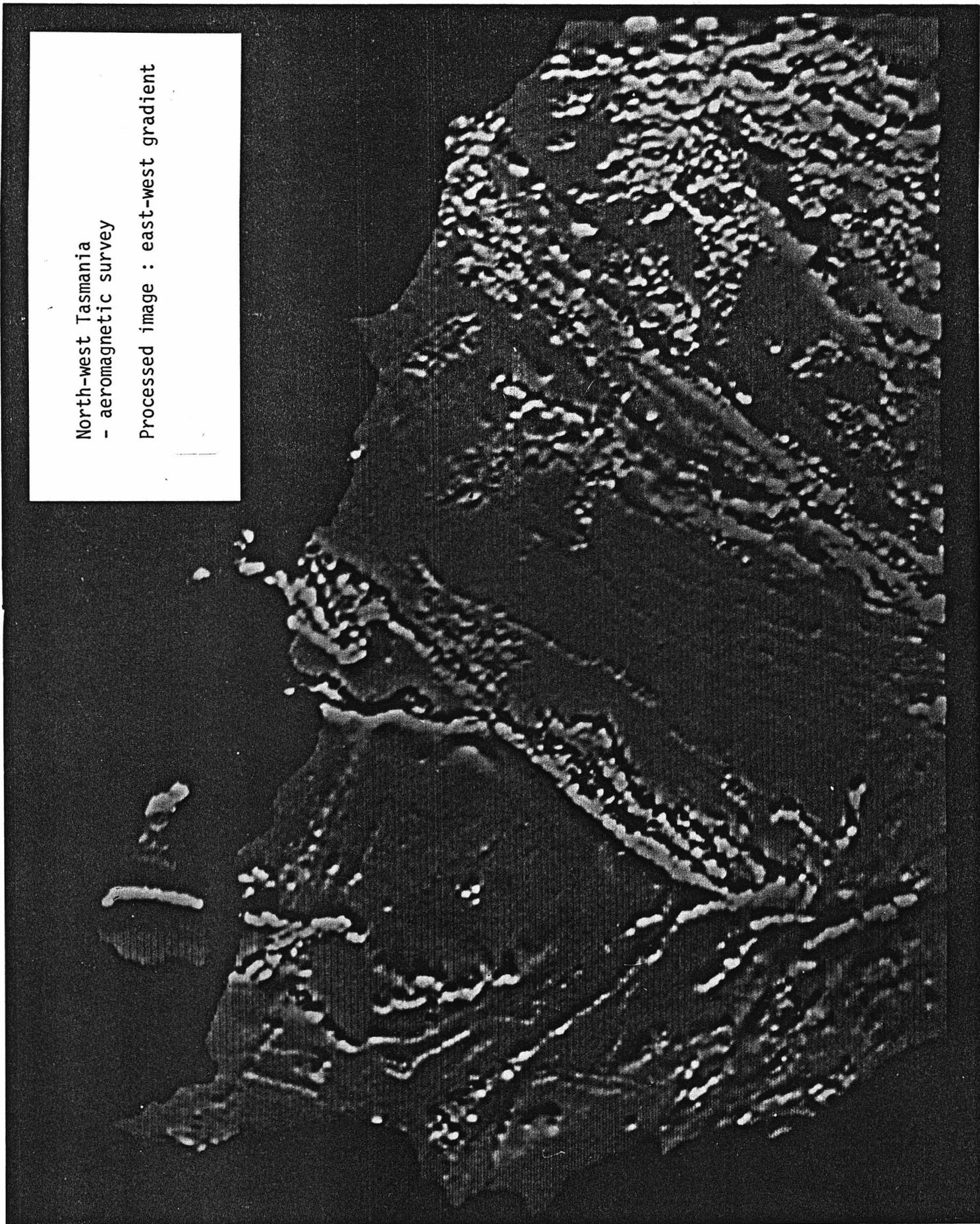
FIGURE 4A



54200 m m

North-west Tasmania
- aeromagnetic survey

Processed image : east-west gradient



ROCKY CAPE BLOCK : PROCESSED MAGNETIC FIELD AND STRUCTURES

PROCESSED RELIEF MAP OF TOTAL MAGNETIC FIELD NW TASMANIA
(refer Bishop, 1986)

FIGURE 4B .

043

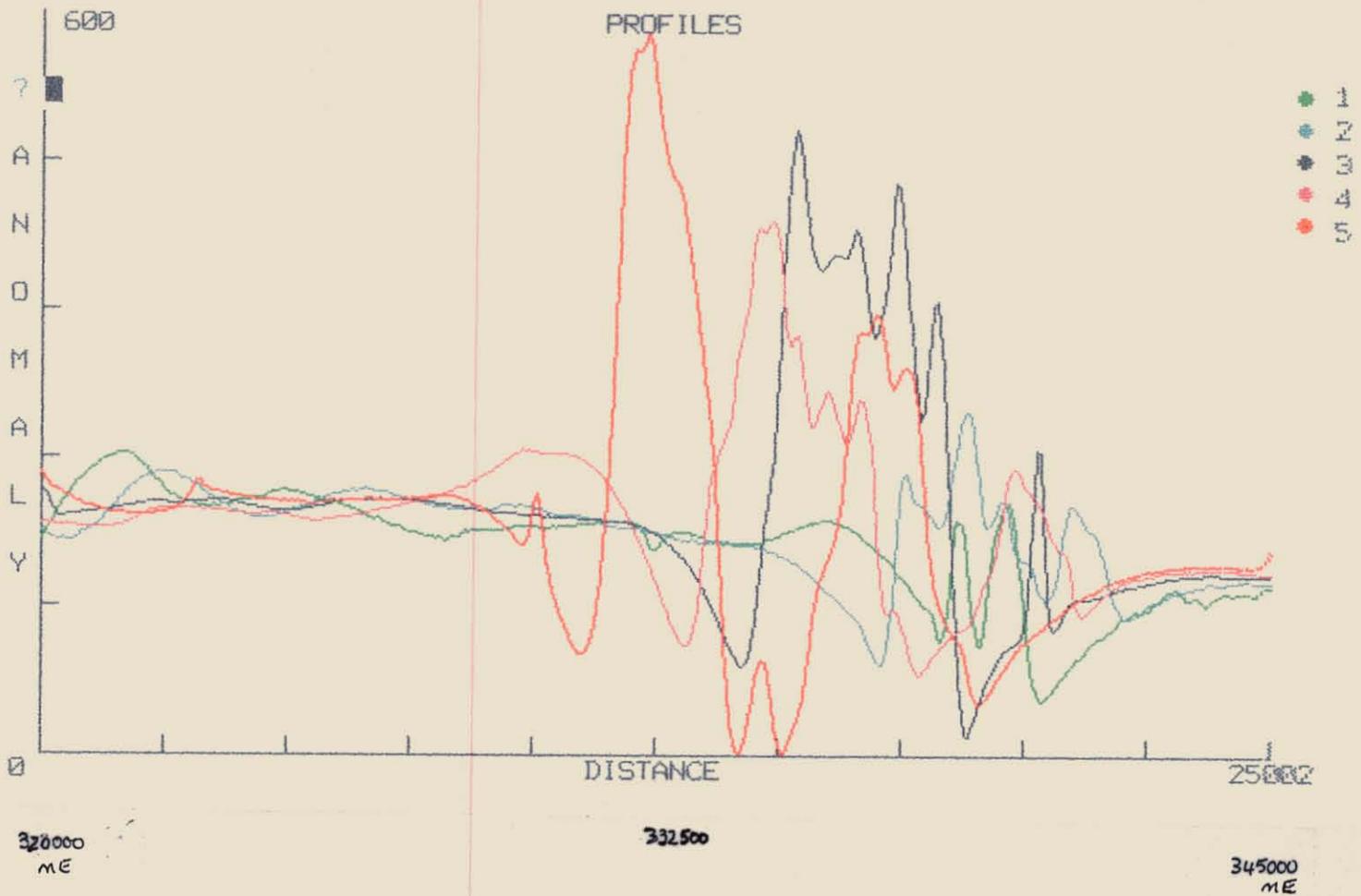
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Hobart, Tasmania 7001

730044

1	B:M2341
2	B:M2380
3	B:M2440
4	B:M2490
5	B:M2540

ZERO SHIFT : 98.18994

BALFOUR PROJECT LINE 2341	~ 5460 200 N
BALFOUR PROJECT LINE 2380	~ 5458
BALFOUR PROJECT LINE 2440	~ 5455
BALFOUR PROJECT LINE 2490	~ 5452 500
BALFOUR PROJECT LINE 2540	~ 5450 100 N

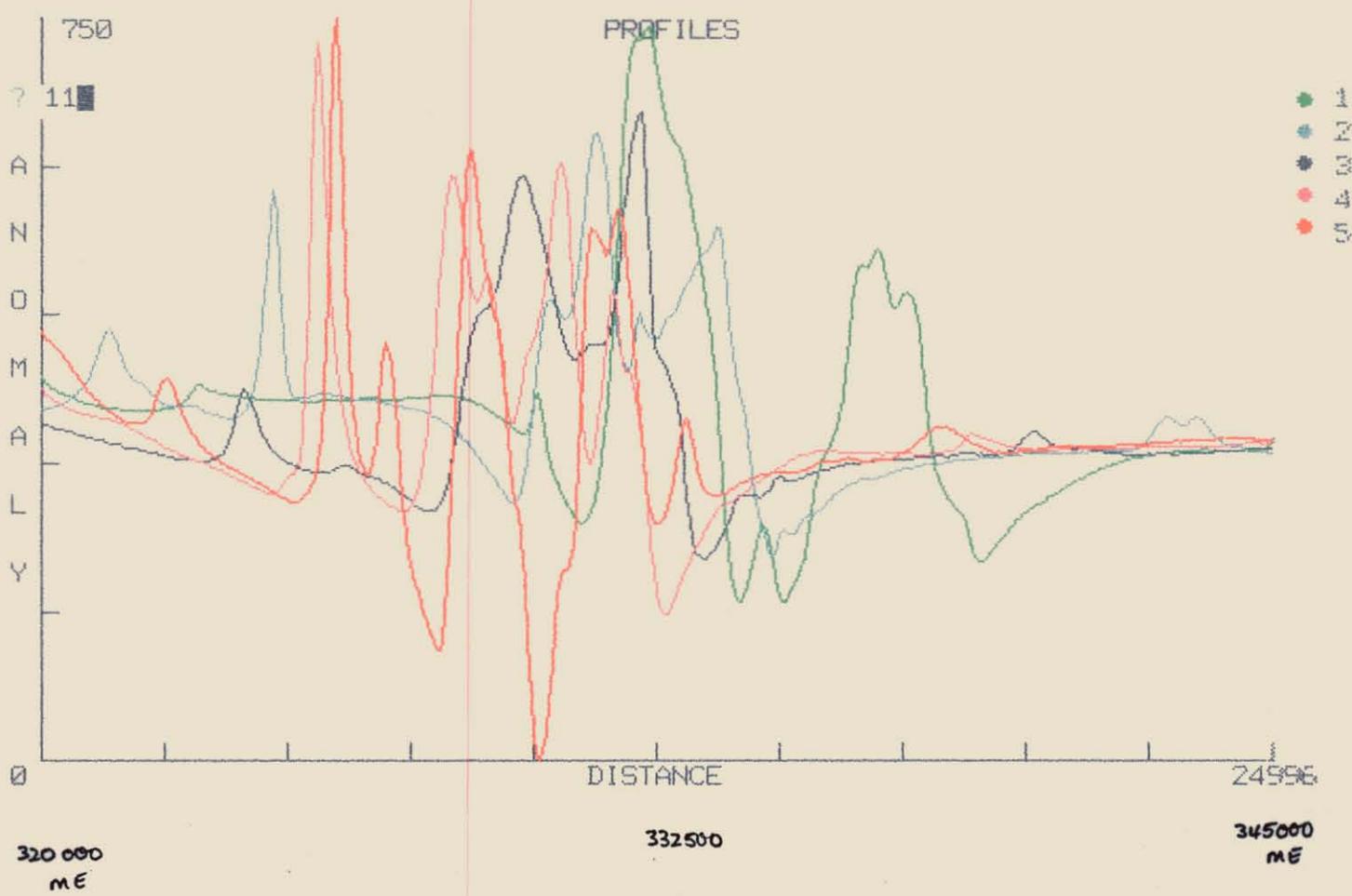


044

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730045

1	B:M2540	BALFOUR PROJECT LINE 2540	~ 5450 100 mN
2	B:M2590	BALFOUR PROJECT LINE 2590	~ 5447 800
3	B:M2640	BALFOUR PROJECT LINE 2640	~ 5445
4	B:M2690	BALFOUR PROJECT LINE 2690	~ 5442 700
5	B:M2730	BALFOUR PROJECT LINE 2730	~ 5440 400 mN
ZERO SHIFT : 257.3901			

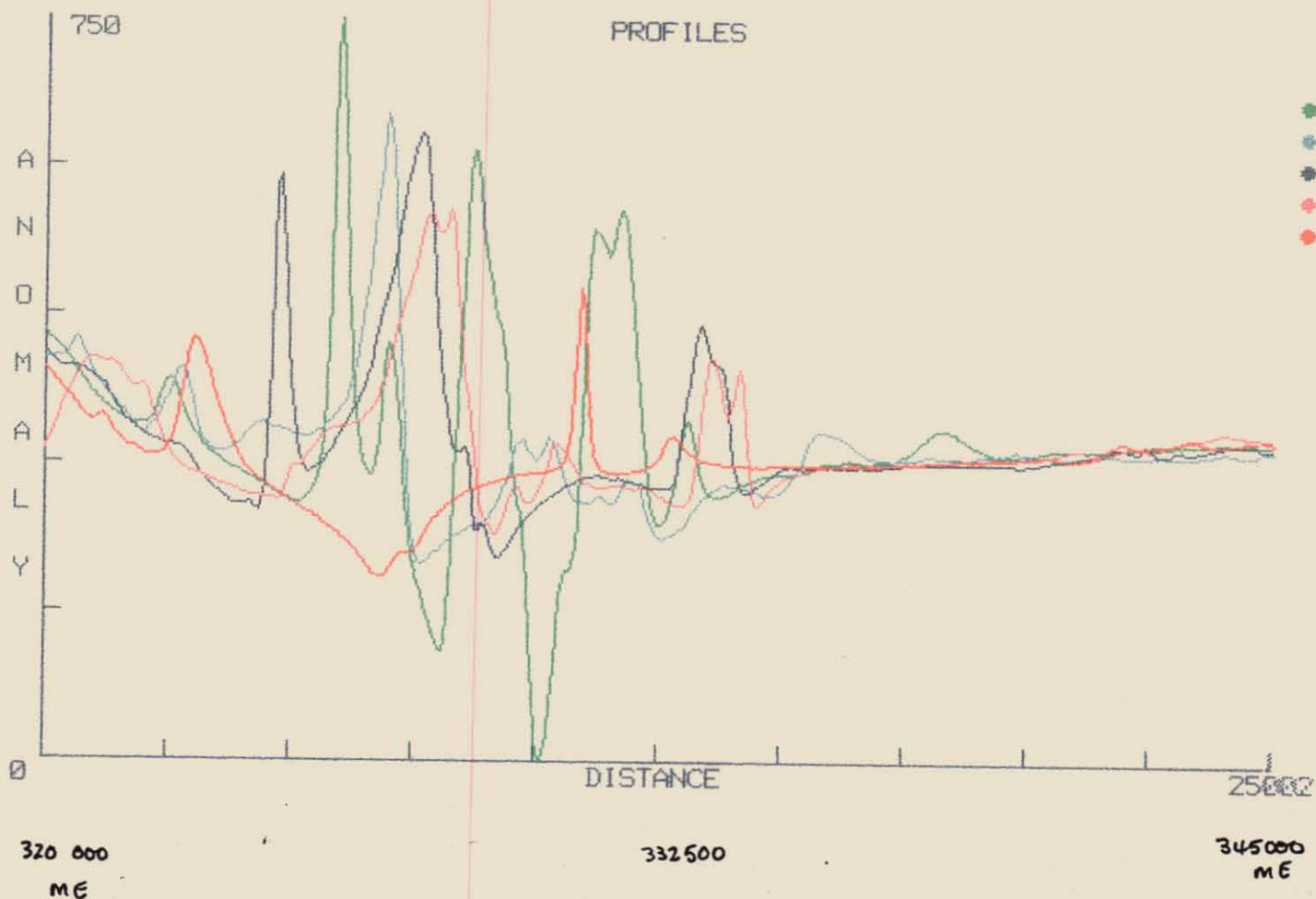


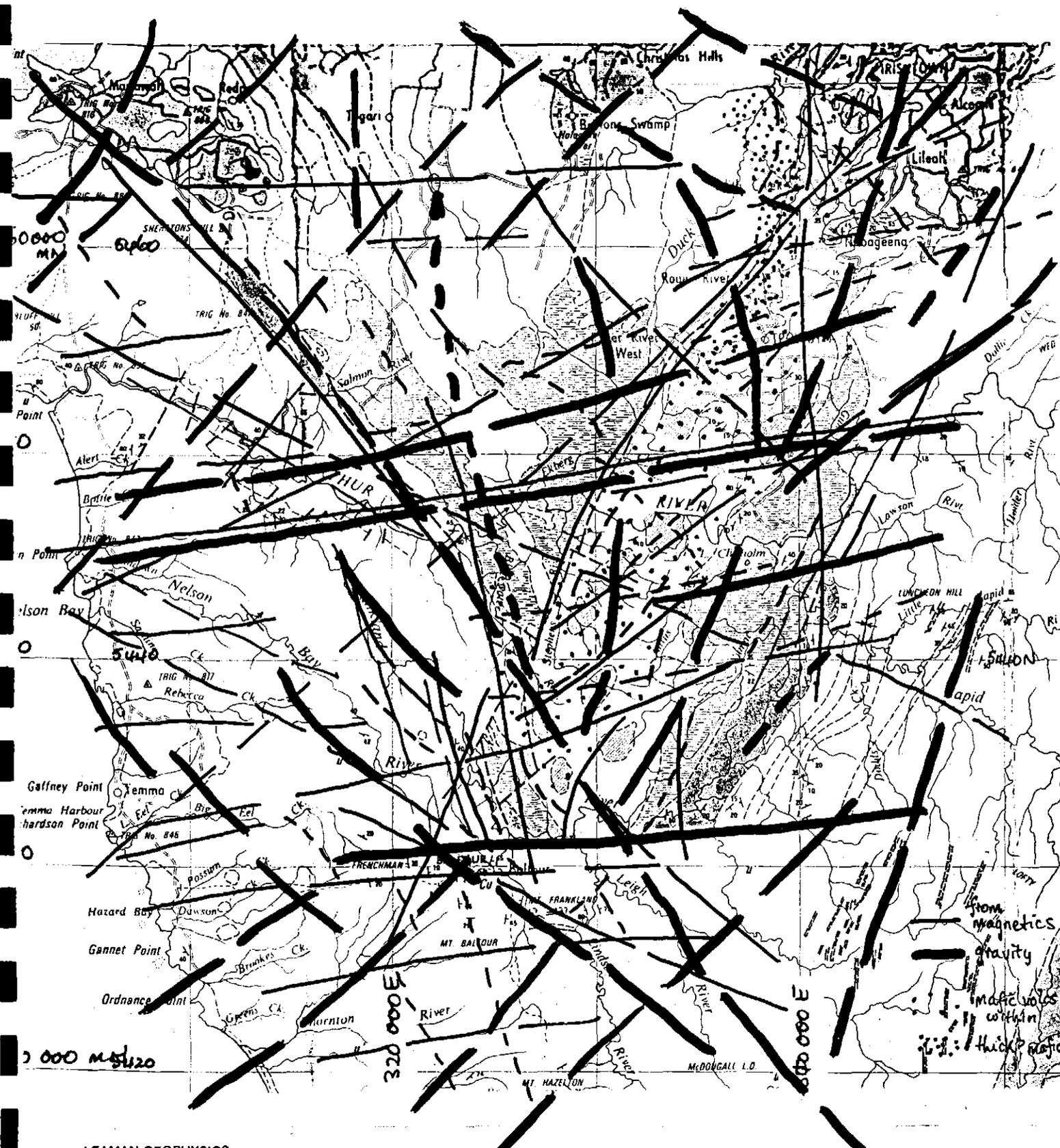
OBSERVED MAGNETIC PROFILES

5440 - 5450 000 mN

FIGURE 5B

1	B:M2730	BALFOUR PROJECT LINE 2730	~ 5440 400 mN
2	B:M2790	BALFOUR PROJECT LINE 2790	~ 5437 500
3	B:M2841	BALFOUR PROJECT LINE 2841	~ 5434 900
4	B:M2880	BALFOUR PROJECT LINE 2880	~ 5432 750
5	B:M2930	BALFOUR PROJECT LINE 2930	~ 5430 700 mN
ZERO SHIFT : 257.3901			





LEAMAN GEOPHYSICS
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 Hobart, Tasmania 7001

5 cm

SUMMARY MAP: TRENDS SUGGESTED IN OBSERVED OR RESIDUAL DATA

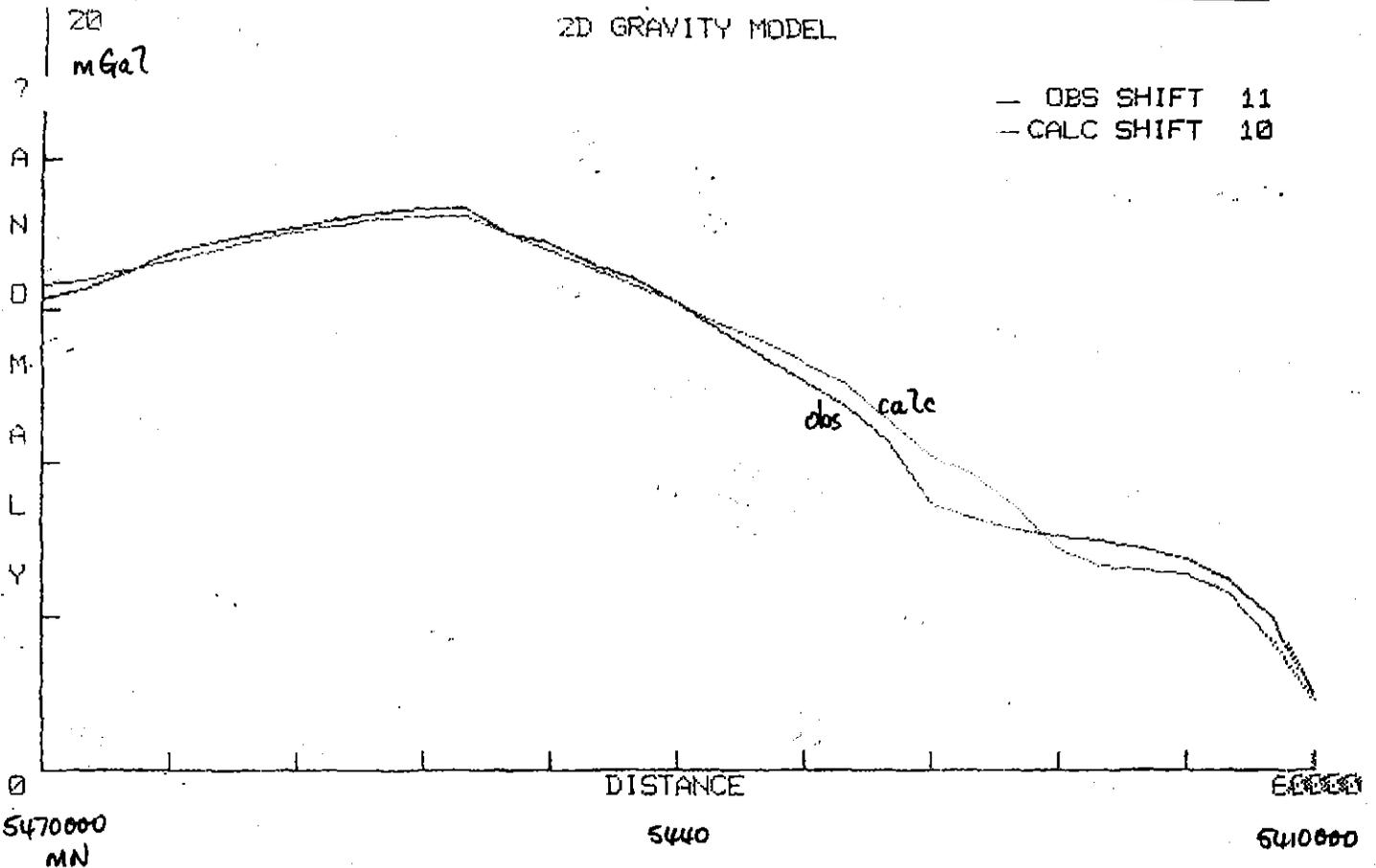
FIGURE 6

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2D GRAVITY MODEL



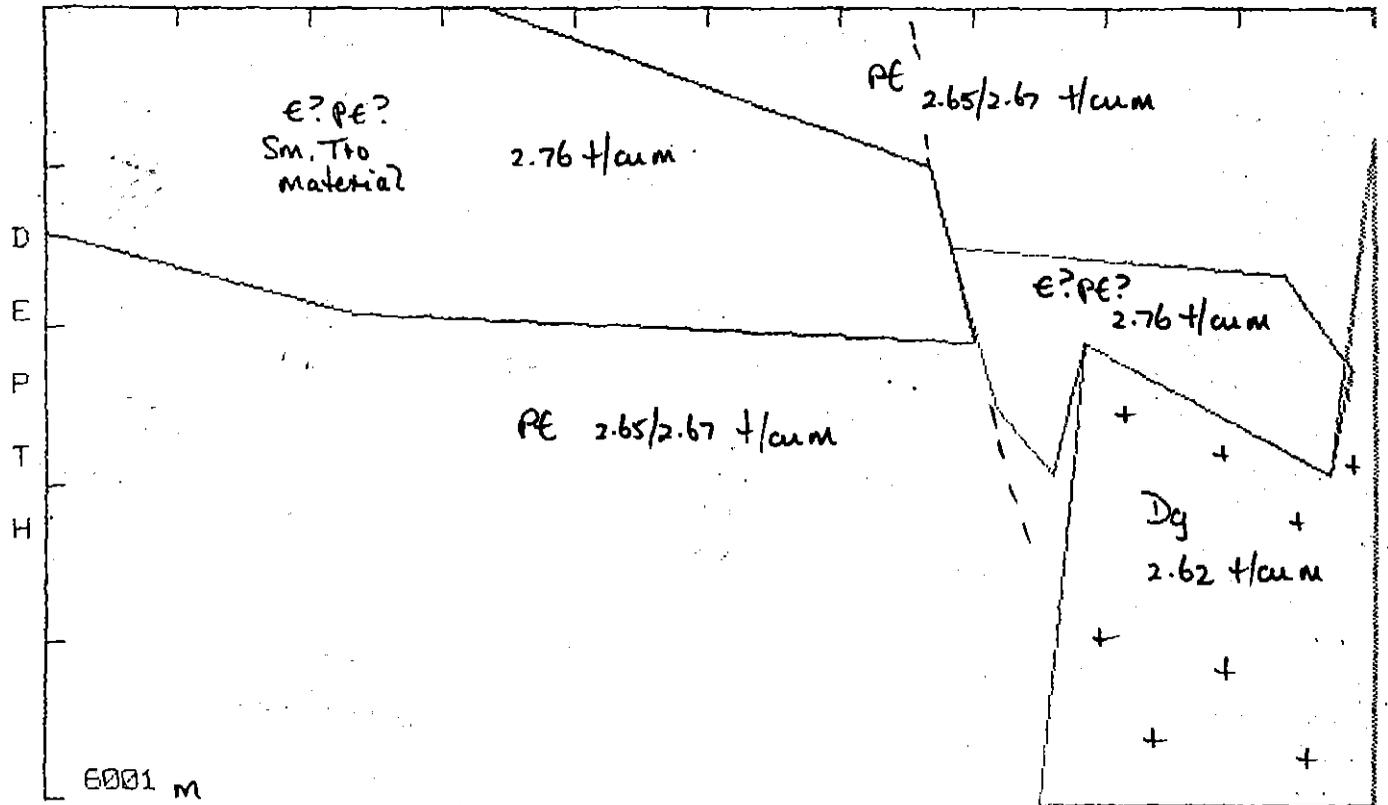
BALFOUR-TROWUTTA LINE 320E
6/3-6 3/1
Togati

5470-5410N

Arthur
R

The
Clump (Balfour)

DISTANCE



048

LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 60000

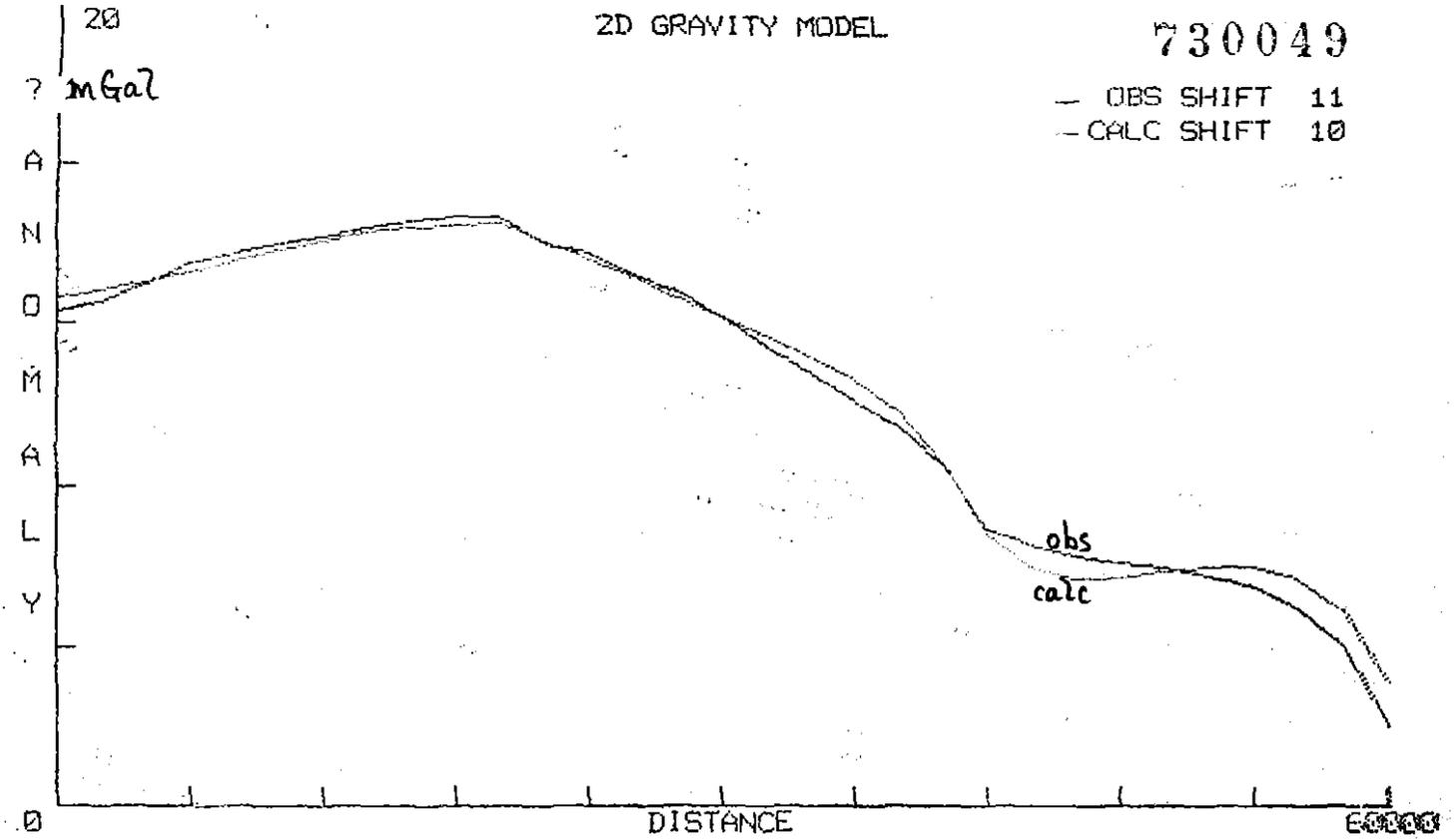
2000

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

2D GRAVITY MODEL

730049

- OBS SHIFT 11
- CALC SHIFT 10



5470000
MN

5440

6410000

BALFOUR-TROMUTTA LINE 320E 5470-5410N

6/6=59000/2000 3/3=59999/1000

Togari

Arthur

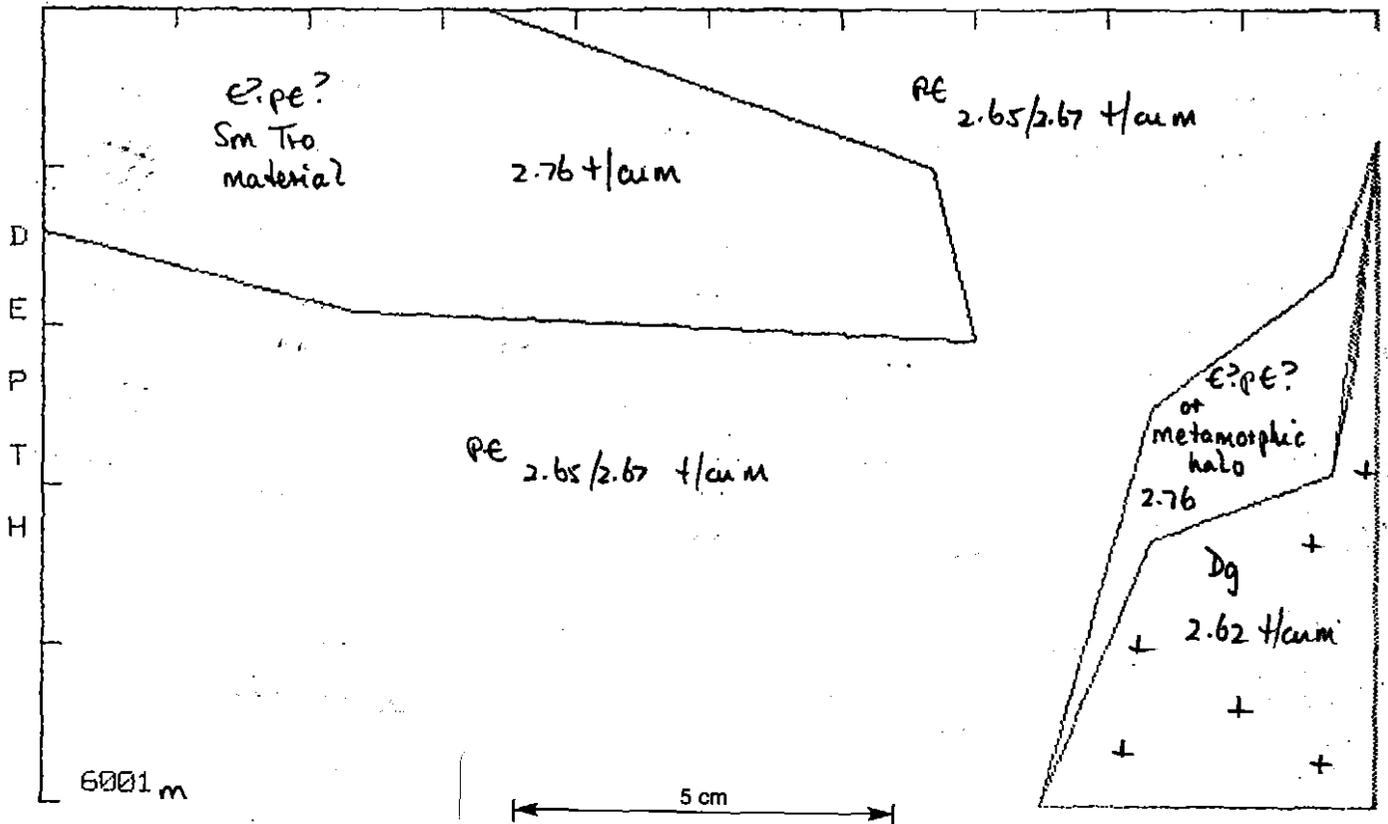
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Clump

(Balfour)

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DISTANCE

60000



GRAVITY INTERPRETATION

LINE 320 E

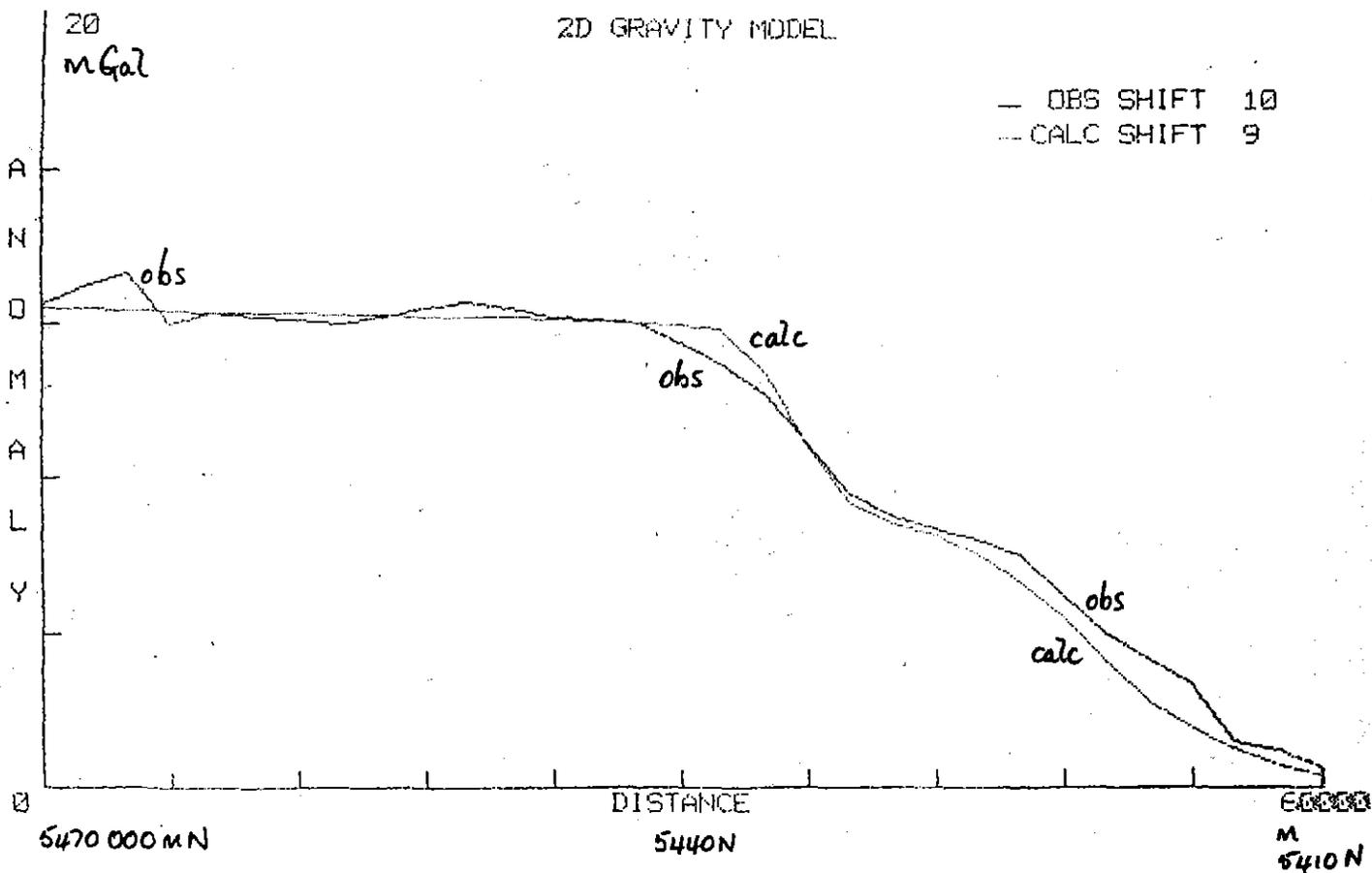
FIGURE 7B

049

730050

2D GRAVITY MODEL

— OBS SHIFT 10
— CALC SHIFT 9



BALFOUR-TROMUTTA LINE 330E 5470-5410N

(Balfour)

Christmas
Hills

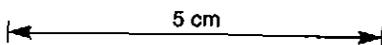
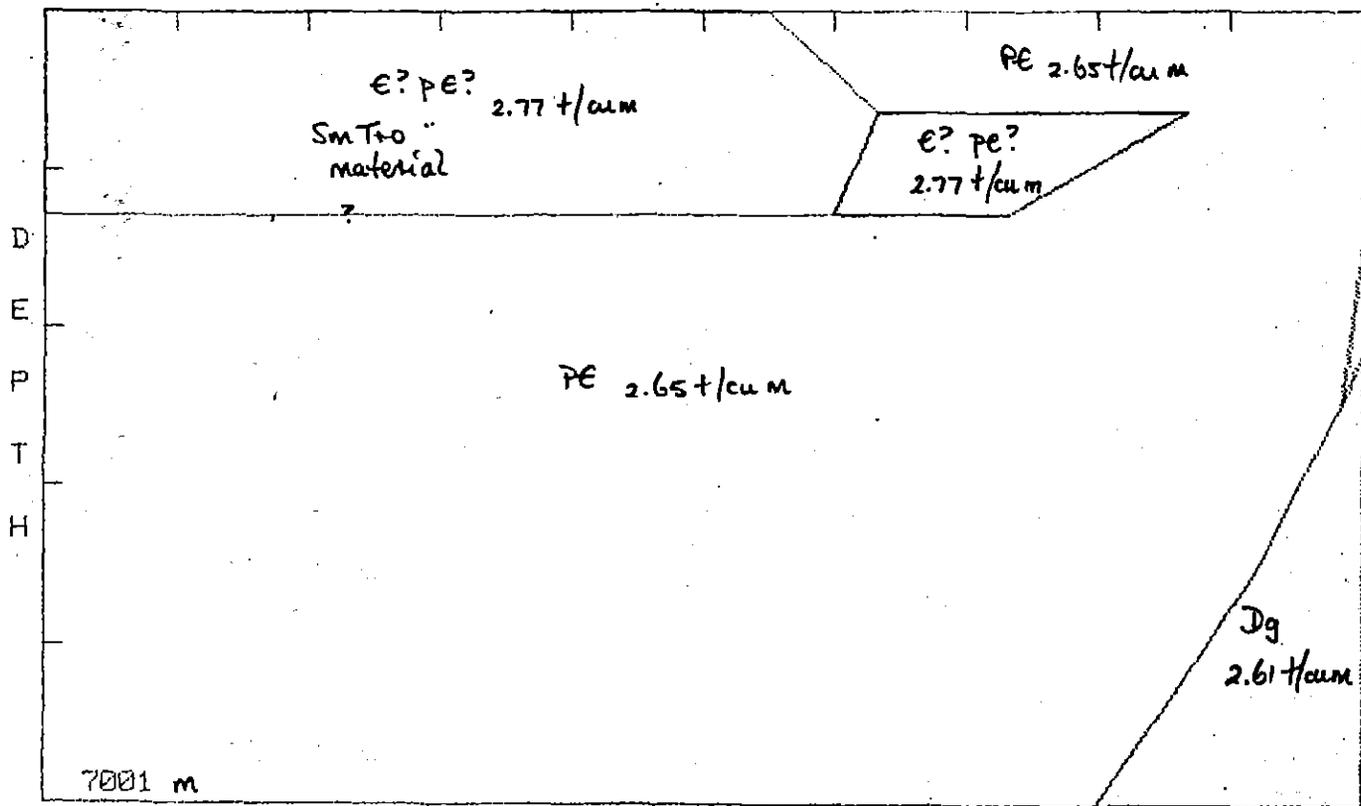
Roger R
west

Arthur
R

Lindsay
R

DISTANCE

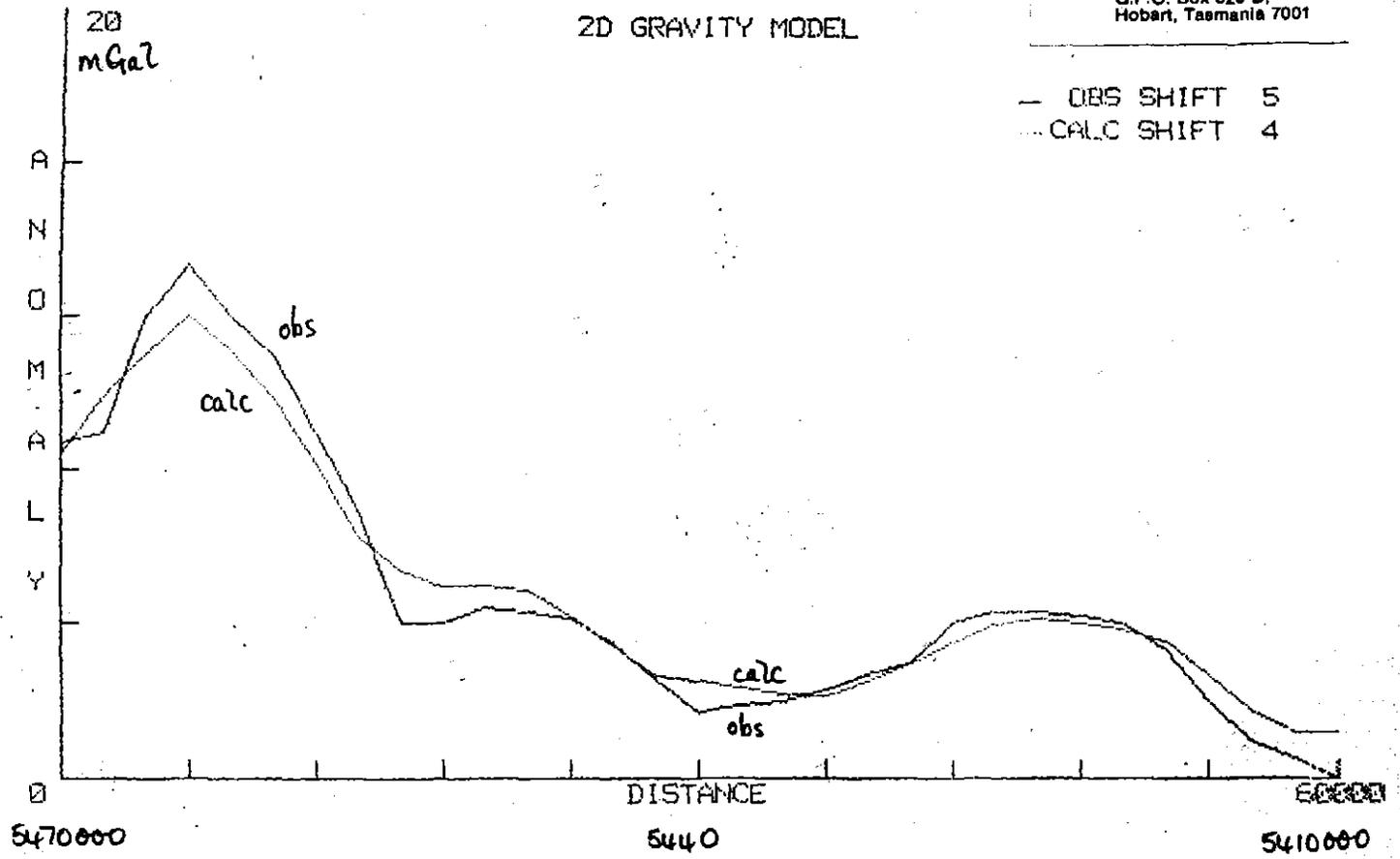
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050

2D GRAVITY MODEL



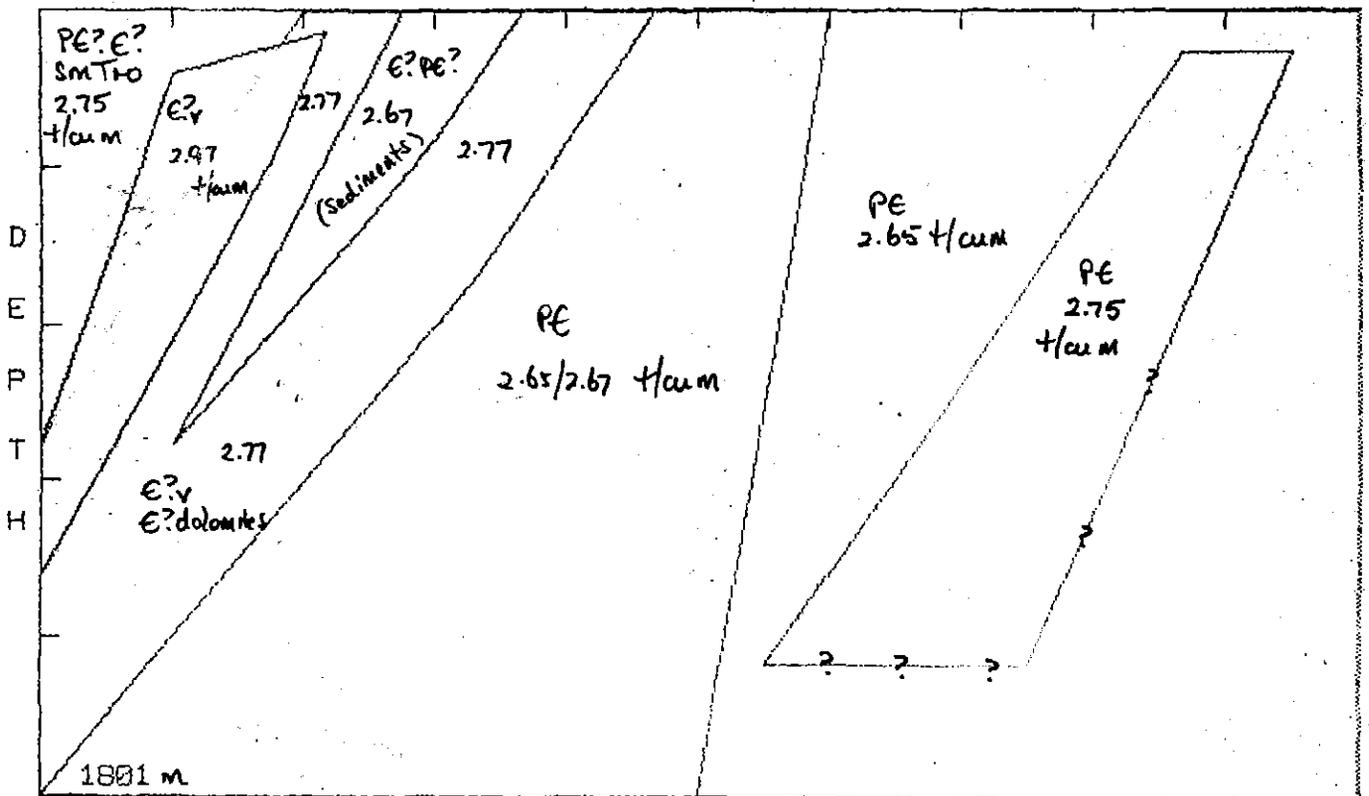
BALFOUR-TROWUTTA LINE 340E 5470-5410N

Edith
ck Roger Trowutta
R

Forked
tree Hill

Horton
R

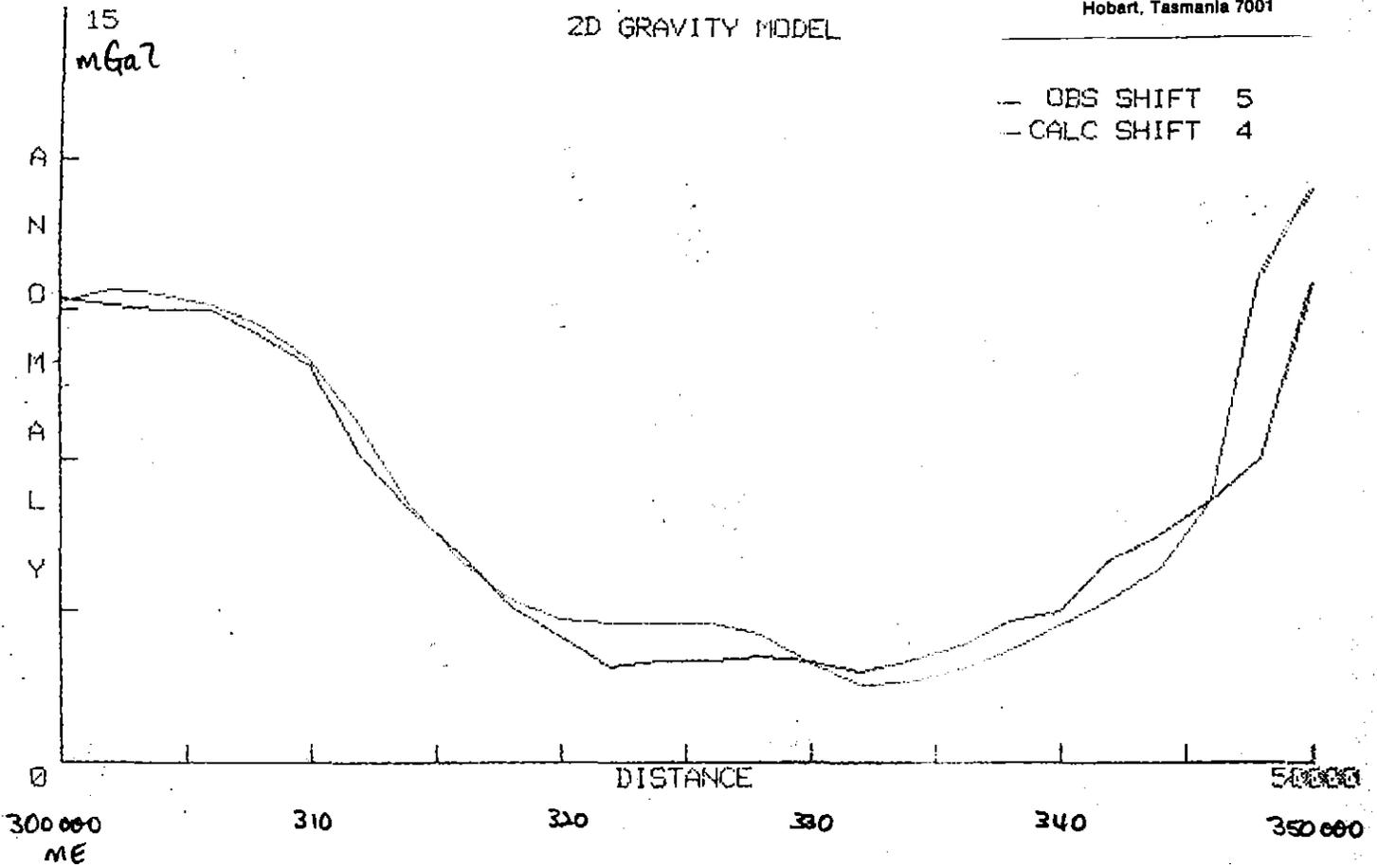
DISTANCE



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2D GRAVITY MODEL

- OBS SHIFT 5
- CALC SHIFT 4



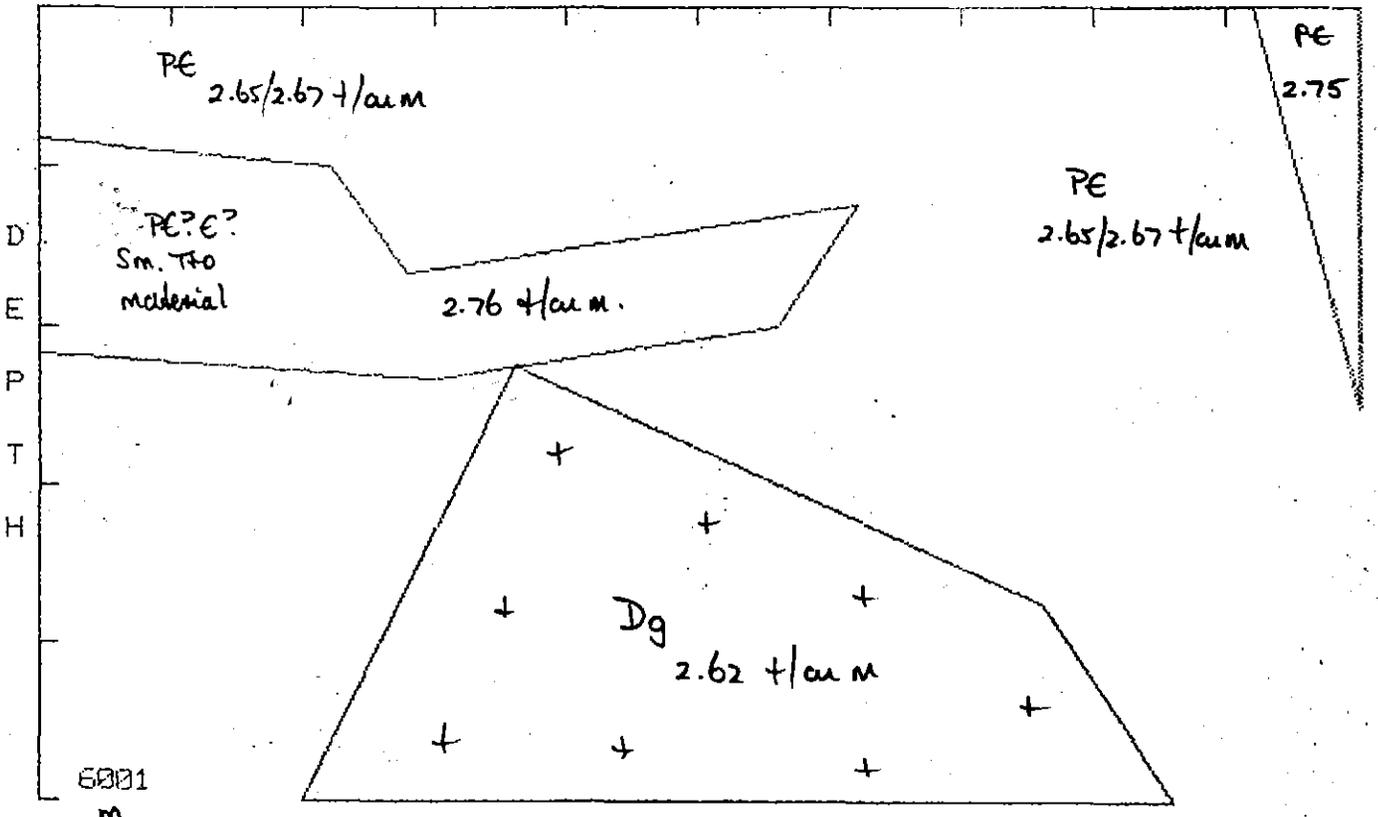
BALFOUR-TROWUTTA LINE 5430N 300-350E
(Temma) Hazard Bay

Balfour

Hotton R

Beryl Pt.

DISTANCE 500000

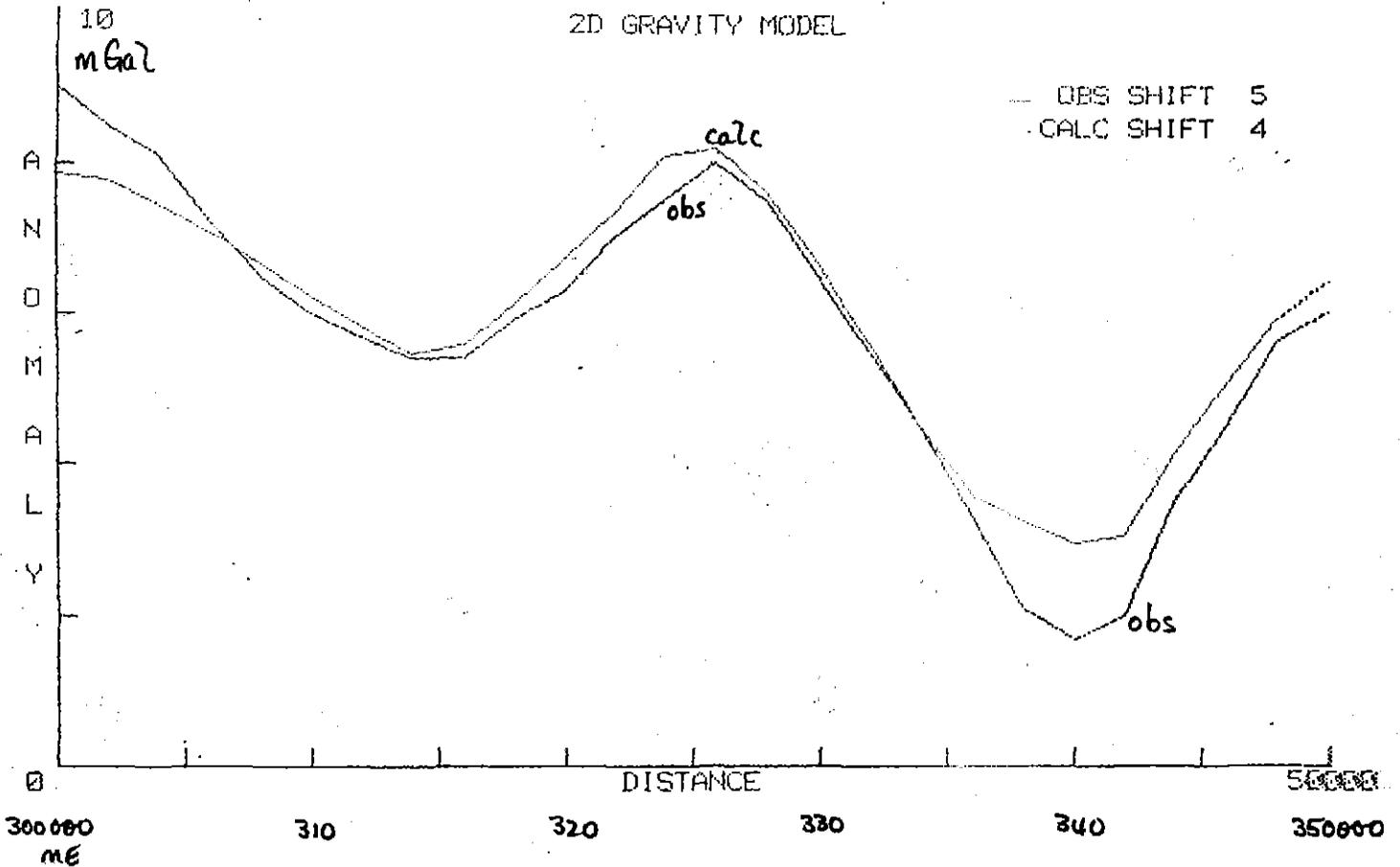


032

5 cm

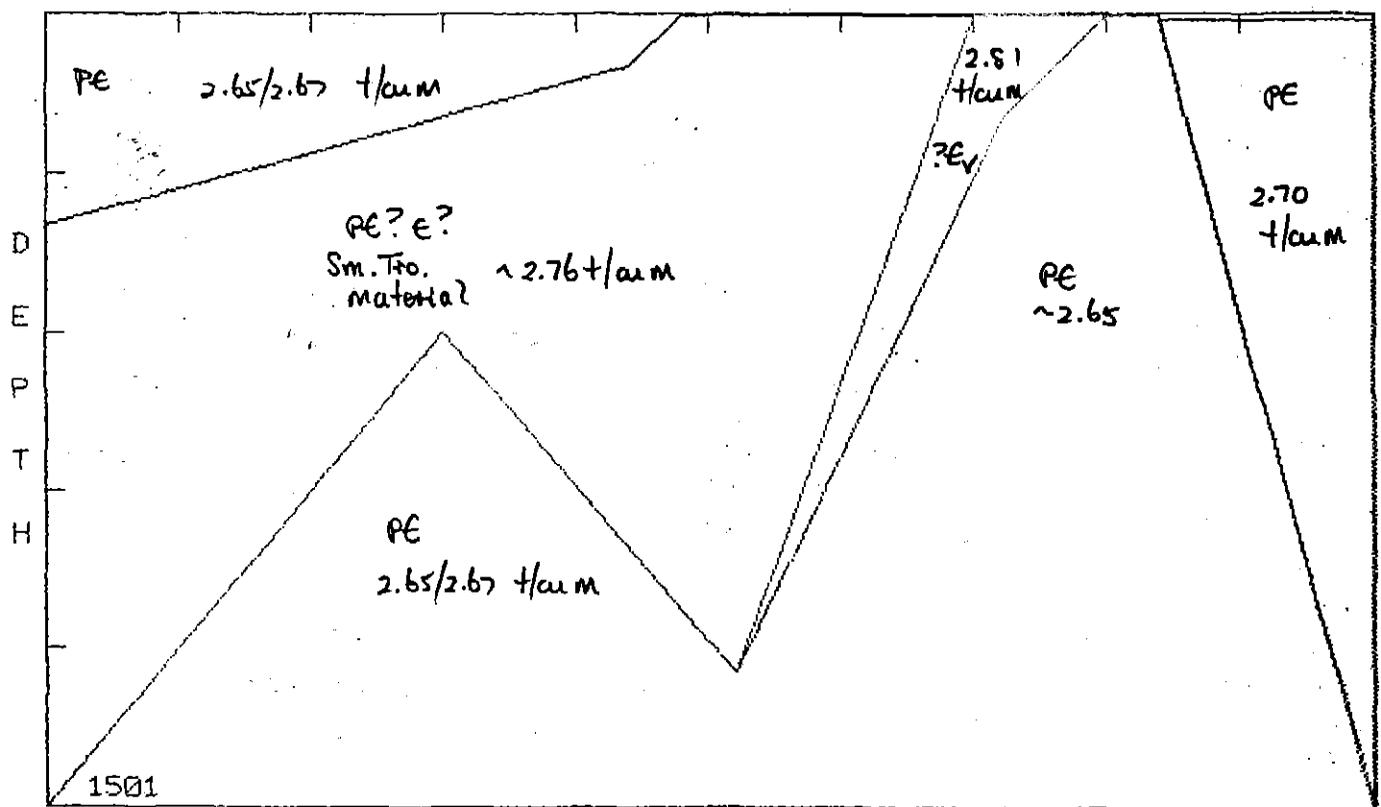
2D GRAVITY MODEL

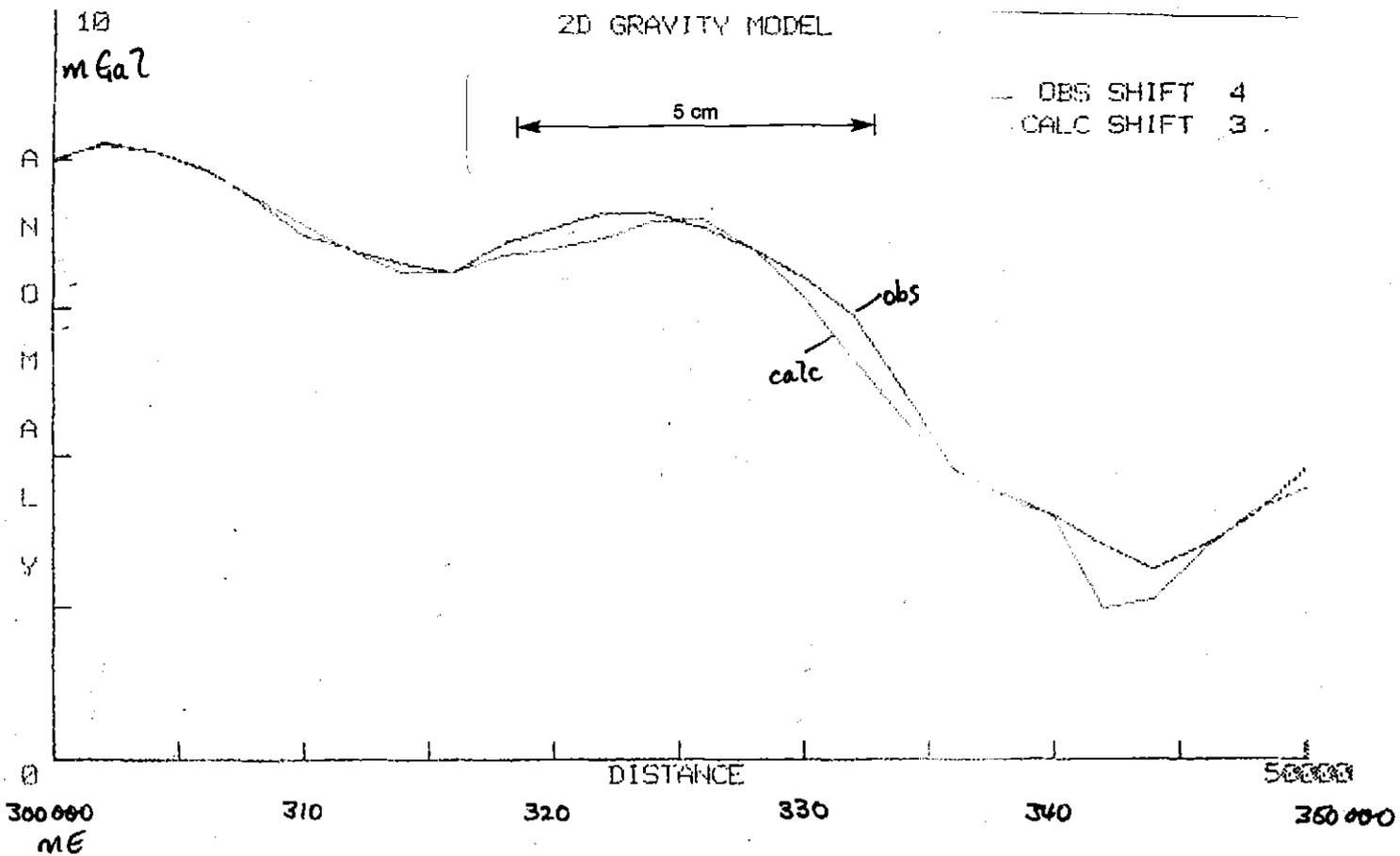
— OBS SHIFT 5
— CALC SHIFT 4



BALFOUR-TROWUTTA LINE 5440 300-350E

Nelson Bay Frankland R Julius CK Forked Tree Hill Rapid R



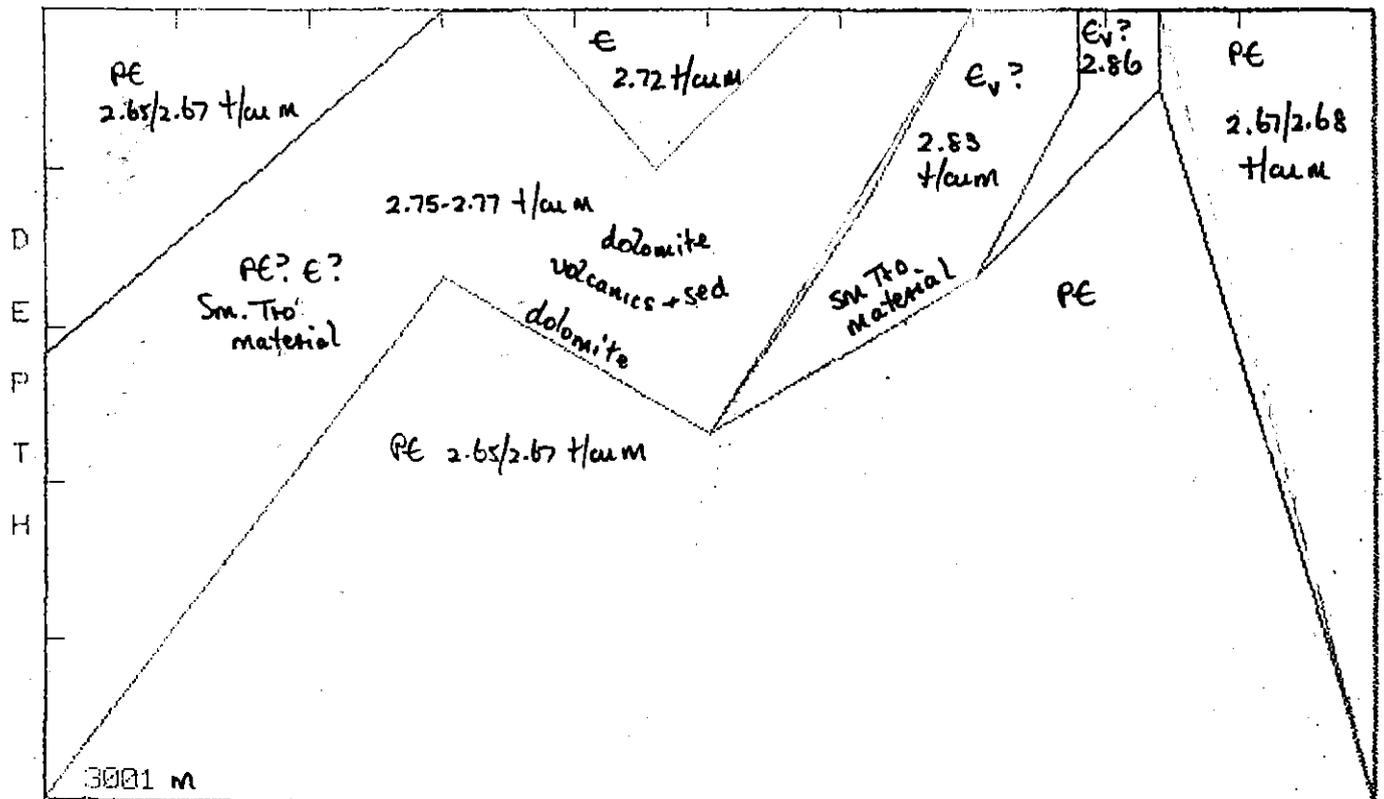


BALFOUR-TROWUTTA 5450N 300-350E

Gasdiner Pt Arthur R Ekberg CK S. Trowutta Arthur R

DISTANCE

50000



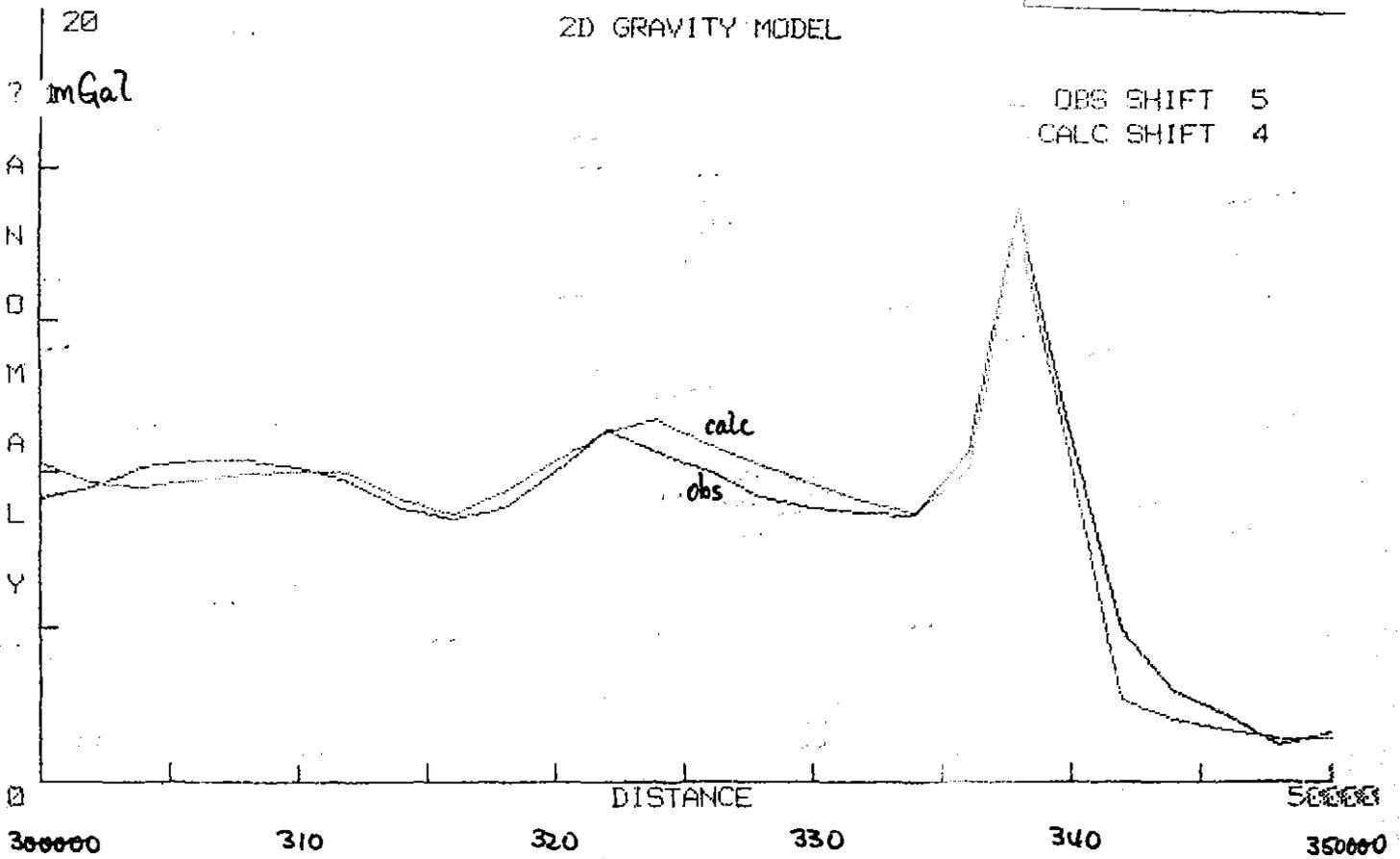
054

LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 50000

2000

730055

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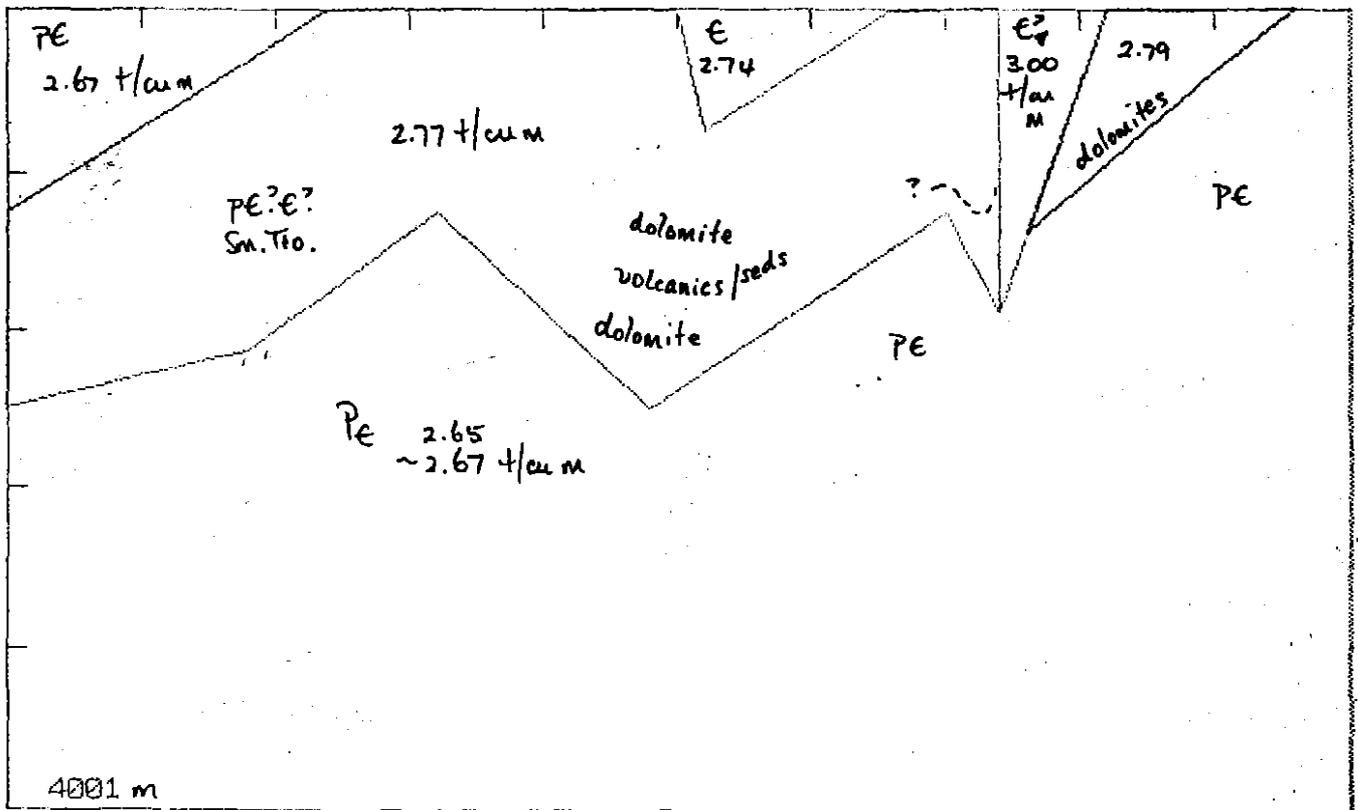
BALFOUR-TROWUTTA LINE 5460N 300-350E

Mawson Bay

Seymour Hill

Roger R

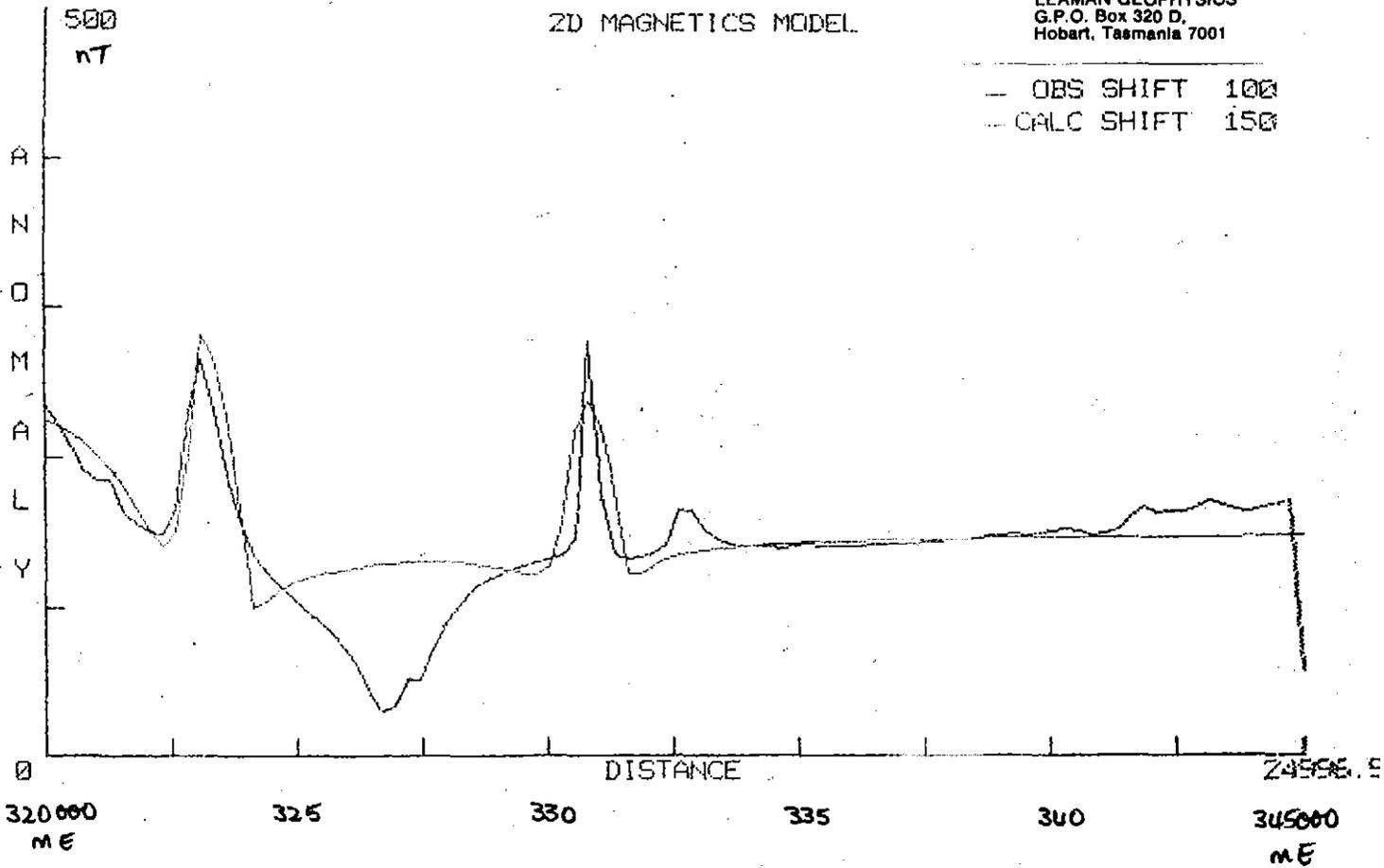
Nabageena



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ZD MAGNETICS MODEL

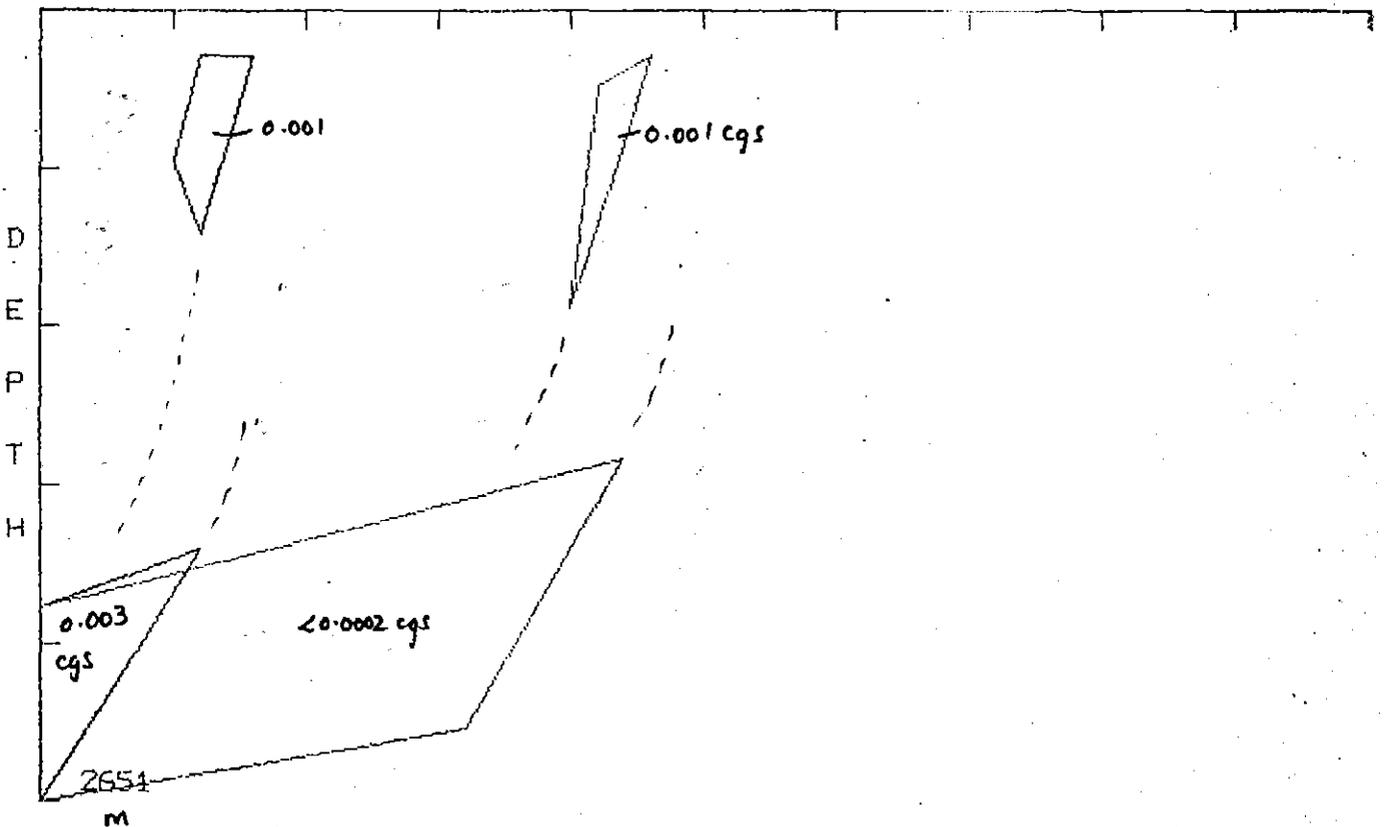
— OBS SHIFT 100
— CALC SHIFT 150



BALFOUR-TROWUTTA BMR2930 5430N 320-345E
K2=001 INC D

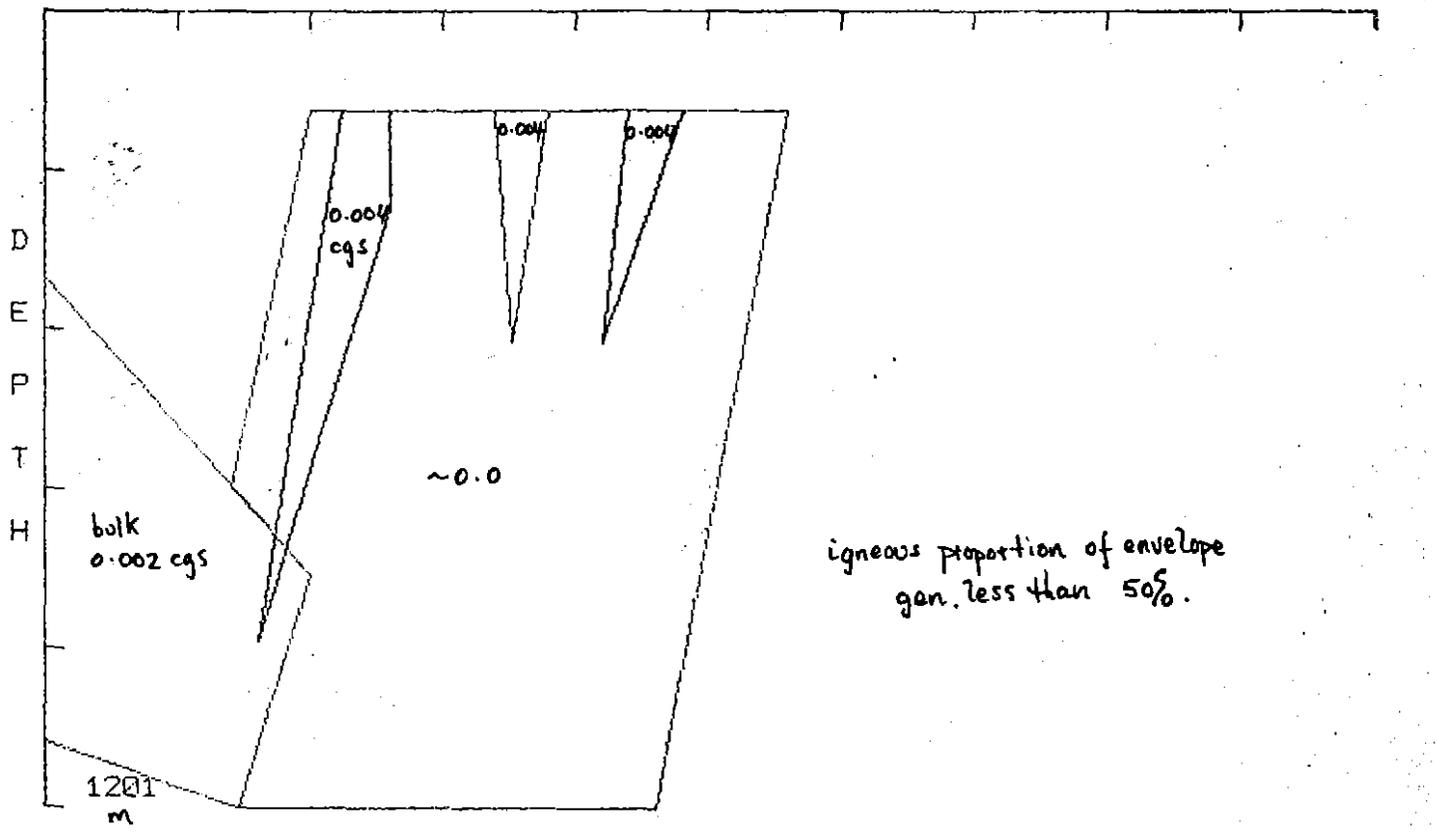
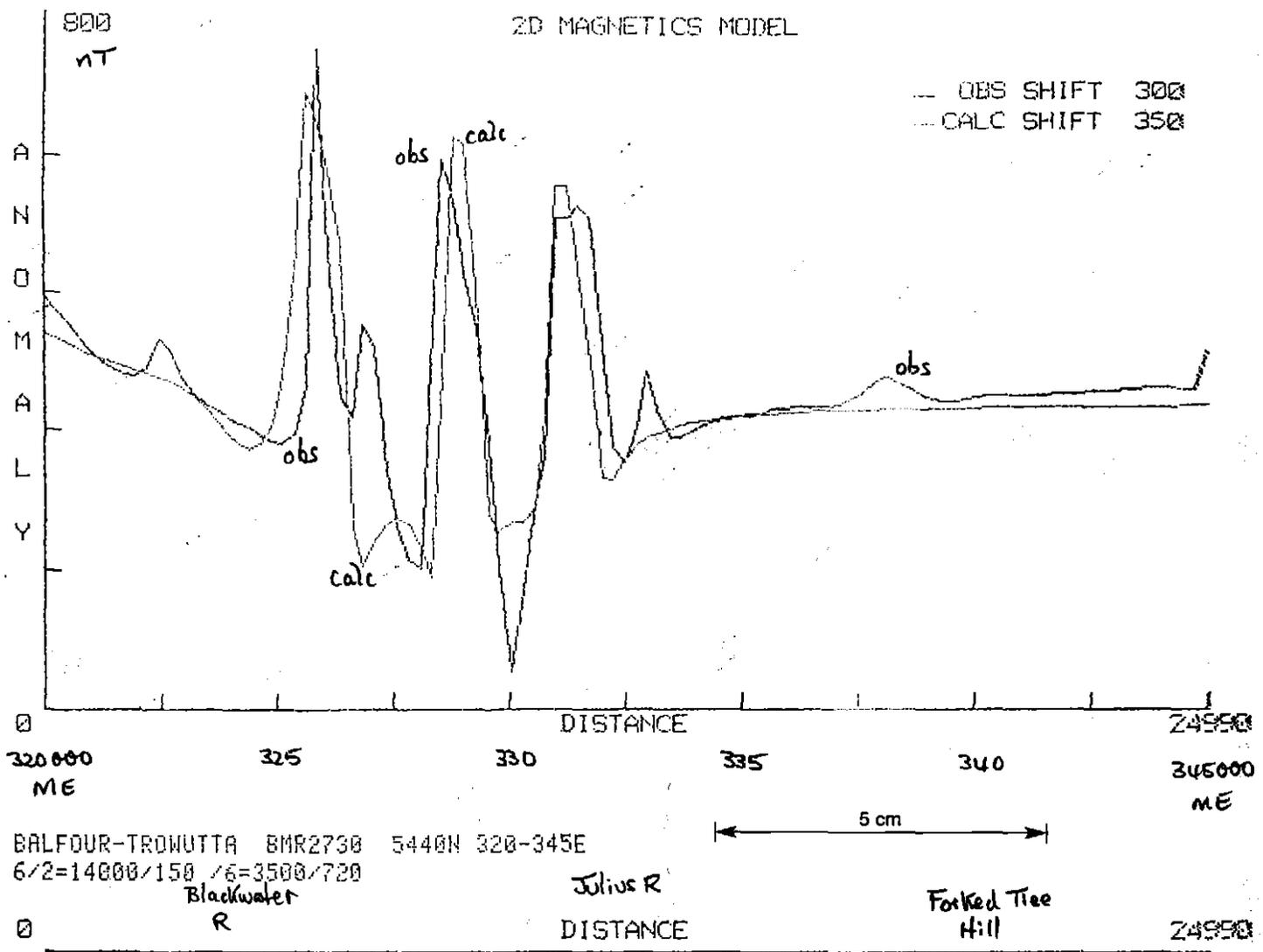
Balfour

DISTANCE 24995.5



055

LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 24950 245

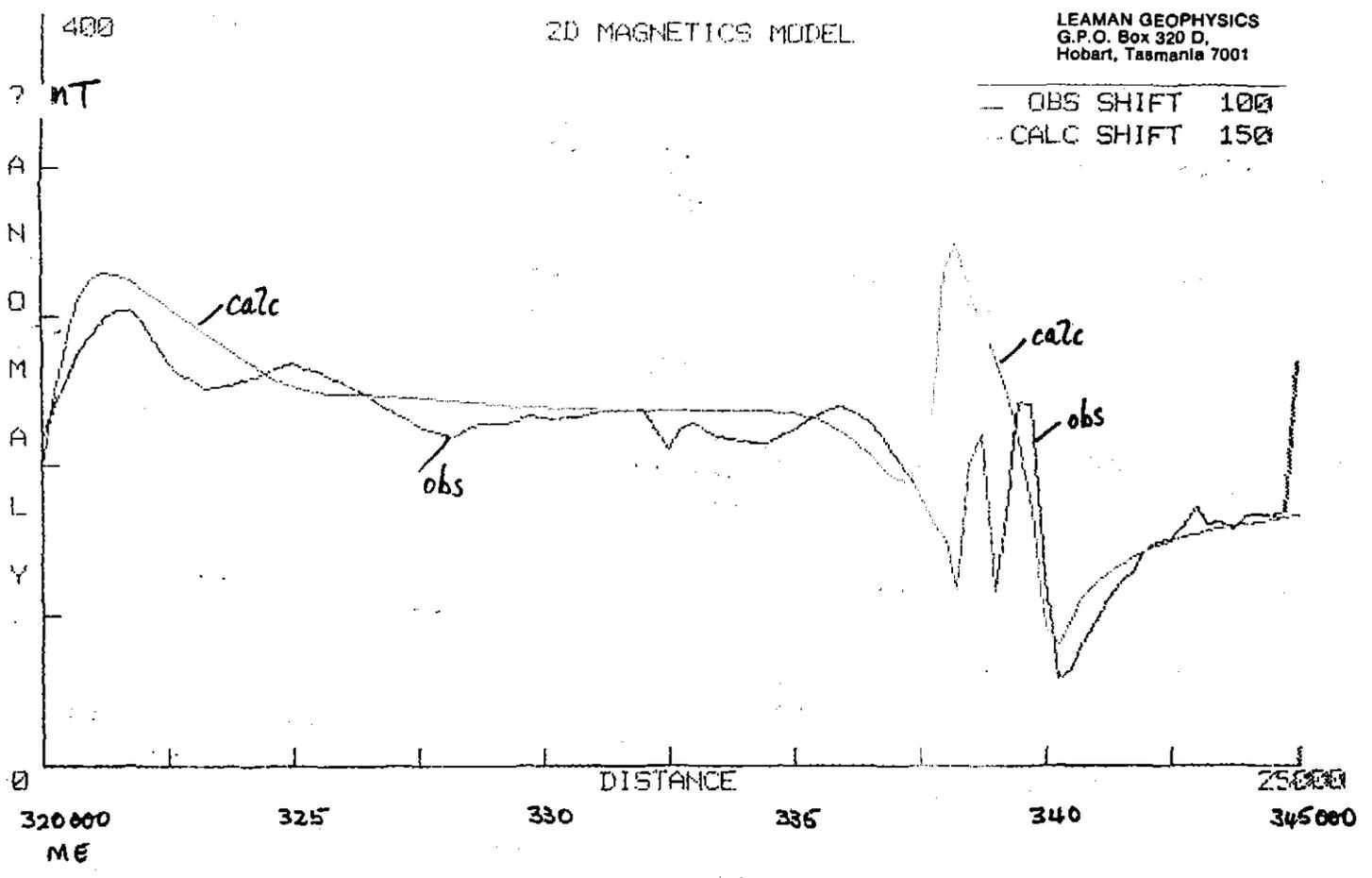


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730059

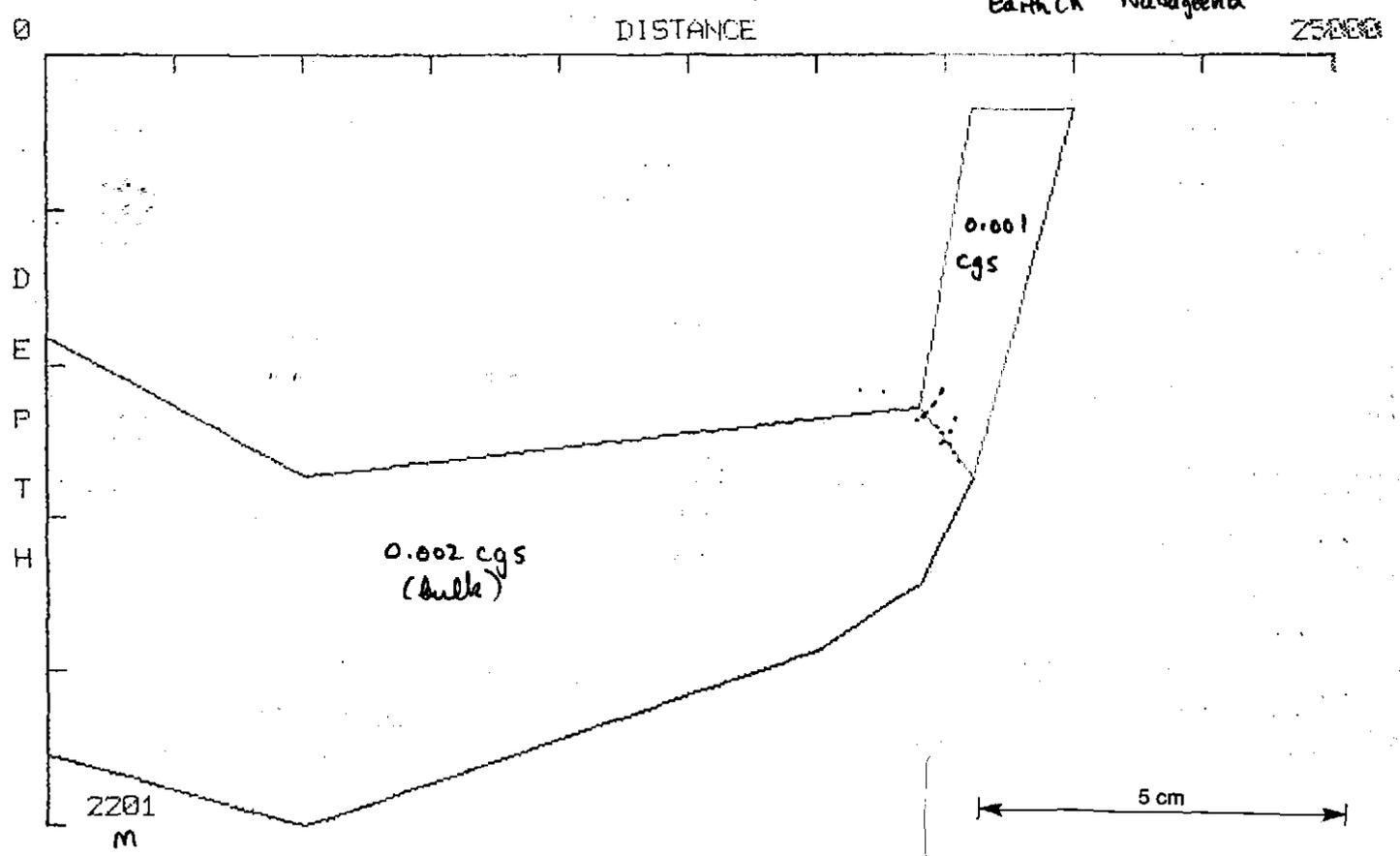
LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 25000 250

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



BALFOUR-TROWUTTA BMR2341 S460N 320-345E

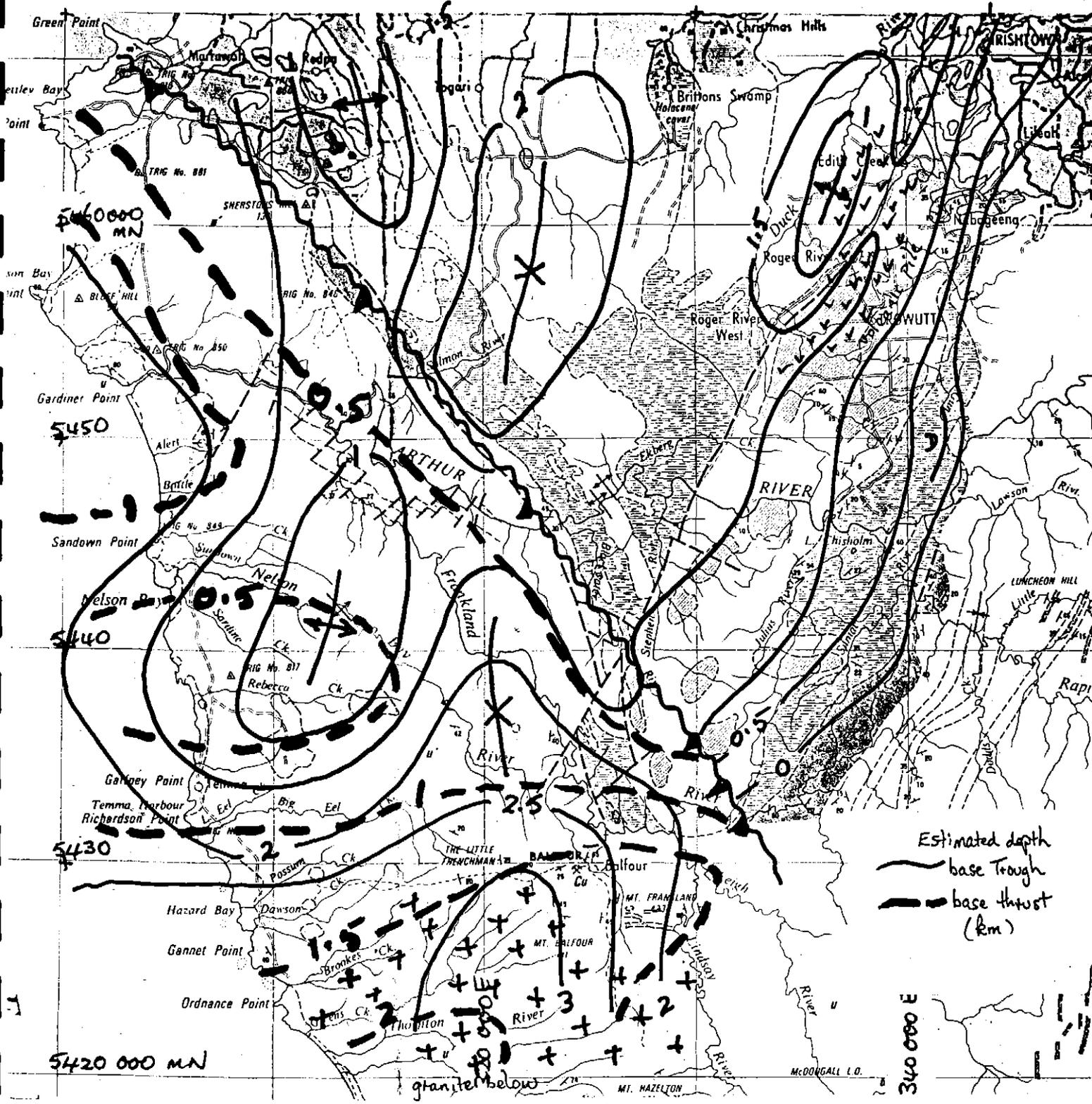
near Edith CK Nabageena



MAGNETIC INTERPRETATION

LINE 5460 000 N

FIGURE 17



SUMMARY OF STRUCTURAL INTERPRETATION

FIGURE 18

APPENDIX 2

Brief petrological descriptions of polished thin sections of selected volcanic rocks, EL 22/87.

Descriptions by A.J. Crawford & S. Stephens, Geology Department, University of Tasmania.

AT10 [410615]

THOLEIITIC BASALT typical of the Crimson Creek Formation or Motton Spilite type. Pseudomorphed olivine euhedra (now chlorite - serpentine), fresh euhedral phenocrysts of augite and albitized plagioclase in chlorite - FeTi oxide dominated groundmass. A calcite-dominated vein is separated from the fresh lava by a zone of green chlorite containing spherulitic pumpellyite aggregates with radial extinction, strong pleochroism and anomalous birefringence. The other side of the vein is the quenched glassy rind (vesicular) of this flow. Along the side of the vein there are a few areas of skeletal pyrite up to 5mm long. Small quantities of chalcopyrite and galena are sparsely scattered about the section.

AT25 [408615]

VESICULAR META-THOLEIITIC BASALT. Crimson Creek type. Sparse pseudomorphosed euhedra of olivine (now yellow chlorite) serpentine, fresh augite phenocrysts and large tabular phenocrysts of albitized plagioclase often riddled with pumpellyite. Vesicles are variably filled by albite, chlorite and pumpellyite. Vein of secondary quartz and albite.

AT26 [406618]

THOLEIITIC BASALT typical of "Crimson Creek Formation". Quite evolved (Fe-rich), as indicated by large euhedral Fe, Ti oxide phenocrysts. Groundmass composed of equigranular augite and albitized plagioclase prisms with interstitial glassy mesostasis replaced by green/yellow chlorite. Minor pumpellyite as tiny blebs in plagioclase/groundmass. Prehnite-pumpellyite facies. A thin vein of mainly carbonate contains many tiny grains of native copper and a few of galena (?).

AT32 [337417]

BONINITE. Very glassy lava full of former euhedral orthopyroxene phenocrysts now replaced by chlorite, serpentine and calcite. Large Cr-rich chromite phenocrysts and chromite inclusions in orthopyroxenes. Groundmass is devitrified glass containing acicular plagioclase and strongly zoned clinopyroxene. Flow contact between boninite and a fragmented glassy rock containing diverse fragments of tuff, tonalite, tholeiitic metabasalt and metadolerite and glassy boninite-rich rock.

AT39 [374582]

CRYSTAL-LITHIC TUFF of Crimson Creek type. Tholeiitic affinity. Diverse metabasalt fragments and crystal fragments of clinopyroxene, albitized plagioclase and multi-crystalline quartz (Precambrian).

004

730063

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Hobart
Tasmania 7000

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SAMPLE NUMBERS	SAMPLE DESCRIPTION & PREPARATION	ELEMENT/METHOD
Various	RD Prep: 006,010,011,012,013,016	Cu,Pb,Zn,Ag/101,As/114
Various	RD	Au/313,Pt/311,Ba/401

RESULTS TO:

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190 Macquarie St.,
Hobart
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PRELIMINARY ANALYTICAL DATA

SAMPLE	REPORT NUMBER			REPORT DATE		CLIENT ORDER No.		PAGE
	999.46.08.05731			05/10/88		18501		1 OF 2
	Cu	Pb	Zn	Ag	As	Au	Pt	
AT 07	200	35	100	<0.5	<1	<0.005	0.003	
AT 08	165	40	115	<0.5	<1	<0.005	0.002	
AT 09	165	65	105	<0.5	<1	<0.005	0.006	
AT 10	25	40	125	<0.5	<1	<0.005	<0.001	
AT 11	40	20	40	<0.5	5	<0.005	0.001	
AT 12	85	30	145	<0.5	<1	<0.005	0.003	
AT 14	45	25	105	<0.5	<1	<0.005	0.004	
AT 15	185	30	275	<0.5	<1	<0.005	0.004	
AT 16	205	35	160	<0.5	<1	<0.005	0.006	
AT 17	75	30	195	<0.5	<1	<0.005	0.011	
AT 19	20	<5	25	<0.5	<1	<0.005	<0.001	
AT 20	210	50	140	<0.5	5	<0.005	0.009	
AT 21	135	55	150	<0.5	2	<0.005	0.008	
AT 22	215	20	160	<0.5	3	0.005	0.003	
AT 28	220	35	95	<0.5	7	0.005	0.007	
AT 29	170	35	65	<0.5	2	0.010	0.014	
AT 30	105	35	90	<0.5	5	<0.005	0.005	
AT 31	105	40	100	<0.5	5	0.040	0.002	
AT 33	15	40	65	<0.5	5	0.005	<0.001	

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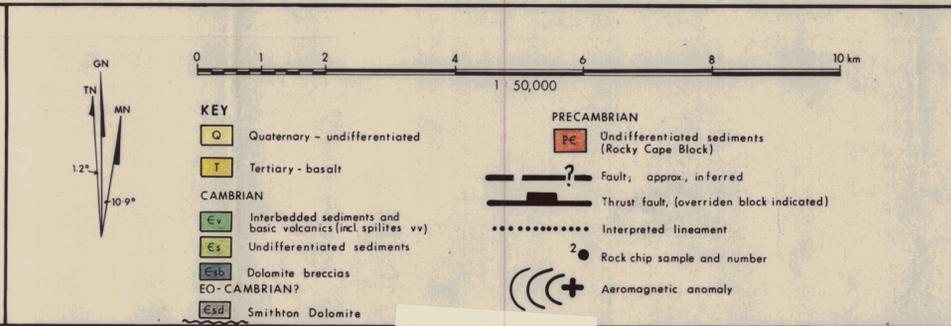
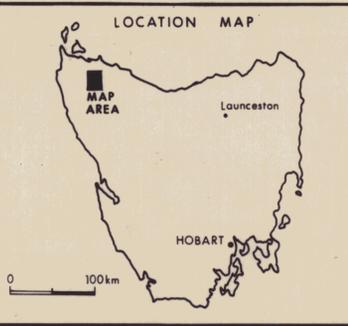
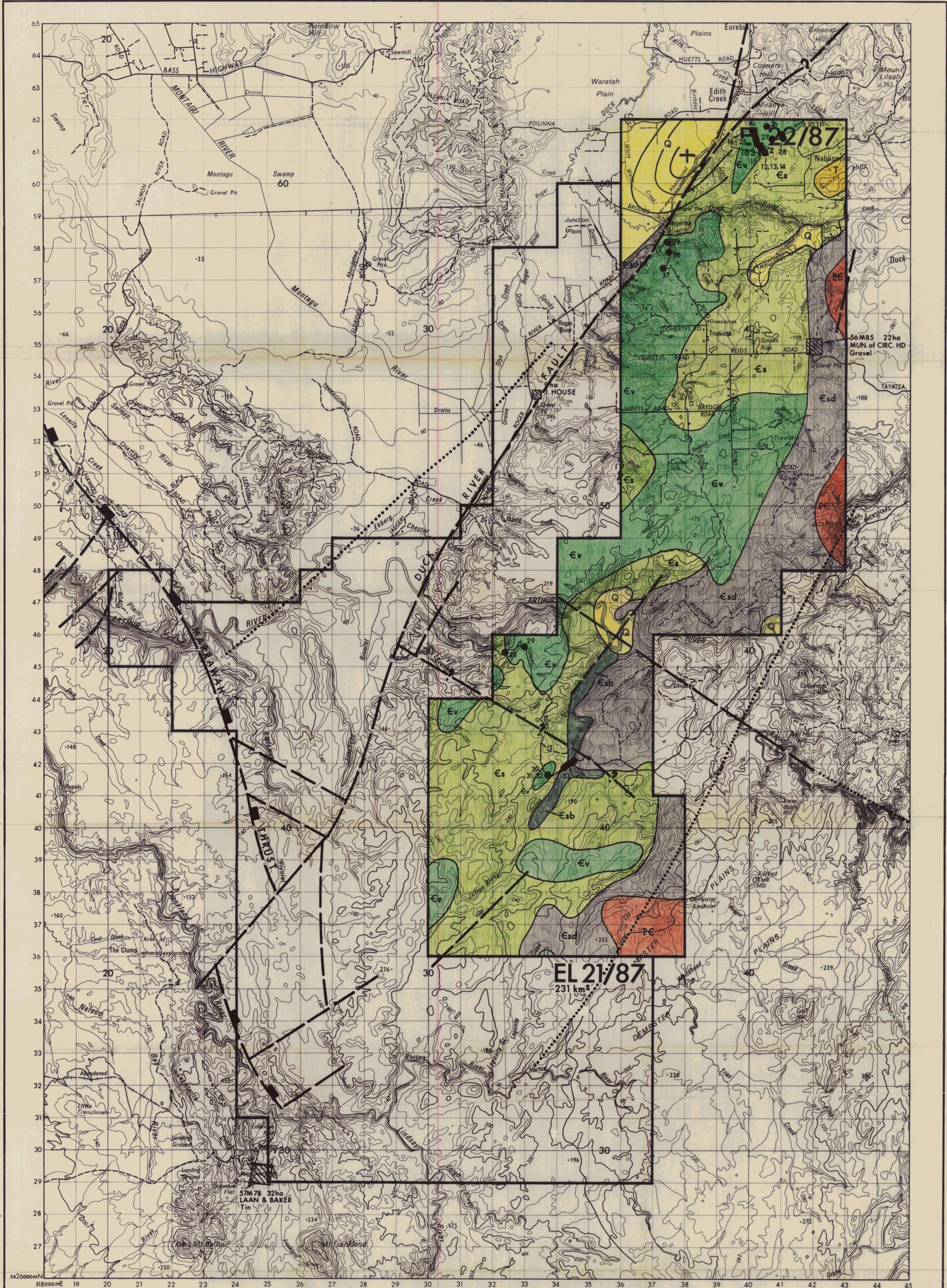
730065

PRELIMINARY ANALYTICAL DATA

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AT 35	65	40	75	<0.5	13	0.005	0.001		
AT 36	80	35	90	<0.5	6	0.010	<0.001		
AT 37	280	30	35	<0.5	2	<0.005	0.006		
AT 38	85	30	85	<0.5	4	<0.005	<0.001		

DETECTION	5	5	5	0.5	1	0.005	0.001
UNITS	PPM	PPM	PPM	PPM	PPM	PPM	PPM
METHOD	101	101	101	101	114	313	311

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88-2866

730066

Geology compiled from Lennox et al (1982), various Dept. Mines Tasmania open file reports and interpretation by Aureole Resources.

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GEOLOGICAL COMPILATION	SCALE 1:50,000

FIG. 2