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Regional evaluation—west and north-west Tasmania

Precambrian and Lower Palaeozoic structural relationships

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REGIONAL EVALUATION
WEST AND NORTH WEST TASMANIA

PRECAMBRIAN AND LOWER PALAEOZOIC STRUCTURAL RELATIONSHIPS

by
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INTRODUCTION

Leaman Geophysics was contracted to provide a regional interpretation of the gravity and magnetic data bases acquired, or enlarged, during the three years of the Mt Read Volcanics Project. Descriptive outlines of magnetic data in NW Tasmania have been provided by Bishop (1986, 1987) and semi-analytic and structural interpretations by Leaman (1986 a, b). Leaman (1986c) had contributed a gravity interpretation focussed on the Mt Read Volcanic arc and adjacent materials but none of these reports had completely integrated the material available although this was partly attempted by Leaman (1986c) with respect to the West Coast Range.

The magnetic data base was complete in 1986 but the gravity data base is still being augmented. It will be many years before the gravity coverage is uniform or equivalent to the magnetic data base. The coverage available early in 1988 is much more extensive than that used by Leaman (1986c) for the 1985-6 interpretation. All new survey has been concentrated within, or north and west of, the Dundas and Fossey Mountain Troughs.

The interpretation was requested with two specific objectives; extension of general understanding of the region and definition of critical elements for subsequent study. The latter, whether of stratigraphic or economic interest, would be drilled if possible to provide tests or control.

Such a broad based interpretation must consider everything, but practicalities and realities mean that the work must proceed, at least initially, at a scale coarser than direct exploration and this has limited the nature of the treatment to primary structures and assemblages. No attempt has been made to examine specific single features (except the Arthur Lineament) or fold systems but rather to provide the gross framework into which such features fit.

Two elements of this interpretation have already been released; revision of the crust-mantle model and a comprehensive regional study of the Cambrian and Devonian granitoids.

The interpretation is based on a set of new long profiles and revision of all previously reported sections. Older models tend to be more specific and detailed but have benefited from the grosser overview and a consistent mantle model. The extant data bases often do not permit more detail - especially across the Rocky Cape Block and much of the Tyennan Block. Interpetation is thus appropriately scaled.

This report concentrates on the implications of potential field character, properties, variations and relationships between the Precambrian blocks and the Early Palaeozoic basins and troughs.

SPECIAL NOTE

This evaluation is based on gravity and magnetic data. The implications of the form of the magnetic and gravity potential fields have been reviewed with respect to the surface geology as known. In many cases geological knowledge is poor - often less well defined than the potential fields.

I have attempted a separation of gross structural or stratigraphic elements. Some of these have not been recognised in extant or published mapping. This should not be taken to mean that mapping is in error or that this interpretation is in error necessarily. It could mean either or both, or it could reflect inadequate mapping or misunderstanding of physical properties. It could also mean that the gross characteristics recognised in a work of this scale are not especially obvious in the field at micro and macro outcrop scales. Surface follow-up, or review of other sources of information, is advised in such cases. No presented implication should be dismissed out of hand. None have been made lightly or without supporting argument. If a conclusion seems unlikely or unbelievable then perhaps the stimulation to prove it false will yield real benefits.

I have not ascribed any specific age relationships in many cases although relative timings may often be inferred from distribution or section patterns. I have chosen to describe what the potential fields imply and have left many of the issues for consideration by the reader. Where ambiguity or alternatives exist they have been presented but the macro inferences are again left to the reader. I make no apology for expressions of opinion in the absence of any previous discussion of this data or crustal scale members in NW Tasmania.

The interpretation, and report, treats huge volumes of geology and it should not be faulted or condemned for omissions of microscale. These are inevitable. The very creation of these huge models, aimed at understanding or defining block, geanticline, basin or trough scales or relationships, must blur or compact detail.

If the general framework and unit or property distributions proposed can be sustained then the gross model of NW Tasmania can be used to generate "regional" field maps. These permit creation of effective and reliable residual maps which allow specific and detailed study of any locality free of the uncertainties due to long wavelength interference effects from large sources.

DATA USED

Magnetic and gravity data obtained, or held in public domain data bases, by the Tasmanian Mines Department has been used throughout. Much of these data bases has been acquired during previous phases of the Mt Read Volcanics Project.

The data includes the 1981 and 1985 aeromagnetic surveys and the 1984 BMR survey of NW Tasmania. The data, coverage and applications have been described by Corbett et al (1982), Leaman (1986 a, b), and Bishop (1986, 1987). Each survey was flown with a line spacing of 500 m and a nominal terrain clearance of 150 m. The specifications were not met for much of the 1981 survey and Leaman (1986a) has described the nature and effect of the correction procedures required for detailed applications. None of these have been needed for this gross regional study. Portions of the available data are presented in Figures 30, 31 and 33.

The TASGRAV data base (Richardson and Leaman, 1987) has been augmented by the BMR offshore data base. The latter has been used for end of line control and definition of structure extension across the continental shelf. The coverage of the offshore data is relatively poor, it is not fully corrected, and its reliability and reproducibility have not been assessed. No part of this interpretation is dependent on offshore data.
Gravity coverage is still being systematically extended across NW Tasmania in order to reduce dependence on the basic 7 km spacing survey.

Data within the TASGRAV data base can be considered of high quality. Stations have been vetted, fully corrected (including terrain correction) and checked for reliability. Values are considered reproducible within about 0.5 mGal. This precision is more than adequate for current or future interpretation.

The gravity data base in the form of a contoured map with 2 mGal contour interval was used for the present work. Actual values have not been utilised generally since the detail is more appropriate to specific studies. The gravity profiles modelled are thus filtered by the often coarse station spacing and the contouring process. Examples of the compilation used are presented in Figures 29, 32 and 34.

INTERPRETATION

GENERAL FEATURES OF THE POTENTIAL FIELDS

Specific features of the magnetic field in W Tasmania have been described by Leaman (1986a, b) and Bishop (1986, 1987) while the gravity field has been considered only by Leaman et al (1980) using an older, more limited data base and by Leaman (1986c) for the region of the Dundas Trough and the Mt Read Volcanics.

No integration of the primary elements of the gravity and magnetic fields has been attempted, or possible, previously. As noted in the Introduction the present work is directed at the principal structural features. These are often subtly represented in the potential fields and their significance may not be immediately apparent.

In much of central N-NW Tasmania the widespread occurrence of Tertiary basalt obscures long wavelength effects and limits any direct inspection of the magnetic data. The complexity of W Tasmania obscures some first order features and the interpretation of Leaman (1986 a) considers much of the second order detail. The coverage of NW Tasmania is largely free of such issues.

Gravity data, by virtue of its relatively coarse and erratic observation spacing, have a smoothed, filtered character. Contour presentations tend to enhance this effect and gross structural features are rarely disguised even though their interpretation may not be obvious.

Gross features, or regimes, in the potential fields which are recognisable on inspection are summarised and labelled in Figures 29, 32 and 34.

Magnetic data S and SE of the Arthur Lineament tend to be shallow source specific and the obvious regimes and responses are related to Cambrian ultramafics, Lower Cambrian formations, mid Palaeozoic granites or Tertiary volcanics. Many of these effects obscure the basement and early Cambrian features sought in this study. It may be possible to use the magnetic data for this purpose after upward continuation by 1 to 1.5 km. A massive processing project of this kind has been beyond the present study.

PROCEDURES

A large number of profile traverses, with various orientations (see Figure 0), have been used to deduce regional characteristics and relationships. Many of the interpretation issues were outlined by Leaman (1988 c, summary chapter).

Simple modelling techniques have been used wherever possible even though some ambiguity may result or the profile matches may be affected by 3D effects. Many of these deficiencies would be serious for any single profile or single orientation but at the present scale the use of many profiles in an array allows definition and recognition of most problems. It does not of course allow detailed resolution, but that is beyond the scope or need of the present analysis.
No sophisticated, regional 3D model of the type ultimately required for sensible appraisal of the potential fields in detail can be established efficiently from use of 3D principles from scratch. The scale of the model, minimum 250 x 250 km and 30 km thick, with many large discrete but abutting sources of opposing contrasts precludes such development. The aim of the present modelling has been to produce quickly and cheaply an internally consistent model concept which is of direct value in itself by its content and implication and which may also form the feedstock for any subsequent 3D refinement. Use of the array modelling method has produced a basic 3D model. Other elements of this model were discussed by Leaman (1988c, d) and the remainder are included in this report.
As noted above, the basic multi-source 3D model inferred and provided here, can be used to generate the basic regional fields in NW Tasmania. Their removal yields a residual of exploration significance and application free of any assumptions about filters, grids, coverage or processing. The quality of the residual depends solely on the quality of the local survey and its station density. Before use in detailed applications the present provisional model should be tested and refined by a first pass 3D check.

I have discussed the interpretation presumptions in the granite reports (Leaman, 1988 c). These are based on satisfaction of a set of profile matching criteria including consistent geological, property and curve offset factors. All must simultaneously satisfy the profile array and all source requirements as well as be geological believable where no control exists. These are very demanding criteria for any interpretation and reduce uncertainties and ambiguities to the lowest levels consistent with the basic methods and data used. Resolution is maximised only when 3D methods are used. Few interpetations are based on such pillars, but doing so simultaneously solves, or suggests solutions for, all geological components included. In this case a simultaneous, limiting solution was sought for the mantle, upper crust, large granitoid volumes, and first order troughs and basins or gross lithological variations whether Precambrian or Palaeozoic in age. These members of the crust, or crust base, generate large gravity responses whose frequency responses overlap. Only by treating all such sources can the interactions be assessed and the array profile method is crucial to the appraisal. Small sources can be included or omitted for residual appraisal as required.

The presence of granites has provided control on the density contrasts and limits but the present property data base is not able to reliably guide gross studies of this type. Too few pre Lower Cambrian determinations are available. Considerable doubts thus attach to some of the bulk density assumptions. For this reason no part of the interpretation is taken to extreme conclusions. It is possible to modify some mass shapes in terms of depth range by adjusting the density assumptions but there are limits and such changes do not affect the concepts offered or issues raised.

Work of this type and scale can never provide a final statement. Further mapping of the Precambrian regions, more property determinations and survey coverage refinements, coupled with use of refined methods (3D) will certainly alter details or even major elements. It should be noted, however, that a study such as this was not feasible prior to 1984 and the data increments supported by the Mt Read Volcanics Project.

The following discussion treats the principal Precambrian blocks individually and examines their constitution and relationships with Palaeozoic structures.

The entire interpretation is summarised in Map 1 (folder). This consolidates the interpretation of the Devonian granitoids and presents the inferred distribution and depth of the siliceous basement cores (approx 2.67 t/cu m). The scale of the interpretation is such that post Carboniferous geology is not generally significant (exceptions are marked) and the influence of post Cambrian Lower Palaeozoic rocks, though of some effect, does not radically alter the presentation. The latter must be treated at the next level of interpretation refinement.
The principal ambiguity in the present solution relates to the interface between Cambrian trough or shelf rocks and denser, younger versions of the basement, presumed Late Precambrian (Eo-Cambrian?) in age. The ambiguity derives from similar density contrasts and uncertain limitations on relationships. Only where magnetic data permit, and have been used to provide, definition of the base of magnetic units - presumed Cambrian - but not always provably so is the situation somewhat improved.
The compilation provides a structural skeleton, is almost certainly flawed on these points, and must be refined with respect to them. Additional mapping and review of existing mapping may also be essential.

THE ROCKY CAPE BLOCK

GENERAL

The Rocky Cape Block occurs west of the principal Palaeozoic axis in W and NW Tasmania; i.e., NW of Zeehan - Burnie. The main elements of the geology and gravity field are shown in Figure 29 and the magnetic data are presented at a comparable scale in Figure 30.

There is considerable correlation between the two data sets and the following features must be considered:
The Rocky Cape Block core,
The Smithton Trough,
The Smithton and Stanley Gradients,
The Temma Structure,
The Burnie Platform,
The Oonah Formation,
The Arthur Lineament,
The nature of the eastern Palaeozoic margin and the placement of the Heazlewood Complex and the Devonian Granites.

WEST OF THE ARTHUR LINEAMENT

OBSERVATIONS

The dominant element in both the gravity and magnetic field presentations west of the Arthur Lineament, as described by Williams (1979) and labelled in Figure 29, is the relatively negative or background response across the entire heart of the Rocky Cape Block. Although the present gravity coverage may suggest a smoother feature than is actually the case there is little doubt that the Bouguer anomalies are generally low and consistent. This might be suspect, given 7 km data, in the absence of the aeromagnetic data. The magnetic data are also stable, at background levels, across the same general area. There are faint NE-trending features which sub-parallel the gravity shape. Only in the region immediately north of the Pieman River and west of the Savage River is the effect destroyed. Bouguer anomalies rise rapidly in this same general area. The present gravity data suggest complexity near the waist in the "egg-timer" shape of the pattern east of Balfour. The subdued magnetic and gravity zone within the Rocky Cape Block has been termed the core in subsequent discussion.

The eastern side of Rocky Cape core zone, the Arthur Lineament, is marked by consistent and strong positive gravity and magnetic gradients from Pieman Heads to a little west of Wynyard.

A similar gradient extends along the western side of the core zone from Stanley and Smithton to Pieman Heads. These strong gradients enclose the core of the Rocky Cape Block.

The western gradient has been labelled the Smithton Gradient in Figure 29. South of the Arthur River it continues seaward but further north the gravity field is more complex and diffuse. North of Trowutta the gradient splits, with the lesser gravimetric effect extending toward Stanley (the Stanley Gradient). The magnetic view is rather different. This suggests (Figure 30) that the Stanley Gradient is the fundamental element parallel to the core block and that poor definition of the gravity field south of Trowutta has not enabled recognition of the continuity in gravity data. The northern Smithton Gradient is pronounced, but almost certainly a deviation.

The principal western gradients are terminated near Balfour. There is no evidence of the extension of the Smithton and Stanley trends or geology southward although a gross but more northerly gradient persists. This has been termed the Smithton Gradient since it is clearly an extension for which there is no geological support in extant surface mapping.

The terminating structures in the Balfour region trend NW and their texture and orientation are recognisable in the magnetic data (Figure 30). These extend from the coast at Marrawah and parallel the faults and stratigraphy along the western edge of the Smithton Trough (Williams, 1979) to Balfour and then arc, with apparent en-echelon offsets to the south along the southern part of the Smithton Gradient toward Pieman Heads. The largest magnetic anomalies occur along the main, continuous gradient although there are suggestions of sub parallel trends within the coastal block designated the Temma Structure (Figure 29). The extension of the trends displayed in Figure 30 can be seen in the larger scale presentation of Figure 31. The trends west of Mt Holloway continue to Marrawah while the anomalies south of Mt Holloway along the Donaldson River possess the form of the anomalies north and north east of Balfour, i.e, comparable with those along the Smithton and Stanley Gradients but somewhat subdued.

Major and minor disruptions can be recognised along all trends described. These are most clearly seen in the magnetic presentation of Figure 30 although many can be inferred in Figures 29 and 31. Figure 30 suggests a regular pattern of ESE fractures breaking from the coast and persisting at least as far as the Arthur Lineament. There is no clear disruption, or offset, of any demonstrably Cambrian unit or structure at a regional scale although such features have presumably influenced later developments.

The gravity field north of Marrawah and west of Christmas Hills is not well controlled and very diffuse. A nearly circular depression in the field near Welcome River can be correlated with exposed Precambrian rocks. The pattern is stressed by the magnetic data and two areas are defined. The second extends across Robbins Island. Each is surrounded by anomalies comparable with those along the northern half of the Smithton Gradient, along the Stanley Gradient and part of the western edge of the Smithton Trough.

West of Robbins Island, in the region of Welcome River and near Marrawah the magnetic field defines a number of features trending nearly N-S. This trend cannot be recognised anywhere else west of the centre of the core block where it is represented faintly and truncated by the NE trending features. Structures of this orientation appear to control the geology and potential fields along the southern part of the Smithton Gradient near Pieman Heads.

The materials of the heart of the Smithton Trough are relatively featureless magnetically and gravimetrically. Mafic lavas appear to be restricted to the Trough margins.

DISCUSSION

The observations noted above are very suggestive. Consider first the core zone of the Rocky Cape Block (refer Map 1).
Several profiles traverse the Rocky Cape core (including 1, 2, 3, 4, 9, 10, 16, 21, 22, and 24). Line 15 is a special, critical case of a strike traverse. In virtually all cases the core zone appears as a flat-bottomed negative depression. Each line can be found on the Figure of the same number.
Some lines provides fragmentary suggestions of a regional trend (e.g., 4) but extension of this trend between large granites indicates that the response is related to materials denser than the Devonian granites. Caution is required in judging any apparent regional trends in this data set whether in contour or sectional form. Calculations and modelling have shown that most such trends are illusory and cannot be sustained on a simple line to line basis without the constraints imposed by the interpretation technology - namely the profile array and the determining criteria described above. Lines 9, 10 and 24, which extend to the Tyennan Block, also allow some assessment of density relativity.
When all lines and the various relative responses with respect to the adjacent materials are correlated with line 15, which can also be density fixed by the Pieman Granite, a consistent bulk density very close to the Bouguer density emerges. (It is important to note here that such judgments would not be possible without the simultaneous evaluation against the same criteria of the mantle effect especially. Failure to include such sources in the same model-profile array would prohibit any definitive conclusion.) Using a density of 2.62 or 2.63 t/cu m for the typical Devonian granitoid then the density of the core of the Rocky Cape Block must be of the order of 2.67 to 2.68 t/cu m for at least the same crustal penetration as have the granites. There is some scope for uncertainty here but for all practical purposes it is of no significance. The granite contrast persists for depths of 8 to 11 km and the core density must be maintained to similar depths. Proportionate changes, some large, would be required to explain both the magnetic and gravity data by thin coverings of lighter materials. Present limited property determinations for core rocks indicate values above 2.60 t/cu m. The rocks described by Gee (1966) and Lennox et al (1982) could

possess these properties but are hardly thick enough. Either the siltstones and quartzites described form part of a more extensive sequence or they overlay Tyennan style materials at relatively shallow depth. If the latter condition applies then geanticline may be an appropriate term and the Rocky Cape Block may be very similar to parts of the Tyennan nucleus to the south east.

The response of both gravity and magnetic fields to the Rocky Cape Block core is considered to represent virtual background. The slight increase in Bouguer anomalies to the south reflects the coastal effect but the change in gradient near Pieman Heads is quite distinct (see discussion of Temma Structure below). The nature of the waist anomaly sampled by line 3 near the northing of Balfour and its relationship to all gradients is also discussed below.

The Smithton Trough as currently understood is readily recognised in the magnetic data (Figure 30). The large marginal magnetic features reflect the presence of mafic volcanics. The largest accumulations of these rocks extend from Smithton and Stanley toward Balfour (also Lennox et al, 1982). The magnetic data also suggest that such materials ring the Precambrian (?) exposures near Welcome River and on Robbins Island. There are suggestions that such materials are patchily present along the western side of the Trough south of Marrawah.
The nature of the trough is rather uncertain since the continuity of materials exposed around the margins cannot be demonstrated across it. The magnetic characters described above certainly indicate that the mafic volcanics are universal but relatively thin. Neither magnetic or gravity data can resolve them in the axis of the trough. Richardson (1987) has interpreted a gravity profile at 5480 000 mN and suggested that the base of the trough is folded with the eastern side partly duplicated by the Stanley and Smithton Gradients. His model presumes continuous volcanics but these cannot be individually resolved. The magnetic anomalies south and east of Smithton suggest a steeply dipping eastern margin to the Trough, steeper than suggested by Richardson. The magnetic data are ambivalent but offer no suggestion of continuous, or thickened, piles beneath the apparent axis of the trough. The principal development of the Trough would appear to be along the present day eastern margin although folding may have confused the view.
The Smithton Trough is not a deep feature. Richardson (1987) suggested a maximum thickness of about 4 km and the present interpretation is in agreement with this figure. If anything the value is 3 km or less using Richardson's density estimates and the gravity field free of any regional-residual assumptions. The nature of the Smithton Trough, its internal basement highs, and the relative thinness of the material is shown in several sections (e.g., 1, 2, 3, 21, 22, 24). The eastern margin is generally deeper and the Trough is asymmetric west to east and shallows southward (see also Map 1).

Several sections suggest that the Smithton Trough is twinned. Richardson (1987) presented a three part model with a main central depression with subsidiary segments south of Stanley and near Welcome River. The branch to Stanley has been described above. The western structure is much larger, as seen on lines 2, 3, 4 and 16. The material in this structure extends south from Cape Grim. I have termed it the Temma Structure.

The Temma structure is directly related to the raised Bouguer anomalies south of Marrawah and the arcuate features between Marrawah, Balfour and Pieman Heads. The exposed rocks have been mapped as Precambrian. North of Marrawah the magnetic response could be consistent with such rocks or materials similar to the content of the Smithton Trough. The basement rise near Welcome River and the implied volcanics near it would indicate that the rocks mapped as Precambrian are equivalent to those at Smithton. South of Marrawah and west of the evident margin of the Smithton Trough the position is clearer. The exposed rocks are Precambrian and the succession is much more dense than the Rocky Cape core materials. As shown below such materials occupy the Arthur Lineament. The rocks filling the Smithton Trough are also sufficiently dense. Bulk densities of 2.74 to 2.75 satisfy the essential requirements of the data where features are well defined but some depth-contrast variation is possible. A general contrast less than 0.07 to 0.10 t/cu m is unlikely between these trough fills or variants and the effective siliceous basement of the core.
The effect and age problems become more pronounced south of Marrawah as line 3 shows. The substantial positive gradients in the Temma region indicate a development initially comparable to the Smithton Trough with a preserved section up to 5 km thick further west. The Temma structure contains more magnetic units than the body of the Smithton Trough but the bulk of the material is non magnetic. This may reflect presence of metamorphosed intermediate or basic lavas or a higher grade of pelite metamorphism generally. Most of the anomalies have relatively shallow sources. Present understanding of the exposed materials cannot explain the Temma response.
Most of the gravity and magnetic characteristics noted for the Temma zone could be explained by a thickening pod of onlapped, somewhat metamorphosed Late Precambrian materials but this leaves the problem of the Balfour closure unexplained since the Temma structures appear to terminate the Smithton Gradients and the marginal volcanics. Unless the magnetic anomalies offset at Balfour and near Mt Bolton (Figure 31) represent a concealed continuation. Note that Precambrian rocks of the general Rocky Cape non-dolomitic type overthrust on a partial extension of the Smithton Trough materials could explain all the features noted in the arc south of Marrawah. This interpretation could also be read into line 25 with little modification.
There is clearly scope for much evaluation in the area west of Welcome River and Balfour. What are the materials, what is their likely age, could their properties explain the anomalies or is it necessary to propose thrusting to account for the magnetic patterns and crossed structural grain?
There are dating implications irrespective of whether a

subsidiary basin or tectonic movements are involved. If a basin, is it the same age as the Smithton Trough or older? It would appear on present mapping to be older. But if the material has been overthrust then the concealed material would be Late Precambrian or Early Cambrian as in the Smithton Trough. If the displacement occurred during the development of the trough then the branch structuring represented by the Smithton and Stanley Gradients may also date from this time. Such a development and a west to east Cambrian thrust phase would be consistent with the implications of my interpretations west of Queenstown and on Sorell Peninsula (Leaman, 1986c, 1988a). Much more mapping control is needed, coupled with infill gravity coverage before some of these issues can be resolved. The thrust option is suggested in line 3.

EAST OF THE ARTHUR LINEAMENT

The belt of Precambrian rocks east of the Arthur Lineament near the north coast (north of Waratah) has been labelled the Burnie Platform in Figure 29. The term platform describes the appearance of the gravity anomalies rather than any genesis of the Burnie Formation. Relatively undeformed Burnie Formation rocks and variable cover of Permian and Tertiary materials are exposed. The deposition of the covering materials and the unusual regional preservation in this region may be related to the origin and character of the deep structures generating the platform anomaly; i.e., it may well have been a shelf for much of its history.

The platform nature of the gravity field is marked. Values are generally more elevated than across the Rocky Cape core and since the mantle gradients do not obscure comparisons it is readily deduced that the rocks east of the Lineament are denser than those of the core. Due to the effect of Permian and Tertiary rocks the total contrast implied is a minimum.

Lines 1, 2, 3, 12 (part), 21 and 24 review aspects of the Burnie zone. Most sections suggest that the Burnie rocks form the eastern part of the Lineament package and are not readily separated from it. It is suggested that the platform effect derives from a thick wedge of moderately dense, non magnetic rocks on siliceous basement. The entire structure-sequence dips east overall and has a retained thickness of at least 10 km. A major basin is implied. There is evidence within the present data and interpretation of variations in density within the sequence. This is exemplified by line 12 where a 4 km thick part of the sequence is little denser than ultimate basement. This type of zonation was also noted in the northern parts of the Cradle Mountain Block (below and Map 1).

The gravity field displays a strong negative gradient around the eastern margin of the Burnie Formation as mapped (Figures 29 and 32). This implies that the Burnie Formation is either thicker and/or denser than the materials to the east. The presence of granites complicates review of this issue. Since the known densities of Dundas Trough, or older, rocks which form the boundary with the Burnie Formation for much of the gradient are either comparable or greater then the gradient must reflect granites alone - unless the siliceous basement extends at shallow depth across the entire northern parts of the Dundas Trough or the Dial Range Trough. An unacceptable and unbelievable situation? Note that an inlier of Precambrian rocks occurs at Waratah and in the Hatfield River - but the correlation is with the denser overlaid Oonah (equivalent Burnie Formation) for the purposes of this study. Unfortunately, the interpretation of up to 10 km of such materials on basement immediately north of Waratah rather limits this argument. I have concluded that the granites dominate the gravity field in this region and that the base Dundas interface is not soluble at this scale without extensive use of the magnetic data.

Both gravity and magnetic fields locate some anomalous features beneath Permian cover. Each has a positive density contrast and is magnetic. One, north of Parrawe is elongate and nowhere exposed as far as is known. A similar feature passes beneath basalt cover along the Waratah River. This is known to be due to mafic units and some ultramafics.

The overall style of structures east of the Lineament is comparable with that in the Smithton area. Further analysis would benefit from some infill of the gravity data base and at least some geological traverses of the area north of Waratah.

The Oonah Formation exposed east of the Lineament south of the Meredith Granite has a character similar to the Burnie Formation. It presents a positive density contrast to the core rocks and the anomalies increase at the western margin of the Lineament. The rocks of the lineament and Oonah Formation are not readily separated geophysically. The same response style occurs along the coast to Temma (above) and probably reflects similar materials and relationships, namely onlap of a more pelitic sequence. Lines 7, 8, 26 and 28 suggest a thick wedge of material on Rocky Cape core rocks which is symmetrically disposed with respect to the Temma material. The section thickens rapidly to east and north and is comparable to the Burnie Formation.

These relationships to the Rocky Cape core are crucial to appraisal and revision of previous interpretations. The Oonah Formation is also exposed near Zeehan, on Mt Dundas and possibly north of Point Hibbs as well as in the Hatfield River and at Waratah. Leaman (1986 c) presented, for the Zeehan - Renison region two options; an onlapped denser sequence or an overthrust slab with faulted edges. The present work, made possible by the extension of the surveys to the west, shows that the second is unlikely on the scale suggested. Not impossible in detail, but not probable as suggested. The Hatfield and Dundas occurrences can not be reviewed at the scale of this study but the tied gravity and magnetic analysis does not require change. Disrupted thrust fragments remain the preferred solution but the overall conception in this regional view implies that the scale of detachment is not large.
The presence of Oonah Formation fragments or slivers within the Dundas Trough, and the similarity of their properties to the Dundas Trough rocks (post Crimson and Success Creek Groups), could mean that the original formation of the trough was commenced in the Late Precambrian and that it is largely filled with Burnie-Oonah Formation materials and that filling of the region north of Dundas was extensive prior to onset of Success Creek deposition. This would mean that the actual content of Cambrian rocks in the Zeehan - Guildford region might be little more than 2 or 3 km, a value which would be consistent with stratigraphic measurements in the Dundas and Dial Range regions. No great disruption is required in these circumstances for insertion of local basement - effectively the Oonah Formation.

THE ARTHUR LINEAMENT

The Arthur Lineament was used as a reference zone in the preceding discussions. The Lineament is identified by the relatively extreme deformations and metamorphism of the materials (Williams, 1979).

North of Savage River the belt is characterised by moderate magnetic anomalies which bifurcate. These features are evident in Figure 30. Gravity features are not well defined but mirror all magnetic characters. The primary lineament trend extends vaguely toward Wynyard while the western bifurcation is terminated. Both gravity and magnetic responses increase southward.
South of Savage River the pattern is reversed and although the lineament is recognisable in both data sets all the way to the coast the amplitude of all features reduces southward.

Anomalies related to the Lineament are complicated by the effect of the mafic rocks of the Heazlewood region. These dominate the centre of the lineament and occur near a point where the etched magnetic stratigraphy is pinched.

The material between Mt Stewart and Campbell River are also distinctive since the "Heazlewood" anomaly extends some distance beyond the known limits of the faulted mafic complex.

The previous discussion of the units east of the Lineament indicated that there is no real structural (or stratigraphic?) distinction between the Lineament rocks and those of either the Burnie or Oonah Formations in terms of their relationship to the Rocky Cape core. This does not mean that there are no metamorphic or deformational differences, merely that the regional view suggests an enormous onlapping sequence which could be expected to possess some normal stratigraphic relationships.

The implied form of the Lineament can be seen in sections 1, 2, 3, 4, 7, 8, 9, 10, 16, 21, 22, and 24 and also in long section 11. These provide an array of perspectives.
The Lineament can be seen as a localised contrast-trough or notch in line 1; as part of a thick wedge in lines 7, 8 and 24; as a wedge with light and heavy members in line 24; and a part of a thick wedge dipping east with a dense magnetic core in lines 4, 9, 16 and 22 (Heazlewood area), 21 (Campbell River), and a lighter magnetic core in lines 2, 3 and 10.
The direct implication is that the lineament represents a structural-stratigraphic hiatus with volcanism. The activity was clearly not continuous or contiguous along the structure. There are discrete piles. What is not yet clear is how the Heazlewood pile, so long believed to be Lower Cambrian, is related to the very similar more deeply buried piles within a wholly Precambrian sequence further north. This question reopens the entire timing issue for all the rocks west of a line from Waratah to Renison. It is further discussed below with respect to the Dundas Trough. Lines 1, 7, 21 and 24 suggest a symmetry with the Smithton Trough in terms of form and volcanism.

ROCKY CAPE BLOCK SUMMATION

The core of the Rocky Cape Block is siliceous and non magnetic. It is unclear whether the Rocky Cape Group rocks exposed are wholly representative of it but they certainly possess comparable bulk physical properties. It is possible that the core, at relatively shallow depth, includes more deformed siliceous units.

There has been symmetrical structural and, apparently, stratigraphic developments on either side of the core.

Trough development to the west, including the Smithton Trough, has been relatively minor with a maximum inferred thickness of about 5 km (offshore Temma). In general, the cover of denser but generally non magnetic rocks on the Rocky Cape core is of the order of 1 to 2 km. The apparent relationship is one of onlap. Only in the Smithton-Stanley area are significant bodies of mafic volcanics present. The eastern margin of the Smithton Trough appears compound but this may reflect later faulting and uplift. This margin appears steeper and was probably more active. It is unclear whether the volcanics extend uniformly across the trough but similar, thinner, occurrences appear to onlap basement(?) dome cores south of Robbins Island.

The volcanic sequence, and the trough itself, is terminated near Balfour. The reason for this is not obvious and various structures can be postulated which are consistent with the present geophysical data. My preferred solution is to argue for a pair for the Burnie-Oonah succession on the eastern side of the core. In this case the original proto-Smithton Trough extended from Stanley to Pieman Heads but was relatively undeveloped to the west. Thickest development was west of Balfour and Temma. Subsequent tension opened the northern half of this trough in the wedge shape expressed in present mapping. Volcanism was associated with this, possibly, very Late Precambrian activity. Timing is not settled.

On the eastern side of the Rocky Cape core basin development was extensive. At least 9 or 10 km of Burnie and Oonah Formations is inferred. The axis of deposition appears to extend from Burnie to Granville Harbour. The occurrence of fragments of these units at Waratah, Dundas and Hatfield River and main exposures as far east as Rénison indicates that any Tyennan "onlap" occurs east of Dundas-perhaps near the position of the Henty Fault.
This sequence is not devoid of mafic volcanics or mafic intrusives, some of which may today be amphibolites, and accumulations can be identified between Savage River and Wynyard. The relationship between these, wholly in the Burnie Formation, and the Heazlewood rocks is unclear. There may be a correlation with implied younger activity east of the Lineament. These more limited volumes parallel the axis of deposition and one is exposed north of Waratah.

This interpretation thus suggests a gross NNE grain for the

Rocky Cape region. Dyke swarms and other minor magnetic features within the core reflect this. So presumably, do the Devonian granitoids. Map 1 shows that all but the Pieman Granite occur in a NE trending corridor sub-parallel to the Rocky Cape grain and that this axis of activity lies very close to the inferred axis of the Burnie Formation deposition. A deep Late Precambrian rift must be implied in this position and activity was only terminated after emplacement of the granites. The Pieman Granite occupies the Temma trend. Its shape indicates fracture and structure controls were applied at the time of emplacement.

It may also be noted that a number of Cambrian structures reflect this orientation and presumably the attitude of the Tyennan face of the rift. These features include the thrusts on Sorell Peninsula (Findlay and McClenaghan, 1987; Leaman, 1988a), the Henty Fault system and the Dial Range Trough. The bulk of the Dundas Trough may have had this orientation along the axis of the older basin. The inferred oceanic basalts occur along this axis which may well have been wrenched in the Late Precambrian. Other basalts marginal to my suggested Burnie Trough are intraplate (including those at Smithton, A.V. Brown, pers comm).

The Arthur Lineament has been described as part of the Burnie Formation development. I ascribe the additional deformation and metamorphism on this edge of the Rocky Cape core to the greater basin development and a much more active margin. Greater compression has been unavoidable along this margin at every folding episode. The emplacement of granites may also have affected aspects of the alteration. It may be noted that the peak alteration occurs in the Savage River region and can be associated with pinching of the units, bending of the core margin, intrusion of the largest mafic pods and loci of the sub east-west axes which apply across NW Tasmania. The area between Savage River, Mt Pearse, Parrawe and Mt Bertha will prove crucial to the understanding of structural developments.
It is also possible that the lineament represents some smaller failed initial trough developments, comparable to the Smithton Trough - although perhaps not of the same age - and which included cratonic mafic volcanism.
Any explanation of the developments along the Lineament must consider the bifurcation near the Campbell River. This may represent a small failed rift.

THE FORTH AND BADGER HEAD BLOCKS

The discussion includes the Precambrian exposures south of Latrobe and the possible Precambrian (Eo-Cambrian) east and south of Port Sorell.

The regional gravity field does not present many clear relationships with these regions, partly due to the effect of granites south of Burnie and Devonport. All Precambrian regions, or those mapped as Eo-Cambrian, are virtually non magnetic. These are not devoid of magnetic sources but the units are not a significant proportion of the rock mass and appear to be in proportions comparable with the Rocky Cape core (Badger Head, part south Latrobe) or Temma-Burnie styles (Forth, Port Sorell). The Forth Block appears to possess compound character.

Several lines evaluate these blocks in a gross way. In all cases appraisal is peripheral to other aspects of the section. Since each line samples differing character a brief individual discussion is provided.

Line 1 suggests that the Forth Block of deformed rocks is not like the Tyennan or Rocky Cape cores but may be part of a sequence such as encountered along the Arthur Lineament. The small volume of ultramafics near Ulverstone occurs near the possible margin with onlapped siliceous basement. These rocks may mark the eastern limit of the Burnie Trough described above.

Line 5 provides a view similar to line 1. It suggests that the denser cover on basement thins rapidly into Bass Strait. There is a contrast conflict with lines 17/18 and this creates compilation problems for Map 1. Further data and work are needed.

Line 6 indicates that the Badger Head Block has core density. This suggests that it is more akin to the Rocky Cape core than the denser Burnie Formation although parts of the Burnie Formation are less dense, as noted above. The deep, narrow Port Sorell trough is illustrated. This could bear a relationship with the Badger Head Block which is similar to the Smithton Trough and the Rocky Cape core.

Line 8 confirms the relationship and scale of the Port Sorell and Badger Head Blocks. It also implies that the slice of exposed basement south of Latrobe is at core density.

Line 13 is near the axis of the Port Sorell basin and the limitations in coverage may have prohibited clear recognition of the Latrobe Precambrian material. An extension of the Beulah granite has been shown in the Figure but it might be possible to account for the response by a combined basement rise and granite. The gradients do support more than one source. It should be noted that the Port Sorell rocks are certainly denser than the normal basement but the section also traverses the eastern end of the Fossey Mountain Trough and this also includes dense rocks (Longman and Leaman, 1971). The model may be too simple or there could be relationships similar to those at Forth. Tyennan style rocks underlie the Ordovician at Mole Creek.

Line 17 is atypical. It lies near the Dial Trough axis. It does not adequately sample the Trough rocks but does imply low density basement near the coast - presumably the Forth core.
Line 18 is comparable.

Line 19 demonstrates the existence of density layering in the Latrobe Precambrian materials. This may account for the apparent discrepancy described for line 13. Line 26 provides a similar conclusion. Some of these rocks are clearly more dense than normal for siliceous basement cores.

These results may be summarised. There is evidence for correlation of the Badger Head, Burnie (parts) and Rocky Cape core units and Penguin-Forth with the Tyennan Blocks. More detailed analysis is feasible. The Port Sorell trough is not unlike the Smithton or Burnie Troughs, but deeper than the former.

The pattern of basins and basement cores between Cape Grim and the Tamar River is symmetrical. Even the presence of ultramafics near Ulverstone can be paired with one of the mafic bands on the eastern face of the Rocky Cape core (in or near the Lineament). Although it has been suggested that there are affinities between the Forth and Tyennan Blocks the symmetry noted may mean that a better correlation might lie with the Lineament rocks near Wynyard. This work would suggest that Rocky Cape style basement may underlie the Mathinna Beds.

WITHIN THE TYENNAN CORE

The Tyennan Geanticline forms the basement core for central Tasmania. No reliable magnetic data are available but the coarsely spaced gravity coverage shows that the rocks of the geanticline are far from uniform on the scale of this analysis (refer Figure 34). Williams (1979) has summarised some of the gross variations. Some detail on the scale of marginal variations was provided by Jennings (1963) which is relevant to the present work but no coherent relationships have been identified or the scale of the changes described.

The present analysis has sampled various parts of the basement core but the treatment has not been detailed or overlapping since the principal objectives of the analysis were related to its western margin. The present treatment shows that there is scope for further productive interpretation using the extant data base although infill to about 2 km spacing would be advisable.

Williams (1979) refers to two discrete blocks within the geanticline (Cradle Mountain and Prince of Wales). A third, west of Maydena, known as the Jubilee Block (A.V. Brown pers comm) contains many dolomitic successions and structurally located pods of mafic rocks.

Map 1 presents an indication of the scale of the density variations within the Tyennan Geanticline. In all modelling south of the Cradle Mountain Block it has been assumed that the denser rocks overlie those representative of the siliceous cores. In virtually all cases this is supportable by gradient implications but it may not be universally correct. A more careful correlation with surface exposures and knowledge might be advisable than has been possible here. The gravity data certainly suggest where further inspection, or comparative inspection, is necessary. For part of the area no such study is feasible due to the cover of post Carboniferous rocks. These have generally been ignored in the modelling process since the smoothing applied for production of the contour maps used, coupled with the coarse spacing, has removed the relevant high frequencies.

In view of the absence of any coherent evaluation each line which impinges upon the geanticline is commented individually.

Line 1 suggests up to 3 km of dense cover on crystalline basement. This, depending on the precise form of the Tor Granite, may be an understatement.

Lines 2, 3 and 5 show that the northern margin of the Cradle Mountain Block is density banded. This is consistent with Jennings (1963). The implied gross dip of the folded dense accretion is to the north or north west. The section implies a relationship with the Burnie Formation and trough.

Line 4, across the southern part of the Cradle Mountain Block, samples only normal basement. This is consistent with the glancing section, line 6.

Lines 7, 7A sample the basement east of Queenstown. Part of the profile is affected by mid Palaeozoic cover but only a limited portion of the profile can be ascribed to denser materials. These may be no thicker than 3 km at the density employed. If the rocks are dolomitic and denser, perhaps 2.79 t/cu m, then the thickness may be of the order of 2 km. This is a veneer comparable to much of the Smithton Trough.

Line 9 is of interest in that the shallow basement beneath the West Coast Range is of the order of 2.67 t/cu m. This value was recovered regularly in the previous more detailed studies of this region (see Leaman, 1986c, 1988b). Also lines 10 and 12. Line 12 ends in the northern part of the Prince of Wales Block which is shown to be distinctive. The dense units thicken rapidly southward on the regular basement.

Line 13 samples a large part of the basement near, and south of, Mole Creek. There is little evidence of abnormal character until the possible extension of the Prince of Wales Block is encountered. A dense cover of up to 7 km is suggested. It is presumed that this material is Precambrian.

Line 14 yields results generally consistent with lines 13 and 16. The basement density is at core value until the extension of the Tamar structures is approached. In this case the higher density can be possibly ascribed to Mathinna Beds although the presumptions of the remainder of the interpretation in NW Tasmania remain possible. Mines Department drilling in the upper midlands suggest a Precambrian or Cambrian explanation at this stage. Line 16 yields similar results but lies south of the Connorville exposures. These are Lower Palaeozoic and either Late Precambrian or Cambrian rocks may explain this effect. Gradient studies show that the material directly underlies the Permian cover.

Line 18 presents a more definitive view of the volume of dense material in the region around the northern margin of the Prince of Wales Block. Compare lines 3 and 10. The anomaly could be generated in various ways but few are believable given the complexities of the region. The lithologic variation lies a little east of Frenchmans Cap. Line 19 suggests that the dense zone thins rapidly northward.

Line 20 presents a more detailed view of the western margin of the Tyennan core (see also Leaman, 1986c). Some banding, comparable to part of the northern face near Cradle Mountain, is implied. This is also inferred in mapping where pelitic or garnet-bearing units have been differentiated.

Lines 21, 22, 23 and 24 sample the massive, relatively uniform core. Line 27 is isolated from other profiles but suggests that the bulk of the Prince of Wales Block is low density. An unmodelled denser section occurs in the region of the Jubilee Block west of Maydena. About 2 km of dolomitic cover is implied. The section also suggests that the trough of Cambrian material exposed near the coast is very narrow.

Line 28 also samples the margin of the Prince of Wales Block. The response suggests that the marginal zone is consistently dense from the region of the Jane River east of Frenchmans Cap. If thick dolomitic sequences are presumed to explain this anomaly then the likely thickness may be no more than 4 or 5 km.

These results may be summarised. The bulk of the Tyennan Geanticline presents normal siliceous densities in the range 2.66 to 2.68 t/cu m. There is evidence of substantial, relatively localised deviations. Around the Prince of Wales Block and within the Jubilee Block these are most likely related to dolomitic sequences. These overlie, or onlap, the crystalline basement. Sub basins of the scale of the Smithton Trough are implied.
Around the northern and western margins of the Tyennan core any density banding noted is localised and not explained by dolomites. The effect is comparable with, and in some cases can be shown to be compatible with, the eastern side of the Burnie-Oonah Formation depression or trough. Near Cradle Mountain the model is almost continuous beneath the younger Palaeozoic material.

These results would suggest that most of the Late Precambrian, and possibly some of the Early Cambrian, deposits are of the same type. Each occupies a depression, tensionally induced, of varying dimensions and contains material which unconformably onlaps the older basement rocks. The primary feature, described earlier, lies NNE across western Tasmania between Strahan and Burnie. Other, wholly cratonic developments tend to be smaller and possibly younger overall.

CONTROL ON THE LOCATION OF PALAEOZOIC BASINS AND TROUGHS

It is relatively difficult to establish a Palaeozoic age for most of the basins in Western Tasmania. All may be Late Precambrian developments. The structure in which the Burnie and Oonah Formations were deposited is clearly older, larger and with a much more extensive history. It is presumed to mark the site of the initial cratonic break up. Some or all of these basin structures contain materials which are equivalent to, or direct correlates of, the Success Creek Group or the Crimson Creek Formation of the Dundas Trough region. Some may contain nothing else. Such units have been inferred from south of Pt Hibbs (known as the Mainwaring Group), around Waratah, in the Dial Range and Fossey Mountain Troughs and at Adamsfield. The widespread distribution of similar materials and relationships, though arguable in detail pending fossil or dating evidence, indicates a single craton in western Tasmania was under stress.

The present interpretation, presenting a series of symmetrical physical-structural relationships, offers support for this view. The modelled sections are wholly consistent with pattern rifting of one block since parts are exposed on either side of each rift. The possible Cambrian sequences such as the Success Creek and Crimson Creek Formations simply cap older deposition in the Dundas and Fossey Mountain Troughs. All occurrences can be related to the western or northern margin of the primary basin which has a general NE-SW extension. Basaltic volcanism around this margin is intraplate, as would be expected in such a concept. Volcanism closer to the axis of the old, but still active trough - more than 10 km deep at the time of deposition of the Success Creek Group - has oceanic affinity. I believe this to be expected also. It seems likely that the active margin of the Burnie-Oonah Trough (usually known as the Dundas, a term which implies much more restricted age and history) moved eastward with time. Ultimately activity was concentrated on or near the Tyennan margin and felsic continental source volcanism again resulted. No other known trough has such a history. All are much more restricted in time and material terms.

Within the Dundas and Fossey Mountain Troughs the Dundas Group and its equivalents and the Mt Read Volcanics overlie the Burnie, Oonah, Success Creek and Crimson Creek successions but evidence of a major hiatus is general. The Lower Cambrian may not be represented in western Tasmania. The Dundas Group and younger volcanics are concentrated about the southern and eastern margin of the old basin, close to the Tyennan nucleus. I presume that these occupy a relatively narrow, depression. This margin remained active until the Lower Ordovician, demonstrated by the minor unconformities within the West Coast Range which directly overlie it. Cambrian materials onlap basement within the range region. The Great Lyell and Henty Faults effectively specify the position of the basin margin since all materials south and east of them are thin and directly piled on basement. In such a model it would also be expected that the western side of the local (sensu stricto) Dundas Trough would also be faulted and that those faults would present Crimson Creek and older units in juxtaposition with Dundas Group materials. This is precisely what is found between Mt Pearse in the north and south of Pt Hibbs in the south. The fault zone, probably originally a multiple structure in any event, has been further disrupted and folded but the fault relationship is universal wherever mapped. I do not see such evidence as proof of massive plate movements or subduction etc, simply shifting of the penultimate rift axis within an existing, and at the time deep, basin. The final stage of sedimentation within the Burnie-Oonah Trough was completed with deposition of the Ordovician to Devonian rocks. The thickest development of these lies close to the original axis of the trough (see also Leaman, 1986c).

I infer that the sequence and development within the Jubilee Block west of Maydena to be identical in style but much more restricted. Basin development was begun much later than within the Burnie-Oonah Trough. I suspect that the Port Sorell and Smithton developments were comparable.

This view of the Dundas Trough is different from that previously modelled (Leaman, 1986c) where it was inferred that the Trough was up to 12 km deep. This thickness included several kilometres of section involving mafic volcanics, or which was deeper than a volcanic section. In view of the above discussion it is evident that various parts of the western sequence had been compounded and that the depth estimate was applicable to all units - including Burnie and Oonah Formations - and not just the Dundas Group. The variations in overall interpretation required have been discussed above and are often shown in the Figures.

Rocks of the Dundas Group and the Burnie or Oonah Formations are not readily separable gravimetrically due to similar bulk densities. Nor are their magnetic properties sufficiently distinctive. The Crimson Creek and Success Creek units are distinctive magnetically and can be used to provide some limits on the scale of the Dundas Group - wherever they underlie it. This is not a simple task, since it also requires assessment of the younger volcanics on the eastern side of the Trough, and time has not permitted a research evaluation of this problem as part of this study. In NW Tasmania the Tertiary basalt cover is a separate and soluble problem.

The rocks of the Dial Range and Fossey Mountain Troughs are essentially similar to the Dundas Trough.
The present rock and structure distribution reflects both original depositional relationships with the Tyennan nucleus and subsequent compressions (also Williams, 1979). I infer that the apparent N-S and E-W systems apparent in the modern day geological map are, in large degree, an illusion. I suggest that the original basement grain was NE-SW. This can be seen in the Rocky Cape Block and in the central portion of the Tyennan nucleus such as the Prince of Wales Block. The basement was parted to create a generally NE-SW basin. This became wider and deeper and by the Late Precambrian was over 10 km deep.

Development and deposition was temporarily halted (?) in the Lower Cambrian. This may reflect a slight wrenching and partial closure of the basin in the Cradle Mountain region. These movements may have set the scene for the apparent trend change in troughs. Active rifting continued subsequently, but near the southern, or Tyennan, margin. The Great Lyell and Henty Faults may date from the Lower Cambrian activity. The Dial Range Trough essentially maintained the original basin axis. Devonian folding and movement of the Tyennan nucleus (also Williams, 1979) completed the apparent pinching of the basin suite. Trends have been rotated about the compressing nose of the Tyennan nucleus - the Cradle Mountain Block.

I support this argument for essentially simple distortion of a single large basin by noting that the granitoids also occupy its volume. All the granitoids in the region are emplaced within a band whose width is equivalent to the presumed extension of the basin (refer Figure 1). The bodies occupy basin margin positions generally and are restricted to the primary axis. They are not found within the basement nuclei. The possible occurrence of a stock near Balfour must be confirmed but even if proven would lie on the west side of the Rocky Cape core along a margin axis which had been active. It is not known whether the Smithton Trough ever contained post Cambrian units and thus its true scale may have been lost by erosion.

The significance of the Heazlewood mafic complex and the E-W extension of the Dolcoath Granite is uncertain. The effective basement in the Huskisson Syncline and Waratah areas is Oonah Formation and it is not deeply buried. Structurally emplaced inliers are present. The fold arc pinpointed by the magnetic Success Creek and Crimson Creek Formations which extend from the syncline south of Cleveland to Parrawe north of Cleveland may reflect Devonian movements. Since the ultramafics within the syncline were structurally emplaced (Leaman, 1986a, c; Brown, 1986) and subsequently dilated from the Heazlewood mass by the Meredith Granite the material could have been derived or translated from several sites. It could be related to one of the more recent, but concealed, belts of mafic rocks within the Burnie Formation.
The Dolcoath Granite may reflect the stress field resulting from the rotations about the Cradle Mountain Block. It is interesting that this northing also contains the Heazlewood accumulation, the peak deformation and metamorphism within the Arthur Lineament (greatest changes in magnetic properties) and pinching of the Rocky Cape core (demonstrated by an hour glass effect in the gravity field).

Many trends are persistent and recognisable in the data used. Most are E-W or ESE. I have excluded the common NE trend which parallels the primary basin axis. All are suggested on Map 1.

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SUMMARY

1. The Rocky Cape Block is composed of a low density, siliceous core and symmetrically disposed Late Precambrian basin developments. Localised mafic sequences define more active margins. The primary basins extend NNW and NE from a pivot point above a plunging core offshore from Pieman Heads. The principal eastern basin contains up to 10 km of Burnie-Oonah Formations while the western basin is more patchy and less well developed in strike length. The Smithton Trough may be a later intracratonic phase of the western basin which reflects the two older trends. It may be argued that Cambrian thrusting has concealed an extension of the Smithton Trough comparable to the relationships on Sorell Peninsula.

2. The bulk of the Tyennan Geanticline has a siliceous constitution and properties. A number of regions possess greater contrasts within it. All are localised. Some can be directly correlated with dolomitic sequences. Others are either concealed or unexplained. The rim of the Prince of Wales Block is marked by such changes. Property and unit changes around the Cradle Mountain Block can be matched across the Dundas and Fossey Mountain Troughs.

3. Structural symmetry can be identified across northern Tasmania from Cape Grim to the Tamar River. The Forth Block could be considered an extension of the Tyennan nucleus or the symmetrical equivalent to parts of the Arthur Lineament at the western margin of the Burnie-Oonah Trough. The Port Sorell basin is comparable to the Burnie Trough and is symmetrically related across the Forth Block.

4. Late Precambrian and, or, Early Cambrian structuring can be inferred to be wholly cratonic. More recent units were deposited in extensional basins which onlap basement. The primary basin extends from Burnie to Zeehan. Oceanic type basalts occur on the eastern side of the axis of this structure. There is evidence from the distribution of mafic rocks that the active margin moved eastward with time. Final activity was felsic and piled on the eastern margin with Tyennan basement at shallow depth.

5. The Arthur Lineament marks the western margin of the Burnie-Oonah Trough. It is not a simple margin although there is evidence of structural and stratigraphic continuity from the Rocky Cape core. Mafic accumulations are concentrated along this margin, and also within the Burnie Formation as the effective margin moved eastward. The deformation of the lineament rocks may be related to the scale and activity of this margin.

6. Definite Cambrian and subsequent Lower Palaeozoic basin development and deposition is concentrated along the better developed of the already initiated structures - in

particular the Burnie-Oonah Trough. The Dundas Trough is a small scale superimposition within the eastern portion of the older Trough. Its development followed an hiatus in basin development with resulting faulted relationships with older materials including the Crimson Creek and Success Creek Formations. Present day trends and rock distribution is related to the original NE trend of the basin and its pinching and deformation about an advancing Tyennan nose, a process begun in the Early Cambrian.

7. Emplacement of Devonian granitoids completed the structural development. These were emplaced along the axes of the Late Precambrian troughs, most are related to the NE extension of the Burnie-Oonah Trough and were intruded in or near the original basin margins. The distribution of granite may indicate the extent of the compressional motion which acted to close the basin and ultimately deform it.

8. It is not yet generally possible to separate the concealed relationships between the Dundas Group and rocks of the Success Creek or Crimson Creek Formations. This is feasible in terms of surface distribution due to distinctive magnetic properties. Models, both gravity and magnetic, do indicate that rocks with the requisite properties do occur in some sections. Gravity data cannot resolve the depth range of the interface but magnetic analysis may be able to do so. This work has been beyond the present study.

9. The analysis has shown that the Precambrian Blocks are far from homogenous. Further analysis does depend on improved survey coverage and upgrading of the rock property data base for these materials.

10. The provisional structural solution provided for the crust in western Tasmania can be used to generate a regional gravity field which would allow better definition of local basin structures. Comprehensive residual analysis requires input of the implied basin forms as well. Note that the present work is provisional and that a 3D assembly check of a subset of profiles used with some refinement is advised before use as a regional field generator for residual extraction. This action is recommended.

REFERENCES

Bishop, J.R., 1986. Interpretation of the NW aeromagnetic survey Mt Read Volcanics Project Report, Dep. Mines Tasm.

Bishop, J.R., 1987. An interpretation of the N Tasmania aero-magnetic survey. Mt Read Volcanics Project Report, Dep. Mines Tasm.

Brown, A.V., 1986. Geology of the Dundas-Mt Lindsay-Mt Youngback Region. Bull. geol. Surv. Tasm., 62

Corbett, K.D., Richardson, R.G., Collins, P.L.F., Green, G.R., and Brown, A.V., 1982. The 1981 West Coast Aeromagnetic Survey: summary of information and results. Unpub. Rep. Dep. Mines Tasm., 1982/39.

Findlay, R.H., and McClenaghan, M.P., 1987. Drilling proposal for the Macquarie Project 1987/8. Memo Dep. Mines Tasm. Apr 15.

Gee, D., 1966. Table Cape. 1:63360 geological map sheet. Sheet K/55-7-22. Geol. Surv. Tasm.

Jennings, I.B., 1963. Middlesex. 1:63360 geological map sheet. Explan. notes geol. Surv. Tasm.

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

Leaman, D.E., 1986 b. Preliminary interpretation report. 1985 West Tasmania Aeromagnetic Survey. Mt Read Volcanics Project Report, Dep. Mines Tasm.

Leaman, D.E., 1986 c. Gravity interpretation west and north west Tasmania. Mt Read Volcanics Project Report, Dep. Mines Tasm.

Leaman, D.E., 1988 a. Review. Structural implications of geophys ical data, Sorell Peninsula, western Tasmania. Unpub. Rep. Dep. Mines Tasm. 1988/1.

Leaman, D.E., 1988 b. Review. Stratigraphic-structural implicat-ions, geophysical data, Lynchford area, western Tasmania. Unpub. Rep. Dep. Mines Tasm. 1988/2.

Leaman, D.E., 1988 c. Granites of W and NW Tasmania. Provisional Interpretation. Mt Read Project Report, Dep. Mines Tasm.

Leaman, D.E., 1988 d. Gravity interpretation. Revised mantle model. Mt Read Project Report, Dep. Mines Tasm.

Lennox, P.G., Corbett, K.D., Baillie, P.W., Corbett, E.B., and Brown, A.V., 1982. Smithton. 1:50000 geological map sheet. Geol. Surv. Tasm.

Longman, M.J., and Leaman, D.E., 1971. Gravity survey of the Tertiary basins in northern Tasmania. Bull. geol. Surv. Tasm., 51

Richardson, R.G., 1987. Interpretation of a gravity survey in the Smithton area, north-western Tasmania. Unpub. Rep. Dep. Mines Tasm., 1987/39

Richardson, R.G., 1988. Gravity map of Tasmania. 1:500000 scale Dep. Mines Tasm.

Richardson, R.G., and Leaman, D.E., 1987. The Tasmanian gravity data base. Unpub. Rep. Dep. Mines Tasm. 1987/2

Williams, E., 1979. Tasman Fold Belt system in Tasmania. Explan. Notes 1: 500 000 structural map of pre-Carboniferous rocks of Tasmania, Dep. Mines Tasm. Revised edition.

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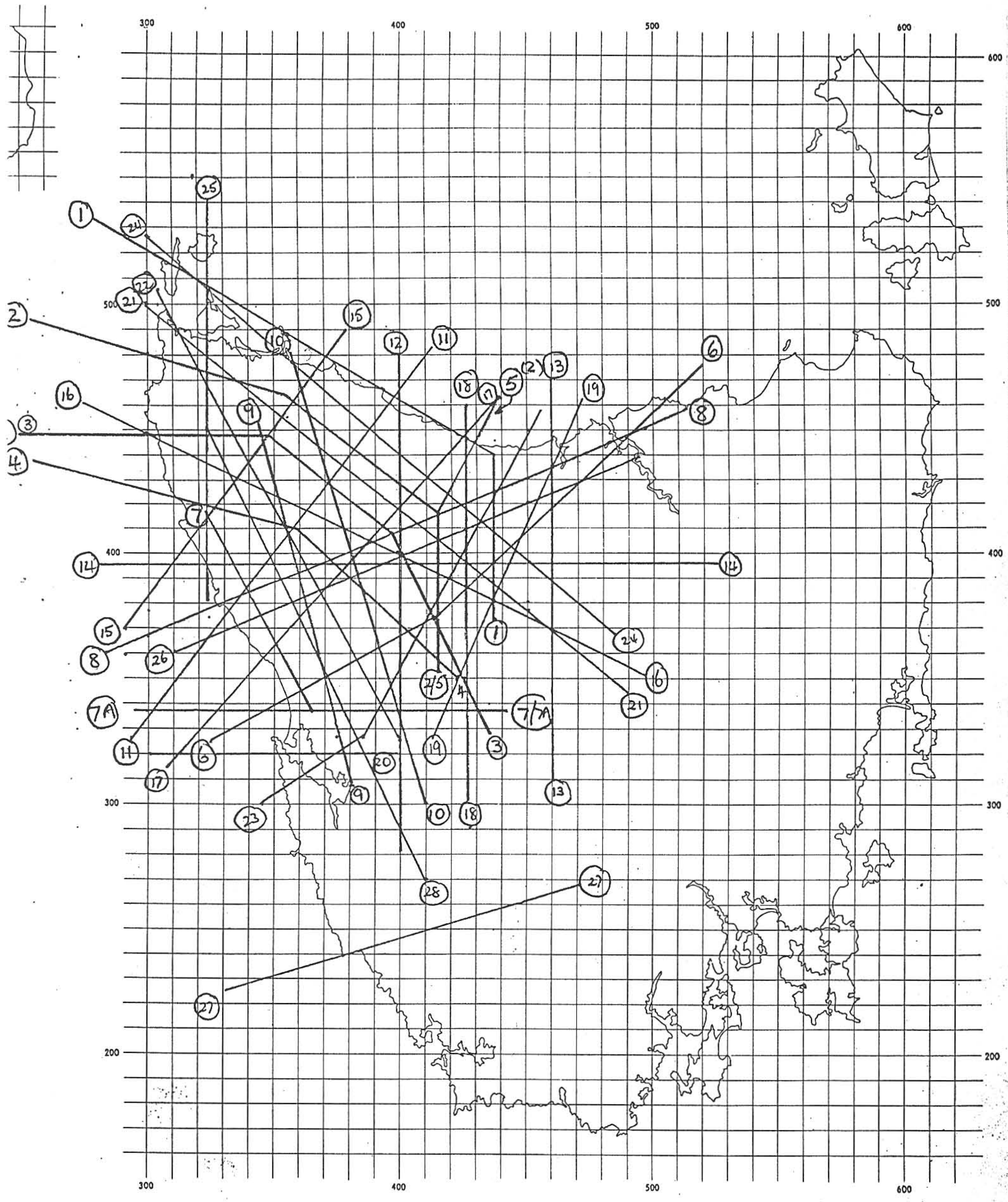

LOCATION OF PROFILES AND SECTIONS USED FOR ARRAY MODEL

FIGURE 0

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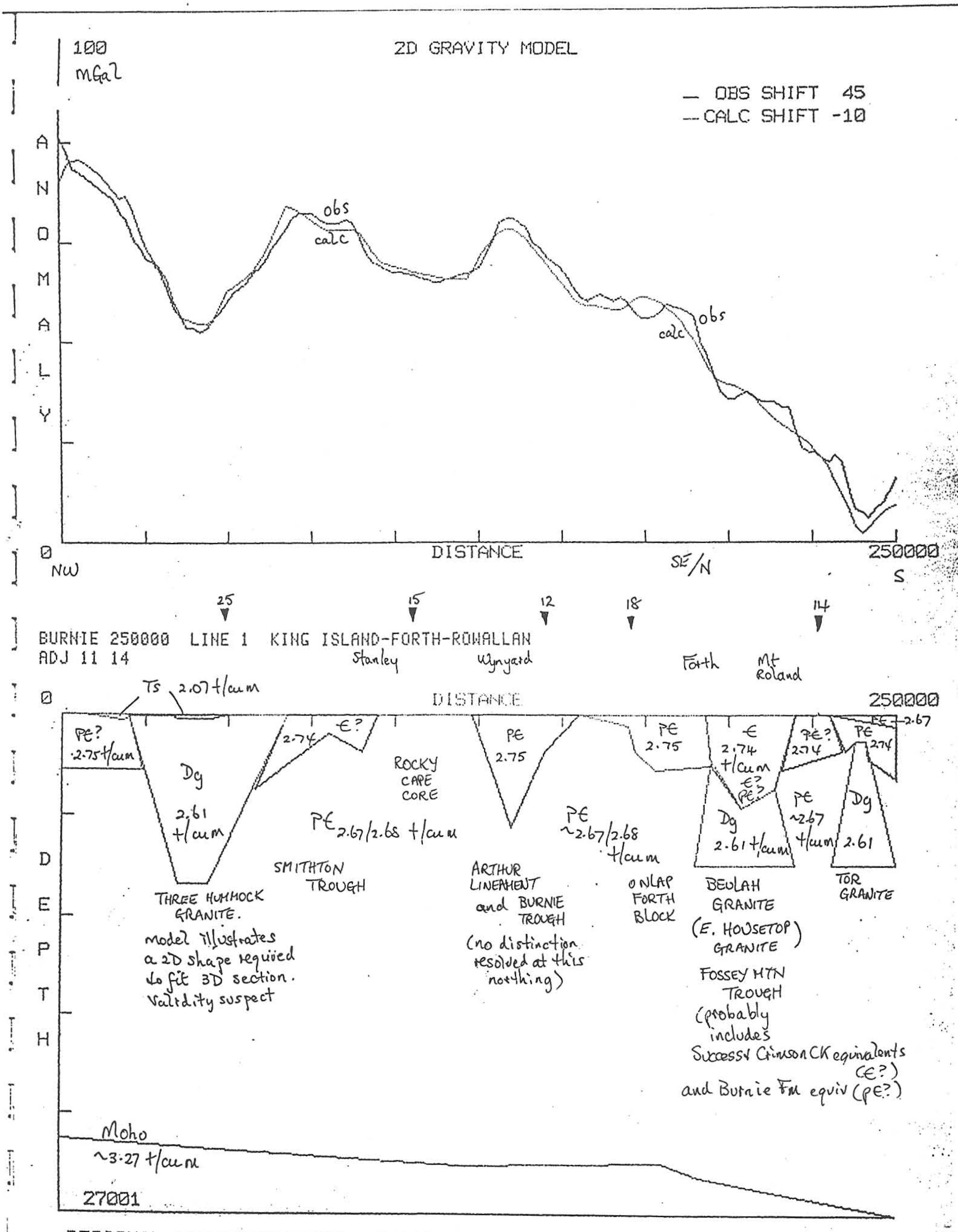

REGIONAL INTERPRETATION : LINE 1
KING ISLAND - FORTH - ROWALLAN

FIGURE 1

LEAMAN GEOPHYSICS

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

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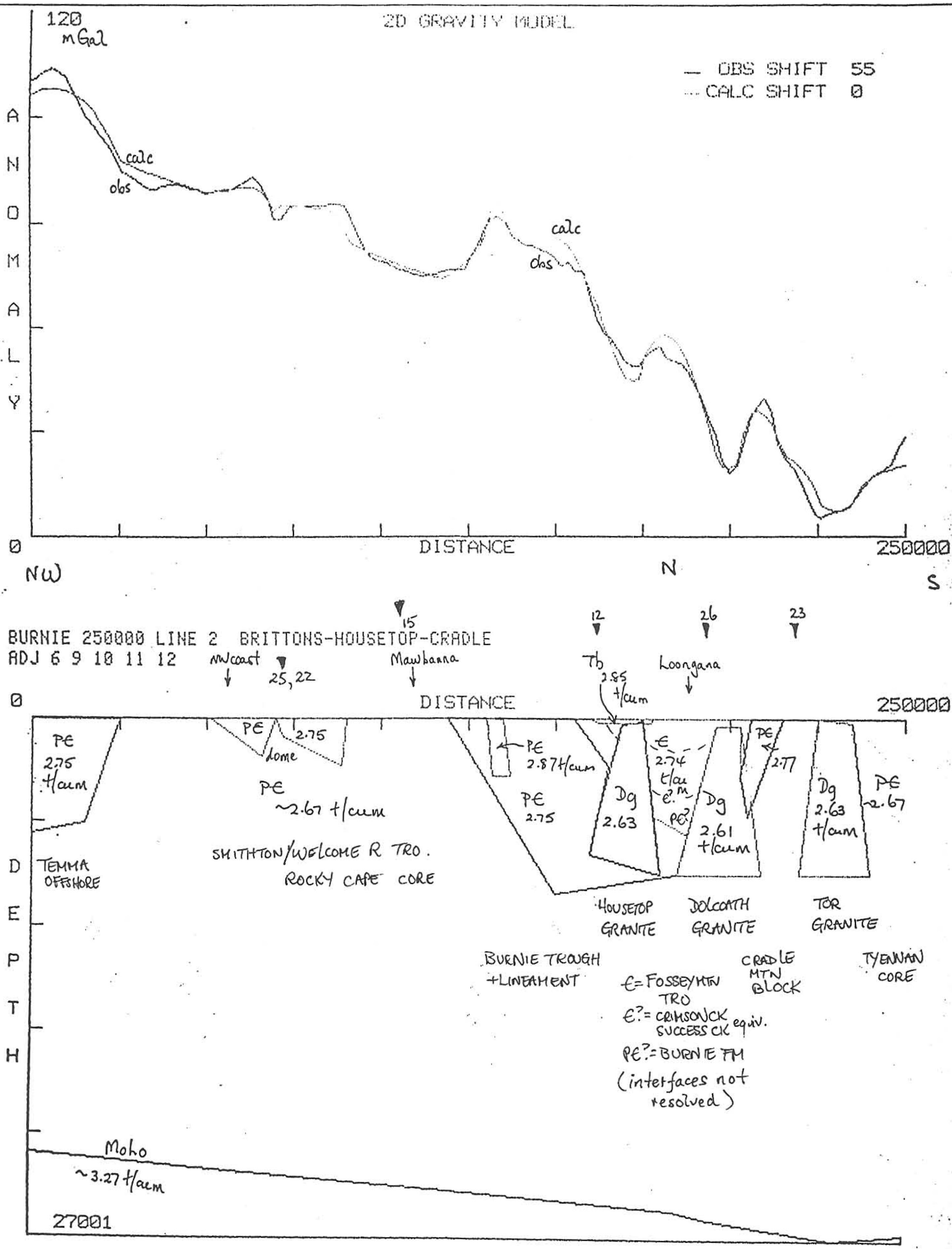

REGIONAL INTERPRETATION : LINE 2
BRITTONS - HOUSETOP - CRADLE

FIGURE 2

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

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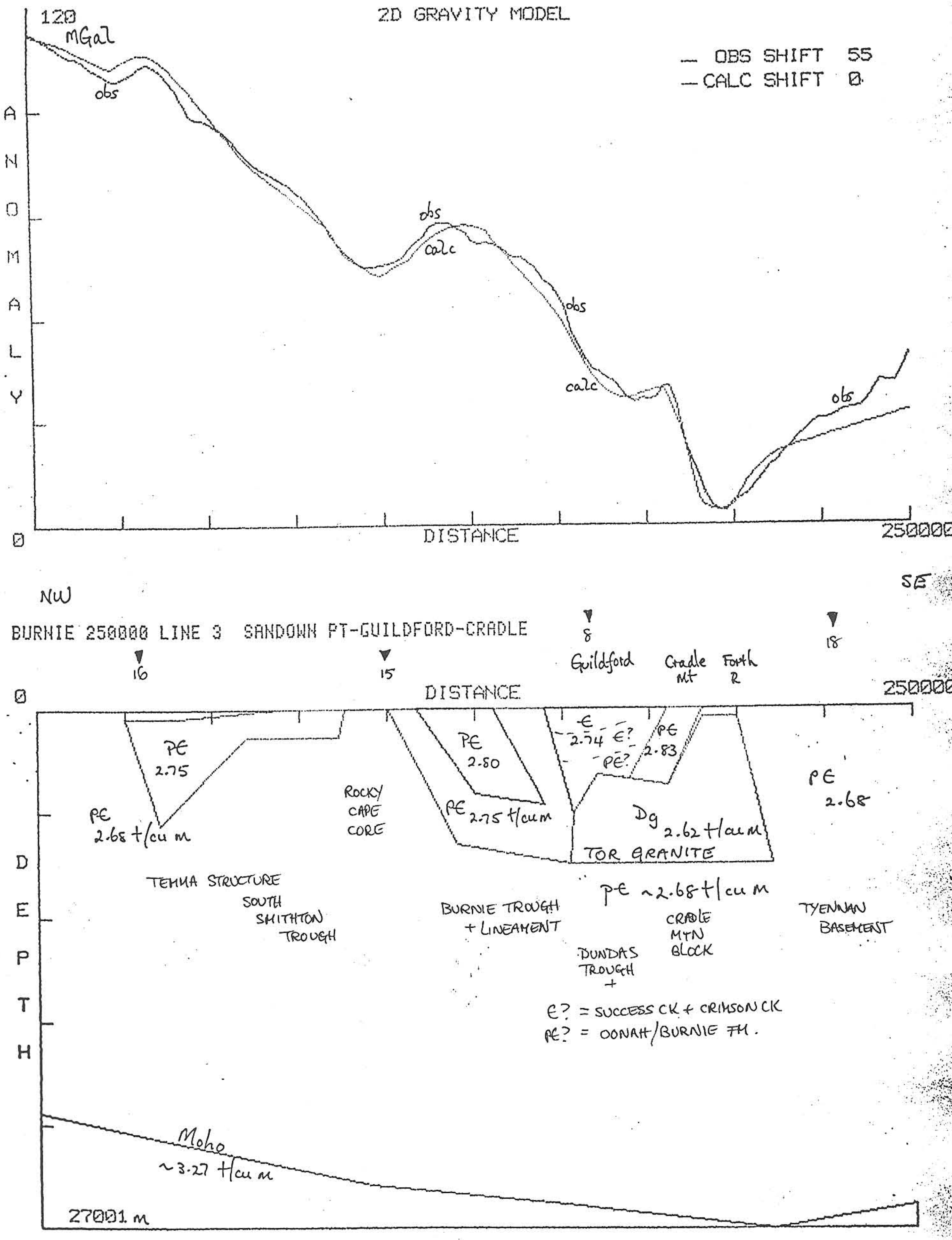

REGIONAL INTERPRETATION : LINE 3
SANDOWN POINT - GUILDFORD - CRADLE MTN

FIGURE 3

LEAMAN GEOPHYSICS

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

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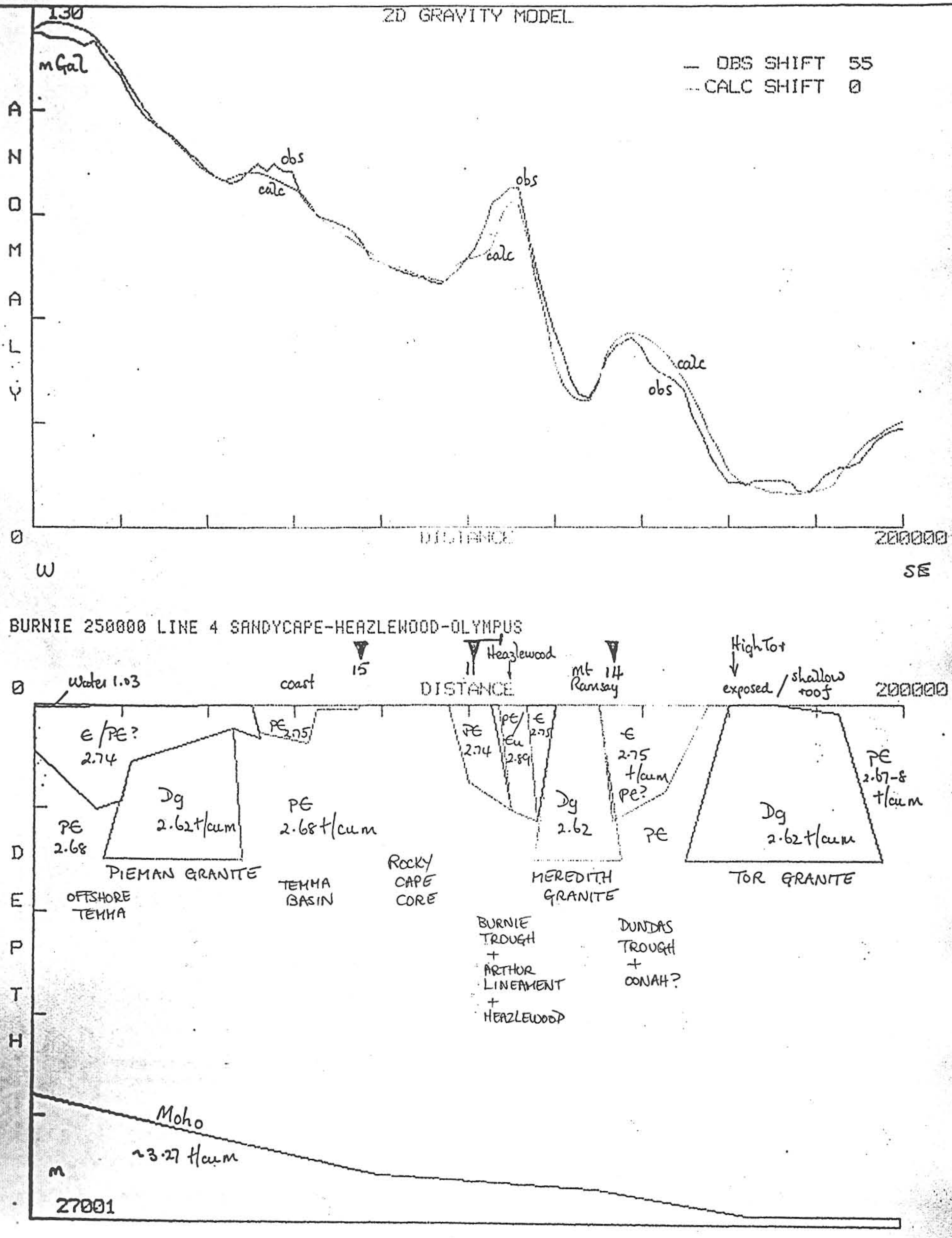

REGIONAL INTERPRETATION : LINE 4
SANDY CAPE - HEAZLEWOOD - MT OLYMPUS

FIGURE 4

031038

LEAMAN GEOPHYSICS

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

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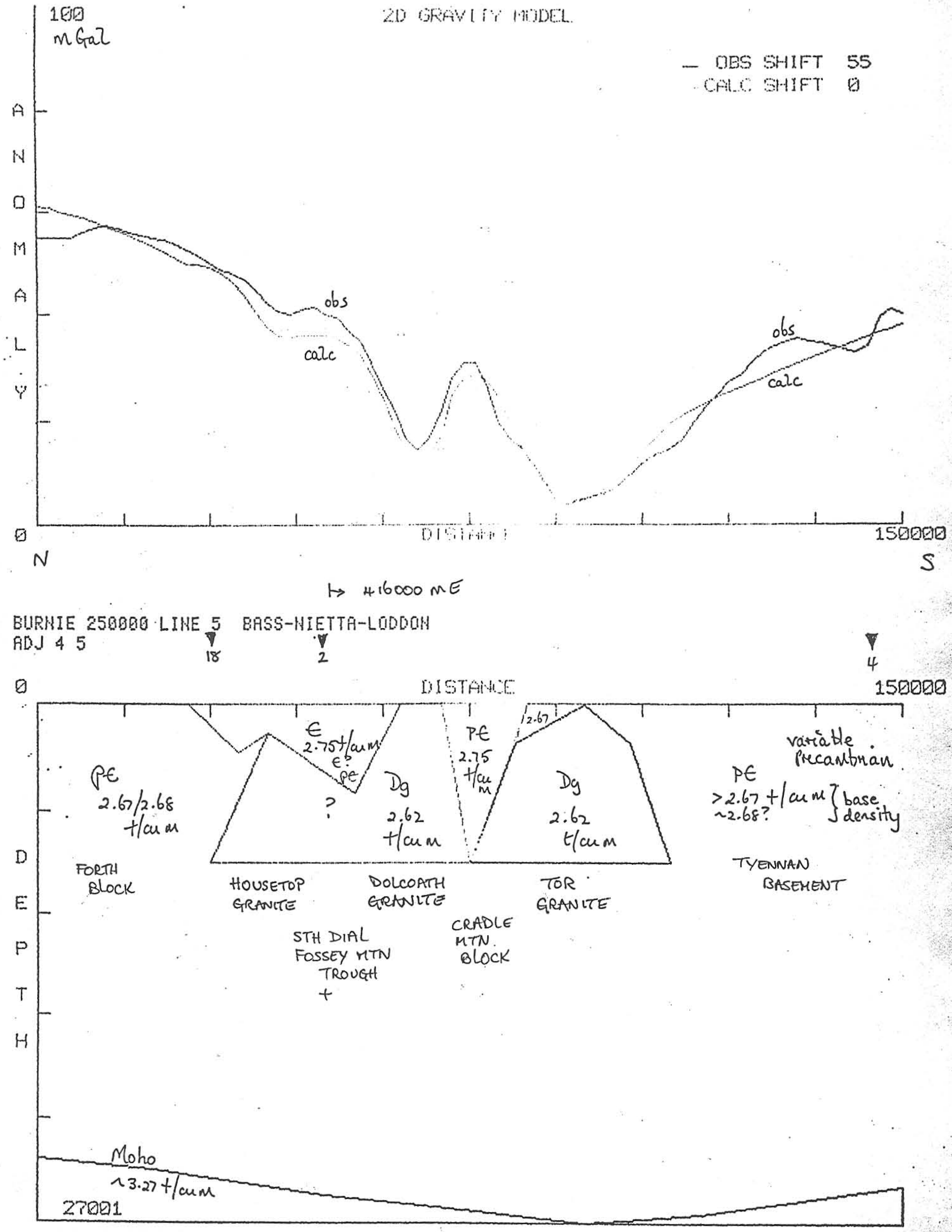

REGIONAL INTERPRETATION : LINE 5
BASS - NIETTA - LODDON

FIGURE 5

031039

LEAMAN GEOPHYSICS

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

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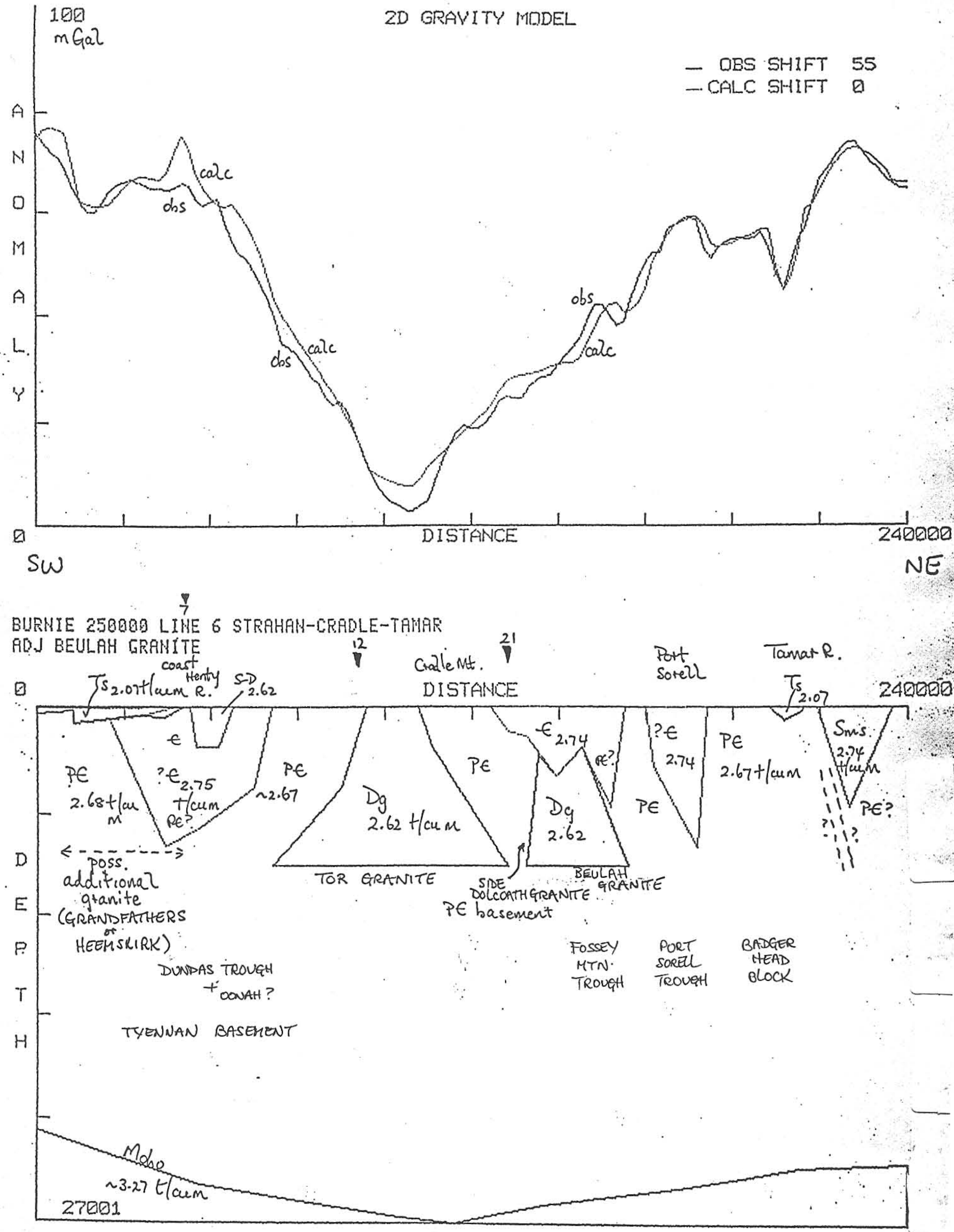

REGIONAL INTERPRETATION : LINE 6
STRAHAN - CRADLE MTN - TAMAR RIVER

FIGURE 6

LEAMAN GEOPHYSICS

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

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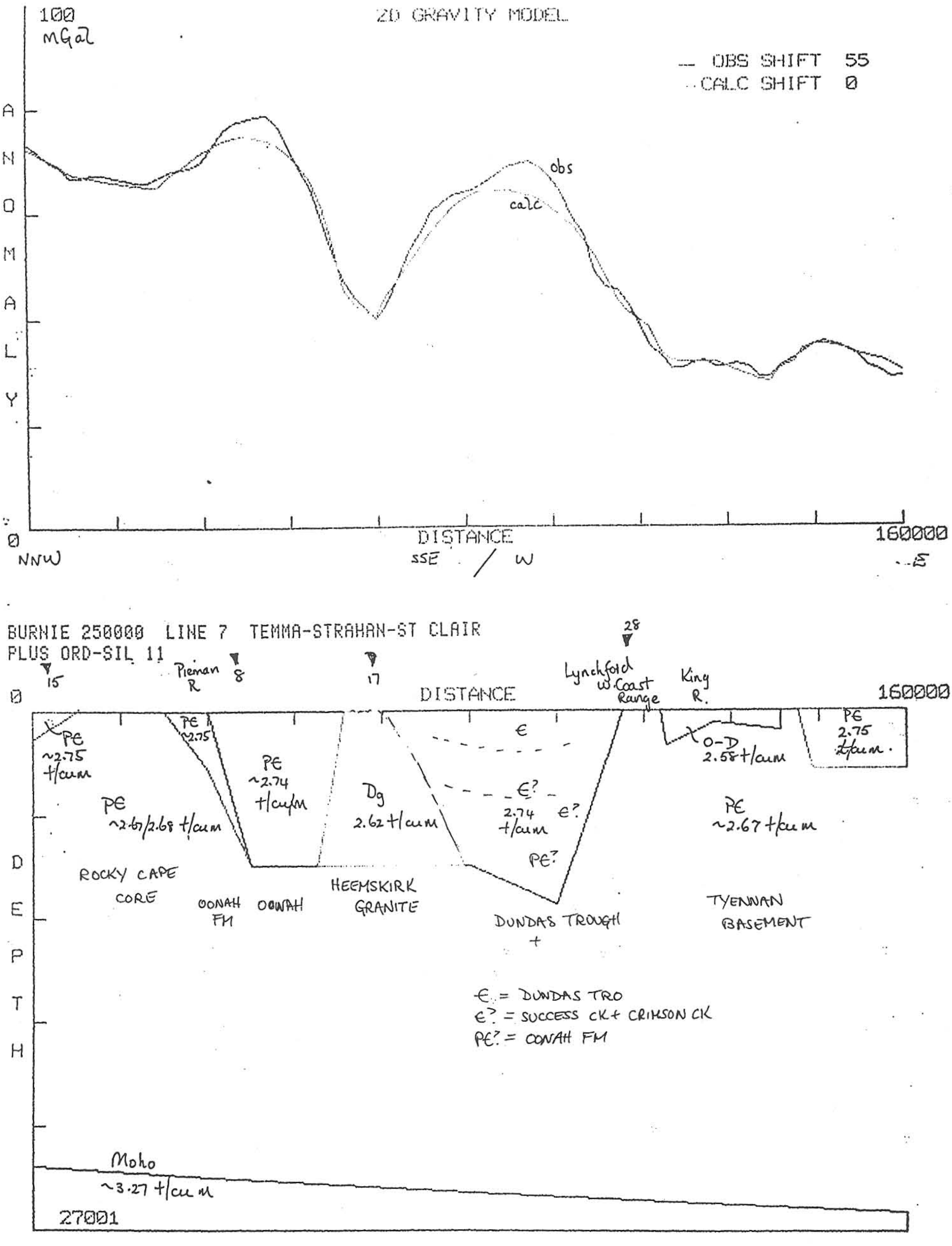

REGIONAL INTERPRETATION : LINE 7
TEMMA - STRAHAN - ST CLAIR

FIGURE 7

031041

LEAMAN GEOPHYSICS

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

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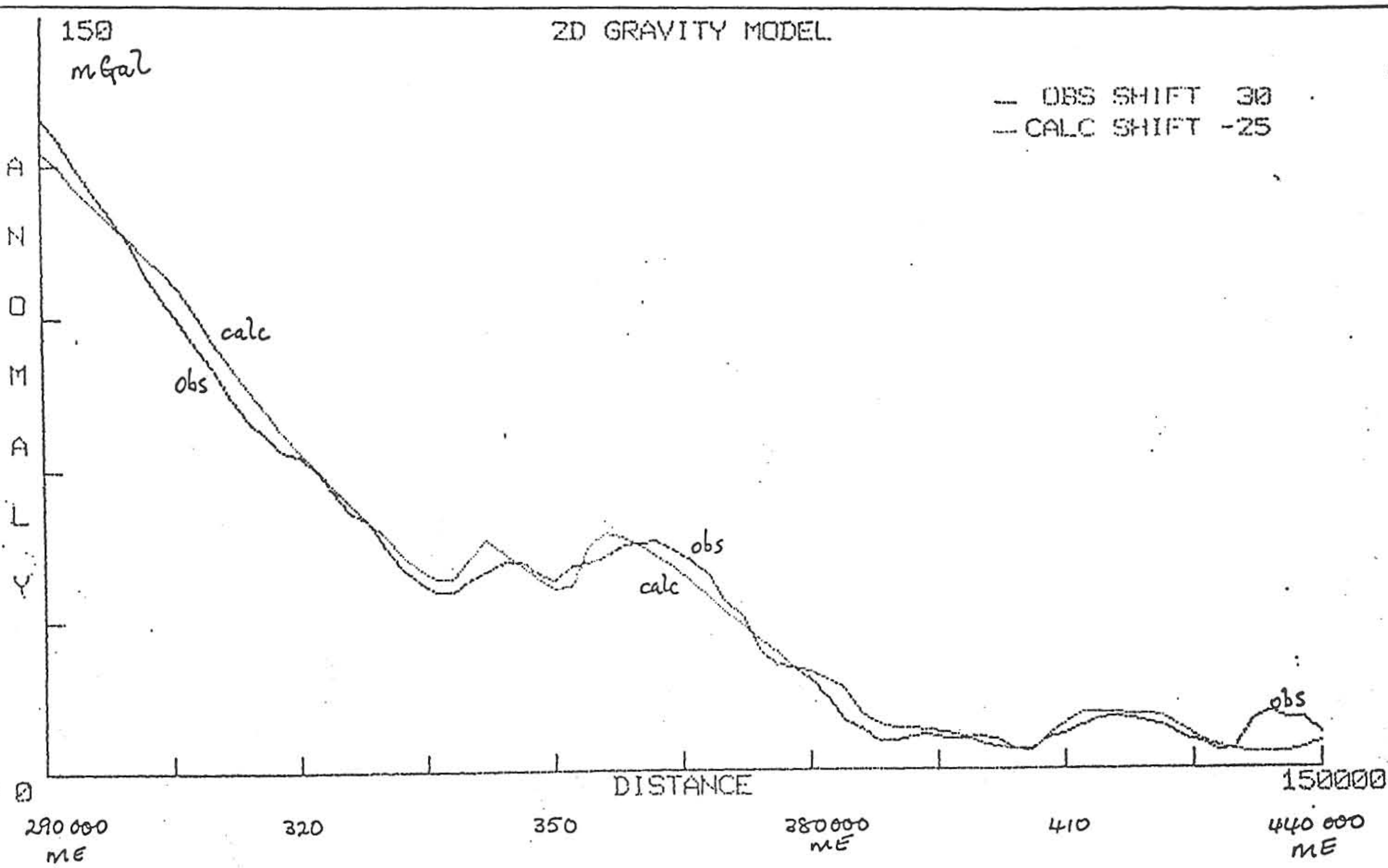
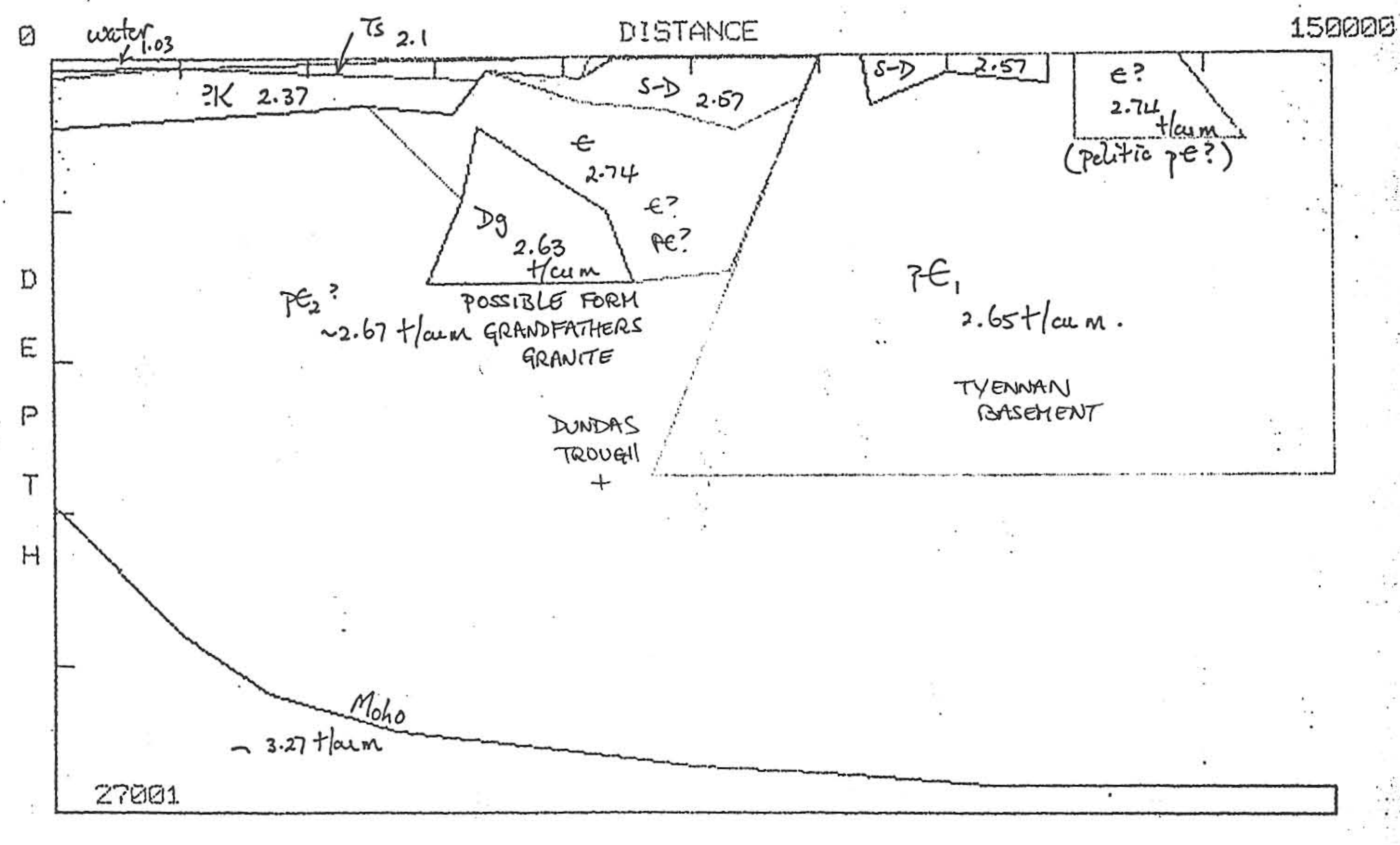


LYNCHFORD DDH STUDY 5337000 N 290-440 E
ADJ 4 + 14 GRANITE PRESENT ALTERNATIVE PATH

LYNCHFORD STUDY AREA

LINE 7A



REGIONAL INTERPRETATION : LINE 7A
5337 000 MN (290 - 440 000 ME)

FIGURE 7A

031042

LEAMAN GEOPHYSICS

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

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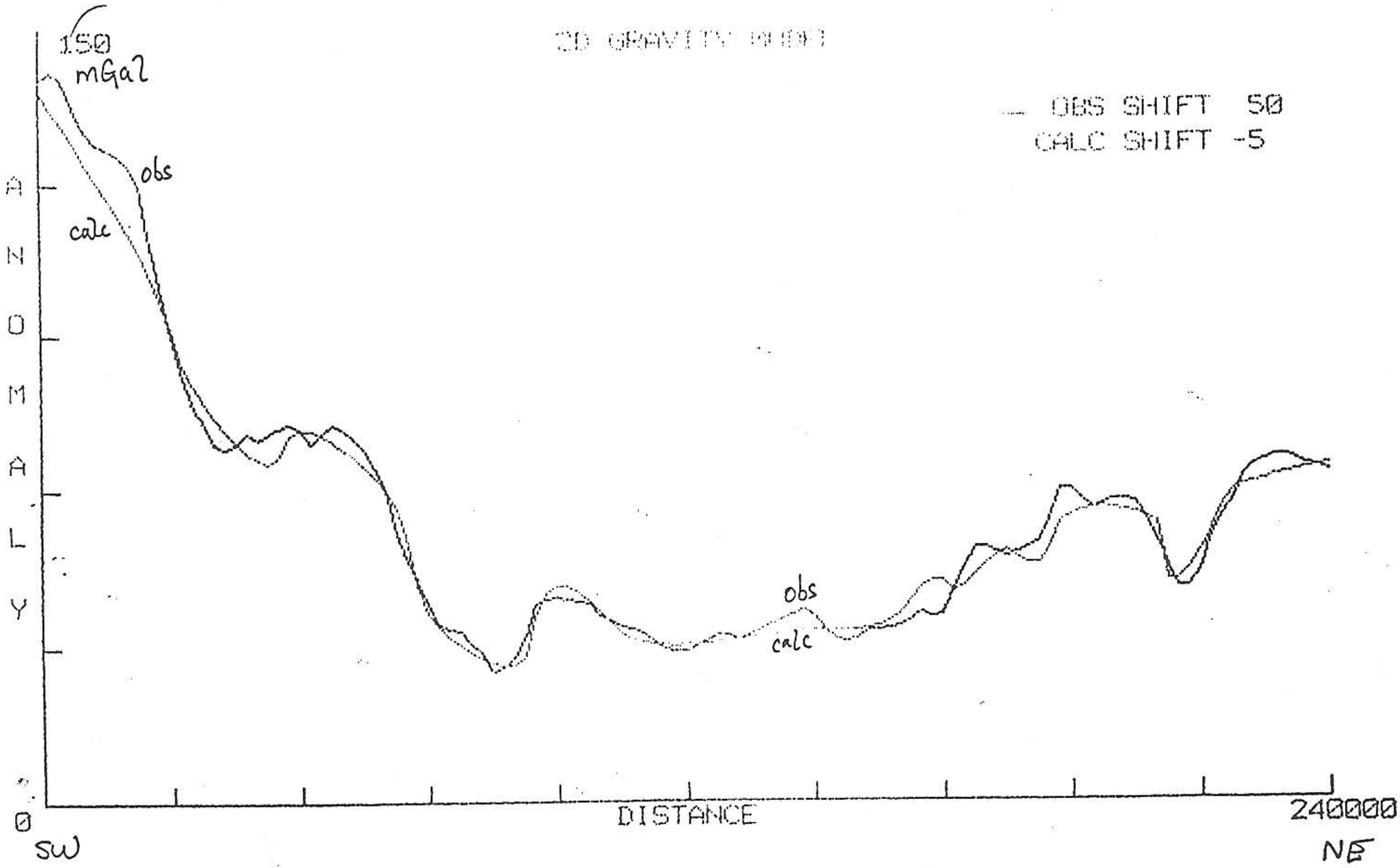
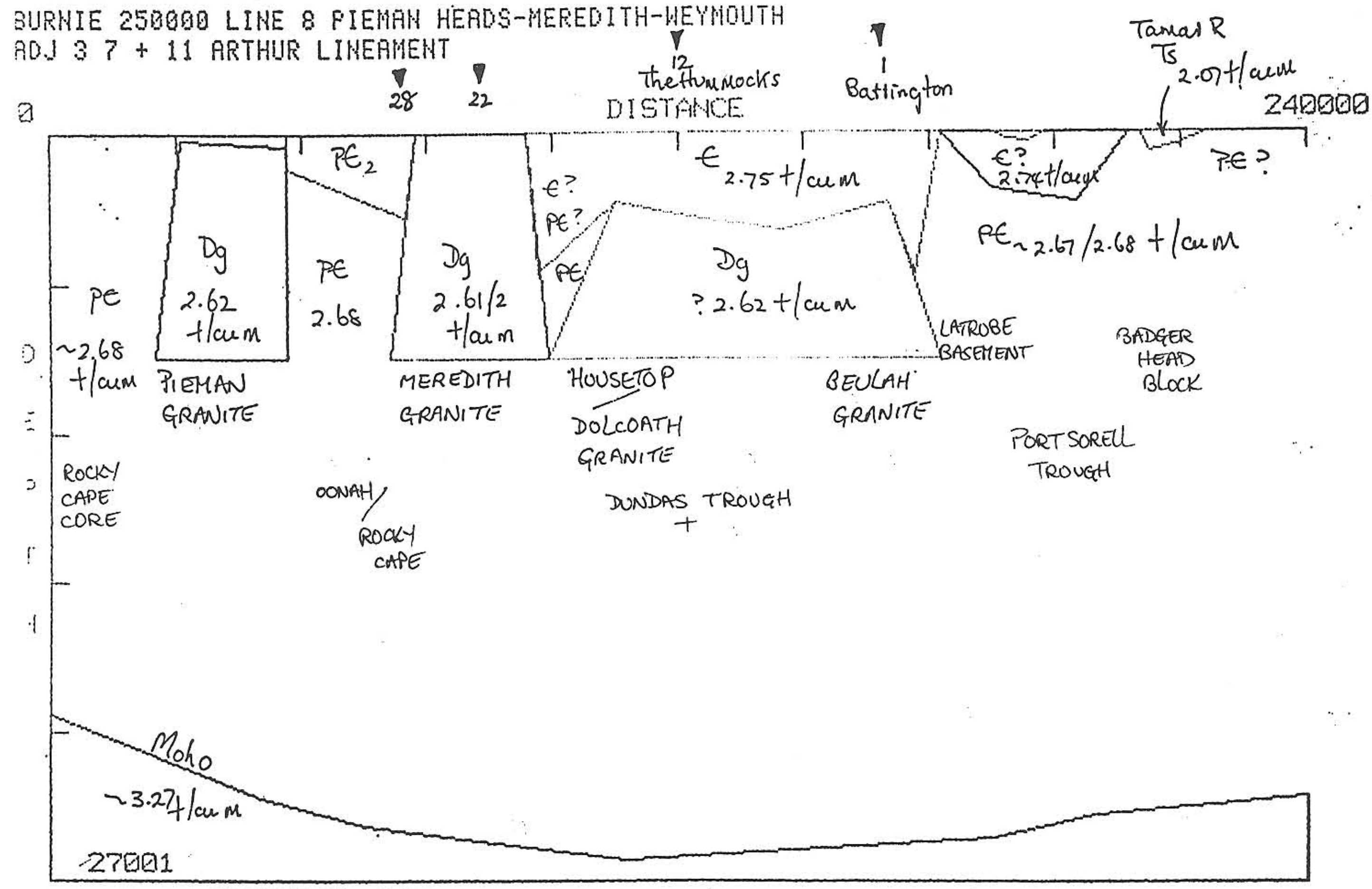


BURNIE 250000 LINE 8 PIEMAN HEADS-MEREDITH-WEYMOUTH
ADJ 3 7 + 11 ARTHUR LINEAMENT



REGIONAL INTERPRETATION : LINE 8
PIEMAN HEADS - MEREDITH - WEYMOUTH

FIGURE 8

BURNIE (H)

031043

LEAMAN GEOPHYSICS

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

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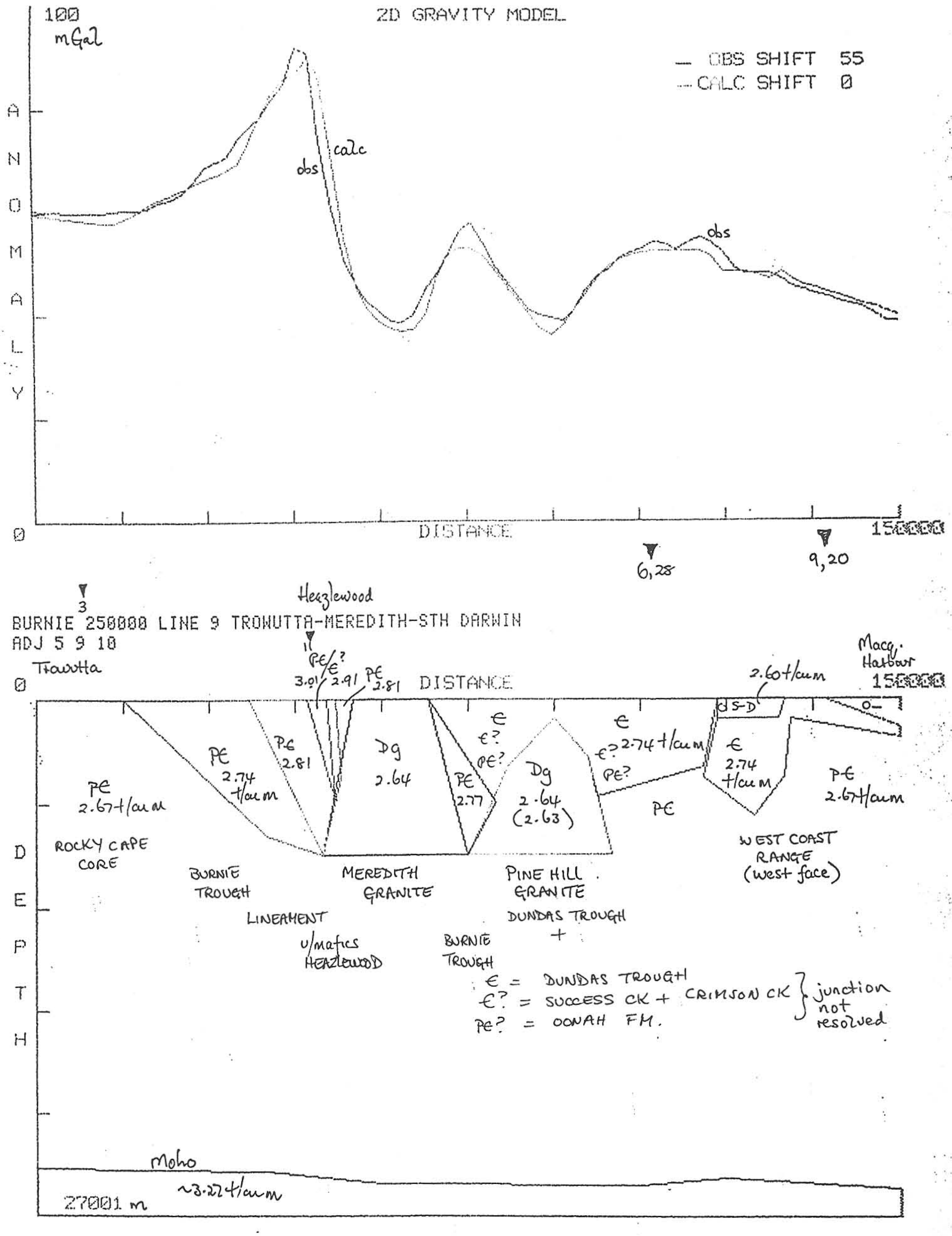

REGIONAL INTERPRETATION : LINE 9
TROWUTTA - MEREDITH - STH DARWIN

FIGURE 9

LEAMAN GEOPHYSICS

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

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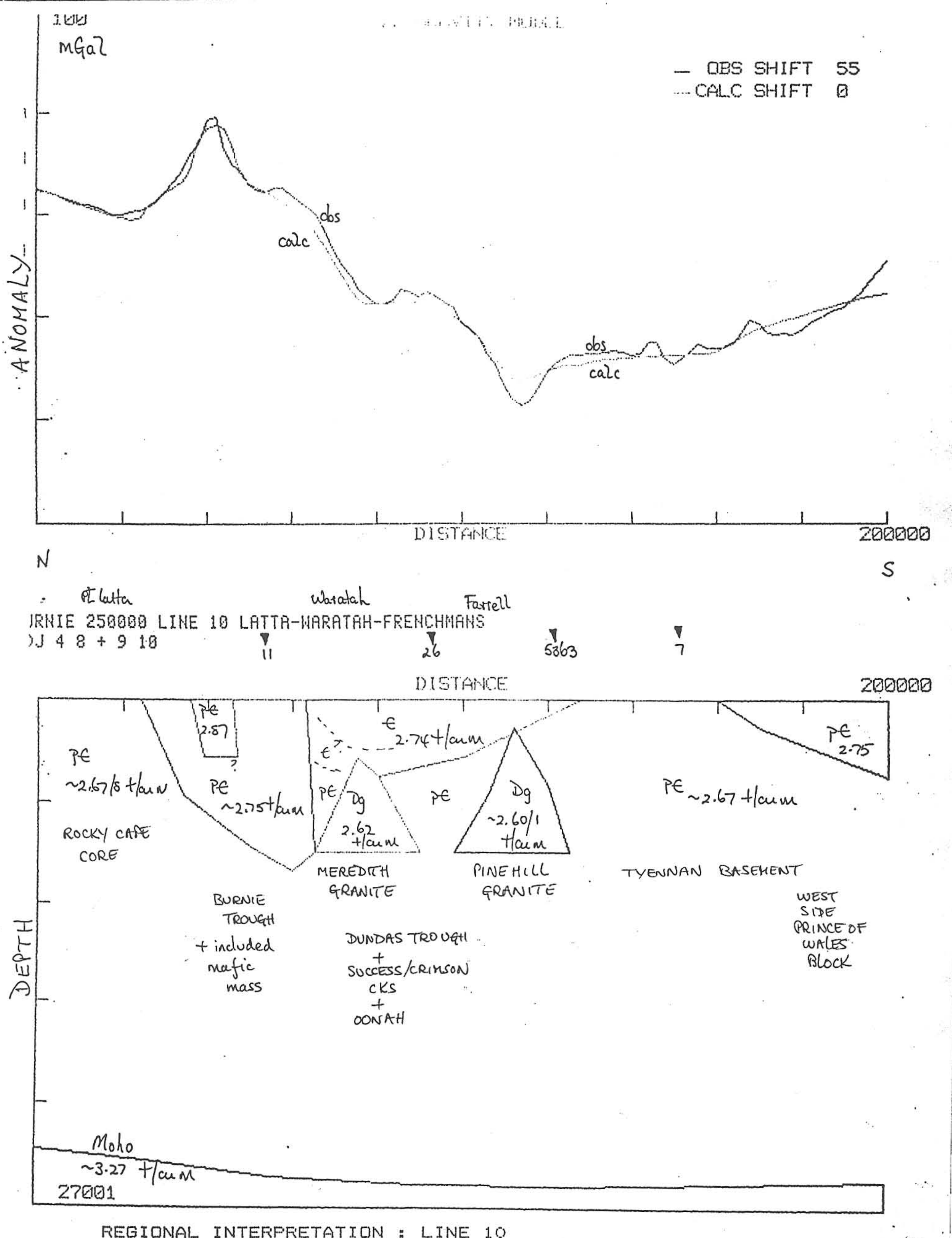

REGIONAL INTERPRETATION : LINE 10
PORT LATTA - WARATAH - FRENCHMANS CAP

FIGURE 10

LEAMAN GEOPHYSICS

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

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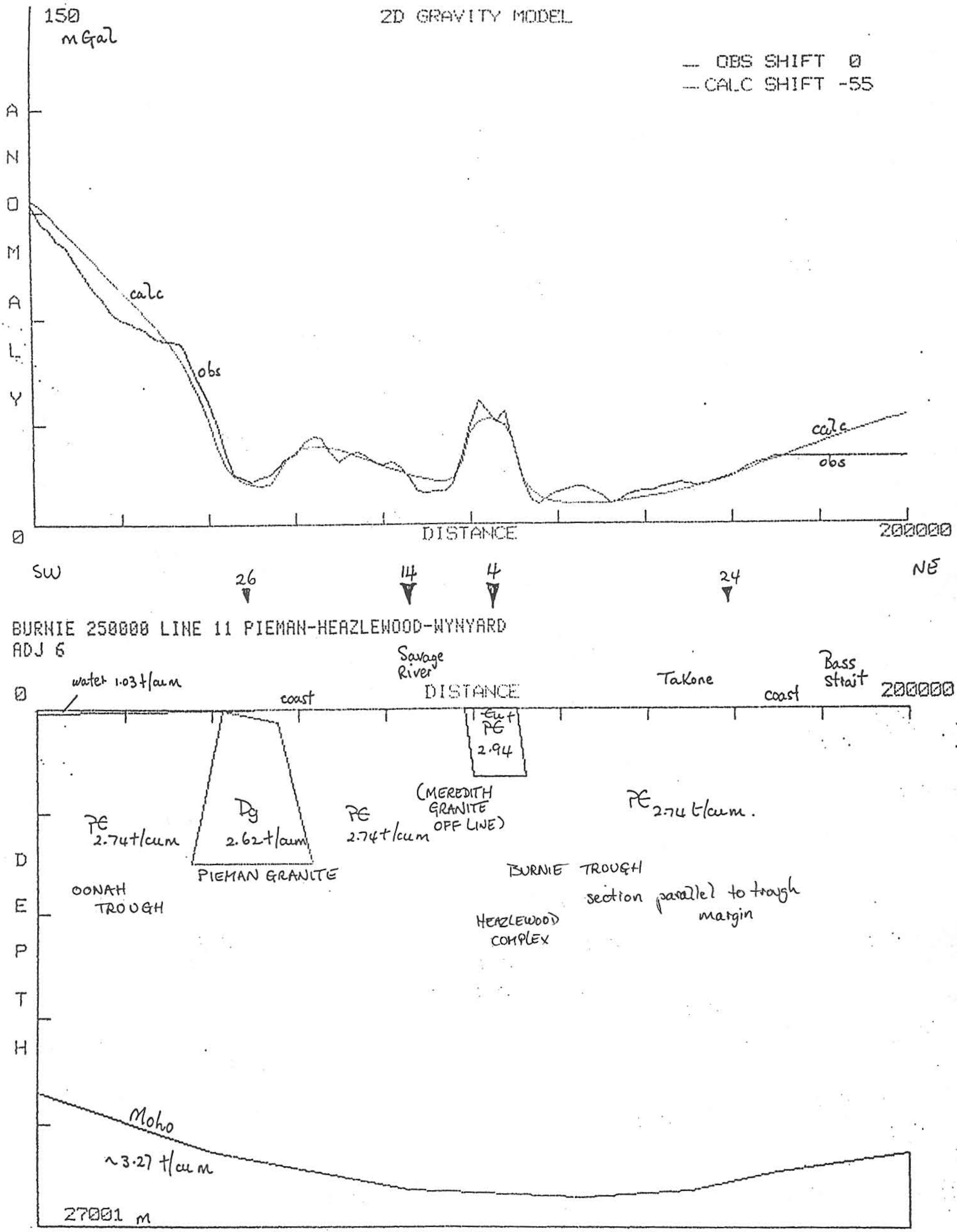

REGIONAL INTERPRETATION : LINE 11
PIEMAN – HEAZLEWOOD – WYNYARD

FIGURE 11

031046

LEAMAN GEOPHYSICS

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

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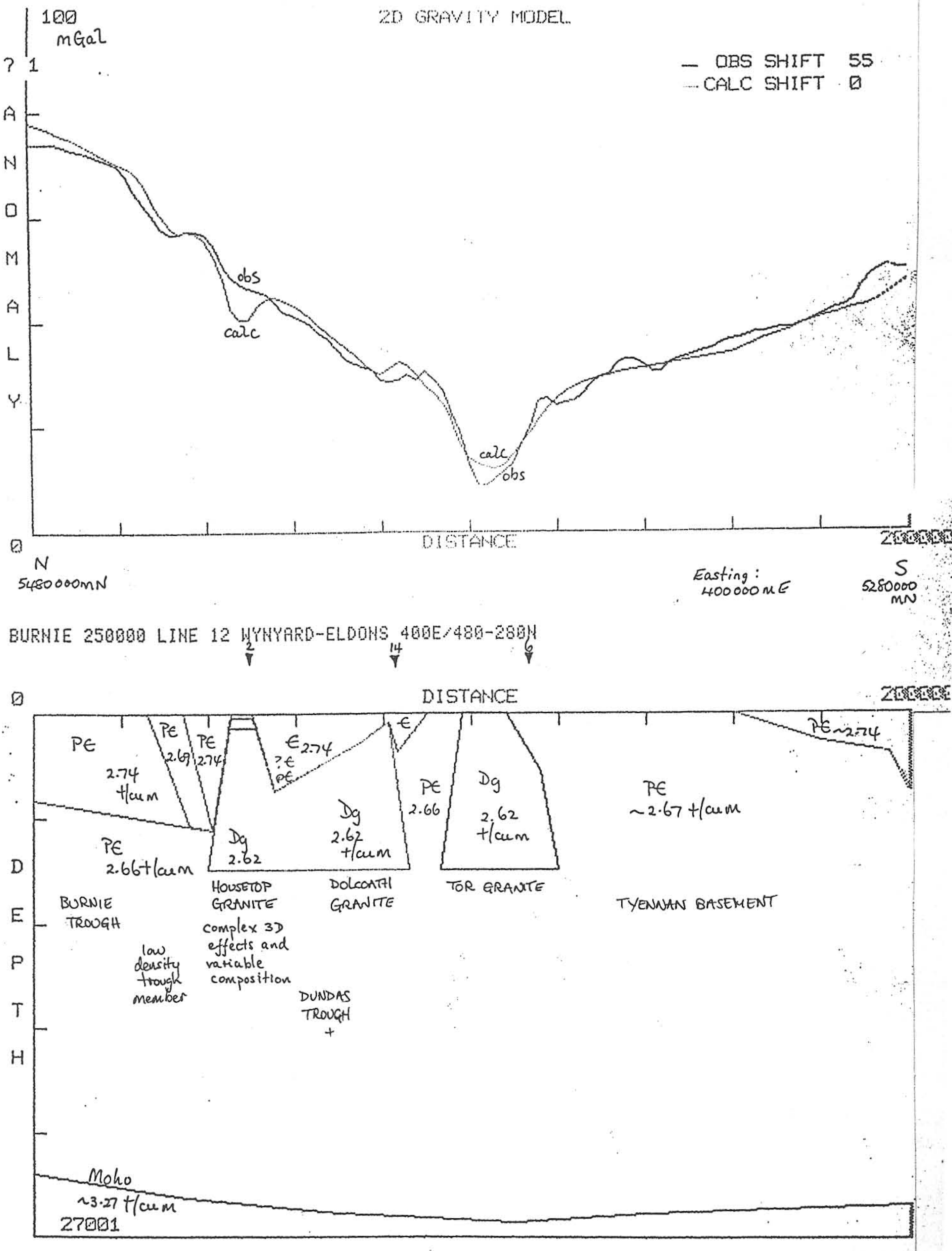

REGIONAL INTERPRETATION : LINE 12
WYNYARD – ELDONS

FIGURE 12

031047

LEAMAN GEOPHYSICS

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

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All Correspondence to:
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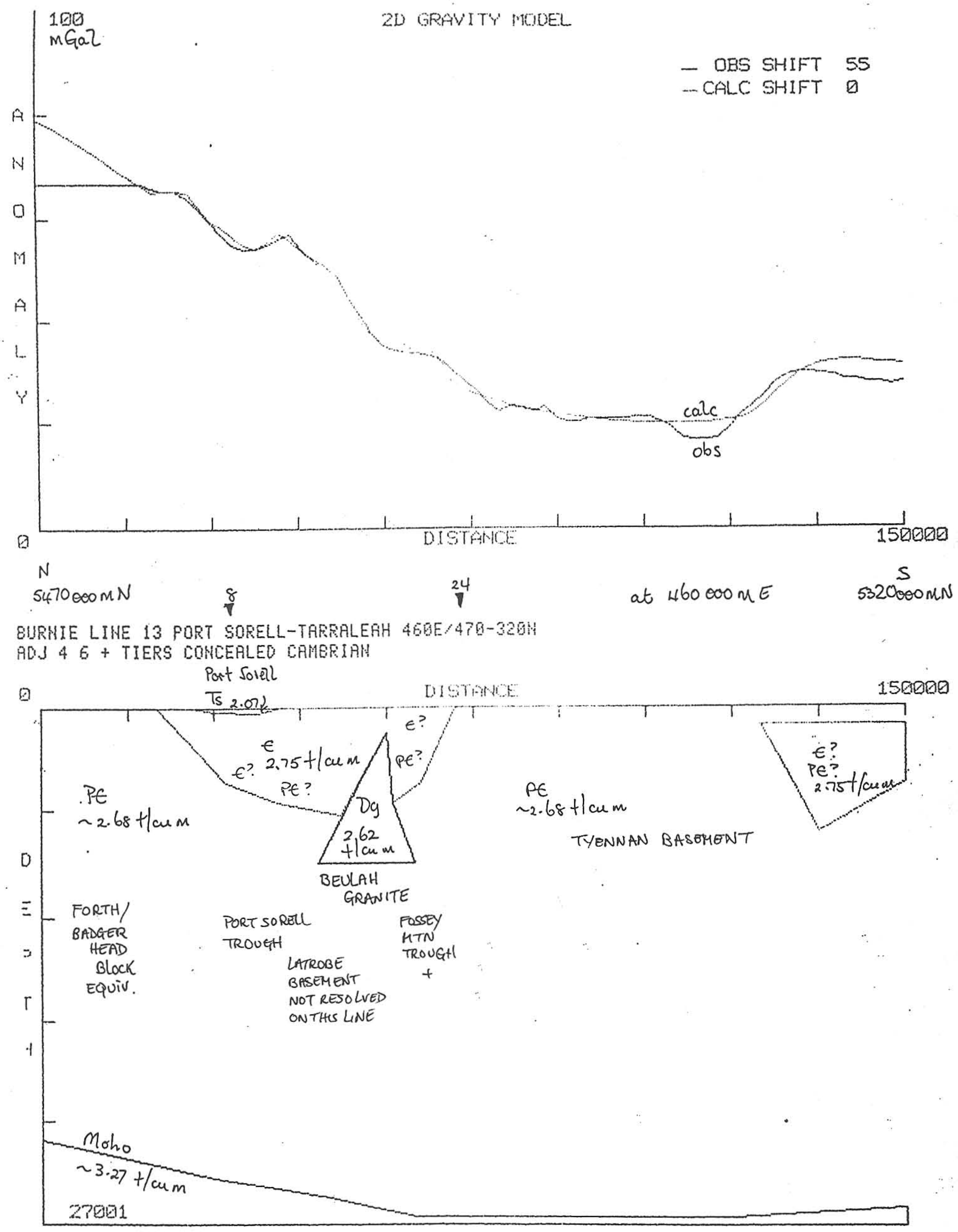

REGIONAL INTERPRETATION : LINE 13
PORT SORELL – TARRALEAH (at 460 000 mE)

FIGURE 13

031048

LEAMAN GEOPHYSICS

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

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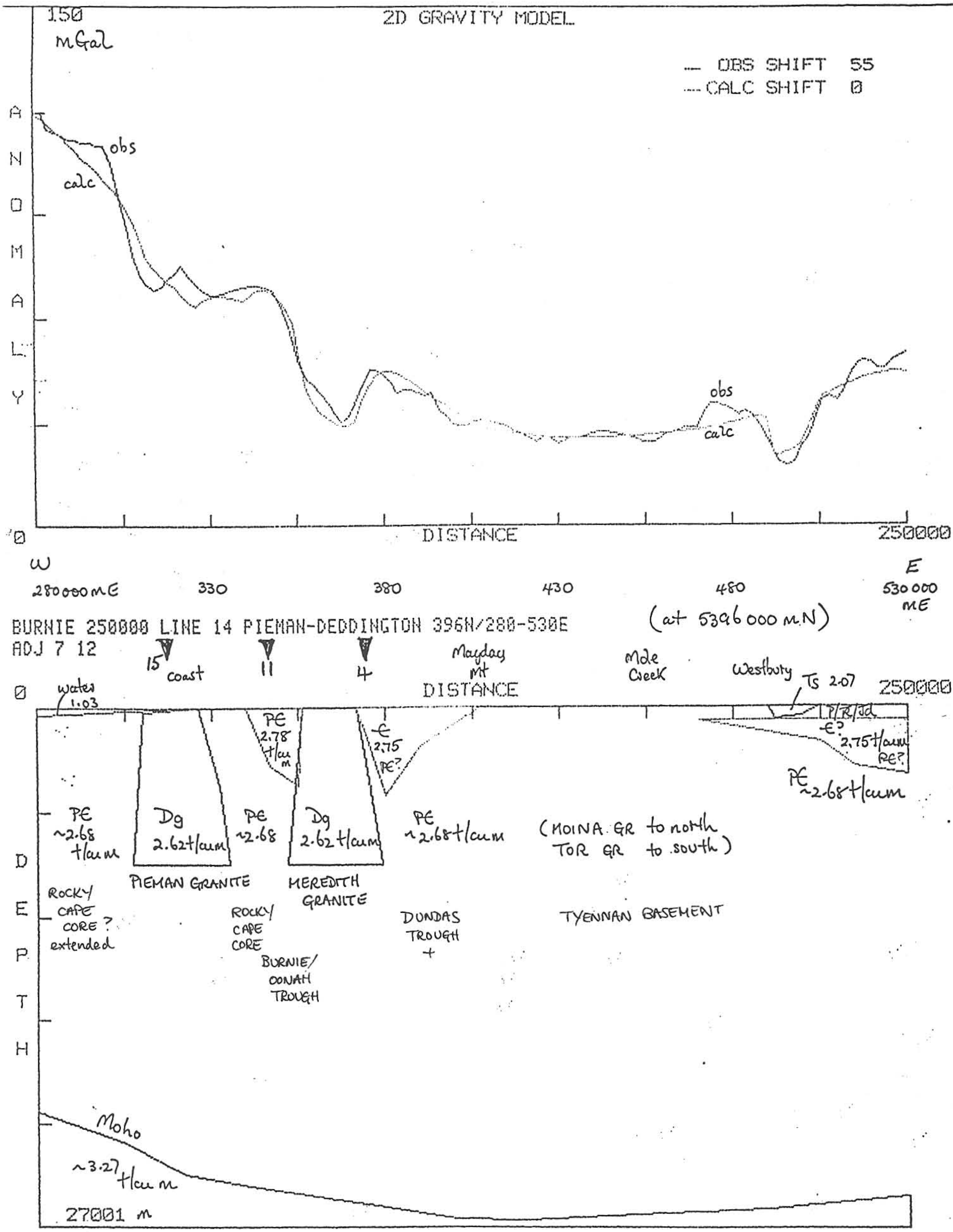

REGIONAL INTERPRETATION : LINE 14
PIEMAN - DEDDINGTON (5396 000 MN, 280-530 000 ME) FIGURE 14

031049

LEAMAN GEOPHYSICS

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

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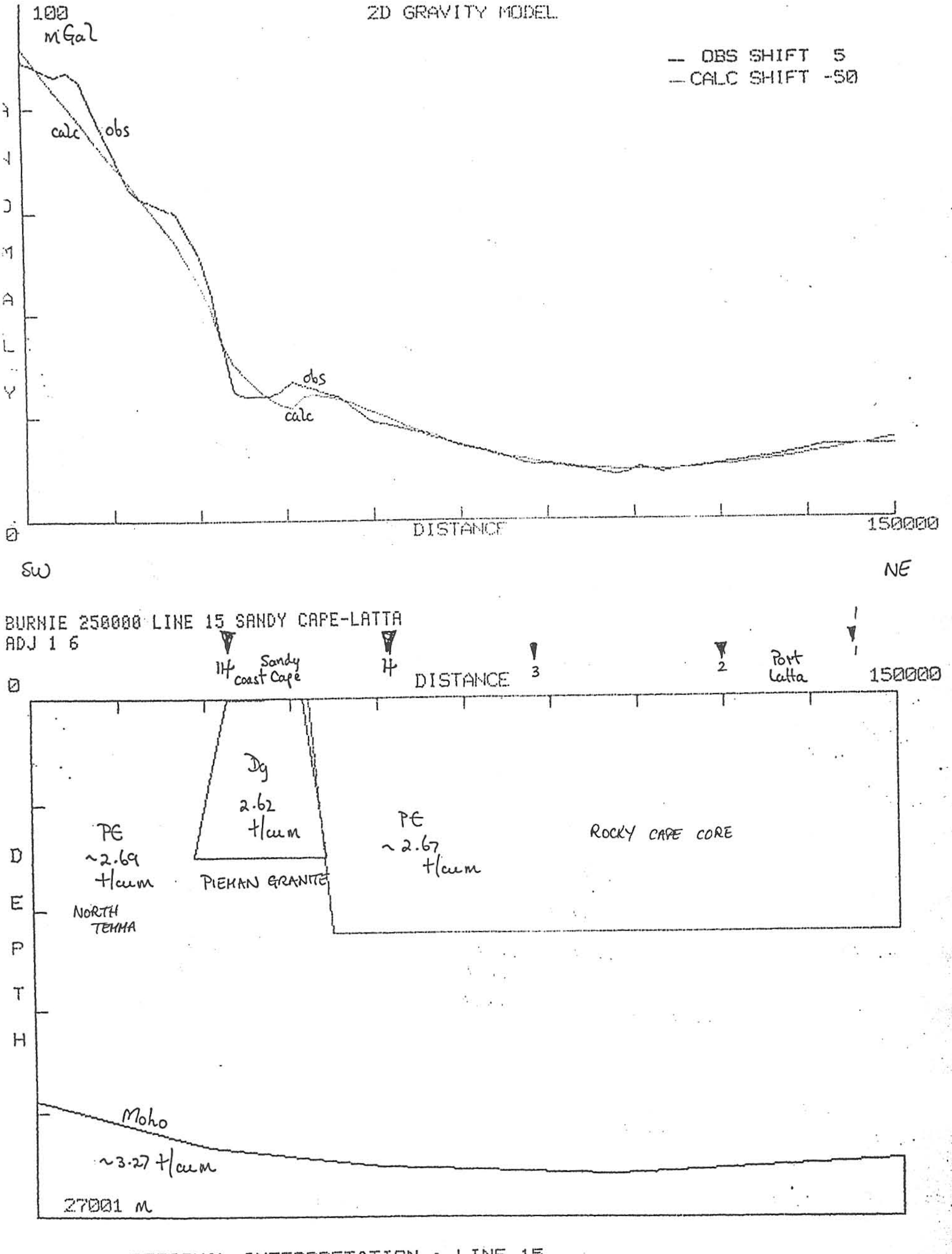

REGIONAL INTERPRETATION : LINE 15
SANDY CAPE - PT LATTA

FIGURE 15

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

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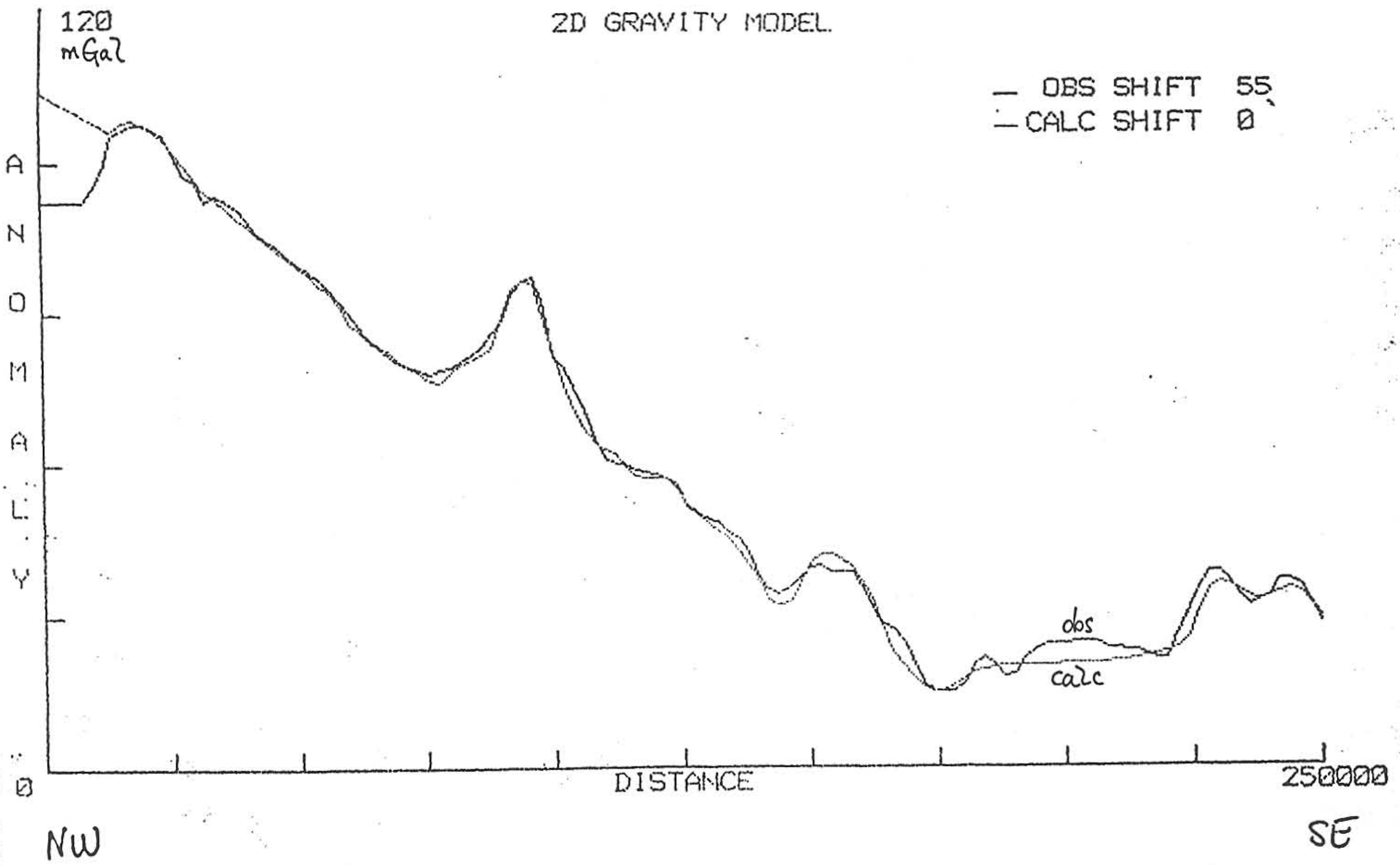

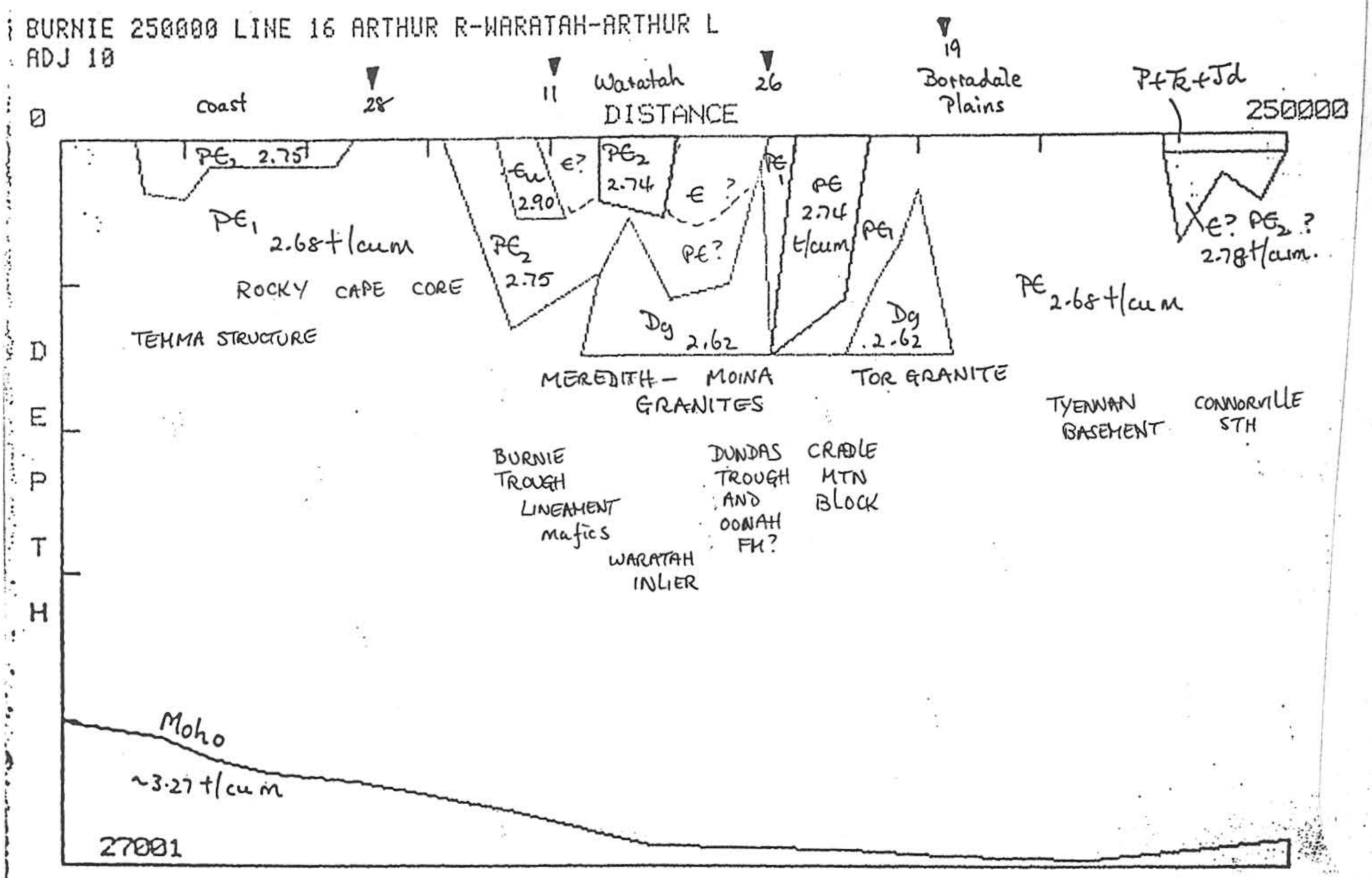

REGIONAL INTERPRETATION : LINE 16
ARTHUR RIVER - WARATAH - ARTHURS LAKE

FIGURE 16

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

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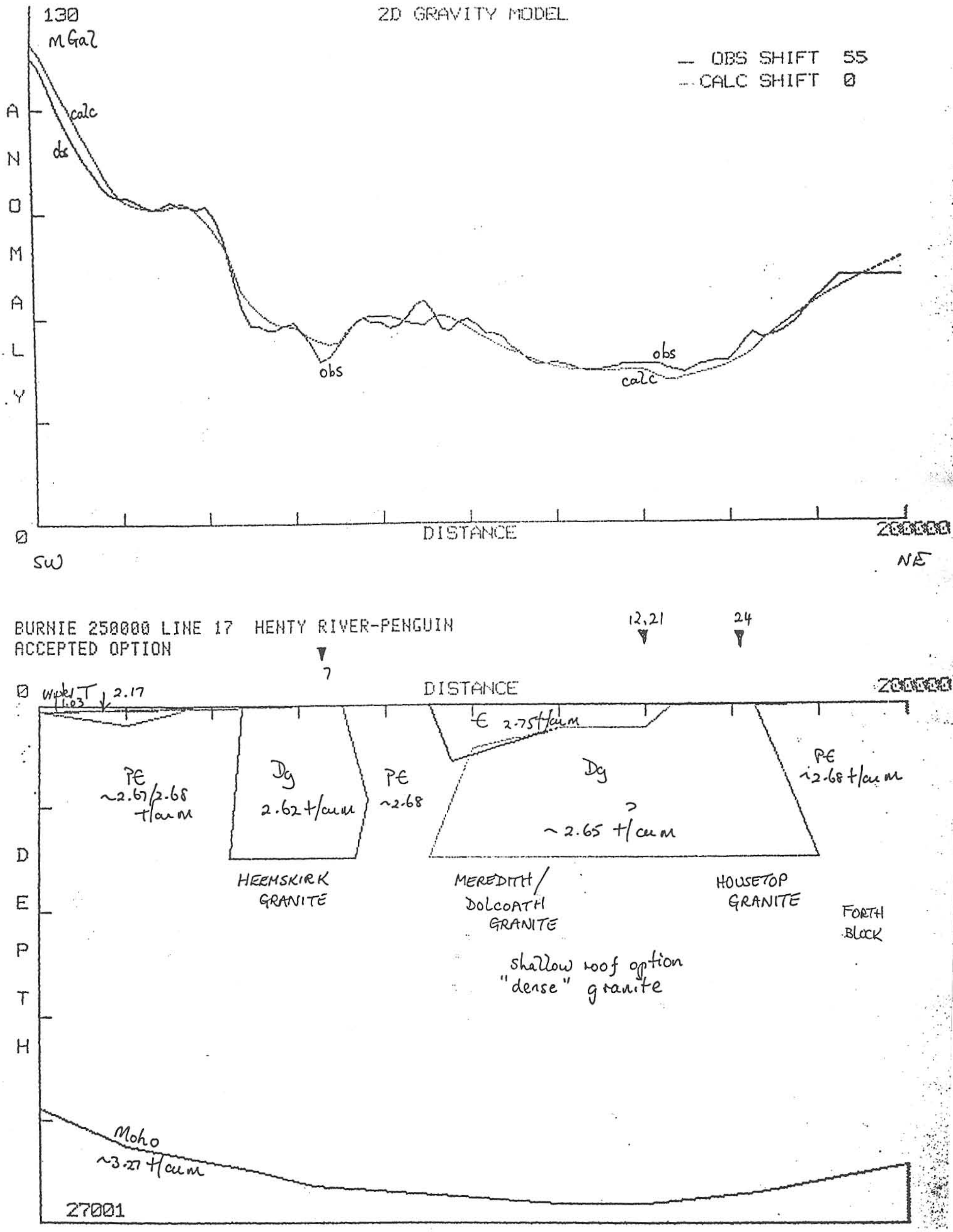

REGIONAL INTERPRETATION : LINE 17
HENTY RIVER - PENGUIN (dense granite option)

FIGURE 17

LEAMAN GEOPHYSICS

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

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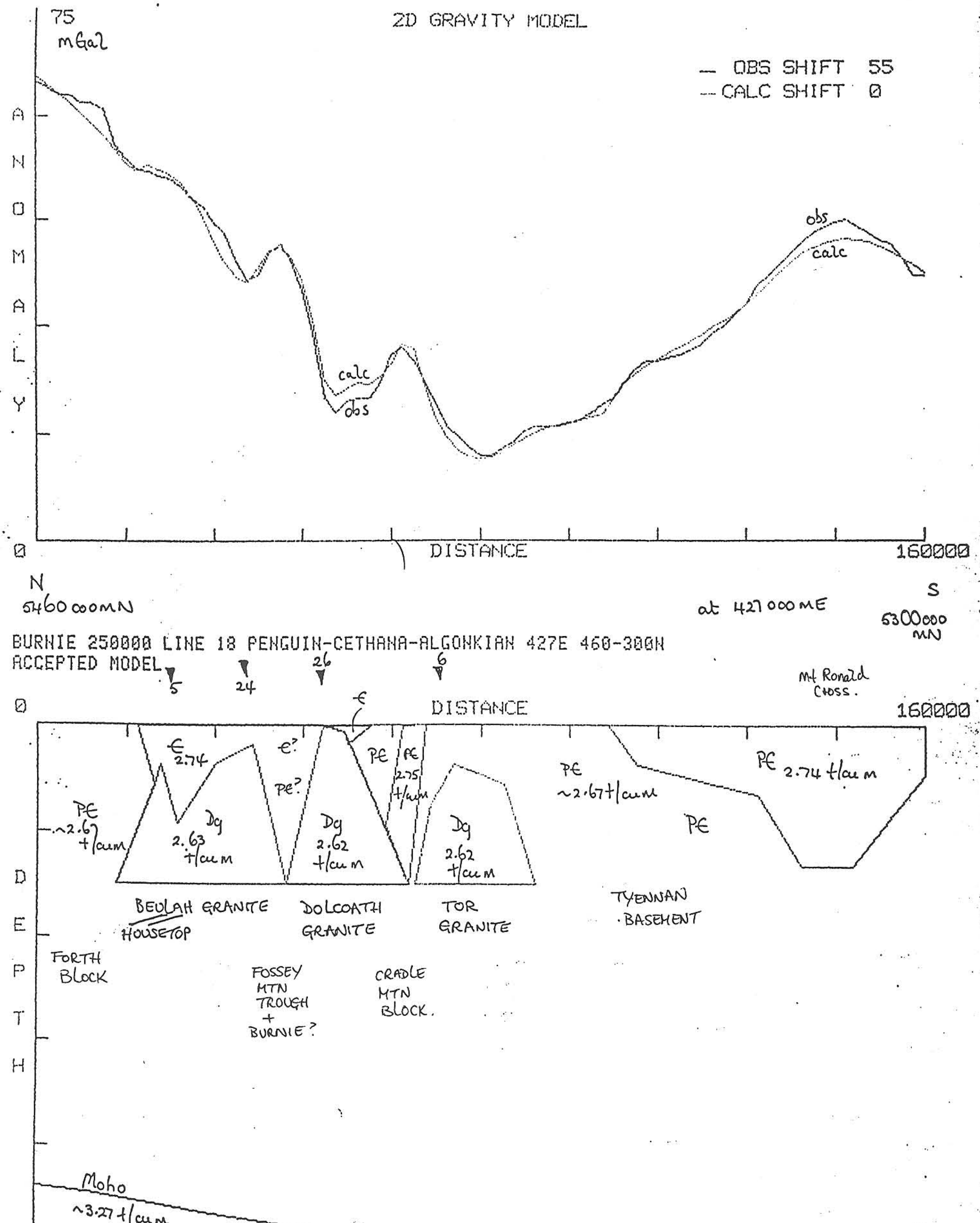

REGIONAL INTERPRETATION : LINE 18
PENGUIN - CETHANA - ALGONKIAN PK

FIGURE 18

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

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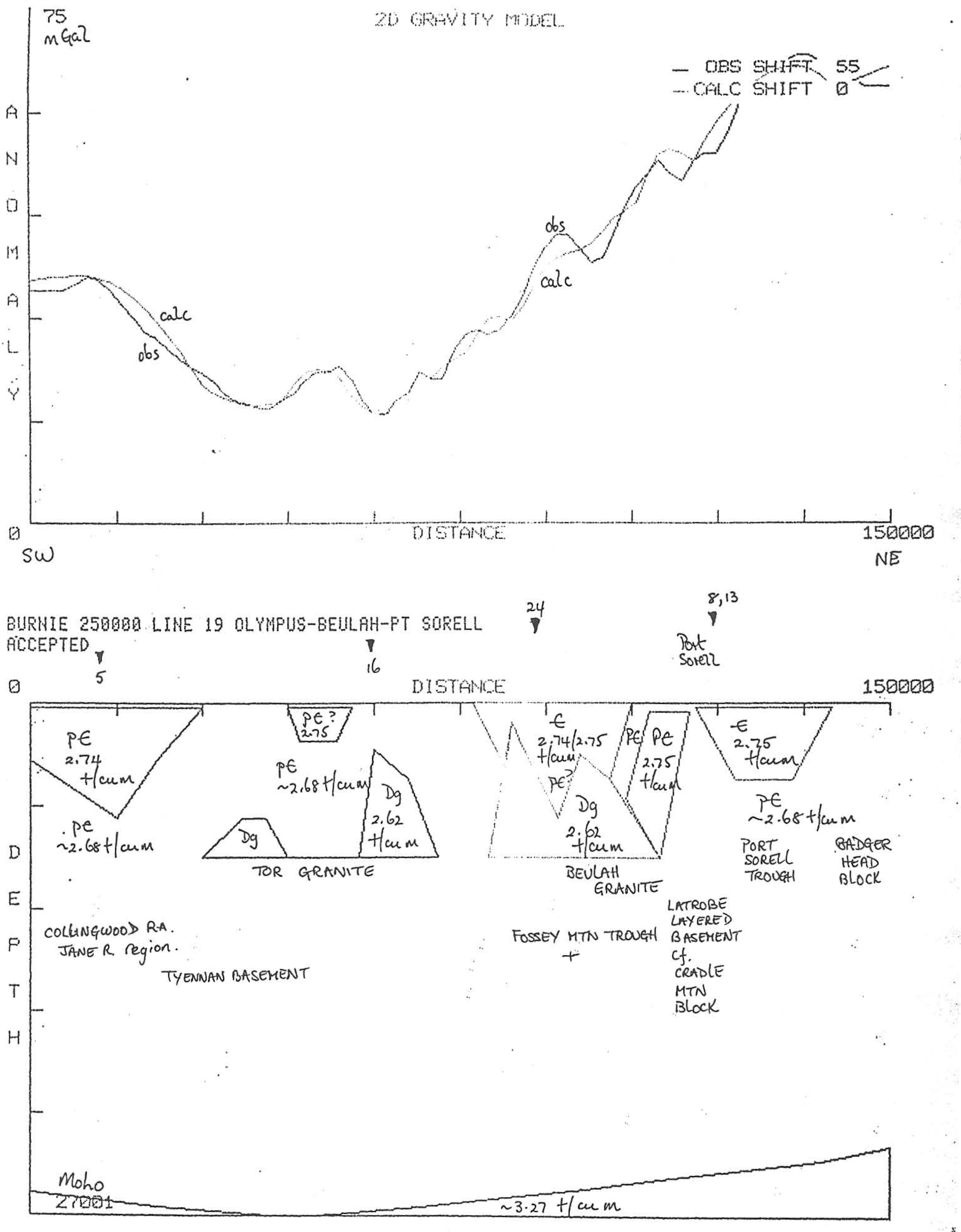

REGIONAL INTERPRETATION : LINE 19
OLYMPUS - BEULAH - PORT SORELL

FIGURE 19

LEAMAN GEOPHYSICS

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

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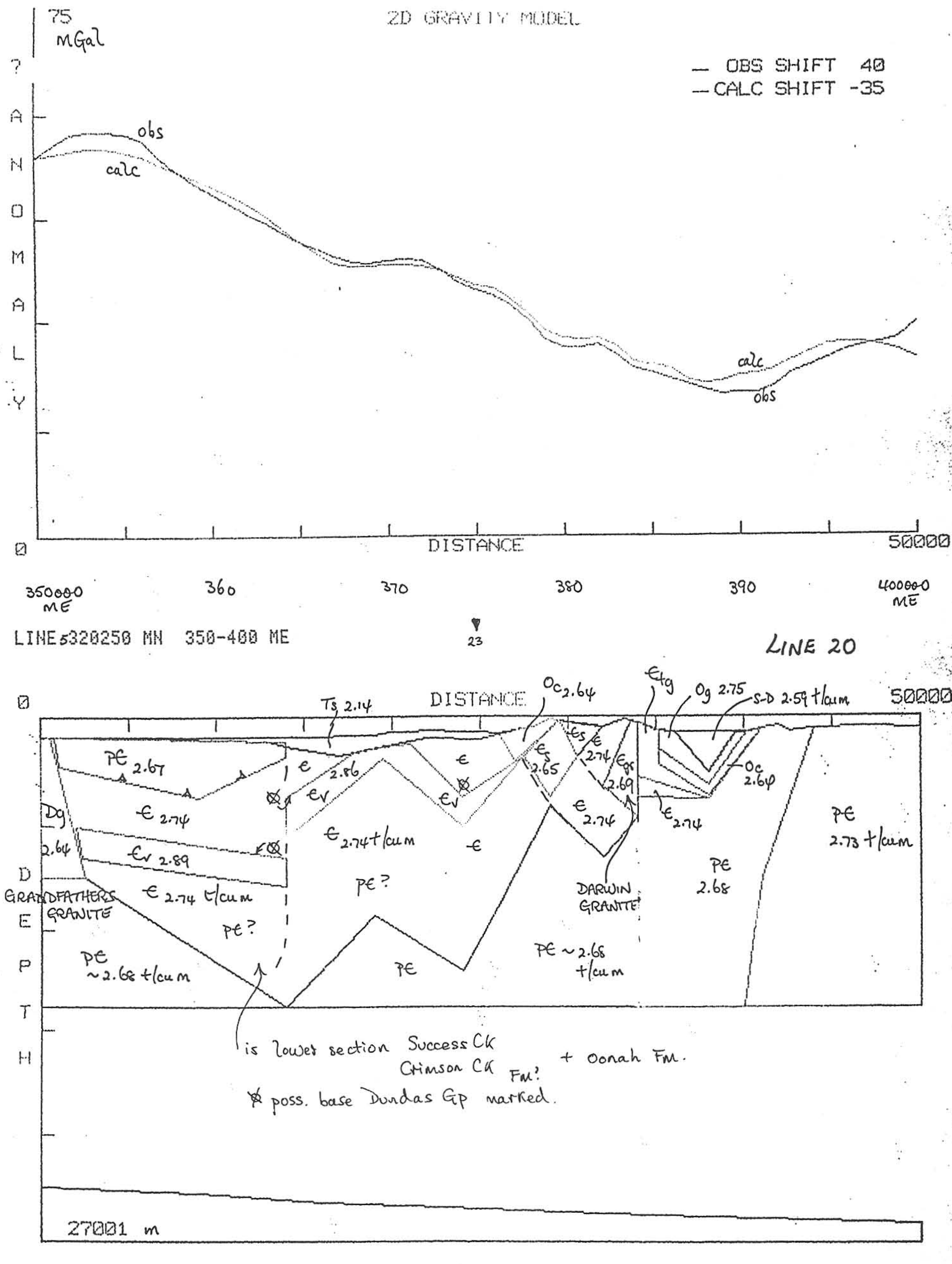
031054



REGIONAL INTERPRETATION : LINE 20
5320 250 MN (350 - 400 000 ME)

FIGURE 20

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

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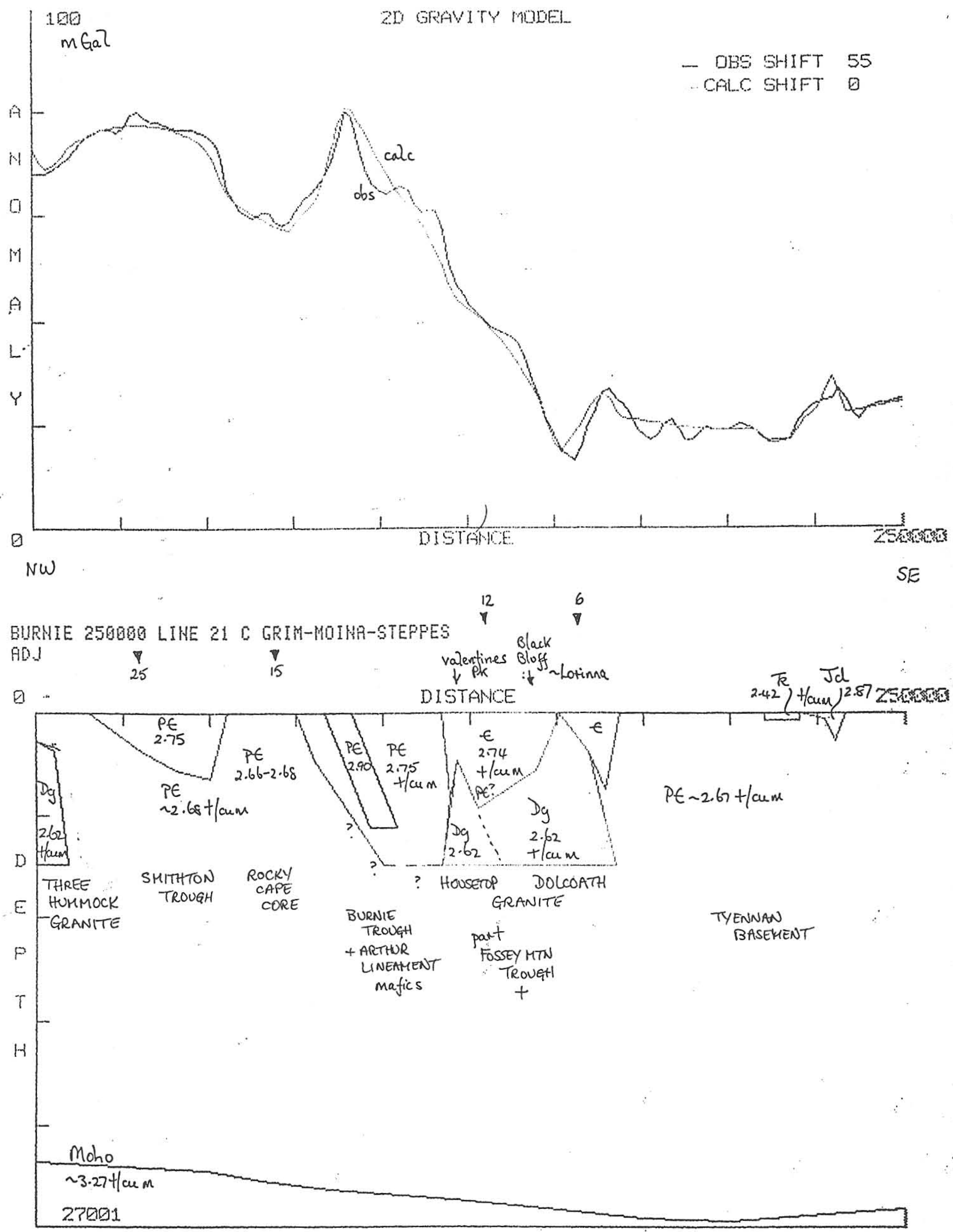
LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 250000 2000



REGIONAL INTERPRETATION : LINE 21
CAPE GRIM - MOINA - STEPPES

FIGURE 21

LEAMAN GEOPHYSICS

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

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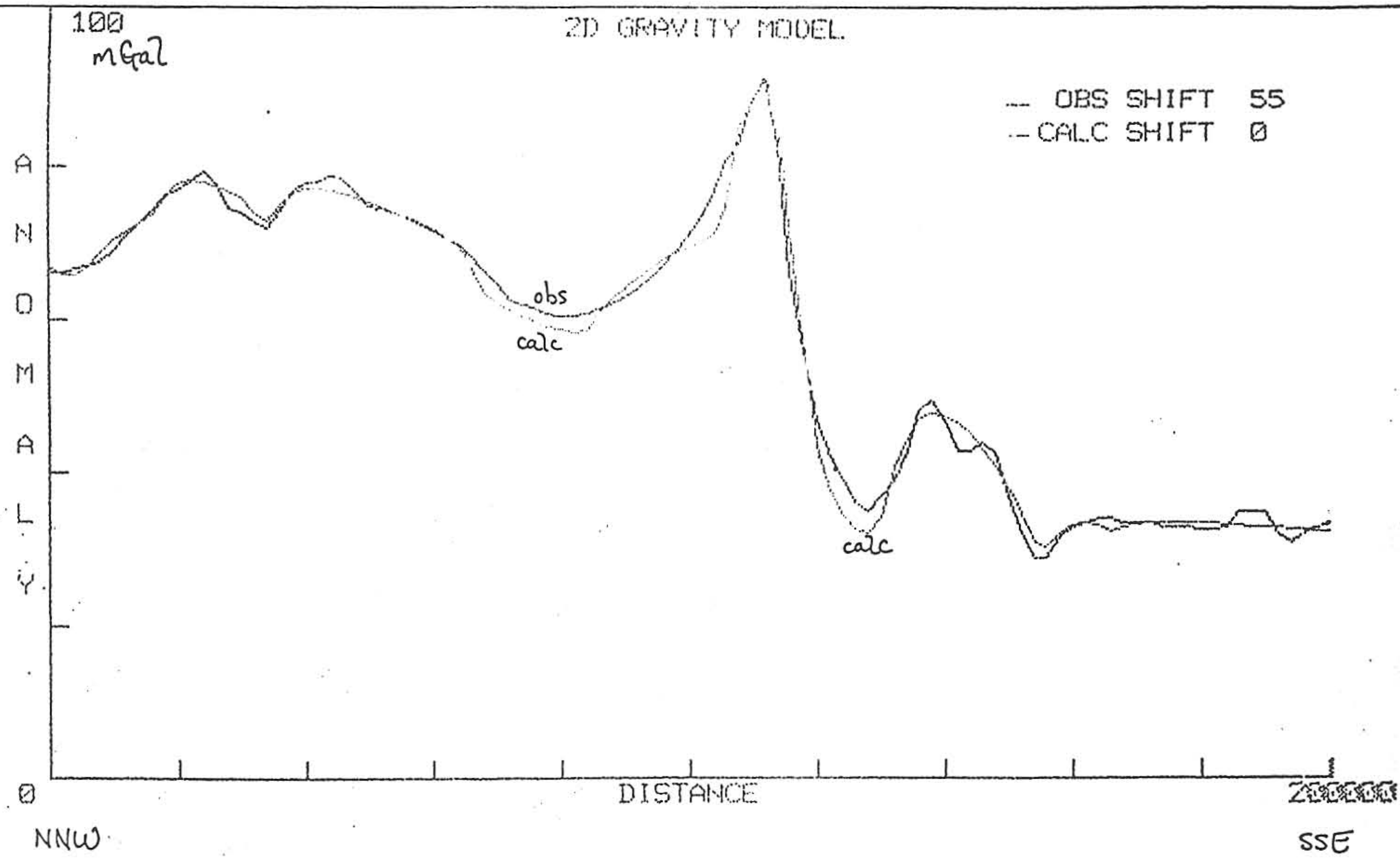

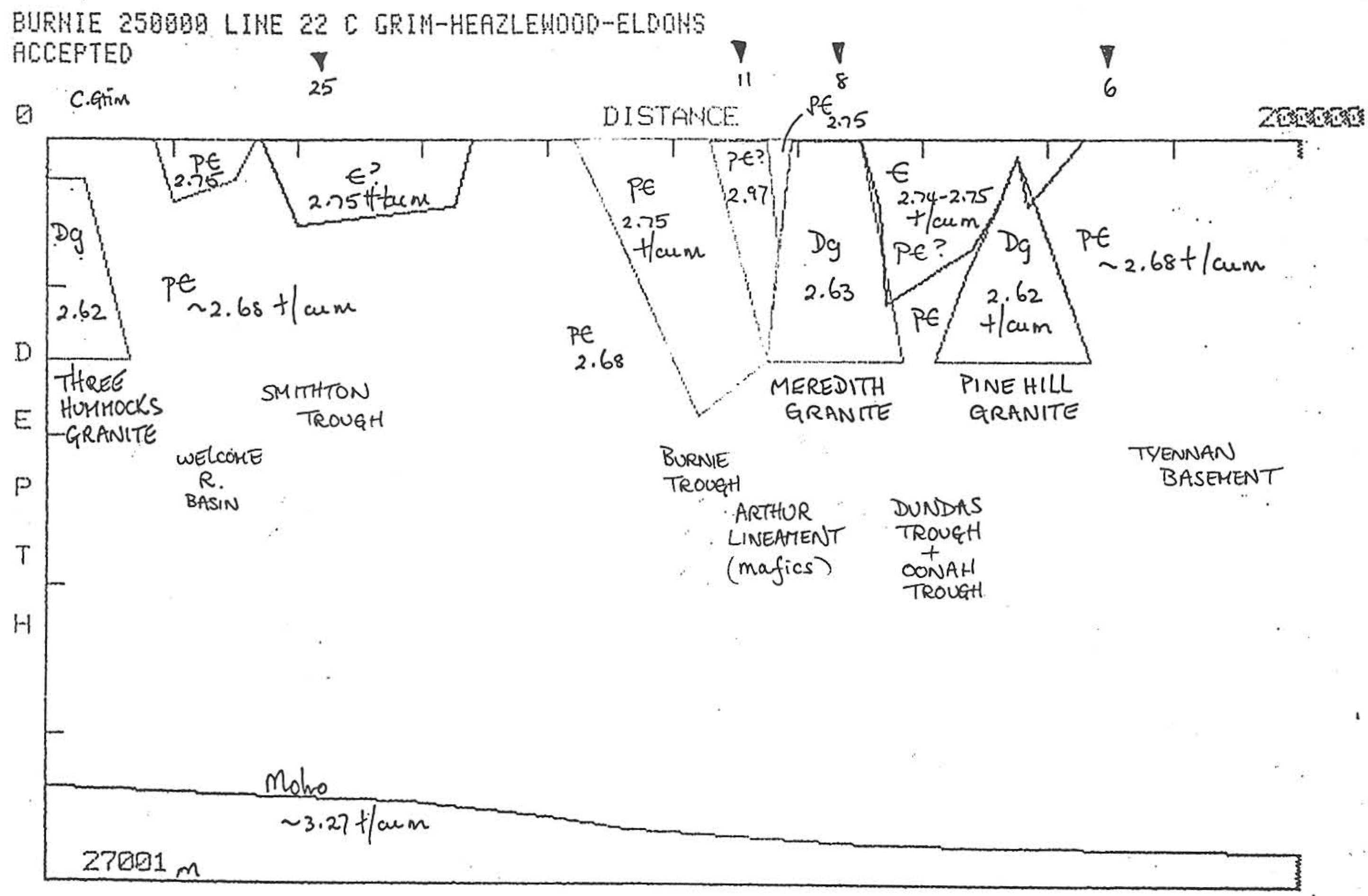

REGIONAL INTERPRETATION : LINE 22
CAPE GRIM - HEAZLEWOOD - ELDONS

FIGURE 22

LEAMAN GEOPHYSICS

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

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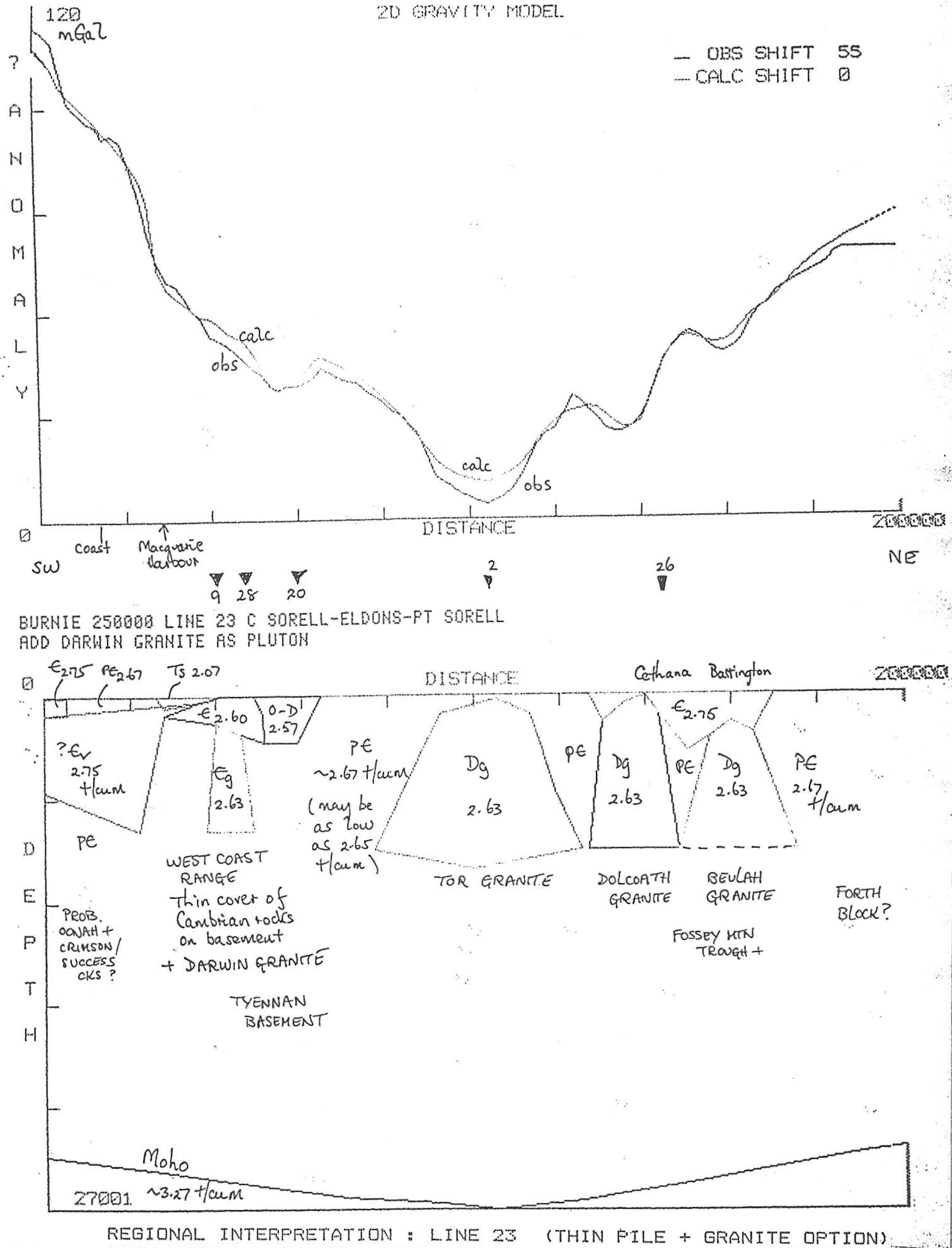

REGIONAL INTERPRETATION : LINE 23 (THIN PILE + GRANITE OPTION)
CAPE SORELL - ELDONS - PORT SORELL FIGURE 23

031058

LEAMAN GEOPHYSICS

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

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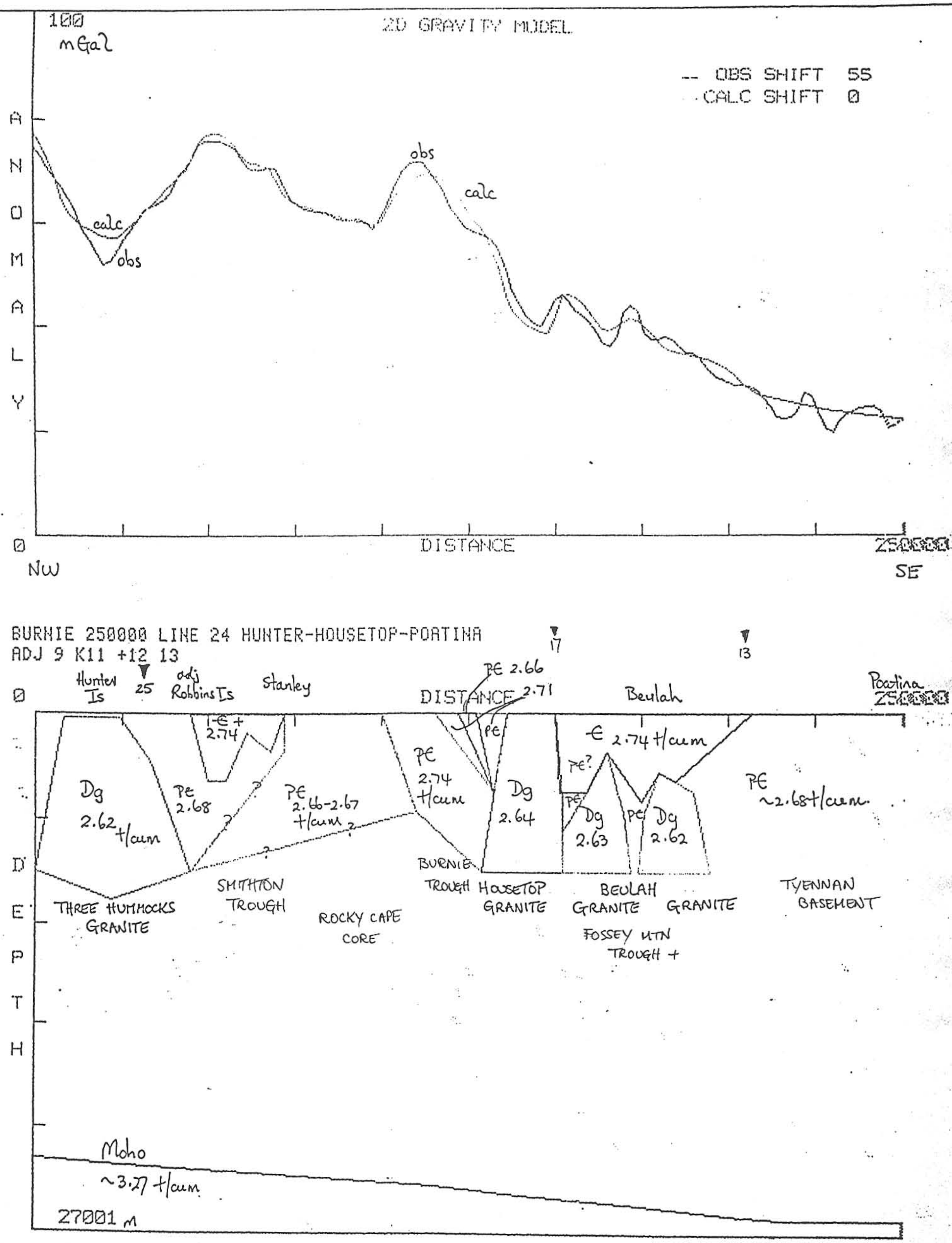

REGIONAL INTERPRETATION : LINE 24
HUNTER ISLAND - HOUSETOP - POATINA

FIGURE 24

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

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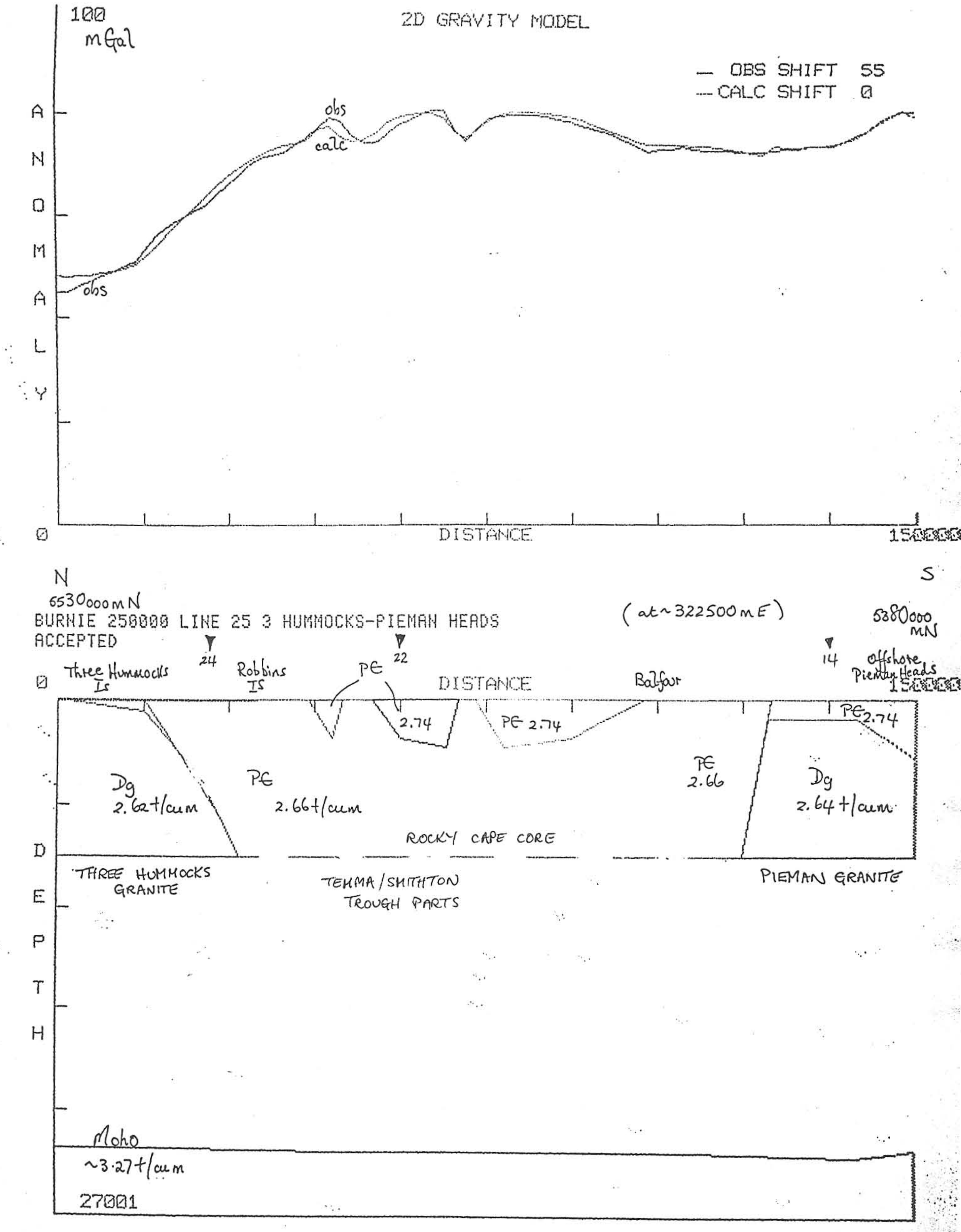

REGIONAL INTERPRETATION : LINE 25
THREE HUMMOCK IS - PIEMAN HEADS

FIGURE 25

031060

LEAMAN GEOPHYSICS

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

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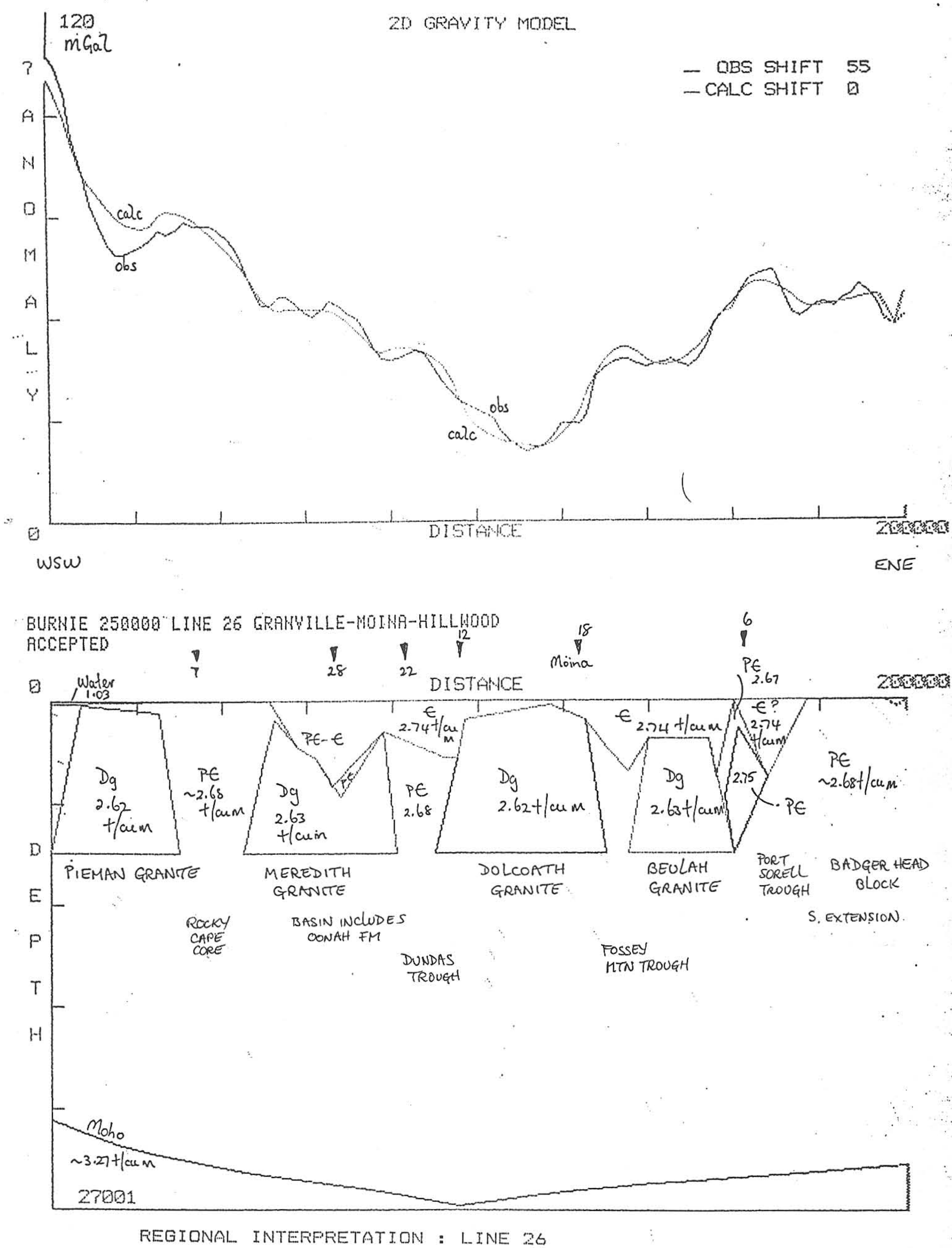

REGIONAL INTERPRETATION : LINE 26
GRANVILLE HARBOUR - MOINA - HILLWOOD

FIGURE 26

LEAMAN GEOPHYSICS

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

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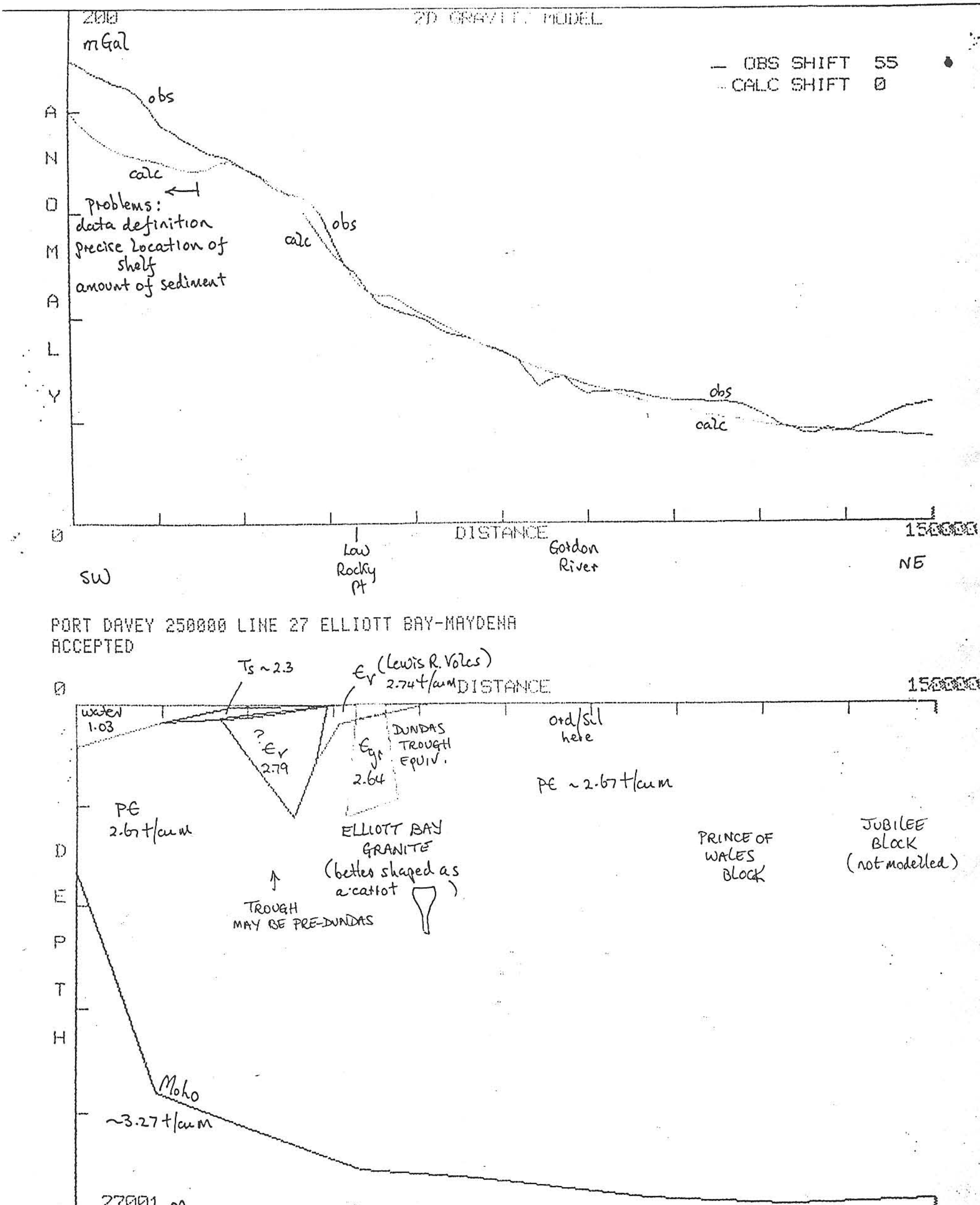

REGIONAL GRAVITY MODEL LINE 27 ELLIOTT BAY-MAYDENA

FIGURE 27

031062

LEAMAN GEOPHYSICS

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

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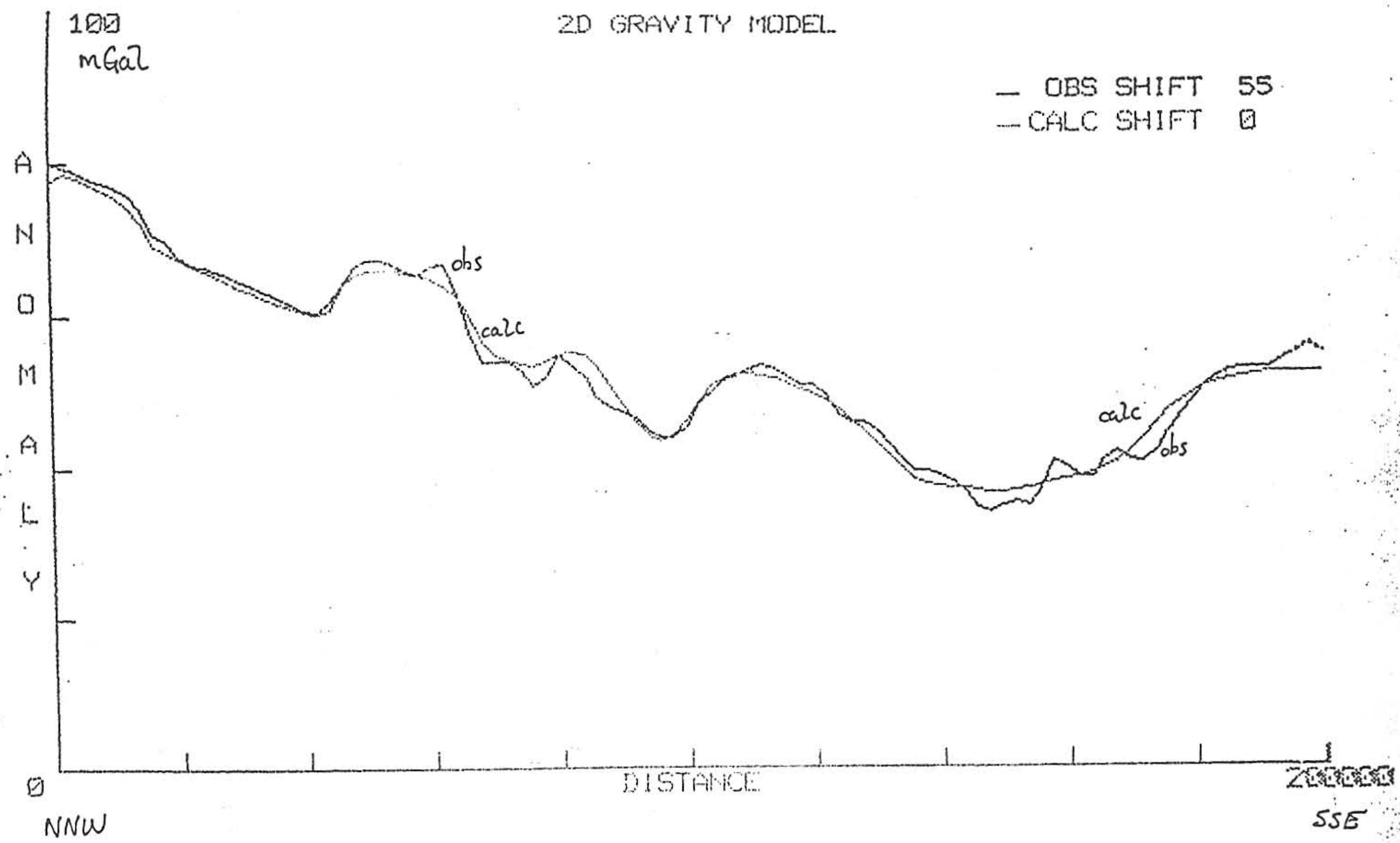
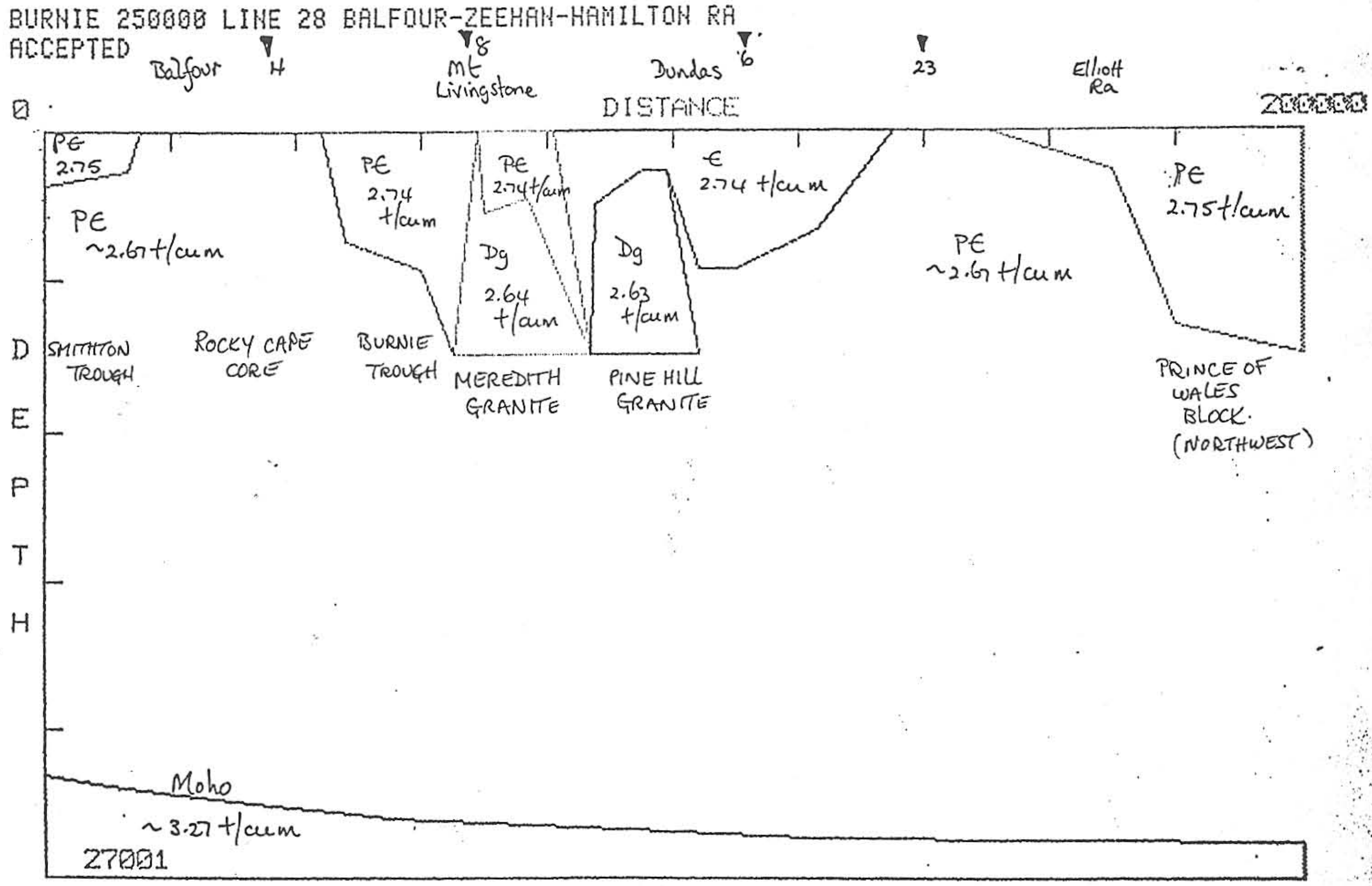


BURNIE 250000 LINE 28 BALFOUR-ZEEHAN-HAMILTON RA
ACCEPTED



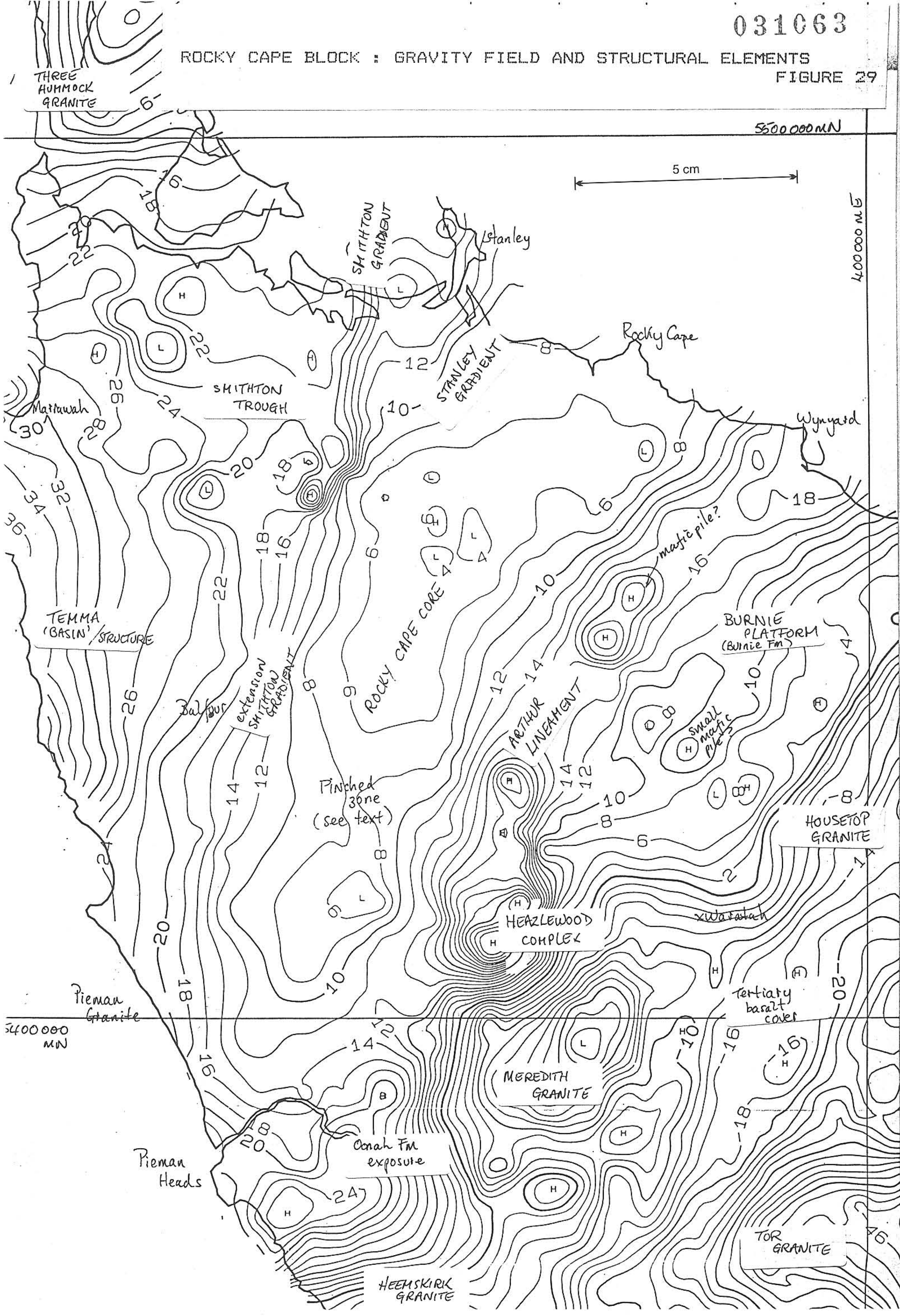
REGIONAL INTERPRETATION : LINE 28
BALFOUR - ZEEHAN - HAMILTON RANGE

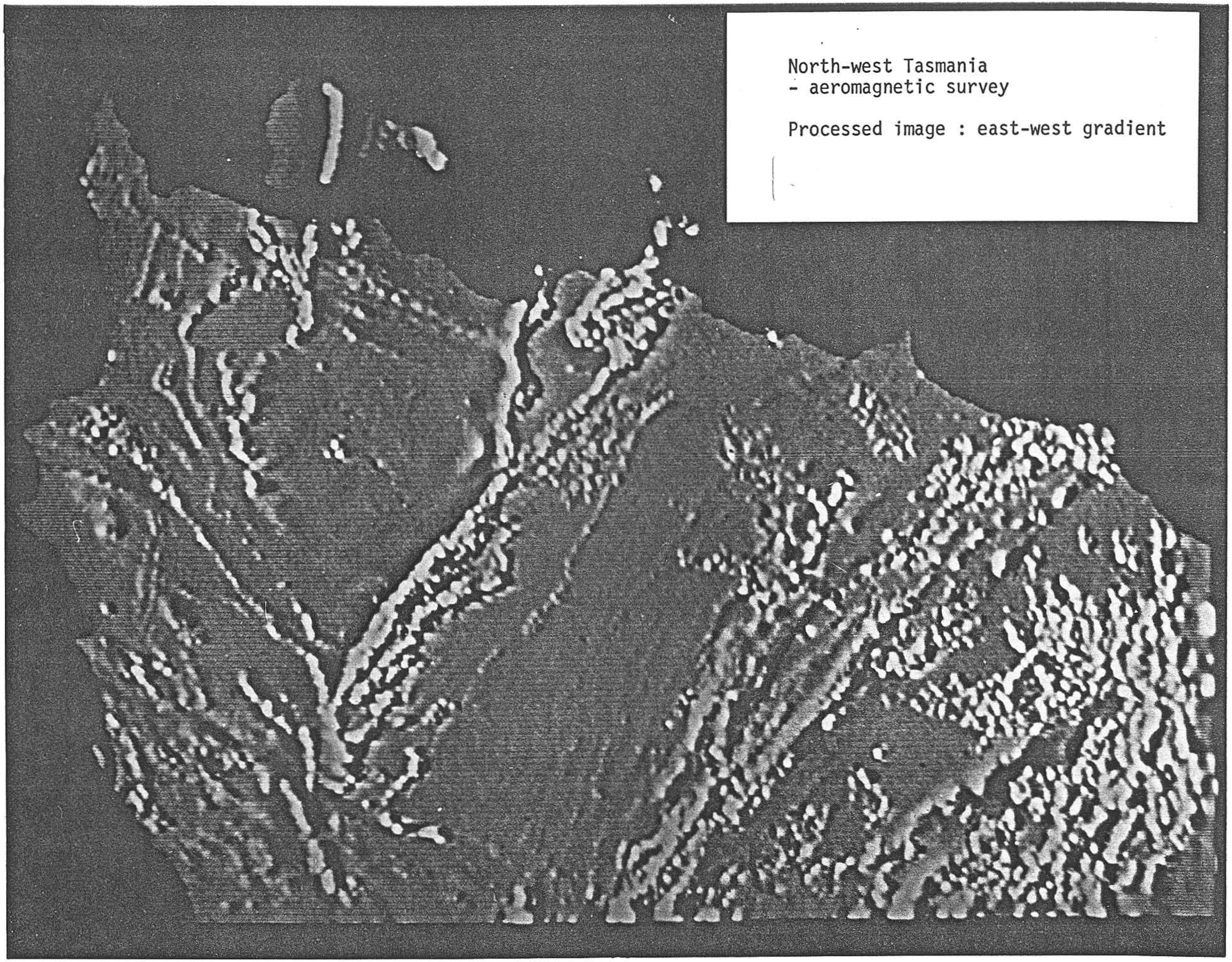
FIGURE 28

031063

ROCKY CAPE BLOCK : GRAVITY FIELD AND STRUCTURAL ELEMENTS

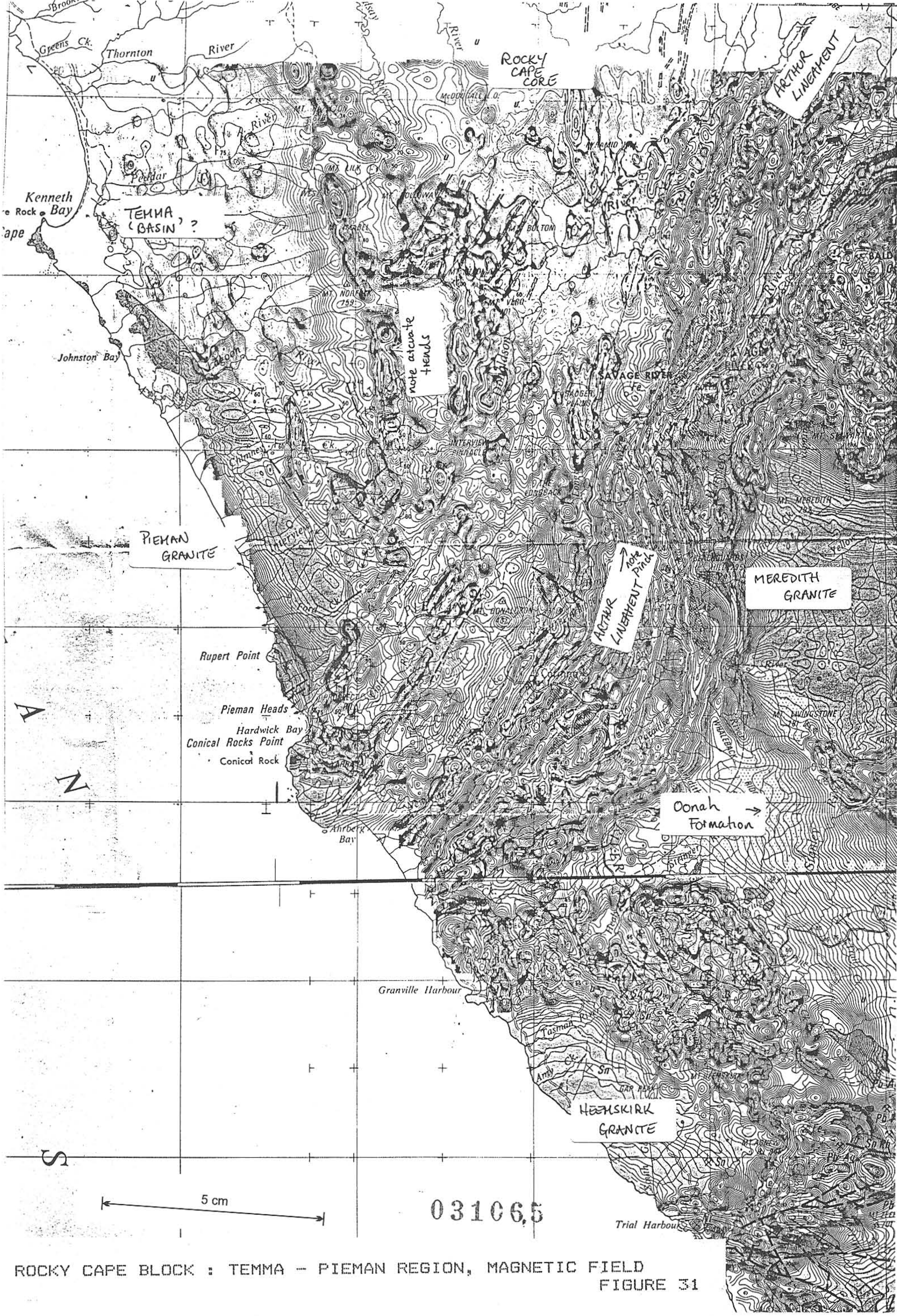
FIGURE 29





ROCKY CAPE BLOCK : PROCESSED MAGNETIC FIELD AND STRUCTURES
FIGURE 30

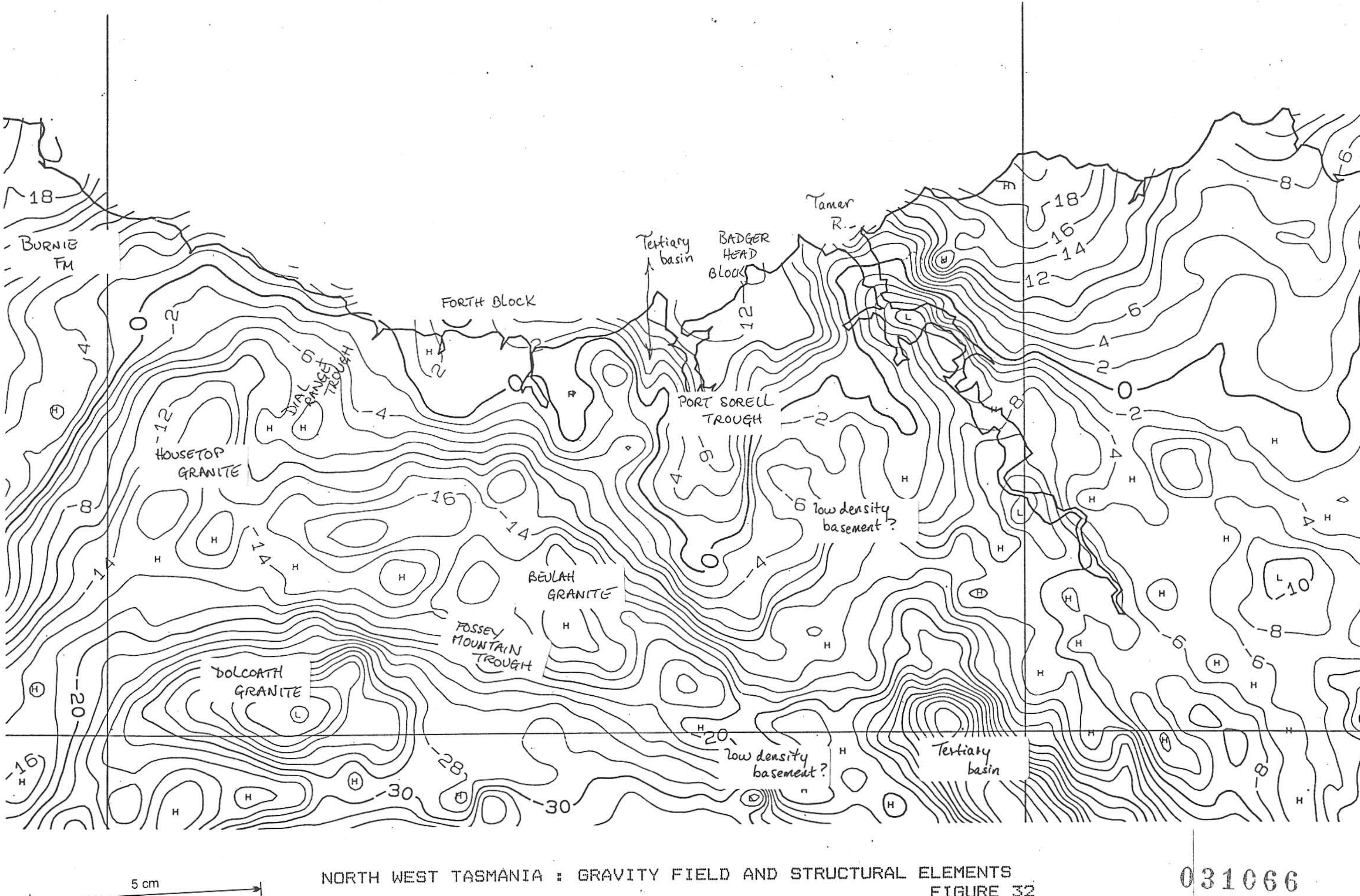
031064



031065

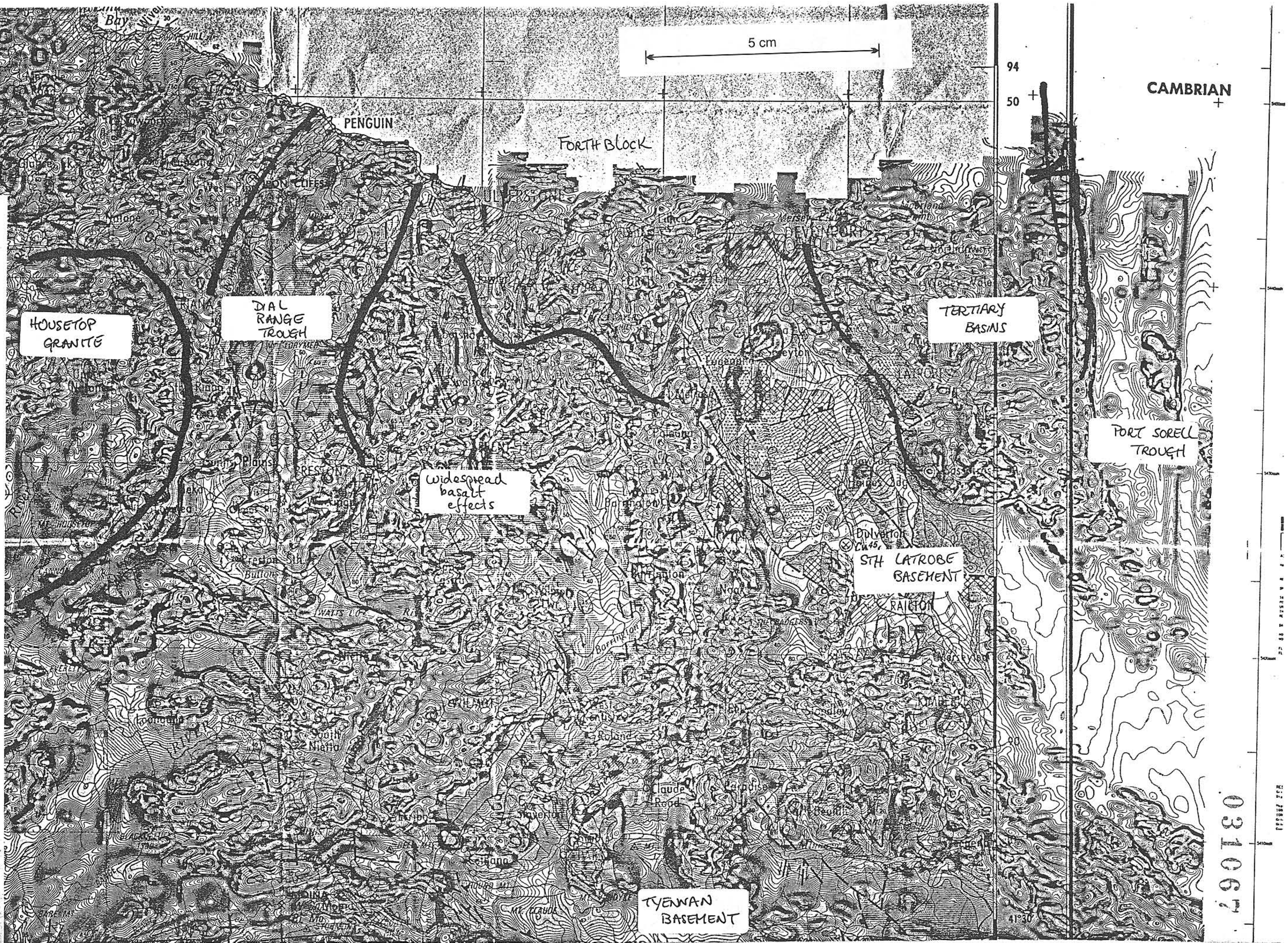
ROCKY CAPE BLOCK : TEMMA - PIEMAN REGION, MAGNETIC FIELD

FIGURE 31

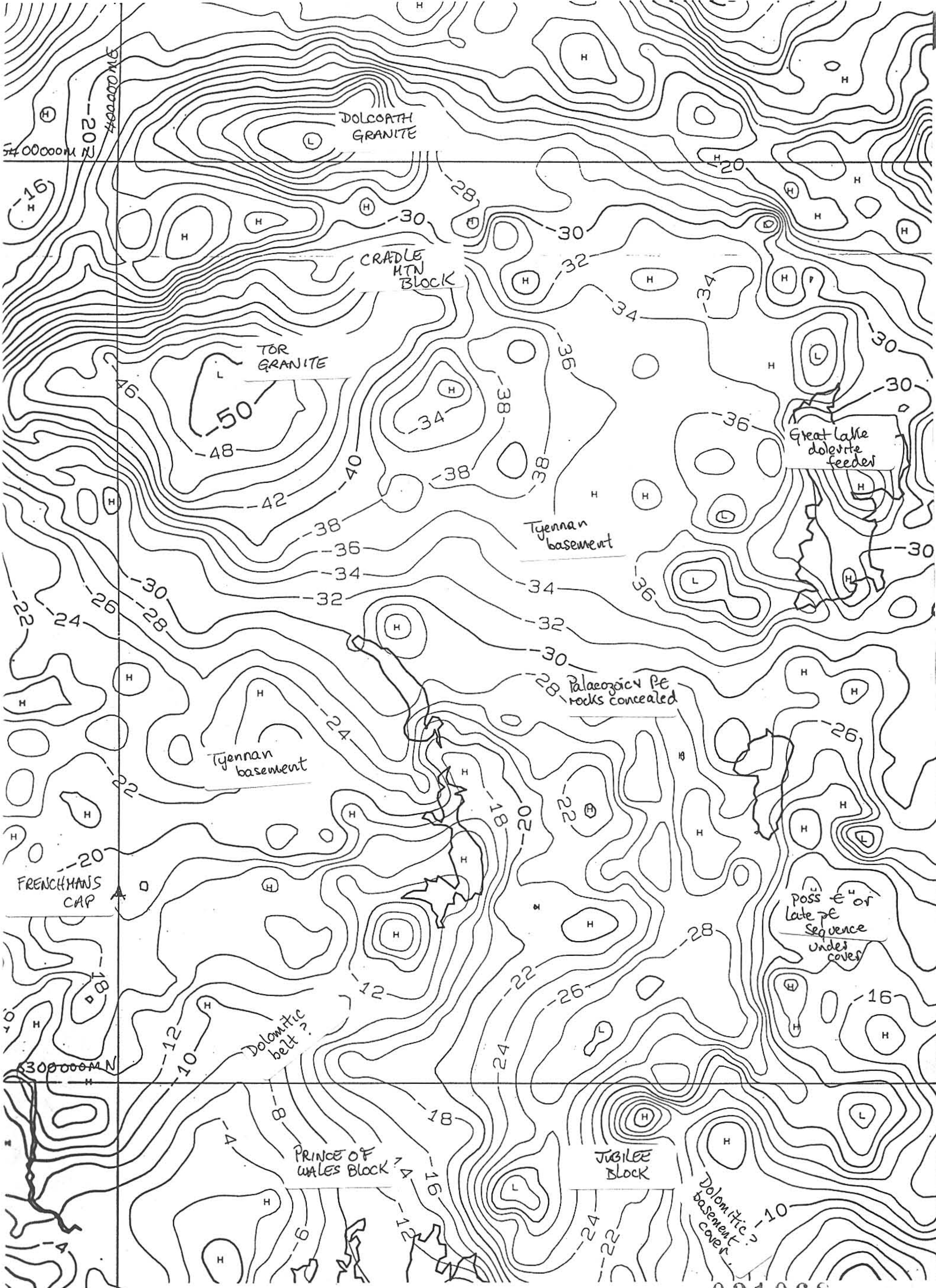


NORTH WEST TASMANIA : GRAVITY FIELD AND STRUCTURAL ELEMENTS
FIGURE 32

031066



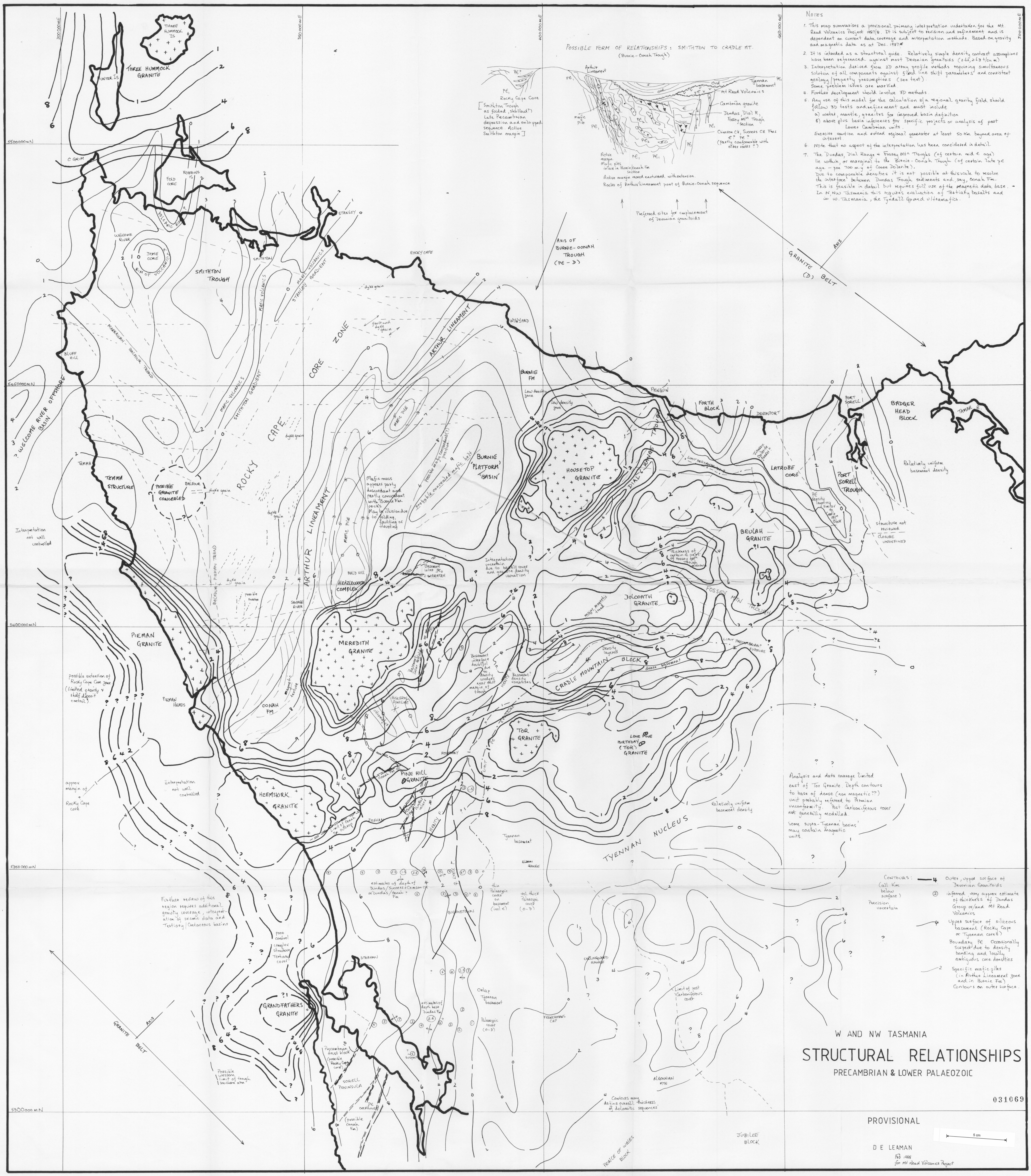
NORTH WEST TASMANIA : MAGNETIC FIELD AND STRUCTURAL ELEMENTS
FIGURE 33



031068

CENTRAL TASMANIA : GRAVITY FIELD AND STRUCTURAL ELEMENTS

FIGURE 34



NOTES
1. This map summarises a provisional primary interpretation undertaken for the Mt. Read Volcanics Project 1987/8. It is subject to revision and refinement and is dependent on current data coverage and interpretation methods. Based on gravity and magnetic data as at Dec. 1987.
2. It is intended as a structural guide. Relatively simple density contrast assumptions have been referenced against most Devonian granitoids (2.62, 2.63 t/cu m)
3. Interpretation derived from 2D array profile methods requiring simultaneous solution of all components against fixed line shift parameters and consistent geology/property presumptions (see text). Some problem issues are marked
4. Further development should involve 3D methods.
5. Any use of this model for the calculation of a regional gravity field should follow 3D tests and refinement and must include
a) water, mantle, granites for improved basin definition
b) above plus basin inferences for specific projects or analysis of post Lower Cambrian units.
Exercise caution and extend regional generator at least 50 km beyond area of interest.
6. Note that no aspect of the interpretation has been considered in detail.
7. The Dundas, Dial Range & Fossey Mtn Troughs (of certain mid € age) lie within, or marginal to the Burnie-Oonah Trough (of certain late p€ age – pre 700 m.y of Cooee Dolerite). Due to comparable densities it is not possible at this scale to resolve the interface between Dundas Trough sediments and, say, Oonah Fm. This is feasible in detail but requires full use of the magnetic data base. In N, NW Tasmania this requires evaluation of Tertiary basalts and in W. Tasmania, the Tyndall Gp and ultramafics.
POSSIBLE FORM OF RELATIONSHIPS: SMITHTON TO CRADLE MT.
(Burnie-Oonah Trough)
CONTOURS: (all Km below surface) Precision uncertain
4 Outer, upper surface of Devonian Granitoids
② inferred, very approx estimate of thickness of Dundas Group or/and Mt Read Volcanics
4 Upper surface of siliceous basement (Rocky Cape or Tyennan cores)
Boundary P€. Occasionally suspect due to density banding and locally ambiguous core densities
2 Specific mafic piles (in Arthur Lineament zone and in Burnie Fm) Contours on outer surface.
THREE HUMMOCK GRANITE
SMITHTON TROUGH
ROCKY CAPE CORE ZONE
ARTHUR LINEAMENT
BURNIE 'PLATFORM' 'BASIN'
HOUSETOP GRANITE
BEULAH GRANITE
JOLCORTH GRANITE
MEREDITH GRANITE
CRADLE MOUNTAIN BLOCK
TOR GRANITE
PIEMAN GRANITE
HEEMSKIRK GRANITE
PINE HILL GRANITE
TYENNAN NUCLEUS
GRANDFATHERS GRANITE
GRANITE BELT
W AND NW TASMANIA
STRUCTURAL RELATIONSHIPS
PRECAMBRIAN & LOWER PALAEOZOIC
031069
PROVISIONAL
5 cm
D E LEAMAN
Feb 1988
for Mt Read Volcanics Project