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LEAMAN GEOPHYSICS

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

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EXPLORATION REQUIREMENTS OF THE ALBERTON GOLDFIELD

for
OCEANIA PTY LTD
by
Dr. D.E. Leaman

July 1991

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Refer letter
25th March 1992
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45m/88 & 46m/88
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ALBERTON

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SUMMARY

A very detailed magnetic survey across the known mineralised areas of the Alberton Goldfield by Oceania Pty. Ltd. has revealed a series of irregular but sub-parallel magnetic patterns. Each correlates closely with the location of known mineralisation but extends laterally beyond it for some distance. Although the precise origin of the effect has yet to be established it is clear that the magnetic data are able to discriminate mineralised ground from barren ground.

The patterns are oriented a little east of ENE. This trend is far from obvious in north east Tasmania and all available geophysical data sets have been inspected for its presence. A case can now be argued to suggest that it represents a diagnostic indicator for mineralisation; every gold deposit can be associated with such a trend, where data permits - even though the feature is often very subtly represented.

Large deposits, such as the "Golden Gate" at Mathinna, are associated with local and specific features of this type, as has been observed at Alberton, and with primary regional trends with the same orientation. These are much rarer. Mineralisation occurs at the intersection of ENE-trending and, usually, NNW-trending structures. A major intersection of this type occurs within the Alberton Goldfield but the available regional data is of insufficient coverage and quality to define its location with certainty. A major deposit of "Golden Gate" proportions is predicted to lie at the node inferred and acquisition of regional data in the vicinity of the lease areas is recommended in order to locate this site.

INTRODUCTION

Geophysical surveys across the Alberton Mining Leases held by Oceania Pty Ltd in the centre of North-east Tasmania have generated several specific and emphatic target zones. Each can be associated with known mineralisation, mineralisation which has been previously worked. Mines Department drilling of 20 and 50 years ago has also encountered quite anomalous character in the host rocks, including the presence of gold-bearing quartz porphyries (?) and keratophyres (?). None of this information, including the magnetic targets, have yet been properly appraised or explained. Nor is it possible to rank the indicated targets for efficient exploration and, perhaps, mining using information available within the vicinity of Alberton.

These notes review what is known in the Alberton area, what Oceania has discovered, what implications this information might have if added to knowledge acquired in other gold-producing areas and how it might assist future exploration and appraisal.

North-eastern Tasmania is littered with numerous minor gold shows and workings. Only a handful have ever proved profitable. A means must be found to discriminate between these and what may be termed, pending more knowledge, the prototypical and desirable target in this environment - a "Golden Gate". The "Golden Gate" Mine yielded more than 7.5 tonnes of gold at grades averaging 25 g/t from a quartz vein system. This review considers what is known of this deposit and whether its characteristics can be described and identified elsewhere - in particular within the Alberton Goldfield. Recognition of such parameters would clearly influence the direction of exploration and its location.

GENERAL COMMENTS - GOLD AND EXPLORATION

Before considering what is known at Alberton, or what might constitute a "Golden Gate" target it is necessary to review the knowledge base and the data available.

Gold occurs at many sites in north-east Tasmania but many occurrences are concentrated along a NNW-trending axis between Mangana and Bass Strait at Lyndhurst (see Figure 1). The important Mathinna (including the "Golden Gate") and Alberton occurrences occur on this axis. Most sites have, however, been minor producers. All deposits occur as veins of quartz within the monotonous series of mudstones and sandstones of Ordovician to Devonian age known as the Mathinna Beds. These host rocks have been folded, faulted, overthrust and multiply deformed and also intruded by massive bodies of granitic rocks known as the Scottsdale and Blue Tier Batholiths. The location of these units is shown in Figure 1. The mineralised Mangana-Lyndhurst axis has been described as a major shear but may be faulted thrust zone. There is evidence for both views in my opinion.

Were all gold mineralisation associated with such a feature then appraisal and exploration would simply depend on the location of crucial structural nodes which might control emplacement of mineralisation. Unfortunately this is not the case. Major and minor deposits occur elsewhere. The important Lefroy and Lisle fields are displaced many kilometres and many minor fields such as Gladstone and Burns Creek are unrelated. Yet all are quartz vein-based deposits in Mathinna Beds. Lisle is a special case since it is an alluvial deposit derived from these materials.

The only common geological features are the vein and host association. Veins possess random patterns, orientations and mineral associations. Some are sulphide rich, others are not. No systematic regional controls have been recognised and mineralisation appears to have been determined by local factors only. These might include local effects at change of rock type (ductility contrasts along rock surfaces producing openings under stress) or fracture controls due to folding or gross stress fields. These observations have led all previous explorers to accept that "gold is where you find it" and that more careful observation might lead to discovery of a universal factor.

Classic panning or trenching methods have, therefore, formed the mainstays of the exploration tool box for more than a century since these will at least find gold-bearing sites - provided they are exposed. They cannot find concealed deposits or assess the scale of the find. History shows that most are insignificant and hopelessly uneconomic in modern terms.

Geochemical methods have also proved to be of dubious value. Direct location of gold has proven difficult in this environment and other indicators, notably arsenic, have been used. Unfortunately these tend to spread and disperse and lack specificity and may have an array of sources. Arsenopyrite is common in the vein systems and no direct correlation has yet been established between sulphide content of any type and gold other than that some high sulphur concentrations are not associated with gold (McIntosh Reid, 1925). Various cut off levels appear to occur and there is no way of discriminating a large ore system from many small or barren systems.

New research into the possible associations between type of quartz and its magnetic properties (at atomic level) and gold has yet to be demonstrated practically.

Geophysical methods have long been dismissed since no property contrasts between mineralisation, quartz and hosts were thought to exist. Explorers have always sought the vein systems rather than the setting of the veins but neither element was considered geophysically approachable. Early research (Leaman, 1974) showed this to be a fallacy at Lefroy; veins could be found and traced using thermal, self potential and piezoelectric methods. Magnetic methods yielded odd results which were not explained until Leaman (1987a) showed that a good instrument, careful methods and close sample spacings could locate the oxidation along the vein-host contact and so map the veins as well (Figure 2). None of these findings were accepted or used for many years. *Why not?*

The more important issues of how to find the critical and mineralised vein systems in the first place, or assess whether they might be mineralised once found were left open.

A breakthrough in regional assessment was achieved in the Gladstone Goldfield by Placeco Australia using very high resolution airborne magnetic surveys. The results were reported by Leaman (1987b). These surveys showed that structure and formations within the Mathinna Beds host rocks could be mapped in considerable detail (Figure 20). Thus, if any structural patterns now visible could be judged systematic and related to known deposits then targets for the ground methods could be defined.

The Gladstone survey led to a small spate of similar surveys covering

the Lyndhurst, Lisle-Golconda and Mangana-Mathinna areas as well as a government regional survey of the Mathinna area (Figures 19; 15-16; 9-10, 24-25). Note that Mathinna contains the "Golden Gate" prototype. Parts of these surveys have been reproduced in this review but none of the acquiring companies survived long enough to realise (all meanings) the value of the data acquired and the regional survey suffered from quality control problems. Indeed, most companies were unable to fund any interpretation or analysis of their data. I have now done this as part of my on-going research in the region. Some of the findings have been outlined in following sections of this review. I have been associated with all the exploration programmes and results utilised and have therefore had opportunity to integrate and consider the implications and results. All the data used is now in the public domain.

Each of the aeromagnetic surveys appears to present different results but analysis shows that this is not the case. All recover information about structural trends, the Mathinna Beds and the intruded granitoids. The quality of the surveys, with the exception of the government regional survey and that by Seltrust at Golconda, has been high and improving. The two poorer surveys have been reprocessed but remain less than ideal while still useful.

Ground magnetic applications have also evolved since their successful application at the "Portland" Mine near Gladstone (Leaman, 1987a). The more rigorous Tower Hill survey (Figures 12-14) sought to assess a mineralised site rather than "chase" veins. An altered volume of host rocks was inferred adjacent to known mineralisation but the

problem of how to process and present the data was not resolved (Leaman, 1989). No detailed interpretation was undertaken. The lessons of these surveys was fed into the specification for coverage of the Oceania leases at Alberton and the result was the finest survey yet undertaken (Figures 5-6) with improved presentation of results. The Alberton survey was the first survey, of any type - whether geological, trenching, geochemical or geophysical - to define regular patterns which appear to be related in some way to gold mineralisation. The patterns are very specific and localised as well.

The data now available can be used to show that elements of the batholiths are probably genetically related to the gold mineralisation. There has been considerable argument and disbelief associated with any such concepts but Klominsky & Groves (1970) have argued for a link. The apparent absence of granodiorites, the granitoid type considered essential, in many areas - such as Beaconsfield, Lefroy and Mathinna - has led others to argue against any such link even though Leaman et al (1973) showed that granodiorite is within 1.5 km of the Lefroy mineralisation at depth. Arguments based on the nearest outcrop distance (30 km) are irrelevant. The magnetic surveys now available show that granodiorites are associated with all gold-bearing regions and are never more than 1.5 to 2.5 km from the deposits - including those at Mathinna (Figure 11). The surveys also indicate that there are at least three granodiorites and only one of these, with distinctive low contrast properties, has a gold association. Thus, discussions of

granodiorite associations must also be tempered with this caution - which granodiorite? Gravity data have been used to support some of these deductions but the coverage, while locally good, is generally poor. Gravity gradients observed near Mangana, Lefroy and Warrentina seem to be associated with mineralisation (e.g. Figures 18 and 22). Gravity data may be of more value than has previously been realised.

No patterns have been recognised, in regional geological or geophysical data which might be relevant to gold mineralisation or exploration, by any company. This observation accounts for the general lack of interest in both the province; interest that is hardly likely to be rekindled unless targets of the "Golden Gate" type can be assigned a signature, or response pattern, and sought on a routine basis.

This review considers whether the detailed information available at Alberton is sufficient, in association with other data sets - including surveys at Mathinna, to provide the necessary clues and, at the same time, indicate whether one of the mineralised sites at Alberton might also be of the "Golden Gate" type.

THE "GOLDEN GATE"

The "Golden Gate" Mine, which has been defined as a most desirable target in the geological environment of north-east Tasmania was located about 1 km south of the township of Mathinna (see Figure 1).

This very rich ore deposit consisted of a set of gold-bearing quartz reefs which filled numerous but randomly oriented fractures apparently unrelated to ^{of the} structures within the host rocks (Mathinna Beds). The reefs range up to nearly 10 m in width and were up to 300 m long although most were much thinner and less than 30 m long. Mining at the "Golden Gate" proceeded to a depth of nearly 500 m with a total production of 7895 kg of gold.

The quartz reefs were typical of the region in that they also contained gold-bearing sulphides (pyrite, arsenopyrite) and other sulphides (chalcopyrite, galena, sphalerite) and silver. Unlike most small producers the grade was maintained at depth (about 25 g/t) with an increasing silver content. Sulphide concentrates were very rich.

Water, mining difficulties and gold price effectively terminated production of deep Tasmanian mines (including the "Tasmania" at Beaconsfield).

Many prospects display similar grades at shallow depth but these rapidly diminish to less than 3 g/t at depths of less than 30 to 50 m. This element has destroyed many hopeful prospects. Any prospect, in which grades are maintained, is likely to prove very profitable.

All explorers agree that other deposits of "Golden Gate" type must exist in the region; the problem is how to identify them or distinguish them from the plethora of minor deposits.

INSIGHTS FROM ALBERTON

The regional location of the Alberton area is shown in Figure 1 and the specific location of the leases is given in Figure 3. Figure 4, using a basemap prepared by Renison Exploration, indicates the general location of mineralisation and old mines in the southern part of the Alberton Field. The field has been a significant producer of gold and, although one may dispute the actual quantities in detail, much of it has come from only one or two mines, such as the Mt Victoria and the Ringarooma United - essentially the extremities of the field. Mining in this field has not been on a large scale nor to great depths yet there are indications of severe reductions in grade with depth. This is the typical behaviour in the province and it is not possible to point to any mine as being a probable "Golden Gate", or one in which the ore will extend economically in depth.

The problem, therefore, of where to direct exploration dollars is a real one.

Ground magnetic surveys were undertaken in order to provide some kind of ranking within the area. Figures 5 and 6 present the results in profile form based on a survey utilising very sensitive vapour magnetometers and sampling at about 20 cm along lines about 50 m apart. The data was fully corrected for diurnal, total field and normal survey links. It reveals about six distinct patterns with sub parallel relationships. These unexpected patterns trend ENE to E-W, are 200 to 500 m long and are directly associated with the known mineralised sites. Although the precise origin of these features can

as yet only be surmised, it does indicate that more than half of the lease area may be of no interest whatsoever.

I infer that the patterns reflect a change in quartz content within units of the Mathinna Beds coupled with long wavelength effects due to variations in rock type (mudstone-sandstone) and perhaps bulk alteration. Figure 7 suggests the possible origin of some of the larger features near the "Long Struggle". These implications have yet to be confirmed.

The best developed magnetic pattern is associated with the "Caxton" and "Long Struggle" group of reefs and it has been presumed that these might represent a good target for further exploration.

Chemical indicators, such as the presence of arsenopyrite and other sulphides, are endemic and offer far less spatial control.

Does one of these magnetic patterns conceal a "Golden Gate" and, if so, which one? Past production from shallow depth is not a reliable indicator and this field has produced a total of about 8.3 tonnes. The limited Alberton zone in itself is rich. Note that one "Golden Gate" has produced almost this amount of gold.

The key elements of what is presently known may be simply stated; near E-W or ENE magnetic anomalies can be correlated with mineralised zones in narrow zones barely more than 300 m long which lie adjacent to major structures trending NNW but which appear to express negligible correlation with the primary structures or local controls. Regional magnetic data are available (Figures 9-10; 24-25) and express similar trends but there are no gravity data.

EXTENSION TO OTHER FIELDS

Available data from other gold fields has been inspected to test whether the regional and local implications of a structural control upon gold mineralisation may occur. No such correlation has been recognised previously. Consider, for example, Figure 17 which represents the last stage of analysis for Pegasus Gold during its tenure of the Mathinna-Mangana area. No further interpretation was undertaken for that company because they felt it showed no correlation with the many gold occurrences in the area. And it does not. I was responsible for this diagram (Leaman, 1990) and it shows the clear trends evident in the many forms of the data inspected. ENE or E-W trends are relatively rare and some do pass through or near mineralised sites.

The significance of this was not appreciated until other data sets were inspected in association with the fact of the correlation at Alberton.

If now the actual data, with 0.5 nT contour interval, is inspected it can be shown that EVERY known site in the area of survey, as well as those just beyond it to the east (such as "Great Fingal"), either lie on such trends or their projected continuation; including "Golden Gate". This correlation is indicated in Figures 15 and 16 which ignore the more obvious trends due to regional structure, unit lithologies and so on to emphasize the ENE elements. It will be noted that the definition is subtle but real and this reflects the mistake of flying the survey with a 4 to 1 E-W to N-S line bias. The line bias problem did not arise at Alberton due to use of NE-SW orientations which were able to define the nominal E-W character. The

correlation might have been expected after the earlier Tower Hill ground survey (Leaman, 1989) but the concerns about presentation of the data restricted acceptance of the compilation (Figure 14). In this survey the data was filtered using continuations of the data, which merely show what it might look like if observed at an increased height above the ground. Such processing smoothes the data (Figure 13) and can remove some important character. The Alberton work shows that the filter used at Tower Hill was too powerful. Even so Figure 14 shows that the two mine sites, "Sunbeam" and "Tower Hill", are actually aligned along a trend a little east of ENE! Just as at Alberton.

If this data were converted to appear in a form observed at 80 m above the ground (where Figures 15 and 16 were) then the ENE character will persist but be subtle. It is. So subtle it was ignored. It should not have been.

Other work in the vicinity of the "Tower Hill" Mine reveals character not unlike that observed near the "Long Struggle" at Alberton (compare Figures 7 and 12 for long wavelength - not spike effects).

Regional evidence is even more important. The only good gravity data is available for the area south of Tower Hill (Figure 18) and it shows that gravity gradients can be correlated with the clusters of mineralised sites - including those well east of Mangana. The groupings occur on offsets of the gradient which must reflect major structures or granitoid wall projections. The offsets are oriented between E-W and NE (could be ENE) but cannot be specified more

accurately. This may ultimately prove to be decisive information for the exploration process.

Regional magnetic data, although of variable quality, is presented in Figures 9 and 10. Figure 9 presents the data as observed as an approximate drape of the land surface with a clearance of about 150 m (specified; actual clearance 100 to 700 m) while Figure 10 presents the data as it would have been observed at a fixed level of 1500 m above sea level. The second diagram smoothes much of the character but represents a true comparison of responses. The large anomalies are due to exposed or concealed granodiorites. Gross ENE and E-W trends can be recognised in these maps and major trend corridors with this orientation occur in the Mathinna ("Golden Gate"), Mangana (south) and Alberton zones. Figure 25 shows that, at high altitude, the trend sweeps from ENE to E-W at Alberton in precisely the same manner as the ground data.

Regional data show that these trends are not universal and are zonally localised. Detailed data, such as shown in Figures 15 and 16, show that even subsets of the major elements are not general. Local and regional trends overlap at South Mangana, Mathinna central and Alberton; each the site for substantial mineralisation.

This work suggests the characteristics for a "Golden Gate" signature; impressed local and regional sub ENE trends in magnetic data, and a probable matching offset in gravity data. Fracture and local bedding relationships are random and not diagnostic.

The validity of these inferences has been tested elsewhere.

Figure 19 presents a portion of the magnetic survey completed by Placeco Australia in the Lyndhurst area. Geological information used as base was derived from regional mapping of the Geological survey. ENE trends can be recognised in this data but they are subtle and although linked with mineralised sites generally lack continuity. There is no evidence of regional trends of this type in either gravity or magnetic data and no evidence of any response related to the small mines a few kilometres further south. It may be concluded that these deposits are quantitatively different from those at either Alberton, Mathinna or Mangana. Their history would support this conclusion. The "Golden Gate" response is absent.

Figure 20 presents data from part of the Gladstone Goldfield, also acquired by Placeco Australia (see Leaman, 1987b). This data is distinctive for its definition of structure within the Mathinna Beds and for displaying disruption of the folds. It does, however, also reveal some ENE trends. Two of these are beyond dispute and can be correlated with the "Big Musselroe" and "Bluebell" pits. Another feature has been inferred in the region of the "Portland" Mine but the 10 to 1 E-W bias of this data within a strongly magnetic and fault-bounded terrain has restricted definition. Ground survey, as shown in Figure 2, does confirm its presence a little north of the shaft where lithological and vein responses, which normally trend NNW, are partially truncated and modified. The mine may line in a narrow corridor between two such features since there are suggestions of a second a little south of the shaft. Old workings and cross

trenching in this mine zone seems to suggest that the miners considered both the vein orientation (NNW) and its conjugate (ENE) important.

Figure 21 summarises the conclusions drawn from the magnetic and gravity data in the Lisle-Golconda area. The predominant elements are not obviously related to the mineralisation but the second order ENE trend is, at all sites. This data set is unique in having a N-S line bias and these features are more easily seen. Indeed, observation of the trend at Alberton and its representation here led to the rechecking described for the Mathinna, Lyndhurst and Gladstone areas. Stream patterns and gravity data north of Golconda might indicate a regional overprint of the same trend is also present.

Examination of data from Golconda, Lyndhurst and Gladstone has confirmed the association with granodiorite for all gold-bearing regions. In every case the nearest granodiorite, usually beneath the deposits, is the first intruded of a series and bears relatively low contrast properties. Explanation of this association is beyond the scope of this review and it is not relevant to Alberton - although the granodiorites are present nearby - since the site is known to be mineralised and does not have either to be found or accounted for.

Only regional gravity data sets are available for the remainder of north-east Tasmania. While these may only crudely define trend and rock patterns an unmistakable ENE-trending gradient may be observed

near Warrentina (Figure 22) which links the gold occurrences there, and at and south of Lefroy.

If one considers also the observations derived from the structural analyses of central and northern Tasmania provided for Conga Oil using its regional gravity and magnetic coverage similar regional trends pass through Beaconsfield and the Little Den Goldfield (Figure 23).

Can there be any doubt as to the importance of ENE to E-W structuring? Its association with gold mineralisation cannot, I believe, be disputed. It is fundamental as an indicator at all scales and can be defined using magnetic or gravity data. All known major mineralised sites occur where regional corridors intersect major structures which usually trend NNW. "Golden Gates" can be expected in these nodes.

How, and how well, can these rare nodes be defined. Good data, such as acquired by Pegasus at Mathinna, would indicate within perhaps a hundred metres in regional terms using an airborne magnetic survey and very much better on the ground.

LESSONS FOR ALBERTON

The original insights drawn from the very detailed ground magnetic surveys at Alberton have been shown to have provincial significance and that the implication has been overlooked in the absence of such definitive results and associations.

The superposition of detailed surveys and more extensive regional surveys in the Mathinna, Mangana and Alberton areas (the government survey, Figure 9) shows that these sites are the exceptions. This is encouraging in itself. The absence of equivalent data superpositions elsewhere precludes recognition of other key sites. Thus if other "Golden Gates" occur one may be expected near Mangana, and another near Alberton.

Does one of the known mine sites represent the location of a new "Golden Gate"? Unfortunately the available regional magnetic data cannot define this with certainty since the survey was terminated at the latitude of Alberton and its east-west character is disrupted by the peripheral influences of basalts (to the west) and granodiorite (to the east). Enlargements of the Alberton area, as presented in Figures 24 and 25, do show that sub E-W character is evident between 5427 and 5429 000 mN in observed data. This band encloses the northern mine group centred on the "Strahan" and "Hannah". Unfortunately this may be a false location due to terrain clearance problems since the corrected map with a reference level would suggest that the placement is further south, at perhaps 5426 000 mN. This

position lies between the "Mt Victoria" and "Long Struggle" groups and the conclusions seem like an each-way bet. The data does not permit a better judgment.

The data available do imply a "Golden Gate" response but cannot locate it precisely. This is certainly a condition which should be corrected since to do so would enable limited exploration funds to be concentrated on that part of the lease area most likely to yield the greatest return.

There is thus a need to provide some indication of regional setting and control. This cannot be done with surface surveys in the conditions which apply at Alberton, although such surveys could be locally extended around the northern mine group. Basically, such surveys are too costly and cannot cover sufficient area.

The necessary information can only be provided in two ways, given the experience elsewhere as described in this review. Either acquire a modest but high precision airborne survey (helicopter required) of a few square kilometres and/or infill the regional gravity coverage. Gravity surveys are here suggested only in a supporting role since the application requires much more evaluation but the extra information may provide a useful control. Tightly specified barometric elevations would be adequate for this purpose and such surveys would not add substantially to the cost of the helicopter survey. No other methods can be recommended as either worthwhile or cost effective.

A notional specification might be:

AEROMAGNETIC SURVEY

Helicopter based, high sensitivity magnetometer, flown with N-S lines no more than 200 m apart and with a sample interval of about 10 m along lines. Relief in the area suggests that the survey be flown as a 100 m drape of the terrain. The object of the survey must be to define any sub E-W gradients in the area of Garden Ridge.

A conservative cost of \$50 per line kilometre should be allowed for the survey (including mobilisation and map production) and this would provide for a coverage of 5 km N-S by 3 km E-W for about \$5000.

GRAVITY SURVEY

Reasonable coverage of the same area should be possible in perhaps 4 days at a cost of perhaps \$1500.

These estimates are approximate but suggest the general probable costs involved.

This work is recommended and would be undertaken in any standard exploration programme as a means of achieving target focus.

It may be commented that the transfer of Alberton exploration from the detailed to the regional is a reversal of normal practice. Regional data would usually be available prior to specific examination but the programme undertaken here reflects the history of evaluation of mine leases, rather than large exploration areas.

Other forms of local exploration, such as detailed review of the origin of the anomalies (by trenching and rock inspection plus sampling) is still required.

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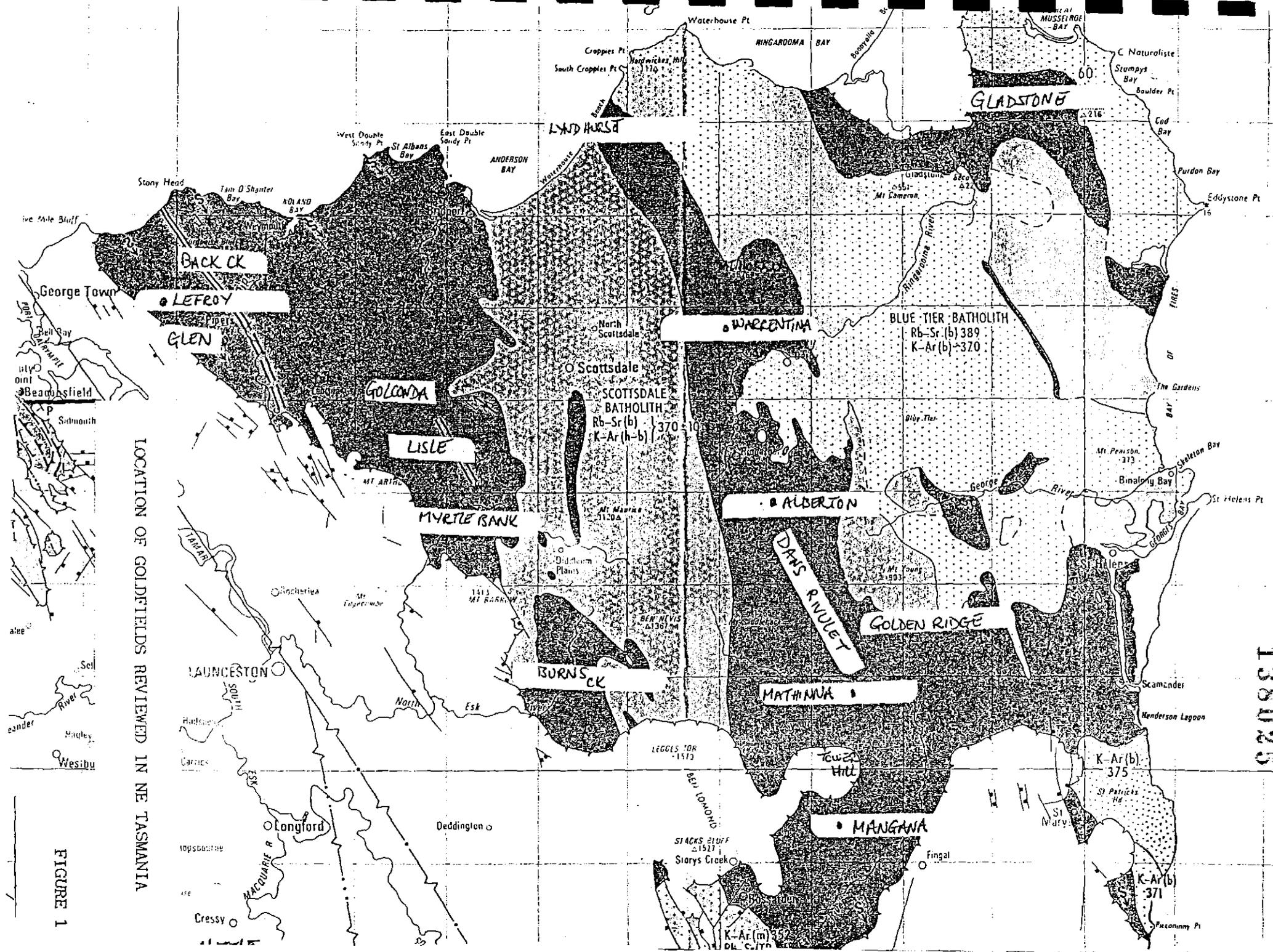
Report submitted on behalf of Leaman Geophysics

by



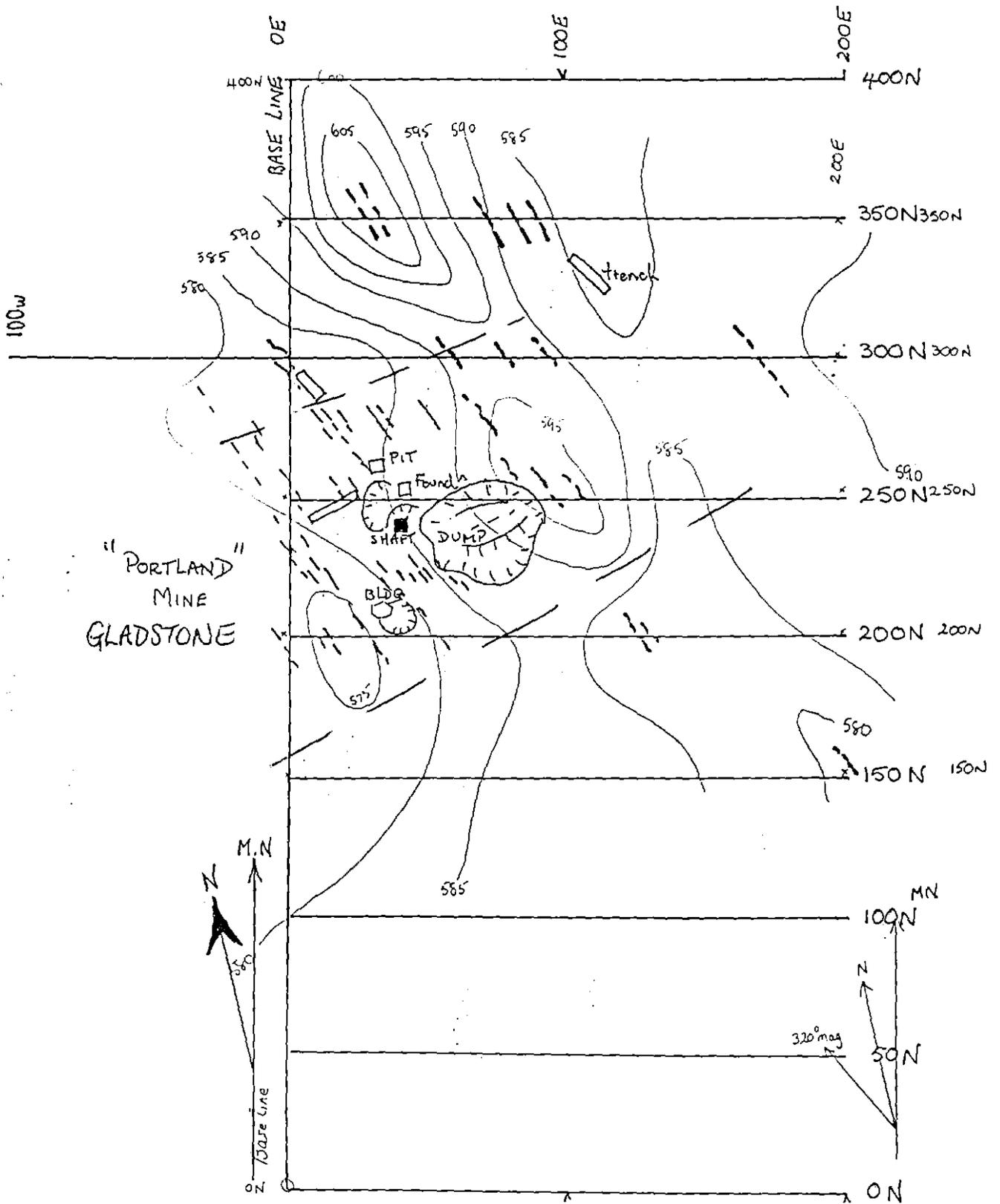
Dr. D. E. Leaman, B.Sc., Ph.D.,
F. Aus. I.M.M., M.M.I.C.A.

Date: 23/7/91



LOCATION OF GOLDFIELDS REVIEWED IN NE TASMANIA

FIGURE 1



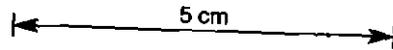
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MINE
GLADSTONE

GROUND SURVEY

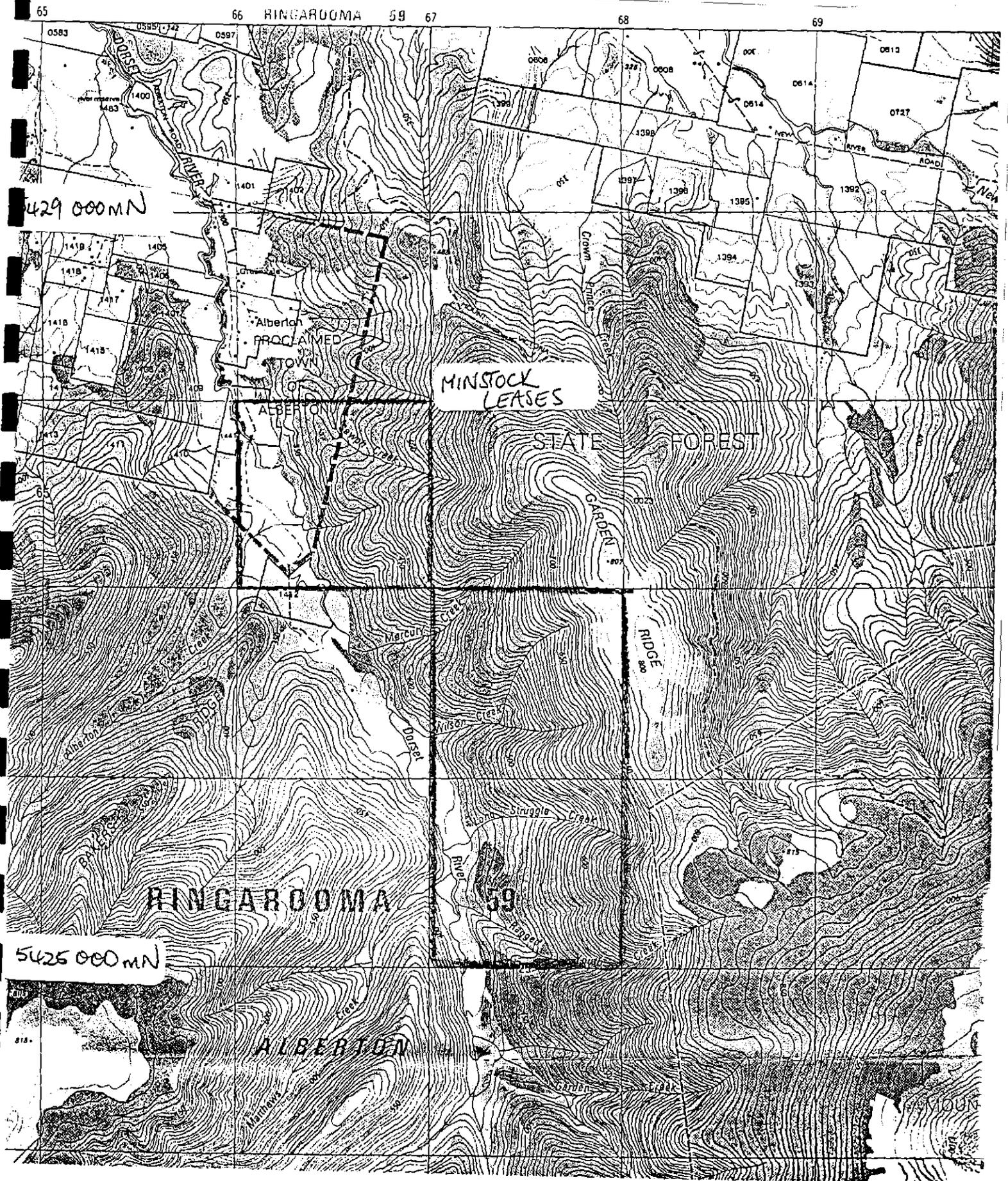
FIGURE 2

CONTOURS OF MAGNETIC FIELD SHOWING LOCATION OF SPIKE FEATURES.
Interval 5 nT, based on noise smoothed profiles.

57000 NE

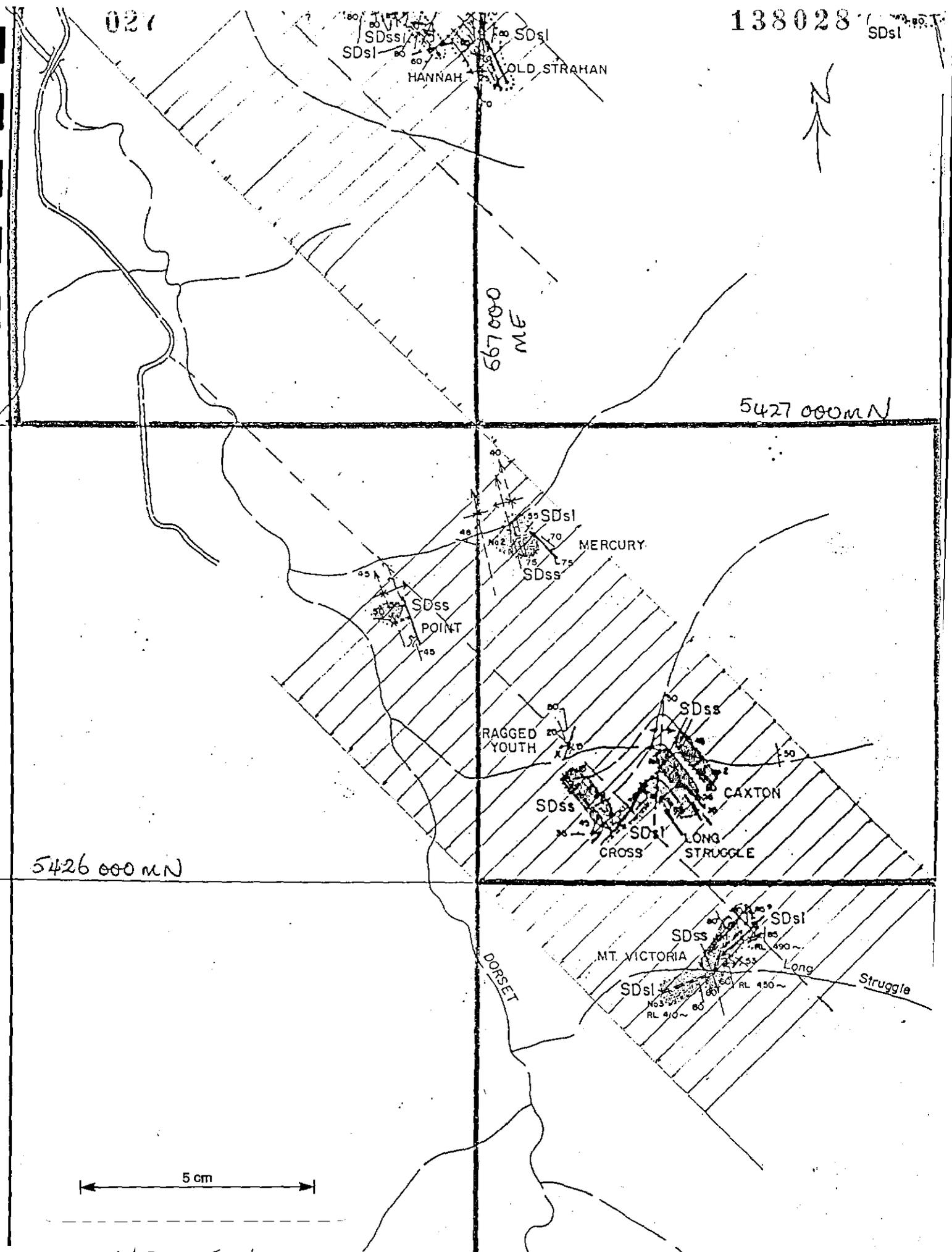


VICT



LOCATION OF ALBERTON LEASES

FIGURE 3



ALBERTON
 LOCATION OF MAGNETIC SURVEY GRIDS
 Basemap after Gold Fields Exploration

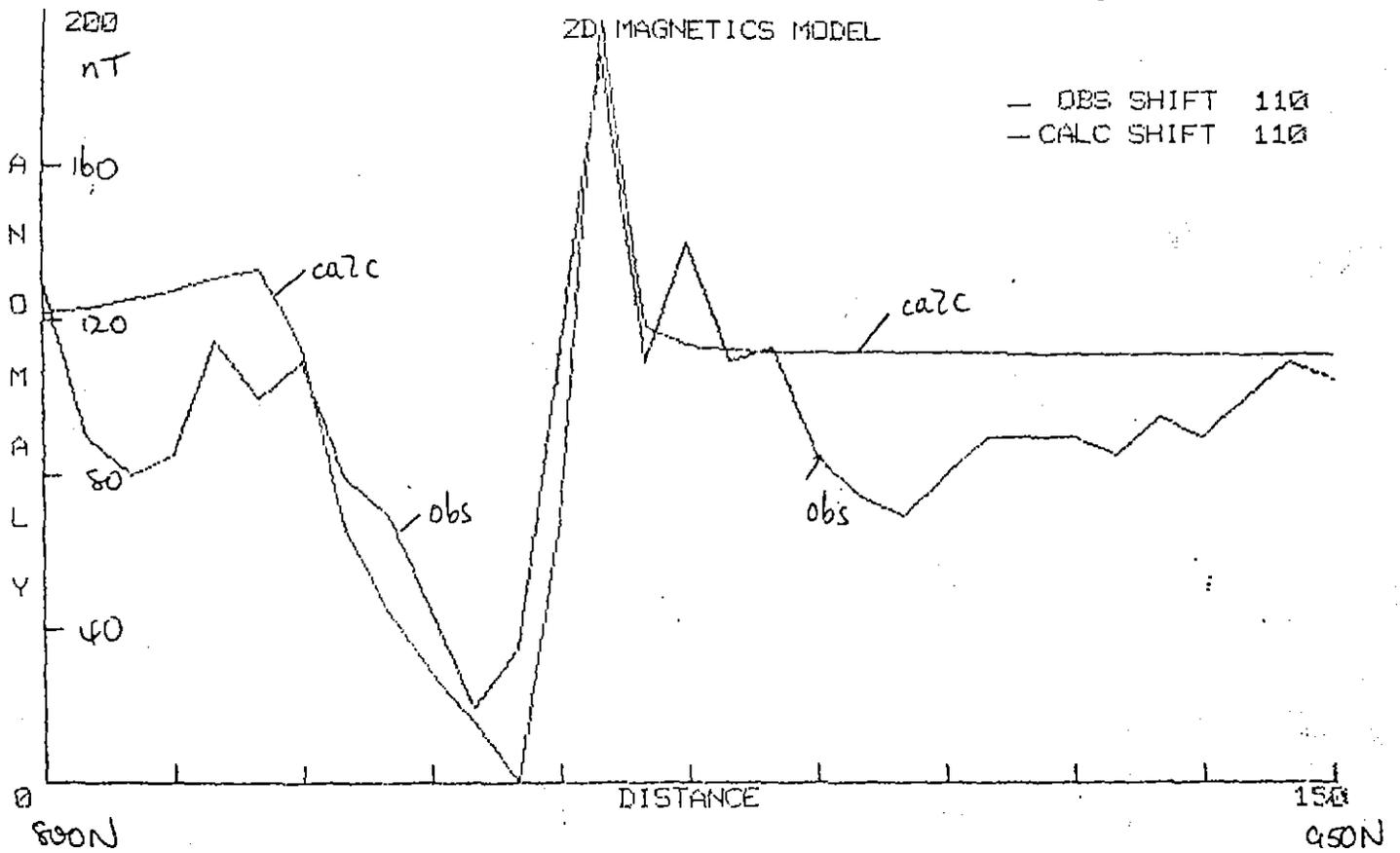
FIGURE 4

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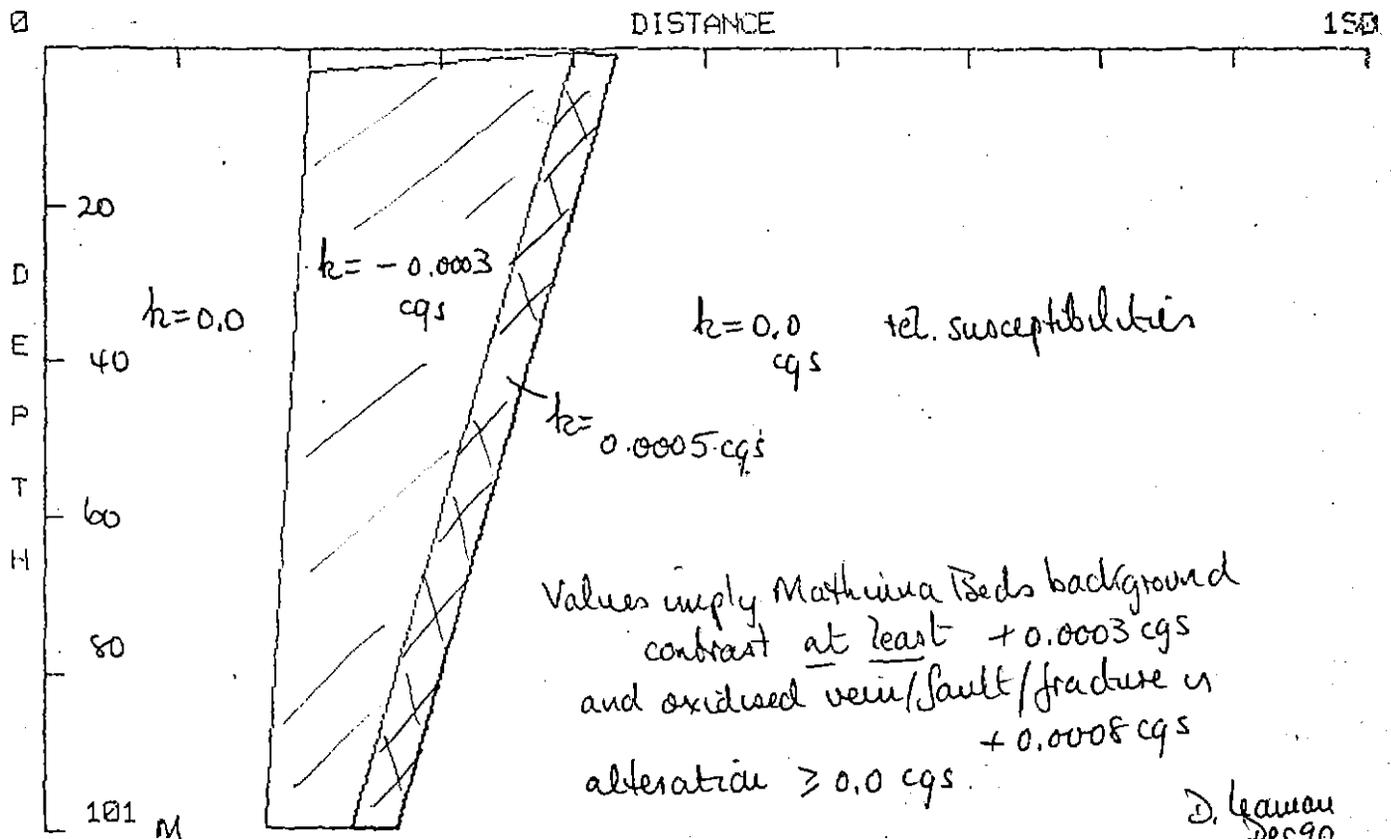
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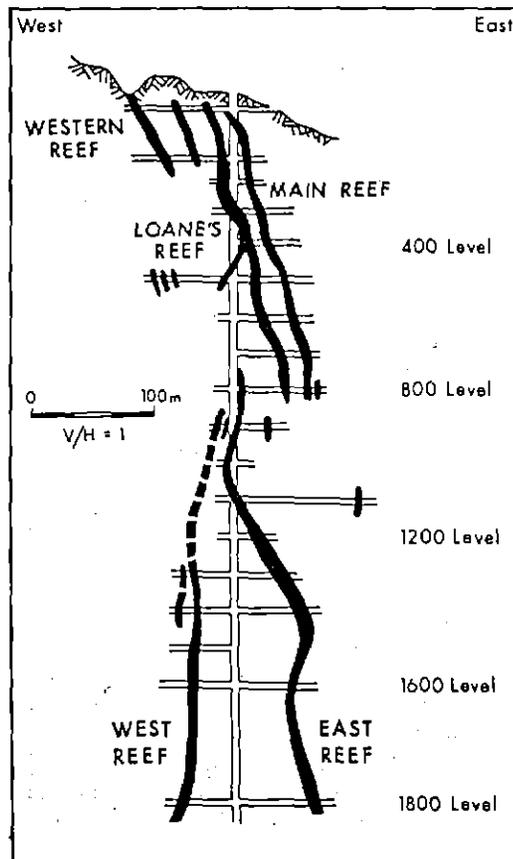


ALBERTON B1 306E 800-950N

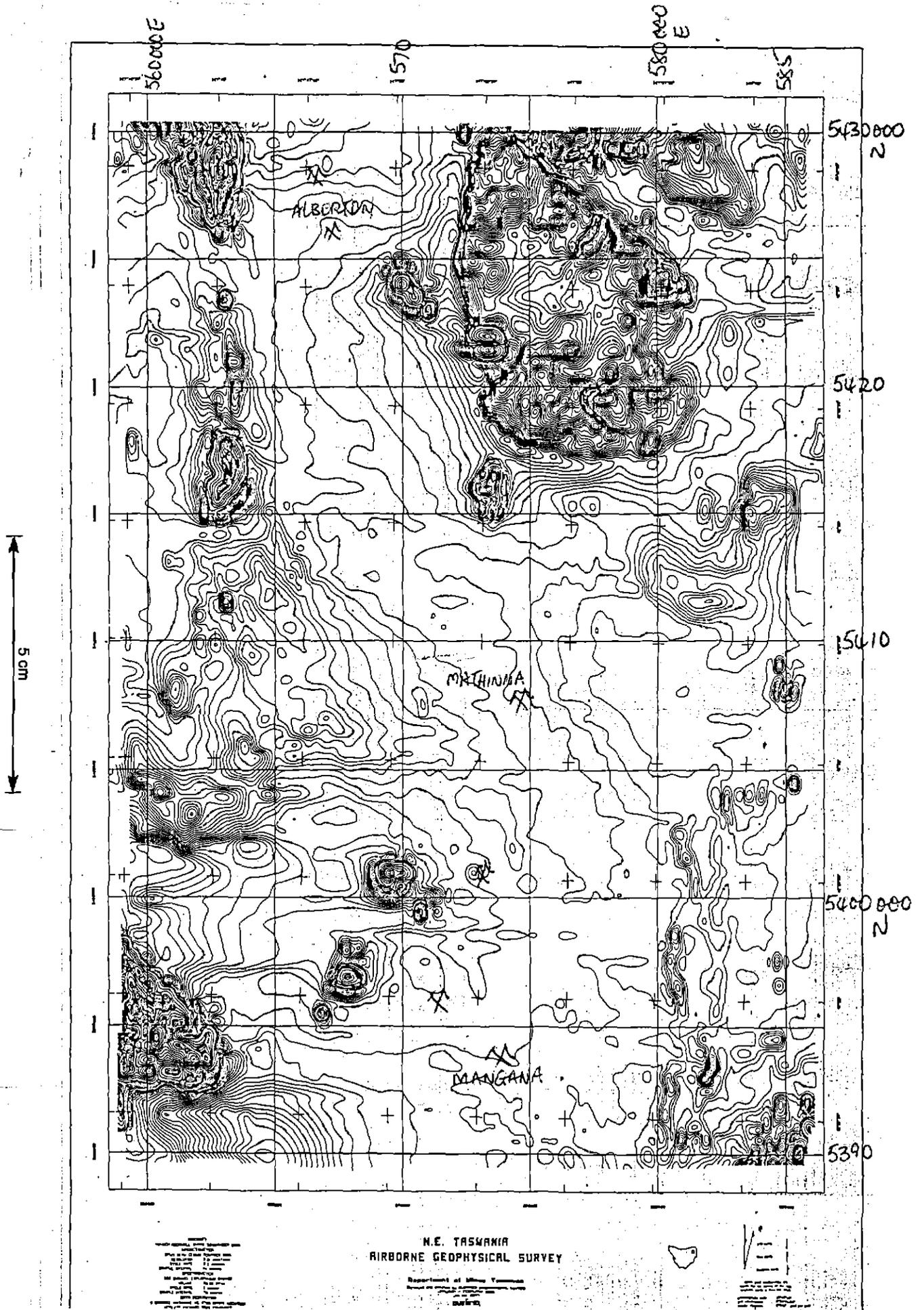


MAGNETICS MODEL PROFILE B1: (WITH WALL ALTERATION)

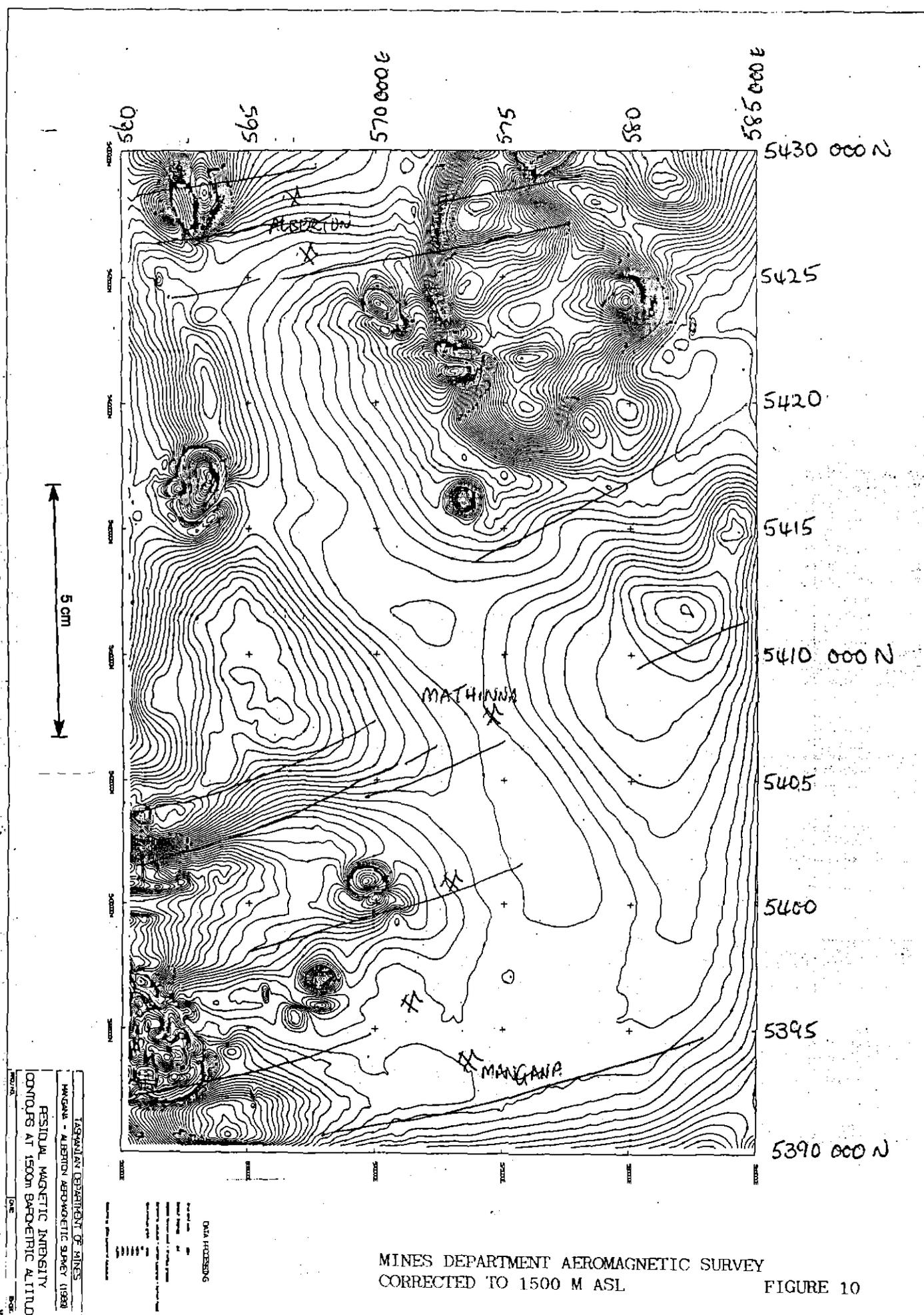
FIGURE 7



Cross section of the New Golden Gate mine, Mathinna showing the main reefs hosted by the Mathinna beds



MINES DEPARTMENT REGIONAL AEROMAGNETIC SURVEY MATHINNA AREA FIGURE 9

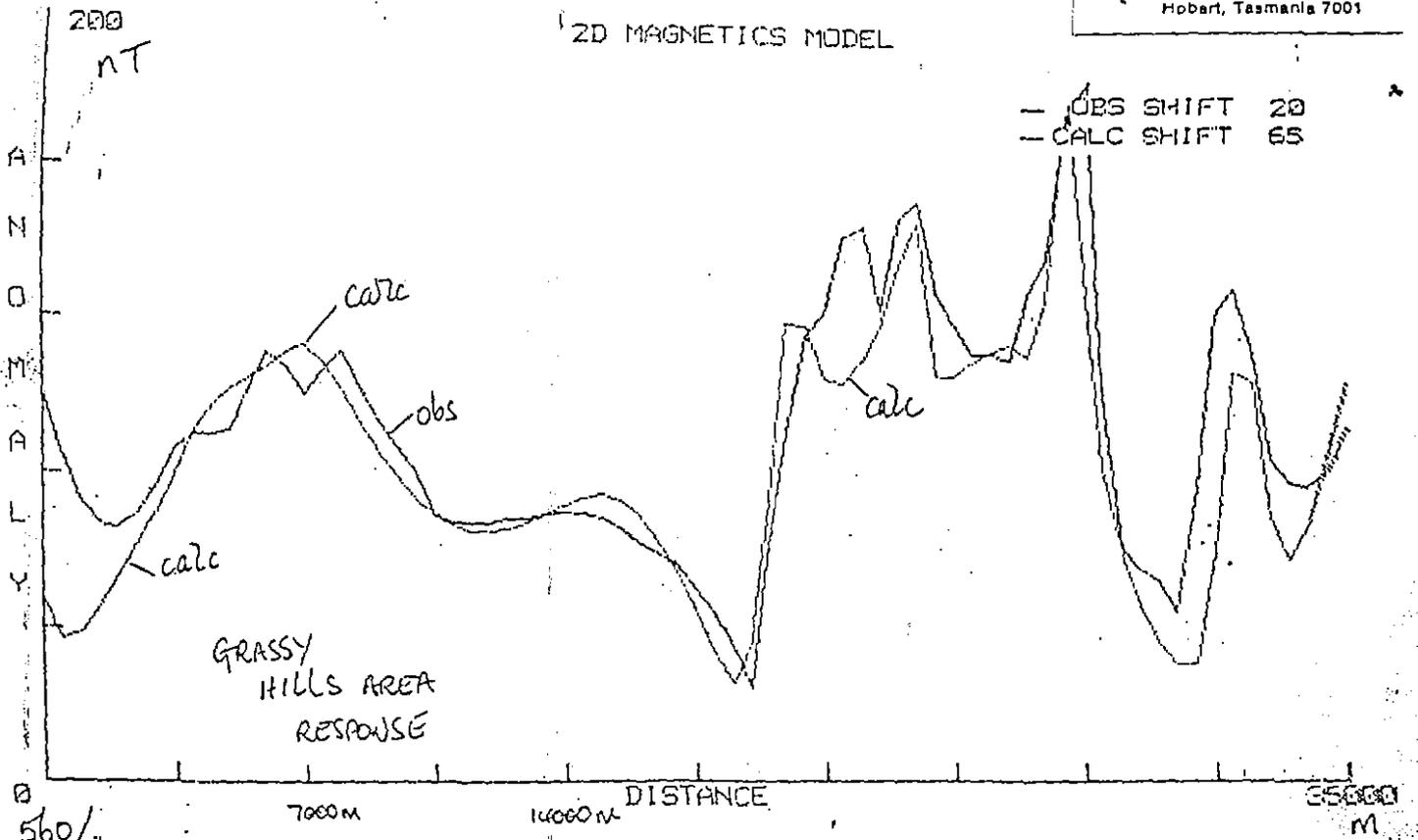


DUVT VIII

LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 35000 500

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

2D MAGNETICS MODEL

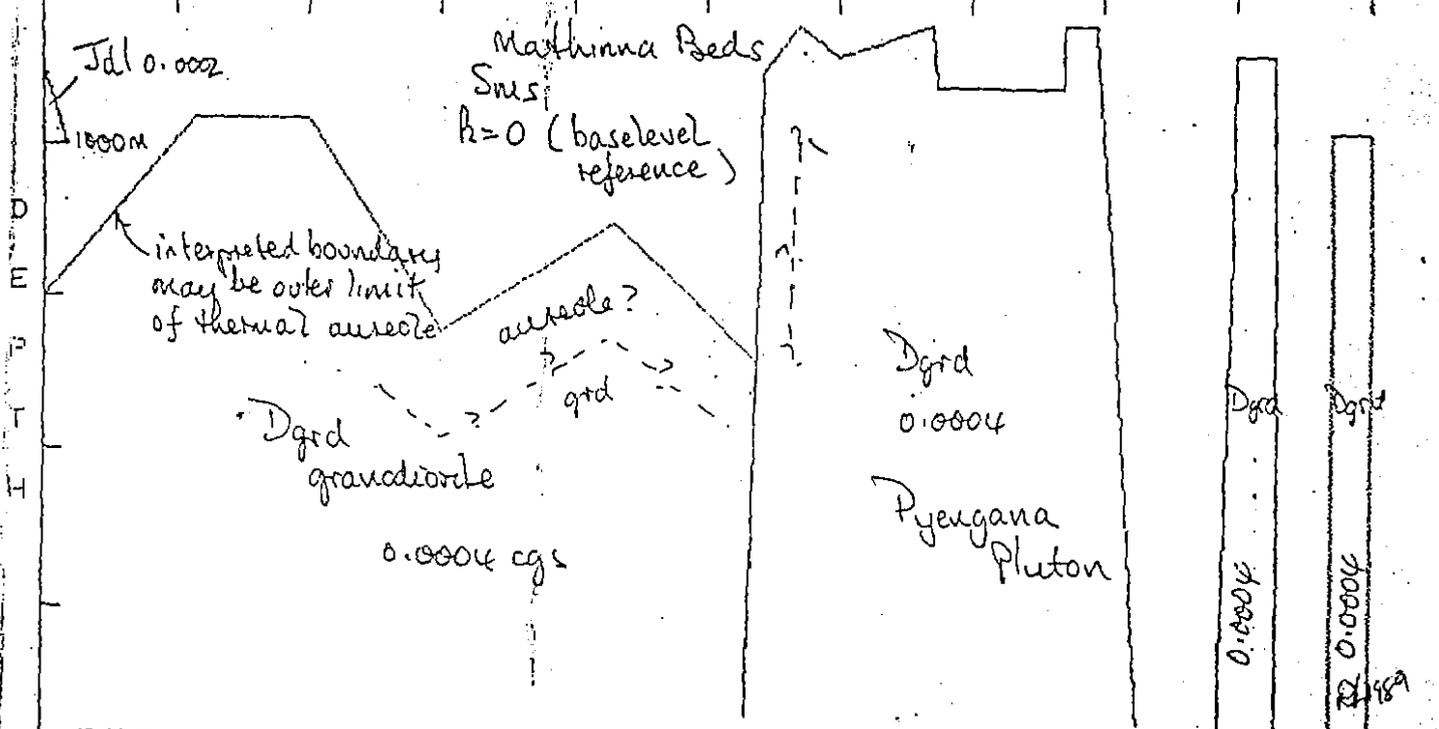


560/5405

585/5430

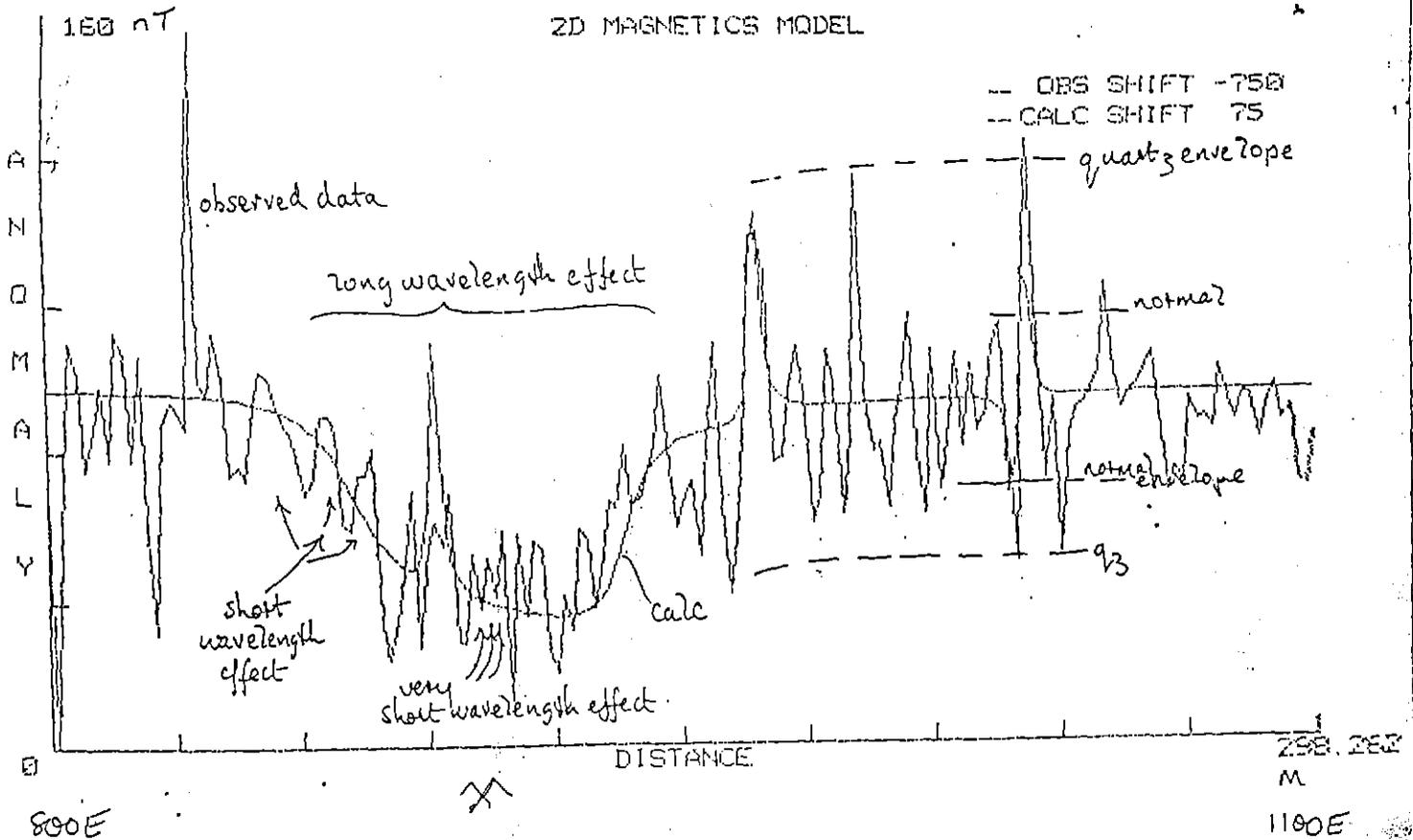
MATHINNA REGION GOLD3 TIELINE 560/5405-585/5430

flight level (variable) DISTANCE 35000

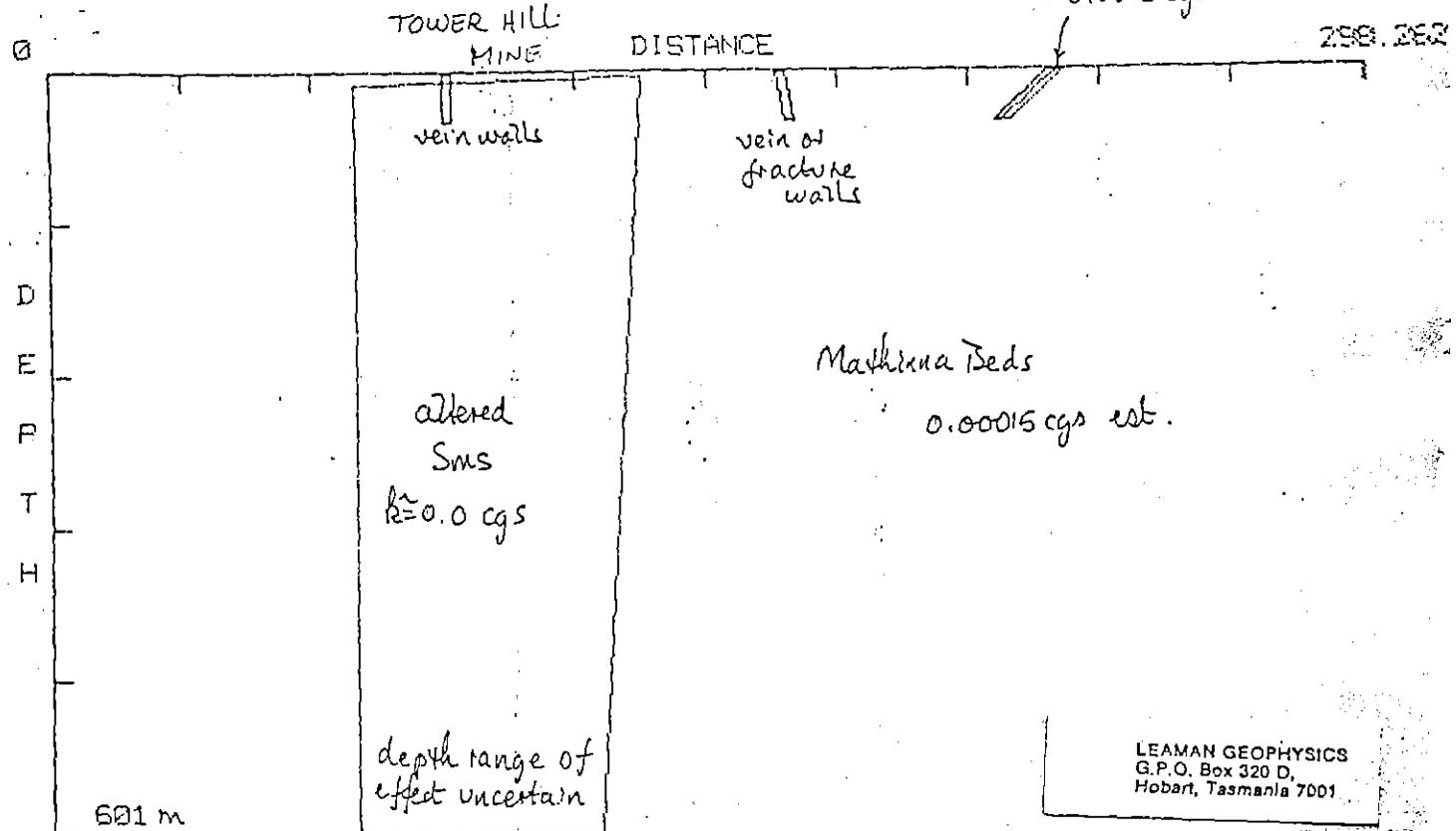


2D MAGNETICS MODEL GOLD3 UNCORRECTED DATA

LINE PARAMETERS - ORIGIN, LIMIT, INCR : 0 300.048 1.786



TOWER HILL MAGNETICS TEST SOURCES 950N 800-1100E W GRID
K5=-00015 5/1=70/10 (DEEPER L TOP)



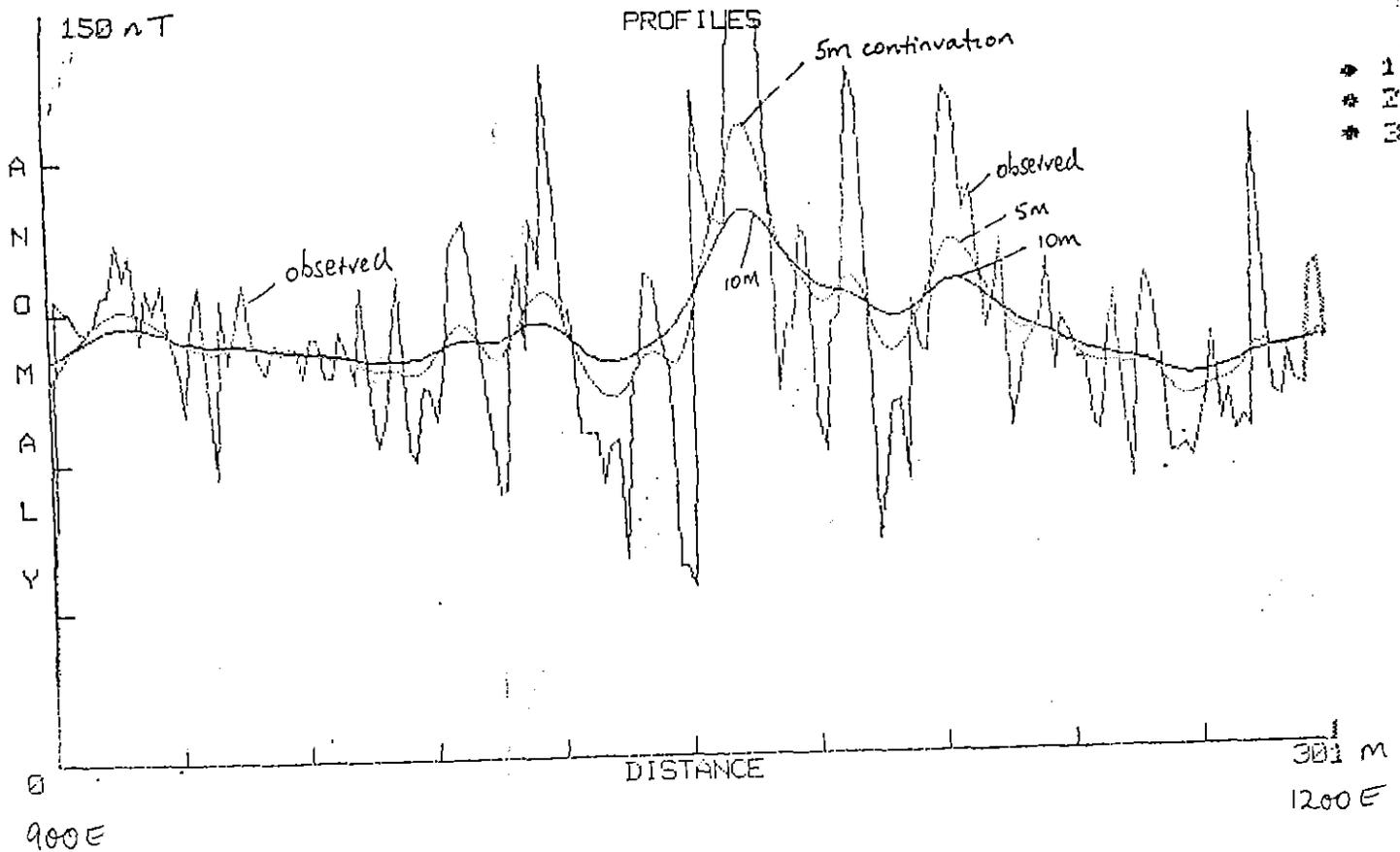
SURFACE MAGNETIC DATA SHOWING VEIN AND PROBABLE ALTERATION RESPONSES NEAR TOWER HILL MINE

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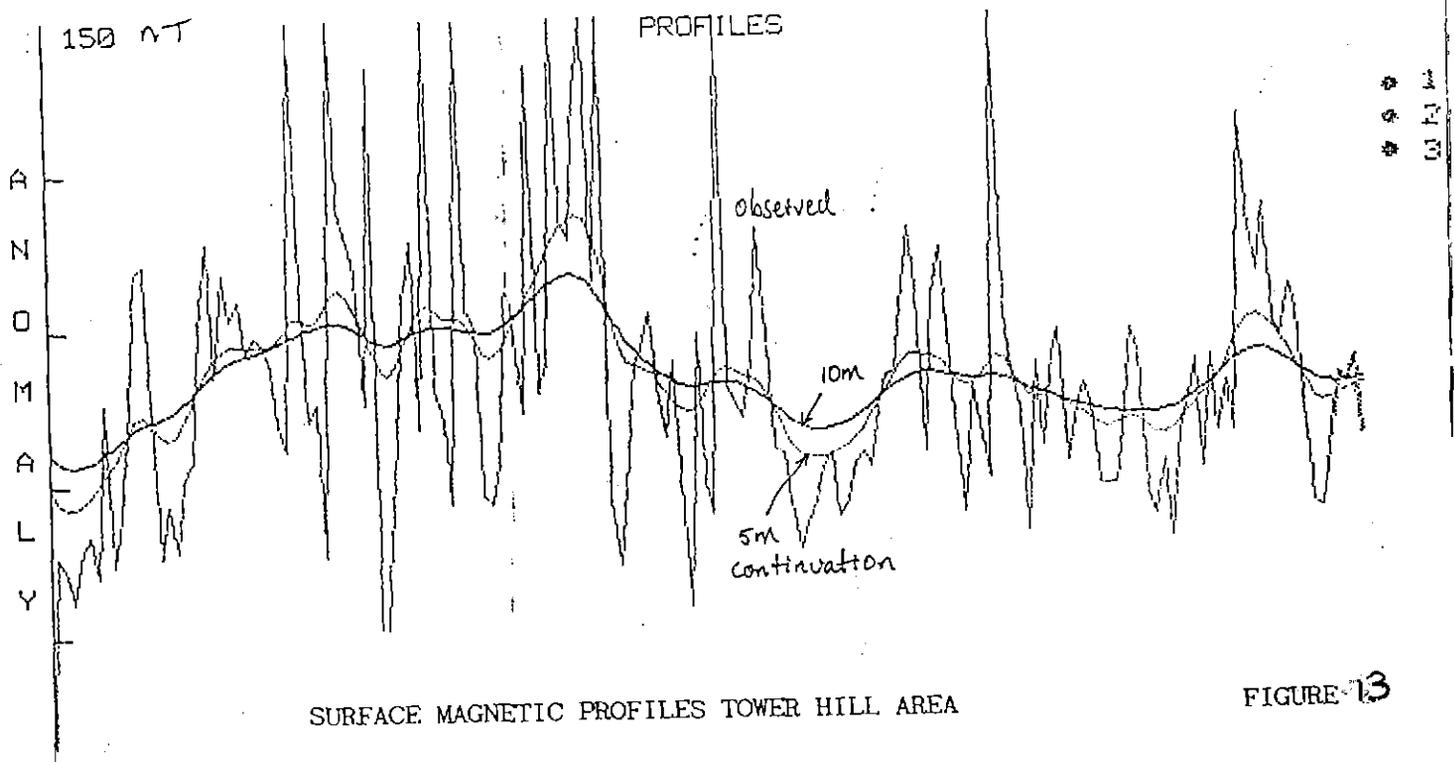
036

1 B:THLE0000 TOWER HILL MAGNETIC SURVEY E GRID 00N 900-1200E
 2 B:C05E0000
 TOWER HILL MAGNETICS E GRID 00N 900-1200E 5M CONTINUATION
 3 B:C10E0000
 TOWER HILL MAGNETICS E GRID 00N 900-1200E 10M CONTINUATION
 ZERO SHIFT :-750

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



1 B:THLE0050 TOWER HILL MAGNETIC SURVEY E GRID 50N 900-1200E
 2 B:C05E0050
 TOWER HILL MAGNETICS E GRID 50N 900-1200E 5M CONTINUATION
 3 B:C10E0050
 TOWER HILL MAGNETICS E GRID 50N 900-1200E 10M CONTINUATION
 ZERO SHIFT :-750



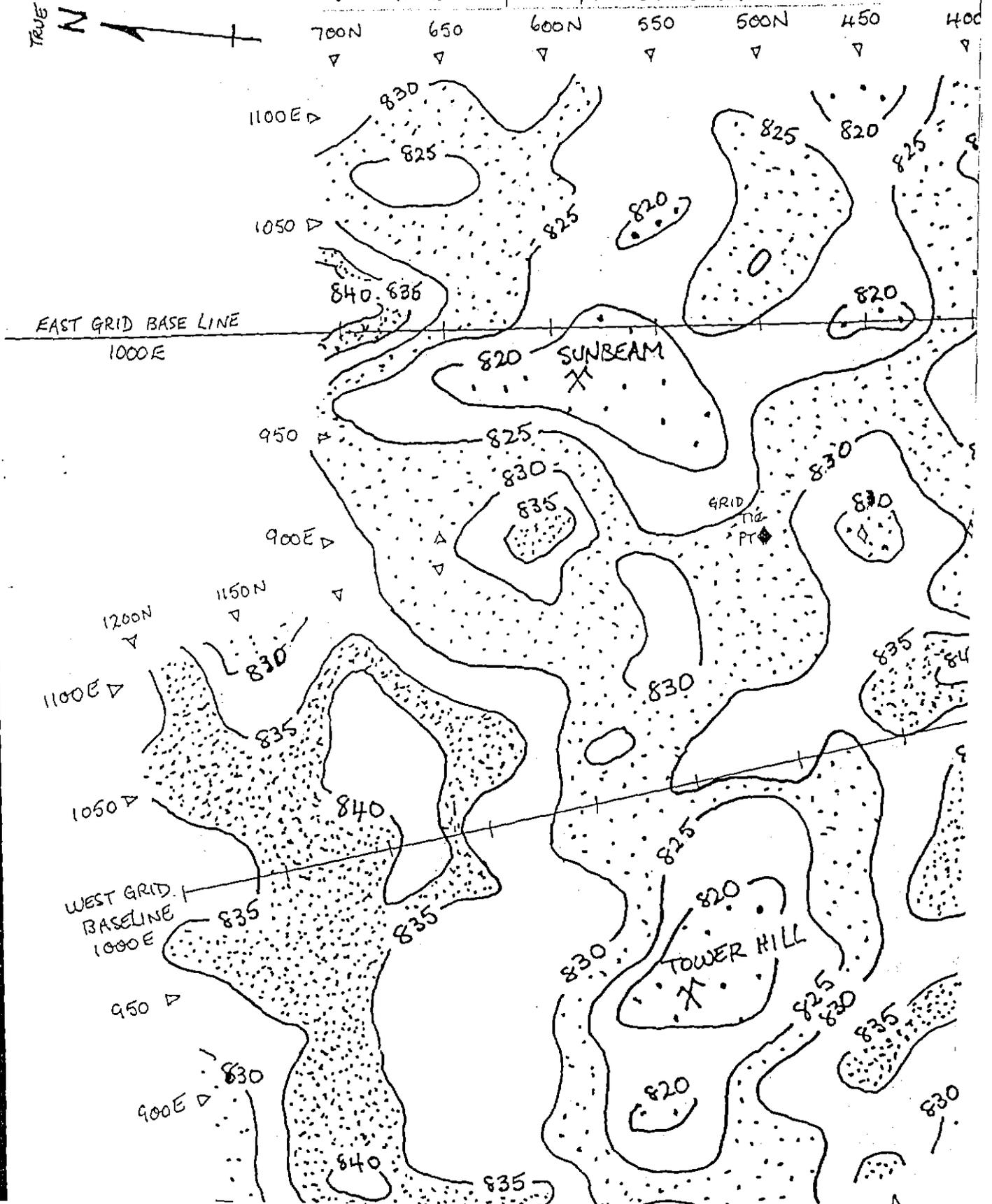
SURFACE MAGNETIC PROFILES TOWER HILL AREA

FIGURE 13

CONTOURS OF THE MAGNETIC FIELD AFTER BASE/DIURNAL AND LINE TIE CORRECTIONS
 Reliability: +/- 5 nT est.

FIGURE 14

Data contoured after application of 10m upward continuation.



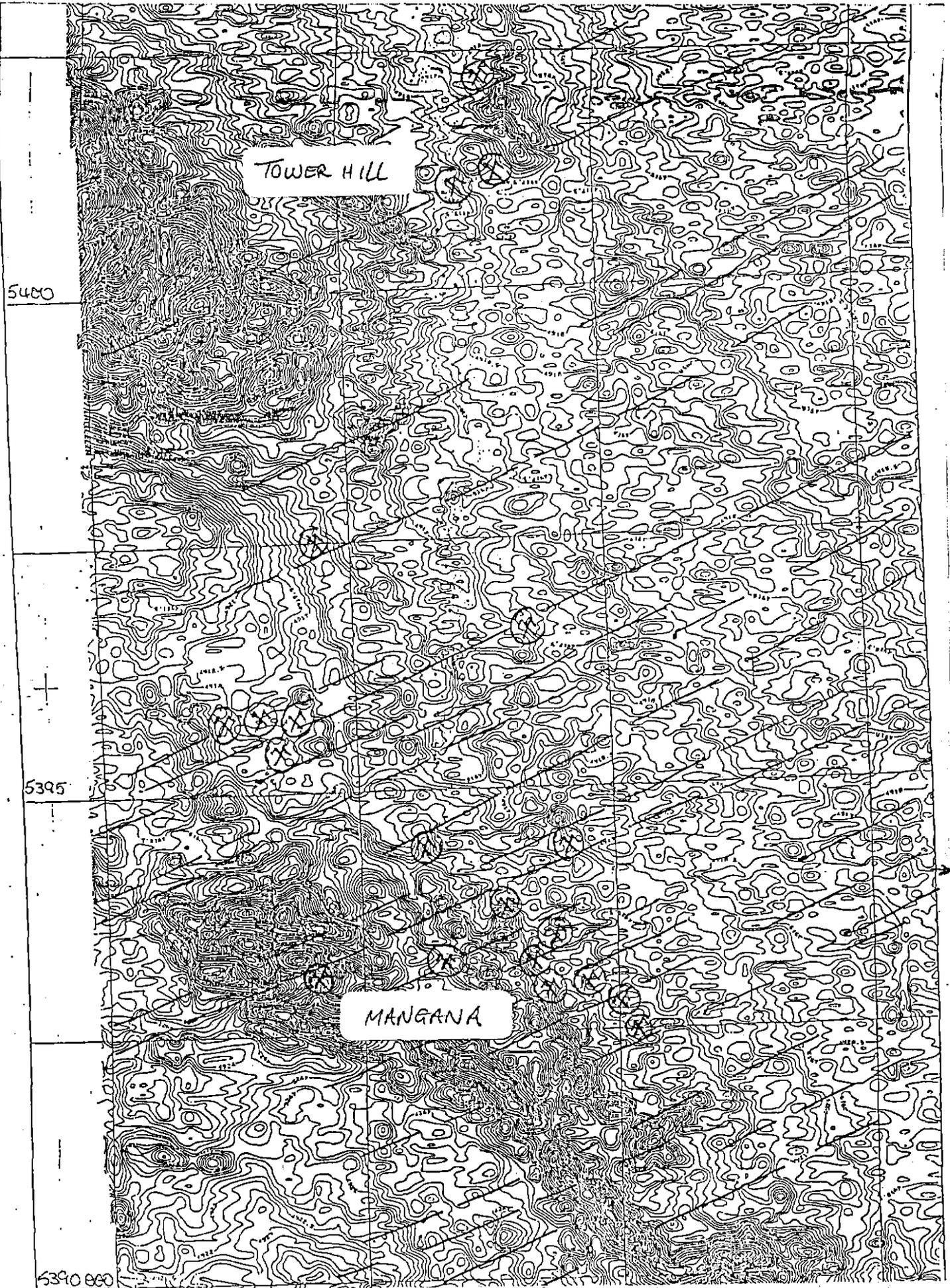
SURFACE MAGNETIC SURVEY TOWER HILL MINE AREA
 CONTINUATION SMOOTHED CONTOURED VALUES (10 M CONTINUATION) FIGURE 14

CONTOURS OF RESIDUAL MAGNETIC FIELD (S PART)
(contour interval 0.5 nT) See also map 3

138039

570 000 E

575 000 E



138040

9

5 cm

039

57300 E
147 35

57200 E

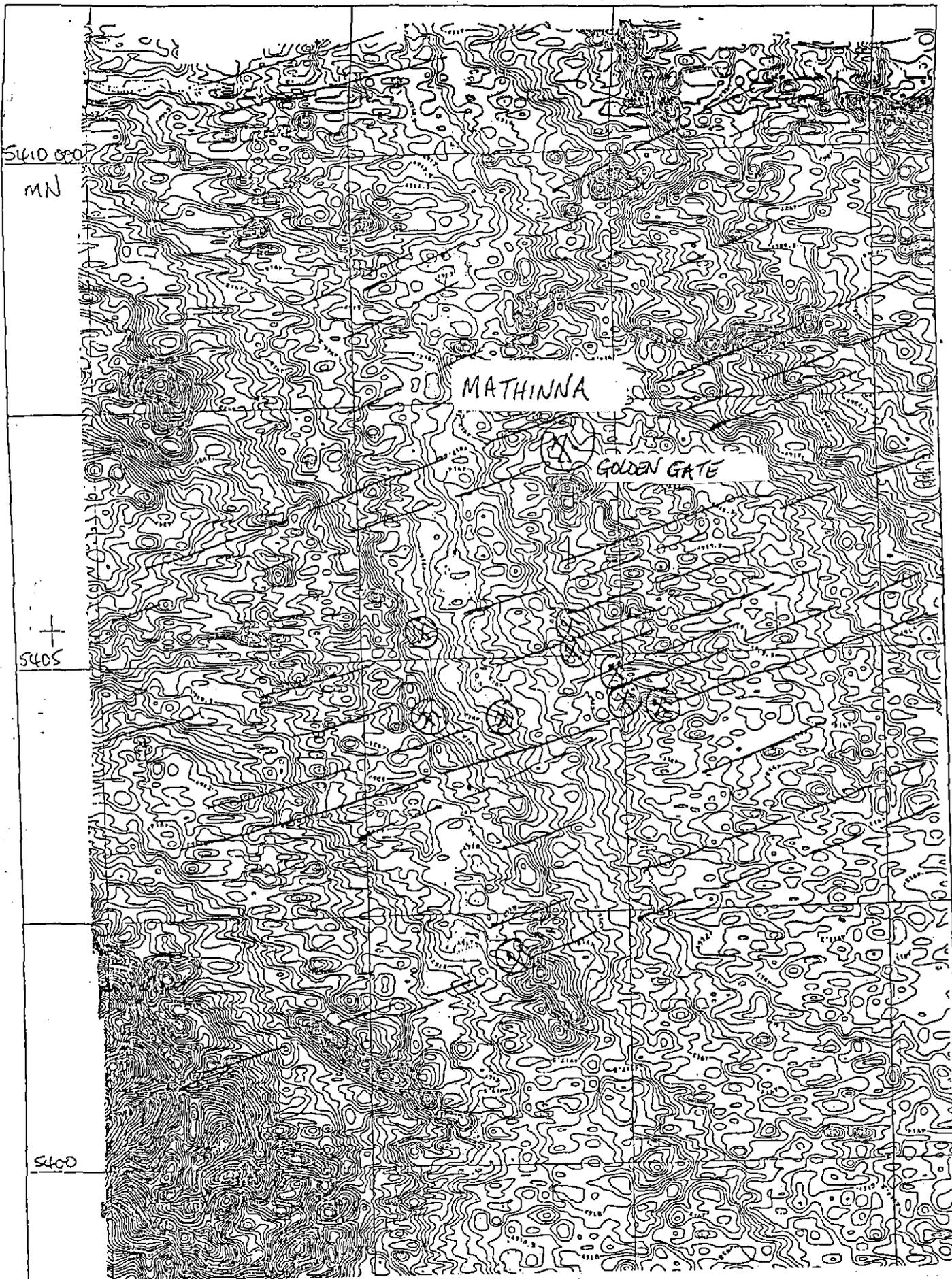
57300 E

147 35

57700 E

570 000 ME

575

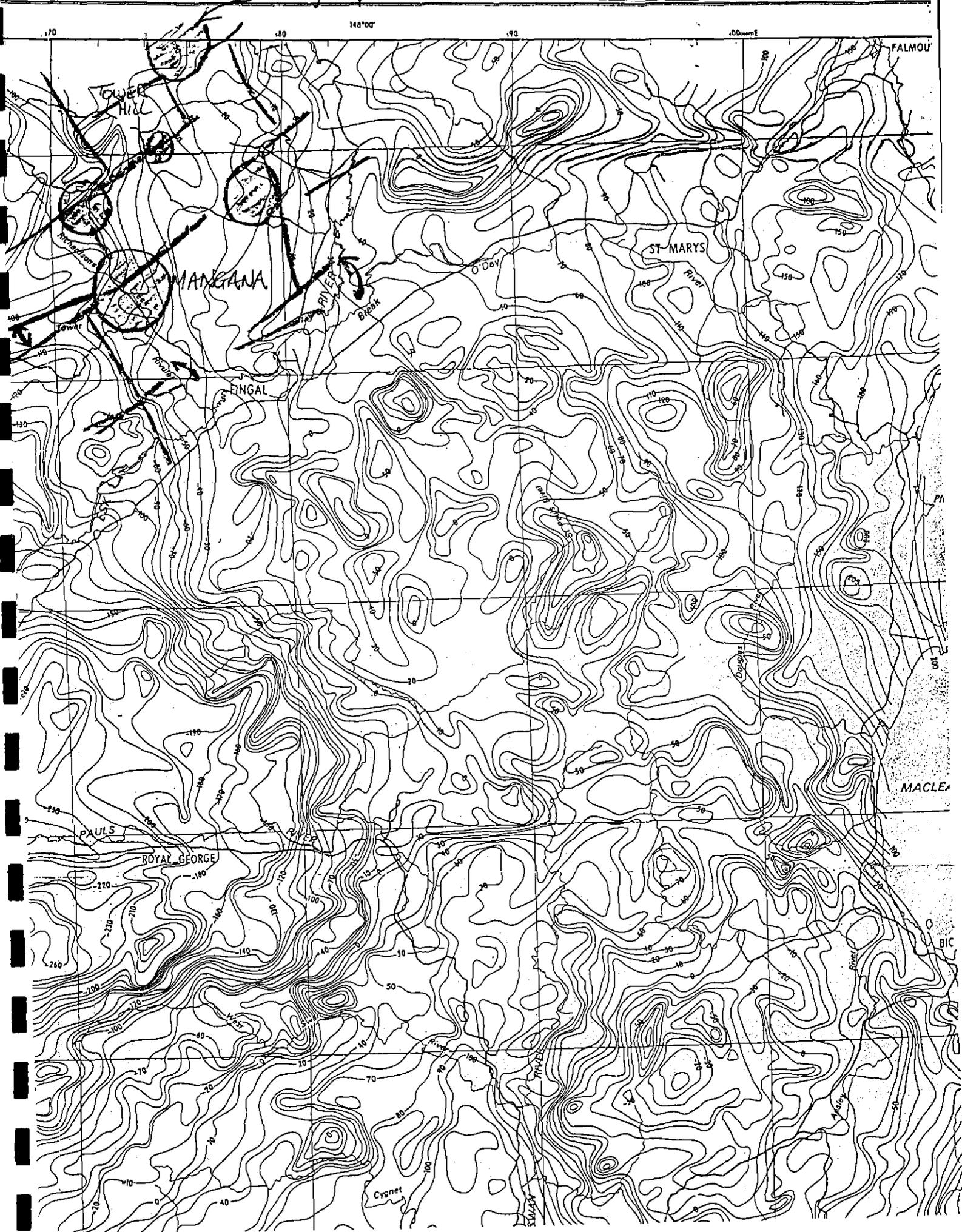


REVISED TREND INTERPRETATION OF MINERALISED SITE CONTROL AND PEGASUS MAGNETICS - NORTH AREA

CONTOURS OF RESIDUAL MAGNETIC FIELD (N PART)

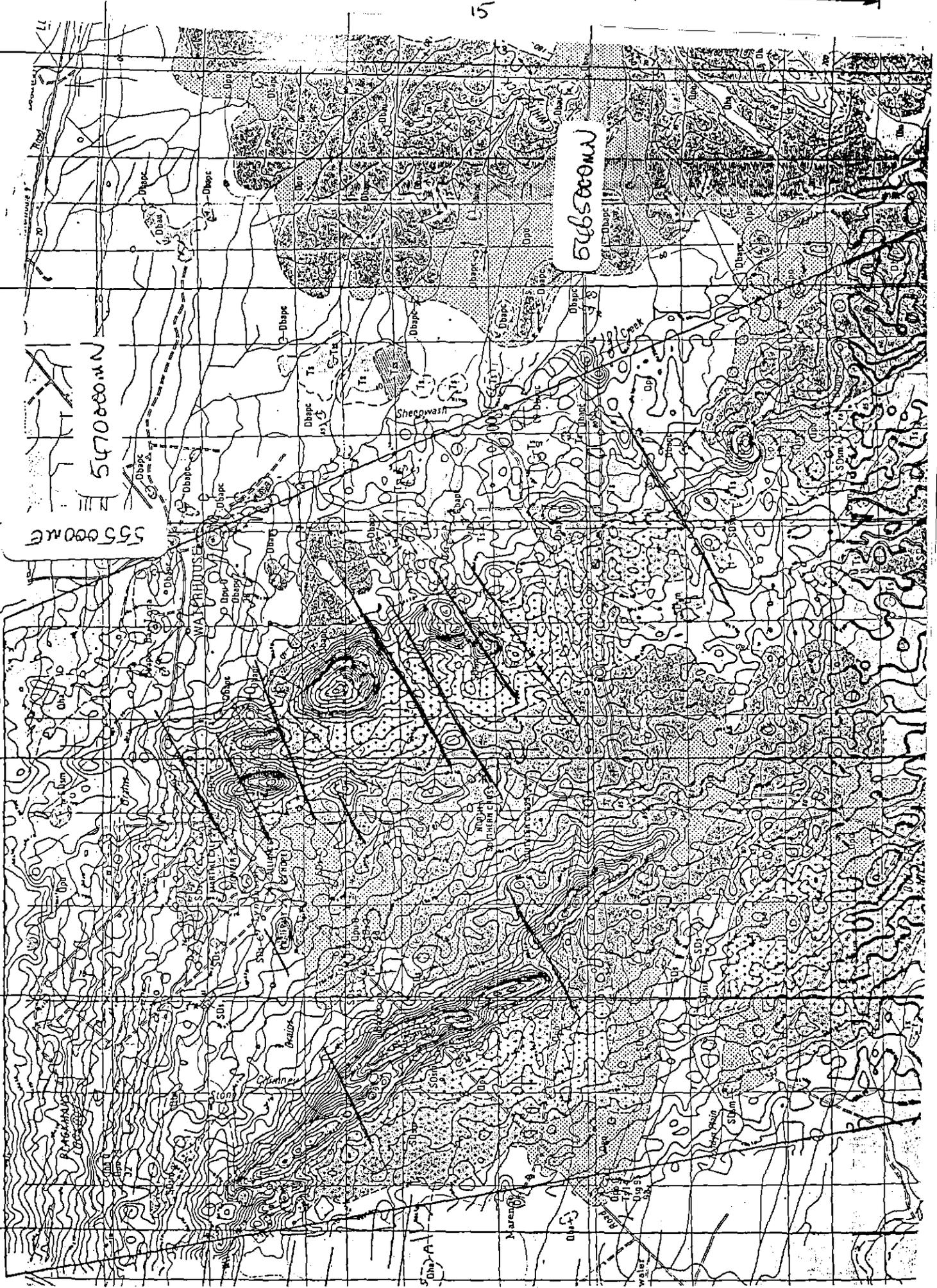
FIGURE 16

mine group



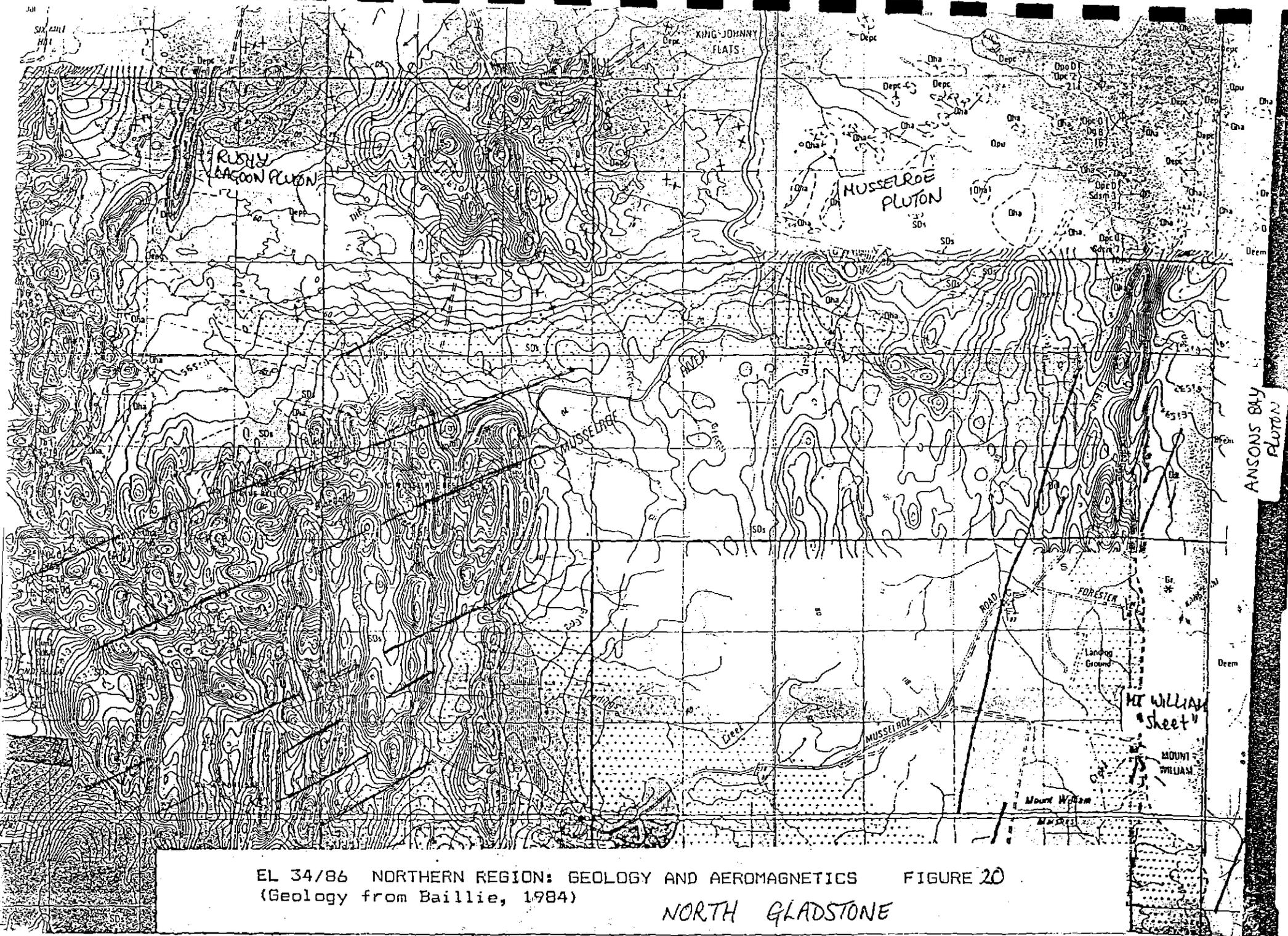
BOUGUER ANOMALIES IN FINGAL-TOWER HILL AREA
AFTER LEAMAN & RICHARDSON (1981)

FIGURE 18



REVISED TREND INTERPRETATION IN GLADSTONE REGION

FIGURE 19



043

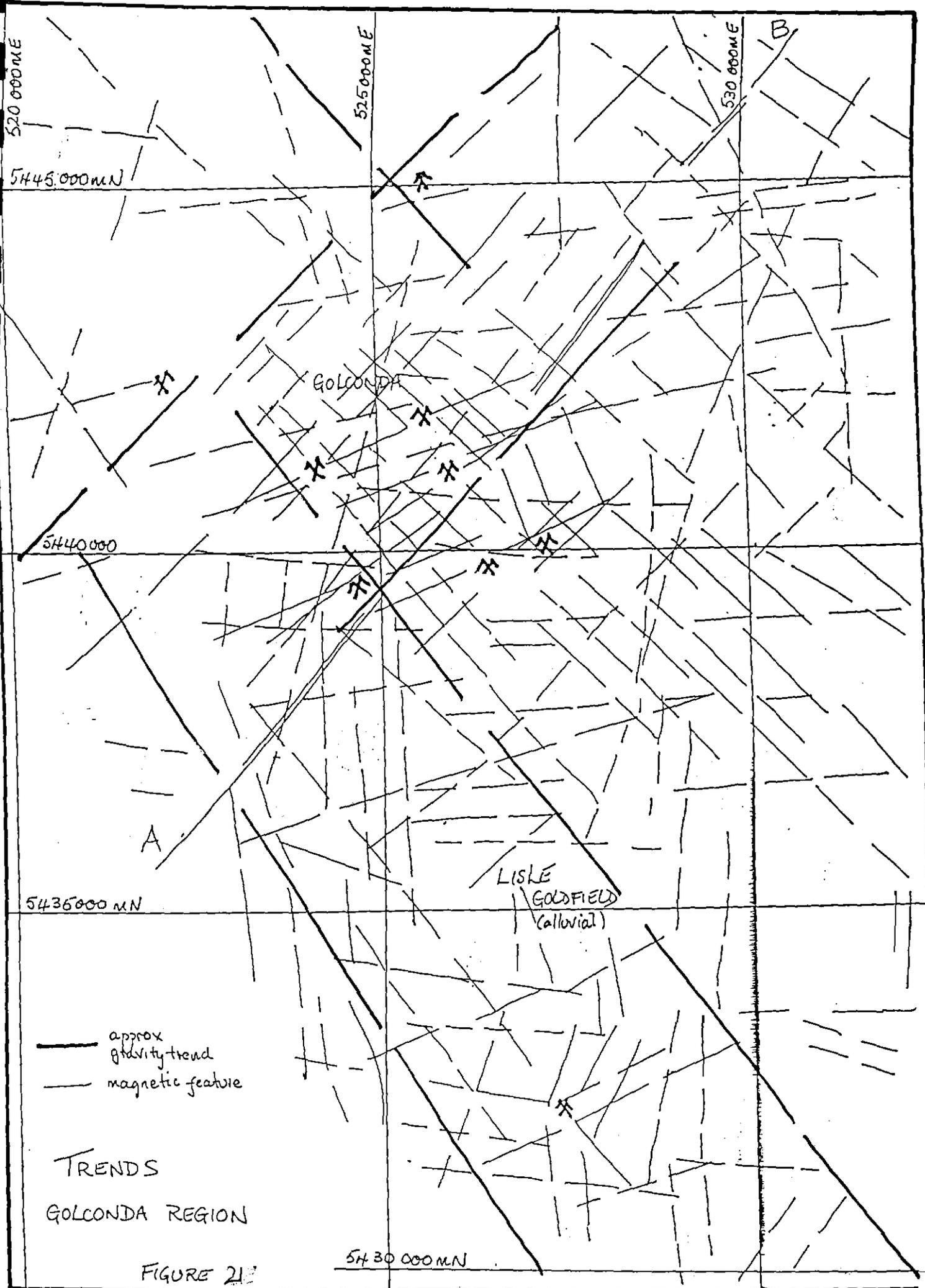
138044

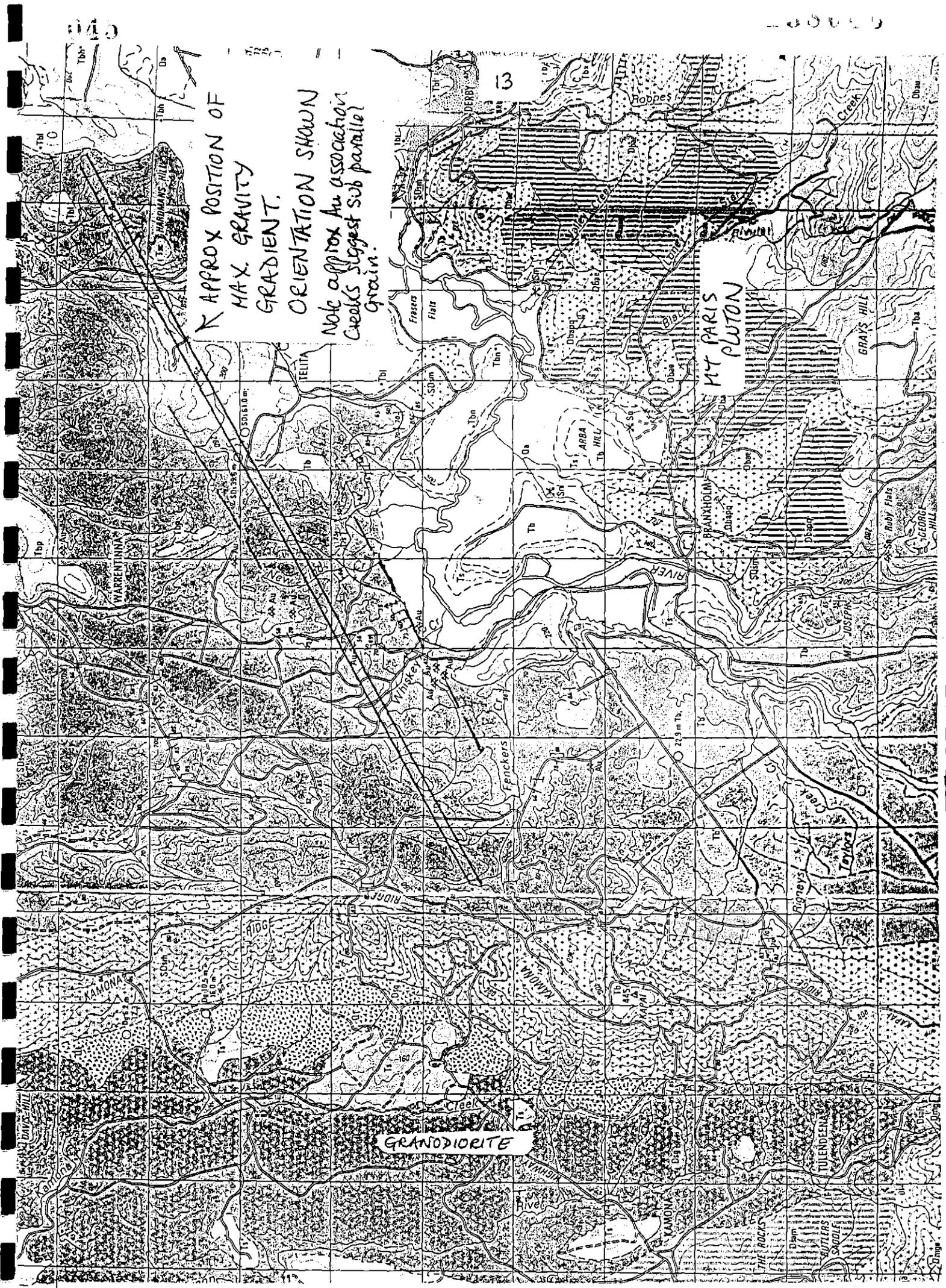
17

5 cm

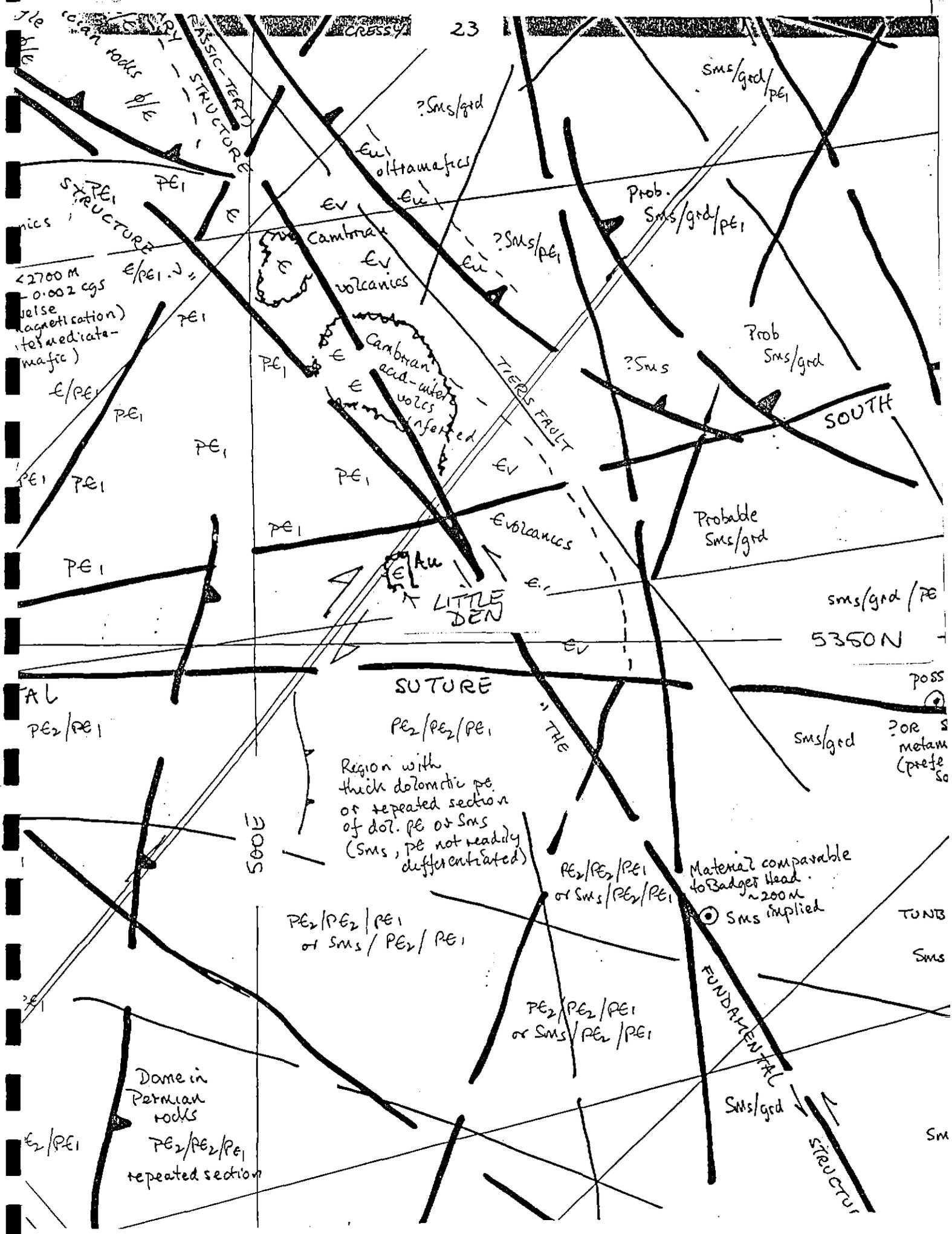
EL 34/86 NORTHERN REGION: GEOLOGY AND AEROMAGNETICS FIGURE 20
 (Geology from Baillie, 1984)

NORTH GLADSTONE

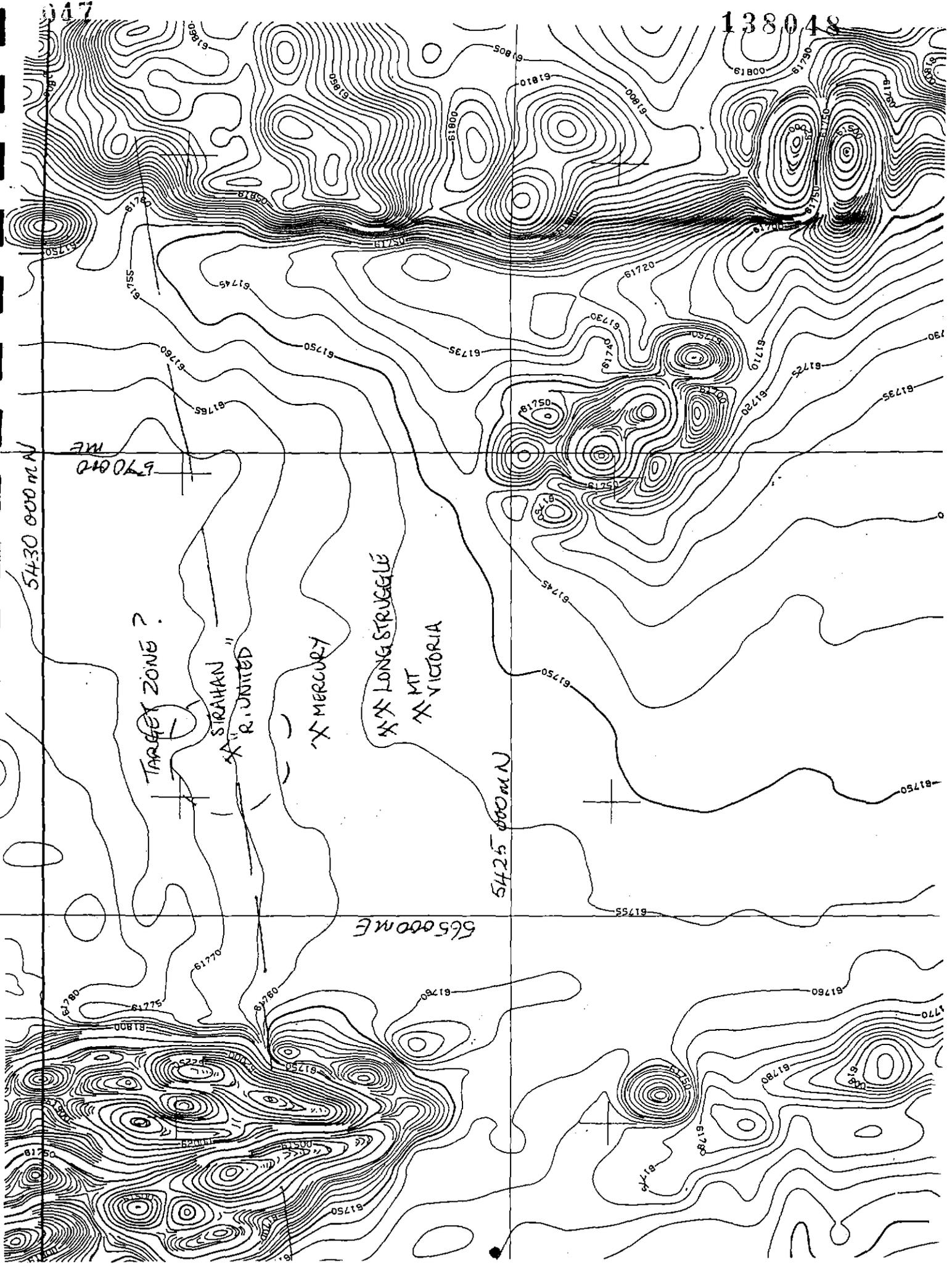




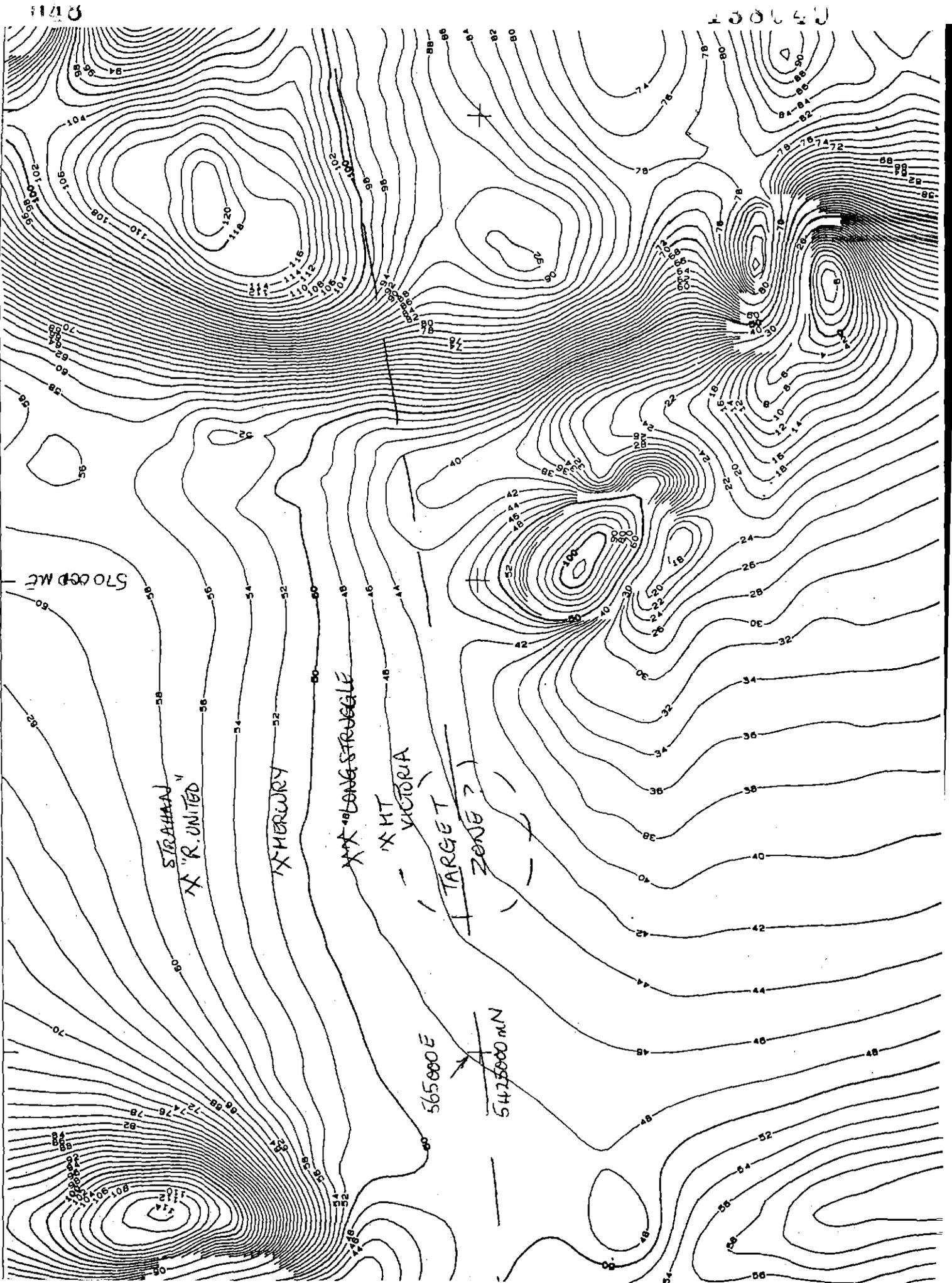
LOCATION OF MINERALISATION AND PRIMARY GRAVITY GRADIENT IN THE WARRENTINA AREA



REGIONAL STRUCTURAL INTERPRETATION OF NORTHERN MIDLANDS AND SETTING OF THE LITTLE DEN GOLDFIELD
 FIGURE 23



MINES DEPARTMENT REGIONAL SURVEY ALBERTON AREA
 Variable data quality. Note location of gradient in region of
 northern mines. This must be confirmed. FIGURE 24



MINES DEPARTMENT REGIONAL SURVEY ALBERTON AREA (CORRECTED DATA)
 Data corrected to 1500 m ASL. Note diffusion of gradient and likely onset near southern mines. Differences with Figure 24 reflect the limited data coverage near edge of survey and high relief terrain.