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EXPLORATION LICENCE 55/88

TOWER HILL

TASMANIA

ANNUAL REPORT ON EXPLORATION

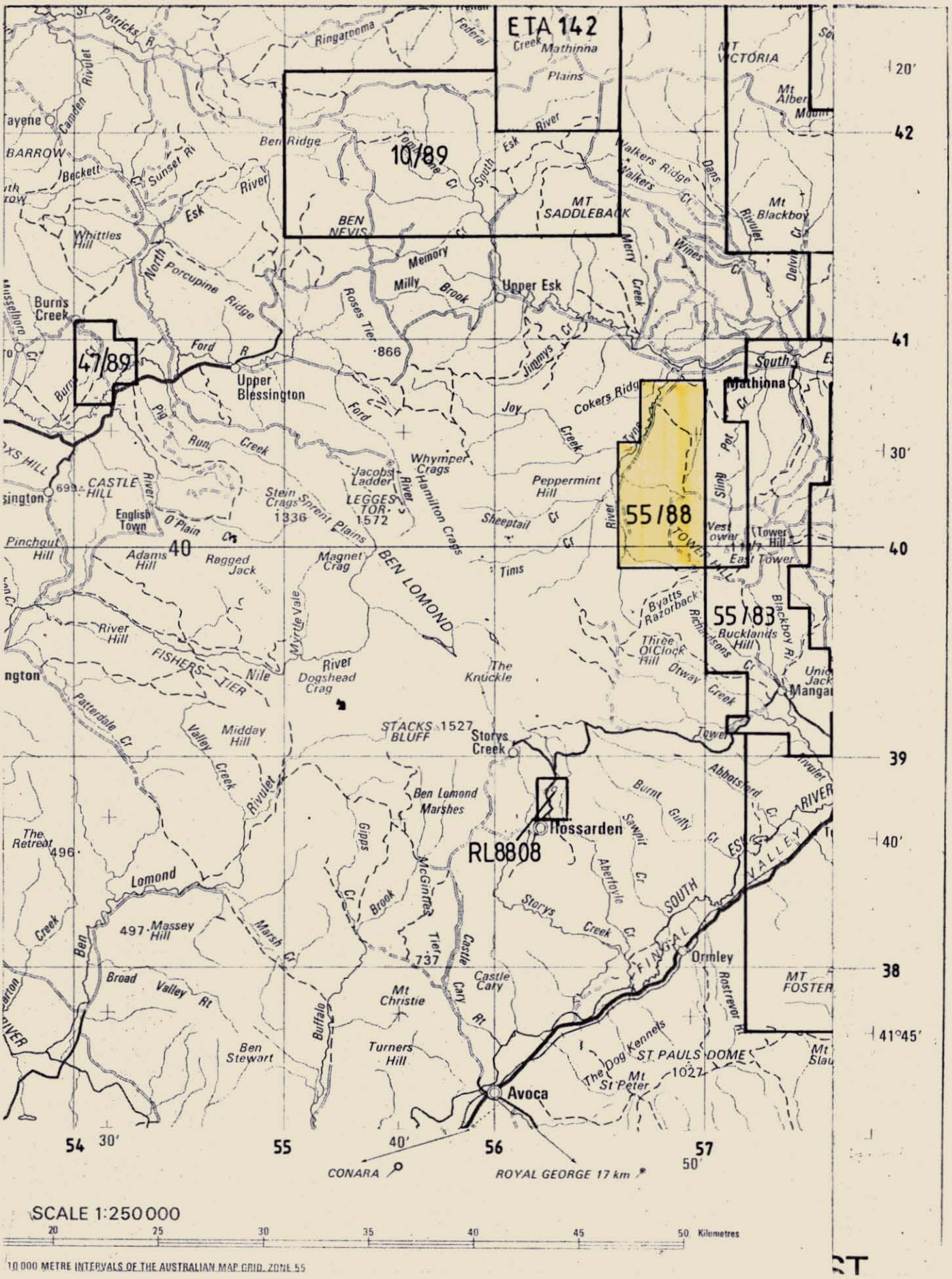
FOR THE PERIOD 7.4.89 TO 9.3.90

H. D. NOLAN
COMINEX
MARCH 1990

C O N T E N T S

FIGURES

APPENDICES



LOCALITY MAP E.L. 55/88

5 cm

figure 1

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INTRODUCTION

E.L. 55/88 covers an area of 32 SKM along the western slopes of Tower Hill plateau, south west of Mathinna in N.E. Tasmania.

Interest in the area was generated following identification of a gold bearing quartz vein system by Messrs Wallis and Roddam on mining lease 93M/87 held by them near the Tyne River.

Although the licence area is aligned along the N.N.W. extent of the regional Mangana - Lyndhurst Line of Lode early prospecting and mining activity was concentrated on the eastern slopes of Tower Hill plateau. The licence area appears to have received little prospecting attention.

The only evidence of early prospecting occurs at Locations 2 and 3 (see figure 2) respectively known locally as 'Butchers Prospect' and 'Romeo Prospect'. In each case the workings are small and consist of shafts approximately one metre square and of limited depth in country rock adjacent to quartz veining. Initial rock chip sampling of these sites gave no encouragement from 'Romeo Prospect' - L 3 but identified anomalous Zn, Mn, As and Au at the 'Butchers Prospect' - L 2. Interestingly Location 2 and Location 1 (Wallis Prospect) fall within a two kilometre zone of interest delineated by Leaman in his review of the Austirex airborne magnetics data.

The Wallis Prospect - L 1 is the only known recent work in the licence area.

THE WALLIS PROSPECT (Locality 1 - figure 2)

As the only known recent workings in the licence and the only workings proven to host an auriferous quartz vein system it is being treated for exploration purposes as a location of primary interest from which geologic, geochemical and geophysical data can be acquired for application through-out the licence area.

The workings consist of a shallow pit and three shallow bulldozer scrapes of approximately 50 metres in length each bearing east-west across the base of a steep slope. Immediately below the scrapes the bedrock with quartz veining is exposed in a small creek.

The country rocks consist of siltstone and fine grained sandstone assigned to the Mathinna Beds. Laminated siltstones exposed in the second bench dip steeply northwards. These sedimentary rocks are cut by several quartz veins many of which contained vughs after sulphides as well as remnants of scorodite, arsenopyrite and pyrite. Thin quartz veins exposed in the creek contain pyrite, chalcopyrite and minor galena.

In the vicinity of the larger quartz veins the country rocks are micaceous and include limonitic spots and cavities after sulphides.

The mineralised quartz veins and altered country rock at this prospect carry a similar sulphide assemblage to that seen on the dumps of the nearby Mathinna mines.

WORK COMPLETED

GEOPHYSICAL

Cominex contracted Austirex International Pty Ltd to conduct an airborne magnetic and radiometric survey over the licence area.

Data acquired from this survey was reviewed by Dr. D. E. Leaman who reported that the magnetics as presented were of limited value as a prospecting tool in comparative analysis of anomalies and responses, or for correlations between known mineralised areas and anomalies, due to recognisable terrain effects in the data. Leaman also reported that the radiometric data could not be considered reliable and did not form the basis for any of his recommendations.

After effecting flight line clearance and terrain variation corrections, Leaman delineated an area of approximately two square kilometres having some geophysical characteristics of interest.

Leamans full review is contained in Appendix 2.

WORK COMPLETED

GEOCHEMICAL

Rock chip sampling has been conducted at Locations 1, 2 and 3, sites of early and current prospecting activity and in Tiger Gully Creek immediately to the north of location 1.

Analyses - see Appendix 1

- LOCATION 1
  (Wallis Prospect)

SAMPLE NO.	DESCRIPTION
T88001	100 mm auriferous quartz vein being worked by Wallis (Main Vein).
T88002	10 mm quartz veins cross cutting the Main Vein.
T88003	country rock against Main Vein
T88004	50 mm quartz vein 500 mm to west of and parallel to Main Vein
T88005	15 mm quartz vein 10 m west of Main Vein
T88006	50 mm quartz vein 20 m west of Main Vein
T88007	50 mm quartz vein 25 m west of Main Vein
T88008	75 mm quartz vein 30 m west of Main Vein

SAMPLE NO.	DESCRIPTION
T88009	75 mm quartz vein 38 m west of Main Vein
T88010	75 mm quartz vein 50 m west of Main Vein
T88011	100 mm quartz vein 20 m east of Main Vein

- LOCATION 2
  (Butchers Prospect)

T88012	300 mm quartz vein in shaft
T88013	altered country rock scree around workings
T88014	altered country rock from excavation dump

- LOCATION 3
  (Romeo Prospect)

T88015	quartz vein from excavation dump
T88016	country rock with quartz veining from excavation dump

- TIGER GULLY CREEK

T88017-025	All samples were of quartz vein material exposed in creek bed

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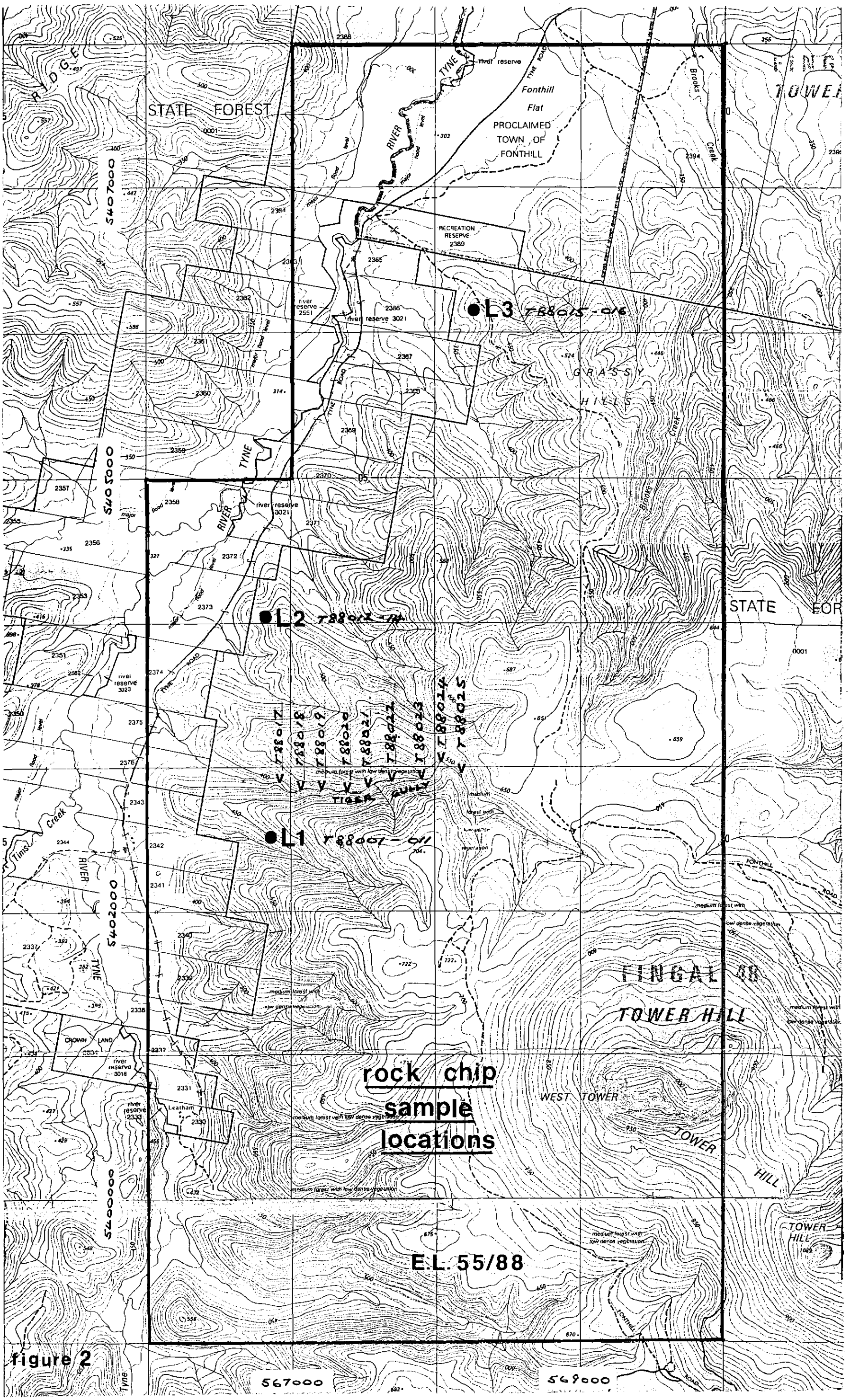

figure 2

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Appendix 1

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ANALABS

A Division of Macdonald Hamilton & Co. Pty. Ltd.

ANALYTICAL DATA

SAMPLE PREFIX | REPORT NUMBER: 999.01.08.05833 | REPORT DATE: 18/11/88 | CLIENT ORDER No.: 15868/9 | P: 1

TUBE No.	SAMPLE No.	Cu	Zn	Ag	Mn	As	Au	AuChk	
1	T88001	30	85	<0.5	275	340	9.760	12.700	
2	T88002	50	75	<0.5	505	110	0.835	-	
3	T88003	100	165	<0.5	1050	420	0.314	-	
4	T88004	10	40	<0.5	465	42	0.013	-	
5	T88005	20	50	<0.5	365	33	0.023	-	
6	T88006	20	30	<0.5	610	22	0.043	-	
7	T88007	20	55	<0.5	720	12	0.015	-	
8	T88008	10	45	<0.5	650	6	<0.008	-	
9	T88009	15	55	<0.5	375	7	<0.008	-	
10	T88010	15	40	<0.5	310	8	<0.008	-	
11	T88011	<5	20	<0.5	430	90	<0.008	-	
12	T88012	<5	15	<0.5	80	60	0.012	-	
13	T88013	25	435	<0.5	4100	3800	0.196	-	
14	T88014	50	555	1.0	4350	3200	0.092	-	
15	T88015	<5	10	<0.5	35	10	<0.008	-	
16	T88016	<5	20	<0.5	140	10	<0.008	-	
17									
18									
19									
20	NOTE: Due to an error the Samples were assayed for Au by method 3								
21	ie 30gm Fire Assay. If you require 313 there will be no ch.								
22	for the 309 analysis.								
23	DETECTION	5	5	0.5	5	1	0.008	0.008	
24	UNITS	PPM	PPM	PPM	PPM	PPM	PPM	PPM	
25	METHOD	101	101	101	101	114	309	309	

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
- = element not determined

AUTHORISED OFFICER

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ANALABS

A Division of Macdonald Hamilton & Co. Pty Ltd.

ANALYTICAL DATA

SAMPLE PREFIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	
	999.01.08.05869	07/12/88	18571	1

TUBE No.	SAMPLE No.	Cu	Zn	Ag	Mn	As	Au	AuChk	
1	T88017	10	60	<0.5	395	20	0.018	0.014	
2	T88018	5	10	<0.5	205	5	<0.005	-	
3	T88019	10	10	<0.5	95	2	<0.005	-	
4	T88020	5	10	<0.5	180	1	0.437	0.300	
5	T88021	5	20	<0.5	770	10	<0.005	-	
6	T88022	15	20	<0.5	1700	2	<0.005	-	
7	T88023	5	15	<0.5	195	1	<0.005	-	
8	T88024	5	20	<0.5	555	4	0.006	-	
9	T88025	5	30	<0.5	510	17	<0.005	-	
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23	DETECTION	5	5	0.5	5	1	0.005	0.005	
24	UNITS	PPM	PPM	PPM	PPM	PPM	PPM	PPM	
25	METHOD	101	101	101	101	114	313	313	

Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER

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Appendix 2

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LEAMAN GEOPHYSICS

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

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REVIEW OF GEOPHYSICAL DATA
EL 55/88 TOWER HILL

for
COMINEX
by
Dr. D.E. Leaman

November 1989

CONTENTS

FIGURES

(All Figures are located between pages 10 and 11)

MAPS

(All maps are located in pockets at the back of the report)

SUMMARY

Airborne radiometric and magnetic data in the region of EL 55/88, Tower Hill, in north-eastern Tasmania, have been reviewed.

Radiometric data contain much character but most is readily associated either with terrain and aircraft clearance or Permo-Triassic or Quaternary cover on Siluro-Devonian Mathinna Beds. Reliance upon this data in its present form is not advised.

Similar comments apply to the magnetic data as presented by the contractor. Terrain effects are recognisable and limit the value of the survey as a prospecting tool, either for comparative analysis of anomalies and responses or for correlations between known mineralised areas and anomalies.

Since EL 55/88 contains no known prospects or old workings these data limitations negate exploration applications.

The basic magnetic data do, however, demonstrate that the Devonian granodiorites and contact aureoles about granitoid margins are slightly magnetised and that structural information about the form of the intrusions can be recovered. A junction between granite and granodiorite can be inferred west of Tower Hill at a depth of about 1 km.

A clearer view results when the regional magnetic data are corrected for flight clearance and terrain variations and presented in true drape form, or the manner desired but imperfectly achieved by the physical survey. All effects remain relatively subtle some correlation may be made between field character, gradients and known mineralisation. Although the Mathinna , Mangana and Tower Hill goldfields lie east of EL 55/88 any correlations must be applicable west of Tower Hill. The largest producers at Mangana and Mathinna are associated with broad, ill-defined magnetic lows.

The reduced magnetic response of mineralised areas suggests that the Mathinna Beds are themselves slightly magnetic and that this property is lost or reduction by alteration associated with the introduction of mineralising fluids or the mineralisation itself.

Within EL 55/88 only one area carries a comparable "mineralisation" response. This two square kilometre area should be explored in detail using ground magnetic and geochemical methods.

INTRODUCTION

EL 55/88, Tower Hill, of 32 square kilometres, is located about 17 km northwest of Fingal and 7 km southwest of Mathinna in northeast Tasmania (see Figure 1).

The geology of much of the licence area is shown by Calver et al (1988).
Alluvial deposits blanket the floors of the larger valleys, such as those of the River Tyne and Joy Creek, and apart from a small area around West Tower at Tower Hill, Siluro-Devonian Mathinna Beds are exposed. A remnant of the Permo-Triassic cover intruded by Jurassic dolerite occurs near Tower Hill. Some post Permian faulting has been suggested west of Tower Hill but no consistent structural pattern is known.

Although the licence was sought in order to undertake basic gold exploration no workings or previous prospects are known. This is perhaps surprising given the concentration and spread of activity to the east of Tower Hill.

In February 1988 the Mines Department acquired magnetic and radiometric data across the region between Mangana and Alberton. This experimental survey was undertaken to test the methods, styles of responses, correlations made and provide some structural information. The Mines Department regional survey was supplemented in the region of EL 55/88 (see Appendix and Maps 1 to 4).

Richardson (1989) has provided a general outline of the survey and data presentation together with basic modelling of three profiles. The Mines Department survey data has subsequently been re-processed (R.G. Richardson pers comm, and Figure 5).

This report describes the particular portion of the regional survey relevant to EL 55/88, the detailed infill, and considers the implications of the reprocessed data.

GEOPHYSICAL DATA

The Mines Department regional survey has been described by Richardson (1989). The survey was specified with east-west lines 500 m apart and nominal terrain clearance of 150 m.
Details of the infill flown concomitantly for EL 55/88 are shown in the Appendix. With the exception of line spacing all other specifications for the two surveys were comparable.

Radiometric and magnetic data were acquired in each case.

Maps 1 to 4 at the rear of this report present flight path recovery, total magnetic field intensity, total counts and potassium counts respectively.

Figure 2 presents an extract from Map 2 imposed on a topographic base. This diagram indicates a large relatively positive feature WNW of Grassy Hills, disturbed field near Tower Hill and a generally 'flat' character west of Tower Hill. Close inspection shows that many second order features are related to the topography and aircraft clearance. Good examples of negative and positive response correlations may be seen at 367 500 mE, 5403 700 mN and 369 300, 5403 850 respectively. Gross features are clearly independent of terrain. Figure 2 is very similar to the Mines Department regional map.

Figure 3 presents an extract from Map 4 with a topographic base. This rather noisy compilation has a very small value range and many features reflect the form of the underlying terrain. Examples may be seen at 366 700 mE, 5403 500 mN and 368 400, 5405 000. Low counts were generally recorded in Permian or Quaternary covered areas. Exposed Mathinna Beds average at least double the counts. There are some exceptional zones in which counts exceed 150. These occur near the ridge top north and west of Tower Hill and may indicate much reduced flight clearances. This is normal wherever the flight path is ramped to achieve nominal clearance levels at the top and base of the slope; the result is to be too low on any slope flexures.
It is difficult to appraise the value and reliability of this data without detailed inspection of on-line clearances and clearance consistency between lines but it is certainly suspect.

Similar problematic relationships are evident in Figure 4 which is an extract from Map 3. All significant total count gradients reflect the terrain, either directly or in somewhat smoothed forms. This is especially noticeable around the edge of the Tower Hill plateau and Grassy Hills even though the value range is now several hundred counts.

Figure 5 presents corrected magnetic data from the Mines Department regional survey. Corrected data by Dr. Richardson, Mines Department release, November 1989. The adjustment, or

difference between say Figure 2 and Figure 5, reflects upward and downward continuation of all data to produce a land parallel projection or drape 250 m above the terrain. This procedure results in some loss in detail in some areas and much gain in others and allows all features recorded to be properly compared even if these cannot be easily modelled; modelling requires a fixed level transformation and not a drape.

The Tower Hill dolerite anomaly is believable and properly located. The elevated field WNW of Grassy Hills has been modified and the gradients are clearer and simpler. Anomalous character west of Tyne River is better defined and there are significant differences in form west of Tower Hill. Most changes reflect the extreme variations between specified flight clearance and actual clearance. These differences have been enormous due to the topographic impediments of Ben Lomond and Tower Hill.

INTERPRETATION

Several issues have been raised by those parts of the data set deemed acceptable.
Namely:

1. What is the origin of the broad rise in magnetic field intensity WNW of Grassy Hills? (Uncorrected data, Figure 2)

2. What is the origin of the large anomaly west of Tims Creek? (Map 2 and Figure 5)

3. What is the origin of the sub E-W features evident in the corrected magnetic data? Several line sets are involved in each and the continuation process should have neutralized any inter line differences. Ghosts of these features are identifiable in regional presentations of the uncorrected data.

4. Are any features, in any data set, related to mineralisation or alteration?

The long wavelength anomalies have been examined. See also Richardson (1989). All are related to irregular granitoid surfaces at depth. The source material is probably granodiorite and the depth estimates may be modified by a 600 to 1000 m thickness of Mathinna Beds modified by thermal contact alteration. Figures 6 and 7 present two sections across the Grassy Hills anomaly NW of the River Tyne. These crude models show that the surface of the intrusives is irregular and not less than 1000 m below the magnetometer. Uncorrected data was used in these models and the implied depth to the outer limit of altered Mathinna Beds in the aureole is thus not less than 800 m below land surface.

These models and profiles show that some of the gradients presented in the observed field map (Figure 2) are not real and the character shown in Figure 5 better defines source boundaries.

The models also indicate the nature of the source of the large anomaly west of the River Tyne. It is due to the termination of the granodiorite slab by a granite pluton. The granite is part of the Ben Lomond Pluton exposed at Rossarden. The granodiorite is the southward extension of the western part of the Scottsdale Batholith as exposed at Diddleum Plains. The overall anomaly pattern would suggest that this contact extends eastward beneath Tower Hill but a depths increasing eastward. The orientation of

these granitoid contacts or cupola type rises and extensions does not appear to bear any obvious relationship to the gold occurrences east of Tower Hill. A three dimensional structural analysis would, however, be required to confirm this view and the magnetic data is of sufficient reliability to permit this.

Several east-west features are evident in all data sets. Figure 8 summarises trend information deducible from reliable presentations.
The trend figure is a compilation from all sources, including uncorrected and radiometric data, in order to suggest weight of indication and probable reality. The trend patterns suggest that the NE-SW, NW-SE stream patterns about Tower Hill are not accidental.

Since the absence of old prospects or mines in EL 55/88 precludes any attempt to correlate features or trends with mineralisation, the area east of Tower Hill was examined instead. It was hoped that this might reveal some patterns which occur in the EL but for which no mineralisation is yet established.

While the trend patterns and inferences concerning the disposition of underlying granitoids are suggestive they are not specific and, like the character in radiometric and uncorrected magnetic field maps, offer no correlations or predictions of use to exploration.

The corrected magnetic field map however appears to merely re-inforce the effect of the observed magnetic field map. Any character along the mineralised belt between Mangana, Mathinna and Alberton is extremely subtle and the magnetic field tends to be dominated by the interfering effects of the deep sources noted above. The result, along the axis of the belt, is a zone of nearly "flat" magnetic field.
The meaning of this character is not immediately evident and several possibilities may be suggested.

1. The Mathinna Beds are negatively anomalous along this axis which would presume that these units normally carry a slight positive contrast. Susceptibility measurements indicate that this might be so.
2. The effect is due to increasing depth of granitoids beneath the mineralised axis.
3. Subtle interference of anomaly tails due to the geometry of the granitoid surface.
4. Gross alteration of the Mathinna Beds .

Within EL 55/88 there are few such features, which perhaps accounts for the absence of known mineralisation. If the geometric effects of the granitoid contacts are discounted then the only possible target of this type is located at 367 000 mE, 5402 to 5404 000 mN approximately. It is represented by the bland field area north west of Tower Hill which has the same character as the field along the Mathinna-Alberton belt but, as noted above, its origin is not established or yet definitely

correlated with mineralised ground.

This suggested target zone are shown in Figure 9. It is possible to conceive of this zone as elements of a single original structure or feature dislocated by sub E-W or NW-SE structures. Its location south of a granodiorite rise but immediately ease of clearly anomalous Mathinna Beds may be significant. Several NW-SE structures cross it and several of these appear to be reflected in the drainage pattern.

CONCLUSIONS

Although much of the data is affected by observational deficiencies imposed by the nature of the various surveys, flight equipment, terrain and specifications useful structural and targetting conclusions can be extracted from the magnetic surveys. The radiometric data can not be considered reliable and does not form the basis for any recommendations.

Observed magnetic data suggest that most character defined is related to granitoid aureoles within the Mathinna Beds. These lie at least 1 km below surface near Tower Hill.

The observed magnetic data reveal no correlations with known mineralisation but data corrected to a fixed reference level do indicate an introduced blandness that is atypical of granitoids or normal Mathinna Beds. The field intensity is locally diminished at mineralised sites indicating a subtle but important change in the properties and/ or composition of the Mathinna Beds. One anomaly of this type has been noted and this relatively small area should be reviewed and carefully explored using ground methods.

RECOMMENDATIONS

The area indicated in Figure 9 should be examined in some detail using ground methods.

Early work has already suggested the presence of gold-bearing quartz at the southern end of the feature and an arsenic anomaly at the northern end. The nature and alignments of the terminations of this area indicate some gross structural controls may be present.

The work reported here accounts for present observations and shows that further work is justified.

Experience elsewhere in NE Tasmania has shown that ground magnetics can identify

- vein systems, since the wall rocks are oxidised and magnetised,
- alteration in Mathinna Beds, since a negative change occurs near mineralisation. (This knowledge from surface work tests formed the basis for checking the corrected airborne data against mineralised sites in expectation of such a response)

Some geochemical approach should support any magnetics.
No other methods are yet known to be of use. At least these are inexpensive and apparently effective.

The ground magnetic survey required to achieve these goals must be quite detailed. A proton magnetometer must be used and times of sunspot activity avoided. The data must be rigorously corrected for loop and field drift errors.
Any mineralised site of reasonable size or interest should be associated with a substantial volume of altered rock and a line spacing of 50 m will be adequate for an initial survey. An observation spacing of 1 good pace (say 1 m) is advised. Such a survey will enable the foci of any airborne response, which will be much more widespread and poorly focussed due to instrument height above the ground, to be found.
Such a survey will reveal spikes in association with veins and the vein response may be traceable between lines by short line segment infills between lines. The orientation of vein systems can be determined in this way. Until more is known of the gold association it is suggested that the key objective of such surveys is the location of the altered foci.

The terrain of the area is such that the lines should be approximately E-W or upslope rather than along slope although some tie lines will be required.

Definition of foci followed by vein location, costeaning, sampling and similar operations should form a realistic exploration sequence. Arsenic anomalies may also overlap or spill from such zones.

REFERENCES

Calver, C.R., Everard, J.L., Findlay, R.H. and Lennox, P.G., 1988. Ben Lomond. 1: 50000 Geological Map Sheet 8414N. Mines Department Tasmania.

Richardson, R.G., 1989. The Mangana-Alberton aeromagnetic survey - a preliminary interpretation. Unpub. Rep. Dep. Mines Tasm., 1989/19.

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Report submitted on behalf of
Leaman Geophysics
by

D. Leaman

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

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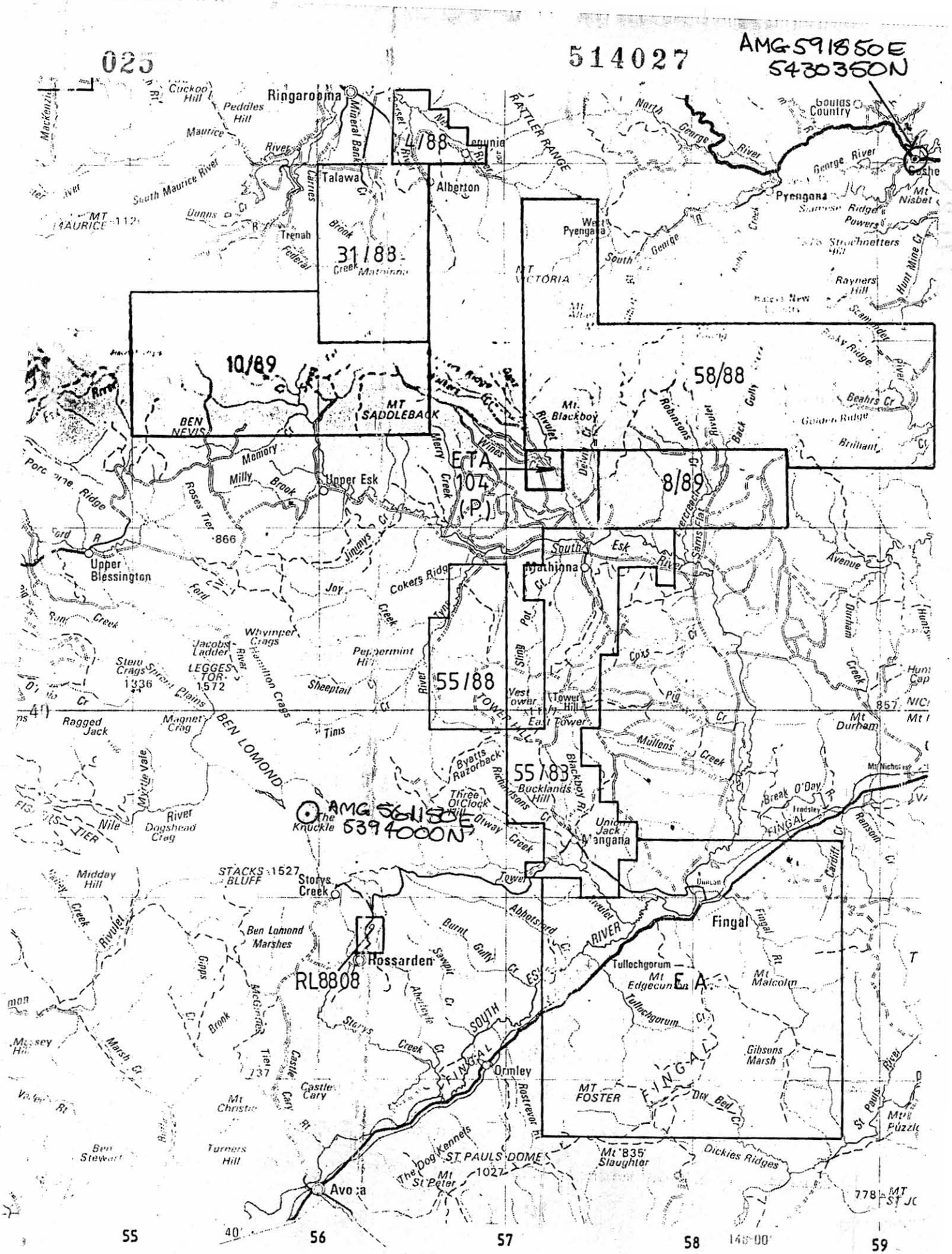
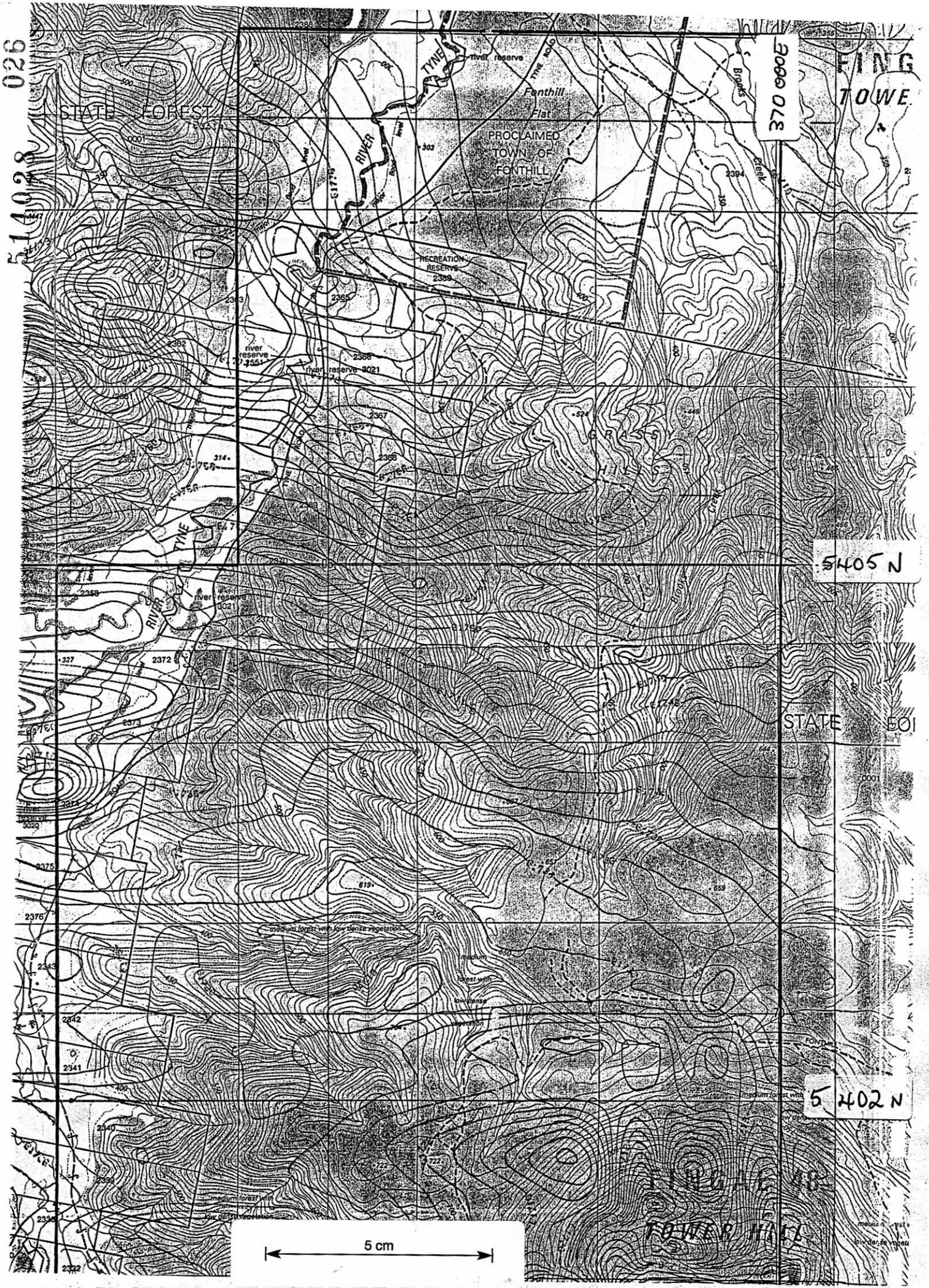
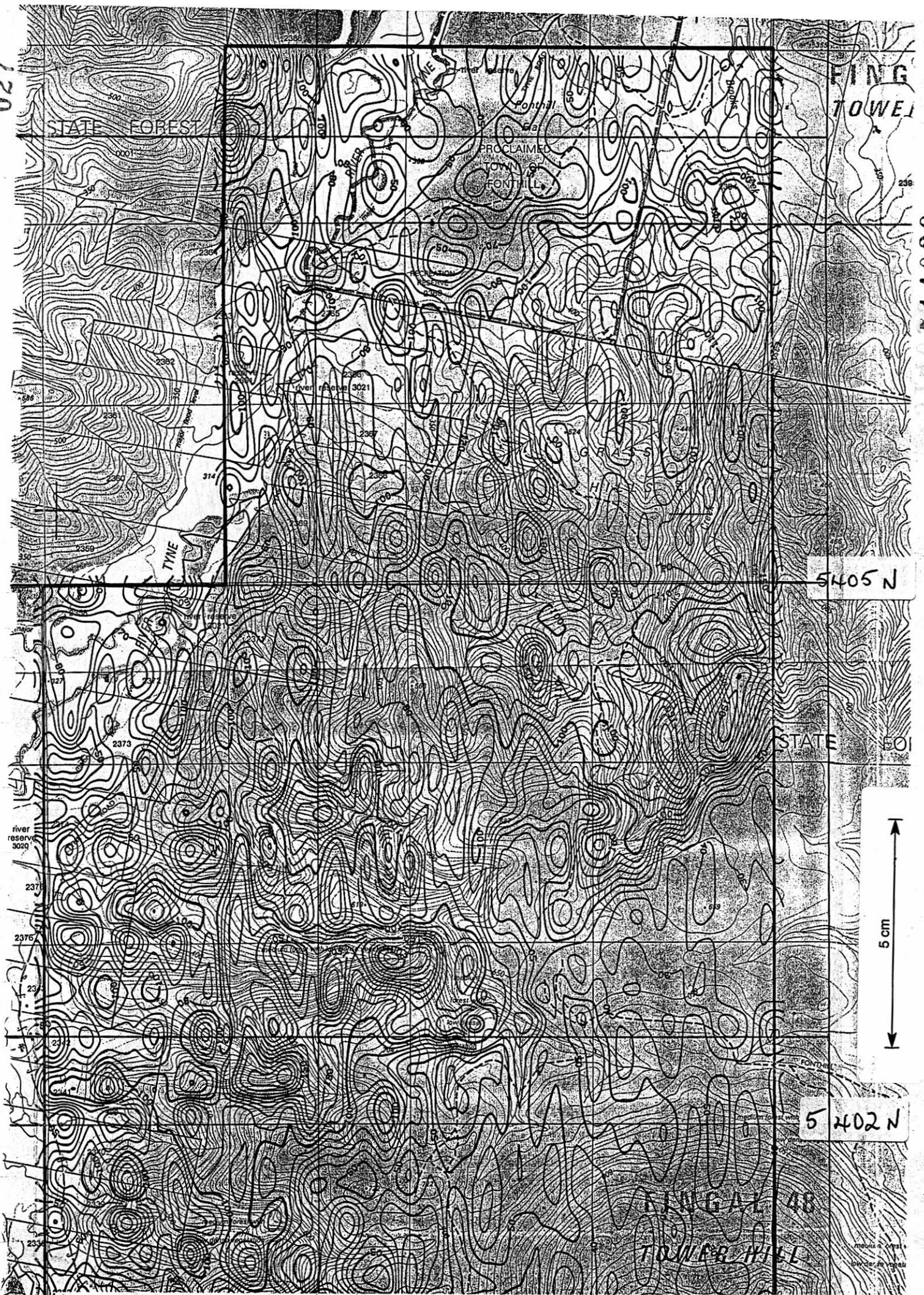


AMG REFERENCE POINTS ADDED

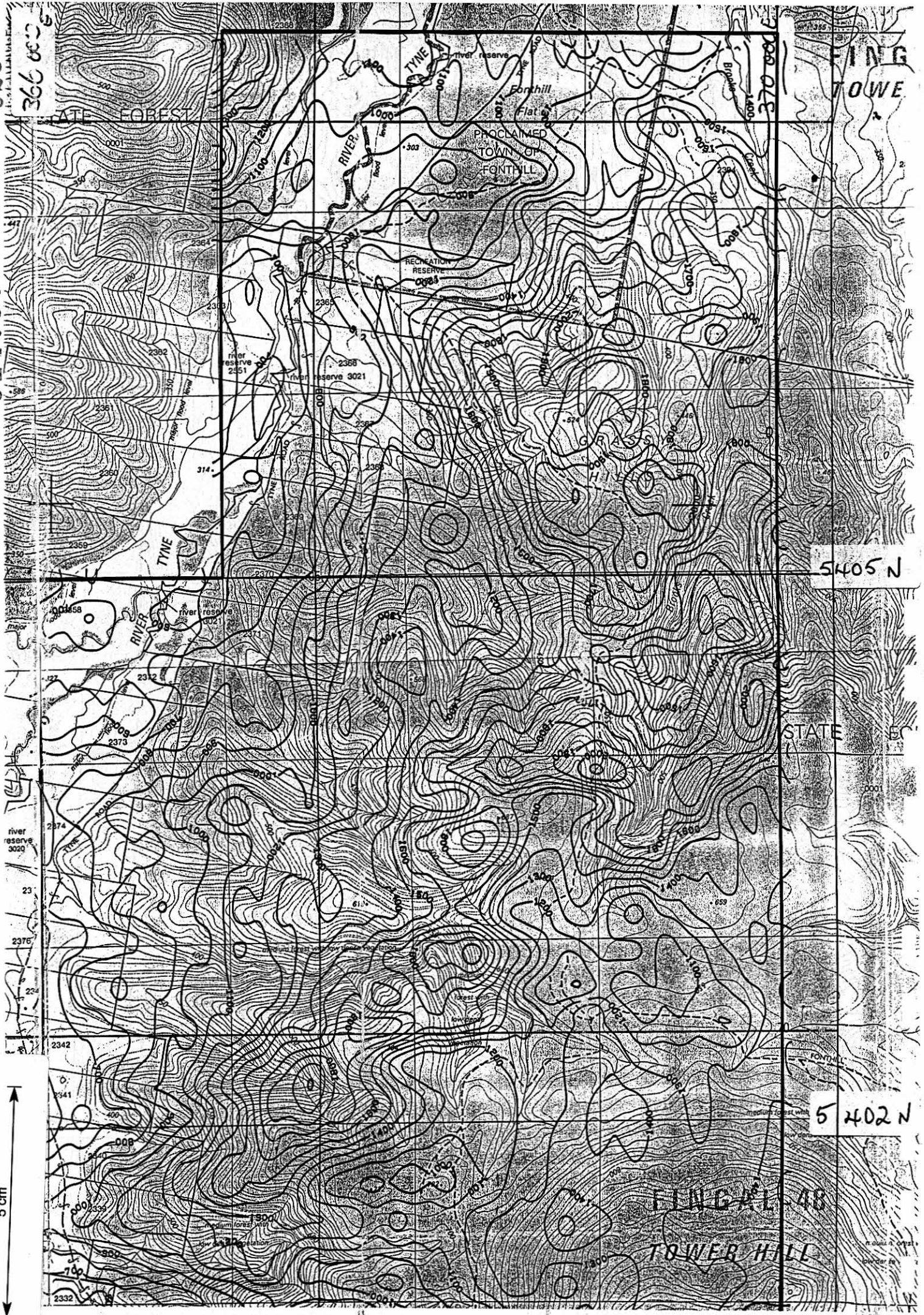
EL 55/88 LOCATION MAP 5 cm FIGURE 1



EL 55/88 EXTRACT OF MAGNETIC FIELD MAP AND TOPOGRAPHY
Detailed survey FIGURE 2

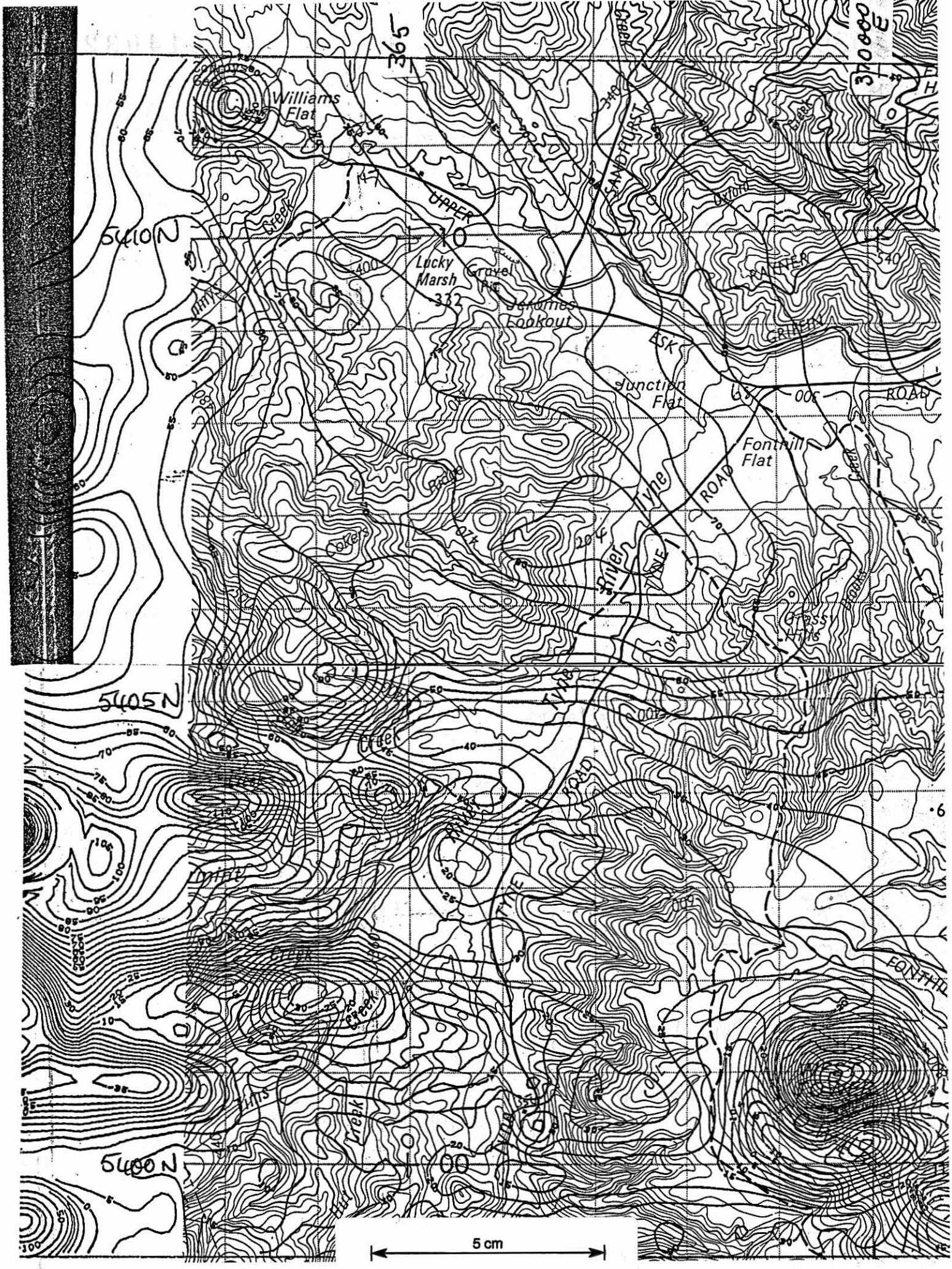


EL 55/88 EXTRACT OF POTASSIUM COUNTS MAP AND TOPOGRAPHY
Detailed survey FIGURE 3



EL 55/88 EXTRACT OF TOTAL COUNTS MAP AND TOPOGRAPHY
Detailed survey

FIGURE 4



EL 55/88 CORRECTED MAGNETIC FIELD MAP AND TOPOGRAPHY
Mines Department data, regional survey continued to 250 m drape. Source: Mines Department FIGURE 5

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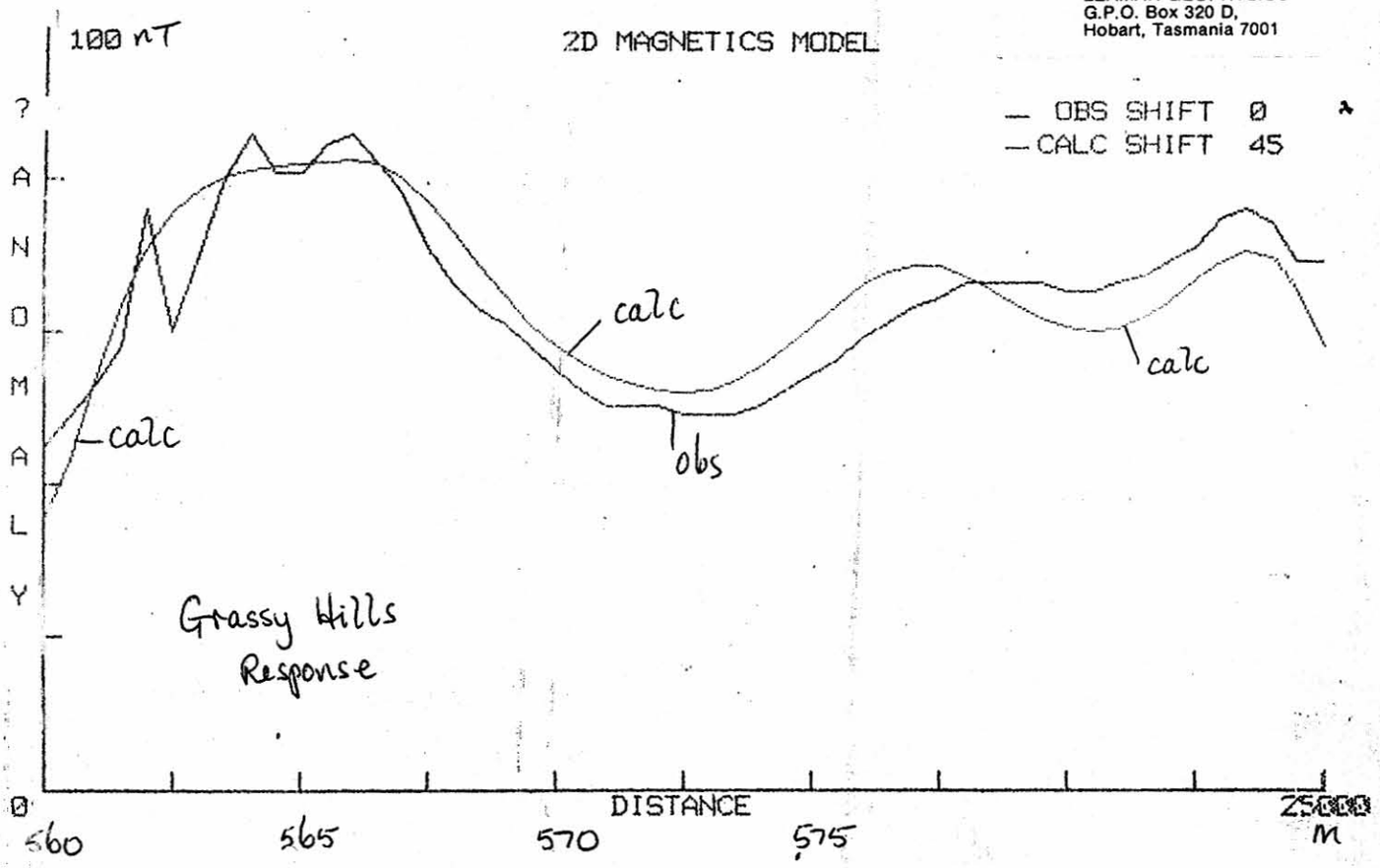
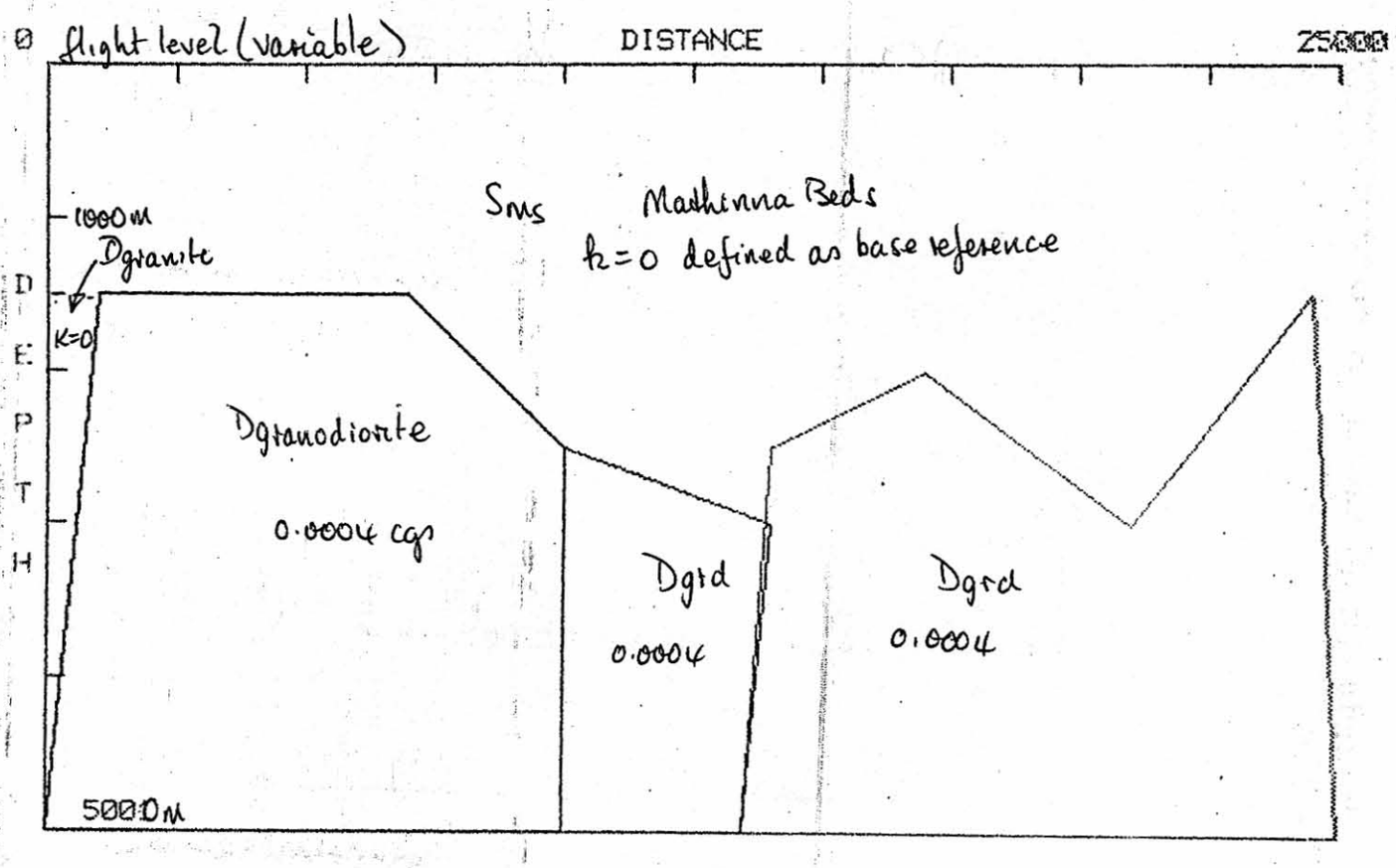
LINE PARAMETERS - ORIGIN,LIMIT,INCR 0 25000 500

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



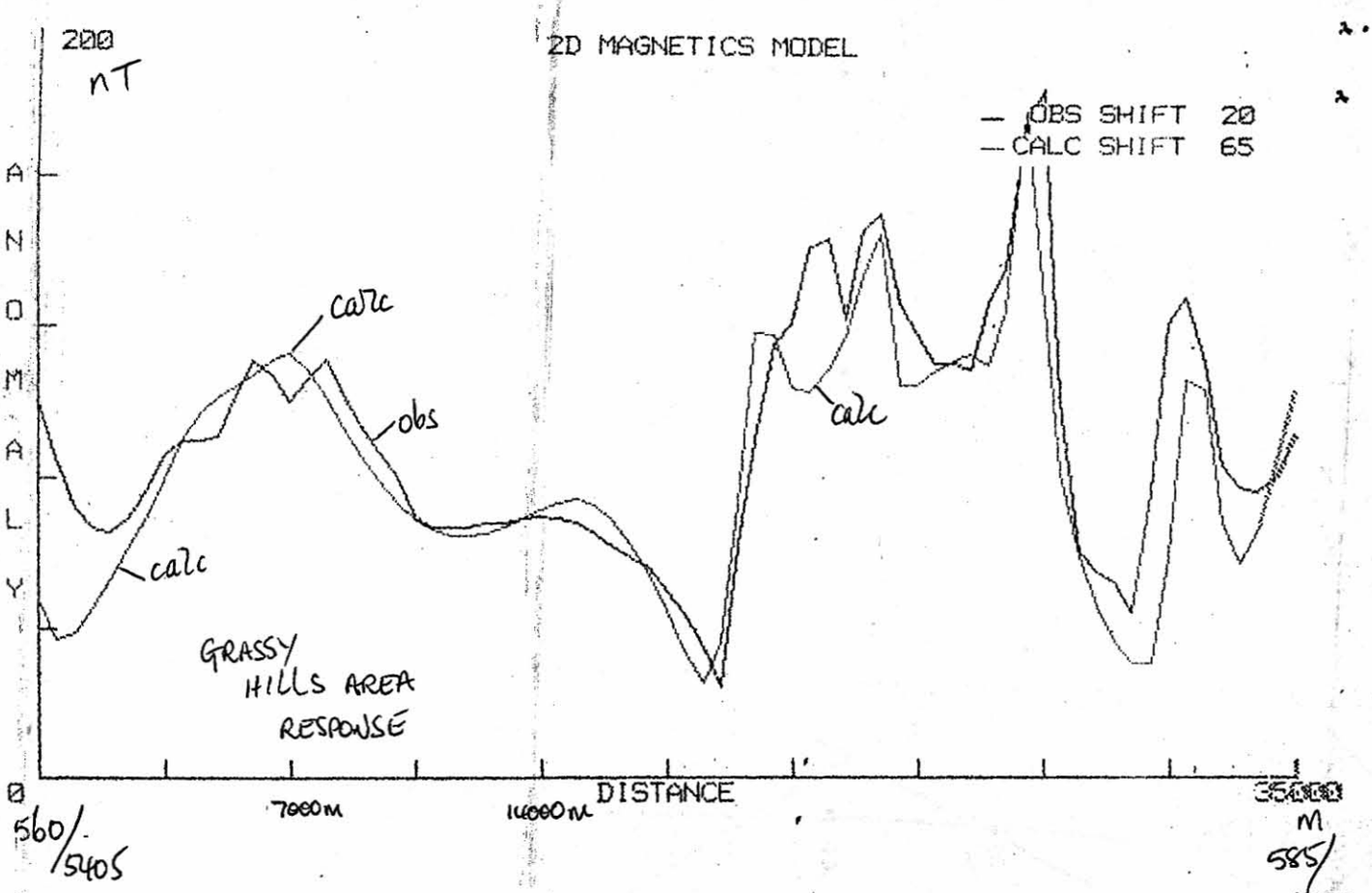
MATHINNA REGION 5410N 560-585E GOLD2



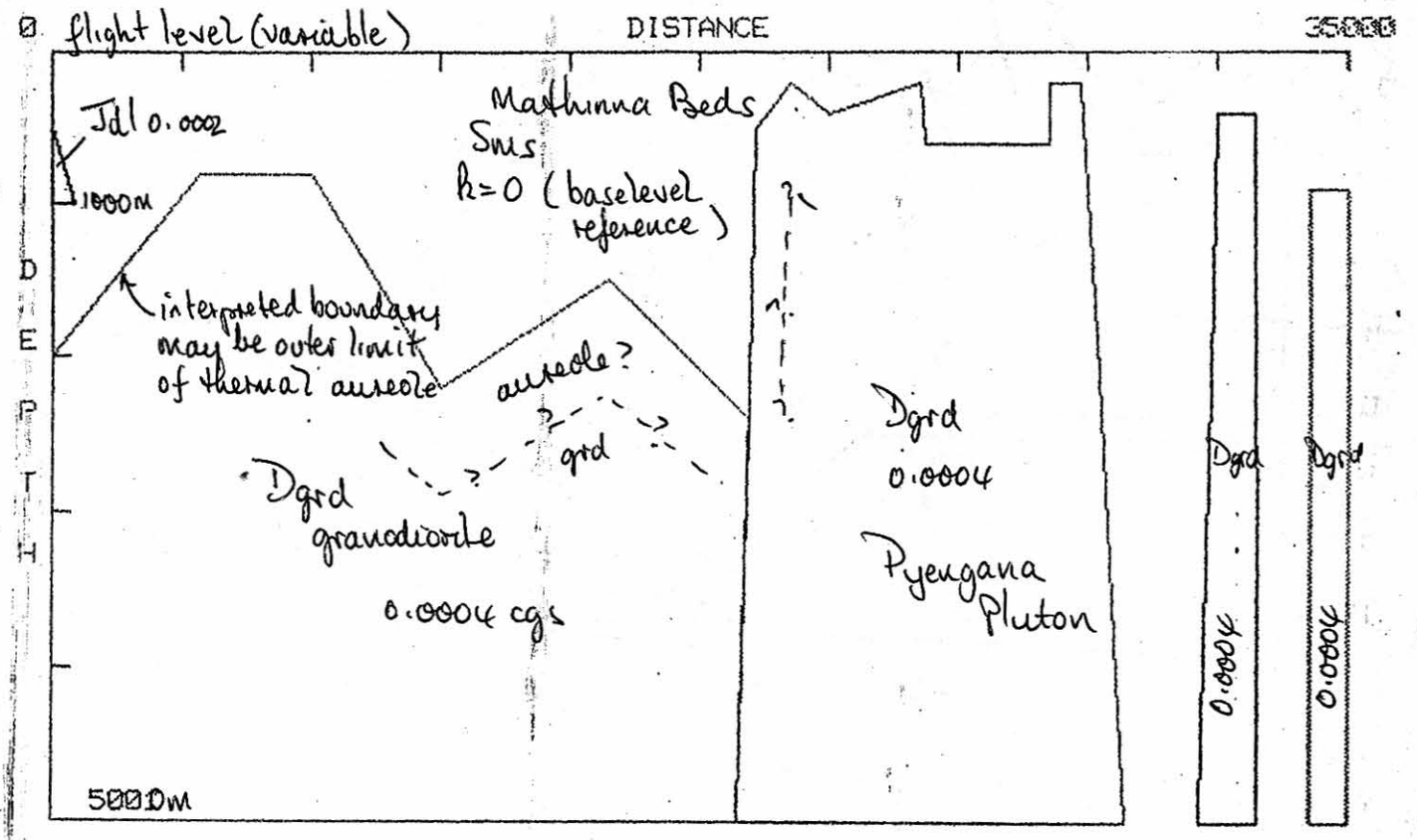
MATHINNA REGION: REGIONAL ASSESSMENT OF MAGNETIC FIELD CHARACTER
E-W LINE AT 5410 N

FIGURE 6

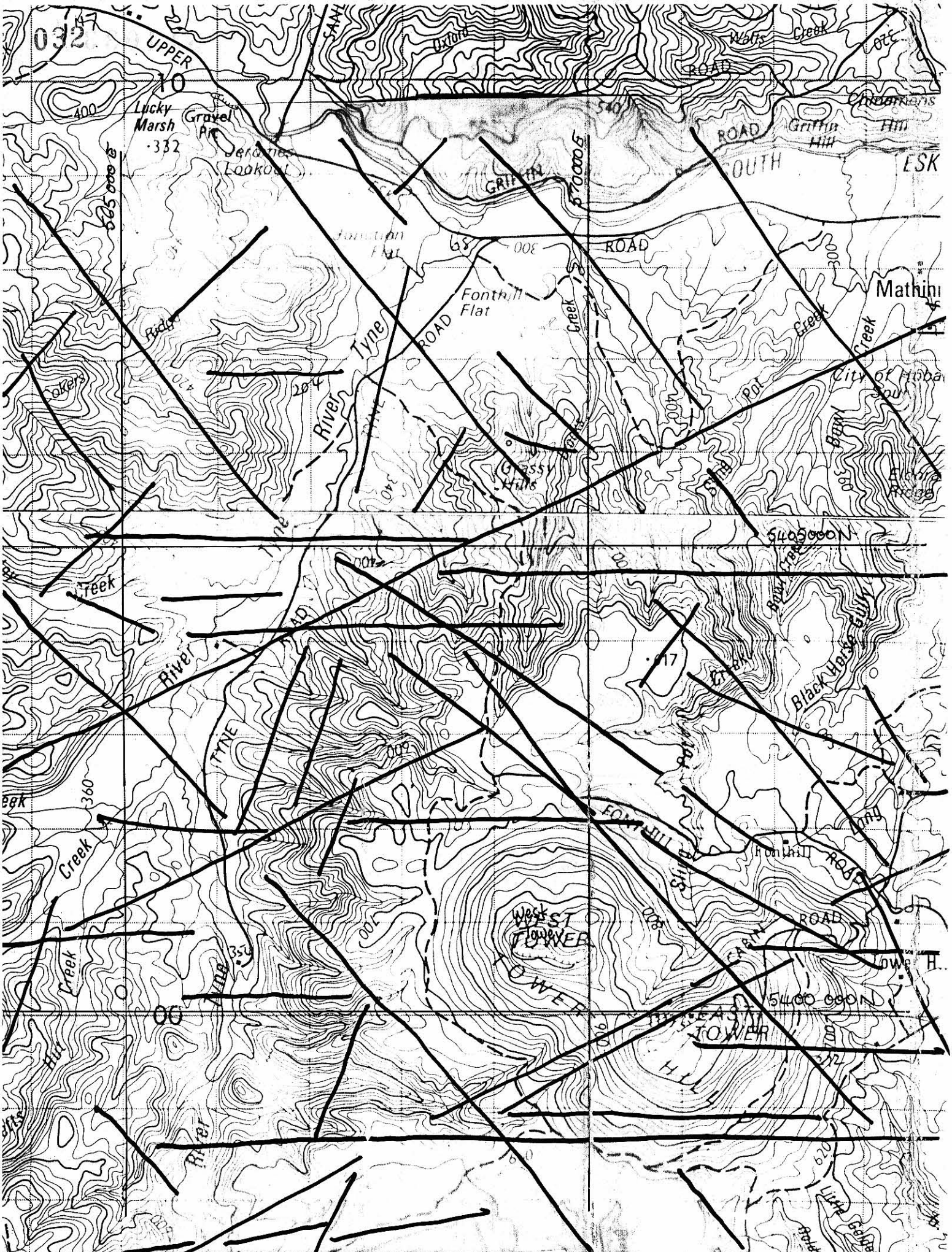
LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 35000 500



MATHINNA REGION GOLD3 TIELINE 560/5405-585/5430



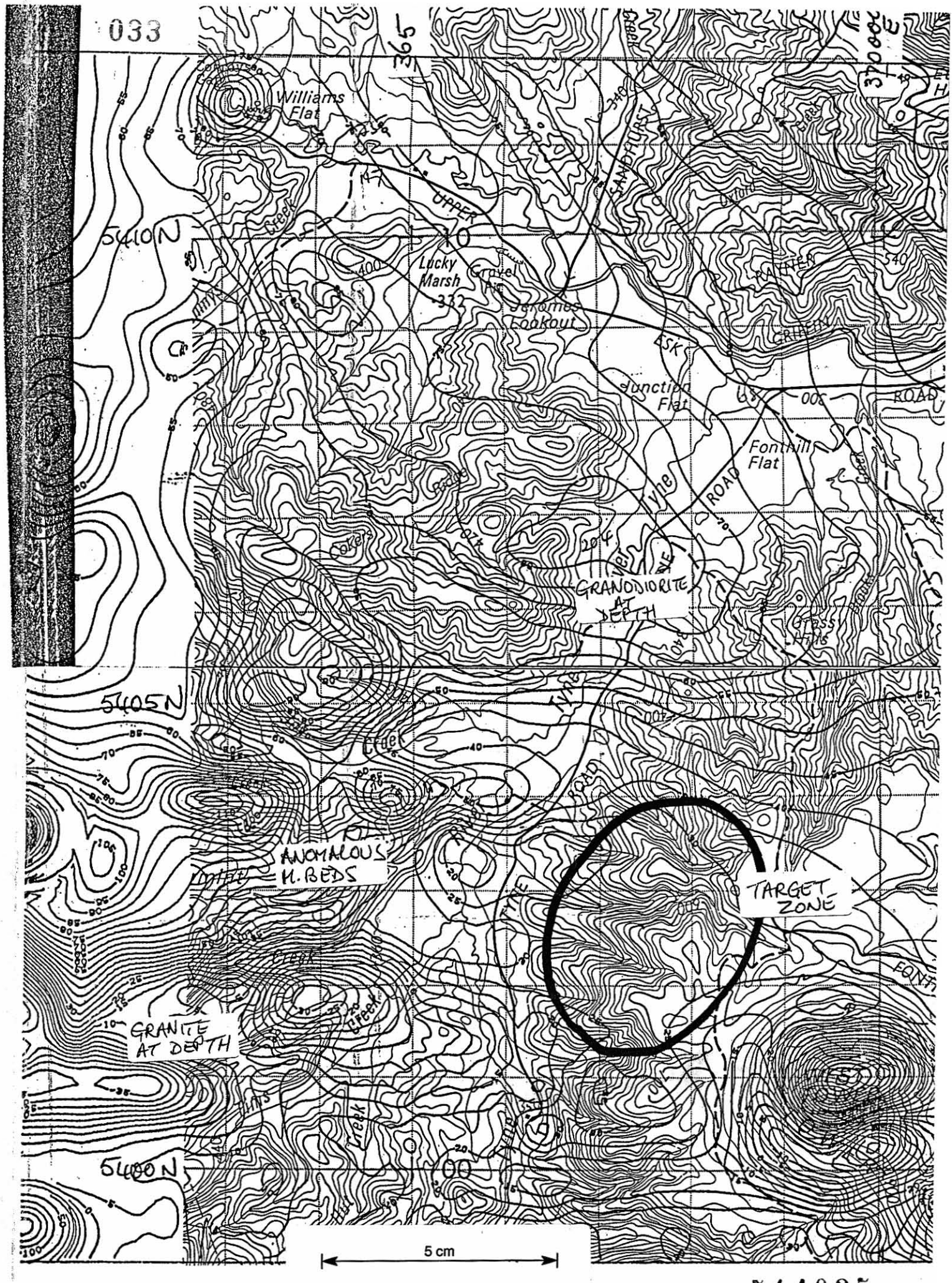
MATHINNA REGION: REGIONAL ASSESSMENT OF MAGNETIC FIELD CHARACTER
SW-NE LINE FROM 560/5405 FIGURE 7



EL 55/88 TRENDS EVIDENT IN GEOPHYSICAL DATA TOWER HILL AREA
FIGURE 8

514034

5 cm



514035

EL 55/88 TOWER HILL POTENTIALLY PROSPECTIVE AREAS
Deductions based on magnetic and trend information FIGURE 9

APPENDIX

LOGISTICS REPORT
AUSTIREX

035

514037

LOGISTICS REPORT

AIRBORNE GEOPHYSICAL SURVEY
MATHINNA AREA TASMANIA

FOR

COMINEX

BY

AUSTIREX INTERNATIONAL LIMITED

CONTENTS

1. SURVEY DETAILS

1.1 Area

1.1.1 Mathinna,Tasmania

Location Longitude 147 degrees 50 minutes east, latitude 40 degrees 30 minutes south within the North East 1:250,000 map sheet. AMG coordinates 566 000mE to 570 000mE and 5 399 000mN to 5 408 000mN

Flight line direction	090 - 270 degrees
Flight line spacing	250 metres
Tie line direction	180 - 360 degrees
Tie line spacing	2,500 metres
Mean terrain clearance	150 metres
Line distance	185.8 kilometres

1.2 Photography and Navigation

Navigation was visual from Tasmanian Department of Lands 1985 aerial photography.

The photographs were 1:42,000 scale. Horizontal photogrammetric control were obtained from the 1:25,000 series topographical mapping.

1.3 Flight Path Recovery

Flight path recovery was carried out using visual image recognition from tracking films on a duplicate set of photographs provided for navigation.

The average distance between recovered points was no greater than 2 kilometres along traverse lines and tie lines where sufficient photographic detail was present.

2. LOGISTICS AND OPERATIONAL STATISTICS

2.1 Operating Base

The operating base was Lawnceston.

2.2 Survey Field Crew

Pilot	N.Fuller
Navigator	P.Mosman
Data Technician	H.Tuckett
Manager	N.Atwell

2.3 Aircraft

Survey aircraft	Aerocommander 500S
Registration	VH-MEH

2.4 Flight Summary

Production flights	1
Survey start	11 February 1989
Survey finish	11 February 1989
Duration	1 day

2.5 Climatic Conditions

Clear weather was recorded during this period.

2.6 Geo-magnetic Conditions

The diurnal field was recorded as stable during this period.

3. *INSTRUMENT SPECIFICATIONS*

3.1 Airborne Magnetometer

Type	Scintrex, V2321 alkali vapour
Resolution	0.01 nanoTeslas
Operating range	17,000 - 95,000 nanoTeslas
Mounting	Tail stinger
Sampling rate	0.2 seconds

3.2 Ground Magnetometer

Type	Geometrics G-856A
Resolution	0.1 nanoTeslas
Sampling rate	30 seconds
Recorder	Hewlett Packard 85B computer
Location	Sited at the airfield

3.3 Spectrometer

Channels	256
Type	Exploranium, GR-800D
Sampling rate	1.0 seconds
Crystal volume	33.56 litres (2048 cubic inches)

Spectral windows:

	Channel from	to	Energy (MeV) from	to
Total count	2	254	0.321	2.995
Potassium	101	120	1.368	1.579
Uranium	128	147	1.653	1.853
Thorium	198	236	2.393	2.805
Cosmic	255	255	2.995	6.000

3.4 Altimeters

Type	Radar Sperry AA100
Range	0 - 610 metres
Sampling rate	1.0 seconds

Type	Barometric Penny and Giles
Pressure sensor	Millibars
Sampling rate	1.0 seconds

3.5 Tracking Camera

Type	Scientific, Vinten MkII
Format	16mm, single frame
Lens	5.9mm

3.6 Acquisition System

3.6.1 Digital recording on magnetic tape

Flight number
Line number
Fiducial number
Time
Magnetic intensity
Total count
Potassium
Uranium
Thorium
Cosmic
Altitude

3.6.2 Analogue recording

Channel 1	Magnetic intensity	0 - 200 nanoTeslas
Channel 2	Magnetic intensity	0 - 2000 nanoTeslas
Channel 3	Altitude	0 - 1000 feet
Channel 5	Thorium	0 - 500 counts per second
Channel 6	Uranium	0 - 500 counts per second
Channel 7	Potassium	0 - 500 counts per second
Channel 8	Total count	0 - 5000 counts per second

4. SYSTEM CALIBRATIONS AND CHECKS

4.1 System Calibration

Magnetometer compensation differences:

	Heading	Roll	Pitch
North	+0.1	0.1	
South	-0.7	0.2	
East	-0.2		0.2
West	+0.9		0.1

System parallax calibration:

Magnetometer	2 fiducials
Spectrometer	2 fiducials

Spectrometer hand sample checks using Cs, U and Th sources were completed before and after each day's production flight. Digital and analogue data was recorded.

Resolution of the gamma ray spectrometer was checked from spectral plots using a Cs137 source. The average resolution of the crystal pack was better than 12 per cent full width half measurement of the photopeak at 0.662 MeV.

Test lines were flown prior to and after each day's production flight over a 2 kilometre length line in a constant direction at survey altitude. Digital and analogue data was recorded.

4.2 Data Acquisition Checks

The checks performed on the data acquisition system involved a read after write check on the tape.

On receipt of data from the field, statistics of each variable are computed, as well as each production line is profiled and the results checked for data integrity.

4.3 Radiometric Correction Coefficients

4.3.1 Analogue Coefficients

The following stripping coefficients are applied to the data prior to presentation on the analogue:

Thorium/Uranium	0.3
Thorium/Potassium	0.5
Uranium/Potassium	0.5

4.3.2 Digital Coefficients

The following coefficients are to be used for stripping the digital data:

Thorium/Uranium	alpha	0.346
Thorium/Potassium	beta	0.416
Uranium/Potassium	gamma	0.755
Uranium/Thorium	a	2.890

4.3.3 Aircraft Background and Cosmic Correction

These coefficients were determined from high altitude flights. The aircraft background is to be removed before stripping.

	Aircraft Background	Cosmic Correction
Total Count	180.0	2.316
Potassium	14.4	0.157
Uranium	7.2	0.129
Thorium	4.3	0.158

4.3.4 Altitude Attenuation

Total Count	0.006185
Potassium	0.007590
Uranium	0.005031
Thorium	0.006066

5. GEOPHYSICAL DATA

5.1 Processing

The field tapes (DC-300's) are decoded and transcribed to 9 track tapes. All lines voided in the field are removed. The data is then automatically edited to remove any major spikes. Any errors not detected in the automatic edit are manually corrected.

On receipt of flight path recovery the photos with control are digitized and transformed to grid coordinates. The flight path is then plotted and checked for any errors which are then corrected.

Diurnal values are read off cassettes and edited to remove high frequency noise. Profiles of diurnal are plotted and any errors remaining are corrected. The diurnal is then interpolated to produce a diurnal value for every fiducial and removed from the magnetic data along with the IGRF value. The data is corrected for system parallex and a new set of coordinates are computed. Tie line levelling is then applied, if necessary, to remove any

linear variations between traverse lines. The data is then gridded and contoured.

5.2 Line Numbering Series

Pre calibration	5010 - 5040
Post calibration	6010 - 6040
Pre low level test line	5080
Pre high level test line	5090
Post low level test line	6080
Post high level test line	6090
Traverse lines	1201 - 1218
Tie lines	1702 - 1703.2
Heading checks	8010 - 8050
Equipment tests	9000 - 9999

5.3 Processed Data

5.3.1 Flight Path Maps

1:25,000 scale

Plotted with Geographic and AMG coordinates.

5.3.2 Contour Maps

1:25,000

Total magnetic intentsity
5nT contour interval, 50 x 50 metre grid cell

1:25,000

Total Count radiometric intensity colour

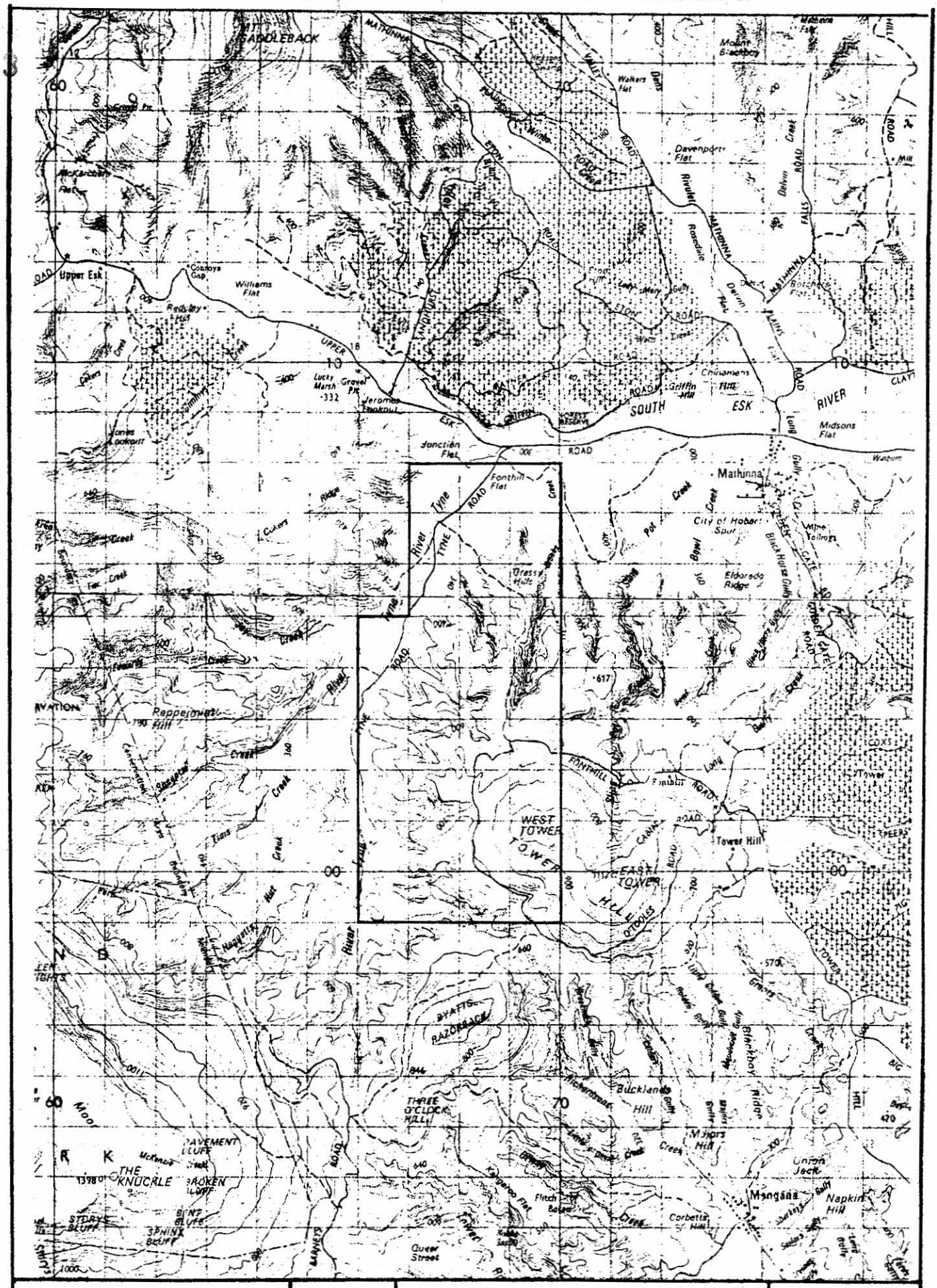
5.3.3 Stacked Profiles

1:25,000 Total magnetic intensity

5.3.4 Data Tapes

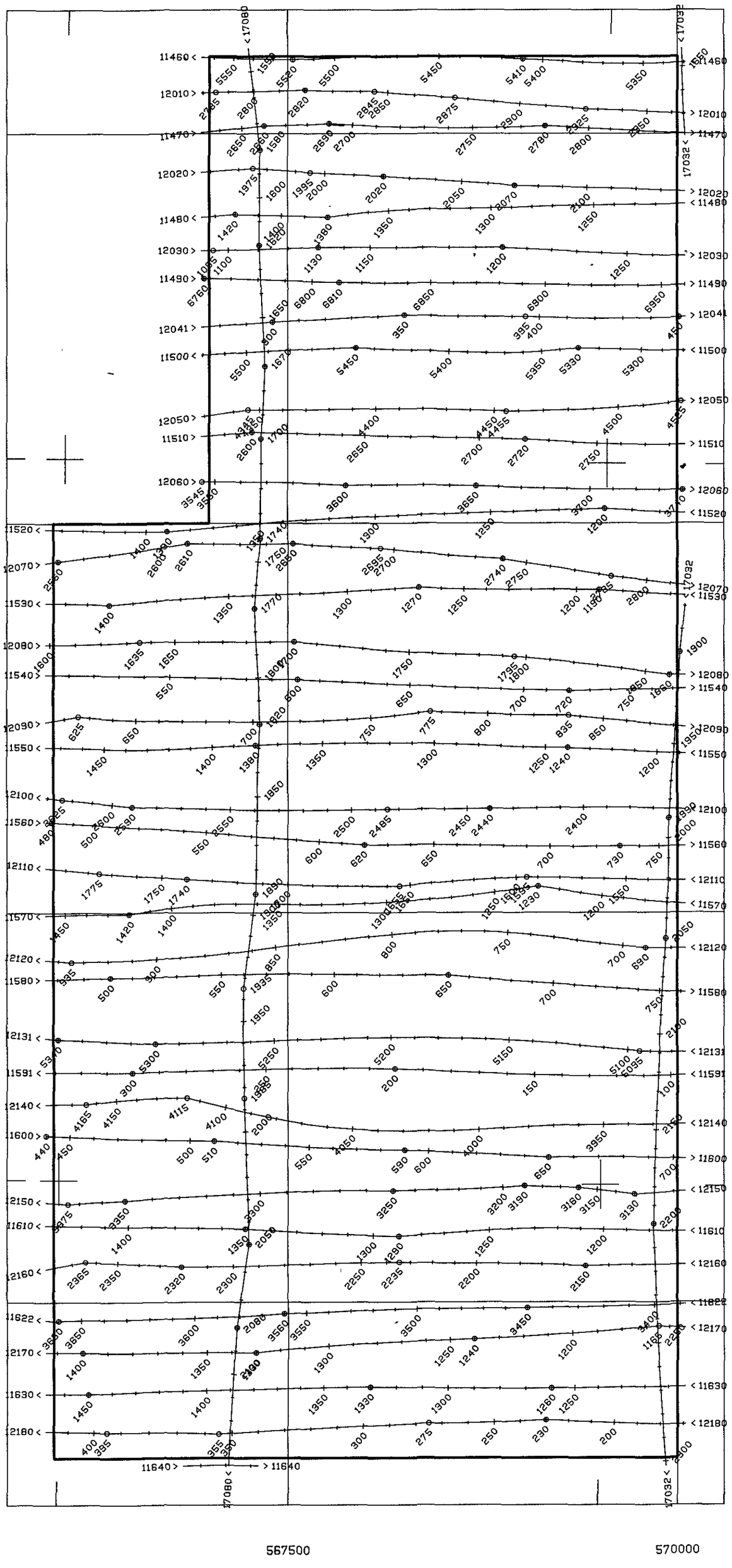
Located raw and corrected geophysical data in ASCII format.
Gridded data in binary format.

043



AUSTIREX INTERNATIONAL LTD.	LOCALITY	NORTH EAST TASMANIA
	AREA	MATHINNA
JOB No. 2079	PLAN SHOWS	SURVEY AREA 514045
	DATE	2/89

5 cm



MATHINNA
AIRBORNE GEOPHYSICAL SURVEY

COMINEX

Surveyed and compiled by AUSTIREX INTERNATIONAL LIMITED
Jan – Feb 1989
Job No 2079

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FLIGHT PATH MAP

LEGEND
- 50 fiducial interval
- 10 fiducial interval
- Recovery point

AIRCRAFT
VH-MEH ROCKWELL SHRIKE COMMANDER 500S

MAGNETOMETER
SPLIT BEAM CESIUM SCINTREX V201

RESOLUTION	0 04 nanoTesla
CYCLE RATE	0.2 seconds
SAMPLE INTERVAL	14 metres

SPECTROMETER
256 CHANNEL EXPLORANIUM GR800B

VOLUME	33.56 litres
CYCLE RATE	1 second
SAMPLE INTERVAL	150 metres

DATA ACQUISITION
8 CHANNEL WATANABE MC 6700 CHART RECORDER
HEWLETT PACKARD 9825 COMPUTER
AUSTIREX DIGITAL ACQUISITION SYSTEM

FLIGHT LINE SPACING

TRAVERSE LINES	250 metres
TIE LINES	2500 metres

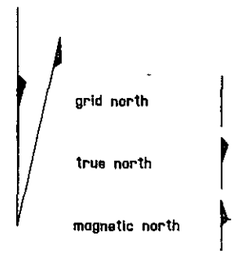
FLIGHT LINE DIRECTION

TRAVERSE LINES	90 – 270 degrees
TIE LINES	0 – 180 degrees

SURVEY HEIGHT
150 metres – MEAN TERRAIN CLEARANCE

NAVIGATION
VISUAL FROM PLANNED FLIGHT STRIPS

FLIGHT PATH RECOVERY
ONTO A.M.G CONTROLLED PHOTOGRAPHS



north point relationships are
shown for the centre of the map
magnetic north is true for 1980

grid/magnetic angle	12°50'30"
grid convergence	0°32'24 77"
secular variation	0°3'10" east per year

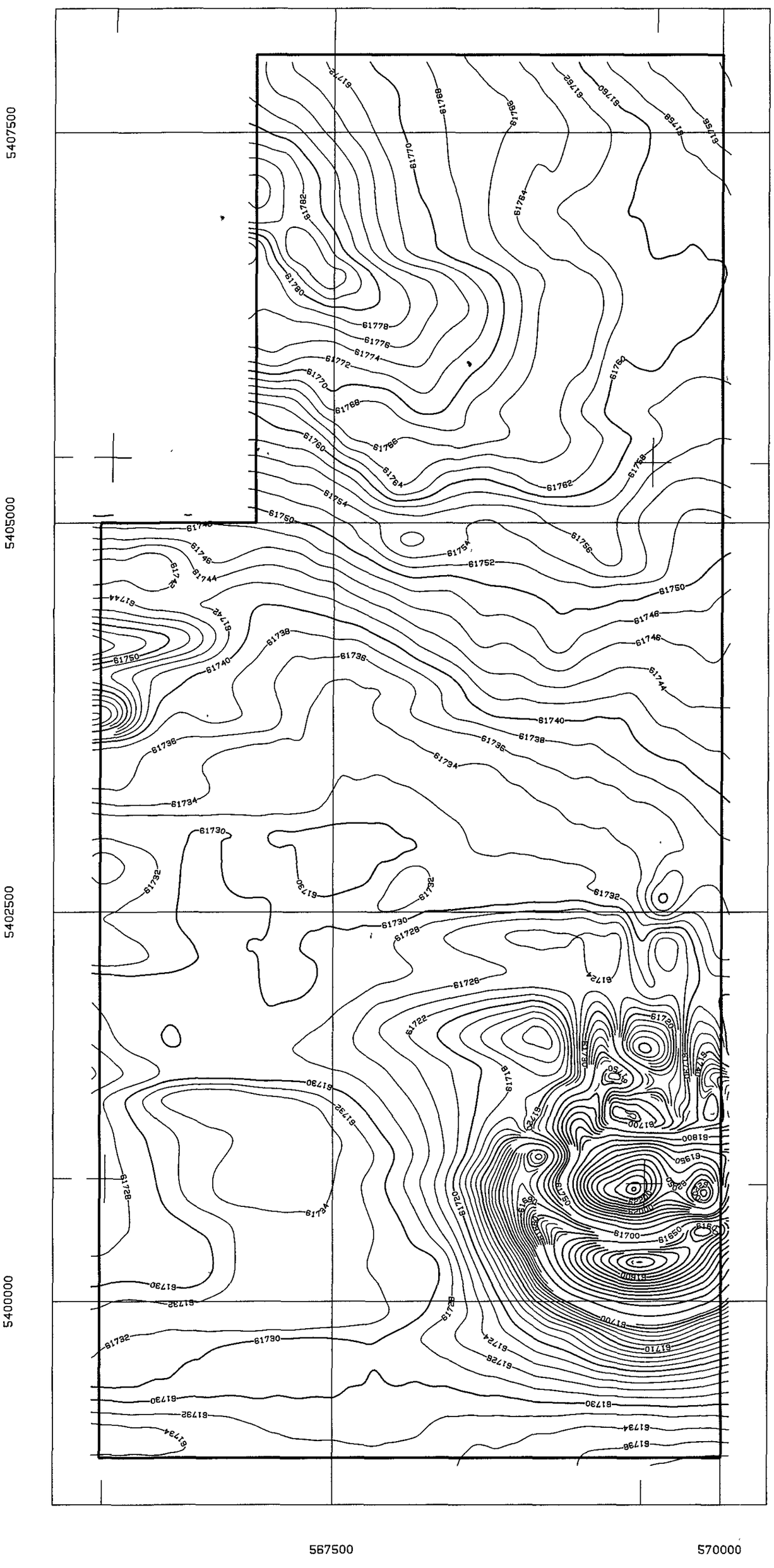
Scale 1·25 000

500 0 500 1000 1500 2000 2500 metres

AUSTRALIAN MAP GRID

5 cm

9139



MATHINNA
AIRBORNE GEOPHYSICAL SURVEY

COMINEX

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TOTAL MAGNETIC INTENSITY CONTOURS

DATA PROCESSING

REGIONAL FIELD	IGRF MODEL 1985 REMOVED
GRID CELL SIZE	150 metres
CONTOUR INTERVAL	5 nanoTeslas
PARALLAX CORRECTION	0 0
BASE VALUE ADDED	61840 nanoTeslas

AIRCRAFT

VH-MEH ROCKWELL SHRIKE COMMANDER 500S

MAGNETOMETER

SPLIT BEAM CESIUM SCINTREX V201

RESOLUTION	0 04 nanoTesla
CYCLE RATE	0 2 seconds
SAMPLE INTERVAL	14 metres

SPECTROMETER

256 CHANNEL EXPLORANIUM GR800B

VOLUME	33 56 litres
CYCLE RATE	1 second
SAMPLE INTERVAL	150 metres

DATA ACQUISITION

8 CHANNEL WATANABE MC 6700 CHART RECORDER
HEWLETT PACKARD 9825 COMPUTER
AUSTIREX DIGITAL ACQUISITION SYSTEM

FLIGHT LINE SPACING

TRAVERSE LINES	250 metres
TIE LINES	2500 metres

FLIGHT LINE DIRECTION

TRAVERSE LINES	90 – 270 degrees
TIE LINES	0 – 180 degrees

SURVEY HEIGHT

150 metres – MEAN TERRAIN CLEARANCE

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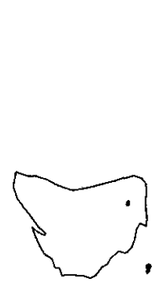
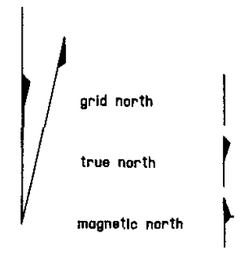
FLIGHT PATH RECOVERY

ONTO A M G CONTROLLED PHOTOGRAPHS





north point relationships are
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magnetic north is true for 1980

grid/magnetic angle	12°50'30"
grid convergence	0°32'24.77"
secular variation	0°3'10" east per year

Scale 1:25 000

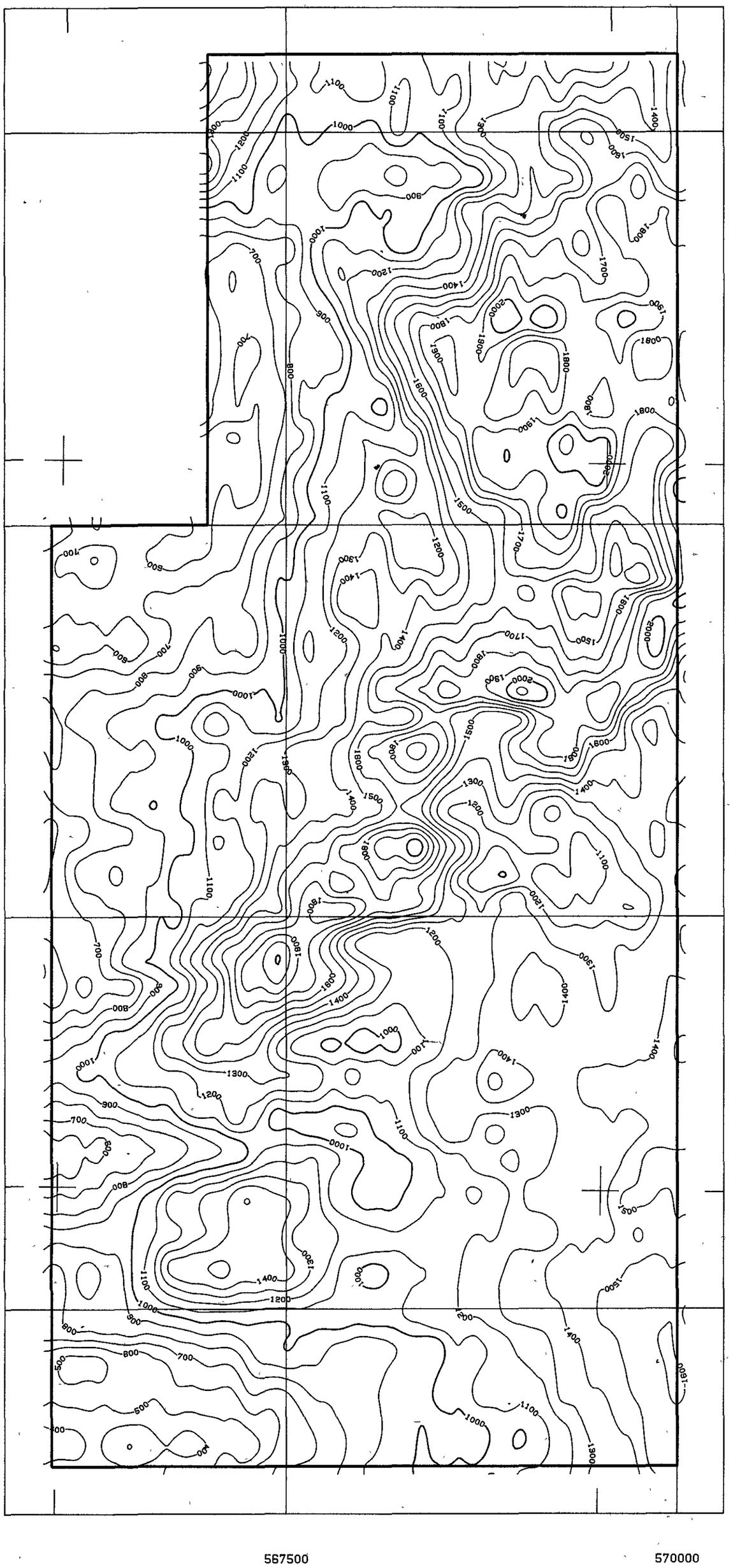
500 0 500 1000 1500 2000 2500 metres

AUSTRALIAN MAP GRID

5 cm

90-307

MAP2



MATHINNA
AIRBORNE GEOPHYSICAL SURVEY

COMINEX

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Jan – Feb 1989
Job No 2079

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TOTAL COUNT CONTOUR MAP

DATA PROCESSING

GRID CELL SIZE	150 metres
CONTOUR INTERVAL	100 counts
PARALLAX CORRECTION	none

AIRCRAFT
VH-MEH ROCKWELL SHRIKE COMMANDER 500S

MAGNETOMETER
SPLIT BEAM CESIUM SCINTREX V201

RESOLUTION	0 04 nanoTesla
CYCLE RATE	0 2 seconds
SAMPLE INTERVAL	14 metres

SPECTROMETER
256 CHANNEL EXPLORANIUM GR800B

VOLUME	33 56 litres
CYCLE RATE	1 second
SAMPLE INTERVAL	150 metres

DATA ACQUISITION
8 CHANNEL WATANABE MC 6700 CHART RECORDER
HEWLETT PACKARD 9825 COMPUTER
AUSTIREX DIGITAL ACQUISITION SYSTEM

FLIGHT LINE SPACING

TRAVERSE LINES	250 metres
TIE LINES	2500 metres

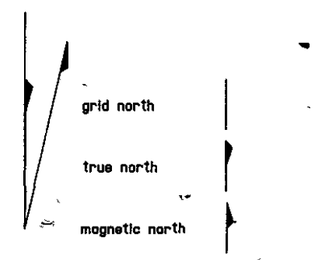
FLIGHT LINE DIRECTION

TRAVERSE LINES	90 – 270 degrees
TIE LINES	0 – 180 degrees

SURVEY HEIGHT
150 metres – MEAN TERRAIN CLEARANCE

NAVIGATION
VISUAL FROM PLANNED FLIGHT STRIPS

FLIGHT PATH RECOVERY
ONTO A M G. CONTROLLED PHOTOGRAPHS



north point relationships are shown for the centre of the map. magnetic north is true for 1980.

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grid convergence	0°32'24 77"
secular variation	0°9'10" east per year

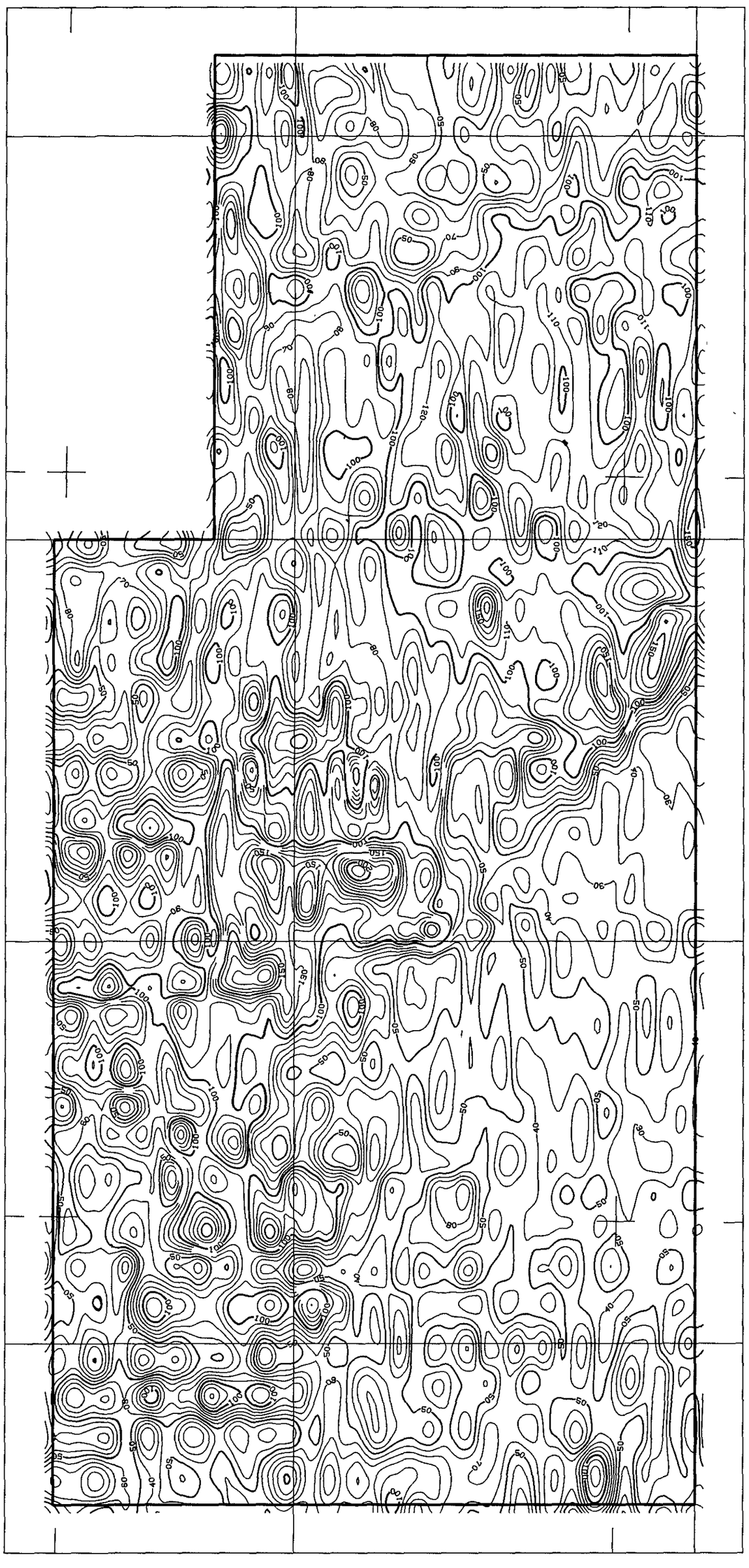
Scale 1:25 000

500 0 500 1000 1500 2000 2500 metres

AUSTRALIAN MAP GRID

5 cm

9141



MATHINNA
AIRBORNE GEOPHYSICAL SURVEY
COMINEX

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POTASSIUM CONTOUR MAP

DATA PROCESSING

GRID CELL SIZE	150 metres
CONTOUR INTERVAL	10 counts
PARALLAX CORRECTION	none

AIRCRAFT

VH-MEH ROCKWELL SHRIKE COMMANDER 500S

MAGNETOMETER

SPLIT BEAM CESIUM SCINTREX V201

RESOLUTION	0 04 nanoTesla
CYCLE RATE	0.2 seconds
SAMPLE INTERVAL	14 metres

SPECTROMETER

256 CHANNEL EXPLORANIUM GR800B

VOLUME	33 56 litres
CYCLE RATE	1 second
SAMPLE INTERVAL	150 metres

DATA ACQUISITION

8 CHANNEL WATANABE MC 6700 CHART RECORDER
HEWLETT PACKARD 9825 COMPUTER
AUSTIREX DIGITAL ACQUISITION SYSTEM

FLIGHT LINE SPACING

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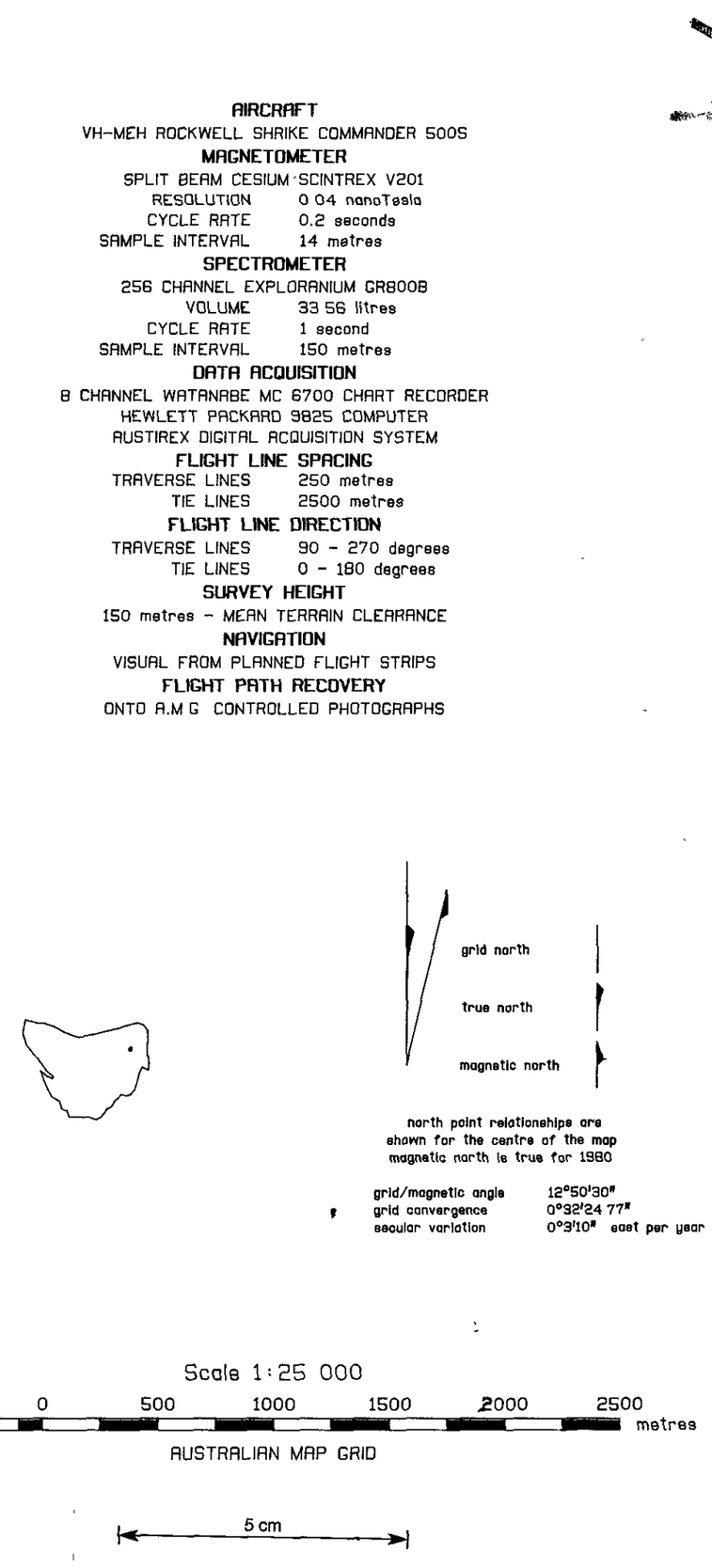

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AUSTRALIAN MAP GRID

5 cm