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UTS GEOPHYSICS PTY LTD

LOGISTICS REPORT

HELICOPTER GEOPHYSICAL SURVEYS

FOR

GOLD MINES OF AUSTRALIA LIMITED

MT LYELL AREA

TASMANIA, AUSTRALIA

20 FEBRUARY 1995

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LOGISTICS REPORT - HELICOPTER GEOPHYSICAL
SURVEYS - GMA - EL 52/94 - UTS GEOPHYSICS P/L

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1 GENERAL SURVEY INFORMATION

In February 1995, UTS Geophysics conducted an airborne magnetometer survey of the Mt Lyell area in Tasmania for Gold Mines of Australia Limited. This report summarises the logistics, survey parameters and processing details of the survey.

The survey was commenced on 8 February 1995 and completed on 23 February 1995.

UTS Geophysics provided the described survey for the following mining company:

Gold Mines of Australia Limited
A.C.N. 000 690 308
P.O. Box 792
CLOVERDALE WA 6105

2 GENERAL FLYING SPECIFICATIONS

Helicopter magnetic surveys were flown over one (1) prospect(s) in West Tasmania. The base of operations was Queenstown, Tasmania. Flight specifications for each area are shown in the following table.

PROSPECT NAME	LINE SPACING	LINE DIRECTION	TIE LINE SPACING	TIE LINE DIRECTION	SENSOR HEIGHT	SAMPLE DENSITY	TOTAL LINE KM
Mt Lyell	100m	090 - 270	1000m	000 - 180	20-30m	3 - 4 m	473
TOTAL							473

The total number of line kilometres of survey data collected over the survey area(s) specified in the above table was 473.

The specified sensor height for the magnetic samples is as stated in the above table. This sensor height may be varied where topographic relief or laws pertaining to built up areas do not allow this altitude to be maintained, or where the safety of the helicopter and equipment is endangered.

The coordinate boundaries and associated maps for the survey area(s) flown is detailed in Appendix B.

3 EQUIPMENT USED AND SPECIFICATIONS

The list of geophysical and navigation equipment used for the survey is as follows:

- UTS helicopter based stinger.
- Geometrics G-833 Metastable Helium Magnetometer
- Develco Vector Magnetometer.
- UTS data acquisition system, digital recording and output system.
- RMS Aeromagnetic Automatic Digital Compensator (AADC II).
- UTS navigation and acquisition software.
- Bendix King KRA-10 Radar Altimeter.
- Magnavox MX-9212 Navigation GPS.
- Magnavox MX-9012 Differential GPS.
- UTS LCD pilot navigation display.
- UTS Radios and radio modem communication system.
- Diurnal monitoring magnetometer (Geometrics G-856)

3.1 Aircraft Used

- Model: Aerospatiale Squirrel AS 350B
- Registration: VH-HBA
- Operator: Helicopter Resources Pty Ltd

3.2 UTS Helicopter Based Stinger System

The platform used for data acquisition was the UTS developed, helicopter stinger. The stinger is a carbon fibre, forward mounted boom, fixed beneath the helicopter and extending beyond the front of the aircraft cabin.

All magnetic and positional sensors are mounted within the stinger.

3.3 Magnetics

Total magnetic field data readings for the survey were made using a Geometrics G-833 Helium Magnetometer. This precision sensor has the following specifications:

- Model Geometrics G-833 Metastable Helium Magnetometer
- Sample Rate 0.1 Seconds (10Hz)
- Sensitivity 0.01nT
- Operating Range 20,000nT to 95,000nT
- Temperature Range -20°C to +50°C

3.4 Data Positioning and Flight Navigation

Data positioning and navigation was derived using differential, real-time GPS (Global Positioning System).

A Differential GPS receiver and associated radio data communications were established in the vicinity of the survey area by UTS. Positional corrections from a base reference GPS were transmitted to the aircraft GPS for real-time corrections to the aircraft's GPS derived position.

Differential corrections were recorded at the base station GPS site to allow for post flight correcting of the positions recorded by the aircraft.

The GPS systems used for the survey were:

- | | |
|---|----------------------------------|
| • Aircraft Navigation GPS Model | Magnavox MX9212 |
| • Satellite Channels Available | 12 |
| • Differential Reference GPS Model | Magnavox MX9012 |
| • Satellite Channels Available | 12 |
| • Typical Differentially Corrected Accuracy | 2-3 metres (horizontal accuracy) |

3.5 UTS Data Acquisition System, Digital Recording and Output System

All geophysical and positional information for the survey was recorded using a UTS developed, high speed, precision computer data acquisition system.

Instrument synchronisation, recording and parallax were measured and removed in real-time using the UTS data acquisition system.

The information recorded for each one tenth of a second (0.1 second) interval was:

- scan time (Local and UTC time)
- one total field magnetometer reading
- one vector magnetometer reading (X,Y,Z)
- one radar altimeter reading
- one WGS84 GPS position
- one AMG84 metric grid coordinate
- one GPS geodetic height reading
- other GPS information including dilution of position, signal information, satellites tracked and pseudo-range information

Survey flight data was down loaded onto magnetic tape.

3.6 Aircraft Compensation

At the start of the survey, the system was calibrated for reduction of heading error.

The heading and manoeuvre effect of the aircraft on the magnetic data was removed using an RMS Automatic Airborne Digital Compensator (AADC). UTS static proprietary compensation techniques were also employed to further refine the removal of the heading effect of the aircraft

A three axis fluxgate magnetometer was used to record the magnetic field in the X,Y and Z direction. These recorded values were used by the RMS AADC compensator to remove the heading effect of the helicopter.

3.7 UTS Navigation System

All data positioning and pilot navigation was controlled through advanced UTS navigation software.

Accurate pilot navigation was achieved through computer controlled aircraft flight instruments and guidance displays located in the cockpit of the aircraft.

GPS derived positions were used to provide aircraft navigation and position information.

3.8 Altitude Readings

Accurate height above the terrain was measured using a Bendix King radar altimeter installed in the aircraft. The height of each magnetic reading was taken from the radar altimeter and stored by the acquisition system.

- Model Bendix King KRA-10 radar altimeter
- Sample Rate 0.1 Seconds (10Hz)

3.9 Diurnal Monitoring Magnetometer

A base station magnetometer was located in a low gradient area beyond the region of influence by any man made interference to monitor diurnal variations during the survey.

The specifications for the magnetometer used are as follows:

- Model Geometrics G-856
- Resolution 0.1 nT
- Sample Interval 10 seconds (0.1Hz)
- Operating Range 20,000nT to 90,000nT
- Temperature -20°C to +50°C

4 SURVEY LOGISTICS

The base location used for operating the aircraft and in-field processing of the survey data was Queenstown, Tasmania.

4.1 Survey Flight Summary

The following table summarises the flight logs provided by the operator for the survey areas flown:

Flight Date	Area No	Flight No	Area Name	Line Km Flown	Lines Flown	Weather Conditions
8 FEB 95	01	01	Mt Lyell	162	33	Survey Production
9 FEB 95	-	-	Mt Lyell	-	-	Bad weather - standby
10 FEB 95			Mt Lyell	-	-	Bad weather - standby
11 FEB 95	01	02	Mt Lyell	113	24	Survey Production
12 FEB 95	01	03	Mt Lyell	12	4	Survey Production
	01	04	Mt Lyell	124	35	Survey Production
	01	05	Mt Lyell	68	13	Survey Production
23 FEB 95	01	T1	Mt Lyell	46	6	Survey Production
	01	06	Mt Lyell	94	21	Survey Production

4.2 Differential GPS Station Locations

The following table contains the locations used for the differential GPS reference station.

Area Name	Period	Trig Station Name	Latitude	Longitude
Mt Lyell	8 - 23 FEB 95	Queenstown	S 42° 04.59672'	E 145° 33.52118'

5 Processed Products Supplied

5.1 Data Processing and Levelling

The raw survey data was loaded from the field tapes and levelled in the following manner to produce preliminary maps:

- Base station magnetometer diurnal levelling
- Tie line levelling

The preliminary levelled data was then plotted to produce the following verification maps:

- Total magnetic intensity contour maps
- Flight path maps

5.2 Final Geophysical Products

A levelled located data tape, containing all traverse lines and tie lines was recorded on the following media:

- EXABYTE TAR format tape

The format for the located data tape is described in Appendix A.

The following geophysical maps and images were supplied:

- None supplied

For further information concerning the survey flown, please contact the following office:

Head Office Address:

UTS Geophysics Pty Ltd
Valentine Road
Perth Airport
REDCLIFFE WA 6104

Tel: +61 9 479 4232

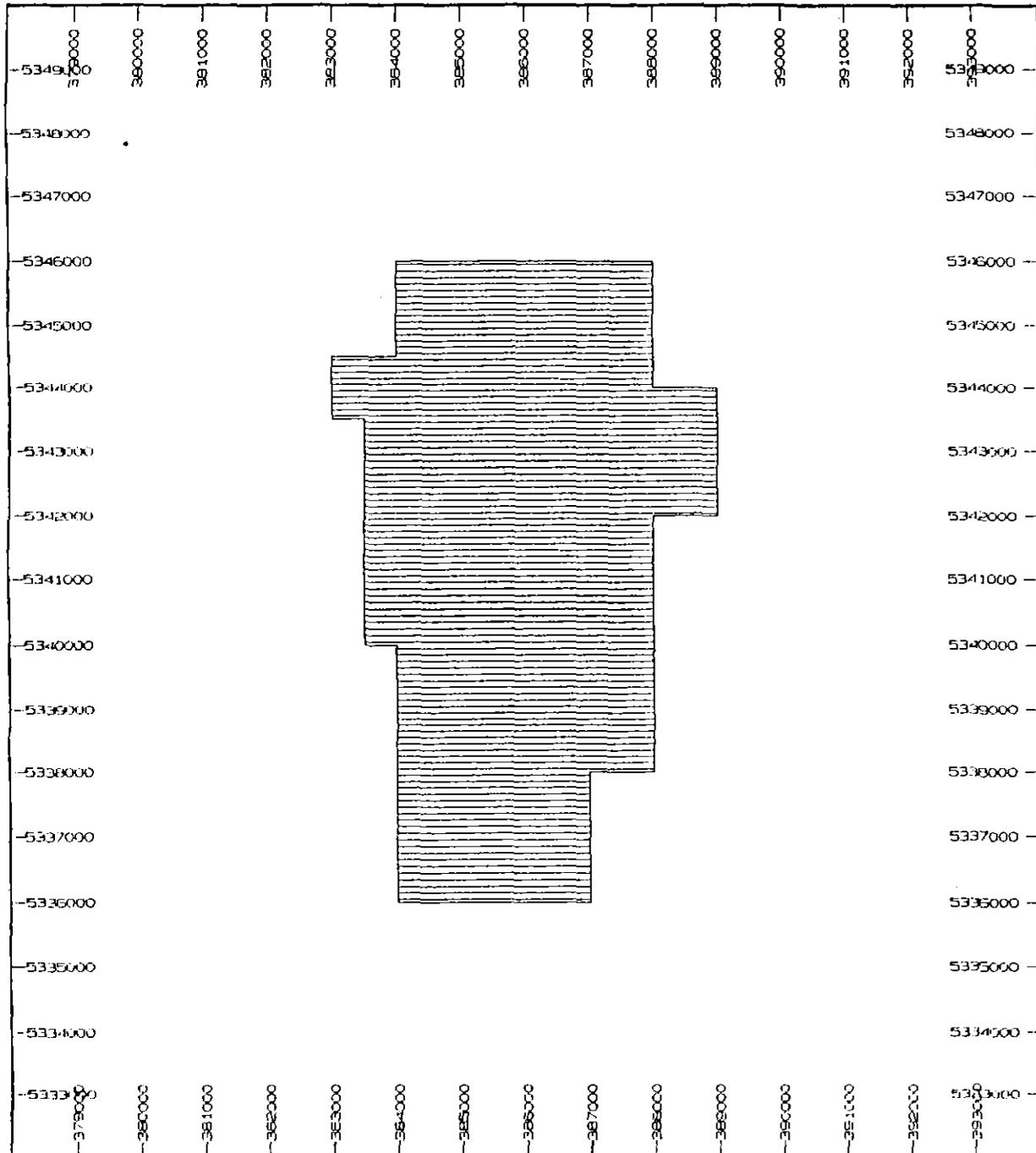
Fax: +61 9 479 1008

Postal Address:

P.O. Box 126
BELMONT WA 6104

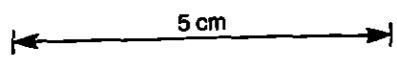
APPENDIX A: LOCATED DATA TAPE FORMAT

APPENDIX B: SURVEY AREA MAPS



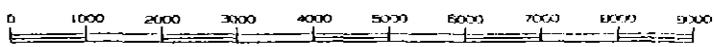
JOB DETAILS

Job Number: _____
 Product: Helimag survey
 Aircraft Type: AS350B
 Aircraft Rego: VH-HBA
 Pilot: _____
 Operator: UTS
 Line Spacing: 100 in
 Line Direction: 090 - 270 deg



MAP DETAILS

Projection: AMG84
 Sheet 1 of 1
 Scale 1: 100000



Drawn: //
 Checked: //
 Approved: //

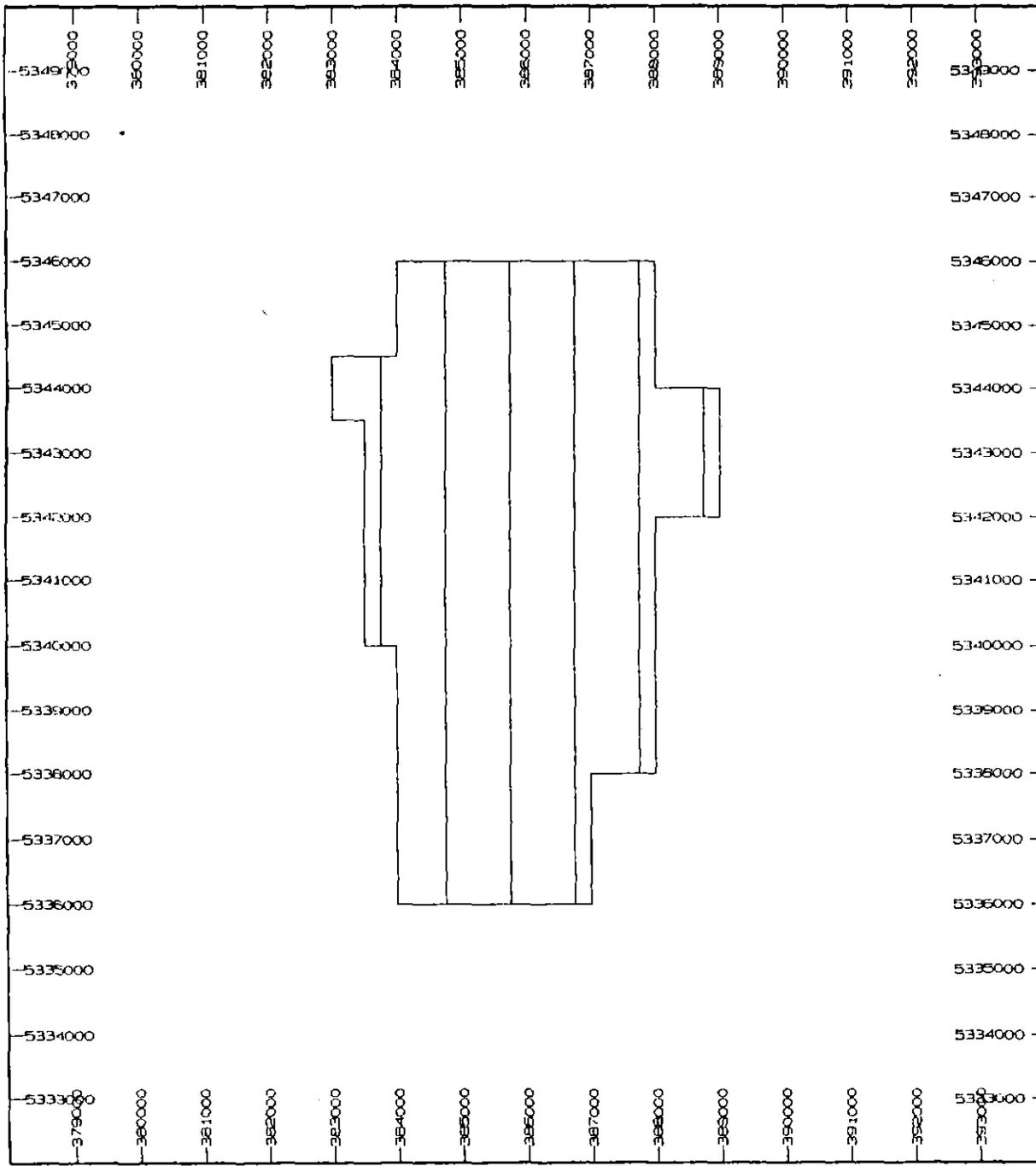
Plotted by Universal Tracking Systems Flight Block Planner

GOLD MINES OF AUSTRALIA

MOUNT LYELL

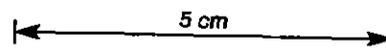
Flown by: U.T.S.
 Job: Mount Lyell
 Flight Date: _____

693015



JOB DETAILS

Job Number: -
 Product: Helimag Survey
 Aircraft Type: AS350B
 Aircraft Rego: VH-HBA
 Pilot:
 Operator: UTS
 Line Spacing: 1000 m
 Line Direction: 000 - 180 deg



MAP DETAILS

Projection: AMG84
 Sheet: 1 of 1
 Scale: 1:100000



Drawn: //
 Checked: //
 Approved: //

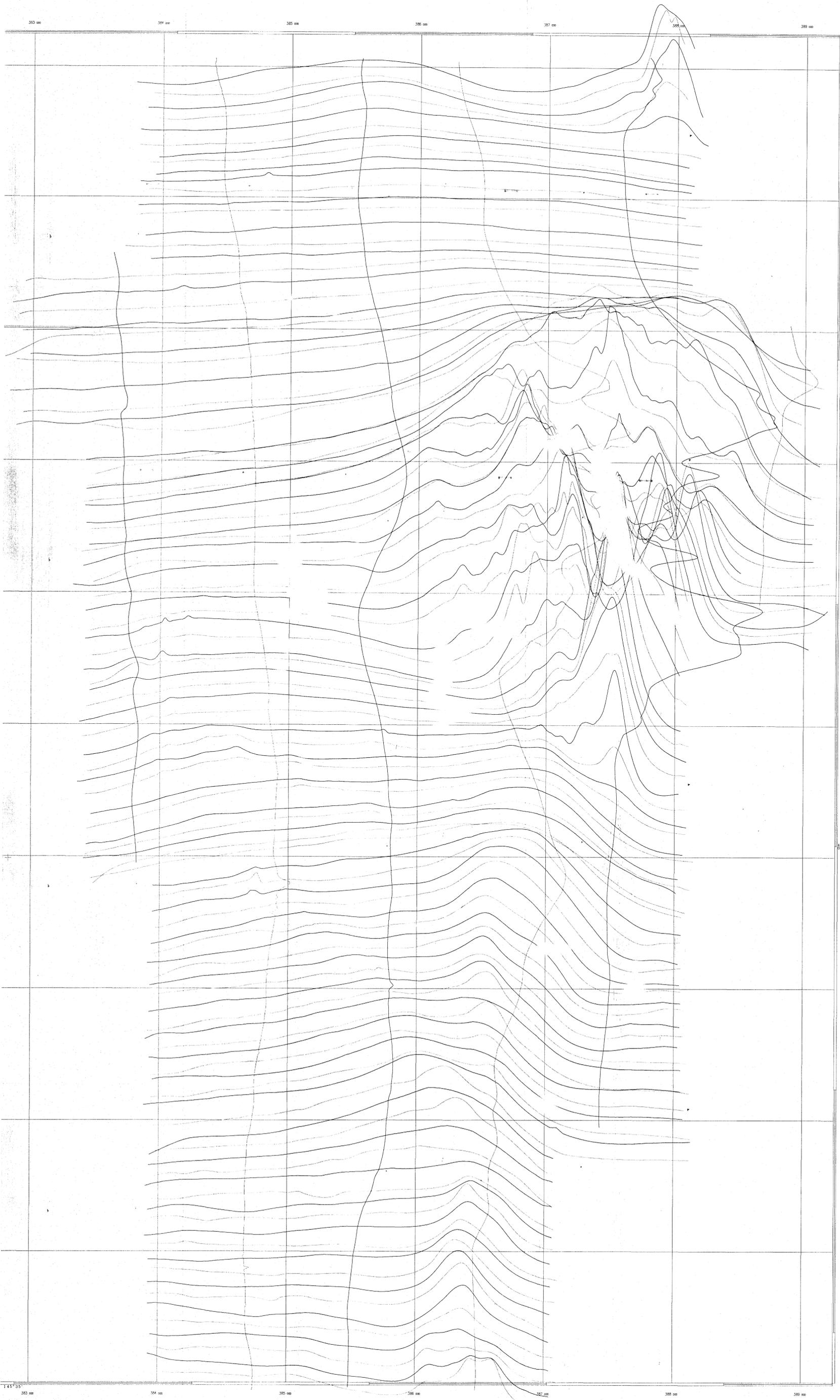
Plotted by Universal Tracking Systems Flight Block Plotter

GOLD MINES OF AUSTRALIA

MOUNT LYELL (TIE LINES)

Flown by: U.T.S.
 Job: Mount Lyell Tie Lines
 Flight Date:

693016



AIRBORNE SURVEY SPECIFICATIONS

Flight Line Direction: 090 - 270 degrees
 Flight Line Separation: 100 metres
 Tie Line Direction: 000 - 180 degrees
 Tie Line Separation: 1000 metres
 Mean Terrain Clearance: 40 metres
 Sample Interval: 3-4 metres
 Navigation: Differential GPS
 Survey Flown: February 1995

AIRBORNE SURVEY EQUIPMENT

Acquisition: UTS Geophysics
 Aircraft: AS2650 Helicopter
 Magnetometer: Geometrics G-833 Helium
 Resolution: 0.001 nT
 Sensitivity: 0.001 nT
 Recording Interval: 10 Hz
 Compensation: PMS ADC II Compensation

PROCESSING DETAILS

Diurnal levelling applied
 Tie line levelling applied
 Vertical scale: 50nT/cm



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COPPER MINES OF TASMANIA PTY LTD

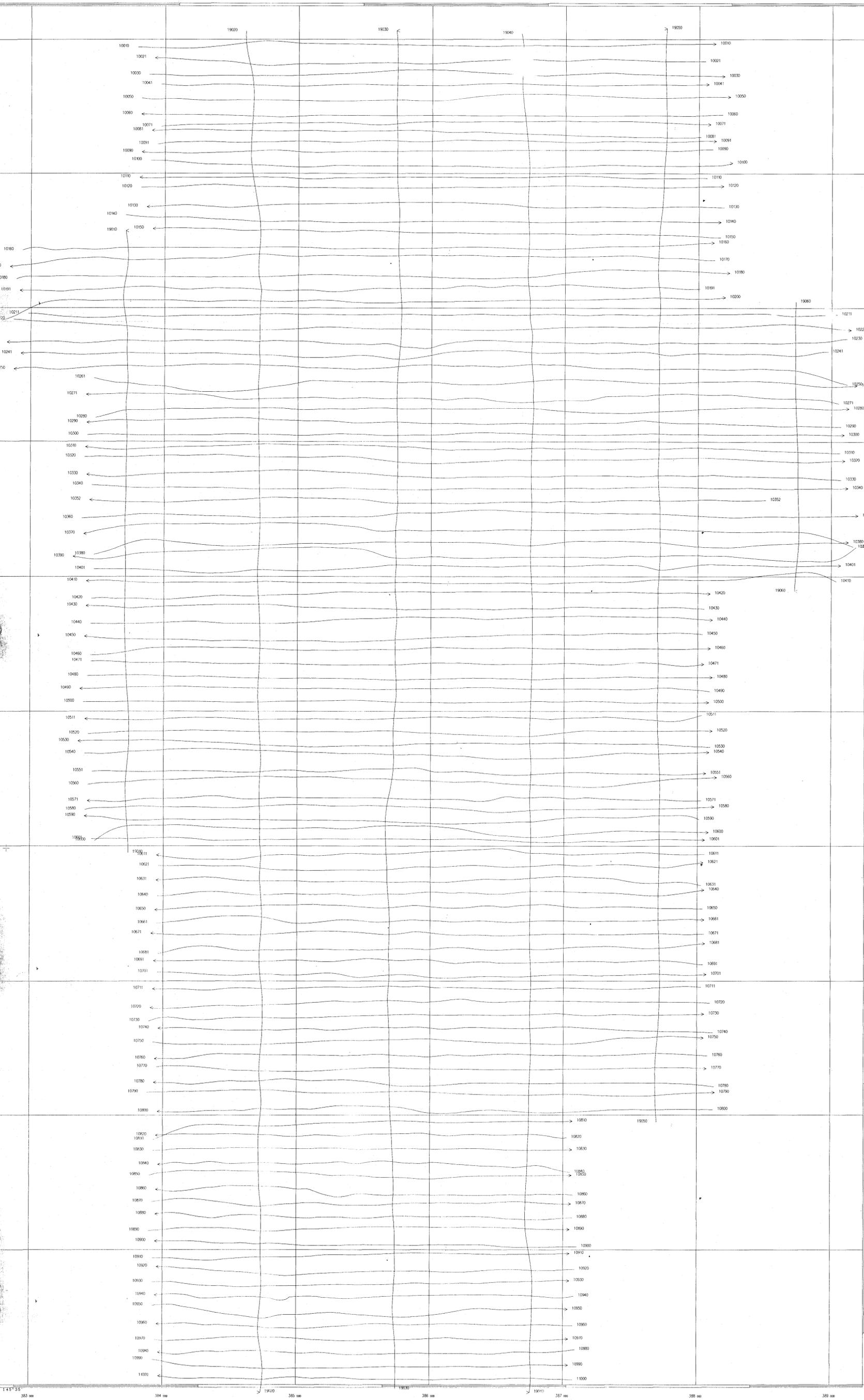
A.C.N. 065 339 835

MT LYELL - TASMANIA - EL 52/94

DETAILED HELI-MAG SURVEY

TMI PROFILE MAP

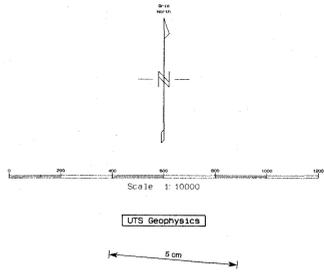
DRAWN: UTS GEOPHYSICS	SCALE: 1:10000
DATE: 30 JUNE 1995	JOB: A052



AIRBORNE SURVEY SPECIFICATIONS
 Flight Line Direction: 090 - 270 degrees
 Flight Line Separation: 100 metres
 Tie Line Direction: 000 - 180 degrees
 Tie Line Separation: 1000 metres
 Mean Terrain Clearance: 40 metres
 Sample Interval: 3-4 metres
 Navigation: Differential GPS
 Survey Flown: February 1995

AIRBORNE SURVEY EQUIPMENT
 Acquisition: UTS Geophysics Pty Ltd
 Aircraft: AS350B Helicopter
 Magnetometer: Geometrics G-833 Helium
 Resolution: 0.001 nT
 Sensitivity: 0.001 nT
 Recording Interval: 10 Hz
 Compensation: RMS AADC II Compensator

PROCESSING DETAILS
 Diurnal levelling applied
 Tie line levelling applied



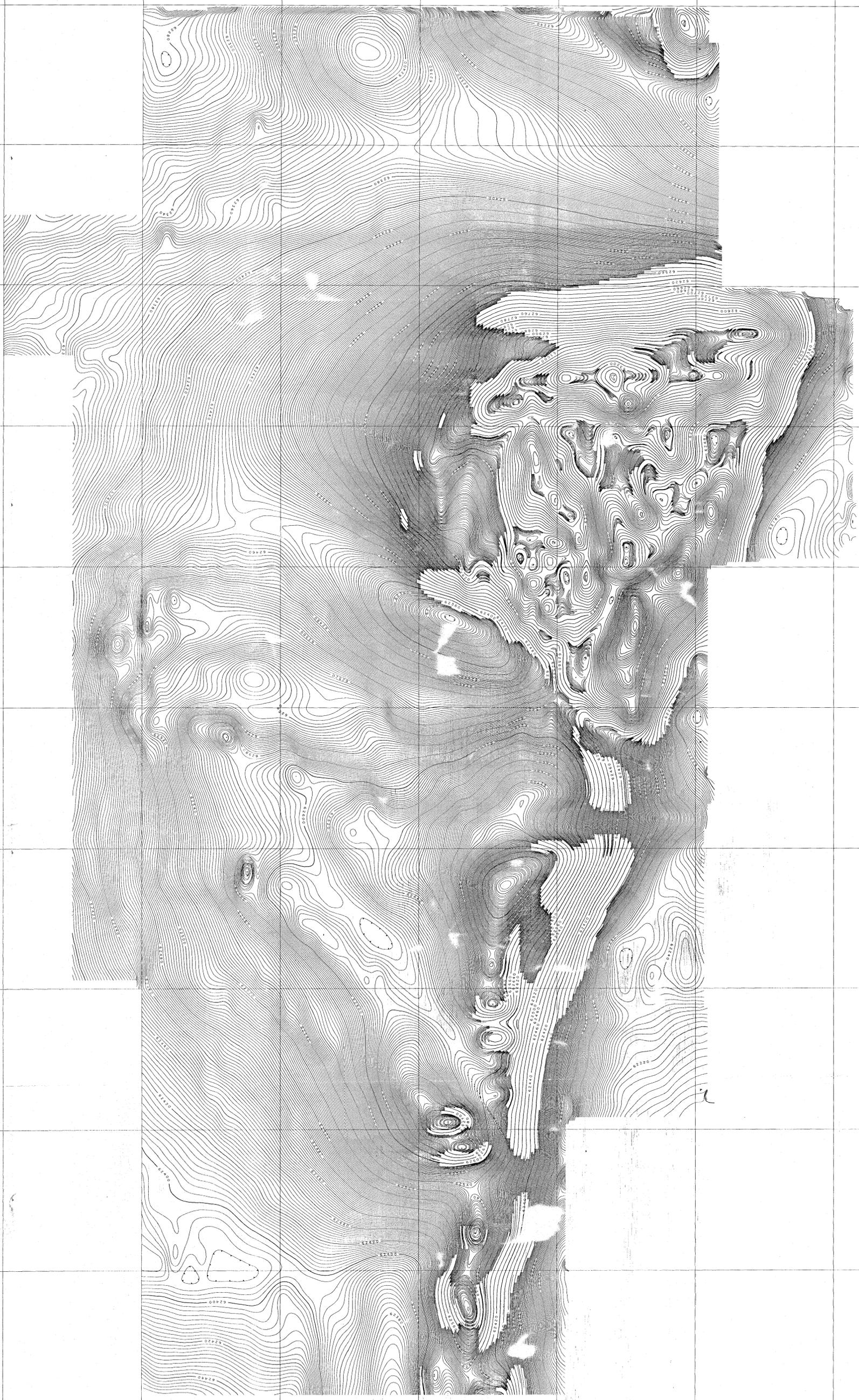
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 MT LYELL TASMANIA - EL 52/94
 DETAILED HELICOPTER SURVEY
 FLIGHT PATH MAP

DRAWN: UTS GEOPHYSICS
 DATE: 22 JUNE 1995
 SCALE: 1:10000
 JOB: A062
 LN-1001



AIRBORNE SURVEY SPECIFICATIONS

Flight Line Direction: 090 - 270 degrees
 Flight Line Separation: 100 metres
 Tie Line Direction: 000 - 180 degrees
 Tie Line Separation: 1000 metres
 Mean Terrain Clearance: 40 metres
 Sample Interval: 3-4 metres
 Navigation: Differential GPS
 Survey Flight: February 1995

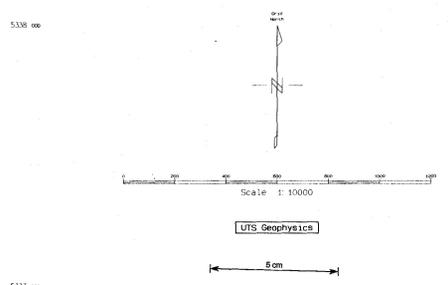
AIRBORNE SURVEY EQUIPMENT

Acquisition: UTS Geophysics Pty Ltd
 Aircraft: AS350B Helicopter
 Magnetometer: Geometrics G-833 Helium
 Resolution: 0.001 nT
 Sensitivity: 0.001 nT
 Recording Interval: 10 Hz
 Compensation: RMS ADC II Compensator

PROCESSING DETAILS

Digital levelling applied
 Tie line levelling applied
 Grid cell size: 25mE x 25mN
 1st contour interval: 20nT
 2nd contour interval: 20nT
 3rd contour interval: 20nT
 4th contour interval: 200nT

45°



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COPPER MINES OF TASMANIA PTY LTD	
A.C.N. 065 339 835	
MT LVELL TASMANIA - EL 52/94	
CONTOUR MAP OF	
TOTAL MAGNETIC INTENSITY	
DRAWN: UTS GEOPHYSICS	SCALE: 1:10000
DATE: 22 JUNE 1995	JOB: A06P LN-1002