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GEOPEKO  
A DIVISION OF PEKO-WALLSEND OPERATIONS LIMITED

1982/83 ANNUAL REPORT E.L. 24/73

AN AEROMAGNETIC SURVEY OF THE DIAL  
RANGE TROUGH

BY

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DECEMBER 1983  
DEVONPORT

*Magnetic tape stored in the  
Compactus*

*TRANSPARENCY HELD*

**OPEN FILE**

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INTRODUCTION

Exploration Licence 24/73 of 106sq km covers the greater portion of the Dial Range Trough, comprising a thick succession of Cambro-Ordovician sediments and volcanics.

As part of the continuing programme of exploration by the Geopeko-Duval Mining joint venture an airborne magnetic survey was completed over the licence area in November 1983. This report details the results of that survey with recommendations for anomaly follow up.

SUMMARY

1. The primary exploration target in the Dial Range Trough is sulphide-cassiterite mineralization of the Renison and Cleveland type. Such mineralization is expected to be both magnetic and conducting.
2. An aeromagnetic survey was carried out over the licence area to search for magnetic anomalies in the favourable Lower to Middle Cambrian stratigraphy of the Cateena Group and Radfords Creek Mudstone.
3. A number of rock units in the licence area have a high magnetic susceptibility and have contributed to a complex aeromagnetic pattern over the trough. In particular the Tertiary basalt, Motton Spilite and Lobster Creek Volcanics give rise to complex anomaly patterns.
4. The Cateena Group and Radfords Creek Mudstone are magnetically quite and therefore anomalies within these units are easy to distinguish.
5. A total of fourteen anomalies occur within favourable geological settings and are recommended for follow up investigation. Most of these will require geological inspection, reconnaissance ground magnetics and limited soil sampling.
6. One anomaly, designated Venture 5, has a very high priority for follow up. It is located 400m south west of the Dial Mine Grid and directly along strike from the tin-copper bearing pyritic breccias previously investigated.

RECOMMENDATIONS

1. Immediate follow up of the Venture 5 magnetic anomaly by extension of the Dial Mine Grid to the south and west.
  
2. Systematic reconnaissance follow up of the other twelve defined anomalies (Venture 6 through to Venture 18). Follow up should include two to four lines of magnetics (depending on the anomaly area), geological mapping and limited power auger soil sampling.

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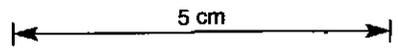
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Figure 1

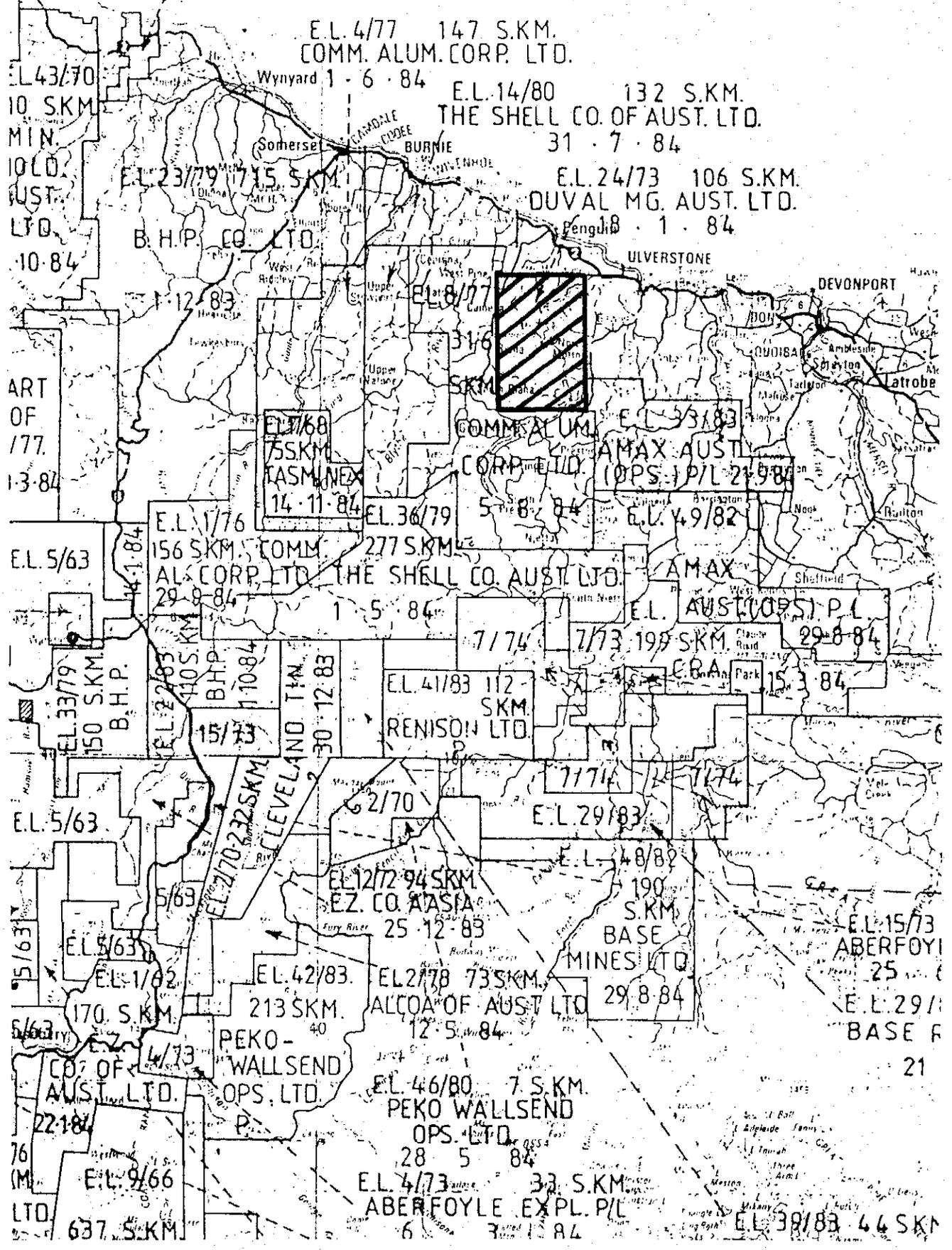
# E.L.24/73 Dial Range Locality Diagram

190 S.K.M.  
OLD. AUST. P/L  
6.8.84

E.L.18/76 19 S.K.M.  
MIN. HOLD. AUST. P/L  
4.8.84



1:500 000



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PREVIOUS EXPLORATION

Previous work by the Geopeko-Duval joint venture is reported in Large & Herrmann (1980), Large (1981), and Wilson (1982). A brief outline of the work is given below;

1979-80 Season: Prospect development on the Dial Mine Grid including mapping, magnetics, SP, Crone Pulse-EM, VLF-EM, soil geochemistry.

1980-81 Season: Drilling of four holes to test geophysical and geochemical target on the Dial Mine Grid.

1981-82 Season: Extension of Dial Mine Grid northwards with further soil geochemistry and IP.

Regional stream sediment sampling and geological mapping programme of the south west part of the E.L.

Results from this work and Duval Mining's previous exploration indicate the presence of weakly mineralized horizons of argillaceous sedimentary breccias within the lower portion of the Cateena Group. On the Dial Mine Grid a large area of biotite and tourmaline alteration occurs within the argillaceous sediments. Specific horizons of sediment breccias are enriched in pyrite and arsenopyrite and average about 200ppm Sn. Adjacent bedded argillites are enriched in copper with the best intersection yeilding 20m of 0.68% Cu.

EXPLORATION MODEL

It is proposed that the area of the Dial Mine Grid represents a major hydrothermal alteration zone related to a Devonian Granite intrusive centre at depth. The extensive biotite and tourmaline alteration in the Cateena Group is an expression of hydrothermal solution movement outwards from the granite. The intense alteration and anomalous tin content of the sediment breccias suggests these breccia units acted as the major plumbing system for hydrothermal solution movement.

The prime targets for future exploration in the licence are massive pyrrhotite-cassiterite replacement bodies developed within the Cateena Group.

AEROMAGNETIC SURVEYa) Specifications and Results

The bulk of the Dial Range E.L. 24/73 was covered by an airborne geophysical survey undertaken during November 1983. The survey area is shown in figure 2. The estimated survey distance was 440 kms. The survey was flown by Austirex International Ltd using a Government Aircraft Factories NOMAD Model 22B carrying a Geometrics Model G813 proton precession magnetometer and a Geometrics Model GR-800 multichannel spectrometer.

The survey specifications (see appendix ) called for flight lines spaced at 250m intervals in an east-west direction. The nominal terrain clearance was 135m, however the steep topography within the survey area, as expected, prevented this height from being consistently maintained. The magnetometer, which has a stated precision of 0.0lnT and noise level less than  $\pm 1.0nT$ , was set to cycle every 0.5m, giving a nominal sampling interval along the flight line of approximately 35 metres. Navigation was by conventional photographic techniques with the assistance of a Dopler navigation system. Although radiometric data were acquired throughout the survey, only the magnetic intensity information was processed and plotted. The contoured magnetic data is shown on plan 2.

The principal problem affecting the acquisition and interpretation of the magnetometer data was the highly variable terrain clearance which arises from the steep topography of the survey area. As the terrain clearance increases beyond the required 135m anomaly amplitudes decrease and resolution also falls away. To give an example, between a terrain clearance of 135m and 180m the response due to a dipolar source at ground surface (the worst case to consider and a very unfavourable geometry for an exploration target), is reduced in amplitude by approximately 50%. Obviously a rapidly changing terrain clearance and markedly

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BASS STRAIT

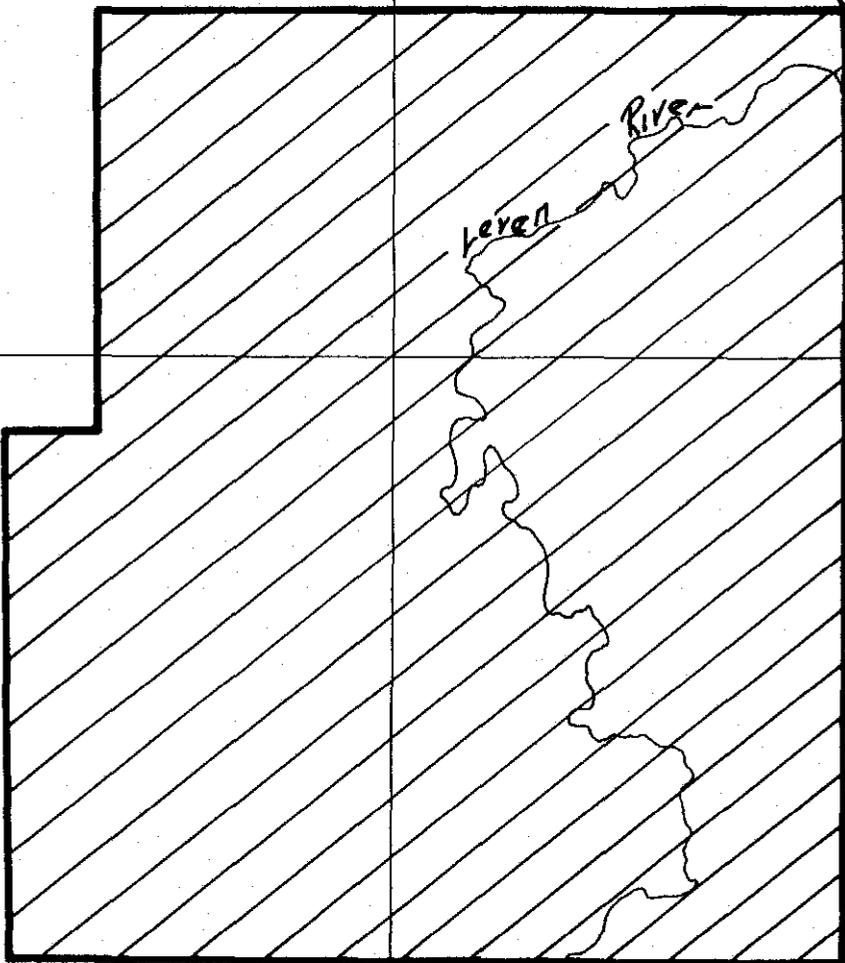
Penguin

West Ulverstone

Bass Highway

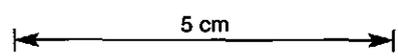
Leven River

5 440 000 N



*Area of Aeromagnetic Survey  
E.L. 24/73 Dial Range, Tas*

4 20 000 E



different clearances on adjacent lines can distort anomaly shapes both along flight lines and in plan. To help overcome, or at least heighten awareness of this problem, flight line maps have been marked to show when terrain clearance exceeds 185m. Also a dynamic upward and downward continuation map to 135m has been prepared (plan 3) which shows relatively little departure from the uncontinued contour plan. (plan 2) This provides good evidence that changing terrain clearance has not greatly distorted the data.

b) Interpretation

Much of the magnetic character in the E.L. can be ascribed to particular rock units of no economic potential. These are listed below;

**Tertiary basalt:** Gives rise to the complex magnetic pattern of high frequency highs and lows on the western and eastern margins of the survey area. Isolated patches of basalt overlying the Cambrian sequences give rise to some discrete anomalies. In some instances these will require field checking eg Venture 13 and Venture 18.

**Lobster Creek Volcanics:**

Gives rise to broad positive anomalies due to minor disseminated magnetite within the micro diorite and dacite bodies. The complex broad anomaly over the micro diorite in the central-eastern part of the E.L. is a good example. Anomalies over the contact of the Lobster Creek Volcanics and Canteena Group will require follow up (eg Venture 12, Venture 6).

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Motton Spillite: Complex magnetic pattern of highs and lows similar to the Tertiary basalt.

Anomalies for follow up

There are a number of discrete anomalies within the favourable stratigraphy that may relate to pyrrhotite or magnetite mineralization and require follow up. These anomalies are designated Venture 5 to Venture 18 and are outlined on plan 1, and detailed below.

Venture 5

- Priority - High
- Magnetic Anomaly Shape - Rounded, broad
- Maximum Intensity - 50nT
- Geology - Cateena Group sediments
- Stream Geochemistry - Area of anomalous Sn, Cu drainage geochemistry
- Comments - This anomaly is just off the south - western edge of the Dial Mine Grid and directly along strike from the tin-copper breccias drilled by Duval/Geopeko.
- Recommendation - Extend gridding on the Dial Mine Grid to cover the anomaly.  
Magnetics, mapping and soil sampling on grid.

Venture 6

- Priority - Medium
- Magnetic Anomaly Shape - Complex
- Maximum Intensity - 70nT
- Geology - Cateena Group, adjacent to western margin of Lobster Creek Dacite.
- Stream Geochemistry - Panned concentrate sample from creek returned 610ppm Sn, 400m downstream from anomaly.
- Comments - Favourable geological position. Tertiary basalt to the south maybe contributing to the anomaly.

Venture 7

Priority	-	Medium
Magnetic Anomaly Shape	-	Round
Maximum Intensity	-	40nT
Geology	-	Covered by Leven River alluvium.
Stream Geochemistry	-	No samples.
Comments	-	Close to contact of Lobster Creek Dacite and Barrington Chert.

Venture 8

Priority	-	High
Magnetic Anomaly Shape	-	Rounded, broad
Maximum Intensity	-	500nT
Geology	-	Cambrian-Precambrian sediments partly covered by basalt.
Stream Geochemistry	-	Anomalous Pb, Zn.
Comments	-	Anomaly is directly south west of the Badgers Pb prospect and along strike to south from the Iron Cliffs hematite lodes. Much of the area is covered by Tertiary basalt however the anomaly does not have the typical basalt (thin sheet) character, and may be sourced below the basalt.

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Venture 9

- Priority - High
- Magnetic Anomaly Shape - Bulls eye (monopole)
- Maximum Intensity - 80nT
- Geology - Close to unconformity between Cateena Group and Owen Conglomerates. Adjacent to a Dacite dyke (?).
- Stream Geochemistry - Low order tin and copper anomalies in Hardstaff Creek and tributaries.
- Comment - Intense but small anomaly in favourable stratigraphy.

Venture 10

- Priority - Medium
- Magnetic Anomaly Shape - Elongate parallel to flight lines \*
- Maximum Intensity - 40nT
- Geology - Cateena Group, part alluvium covered.
- Stream Geochemistry - No sampling.
- Comment - Anomaly is adjacent to Russel's Cu-Ag-Au workings.

\* The magnetic intensity map is a preliminary, the final processing may alter the shape of this anomaly.

Venture 11

- Priority - Low
- Magnetic Anomaly Shape - Elongate east-west (along strike from Venture 10).
- Maximum Intensity - 90nT
- Geology - Alluvial cover (probably over Lobster Creek Volcanics).
- Stream Geochemistry - No sampling.
- Comment - This anomaly forms part of a major complex of anomalies probably due to disseminated magnetite dispersed in the Lobster Creek Volcanics.

Venture 12

Priority - Low

Magnetic Anomaly Shape - Complex double peaked.

Maximum Intensity - 90nT

Geology - Anomaly straddles contact of Lobster Creek Volcanics and Cateena Group.

Stream Geochemistry - No sampling.

Comments - Western portion of anomaly occurs over Lobster Creek Volcanics, and the eastern portion over Cateena Group.

Venture 13

Priority - Low

Magnetic Anomaly Shape - Bulls eye - "flat topped"

Maximum Intensity - 180nT

Geology - Patch of basalt overlying Cateena Group adjacent to Barrington Chert contact.

Stream Geochemistry - No samples.

Comments - Probably caused by Tertiary basalt but requires field checking.

Venture 14

Priority - Medium

Magnetic Anomaly Shape - Elongate E-W

Maximum Intensity - 200nT

Geology - Cateena Group adjacent to Tertiary basalt.

Stream Geochemistry - No sampling.

Comments - Maybe Tertiary basalt but lies south of mapped basalt plateau.

Venture 15

Priority	-	Medium
Magnetic Anomaly Shape	-	Rounded
Maximum Intensity	-	40nT
Geology	-	Chert on contact of Motton Spilite and Cateena Group.
Stream Geochemistry	-	Anomalous Cu and Zn in stream draining anomaly (75ppm Cu, 185ppm Zn).
Comments	-	An old prospect is recorded about 1km along strike to the south west of the anomaly. The cherts on the contact of the Motton Spillite and Cateena Group maybe surface silicified limestones, and represent a very favourable host rock (similar to Cleveland Mine environment).

Venture 16

Priority	-	Low
Magnetic Anomaly Shape	-	Oval
Maximum Intensity	-	40nT
Geology	-	Contact of Radfords Creek Mudstone and Motton Spilite.
Stream Geochemistry	-	Background values.
Comments	-	Very low order anomaly possibly related to rock contact.

Venture 17

Priority	-	Low
Magnetic Anomaly Shape	-	Complex, broad.
Maximum Intensity	-	100nT
Geology	-	Lobster Creek Volcanic porphyry (?) intruding Radford Creek Mudstone.
Drainage Geochemistry	-	No samples.
Comment	-	Anomaly probably due to disseminated magnetite in Lobster Creek Volcanics.

Venture 18

Priority	-	Low
Magnetic Anomaly Shape	-	Intense elongate
Maximum Intensity	-	200nT
Geology	-	Tertiary basalt and Tertiary sediments.
Drainage Geochemistry	-	Background values.
Comments	-	Most probably caused by Tertiary basalt but requires checking.

CONCLUSIONS

1. The aeromagnetic survey was successful in delineating a number of anomalies in favourable geological settings.
2. Five of the aeromagnetic anomalies are in areas of elevated stream sediment geochemistry - Ventures 5,6,8,9 and 15.
3. The Venture 5 anomaly lies directly along strike from the mineralized horizons on the Dial Mine Grid and holds very good potential.
4. Follow up of the fourteen designated anomalies should include:
  - ground magnetic traversing.
  - rock chip and soil sampling over the anomalies.
  - mapping with particular emphasis on the search for biotite and/or tourmaline alteration.

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REFERENCES

Large R.R. And Herrmann W. 1980: Progress Report on E.L. 24/73 to December 1979; Geopeko Company Report, July 1980.

Large R.R., 1981: Progress Report - E.L. 24/73, Dial Range - 1980 Field Season; Geopeko Company Report, May 1981.

Wilson, P.A., 1982: Annual Report E.L. 24/73, Dial Range, 1981-82 Field Season; Geopeko Company Report, September 1982.

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APPENDIX

SPECIFICATIONS FOR AEROMAGNETIC SURVEY

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SCHEDULE 1

SURVEY SPECIFICATIONS

The Contractor shall conduct the Survey according to the following specifications:

1. The survey area is as shown on Plan 1
  
2. Flight lines shall be flown in the directions and at the flight line spacings as follows:

Flight line direction: 090° - 270°

Flight line spacings: 250 metres. Distance between lines not to exceed 375 metres over a distance of 2.5 kilometres.

Tie lines shall be flown so that the ratio of tie line spacing to flight line spacing shall be 1:10.

3. The total programmed linear distance to be flown, including flight lines and tie lines is 438.75 kilometres.

4. *Sampling interval shall not exceed 35 metres along the flight line.*
  
5. *Mean terrain clearance shall be 135 metres  $\pm$  45 metres but the final adopted terrain clearance on any part of a flight line shall be at the discretion of the pilot of the aircraft according to the safety of the aircraft and its crew and the Contractor shall not accrue a penalty for failure to maintain the terrain clearance specified herein where that failure is due to severe terrain.*
  
6. *The Contractor shall be responsible for obtaining such permits or clearance as are necessary to conduct the Survey.*
  
7. *Aerial photography shall be good quality black and white prints at nominal 1:30,000 scale and shall be supplied by Geopeko at least 10 days before the commencement of the Survey in such quantity as to allow the Contractor to extract 2 copies of ground coverage to use for flight lines, tie lines, and in-field data recovery. Horizontal control will be established from 1:25,000 topographic maps and coordinate data transferred to the recovery set of photography.*
  
8. *Navigation shall be visual from the photography specified in paragraph 7 of this Schedule with Doppler assistance. Vertical*

tracking films shall be made of the actual aircraft path with an average fiducial recovery interval of 2,000 metres on all flight and tie lines.

9. Magnetometer shall be as specified in Schedule 2.
10. Spectrometer shall be as specified in Schedule 2. The Survey shall not be suspended during rain or thereafter.
11. Data acquisition shall be by digital recording on to 9 track 800 b.p.i. magnetic tape with analogue recording on multi channels of radiometric data, total intensity magnetics and radar altimeter heights.

All data acquisition shall be synchronised to a 0.5 second time base.

12. Reflying shall be carried out at the sole cost and expense of the Contractor, as requested by the Site Geologist, in the following circumstances:

- (a) where for a flight line distance of 2.5 kilometres the flight line spacing exceeds 1.5 times the flight line spacing specified in paragraph 2 of the Schedule,  
or

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- (b) where the terrain clearance exceeds the limits provided for in paragraph 5 of this Schedule, or
- (c) where for a flight line time of more than 5 minutes the magnetic diurnal non-linear variation exceeds 5 nT unless the Contractor has been instructed to continue flying pursuant to paragraph 14 of this Schedule, or
- (d) in any other circumstances where the specifications in the Schedules are not complied with.

13. If Geopeko gives notice to the Contractor at least 5 days before the day estimated by the Contractor to be the last day of flying of the Survey Geopeko shall have the right to extend the Survey by an amount of a further 1,000 kilometres of flight lines provided that any extension shall not be specified at closer flight line spacing than is in the reasonable opinion of the Contractor practicable and Geopeko may at the same time subject to the agreement of the Contractor further extend the Survey beyond the further 1,000 kilometres provided that if any extension should require flying outside the Area Geopeko shall supply such additional aerial photography to the same specifications as paragraph 7 of this Schedule and such other information as might be required by the Contractor so as to allow flight-planning to proceed at the date of the notice.

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14. *The Contractor shall advise the Site Geologist if in the opinion of the Contractor flying should be suspended due to magnetic storms and unless the Site Geologist instructs the Contractor to continue flying the Standby Rate shall be charged during the period of suspension.*
15. *Checks and tests of instrumentation to be performed during the course of the survey:*
- (a) Magnetometer heading compensation and parallax evaluation prior to survey commencement.*
  - (b) Spectrometer pre and post flight calibrations using standard Cs, Th and U sources. System response to be within  $\pm 10\%$  of the normal or mean system response.*
  - (c) Spectrometer pre and post flight systems stability confirmation. Real time resolutions spectral plot to be less than 12% FWHM at .662 MeV.*

SCHEDULE 2EQUIPMENT AND PERSONNEL

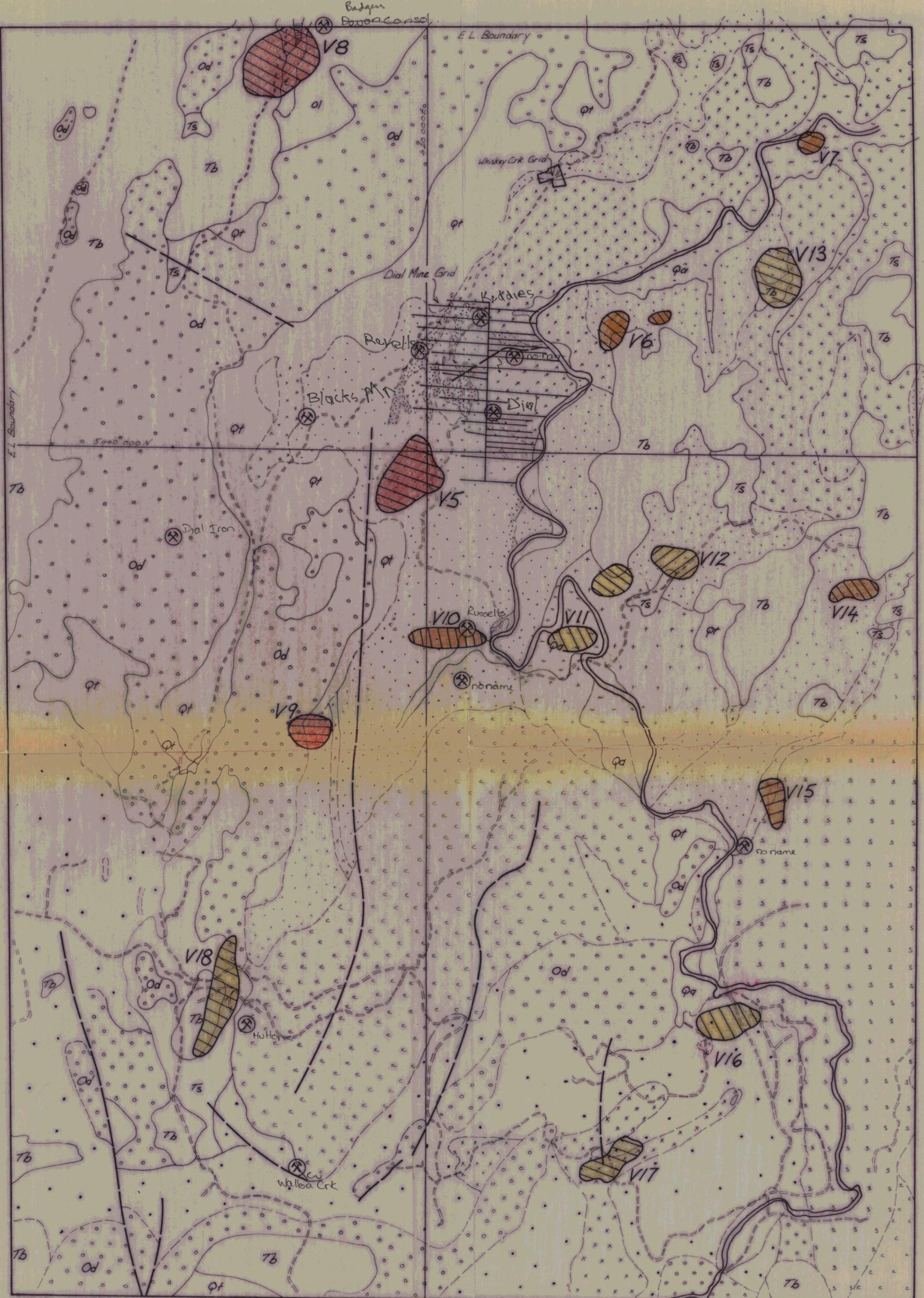
The Contractor shall supply equipment and personnel sufficient to complete the Survey in accordance with paragraph 2 of this Agreement and in particular shall supply the following equipment:

1. Survey Aircraft: Government Aircraft Factories NOMAD, Model 22B. Registration number VH-CPX.
2. Airborne Proton Magnetometer: Geometrics Model G.813 Sensor and magnetometer. Recording precision 0.01 nT. Noise level less than  $\pm 1.0$  nT.
3. Ground Station Proton Magnetometer: Geometrics 826A magnetometer with a sensitivity of 1.0 nT. Noise level less than  $\pm 1.0$  nT.
4. Airborne Gamma-ray Spectrometer: Geometrics Model GR-800 with multichannels of 256 and 128 channels for main and upwards crystal arrays. Energy windows set for potassium

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at 1.37 to 1.57 MeV, uranium at 1.66 to 1.86 MeV, thorium at 2.40 to 2.80 MeV, total count at 0.4 - 3.0 MeV, and cosmic background 3.0 to 6.0 MeV.

5. *Crystal Detectors: Geometrics Model 3072/512R with sodium iodide (thallium-activated) crystals with the main detector containing 50.34 litres and the upwards-looking detector containing 8.39 litres. All crystals are optically coupled to matched photo-multiplier tubes.*
  
6. *Radar Altimeter: Collins ALT.50 altimeter, measuring vertical distances from surface to aircraft with range 0 to 610 metres and accuracy  $\pm 2\%$ .*
  
7. *Doppler Navigation System: Sperry-Decca type 72 with TANS Computer 9447D. Navigation in latitude-longitude, grid or range and bearing.*
  
8. *Aerial Tracking Camera: Geocam model SF75, 35 mm frame camera with wide-angle lens.*



**QUATERNARY** - Qa - Alluvium

**TERTIARY** - Tb - Basalt  
Sediments

**ORDOVICIAN** - Od - Conglomerate sandstone

**CAMBRIAN** - Pt - Siltite - **HUTTON SPILLITE**  
- C.C.C. - Banded cherts - **BARRINGTON CHERT**  
- Sediments - Breccias, mudstones, claystones, etc. - **CATEENA GROUP**

**IGNEOUS ROCKS** - X X X - Patuxtic 'dikes' possibly intrusives  
- \* \* \* - Massive 'sills' - **LOBSTER CREEK VOLCANICS**

Magnetic anomalies proposed for follow-up:  
Red - High priority  
Orange - Medium priority  
Yellow - Low priority

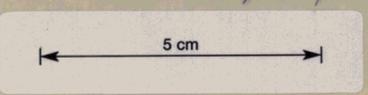
**GEOPEKO**  
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Scale 1:25 000  
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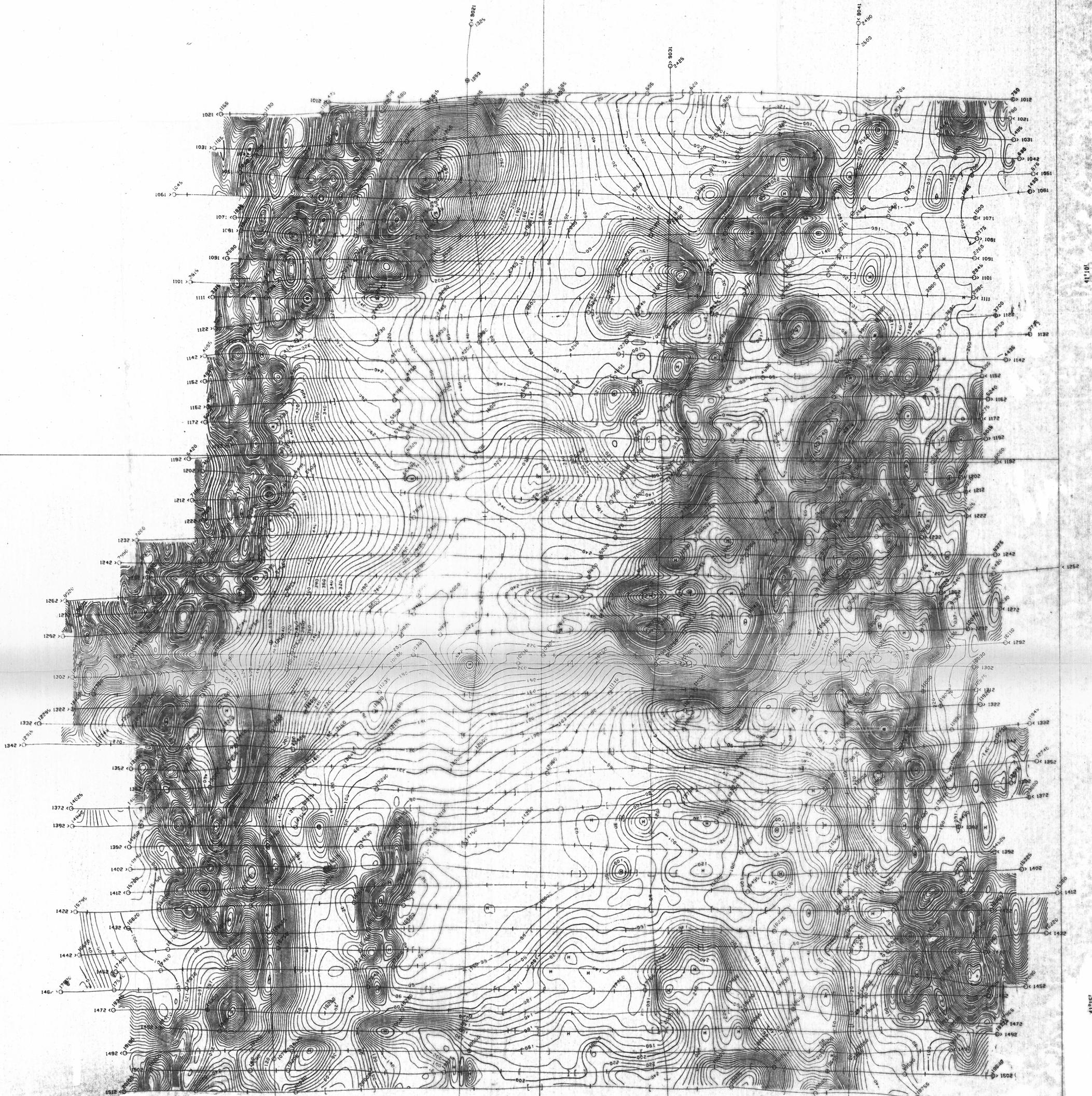
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Drawn By: Plog  
Date: Dec '83  
Approved By:  
Revision By: Date:  
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E.L. 24/73 Dial Range, Tasmania  
Geology 027  
and Magnetic Targets

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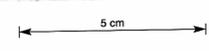
83-2077 **PRELIMINARY**



PRELIMINARY  
Plan 2

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JOB 314  
DIAL RANGE  
MAGNETIC INTENSITY CONTOURS (10M)  
UNLEVELLED 1:25,000 25 NOV 83



41°10'

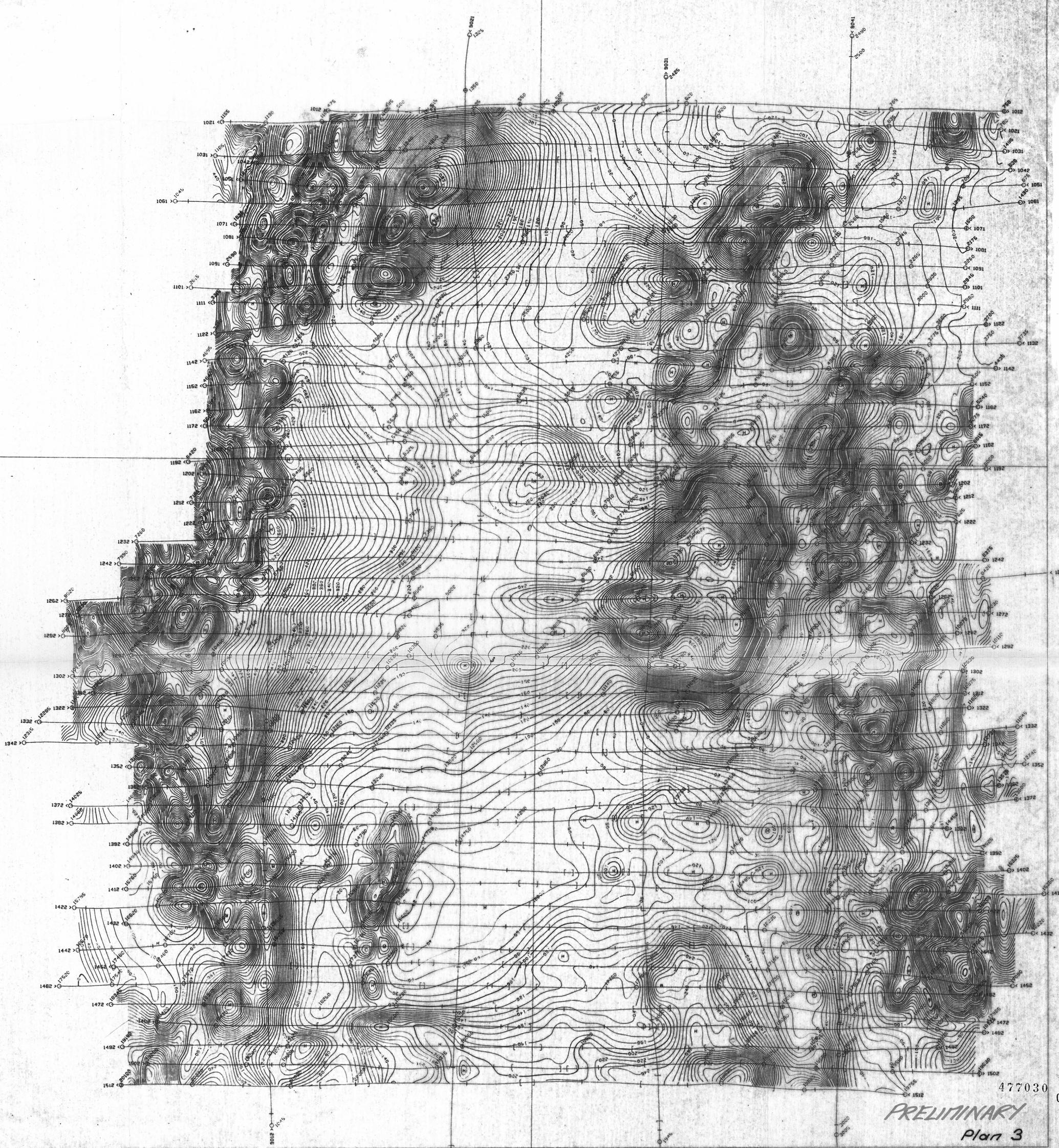
41°10'

5440000 S

5440000 S

41°15'

41°15'



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**PRELIMINARY**  
**Plan 3**

0314 AREA 1  
 DIAL Range  
 Dynamic upward/downward Continuation  
 to 135 metres  
 magnetic intensity.

43-2077

