REPORT

GROUND MAGNETICS SURVEY
Long Plains, Savage River, Tasmania

POST-ACTIVITY REPORT

GAP Geophysics Australia Pty Limited

Project Reference:	06042ABMS
Prepared For:	Australian Bulk Minerals
Issuing Office:	Brisbane Office
Date of Issue:	February 2007

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GROUND MAGNETICS SURVEYS
POST-OPERATIONS REPORT

Long Plains, Savage River, Tasmania

EXECUTIVE SUMMARY

GAP Geophysics Australia Pty Limited (GAP) was commissioned by Australian Bulk Minerals to conduct geophysical surveys using Ground Magnetics over two areas at Savage River, Long Plains and a small area over a waste dump. The surveys were carried out during the period 20th February to 23rd February 2007.

SCOPE AND OBJECTIVES OF THE SURVEY

The Statement of Work (SOW) specified that GAP was to utilise its Ground Magnetics technology to survey (in AMG/AGD 66 Zone 55 coordinates) two areas totalling approximately 8 line km.

The deliverables for the project were as follows:

- A brief report on field activities.
- A digital copy of the Total Magnetic Intensity data in ASCII XYZ and CSV(.XYZ) format.
- A digital copy of the Total Magnetic Intensity and data in Geosoft grid (.GRD) format.
- Colour images of the processed data as JPEG images.

PROJECT PERSONNEL

The Client representative was Michael Everitt for Australian Bulk Minerals who arranged the survey and provided on site assistance. Lucas Heape led the project for GAP, with field operations carried out by Lucas Heape and Andrea Daniels.

SURVEY PROCEDURE AND INSTRUMENTATION

A summary of the instrumentation and data processing parameters applied to the surveys is shown in Table 1.

Roving Magnetometer Acquisition System	
Magnetometer	Geophysical Technology TM-6 Magnetometer Controller - Synchronised with GPS 1PPS pulse
Sensor	Geometrics 822AS Cs Vapour
Sensor Elevation	~3.0 m
Sample Rate	1200 Hz
Sample Resolution	0.01nT
Base Station	
Magnetometer	Geometrics G856 Proton Precession
Sample Rate	0.1 Hz
Sample Resolution	0.1 nT
Navigation & Positioning	
GPS	Novatel
Differential Corrections	None applied, cotton odometer used synchronously
Software	SurvNav - GAP Geophysics Australia Pty Limited
Datum	AGD 66 / - AMG Zone 55
Sample Rate	1 Hz
Nominal Survey Direction	East West (100 degrees)
Nominal Line Spacing	25m or where line traverses were cut
Data Processing Parameters	
TMI Sample Interval	~ 0.3 m
Gridding	Minimum Curvature
Cell Size	10m
TMI Filtering	None unless specified.
Images Produced	TMI, TMI_RTP

Table 1 Instrumentation and data processing parameters used for the survey.

SURVEY RESULTS

The data were processed as described in Appendix B. Colour images of the data were produced and are provided on the accompanying CD as JPEG images.

Images were produced of the following:

- Survey Map - This map shows survey area with line paths and numbers coloured black.
- Colour Image of Total Magnetic Intensity (TMI).
- Colour Image of Total Magnetic Intensity – Reduced to Pole (TMI_RTP).
- Colour Image of Total Magnetic Intensity – First Vertical Derivative (TMI_1VD).

Reduced scale copies of the images have been included in Appendix A for reference.

DIGITAL DATA PRODUCTS

The following files are supplied on the accompanying CD for each of the survey grids:

Files	Description
Grid Name.xyz	TMI in Geosoft XYZ Format
Grid Name.gdb	TMI in Geosoft Database Format
Grid Name TMI.grd	TMI grid file in Geosoft Format
Grid Name TMI RTP.grd	TMI Reduced to Pole grid file in Geosoft Format
Grid Name TMI .jpg	Colour Image of TMI in JPEG Format

Key:

- TMI – Total Magnetic Intensity
- RTP – Reduced To Pole
- 1VD – First Vertical Derivative

Also included on the CD is a copy of this report in Microsoft Word format.

FINAL REMARKS

- Data collection at Long Plains was carried out along lines cut through thick scrub and forest, lines are of irregular length and whilst the typical line spacing was 25m the southern end of the grid had some lines 100m apart. To help tie in the data from the southern portion of the grid a traverse was completed along a road that ran the length of the grid.
- Due to the thick tree cover at Long Plains differential GPS was not utilised, we believed it unlikely that corrections would be obtained. A synchronous cotton odometer system was used that interpolated the distance between the GPS readings. This system worked as expected, with minimal filtering of the line coordinates required to give a close representation of the actual line path.
- A small survey was carried out over the North Pit Waste Dump with the aim of determining the extent of a basalt flow suspected to lie underneath. We believe that there was to much residual magnetite in the waste dump to be able to determine the geology underneath.

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APPENDIX A – IMAGES

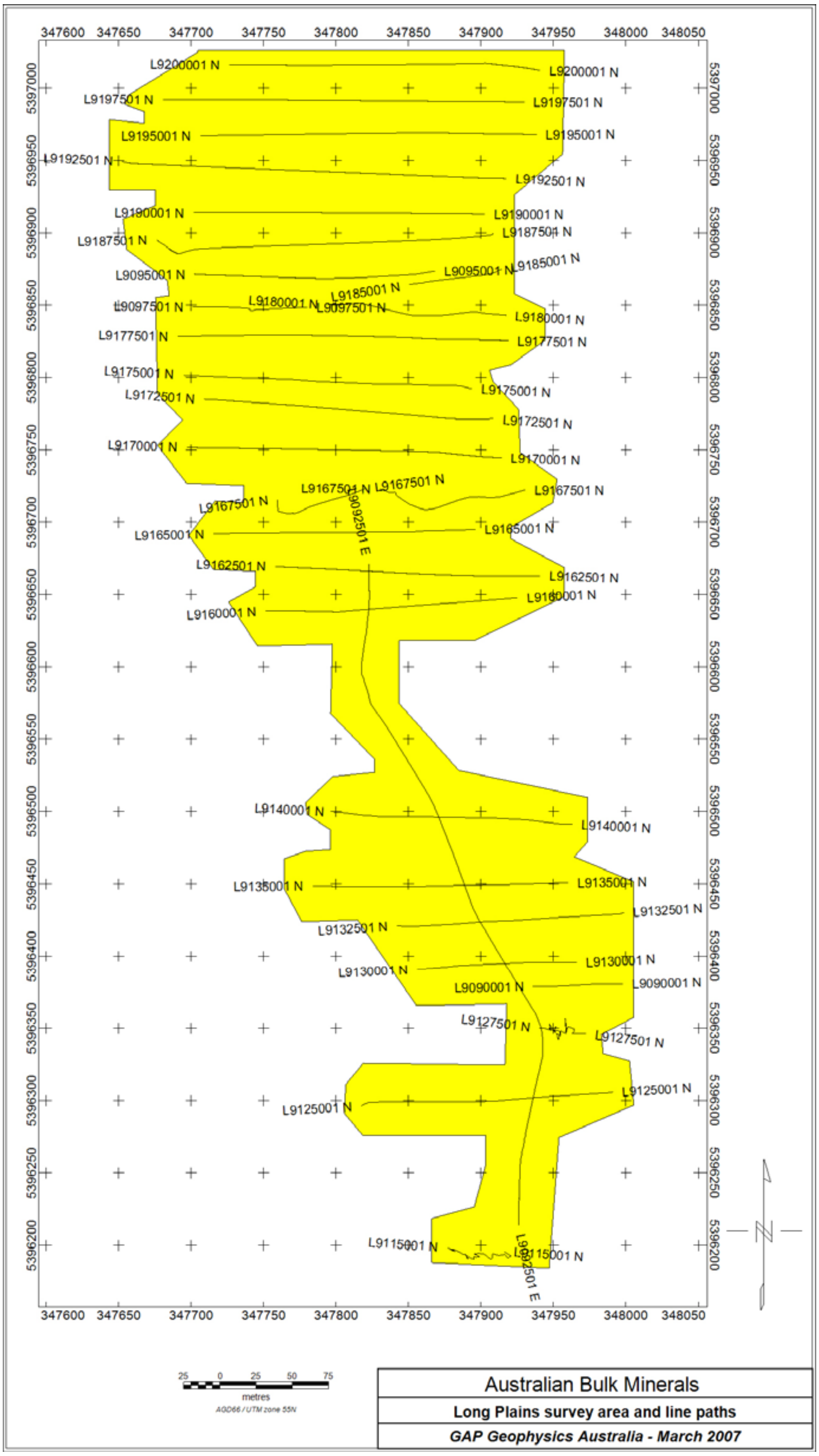

Figure 1 Long plains grid Survey Area - showing the survey line paths.

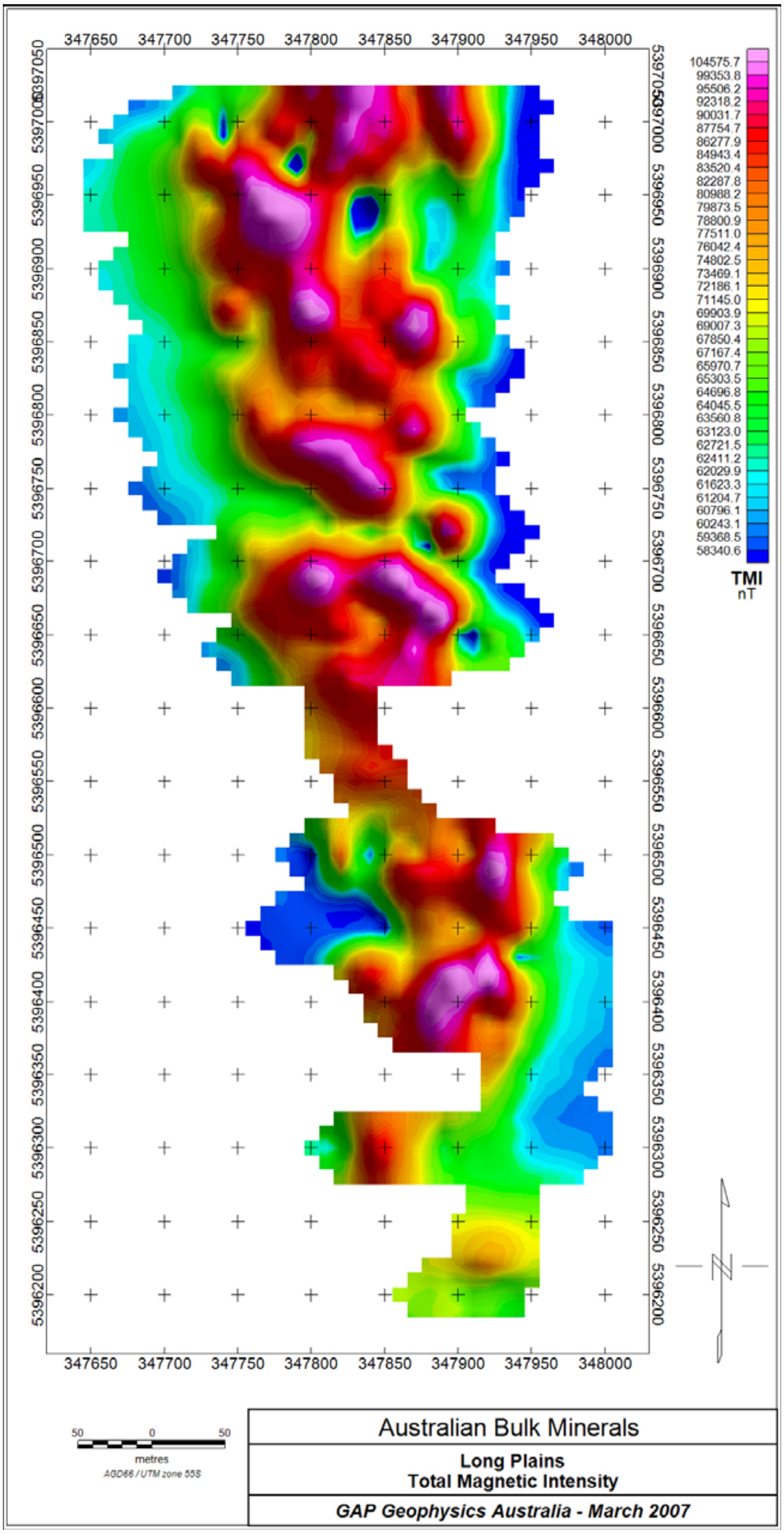

Figure 2 Long Plains Grid – colour image of Total Magnetic Intensity.

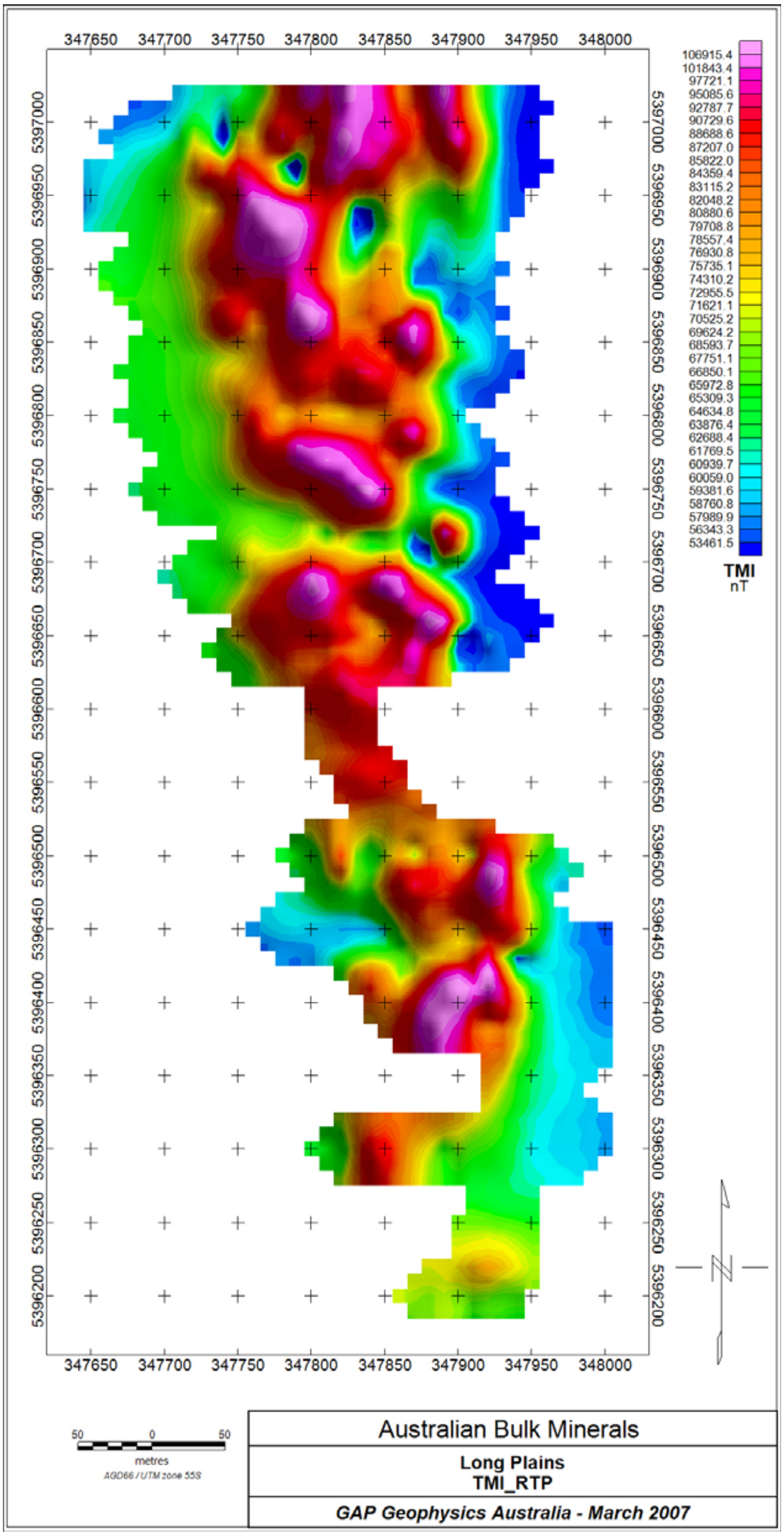

Figure 3 Long Plains Grid – colour image of TMI Reduced to Pole (RTP).

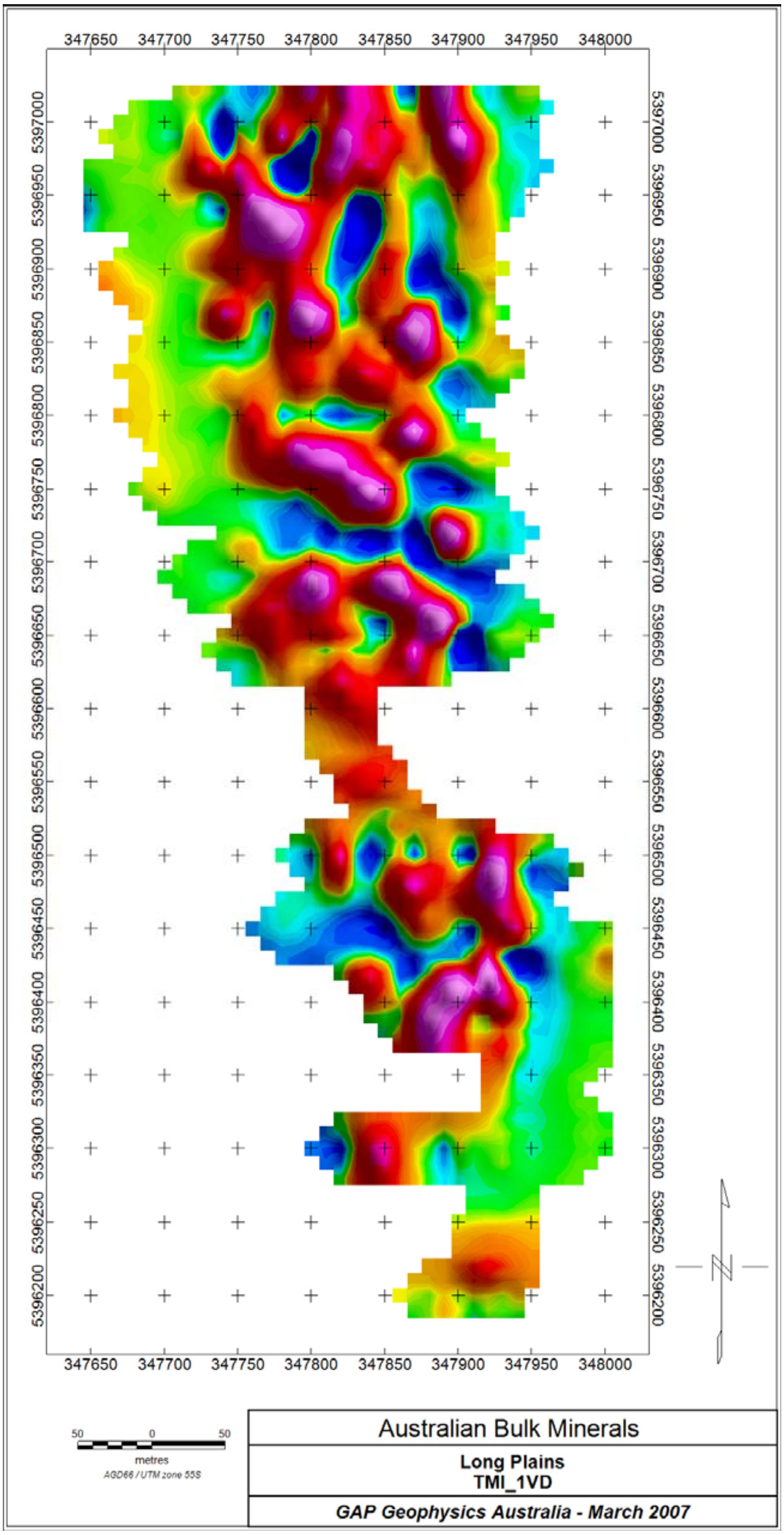

Figure 4 Long Plains Grid – colour image of TMI First vertical Derivative (1VD) .

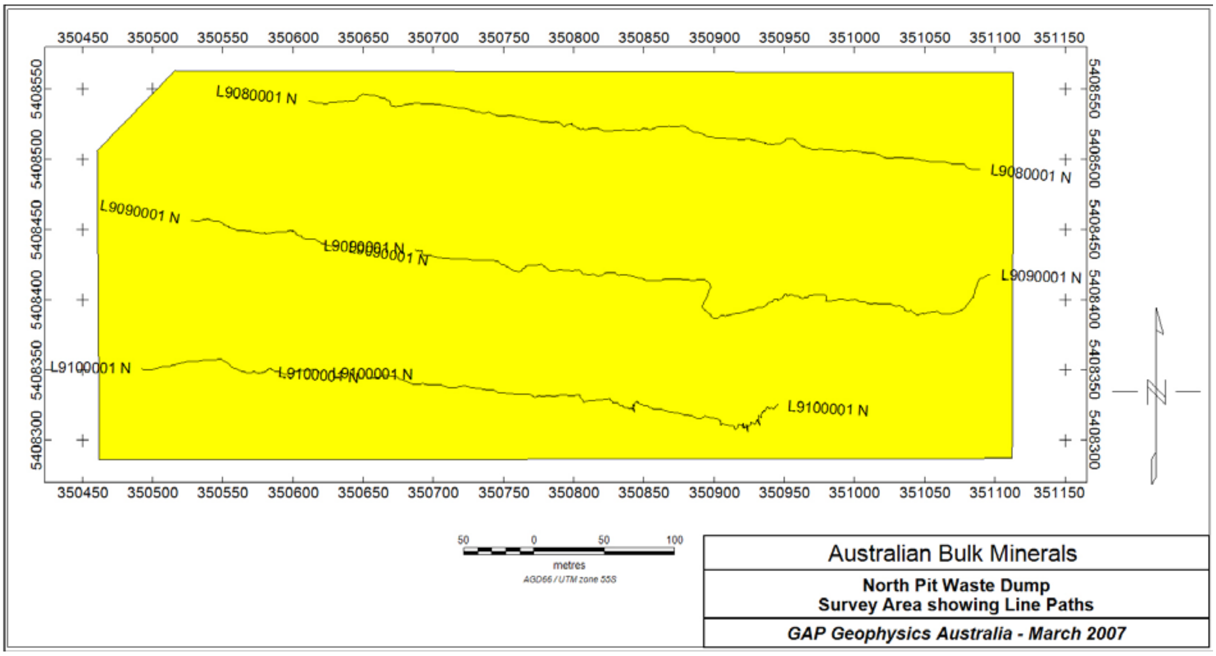

Figure 5 North Pit waste Dump grid Survey Layout - showing the, survey line paths and line numbers.

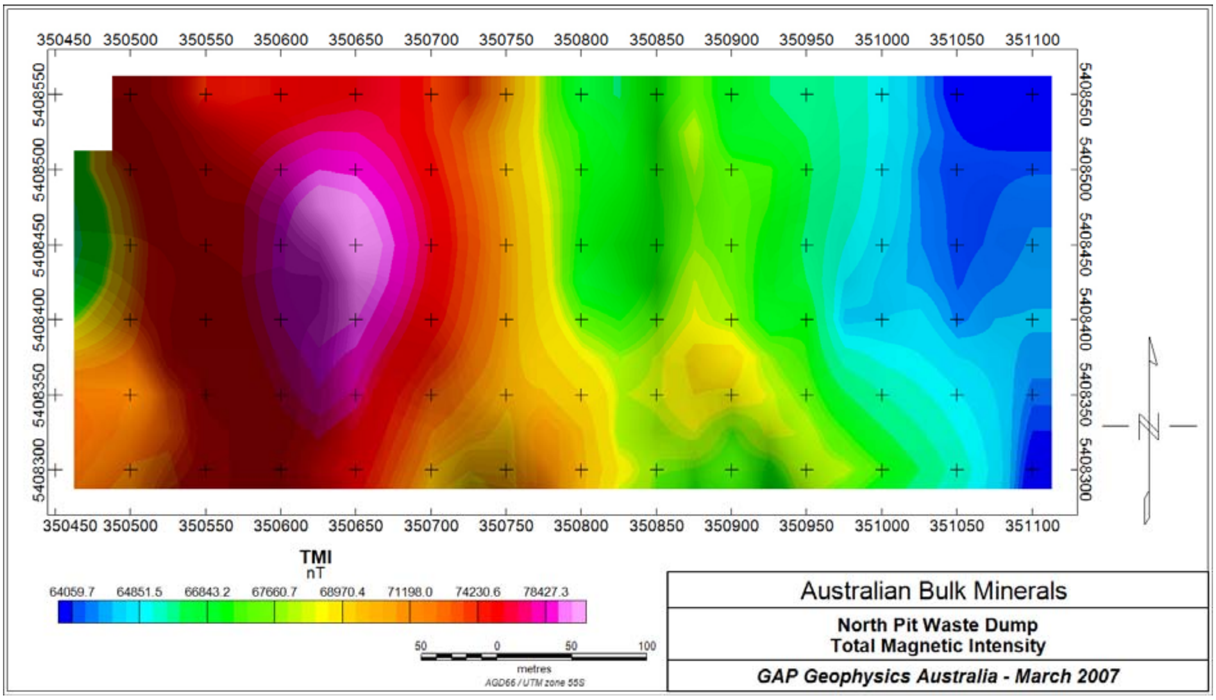

Figure 6 North Pit waste Dump grid – colour image of Total Magnetic Intensity (TMI).

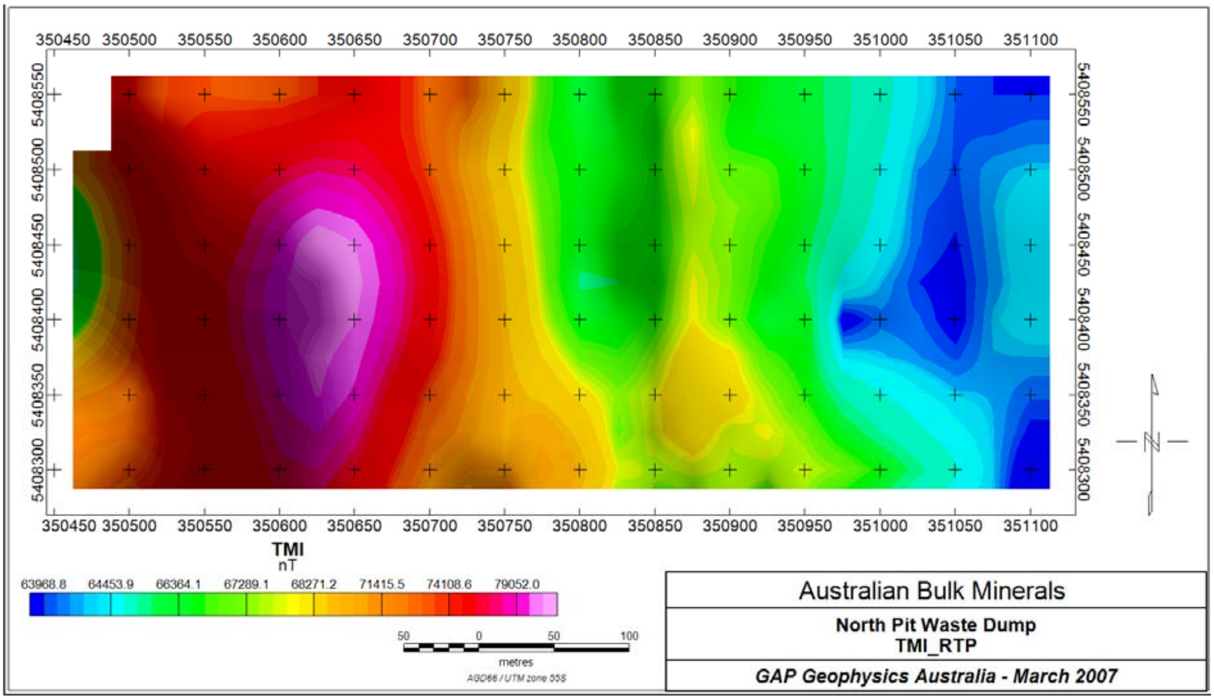

Figure 7 North Pit waste Dump grid – colour image of Total Magnetic Intensity Reduced to Magnetic Pole (TMI_RTP).

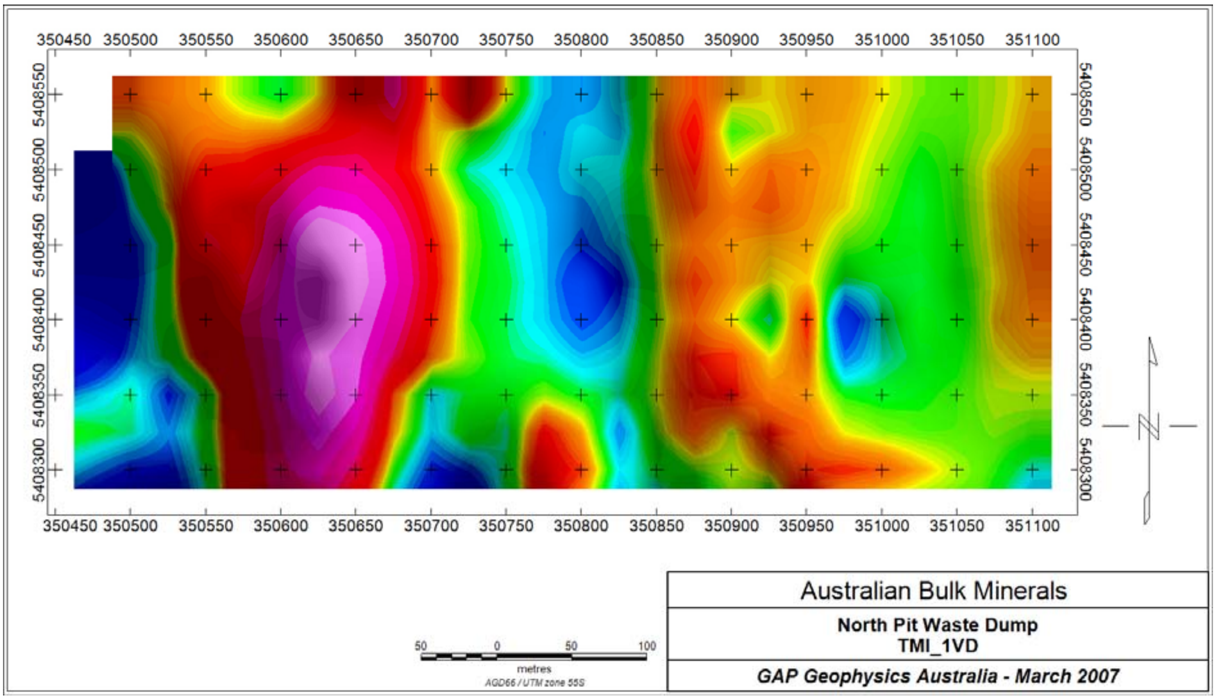

Figure 8 North Pit waste Dump grid – colour image of Total Magnetic Intensity First Vertical Derivative (TMI_1VD).

Instrumentation

The TM-6 Magnetometer

A Geophysical Technology Model TM-6 magnetometer controller was used in conjunction with a caesium-vapour magnetometer sensor for this survey. The TM-6 was programmed to record Total Magnetic Intensity (TMI) readings to a resolution of 0.01nT. Measurements were logged to the TM-6 flash memory at a rate of 1200 per second.

In hand-held magnetic survey mode, the TM-6 normally requires two operators, one of whom holds the sensor (see Figure 9). The sensor is connected to the controller by a 5m coaxial cable, which enables the sensor to be separated from the controller by sufficient distance to ensure that the sensor is free from any magnetic interference produced by the control electronics. GAP utilises differential GPS with the Ground Magnetics acquisition system to assist survey navigation and positioning. This obviates the costly requirement for the client to establish control grids in the survey areas.

The TM-6 system employs GAP's proprietary TM6-UI navigation software running on a hand-held computer and coupled with a Trimble AgGPS-132 differential GPS, using Fugro OmniStar real-time differential corrections. The accuracy of the DGPS is described as less than 1m.

In Handheld mode the TM-6 and GPS units are mounted in a backpack as shown in Figure 10. Also included in the backpack are batteries to power the units and a warning system should any of the instruments malfunction.

Figure 9 The TM-6 magnetometer system in hand-held configuration. The operators are separated by a distance of up to 5m to minimise magnetic interference from the controller.

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For hand held operation the Cs vapour magnetometer sensor and GPS antenna are mounted on a second backpack, which enables variable sensor height. A typical sensor configuration is shown in Figure 11.

Accurate timing information is provided via the AgGPS-132 receiver which outputs a 1μs "strobe" pulse every second. The strobe pulses are logged by the TM-6 in between Total Magnetic Intensity readings, thus providing the GPS time-reference for magnetic field measurements.

Base-Station

A Geometrics G856 proton precession magnetometer is used to record temporal changes in the Earth's magnetic field. The magnetometer is generally set to record Total Magnetic Intensity readings to a precision of 0.1nT once every 10 seconds.

The base-station magnetometer is located at safe distances from likely sources of cultural magnetic noise during the surveys. Diurnal variation data is calculated as the base-station reading minus the approximate average value at the base-station site(s) used for these surveys.

Figure 10 Backpack showing the TM-6 magnetometer controller, Trimble Ag-132 differential GPS unit and hand held PC's, for navigation and survey controls.

Figure 11 Typical sensor configuration showing the Cs vapour sensor on the left at a survey height of 2.5m. The GPS antenna is mounted on the right side of the backpack.