HoistEM Airborne Geophysical Survey

Bootu, Northern Territory.

September 2006

Survey Operations and Logistics Report

For

OM MANGANESE LTD

Survey Flown by:

GPX Airborne

JOB NUMBER 2225

TABLE OF CONTENTS

GPX Airborne
HoistEM (MkII) Survey

SURVEY SUMMARY

Client: OM Manganese Ltd.

Job Number: 2225

Survey Area: Bootu, Northern Territory.

Data Processing Base: Bootu Mine, Northern Territory.

Mobilisation   1st September 2006

Production   3rd – 12th September 2006

Demobilisation   12th September 2006

Line km surveyed: Bootu, NT   1,524.9 kms

**Survey Crew:**   Ben Trevenen,

                            Raphael Fisher,

                            Jason Wooster,

                            Dale Bourke (Pilot)

In September 2006, GPX Airborne was contracted by OM Manganese Ltd to perform a HoistEM survey in the Bootu area, NT. The job was flown between the 3rd and 12th of September 2006.

During the survey the crew consisted of Ben Trevenen, Raphael Fisher and Jason Wooster, the pilot was Dale Bourke. The crew stayed at the Bootu Mine Facilities which was situated within the survey area. Wind conditions prevented the crew from survey work for 4 ½ days.

Survey Area Map

<u>**Overview**</u>
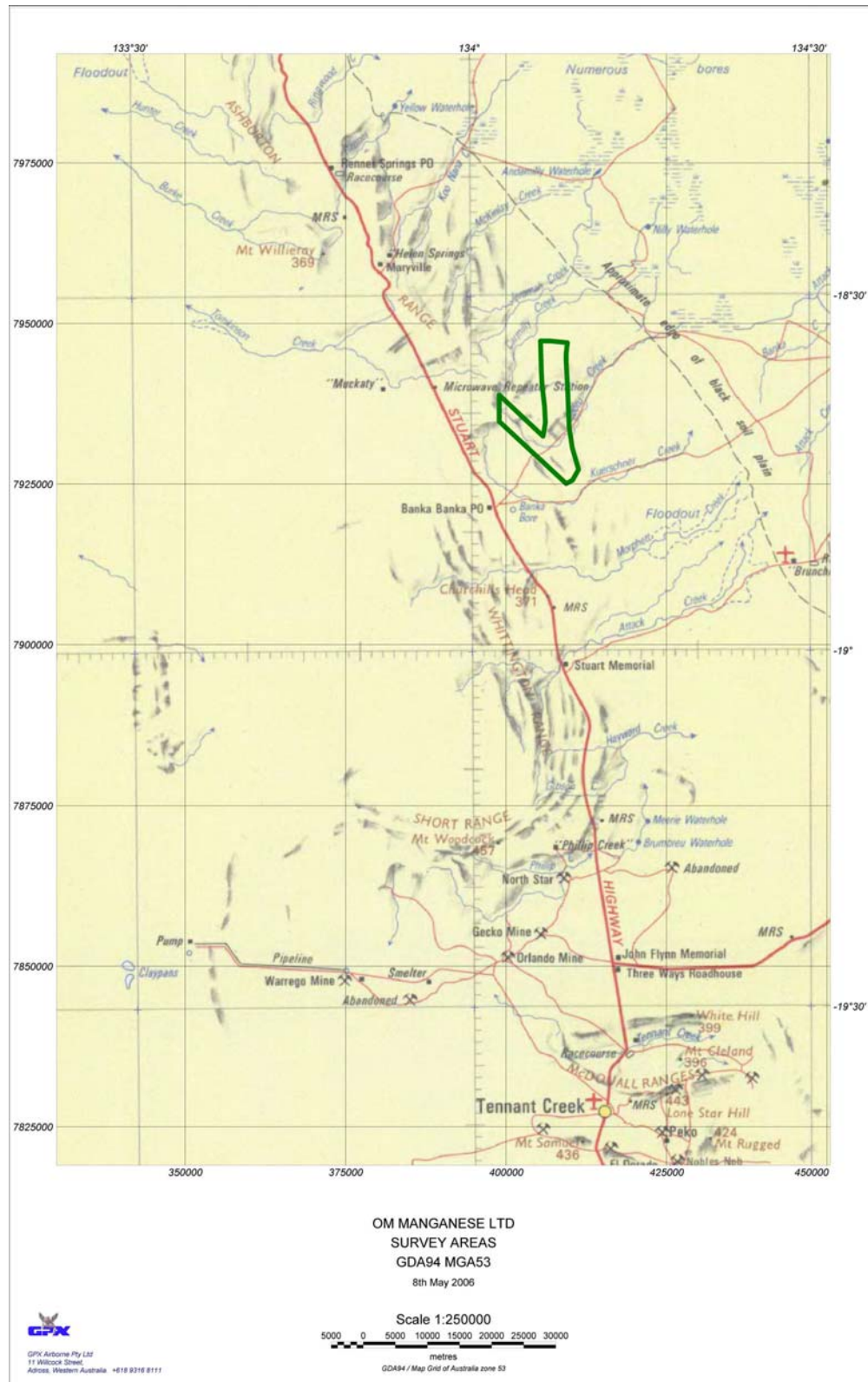
HoistEM System Specifications

Transmitter

|	
Waveform –	25% duty cycle square wave
Pulse on Time -	5 ms (inclusive of 1ms cosine ramp on)
Pulse off Time -	15 ms
Pulse Current -	320 Amps
Switch on Ramp -	1 ms
Switch off Ramp -	40 µs
Tx Loop Area -	~340 m^2
Tx NIA –	108,800
Tx Frequency-	25 Hz

Receiver

A-D Circuitry -	20 bit
Sample Time -	0 - 14 ms
Sampling -	124 Linear channels

(12 channels from 54 microsecs after switchoff-25 microsecs wide

Then -112 channels to 13 millisecs-113 microsecs wide.

Receiver Coil

Effective NA -	3382 Square Metres
Bandwidth –	45,000 Hz

Geometry.
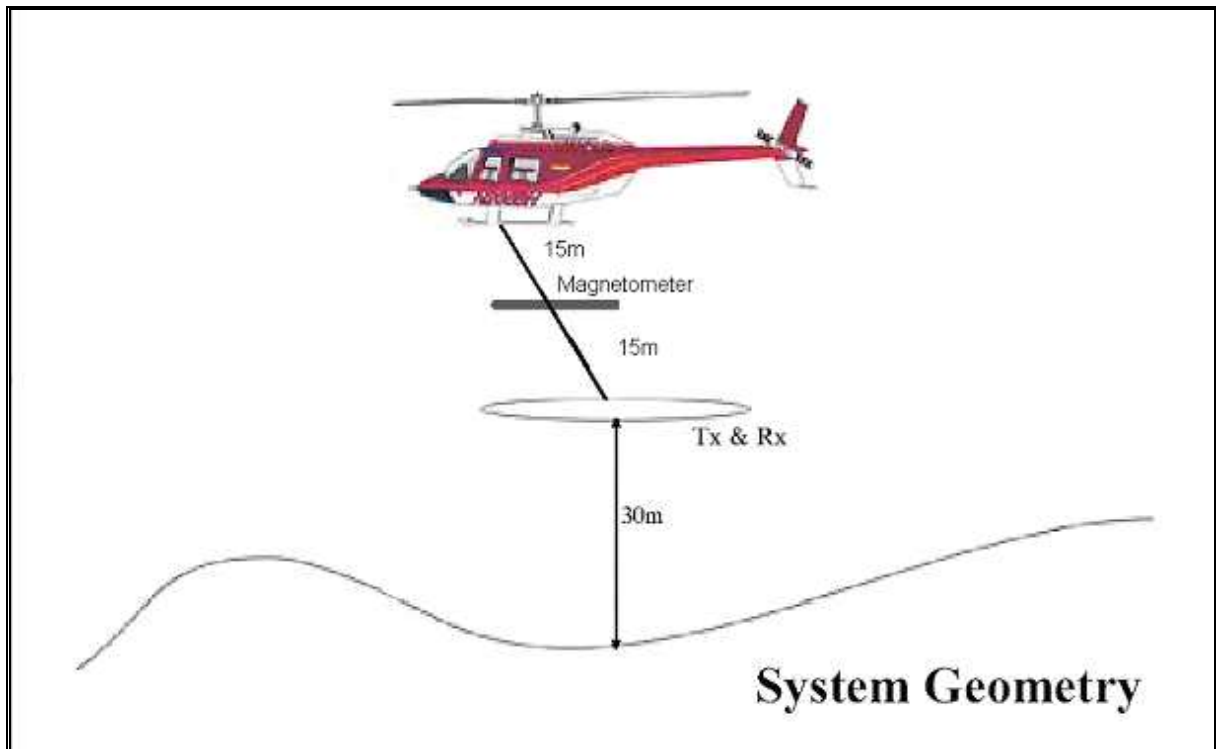
Transmitter loop is towed 30 m below helicopter- Receiver coil is located at centre of Tx loop.

Transmitter / Receiver at nominal 35 m terrain clearance.

Helicopter survey speed is between 35 and 45 knots.

Along line sample interval is between 8 and 10 metres

EM Data Channel Specifications

21 Channel Sampling Scheme

Begin Time	End Time	Centre Time	Width Microsecs	Window	Original Start window	Original End window
65.7	91.0	78.33	25.25	1	11	
91.0	116.2	103.58	25.25	2	12	
116.2	141.5	128.83	25.25	3	13	
141.5	166.7	154.08	25.25	4	14	
178.0	279.0	228.9	101.0	5	15	18
291.0	392.0	341.6	101.0	6	19	22
404.0	505.0	454.3	101.0	7	23	
517.0	618.0	567.0	101.0	8	24	
629.0	843.0	736.1	213.7	9	25	26
855.0	1181.0	1017.8	326.4	10	27	29
1193.0	1632.0	1412.3	439.1	11	30	33
1644.0	2195.0	1919.4	551.8	12	34	38
2207.0	2872.0	2539.3	664.5	13	39	44
2883.0	3660.0	3271.8	777.2	14	45	51
3672.0	4562.0	4117.1	889.9	15	52	59
4574.0	5576.0	5075	1002.6	16	60	68
5588.0	6703.0	6145.7	1115.3	17	69	78
6715.0	7943.0	7329.0	1228.0	18	79	89
7955.0	9295.0	8625.1	1340.7	19	90	101
9307.0	10761.0	10033.8	1453.4	20	102	114
10772.0	12676.0	11724.3	1904.2	21	115	131

NB: time 0 is at the start of the switch off ramp

Magnetic Data Specifications

The helicopter was equipped with a bird-mounted Geometrics G 822A Cesium vapor, optically pumped magnetometer continuously sampling at 1200 Hz.

The instrument has a sensitivity of 0.001nT, with a sensor noise level of less than 0.1nT.

The magnetic readings are resampled to 50Hz with each sample containing an array of 24 readings. Adjacent readings are summed to minimise bias from the EM transmissions to produce the 25Hz magnetic array data. The late time array positions are averaged to create the magnetic response.

The time-synchronized ground magnetic field data was digitally recorded at a 5.0 sec interval with a Geometrics magnetometer to an accuracy of better than 0.1nT.

Base Magnetometer

Type: Geometrics G856 Magnetometer.

Location: E 134° 05' 16.4"   S 18° 43 09.3"   (WGS84, Zone 53)

DATA PROCESSING SUMMARY

The following processes were carried out at the field processing office:

- Spline removal of birdswing

- Negative decays paired and reversed

- Filtering and correction of laser altimeter

- Data is splined to a uniform sample spacing

- Butterworth filter applied to each channel

- Preliminary gridding and data verification

Final EM Processing

Software used for processing at the GPX Perth office:

- Geosoft

- EmaxAIR by Fullagar Geophysics

- ChrisDBF

System response obtained from high level flights is removed from the data. CDIs are generated using EmaxAIR, and depth slice data is interpolated from the Emax output using in-house software. Final plots are created in Geosoft .MAP format, and include CDIs that are masked to the first and last depth solution at each station.

Magnetic Data processing.

The aircrafts magnetic data was corrected for diurnal and the mean diurnal value (50115 nT) added back to the channel. Parallax was applied, followed by the IGRF correction, the mean IGRF value (50090 nT) being added back to data. Micro levelling (± 2nT) were performed on the data.

Digital Elevation Model

The laser altimeter data, plus a constant of 30, was subtracted from the GPS height to give a digital elevation model which represents height above the WGS84 spheroid. This is recorded in channel 'DEM'. This data was then mean levelled with the SRTM (Satellite Radar Topography Mission, NASA) to remove any levelling.

Final CD Contents

\images

GeoTiff format images of all depth slices, first, minimum, maximum and last conductivity, digital elevation and magnetic data.

\grids

Conductivity depth slices with name convention of dnnn.grd where nnn is the depth of the conductivity slice, grids are in Geosoft GRD format. ERMapper format grids have also been provided, with a ERM_Dnnn.ers naming convention.

Final Magnetic grid: ERM_Magnetics.ers

Final Magnetic Grid + 1st Vertical Derivative: ERM_ Magnetics_1VD.ers

Final Digital Terrain (level with SRTM data):   ERM_DEM.ers (WGS84 spheroid)

grids\cdi_grids

Geosoft format files of the CDI grids.

\located_data

TEM.LDT

Line:	Line number
Fiducial:	Fiducial number as displayed on the CDI sections.
East:	Easting (GDA94 MGA53)(metres)
North:	Northing (GDA94 MGA53)(metres)
Heli_Z:	GPS altitude of helicopter (metres)
TX_Laser:	Height of the laser altimeter on the hoist (metres)
DEMF:	Levelled Digital Elevation Model, WGS84 (metres)
Current:	Transmitter current (amps)
Ch[*]:	EM response, channels 1-21 (uV)
MagF:	Interpolated magnetic channel.

CDI.LDT

Line:	Line number
East:	Easting (GDA94 MGA53)(metres)
North:	Northing (GDA94 MGA53)(metres)
Distance:	Distance along line (metres)
Depth:	Depth below surface (metres)
Conductivity:	Conductivitiy (mS/m)
RL:	GPS depth (WGS84)(metres)

DEPTHSLICE.LDT

Line:	Line number
East:	Easting (GDA94 MGA53)(metres)
North:	Northing (GDA94 MGA53)(metres)
Distance:	Distance along line (metres)
RL:	GPS depth (WGS84)(metres)
[30-150]:	Conductivity at specified depth (mS/m)

COND_SUMMARY.LDT

Line: Line number

East: Easting (GDA94 MGA53)(metres)

North: Northing (GDA94 MGA53)(metres)

Firstcond: First recorded conductivity in a decay (mS/m)

Maxcond: Maximum recorded conductivity in a decay (mS/m)

Lastcond: Last recorded conductivity in a decay (mS/m)

Mincond: Minimum recorded conductivity in a decay (mS/m)

MAGNETICS.LDT (25Hz data)

Line: Line Number

SPM: Seconds past midnight.

East: Easting (GDA94 MGA53)(metres)

North: Northing (GDA94 MGA53)(metres)

Rawmag: Raw magnetics channel

Diurnal: Diurnal data

PreMag: Diurnal corrected.

IGRF: Calculated IGRF value for each point.

MagF : Final magnetics channel (micro - levelling applied)

GPS_Z: GPS altitude of helicopter (metres)

Clearance: Ground clearance of the Magnetic Sensor.

Each data type is also accompanied with a similar Geosoft database.
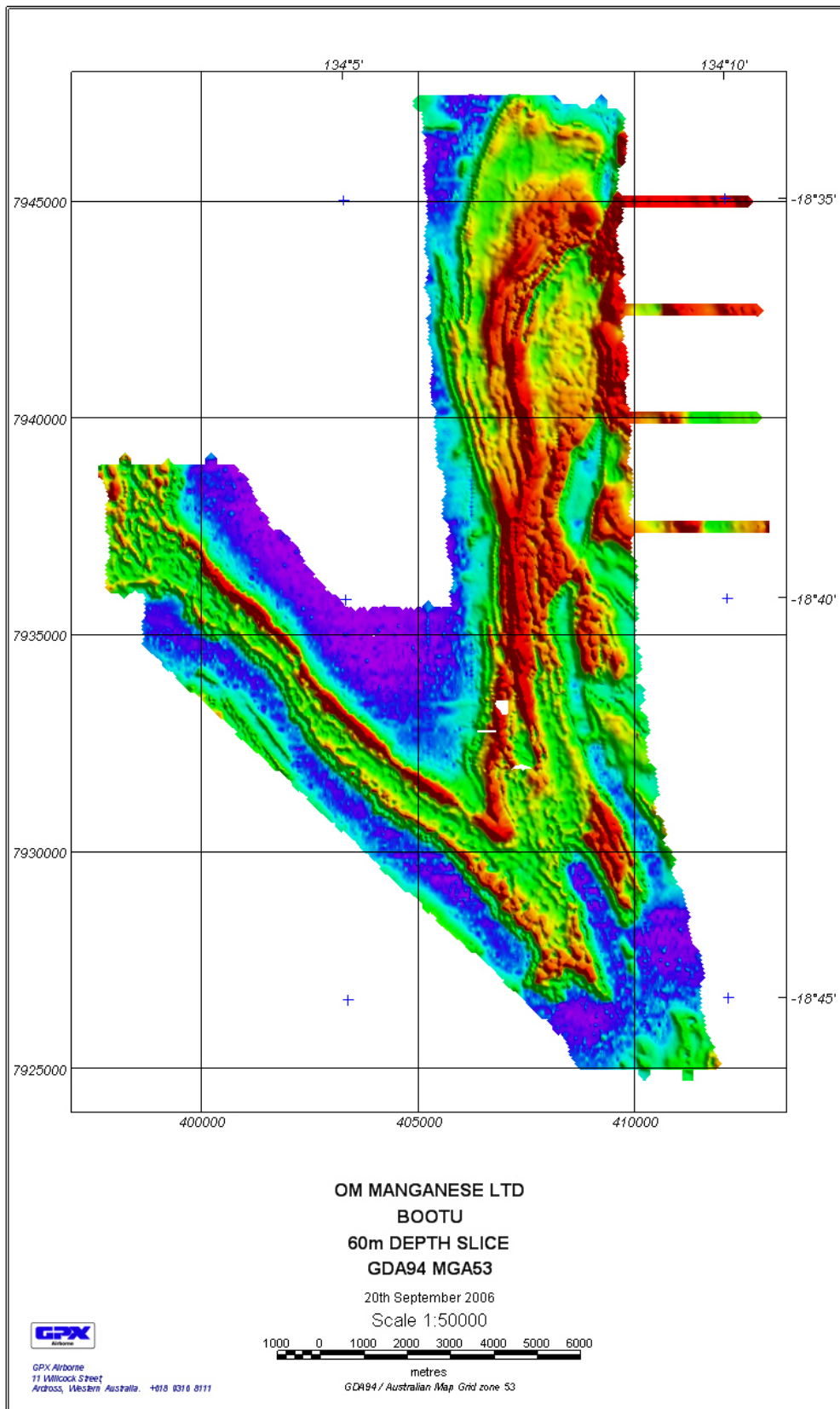

\sections

Linear & logarithmic profiles, and conductivity depth images for each line. In Geosoft .MAP format (viewable with the free interface at http://www.geosoft.com).
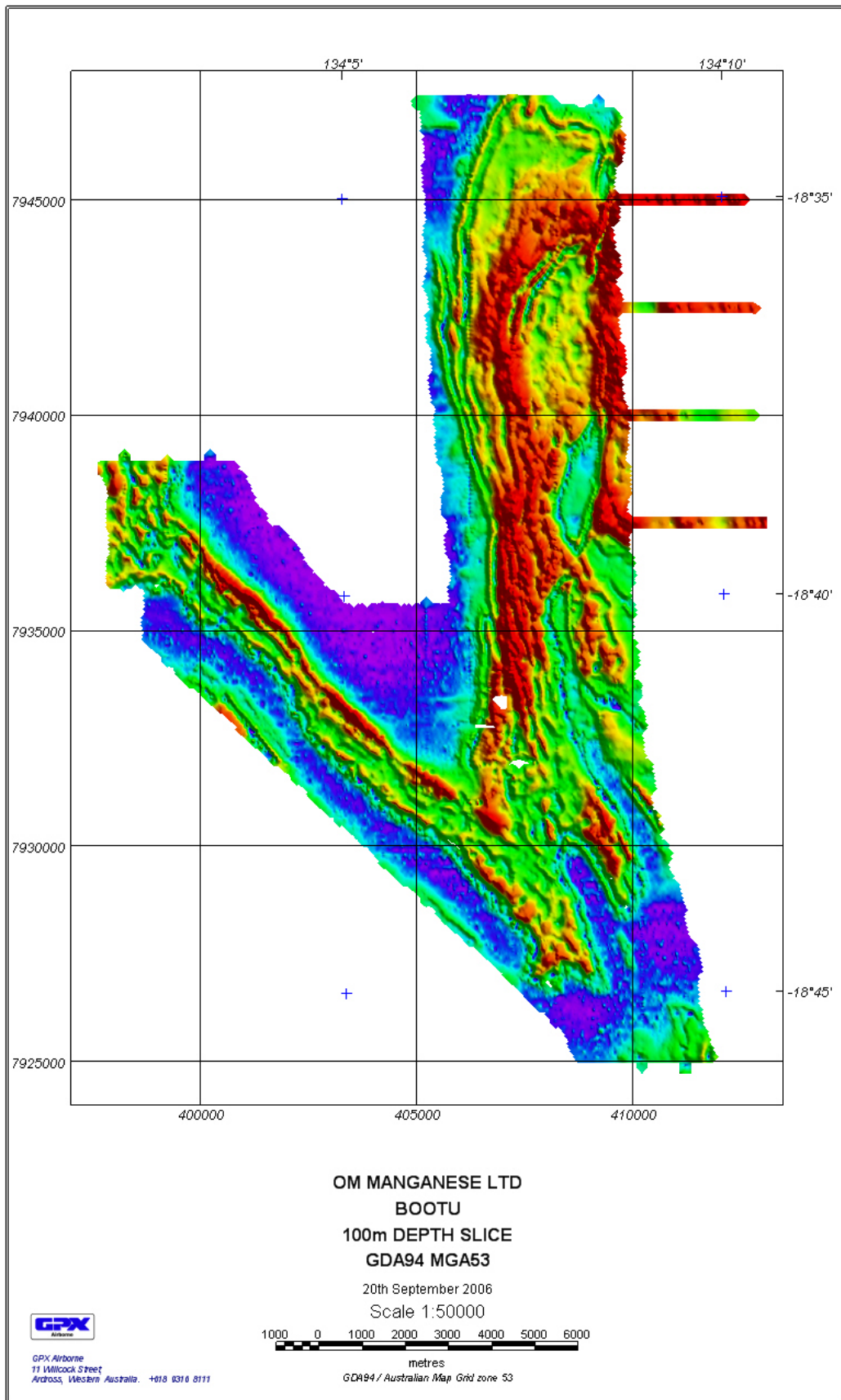
\sections\Images

Linear & logarithmic profiles, and conductivity depth images for each line. In PNG (Portable Network Graphics) format.

IMAGES

60m Depthslice

OM MANGANESE LTD
BOOTU
60m DEPTH SLICE
GDA94 MGA53

20th September 2006
Scale 1:50000

1000   0   1000   2000   3000   4000   5000   6000
metres
GDA94 / Australian Map Grid zone 53

GPX Airborne
11 Willcock Street
Ardross, Western Australia.   +018 0310 8111

100m Depthslice

OM MANGANESE LTD
BOOTU
100m DEPTH SLICE
GDA94 MGA53

20th September 2006
Scale 1:50000

GPX Airborne
11 Willcock Street
Ardross, Western Australia. +018 0310 8111

metres
GDA94 / Australian Map Grid zone 53

Total Magnetic Intensity

OM MANGANESE LTD
BOOTU
TOTAL MAGNETIC INTENSITY
GDA94 MGA53

12th September 2006
Scale 1:50000

1000 0 1000 2000 3000 4000 5000 6000
metres
GDA94 / Australian Map Grid zone 53

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CONTRACTOR INFORMATION

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