

Wollogorang, Northern Territory Airborne Magnetic and Radiometric Geophysical Survey

Acquisition and Processing Report

for

Gulf Mines Limited

Prepared by : P. Evans

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Authorised for release by :

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Survey flown: August - September 2006

by



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FAS JOB # 1777

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1. SURVEY OPERATIONS AND LOGISTICS

1.1 Introduction

Between the 14th of August 2006 and the 8th of September 2006, Fugro Airborne Surveys Pty. Ltd. (FAS) undertook an airborne magnetic and radiometric survey for Gulf Mines Limited, over the Wollogorang Project area, in the Northern Territory. The survey consisted of one area, flown in 28 flights. Total coverage of the survey area amounted to 18478.7 line kilometres. The survey was flown using an Aerocommander Shrike 500-S aircraft, registration VH-WAM owned and operated by FAS. This report summarises the procedures and equipment used by FAS in the acquisition, verification and processing of the airborne geophysical data.

1.2 Survey Base

The survey was based out of Wollogorang, Northern Territory. The survey aircraft was operated from the Wollogorang Station airstrip with the aircraft fuel available on site. A temporary office was set up at the Wollogorang Station, where all survey operations were run and the post-flight data verification was performed.

1.3 Survey Personnel

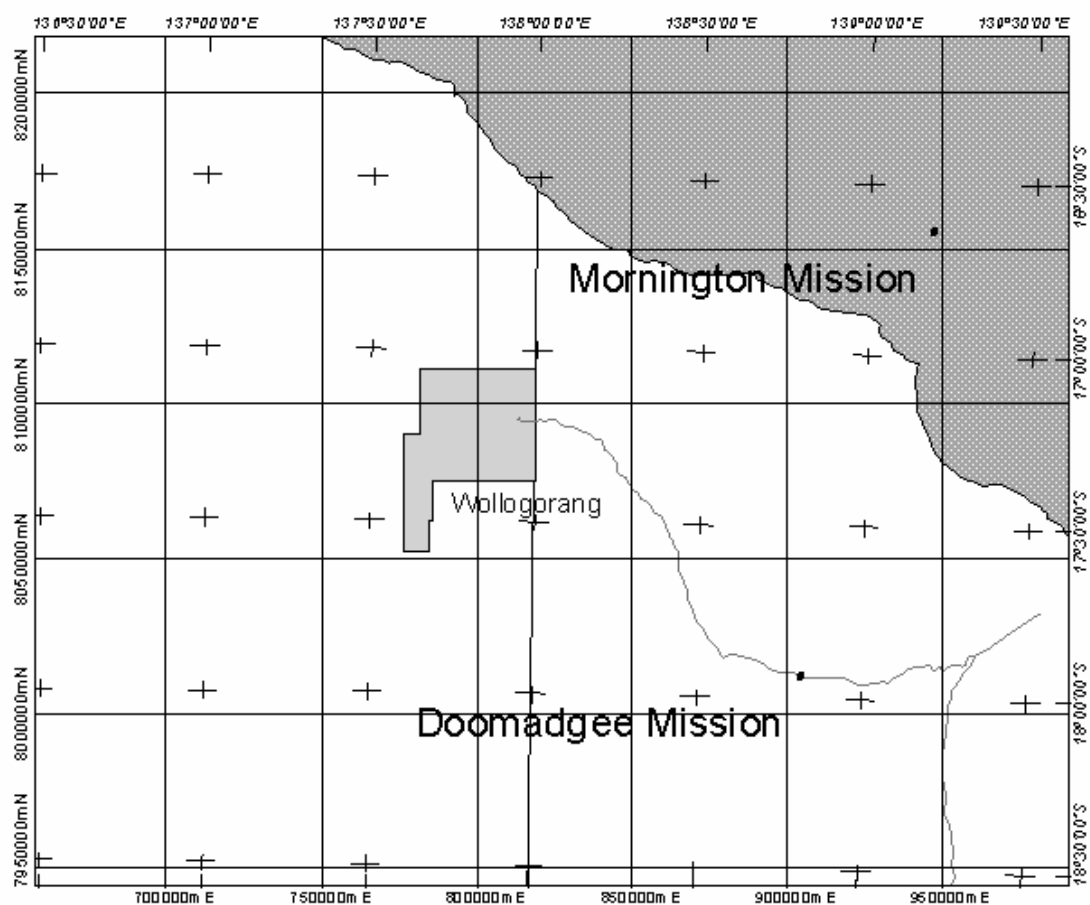
The following personnel were involved in this project:

Project Supervision - Acquisition	Rod Pullin
- Processing	Kathlene Oliver
On-site Crew Leader	Rob Doepel
Pilot/s	Dane Hughes / Andrew Jamieson
System Operator/s	Rob Doepel
Field Data Processing	Rob Doepel
Data Processing	Paul Evans

1.4 Survey Equipment

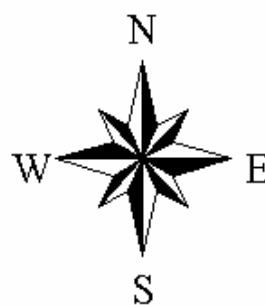
Survey Platform	- Aerocommander Shrike 500-S VH-WAM
Data Acquisition System	- FAS digital acquisition system
Total Field Magnetometer	- Geometrics G-822A Caesium vapour
Vector Magnetometer	- Billingsley TFM100-1E 3-axis
Magnetometer Compensator	- Fugro FASDAS Mag Decoupler Unit Aeromagnetic Digital
Gamma-ray Spectrometer	- Exploranium GR820 256 Channels
Gamma-ray Detector	- 8 NaI(Tl) crystals; 33.56 L down
Navigation System GPS	- Fugro Omnistar in VBS (Virtual Base Station) mode, Novatel OEM4 GPS receiver
Base Station Magnetometers	- 2 x Scintrex Envi Mag
Altimeter	- Sperry Stars RT-220 radio altimeter
Barometer	- Paroscientific Digibaro altimeter
Thermometer	- Vaisala HMY 133 temperature and humidity sensor

1.5 Area Map



Gulf Mines Ltd
Wollogorang, NT
Mag/Spec

Datum: GDA94
Projection: MGA
Zone: 53



2. SURVEY SPECIFICATIONS AND PARAMETERS

2.1 Area Co-ordinates

The survey area was located within UTM Zone 53S, Central Meridian = 135
(Note - Co-ordinates in WGS84 Zone 53)

Easting	Northing
782000	8111000
819000	8111000
819000	8074800
786000	8074800
786000	8062000
785000	8062000
785000	8052000
776000	8052000
776000	8090000
782000	8090000

2.2 Survey Area Parameters

Job Number	-	1777
Survey Company	-	Fugro Airborne Surveys Pty Ltd
Date Flown	-	14 th August 2006 – 8 th September 2006
Client	-	Gulf Mines Limited
Area Name	-	Wollogorang, Northern Territory
Nominal Terrain Clearance	-	50 m
Traverse Line Spacing	-	100 m
Traverse Line Direction	-	000 – 180 deg
Traverse Lines	-	20001 – 20433
Tie Line Spacing	-	1000 m
Tie Line Direction	-	090 – 270 deg
Tie Lines	-	29001 – 29059
Total Line Kilometres	-	18478.7 km

2.3 Data Sample Intervals

Nominal data sample intervals.	
Magnetometer	- 7 m (@10 Hz)
Radar Altimeter	- 7 m (@10 Hz)
Temperature	- 7 m (@10 Hz)
Pressure	- 7 m (@10 Hz)
GPS	- 70 m (@1 Hz)
Spectrometer	- 70 m (@1 Hz)
Magnetic Base Station (Envi Mag)	- 5 s

2.4 Survey Tolerances

As specified in the contract the following tolerances were used:

Traverse line deviation	-	+/- 50% of nominated line spacing over 1 km or more
Tie line deviation	-	+/- 50% of nominated tie line spacing over 1 km or more
Total magnetometer system noise	-	More than 0.1 nT continuously for more than 1 km
Magnetic diurnal variation	-	More than 5 nT in 5 minutes non-linear either on flight lines or tie lines.

3. AIRCRAFT EQUIPMENT AND SPECIFICATIONS

3.1 Aircraft

Manufacturer	-	Aerocommander
Model	-	Shrike 500S
Registration	-	VH-WAM
Ownership	-	Fugro Airborne Surveys Pty Ltd

3.2 Navigation System

The GPS receiver was integrated as part of the acquisition system. Navigation displays were generated by the acquisition system software that displayed to the pilot a graphical representation of the line being flown. A pre-defined flight plan, with area boundaries and the start and end of the line co-ordinates, was loaded into memory and used for real-time navigation information. Position co-ordinates and other relevant GPS information were output and recorded by the acquisition computer.

3.3 Aircraft Magnetometers

The survey was flown using a Geometrics G822-A ultra-high sensitivity Caesium vapour magnetometer sensor with the sensor mounted in the tail stinger of the aircraft. The sensor provides a Larmor signal that is processed by high precision counters embedded within the FASDAS to provide an operating range of 20,000 to 100,000 nT.

Specifications

Nominal Sensitivity:	-	0.001 nT
Still Air RMS Noise:	-	0.05 nT
Digital Recording Resolution:	-	0.001 nT
Magnetic Gradient Tolerance	-	>20,000 nT/m

3.4 Automatic Compensator

The magnetometer data, together with data from the 3-axis fluxgate, was integrated in the acquisition system to produce real time compensation for the effects of the aircraft's motion, i.e. from changes in attitude and heading. The compensation coefficients were calculated from compensation flights carried out before the survey commenced. The compensated output data, with a resolution and sensitivity of 0.001 nT at a sampling rate of 10 times per second, were recorded digitally.

3.5 Gamma Ray Spectrometer System

The radiometric acquisition system consisted of a 256 channel gamma-ray spectrometer and detector system with the following specifications:

Manufacturer:	Exploranium Inc.
Model:	GR-820
Number of channels:	256
Crystal Volume:	33.56 L downward looking (thermally insulated)
Sampling interval:	1 s
Windows (keV):	Potassium: 1370 to 1570
	Uranium: 1660 to 1860
	Thorium: 2410 to 2810
	Total Count: 410 to 2810
	Cosmic: 4000 to >6000

Data checking in the survey system was carried out by the use of resolution procedures using known radiometric sources. To verify the system, real time display of individual crystal resolutions and system resolutions, real time display peak channel tracking information, real time display of the energy spectrum showing counts, cosmic level and system deadtime was available. The survey system displayed to the operator any errors encountered in the spectrometer system.

3.6 Radar Altimeter

A Sperry Stars RT-220 radio altimeter system was used to measure ground clearance. The radio altimeter indicator provides an absolute altitude display from 0 - 750 metres (0 - 2,500 feet) with a sensitivity of 4 mV/ft. Radar altimeter data were digitally recorded every 0.1 seconds.

Specifications

Range:	-	0 - 2500 ft
Accuracy:	-	1%
Resolution:	-	4 mV/ft

3.7 Barometric Altimeter

The output of the Paroscientific pressure transducer was used for calculating the barometric altitude of the aircraft. The atmospheric pressure was taken from a probe and fed to the transducer. The transducer uses a precise quartz crystal resonator whose frequency of oscillation varies with pressure induced stress. The temperature of the pressure sensor was also recorded. In conjunction with the area QNH pressure and ambient temperature, the barometric altitude was calculated.

Specifications

Range:	-	sea level to 10,000 ft
Accuracy:	-	5 ft
Resolution:	-	1 mV/ft

3.8 Flight Data Recording

All data recorded by the data acquisition system were stored in a digital format on the removable media drive located in the DAS. This data were then transferred to the field office computers for post-flight quality control examination.

3.9 Flight Following

An integral part of the Safety Management System provides for the installation of a Flight Following System that transmits a position via satellite at pre determined intervals. The Fugro Omnistar Flight Following System was fitted to the aircraft and for this survey, position information was transmitted every 2 minutes to Fugro's premises in Perth. This information can be monitored by accessing the Fugro web page where the updated flight path is displayed. The aircraft was also fitted with an emergency switch and activation of this by the pilot or crew will notify the Omnistar Network control centre immediately. They in turn will contact FAS personnel as per the Emergency Response plan.

Aircraft are also fitted with Thrane & Thrane Inmarsat C reporting units which report every 5 minutes directly to the FAS office. A similar Emergency alarm system is in place.

4. GROUND DATA ACQUISITION EQUIPMENT AND SPECIFICATIONS

4.1 Magnetic Base Station

Two Scintrex Envi Mag magnetometers were used to measure the daily variations of the Earth's magnetic field. The base stations were established in an area of low gradient, away from cultural influences. The base stations were run continuously throughout the survey flying period with a sampling interval of 5 seconds at a sensitivity of 0.01 nT. The base station data were closely examined after each day's production flying to determine if any data had been acquired during periods of out-of-specification diurnal variation. The base stations were located at the Wollogorang Station airstrip, approximately 300 metres south west of the aircraft parking area and were set up approximately 100 m apart.

4.2 GPS Base Station

A GPS base logging station was set up at the Wollogorang Station. The GPS antenna was positioned on the roof of the unit 4.

The GPS base system was comprised of a GPS receiver, a logging computer, an antenna and a power supply. Data was logged and displayed in real time on the logging computer screen. The logged base data was processed with the airborne GPS data to calculate the differentially post-processed position of the aircraft.

The GPS base station position was calculated by logging data continuously at the base position over a period of approximately 24 hours. These data were then statistically averaged to obtain the position of the base station.

The calculated GPS base position was (in WGS84):

17° 12' 41.37215" S
137° 56' 50.68029" E
107.875 m.

5. EQUIPMENT CALIBRATIONS AND DATA ACQUISITION CHECKS

5.1 Survey Calibrations

A series of calibrations were performed as follows:

5.1.1 Dynamic Magnetometer Compensation

Carrying a magnetometer through a varying field in a non-uniform orientation produces manoeuvre noise. To compensate for this manoeuvre noise a standard compensation test flight called a “comp box” was flown. The compensation file produced also removed the majority of the heading error. Aircraft compensation tests were flown on the 4 survey line headings and also at $\pm 7\frac{1}{2}$ and 15° to the line headings (to accommodate for cross wind flying conditions). The data for each heading consists of a series of aircraft manoeuvres with large angular excursions: specifically pitches, rolls and yaws. This was done to artificially create the worst possible attitudes and rates of attitudinal change likely to be encountered while on line and compensate for any magnetic noise created by the aircraft’s motion within the earth’s magnetic field. The data was processed to obtain the real-time compensation terms. These coefficients were applied in real-time or later during post-processing if required. Note that this form of compensation will only remove those noise effects modelled in the manoeuvre test flight. Random motions of the stinger with respect to the aircraft airframe generally establish the noise floor for this type of installation. Details of the comp boxes flown for this survey are shown in the table below.

Flown	Flights covered
14/8/2006	1 – 16
30/8/2006	17 – 22
6/9/2006	23 – 28

Table 1: Magnetometer Compensation Details

5.1.2 Parallax

Parallax error is caused by the physical difference in distance between the various sensors, the electronic delay and software timing in the acquisition system. Hence all variables are subjected to a displacement from the GPS co-ordinates. If these variables are processed without a position offset a parallax error will usually occur. The most suitable way to treat this problem is to use the 1 second radiometric data as a base with a zero correction. This will prevent interpolation of important variables (a filtering process). The co-ordinates were moved by linear interpolation and other data variables were displaced onto the radiometric data, without change.

Data	Parallax
Radiometrics	0 second
GPS	-0.6 second
Magnetics	0.52 second
Radar Altitude	0.3 second
Barometer	2.1 second
Temperature	2.1 second

Table 2: Parallax Values

5.1.3 Pad Calibrations

A series of tests were taken using a set of radiometric pads of known concentrations of Potassium, Uranium and Thorium. Each crystal pack was tested individually, with data accumulated for 15 minutes. The pad calibration data were processed to determine the radiometric stripping coefficients for each crystal pack. Where aircraft had more than one crystal pack installed, the average of the stripping coefficients were used in final data processing.

5.1.4 Background and Cosmic Calibration Stacks

High-level stacks were flown over the ocean away from the effects of any land based radon. Data were collected for ten minutes at altitudes starting at 1000 feet above sea level and incrementing to 10000 feet above sea level. The high-level stack data were processed to determine the cosmic and aircraft background coefficients.

5.1.5 Height Attenuation Calibrations

Low-level stacks were flown over the Carnamah Dynamic Test Range, Western Australia. Data were collected at altitudes of 130 feet above sea level (asl), 200 ft asl, 260 ft asl, 330 ft asl, 400 ft asl and 650 ft asl. The neighbouring salt lake was flown at the same altitudes, and the data were used as a radon test. A ground survey was carried out on the same day using a calibrated gamma-ray spectrometer.

The airborne and ground data were processed to determine radioelement sensitivity and height attenuation coefficients.

5.1.6 Daily Calibrations

A set of calibrations were performed each survey day as follows:

- Magnetic base station time check
- Spectrometer resolution test
- Spectrometer button test
- Low level test line

5.1.6.1 Magnetic Base Station Time Check

Prior to each day's survey all magnetic base stations were time checked and synchronised with the time on the aircraft survey system GPS receiver.

5.1.6.2 Spectrometer Resolution Test

Once the spectrometer had stabilised a Thorium source resolution check was carried out by placing the source in a cradle specially designed to ensure precisely repeatable locations.

5.1.6.3 Spectrometer Button Test

Thorium sample checks were performed on the spectrometer before and after each day's survey acquisition. Each sample was placed in a predetermined location and data recorded for 180 sec. Relative count rates above background were within +/- 5% of the average sample checks for the duration of the survey.

5.1.6.4 Low Level Test line

To monitor the effects of soil moisture and radon and to verify the system was functioning correctly a low level test line was flown at survey altitude prior to and after each day's production. The collected data were checked by the operator to ensure the Thorium for the low level test line was within +/- 10% of the initial average. The location of the low level test line is below.

The calculated test line location was (in WGS84 Zone 53):

Point A	180175 E	8120772 N
Point B	180161 E	8106824 N

6. DATA VERIFICATION AND FIELD PROCESSING

All data verification was conducted at the field office in Wollogorang for the duration of the survey. At the conclusion of each days survey all magnetic, radiometric, altimeter, flight path and diurnal data were downloaded onto the field office computer for preliminary verification. All raw aircraft data were backed up at the end of each day's survey. One copy was sent to the FAS office in Perth, the other copy remaining at the field office.

6.1 Magnetic Diurnal Data

Diurnal data recorded from the primary base station was downloaded onto the field office computer. The data was checked for spikes and erroneous readings. If invalid diurnal data occurred whilst survey data was being acquired the affected section was re-flown. The diurnal data was also checked to see that the change in diurnal readings during the course of the survey did not exceed the specified tolerances. When this occurred the affected part of the survey line was re-flown. The diurnal data was merged with the aircraft data and used in the verification of the magnetic data. Diurnal data recorded on the secondary base station was also downloaded onto the field office computer.

6.2 Height Data

Radar altimeter, barometric altimeter and GPS height data from the aircraft was transferred onto the field office computer.

6.2.1 Radar Altimeter Data

The radar altimeter data was verified to check that a reasonably constant height above the terrain was flown, readings during the course of the survey did not exceed the specified tolerances and for equipment reliability.

6.2.2 GPS Height Data

The aircraft's height above the WGS84 ellipsoid each second was determined by differentially post-processing the synchronised GPS data from the aircraft and GPS base station data. The GPS height of the aircraft was verified to check for data masking and for equipment reliability.

6.2.3 Barometric Altimeter Data

As a backup to the aircraft's GPS height, barometric height was also recorded. The barometric height of the aircraft was verified to check for equipment reliability. The barometric data were also used in the processing of the radiometric data.

6.2.4 Topographical Data

After verification parallax corrections were applied, the radar altitude was subtracted from the GPS height to give the elevation of the terrain above the WGS84 ellipsoid. It was not considered necessary to make any further corrections as this data was for verification purposes only.

6.2.5 Gridding and Inspection

The topographical data was gridded and grid image enhancements were computed and displayed on screen. These were inspected for inconsistencies and errors.

6.3 Flight Path Data

The flight path data from the aircraft and the GPS base station were transferred onto the field office computer. The aircraft's precise location each second was determined by differentially post-processing the synchronised GPS data from the aircraft and GPS base station data. The flight path was recovered and plotted daily to ensure it was within specification. Any data not within specification was re-flown. The flight path data was then merged with the rest of the aircraft and diurnal data. Both the aircraft and GPS base station recorded the data in the WGS84 datum.

6.4 Magnetic Data

The real-time compensated and uncompensated magnetic data from the aircraft recorded every 0.1 second were transferred onto the field office computer. The raw magnetic data was checked to identify noise and spikes. If the noise exceeded the specified tolerances the part of the line affected was re-flown. After the magnetic data were merged with the digital flight path the following sequence of operations were carried out to allow inspection and verification of the data:

6.4.1 Diurnal Correction

The synchronised digital diurnal data collected by the base station was first subtracted from the corresponding airborne magnetic readings to calculate a difference. The resultant difference was then subtracted from the base value to produce diurnally corrected magnetic data.

6.4.2 Parallax Correction

The diurnally corrected magnetic data was corrected for system parallax using the calculated value.

6.4.3 Preliminary Gridding and Inspection

The magnetic data were gridded and grid image enhancements were computed and displayed on screen. These were inspected for inconsistencies and errors.

6.5 Spectrometer Data

Spectrometer data from the aircraft were transferred onto the field office computer. The data was verified to check that readings during the course of the survey did not exceed the specified tolerances and for equipment reliability.

6.5.1 Parallax Correction

The raw window data were corrected for system parallax using the calculated value.

6.5.2 Preliminary Gridding and Inspection

The spectrometer data were gridded and grid image enhancements were computed and displayed on screen. These were inspected for inconsistencies and errors.

7. FINAL DATA PROCESSING

7.1 Aircraft Location

The aircraft's location each second was determined by differentially post-processing the synchronised GPS data recorded on both the aircraft and GPS base station. This data is recorded in the WGS84 datum.

7.2 Magnetic Data Processing

The processing procedures applied to the magnetic data are summarised below:

- a) Apply any spike corrections to the compensated magnetic variables.
- b) Interpolate undefined magnetic values.
- c) Co-ordinate the data with post-processed GPS data.
- d) Filter diurnal values and subtract them from individual compensated magnetic readings.

Area	Base Value
Wollogorang	48786.6 nT

Table 3: Diurnal Base Values

- e) Apply parallax correction.
- f) Correct for regional effects of the earth's magnetic field by calculating the IGRF value at each fiducial using IGRF model 2005 and secular variation model. A base value was added back.

Area	IGRF Model	Base Value
Wollogorang	2006.8	48863.7 nT

Table 4: IGRF Base Values

- g) Using the tie lines (flown at 90 degrees to the traverse lines) a set of miss-tie values were determined. These miss-tie values reflected the differences in the magnetic value between the tie lines and traverse lines over the same geographical point. Using a least squares fit algorithm, which also takes into account the statistical variation inherent in DGPS positioning, a series of corrections were applied to the traverse line data. These allowed the data to be levelled to the same base value.
- h) Following this, a FAS proprietary microlevelling process was applied in order to more subtly level the data.

7.2.1 Gridding

The final levelled magnetic data were gridded using a bi-directional spline algorithm. The data was gridded with a cell size of 20 m.

7.3 Radiometric Data Processing

The radiometric data was processed using the standard IAEA window processing technique as summarised below.

- a) Co-ordinate the data with post-processed GPS data.
- b) Apply spike corrections to the radar altimeter, temperature and pressure values.
- c) Apply parallax corrections to altimeter, temperature and pressure values.
- d) Apply NASVD filtering to the 256 channel radiometric data.
- e) Apply energy recalibration to the 256 channel radiometric data.
- f) Correct for dead time.
- g) Calculate the equivalent terrain clearance at STP (standard temperature and pressure).
- h) Remove aircraft background.
- i) Remove cosmic background.
- j) Window the 256 channel data using the IAEA standard energy windows.
- k) Remove radon background.
- l) Apply stripping ratios.
- m) Apply height corrections.
- n) Using the tie lines (flown at 90 degrees to the traverse lines) a set of miss-tie values were determined. These miss-tie values reflected the differences in the value between the tie lines

and traverse lines over the same geographical point. Using a least squares fit algorithm, which also takes into account the statistical variation inherent in DGPS positioning, a series of corrections were applied to the traverse line data. These allowed the data to be levelled to the same base value.

- o) Following this, a Fugro proprietary micro-levelling process was applied in order to more subtly level the data.

7.3.1 Energy Recalibration

The spectral drift was checked by monitoring the position of the Potassium, Uranium and Thorium peaks on average spectra along flight lines. The peak positions were determined by using a Gaussian fitting method. Energy recalibration was applied to the spectra using a linear regression (LSQ fit) to determine the slope and intercept.

7.3.2 NASVD Filtering

The radiometrics were produced with NASVD smoothing. Using the NASVD technique, the raw spectra were first smoothed using 6 principal components. Eigenvectors and statistics on the NASVD processing results were used for analysis.

7.3.3 Dead Time

Gamma-ray spectrometers require a finite time to process each pulse from the detectors. While one pulse is being processed, any other pulse that arrives will be rejected. Consequently the 'live time' of a spectrometer is reduced by the time taken to process all pulses reaching the spectrometer. The spectra are normalised to counts per second by dividing by the live time.

7.3.4 STP Altitude

The radar altimeter data was converted to effective height at standard temperature and pressure using the expression:

$$\text{STPAlt} = \text{RAIt} * (\text{P}/103) * (273 / (\text{T}+273))$$

where:

RAIt = the observed radar altitude in m
 T = the measured air temperature in deg C
 P = the barometric pressure in hPa

7.3.5 Cosmic and Aircraft Background Removal

The 256 channel aircraft and cosmic spectra for the aircraft were calculated from the high-level test data with the aircraft and cosmic backgrounds derived using least squares fitting applied on a channel by channel basis.

The aircraft background was removed by subtracting the computed aircraft background spectra from the dead time corrected spectra. The 256 channel cosmic background spectrum that is removed is calculated by multiplying the 256 channel cosmic factor values by the cosmic counts recorded. The effect of cosmic radiation is removed from the spectra by subtracting the resultant cosmic spectrum.

Window	Aircraft Background	Cosmic Stripping Ratio
Total Count	57.8	0.8700
Potassium	9.1	0.0510
Uranium	2.6	0.4010
Thorium	0.6	0.0530

Table 5: Aircraft Background and Cosmic Stripping Ratios

7.3.6 Window Definitions

The 256 channel data were summed into the standard IAEA windows.

Window	Peak Energy (keV)	Energy Window (keV)	GR-820 Channel Window
Total Count	-	410 - 2810	34 - 234
Potassium	1460	1370 - 1570	115 - 131
Uranium	1765	1660 - 1860	139 - 155
Thorium	2614	2410 - 2810	201 - 234
Cosmic	-	4000 - 6000	-

Table 6: IAEA Window Definitions

7.3.7 Radon Correction

Radon corrections were applied using the spectral ratio method.

Stripping	Value
Total Count	13.15
Potassium	0.782
Thorium	0.061
Radon	1.88
Ground	0.4

Table 7: Radon Stripping Values

7.3.8 Spectral Stripping

Spectral stripping was applied to the Potassium, Uranium and Thorium windows. The stripping coefficients were corrected for STP altitude.

Stripping	Value	STP adjustment (/m)
Alpha	0.2657	0.00049
Beta	0.4192	0.00065
Gamma	0.7963	0.00069
A	0.0621	0
B	0.0016	0
G	-0.0166	0

Table 8: Spectral Stripping Ratios

7.3.9 Height Correction

The background corrected and stripped window data were corrected for variations in the density altitude of the detector.

Window	Attenuation coefficient (m^{-1})
Total Count	-0.00700
Potassium	-0.00900
Uranium	-0.00990
Thorium	-0.00750

Table 9: STP Altitude Coefficients

7.3.10 Gridding

The final radiometric data were gridded using a minimum curvature algorithm. A grid cell size of 20 m was used.

7.4 Digital Elevation Model

The processing procedures applied to the terrain data are summarised below:

- a) Apply any spike corrections to the raw radar altimeter data.
- b) Interpolate undefined values.
- c) Co-ordinate the data with post-processed GPS data.
- d) Apply parallax corrections.
- e) Subtract the aircraft's height above ground from the aircraft's height above the WGS84 ellipsoid and correct for radar altimeter/GPS sensor separation.
- f) Derive surface topography values with respect to mean sea level (referenced to the geoid) by correcting the WGS84 ellipsoid values with geoid-ellipsoid separation values.
- g) Using the tie lines (flown at 90 degrees to the traverse lines) a set of miss-tie values were determined. These miss-tie values reflected the differences in the value between the tie lines and the traverse lines over the same geographical point. Using a least squares fit algorithm, which also takes into account the statistical variation inherent in DGPS positioning, a series of corrections were applied to the traverse line data. These allowed the data to be levelled to the same base value.
- h) Following this, a FAS proprietary micro-levelling process was applied in order to more subtly level the data.

7.4.1 Gridding

The final levelled elevation data were gridded using a bi-directional spline algorithm. A grid cell size of 20 m was used.

The accuracy of the elevation calculation is directly dependent on the accuracy of the two input parameters, radar altitude and GPS altitude. The radar altitude value may be erroneous in areas of heavy tree cover, where the altimeter reflects the distance to the tree canopy rather than the ground. The GPS altitude value is primarily dependent on the number of available satellites. Although post-processing of GPS data will yield X and Y accuracies in the order of 1-2 metres, the accuracy of the altitude value is usually much less, sometimes in the ± 5 metre range. Further inaccuracies may be introduced during the interpolation and gridding process.

Because of the inherent inaccuracies of this method, no guarantee is made or implied that the information displayed is a true representation of the height above sea level. Although this product may be of some use as a general reference, THIS PRODUCT MUST NOT BE USED FOR NAVIGATION PURPOSES.

APPENDIX I – Weekly Operations Report

Week Commencing: **Monday 14-Aug-06**
 Job Number: 1777
 Total km: 25438.0

Aircraft: VH-WAM
 Base: Wologorang
 Country: Australia
 Area Name: Wologorang

Operators: Rob Doepel
 Data Proc: Rob Doepel
 Crew Leader: Rob Doepel
 Accom: Wologorang Station

Pilots: D. Hughes , A. Jamieson
 Techs:
 Client: Gulf Mines
 Contact #: Steve Webster

Date	Flight Number	Crew	Time	M/R	Oil	Fuel	This Flight	To Date	Standby (0, 0.5, 1)	Comments
Monday 14-Aug-06	1	TM RD	T/O 10:00 Land 11:54	1.9						Comp Flight and testline OK
Julian Day 1			Hours Today	1.9			0.0	0.0	0.0	No PM Flight due to boost pump failure
Tuesday 15-Aug-06										Boost pump failure
Julian Day 227										
Wednesday 16-Aug-06			Hours Today	0.0			0.0	0.0	0.0	Boost pump failure
Julian Day 228										
Thursday 17-Aug-06			Hours Today	0.0			0.0	0.0	0.0	Boost pump repaired. WAM to Mt Isa to collect operator
Julian Day 229	TM		15:30 17:00	1.5	1					
Friday 18-Aug-06			Hours Today	1.5			0.0	0.0	0.0	Ferry Isa To Wologorang
Julian Day 230	RD		11:30 12:54	1.4						
Saturday 19-Aug-06										PM Flight OK
Julian Day 231	DH		14:54 17:30	2.6			458.0	458.0	0.0	
Sunday 20-Aug-06			Hours Today	4.0			458.0	0.0	0.0	AM Flight OK
Julian Day 232	DH		6:55 12:04	5.2	2	1	1071.0			PM Flight OK
Julian Day 233	TM		12:40 17:46	5.1	3	1	981.0			Flight returned due to FASDAS Lockup
Julian Day 234			Hours Today	10.3			2052.0	0.0	0.0	PM Flight OK. Some diurnal activity
Julian Day 235	TM		6:45 11:34	4.8			940.6			
Julian Day 236	DH		12:20 18:02	5.7			1209.0			
Julian Day 237			Hours Today	10.5			2149.6	0.0	0.0	
Total Job Hours	31.9	Weekly Totals	28.2	6	2	0	4659.6	0.0	0.0	
Total Aircraft Hours										Total Standby
Hours to Next Periodic										% Complete
Anticipated Hours Next week										km Remaining
										18.3 %
										20778.4 km

Survey Equipment Problems:

Week Commencing: **Monday 21-Aug-06**

Job Number: 1777

Total km: 25438

Aircraft: VH-WAM

Base: Wologorang

Country: Australia

Area Name: Wologorang

Operators: Rob Doepel

Data Proc: Rob Doepel

Crew Leader: Rob Doepel

Accom: Wologorang Station

Pilots: D. Hughes , A. Jamieson

Techs: 0

Client: Gulf Mines

Contact #: Steve Webster

Date	Flight Number	Crew		Time		M/R		Oil		Fuel		This Flight		To Date		Standby (0, 0.5, 1)	Comments
		Plt(s)	Op	T/O	Land	Hrs	L	R	L	R	Added	Prod	Refly	Prod	Refly		
Monday 21-Aug-06	7	DH		6:35	12:47	6.2	2	2	1			1300.0				AM Flight OK	
Julian Day 233	8	TM		13:50	18:02	4.2	2	2	1			804.0				PM Flight OK	
Tuesday 22-Aug-06	9	DH		7:40	10:52	3.2						111.0	464.0		6763.6	0.0	AM Flight OK
Julian Day 234	10	AJ	DH	13:50	17:38	3.8	2	2	1			110.0				ICUS for A. Jamieson	
Wednesday 23-Aug-06	11	AJ	DH	8:00	13:36	5.6	2	2	1			1023.0			6984.6	464.0	ICUS for A. Jamieson
Julian Day 235	12	DH		15:30	18:00	2.5	2	2	1			440.0				PM Flight OK	
Thursday 24-Aug-06	13	AJ		6:45	10:15	3.5						1463.0	0.0		8447.6	464.0	A. Jamieson solo flight OK
Julian Day 236	14	AJ	DH	10:50	12:20	1.5	1	1	1			548.0				D. Hughes RDO	
Friday 25-Aug-06	15	AJ	DH	16:30	18:00	1.5											WAM Flown to Mt Isa for 50 Hourly oil change and spar inspection.
Julian Day 237	16	DH		6:45	12:21	5.6						548.0	0.0		8995.6	464.0	AM Flight OK
Saturday 26-Aug-06	17			13:00	17:42	4.7	2	2	1			912.0				PM Flight OK	
Julian Day 238	18	DH		Hours Today	10.3							2007.0	0.0		11002.6	464.0	AM Flight aborted due to Hydraulic failure
Sunday 27-Aug-06	19			6:45	9:33	2.8											WAM diverted to Mt Isa
Julian Day 239	20			Hours Today	2.8							0.0	0.0		11002.6	464.0	AM Flight aborted due to Hydraulic failure
Monday 28-Aug-06	21																WAM grounded in Mt Isa due to no Hydraulics
Julian Day 240	22																
Julian Day 241	23																
Julian Day 242	24																
Julian Day 243	25																
Julian Day 244	26																
Julian Day 245	27																
Julian Day 246	28																
Julian Day 247	29																
Julian Day 248	30																
Julian Day 249	31																
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Julian Day 310	92																
Julian Day 311	93																
Julian Day 312	94																
Julian Day 313	95																
Julian Day 314	96																
Julian Day 315	97																
Julian Day 316	98																
Julian Day 317	99																
Julian Day 318	100																
Julian Day 319	101																
Julian Day 320	102																
Julian Day 321	103																
Julian Day 322	104																

Survey Equipment Problems:

Week Commencing: **Monday 28-Aug-06**

Job Number: 1777

Total km: 25438

Aircraft: VH-WAM
Base: Wologorang
Country: Australia
Area Name: Wologorang

Operators: Rob Doepe
Data Proc: Rob Doepe
Crew Leader: Rob Doepe
Accom: Wologorang Station

Pilots: D. Hughes , A. Jamieson
Techs: 0
Client: Gulf Mines
Contact #: Steve Webster

Date	Flight Number	Crew		Time		M/R	Oil		Fuel Added	This Flight		To Date		Standby (0, 0.5, 1)	Comments
		Plt(s)	Op	T/O	Land		Hrs	L		R	Prod	Refly	Prod		
Monday 28-Aug-06															WAM in Mt Isa for repairs
Julian 240															
Day 15				Hours Today		0.0			0.0	0.0	11002.6	464.0			
Tuesday 29-Aug-06															WAM in Mt Isa for repairs
Julian 241															
Day 16				Hours Today		0.0			0.0	0.0	11002.6	464.0			
Wednesday 30-Aug-06															Test Flight in Mt Isa WAM returned to Wologorang COMP Flight done
Julian 242		DH		11:00	12:06	1.1									
Day 17	17	AJ		13:30	15:00	1.5	1	2							
Thursday 31-Aug-06															AM Flight OK PM Flight OK. Some diurnal
Julian 243				16:10	17:16	1.1									
Day 18				Hours Today		3.7			0.0	0.0	11002.6	464.0			
Friday 1-Sep-06															AM Flight OK A. Jamieson departed Doomagee. PM Flight OK
Julian 244		AJ		6:45	12:15	5.5	2	1	1058.0						
Day 19				Hours Today		10.3			902.0	0.0	12962.6	464.0			
Saturday 2-Sep-06															AM Flight OK Ferry WAM to Isa for Sheduled maintenance
Julian 245		DH		7:10	11:46	4.6			810.0	62.0					
Day 20				Hours Today		7.0			438.0		14210.6	526.0			
Sunday 3-Sep-06															WAM in service.
Julian 246				7:10	10:10	3.0			511.0						
Day 21				Hours Today		4.5			511.0	0.0	14721.6	526.0			
Total Job Hours		Weekly Totals		Hours Today		25.5		3		3		0		0.0	

Survey Equipment Problems:

Contact #: Steve Webster

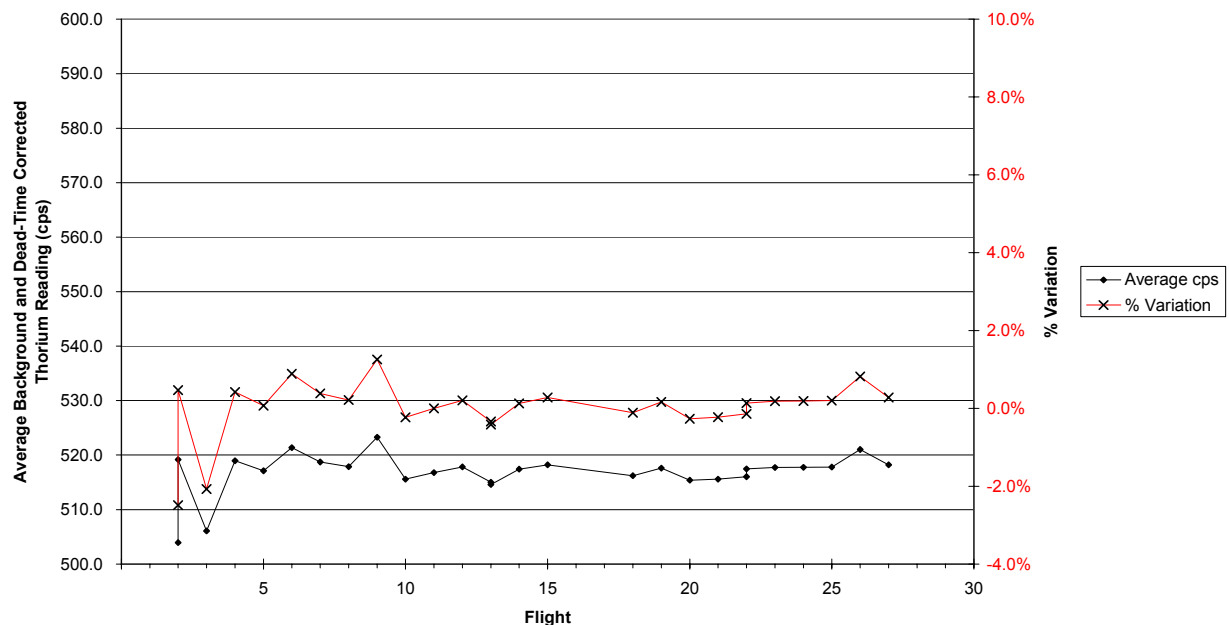
Survey Equipment Problems:

APPENDIX II – Button Calibration Data

AIRCRAFT VH-WAM

Flt#	Peak Posn	Raw (cps)	B/G (cps)	Normalised (cps)	FHTM/ FHHM	Readings	Running average	% Change
2	217.8517	608.2935	104.36570	503.928	1.836620	222	503.92770	-2.5%
2	218.0375	623.8789	104.68650	519.192	1.840609	278	511.56000	0.5%
3	218.0445	611.1468	105.07650	506.070	1.834274	228	509.73007	-2.1%
4	218.1919	622.1989	103.24500	518.954	1.829468	254	512.03598	0.4%
5	217.9821	623.6502	106.51040	517.140	1.815573	189	513.05676	0.1%
6	217.7953	626.2922	104.92960	521.363	1.833635	189	514.44107	0.9%
7	218.0718	625.0996	106.34650	518.753	1.795094	194	515.05707	0.4%
8	217.9781	623.5843	105.69690	517.888	1.866964	206	515.41088	0.2%
9	217.9973	627.7265	104.45230	523.274	1.792605	207	516.28458	1.3%
10	217.9465	620.9003	105.32650	515.574	1.828380	187	516.21349	-0.2%
11	217.9575	624.7953	108.02330	516.772	1.821145	198	516.26426	0.0%
12	218.0102	621.7661	103.92120	517.845	1.826817	180	516.39599	0.2%
13	218.1067	621.7387	106.70860	515.030	1.798344	192	516.29092	-0.3%
13	217.9960	620.0485	105.42990	514.619	1.810681	175	516.17147	-0.4%
14	218.1066	623.0435	105.61900	517.424	1.810084	183	516.25500	0.1%
15	217.9474	621.5491	103.32620	518.223	1.821239	193	516.37801	0.3%
18	218.0645	618.6035	102.39690	516.207	1.855405	187	516.36793	-0.1%
19	218.0020	622.4600	104.85290	517.607	1.804448	186	516.43677	0.2%
20	218.0467	621.6931	106.31540	515.378	1.867369	215	516.38103	-0.3%
21	217.9480	621.9964	106.39990	515.597	1.824158	190	516.34181	-0.2%
22	218.0721	623.7917	107.75470	516.037	1.818345	261	516.32730	-0.1%
22	217.9880	622.8787	105.40120	517.478	1.820608	189	516.37958	0.1%
23	218.0361	621.5061	103.79000	517.716	1.863264	190	516.43770	0.2%
24	217.9092	623.2391	105.49320	517.746	1.822449	178	516.49221	0.2%
25	218.0596	622.5939	104.78640	517.807	1.833476	196	516.54482	0.2%
26	217.9196	627.7108	106.68500	521.026	1.836170	209	516.71716	0.8%
27	217.9708	622.4544	104.23640	518.218	1.795974	196	516.77275	0.3%

FUGRO AIRBORNE SURVEYS
Ground Calibration Check
Background and Dead-Time Corrected Thorium Counts



APPENDIX III – Final Located Data Formats

Headers for final data files

Description File for 0.1 sec Magnetics and Elevation Data

```

COMM JOB NUMBER: 1777
COMM AREA NUMBER: 02
COMM SURVEY COMPANY: Fugro Airborne Surveys
COMM CLIENT: Gulf Mines Limited
COMM SURVEY TYPE: Magnetic and Radiometric
COMM AREA NAME: Wollogorang
COMM STATE: NT
COMM COUNTRY: Australia
COMM SURVEY FLOWN: August to September 2006
COMM LOCATED DATA CREATED: October 2006
COMM
COMM DATUM: GDA94
COMM PROJECTION: MGA
COMM ZONE: 53
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING: 100 m
COMM TRAVERSE LINE DIRECTION: 000 - 180 deg
COMM TIE LINE SPACING: 1000 m
COMM TIE LINE DIRECTION: 090 - 270 deg
COMM NOMINAL TERRAIN CLEARANCE: 50 m
COMM FINAL LINE KILOMETRES: 18478.7 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS: 20001 - 20433
COMM TIE LINE NUMBERS: 29001 - 29059
COMM
COMM AREA BOUNDARY
COMM
COMM easting northing
COMM 782000 8111000
COMM 819000 8111000
COMM 819000 8074800
COMM 786000 8074800
COMM 786000 8062000
COMM 785000 8062000
COMM 785000 8052000
COMM 776000 8052000
COMM 776000 8090000
COMM 782000 8090000
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT: VH-WAM Aerocommander Shrike 500S
COMM
COMM MAGNETOMETER: Geometrics G-822A CV
COMM INSTALLATION: Stinger
COMM RESOLUTION: 0.001 nT
COMM RECORDING INTERVAL: 0.1 s
COMM
COMM RADAR ALTIMETER: Sperry RT220
COMM RECORDING INTERVAL: 0.1 s
COMM

```

```

COMM NAVIGATION:                      real-time differential GPS
COMM RECORDING INTERVAL:                1.0 s
COMM
COMM ACQUISITION SYSTEM:                Fugro DAS
COMM
COMM BASE MAGNETOMETER:                 Scintrex Envi-mag
COMM RECORDING INTERVAL:                5 s
COMM
COMM DATA PROCESSING
COMM
COMM CO-ORDINATES
COMM PARALLAX CORRECTION APPLIED        -0.6 s
COMM
COMM MAGNETIC DATA
COMM DIURNAL CORRECTION APPLIED          base value 48786.6 nT
COMM PARALLAX CORRECTION APPLIED          0.52 s
COMM IGRF CORRECTION APPLIED             base value 48863.7 nT
COMM IGRF MODEL 2005 extrapolated to     August 2006
COMM DATA HAVE BEEN TIE LINE LEVELLED
COMM DATA HAVE BEEN MICROLEVELLED
COMM
COMM RADAR ALTITUDE DATA
COMM PARALLAX CORRECTION APPLIED          0.3 s
COMM
COMM GPS ALTITUDE DATA
COMM PARALLAX CORRECTION APPLIED        -0.6 s
COMM
COMM DIGITAL TERRAIN DATA
COMM DTM CALCULATED [DTM = GPS ALTITUDE - (RADAR ALTITUDE + SENSOR
SEPARATION)]
COMM DATA CORRECTED TO AUSTRALIAN HEIGHT DATUM
COMM DATA HAVE BEEN TIE LINE LEVELLED
COMM DATA HAVE BEEN MICROLEVELLED
COMM -----
COMM The accuracy of the elevation calculation is directly dependent on
COMM the accuracy of the two input parameters, radar altitude and GPS
COMM altitude. The radar altitude value may be erroneous in areas of heavy
COMM tree cover, where the altimeter reflects the distance to the tree
COMM canopy rather than the ground. The GPS altitude value is primarily
COMM dependent on the number of available satellites. Although
COMM post-processing of GPS data will yield X and Y accuracies in the
COMM order of 1-2 metres, the accuracy of the altitude value is usually
COMM much less, sometimes in the ±5 metre range. Further inaccuracies
COMM may be introduced during the interpolation and gridding process.
COMM Because of the inherent inaccuracies of this method, no guarantee is
COMM made or implied that the information displayed is a true
COMM representation of the height above sea level. Although this product
COMM may be of some use as a general reference,
COMM THIS PRODUCT MUST NOT BE USED FOR NAVIGATION PURPOSES.
COMM -----
COMM
COMM
COMM LINE DATA FORMAT
COMM A space is left between fixed fields so that a field of, for example,
COMM A8 should only ever have a maximum of 7 characters in it, even when it
COMM is a null, thus:
COMM
COMM FIELD                UNITS                NULL                FORMAT
COMM Line Number          -9999          I5
COMM Flight Number        -99              I4
COMM Date (yyyymmdd)       -99999        I9
COMM Fiducial Number       -999999       I8
COMM Time (local,UTC)      s              -9999.9             F8.1
COMM Easting               m              -99999.99           F10.2

```


COMM Northing	m	-999999.99	F11.2
COMM Longitude	deg	-999.9999999	F13.7
COMM Latitude	deg	-99.9999999	F12.7
COMM GPS Altitude	m	-999.99	F8.2
COMM Radar Altitude	m	-999.99	F8.2
COMM Compensated TMI	nT	-99999.99	F10.2
COMM Diurnal	nT	-99999.99	F9.2
COMM Final TMI	nT	-99999.99	F10.2
COMM Digital Terrain Model	m	-99.99	F8.2

Description File for 1.0 sec Windowed Radiometrics Data

```

COMM JOB NUMBER:                                1777
COMM AREA NUMBER:                                02
COMM SURVEY COMPANY:                            Fugro Airborne Surveys
COMM CLIENT:                                    Gulf Mines Limited
COMM SURVEY TYPE:                               Magnetic and Radiometric
COMM AREA NAME:                                 Wollogorang
COMM STATE:                                     NT
COMM COUNTRY:                                   Australia
COMM SURVEY FLOWN:                             August to September 2006
COMM LOCATED DATA CREATED:                    October 2006
COMM
COMM DATUM:                                     GDA94
COMM PROJECTION:                               MGA
COMM ZONE:                                      53
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:                     100 m
COMM TRAVERSE LINE DIRECTION:                   000 - 180 deg
COMM TIE LINE SPACING:                          1000 m
COMM TIE LINE DIRECTION:                        090 - 270 deg
COMM NOMINAL TERRAIN CLEARANCE:                  50 m
COMM FINAL LINE KILOMETRES:                     18478.7 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:                     20001 - 20433
COMM TIE LINE NUMBERS:                         29001 - 29059
COMM
COMM AREA BOUNDARY
COMM
COMM      easting    northing
COMM      782000    8111000
COMM      819000    8111000
COMM      819000    8074800
COMM      786000    8074800
COMM      786000    8062000
COMM      785000    8062000
COMM      785000    8052000
COMM      776000    8052000
COMM      776000    8090000
COMM      782000    8090000
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                                  VH-WAM Aerocommander Shrike 500S
COMM
COMM SPECTROMETER:                             256 Channel Exploranium GR820
COMM CRYSTAL VOLUME:                           33.56 L
COMM RECORDING INTERVAL:                       1 s
COMM

```

COMM RADAR ALTIMETER:	Sperry RT220
COMM RECORDING INTERVAL:	0.1 s
COMM	
COMM NAVIGATION:	real-time differential GPS
COMM RECORDING INTERVAL:	1.0 s
COMM	
COMM ACQUISITION SYSTEM:	Fugro DAS
COMM	
COMM DATA PROCESSING	
COMM	
COMM CO-ORDINATES	
COMM PARALLAX CORRECTION APPLIED	-0.6 s
COMM	
COMM RADAR ALTITUDE DATA	
COMM PARALLAX CORRECTION APPLIED	0.3 s
COMM	
COMM GPS ALTITUDE DATA	
COMM PARALLAX CORRECTION APPLIED	-0.6 s
COMM	
COMM BAROMETRIC DATA	
COMM PARALLAX CORRECTION APPLIED	2.1 s
COMM	
COMM TEMPERATURE DATA	
COMM PARALLAX CORRECTION APPLIED	2.1 s
COMM	
COMM	
COMM RADIOMETRIC DATA	
COMM NASVD FILTERING APPLIED TO 256 CHANNEL DATA	
COMM WINDOW DATA EXTRACTED USING IAEA STANDARD WINDOWS	
COMM PARALLAX CORRECTION APPLIED	0 s
COMM COSMIC, AIRCRAFT AND RADON BACKGROUNDS REMOVED	
COMM STRIPPING CORRECTIONS APPLIED	
COMM HEIGHT CORRECTED TO	50 m AGL
COMM DATA HAVE BEEN TIE LINE LEVELLED	
COMM DATA HAVE BEEN MICROLEVELLED	
COMM AIRCRAFT BACKGROUND COEFFICIENTS	
COMM TOTAL COUNT	57.8
COMM POTASSIUM	9.1
COMM URANIUM	2.6
COMM THORIUM	0.6
COMM COSMIC COEFFICIENTS	
COMM TOTAL COUNT	0.8700
COMM POTASSIUM	0.0510
COMM URANIUM	0.0401
COMM THORIUM	0.0530
COMM STRIPPING COEFFICIENTS	
COMM ALPHA	0.2657
COMM BETA	0.4192
COMM GAMMA	0.7963
COMM a	0.0621
COMM b	0.0016
COMM g	-0.0166
COMM STRIPPING HEIGHT ATTENUATION COEFFICIENTS	
COMM ALPHA	0.00049
COMM BETA	0.00065
COMM GAMMA	0.00069
COMM RADON STRIPPING COEFFICIENTS	
COMM TOTAL COUNT	13.150
COMM POTASSIUM	0.782
COMM THORIUM	0.061
COMM SPECTRAL RATIOS	
COMM RADON (C1)	1.87540
COMM GROUND (C2)	0.4
COMM ALTITUDE COEFFICIENTS	

COMM TOTAL COUNT -0.0070
 COMM POTASSIUM -0.0090
 COMM URANIUM -0.0099
 COMM THORIUM -0.0075

COMM SENSITIVITY COEFFICIENTS AT 60 m

COMM TOTAL COUNT 33.84 (cps/(nGy/h))
 COMM POTASSIUM 129.72 (cps/%)
 COMM URANIUM 8.15 (cps/ppm)
 COMM THORIUM 7.64 (cps/ppm)

COMM

COMM LINE DATA FORMAT

COMM A space is left between fixed fields so that a field of, for example,
 COMM A8 should only ever have a maximum of 7 characters in it, even when it
 COMM is a null, thus:

COMM

COMM FIELD	UNITS	NULL	FORMAT
COMM Line Number		-9999	I5
COMM Flight Number		-99	I4
COMM Date (yyyymmdd)		-9999999	I9
COMM Fiducial Number		-999999	I8
COMM Time (local, UTC)	s	-9999.9	F8.1
COMM Easting	m	-99999.99	F10.2
COMM Northing	m	-999999.99	F11.2
COMM Longitude	deg	-999.9999999	F13.7
COMM Latitude	deg	-99.9999999	F12.7
COMM GPS Altitude	m	-999.99	F8.2
COMM Radar Altitude	m	-999.99	F8.2
COMM Raw Cosmic	cps	-99	I4
COMM Barometric Pressure	hPa	-999.99	F8.2
COMM Temperature	deg C	-9.9	F5.1
COMM Livetime	s	-9.999	F7.3
COMM Uncorrected Total Count	cps	-9999.9	F8.1
COMM Uncorrected Potassium	cps	-999.9	F7.1
COMM Uncorrected Uranium	cps	-999.9	F7.1
COMM Uncorrected Thorium	cps	-999.9	F7.1
COMM Final Total Count	cps	-9999.9	F8.1
COMM Final Potassium	cps	-999.9	F7.1
COMM Final Uranium	cps	-999.9	F7.1
COMM Final Thorium	cps	-999.9	F7.1
COMM Raw 256 Channel Radiometrics counts		-999	256I5

APPENDIX IV – List Of All Supplied Data

Final Located Data

- 0.1 second magnetics and digital elevation data
- 1.0 second windowed radiometrics & 256 channel data

Final located data is in Geosoft database format. Contents of each are shown in Appendix III.

Preliminary Gridded Data

Preliminary gridded data was produced in ERMapper format in GDA94/MGA543

- Total magnetic intensity
- Total count
- Potassium count
- Uranium count
- Thorium count
- Digital elevation model

Final Gridded Data

Final gridded data was produced in ERMapper format in GDA94/MGA53

Merged grids of Wollogorang and previously flown (UTS) Hartz Range survey.

- Total magnetic intensity
- Total count
- Potassium count
- Uranium count
- Thorium count
- Digital elevation model

Final Map Products

- Flight Path
- Image of Total Magnetic Intensity (TMI) or first or second vertical derivative (1VD or 2VD)
- Image of Ternary radiometrics
- Image of contours of Digital Elevation Model (DEM)