Tiwi Islands, Northern Territory

Airborne Magnetic, Gamma-ray and Elevation Survey

for

Geoscience Australia

Acquisition and Processing Report

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Survey flown: October - November 2006

by

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FAS JOB# 1824
GA JOB# 1137

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1. INTRODUCTION

This report provides details of the Tiwi Islands airborne magnetic, gamma-ray and elevation survey, carried out north of Darwin in the Northern Territory. The survey area consists of 30,688.7 line kilometres flown in one block over 53 flights. A daily test line was also undertaken to check for system repeatability. The area lies within the Melville Island and Darwin 1:250 000 map sheets. The survey was flown for the Commonwealth of Australia through Geoscience Australia (GA), and was undertaken by Fugro Airborne Surveys Pty Ltd.

2. SURVEY DETAILS

2.1 Project Identification

Area Name:	Tiwi Islands
Contractor:	Fugro Airborne Surveys Pty Ltd
Geoscience Job No.:	1137
Fugro Job No.:	1824

2.2 Survey Location

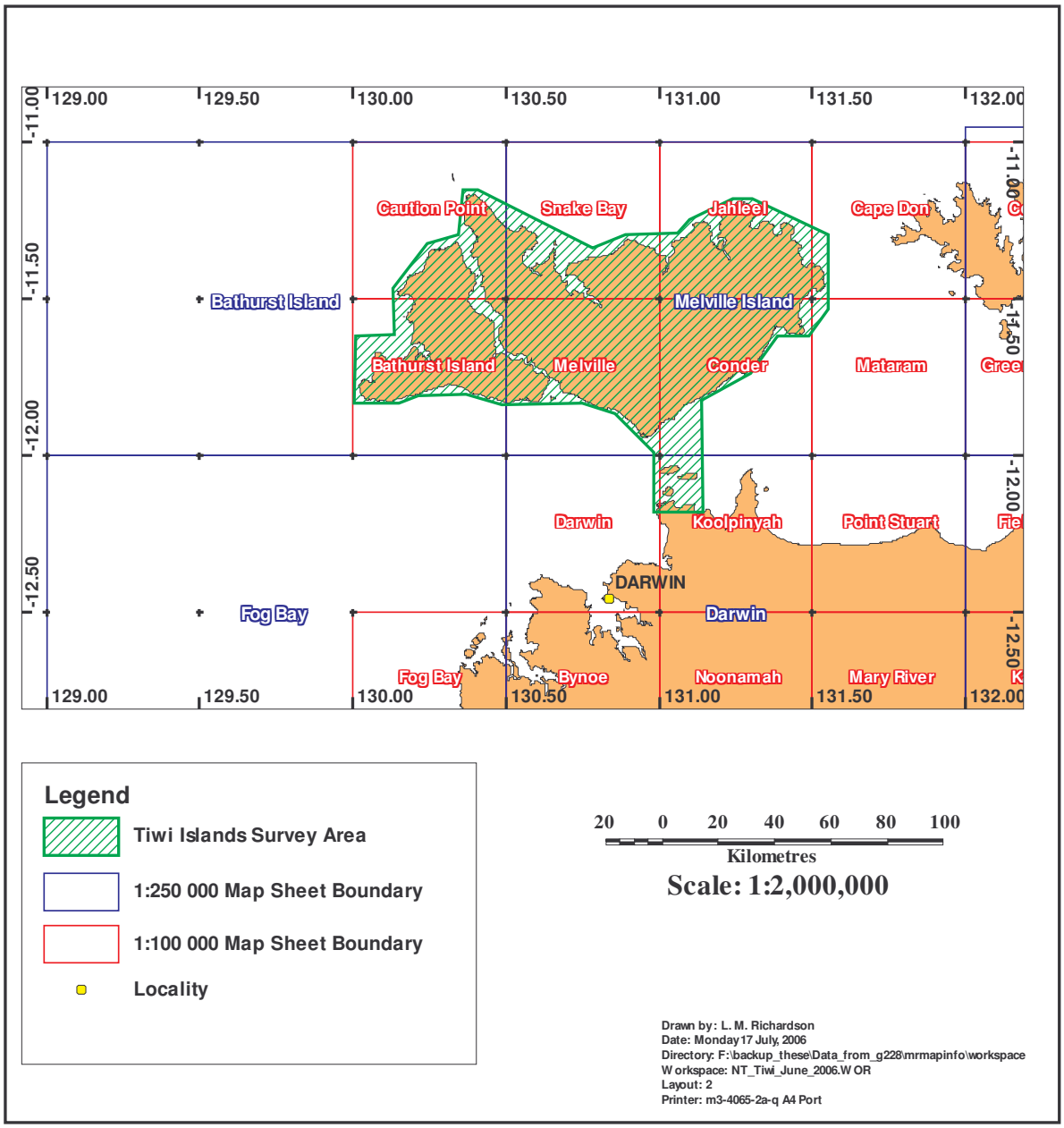
The survey location is shown in Figure 1.

Survey boundary co-ordinates for Tiwi Islands.

400 m line spacing in GDA94 MGA Zone 52

	Easting	Northing		Easting	Northing
1	653504	8767076	16	715783	8673516
2	694432	8746301	17	702308	8687366
3	706519	8750997	18	690424	8691109
4	725114	8750891	19	661789	8690922
5	729352	8755676	20	649250	8694477
6	744511	8763349	21	632032	8694290
7	751436	8763162	22	625294	8691670
8	778292	8750248	23	609573	8691670
9	778292	8724047	24	609854	8715438
10	771461	8714503	25	623610	8715626
11	760232	8714316	26	623339	8732253
12	750687	8701215	27	635847	8747703
13	732908	8692044	28	646637	8751136
14	733115	8652588	29	648354	8767076
15	715568	8652588			

Figure 1 Tiwi Islands Location Diagram



Repeat Test Line Coordinates (GDA94 MGA52)

Point A 668900E 8759200N

Point B 668900E 8690000N

2.3 Specifications and Tolerances

Project Number	1824/1137
Total line kilometres (including ties)	30,688.7 km
Traverse direction	000°-180°
Traverse spacing	400 m
Traverse line numbers	100011 - 104271
Tie-line direction	090°-270°
Tie-line spacing	4,000 m
Tie line numbers	190011 – 190351
Nominal Terrain Clearance	80 m
Repeat Test Line numbers	900331 - 900502

Sample Intervals:

Magnetics (aircraft)	10 Hz (approx. 7.0 m)
Gamma-ray	1 Hz (approx. 70 m)
GPS positions	1 Hz
Radar altimeter	10 Hz
Temperature & pressure	1 Hz
Magnetics (base stations)	2 s
Crystal size	33.56 L

Contracted tolerances:

Flight or tie lines	must not exceed 20 m off course for 1 km or more
Position accuracy	5 m horizontal; 10 m height
Radar altimeter accuracy	0.3 m
Temperature accuracy	1°C
Pressure accuracy	0.1%

Magnetic base stations:

Noise envelope	0.1 nT
Variation	5 nT in 5 minutes and less than 1nT from any chord 1 minute long across the diurnal record

Aircraft magnetometer:

Non-geological noise envelope	0.1 nT
Variation with heading	+/- 1 nT
Total noise on unfiltered profiles	0.2 nT
Terrain clearance envelope	70 to 90 m
Ground moisture	10% variation in corrected Th

3. PROJECT PERSONNEL

PROJECT SUPERVISION	Bart Anderson – Fugro: data acquisition Kathlene Oliver – Fugro: data processing
SURVEY PILOTS	Til Ribarich, Joshua Cox, Max Eichorn, Laszlo Balint, Geoff Lawrence
SURVEY OPERATORS	Matt Richardson (Crew Leader)
TRAINING OFFICER	Kevin Harrington
DATA PROCESSING	Matthew Lawrence

4. ACQUISITION

4.1 Aircraft and Equipment

VH-KAC

Aircraft Model	Aerocommander Shrike 500S
Aircraft Registration	VH-KAC
Aircraft Magnetometer	Geometrics G-822A CV
Magnetic Compensator	Fugro FASDAS Magnetic Decoupler Unit Aeromagnetic Digital
Base station magnetometer	2 x Scintrex ENVI Mag magnetometer
Gamma-ray spectrometer	Exploranium GR820D, 256 channels
Gamma-ray detector	NaI(Tl) crystals; 33.56L;
Altimeter	Sperry RT-220 radio altimeter
Barometer	Paroscientific Digibaro altimeter
Thermometer	Vaisala HMY133 temperature and humidity sensor
Navigation system	Fugro Omnistar in VBS mode Novatel OEM4 GPS receiver
Data acquisition system	FAS digital acquisition system (FASDAS)

4.2 Base Stations

Base Station Logs can be found in Appendix A.

GPS Receiver

Model Novatel OEM4 GPS Receiver

The acquired WGS84 GPS positions (latitude, longitude and altitude) were differentially post-processed in the field. Final co-ordinates reference GDA94, MGA Zone 52.

Magnetometers

Two Scintrex ENVI mag base station 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. These data were displayed and recorded on a laptop computer. The base stations were run continuously throughout the survey flying period with a sampling interval of 2 seconds and a sensitivity of 0.1 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.

4.3 Survey Operations

A summary of the acquisition phase is given in Table 1. Full operations reports are provided in Appendix B. The survey flight logs are provided as Appendix H.

Date	Aircraft	Base	Comment
October 2, 2006	VH-KAC	Darwin, N.T.	Mobilisation
November 18, 2006	VH-KAC	Darwin, N.T.	Acquisition complete

TABLE 1 – OPERATIONS SUMMARY

4.4 Recorded Parameters

All acquired data were recorded digitally.

The following parameters are recorded at 10 Hz:

Parameter	*Resolution*	*units*
Fiducial number	1.0	unit
Uncompensated Total Magnetic Intensity (TMI)	0.001	nT
Fluxgates X, Y & Z	0.01	nT
Fluxgate Total Field	0.01	nT
Compensated TMI	0.001	nT

The following parameters are recorded at 1 Hz:

Parameter	*Resolution*	*units*
GPS time	1.0	s
Terrain clearance (radar altimeter)	0.01	m
Latitude	0.0000001	°
Longitude	0.0000001	°
GPS height	0.01	m
Outside air temperature	1.0	℃
Barometric pressure	0.01	hPa
Barometric altitude	0.01	m
Full 256-channel gamma-ray spectrum	1.0	cps
Spectrometer livetime	0.001	s
Resolution	0.1	%
Number of satellites	1.0	
Position dilution of precision (PDOP)	0.1	
HDOP	0.1	

4.5 Calibrations and System Checks

4.5.1 Gamma-ray Spectrometer Calibrations

Pre-survey gamma-ray spectrometer calibration results are summarised in Table 2. These tests were conducted respectively by flying the dynamic test range at Carnamah, WA, flying over water and taking pad tests at Jandakot Airport, WA during January 2006.

	Date	Window	VH-KAC
Aircraft Background	4 Jan 2006	TC	40.00
		K	8.20
		U	0.50
		Th	0.40
Cosmic Background	4 Jan 2006	TC	0.9300
		K	0.0510
		U	0.0440
		Th	0.0510
Stripping	4 Jan 2006	α	0.2800
		β	0.4356
		γ	0.7968
		a	0.0677
		b	-0.0154
		c	0.0023
Height Attenuation	19 Jan 2006	TC	-0.0073
		K	-0.0095
		U	-0.0099
		Th	-0.0072
Air/Ground @ 80m	19 Jan 2006	Dose	30.14
		K	104.99
		U	6.88
		Th	6.33

TABLE 2 – COEFFICIENTS SUMMARY

4.5.2 Magnetic Compensation

Magnetic compensation sequences were flown before acquisition commenced and after routine maintenance was performed, as required. The resulting coefficients were used for real-time magnetic compensation:

COMPENSATION 1

October 7, 2006 - Flight 3

LOCATION: On ferry to area at 10,000ft AMSL

CMP 0.028

IR 8.7

COMPENSATION 2

October 13, 2006 - Flight 10

LOCATION: On ferry to area at 10,000ft AMSL

CMP 0.036

IR 6.95

COMPENSATION 3

October 25, 2006 - Flight 23

LOCATION: On ferry to area at 10,000ft AMSL

CMP 0.030

IR 10.99

COMPENSATION 4

November 6, 2006 - Flight 38

LOCATION: On ferry to area at 10,000ft AMSL

CMP 0.027

IR 6.40

COMPENSATION 5

November 16, 2006 - Flight 49

LOCATION: On ferry to area at 10,000ft AMSL

CMP 0.017

IR 9.67

CMP: Standard deviation of compensated TMI (nT)

IR: Improvement ratio (UNC/CMP)

4.5.3 Low-level Test Lines

Low-level test lines were flown twice per day at survey height in the same flight configuration as on survey. Average counts were compared to assess system repeatability, soil moisture effects, etc. The location of the Low-level test lines and test line records, resulting statistics and Th graphs are given in Appendix C.

4.5.4 Gamma-ray Button Checks

Crystal stabilisation using Thorium was undertaken prior to each day's acquisition, before both the morning and afternoon flights. Gamma-ray counts were recorded by locating the Thorium samples underneath the crystal packs, a distance of 40 cm below the aircraft. This process was also conducted with the samples removed to determine background radiation.
Resulting statistics and Th graphs are given in Appendix D.

4.5.5 Radar Altimeter Stacks

Prior to commencement of acquisition, radar altimeter stacks were flown as accurately as possible with reference to the radar altimeter indicator, which was set at a pre-determined height. The results are shown below in Table 3.

VH-KAC Flown Pre survey

Planned Height (feet)	Planned Height (metres)	Radar Altimeter (metres)	Barometric Height (metres)	GPS Height (metres)	Hr – Hb (metres)	Hr – Hg (metres)
100	30	30	29	30	1	0
150	46	47	45	47	2	0
200	61	61	61	62	1	0
250	76	76	76	76	0	0
300	91	92	92	92	1	0
350	107	107	107	107	0	0
400	122	122	122	121	0	0
500	152	156	157	156	0	0
600	183	194	194	194	0	0
800	244	259	258	259	1	0
1000	305	301	299	301	2	0

TABLE 3 – VH-KAC RADAR ALTIMETER STACKS

4.5.6 Navigation

A navigation repeatability check was performed prior to and following each day's acquisition. The aircraft was parked in the same position each day, to test the navigation repeatability. The results are shown in Appendix E.

5. PROCESSING

5.1 Hardware and Software

All data processing was carried out by Fugro Airborne Surveys Pty Ltd in its Western Australia office in Floreat, Perth.

Hardware	Pentium PCs (Windows XP) HP Designjet 1050 and 1055 Plotters LG DVD Writer
Software	Fugro in-house software Oasis montaj 6.2

5.2 GPS Positioning

5.2.1 Spheroids, Datums and Zones

The acquired GPS positions (latitude, longitude and altitude) were differentially post-processed in the field. Final co-ordinates reference GDA94, MGA Zone 52.

The 1 Hz position data was interpolated to coordinate all 0.1 Hz data.

5.2.2 Quality Control

The following position quality control plots were produced:

- flight path
- ground speed

5.3 Magnetics

5.3.1 Quality Control

The following quality control plots were produced:

- diurnal variation
- radar altimeter

This visual aspect of quality control was aided by the determination of statistics (max., min., mean and SD.) for all parameters for every line.

System spikes were removed from the magnetic data but cultural responses were retained.

5.3.2 Parallax Correction

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 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.

Data	Parallax (VH-KAC)
GPS easting	-0.5 sec (~35 m)
GPS northing	-0.5 sec (~35 m)
GPS height	-0.5 sec (~35 m)
Radiometrics	0
Magnetics	-0.1 sec
Radar altitude	-0.05 sec
Barometer	-0.05 sec
Temperature	-0.05 sec

TABLE 4 – PARALLAX VALUES

5.3.3 Diurnal Correction

The magnetic data were corrected for diurnal variations. The correction formula was:

diurnal corrected TMI = compensated TMI *minus* diurnal *plus* mean diurnal value

Area Name	Mean Diurnal Value
Tiwi Islands	46454 nT

TABLE 5 – DIURNAL BASE VALUES

5.3.4 IGRF Correction

The International Geophysical Reference Field (IGRF) was removed from the data using the 2005 model extrapolated to the survey date. The correction formula was:

IGRF corrected TMI = diurnal corrected TMI *minus* local IGRF plus mean IGRF value.

Area Name	Mean IGRF Value	Survey Date
Tiwi Islands	45816 nT	2006.10

TABLE 6 – IGRF BASE VALUES

5.3.5 Levelling

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 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.

Tie line levelling and further micro-levelling produced the final levelled magnetics. The parameters used for levelling the magnetics are shown in Table 7 and 8.

Tie Lines	Order 0 polynomial fitted to all crossovers
Traverse Lines	Oasis tension spline fitted to all crossovers Smoothness=0.7, tension=0.00002

TABLE 7 – MAGNETIC TIE-LINE LEVELLING PARAMETERS

Wavelength (m)	High Pass	Threshold (nT)
1680	21 cells	0.5

TABLE 8 – MAGNETIC MICRO-LEVELLING PARAMETERS

5.3.6 Gridding & Further Enhancements

A bi-cubic spline algorithm was used to produce gridded data of 80 metre cell size.

5.4 Gamma-ray spectrometry

Gamma-ray processing closely follows the IAEA publication, “Technical Reports Series No. 323” (1991).

5.4.1 Quality Control

256 channel spectral plots for all flights and source tests were produced. All data were checked for peak stability and count variation.

Statistics for all channels were calculated and checked. Profiles were produced where required. The data were subsequently checked (images, profiles and statistics) after each stage of processing to ensure continued data integrity.

5.4.2 Calibrations and Coefficients

See Section 4.5.

5.4.3 256-Channel Pre-processing

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.

The gamma-ray data were produced with and without NASVD smoothing. Using the NASVD technique, the raw spectra were first smoothed, using 7 principal components.

Raw count rates used for final processing were extracted by summing the 256 channel data over the IAEA windows centred on the peak locations, to the nearest channel. The IAEA windows are:

Total Count	0.41 to 2.81 MeV
Potassium	1.37 to 1.57 MeV
Uranium (Bi^{214})	1.66 to 1.86 MeV
Thorium (Tl^{208})	2.41 to 2.81 MeV
Cosmic	>4.0 MeV

5.4.4 Final Processing

A Gaussian-damped sync function filter was applied to height, cosmic and radon channels. These filter lengths are specified in fiducials and were respectively, a filter length of 9 (equivalent to a cut-off wavelength of 296 m), a filter length of 9 (equivalent to a cut-off wavelength of 296 m), and a filter length of 7 (equivalent to a cut-off wavelength of 222 m). Cosmic, aircraft and Radon backgrounds were then removed. Radon corrections were performed using the spectral ratio technique.

The Potassium, Uranium and Thorium count rates were corrected for Compton scattering (stripped). The coefficients themselves were corrected to the STP height using theoretical linear corrections for the three primary stripping coefficients.

Corrections to account for terrain clearance variation from the nominal survey terrain clearance of 80m were made using STP corrected heights and the absorption factors appropriate to the exponentially decreasing count rates with height.

Micro-levelling produced the final levelled gamma-ray data. The parameters used for levelling are shown in Table 9. Final levelled airborne gamma-ray counts were then converted to the equivalent ground radioelement concentrations.

Radioelement	Wavelength (m)	High Pass (cells)	Threshold
Total Count	Pass 1 2480	31	20 cps
Potassium	Pass 1 2480	31	2 cps
Uranium	Pass 1 2480	31	1 cps
Thorium	Pass 1 1680	21	3 cps

TABLE 9 – GAMMA-RAY MICRO-LEVELLING PARAMETERS

5.4.5 Gridding

A minimum curvature algorithm was used to produce gridded data of 80 metre cell size.

5.5 Digital Elevation Model

5.5.1 Processing

The form of the calculation used was:

Digital Terrain = GPS altitude – Radar Altimeter – 1.71 m

where,

GPS Altitude is flying height above ellipsoid (WGS84),
Radar Altimeter is flying height above ground and,
a 1.71 m correction was made to allow for the vertical distance between the GPS antenna and the radar altimeter.

Tie line levelling and further micro-levelling produced the final levelled terrain model. The parameters used for levelling the Digital Elevation Model are shown in Table 10 and 11.

Tie Lines	Order 0 polynomial fitted to all crossovers
Traverse Lines	Oasis tension spline fitted to all crossovers Smoothness=0.7, tension=0.00002

TABLE 10 – DIGITAL TERRAIN TIE-LINE LEVELLING PARAMETERS

Wavelength (m)	High Pass	Threshold (m)
Pass 1 2160 Pass 2 1200	27 cells 15 cells	0.5 m 0.2 m

TABLE 11 – DIGITAL TERRAIN MICRO-LEVELLING PARAMETERS

5.5.2 Australian Height Datum

Minimum N-value (m)	Maximum N-value (m)	Mean N-value (m)
49.61	55.59	53.19

TABLE 12 – N-VALUE STATISTICS

The final AHD corrected terrain values were then compared to 9 second AUSLIG terrain values in order to check the accuracy of the heights. This was done by comparing several terrain heights at grid points along areas of relatively flat terrain. The results are shown in Table 13.

Easting	Northing	Auslig 9s DEM (m)	Survey DEM (m)	DEM difference (m)
645760.551	8719374.466	8.253	8.339	-0.086
663360.574	8718393.689	9.610	9.904	-0.294
764161.769	8745233.350	14.222	14.060	0.162
769750.754	8738015.273	7.361	7.213	0.148
			Average Difference	-0.07

TABLE 13 – COMPARISON OF SURVEY DEM WITH 9 SEC AUSLIG DEM

5.5.3 Gridding

A bi-cubic spline algorithm was used to produce gridded data of 80 metre cell size.

6. PRELIMINARY PRODUCTS

6.1 Raw Located Data

- 0.1 second magnetics
- 1.0 second gamma-ray data (includes 256 channel data)
- 0.1 second digital elevation

Preliminary raw located data is in ASEG-GDF2 format. Descriptions of each are shown in Appendix F.
Raw located data for the Repeat Testline was also delivered in ASEG-GDF2 format. Descriptions of each are shown in Appendix F.

7. FINAL PRODUCTS

7.1 Final Located Data

- 0.1 second magnetics
- 1.0 second gamma-ray
- 0.1 second digital elevation

Final located data is in ASEG-GDF2 format. Descriptions of each are shown in Appendix G.

7.2 Final Gridded Data

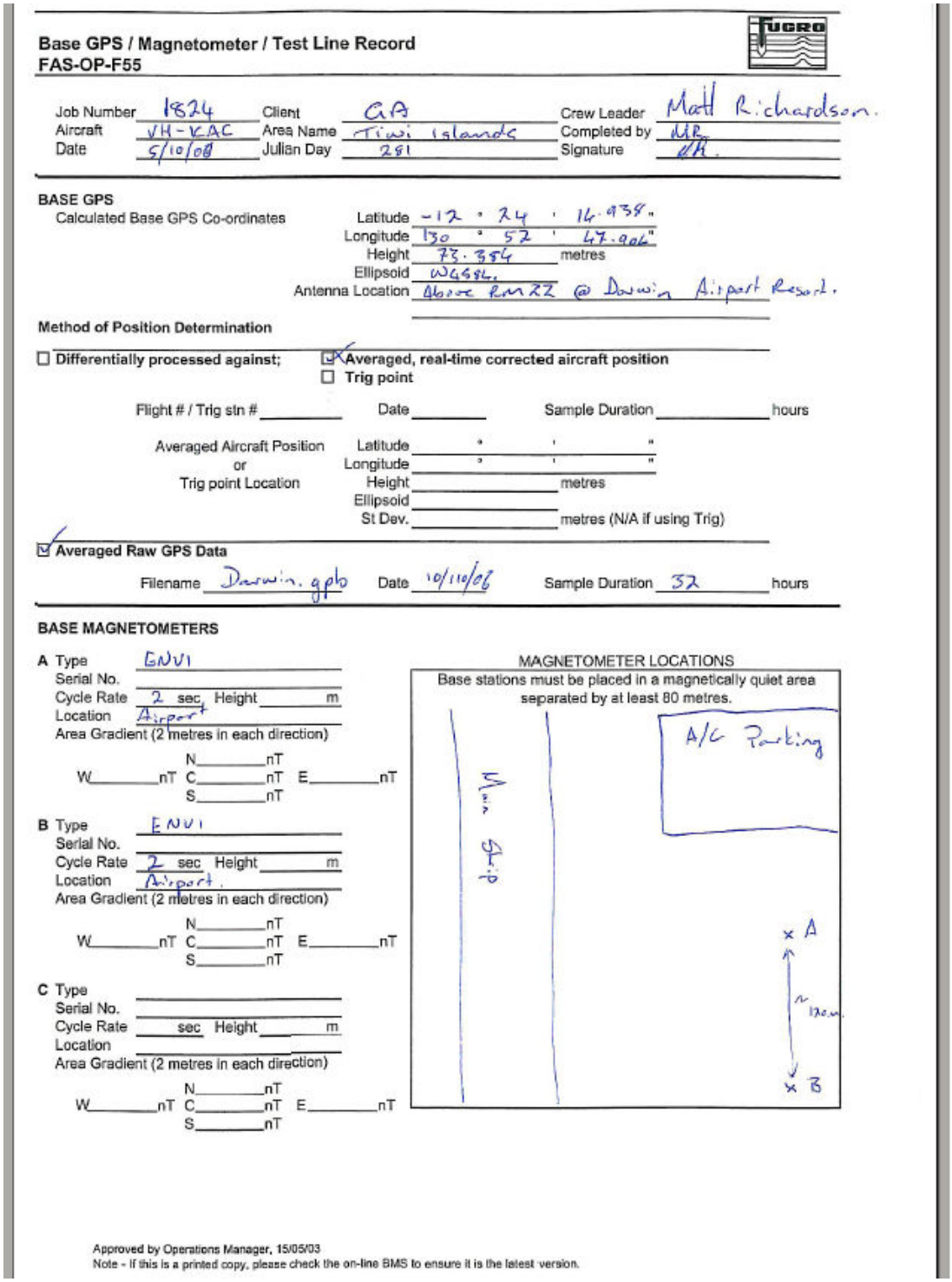
Final gridded data was produced in ERMapper format.

- Total Magnetic Intensity (TMI), nT
- Doserate, nGy/h (NASVD spectral smoothing applied)
- Potassium, % (NASVD spectral smoothing applied)
- Uranium, ppm eU (NASVD spectral smoothing applied)
- Thorium, ppm eTh (NASVD spectral smoothing applied)
- Digital Elevation Model (DEM), m (AHD)

APPENDIX A

BASE STATION LOGS

Base Records



Base GPS / Magnetometer / Test Line Record
FAS-OP-F55

Job Number 1824 Client GA Crew Leader Matt Richardson.
Aircraft VH-KAC Area Name Tiwi Islands Completed by MR
Date 5/10/08 Julian Day 281 Signature MR.

BASE GPS

Calculated Base GPS Co-ordinates
Latitude -12 ° 24 ' 16.938"
Longitude 130 ° 52 ' 47.906"
Height 73.354 metres
Ellipsoid WGS84.
Antenna Location Above RW22 @ Darwin Airport Resort.

Method of Position Determination

☐ Differentially processed against; ☑ Averaged, real-time corrected aircraft position
☐ Trig point

Flight # / Trig stn # _____ Date _____ Sample Duration _____ hours

Averaged Aircraft Position or Trig point Location
Latitude ° ' "
Longitude ° ' "
Height metres
Ellipsoid
St Dev. metres (N/A if using Trig)

☑ **Averaged Raw GPS Data**

Filename Darwin.gpb Date 10/10/08 Sample Duration 32 hours

BASE MAGNETOMETERS

A Type GNV1
Serial No.
Cycle Rate 2 sec Height m
Location Airport
Area Gradient (2 metres in each direction)
N nT
W nT C nT E nT
S nT

B Type GNV1
Serial No.
Cycle Rate 2 sec Height m
Location Airport.
Area Gradient (2 metres in each direction)
N nT
W nT C nT E nT
S nT

C Type
Serial No.
Cycle Rate sec Height m
Location
Area Gradient (2 metres in each direction)
N nT
W nT C nT E nT
S nT

MAGNETOMETER LOCATIONS
Base stations must be placed in a magnetically quiet area separated by at least 80 metres.

Approved by Operations Manager, 15/05/03
Note - If this is a printed copy, please check the on-line BMS to ensure it is the latest version.

Low Level Test Line Locations

Base GPS / Magnetometer / Test Line Record
FAS-OP-F55

TEST LINE LOCATION

Point A

Latitude ° ' "
Longitude ° ' "
Ellipsoid

OR

Easting 701993
Northing 8689356
Zone 52

Point B

Latitude ° ' "
Longitude ° ' "

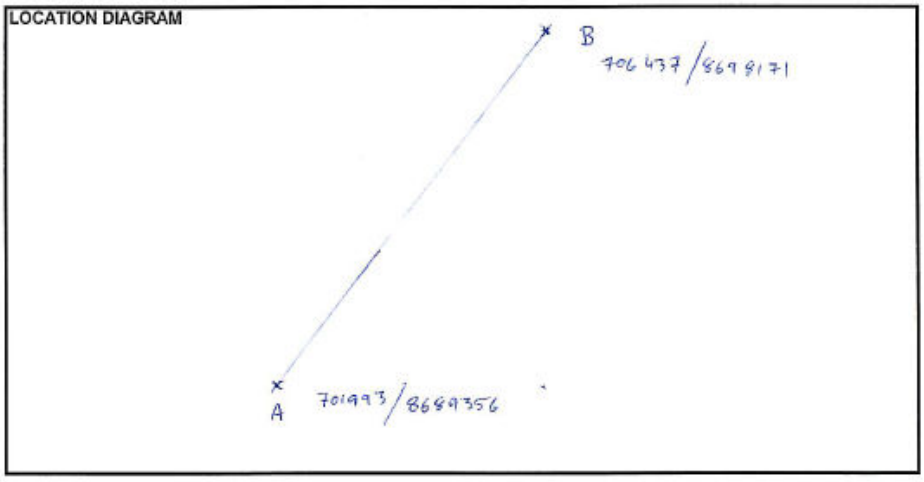
OR

Easting 706437
Northing 8698171

LOCATION DESCRIPTION

Located on Tiwi Island, approx 30 NM NNE of Darwin

LOCATION DIAGRAM



Approved by Operations Manager, 15/05/03
Note - If this is a printed copy, please check the on-line BMS to ensure it is the latest version.

APPENDIX B

OPERATIONS REPORT

System:	FASDAS		Job Name:	Tiwi Islands		Title	Name	Contact No.	Rm No.		29360.0	Kms	- Total Job Kms including Proc. Reflights
Aircraft:	VH-KAC		Area Names:	Tiwi Islands		Processor	Richardson M.	0404 754 203	327				
Job Number:	1824		Accommodation:	Darwin Airport Resort			Richardson M.	08 8920 3333	327		30894.2	Hrs	- Progressive M/R Hrs at the start of job
Total Job kms:	29360.0	Kms	Flying Base:	Darwin International Airport		A/C Engineer							
Proc. Reflight Kms:		Kms	Client:	Geoscience Australia		Technician					80	m	- Nominal Survey Flying Height
Kms Remain:	29360.0	Kms	Crew Leader:	Richardson M.		Processor	Richardson M.	See others below			400	m	- Traverse Line Spacing
% Complete:	0.00	%	Pilot:	Ribarich T.		**OFFICE:**	OFFICE	0404 754 203	327		4000	m	- Tie Line Spacing

Date	Flt	Pilot initials	On board Oper initials	Production excludes Scrubs & Reflights	Processing Reflights flown today	Fugro Scrub	Time Take Off	Time Land	Flt Hrs on M/R	Hours to Periodic Inspection	Job Hrs to Date	Prod. to Date	Proc. Reflights to Date	Scrubs to Date	Stdby Days	Lost Days	Activity	COMMENTS Weather, Data delivery, Safety Meetings Crew movements etc
Date 2-Oct	1	TR					9:30	14:24	4.9								**MO**	Aircraft ferry flight Karratha to Kununurra
Julian Day 275																	**MO**	Matt R vehicle ferry Broome to Kununurra
Monday																		
									4.9	74.3	4.9						Weather▶	Moderate winds
Date 3-Oct	2	TR					9:30	11:06	1.6								**MO**	Aircraft ferry flight Kununurra to Darwin
Julian Day 276																	**MO**	Matt R vehicle ferry Kununurra to Darwin
Tuesday																		
									1.6	72.7	6.5						Weather▶	Moderate winds
Date 4-Oct																	**E**	Set up field office, Base GPS
Julian Day 277																	**A**	Aircraft in service due alternator problems
Wednesday																	**O**	Made an appointment to speak to Darwin
																		miltary air control 06/10 re: safe ops in and
																		around survey area
										72.7	6.5						Weather▶	Moderate winds
Date 5-Oct																	**A**	Aircraft still in service alternator belt repair
Julian Day 278																	**O**	Finalised contract requirments
Thursday																	**O**	Spoke to Darwin Airport Managemnt resolved
																		aircraft parking and vehicle access problems
										72.7	6.5						Weather▶	Fine, light winds
Date 6-Oct																	**O**	Darwin military control meeting succesful
Julian Day 279																		airspace restrictions discussed and sorted
Friday																	**A**	Aircraft alternator and spar inspection
																		due for completion end of day
										72.7	6.5						Weather▶	
Date 7-Oct	3	TR	MR				10:00	12:00	2.0								**O**	Reece flight, low test line capture
Julian Day 280																	**E**	Comp box attempt unsuccesful due system
Saturday																		glitch
									2.0	70.7	8.5						Weather▶	Fine moderate winds
Date 8-Oct	4	TR	MR				10:05	12:11	2.1								**E**	Comp box succesful processing check "ok"
Julian Day 281																		production 09/10/06
Sunday																		
									2.1	68.6	10.6						Weather▶	Fine, moderate winds
	Totals This Week: ▶			0.0	0.0	0.0	**Week Hours:▶**		10.6	▲: A/C Hrs to Next Service					0.0	0.0		

System:	FASDAS		Job Name:	Tiwi Islands		Title	Name	Contact No.	Rm No.		29360.0	Kms	- Total Job Kms including Proc. Reflights						
Aircraft:	VH-KAC		Area Names:	Tiwi Islands		Processor	Richardson M.	0404 754 203	327										
Job Number:	1824		Accommodation:	Darwin Airport Resort			Richardson M.	08 8920 3333	327		30904.8	Hrs	- Progressive M/R Hrs at the start of job						
Total Job kms:	29360.0	Kms	Flying Base:	Darwin International Airport		A/C Engineer													
Proc. Reflight Kms:		Kms	Client:	Geoscience Australia		Technician					80	m	- Nominal Survey Flying Height						
Kms Remain:	25167.0	Kms	Crew Leader:	Richardson M.		Processor	Richardson M.	See others below			400	m	- Traverse Line Spacing						
% Complete:	14.28	%	Pilot:	Ribarich T.		**OFFICE:**	OFFICE	0404 754 203	327		4000	m	- Tie Line Spacing						

Date	Flt	Pilot initials	On board Oper initials	Production excludes Scrubs & Reflights	Processing Reflights flown today	Fugro Scrub	Time Take Off	Time Land	Flt Hrs on M/R	Hours to Periodic Inspection	Job Hrs to Date	Prod. to Date	Proc. Reflights to Date	Scrubs to Date	Stdby Days	Lost Days	Activity	COMMENTS Weather, Data delivery, Safety Meetings Crew movements etc
Date 9-Oct	5	TR		436.0			8:00	12:48	4.8									A.M flight "ok"
Julian Day 282																		
Monday																		
				436.0					4.8	63.8	4.8	436.0					Weather▶	Moderate winds
Date 10-Oct	6	JC	MR				9:40	10:09	0.5								O	Aircraft standby short ferry flights to Melville Is
Julian Day 283	7	JC	MR				13:30	13:59	0.5									and back to Darwin public relations activity with
Tuesday																		local island residents client request
									1.0	62.8	5.8	436.0			1.0		Weather▶	Moderate winds
Date 11-Oct	8	JC	TR	769.0			6:45	11:20	4.6									New pilot aero-commander /survey area intro
Julian Day 284																		flight J. Cox
Wednesday																		
				769.0					4.6	58.3	10.4	1205.0					Weather▶	Moderate winds
Date 12-Oct	9	JC	MR	892.0			6:15	11:30	5.3									
Julian Day 285	10	TR	MR	587.0			12:15	17:15	5.0									
Thursday																		
				1479.0					10.3	48.0	20.6	2684.0					Weather▶	Fine, light winds
Date 13-Oct	11	TR	MR	622.0			9:00	13:12	4.2									Flt 11 delayed departure complications
Julian Day 286	12	JC	MR				15:00	16:48	1.8									removing wing sensor software analog input ch.
Friday																		Flt 12 Comp box and check box as per floreat
																		office request. Single sensor std 0.036 imp 6.950
																		Post process check box "ok"
				622.0					6.0	42.0	26.6	3306.0					Weather▶	Fine, Moderate winds
Date 14-Oct	13	JC	MR	887.0			6:00	11:18	5.3								A	Post Flt 13 aircraft grounded due siginificant
Julian Day 287																		oil leak right hand side engine. J Cox to follow
Saturday																		up possible repair maintenance org.
																		Processing checks Flt 13 noise still preseent
																		in system followed up with floreat engineering
				887.0					5.3	36.7	31.9	4193.0					Weather▶	Fine moderate winds
Date 15-Oct																	A	Floreat engineering advised run a single test line
Julian Day 288																		30 min test. Swap mag sensors and pre-amp
Sunday																		tail for wing, wing for tail, single sensor test
																		repeated noise still present.
										36.7	31.9	4193.0					Weather▶	Fine, moderate winds
Totals This Week: ▶				**4193.0**	**0.0**	**0.0**	**Week Hours:▶**		**31.9**	**▲: A/C Hrs to Next Service**					**1.0**	**0.0**		

System:	FASDAS		Job Name:	Tiwi Islands		Title	Name	Contact No.	Rm No.							29360.0	Kms	- Total Job Kms including Proc. Reflights	
Aircraft:	VH-KAC		Area Names:	Tiwi Islands		Processor	Richardson M.	0404 754 203	327										
Job Number:	1824		Accommodation:	Darwin Airport Resort			Richardson M.	08 8920 3333	327							30936.7	Hrs	- Progressive M/R Hrs at the start of job	
Total Job kms:	29360.0	Kms	Flying Base:	Darwin International Airport		A/C Engineer													
Proc. Reflight Kms:		Kms	Client:	Geoscience Australia		Technician										80	m	- Nominal Survey Flying Height	
Kms Remain:	20429.0	Kms	Crew Leader:	Richardson M.		Processor	Richardson M.	See others below								400	m	- Traverse Line Spacing	
% Complete:	30.42	%	Pilot:	Ribarich T.		**OFFICE:**	OFFICE	0404 754 203	327							4000	m	- Tie Line Spacing	

Date	Flt	Pilot initials	On board Oper initials	Production excludes Scrubs & Reflights	Processing Reflights flown today	Fugro Scrub	Time Take Off	Time Land	Flt Hrs on M/R	Hours to Periodic Inspection	Job Hrs to Date	Prod. to Date	Proc. Reflights to Date	Scrubs to Date	Stdby Days	Lost Days	Activity	COMMENTS Weather, Data delivery, Safety Meetings Crew movements etc
Date 16-Oct																	A	Aircraft on standby rhs engine oil
Julian Day 289																		
Monday																		
				4193.0														Production Km's carried through
				4193.0						36.7		4193.0					Weather▶	Moderate winds
Date 17-Oct	14	JC	MR				6:30	8:00	1.5									Flt14 Check box for compensation
Julian Day 290																		Check box poocessed "ok" compensation good
Tuesday																		
	15	JC	GL	720.0			10:15	15:33	5.3									P.M. Survey flight "ok", Survey
																		pilot training G. Lawerence
				720.0					6.8	29.9	6.8	4913.0			1.0		Weather▶	Moderate winds
Date 18-Oct	16	GL	JC	732.0			6:55	11:30	4.6									A.M. Flight "ok"
Julian Day 291	17	TR		750.0			12:45	17:45	5.0									P.M. Flight "ok"
Wednesday																		
				1482.0					9.6	20.3	16.4	6395.0					Weather▶	Moderate winds
Date 19-Oct	18	TR		1064.0			6:50	12:14	5.4									A.M. Flight "ok"
Julian Day 292																		Matt accidently crack thoriurm sample outside
Thursday																		of a/c removed from use check b/ground line
																		NO change in counts in or near a/c.
	19	GL	JC	292.0			12:50	16:00	3.2									P.M Flight "ok" cut short due high winds
				1356.0					8.6	11.8	25.0	7751.0					Weather▶	Fine, moderate to high winds
Date 20-Oct																	O	Remaining crew member requested a brief visit
Julian Day 293																		to doctor for check , crew all "ok"
Friday																		
	20	GL	TR	330.0			13:30	16:50	3.3									P.M flight cut shor due appoinment with a local
																		magazine editor PR for the company
				330.0					3.3	8.4	28.3	8081.0					Weather▶	Fine, moderate winds
Date 21-Oct	21	GL	TR	330.0			7:20	10:38	3.3								A	A.M flight Survey cut short due concerns over
Julian Day 294																		Joshua Cox inducing a back injiury in right hand
Saturday																		side seat during training
																		Engineering manager M. Doyle & Ops Manger
																		T. Mofflin notified
				330.0					3.3	5.1	31.6	8411.0					Weather▶	Fine light winds
Date 22-Oct	22	GL	TR	520.0			7:30	11:48	4.3								A	A.M. survey flight "ok". Aircraft maintenace
Julian Day 295																		23/10/2006
Sunday																		
				520.0					4.3	0.8	35.9	8931.0					Weather▶	Fine, moderate winds
	Totals This Week: ▶			**8931.0**	**0.0**	**0.0**	**Week Hours:▶**		**35.9**	**▲: A/C Hrs to Next Service**					**1.0**	**0.0**		

System:	FASDAS		Job Name:	Tiwi Islands		Title	Name	Contact No.	Rm No.							29360.0	Kms	- Total Job Kms including Proc. Reflights	
Aircraft:	VH-KAC		Area Names:	Tiwi Islands		Processor	Richardson M.	0404 754 203	327										
Job Number:	1824		Accommodation:	Darwin Airport Resort			Richardson M.	08 8920 3333	327							30971.1	Hrs	- Progressive M/R Hrs at the start of job	
Total Job kms:	29360.0	Kms	Flying Base:	Darwin International Airport		A/C Engineer													
Proc. Reflight Kms:		Kms	Client:	Geoscience Australia		Technician										80	m	- Nominal Survey Flying Height	
Kms Remain:	15625.0	Kms	Crew Leader:	Richardson M.		Processor	Richardson M.	See others below								400	m	- Traverse Line Spacing	
% Complete:	46.78	%	Pilot:	Ribarich T.		**OFFICE:**	OFFICE	0404 754 203	327							4000	m	- Tie Line Spacing	

Date	Flt	Pilot initials	On board Oper initials	Production excludes Scrubs & Reflights	Processing Reflights flown today	Fugro Scrub	Time Take Off	Time Land	Flt Hrs on M/R	Hours to Periodic Inspection	Job Hrs to Date	Prod. to Date	Proc. Reflights to Date	Scrubs to Date	Stdby Days	Lost Days	Activity	COMMENTS Weather, Data delivery, Safety Meetings Crew movements etc
Date 23-Oct																	A	Aircraft Maintenance Direct Air
Julian Day 296																		
Monday																		
				8931.0														Production Km's carried through
				8931.0						110.0		8931.0					Weather▶	Moderate winds
Date 24-Oct																	A	Aircraft Maintenance Direct Air
Julian Day 297																		
Tuesday																		
										110.0		8931.0			1.0		Weather▶	Moderate winds
Date 25-Oct																	A	Aircraft Maintenance Direct Air
Julian Day 298																		
	23	GL	MR				14:30	16:06	1.6									Comp box & check box successful
Wednesday																		std 0.030 improvement ratio 10.99
									1.6	108.4	1.6	8931.0					Weather▶	Moderate winds
Date 26-Oct	24	GL		823.0			6:50	11:50	5.0									AM flight "ok"
Julian Day 299	25	TR		903.0			13:00	18:00	5.0									PM flight "ok"
Thursday																		
				1726.0					10.0	98.4	11.6	10657.0					Weather▶	Fine, moderate to high winds
Date 27-Oct																	O	Aircraft on half down standby unable
Julian Day 300																		to survey due NOTAM restriction search
	26	TR		961.0			6:30	11:42	5.2									and rescue of local island resident lost to sea
Friday																		
				961.0					5.2	93.2	16.8	11618.0					Weather▶	Fine, moderate winds
Date 28-Oct																	O	Aircraft on half down standby unable
Julian Day 301																		to survey due NOTAM restriction search
																		and rescue of local island resident lost to sea
Saturday	27	GL		407.0			13:25	17:19	3.9									P.M flt "ok" Shorter due GL familarise KAC
																		Diagnosised fauty flash disk removed from use
				407.0					3.9	89.3	20.7	12025.0					Weather▶	Fine light winds
Date 29-Oct	28	TR		932.0			6:35	11:45	5.2									AM flight "ok"
Julian Day 302	29	GL		778.0			13:20	17:50	4.5									PM flight "ok"
Sunday																		
																		Weekly safey meeting conducted
				1710.0					9.7	79.6	30.4	13735.0					Weather▶	Fine, moderate winds
		Totals This Week: ▶		**13735.0**	**0.0**	**0.0**	**Week Hours:▶**		**30.4**	**▲: A/C Hrs to Next Service**					**1.0**	**0.0**		

System:	FASDAS		Job Name:	Tiwi Islands		Title	Name	Contact No.	Rm No.		29360.0	Kms	- Total Job Kms including Proc. Reflights						
Aircraft:	VH-KAC		Area Names:	Tiwi Islands		Processor	Richardson M.	0404 754 203	327										
Job Number:	1824		Accommodation:	Darwin Airport Resort			Richardson M.	08 8920 3333	327		31001.5	Hrs	- Progressive M/R Hrs at the start of job						
Total Job kms:	29360.0	Kms	Flying Base:	Darwin International Airport		A/C Engineer													
Proc. Reflight Kms:		Kms	Client:	Geoscience Australia		Technician					80	m	- Nominal Survey Flying Height						
Kms Remain:	9134.0	Kms	Crew Leader:	Richardson M.		Processor	Richardson M.	See others below			400	m	- Traverse Line Spacing						
% Complete:	68.89	%	Pilot:	Eichorn M.		**OFFICE:**	OFFICE	0404 754 203	327		4000	m	- Tie Line Spacing						

Date	Flt	Pilot initials	On board Oper initials	Production excludes Scrubs & Reflights	Processing Reflights flown today	Fugro Scrub	Time Take Off	Time Land	Flt Hrs on M/R	Hours to Periodic Inspection	Job Hrs to Date	Prod. to Date	Proc. Reflights to Date	Scrubs to Date	Stdby Days	Lost Days	Activity	COMMENTS Weather, Data delivery, Safety Meetings Crew movements etc
Date 30-Oct	30	GL		918.0			6:15	11:20	5.1									A. M Flight "ok"
Julian Day 303	31	TR		1202.0			12:30	18:30	6.0									P.M Flight "ok"
Monday																		
				13735.0														
				15855.0					11.1	68.5	11.1	15855.0					Weather▶	Fine, Moderate winds
Date 31-Oct	32	TR		445.0			6:40	9:58	3.3									A. M Flight "ok"
Julian Day 304	33	GL		943.0			12:00	17:18	5.3									P.M. Flight "ok"
Tuesday																		Weekly Omnistar emergency test conducted
																		outcome successful.
																		Diagnosised problems base mags notified office
				1388.0					8.6	59.9	19.7	17243.0			1.0		Weather▶	Overcast
Date 1-Nov	34	GL		717.0			6:30	10:54	4.4								W	A.M Flight "ok"
Julian Day 305																		Afternoon flight cancelled due rain/thunderstorms
Wednesday																		survey area contract spec flight safety
				717.0					4.4	55.5	24.1	17960.0					Weather▶	Afternoon thunderstorm
Date 2-Nov	35	ME		888.0			6:30	11:48	5.3								W	A.M Flight "ok"
Julian Day 306	36	GL		337.0			12:30	14:54	2.4									Afternoon flight cancelled due rain/thunderstorms
Thursday																		survey area contract spec flight safety
				1225.0					7.7	47.8	31.8	19185.0					Weather▶	Afternoon thunderstorm
Date 3-Nov	37	GL		1041.0			6:20	11:56	5.6								A	A.M Flight "ok"
Julian Day 307																		Aircraft on standby due problems aircraft
Friday																		ventilation system high cabin humidity
				1041.0					5.6	42.2	37.4	20226.0					Weather▶	Fine, moderate winds
Date 4-Nov																	A	Aircraft on standby due problems aircraft
Julian Day 308																		ventilation system high cabin humidity
Saturday																		
										42.2	37.4	20226.0					Weather▶	Fine light winds
Date 5-Nov																	A	Aircraft on standby due problems aircraft
Julian Day 309																		ventilation system high cabin humidity
Sunday																		
										42.2	37.4	20226.0					Weather▶	Fine, moderate winds
Totals This Week: ▶				**20226.0**	**0.0**	**0.0**	**Week Hours:▶**		**37.4**	**▲: A/C Hrs to Next Service**					**1.0**	**0.0**		

System:	FASDAS		Job Name:	Tiwi Islands		Title	Name	Contact No.	Rm No.		29360.0	Kms	- Total Job Kms including Proc. Reflights						
Aircraft:	VH-KAC		Area Names:	Tiwi Islands		Processor	Richardson M.	0404 754 203	327										
Job Number:	1824		Accommodation:	Darwin Airport Resort			Richardson M.	08 8920 3333	327		31038.9	Hrs	- Progressive M/R Hrs at the start of job						
Total Job kms:	29360.0	Kms	Flying Base:	Darwin International Airport		A/C Engineer													
Proc. Reflight Kms:		Kms	Client:	Geoscience Australia		Technician					80	m	- Nominal Survey Flying Height						
Kms Remain:	1128.0	Kms	Crew Leader:	Richardson M.		Processor	Richardson M.	See others below			400	m	- Traverse Line Spacing						
% Complete:	96.16	%	Pilot:	Eichorn M.		**OFFICE:**	OFFICE	0404 754 203	327		4000	m	- Tie Line Spacing						

Date	Flt	Pilot initials	On board Oper initials	Production excludes Scrubs & Reflights	Processing Reflights flown today	Fugro Scrub	Time Take Off	Time Land	Flt Hrs on M/R	Hours to Periodic Inspection	Job Hrs to Date	Prod. to Date	Proc. Reflights to Date	Scrubs to Date	Stdby Days	Lost Days	Activity	COMMENTS Weather, Data delivery, Safety Meetings Crew movements etc
Date 6-Nov																		
Julian Day 310																		
Monday	38	GL	MR				16:30	18:18	1.8									Comp Box standard deviation 0.027
				20226.0														Improvement ratio 6.40 processing check "ok"
				20226.0					1.8	40.4	1.8	20226.0					Weather▶	Fine, Moderate winds
Date 7-Nov	39	ME		988.0			6:40	11:52	5.2									A.M. Flight "ok"
Julian Day 311	40	GL		1065.0			12:20	17:44	5.4									P.M. Flight "ok"
Tuesday																		
				2053.0					10.6	29.8	12.4	22279.0			1.0		Weather▶	Fine, Moderate winds
Date 8-Nov	41	GL		1163.0			6:30	12:06	5.6									A.M. Flight "ok"
Julian Day 312	42	ME		907.0			12:40	17:40	5.0									P.M. Flight "ok"
Wednesday																		
				2070.0					10.6	**19.2**	23.0	24349.0					Weather▶	Fine, Light winds
Date 9-Nov	43	ME		1040.0			6:30	11:48	5.3									A.M. Flight "ok"
Julian Day 313	44	GL		715.0			12:30	17:06	4.6									P.M. Flight "ok"
Thursday																		
				1755.0					9.9	**9.3**	32.9	26104.0					Weather▶	Fine, Afternoon thunderstorms
Date 10-Nov	45	GL		569.0			6:20	10:44	4.4								**D**	Aircraft on half down standby Diurnal
Julian Day 314																		activity out of spec
Friday																		
				569.0					4.4	**4.9**	37.3	26673.0					Weather▶	Fine, Afternoon thundrstorms
Date 11-Nov																	**D**	Aircraft on half down standby Diurnal
Julian Day 315																		activity out of spec
Saturday	46			148.0			13:20	15:38	2.3								**W**	Aircraft returned early due heavt turbulence
																		and weather afternoon thinderstorm
				148.0					2.3	**2.6**	39.6	26821.0					Weather▶	Fine light winds
Date 12-Nov	47			911.0			6:30	12:06	5.6									A.M. Flight "ok"
Julian Day 316	48			500.0			12:20	17:20	5.0									P.M. Flight "ok"
Sunday																		
				1411.0					10.6	**-8.0**	50.2	28232.0					Weather▶	Fine, moderate winds
		Totals This Week: ▶		**28232.0**	**0.0**	**0.0**	**Week Hours:▶**		**50.2**	**▲: A/C Hrs to Next Service**					**1.0**	**0.0**		

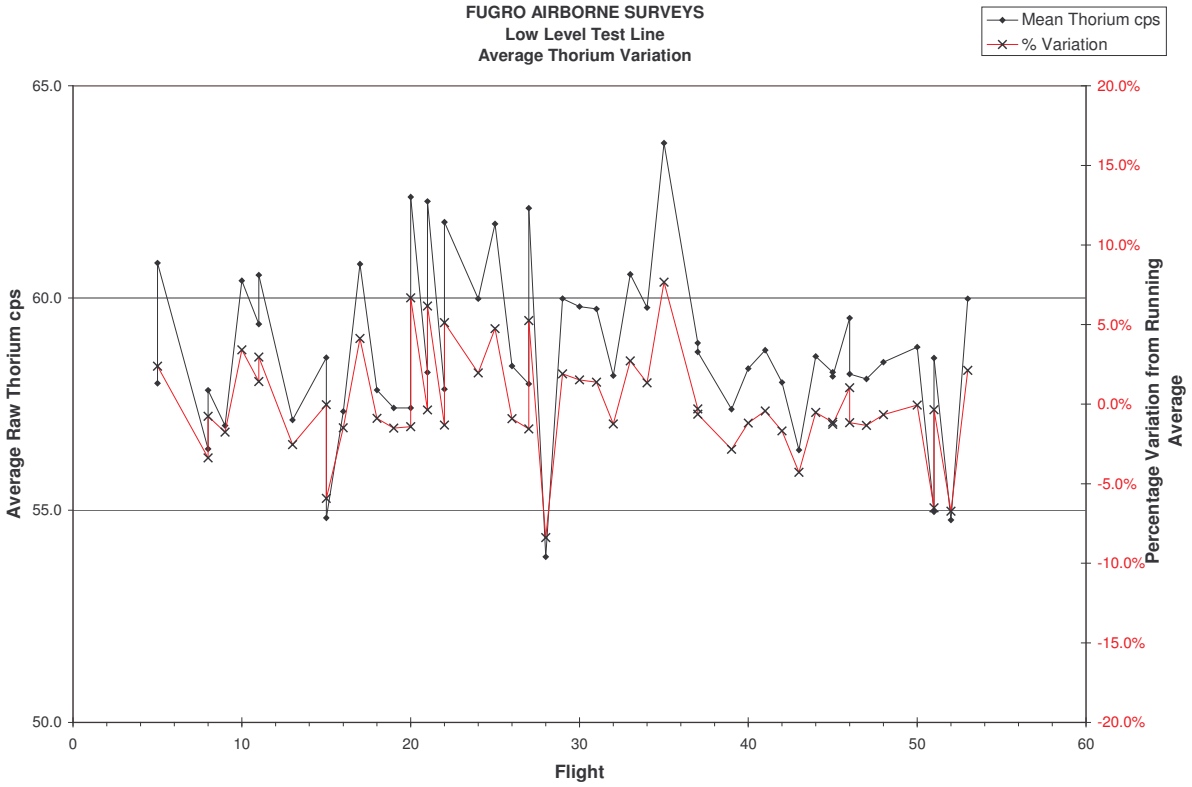
APPENDIX C

LOW LEVEL STATISTICS

Low Level Test Line - Average Thorium Variation

Flt No.	Mean TC (cps)	Mean K (cps)	Mean U (cps)	Mean Th (cps)	Running Average	% Change	Min	Max
5	1130.46	61.28	40.72	57.99	57.99		52.2	63.8
5	1188.44	65.54	42.20	60.82	59.41	2.38%	53.5	65.3
8	1112.58	60.06	40.98	56.44	58.42	-3.38%	52.6	64.3
8	1116.49	61.39	40.29	57.83	58.27	-0.76%	52.4	64.1
9	1136.95	62.68	41.59	56.99	58.02	-1.76%	52.2	63.8
10	1176.90	64.49	43.19	60.41	58.41	3.42%	52.6	64.3
11	1132.17	61.19	40.20	59.39	58.55	1.42%	52.7	64.4
11	1177.96	65.00	43.03	60.54	58.80	2.96%	52.9	64.7
13	1141.24	61.82	41.37	57.12	58.62	-2.54%	52.8	64.5
15	1138.88	61.68	40.76	58.60	58.61	-0.03%	52.8	64.5
15	1115.65	59.65	39.86	54.82	58.27	-5.92%	52.4	64.1
16	1125.34	60.98	41.00	57.33	58.19	-1.48%	52.4	64.0
17	1179.73	64.01	43.39	60.80	58.39	4.12%	52.6	64.2
18	1132.83	60.98	41.55	57.83	58.35	-0.89%	52.5	64.2
19	1118.02	61.53	40.59	57.41	58.29	-1.51%	52.5	64.1
20	1118.02	61.53	40.59	57.41	58.23	-1.41%	52.4	64.1
20	1200.99	63.91	44.15	62.38	58.48	6.67%	52.6	64.3
21	1148.46	62.30	39.96	58.25	58.46	-0.37%	52.6	64.3
21	1197.28	64.94	43.39	62.28	58.67	6.16%	52.8	64.5
22	1127.72	61.35	40.69	57.85	58.62	-1.32%	52.8	64.5
22	1209.30	66.64	44.10	61.79	58.77	5.12%	52.9	64.7
24	1203.82	64.92	44.27	59.98	58.83	1.96%	52.9	64.7
25	1176.43	63.49	42.02	61.75	58.96	4.74%	53.1	64.9
26	1130.31	61.34	40.94	58.40	58.93	-0.91%	53.0	64.8
27	1137.23	61.27	39.57	57.98	58.90	-1.56%	53.0	64.8
27	1206.32	65.11	42.49	62.12	59.02	5.25%	53.1	64.9
28	1079.60	57.59	38.65	53.90	58.83	-8.38%	52.9	64.7
29	1172.11	62.27	42.07	59.99	58.87	1.90%	53.0	64.8
30	1152.90	62.11	41.64	59.80	58.90	1.52%	53.0	64.8
31	1164.92	63.41	40.15	59.74	58.93	1.38%	53.0	64.8
32	1135.08	62.64	41.04	58.17	58.91	-1.25%	53.0	64.8
33	1159.22	62.41	41.65	60.56	58.96	2.72%	53.1	64.9
34	1155.12	63.90	41.77	59.77	58.98	1.34%	53.1	64.9
35	1217.05	59.83	45.66	63.65	59.12	7.66%	53.2	65.0
37	1152.32	62.82	41.98	58.94	59.11	-0.30%	53.2	65.0
37	1164.11	63.81	42.41	58.73	59.10	-0.63%	53.2	65.0
39	1117.55	60.41	40.75	57.38	59.06	-2.84%	53.2	65.0
40	1136.21	62.68	40.80	58.34	59.04	-1.19%	53.1	64.9
41	1130.63	61.85	40.21	58.77	59.03	-0.44%	53.1	64.9
42	1110.40	60.29	40.08	58.01	59.01	-1.68%	53.1	64.9
43	1119.53	59.84	40.70	56.42	58.94	-4.28%	53.0	64.8
44	1142.79	62.30	41.24	58.63	58.94	-0.52%	53.0	64.8
45	1136.72	60.72	42.18	58.25	58.92	-1.13%	53.0	64.8
45	1155.74	62.77	42.10	58.15	58.90	-1.27%	53.0	64.8
46	1139.49	61.37	40.29	59.53	58.92	1.04%	53.0	64.8

46	1153.17	62.77	42.49	58.21	58.90	-1.17%	53.0	64.8
47	1171.81	63.89	42.83	58.09	58.88	-1.34%	53.0	64.8
48	1160.59	62.24	42.10	58.49	58.88	-0.66%	53.0	64.8
50	1161.54	63.81	40.42	58.84	58.87	-0.05%	53.0	64.8
51	1118.19	58.58	40.22	54.96	58.80	-6.52%	52.9	64.7
51	1197.02	64.05	46.17	58.59	58.79	-0.35%	52.9	64.7
52	1075.67	58.22	39.00	54.77	58.71	-6.73%	52.8	64.6
53	1161.82	62.18	42.93	59.98	58.74	2.12%	52.9	64.6



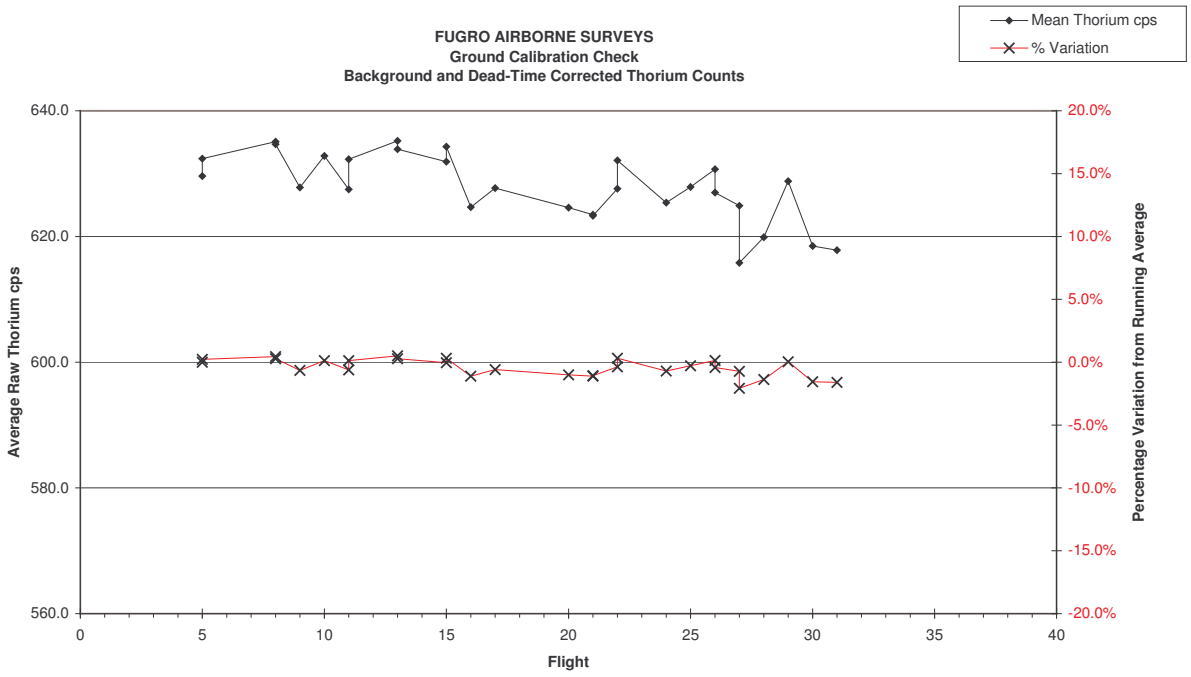
APPENDIX D

BUTTON CALIBRATION DATA

Button Calibration Check

FLIGHT 1 - 31

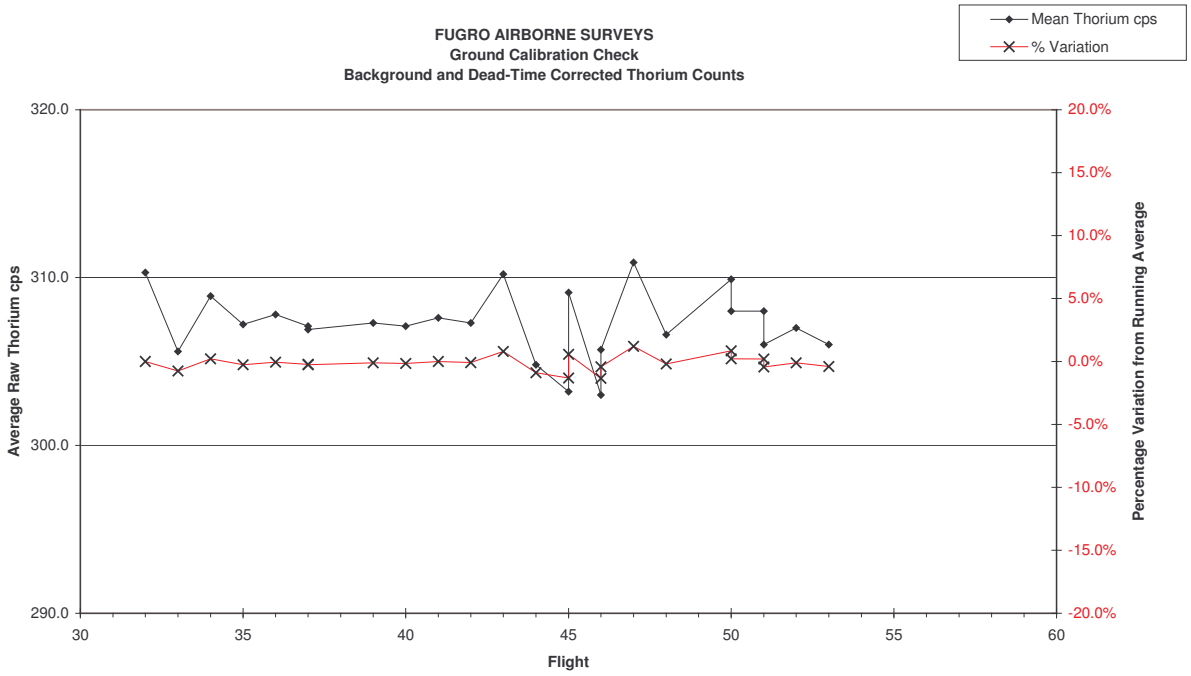
Flt#	Th in 501/601	Th in 502/602	Th Counts Actual	Th Counts Used	Running Average	Allowed Minimum	Allowed Maximum	% Change
5	76.8	706.4	629.6	629.6	629.6	598.1	661.1	0.0%
5	77.8	710.2	632.4	632.4	631.0	599.5	662.6	0.2%
8	76.9	712	635.1	635.1	632.4	600.7	664.0	0.4%
8	76.3	711	634.7	634.7	633.0	601.3	664.6	0.3%
9	76.8	704.6	627.8	627.8	631.9	600.3	663.5	-0.7%
10	77.4	710.2	632.8	632.8	632.1	600.5	663.7	0.1%
11	76.4	703.9	627.5	627.5	631.4	599.8	663.0	-0.6%
11	76.7	709	632.3	632.3	631.5	599.9	663.1	0.1%
13	76.9	712.1	635.2	635.2	631.9	600.3	663.5	0.5%
13	76.3	710.2	633.9	633.9	632.1	600.5	663.7	0.3%
15	78.2	710.1	631.9	631.9	632.1	600.5	663.7	0.0%
15	76.1	710.4	634.3	634.3	632.3	600.7	663.9	0.3%
16	77.5	702.2	624.7	624.7	631.7	600.1	663.3	-1.1%
17	78.6	706.3	627.7	627.7	631.4	599.9	663.0	-0.6%
20	75.8	700.4	624.6	624.6	631.0	599.4	662.5	-1.0%
21	74.6	698.1	623.5	623.5	630.5	599.0	662.0	-1.1%
21	75.2	698.5	623.3	623.3	630.1	598.6	661.6	-1.1%
22	75.6	703.2	627.6	627.6	629.9	598.4	661.4	-0.4%
22	75	707.1	632.1	632.1	630.1	598.6	661.6	0.3%
24	75.8	701.2	625.4	625.4	629.8	598.3	661.3	-0.7%
25	75.6	703.5	627.9	627.9	629.7	598.2	661.2	-0.3%
26	75.2	705.9	630.7	630.7	629.8	598.3	661.3	0.1%
26	75	702	627.0	627.0	629.7	598.2	661.1	-0.4%
27	75	699	624.9	624.9	629.5	598.0	660.9	-0.7%
27	75	691	615.8	615.8	628.9	597.5	660.4	-2.1%
28	75	695	619.9	619.9	628.6	597.1	660.0	-1.4%
29	75	704	628.8	628.8	628.6	597.1	660.0	0.0%
30	76	694	618.5	618.5	628.2	596.8	659.6	-1.5%
31	77	695	617.8	617.8	627.9	596.5	659.2	-1.6%


FUGRO AIRBORNE SURVEYS
Ground Calibration Check
Background and Dead-Time Corrected Thorium Counts
Mean Thorium cps
% Variation
Average Raw Thorium cps
Percentage Variation from Running Average
Flight
640.0
620.0
600.0
580.0
560.0
20.0%
15.0%
10.0%
5.0%
0.0%
-5.0%
-10.0%
-15.0%
-20.0%
0
5
10
15
20
25
30
35
40

Button Calibration Check

FLIGHT 32 - 53

Flt#	Th in 501/601	Th in 502/602	Th Counts Actual	Th Counts Used	Running Average	Allowed Minimum	Allowed Maximum	% Change
32	76	386	310.3	310.3	310.3	294.8	325.8	0.0%
33	76	382	305.6	305.6	308.0	292.6	323.3	-0.8%
34	77	386	308.9	308.9	308.3	292.9	323.7	0.2%
35	78	385	307.2	307.2	308.0	292.6	323.4	-0.3%
36	77	385	307.8	307.8	308.0	292.6	323.4	-0.1%
37	76	383	307.1	307.1	307.8	292.4	323.2	-0.2%
37	77	384	306.9	306.9	307.7	292.3	323.1	-0.3%
39	77	384	307.3	307.3	307.6	292.3	323.0	-0.1%
40	77	384	307.1	307.1	307.6	292.2	323.0	-0.2%
41	76	384	307.6	307.6	307.6	292.2	323.0	0.0%
42	77	384	307.3	307.3	307.6	292.2	322.9	-0.1%
43	76	386	310.2	310.2	307.8	292.4	323.2	0.8%
44	77	382	304.8	304.8	307.5	292.2	322.9	-0.9%
45	77	380	303.2	303.2	307.2	291.9	322.6	-1.3%
45	77	386	309.1	309.1	307.4	292.0	322.7	0.6%
46	76	379	303.0	303.0	307.1	291.7	322.4	-1.3%
46	76	382	305.7	305.7	307.0	291.7	322.4	-0.4%
47	75	386	310.9	310.9	307.2	291.9	322.6	1.2%
48	76	382	306.6	306.6	307.2	291.8	322.5	-0.2%
50	76	386	309.9	309.9	307.3	292.0	322.7	0.8%
50	76	384	308.0	308.0	307.4	292.0	322.7	0.2%
51	76	384	308.0	308.0	307.4	292.0	322.8	0.2%
51	77	383	306.0	306.0	307.3	292.0	322.7	-0.4%
52	76	383	307.0	307.0	307.3	291.9	322.7	-0.1%
53	77	383	306.0	306.0	307.3	291.9	322.6	-0.4%


FUGRO AIRBORNE SURVEYS
Ground Calibration Check
Background and Dead-Time Corrected Thorium Counts
Mean Thorium cps
% Variation
Average Raw Thorium cps
Percentage Variation from Running Average
Flight
320.0
310.0
300.0
290.0
20.0%
15.0%
10.0%
5.0%
0.0%
-5.0%
-10.0%
-15.0%
-20.0%
30
35
40
45
50
55
60

APPENDIX E

NAVIGATION REPEATABILITY CHECKS

Navigation Repeatability Check

Based on Ground Calibration Tests

Flight	Line No.	Easting	Northing	Height
5	Pre Flt	703604.2	8628165.7	70.8727
5	Post Flt	703604.73	8628166.85	74.0246
8	Pre Flt	703604.1	8628165.6	70.4507
8	Post Flt	703604.01	8628165.52	70.97
9	Pre Flt	703603.97	8628165.62	70.7125
10	Post Flt	703604.39	8628165.47	69.7419
11	Pre Flt	703604.56	8628165.74	70.8338
11	Post Flt	703604.1	8628165.94	71.3039
13	Pre Flt	703604.44	8628165.51	70.5904
13	Post Flt	703604.11	8628165.85	70.7449
15	Pre Flt	703604.67	8628165.66	71.2597
15	Post Flt	703604.55	8628165.84	70.3784
16	Pre Flt	703603.22	8628164.5	76.9717
17	Post Flt	703604.02	8628166.07	71.78
18	Pre Flt	703603.94	8628166.02	71.78
19	Post Flt	703604.80	8628166.70	71.82
20	Pre Flt	703605.94	8628165	71.86
20	Post Flt	703603.94	8628163.94	71.3995
21	Pre Flt	703605.08	8628163.65	72.1262
21	Post Flt	703604.2	8628164.61	71.7684
22	Pre Flt	703604.79	8628164.45	71.9501
22	Post Flt	703604.9	8628164.46	71.9846
24	Pre Flt	703604.61	8628164.4	71.7935
25	Post Flt	703604.49	8628164.34	72.6368
26	Pre Flt	703604.8	8628166.05	71.8658
26	Post Flt	703604.62	8628166.16	71.68
27	Pre Flt	703604.45	8628164.15	74.3625
27	Post Flt	703603.85	8628164.69	73.9264
28	Pre Flt	703604.49	8628164.24	71.8261
29	Post Flt	703604.29	8628164.28	73.3686
30	Pre Flt	703604.78	8628164.16	71.8466
31	Post Flt	703604.35	8628164.41	71.8766
32	Pre Flt	703604.62	8628164.38	71.8314
33	Pre Flt	703604.35	8628164.23	72.7262
34	Post Flt	703604.72	8628164.22	71.9403
35	Pre Flt	703604.77	8628164.18	71.854
36	Post Flt	703603.92	8628164.08	72.0218
37	Pre Flt	703604.22	8628165.25	71.7124
37	Post Flt	703604.55	8628165.51	71.8393
39	Pre Flt	703604.88	8628164.38	71.4745
40	Post Flt	703604.48	8628163.64	71.382
41	Pre Flt	703604.52	8628163.94	72.3308
42	Post Flt	703604.96	8628163.87	72.4287
43	Pre Flt	703605.03	8628164.05	73.1258
44	Post Flt	703604.54	8628164	71.869
45	Pre Flt	703604.87	8628164.3	72.0398
45	Post Flt	703604.78	8628163.26	71.4142
46	Pre Flt	703604.4	8628165.3	72.3001

46	Post Flt	703604.25	8628164.23	71.5171
47	Pre Flt	703605.36	8628164.63	72.6222
48	Post Flt	703605.28	8628164.28	71.833
50	Pre Flt	703605.27	8628163.99	73.2157
50	Post Flt	703604.54	8628164.54	72.1927
51	Pre Flt	703604.00	8628164.00	71.00
51	Post Flt	703604.80	8628165.50	70.34
52	Pre Flt	703605.22	8628164.83	72.18
52	Post Flt	703604.78	8628165.50	71.94

APPENDIX F

RAW LOCATED DATA FORMATS

MAGNETICS – RAW

```
COMM RAW POINT LOCATED DATA
COMM
COMM Geoscience Australia Project No.     1137
COMM
COMM JOB NUMBER:                        1824
COMM AREA NUMBER:                       1
COMM SURVEY COMPANY:                    Fugro Airborne Surveys
COMM CLIENT:                            Geoscience Australia
COMM SURVEY TYPE:                       Magnetic and Radiometric
COMM AREA NAME:                         Tiwi Islands
COMM STATE:                             Northern Territory
COMM COUNTRY:                           Australia
COMM SURVEY FLOWN:                      Oct / Nov 2006
COMM LOCATED DATA CREATED:              1 Dec 2006
COMM
COMM DATUM:                             GDA94
COMM PROJECTION:                        MGA
COMM ZONE:                              52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:             400 m
COMM TRAVERSE LINE DIRECTION:           000-180 deg
COMM TIE LINE SPACING:                  4000 m
COMM TIE LINE DIRECTION:                090-270 deg
COMM NOMINAL TERRAIN CLEARANCE:         80 m
COMM FINAL LINE KILOMETRES:             29874 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:             100011 - 104271
COMM TIE LINE NUMBERS:                  190011 - 190351
COMM
COMM AREA BOUNDARY
COMM
COMM Eastings  :  653504  694432  706519  725114  729352  744511
COMM              751436  778292  778292  771461  760232  750687  732908
COMM              733115  715568  715783  702308  690424  661789  649250
COMM              632032  625294  609573  609854  623610  623339  635847
COMM              646637  648354
COMM
COMM Northings : 8767076 8746301 8750997 8750891 8755676 8763349
COMM             8763162 8750248 8724047 8714503 8714316 8701215 8692044
COMM             8652588 8652588 8673516 8687366 8691109 8690922 8694477
COMM             8694290 8691670 8691670 8715438 8715626 8732253 8747703
COMM             8751136 8767076
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                VH-KAC 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:                       FASDAS
COMM
COMM BASE MAGNETOMETER:                        Scintrex Envi-mag
COMM RECORDING INTERVAL:                       2 s
COMM
COMM DATA PROCESSING
COMM
COMM CO-ORDINATES
COMM NO PARALLAX APPLIED
COMM
COMM MAGNETIC DATA
COMM RAW DATA ONLY
COMM
COMM RADAR ALTITUDE DATA
COMM RAW DATA ONLY
COMM
COMM BAROMETRIC DATA
COMM RAW DATA ONLY
COMM
COMM TEMPERATURE DATA
COMM RAW DATA ONLY
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 Project Number                                              -99      I4
COMM Flight Number                                               -99      I4
COMM Line Number                                              -99999      I7
COMM Fiducial                                                -999999      I8
COMM Date (yyyymmdd)                                        -9999999      I9
COMM Mean Compass Heading                        deg             -99      I4
COMM Longitude, DATUM: GDA94                     deg    -99.9999999   F12.7
COMM Latitude, DATUM: GDA94                      deg    -99.9999999   F12.7
COMM Easting, PROJECTION: MGA ZONE: 52             m      -99999.99   F10.2
COMM Northing, PROJECTION: MGA ZONE: 52            m     -999999.99   F11.2
COMM Radar Altitude                                m        -999.99    F8.2
COMM Barometric Pressure                          hPa         -999.9    F7.1
COMM Temperature                                deg C           -9.9    F5.1
COMM Fluxgate X Component                          nT      -99999.99   F10.2
COMM Fluxgate Y Component                          nT      -99999.99   F10.2
COMM Fluxgate Z Component                          nT      -99999.99   F10.2
COMM Uncompensated Magnetics                       nT     -99999.999   F11.3
COMM Raw Compensated Magnetics                     nT     -99999.999   F11.3
COMM Magnetic Diurnal                              nT     -99999.999   F11.3
```

DIGITAL ELEVATION MODEL – RAW

```
COMM RAW POINT LOCATED DATA
COMM
COMM Geoscience Australia Project No.     1137
COMM
COMM JOB NUMBER:                        1824
COMM AREA NUMBER:                       1
COMM SURVEY COMPANY:                    Fugro Airborne Surveys
COMM CLIENT:                            Geoscience Australia
COMM SURVEY TYPE:                       Magnetic and Radiometric
COMM AREA NAME:                         Tiwi Islands
COMM STATE:                             Northern Territory
COMM COUNTRY:                           Australia
COMM SURVEY FLOWN:                      Oct / Nov 2006
COMM LOCATED DATA CREATED:              1 Dec 2006
COMM
COMM DATUM:                             GDA94
COMM PROJECTION:                        MGA
COMM ZONE:                              52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:             400 m
COMM TRAVERSE LINE DIRECTION:           000-180 deg
COMM TIE LINE SPACING:                  4000 m
COMM TIE LINE DIRECTION:                090-270 deg
COMM NOMINAL TERRAIN CLEARANCE:         80 m
COMM FINAL LINE KILOMETRES:             29874 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:             100011 - 104271
COMM TIE LINE NUMBERS:                  190011 - 190351
COMM
COMM AREA BOUNDARY
COMM
COMM Eastings  :  653504  694432  706519  725114  729352  744511
COMM              751436  778292  778292  771461  760232  750687  732908
COMM              733115  715568  715783  702308  690424  661789  649250
COMM              632032  625294  609573  609854  623610  623339  635847
COMM              646637  648354
COMM
COMM Northings : 8767076 8746301 8750997 8750891 8755676 8763349
COMM             8763162 8750248 8724047 8714503 8714316 8701215 8692044
COMM             8652588 8652588 8673516 8687366 8691109 8690922 8694477
COMM             8694290 8691670 8691670 8715438 8715626 8732253 8747703
COMM             8751136 8767076
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                VH-KAC Aerocommander Shrike 500S
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:                        FASDAS
COMM
COMM DATA PROCESSING
COMM
COMM CO-ORDINATES
COMM NO PARALLAX APPLIED
COMM
COMM RADAR ALTITUDE DATA
COMM RAW DATA ONLY
COMM
COMM GPS ALTITUDE DATA
COMM NO PARALLAX APPLIED
COMM
COMM BAROMETRIC DATA
COMM RAW DATA ONLY
COMM
COMM TEMPERATURE DATA
COMM RAW DATA ONLY
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 Project Number                                            -99      I4
COMM Flight Number                                             -99      I4
COMM Line Number                                            -99999      I7
COMM Fiducial                                              -999999      I8
COMM Date (yyyymmdd)                                      -9999999      I9
COMM Mean Compass Heading                       deg            -99      I4
COMM Longitude, DATUM: GDA94                    deg    -99.9999999   F12.7
COMM Latitude, DATUM: GDA94                     deg    -99.9999999   F12.7
COMM Easting, PROJECTION: MGA ZONE: 52            m      -99999.99   F10.2
COMM Northing, PROJECTION: MGA ZONE: 52           m     -999999.99   F11.2
COMM Radar Altitude                               m        -999.99    F8.2
COMM Barometric Pressure                        hPa         -999.9    F7.1
COMM Temperature                              deg C           -9.9    F5.1
COMM GPS Time of Week                           sec       -99999.9    F9.1
COMM GPS Height, DATUM: GDA94                     m        -999.99    F8.2
```

RADIOMETRICS – RAW

```
COMM RAW POINT LOCATED DATA
COMM
COMM Geoscience Australia Project No.     1137
COMM
COMM JOB NUMBER:                        1824
COMM AREA NUMBER:                       1
COMM SURVEY COMPANY:                    Fugro Airborne Surveys
COMM CLIENT:                            Geoscience Australia
COMM SURVEY TYPE:                       Magnetic and Radiometric
COMM AREA NAME:                         Tiwi Islands
COMM STATE:                             Northern Territory
COMM COUNTRY:                           Australia
COMM SURVEY FLOWN:                      Oct / Nov 2006
```

```
COMM LOCATED DATA CREATED:           1 Dec 2006
COMM
COMM DATUM:                          GDA94
COMM PROJECTION:                     MGA
COMM ZONE:                           52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:          400 m
COMM TRAVERSE LINE DIRECTION:        000-180 deg
COMM TIE LINE SPACING:               4000 m
COMM TIE LINE DIRECTION:             090-270 deg
COMM NOMINAL TERRAIN CLEARANCE:      80 m
COMM FINAL LINE KILOMETRES:          29874 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:          100011 - 104271
COMM TIE LINE NUMBERS:               190011 - 190351
COMM
COMM AREA BOUNDARY
COMM
COMM Eastings  :  653504  694432  706519  725114  729352  744511
COMM              751436  778292  778292  771461  760232  750687  732908
COMM              733115  715568  715783  702308  690424  661789  649250
COMM              632032  625294  609573  609854  623610  623339  635847
COMM              646637  648354
COMM
COMM Northings : 8767076 8746301 8750997 8750891 8755676 8763349
COMM             8763162 8750248 8724047 8714503 8714316 8701215 8692044
COMM             8652588 8652588 8673516 8687366 8691109 8690922 8694477
COMM             8694290 8691670 8691670 8715438 8715626 8732253 8747703
COMM             8751136 8767076
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:               VH-KAC Aerocommander Shrike 500S
COMM
COMM SPECTROMETER:                           256 Channel Exploranium GR820
COMM CRYSTAL VOLUME:                          33.56 l
COMM RECORDING INTERVAL:                      1.0 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:                     FASDAS
COMM
COMM DATA PROCESSING
COMM
COMM CO-ORDINATES
COMM NO PARALLAX APPLIED
COMM
COMM RADAR ALTITUDE DATA
COMM RAW DATA ONLY
COMM
COMM BAROMETRIC DATA
```

```
COMM RAW DATA ONLY
COMM
COMM TEMPERATURE DATA
COMM RAW DATA ONLY
COMM
COMM RADIOMETRIC DATA
COMM NO PROCESSING APPLIED TO RAW 256 CHANNEL RADIOMETRIC DATA
COMM
COMM WINDOW DATA EXTRACTED USING IAEA STANDARD WINDOWS
COMM AIRCRAFT BACKGROUND COEFFICIENTS
COMM TOTAL COUNT                                        40.0
COMM POTASSIUM                                          8.2
COMM URANIUM                                            0.5
COMM THORIUM                                            0.4
COMM COSMIC COEFFICIENTS
COMM TOTAL COUNT                                        0.9300
COMM POTASSIUM                                          0.0510
COMM URANIUM                                            0.0440
COMM THORIUM                                            0.0510
COMM STRIPPING COEFFICIENTS
COMM ALPHA                                              0.2800
COMM BETA                                               0.4356
COMM GAMMA                                              0.7968
COMM DELTA                                              0.0677
COMM g                                                  -0.0154
COMM b                                                  0.0023
COMM STRIPPING HEIGHT ATTENUATION COEFFICIENTS
COMM ALPHA                                              0.00049
COMM BETA                                               0.00065
COMM GAMMA                                              0.00069
COMM RADON STRIPPING COEFFICIENTS
COMM TOTAL COUNT                                        13.15
COMM POTASSIUM                                          0.7824
COMM THORIUM                                            0.0610
COMM SPECTRAL RATIOS
COMM RADON                                              1.88
COMM GROUND                                             0.4586
COMM ALTITUDE COEFFICIENTS
COMM TOTAL COUNT                                        -0.0073
COMM POTASSIUM                                          -0.0095
COMM URANIUM                                            -0.0099
COMM THORIUM                                            -0.0072
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 Project Number                                          -99      I4
COMM Flight Number                                           -99      I4
COMM Line Number                                          -99999      I7
COMM Fiducial                                            -999999      I8
COMM Date (yyyymmdd)                                    -9999999      I9
COMM Mean Compass Heading                     deg             -99      I4
COMM Longitude, DATUM: GDA94                  deg    -99.9999999   F12.7
COMM Latitude, DATUM: GDA94                   deg    -99.9999999   F12.7
COMM Easting, PROJECTION: MGA ZONE: 52          m      -99999.99   F10.2
```

COMM Northing, PROJECTION: MGA ZONE: 52	m	-999999.99	F11.2
COMM Radar Altitude	m	-999.99	F8.2
COMM Barometric Pressure	hPa	-999.9	F7.1
COMM Temperature	deg C	-9.9	F5.1
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 Raw Cosmic	cps	-99	I4
COMM 256 Channel Fiducial		-999999	I8
COMM Sample Time	s	-.999	F6.3
COMM Low Energy Bound	MeV	-.9	F4.1
COMM High Energy Bound	MeV	-.9	F4.1
COMM Live Time	s	-.999	F6.3
COMM Spectrum Resolution	%	-.9	F4.1
COMM Raw 256 Channel Radiometrics	cps	-999	I5

REPEAT TEST LINE DATA FILES

MAGNETICS – RAW

```
COMM RAW POINT LOCATED DATA
COMM
COMM Geoscience Australia Project No.     1137
COMM
COMM JOB NUMBER:                        1824
COMM AREA NUMBER:                       9
COMM SURVEY COMPANY:                    Fugro Airborne Surveys
COMM CLIENT:                            Geoscience Australia
COMM SURVEY TYPE:                       Magnetic and Radiometric
COMM AREA NAME:                         Tiwi Islands - Repeat Line
COMM STATE:                             Northern Territory
COMM COUNTRY:                           Australia
COMM SURVEY FLOWN:                      Oct / Nov 2006
COMM LOCATED DATA CREATED:              Thu Jan  4 12:26:44 2007
COMM
COMM DATUM:                             GDA94
COMM PROJECTION:                        MGA
COMM ZONE:                              52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM LINE NUMBERING
COMM
COMM TEST LINE NUMBERS:                 900331 - 900502
COMM TEST LINE NUMBER CONVENTION:       900<ff><a>, ff=flight number, a=attempt
number
COMM
COMM AREA BOUNDARY
COMM
COMM Eastings  :  653504  694432  706519  725114  729352  744511  751436
COMM              778292  778292  771461  760232  750687  732908  733115
COMM              715568  715783  702308  690424  661789  649250  632032
COMM              625294  609573  609854  623610  623339  635847  646637
COMM              648354
COMM
COMM Northings : 8767076 8746301 8750997 8750891 8755676 8763349 8763162
COMM             8750248 8724047 8714503 8714316 8701215 8692044 8652588
COMM             8652588 8673516 8687366 8691109 8690922 8694477 8694290
COMM             8691670 8691670 8715438 8715626 8732253 8747703 8751136
COMM             8767076
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                  VH-KAC 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:                        FASDAS
COMM
COMM BASE MAGNETOMETER:                         Scintrex Envi-mag
COMM RECORDING INTERVAL:                        2 s
COMM
COMM DATA PROCESSING
COMM
COMM CO-ORDINATES
COMM NO PARALLAX APPLIED
COMM
COMM MAGNETIC DATA
COMM RAW DATA ONLY
COMM
COMM RADAR ALTITUDE DATA
COMM RAW DATA ONLY
COMM
COMM BAROMETRIC DATA
COMM RAW DATA ONLY
COMM
COMM TEMPERATURE DATA
COMM RAW DATA ONLY
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 Project Number                                               -99      I4
COMM Flight Number                                                -99      I4
COMM Line Number                                                -99999      I7
COMM Fiducial                                                  -999999      I8
COMM Date (yyyymmdd)                                          -9999999      I9
COMM Mean Compass Heading                         deg              -99      I4
COMM Longitude, DATUM: GDA94                      deg    -99.9999999   F12.7
COMM Latitude, DATUM: GDA94                       deg    -99.9999999   F12.7
COMM Easting, PROJECTION: MGA ZONE: 52              m      -99999.99   F10.2
COMM Northing, PROJECTION: MGA ZONE: 52             m     -999999.99   F11.2
COMM Radar Altitude                                 m        -999.99    F8.2
COMM Barometric Pressure                           hPa         -999.9    F7.1
COMM Temperature                                 deg C           -9.9    F5.1
COMM Fluxgate X Component                           nT      -99999.99   F10.2
COMM Fluxgate Y Component                           nT      -99999.99   F10.2
COMM Fluxgate Z Component                           nT      -99999.99   F10.2
COMM Uncompensated Magnetics                        nT     -99999.999   F11.3
COMM Raw Compensated Magnetics                      nT     -99999.999   F11.3
COMM Magnetic Diurnal                               nT     -99999.999   F11.3
```

DIGITAL ELEVATION MODEL – RAW

```
COMM RAW POINT LOCATED DATA
COMM
COMM Geoscience Australia Project No.     1137
COMM
COMM JOB NUMBER:                     1824
```

```
COMM AREA NUMBER:                    9
COMM SURVEY COMPANY:                 Fugro Airborne Surveys
COMM CLIENT:                         Geoscience Australia
COMM SURVEY TYPE:                    Magnetic and Radiometric
COMM AREA NAME:                      Tiwi Islands - Repeat Line
COMM STATE:                          Northern Territory
COMM COUNTRY:                        Australia
COMM SURVEY FLOWN:                   Oct / Nov 2006
COMM LOCATED DATA CREATED:           Thu Jan  4 12:26:44 2007
COMM
COMM DATUM:                          GDA94
COMM PROJECTION:                     MGA
COMM ZONE:                           52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM LINE NUMBERING
COMM
COMM TEST LINE NUMBERS:              900331 - 900502
COMM TEST LINE NUMBER CONVENTION:    900<ff><a>, ff=flight number, a=attempt
number
COMM
COMM AREA BOUNDARY
COMM
COMM Eastings  :  653504  694432  706519  725114  729352  744511  751436
COMM              778292  778292  771461  760232  750687  732908  733115
COMM              715568  715783  702308  690424  661789  649250  632032
COMM              625294  609573  609854  623610  623339  635847  646637
COMM              648354
COMM
COMM Northings : 8767076 8746301 8750997 8750891 8755676 8763349 8763162
COMM             8750248 8724047 8714503 8714316 8701215 8692044 8652588
COMM             8652588 8673516 8687366 8691109 8690922 8694477 8694290
COMM             8691670 8691670 8715438 8715626 8732253 8747703 8751136
COMM             8767076
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:               VH-KAC Aerocommander Shrike 500S
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:                       FASDAS
COMM
COMM DATA PROCESSING
COMM
COMM CO-ORDINATES
COMM NO PARALLAX APPLIED
COMM
COMM RADAR ALTITUDE DATA
COMM RAW DATA ONLY
COMM
COMM GPS ALTITUDE DATA
COMM NO PARALLAX APPLIED
COMM
```

```
COMM BAROMETRIC DATA
COMM RAW DATA ONLY
COMM
COMM TEMPERATURE DATA
COMM RAW DATA ONLY
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 Project Number                                            -99      I4
COMM Flight Number                                             -99      I4
COMM Line Number                                            -99999      I7
COMM Fiducial                                              -999999      I8
COMM Date (yyyymmdd)                                      -9999999      I9
COMM Mean Compass Heading                      deg             -99      I4
COMM Longitude, DATUM: GDA94                   deg    -99.9999999   F12.7
COMM Latitude, DATUM: GDA94                    deg    -99.9999999   F12.7
COMM Easting, PROJECTION: MGA ZONE: 52           m      -99999.99   F10.2
COMM Northing, PROJECTION: MGA ZONE: 52          m     -999999.99   F11.2
COMM Radar Altitude                              m        -999.99    F8.2
COMM Barometric Pressure                       hPa         -999.9    F7.1
COMM Temperature                             deg C           -9.9    F5.1
COMM GPS Time of Week                          sec       -99999.9    F9.1
COMM GPS Height, DATUM: GDA94                    m        -999.99    F8.2
```

RADIOMETRICS – RAW

```
COMM RAW POINT LOCATED DATA
COMM
COMM Geoscience Australia Project No.     1137
COMM
COMM JOB NUMBER:                      1824
COMM AREA NUMBER:                     9
COMM SURVEY COMPANY:                  Fugro Airborne Surveys
COMM CLIENT:                          Geoscience Australia
COMM SURVEY TYPE:                     Magnetic and Radiometric
COMM AREA NAME:                       Tiwi Islands - Repeat Line
COMM STATE:                           Northern Territory
COMM COUNTRY:                         Australia
COMM SURVEY FLOWN:                    Oct / Nov 2006
COMM LOCATED DATA CREATED:            Thu Jan  4 12:26:44 2007
COMM
COMM DATUM:                           GDA94
COMM PROJECTION:                      MGA
COMM ZONE:                            52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM LINE NUMBERING
COMM
COMM TEST LINE NUMBERS:               900331 - 900502
COMM TEST LINE NUMBER CONVENTION:     900<ff><a>, ff=flight number, a=attempt
number
```

```
COMM
COMM AREA BOUNDARY
COMM
COMM Eastings  :  653504  694432  706519  725114  729352  744511  751436
COMM              778292  778292  771461  760232  750687  732908  733115
COMM              715568  715783  702308  690424  661789  649250  632032
COMM              625294  609573  609854  623610  623339  635847  646637
COMM              648354
COMM
COMM Northings : 8767076 8746301 8750997 8750891 8755676 8763349 8763162
COMM             8750248 8724047 8714503 8714316 8701215 8692044 8652588
COMM             8652588 8673516 8687366 8691109 8690922 8694477 8694290
COMM             8691670 8691670 8715438 8715626 8732253 8747703 8751136
COMM             8767076
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                VH-KAC Aerocommander Shrike 500S
COMM
COMM SPECTROMETER:                              256 Channel Exploranium GR820
COMM CRYSTAL VOLUME:                             33.56 l
COMM RECORDING INTERVAL:                         1.0 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:                        FASDAS
COMM
COMM DATA PROCESSING
COMM
COMM CO-ORDINATES
COMM NO PARALLAX APPLIED
COMM
COMM RADAR ALTITUDE DATA
COMM RAW DATA ONLY
COMM
COMM BAROMETRIC DATA
COMM RAW DATA ONLY
COMM
COMM TEMPERATURE DATA
COMM RAW DATA ONLY
COMM
COMM RADIOMETRIC DATA
COMM NO PROCESSING APPLIED TO RAW 256 CHANNEL RADIOMETRIC DATA
COMM
COMM WINDOW DATA EXTRACTED USING IAEA STANDARD WINDOWS
COMM AIRCRAFT BACKGROUND COEFFICIENTS
COMM TOTAL COUNT                                        40.0
COMM POTASSIUM                                          8.2
COMM URANIUM                                            0.5
COMM THORIUM                                            0.4
COMM COSMIC COEFFICIENTS
COMM TOTAL COUNT                                        0.9300
COMM POTASSIUM                                          0.0510
COMM URANIUM                                            0.0440
COMM THORIUM                                            0.0510
```

```
COMM STRIPPING COEFFICIENTS
COMM ALPHA                                          0.2800
COMM BETA                                           0.4356
COMM GAMMA                                          0.7968
COMM DELTA                                          0.0677
COMM g                                              -0.0154
COMM b                                              0.0023
COMM STRIPPING HEIGHT ATTENUATION COEFFICIENTS
COMM ALPHA                                          0.00049
COMM BETA                                           0.00065
COMM GAMMA                                          0.00069
COMM RADON STRIPPING COEFFICIENTS
COMM TOTAL COUNT                                    13.15
COMM POTASSIUM                                      0.7824
COMM THORIUM                                        0.0610
COMM SPECTRAL RATIOS
COMM RADON                                          1.88
COMM GROUND                                         0.4586
COMM ALTITUDE COEFFICIENTS
COMM TOTAL COUNT                                    -0.0073
COMM POTASSIUM                                      -0.0095
COMM URANIUM                                        -0.0099
COMM THORIUM                                        -0.0072
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 Project Number                                          -99      I4
COMM Flight Number                                           -99      I4
COMM Line Number                                          -99999      I7
COMM Fiducial                                            -999999      I8
COMM Date (yyyymmdd)                                    -9999999      I9
COMM Mean Compass Heading                     deg             -99      I4
COMM Longitude, DATUM: GDA94                  deg    -99.9999999   F12.7
COMM Latitude, DATUM: GDA94                   deg    -99.9999999   F12.7
COMM Easting, PROJECTION: MGA ZONE: 52          m      -99999.99   F10.2
COMM Northing, PROJECTION: MGA ZONE: 52         m     -999999.99   F11.2
COMM Radar Altitude                             m        -999.99    F8.2
COMM Barometric Pressure                      hPa         -999.9    F7.1
COMM Temperature                            deg C           -9.9    F5.1
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 Raw Cosmic                               cps             -99      I4
COMM 256 Channel Fiducial                                -999999      I8
COMM Sample Time                                s           -.999    F6.3
COMM Low Energy Bound                         MeV              -.9    F4.1
COMM High Energy Bound                        MeV              -.9    F4.1
COMM Live Time                                  s           -.999    F6.3
COMM Spectrum Resolution                        %              -.9    F4.1
COMM Raw 256 Channel Radiometrics             cps            -999      I5
```

APPENDIX G

FINAL LOCATED DATA FORMATS

MAGNETICS – FINAL

```
COMM FINAL POINT LOCATED DATA
COMM
COMM Geoscience Australia Project No.     1137
COMM
COMM JOB NUMBER:                      1824
COMM AREA NUMBER:                     1
COMM SURVEY COMPANY:                  Fugro Airborne Surveys
COMM CLIENT:                          Geoscience Australia
COMM SURVEY TYPE:                     Magnetic and Radiometric
COMM AREA NAME:                       Tiwi Islands
COMM STATE:                           Northern Territory
COMM COUNTRY:                         Australia
COMM SURVEY FLOWN:                    Oct / Nov 2006
COMM LOCATED DATA CREATED:            Sun Jan  7 13:12:23 2007
COMM
COMM DATUM:                           GDA94
COMM PROJECTION:                      MGA
COMM ZONE:                            52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:           400 m
COMM TRAVERSE LINE DIRECTION:         000-180 deg
COMM TIE LINE SPACING:                4000 m
COMM TIE LINE DIRECTION:              090-270 deg
COMM NOMINAL TERRAIN CLEARANCE:       80 m
COMM FINAL LINE KILOMETRES:           30688.7 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:           100011 - 104271
COMM TIE LINE NUMBERS:                190011 - 190351
COMM
COMM AREA BOUNDARY
COMM
COMM Eastings  :  653504  694432  706519  725114  729352  744511  751436
COMM              778292  778292  771461  760232  750687  732908  733115
COMM              715568  715783  702308  690424  661789  649250  632032
COMM              625294  609573  609854  623610  623339  635847  646637
COMM              648354
COMM
COMM Northings : 8767076 8746301 8750997 8750891 8755676 8763349 8763162
COMM             8750248 8724047 8714503 8714316 8701215 8692044 8652588
COMM             8652588 8673516 8687366 8691109 8690922 8694477 8694290
COMM             8691670 8691670 8715438 8715626 8732253 8747703 8751136
COMM             8767076
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                VH-KAC 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:                       FASDAS
COMM
COMM BASE MAGNETOMETER:                        Scintrex Envi-mag
COMM RECORDING INTERVAL:                       2 s
COMM
COMM DATA PROCESSING
COMM
COMM CO-ORDINATES
COMM PARALLAX CORRECTION APPLIED               -0.5 s
COMM
COMM MAGNETIC DATA
COMM DIURNAL CORRECTION APPLIED                base value 46454 n
COMM PARALLAX CORRECTION APPLIED               -0.1 s
COMM IGRF CORRECTION APPLIED                   base value 45816 nT
COMM IGRF MODEL 2005 extrapolated to           2006/10/08
COMM DATA HAVE BEEN TIE LINE LEVELLED
COMM DATA HAVE BEEN MICROLEVELLED
COMM
COMM RADAR ALTITUDE DATA
COMM PARALLAX CORRECTION APPLIED               -0.05 s
COMM
COMM BAROMETRIC DATA
COMM PARALLAX CORRECTION APPLIED               0.05 s
COMM
COMM TEMPERATURE DATA
COMM PARALLAX CORRECTION APPLIED               0.05 s
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 Project Number                                              -99      I4
COMM Flight Number                                               -99      I4
COMM Line Number                                              -99999      I7
COMM Fiducial                                                -999999      I8
COMM Date (yyyymmdd)                                        -9999999      I9
COMM Mean Compass Heading                        deg              -99      I4
COMM Longitude, DATUM: GDA94                     deg    -99.9999999   F12.7
COMM Latitude, DATUM: GDA94                      deg    -99.9999999   F12.7
COMM Easting, PROJECTION: MGA ZONE: 52             m      -99999.99   F10.2
COMM Northing, PROJECTION: MGA ZONE: 52            m     -999999.99   F11.2
COMM Radar Altitude                                m        -999.99    F8.2
COMM Barometric Pressure                         hPa         -999.9    F7.1
COMM Temperature                               deg C           -9.9    F5.1
COMM Corrected Magnetics                          nT     -99999.999   F11.3
COMM Final Magnetics                              nT     -99999.999   F11.3
```

DIGITAL ELEVATION MODEL – FINAL

```
COMM FINAL POINT LOCATED DATA
COMM
COMM Geoscience Australia Project No.     1137
COMM
COMM JOB NUMBER:                        1824
COMM AREA NUMBER:                       1
COMM SURVEY COMPANY:                    Fugro Airborne Surveys
COMM CLIENT:                            Geoscience Australia
COMM SURVEY TYPE:                       Magnetic and Radiometric
COMM AREA NAME:                         Tiwi Islands
COMM STATE:                             Northern Territory
COMM COUNTRY:                           Australia
COMM SURVEY FLOWN:                      Oct / Nov 2006
COMM LOCATED DATA CREATED:              Sun Jan  7 13:12:23 2007
COMM
COMM DATUM:                             GDA94
COMM PROJECTION:                        MGA
COMM ZONE:                              52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:             400 m
COMM TRAVERSE LINE DIRECTION:           000-180 deg
COMM TIE LINE SPACING:                  4000 m
COMM TIE LINE DIRECTION:                090-270 deg
COMM NOMINAL TERRAIN CLEARANCE:         80 m
COMM FINAL LINE KILOMETRES:             30688.7 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:             100011 - 104271
COMM TIE LINE NUMBERS:                  190011 - 190351
COMM
COMM AREA BOUNDARY
COMM
COMM Eastings  :  653504  694432  706519  725114  729352  744511  751436
COMM              778292  778292  771461  760232  750687  732908  733115
COMM              715568  715783  702308  690424  661789  649250  632032
COMM              625294  609573  609854  623610  623339  635847  646637
COMM              648354
COMM
COMM Northings : 8767076 8746301 8750997 8750891 8755676 8763349 8763162
COMM             8750248 8724047 8714503 8714316 8701215 8692044 8652588
COMM             8652588 8673516 8687366 8691109 8690922 8694477 8694290
COMM             8691670 8691670 8715438 8715626 8732253 8747703 8751136
COMM             8767076
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                VH-KAC Aerocommander Shrike 500S
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:                          FASDAS
COMM
COMM DATA PROCESSING
COMM
COMM CO-ORDINATES
COMM PARALLAX CORRECTION APPLIED                  -0.5 s
COMM
COMM RADAR ALTITUDE DATA
COMM PARALLAX CORRECTION APPLIED                  -0.05 s
COMM
COMM GPS ALTITUDE DATA
COMM PARALLAX CORRECTION APPLIED                  -0.5 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 BAROMETRIC DATA
COMM PARALLAX CORRECTION APPLIED                  0.05 s
COMM
COMM TEMPERATURE DATA
COMM PARALLAX CORRECTION APPLIED                  0.05 s
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 Project Number                                                 -99      I4
COMM Flight Number                                                  -99      I4
COMM Line Number                                                 -99999      I7
COMM Fiducial                                                   -999999      I8
COMM Date (yyyymmdd)                                           -9999999      I9
COMM Mean Compass Heading                           deg            -99      I4
COMM Longitude, DATUM: GDA94                        deg    -99.9999999   F12.7
COMM Latitude, DATUM: GDA94                         deg    -99.9999999   F12.7
```

```
COMM Easting, PROJECTION: MGA ZONE: 52            m      -99999.99   F10.2
COMM Northing, PROJECTION: MGA ZONE: 52           m     -999999.99   F11.2
COMM Radar Altitude                               m        -999.99    F8.2
COMM Barometric Pressure                        hPa         -999.9    F7.1
COMM Temperature                              deg C           -9.9    F5.1
COMM GPS Height, DATUM: GDA94                     m        -999.99    F8.2
COMM Digital Elevation Model, AHD                 m        -999.99    F8.2
```

RADIOMETRICS – FINAL

```
COMM FINAL POINT LOCATED DATA
COMM
COMM Geoscience Australia Project No.     1137
COMM
COMM JOB NUMBER:                      1824
COMM AREA NUMBER:                     1
COMM SURVEY COMPANY:                  Fugro Airborne Surveys
COMM CLIENT:                          Geoscience Australia
COMM SURVEY TYPE:                     Magnetic and Radiometric
COMM AREA NAME:                       Tiwi Islands
COMM STATE:                           Northern Territory
COMM COUNTRY:                         Australia
COMM SURVEY FLOWN:                    Oct / Nov 2006
COMM LOCATED DATA CREATED:            1 Feb 2007
COMM
COMM DATUM:                           GDA94
COMM PROJECTION:                      MGA
COMM ZONE:                            52
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:           400 m
COMM TRAVERSE LINE DIRECTION:         000-180 deg
COMM TIE LINE SPACING:                4000 m
COMM TIE LINE DIRECTION:              090-270 deg
COMM NOMINAL TERRAIN CLEARANCE:       80 m
COMM FINAL LINE KILOMETRES:           29874 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:           100011 - 104271
COMM TIE LINE NUMBERS:                190011 - 190351
COMM
COMM AREA BOUNDARY
COMM
COMM Eastings  :  653504  694432  706519  725114  729352  744511  751436
COMM              778292  778292  771461  760232  750687  732908  733115
COMM              715568  715783  702308  690424  661789  649250  632032
COMM              625294  609573  609854  623610  623339  635847  646637
COMM              648354
COMM
COMM Northings : 8767076 8746301 8750997 8750891 8755676 8763349 8763162
COMM             8750248 8724047 8714503 8714316 8701215 8692044 8652588
COMM             8652588 8673516 8687366 8691109 8690922 8694477 8694290
COMM             8691670 8691670 8715438 8715626 8732253 8747703 8751136
COMM             8767076
COMM
```

```
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                VH-KAC Aerocommander Shrike 500S
COMM
COMM SPECTROMETER:                              256 Channel Exploranium GR820
COMM CRYSTAL VOLUME:                             33.56 l
COMM RECORDING INTERVAL:                         1.0 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:                        FASDAS
COMM
COMM DATA PROCESSING
COMM
COMM CO-ORDINATES
COMM PARALLAX CORRECTION APPLIED                -0.5 s
COMM
COMM RADAR ALTITUDE DATA
COMM PARALLAX CORRECTION APPLIED                -0.05 s
COMM
COMM BAROMETRIC DATA
COMM PARALLAX CORRECTION APPLIED                -0.05 s
COMM
COMM TEMPERATURE DATA
COMM PARALLAX CORRECTION APPLIED                -0.05 s
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                                80 m AGL
COMM DATA HAVE BEEN MICROLEVELLED
COMM AIRCRAFT BACKGROUND COEFFICIENTS
COMM TOTAL COUNT                                        40.0
COMM POTASSIUM                                          8.2
COMM URANIUM                                            0.5
COMM THORIUM                                            0.4
COMM COSMIC COEFFICIENTS
COMM TOTAL COUNT                                        0.9300
COMM POTASSIUM                                          0.0510
COMM URANIUM                                            0.0440
COMM THORIUM                                            0.0510
COMM STRIPPING COEFFICIENTS
COMM ALPHA                                              0.2800
COMM BETA                                               0.4356
COMM GAMMA                                              0.7968
COMM DELTA                                              0.0677
COMM g                                                  -0.0154
COMM b                                                  0.0023
COMM STRIPPING HEIGHT ATTENUATION COEFFICIENTS
COMM ALPHA                                              0.00049
COMM BETA                                               0.00065
COMM GAMMA                                              0.00069
```

```
COMM RADON STRIPPING COEFFICIENTS
COMM TOTAL COUNT                                    13.15
COMM POTASSIUM                                      0.7824
COMM THORIUM                                        0.0610
COMM SPECTRAL RATIOS
COMM RADON                                          1.88
COMM GROUND                                         0.4586
COMM ALTITUDE COEFFICIENTS
COMM TOTAL COUNT                                    -0.0073
COMM POTASSIUM                                      -0.0095
COMM URANIUM                                        -0.0099
COMM THORIUM                                        -0.0072
COMM SENSITIVITY FACTORS @ 80 metres:
COMM TOTAL COUNT                                    30.14 (cps/(nGy/h))
COMM POTASSIUM                                      104.99 (cps/%)
COMM URANIUM                                        6.88 (cps/ppm)
COMM THORIUM                                        6.33 (cps/ppm)
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 Project Number                                          -99      I4
COMM Flight Number                                           -99      I4
COMM Line Number                                          -99999      I7
COMM Fiducial                                            -999999      I8
COMM Date (yyyymmdd)                                    -9999999      I9
COMM Mean Compass Heading                     deg            -99      I4
COMM Longitude, DATUM: GDA94                  deg    -99.9999999   F12.7
COMM Latitude, DATUM: GDA94                   deg    -99.9999999   F12.7
COMM Easting, PROJECTION: MGA ZONE: 52          m      -99999.99   F10.2
COMM Northing, PROJECTION: MGA ZONE: 52         m     -999999.99   F11.2
COMM Radar Altitude                             m         -99.99    F7.2
COMM Barometric Pressure                      hPa         -999.9    F7.1
COMM Temperature                            deg C           -9.9    F5.1
COMM Smoothed Final Total Count             nGy/hr      -9999.999   F10.3
COMM Smoothed Final Potassium                   %         -9.999    F7.3
COMM Smoothed Final Uranium                   ppm         -9.999    F7.3
COMM Smoothed Final Thorium                   ppm         -9.999    F7.3
COMM Unsmoothed Final Total Count           nGy/hr      -9999.999   F10.3
COMM Unsmoothed Final Potassium                 %         -9.999    F7.3
COMM Unsmoothed Final Uranium                 ppm         -9.999    F7.3
COMM Unsmoothed Final Thorium                 ppm         -9.999    F7.3
```

APPENDIX H

FLIGHT LOGS

Flight logs can be found on the accompanying CD in the directory flight_logs.