UTS AEROQUEST

Logistics Report

for a

DETAILED AIRBORNE MAGNETIC, RADIOMETRIC AND DIGITAL TERRAIN SURVEY

for the

South Canning 2 Project

carried out on behalf of

GEOSCIENCE AUSTRALIA

(UTS Job #B175)

FAUNTLEROY AVENUE, PERTH AIRPORT
PO BOX 126, BELMONT WA 6984
Telephone +61 8 9479 4232 Facsimile +61 8 9479 7361
A.B.N. 31 058 054 603

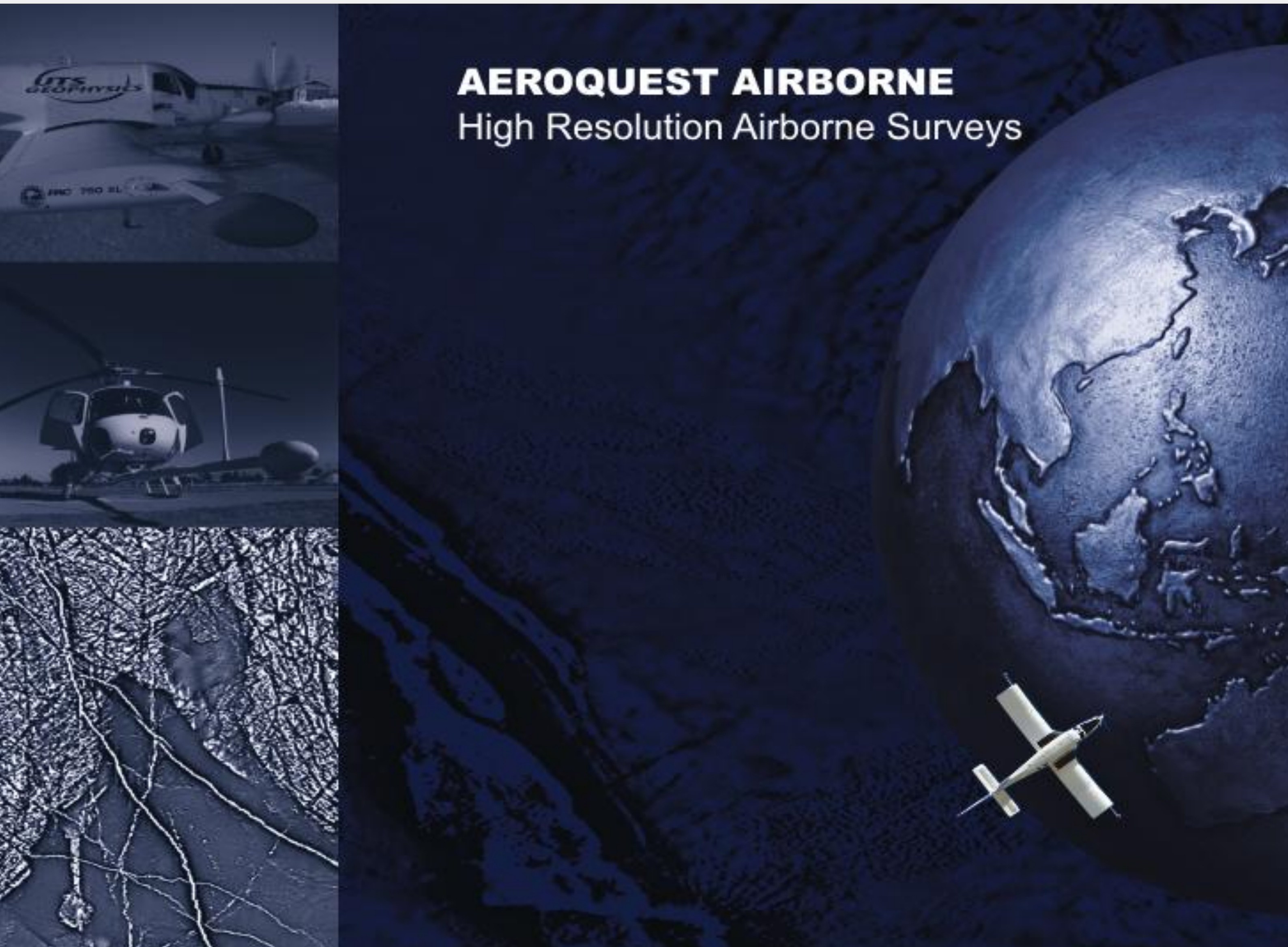


TABLE OF CONTENTS

1 GENERAL SURVEY INFORMATION

From July 2010 to November 2010, Aeroquest Airborne conducted a low level airborne geophysical survey for the following company:

Geoscience Australia
Cnr Jerrabomberra Ave and Hindmarsh Drive
Symonston
Canberra ACT 2609

Acquisition for this survey commenced on the 03rd July 2010 and was completed on the 11th of January 2011.

2 SURVEY LOCATION

The survey was contained within the Warrie, Morris, Ryan and Cobbe 1:250,000 map sheets. Survey boundary coordinates are provided in Appendix C of this report.

The survey was flown using the MGA94 coordinate system (a Universal Transverse Mercator projection) derived from the Geocentric Datum of Australia and was acquired in zone 51 with a central meridian of 122 degrees. Details of the datum and projection system are provided in Appendix B of this report.

3 AIRCRAFT AND SURVEY EQUIPMENT

The UTS navigation flight control computer, data acquisition system and geophysical sensors were installed into a specialised geophysical survey aircraft.

The list of geophysical and navigation equipment used for the survey is as follows:

General Survey Equipment

- Cessna 206H fixed wing survey aircraft.
- UTS proprietory flight planning and survey navigation system.
- UTS proprietory high speed digital data acquisition system.
- Novatel oem-4 series, 12 channel precision navigation GPS.
- Omnistar Omnilite 132 real time differential GPS system.
- UTS LCD pilot navigation display and LED track guidance display.
- UTS post mission data verification and processing system.
- Bendix King KRA-405B radar altimeter.
- Riegl LD 90-3300HR Lasor Altimeter

Magnetic Data Acquisition Equipment

- UTS tail stinger magnetometer installation.
- Geometrics823 Vapour CS-2 total field magnetometer.
- Billingsley Fluxgate three component vector magnetometer.
- RMS Automatic Aeromagnetic Digital Compensator (AADC II).
- Diurnal monitoring magnetometer (Scintrex Envimag).

Radiometric Data Acquisition Equipment

- Exploranium GR-820 gamma ray spectrometer.
- Exploranium gamma ray detectors 1024 GPX.
- Barometric Vaisala PTB 220 altimeter (pressure measurements).
- UTS Internal Temperature and humidity sensor PTB 200.

3.1 Survey Aircraft

The aircraft used for this survey was a Cessna 210 fixed wing survey aircraft, operated by Aeroquest Airborne, registrations VH-TKQ. The specification for this aircraft is as follows:

Power Plant

- Engine Type Continental, IO-540
- Brake Horse Power 300 bhp
- Fuel Type AV-GAS

Performance

- Cruise speed 150 Kn
- Survey speed 130 Kn
- Stall speed 60 Kn
- Range 1185 Km
- Endurance (no reserves) 6.7 hours
- Fuel tank capacity 442 litres

3.2 Data Positioning and Flight Navigation

Survey data positioning and flight line navigation was derived using real-time differential GPS (Global Positioning System).

Navigation was provided through a UTS designed and built electronic pilot navigation system providing computer controlled digital navigation instrumentation mounted in the cockpit as well as an LED track guidance system.

GPS derived positions were used to provide both aircraft navigation and survey data location information.

The GPS systems used for the survey were:

- Aircraft GPS Model Novatel oem4 series
- Sample rate 0.5 Seconds (2 Hz)
- GPS satellite tracking channels 12 parallel
- Typical differentially corrected accuracy 1-2 metres (horizontal)
  3-5 metres (vertical)

3.3 UTS Data Acquisition System and Digital Recording

All geophysical sensor data and positional information measured during the survey were recorded using a UTS developed, high speed, precision data acquisition system. Survey data was downloaded on completion of each survey flight.

Instrument synchronisation times were measured and removed in real-time by the UTS data acquisition system.

3.4 Altitude Readings

Accurate survey heights above the terrain were measured using a King radar altimeter installed in the aircraft. The height of each survey data point was measured by the radar altimeter and stored by the UTS data acquisition system.

- Radar altimeter models King KRA-405B
- Accuracy +/- 5FT (1.5m)
- Resolution 0.1 metres
- Range 0 - 500 metres
- Sample rate 0.1 Seconds (10Hz)

The digital terrain model is calculated by subtracting the terrain clearance (radar altimeter) from the GPS height (interpolated to 0.1 Hz), and as such the accuracy is constrained by the differentially corrected GPS position. The GPS height is acquired relative to the WGS84 datum height and so n-value separations are applied to the final digital terrain model to create a digital elevation model relative to the Australian Height Datum (AHD).

3.5 UTS Stinger Mounted Magnetometer System

The installation platform used for the acquisition of magnetic data was a tail mounted stinger. This proprietary stinger system was constructed of carbon fibre and designed for maximum rigidity and stability.

Both the total field magnetometer and three component vector magnetometer were located within the tail stinger.

3.6 Total Field Magnetometer

Total field magnetic data readings for the survey were made using a Scintrex Cesium Vapour CS-2 Magnetometer. This precision sensor has the following specifications:

- Model Scintrex Cesium Vapour CS-2 Magnetometer
- Sample Rate 0.1 seconds (10Hz)
- Resolution 0.001nT
- Operating Range 15,000nT to 100,000nT
- Temperature Range -40^{o}C to +50^{o}C

3.7 Three Component Vector Magnetometer

Three component vector magnetic data readings for the survey were made using a Develco Fluxgate Magnetometer. This precision sensor has the following specifications:

- Model Billingsley Fluxgate Magnetometer(TFM100-IE)
- Sample Rate 0.1 seconds (10Hz)
- Resolution 0.1nT
- Operating Range -100,000nT to 100,000nT
- Temperature Range -55^{o}C to +85^{o}C

3.8 Aircraft Magnetic Compensation

At the start of the survey, the system was calibrated for reduction of magnetic heading error. The heading and manoeuvre effects of the aircraft on the magnetic data were removed using an RMS Automatic Aeromagnetic Digital Compensator (AADC II).

Calibration of the aircraft heading effects were measured by flying a series of pitch, roll and yaw manoeuvres at high altitude while monitoring changes in the three axis magnetometer and the effect on total field readings. A 26 term polynomial model of the aircraft magnetic noise covering permanent, induced and eddy current fields was determined. These coefficients were then applied to the data collected during the survey in real-time. The coefficients are listed in Appendix F.

The compensation flight data was recorded and then checked to ensure the acquisition of the compensation solution was without artifacts. A test-box flight was then recorded repeating the series of pitch, roll and yaw manoeuvres on all cardinal headings as with the compensation flight but now using the approved solution stored in the AADC II. This test-box flight data was then processed to test the validity of the compensation for all cardinal headings, north, south, east and west.

UTS static compensation techniques were also employed to reduce the initial magnetic effects of the aircraft upon the survey data.

3.9 Diurnal Monitoring Magnetometer

A base station magnetometer was located in a low gradient area beyond the region of influence of any man made interference to monitor diurnal variations during the survey.

The specifications for the magnetometers used are as follows:

- Model Scintrex Envimag
- Resolution 0.1 nT
- Sample interval 2 seconds (0.5 Hz)
- Operating range 20,000nT to 90,000nT
- Temperature -20^{o}C to +50^{o}C

3.10 Barometric Pressure

An Air DB barometric altimeter was installed in the aircraft so as to record and monitor barometric pressure. The data was recorded at 0.10 second intervals and is used for the reduction of the radiometric data.

- Model Air DB barometric altimeter PTB 200
- Accuracy 2 metres
- Height resolution 0.1 metres
- Height range 0 - 3500 metres
- Maximum operating pressure: 5000 mb
- Pressure resolution: 0.01 mb
- Sample rate 10 Hz

3.11 Temperature and Humidity

Temperature and humidity measurements were made during the survey at a sample rate of 10Hz. Ambient temperature was measured with a resolution of 0.1 degree Celsius and ambient humidity to a resolution of 0.1 percent.

3.12 Radiometric Data Acquisition

The gamma ray spectrometer used for the survey was capable of recording 256 channels and was self stabilising in order to minimise spectral drift. The detectors used contain thallium activated sodium iodide crystals.

Thorium source measurements were made each survey day to monitor system resolution and sensitivity. A calibration line was also flown at the start and end of each survey day to monitor ground moisture levels and system performance. The background and height corrected thorium channel from the test lines, along with the source measurement results are presented in Appendix E.

- Spectrometer model Exploranium GR820
- Detector volume 32 litres
- Sample rate 1 Hz

The following table lists the spectral windows used.

Window Name	Total Count	K	U	Th
Energy Range (MeV)	0.4-2.81	1.370-1.570	1.660-1.860	2.410-2.810

4 PERSONNEL

4.1 Field Operations

Aeroquest Airborne operators and data processors	Ryan Allen Will Bennet Daniel Ting Lance Posetti Hayley Kelly Russel Bowden Jane Ament
Aeroquest Airborne Survey Pilots	John Alders John Cass Mick Thornett Dallas Coste Peter Stevens

4.2 Project Management

Geoscience Australia	Murray Richardson
Aeroquest Airborne Perth Office	David Abbott Cameron Johnston Rebecca Steadman

5 SURVEY PARAMETERS

The survey data acquisition specifications are specified in the following table:

AREA No.	PROJECT NAME	LINE SPACING	LINE DIRECTION	TIE LINE SPACING	TIE LINE DIRECTION	SENSOR HEIGHT	TOTAL LINE KM
01	South Canning 2	400m	000-180	4000m	090-270	60m	134,956.99
TOTAL							**134,956.99**

The specified sensor height for the magnetic samples is as stated in the above table. This sensor height may be varied where topographic relief or laws pertaining to built up areas do not allow this altitude to be maintained, or where the safety of the aircraft and equipment is endangered.

The coordinate boundaries for the survey areas flown are detailed in Appendix C.

6 SURVEY LOGISTICS

The South Canning 1 project was flown using the aircraft VH-TKQ. The base locations used for operating these aircrafts and performing in-field quality control and data processing of the survey data were Morris, Ryan and Cobbe in Western Australia.

6.1 Diurnal Magnetometer Locations

The following table contains the approximate locations of the diurnal base station magnetometers for the survey duration.

VH-TKQ

Period	Latitude	Longitude	Location
July 2010 – December 2011	24.30000 degrees	123.30000 degrees	Madley

7 DATA PROCESSING PROCEDURES

7.1 Data Pre-processing

At the commencement of each acquisition flight, all the instrumentation clocks were synchronized to local time, and the error and latency of each instrument in providing its data measurement calculated. The results of these latency measurements were recorded into a synchronisation file, and the results used to assign GPS positions to the magnetic, radiometric and elevation data. As a result of the physical separation of the sensors, a small residual offset still exists between instrument timings.

The raw survey data were downloaded from the aircraft after each flight and transferred to the field computer where they were then trimmed to the correct survey boundary extents. Any survey lines subsequently reflown were removed from the raw field dataset.

To compensate for this residual parallax error, an adjustment was made to the instrument clocks. The magnetic and radar altimeter data were adjusted by 0.600 seconds, and the radiometric data were adjusted by 1.375 seconds for each flight.

The synchronized, parallax corrected data were then exported as located ASCII data and loaded into field data bases for further quality control procedures.

7.2 Magnetic Data Processing

The diurnal data were filtered with a 13 point moving average filter to reduce noise levels, followed by second difference filter to identify and remove spikes of less than 0.25 nT.

The filtered diurnal measurements were subtracted from the diurnal base field and the residual corrections applied to the survey data by synchronising the diurnal data time and the aircraft survey time. The average diurnal base station value was added to the survey data.

An eighth difference filter was run on the raw magnetic survey data in order to identify any remaining spikes in the data, which were manually edited from the data.

The X and Y positioning of the data was then checked for spikes before applying the IGRF correction. Any spikes in the positions were manually edited. The updated IGRF 2010 correction was calculated at each data point (taking into account the height above sea level).

This regional magnetic gradient was subtracted from the survey data points.

An assessment of the data at this point showed that no major levelling problems existed in the residual magnetic data.

Survey tie line leveling was then applied to improve the DC component of the magnetic data. A single micro-levelling pass was then applied to the data to correct any minor level errors due to variations in terrain clearance or other factors. The micro-levelling process targets wavelengths of 2 x line spacing interval (in this case, 800m) using a proprietary method.

For a given target wavelength a reference grid was constructed and then filtered by two dimensional operators. A file of levelling corrections is generated from comparing the survey line data and the reference grid for each target wavelength and then subjected to statistical analysis. Limits are established for the levelling corrections based on these statistics, and the levelling corrections restricted to these limits. The microlevelling corrections are then applied to the survey line data and the resulting line data are interrogated. Limits of +/- 10 nT were used for the levelling corrections.

Located and gridded data were generated from the final processed magnetic data.

7.3 Radiometric Data Processing

Statistical noise reduction of the 256 channel data was performed for each aircraft using the Noise Adjusted Singular Variable Decomposition (NASVD) method described by Hovgaard and Grasty (1997).

A noise-adjusted singular value decomposition is performed, and the number of components to be used is determined by inspection of plots of the spectral components and by a statistical analysis of the contributions of the components. If the spectral shapes show any unusual characteristics, further analysis of the concentrations of the spectral components in the line data is performed in order to identify and eliminate any corrupt spectra. If such spectra were eliminated, the NASVD process is re-performed, in order to obtain spectral components free of any bias from corrupt spectra.

Only the dominant spectral shapes (identified as described above) were used in the spectral reconstruction process. As instructed by GSA, NASVD was performed on a flight by flight basis. The first 8 NASVD components were used for this process as requested by Geoscience Australia.

Channels 30-250 only are spectrally smoothed, as these contain the regions of interest and are not dominated by the lower end of the Compton continuum. The energy spectrum between the potassium and thorium peaks was recalibrated from the spectrally smoothed 256 channel measurements.

The aircraft background spectrum and the scaled unit cosmic spectrum were then subtracted from the 256 channel data. This 256 channel data were then windowed to the 5 primary channels of total count, potassium, uranium, thorium and low-energy uranium. Dead time corrections were then applied to the data. Radon background removal was performed using the Minty Spectral Ratio method (1992).

The radar altimeter data were corrected to standard temperature and pressure, and height corrected spectral stripping was then applied to the windowed data. Height attenuation corrections based on the STP radar altimeter were then performed to remove any altitude variation effects from the data.

The Uranium and Total Count channels were tie-levelled to remove the effects of residual radon background. The tie-levelling process employed was a least-squares/median filter procedure, which generated a single correction for each line of data. Mis-matches were calculated at each tie-traverse intersection and the median mismatch for each flight line was calculated as the residual levelling error for that line.

Final micro-levelling techniques were then selectively applied to the tie line levelled data to remove minor residual variations in profile intensities, as per the method outlined for magnetic data micro-levelling in 7.2 above. Limits of +/- 70 cps for Total Count, +/- 5 cps for Potassium, and +/- 5 cps for Uranium were used for the levelling corrections.

The corrected count rate data was then converted to ground concentrations for potassium, uranium and thorium (sensitivity coefficients are supplied in Appendix F).

Located and gridded data were generated from the final processed radiometric data.

References

Hovgaard, J., and Grasty, R.L., 1997. Reducing statistical noise in airborne gamma-ray data through spectral component analysis. In *“Proceedings of Exploration 97: Fourth Decennial Conference on Mineral Exploration” edited by A.G.Gubins,* 1997, 753-764.

Minty, B. R. S., 1992 - Airborne gamma-ray spectrometric background estimation using full spectrum analysis. *Geophysics*, **57**, 279-287.

7.4 Digital Elevation Model Data Processing

The raw radar altimeter data were checked for spikes, and any found were manually edited.

The Geoid/Elipsoid corrections (NVAL) were applied to the GPS data real time. The GPS Height acquired by the acquisition system and the subsequent processed DEM is therefore relative to the Australian Height Datum (AHD).

The GPS altimeter data were checked for spikes and steps, and any found were manually edited.

The radar altimeter data were then subtracted from the GPS altimeter data. The separation distance between the GPS antenna and the radar altimeter of 1.4 metres was subtracted from the digital terrain data.

The digital terrain data thus derived were tie line levelled and gridded. The tie-levelling process employed was a least-squares/median filter procedure, which generated a single correction for each line of data. Mis-matches were calculated at each tie-traverse intersection and the median mismatch for each flight line was calculated as the residual levelling error for that line. The tie-levelled data were then examined and subjected to a 2-pass microlevelling procedure targeting wavelengths of 800m and 400m, with correction limits of 5.0m and 2.0m respectively, to produce the final digital terrain model data channel. The final digital terrain model grid displayed no line dependent artifacts.

This elevation model was compared to the gravity database digital elevation data downloaded from the Geoscience Australia website.

The following table contains spot height checks between the final processed digital elevation model data and the gravity database elevations.

EASTING (MGA94, ZONE 51)	NORTHING (MGA94, ZONE 54)	B100 DEM (m)	GA Elevation (m)	Difference (m)
869905.4	7228050.7	485.6	487.00	-1.3
889087.4	7226896.2	426.7	426.70	0.00
844174.0	7251241.0	484.3	484.70	-0.4
872315.3	7255447.2	476.2	474.50	-0.3
703578.8	7416853.6	393.0	393.10	-0.1
699352.7	7444974.1	346.6	345.3	-1.3
860741.0	7456754.7	357.9	358.8	-0.9

For further information concerning the survey flown, please contact the following office:

Head Office Address:

Aeroquest Airborne
Fauntleroy Avenue, Perth Airport
REDCLIFFE WA 6104

Tel: +61 8 9479 4232
Fax: +61 8 9479 7361

Postal Address:

Aeroquest Airborne
P.O. Box 126
BELMONT WA 6984

Quoting reference number: B175

APPENDIX A - LOCATED DATA FORMATS

FINAL MAGNETIC LOCATED DATA

FIELD	FORMAT	DESCRIPTION	UNITS
1	I5	PROJECT NUMBER	
2	I6	FLIGHT/AREA NUMBER	AAFF (Area/Flight)
3	I8	LINE NUMBER	
4	I8	FIDUCIAL NUMBER	
5	I9	DATE	YYYYMMDD
6	F6.1	BEARING	degrees
7	F12.6	LONGITUDE (GDA94)	degrees
8	F12.6	LATITUDE (GDA94)	degrees
9	F11.2	EASTING (MGA51)	metres
10	F11.2	NORTHING (MGA51)	metres
11	F8.2	RADAR ALTIMETER HEIGHT	metres
12	F7.1	BAROMETRIC PRESSURE	hPa
13	F6.1	TEMPERATURE	degrees C
14	F10.3	TIE LEVELLED TMI	nT
15	F10.3	MICRO LEVELLED TMI	nT

FINAL DIGITAL ELEVATION MODEL LOCATED DATA

FIELD	FORMAT	DESCRIPTION	UNITS
1	I5	PROJECT NUMBER	
2	I6	FLIGHT/AREA NUMBER	AAFF (Area/Flight)
3	I8	LINE NUMBER DATE	
4	I8	FIDUCIAL NUMBER	
5	I9	DATE	YYYYMMDD
6	F6.1	BEARING	degrees
7	F12.6	LONGITUDE (GDA94)	degrees
8	F12.6	LATITUDE (GDA94)	degrees
9	F11.2	EASTING (MGA51)	metres
10	F11.2	NORTHING (MGA51)	metres
11	F8.2	RADAR ALTIMETER HEIGHT	metres
12	F7.1	BAROMETRIC PRESSURE	hPa
13	F6.1	TEMPERATURE	degrees C
14	F8.2	GPS HEIGHT	metres
15	F8.2	DTM_FINAL	metres

FINAL RADIOMETRIC LOCATED DATA

FIELD	FORMAT	DESCRIPTION	UNITS
1	I5	PROJECT NUMBER	
2	I6	FLIGHT/AREA NUMBER	AAFF (Area/Flight)
3	I8	LINE NUMBER DATE	
4	I8	FIDUCIAL NUMBER	
5	I9	DATE	YYYYMMDD
6	F6.1	BEARING	degrees
7	F12.6	LONGITUDE (GDA94)	degrees
8	F12.6	LATITUDE (GDA94)	degrees
9	F11.2	EASTING (MGA51)	metres
10	F11.2	NORTHING (MGA51)	metres
11	F8.2	RADAR ALTIMETER HEIGHT	metres
12	F7.1	BAROMETRIC PRESSURE	hPa
13	F6.1	TEMPERATURE	degrees C
14	F10.4	DOSE RATE	nGy/H
15	F9.4	POTASSIUM CONCENTRATION	%
16	F9.4	URANIUM CONCENTRATION	ppm
17	F9.4	THORIUM CONCENTRATION	ppm

RAW MAGNETIC LOCATED DATA

FIELD	FORMAT	DESCRIPTION	UNITS
1	I5	PROJECT NUMBER	
2	I6	FLIGHT/AREA NUMBER	AAFF (Area/Flight)
3	I8	LINE NUMBER	
4	F11.1	FIDUCIAL NUMBER	
5	I9	DATE	YYYYMMDD
6	F6.1	BEARING	degrees
7	F12.6	LONGITUDE (GDA94)	degrees
8	F11.6	LATITUDE (GDA94)	degrees
9	F11.2	EASTING (MGA51)	metres
10	F11.2	NORTHING (MGA51)	metres
11	F8.2	RADAR ALTIMETER HEIGHT	metres
12	F7.1	BAROMETRIC PRESSURE	hPa
13	F5.1	TEMPERATURE	degrees C
14	F11.3	FLUXGATE_X	nT
15	F11.3	FLUXGATE_Y	nT
16	F11.3	FLUXGATE_Z	nT
17	F10.3	UNCOMPENSATED MAG	nT
18	F10.3	COMPENSATED MAG	nT
19	F10.3	DIURNAL MAG	nT

RAW DIGITAL TERRAIN MODEL LOCATED DATA

FIELD	FORMAT	DESCRIPTION	UNITS
1	I5	PROJECT NUMBER	
2	I6	FLIGHT/AREA NUMBER	AAFF (Area/Flight)
3	I8	LINE NUMBERDATE	
4	F11.1	FIDUCIAL NUMBER	
5	F9	DATE	YYYYMMDD
6	F6.1	BEARING	degrees
7	F12.6	LONGITUDE (GDA94)	degrees
8	F11.6	LATITUDE (GDA94)	degrees
9	F11.2	EASTING (MGA51)	metres
10	F11.2	NORTHING (MGA51)	metres
11	F8.2	RADAR ALTIMETER HEIGHT	metres
12	F7.1	BAROMETRIC PRESSURE	hPa
13	F5.1	TEMPERATURE	degrees C
14	F10.1	GPS TIME	seconds
15	F8.2	GPS HEIGHT (GEIOD)	metres

RAW RADIOMETRIC LOCATED DATA

FIELD	FORMAT	DESCRIPTION	UNITS
1	I5	PROJECT NUMBER	
2	I6	FLIGHT/AREA NUMBER	AAFF (Area/Flight)
3	I8	LINE NUMBER	
4	F11.1	FIDUCIAL NUMBER	
5	I9	DATE	YYYYMMDD
6	F6.1	BEARING	degrees
7	F12.6	LONGITUDE (GDA94)	degrees
8	F11.6	LATITUDE (GDA94)	degrees
9	F11.2	EASTING (MGA51)	metres
10	F11.2	NORTHING (MGA51)	metres
11	F8.2	RADAR ALTIMETER HEIGHT	metres
12	F7.1	BAROMETRIC PRESSURE	hPa
13	F6.1	TEMPERATURE	degrees C
14	I7	RAW TOTAL COUNT	counts/sec
15	I5	RAW POTASSIUM COUNT	counts/sec
16	I5	RAW URANIUM COUNT	counts/sec
17	I5	RAW THORIUM COUNT	counts/sec
18	I5	COSMIC	counts/sec
19	F11.1	FID AT START OF SPECTRUM	
20	I7	SAMPLE INTEGRATION TIME	msec
21	I4	LOW ENERGY BOUND OF SPECTRUM	MeV
22	I4	HIGH ENERGY BOUND OF SPECTRUM	MeV
23	I7	LIVE TIME	msec
24	F5.1	SPECTRUM RESOLUTION	%
25	I5	256 RAW RADIOMETRIC CHANNELS	counts/sec

GRIDDED DATASET FORMATS

Gridding was performed using a bicubic spline algorithm.

The following grid formats have been provided:

- ER-Mapper format

LINE NUMBER FORMATS

Line numbers are identified with a six digit composite line number and have the following format - ALLLLB, where:

A	Survey area number
LLLL	Survey line number 0001-8999 reserved for traverse lines 9001-9999 reserved for tie lines
B	Line attempt number, 0 is attempt 1, 1 is attempt 2 etc.

UTS FILE NAMING FORMATS

Located and gridded data provided by Aeroquest Airborne uses the following 8 character file naming convention to be compatible with PC DOS based systems.

File names have the following general format - JJJJAABB.EEE, where:

JJJJ	UTS Job number	
AA	Area number if the survey is broken into blocks	
BB	M	Magnetic data
	R	Radiometric data
	TC	Total count data
	K	Potassium counts
	U	Uranium counts
	Th	Thorium counts
	DT	Digital terrain data
EEE	File name extension	
	DAT	Located digital data file
	DFN	Located data definition file
	ERS	Ermapper gridded data header file Ermapper data portion has no extension
	GRD	Geosoft gridded data file

APPENDIX B - COORDINATE SYSTEM DETAILS

Locations for the survey data are provided in both geographical latitude and longitude and Universal Transverse Mercator metric projection coordinate systems.

MGA94	Map Grid of Australia 1994
Coordinate type	Universal Transverse Mercator Projection Grid
Geodetic datum	Geocentric Datum of Australia
Semi major axis	6378137m
Flattening	1/298.257222101

APPENDIX C - SURVEY BOUNDARY DETAILS

South Canning 2

COORDINATES REPORT

Job: B175

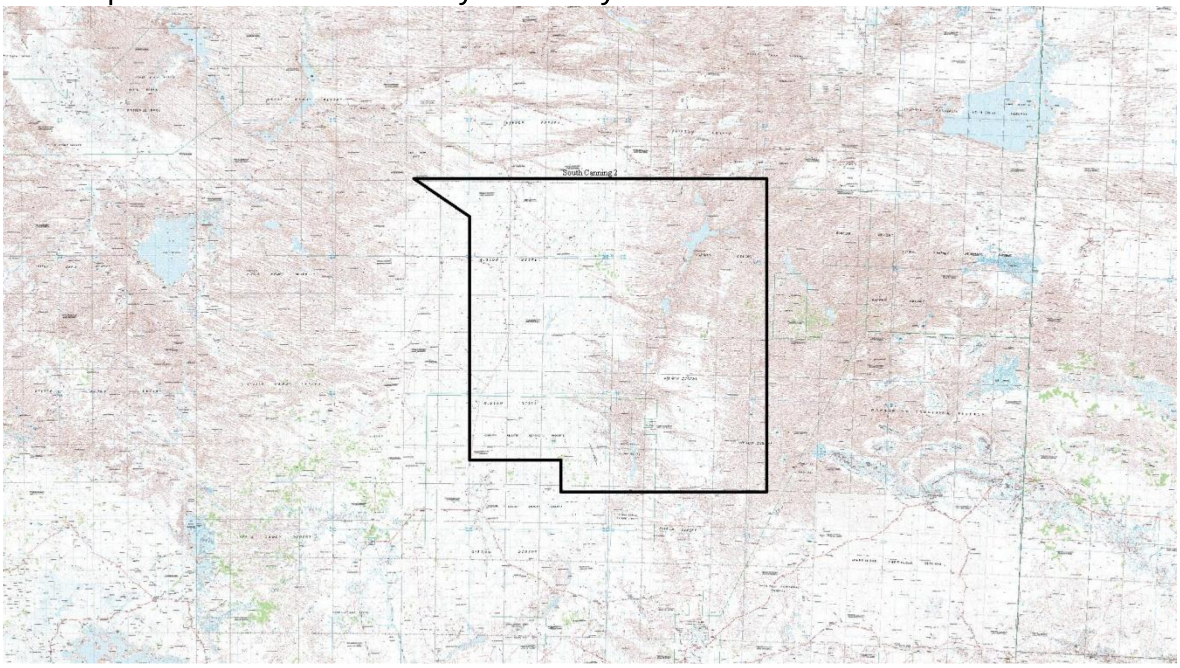
Client: GSWA

Surround

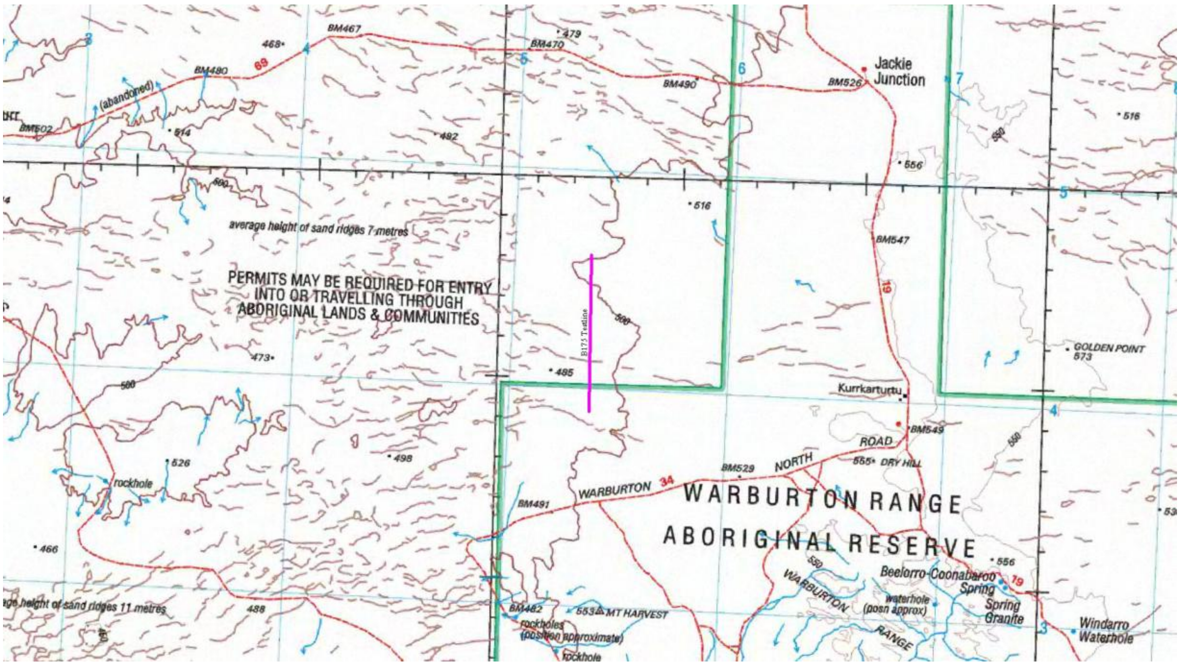
660050.000	7456700.000
918700.000	7456700.000
918700.000	7227200.000
767900.000	7227200.000
767900.000	7250400.000
701100.000	7250400.000
701100.000	7428650.000

APPENDIX E – RADIOMETRIC CALIBRATION RESULTS

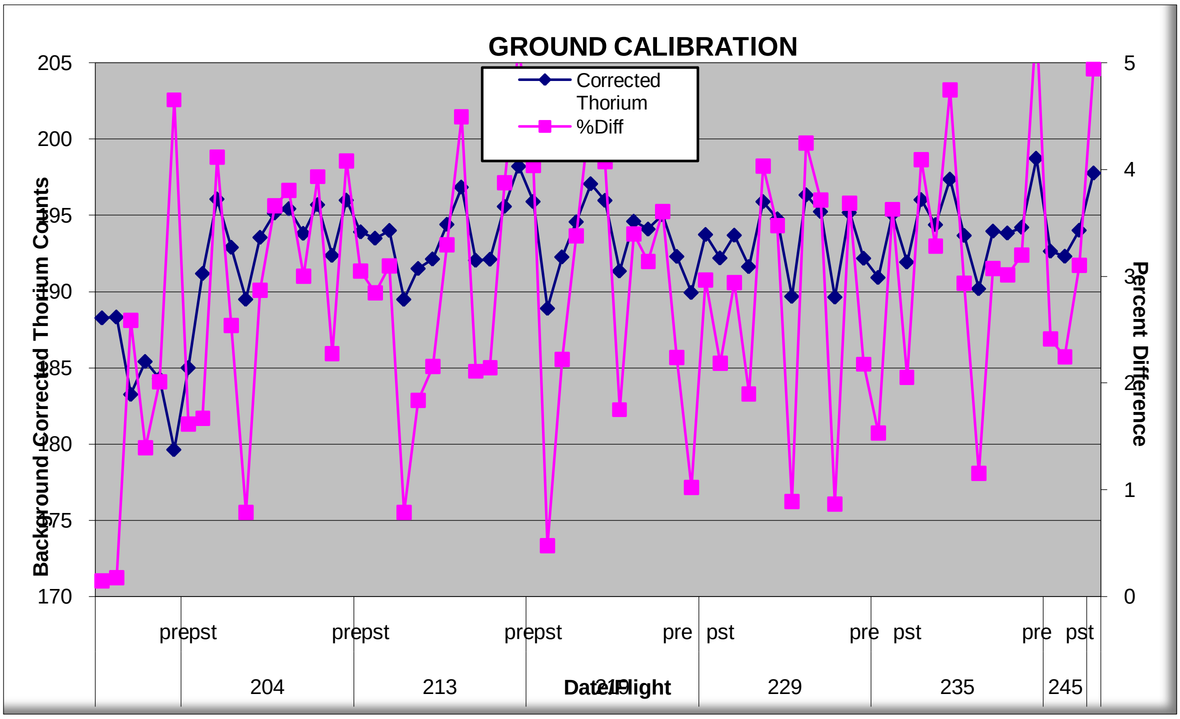
The map below shows the survey boundary



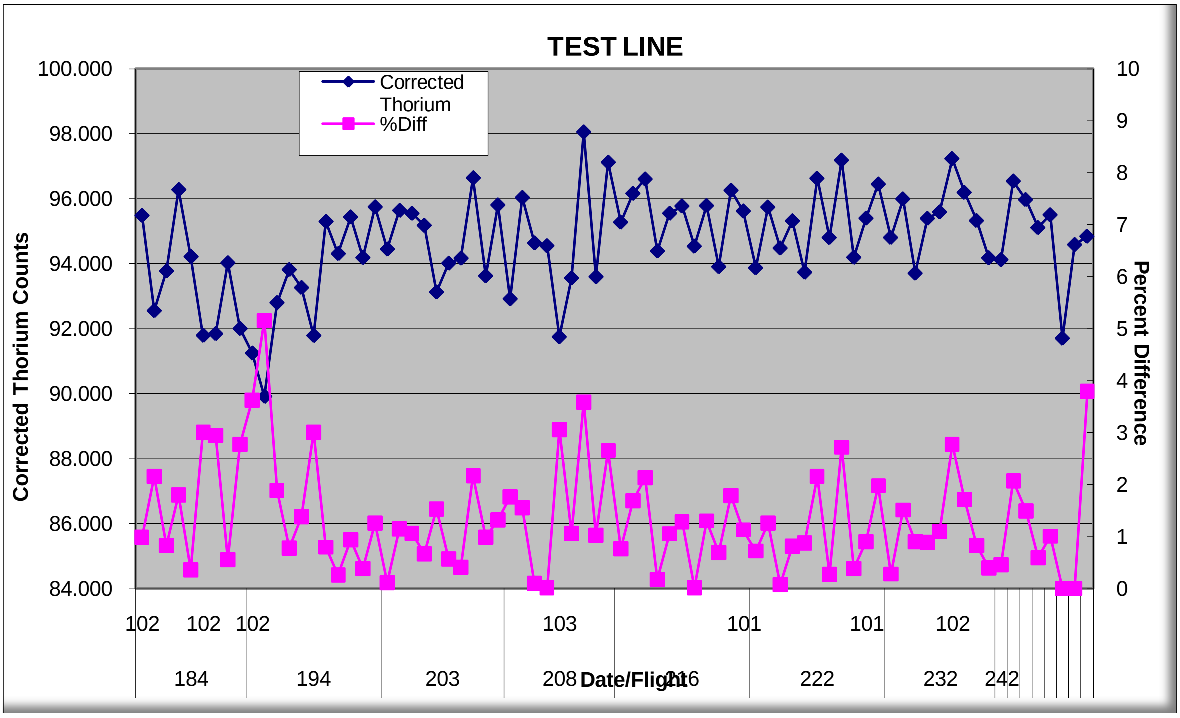
The map below show a zoomed view of the location of the radiometric testline.



The charts below show the results of the daily thorium source tests for each day.



The charts below show the average thorium value for each test line flown.



APPENDIX F – ACQUISITION AND PROCESSING PARAMETERS

Magnetic Data

RMS AADC Coefficients

Solution Date: 04/08/2006 Solution Altitude: 7000 ft AGL
Standard Deviation Total Field Uncompensated 6.933 $x10^{-1}$
Standard Deviation Total Field Compensated 3.989 $x10^{-2}$
Improvement Ratio 17.4
Norm 30.1

Magnetic Processing Parameters

IGRF Date:	2010
Average Declination:	3.0311 degrees
Average Inclination:	-56.5094degrees
Average Field strength:	53798.46 nT
Average diurnal:	55690.00 nT

Radiometric Data

Height Attenuation Coefficients

Total Count:	-0.0074
Potassium:	-0.0094
Uranium:	-0.0084
Thorium:	-0.0074

Cosmic Correction Coefficients

Total Count:	0.8368
Potassium:	0.0464
Uranium:	0.0380
Thorium:	0.0444

Aircraft Background Coefficients

Total Count:	33.201
Potassium:	6.535
Uranium:	0.1835
Thorium:	0.3243

Sensitivity Coefficients

Total Count:	29.68 cps/dose rate
Potassium:	96.8 cps/%k
Uranium:	10.4 cps/ppm
Thorium:	6.1 cps/ppm

***Final Reduction* -** All data reduced to STP height datum 60m

APPENDIX G – SURVEY FLIGHT LOGS

The following table summarises the flight logs for B175 – South Canning 2 Project.

Line Number	Flight #	Dist Km
100	101460	229.666
100	101450	229.686
100	101440	229.665
100	101430	229.658
101	105440	206.483
101	105450	28.025
101	105460	27.745
101	105470	27.498
101	105480	27.194
101	105490	26.956
101	105500	26.637
101	105510	26.407
101	105520	26.113
101	105530	25.844
101	105540	25.563
101	105550	25.304
101	105560	25.039
101	105430	206.466
102	105420	206.468
102	105570	24.715
102	105580	24.5
102	105590	24.209
102	105600	23.901
102	105610	23.663
102	105620	23.389
102	105630	23.121
102	105640	22.81
102	105650	22.572
102	105660	22.279
102	105670	21.999
102	105680	21.759
102	105690	21.476
102	105700	21.187

102	105710	20.916
102	105720	20.628
102	105730	20.396
102	105740	20.086
102	105410	206.481
103	105400	206.471
103	105750	19.829
103	105760	19.556
103	105770	19.288
103	105780	19.01
103	105790	18.716
103	105800	18.448
103	105390	206.468
104	105380	206.451
104	105370	206.487
105	105360	206.471
105	105810	18.153
105	105820	17.888
105	105830	17.653
105	105840	17.357
105	105850	17.099
105	105860	16.819
105	105870	16.568
105	105880	16.272
105	105890	16.011
105	105900	15.717
105	105910	15.472
105	105920	15.157
105	105930	14.921
105	105940	14.613
105	105950	14.363
105	105960	14.078
105	105970	13.79
105	105980	13.551
105	105990	13.259
105	106000	12.997
105	106010	12.74

105	106020	12.453
105	106030	12.154
105	106040	11.9
105	106050	11.631
105	106060	11.377
105	105350	206.454
106	105340	206.474
106	106070	11.072
106	106080	10.799
106	106090	10.507
106	106100	10.26
106	106110	10.009
106	106120	9.688
106	106130	9.422
106	106140	9.139
106	106150	8.89
106	106160	8.636
106	106170	8.334
106	106180	8.044
106	106190	7.826
106	106200	7.534
106	106210	7.256
106	106220	6.965
106	106230	6.706
106	106240	6.423
106	106250	6.144
106	106260	5.882
106	106270	5.599
106	106280	5.321
106	106290	5.068
106	106300	4.819
106	106310	4.525
106	106320	4.27
106	106330	3.979
106	106340	3.677
106	106350	3.452
106	106360	3.151

106	106370	2.858
106	106380	2.581
106	105330	206.462
107	100010	229.678
107	106390	2.336
107	106400	2.034
107	106410	1.803
107	106420	1.518
107	106430	1.269
107	106440	0.961
107	106450	0.677
107	106460	0.435
107	105320	206.456
108	105310	206.479
108	105290	206.424
109	100020	229.631
109	100030	229.651
110	100040	229.667
110	100050	229.651
111	103780	206.464
111	103790	206.469
111	103800	206.462
111	103810	206.481
112	100060	229.675
112	100070	229.647
113	103770	217.724
113	103771	28.321
113	103760	229.668
114	100080	229.666
114	100090	229.66
115	103750	229.646
115	103740	229.63
115	103730	229.663
116	100100	229.663
116	100110	229.66
117	103720	229.667
117	103710	229.66

117	103700	229.666
117	103690	229.67
118	100120	229.636
118	100130	229.677
119	105300	206.49
119	105280	206.435
120	105270	206.446
120	105260	206.459
121	105250	206.459
121	105240	206.499
122	105230	206.444
122	105220	206.451
123	103680	229.65
123	103670	229.657
123	103660	229.633
123	103650	229.663
124	103640	229.658
124	103630	229.676
124	103620	229.694
124	103610	229.645
125	103600	229.667
125	103590	229.664
125	103580	229.649
125	103570	229.656
126	103560	229.647
126	103550	229.69
126	103540	229.69
126	103530	229.691
127	100140	229.649
127	100150	229.68
128	103520	229.658
128	103510	229.647
128	103500	229.659
128	103490	229.683
129	103480	229.684
129	103470	229.647
129	103460	229.664

129	103450	229.672
130	103440	229.644
130	103430	229.648
130	103420	229.671
130	103410	229.636
131	103400	229.639
131	103390	229.678
131	103380	229.645
131	103370	229.667
132	103360	229.64
132	103340	229.683
132	103330	229.693
133	103320	229.681
133	103310	229.645
133	103300	229.661
133	103290	229.662
134	103350	229.649
134	103280	229.639
134	103270	229.649
134	103260	229.67
135	103250	229.659
135	103240	229.671
135	103230	229.678
135	103220	229.673
136	105210	206.432
136	105200	206.444
138	103210	229.667
138	103200	229.665
138	103190	229.655
138	103180	229.643
139	103170	229.683
139	103160	229.661
139	103150	229.663
139	103140	229.683
140	103130	229.663
140	103120	229.666
140	103110	229.662

140	103100	229.663
141	103090	229.643
141	103080	229.696
141	103070	229.635
141	103060	229.642
142	103050	229.646
142	103040	229.671
142	103030	229.672
142	103020	229.653
143	103010	229.659
143	103000	229.664
143	102990	229.67
143	102980	229.685
144	102970	229.643
144	102960	229.653
144	102950	229.664
144	102940	229.668
145	102930	229.664
145	102920	229.69
145	102910	229.665
145	102900	229.665
146	102890	229.663
146	102880	229.658
146	102870	229.673
146	102860	229.689
147	102850	229.663
147	102840	229.645
147	102830	229.685
147	102820	229.655
148	102810	229.67
148	102800	229.642
148	102790	229.657
148	102780	229.695
149	102770	229.693
149	102760	229.656
149	102750	229.696
149	102740	229.664

150	105190	206.445
150	105180	206.478
151	102730	229.685
151	102720	229.677
151	102710	229.663
151	102700	229.703
152	102690	229.657
152	102680	229.667
152	102670	229.636
152	102660	229.657
153	102650	229.657
153	102640	229.672
154	102630	229.65
154	102620	229.661
154	102610	229.667
154	102600	229.672
155	102590	229.668
155	102580	229.669
155	102570	229.668
155	102560	229.65
156	102550	229.677
156	102540	229.69
156	102530	229.643
156	102520	229.677
157	102510	229.646
157	102500	229.684
157	102490	229.657
157	102480	229.66
158	102470	229.682
158	102460	229.663
158	102450	229.652
158	102440	229.659
159	102430	229.666
159	102420	229.685
159	102410	229.681
159	102400	229.649
160	102390	229.671

160	102380	229.638
160	102360	229.667
161	102350	229.652
161	102340	229.644
161	102330	229.65
161	102320	229.677
162	102310	229.663
162	102300	229.647
162	102290	229.657
162	102280	229.643
163	102270	229.665
163	102260	229.682
163	102250	229.628
163	102240	229.683
164	102230	229.708
164	102220	229.689
165	102210	229.696
165	102200	229.646
165	102190	229.646
165	102180	229.673
166	102170	229.685
166	102160	229.686
166	102150	229.681
166	102140	229.675
167	102130	229.674
167	102120	229.678
167	102110	229.647
167	102100	229.68
168	102090	229.669
168	102080	229.695
169	102070	229.659
169	102060	229.655
169	102050	229.663
169	102040	229.665
170	102030	229.668
170	102020	229.684
170	102010	229.674

170	102000	229.683
171	101990	229.689
171	101980	229.718
172	101970	229.679
172	101960	229.641
173	101950	229.66
173	101940	229.672
173	101930	229.683
173	101920	229.68
174	101910	229.664
174	101900	229.67
174	101890	229.688
174	101880	229.652
175	101870	229.641
175	101860	229.671
177	100160	229.68
177	100170	229.678
178	100180	229.668
178	100190	229.667
179	100200	229.652
179	100210	229.642
180	100220	229.654
180	100230	229.685
180	100240	229.676
180	100250	229.663
181	100260	229.666
181	100270	229.679
182	100280	229.685
182	100290	229.684
182	100300	229.649
182	100310	229.708
183	100320	229.668
183	100330	229.657
183	100340	229.658
183	100350	229.649
184	101850	229.772
184	101840	229.772

185	100360	201.553
185	100361	39.893
185	100371	229.736
186	101830	229.775
186	101820	229.777
186	101810	229.724
186	101800	229.74
187	101790	229.704
187	101780	229.725
187	101770	229.707
187	100380	229.689
188	101760	229.659
188	101750	229.722
189	101740	229.668
189	101730	229.697
189	101720	229.629
189	101710	229.677
190	101700	229.675
190	101690	229.667
190	101680	229.666
190	101670	229.66
191	101660	229.662
191	101650	229.677
191	101640	229.644
191	101630	229.687
192	100390	229.722
194	101620	229.665
194	101610	229.676
194	101600	229.657
194	101590	229.657
195	101580	229.674
195	101570	229.658
195	101560	229.677
195	101550	229.677
196	100420	229.7
197	100430	229.688
198	101540	229.642

198	101530	229.637
198	101520	229.691
198	101510	229.685
199	101500	229.669
199	101490	229.668
199	101480	229.695
199	101470	229.682
201	201420	229.649
201	201410	229.682
201	201400	229.689
201	201390	229.675
202	201380	229.73
202	201370	229.693
203	201360	229.685
203	201350	229.672
204	201340	229.7
204	201330	229.656
204	201320	229.655
204	201310	229.662
205	201300	229.682
205	201290	229.709
205	201280	229.731
205	201270	229.73
206	201260	229.662
206	201250	229.676
206	201240	229.668
206	201230	229.653
207	201220	229.716
207	201210	229.729
207	201200	229.679
207	201190	229.676
208	201180	229.686
208	201170	229.684
208	201160	229.697
208	201150	229.687
209	201140	229.666
209	201130	229.669

209	201120	229.656
209	201110	229.671
210	201100	229.673
210	201090	229.714
210	201080	229.696
210	201070	229.681
211	201060	229.647
211	201050	229.668
211	201040	229.68
211	201030	229.663
212	201020	229.673
212	201010	229.669
212	201000	229.636
212	200990	229.675
213	200980	229.719
213	200970	229.711
214	200960	229.715
214	200950	229.726
214	200940	229.668
214	200930	229.73
219	200920	229.673
219	200910	229.694
219	200900	229.683
219	200890	229.682
217	200880	229.73
217	200870	229.707
217	200860	229.71
217	200850	229.696
218	203820	206.486
218	203830	206.493
218	203840	206.539
218	203850	206.529
219	203860	206.487
219	203870	206.463
219	203880	206.458
219	203890	206.476
220	203900	206.493

220	203910	206.506
221	200840	229.667
221	200830	229.653
221	200820	229.669
221	200810	229.677
222	200800	229.688
222	200790	229.712
223	203920	206.511
223	203930	206.498
223	203940	206.499
223	203950	206.525
224	200780	229.691
224	200770	229.663
225	200760	229.64
225	200750	229.676
225	200740	229.698
225	200730	229.669
226	200720	229.674
226	200710	229.677
226	200700	229.687
226	200690	229.67
227	200680	229.652
227	200670	229.668
227	200660	229.69
227	200650	229.694
228	200640	229.681
228	200630	229.657
228	200620	229.679
228	200610	229.651
229	200600	229.657
229	200590	229.674
229	200580	229.645
229	200570	229.647
230	200560	229.696
230	200550	229.683
231	200540	229.682
232	200530	229.681

232	200520	229.677
233	200510	229.677
233	200500	229.652
234	205170	206.481
234	205160	206.455
234	205150	206.445
234	205140	206.45
235	205130	206.468
235	205120	206.452
235	205110	206.461
235	205100	206.476
236	205090	206.446
236	205080	206.459
236	205070	206.472
236	205060	206.484
237	205050	206.49
237	205040	206.481
237	205030	206.459
237	205020	206.478
238	203960	206.447
238	203970	206.491
239	205010	206.469
239	205000	206.433
239	204990	206.475
239	204980	206.458
240	204970	206.478
240	204960	206.457
240	204950	206.451
240	204940	206.463
241	204930	206.462
241	204920	206.449
241	204910	206.451
241	204900	206.453
242	204890	206.487
242	204880	187.072
243	204881	38.405
243	204870	206.473

243	202370	229.667
244	200470	229.65
244	200460	229.667
244	200450	229.666
244	200440	229.674
245	204860	206.464
245	204850	206.467
245	204840	206.489
245	204830	206.479
246	204820	206.444
246	204810	206.476
246	204800	206.46
246	204790	206.453
247	204780	206.457
247	204770	206.473
247	204760	206.465
247	204750	206.455
248	204740	206.47
248	204730	206.45
248	204720	206.471
248	204710	206.471
249	204700	206.471
249	204690	206.526
250	204680	206.497
250	204670	206.489
250	204660	206.497
250	204650	206.501
251	204640	206.445
251	204630	206.459
251	204620	206.49
251	204610	206.455
252	204600	206.456
252	204590	206.432
252	204580	206.473
252	204570	206.476
253	204560	206.502
253	204550	206.527

254	204540	206.477
254	204530	206.46
254	204520	206.467
254	204510	206.474
255	204500	206.478
255	204490	206.481
255	204480	206.478
255	204470	206.443
256	204450	206.485
256	204440	206.486
256	204430	206.462
256	204420	206.52
257	204460	206.447
257	204410	206.473
257	204400	206.493
257	204390	206.487
258	204380	206.452
258	204370	206.478
258	204360	206.499
258	204350	206.45
259	204340	206.465
259	204330	206.48
259	204320	206.477
259	204310	206.428
260	204300	206.504
260	204290	55.04
260	204291	155.474
261	203980	206.491
261	203990	206.456
261	204000	206.502
261	204010	206.482
262	204020	206.454
262	204030	206.451
262	204040	206.456
262	204050	206.441
263	204060	206.466
263	204070	206.451

263	204080	206.467
263	204090	206.464
264	204100	206.459
264	204110	206.459
264	204120	206.475
264	204130	206.461
265	204140	206.462
265	204150	206.489
265	204160	206.451
265	204170	206.428
266	204180	206.461
266	204190	206.456
266	200490	229.675
266	200480	229.655
267	204280	206.449
267	204270	206.451
267	204260	206.47
267	204250	206.456
268	204240	206.446
268	204230	206.445
268	204220	206.458
268	204210	206.472
269	200400	229.669
269	200410	229.647
269	204200	206.437
901	190120	217.755
901	190130	217.772
901	190500	217.776
901	190490	217.774
902	190480	217.734
902	190470	217.778
902	190460	217.765
902	190450	217.771
903	190440	217.78
903	190430	217.746
904	190420	217.751
904	190410	217.766

905	190400	217.759
906	190390	217.755
906	190380	217.77
907	190370	217.796
907	190360	217.791
908	190350	217.791
908	190340	217.862
909	190330	217.834
910	190320	217.781
911	190310	217.787
911	190300	217.811
911	190290	217.77
912	190280	217.786
912	190270	217.76
913	190250	217.787
913	190240	217.809
914	190140	217.796
914	190260	217.809
915	190150	217.799
915	190230	217.822
916	190220	217.778
916	190160	217.74
916	190170	217.751
917	190210	217.821
917	190200	217.837
918	190190	217.766
918	190180	217.827
919	190580	150.951
920	190010	257.871
920	190570	150.958
920	190560	150.97
920	190550	150.959
921	190020	252.011
921	190030	246.191
921	190540	150.961
921	190530	150.973
921	190520	217.749

921	190510	217.783
922	190040	240.303
922	190050	234.471
923	190060	228.568
923	190070	222.742
924	190080	217.779
924	190090	217.778
925	190100	217.768
925	190110	217.777
Total		134,956.99