

# **Logistics Report**

for a

## **DETAILED AIRBORNE MAGNETIC, RADIOMETRIC AND DIGITAL ELEVATION SURVEY**

for the

### **SOLITAIRE PROJECTS**

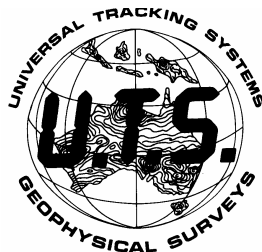
carried out on behalf of

#### **GOLDFIELDS AUSTRALASIA PTY LTD**

by

#### **UTS GEOPHYSICS**

(UTS Job #A398)



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## 1 GENERAL SURVEY INFORMATION

In August 2000, UTS Geophysics conducted a low level airborne geophysical survey approximately 100km south-east of the Granites Mine for Goldfields Australasia Pty Ltd.

This report summarises the logistics, survey parameters and processing details of the survey.

The survey commenced on the 14<sup>th</sup> August 2000 and was completed on the 23<sup>rd</sup> August 2000.

UTS Geophysics provided the described survey for the following company:

Goldfields Australasia Pty Ltd  
PO Box 628  
WEST PERTH WA 6872

## 2 SURVEY LOCATION

The area surveyed was approximately 100km south-east of the Granites Mine in the Northern Territory. A survey location map is provided in Appendix C of this report.

The survey was flown using the AMG84 coordinate system (a Universal Transverse Mercator projection) derived from the Australian Geodetic Datum and was contained within zone 52 with a central meridian of 129 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**

- ? FU24-954 fixed wing survey aircraft.
- ? UTS proprietary flight planning and survey navigation system.
- ? UTS proprietary high speed digital data acquisition system.
- ? Novatel 3951R, 12 channel precision navigation GPS.
- ? Satellite transmitted differential GPS correction receiver.
- ? UTS LCD pilot navigation display and external track guidance display.
- ? UTS post mission data verification and processing system.
- ? Bendix King KRA-405 radar altimeter.

#### **Magnetic Data Acquisition Equipment**

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

#### **Radiometric Data Acquisition Equipment**

- ? Exploranium GR-820 gamma ray spectrometer.
- ? Exploranium gamma ray detectors.
- ? Barometric altimeter (height and pressure measurements).
- ? Temperature and humidity sensor.

### 3.1 *Survey Aircraft*

The aircraft used was a FU24-954 fixed wing survey aircraft owned by UTS Geophysics, registration VH-CYU.

#### **Power Plant**

? Engine Type	Single engine, Lycoming, IO-720
? Brake Horse Power	400 bhp
? Fuel Type	AV-GAS

#### **Performance**

? Cruise speed	105 Kn
? Survey speed	100 Kn
? Stall speed	45 Kn
? Range	970 Km
? Endurance (no reserves)	5 hours
? Fuel tank capacity	490 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 externally mounted 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 3951R
? GPS satellite tracking channels	12 parallel
? Typical differentially corrected accuracy	2-3 metres (horizontal)
? Real-time differential service	RACAL Landstar

### 3.3 *UTS Data Acquisition System and Digital Recording*

All geophysical sensor data and positional information measured during the survey was recorded using a UTS developed, high speed, precision data acquisition system. Survey data was downloaded onto magnetic tape 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 model	King KRA-405, twin antenna altimeter
? Accuracy	0.3 metres
? Resolution	0.1 metres
? Range	0 - 500 metres
? Sample rate	0.1 Seconds (10Hz)

### 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	-20°C to +50°C

### 3.7 *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 was removed using an RMS Automatic Airborne 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 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.

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

### 3.8 *Diurnal Monitoring Magnetometer*



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

The specifications for the magnetometer used are as follows:

? Model	Scintrex Envimag
? Resolution	0.1 nT
? Sample interval	10 seconds (0.1Hz)
? Operating range	20,000nT to 90,000nT
? Temperature	-20°C to +50°C

### 3.9 *Barometric Altitude*

An Air DB barometric altimeter was installed in the aircraft so as to record and monitor barometric height and pressure. The data was recorded at 0.33 second intervals and is used for the reduction of the radiometric data.

? Model	Air DB barometric altimeter
? Accuracy	2 metres
? Height resolution	0.1 metres
? Height range	0 - 3500 metres
? Maximum operating pressure:	1,300 mb
? Pressure resolution:	0.01 mb
? Sample rate	3 Hz

### 3.10 *Temperature and Humidity*

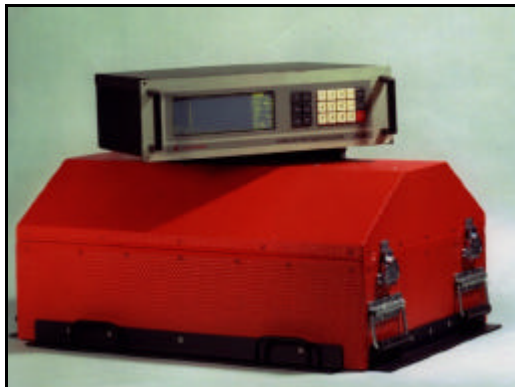
Temperature and humidity measurements were made during the survey at a sample rate of 10Hz. Ambient temperature was measured with a resolution of 0.1 degree Celsius and ambient humidity to a resolution of 0.1 percent.

### 3.11 *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, cesium and uranium 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.

? Spectrometer model	Exploranium GR820
? Detector volume	33 litres





## **4 PERSONNEL**

### **4.1 *Field Operations***

UTS Geophysics operator and data processor Tomas Steyer

UTS Geophysics Survey Pilot Mike Officer

### **4.2 *Project Management***

Goldfields Australasia Pty Ltd Steve Massey

UTS Geophysics Perth Office Neil Goodey

## 5 SURVEY PARAMETERS

The survey data acquisition specifications for each area flown are specified in the following table:

PROJECT NAME	LINE SPACING	LINE DIRECTION	TIE LINE SPACING	TIE LINE DIRECTION	SENSOR HEIGHT	TOTAL LINE KM
Solitaire project 1	200m	000-180	2000m	090-270	25m	5,311
Solitaire project 2	200m	000-180	2000m	090-270	25m	461
<b>TOTAL</b>						<b>5,772</b>

The total number of line kilometres of survey data collected over the survey areas specified in the above table was 5,772.

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 area flown is detailed in Appendix C.

## 6 SURVEY LOGISTICS

The base location used for operating the aircraft and performing in-field quality control and data processing of the survey data was the Granites Mine in the Northern Territory. The aircraft was operated from the Granites Mine Airstrip.

### 6.1 Survey Flight Summary

The following table summarises the flight logs for the survey area flown:

Flight Date	Area No	Flight No	Area Name / Survey Details	Lines Flown	Line Km Flown
13/09/99			Mobilisation to The Granites		
14/08/00	02	01	Solitaire 1 – Traverse Lines 200010-200100	10	33
	04	T1	Solitaire 2 – Tie Lines 400010-400050	5	30
	04	01	Solitaire 2 – Traverse Lines 400430-400010	43	404
15/08/00	02	02	Solitaire 1 – Traverse Lines 202080-202230	16	252
	-	-	No afternoon flight due to bad weather		
16/08/00	-	-	No morning flight - maintenance		
	02	03	Solitaire 1 – Traverse Lines 200110-200680	58	530
17/08/00	-	-	No flying due to maintenance		
18/08/00	-	-	No flying due to maintenance		
19/08/00	02	04	Solitaire 1 – Traverse Lines 202070-201960	12	223
	02	05	Solitaire 1 – Traverse Lines 201930-201950	3	56
	03	01	Solitaire 1 – Traverse Lines 300530-300010	53	548
20/08/00	02	06	Solitaire 1 – Traverse Lines 201920-201530	40	746
	02	07	Solitaire 1 – Traverse Lines 201520-201300	23	727
21/08/00	02	08	Solitaire 1 – Traverse Lines 201290-201120	32	731
	02	09	Solitaire 1 – Traverse Lines 201110-200860	86	712
22/08/00	02	10	Solitaire 1 – Traverse Lines 200850-200770	13	213
	02	11	Solitaire 1 – Traverse Lines 200760-200690	8	188
	01	T1	Solitaire 1 – Tie Lines 100010-100290	29	476
23/08/00	02	12	Solitaire 1 – Reflys Lines - 200650-200680	4	
<b>TOTAL</b>					<b>5,772</b>

A complete survey kilometre report is contained in Appendix G of this report.

## 6.2 *Diurnal Magnetometer Locations*

The following table contains the approximate locations where the diurnal base station magnetometer was located for each survey area.

Area Name	Period	Base Station ID	Location
Granites Mine	14/08/00-23/08/00	31	2km from the Granites Airstrip

## 6.3 *Spectrometer Calibration Results*

Appendix E of this report contains the results of the daily spectrometer resolution and sensitivity tests performed during the survey.

## 7 DATA PROCESSING PROCEDURES

### 7.1 *Magnetic Data Processing*

The raw magnetic survey data was loaded from the field tapes and the recorded data trimmed to the correct survey boundary extents. Lines subsequently reflight were removed from the data. System parallax was removed from the raw data using corrections measured by the acquisition system.

The diurnal base station data was loaded, checked and suitably filtered for correction of the aircraft magnetic data. 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 regional magnetic gradient was subtracted from the survey data by application of the IGRF model extrapolated to the date of the survey and interpolated on the survey position.

The data was then corrected to remove any residual parallax errors. Tie line levelling was applied to the parallax corrected data by measuring tie line crossover points with the survey traverse line data.

Final microlevelling techniques were then applied to the tie line leveled data to remove minor residual variations in profile intensities.

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

### 7.2 *Radiometric Data Processing*

The raw radiometric survey data was loaded from the field tapes and the recorded data trimmed to the correct survey boundary extents. Lines subsequently reflight were removed from the data. System parallax was removed from the raw data using corrections measured by the acquisition system.

Statistical noise reduction of the 256 channel data was performed using the Maximum Noise Fraction (MNF) method described by Dickson and Taylor (1998). This method constructs a noise covariance model from the survey data, which is then decorrelated and re-scaled so that the model has unit variance and no channel-to-channel correlation.

A principal component transformation of the noise-whitened data is performed, and the number of components to be saved is determined by ranking the eigenvectors by signal-to-noise ratio. The signal-rich components are retained, and the spectral data

reconstructed without the noise fraction. Typically, 32-42 MNF components are retained during this process.

Channels 30-250 only are noise-cleaned, 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 noise-cleaned 256 channel measurements.

The 256 channel data was 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.

Cosmic and aircraft background corrections were applied. Radon background removal was performed using the Minty Spectral Ratio method (1992). Spectral stripping was then applied to the windowed data.

The radar altimeter data was corrected to standard temperature and pressure. Height corrections based on the STP radar altimeter were then performed to remove any altitude variation effects from the data (refer to Appendix E for stripping ratios and equations).

The corrected count rate data was then converted to ground concentrations for potassium, uranium and thorium. Final microlevelling of the total count, potassium, uranium and thorium data was then applied to remove minor residual variations in profile intensities.

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

**Head Office Address:**

UTS Geophysics  
Valentine Road, Perth Airport  
REDCLIFFE WA 6104

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

**Postal Address:**

UTS Geophysics  
P.O. Box 126  
BELMONT WA 6104

**Quoting reference number: A398**

## APPENDIX A - LOCATED DATA FORMATS

### MAGNETIC LOCATED DATA

FIELD	FORMAT	DESCRIPTION	UNITS
1	I6	LINE NUMBER	
2	I5	FLIGHT/AREA NUMBER	AAFF (Area/Flight)
3	I8	DATE	YYMMDD
4	F11.1	TIME	sec
5	I8	FIDUCIAL NUMBER	
6	I3	UTM/AMG ZONE	
7	F10.2	EASTING (AMG84)	metres
8	F11.2	NORTHING (AMG84)	metres
9	F13.7	LATITUDE (GDA94)	degrees
10	F13.7	LONGITUDE (GDA94)	degrees
11	F10.2	EASTING (MGA94)	metres
12	F11.2	NORTHING (MGA94)	metres
13	F7.1	RADAR ALTIMETER HEIGHT	metres
14	F7.1	GPS HEIGHT (WGS84)	metres
15	F7.1	TERRAIN HEIGHT (CORRECTED)	metres
16	F10.2	RAW MAGNETIC INTENSITY	nT
17	F10.2	DIURNAL CORRECTION	nT
18	F10.2	LEVELLED MAGNETIC INTENSITY	nT
19	F10.2	IGRF CORRECTION	nT
20	F10.2	LEVELLED, IGRF CORRECTED	nT

### RADIOMETRIC LOCATED DATA

FIELD	FORMAT	DESCRIPTION	UNITS
1	I6	LINE NUMBER	
2	I5	FLIGHT/AREA NUMBER	AAFF (Area/Flight)
3	I8	DATE	YYMMDD
4	F11.1	TIME	sec
5	I8	FIDUCIAL NUMBER	
6	I3	UTM/AMG ZONE	
7	F10.2	EASTING (AMG84)	metres
8	F11.2	NORTHING (AMG84)	metres
9	F13.7	LATITUDE (WGS84)	degrees
10	F13.7	LONGITUDE (WGS84)	degrees
11	F10.2	EASTING (MGA94)	metres
12	F11.2	NORTHING (MGA94)	metres
13	F7.1	RADAR ALTIMETER HEIGHT	metres
14	F7.1	GPS HEIGHT (WGS84)	metres
15	I5	LIVE TIME	milli sec
16	F7.1	PRESSURE	hPa
17	F5.1	TEMPERATURE	Degrees Celcius
18	F8.1	TOTAL COUNT (RAW)	Counts/sec
19	F7.1	POTASSIUM (RAW)	Counts/sec
20	F7.1	URANIUM (RAW)	Counts/sec
21	F7.1	THORIUM (RAW)	Counts/sec
22	F7.1	COSMIC (RAW)	Counts/sec
23	F7.1	URANIUM LOW (RAW)	Counts/sec
24	F8.1	TOTAL COUNT (CORRECTED)	Counts/sec
25	F7.1	POTASSIUM (CORRECTED)	Counts/sec



26	F7.1	URANIUM (CORRECTED)	Counts/sec
27	F7.1	THORIUM (CORRECTED)	Counts/sec
28	F7.3	POTASSIUM GRND CONCENTRATION	%
29	F7.3	URANIUM GRND CONCENTRATION	ppm
30	F7.3	THORIUM GRND CONCENTRATION	ppm

#### DIGITAL TERRAIN MODEL LOCATED DATA

FIELD	FORMAT	DESCRIPTION	UNITS
1	I6	LINE NUMBER	
2	I8	FIDUCIAL NUMBER	
3	I3	UTM/AMG ZONE	
4	F10.2	EASTING (AMG84)	metres
5	F11.2	NORTHING (AMG84)	metres
6	F13.7	LATITUDE (GDA94)	degrees
7	F13.7	LONGITUDE (GDA94)	degrees
8	F10.2	EASTING (MGA94)	metres
9	F11.2	NORTHING (MGA94)	metres
10	F7.1	RADAR ALTIMETER HEIGHT	metres
11	F7.1	GPS HEIGHT (WGS84)	metres
12	F7.1	TERRAIN HEIGHT (CORRECTED)	metres

#### 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 UTS Geophysics uses the following 8 character file naming convention to be compatible with PC DOS based systems.

File names have the following general format - JJJAABB.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 KC    Potassium concentration UC    Uranium concentration ThC   Thorium concentration DT    Digital terrain data
EEE	File name extension LDT   Located digital data file FMT   Located data format 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.

<b>WGS84</b>	World Geodetic System 1984
Coordinate Type	Geographical
Semi Major Axis	6378137m
Flattening	1/298.257223563
<b>AMG84</b>	Australian Map Grid 1984
Coordinate Type	Universal Transverse Mercator Projection Grid
Geodetic datum	Australian Geodetic Datum
Semi Major Axis	6378160m
Flattening	1/298.25
<b>MGA94</b>	Map Grid of Australia 1994
Coordinate type	Universal Transverse Mercator Projection Grid
Geodetic datum	Geodetic Datum of Australia
Semi major axis	6378137m
Flattening	1/298.257222101

## APPENDIX C - SURVEY BOUNDARY DETAILS

Job ID code: A3980101  
Client: Gold Fields Australasia Pty Ltd  
Job: Mt Solitaire Project 1  
Coordinate System: AMG84 Grid Zone: 52

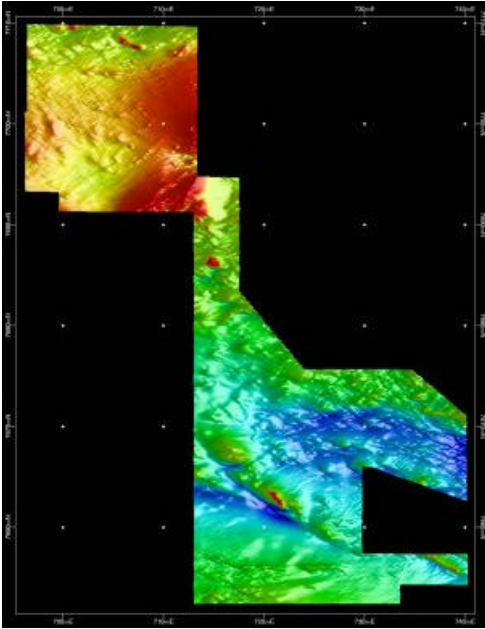
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733624.290	7652313.010
733624.290	7654211.920
740507.180	7654214.140
740507.180	7657503.710
729838.330	7657503.710
729826.480	7666123.250
740373.820	7662349.150
740356.780	7671129.460
734832.690	7675790.420
724129.750	7675790.420
717791.410	7683420.130
717791.410	7694800.250
713390.510	7694933.610
713434.970	7709781.100
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Job ID code: A3980401  
Client: Gold Fields Australasia Pty Ltd  
Job: Mt Solitaire Project 2  
Coordinate System: AMG84 Grid Zone: 52

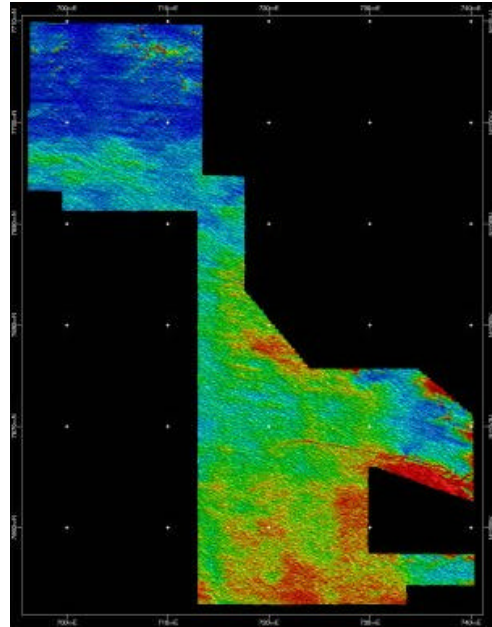
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754687.870	7674218.250
754776.780	7685465.000
746108.330	7685465.000
746152.790	7677596.720

## APPENDIX D - PROJECT DATA OVERVIEW

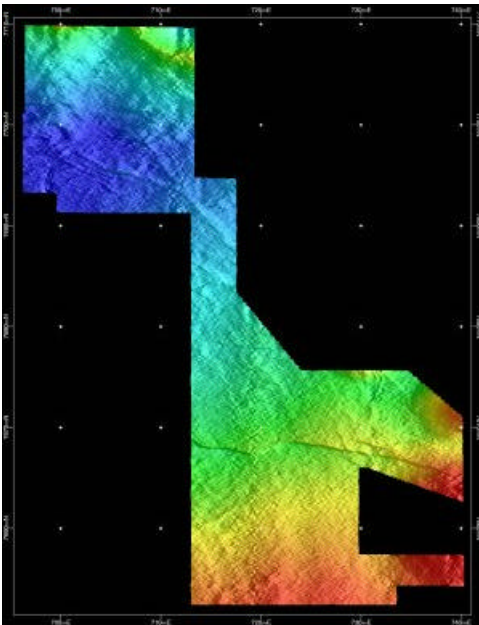
### Mt Solitaire Project 1



Total Magnetic Intensity

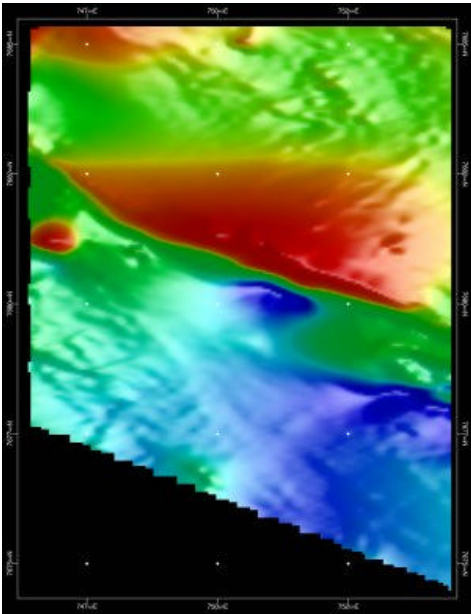


Radiometric Total Count

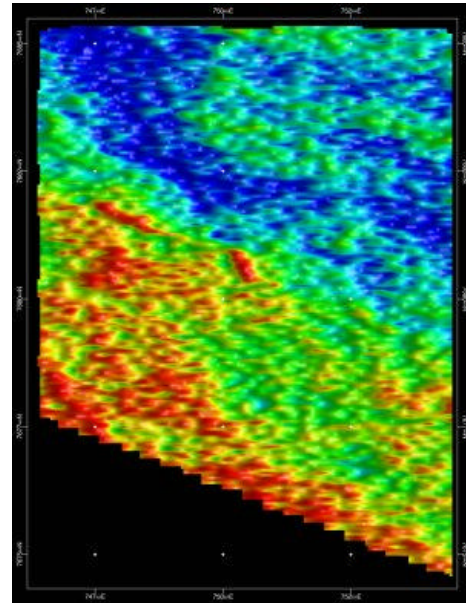


Digital Terrain Model

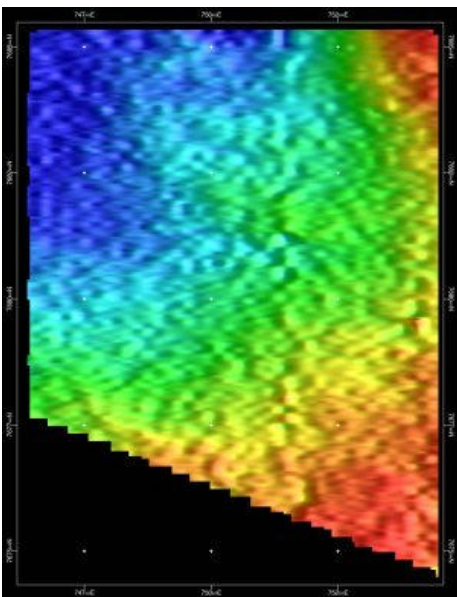
## Mt Solitaire Project 2



Total Magnetic Intensity



Radiometric Total Count



Digital Terrain Model

## **APPENDIX E – RADIOMETRIC CALIBRATION RESULTS**

## APPENDIX F – DATA PROCESSING PARAMETERS

### Magnetic Data

Mt. Solitaire Project 1

IGRF date	2000.71
IGRF mean value	51974 nT
Magnetic inclination	-52.617 deg
Magnetic declination	4.191 deg
Diurnal base value	51390 nT

Mt. Solitaire Project 1

IGRF date	2000.71
IGRF mean value	51937 nT
Magnetic inclination	-52.656 deg
Magnetic declination	4.264 deg
Diurnal base value	51390 nT

### Radiometric Data

#### Stripping Ratios

?	0.224
?	0.395
?	0.722
a	0.047
b	0.000
c	0.000

#### Height Attenuation Coefficients

Total Count	-0.0060
Potassium	-0.0075
Uranium	-0.0039
Thorium	-0.0062

**Final Reduction** - All data reduced to STP height datum 25m

#### Stripping Equations

?	=	? + STPHeight * 0.00049
?	=	? + STPHeight * 0.00065
?	=	? + STPHeight * 0.00069
tho`	=	(tho - (a * ura)) / (1 - (a * ?))
ura`	=	(ura - (? * tho)) / (1 - (a * ?))
pot`	=	pot - (? * tho`) - (? * ura`)

#### Conversion to Concentrations

% K	=	k.cps / 232.1
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ppm U = u.cps / 33.0  
ppm Th = th.cps / 9.2

## APPENDIX G – SURVEY KILOMETRE REPORT

LINE KM REPORT FOR a39801m.ltd

LINE	FLT	DATE	START COORDINATE	END COORDINATE	LINE KM
190020	191	000822	733648	7654004	21.0
190030	191	000822	712727	7655996	27.9
190040	191	000822	729872	7658001	17.2
190050	191	000822	712761	7659996	17.2
190060	191	000822	729851	7662003	17.1
190070	191	000822	712793	7663999	27.7
190080	191	000822	740399	7666013	27.6
190090	191	000822	712809	7667989	27.6
190100	191	000822	740399	7670004	27.6
190110	191	000822	712849	7671999	26.6
190120	191	000822	737040	7673995	24.2
190130	191	000822	712866	7675981	11.2
190140	191	000822	722353	7677996	9.5
190150	191	000822	712922	7680002	7.8
190160	191	000822	719020	7681993	6.1
190170	191	000822	712936	7683998	4.9
190180	191	000822	717824	7686011	4.9
190190	191	000822	712987	7688004	4.9
190200	191	000822	717830	7690003	4.9
190210	191	000822	699362	7692009	18.5
190220	191	000822	717804	7693997	22.0
190230	191	000822	695926	7696003	17.6
190240	191	000822	713425	7697998	17.5
190250	191	000822	695976	7699988	17.5
190260	191	000822	713437	7702001	17.5
190270	191	000822	696029	7703982	17.5
190280	191	000822	713464	7705994	17.4
190290	191	000822	696069	7708000	17.4
200010	201	000814	712090	7710000	16.4
200020	201	000814	740399	7657546	3.4
200030	201	000814	740218	7654171	3.4
200040	201	000814	740004	7657546	3.4
200050	201	000814	739806	7654187	3.4
200060	201	000814	739594	7657552	3.4
200070	201	000814	739400	7654188	3.4
200080	201	000814	739200	7657550	3.4
200090	201	000814	738983	7654183	3.4
200100	201	000814	738800	7657530	3.4
202230	202	000815	738607	7654169	3.4
202220	202	000815	695937	7701395	8.2
202210	202	000815	696204	7693219	16.9
202200	202	000815	696399	7710038	16.9
202190	202	000815	696586	7693187	16.9
202180	202	000815	696799	7710021	16.9
202170	202	000815	697000	7693177	16.9
202160	202	000815	697200	7710027	16.9
202150	202	000815	697401	7693176	16.9
202140	202	000815	697598	7710030	16.9
202130	202	000815	697808	7693168	16.9
202120	202	000815	697991	7710003	16.9
202110	202	000815	698199	7693164	16.9
202100	202	000815	698399	7710003	16.9
202090	202	000815	698592	7693141	16.9
202080	202	000815	698801	7710012	16.9
200110	203	000816	699001	7693132	16.9
200120	203	000816	738397	7657538	3.4
200130	203	000816	738212	7654175	3.4
200140	203	000816	738001	7657531	3.4

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200150	203	000816	737803	7654168	737799	7657588	3.4
200160	203	000816	737592	7657544	737601	7654132	3.4
200170	203	000816	737403	7654172	737399	7657583	3.4
200180	203	000816	737207	7657545	737198	7654134	3.4
200190	203	000816	736999	7654164	737001	7657582	3.4
200200	203	000816	736792	7657548	736801	7654140	3.4
200210	203	000816	736602	7654158	736603	7657585	3.4
200220	203	000816	736402	7657546	736403	7654151	3.4
200230	203	000816	736202	7654183	736202	7657593	3.4
200240	203	000816	735999	7657541	736004	7654146	3.4
200250	203	000816	735799	7654166	735799	7657584	3.4
200260	203	000816	735606	7657548	735601	7654130	3.4
200270	203	000816	735404	7654180	735401	7657581	3.4
200280	203	000816	735191	7657534	735199	7654133	3.4
200290	203	000816	734998	7654173	735000	7657591	3.4
200300	203	000816	734802	7657520	734802	7654125	3.4
200310	203	000816	734603	7654168	734598	7657592	3.4
200320	203	000816	734400	7657536	734397	7654133	3.4
200330	203	000816	734204	7654165	734204	7657568	3.4
200340	203	000816	733999	7657540	734003	7654140	3.4
200350	203	000816	733799	7654181	733799	7657588	3.4
200360	203	000816	733599	7657529	733598	7652240	5.3
200370	203	000816	733399	7652261	733395	7657569	5.3
200380	203	000816	733202	7657527	733204	7652250	5.3
200390	203	000816	733001	7652285	733000	7657574	5.3
200400	203	000816	732786	7657532	732801	7652241	5.3
200410	203	000816	732608	7652270	732599	7657569	5.3
200420	203	000816	732400	7657530	732399	7652228	5.3
200430	203	000816	732201	7652277	732198	7657579	5.3
200440	203	000816	732016	7657541	732006	7652237	5.3
200450	203	000816	731804	7652267	731796	7657574	5.3
200460	203	000816	731603	7657526	731607	7652237	5.3
200470	203	000816	731403	7652265	731401	7657567	5.3
200480	203	000816	731190	7657546	731203	7652248	5.3
200490	203	000816	731000	7652280	731002	7657579	5.3
200500	203	000816	730804	7657544	730796	7652235	5.3
200510	203	000816	730603	7652280	730598	7657591	5.3
200520	203	000816	730399	7657526	730402	7652223	5.3
200530	203	000816	730199	7652265	730198	7657590	5.3
200540	203	000816	730004	7657528	729998	7652246	5.3
200550	203	000816	729800	7652283	729799	7675891	23.6
200560	203	000816	729599	7675852	729602	7652228	23.6
200570	203	000816	729402	7652260	729394	7675888	23.6
200580	203	000816	729195	7675851	729199	7652238	23.6
200590	203	000816	729008	7652266	729002	7675875	23.6
200600	203	000816	728798	7675844	728803	7652243	23.6
200610	203	000816	728602	7652262	728597	7675875	23.6
200620	203	000816	728400	7675832	728398	7652244	23.6
200630	203	000816	728195	7652274	728196	7675890	23.6
200640	203	000816	728000	7675848	727996	7652243	23.6
200650	203	000816	727809	7652275	727800	7675873	23.6
200660	203	000816	727590	7675834	727605	7652241	23.6
200670	203	000816	727400	7652277	727404	7675887	23.6
200680	203	000816	727197	7675820	727202	7652221	23.6
202070	205	000819	727011	7652269	726992	7675889	23.6
202060	205	000819	699205	7709998	699199	7693081	16.9
202050	205	000819	699394	7691202	699401	7710041	18.8
202040	205	000819	699599	7710003	699603	7691173	18.8
202030	205	000819	699800	7691209	699799	7710037	18.8
202020	205	000819	700000	7709997	699998	7691162	18.8
202010	205	000819	700201	7691202	700199	7710034	18.8
202000	205	000819	700410	7709994	700397	7691177	18.8
201990	205	000819	700596	7691206	700597	7710030	18.8
201980	205	000819	700799	7709972	700802	7691176	18.8
201970	205	000819	700996	7691200	700999	7710010	18.8
201960	205	000819	701196	7709969	701205	7691154	18.8

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201950	205	000819	701406	7691209	701396	7710022	18.8
201940	205	000819	701602	7691214	701597	7710013	18.8
201930	205	000819	701784	7709953	701796	7691173	18.8
201920	206	000820	701998	7691204	702003	7709999	18.8
201910	206	000820	702199	7709944	702198	7691154	18.8
201900	206	000820	702398	7691194	702398	7709995	18.8
201890	206	000820	702585	7709973	702600	7691150	18.8
201880	206	000820	702799	7691211	702800	7709999	18.8
201870	206	000820	702977	7709959	703006	7691159	18.8
201860	206	000820	703201	7691209	703202	7709991	18.8
201850	206	000820	703392	7709942	703400	7691157	18.8
201840	206	000820	703611	7691199	703601	7709985	18.8
201830	206	000820	703795	7709947	703799	7691164	18.8
201820	206	000820	704000	7691189	704002	7709986	18.8
201810	206	000820	704201	7709934	704200	7691151	18.8
201800	206	000820	704396	7691182	704403	7709969	18.8
201790	206	000820	704608	7709940	704596	7691154	18.8
201780	206	000820	704811	7691204	704799	7709957	18.8
201770	206	000820	705009	7709932	705005	7691143	18.8
201760	206	000820	705204	7691185	705199	7709974	18.8
201750	206	000820	705383	7709932	705396	7691136	18.8
201740	206	000820	705610	7691192	705598	7709964	18.8
201730	206	000820	705797	7709921	705799	7691160	18.8
201720	206	000820	705996	7691173	705995	7709957	18.8
201710	206	000820	706199	7709912	706195	7691155	18.8
201700	206	000820	706414	7691186	706400	7709941	18.8
201690	206	000820	706616	7709916	706602	7691139	18.8
201680	206	000820	706797	7691191	706797	7709943	18.8
201670	206	000820	707012	7709893	706996	7691141	18.8
201660	206	000820	707172	7691176	707199	7709935	18.8
201650	206	000820	707407	7709901	707400	7691137	18.8
201640	206	000820	707594	7691173	707595	7709939	18.8
201630	206	000820	707764	7709892	707801	7691129	18.8
201620	206	000820	708002	7691170	707998	7709936	18.8
201610	206	000820	708203	7709870	708204	7691153	18.7
201600	206	000820	708412	7691168	708401	7709929	18.8
201590	206	000820	708593	7709889	708598	7691148	18.7
201580	206	000820	708806	7691180	708800	7709917	18.7
201570	206	000820	709002	7709873	709006	7691142	18.7
201560	206	000820	709196	7691176	709199	7709915	18.7
201550	206	000820	709397	7709876	709402	7691127	18.8
201540	206	000820	709606	7691166	709602	7709895	18.7
201530	206	000820	709801	7709869	709801	7691142	18.7
201520	207	000820	710007	7691172	710001	7709913	18.7
201510	207	000820	710200	7709842	710202	7691135	18.7
201500	207	000820	710386	7691168	710400	7709897	18.7
201490	207	000820	710593	7709842	710596	7691143	18.7
201480	207	000820	710799	7691171	710796	7709889	18.7
201470	207	000820	710994	7709851	711001	7691125	18.7
201460	207	000820	711199	7691156	711200	7709873	18.7
201450	207	000820	711390	7709829	711400	7691123	18.7
201440	207	000820	711594	7691168	711598	7709871	18.7
201430	207	000820	711817	7709827	711796	7691128	18.7
201420	207	000820	712006	7691176	711997	7709886	18.7
201410	207	000820	712195	7709835	712201	7691134	18.7
201400	207	000820	712406	7691165	712398	7709882	18.7
201350	207	000820	712595	7709836	712601	7691130	18.7
201360	207	000820	713609	7694956	713598	7652240	42.7
201370	207	000820	713404	7652261	713401	7709857	57.6
201380	207	000820	713202	7709832	713199	7652214	57.6
201390	207	000820	713010	7652270	712999	7709869	57.6
201340	207	000820	712803	7709837	712798	7652227	57.6
201330	207	000820	713798	7652285	713799	7694996	42.7
201320	207	000820	713993	7694938	714005	7652233	42.7
201310	207	000820	714196	7652269	714196	7694979	42.7
201300	207	000820	714398	7694946	714402	7652236	42.7

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201290	208	000821	714600	7652260	714605	7694980	42.7
201280	208	000821	714797	7694926	714796	7652234	42.7
201270	208	000821	715003	7652269	714995	7694959	42.7
201260	208	000821	715198	7694920	715204	7652223	42.7
201250	208	000821	715398	7652271	715394	7694940	42.7
201240	208	000821	715606	7694906	715594	7652228	42.7
201230	208	000821	715797	7652255	715796	7694925	42.7
201220	208	000821	715994	7694876	715999	7652241	42.6
201210	208	000821	716193	7652268	716198	7694935	42.7
201200	208	000821	716391	7694883	716402	7652234	42.7
201190	208	000821	716595	7652267	716605	7694919	42.7
201180	208	000821	716797	7694873	716795	7652232	42.6
201170	208	000821	716998	7652264	717009	7694893	42.6
201160	208	000821	717205	7694849	717199	7652219	42.6
201150	208	000821	717388	7652264	717404	7694902	42.6
201140	208	000821	717580	7694833	717606	7652225	42.6
201130	208	000821	717802	7652272	717798	7683514	31.2
201120	208	000821	718011	7683239	718001	7652223	31.0
201110	209	000821	718194	7652259	718204	7683046	30.8
201100	209	000821	718401	7682772	718398	7652232	30.5
201090	209	000821	718595	7652255	718601	7682582	30.3
201080	209	000821	718800	7682293	718802	7652219	30.1
201070	209	000821	719000	7652268	718998	7682093	29.8
201060	209	000821	719192	7681806	719200	7652236	29.6
201050	209	000821	719389	7652254	719400	7681629	29.4
201040	209	000821	719591	7681351	719591	7652236	29.1
201030	209	000821	719796	7652269	719798	7681149	28.9
201020	209	000821	719992	7680867	719999	7652234	28.6
201010	209	000821	720199	7652269	720195	7680649	28.4
201000	209	000821	720396	7680362	720401	7652218	28.1
200990	209	000821	720608	7652270	720606	7680154	27.9
200980	209	000821	720811	7679860	720800	7652234	27.6
200970	209	000821	721009	7652266	720998	7679705	27.4
200960	209	000821	721198	7679411	721198	7652234	27.2
200950	209	000821	721406	7652287	721401	7679209	26.9
200940	209	000821	721594	7678934	721600	7652240	26.7
200930	209	000821	721812	7652270	721800	7678718	26.5
200920	209	000821	721998	7678463	722003	7652222	26.2
200910	209	000821	722181	7652281	722196	7678243	26.0
200900	209	000821	722398	7677957	722398	7652221	25.7
200890	209	000821	722596	7652277	722597	7677781	25.5
200880	209	000821	722806	7677462	722800	7652230	25.2
200870	209	000821	723026	7652263	723002	7677283	25.0
200860	209	000821	723202	7677013	723201	7652231	24.8
200850	210	000822	723405	7652273	723391	7676813	24.5
200840	210	000822	723597	7676535	723598	7652235	24.3
200830	210	000822	723806	7652289	723800	7676316	24.0
200820	210	000822	724001	7676043	723996	7652243	23.8
200810	210	000822	724200	7652269	724200	7675870	23.6
200800	210	000822	724398	7675825	724403	7652223	23.6
200790	210	000822	724613	7652269	724600	7675875	23.6
200780	210	000822	724800	7675836	724803	7652236	23.6
200770	210	000822	725007	7652268	725003	7675878	23.6
200760	211	000822	725203	7675836	725201	7652232	23.6
200750	211	000822	725400	7675841	725396	7652237	23.6
200740	211	000822	725599	7652271	725604	7675875	23.6
200730	211	000822	725783	7675842	725800	7652239	23.6
200720	211	000822	725999	7652268	726000	7675883	23.6
200710	211	000822	726194	7675831	726201	7652239	23.6
200700	211	000822	726416	7652271	726399	7675869	23.6
200690	211	000822	726601	7675831	726600	7652233	23.6
300520	301	000819	726795	7652277	726802	7675879	23.6
300510	301	000819	730004	7665997	730001	7675872	9.9
300500	301	000819	730204	7675824	730199	7665885	9.9
300490	301	000819	730381	7665862	730400	7675880	10.0
300480	301	000819	730613	7675842	730600	7665763	10.1

300470	301	000819	730807	7665724	730801	7675868	10.1
300460	301	000819	730990	7675823	731000	7665608	10.2
300450	301	000819	731186	7665579	731200	7675879	10.3
300440	301	000819	731409	7675826	731401	7665474	10.4
300430	301	000819	731613	7665433	731600	7675869	10.4
300420	301	000819	731806	7675852	731798	7665334	10.5
300410	301	000819	731997	7665293	731997	7675865	10.6
300400	301	000819	732197	7675830	732194	7665173	10.7
300390	301	000819	732405	7665136	732402	7675867	10.7
300380	301	000819	732599	7675830	732598	7665040	10.8
300370	301	000819	732803	7665008	732802	7675878	10.9
300360	301	000819	733000	7675829	732996	7664903	10.9
300350	301	000819	733198	7664851	733201	7675877	11.0
300340	301	000819	733414	7675835	733393	7664756	11.1
300330	301	000819	733596	7664725	733603	7675855	11.1
300320	301	000819	733804	7675815	733800	7664611	11.2
300310	301	000819	734008	7664581	734002	7675862	11.3
300300	301	000819	734201	7675823	734192	7664464	11.4
300290	301	000819	734403	7664440	734398	7675867	11.4
300280	301	000819	734600	7675823	734599	7664338	11.5
300270	301	000819	734846	7664284	734804	7675857	11.6
300260	301	000819	734995	7675715	734995	7664174	11.5
300250	301	000819	735202	7664155	735200	7675587	11.4
300240	301	000819	735397	7675383	735400	7664043	11.3
300230	301	000819	735618	7663991	735599	7675252	11.3
300220	301	000819	735801	7675044	735800	7663897	11.1
300210	301	000819	736006	7663865	735998	7674898	11.0
300200	301	000819	736192	7674699	736201	7663742	11.0
300190	301	000819	736409	7663709	736401	7674560	10.9
300180	301	000819	736597	7674357	736599	7663624	10.7
300170	301	000819	736806	7663580	736799	7674228	10.6
300160	301	000819	737003	7674031	737000	7663483	10.5
300150	301	000819	737196	7663442	737200	7673885	10.4
300140	301	000819	737399	7673697	737396	7663342	10.4
300130	301	000819	737600	7663294	737606	7673554	10.3
300120	301	000819	737806	7673352	737797	7663188	10.2
300110	301	000819	738010	7663148	737998	7673221	10.1
300100	301	000819	738192	7673039	738202	7663036	10.0
300090	301	000819	738403	7662999	738407	7672888	9.9
300080	301	000819	738590	7672690	738598	7662895	9.8
300070	301	000819	738798	7662882	738799	7672552	9.7
300060	301	000819	739001	7672338	738997	7662767	9.6
300050	301	000819	739179	7662732	739204	7672208	9.5
300040	301	000819	739387	7672010	739402	7662618	9.4
300030	301	000819	739605	7662577	739602	7671859	9.3
300020	301	000819	739803	7671654	739800	7662469	9.2
300010	301	000819	740024	7662419	740000	7671526	9.1
300010	301	000819	740194	7671333	740197	7662340	9.0

TOTALS BY FLIGHT

FLIGHT	LINE KM
1	579.2
2	261.6
3	536.7
5	280.4
6	750.8
7	730.0
8	733.0
9	716.1
10	213.8
11	188.8
91	495.2
TOTAL	5485.6

LINE KM REPORT FOR a39804m.ltd

LINE	FLT	DATE	START COORDINATE	END COORDINATE	LINE KM
490020	491	000814	749919	7675996	4.9
490030	491	000814	754756	7677996	8.7
490040	491	000814	746112	7679988	8.7
490050	491	000814	754776	7682000	8.7
400010	401	000814	746075	7683993	8.8
400020	401	000814	754600	7685485	11.3
400030	401	000814	754393	7674287	11.2
400040	401	000814	754199	7685495	11.2
400050	401	000814	754009	7674458	11.1
400060	401	000814	753804	7685495	11.0
400070	401	000814	753601	7674616	10.9
400080	401	000814	753396	7685503	10.9
400090	401	000814	753184	7674765	10.8
400100	401	000814	752999	7685501	10.7
400110	401	000814	752798	7674910	10.6
400120	401	000814	752607	7685509	10.5
400130	401	000814	752400	7675062	10.5
400140	401	000814	752196	7685494	10.4
400150	401	000814	752014	7675207	10.3
400160	401	000814	751798	7685497	10.2
400170	401	000814	751603	7675369	10.2
400180	401	000814	751395	7685489	10.1
400190	401	000814	751200	7675527	10.0
400200	401	000814	751002	7685503	9.9
400210	401	000814	750800	7675682	9.9
400220	401	000814	750600	7685497	9.8
400230	401	000814	750407	7675851	9.7
400240	401	000814	750200	7685501	9.6
400250	401	000814	750010	7676002	9.5
400260	401	000814	749791	7685512	9.5
400270	401	000814	749610	7676148	9.4
400280	401	000814	749404	7685496	9.3
400290	401	000814	749209	7676323	9.2
400300	401	000814	748989	7685500	9.1
400310	401	000814	748790	7676473	9.1
400320	401	000814	748593	7685500	9.0
400330	401	000814	748403	7676630	8.9
400340	401	000814	748204	7685511	8.8
400350	401	000814	748015	7676779	8.8
400360	401	000814	747799	7685494	8.7
400370	401	000814	747596	7676938	8.6
400380	401	000814	747393	7685498	8.5
400390	401	000814	747202	7677108	8.4
400400	401	000814	747003	7685492	8.4
400410	401	000814	746784	7677274	8.3
400420	401	000814	746605	7685507	8.2
400430	401	000814	746408	7677398	8.1
400430	401	000814	746201	7685510	8.1

TOTALS BY FLIGHT

FLIGHT	LINE KM
1	416.7
91	39.7
TOTAL	456.5