Logistics Report

for a

DETAILED AIRBORNE MAGNETIC, RADIOMETRIC AND DIGITAL ELEVATION SURVEY

for the

GOOMADEER PROJECT

carried out on behalf of

Cameco Australia Pty Ltd

by

(UTS Job #A397)

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1 GENERAL SURVEY INFORMATION

In July 2001, UTS Geophysics conducted low level airborne geophysical surveys approximately 62km west of Maningrida for Cameco Australia Pty LTD.

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

The survey commenced on the 5th July 2001 and was completed on the 15th July 2001.

UTS Geophysics provided the described survey for the following company:

Cameco Australia Pty Ltd
66 Winnellie Road
WINNELLIE, NT, 0821

2 SURVEY LOCATION

The areas surveyed were approximately 62km west of Maningrida in the Northern Territory. Survey boundary coordinates are 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 53 with a central meridian of 135 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 proprietory flight planning and survey navigation system.
- UTS proprietory 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, registrations VH-HVP.

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 proprietory 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^{o}C to +50^{o}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^{o}C to +50^{o}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 0.1 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 10 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 48 litres
- Sample rate 2 Hz

4 PERSONNEL

4.1 Field Operations

UTS Geophysics operator and data processor	Adam Schubert
UTS Geophysics Survey Pilots	Adam King Mike Smith John Zammit

4.2 Project Management

Cameco Australia Pty Ltd	Geoff Beckitt
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
Cameco	200m	090-270	2000m	000-180	60m	5563
TOTAL						**5563**

The total number of line kilometres of survey data collected over the survey areas specified in the above table was 5563km.

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 Kakadu Lodge in Jabiru in the Nothern Territory. The aircraft was operated from the Jabiru Airport.

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
05/07/01	03	T1	Goomadeer Project- Tie Lines 390180-390010	18	507
05/07/01	03	01	Goomadeer Project- Traverse Lines 300010-300310	31	609
06/07/01	03	02	Goomadeer Project- Traverse Lines 300320-300580	27	588
06/07/01	03	03	Goomadeer Project- Traverse Lines 300590-300680	10	218
07/07/01	03	04	Goomadeer Project- Traverse Lines 300690-300890	21	457
07/07/01	03	05	Goomadeer Project- Traverse Lines 301000-301250	26	566
08/07/01	03	06	Goomadeer Project- Traverse Lines 300900-300990 Goomadeer Project- Traverse Lines 301260-301370	22	479
13/07/01	03	07	Goomadeer Project- Traverse Lines 301380-301530	16	549
14/07/01	03	08	Goomadeer Project- Traverse Lines 301540-301690	16	581
14/07/01	03	09	Goomadeer Project- Traverse Lines 301700-301750	6	218
15/07/01	03	10	Goomadeer Project- Traverse Lines 301760-301980	23	525
15/07/01	03	11	Goomadeer Project- Traverse Lines 301990-302320	34	221
Total					5563

A complete survey kilometer 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
Cameco	26/06/01 – 15/07/01	41	500m North of Jabiru Airport off Jabiru-Ranger Access Road T-Junction

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 reflown 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 reflown 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: A39703

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 (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	F7.1	TERRAIN HEIGHT (WGS84)	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

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 (WGS84)	degrees
7	F13.7	LONGITUDE (WGS84)	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 (WGS84)	metres

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	F7.1	URANIUM UP (RAW)	Counts/sec
25	F8.1	TOTAL COUNT (CORRECTED)	Counts/sec
26	F7.1	POTASSIUM (CORRECTED)	Counts/sec
27	F7.1	URANIUM (CORRECTED)	Counts/sec
28	F7.1	THORIUM (CORRECTED)	Counts/sec
29	F7.3	POTASSIUM GRND CONCENTRATION	%
30	F7.3	URANIUM GRND CONCENTRATION	ppm
31	F7.3	THORIUM GRND CONCENTRATION	ppm

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 - 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
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.

WGS84	World Geodetic System 1984
Coordinate Type	Geographical
Semi Major Axis	6378137m
Flattening	1/298.257223563

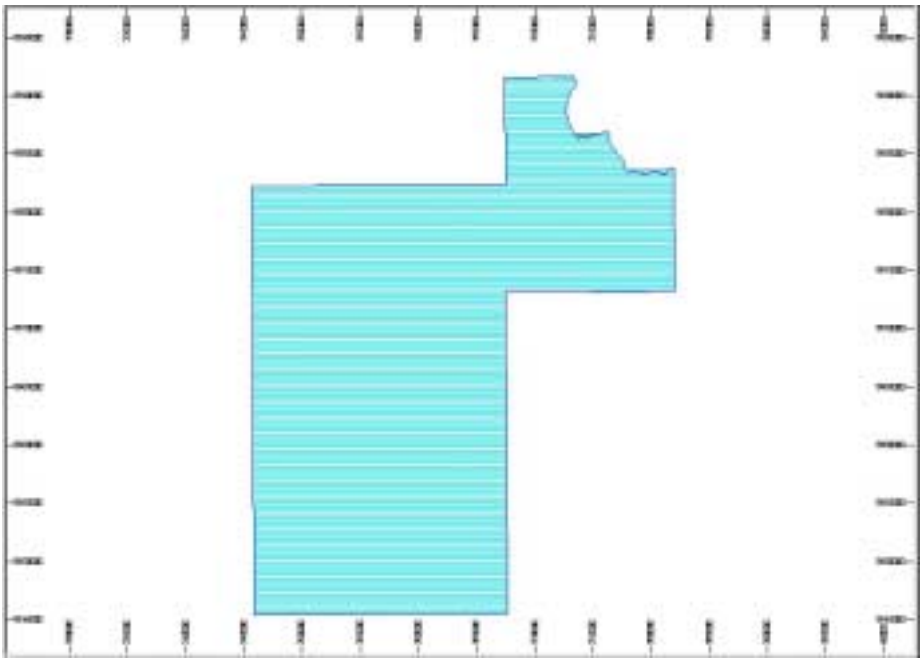
AMG84	Australian Map Grid 1984
Coordinate Type	Universal Transverse Mercator Projection Grid
Geodetic datum	Australian Geodetic Datum
Semi Major Axis	6378160m
Flattening	1/298.25

MGA94	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

COORDINATES REPORT

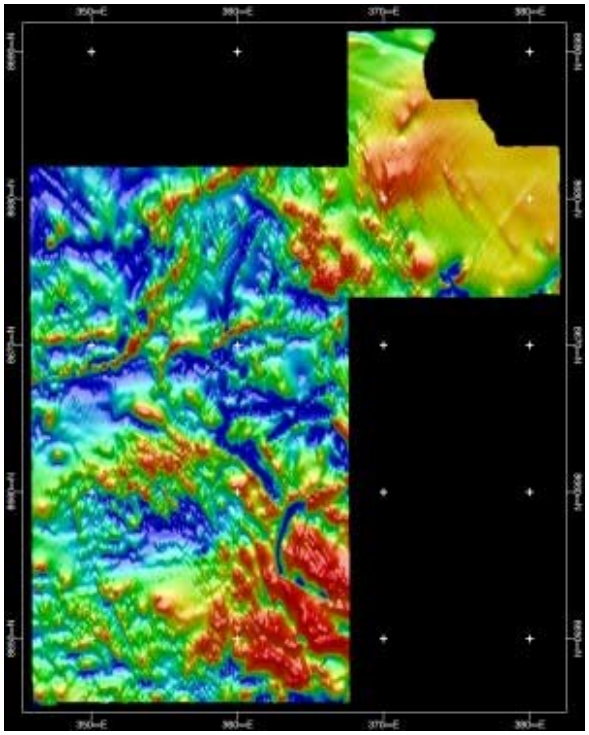
Job ID code: A39703
Client: Cameco
Job: Goomadeer Project
Coordinate System AMG 84, Grid Zone 53



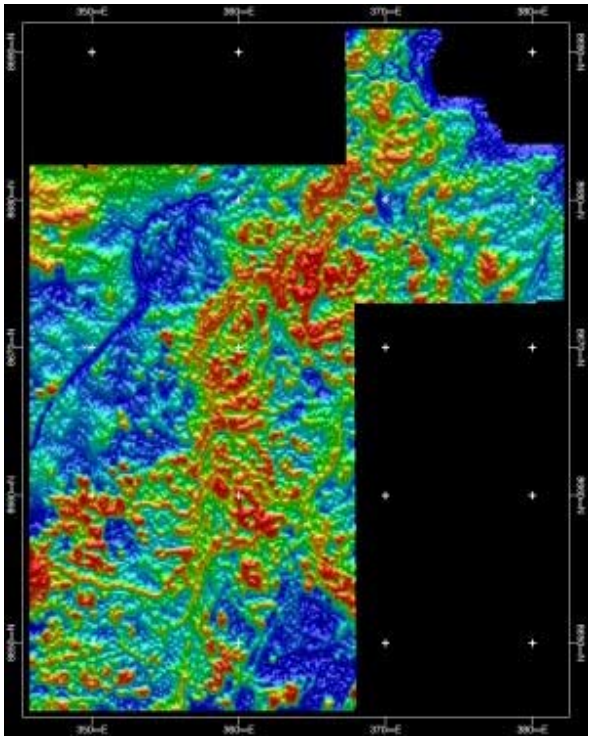
367504.000	8682366.000
345720.000	8682262.000
345911.000	8645392.000
367668.000	8645498.000
367545.000	8673149.000
382062.000	8673209.000
382021.000	8683778.000
381568.000	8683684.000
381266.000	8683314.000
380903.000	8683312.000
380599.000	8683557.000
380388.000	8683402.000
380207.000	8683432.000
379934.000	8683462.000
379482.000	8683153.000
379179.000	8683306.000
378966.000	8683581.000
378694.000	8683457.000
378391.000	8683425.000
378089.000	8683393.000
377632.000	8684098.000
377632.000	8684252.000
377631.000	8684528.000
377175.000	8684956.000
376566.000	8685814.000
376384.000	8686090.000
376383.000	8686336.000
376533.000	8686521.000
376290.000	8686827.000
375413.000	8686793.000
374748.000	8686513.000
374537.000	8686328.000
374143.000	8686480.000
373781.000	8686263.000
373385.000	8686815.000
372989.000	8687520.000
372928.000	8687673.000
372866.000	8687919.000
372711.000	8688748.000
372709.000	8689301.000
372919.000	8689762.000
373128.000	8690316.000
373520.000	8690840.000
373518.000	8691239.000
373365.000	8691607.000
367464.000	8691582.000

APPENDIX D - PROJECT DATA OVERVIEW

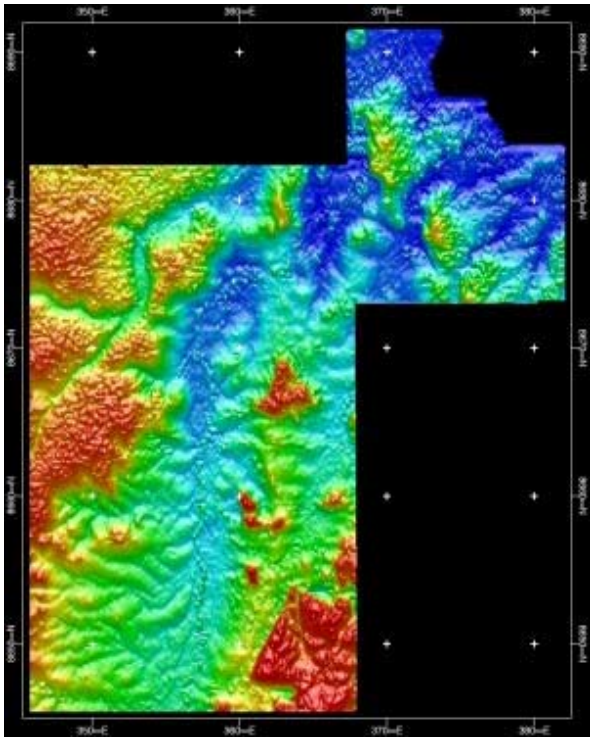
Goomadeer Project



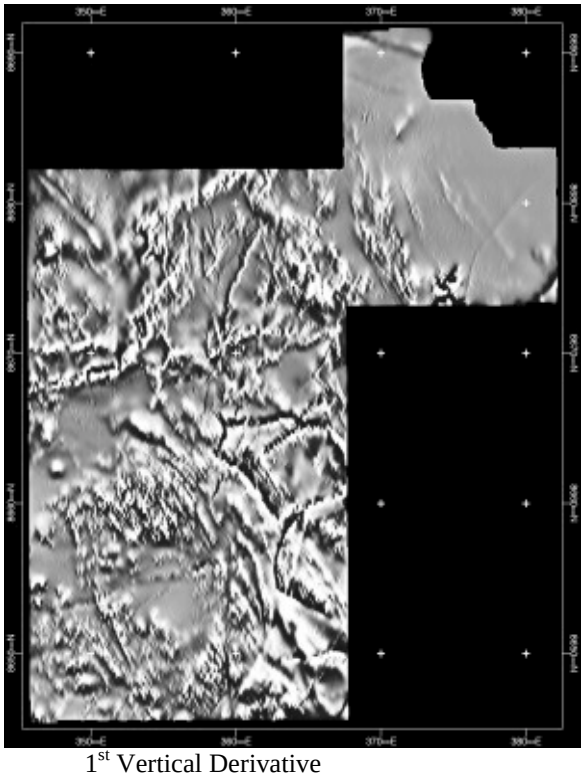
Total Magnetic Intensity



Radiometric Total Count



Digital Terrain Model



1st Vertical Derivative

APPENDIX E – RADIOMETRIC CALIBRATION RESULTS

Source Check Report Page: 1

Date	Th.ROITh	Th.ROIU	Th.ROIK	U.ROITh	U.ROIU	U.ROIK	B/G.ROITh	B/G.ROIU	B/G.ROIK
107050	46067	9564	18881	34008	39687	27874	19960	13315	22517
107055	45416	9383	17993	34685	40839	28803	20119	13850	22703
107060	45257	9873	18423	34331	41370	28744	20278	13981	22858
107065	45404	9313	18217	34343	39990	27579	20133	13710	22903
107070	45251	9785	18479	34639	41956	29206	20284	14217	22838
107075	45393	9875	19362	34236	41797	29129	20142	14046	22761
107080	45287	9877	18791	34683	42901	29060	20248	14173	23065
107085	45550	9610	19275	34596	42374	28990	19985	14395	22928
107130	45669	9570	18828	34188	40978	28101	19866	13732	22605
107135	45472	9433	17914	34732	41736	29773	20063	14114	22910
107140	45411	9712	18938	34659	42283	30230	20124	13909	22503
107145	45406	9655	19399	34449	42930	29407	20129	13765	22858
107150	45195	9447	18818	34740	42498	29724	20340	14874	24301
107155	45630	9531	18989	34641	41841	28555	19905	13560	22720
Mean	45458	9616	18736	34495	41656	28941	20113	13974	22891

Per Cent Source Check Report Page 1

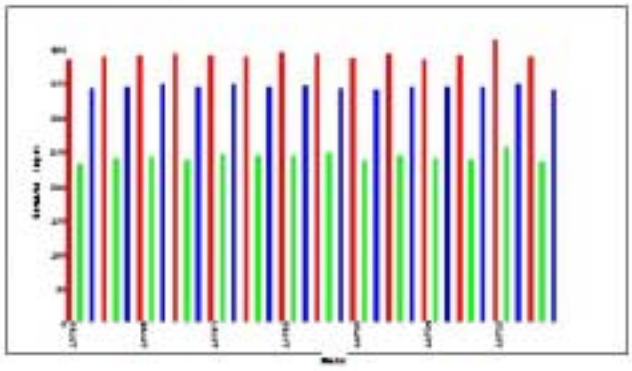
Date	Th.ROITh	Th.ROIU	Th.ROIK	U.ROITh	U.ROIU	U.ROIK	B/G.ROITh	B/G.ROIU	B/G.ROIK
107050	1.3	-0.5	0.8	-1.4	-4.7	-3.7	-0.7	-4.7	-1.6
107055	-0.1	-2.4	-4.0	0.6	-2.0	-0.5	0.0	-0.9	-0.8
107060	-0.4	2.7	-1.7	-0.5	-0.7	-0.7	0.8	0.0	-0.1
107065	-0.1	-3.2	-2.8	-0.4	-4.0	-4.7	0.1	-1.9	0.1
107070	-0.5	1.8	-1.4	0.4	0.7	0.9	0.8	1.7	-0.2
107075	-0.1	2.7	3.3	-0.8	0.3	0.6	0.1	0.5	-0.6
107080	-0.4	2.7	0.3	0.5	3.0	0.4	0.7	1.4	0.8
107085	0.2	-0.1	2.9	0.3	1.7	0.2	-0.6	3.0	0.2
107130	0.5	-0.5	0.5	-0.9	-1.6	-2.9	-1.2	-1.7	-1.2
107135	0.0	-1.9	-4.4	0.7	0.2	2.9	-0.2	1.0	0.1
107140	-0.1	1.0	1.1	0.5	1.5	4.5	0.1	-0.5	-1.7
107145	-0.1	0.4	3.5	-0.1	3.1	1.6	0.1	-1.5	-0.1
107150	-0.6	-1.8	0.4	0.7	2.0	2.7	1.1	6.4	6.2
107155	0.4	-0.9	1.3	0.4	0.4	-1.3	-1.0	-3.0	-0.7

Resolution Report Page: 1

Date	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	Sum	% Var
10705	4.1	4.3	4.7	4.5	4.3	4.7	4.4	5.3	4.9	4.9	5.0	4.4	4.8	0.6
10706	4.0	4.4	4.6	4.6	4.4	4.6	4.4	5.1	5.0	4.9	4.9	4.3	4.8	0.6
10707	3.9	4.4	4.5	4.5	4.4	4.9	4.5	5.3	4.9	4.9	4.9	4.2	4.8	0.6
10708	4.1	4.4	4.5	4.4	4.4	4.7	4.4	5.3	4.8	4.9	4.8	4.2	4.7	-1.5
10713	4.1	4.3	4.6	4.4	4.3	4.6	4.4	5.1	5.0	4.9	5.0	4.3	4.8	0.6
10714	4.1	4.3	4.7	4.5	4.5	4.6	4.5	4.0	4.0	4.0	4.9	4.2	4.7	-1.5
10715	4.0	4.4	4.5	4.4	4.4	4.6	4.4	4.9	4.8	5.1	4.9	4.2	4.8	0.6
Mean	4.0	4.4	4.6	4.5	4.4	4.7	4.4	5.1	4.9	4.9	4.9	4.3	4.8	

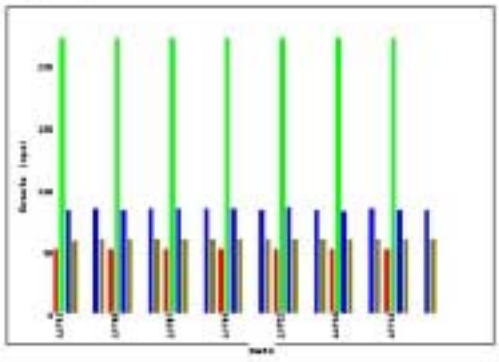
Background Source Test (Ground)

Date	K	K	Th	% Error
13705	276.5	220.0	335.2	-0.5
13706	281.0	230.0	336.3	0.3
13706	281.7	226.5	335.6	-0.6
13707	285.8	236.3	338.1	0.8
13707	279.8	224.1	335.7	-0.1
13708	284.4	226.2	337.5	0.6
13708	282.1	228.8	336.1	0.4
13712	276.8	228.8	331.1	-1.4
13712	281.2	232.2	334.4	0.2
13714	275.1	221.8	335.4	-0.8
13714	281.0	226.6	335.5	-0.4
13715	426.0	247.8	338.8	4.5
13715	278.7	226.0	331.8	-1.4
Averg	281.5	227.9	225.2	0.8



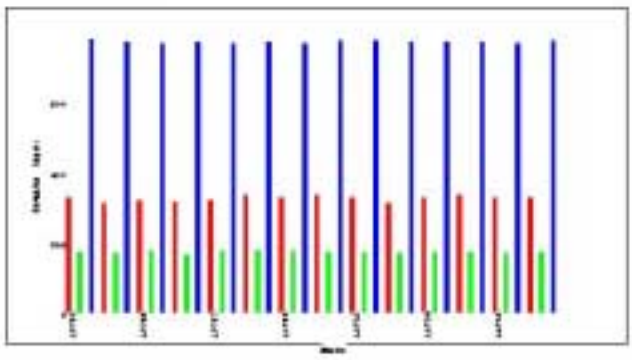
Spectrometer Calibration (Ground)

Date	Eye Res(Th)	Peak Ch(Th)	Eye Res(Cs)	Peak Ch(Cs)
13705	48.0	218.1	79.8	54.8
13705	0.0	0.0	80.8	54.8
13706	48.0	218.1	79.8	55.1
13706	0.0	0.0	80.8	54.8
13707	48.0	218.1	80.8	55.0
13707	0.0	0.0	80.8	55.0
13708	47.0	218.1	80.8	55.0
13708	0.0	0.0	79.8	55.1
13713	48.0	217.9	81.8	55.1
13713	0.0	0.0	79.8	54.9
13716	47.0	218.0	76.8	55.0
13716	0.0	0.0	80.8	55.0
13715	48.0	218.0	79.8	55.1
13715	0.0	0.0	79.8	55.2
Averg	47.7	218.0	79.5	55.0



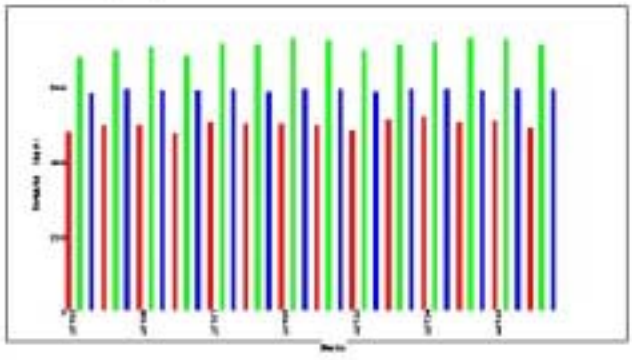
Thorium Source Test (Ground)

Date	K	K	Th	% Error
13705	225.0	158.5	356.0	-1.5
13706	227.1	164.6	354.3	-0.9
13706	224.6	158.2	356.7	-1.6
13707	228.0	160.1	354.2	-0.8
13707	222.7	164.6	355.5	1.1
13708	231.2	164.6	356.8	0.2
13708	231.0	162.2	358.2	0.0
13712	233.8	158.3	361.1	0.9
13712	228.6	157.2	357.9	-1.0
13714	233.6	161.8	358.9	0.3
13714	234.2	162.8	356.8	0.0
13715	233.5	157.6	360.2	-0.5
13715	234.3	158.8	360.3	0.5
Averg	212.3	160.2	717.6	0.0



Uranium Source Test (Ground)

Date	K	K	Th	% Error
13705	480.1	696.6	378.1	-0.7
13706	476.1	688.3	375.3	-0.6
13706	476.6	686.5	378.4	-0.0
13707	483.8	698.3	377.1	0.7
13707	483.5	696.6	376.6	0.1
13708	484.9	713.0	378.0	1.5
13708	482.2	704.2	376.0	0.0
13712	478.4	693.0	380.8	-1.2
13712	484.2	698.6	378.9	1.1
13714	481.8	704.7	377.6	1.0
13714	484.1	713.5	374.1	1.6
13715	482.6	708.2	379.0	1.0
13715	473.9	691.6	377.6	-0.1
Averg	482.4	694.3	374.9	0.0



APPENDIX F – DATA PROCESSING PARAMETERS

Magnetic Data

Goomadeer Project

IGRF date	2001.63
IGRF mean value	-46021 nT
Magnetic inclination	-39.223 deg
Magnetic declination	3.923 deg
Diurnal base value	46440 nT

Radiometric Data

Goomadeer Project

Sensitivity Constants at 60m flying height

Total Count:	37.60 cps/dose rate
Potassium:	131.30 cps/%k
Uranium:	12.30 cps/ppm
Thorium:	7.90 cps/ppm

APPENDIX G – SURVEY KILOMETRE REPORT

LINE KM REPORT FOR a39703m.ldt

LINE	FLT	DATE	START COORDINATE		END COORDINATE		LINE KM
390170	391	010705	346703	8645368	346693	8682353	37.0
390160	391	010705	348701	8682317	348700	8645335	37.0
390150	391	010705	350697	8645390	350699	8682356	37.0
390140	391	010705	352706	8682322	352701	8645355	37.0
390130	391	010705	354705	8645400	354698	8682370	37.0
390120	391	010705	356695	8682339	356704	8645366	37.0
390110	391	010705	358684	8645417	358696	8682393	37.0
390100	391	010705	360696	8682353	360701	8645393	37.0
390090	391	010705	362699	8645429	362703	8682431	37.0
390080	391	010705	364704	8682386	364707	8645414	37.0
390070	391	010705	366686	8645484	366699	8682440	37.0
390060	391	010705	368696	8691628	368698	8673083	18.5
390050	391	010705	370697	8673122	370699	8691660	18.5
390040	391	010705	372695	8691646	372693	8673083	18.6
390030	391	010705	374698	8673149	374700	8686572	13.4
390020	391	010705	376700	8685720	376704	8673118	12.6
390010	391	010705	378701	8673165	378702	8683557	10.4
300020	301	010705	380688	8683556	380701	8673122	10.4
300010	301	010705	367687	8645601	345847	8645601	21.8
300030	301	010705	345881	8645398	347644	8645396	1.8
300040	301	010705	345882	8645801	367739	8645803	21.9
300050	301	010705	345864	8645998	367750	8646001	21.9
300060	301	010705	367703	8646192	345821	8646197	21.9
300070	301	010705	345856	8646403	367747	8646400	21.9
300080	301	010705	367693	8646601	345836	8646600	21.9
300090	301	010705	345872	8646803	367733	8646797	21.9
300100	301	010705	367706	8647004	345816	8646993	21.9
300110	301	010705	345849	8647202	367738	8647194	21.9
300120	301	010705	367703	8647400	345828	8647394	21.9
300130	301	010705	345863	8647594	367741	8647589	21.9
300140	301	010705	367699	8647764	345832	8647797	21.9
300150	301	010705	345845	8647990	367722	8648001	21.9
300160	301	010705	367691	8648186	345819	8648199	21.9
300170	301	010705	345861	8648400	367723	8648396	21.9
300180	301	010705	367684	8648583	345825	8648602	21.9
300190	301	010705	345845	8648800	367739	8648797	21.9
300200	301	010705	367684	8648993	345819	8648996	21.9
300210	301	010705	345853	8649207	367719	8649201	21.9
300220	301	010705	367684	8649401	345819	8649398	21.9
300230	301	010705	345844	8649596	367731	8649599	21.9
300240	301	010705	367684	8649807	345801	8649796	21.9
300250	301	010705	345835	8649984	367735	8650001	21.9
300260	301	010705	367683	8650191	345812	8650199	21.9
300270	301	010705	345846	8650398	367716	8650401	21.9
300280	301	010705	367683	8650586	345797	8650600	21.9
300290	301	010705	345845	8650788	367720	8650794	21.9
300300	301	010705	367677	8650993	345801	8651003	21.9
300310	301	010705	345848	8651201	367706	8651194	21.9
300320	302	010706	367666	8651396	345802	8651398	21.9
300330	302	010706	345838	8651597	367731	8651598	21.9
300340	302	010706	367673	8651796	345793	8651797	21.9
300350	302	010706	345843	8651992	367728	8651999	21.9
300360	302	010706	367668	8652202	345782	8652207	21.9
300370	302	010706	345843	8652399	367727	8652401	21.9
300380	302	010706	367678	8652611	345788	8652599	21.9
300390	302	010706	345837	8652792	367710	8652797	21.9
300400	302	010706	367662	8652999	345801	8653002	21.9
300410	302	010706	345821	8653200	367717	8653200	21.9
300420	302	010706	367667	8653402	345802	8653403	21.9
300430	302	010706	345833	8653597	367717	8653600	21.9
300440	302	010706	367659	8653800	345796	8653802	21.9
300450	302	010706	345832	8653980	367701	8654000	21.9
300460	302	010706	367668	8654200	345775	8654201	21.9
300470	302	010706	345828	8654401	367711	8654400	21.9
300480	302	010706	367653	8654585	345795	8654608	21.9
300490	302	010706	345819	8654803	367702	8654798	21.9
300500	302	010706	367661	8654994	345770	8654994	21.9
300510	302	010706	345821	8655196	367714	8655195	21.9
300520	302	010706	367653	8655403	345770	8655400	21.9
300530	302	010706	345810	8655597	367705	8655601	21.9
300540	302	010706	367641	8655793	345769	8655805	21.9
300550	302	010706	345810	8655999	367713	8655998	21.9

300560	302	010706	367642	8656202	345767	8656204	21.9
300570	302	010706	345804	8656399	367706	8656397	21.9
300580	302	010706	367654	8656603	345768	8656600	21.9
300590	303	010706	345809	8656793	367701	8656809	21.9
300600	303	010706	345811	8657008	367701	8657003	21.9
300610	303	010706	367633	8657195	345776	8657203	21.9
300620	303	010706	345811	8657402	367684	8657402	21.9
300630	303	010706	367634	8657597	345781	8657610	21.9
300640	303	010706	345805	8657793	367702	8657798	21.9
300650	303	010706	367635	8658010	345766	8657998	21.9
300660	303	010706	345792	8658206	367683	8658201	21.9
300670	303	010706	367631	8658394	345754	8658400	21.9
300680	303	010706	345814	8658603	367698	8658592	21.9
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300700	304	010707	345814	8659001	367687	8658999	21.9
300710	304	010707	367644	8659175	345763	8659198	21.9
300720	304	010707	345797	8659406	367675	8659400	21.9
300730	304	010707	367646	8659598	345752	8659603	21.9
300740	304	010707	345801	8659792	367690	8659801	21.9
300750	304	010707	367645	8659998	345763	8660000	21.9
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300770	304	010707	367643	8660425	345755	8660402	21.9
300780	304	010707	345792	8660598	367682	8660601	21.9
300790	304	010707	367632	8660799	345752	8660804	21.9
300800	304	010707	345783	8661005	367680	8660995	21.9
300810	304	010707	367626	8661217	345741	8661199	21.9
300820	304	010707	345785	8661399	367674	8661401	21.9
300830	304	010707	367635	8661604	345758	8661598	21.9
300840	304	010707	345783	8661803	367666	8661800	21.9
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300870	304	010707	367596	8662396	345751	8662399	21.8
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300890	304	010707	367618	8662801	345754	8662800	21.9
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301030	305	010707	345764	8665586	367662	8665597	21.9
301040	305	010707	367616	8665803	345738	8665800	21.9
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300980	306	010708	367623	8664585	345731	8664610	21.9
300990	306	010708	345766	8664795	367672	8664784	21.9
301260	306	010708	367607	8664995	345735	8665003	21.9
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301280	306	010708	367576	8670606	345687	8670605	21.9
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301300	306	010708	367569	8671003	345691	8671001	21.9
301310	306	010708	345749	8671205	367629	8671203	21.9
301320	306	010708	367587	8671408	345710	8671398	21.9
301330	306	010708	345735	8671596	367626	8671598	21.9
301340	306	010708	367572	8671787	345692	8671802	21.9
301350	306	010708	345733	8672002	367627	8672000	21.9
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301400	307	010713	367581	8672984	345678	8673000	21.9
301410	307	010713	345732	8673198	380023	8673195	34.3
301420	307	010713	382106	8673399	345681	8673396	36.4
301430	307	010713	345737	8673604	382155	8673600	36.4
301440	307	010713	382085	8673798	345696	8673790	36.4
301450	307	010713	345717	8673998	382133	8674004	36.4
301460	307	010713	382079	8674199	345680	8674201	36.4
301470	307	010713	345714	8674395	382142	8674404	36.4
301480	307	010713	382084	8674627	345673	8674605	36.4
301490	307	010713	345728	8674802	382150	8674798	36.4
301500	307	010713	382084	8675000	345670	8675000	36.4
301510	307	010713	345724	8675192	382146	8675201	36.4
301520	307	010713	382097	8675367	345670	8675394	36.4
301530	307	010713	345714	8675592	382145	8675601	36.4
301540	308	010714	382092	8675747	345668	8675799	36.4
301550	308	010714	345718	8676001	382142	8676000	36.4
301560	308	010714	382090	8676204	345659	8676200	36.4
301570	308	010714	345702	8676402	382129	8676400	36.4
301580	308	010714	382074	8676600	345657	8676602	36.4
301590	308	010714	345714	8676798	382128	8676801	36.4
301600	308	010714	382082	8677002	345668	8676998	36.4
301610	308	010714	345696	8677201	382124	8677195	36.4
301620	308	010714	382071	8677397	345679	8677404	36.4
301630	308	010714	345700	8677595	382132	8677600	36.4
301640	308	010714	382063	8677803	345653	8677798	36.4
301650	308	010714	345693	8678002	382116	8677999	36.4
301660	308	010714	382063	8678206	345668	8678203	36.4
301670	308	010714	345693	8678404	382135	8678401	36.4
301680	308	010714	382066	8678612	345655	8678603	36.4
301690	308	010714	345695	8678790	382131	8678809	36.4
301700	309	010714	382060	8679011	345667	8679002	36.4
301710	309	010714	345710	8679202	382085	8679205	36.4
301720	309	010714	382075	8679407	345660	8679395	36.4
301730	309	010714	345686	8679673	382120	8679607	36.5
300000	309	010714	382060	8679661	364807	8679801	17.3
301740	309	010714	364710	8679805	345653	8679801	19.1
301750	309	010714	345705	8680003	382096	8680005	36.4
301760	310	010715	382070	8680202	345664	8680199	36.4
301770	310	010715	345711	8680406	382111	8680399	36.4
301780	310	010715	382076	8680618	345657	8680595	36.4
301790	310	010715	382030	8680779	345652	8680797	36.4
301800	310	010715	345685	8681027	382111	8681002	36.4
301810	310	010715	382066	8681211	345634	8681200	36.4
301820	310	010715	345692	8681414	382116	8681401	36.4
301830	310	010715	382049	8681595	345639	8681593	36.4
301840	310	010715	345679	8681803	382087	8681795	36.4
301850	310	010715	382056	8682008	345637	8681997	36.4
301860	310	010715	345684	8682203	382106	8682195	36.4
301870	310	010715	382049	8682499	367422	8682397	14.6
301880	310	010715	367463	8682664	382099	8682614	14.6
301890	310	010715	382042	8682790	367434	8682791	14.6
301900	310	010715	367461	8683039	382111	8682998	14.7
301910	310	010715	382054	8683176	367422	8683197	14.6
301920	310	010715	367464	8683411	382081	8683397	14.6
301930	310	010715	382064	8683606	367429	8683600	14.6
301940	310	010715	367458	8683814	377869	8683797	10.4
301950	310	010715	377728	8684007	367444	8683997	10.3
301960	310	010715	367457	8684218	377675	8684198	10.2
301970	310	010715	377671	8684416	367425	8684395	10.2
301980	310	010715	367442	8684600	377615	8684599	10.2
301990	311	010715	377408	8684809	367415	8684798	10.0
302000	311	010715	367456	8685000	377257	8685002	9.8
302010	311	010715	377040	8685204	367405	8685201	9.6
302020	311	010715	367449	8685401	376959	8685394	9.5
302030	311	010715	376762	8685602	367419	8685601	9.3
302040	311	010715	367453	8685805	376678	8685806	9.2
302050	311	010715	376508	8685966	367402	8685998	9.1
302060	311	010715	367449	8686200	376464	8686200	9.0
302070	311	010715	376498	8686399	367411	8686401	9.1
302080	311	010715	367443	8686605	376585	8686600	9.1
302090	311	010715	376367	8686803	367394	8686801	9.0
302100	311	010715	367430	8686986	373367	8687005	5.9
302110	311	010715	373224	8687209	367409	8687208	5.8
302120	311	010715	367437	8687403	373153	8687400	5.7
302130	311	010715	372987	8687604	367392	8687601	5.6
302140	311	010715	367437	8687801	372980	8687801	5.5
302150	311	010715	372881	8688016	367413	8688000	5.5
302160	311	010715	367436	8688208	372903	8688200	5.5
302170	311	010715	372801	8688406	367394	8688399	5.4
302180	311	010715	367430	8688601	372831	8688598	5.4

302190	311	010715	372748	8688801	367389	8688800	5.4
302200	311	010715	367417	8689003	372782	8689004	5.4
302210	311	010715	372730	8689211	367389	8689200	5.3
302220	311	010715	367421	8689399	372841	8689407	5.4
302230	311	010715	372880	8689592	367396	8689601	5.5
302240	311	010715	367428	8689798	373025	8689795	5.6
302250	311	010715	373040	8689997	367396	8689998	5.6
302260	311	010715	367429	8690195	373166	8690201	5.7
302270	311	010715	373223	8690390	367398	8690398	5.8
302280	311	010715	367426	8690599	373445	8690603	6.0
302290	311	010715	373519	8690780	367401	8690798	6.1
302300	311	010715	367432	8690999	373593	8691001	6.2
302310	311	010715	373553	8691204	367398	8691202	6.2
302320	311	010715	367433	8691397	373536	8691399	6.1
302320	311	010715	373334	8691609	370559	8691592	2.8

TOTALS BY FLIGHT

FLIGHT	LINE KM
1	658.0
2	590.9
3	218.8
4	459.6
5	569.2
6	481.6
7	551.6
8	582.7
9	218.4
10	527.9
11	226.3
91	509.3
TOTAL	5594.4