

**Logistics Report**

for a

**DETAILED AIRBORNE  
MAGNETIC, RADIOMETRIC AND  
DIGITAL TERRAIN SURVEY**

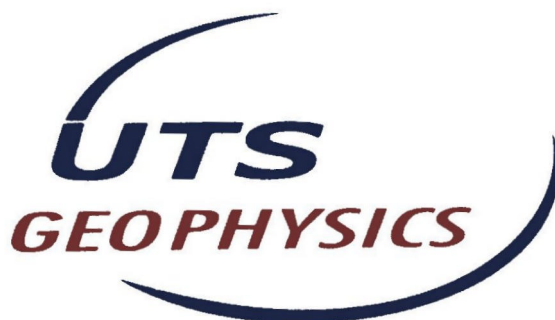
for the

**MANYALLALUK, ARRARA, SANDY POINT AND  
MORDIJIMUK PROJECTS**

carried out on behalf of

**CAMECO AUSTRALIA PTY LTD**

by



(UTS Job #A576)

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## **1 GENERAL SURVEY INFORMATION**

In September and October 2003, UTS Geophysics conducted a low level airborne geophysical survey for the following company:

Cameco Australia Pty Ltd  
66 Winnellie Road  
WINNELLIE, NT 0820

Acquisition for this survey commenced on the 26<sup>th</sup> September 2003 and was completed on the 7<sup>th</sup> October 2003.

## **2 SURVEY LOCATION**

The area surveyed was approximately 60km North East of Katherine and 60km North East of Jabiru 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 proprietary flight planning and survey navigation system.
- UTS proprietary high speed digital data acquisition system.
- Novatel 3951R, 12 channel precision navigation GPS.
- RACAL MK IV real time differential GPS system.
- 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

An FU24-950 series fixed wing survey aircraft owned and operated by UTS Geophysics, registration VH-HVP, was used for this survey. The specifications are as follows:

## Power Plant – VH-HVP

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

## Performance - VH-HVP

- Cruise speed 105 Kn
- Survey speed 100 Kn
- Stall speed 45 Kn
- Range 970 Km
- Endurance (no reserves) 5.6 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                                    |
| ● Sample rate                               | 0.5 Seconds (2 Hz)                               |
| ● GPS satellite tracking channels           | 12 parallel                                      |
| ● Typical differentially corrected accuracy | 1-2 metres (horizontal)<br>3-5 metres (vertical) |

### **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 models                      King KRA-405, twin antenna altimeter
- Accuracy    0.3 metres
- 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.

### 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 *Three Component Vector Magnetometer*

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

- Model Develco Fluxgate Magnetometer
- Sample Rate 0.1 seconds (10Hz)
- Resolution 0.1nT
- Operating Range -100,000nT 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 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 5 seconds (0.2 Hz)
- 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 0.10 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*

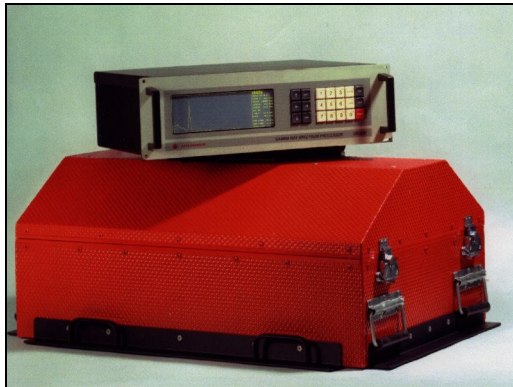
Temperature and humidity measurements were made during the survey at a sample rate of 10Hz. Ambient temperature was measured with a resolution of 0.1 degree Celsius and ambient humidity to a resolution of 0.1 percent.

### 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 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 along with a location map for the test lines.

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



## **4 PERSONNEL**

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

UTS Geophysics operators and data processors                      Sean Plunkett

UTS Geophysics Survey Pilots    Graham Simpson

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

Cameco Australia Pty Ltd    Geoff Beckitt

UTS Geophysics Perth Office    Nino Tufilli

## 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
Manyallaluk (01 + 02)	200m	000-180	2000m	090-270	30m	3480
Arrara	50m	090-270	500m	000-180	30m	1861
Sandy Point	50m	090-270	500m	000-180	30m	158
Mordijimuk	50m	090-270	500m	000-180	30m	1108
<b>TOTAL</b>						<b>6606</b>

The total number of line kilometres of survey data collected over the survey areas specified in the above table was 6606.

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 base location used for operating the aircraft and performing in-field quality control and data processing of the survey data was the Pine Tree Motel, in Katherine, and the Kakadu Lodge, Jabiru in the Northern Territory. The aircraft was operated from the Tindal and Jabiru airports. The flight logs are summarised in Appendix G.

### 6.1 Diurnal Magnetometer Locations

The following table contains the approximate locations where the diurnal base station magnetometers were located for the survey duration.

Area Name	Period	Base Station ID	Location
Manyallaluk Project	26/09/03 – 29/09/03	41	3km North of Tindal Runway
Arrara, Sandy Point and Mordijimuk Projects	01/10/03-07/10/03	41	500m north of the Jabiru airstrip

### 6.2 Survey Flight Logs

Flight Date	Area No	Flight No	Area Name / Survey Details	Lines Flown	Line Km Flown
26/09/03	01	01	Area 1 Traverse Lines: 100010-100090	9	304
27/09/03	01	02	Area 1 Traverse Lines: 100100-100280	19	702
	01	03	Area 1 Traverse Lines: 100290-100470	19	703
28/09/03	01	04	Area 1 Traverse Lines: 100480-100660	19	703
	01	05	Area 1 Traverse Lines: 100670-100940	28	693
29/09/03	01	T1	Area 1 Tie Lines: 190010-190180	18	309
	02	01	Area 2 Traverse Lines: 200010-200180	18	66
01/10/03	04	01	Area 4 Traverse Lines: 400010-400400	40	142
	04	T1	Area 4 Tie Lines: 490010-490080	8	16
02/10/03	05	01	Area 5 Traverse Lines: 500010-500670	67	442
03/10/03	05	02	Area 5 Traverse Lines: 500680-501090	42	564
	05	T1	Area 5 Tie Lines: 590010-590110, 590130-590210	20	62
05/10/03	05	T2	Area 5 Tie Lines: 590120, 590220-590310	11	39
	03	01	Area 3 Traverse Lines: 300010-300740, 300760-300820	81	492
06/10/03	03	02	Area 3 Traverse Lines: 300750, 300830-301510	70	638
07/10/03	03	03	Area 3 Traverse Lines: 301520-302580	107	565
	03	T1	Area 3 Tie Lines: 390010-390180	18	166

## 7 DATA PROCESSING PROCEDURES

### 7.1 *Data Pre-processing*

The raw survey data was loaded from the field tapes and the recorded data trimmed to the correct survey boundary extents. Any survey lines subsequently re flown were removed from the dataset.

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.

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

The synchronized, parallax corrected data was then exported as located ASCII data.

## 7.2 *Magnetic Data Processing*

The diurnal base station data was checked for spikes and steps, and suitably filtered prior to the removal of diurnal variations from the aircraft magnetic data.

The diurnal data was filtered with a 13 point moving average filter to reduce noise levels, followed by second difference filter was 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 2000 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.

Tie line levelling was applied to the data by least squares minimisation, using a polynomial fit of order 0, of the differences in magnetic values at the crossover points of the survey traverse and tie line data.

The least squares tie line levelling process employs a two pass Gauss-Seidel iterative scheme. The essential steps in this process are:

- In the first pass the tie lines were first adjusted to minimise, in the least squares sense, the crossover values with the traverse line values being held constant.
- The second pass held the levelled tied line values constant, and minimised in the least squares sense, the crossover values with traverses.
- The DC correction values to be applied to the traverse lines and tie lines were then applied to the magnetic data.

To reduce the effects of terrain induced variations the recorded magnetic field at the crossover points, points having a radar altimeter difference of 5 metres or a magnetic gradient of 0.16 nT/metre on the traverse or tie line were excluded from the tying process.

In order to remove any residual long wavelength variations in the tie line levelled data along the traverse lines, polynomial levelling was then applied using the following steps:

- For each traverse line the residual crossover value at each intersecting tie line was calculated.
- An Akima spline was fitted to the crossover values along each traverse line.
- The interpolated crossover values were removed from the traverse line data.

Final micro-levelling techniques were then selectively applied to the tie line levelled data to remove minor residual variations in profile intensity. Selective microlevelling was applied in order to leave unaffected any data having no residual levelling artifacts. Selective microlevelling proceeds using the following steps:

- The areas of interest that required micro-levelling were identified through the use of image processing visualisation.
- Polygons were used to define areas requiring microlevelling.
- “Pseudo-ties” were constructed from the gridded data by extracting traverses from the grid normal to the flight direction.
- Line dependent artifacts were removed from the pseudo lines using a custom filter.
- Crossover values were calculated between traverse lines and pseudo tie lines.
- The traverse lines were adjusted in the pre-defined sections to minimise the crossover values.

This process was repeated in order to remove various wavelength line dependent artifacts from the pseudo-ties. The object of each microlevelling iteration was to produce a smooth control surface to which the traverse lines are levelled. This control surface was provided through the use of “pseudo-ties”.

The most predominant artifact wavelength was one flight line spacing, as adjacent flight lines were flown in opposite directions.

The custom filter design was based on a normalised Blackman filter. The most commonly used Blackman window, optimal for line dependent artifacts with a wavelength of one line spacing, was 13 grid points. (The data was gridded at one fifth of the line spacing) This translated to a filter length of 13 for the “pseudo-ties”. Any remaining line dependent features with longer wavelengths were treated in a similar manner, but with a larger filter width.

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 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 aircraft background spectrum and the scaled unit cosmic spectrum were then subtracted from the 256 channel data. This 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. Radon background removal was performed using the Minty Spectral Ratio method (1992).

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

Final micro-levelling techniques were then selectively applied to the tie line levelled data to remove minor residual variations in profile intensities. Located and gridded data were generated from the final processed radiometric data.

## **7.4    *Digital Terrain Model Data Processing***

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

The radar altimeter data was 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 was tie line levelled and gridded. Tie line levelled data was then examined and selectively microlevelled to produce a grid without line dependent artifacts. (See Magnetic Data Processing above.)

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

**Head Office Address:**

UTS Geophysics  
Fauntleroy Avenue, 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 6984

**Quoting reference number: A576**

## 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 (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

### 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 (CORRECTED)	metres

**RADIOMETRIC LOCATED DATA**

FIELD	FORMAT	DESCRIPTION	UNITS
-----	-----	-----	-----
1	I6	LINE NUMBER	
2	I5	FLIGHT/AREA NUMBER	AAFF (Area/Flight)
3	I7	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

**GRIDDED DATASET FORMATS**

Gridding was performed using a bicubic spline algorithm for the total magnetic intensity data, and a minimum curvature algorithm for the radiometric and digital terrain data.

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 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.

### **GDA94**

Coordinate Type  
Semi Major Axis  
Flattening

Geocentric Datum of Australia  
Geographical  
6378137m  
1/298.257222101

### **AMG84**

Coordinate Type  
Geodetic datum  
Semi Major Axis  
Flattening

Australian Map Grid 1984  
Universal Transverse Mercator Projection Grid  
Australian Geodetic Datum  
6378160m  
1/298.25

### **MGA94**

Coordinate type  
Geodetic datum  
Semi major axis  
Flattening

Map Grid of Australia 1994  
Universal Transverse Mercator Projection Grid  
Geocentric Datum of Australia  
6378137m  
1/298.257222101

## APPENDIX C - SURVEY BOUNDARY DETAILS

### COORDINATES REPORT

Job ID code: A57601  
Client: Cameco Australia Pty Ltd  
Job: Manyallaluk  
AMG84 Zone 53Grid Zone: 53

#### Surround

266069.530	8451333.310
266140.040	8432754.180
269739.460	8432787.250
269874.600	8418031.900
269874.600	8414342.000
284294.640	8414471.590
284215.140	8423693.020
284993.850	8423676.150
284790.480	8451435.790
266069.530	8451333.310

### COORDINATES REPORT

Job ID code: A57603  
Client: Cameco Australia Pty Ltd  
Job: Arrara  
AMG84 Zone 53Grid Zone: 53

#### Surround

264233.130	8654073.180
269675.920	8654116.080
269647.220	8657804.450
273276.390	8657832.420
273347.130	8648611.770
271533.120	8648597.750
271561.350	8644912.150
266946.230	8644912.650
266957.210	8646930.940
264198.170	8647143.660
264233.130	8654073.180

## COORDINATES REPORT

Job ID code: A57604  
Client: Cameco Australia Pty Ltd  
Job: Sandy Point  
AMG84 Zone 53Grid Zone: 53

## Surround

308150.210	8685331.430
311703.450	8685331.430
311703.450	8683326.830
308150.210	8683326.830

## COORDINATES REPORT

Job ID code: A5760501  
Client: Cameco Australia  
Job: Mordijimuk  
Coordinates in AMG84 Zone 53Grid Zone: 53

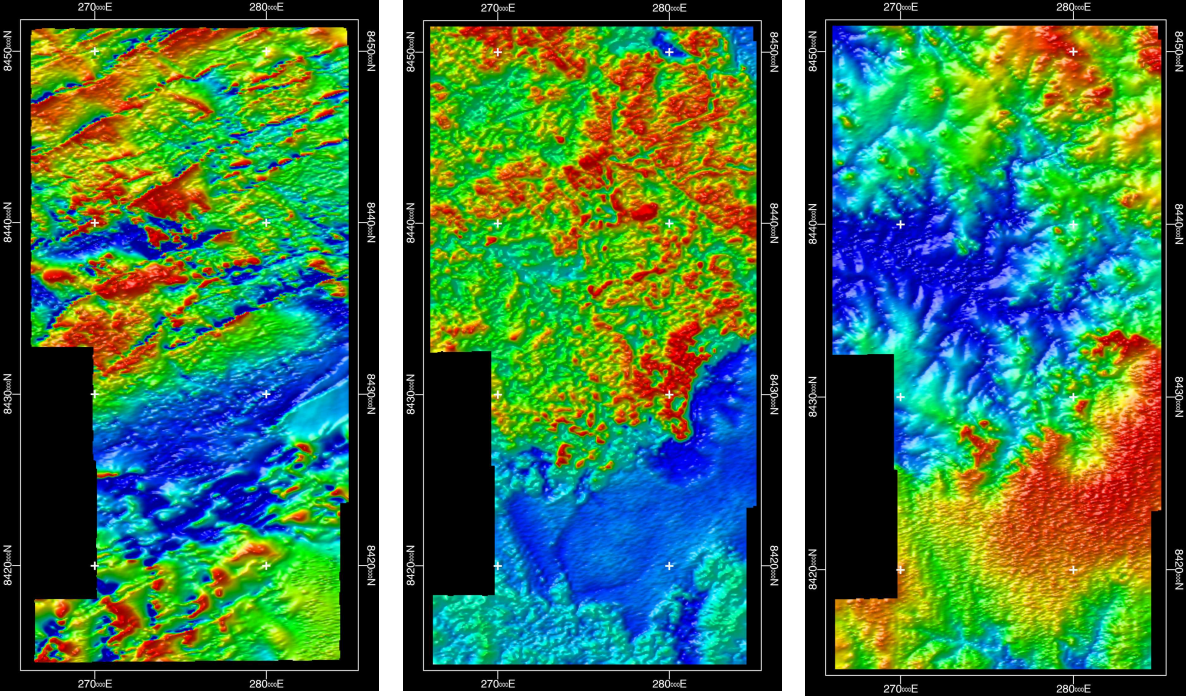
## Surround

304888.910	8626737.770
306142.710	8626718.980
306130.370	8628562.860
320628.430	8628665.060
320640.430	8626812.410
313401.100	8626757.840
313441.250	8623224.480
308984.390	8623244.550
308984.390	8624790.450
305009.360	8624790.450
304888.910	8626737.770



APPENDIX D - PROJECT DATA OVERVIEW

Manyallaluk Project

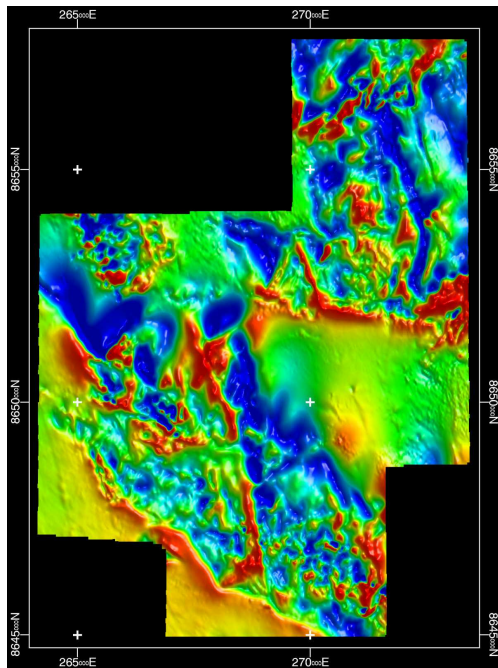


Total Magnetic Intensity

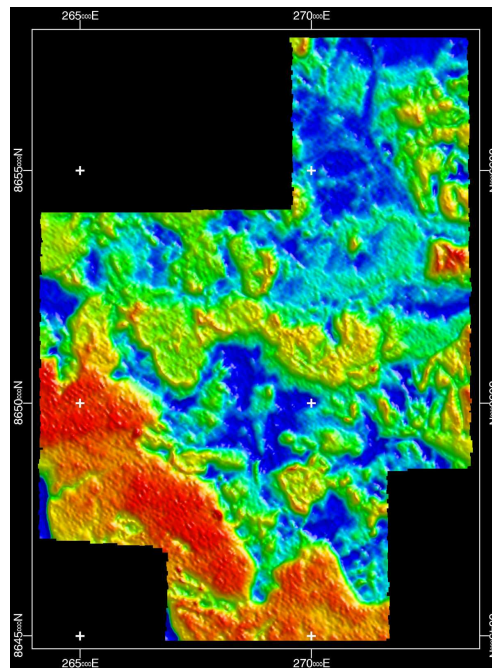
Radiometric Total Count

Digital Terrain Model

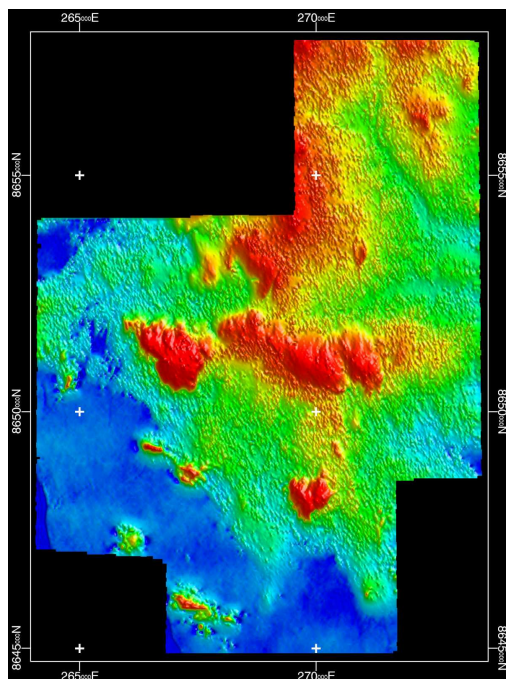
## Arrara Project



Total Magnetic Intensity

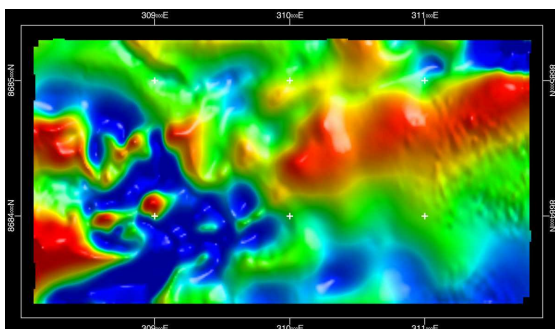


Radiometric Total Count

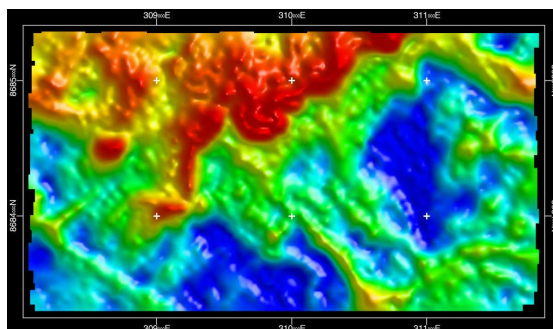


Digital Terrain Model

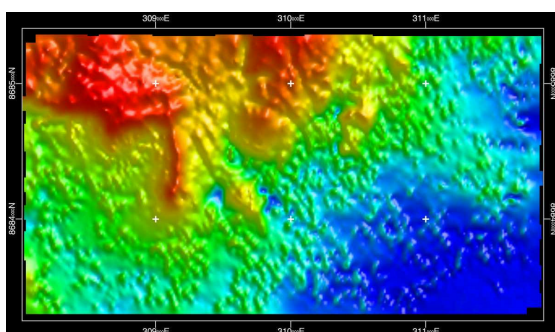
## Sandy Point Project



Total Magnetic Intensity

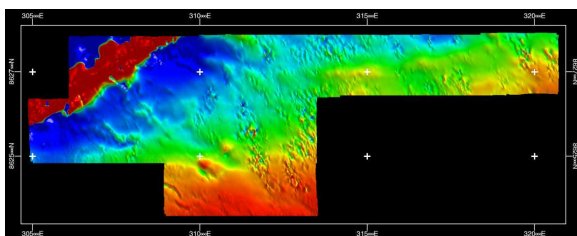


Radiometric Total Count

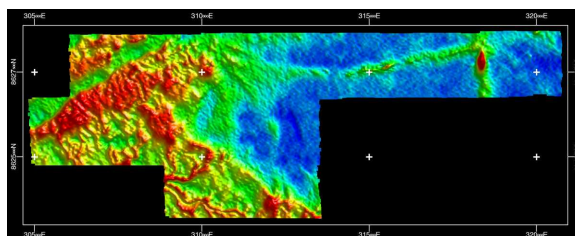


Digital Terrain Model

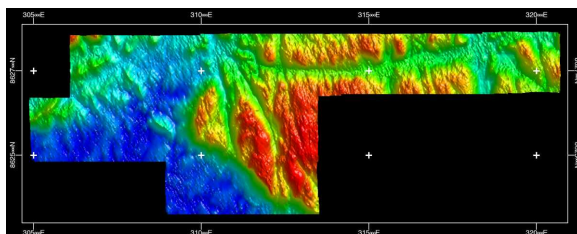
## Mordijimuk Project



Total Magnetic Intensity



Radiometric Total Count



Digital Terrain Model

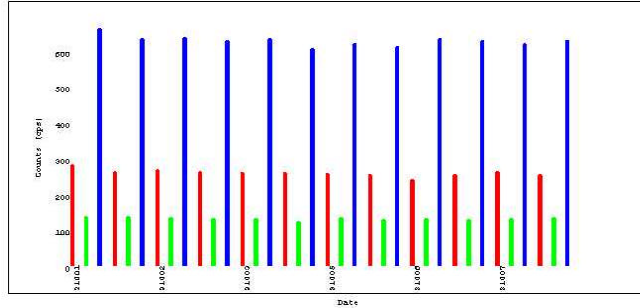


## APPENDIX E – RADIOMETRIC CALIBRATION RESULTS

### Jabiru Airstrip

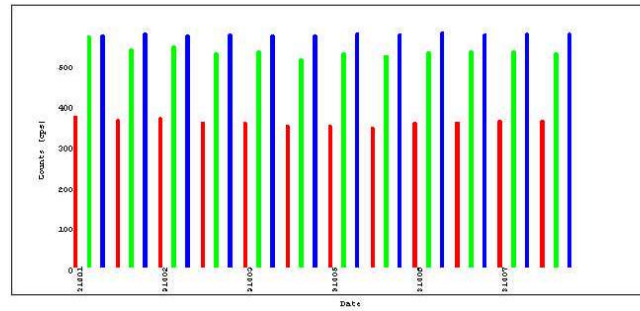
Thorium Source Test (Ground)

Date	K	U	Th	% Error
31001	272.4	126.9	652.2	5.8
31001	254.3	127.8	626.9	1.6
31002	257.9	124.1	627.3	1.6
31002	253.8	122.3	619.2	0.2
31003	251.7	122.0	635.0	0.6
31003	250.7	116.2	597.3	-2.9
31005	247.9	124.6	613.0	-0.9
31005	244.5	119.1	601.7	-2.8
31006	233.1	121.6	626.1	-1.3
31006	245.2	118.9	618.1	-1.1
31007	254.6	121.7	612.1	-0.5
31007	244.7	123.8	621.9	-0.3
Avg	250.9	122.4	620.1	0.0



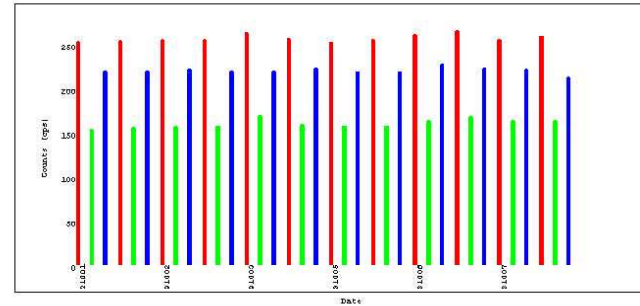
Uranium Source Test (Ground)

Date	K	U	Th	% Error
31001	365.7	561.5	564.1	3.3
31001	356.9	530.3	568.6	0.9
31002	361.5	537.6	564.8	1.4
31002	349.4	521.1	565.8	-0.5
31003	348.9	525.3	564.6	-0.3
31003	341.5	505.5	563.6	-2.3
31005	342.1	519.6	568.7	-0.9
31005	337.6	514.4	567.0	-1.7
31006	349.2	521.5	570.6	-0.1
31006	350.3	524.7	565.5	-0.2
31007	353.9	525.3	568.2	0.3
31007	354.1	520.8	568.4	0.0
Avg	350.9	525.6	566.7	0.0



Background Source Test (Ground)

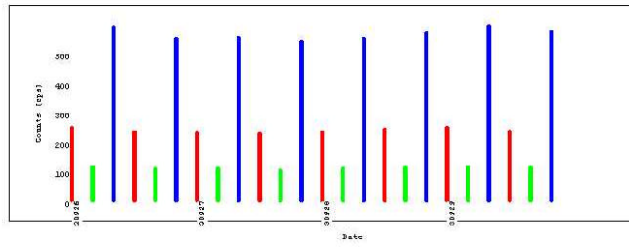
Date	K	U	Th	% Error
31001	249.9	150.2	215.9	-1.8
31001	251.0	151.5	216.2	-1.4
31002	252.0	152.7	218.4	-0.7
31002	251.7	153.7	215.9	-1.0
31003	260.0	165.3	216.7	2.3
31003	252.9	156.0	219.0	0.1
31005	249.4	153.7	215.9	-1.4
31005	252.0	153.9	215.4	-1.0
31006	257.9	159.2	224.2	2.2
31006	261.6	164.0	219.1	2.7
31007	252.1	159.4	218.0	0.3
31007	256.1	159.4	209.7	-0.3
Avg	253.9	156.6	217.0	0.0



## Tindal Airstrip

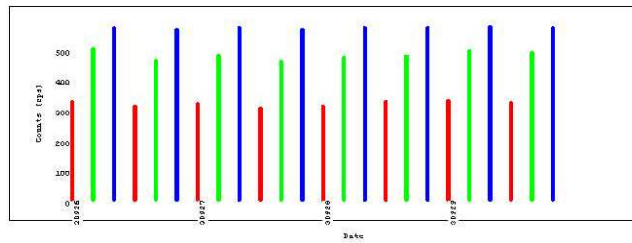
Thorium Source Test (Ground)

Date	K	U	Th	% Error
30926	241.7	110.6	582.1	4.2
30926	227.8	103.5	543.6	-2.4
30927	226.1	103.2	549.0	-2.1
30927	222.6	99.6	534.7	-4.4
30928	228.0	104.2	543.5	-2.3
30928	237.6	107.8	563.3	1.3
30929	242.0	108.5	585.3	4.4
30929	231.6	108.0	569.4	1.4
<b>Avg</b>	<b>232.2</b>	<b>105.7</b>	<b>558.8</b>	<b>0.0</b>



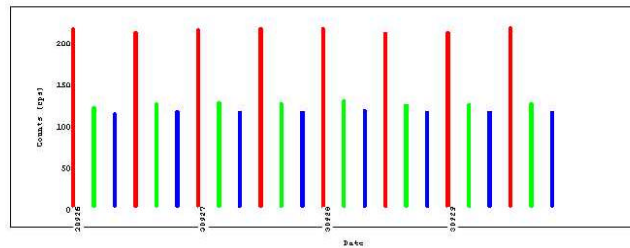
Uranium Source Test (Ground)

Date	K	U	Th	% Error
30926	321.7	496.1	563.8	2.3
30926	306.1	458.1	558.9	-2.1
30927	313.3	475.7	565.4	0.2
30927	299.1	455.2	560.0	-2.7
30928	306.6	466.1	564.3	-1.1
30928	320.8	471.9	564.0	0.4
30929	325.7	486.8	567.1	2.1
30929	316.1	482.0	563.7	0.8
<b>Avg</b>	<b>313.8</b>	<b>474.0</b>	<b>563.4</b>	<b>0.0</b>



Background Source Test (Ground)

Date	K	U	Th	% Error
30926	211.3	116.7	109.1	-1.2
30926	207.1	121.9	112.5	-0.2
30927	210.1	122.3	111.4	0.3
30927	211.3	121.7	111.8	0.6
30928	211.4	124.4	113.8	1.7
30928	206.2	119.1	111.2	-1.3
30929	207.4	121.0	111.1	-0.6
30929	212.5	121.2	111.9	0.7
<b>Avg</b>	<b>209.7</b>	<b>121.0</b>	<b>111.6</b>	<b>0.0</b>



## APPENDIX F – ACQUISITION AND PROCESSING PARAMETERS

### Magnetic Data

#### Manyallaluk Project

Model	:	IGRF 2003.817
Average Declination	:	4.016 degrees
Average Inclination	:	-42.532 degrees
Average Field strength:		47353 nT
Average diurnal	:	47590 nT

#### Arrara Project

Model	:	IGRF 2003.76
Average Declination	:	3.8 degrees
Average Inclination	:	-39.4 degrees
Average Field strength:		46131.7 nT
Average diurnal	:	46985 nT

#### Sandy Point Project

Model	:	IGRF 2003.75
Average Declination	:	3.8 degrees
Average Inclination	:	-38.9 degrees
Average Field strength:		44733.5 nT
Average diurnal	:	46380 nT

#### Mordijimuk Project

Model	:	IGRF 2003.76
Average Declination	:	3.9 degrees
Average Inclination	:	-39.8 degrees
Average Field strength:		45061 nT
Average diurnal	:	46380 nT

## Radiometric Data

VH-HVP 32L:

### Spectral Stripping Coefficients

alpha 0.231  
beta 0.400  
gamma 0.748  
a 0.070

	Cosmic	Bkgnd	Altitude	Sens
TC	0.755	124.98	-0.0064	43.6
K	0.044	10.19	-0.0085	169.5
U	0.039	4.68	-0.0066	16.2
Th	0.048	0.37	-0.0064	9.1

**Final Reduction** - All data reduced to STP height datum 30m

## APPENDIX G – LINE KILOMETRE REPORTS

LINE KM REPORT FOR a57601m.ltd

LINE	FLT	DATE	START COORDINATE		END COORDINATE		LINE KM
190020	191	030929	266248	8416001	284368	8416005	18.1
190030	191	030929	284304	8417968	266194	8418002	18.1
190040	191	030929	269812	8420000	284316	8419996	14.5
190050	191	030929	284274	8422003	269766	8421996	14.5
190060	191	030929	269786	8424000	285064	8423999	15.3
190070	191	030929	285021	8425995	269717	8426005	15.3
190080	191	030929	269740	8428003	285050	8427998	15.3
190090	191	030929	284980	8429995	269679	8430003	15.3
190100	191	030929	269705	8432009	285017	8432000	15.3
190110	191	030929	284937	8434017	266058	8433999	18.9
190120	191	030929	266098	8436007	284967	8436003	18.9
190130	191	030929	284913	8438025	266049	8438000	18.9
190140	191	030929	266094	8439998	284948	8440005	18.9
190150	191	030929	284909	8441947	266031	8442007	18.9
190160	191	030929	266074	8444004	284908	8443999	18.8
190170	191	030929	284853	8446004	266028	8445998	18.8
190180	191	030929	266038	8448002	284905	8447996	18.9
100010	101	030926	284826	8449998	266007	8450002	18.8
100020	101	030926	284794	8423648	284798	8450447	26.8
100030	101	030926	284597	8451455	284596	8423613	27.8
100040	101	030926	284407	8423648	284399	8451512	27.9
100050	101	030926	284194	8451459	284195	8414381	37.1
100060	101	030926	283995	8414436	284002	8451498	37.1
100070	101	030926	283808	8451465	283807	8414398	37.1
100080	101	030926	283601	8414432	283600	8451498	37.1
100090	101	030926	283399	8451452	283401	8414388	37.1
100100	102	030927	283193	8414422	283201	8451506	37.1
100110	102	030927	283003	8451463	282999	8414379	37.1
100120	102	030927	282801	8414430	282802	8451509	37.1
100130	102	030927	282604	8451452	282598	8414368	37.1
100140	102	030927	282400	8414429	282400	8451501	37.1
100150	102	030927	282196	8451460	282197	8414362	37.1
100160	102	030927	282006	8414416	282001	8451490	37.1
100170	102	030927	281807	8451460	281804	8414358	37.1
100180	102	030927	281598	8414411	281602	8451491	37.1
100190	102	030927	281386	8451453	281401	8414359	37.1
100200	102	030927	281190	8414404	281201	8451506	37.1
100210	102	030927	280994	8451441	280997	8414374	37.1
100220	102	030927	280788	8414406	280799	8451487	37.1
100230	102	030927	280600	8451446	280602	8414366	37.1
100240	102	030927	280386	8414411	280400	8451483	37.1
100250	102	030927	280199	8451434	280201	8414345	37.1
100260	102	030927	279991	8414403	280001	8451483	37.1
100270	102	030927	279797	8451449	279801	8414362	37.1
100280	102	030927	279607	8414408	279601	8451482	37.1
100290	103	030927	279398	8451419	279405	8414336	37.1
100300	103	030927	279201	8414382	279199	8451489	37.1
100310	103	030927	278997	8451436	279006	8414349	37.1
100320	103	030927	278793	8414396	278803	8451482	37.1
100330	103	030927	278609	8451425	278608	8414350	37.1
100340	103	030927	278402	8414385	278405	8451468	37.1
100350	103	030927	278199	8451442	278204	8414335	37.1
100360	103	030927	277991	8414391	278002	8451482	37.1
100370	103	030927	277798	8451443	277795	8414330	37.1
100380	103	030927	277597	8414377	277604	8451468	37.1
100390	103	030927	277400	8451421	277408	8414325	37.1
100400	103	030927	277195	8414370	277190	8451462	37.1
100410	103	030927	276994	8451437	277000	8414335	37.1
100420	103	030927	276798	8414374	276795	8451461	37.1
100430	103	030927	276602	8451424	276607	8414321	37.1
100440	103	030927	276391	8414384	276403	8451476	37.1
100450	103	030927	276206	8451413	276212	8414326	37.1
100460	103	030927	276009	8414373	275997	8451476	37.1
100470	103	030927	275799	8451430	275797	8414318	37.1
100480	104	030928	275591	8414372	275599	8451457	37.1
100490	104	030928	275401	8451429	275400	8414310	37.1
100500	104	030928	275199	8414355	275200	8451451	37.1
100510	104	030928	275000	8451408	275002	8414319	37.1
100520	104	030928	274784	8414352	274798	8451449	37.1
100530	104	030928	274595	8451412	274593	8414305	37.1



100540	104	030928	274396	8414358	274396	8451448	37.1
100550	104	030928	274199	8451425	274200	8414295	37.1
100560	104	030928	273996	8414349	273999	8451453	37.1
100570	104	030928	273788	8451403	273801	8414309	37.1
100580	104	030928	273598	8414351	273606	8451444	37.1
100590	104	030928	273400	8451418	273395	8414303	37.1
100600	104	030928	273189	8414328	273200	8451457	37.1
100610	104	030928	272980	8451411	273003	8414293	37.1
100620	104	030928	272799	8414326	272802	8451441	37.1
100630	104	030928	272598	8451402	272599	8414290	37.1
100640	104	030928	272394	8414320	272396	8451443	37.1
100650	104	030928	272211	8451405	272208	8414280	37.1
100660	104	030928	271995	8414318	271997	8451448	37.1
100670	105	030928	271803	8451388	271805	8414292	37.1
100680	105	030928	271608	8414335	271601	8451430	37.1
100690	105	030928	271368	8451392	271399	8414282	37.1
100700	105	030928	271197	8414327	271196	8451436	37.1
100710	105	030928	271011	8451397	271003	8414273	37.1
100720	105	030928	270801	8414304	270795	8451441	37.1
100730	105	030928	270590	8451383	270608	8414278	37.1
100740	105	030928	270403	8414311	270404	8451439	37.1
100750	105	030928	270205	8451393	270194	8414278	37.1
100760	105	030928	270005	8414311	270004	8451433	37.1
100770	105	030928	269803	8451406	269797	8426038	25.4
100780	105	030928	269600	8432747	269597	8451432	18.7
100790	105	030928	269403	8451382	269393	8432715	18.7
100800	105	030928	269203	8432746	269198	8451422	18.7
100810	105	030928	269005	8451401	268998	8432711	18.7
100820	105	030928	268811	8432752	268797	8451429	18.7
100830	105	030928	268596	8451387	268593	8432696	18.7
100840	105	030928	268408	8432742	268398	8451424	18.7
100850	105	030928	268206	8451384	268193	8432708	18.7
100860	105	030928	267998	8432740	267997	8451422	18.7
100870	105	030928	267796	8451366	267796	8432689	18.7
100880	105	030928	267595	8432742	267606	8451428	18.7
100890	105	030928	267413	8451390	267407	8432694	18.7
100900	105	030928	267197	8432732	267204	8451425	18.7
100910	105	030928	267000	8451379	266991	8432674	18.7
100920	105	030928	266827	8432716	266799	8451426	18.7
100930	105	030928	266600	8451377	266599	8432672	18.7
100940	105	030928	266410	8432725	266403	8451417	18.7
200010	201	030929	266205	8451363	266199	8432675	18.7
200020	201	030929	269799	8418047	269796	8414252	3.8
200030	201	030929	269602	8414311	269598	8418109	3.8
200040	201	030929	269400	8418055	269399	8414255	3.8
200050	201	030929	269202	8414308	269200	8418099	3.8
200060	201	030929	269000	8418055	269001	8414267	3.8
200070	201	030929	268800	8414306	268799	8418093	3.8
200080	201	030929	268601	8418054	268598	8414256	3.8
200090	201	030929	268393	8414308	268401	8418096	3.8
200100	201	030929	268206	8418065	268198	8414242	3.8
200110	201	030929	268000	8414298	267994	8418081	3.8
200120	201	030929	267813	8418043	267803	8414238	3.8
200130	201	030929	267599	8414290	267599	8418099	3.8
200140	201	030929	267400	8418055	267401	8414231	3.8
200150	201	030929	267199	8414276	267200	8418074	3.8
200160	201	030929	267008	8418041	267001	8414251	3.8
200170	201	030929	266801	8414281	266800	8418075	3.8
200180	201	030929	266583	8418048	266601	8414223	3.8
200180	201	030929	266398	8414266	266398	8418079	3.8

## TOTALS BY FLIGHT

FLIGHT	LINE KM
1	373.4
2	704.7
3	705.0
4	705.2
5	695.9
91	311.5
TOTAL	3495.6

LINE KM REPORT FOR A57603m.ltd

LINE	FLT	DATE	START	COORDINATE	END	COORDINATE	LINE KM
390020	391	031007	273103	8648581	273101	8657921	9.3
390030	391	031007	272603	8657869	272599	8648517	9.4
390040	391	031007	272115	8648569	272102	8657894	9.3
390050	391	031007	271613	8657851	271604	8644845	13.0
390060	391	031007	271098	8644875	271104	8657879	13.0
390070	391	031007	270584	8657832	270598	8644832	13.0
390080	391	031007	270079	8644886	270102	8657881	13.0
390090	391	031007	269600	8654237	269603	8644837	9.4
390100	391	031007	269113	8644879	269099	8654181	9.3
390110	391	031007	268603	8654135	268602	8644825	9.3
390120	391	031007	268100	8644880	268099	8654183	9.3
390130	391	031007	267634	8654133	267601	8644832	9.3
390140	391	031007	267150	8644869	267102	8654162	9.3
390150	391	031007	266617	8654135	266603	8646879	7.3
390160	391	031007	266106	8646959	266099	8654156	7.2
390170	391	031007	265595	8654102	265605	8646962	7.1
390180	391	031007	265094	8647051	265097	8654146	7.1
300010	301	031005	264614	8654091	264598	8647032	7.1
300020	301	031005	271599	8644952	266867	8644951	4.7
300030	301	031005	266916	8644995	271638	8644996	4.7
300040	301	031005	271587	8645047	266861	8645052	4.7
300050	301	031005	266903	8645096	271631	8645098	4.7
300060	301	031005	271591	8645144	266871	8645160	4.7
300070	301	031005	266900	8645195	271644	8645196	4.7
300080	301	031005	271604	8645249	266866	8645249	4.7
300090	301	031005	266914	8645297	271647	8645299	4.7
300100	301	031005	271587	8645352	266858	8645354	4.7
300110	301	031005	266919	8645397	271638	8645397	4.7
300120	301	031005	271590	8645459	266884	8645452	4.7
300130	301	031005	266912	8645502	271638	8645499	4.7
300140	301	031005	271593	8645550	266872	8645556	4.7
300150	301	031005	266904	8645598	271641	8645597	4.7
300160	301	031005	271579	8645654	266881	8645647	4.7
300170	301	031005	266920	8645699	271640	8645698	4.7
300180	301	031005	271595	8645749	266885	8645744	4.7
300190	301	031005	266917	8645802	271647	8645800	4.7
300200	301	031005	271586	8645856	266873	8645851	4.7
300210	301	031005	266918	8645898	271627	8645899	4.7
300220	301	031005	271586	8645960	266871	8645949	4.7
300230	301	031005	266920	8645997	271631	8645999	4.7
300240	301	031005	271577	8646050	266887	8646044	4.7
300250	301	031005	266919	8646109	271645	8646100	4.7
300260	301	031005	271577	8646154	266877	8646146	4.7
300270	301	031005	266920	8646202	271638	8646198	4.7
300280	301	031005	271593	8646253	266888	8646247	4.7
300290	301	031005	266912	8646296	271635	8646298	4.7
300300	301	031005	271593	8646354	266873	8646353	4.7
300310	301	031005	266913	8646399	271632	8646397	4.7
300320	301	031005	271591	8646451	266883	8646448	4.7
300330	301	031005	266915	8646498	271637	8646497	4.7
300340	301	031005	271575	8646556	266867	8646551	4.7
300350	301	031005	266907	8646604	271623	8646601	4.7
300360	301	031005	271575	8646650	266885	8646646	4.7
300370	301	031005	266913	8646703	271630	8646701	4.7
300380	301	031005	271570	8646754	266879	8646748	4.7
300390	301	031005	266913	8646794	271632	8646802	4.7
300400	301	031005	271579	8646850	266798	8646844	4.8
300410	301	031005	266842	8646905	271624	8646894	4.8
300420	301	031005	271586	8646949	266597	8646949	5.0
300430	301	031005	265784	8647004	271630	8647002	5.8
300440	301	031005	271574	8647047	265204	8647044	6.4
300450	301	031005	264510	8647104	271628	8647096	7.1
300460	301	031005	271585	8647143	264118	8647148	7.5
300470	301	031005	264160	8647202	271627	8647196	7.5
300480	301	031005	271572	8647251	264109	8647251	7.5
300490	301	031005	264165	8647295	271619	8647306	7.5
300500	301	031005	271574	8647347	264112	8647345	7.5
300510	301	031005	264155	8647397	271614	8647400	7.5
300520	301	031005	271585	8647442	264115	8647451	7.5
300530	301	031005	264160	8647500	271615	8647497	7.5
300540	301	031005	271566	8647524	264111	8647550	7.5
300550	301	031005	264180	8647602	271623	8647603	7.4
300560	301	031005	271564	8647651	264115	8647656	7.4
300570	301	031005	264159	8647700	271620	8647699	7.5
300580	301	031005	271567	8647747	264133	8647750	7.4
300590	301	031005	264157	8647789	271623	8647795	7.5
300600	301	031005	271566	8647850	264136	8647853	7.4

300610	301	031005	264178	8647899	271612	8647897	7.4
300620	301	031005	271579	8647945	264112	8647964	7.5
300630	301	031005	264152	8647995	271629	8647999	7.5
300640	301	031005	271552	8648040	264135	8648056	7.4
300650	301	031005	264179	8648096	271615	8648096	7.4
300660	301	031005	271561	8648158	264114	8648152	7.4
300670	301	031005	264156	8648200	271623	8648200	7.5
300680	301	031005	271575	8648255	264122	8648246	7.5
300690	301	031005	264183	8648300	271613	8648298	7.4
300700	301	031005	271563	8648351	264126	8648353	7.4
300710	301	031005	264175	8648398	271620	8648394	7.4
300720	301	031005	271546	8648446	264114	8648455	7.4
300730	301	031005	264165	8648507	271616	8648493	7.5
300740	301	031005	271577	8648551	264128	8648552	7.4
300760	301	031005	264169	8648599	271997	8648598	7.8
300770	301	031005	264177	8648697	273427	8648703	9.3
300780	301	031005	273375	8648741	264122	8648748	9.3
300790	301	031005	264181	8648806	273420	8648800	9.2
300800	301	031005	273364	8648830	264124	8648850	9.2
300810	301	031005	264176	8648897	273414	8648898	9.2
300820	301	031005	273369	8648949	264140	8648951	9.2
300750	302	031006	264173	8648999	273412	8649002	9.2
300830	302	031006	273369	8648653	264136	8648649	9.2
300840	302	031006	264163	8649048	273432	8649047	9.3
300850	302	031006	273392	8649097	264135	8649100	9.3
300860	302	031006	264167	8649146	273431	8649148	9.3
300870	302	031006	273384	8649202	264128	8649201	9.3
300880	302	031006	264181	8649248	273421	8649251	9.2
300890	302	031006	273374	8649295	264121	8649297	9.3
300900	302	031006	264180	8649353	273413	8649350	9.2
300910	302	031006	273374	8649389	264134	8649401	9.2
300920	302	031006	264170	8649452	273409	8649451	9.2
300930	302	031006	273367	8649487	264127	8649499	9.2
300940	302	031006	264175	8649550	273405	8649550	9.2
300950	302	031006	273373	8649592	264131	8649599	9.2
300960	302	031006	264172	8649650	273419	8649647	9.2
300970	302	031006	273379	8649697	264130	8649701	9.2
300980	302	031006	264183	8649750	273416	8649748	9.2
300990	302	031006	273366	8649789	264127	8649799	9.2
301000	302	031006	264182	8649845	273406	8649851	9.2
301010	302	031006	273379	8649893	264129	8649894	9.3
301020	302	031006	264176	8649950	273407	8649945	9.2
301030	302	031006	273375	8649999	264126	8649997	9.3
301040	302	031006	264166	8650046	273424	8650051	9.3
301050	302	031006	273362	8650090	264148	8650093	9.2
301060	302	031006	264180	8650145	273414	8650151	9.2
301070	302	031006	273383	8650194	264144	8650204	9.2
301080	302	031006	264185	8650251	273416	8650248	9.2
301090	302	031006	273363	8650304	264150	8650301	9.2
301100	302	031006	264174	8650343	273419	8650350	9.2
301110	302	031006	273363	8650395	264130	8650398	9.2
301120	302	031006	264185	8650450	273411	8650453	9.2
301130	302	031006	273366	8650491	264146	8650501	9.2
301140	302	031006	264168	8650547	273405	8650550	9.2
301150	302	031006	273372	8650592	264130	8650603	9.2
301160	302	031006	264176	8650653	273410	8650651	9.2
301170	302	031006	273373	8650694	264129	8650695	9.2
301180	302	031006	264181	8650748	273407	8650758	9.2
301190	302	031006	273374	8650793	264137	8650800	9.2
301200	302	031006	264169	8650849	273395	8650850	9.2
301210	302	031006	273369	8650893	264154	8650898	9.2
301220	302	031006	264177	8650951	273411	8650947	9.2
301230	302	031006	273374	8650980	264139	8650996	9.2
301240	302	031006	264175	8651045	273408	8651049	9.2
301250	302	031006	273374	8651088	264150	8651103	9.2
301260	302	031006	264183	8651155	273391	8651148	9.2
301270	302	031006	273353	8651205	264133	8651205	9.2
301280	302	031006	264187	8651249	273415	8651251	9.2
301290	302	031006	273353	8651287	264142	8651303	9.2
301300	302	031006	264183	8651342	273399	8651358	9.2
301310	302	031006	273361	8651401	264143	8651400	9.2
301320	302	031006	264186	8651445	273393	8651453	9.2
301330	302	031006	273370	8651495	264149	8651500	9.2
301340	302	031006	264181	8651542	273411	8651550	9.2
301350	302	031006	273363	8651588	264131	8651598	9.2
301360	302	031006	264176	8651645	273396	8651654	9.2
301370	302	031006	273362	8651694	264143	8651697	9.2
301380	302	031006	264190	8651759	273402	8651747	9.2
301390	302	031006	273354	8651793	264146	8651798	9.2
301400	302	031006	264192	8651853	273408	8651850	9.2
301410	302	031006	273345	8651905	264147	8651901	9.2

301420	302	031006	264176	8651949	273407	8651947	9.2
301430	302	031006	273352	8651988	264135	8652000	9.2
301440	302	031006	264182	8652060	273405	8652047	9.2
301450	302	031006	273345	8652100	264143	8652098	9.2
301460	302	031006	264175	8652159	273406	8652152	9.2
301470	302	031006	273360	8652211	264157	8652194	9.2
301480	302	031006	264184	8652241	273392	8652252	9.2
301490	302	031006	273352	8652307	264135	8652298	9.2
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301510	302	031006	273358	8652393	264145	8652402	9.2
301520	303	031007	264185	8652448	273392	8652455	9.2
301530	303	031007	273347	8652497	264154	8652501	9.2
301540	303	031007	264195	8652550	273404	8652548	9.2
301550	303	031007	273337	8652593	264153	8652602	9.2
301560	303	031007	264197	8652650	273399	8652648	9.2
301570	303	031007	273357	8652708	264136	8652703	9.2
301580	303	031007	264193	8652750	273403	8652750	9.2
301590	303	031007	273343	8652817	264156	8652800	9.2
301600	303	031007	264192	8652854	273389	8652845	9.2
301610	303	031007	273349	8652898	264160	8652906	9.2
301620	303	031007	264193	8652953	273398	8652953	9.2
301630	303	031007	273350	8652999	264160	8653000	9.2
301640	303	031007	264198	8653069	273384	8653048	9.2
301650	303	031007	273341	8653098	264140	8653100	9.2
301660	303	031007	264199	8653146	273401	8653149	9.2
301670	303	031007	273340	8653209	264157	8653199	9.2
301680	303	031007	264185	8653257	273390	8653251	9.2
301690	303	031007	273335	8653297	264147	8653301	9.2
301700	303	031007	264197	8653352	273397	8653348	9.2
301710	303	031007	273336	8653402	264161	8653396	9.2
301720	303	031007	264203	8653450	273385	8653451	9.2
301730	303	031007	273332	8653498	264162	8653502	9.2
301740	303	031007	264191	8653555	273381	8653549	9.2
301750	303	031007	273325	8653597	264139	8653600	9.2
301760	303	031007	264191	8653646	273399	8653646	9.2
301770	303	031007	273331	8653704	264158	8653701	9.2
301780	303	031007	264200	8653753	273398	8653748	9.2
301790	303	031007	273337	8653802	264139	8653803	9.2
301800	303	031007	264206	8653851	273389	8653847	9.2
301810	303	031007	273327	8653906	264162	8653899	9.2
301820	303	031007	264191	8653954	273388	8653948	9.2
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301840	303	031007	264189	8654046	273379	8654048	9.2
301850	303	031007	273346	8654088	267387	8654095	6.0
301860	303	031007	269629	8654148	273378	8654149	3.7
301870	303	031007	273338	8654200	269573	8654201	3.8
301880	303	031007	269644	8654249	273382	8654248	3.7
301890	303	031007	273338	8654310	269590	8654298	3.7
301900	303	031007	269642	8654348	273389	8654342	3.7
301910	303	031007	273327	8654400	269602	8654398	3.7
301920	303	031007	269651	8654455	273381	8654449	3.7
301930	303	031007	273323	8654503	269598	8654503	3.7
301940	303	031007	269651	8654548	273393	8654550	3.7
301950	303	031007	273320	8654618	269602	8654601	3.7
301960	303	031007	269627	8654653	273373	8654645	3.7
301970	303	031007	273333	8654696	269578	8654699	3.8
301980	303	031007	269638	8654751	273393	8654751	3.8
301990	303	031007	273327	8654796	269597	8654799	3.7
302000	303	031007	269627	8654855	273373	8654849	3.7
302010	303	031007	273341	8654899	269583	8654898	3.8
302020	303	031007	269638	8654946	273385	8654949	3.7
302030	303	031007	273318	8654999	269593	8655001	3.7
302040	303	031007	269640	8655048	273372	8655048	3.7
302050	303	031007	273334	8655096	269578	8655100	3.8
302060	303	031007	269646	8655166	273387	8655150	3.7
302070	303	031007	273337	8655205	269576	8655200	3.8
302080	303	031007	269629	8655251	273388	8655250	3.8
302090	303	031007	273335	8655298	269577	8655298	3.8
302100	303	031007	269630	8655348	273373	8655349	3.7
302110	303	031007	273323	8655398	269585	8655399	3.7
302120	303	031007	269626	8655450	273365	8655451	3.7
302130	303	031007	273337	8655501	269589	8655501	3.7
302140	303	031007	269623	8655564	273379	8655552	3.8
302150	303	031007	273334	8655596	269593	8655605	3.7
302160	303	031007	269644	8655656	273376	8655654	3.7
302170	303	031007	273333	8655695	269590	8655699	3.7
302180	303	031007	269633	8655756	273368	8655745	3.7
302190	303	031007	273335	8655803	269580	8655801	3.8
302200	303	031007	269619	8655856	273366	8655851	3.7
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302220	303	031007	269617	8655951	273371	8655950	3.8

302230	303	031007	273318	8655995	269589	8656004	3.7
302240	303	031007	269625	8656042	273372	8656047	3.7
302250	303	031007	273321	8656092	269568	8656099	3.8
302260	303	031007	269631	8656149	273369	8656150	3.7
302270	303	031007	273322	8656200	269572	8656199	3.8
302280	303	031007	269624	8656245	273358	8656247	3.7
302290	303	031007	273305	8656297	269587	8656299	3.7
302300	303	031007	269619	8656346	273362	8656345	3.7
302310	303	031007	273323	8656399	269578	8656398	3.7
302320	303	031007	269635	8656438	273368	8656448	3.7
302330	303	031007	273326	8656497	269589	8656501	3.7
302340	303	031007	269631	8656540	273360	8656553	3.7
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302360	303	031007	269634	8656641	273367	8656649	3.7
302370	303	031007	273320	8656695	269581	8656698	3.7
302380	303	031007	269624	8656746	273376	8656748	3.8
302390	303	031007	273310	8656799	269571	8656798	3.7
302400	303	031007	269612	8656846	273363	8656850	3.8
302410	303	031007	273324	8656893	269585	8656901	3.7
302420	303	031007	269613	8656945	273360	8656949	3.7
302430	303	031007	273318	8656986	269576	8656997	3.7
302440	303	031007	269625	8657050	273353	8657049	3.7
302450	303	031007	273327	8657108	269570	8657098	3.8
302460	303	031007	269620	8657146	273360	8657152	3.7
302470	303	031007	273312	8657195	269569	8657199	3.7
302480	303	031007	269627	8657253	273368	8657248	3.7
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302500	303	031007	269625	8657332	273350	8657351	3.7
302510	303	031007	273306	8657402	269578	8657400	3.7
302520	303	031007	269628	8657452	273361	8657449	3.7
302530	303	031007	273313	8657503	269564	8657507	3.7
302540	303	031007	269605	8657551	273370	8657550	3.8
302550	303	031007	273300	8657598	269570	8657599	3.7
302560	303	031007	269627	8657654	273362	8657647	3.7
302570	303	031007	273297	8657697	269570	8657700	3.7
302580	303	031007	269602	8657753	273369	8657750	3.8
302580	303	031007	273311	8657794	269578	8657803	3.7

## TOTALS BY FLIGHT

FLIGHT	LINE	KM
1	501.8	
2	646.1	
3	577.0	
91	171.7	
TOTAL	1896.7	

LINE KM REPORT FOR a57604m.ltd

LINE	FLT	DATE	START COORDINATE		END COORDINATE		LINE KM
490020	491	031001	311673	8685365	311665	8683253	2.1
490030	491	031001	311167	8683287	311173	8685405	2.1
490040	491	031001	310675	8685345	310664	8683251	2.1
490050	491	031001	310164	8683303	310173	8685416	2.1
490060	491	031001	309673	8685356	309664	8683248	2.1
490070	491	031001	309176	8683280	309168	8685416	2.1
490080	491	031001	308680	8685354	308671	8683261	2.1
400010	401	031001	308162	8683286	308172	8685417	2.1
400020	401	031001	311722	8683350	308079	8683348	3.6
400030	401	031001	308103	8683402	311793	8683402	3.7
400040	401	031001	311723	8683446	308079	8683458	3.6
400050	401	031001	308115	8683499	311772	8683496	3.7
400060	401	031001	311735	8683548	308085	8683553	3.6
400070	401	031001	308108	8683598	311790	8683600	3.7
400080	401	031001	311747	8683651	308080	8683655	3.7
400090	401	031001	308107	8683697	311773	8683700	3.7
400100	401	031001	311721	8683756	308074	8683751	3.6
400110	401	031001	308115	8683794	311781	8683805	3.7
400120	401	031001	311737	8683855	308068	8683852	3.7
400130	401	031001	308100	8683904	311783	8683899	3.7
400140	401	031001	311723	8683953	308083	8683954	3.6
400150	401	031001	308115	8683999	311777	8684000	3.7
400160	401	031001	311733	8684054	308072	8684048	3.7
400170	401	031001	308116	8684096	311781	8684098	3.7
400180	401	031001	311721	8684153	308082	8684149	3.6
400190	401	031001	308121	8684204	311779	8684197	3.7
400200	401	031001	311728	8684248	308065	8684252	3.7
400210	401	031001	308115	8684305	311794	8684302	3.7
400220	401	031001	311728	8684350	308082	8684350	3.6
400230	401	031001	308122	8684399	311770	8684400	3.6
400240	401	031001	311740	8684453	308082	8684449	3.7
400250	401	031001	308111	8684500	311771	8684499	3.7
400260	401	031001	311727	8684539	308073	8684547	3.7
400270	401	031001	308120	8684596	311791	8684601	3.7
400280	401	031001	311737	8684643	308073	8684643	3.7
400290	401	031001	308098	8684700	311775	8684689	3.7
400300	401	031001	311747	8684748	308084	8684752	3.7
400310	401	031001	308100	8684807	311772	8684799	3.7
400320	401	031001	311729	8684844	308061	8684853	3.7
400330	401	031001	308095	8684909	311776	8684896	3.7
400340	401	031001	311727	8684972	308085	8684949	3.6
400350	401	031001	308107	8685002	311775	8684996	3.7
400360	401	031001	311727	8685051	308080	8685052	3.6
400370	401	031001	308109	8685105	311775	8685095	3.7
400380	401	031001	311731	8685153	308083	8685147	3.6
400390	401	031001	308109	8685199	311788	8685199	3.7
400400	401	031001	311748	8685249	308083	8685246	3.7
400400	401	031001	308120	8685301	311792	8685299	3.7

TOTALS BY FLIGHT

FLIGHT	LINE KM
1	146.5
91	16.9
TOTAL	163.4

LINE KM REPORT FOR A57605m.ltd

LINE	FLT	DATE	START COORDINATE		END COORDINATE		LINE KM
590020	591	031003	320295	8628676	320294	8626734	1.9
590030	591	031003	319778	8626765	319805	8628724	2.0
590040	591	031003	319296	8628695	319298	8626725	2.0
590050	591	031003	318794	8626763	318803	8628717	2.0
590060	591	031003	318305	8628676	318291	8626731	1.9
590070	591	031003	317810	8626758	317805	8628710	2.0
590080	591	031003	317301	8628666	317299	8626698	2.0
590090	591	031003	316803	8626739	316792	8628728	2.0
590100	591	031003	316310	8628661	316304	8626699	2.0
590110	591	031003	315799	8626735	315800	8628711	2.0
590130	591	031003	315299	8628656	315300	8626702	2.0
590140	591	031003	314303	8628656	314302	8626680	2.0
590150	591	031003	313802	8626732	313796	8628698	2.0
590160	591	031003	313293	8628655	313295	8623142	5.5
590170	591	031003	312806	8623197	312807	8628679	5.5
590180	591	031003	312290	8628625	312292	8623166	5.5
590190	591	031003	311832	8623206	311803	8628680	5.5
590200	591	031003	311299	8628613	311296	8623150	5.5
590210	591	031003	310803	8623224	310813	8628686	5.5
590120	592	031005	310275	8628633	310297	8623155	5.5
590220	592	031005	314797	8626733	314798	8628694	2.0
590230	592	031005	309797	8628610	309796	8623172	5.4
590240	592	031005	309301	8623212	309300	8628657	5.4
590250	592	031005	308799	8628607	308795	8624726	3.9
590260	592	031005	308301	8624760	308306	8628652	3.9
590270	592	031005	307825	8628598	307797	8624708	3.9
590280	592	031005	307331	8624753	307302	8628662	3.9
590290	592	031005	306803	8628602	306798	8624703	3.9
590300	592	031005	306314	8624764	306299	8628652	3.9
590310	592	031005	305802	8626751	305800	8624711	2.0
500010	501	031002	305293	8624764	305301	8626819	2.1
500020	501	031002	308958	8623249	313523	8623231	4.6
500030	501	031002	313500	8623311	308911	8623299	4.6
500040	501	031002	308969	8623350	313525	8623366	4.6
500050	501	031002	313486	8623403	308898	8623402	4.6
500060	501	031002	308948	8623452	313519	8623463	4.6
500070	501	031002	313481	8623504	308904	8623500	4.6
500080	501	031002	308943	8623545	313519	8623553	4.6
500090	501	031002	313481	8623604	308914	8623607	4.6
500100	501	031002	308959	8623651	313508	8623663	4.6
500110	501	031002	313490	8623704	308914	8623708	4.6
500120	501	031002	308952	8623755	313515	8623752	4.6
500130	501	031002	313478	8623794	308905	8623798	4.6
500140	501	031002	313484	8623851	308908	8623851	4.6
500150	501	031002	313473	8623899	308899	8623901	4.6
500160	501	031002	313484	8623949	308909	8623944	4.6
500170	501	031002	313480	8623995	308896	8623999	4.6
500180	501	031002	313464	8624061	308903	8624052	4.6
500190	501	031002	313468	8624105	308909	8624100	4.6
500200	501	031002	313472	8624145	308907	8624148	4.6
500210	501	031002	313468	8624197	308903	8624201	4.6
500220	501	031002	313461	8624243	308910	8624254	4.6
500230	501	031002	313483	8624293	308897	8624298	4.6
500240	501	031002	313467	8624359	308903	8624346	4.6
500250	501	031002	313460	8624423	308904	8624397	4.6
500260	501	031002	313464	8624455	308911	8624452	4.6
500270	501	031002	313451	8624502	308904	8624497	4.5
500280	501	031002	313327	8624563	308903	8624551	4.4
500290	501	031002	313444	8624585	308906	8624604	4.5
500300	501	031002	313461	8624650	308913	8624647	4.5
500310	501	031002	313463	8624696	308911	8624702	4.6
500320	501	031002	313459	8624753	308916	8624751	4.5
500330	501	031002	304984	8624794	313504	8624803	8.5
500340	501	031002	313467	8624846	304915	8624850	8.6
500350	501	031002	304967	8624906	313495	8624899	8.5
500360	501	031002	313466	8624962	304919	8624949	8.5
500370	501	031002	304966	8624992	313498	8624997	8.5
500380	501	031002	313445	8625050	304908	8625050	8.5
500390	501	031002	304972	8625097	313484	8625102	8.5
500400	501	031002	313439	8625149	304902	8625155	8.5
500410	501	031002	304944	8625195	313505	8625202	8.6
500420	501	031002	313447	8625250	304895	8625246	8.6
500430	501	031002	304951	8625302	313486	8625302	8.5
500440	501	031002	313456	8625345	304887	8625350	8.6
500450	501	031002	304950	8625393	313497	8625400	8.6
500460	501	031002	313437	8625450	304885	8625450	8.6
500470	501	031002	304930	8625502	313498	8625503	8.6

500480	501	031002	313453	8625551	304878	8625548	8.6
500490	501	031002	304946	8625601	313499	8625600	8.6
500500	501	031002	313447	8625641	304884	8625646	8.6
500510	501	031002	304922	8625703	313490	8625700	8.6
500520	501	031002	313453	8625750	304867	8625749	8.6
500530	501	031002	304918	8625799	313484	8625799	8.6
500540	501	031002	313441	8625842	304871	8625854	8.6
500550	501	031002	304899	8625902	313488	8625900	8.6
500560	501	031002	313456	8625952	304854	8625952	8.6
500570	501	031002	304895	8625992	313476	8626000	8.6
500580	501	031002	313443	8626053	304855	8626056	8.6
500590	501	031002	304898	8626097	313471	8626101	8.6
500600	501	031002	313437	8626153	304842	8626150	8.6
500610	501	031002	304895	8626202	313489	8626201	8.6
500620	501	031002	313435	8626251	304829	8626256	8.6
500630	501	031002	304885	8626311	313487	8626301	8.6
500640	501	031002	313430	8626352	304843	8626344	8.6
500650	501	031002	304866	8626413	313482	8626402	8.6
500660	501	031002	313427	8626446	304837	8626447	8.6
500670	501	031002	304880	8626507	313484	8626497	8.6
500680	502	031003	313447	8626550	304828	8626550	8.6
500690	502	031003	304854	8626606	313492	8626604	8.6
500700	502	031003	313425	8626641	304829	8626643	8.6
500710	502	031003	304858	8626700	313476	8626708	8.6
500720	502	031003	314184	8626759	306056	8626750	8.1
500730	502	031003	306119	8626803	319145	8626804	13.0
500740	502	031003	320683	8626840	306052	8626856	14.6
500750	502	031003	306113	8626903	320711	8626907	14.6
500760	502	031003	320666	8626949	306055	8626941	14.6
500770	502	031003	306097	8626995	320732	8627001	14.6
500780	502	031003	320675	8627049	306055	8627049	14.6
500790	502	031003	306122	8627096	320714	8627094	14.6
500800	502	031003	320668	8627159	306057	8627152	14.6
500810	502	031003	306107	8627202	320707	8627196	14.6
500820	502	031003	320674	8627250	306065	8627241	14.6
500830	502	031003	306118	8627300	320721	8627304	14.6
500840	502	031003	320659	8627360	306064	8627347	14.6
500850	502	031003	306101	8627398	320725	8627404	14.6
500860	502	031003	320667	8627456	306049	8627454	14.6
500870	502	031003	306099	8627500	320721	8627500	14.6
500880	502	031003	320682	8627550	306053	8627554	14.6
500890	502	031003	306101	8627597	320711	8627600	14.6
500900	502	031003	320653	8627650	306068	8627650	14.6
500910	502	031003	306096	8627695	320714	8627693	14.6
500920	502	031003	320670	8627749	306063	8627750	14.6
500930	502	031003	306113	8627807	320702	8627804	14.6
500940	502	031003	320657	8627849	306053	8627851	14.6
500950	502	031003	306097	8627909	320717	8627911	14.6
500960	502	031003	320677	8627955	306061	8627946	14.6
500970	502	031003	306104	8627998	320708	8628001	14.6
500980	502	031003	320654	8628049	306061	8628051	14.6
500990	502	031003	306110	8628095	320714	8628103	14.6
501000	502	031003	320661	8628147	306046	8628158	14.6
501010	502	031003	306113	8628206	320709	8628200	14.6
501020	502	031003	320661	8628254	306051	8628260	14.6
501030	502	031003	306101	8628324	320718	8628296	14.6
501040	502	031003	320669	8628365	306052	8628354	14.6
501050	502	031003	306090	8628403	320700	8628402	14.6
501060	502	031003	320655	8628449	306058	8628453	14.6
501070	502	031003	306096	8628515	320716	8628502	14.6
501080	502	031003	320657	8628547	306051	8628552	14.6
501090	502	031003	309942	8628602	320707	8628606	10.8
501090	502	031003	320651	8628652	318353	8628651	2.3

## TOTALS BY FLIGHT

FLIGHT	LINE	KM
1	450.0	
2	571.6	
91	63.9	
92	40.3	
TOTAL	1125.7	