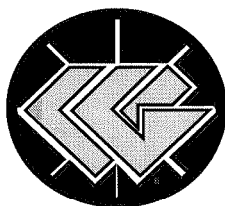


**AIRBORNE GEOPHYSICAL SURVEY
RUM JUNGLE AREA
NORTHERN TERRITORY
AUSTRALIA**

ACQUISITION and PROCESSING REPORT

Prepared by



LIBRARY
DEPARTMENT OF MINES
AND ENERGY
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WORLD GEOSCIENCE CORPORATION LTD

for
Northern Territory Geological Survey

SURVEY CONDUCTED
September 1999

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GS 2000-0002



NORTHERN TERRITORY GEOLOGICAL SURVEY

Geological Survey Record

GS 2000-0002

**Operations and processing report, Rum Jungle area
airborne geophysical survey, NTGS 1999 (flown by WGC,
covering parts of Darwin and Pine Creek 1:250 000 map
sheets).**

World Geoscience Corporation

NORTHERN TERRITORY DEPARTMENT OF MINES AND ENERGY

MINISTER: Hon. Daryl Manzie, M.L.A.

SECRETARY: Peter Blake

NORTHERN TERRITORY GEOLOGICAL SURVEY

DIRECTOR: Dr R Dennis Gee

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1. INTRODUCTION

In August 1999, World Geoscience Corporation was contracted by Northern Territory Geological Survey (NTGS), to acquire and process approximately 10,871 line kilometres of high resolution aeromagnetic and radiometric data over the Rum Jungle area of Northern Territory. The airborne geophysical data were collected from WGC's Cessna U206G aircraft (VH-AZG)

The survey commenced on 31/08/99 and was completed on 21/09/99. The project was based out of Batchelor.

This report summarises the field acquisition program and data processing.

2. SURVEY OPERATIONS AND LOGISTICS

This project was flown using the one aircraft operating from Batchelor in Northern Territory.

2.1 Airport Details

Airport	- Batchelor, Northern Territory
Runway Heading and Type	- 14/32 Bitumen 1600m
Airport Lighting	- Emergency flares only
Navigation Aids	- Nil
Airport Facilities	- Phone, toilets, water
Aviation Fuel	- Nil
Aircraft parking	- Apron in front of terminal
Power	- Power obtained from departure terminal

2.2 Accommodation Details

The crew stayed at Rum Jungle Motor Inn.

2.3 Survey Field Crew

The following personnel were employed on this project:

Project Manager	- Ian Cook
Crew Leader - On Site	- Peter Hiskins
Pilot	- Peter Hiskins
Pilot	- Mike Nelson
Instrument Operator	- Richard Barwise
Data Processor / Data Q.C. - On Site	- Peter Hiskins
Data Processor - Perth	- Peter Chambers, Joe Kita
Data Processor - Sydney	- Cathy Carr

2.4 Flying Summary

Flight	Date	Julian Day	Hours Flown	Standby Hrs	No. of Sorties	Prod. Kms	Comment
-	30-08-99	242	0	0	0	0	Aircraft and crew mobilised to site
001	31-08-99	243	3.7	0	1	0	Reconnaissance and calibration flight
002	01-09-99	244	4.2	0	1	324	Comp box and some survey
003	02-09-99	245	7.0	0	2	785	Thick smoke haze low visibility
004	03-09-99	246	6.3	0	2	936	Power lines and towers in area
005	04-09-99	247	7.1	0	2	1098	Diurnal OK
006	05-09-99	248	7.1	0	2	1097	Becoming turbulent after 1100
007	06-09-99	249	7.0	0	2	1015	overflow Rum Jungle mine site
008	07-09-99	250	5.5	0	2	674	flew reflights from flight 01
009	08-09-99	251	4.1	0	1	649	visibility problems, power lines & towers
010	09-09-99	252	3.5	0	1	486	Thick smoke haze, turbulence developing
011	10-09-99	253	4.1	0	1	608	some diurnal activity, one pilot ill. Client visit
012	11-09-99	254	4.2	0	1	567	near misses with birds in survey area
013	12-09-99	255	3.9	0	1	566	video problem rectified
-	13-09-99	256	0	0	0	0	100 hourly maintenance
014	14-09-99	257	2.0	0	1	178	100 hourly completed at 1500
015	15-09-99	258	7.0	0	2	794	traverses complete, begin tie lines
016	16-09-99	259	6.8	0	2	1061	diurnal active periods, tie lines flown
-	17-09-99	260	0	0	0	0	no flight, verifying data
017	18-09-99	261	4.8	0	1	0	flew radiometric stacks
-	19-09-99	262	0	8	0	0	no flying due wet ground
018	20-09-99	263	1.4	0	1	0	reflew 2 tie lines
-	21-09-99	264	0	0	0	0	all data verified, demobilisation
Totals			89.7	8	26	10838	

Mobilisation and De-mobilisation	= 2 days
Actual survey	= 17 days
Un-scheduled delays due equipment	= 0 days
Equipment calibration	= 2 days
Scheduled pilot days off	= 0 days
Un-scheduled aircraft maintenance	= 0 days
Stand-by days due to bad weather	= 1 day
Total survey duration	= 22 days

3. AIRCRAFT AND EQUIPMENT

Type:	Cessna U206G
Registration:	VH-AZG
Ownership/Operator:	World Geoscience Corporation
Serial Number:	U20605999
Date of Manufacture:	1981
Dimensions	Wingspan 36.00ft Length 29.00 ft Height 09.60 ft
Fuel:	Avgas 100/130
Fuel Capacity:	88 US gallons (335 litres) useable
Endurance:	6.5 hr at 13.5 US gal/hr
Cruise Speed:	120 kt
Total Airframe Time:	14,158 hr
Seating:	2 Pax, survey configuration
Emergency Equipment:	Inmarsat C Flight Following GPS system Emergency Locator Transmitter (ELT) First Aid Kit Survival Pack
Flight Instruments:	Cessna 400B Autopilot Directional Gyro
Radio Equipment:	Codan HF mulitchannel radio King K1525A Horizontal situation indicator Sperry RT100 altimeter DigiQuartz 223-AS-002 pressure transducer Cessna Nav/Com VHF radio Cessna ADF King KT76A ATC-SSR Transponder

4. SUMMARY OF SURVEY PARAMETERS AND TOLERANCES

4.1 Survey Parameters

Flight Plan Parameters and Sample Rates

Job Number	-	1406
Approximate line kms:	-	10,871
Flight line spacing	-	100, 200 & 400m
Flight line direction	-	090/270°
Tie line spacing	-	1000, 2000 & 4000m
Tie line direction	-	000/180° deg
Flight line overfly	-	400, 400 & 800m
Tie line overfly	-	500, 500 & 1200m
Spheroid	-	Australian National
Zone	-	52
Central Meridian	-	129degrees
Sensor height	-	60m
Magnetometer sample interval	-	7m
Magnetometer cycle rate	-	10Hz (0.1 sec)
Magnetometer resolution	-	0.001 nT
Radar altimeter cycle rate	-	10Hz (0.1 sec), less than 7m
Barometric altimeter cycle rate	-	10Hz (0.1 sec), less than 7m
Humidity sensor cycle rate	-	10Hz (0.1 sec), less than 7m
Temperature sensor cycle rate	-	10Hz (0.1 sec), less than 7m
3 Axes Fluxgate Magnetometer	-	10Hz (0.1 sec), less than 7m
GPS cycle rate	-	1 Hz (1.0 sec), less than 70m
PGAM 1000 Spectrometer	-	1 Hz (1.0 sec), less than 70m
(with 33.56 litres of NaI crystal sensor)		
Base magnetometer cycle rate	-	0.2Hz (5.0 sec)

4.2 Flight Plan

```

JOB_Number 1406.1
CLIENT N.T.DME
AREA_NAME RUM JUNGLE
PLANNED_BY PRH 31/08/1999 change Info: .....!!.....
|
SPHEROID 3 AUSTRALIAN_NAT. 6378160.0 298.25 0.9996
DELTAXYZ 116.00 50.47 -141.69 0.230 0.390 0.344 -0.0983E-6
HEMISPHERE SOUTH
UTM_ORIGIN 52 129 129
BOUNDARY 1 704106 8589766 -12.750004 +130.880001 -124500.0 +1305248.0 12 *
BOUNDARY 2 742900 8589475 -12.749853 +131.237176 -124459.5 +1311413.8 12 *
BOUNDARY 3 742900 8543710 -13.163375 +131.240872 -130948.2 +1311427.1 12 *
BOUNDARY 4 729136 8543710 -13.164452 +131.113955 -130952.0 +1310650.2 12 *
BOUNDARY 5 729043 8532756 -13.263443 +131.113950 -131548.4 +1310650.2 12 *
BOUNDARY 6 703697 8532756 -13.265276 +130.880113 -131555.0 +1305248.4 12 *
SQUARE_KMS 2066.380
|
WAYPOINT 1 720481 8554602 -13.066667 +131.033333 -130360.0 +1310160.0 56 *
|
NAVTYPE NOVATEL
NAVMODE U.T.M
PLAN_TYPE Normal
LINE_TYPE S.LINE X.LINE 0 0
HEADING 90 0
SPACING 200 2000 2000 2000
OVER_LINE 5 1
OVERFLY 800 1200
MIN_LENGTH 5 5
FIRST_LINE 10 10
INCREMENT 10 10
X_TRACK 50 50
MASTER_PT 1 500000 6000000 -36.144593 +129.000000
MASTER_NEW 1 724000 8555200 -13.061006 +131.065726
KM_in_AREA 10706 1132
KM+OVERFLY 11281 1211

```

```

JOB_Number 1406.2
CLIENT NTDME
AREA_NAME Rum Jungle
PLANNED_BY Ian Cook 26/08/1999 Initial Flight Plan
PLANNED_BY Ian Cook 27/08/1999 Boundary change Info: .....! *
PLANNED_BY PRH 03/09/1999 change Info: .....!!!!!! *
|
SPHEROID 3 AUSTRALIAN_NAT. 6378160.0 298.25 0.9996
DELTAXYZ 116.00 50.47 -141.69 0.230 0.390 0.344 -0.0983E-6
HEMISPHERE SOUTH
UTM_ORIGIN 52 129 129
BOUNDARY 1 707000 8568500 -12.942010 +130.908097 -125631.2 +1305429.1 12 *
BOUNDARY 2 713000 8568500 -12.941600 +130.963382 -125629.8 +1305748.2 12 *
BOUNDARY 3 713000 8565000 -12.973231 +130.963630 -125823.6 +1305749.1 12 *
BOUNDARY 4 707000 8565000 -12.973642 +130.908338 -125825.1 +1305430.0 12 *
SQUARE_KMS 21.000
|
NAVTYPE NOVATEL
NAVMODE U.T.M
PLAN_TYPE Infill
LINE_TYPE S.LINE X.LINE 0 0
HEADING 90 0
SPACING 200 2000 2000 2000
OVER_LINE 1 1
OVERFLY 400 1000
MIN_LENGTH 5 5
FIRST_LINE 10 10
INCREMENT 10 10
X_TRACK 50 50
MASTER_PT 1 703000 8590700 -12.741635 +130.869755
MASTER_NEW 1 709000 8566900 -12.956335 +130.926637
KM_in_AREA 132 14
KM+OVERFLY 150 28

```

Explanatory Note:

Area 1 above was flight planned at 200 m line spacing. However the survey required that the northern end of the area be flown at 400 m spacing only. Consequently every second line starting at line number 2 up to line number 86 was flown and starting at line 87, every single flight line was flown. As a result of this the number of km stated in the area 1 flight plan above is inaccurate. The entire area was covered with tie lines at a spacing of 2000m.

Area 2 was a small infill area (within the 200 m spaced area) to be flown at 100 m spacing. This was achieved by flight planning the lines at 200 m spacing with a 100 m offset such that these lines fell midway between the lines flown for the main 200 m spaced area. Infill tie lines were flown to produce a 1,000 m spacing over the detailed area.

4.3 Survey Tolerances

Reflight Requirements

The Contractor was responsible for monitoring data quality and assessing the need for reflights where data quality fell below the standards described in the contract.

Re-flights occurred where 1) any equipment, needed to record either aircraft position, height, or the magnetic field, failed, i.e. GPS (static or mobile), airborne or ground magnetometers, spectrometers, altimeters, or digital recorders or, 2) data quality did not meet tolerances described below.

If the recorded data became lost, destroyed or otherwise not available to the client, the affected lines were reflown.

Fill in flight lines were of sufficient length to cover a minimum of two tie lines.

Navigation Tolerance

A re-flight occurred where the flight line spacing exceeded 110% of the specified line spacing over a distance of 2 kilometres or more, or where the flight line spacing exceeded 200% of the nominal spacing. No flight or tie lines were allowed to overlap each other at any point.

Re-flights also occurred when less than 6 GPS satellites were available for recording or, the PDOP indicated that accuracy could not be achieved.

Height Tolerance

Re-flights occurred where the terrain clearance varied by more than ± 10 metres from the nominal survey height for more than 2 continuous kilometres on any line, except where such lines exceed the nominal flying height due to mountainous terrain, breach air regulations, or in the opinion of the pilot, put aircraft and crew at risk.

Airborne Magnetometer Noise Tolerance

The total permitted magnetometer noise from all sources was 0.2 nT peak to peak). A reflight was required if this was exceeded over 100 consecutive readings or more.

Base Station Magnetometer Diurnal Tolerance

Reflights occurred where the base station magnetometer noise levels were in excess of ± 0.5 nT for a period greater than 100 consecutive readings.

Reflights occurred where non-linear magnetic diurnal variations of greater than 5 nT in 10 minutes were encountered.

Reflights also occurred where the base station magnetometer instrument noise levels were in excess of 2 nT for a period greater than 5 minutes or where the base station ceased to function for a period of 5 minutes or more.

Ground Dampness

In case of heavy rainfall, flying was not to be conducted in affected areas within 48 hours. The effect of dampness was determined by reflying an 8 km section of a previously flown line and comparing the pre-rainfall and post-rainfall data.

5. AIRBORNE DATA ACQUISITION EQUIPMENT AND SPECIFICATIONS

The Airborne Data Acquisition system utilised on this project consisted of the following sub-systems:

- Data Acquisition System
- Navigation System
- GPS System
- Magnetometer Sensors
- Altimeter Systems
- Temperature and Relative Humidity System
- PGAM 1000 Spectrometer with 33.56 litres of NaI crystal.

5.1 Data Acquisition System

PDAS 1000 Data Acquisition System

The Picodas PDAS 1000 Data Acquisition System (PDAS) was the central airborne data logging system used. The PDAS is based on the IBM PC architecture and was configured with the following processing boards:

- magnetometer processor board
- frequency processor board
- 12 channel, 16-bit analogue processor board
- 10 channel GPSCard
- GPS 1 PPS interface board
- disk, parallel, serial I/O board
- LCD screen display adaptor

The PDAS computer executes a proprietary survey program for data acquisition and recording. This data is presented both numerically and graphically in real time on a liquid-crystal display for verification and quality control.

Specifications

Model	-	Picodas PDAS 1000
Processor	-	Intel i486 DX33
Operating System	-	MS-DOS 6.2
Storage		
Hard disk	-	240 MB
Floppy disk	-	1.44 MB
Magneto Optical Backup Drive	-	120 MB QIC-80 format

PDAS 1000A Power Console

A PDAS 1000A power console is used in conjunction with the PDAS 1000. This console contains the power supplies for providing regulated power to instruments such as caesium and fluxgate magnetometers, humidity,

temperature, and barometric pressure transducers. It also provides the interconnect to all analogue signals.

5.2 Navigation System

The Picodas PNAV 2001 Navigation Computer was used for real time navigation. The PNAV computer loads a pre-programmed flight plan from disk which contains boundary coordinates, line start and end coordinates, local coordinate system parameters, line spacing, and cross track definitions. The WGS-84 latitude and longitude positional data received from the Novatel GPS Card contained in the PDAS 1000 computer is transformed to the local coordinate system for calculation of the cross track and distance to go values. This information, along with ground heading and ground speed, is displayed to the pilot numerically and graphically on a two line LCD display, and on an analog HSI indicator. It is also presented on an LCD screen in conjunction with a pictorial representation of the survey area, survey lines, and ongoing flight path. The PNAV is interlocked to the PDAS computer for auto selection and verification of the line to be flown.

Specifications

Model	-	Picodas PNAV 2001
Update Rate	-	2 Hz

5.3 GPS System

GPS Receiver

The Novatel GPS Card 951R was utilised for airborne positioning and navigation. The GPS Card is contained in the PDAS 1000 computer and provides positional and satellite range data via the PDAS bus for display and recording, and positional data via a serial port to the PNAV 2001 for navigation. The GPS Card accepts RTCM 104 differential corrections via a serial port for real time differential solutions. Satellite range data is recorded for generating post processed differential solutions.

Specifications

Model	-	Novatel GPS Card 951R
Channels	-	10 Channels dedicated tracking
Position Update Rate	-	PDAS 1000 @ 1 Hz
	-	PNAV 2001 @ 2 Hz
Raw Data Update Rate	-	1 Hz
Datum for Positional Data	-	WGS-84
Time Sync	-	1 PPS output

Differential GPS Demodulator

The Racal differential GPS service was utilised for providing real time differential corrections. The product used by WGC is the portable DGPS Landstar system. Differential GPS corrections, derived from strategically located DGPS Reference Stations, are broadcast in RTCM 104 format via satellite. These corrections are received by the Landstar plate antenna

mounted on the aircraft. The signal is transferred to the Landstar demodulator and then after being demodulated is fed to the GPS card via a serial port.

The GPS card uses these corrections to determine a position with sub-metre accuracy, which provides :

- real-time navigation information for the PNAV 2001
- differentially corrected flight path information recorded in geophysical binary files.

Specifications

Model	-	Landstar MKII
Typical Received Update Rate	-	1 - 5 seconds
Data Format	-	RTCM 104 Ver. 2

5.4 Magnetometer Sensors

Caesium Vapour Magnetometer Sensor

A Caesium Vapour magnetometer sensor was utilised on the aircraft for the project. The sensor consists of the sensor head and cable, and the sensor electronics. The sensor head was housed at the end of a three metre kevlar stinger, and held by a rotatable clamp that permits orientating the sensor head for optimum coupling with the ambient magnetic field direction. The sensor electronics were mounted in the base end of the stinger. The magnetometer was powered by a dedicated power supply in the PDAS 1000A power console. Power was connected to the magnetometer using coaxial cable. The Larmor frequency output of the magnetometer is modulated onto this power cable for input to the magnetometer processor board in the PDAS 1000 computer.

Specifications

Model	-	Geometrics G822
Operating Voltage	-	30 Vdc
Operating Range	-	15,000 - 100,000 nT
Heading Error	-	± 0.25 nT
Gradient Tolerance	-	40,000 nT/m

Magnetometer Processor Board

Picodas magnetometer processor boards were used for decoupling and processing the Larmor frequency output of the magnetometer sensor. The processor board interfaces with the PDAS 1000 computer, which initiates data sampling and transfers for precise sample intervals.

Specifications

Model	-	Picodas Mag Processor MGP193
Sample Rate	-	10 Hz
Bandwidth	-	2 Hz
Resolution	-	0.001 nT

Fluxgate Magnetometer

A Bartington three axis fluxgate magnetometer was used for determination of the aircraft attitude. This data is used in the reduction of noise on the measured magnetic total field. This noise comes from the complex, three dimensional magnetic signature of the airframe. This changes with the airframe attitude, pitch, roll, yaw and rates of change of these elements in the earth's magnetic field. Permanent, induced, and eddy current effects are compensated by this method, as are the residual heading effects of the caesium vapour magnetometer.

Specifications

Model	-	MAG-03MC
Sample Rate	-	10 Hz
Output Signal Scaling	-	10mT/V
Measuring Range	-	±100mT

5.5 Altimeter Systems

Radar Altimeter

A Collins ALT-50 radar altimeter was used. The altimeter outputs a voltage proportional to height above terrain. This output has two scales for the indicated heights of 0 - 500 feet, and 500 to full scale output. The signal is available to a dashboard analog indicator for the pilot, and to the PDAS 1000 computer for display and recording. Prior to commencement of the project, coefficients are determined for accurately converting the two stage output signal to equivalent height. The calculated height and the measured signal are both recorded.

Specifications

Model	-	Collins ALT-50
Accuracy	-	-20 to 150 ft ± 3 ft
	-	150 to 500 ft ± 2%
	-	500 to 2000 ft ± 3.5%
Sample Rate	-	10 Hz

Barometric Altimeter

The output of a Digiquartz pressure transducer was used for calculating the barometric altitude of the aircraft. The atmospheric pressure is taken from a gimbal-mounted probe on the nose of the aircraft and fed to the transducer mounted in the aircraft fuselage. The transducer uses a precise quartz crystal resonator whose frequency of oscillation varies with pressure induced stress. A Picodas frequency processor board in the PDAS 1000 computer is used to measure the frequency of the output, and in combination with the QNH pressure and ambient temperature, the barometric altitude is calculated. This calculated altitude and the raw frequency are recorded to enable levelling to the post flight QNH pressure.

Specifications

Model	-	Digiquartz 215A-101
-------	---	---------------------

Range	-	0 - 0.10 Mpa
Accuracy	-	0.01%
Resolution	-	1×10^{-8} Mpa
Sample Rate	-	10 Hz

5.6 Temperature and Relative Humidity System

Vaisala humidity and temperature transmitters were utilised for measuring the relative humidity and temperature of the atmosphere external to the aircraft. These transmitters produce a linear voltage that is measured by the analogue processor board in the PDAS 1000 computer.

Specifications

Model	-	Vaisala HMP133Y
Sample Rate	-	10 Hz
Relative Humidity		
Measuring Range	-	0 - 100 %RH
Accuracy	-	±1 %RH (0..90 %RH)
Sensor	-	HUMICAP® H-sensor
Temperature Measuring Range	-	-20 .. +60 °C
Accuracy	-	±0.2 °C
Sensor	-	Pt 100 RTD

5.7 PGAM 1000 Spectrometer and Crystals.

The PGAM 1000 Spectrometer measures the gamma radiation emitted by the nuclear decay of naturally occurring radioactive isotopes of Potassium (K40), Uranium (U238) and Thorium (TH232). Spectra are presented as summed 256 channel data covering an energy range of 100 keV to 3 MeV. The Spectrometer was interfaced to two sensor packs each containing 4 NaI crystals (total volume of 33.56 litres).

6. SYSTEM TIMING

The system time is synchronised to the GPS time. Data sampling is synchronised to the Pulse Per Second output from the GPS receiver.

7. GROUND DATA ACQUISITION EQUIPMENT AND SPECIFICATIONS

The Ground Data Acquisition equipment utilised on this project consisted of the following systems:

- GPS Base Station System
- Base Magnetometer Systems

8. EQUIPMENT AND DATA ACQUISITION CALIBRATIONS

Prior to commencement of the survey and commencement of each day's flying, a series of calibrations were performed as follows:

8.1 Pre-Survey Calibrations

Radar altimeter coefficient calibration

This line is used to form a look up table for the radar altimeters by comparing the rad-alt data recorded in 'mVolts' in a PDAS analog channel to the differentially corrected GPS Altitude and the Barometric Altitude. The line consists of three steady climbs and descents between 50ft and 3000ft whilst over the ocean.

Radar altimeter slope crossover test

This line is used to check the Lookup Table produced from the above calibration line by applying the Lookup Table to the data from this line and ensuring that there are no kinks or level shifts in the radar altimeter data due to the cross-over.

Radar Alt / Barometric Alt / GPS Alt Parallax

Parallax error is caused by the physical difference in distance between the various sensors, the electronic delay and software timing in the acquisition system.

The aircraft system parallax was checked prior to project commencement.

This line is flown to calculate the parallax between the radar altimeter, the barometric altimeter and the differentially corrected GPS altitude.

This consists of the aircraft starting off at an altitude of approximately 250 feet pitching forward slowly, descending a 100 feet or so and then a rather sharp pitch up, levelling off at 350 feet again for a few seconds before repeating the pitch a further 3 times.

Magnetometer Parallax Check

The parallax between the GPS and the magnetometer was calculated using a line flown over a sharply defined magnetic source in opposite directions to calculate the combined effects of magnetometer and GPS lags. The final parallax values derived are recorded later in this report.

Dynamic Magnetometer Compensation

A series of aircraft compensation tests were flown on survey line heading and also 7.5° and 15° either side to calibrate the aircraft's automatic compensation system. The profile for each heading consists of a series of aircraft manoeuvres, pitches, rolls and yaws designed to simulate aircraft attitude changes whilst on survey and compensate for any magnetic noise induced by the aircraft's attitude in the naturally occurring magnetic field. The data

acquired are down-loaded to the field PC and processed, using software developed by WGC, to obtain the best possible magnetic dynamic compensation coefficients in the form of 30 mathematical terms. These coefficients are applied in real time as well as in post-processing.

Spectrometer Cosmic Calibration

During the survey two flights were made over the sea at barometric altitudes of 250 m and 2250 m to relate the cosmic-ray window to the combined cosmic and aircraft backgrounds of each window. The flying time at each altitude was a minimum of 10 minutes.

Spectrometer Pad Calibrations

The airborne spectrometer system was calibrated on WGC's set of approved calibration pads for the measurement of stripping ratios. This was done in January 1999.

Spectrometer Sensitivity and Height Attenuation Calibrations

A series of flights were made over Carnamah WA calibration range to determine aircraft system sensitivities and height attenuation coefficients. The calibration range was also ground-surveyed with a calibrated 256 channel portable spectrometer on the same day as the calibration flights.

8.2 Daily Calibrations

Equipment Tests

All equipment both on the ground and in the aircraft were tested daily to ensure correct functioning prior to any production flying.

A test line, approximately 8 km long, was flown before and after each production sortie to verify the correct operation of all systems. The test line was flown at survey height.

Before and at the end of each sortie, calibration sample checks were applied to the spectrometer system to monitor crystal alignment.

Daily Thorium Source Test

In order to verify that the system sensitivity remained constant throughout the survey, thorium source tests and background measurements were carried out before and after every day's flying.

If the dead-time and background corrected thorium window count rate differed by more than 5 percent from the average of all measurements carried out during the most recent calibrations, flights were suspended until the problem was rectified.

Daily System Resolution Checks

Each day the overall system resolution was measured with a Thorium source placed at least 40 cm from each detector package. If the resolution changed by more than 1 percent (eg from 6 to 7 percent) from the resolution at the beginning of the survey, flights were suspended until the problem was rectified.

Spectrum Stability

The field operator monitored spectral drift during the course of the flights. The average spectrum for each flight line was accumulated as a graph with the channel numbers marked and stored in a file for easy visualisation. These files were retained as part of the regular quality assurance procedures.

Survey Test Line

A survey test line at least 8 km in length was flown each day at the nominal survey altitude to monitor the effects of soil moisture, and verify that the system was functioning correctly. If the background and height corrected thorium window count rate varied by more than ± 10 percent from the average of the previous measurements, flights were suspended until the Thorium count rate returned to acceptable levels.

Survey Monitoring Reporting

The results of daily checks and source tests were routinely recorded. All resolution checks, source tests and survey test line data were recorded digitally and included as deliverables.

Cumulative plots were made of the thorium source tests, average background and height corrected thorium count rates over the survey test line, and the average flight line spectra indicating the thorium resolution and the potassium and thorium peak positions.

8.3 Field Data Processing

The following processes were carried out on site to ensure optimum data quality ;

- Identification and rejection of sub-standard data;
- Differential correction of GPS data
- Calculation of PDOPs
- Aircraft velocity checks
- Correction for lag, consolidation and merging of navigation, magnetic and altimeter data
- Flight path recovery
- Basic magnetic data processing and gridding (using Geosoft software)
- Preparation of preliminary magnetic contour maps and magnetic grey-scale imagery to check for subtle data errors.

After checking and preliminary processing in the field, the data were backed up onto magneto-optical disks and sent to head office for final processing.

9. FINAL DATA PROCESSING

Three separate streams of raw data are collected by separate acquisition systems. All three sets of data are treated as discrete units and are post-processed accordingly before being merged.

9.1 Raw Data Collection

Aircraft Data

Data collected by the aircraft includes:

- total magnetic intensity
- 256 Channel spectrometer
- 3 axis fluxgate magnetometer
- radar altimeter
- pressure
- humidity
- temperature
- fiducial
- time
- GPS Positioning information (including time and satellite data)

Magnetic Base Station Data

Whilst the aircraft was collecting data, two Geometrics G-856 memory proton precession magnetometers were collecting diurnal data at the base.

Global Positioning System Base Station Data

An Ashtech Ranger II 12 channel GPS receiver was used for the GPS base station at the crew headquarters. This instrument recorded variables such as location, time and satellite information to be used later for post processing of the aircraft location.

9.2 System Parallax

Parallax error is caused by the physical difference in distance between the various sensors, the electronic delay and software timing in the acquisition system. Hence all variables are subjected to a displacement from the GPS coordinates. If these variables are processed without a position offset a parallax error will occur.

The most suitable way to treat this problem is to use the 1 second radiometric data as a base with a zero correction. This will prevent interpolation of important variables (a filtering process). The coordinates were moved by linear interpolation and other data variables were displaced onto the radiometric data, without change, in multiples of 0.1 seconds.

VARIABLE	PARALLAX	DELAY
Mag.	-1.1	Seconds
Rad Alt.	-0.7	Seconds
Baro. Alt	0	Seconds
Radiometrics	0	Seconds
GPS Positioning	-1.4	Seconds

TABLE 1: VH-AZG Parallax

9.3 Aircraft Location

The aircraft's location each second was determined by differentially post processing the synchronised GPS data recorded on both the aircraft and GPS base station. Where small gaps occurred in the differential data, positions were calculated using the GPS velocities. These data are recorded in the WGS84 datum. Prior to merging with the aircraft data they were converted to the AGD84 datum. All preliminary and final data processing products were in the AGD84 datum.

9.4 Magnetic Data Processing

Data collected by each of the raw data sources is checked for spikes and noise by the procedures summarised below:

- Apply any spike corrections to the raw magnetic variables.
- Interpolate undefined magnetic values.
- Coordinate the data with post processed GPS data.
- Apply fluxgate corrections and compensate the data with post-processed compensation files.
- Filter diurnal values and subtract them from individual magnetic readings. (A diurnal base of 46,800 nT was used)
- Correct for regional effects of the earth's magnetic field by subtracting the calculated IGRF value from each reading. (An IGRF base of 46,900 nT was used)
- Apply parallax correction

9.5 Levelling Magnetic Data

The high quality of the final data was assured through WGC's in-house processing system which offers some of the most powerful levelling capabilities available in the industry. The tie lines are used to level the dataset after the removal of the diurnal, parallax and heading errors.

Using the tie lines (flown at 90 degrees to the traverse lines) a set of miss-tie values were determined. These miss-tie values reflected the differences in the magnetic value between the tie lines and the traverse lines over the same geographical point. Using a least squares fit algorithm, which also takes into account the statistical variation inherent in DGPS positioning, a

series of corrections were applied to the traverse line data. These allowed the data to be levelled to the same base value.

Following this, a WGC proprietary micro-levelling process was applied in order to more subtly level the data. This process removes sub-gamma pulls evident only under image enhancement algorithms. Since the correction values applied were based upon a least squares fit equation, the tie lines were then re-levelled to the traverse lines. This eliminated any “bulls-eyeing” effect which may be found when tie lines and traverse lines are used to generate a single grid.

The altitude variation between the flight lines and tie lines was accounted for when computing line corrections. A proprietary algorithm was applied to the magnetic data and a correction was made to remove this height effect.

9.6 Radiometric Data Processing

The radiometric data was processed using the standard IAEA window processing technique as summarised below.

- If there is evidence of peak drift in the 256 channel data then the data are energy calibrated.
- Rewindow the 256 channel data using the IAEA standard windows.
- Apply spike corrections to the radar altimeter, temperature and pressure values.
- Coordinate the data with post processed AMG coordinates.
- Apply parallax corrections.
- Calculate the equivalent terrain clearance at STP (standard temperature and pressure).
- Remove aircraft background.
- Remove cosmic background.
- Remove radon background.
- Apply stripping ratios.
- Apply height corrections.

Dead-Time Correction

Gamma-ray spectrometers require a finite time to process each pulse from the detectors. While one pulse is being processed, any other pulse that arrives will be rejected. Consequently the ‘live’ time of a spectrometer is reduced by the time taken to process all pulses reaching the multi channel analyser. The Picodas PGAM 1000 system has analogue to digital converters associated with each detector making the total dead-time, even at ground level, extremely small, and as such can be ignored.

Energy Calibration

The spectral drift was checked by monitoring the position of Potassium, Uranium and Thorium peaks on average spectra along flight lines. The peak

positions were determined by removing the Compton continuum and applying a gradient search technique on the residual spectrum. The original 256 channel data were mapped onto the corrected peak positions and a new 256 channel data set was generated by interpolation.

To verify the calibration, spectra were checked by comparing the before and after energy calibration plots. Where any spectra showed errors in recalibration, or any other abnormalities, the lines were reflown.

Window Definitions

After energy calibration, the corrected 256 channel data were summed into the standard IAEA windows.

Window	Peak Energy (keV)	Energy Window (keV)	PGAM Channel Window
Total Count	-	410 - 2810	35 - 240
Uranium Low	609	550 - 680	46 - 58
Potassium	1460	1370 - 1570	117 - 134
Uranium	1765	1660 - 1860	142 - 159
Thorium	2614	2410 - 2810	206 - 240
Cosmic	-	3000 - 6000	255 - 255

TABLE 2: Radiometric Window Definitions

Cosmic and Aircraft Background Removal

The cosmic and aircraft backgrounds for each channel are of the form:

$$N = a + bC$$

where

- N** = combined cosmic & aircraft background in each spectral window
- a** = aircraft background in the window
- C** = cosmic channel count
- b** = cosmic stripping factor

The aircraft background radiation was removed by subtracting the computed aircraft background from the Total Count, Potassium, Uranium and Thorium windows. The effect of cosmic radiation was removed from each window by multiplying the cosmic channel by the cosmic stripping factor for each window and subtracting the result from the window data.

Atmospheric Radon

The method of radon removal differs to that of Grasty and Minty (A Guide to the Technical Specifications for Airborne Gamma-Ray Surveys. Record 1995/60 p.34, Australian Geological Survey Organisation) and is proprietary but its effectiveness is evident in the quality of the final product.

STP Altitude

The data were converted to effective height at standard temperature and pressure using the expression:

$$\text{STPAIt} = \text{Ralt} * (\text{P}/1013) * (273 / (\text{T}+273))$$

where

Ralt = the observed radar altitude in metres
T = the measured air temperature in degrees C
P = the barometric pressure in millibars

In areas of significant topographic variation, height correction problems can be induced by sudden jumps in the radar altimeter data. To overcome this, the radar altimeter data were lightly filtered.

Conversion to Concentrations

The corrected window count rate data were converted to ground concentrations of Potassium, Uranium and Thorium using the following expression:

$$\text{C} = \text{N}/\text{S}$$

where

C = concentration of the radioelement (K%, U or Th ppm)
S = broad source sensitivity for the window; and
N = count rate for each window, after dead time, background, stripping and height correction

The broad source sensitivities were obtained from the calibration range flights.

9.7 Altimeter Derived Terrain

The radar altimeter data were subtracted from the GPS heights to provide a model of the terrain height.

9.8 Gridding and Projections

A proprietary gridding algorithm using bi-directional polynomial interpolation was used.

The final data were projected to the Australian Map Grid, zone 52.

9.9 Deliverables

The following deliverable items were provided under the contract:

Weekly reports

Three weekly flying progress reports were provided during the time it took to fly the survey.

Hundred Hourly reports

One such report was delivered as the survey took less than 100 hours of aircraft time to fly. This report contained quality assurance products as specified in the tender document.

Gridded Data

Grids were provided of magnetics, RTP magnetics, FVD (first vertical derivative), AGC magnetics, elevation, potassium, uranium, thorium and total count at a cell size of 100 metres.

Vector Data

Vector data files were provided in Microstation-DGN format of the following

- flight paths
- magnetic contours
- contours of total count
- contours of potassium
- contours of uranium
- contours of thorium
- FVD profiles

Separate digital vector files were provided for each 1:100,000 map sheet of each of the above vector quantities.

Separate digital vector files of the contoured data were provided at 1:250,000.

Print Files

Print files were provided for all image algorithms and vector data files.

Images

Print files of ER Mapper algorithm image files were provided for each imaged quantity (magnetics, radiometrics and DEM) at 1:250,000 and 1:100,000 scales. Ternary images of the radiometrics were provided.

Digital Data

The full set of digital data includes:

- line data
- grids
- vectors
- packages

Digital data were gathered by map sheet (1:100,000 and 1:250,000) and supplied as map sheet packages on CDROM.

Gridded data were subsetting to cover a little more than the map sheet.

The data were provided in a series of CDROMs, each series being a specific data type.

A copy of all line and gridded data was provided on Exabyte tape.

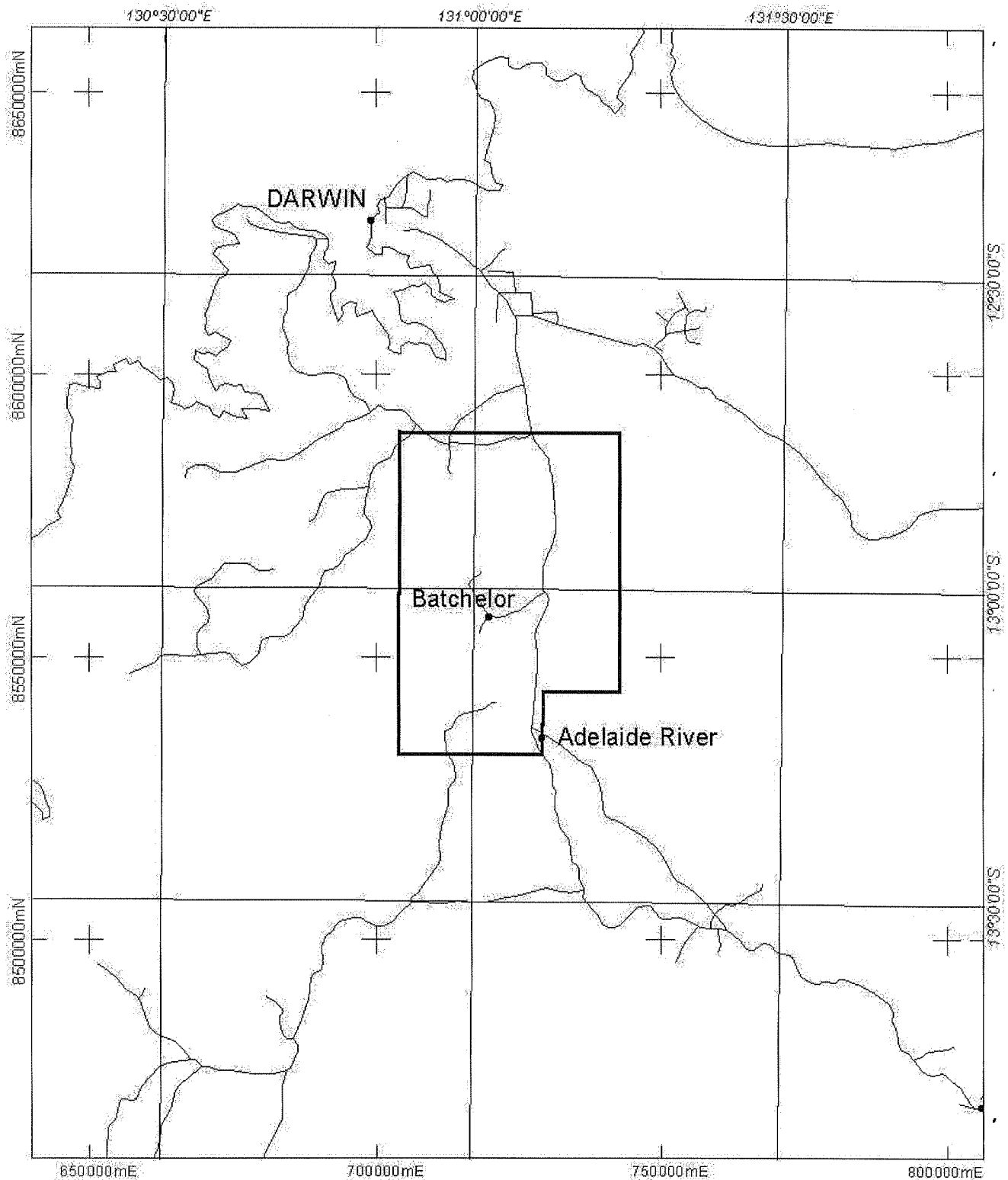
Report

This survey operational and logistics report is required to include:

- Location of the survey
- Map of the flight lines at reduced scale
- height difference at crossovers
- magnetometer tests
- spectrometer calibration results
- location of the survey test line
- description of data processing
- printouts of metadata files

APPENDIX A

SURVEY LOCATION MAP

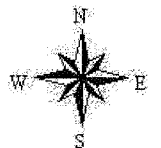
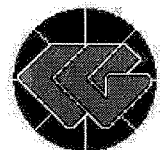


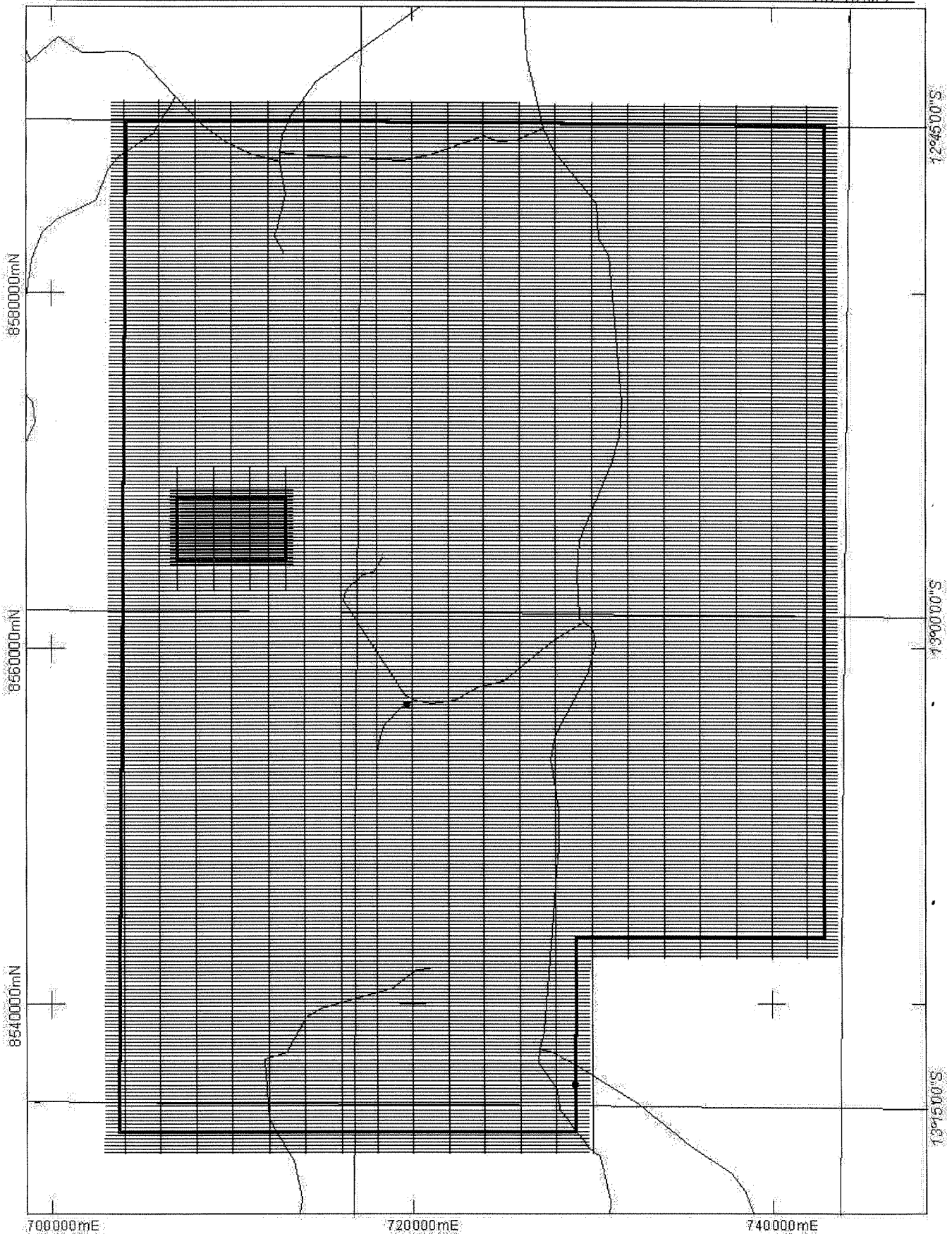
Location Plan for Job 1406

Projection: Transverse Mercator
 Spheroid: WGS 84
 FalseEasting: 500000
 FalseNorthing: 10000000
 CentralMeridian: 129

1:1000000

50 0 50 Kilometers

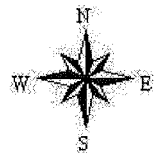
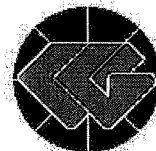




Flight Plan for Job 1406

Projection : Transverse Mercator
 Spheroid : WGS 84
 FalseEasting : 500000
 FalseNorthing : 10000000
 CentralMeridian : 129

1:300000



10 0 10 20 Kilometers

APPENDIX B

FLIGHT LINE MAP

130°30' 131°00' 131°30' 132°00'

8600000 mN

8550000 mN

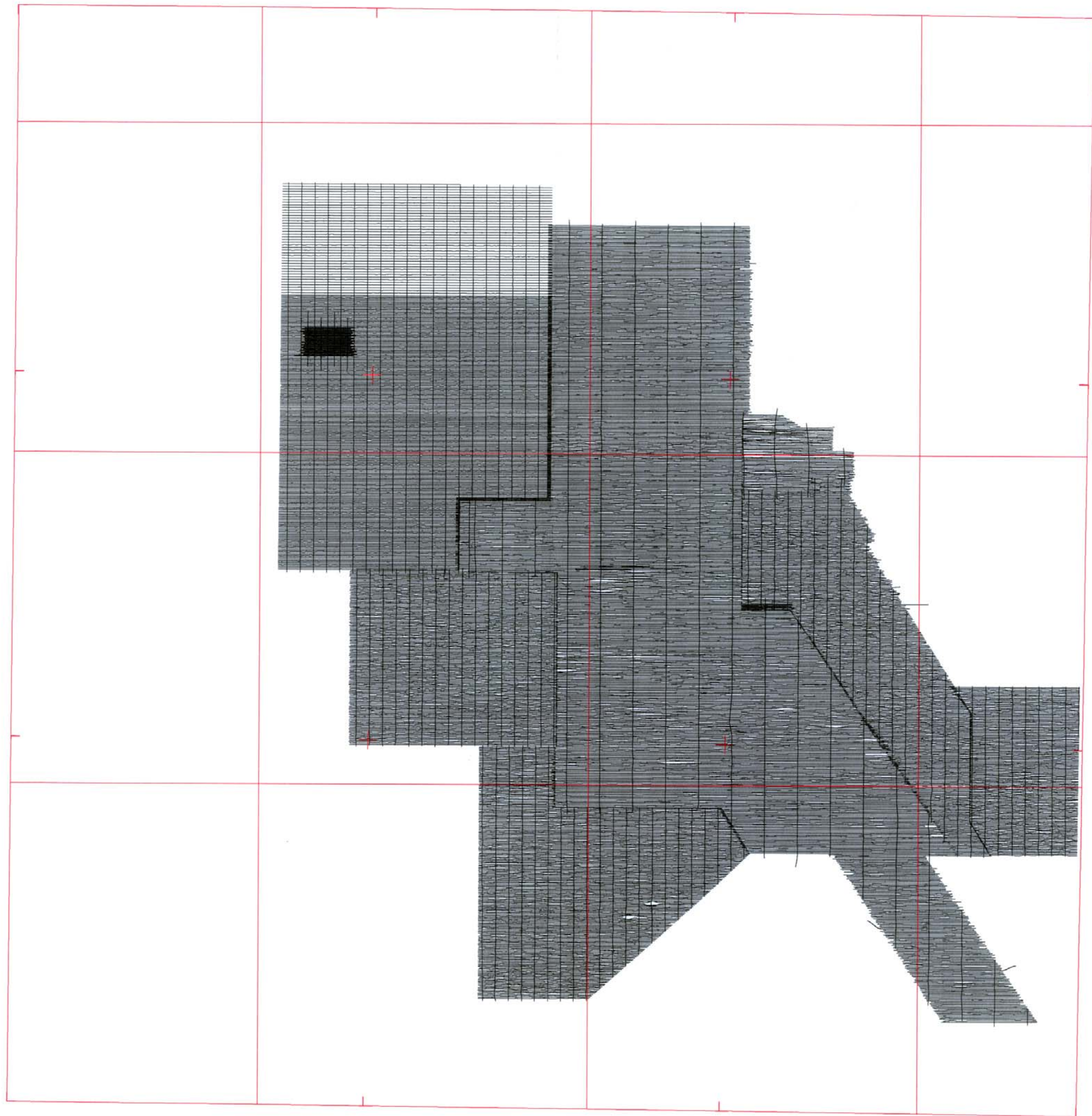
8500000 mN

12°30'

13°00'

13°30'

14°00'



700000 mE

750000 mE

800000 mE

Job 1406
Area RumJungle
Scale 1:500 000
Sheet RumJungle

APPENDIX C

DIGITAL DATA

APPENDIX C: Digital Data

1. STANDARD MAGNETICS AND RADIOMETRICS

Located data were written at 0.1 second intervals in the following ascii format onto Exabyte tape:-

Variable	Format	Undefined
Line	I5	99999
Flt	I4	999
Heading	I4	999
Date	I7	999999
Fiducial	F8.1	99999.9
Time	F8.1	99999.9
Recovery Status	I3	-1
Easting	F9.1	999999.9
Northing	F10.1	9999999.9
Longitude	F13.7	9999.999999
Latitude	F12.7	999.999999
GPS Altitude	F7.1	9999.9
Radar Altimeter	F7.1	9999.9
Baro Altimeter	F7.1	9999.9
Raw Mag	F10.3	99999.999
IGRF	F10.3	99999.999
Diurnal	F10.3	99999.999
Final Mag	F10.3	99999.999
Altimeter Derived Terrain	F7.1	9999.9
Raw Tot	F8.1	99999.9
Raw Pot	F7.1	9999.9
Raw Ura	F7.1	9999.9
Raw Tho	F7.1	9999.9
Raw Cos	F7.1	9999.9
Final Total Count	F8.1	99999.9
Final Potassium	F7.1	9999.9
Final Uranium	F7.1	9999.9
Final Thorium	F7.1	9999.9

Logical records are fixed length but as well each field is separated by a <blank>

Each logical record is terminated by an < ><cr><nl>

2. 256 CHANNEL RADIOMETRICS

Located radiometric data were written at 1 second intervals in the following ascii format onto Exabyte tape:-

<u>Variable</u>	<u>Format</u>	<u>Undefined</u>
Line	I5	99999
Flt	I4	999
Heading	I4	999
Date	I7	999999
Fiducial	F8.1	99999.9
Time	F8.1	99999.9
Recovery Status	I3	-1
Easting	F9.1	999999.9
Northing	F10.1	9999999.9
Longitude	F13.7	9999.999999
Latitude	F12.7	999.999999
GPS Altitude	F7.1	9999.9
Radar Altimeter	F7.1	9999.9
Baro Altimeter	F7.1	9999.9
Altimeter Derived Terrain	F7.1	9999.9
Raw Tot	F8.1	99999.9
Raw Pot	F7.1	9999.9
Raw Ura	F7.1	9999.9
Raw Tho	F7.1	9999.9
Raw Cos	F7.1	9999.9
Final Total Count	F8.1	99999.9
Final Potassium	F7.1	9999.9
Final Uranium	F7.1	9999.9
Final Thorium	F7.1	9999.9
Pressure	F8.2	9999.99
Temperature	F5.1	99.9
256 Channels	F5.0	9999

Logical records are fixed length but as well each field is separated by a <blank>

Each logical record is terminated by an < ><cr><n>

3. GRIDDED DATA

Final gridded data were written in ERMapper format onto Exabyte tape:-

<u>Grid</u>	<u>Data Type</u>
tmi	Total Magnetic Intensity
adt	Altimeter Derived Terrain
tot	Total Count
pot	Potassium
ura	Uranium
tho	Thorium

APPENDIX D

CROSSOVERS

Altitude difference

	17020 16 16Sep1999	17030 16 16Sep1999	17040 16 16Sep1999	17050 16 16Sep1999	17060 16 16Sep1999	17070 16 16Sep1999	17080 16 16Sep1999	17090 16 16Sep1999	17100 16 16Sep1999
10020	1515Sep199	-7.930	-4.289	5.807	0.073	0.255	-1.545	-4.973	-0.853
10040	1515Sep199	4.134	15.484	0.228	3.901	2.584	6.698	1.875	6.964
10060	1515Sep199	-1.876	2.470	2.962	-10.847	-3.342	2.920	-8.116	-4.346
10080	1515Sep199	-8.360	-9.760	2.351	-8.949	-3.302	5.013	1.609	1.284
10100	1515Sep199	-7.496	-4.644	4.410	-3.380	1.055	7.239	-2.576	1.743
10120	1515Sep199	-1.085	-1.730	-2.136	-5.662	-0.528	1.002	-6.845	-9.823
10140	1515Sep199	-4.063	0.777	4.235	-1.994	-3.041	0.769	-4.923	-5.078
10160	1515Sep199	0.814	-0.045	-1.836	-4.844	6.318	-0.499	-9.815	-5.215
10180	1515Sep199	-1.038	-7.603	1.041	-2.436	-2.710	-3.471	-1.746	-7.109
10200	1515Sep199	1.213	-5.594	6.545	-7.218	4.861	-0.363	-5.334	-5.575
10220	1515Sep199	2.143	-2.897	8.275	-5.920	-5.686	2.263	-7.512	-3.854
10240	1312Sep199	8.172	-2.844	16.689	5.980	-0.911	1.660	-3.945	0.090
10260	1312Sep199	-3.667	5.721	5.261	-0.303	-1.773	2.897	4.979	4.426
10280	1312Sep199	-4.844	4.248	-0.015	-13.080	-1.887	-0.561	-3.408	7.759
10300	1312Sep199	1.864	0.889	7.037	4.861	0.300	0.120	9.794	-2.425
10320	1312Sep199	-2.300	6.459	2.735	4.073	2.479	-2.393	8.525	8.719
10340	1312Sep199	1.403	-4.682	1.295	2.410	3.738	-2.322	0.237	4.972
10360	1312Sep199	1.603	9.968	2.218	-5.279	-2.497	4.257	4.450	12.278
10380	1312Sep199	0.771	4.072	6.413	1.137	0.204	4.605	5.725	18.476
10400	1312Sep199	-2.134	8.507	-3.146	6.414	4.578	-7.680	13.258	10.737
10420	1312Sep199	5.503	7.497	5.653	-0.951	-6.238	3.645	1.336	-8.335
10440	1312Sep199	-6.810	1.214	-6.475	2.505	5.863	10.671	-2.777	19.971
10460	1312Sep199	4.378	-0.946	1.560	-4.409	5.491	-12.818	-1.661	13.994
10480	1312Sep199	3.222	0.518	-6.980	-5.503	-4.009	-0.500	26.148	5.060
10500	1312Sep199	1.638	0.717	1.330	3.829	-1.396	18.326	24.592	17.219
10520	1211Sep199	-0.307	4.557	-1.159	-3.125	-0.357	-2.852	5.359	-3.313
10540	1211Sep199	0.754	-9.791	3.604	3.824	1.458	7.570	-0.568	-5.171
10560	1211Sep199	9.751	1.343	0.219	-1.282	9.282	-4.616	-7.403	1.344
10580	1211Sep199	-2.432	7.056	-0.290	-6.118	-3.005	-5.157	-8.577	-6.500
10600	1211Sep199	-0.279	-3.267	2.092	-0.166	-4.688	-1.771	-4.595	-10.988
10620	1211Sep199	5.448	0.261	-6.474	1.996	-8.590	-2.576	2.342	-7.266
10640	1211Sep199	0.690	2.707	-0.850	-3.723	-3.221	-0.358	8.347	-8.031
10660	1211Sep199	1.116	2.391	1.336	0.106	-5.543	1.545	-5.235	-4.283
10680	1211Sep199	-2.120	3.568	-2.966	-0.075	4.331	-7.957	3.249	-4.843
10700	1211Sep199	-11.337	-7.019	0.782	7.987	-4.530	4.800	2.085	-6.533
10720	1211Sep199	0.215	-4.398	0.511	-4.768	0.286	1.631	1.701	1.602

10740	1211Sep199	3.403	-2.162	1.717	-1.426	-1.730	-2.630	2.606	3.270	-0.647
10760	1211Sep199	-2.042	1.207	0.816	-1.507	0.321	3.417	7.478	1.849	0.865
10780	1211Sep199	1.885	0.280	-1.571	1.642	-7.084	-1.365	-1.903	2.553	-2.054
10800	1110Sep199	1.916	0.080	-5.098	3.517	-7.548	6.012	-4.782	-9.790	0.775
10820	1110Sep199	-1.754	2.848	5.902	2.309	3.821	0.747	-4.484	3.412	0.955
10840	1110Sep199	8.787	10.818	-0.306	9.329	0.243	4.532	5.639	-5.476	0.672
10860	1110Sep199	-3.184	-1.850	0.088	-7.362	-0.805	-0.885	9.367	-5.645	1.864
10870	1110Sep199	-1.669	9.937	3.871	-1.716	-5.035	3.217	2.661	5.464	-3.272
10880	1110Sep199	0.557	-3.960	5.271	-7.766	-3.919	-6.989	-1.938	-5.229	-0.520
10890	1110Sep199	-3.663	-3.371	-1.971	-7.878	-2.452	-1.366	-4.877	-0.335	1.810
10900	1110Sep199	-9.399	2.129	0.567	-2.141	1.957	-2.033	1.550	-1.187	-2.888
10910	1110Sep199	3.916	9.467	6.491	-1.869	1.767	2.049	0.738	-1.991	-3.599
10920	1110Sep199	-10.898	0.832	1.992	15.730	9.561	-4.102	-2.456	-8.127	-4.414
10930	1110Sep199	-5.403	5.447	-1.299	6.969	-3.417	6.579	2.790	-2.573	2.146
10940	1110Sep199	-10.955	-2.317	0.869	5.106	-7.726	-3.388	0.109	-3.664	-2.410
10950	1110Sep199	-0.322	1.721	1.963	9.764	-6.176	5.152	-7.305	-2.098	-4.673
10960	1110Sep199	-5.372	0.494	3.011	2.660	4.461	1.158	-2.278	1.868	2.486
10970	1110Sep199	-0.633	3.963	-1.065	8.046	-2.916	-1.846	-4.999	5.798	0.071
10980	1009Sep199	1.425	0.740	2.158	7.514	-4.221	9.270	-2.868	3.512	0.330
10990	1009Sep199	5.309	3.200	7.261	1.866	-2.641	6.168	10.974	5.321	-0.086
11000	1009Sep199	-1.301	-1.866	1.180	5.640	-2.784	3.236	1.353	-4.070	-10.243
11010	1009Sep199	1.778	-0.823	6.598	6.000	0.032	-0.367	3.679	-0.719	-3.400
11020	1009Sep199	9.380	-3.646	-2.136	6.055	1.891	6.020	5.948	3.469	-2.744
11030	1009Sep199	-3.200	0.854	-0.144	4.462	-2.041	3.420	0.859	-6.767	8.166
11040	1009Sep199	1.538	5.651	3.789	2.397	-1.084	7.099	-4.721	-0.930	3.403
11050	1009Sep199	-2.449	3.503	2.981	9.291	4.944	-1.630	-7.134	-2.579	-2.256
11060	1009Sep199	-1.366	8.465	11.207	3.087	1.579	-0.706	-3.215	0.251	-4.288
11070	1009Sep199	4.947	5.530	11.934	2.664	8.454	-2.929	-5.530	-9.468	-5.433
11080	1009Sep199	-5.615	2.892	1.748	5.254	8.924	-6.334	0.563	-3.120	0.444
11090	1009Sep199	6.808	5.405	-0.268	5.773	8.238	-5.267	-2.087	0.476	6.011
11100	908Sep199	8.560	-0.880	9.389	5.799	0.239	-7.797	-0.098	-8.106	3.674
11110	908Sep199	2.363	10.635	4.794	-4.609	7.855	-2.261	-1.327	-0.456	6.207
11120	908Sep199	4.730	-2.010	7.993	4.164	-12.575	-8.834	-2.897	8.173	3.258
11130	908Sep199	6.509	-0.863	3.995	-4.152	4.522	-0.686	-7.337	5.278	1.335
11140	908Sep199	5.153	-2.608	4.619	0.828	3.686	-3.047	-5.532	-0.152	2.343
11150	908Sep199	7.702	0.150	6.340	2.322	11.199	-3.654	-5.011	6.944	-2.647
11160	908Sep199	6.719	-4.245	2.392	0.541	0.081	-0.060	5.675	5.242	1.698
11170	908Sep199	9.035	6.193	0.365	-0.167	-1.167	-5.810	3.020	0.169	9.081
11180	908Sep199	9.819	-1.224	1.542	-2.655	-0.492	2.928	-1.201	2.921	9.140
11190	908Sep199	-2.788	4.457	0.141	4.405	0.701	-9.994	9.795	10.822	2.108
11200	908Sep199	1.122	-2.620	1.508	10.424	7.649	-7.283	-4.232	3.997	-0.852
11210	908Sep199	4.109	-0.388	3.500	7.277	-0.005	-1.856	1.141	6.252	-7.248

11220	908Sep199	1.361	-2.772	2.206	4.919	-12.590	-8.444	3.563	7.222	-3.657
11230	908Sep199	5.096	3.300	2.498	7.765	19.058	-4.276	2.840	-2.179	-4.956
11240	908Sep199	-0.890	-5.178	0.803	6.088	-3.354	-5.351	0.387	1.131	-2.105
11250	908Sep199	5.395	0.328	-1.268	4.811	10.060	-0.051	-2.060	3.215	-8.170
11260	807Sep199	9.213	-1.687	3.400	1.516	-5.398	-9.165	-3.284	2.934	2.373
11270	807Sep199	4.296	-0.235	8.233	1.707	-0.866	0.689	5.259	-6.449	-3.109
11280	807Sep199	0.798	1.877	2.775	-4.359	-11.306	-1.640	-2.995	-5.135	0.007
11290	807Sep199	2.213	8.721	-11.102	7.890	-11.023	3.822	-4.179	-1.484	9.746
11300	706Sep199	1.033	1.399	3.775	-0.017	-4.384	3.379	0.916	-10.754	-16.728
11310	706Sep199	0.898	4.983	-0.002	0.923	-25.643	3.541	6.179	6.668	-5.555
11320	706Sep199	-5.956	0.340	-5.612	-1.395	-0.342	0.638	7.439	-6.665	5.635
11330	706Sep199	0.072	-2.672	-10.060	8.190	-2.583	-13.473	8.772	-4.179	8.821
11340	706Sep199	-6.789	6.010	4.473	1.964	2.410	0.562	11.181	3.134	-4.297
11350	706Sep199	2.819	8.718	9.717	8.791	-2.318	-2.573	5.974	-0.185	3.461
11360	706Sep199	-2.329	5.154	4.420	0.442	9.404	0.478	-2.107	-11.356	0.805
11370	706Sep199	-4.199	-3.260	5.243	1.816	-1.528	-3.292	-1.045	-1.221	1.331
11380	706Sep199	-4.768	-0.160	2.127	-0.003	-1.463	-1.464	-3.244	-7.844	-3.077
11390	706Sep199	3.524	4.081	4.962	-2.738	3.824	6.187	8.382	7.619	-1.937
11400	706Sep199	5.767	7.577	2.366	8.544	0.368	0.302	1.879	0.268	1.213
11410	706Sep199	-20.204	-4.221	0.562	0.142	4.296	5.425	13.427	0.274	-0.658
11420	706Sep199	-13.996	2.035	3.003	10.788	2.723	4.804	6.447	-2.547	4.993
11430	706Sep199	-15.837	-0.539	5.470	-3.871	1.488	1.261	9.054	-9.981	-4.611
11440	706Sep199	-6.382	2.630	2.238	-4.462	2.249	0.890	12.045	-5.197	2.621
11450	706Sep199	-4.442	2.467	2.208	-1.838	4.402	-0.828	-1.408	3.035	1.506
11460	706Sep199	-24.354	5.005	3.847	-1.865	-1.735	-0.778	-1.505	-8.777	2.739
11470	706Sep199	-8.751	1.257	-2.645	-1.633	-3.155	-9.871	7.228	0.721	0.229
11480	706Sep199	-14.250	8.776	0.722	6.060	2.131	-3.104	4.603	-2.232	-1.424
11490	706Sep199	6.759	5.532	-0.263	0.783	8.492	-1.792	3.640	1.364	-9.411
11500	706Sep199	-6.343	1.733	-5.568	0.769	0.682	-8.369	4.922	5.681	-2.955
11510	706Sep199	2.690	4.841	-2.151	8.871	-1.796	-3.094	-7.187	2.808	1.886
11520	706Sep199	10.119	7.418	0.983	-0.905	7.328	1.105	12.771	3.379	-6.654
11530	706Sep199	-2.645	6.777	1.067	6.199	-3.529	0.720	4.502	7.190	-3.456
11540	605Sep199	-5.250	6.665	2.042	8.664	-6.909	1.370	9.236	3.214	-2.246
11550	605Sep199	-19.619	3.069	4.833	2.648	-1.332	-3.547	5.815	0.645	-5.991
11560	605Sep199	-18.824	6.594	0.072	1.369	-7.415	-0.237	7.463	-2.772	-5.372
11570	605Sep199	-9.778	9.689	4.904	-1.180	-5.759	3.588	-5.719	-7.898	-3.878
11580	605Sep199	2.565	5.486	-0.653	4.592	-3.130	0.420	-3.620	-7.480	-22.413
11590	605Sep199	-7.646	4.189	2.204	-5.676	-3.195	1.578	1.980	0.721	6.592
11600	605Sep199	0.849	8.887	-7.198	2.930	-1.648	-0.637	4.801	-11.310	0.002
11610	605Sep199	2.091	8.930	1.490	-0.335	-1.320	-1.073	3.700	-6.006	-1.676
11620	605Sep199	-2.303	11.187	-5.037	1.668	-2.221	-0.353	3.183	-28.176	-0.233
11630	605Sep199	7.606	2.081	-7.395	8.879	-2.330	-4.976	3.190	2.896	0.879

11640	605Sep199	-2.171	6.694	4.728	10.551	-2.747	-5.585	-7.228	-2.453	3.991
11650	605Sep199	5.823	10.898	0.852	4.767	-4.636	-16.523	9.025	-0.919	-4.497
11660	605Sep199	0.002	21.327	11.658	-3.911	2.632	8.250	8.207	-9.104	-0.868
11670	605Sep199	-0.488	4.322	-2.127	-0.036	4.528	-2.336	-8.957	2.070	-0.214
11680	605Sep199	-5.851	-5.060	5.793	-2.158	-1.464	0.591	9.913	-2.385	15.834
11690	605Sep199	-6.963	5.454	-1.172	2.030	-1.821	6.529	1.481	-10.661	-13.725
11700	605Sep199	6.561	6.629	0.061	1.881	7.679	5.299	8.960	-28.837	-58.557
11710	605Sep199	-19.480	-5.849	3.697	-2.885	7.497	14.894	4.134	-13.146	-35.438
11720	605Sep199	-22.499	4.759	2.207	5.700	6.891	16.603	7.467	-70.103	-44.264
11730	605Sep199	-25.142	6.523	-5.689	-2.686	4.528	-5.264	-2.055	-7.442	-33.145
11740	605Sep199	-20.960	-0.637	-3.064	-8.059	8.954	-11.094	-4.752	-0.240	55.977
11750	605Sep199	-2.689	-4.524	4.737	1.117	1.017	-0.851	2.220	7.973	46.760
11760	605Sep199	-23.149	-7.200	8.607	-4.814	-3.934	0.603	3.343	-4.750	17.994
11770	605Sep199	16.216	3.356	5.328	-1.860	-3.450	1.865	5.648	-2.588	6.371
11780	605Sep199	2.171	1.530	9.252	6.104	-1.305	1.946	16.695	-5.443	3.722
11790	706Sep199	-6.583	10.142	-3.893	-2.644	1.695	-3.356	10.721	3.866	9.140
11800	605Sep199	13.886	15.573	1.762	-3.637	5.962	1.221	12.714	1.110	3.972
11811	605Sep199	0.935	15.052	-3.349	-1.211	-4.841	7.098	-5.147	4.337	4.886
11821	504Sep199	-2.653	18.580	-14.285	-10.725	9.357	-0.140	7.005	-5.977	7.472
11830	504Sep199	4.504	6.216	-9.459	-1.400	-1.301	-0.157	-17.978	-7.499	4.500
11840	504Sep199	18.175	17.224	-9.337	-0.447	2.622	8.481	5.522	-0.665	3.463
11850	504Sep199	-0.718	-2.949	-0.987	4.042	-1.361	2.151	-5.744	-2.675	6.114
11860	504Sep199	-3.899	8.757	-5.388	1.337	-3.142	2.207	7.003	7.234	4.190
11870	504Sep199	-4.619	13.939	-1.453	6.355	-11.596	1.994	5.216	-4.023	0.175
11880	504Sep199	3.782	11.450	-4.120	6.146	5.071	5.278	19.807	4.833	1.524
11890	504Sep199	4.924	-4.529	10.878	2.839	-0.713	-1.455	15.106	-9.467	-4.514
11900	504Sep199	-2.214	8.710	-2.117	-7.637	7.730	7.618	-3.315	2.805	0.068
11910	504Sep199	9.052	5.909	-9.851	5.427	-4.405	5.092	8.034	2.698	-0.496
11920	504Sep199	21.029	9.864	1.714	-8.669	-1.688	4.156	0.380	11.834	8.141
11930	504Sep199	-6.766	11.394	-6.699	4.609	-2.459	-11.201	8.205	6.753	-1.983
11940	504Sep199	0.790	8.145	-1.976	3.136	-5.517	-12.442	-2.539	-7.076	0.023
11950	504Sep199	1.519	-11.924	2.295	3.851	5.640	-7.691	5.952	4.267	7.793
11960	504Sep199	-9.357	5.836	-6.954	4.145	4.478	4.297	3.969	1.335	1.019
11970	504Sep199	1.092	-11.125	1.655	-3.084	-3.614	8.403	-0.226	3.131	3.079
11980	504Sep199	-3.117	2.971	5.933	3.091	-9.288	3.994	-10.669	-5.755	-2.089
11990	504Sep199	-3.876	-17.948	-17.694	-6.447	1.919	-6.764	-3.298	-1.390	0.321
12000	504Sep199	-16.988	-12.453	-2.593	3.594	2.187	-4.095	-1.880	-1.843	-2.884
12010	504Sep199	7.825	-2.094	-14.615	4.229	-0.910	-1.972	3.907	-2.731	2.554
12020	504Sep199	-21.623	5.342	7.330	1.200	-2.335	-6.562	-3.405	-6.355	-5.202
12030	504Sep199	-34.629	18.606	-5.567	-2.430	-6.881	0.421	1.234	-11.208	1.870
12040	504Sep199	-9.239	9.515	3.029	1.844	-2.618	10.565	-4.746	-7.612	-8.414
12050	504Sep199	-12.262	-19.890	-7.111	10.480	3.541	4.208	6.715	-6.837	-4.567

12060	504Sep199	-4.340	-12.818	-0.547	-4.006	-7.319	7.650	-3.739	-4.218	-5.001
12071	504Sep199	7.524	8.922	0.602	-1.555	-7.713	-2.469	3.662	-12.803	6.843
12080	403Sep199	1.640	-14.849	-1.200	-9.680	-0.691	-0.509	-6.991	1.409	2.070
12090	403Sep199	-18.007	-29.401	3.137	1.095	1.420	0.589	-4.595	-3.949	1.640
12100	403Sep199	-9.681	-15.406	-13.109	1.153	-1.073	5.779	-2.111	-6.261	-10.226
12110	403Sep199	-5.596	-25.503	1.772	-11.502	0.850	-0.614	-0.924	-4.745	4.447
12120	403Sep199	-19.128	-5.888	2.265	-2.236	4.980	-1.166	-9.529	-5.005	2.783
12130	403Sep199	-8.092	-24.296	8.540	-2.631	-0.297	-2.258	0.797	-0.594	-4.481
12140	403Sep199	-24.429	-9.666	8.058	-1.887	-4.010	0.734	-7.227	-0.953	4.182
12150	403Sep199	-9.222	-18.802	6.033	0.724	-9.036	-5.238	-9.455	-15.706	-8.385
12160	403Sep199	13.746	-8.609	14.546	2.279	8.027	-6.377	-4.526	-5.214	-0.320
12170	403Sep199	9.461	-8.309	5.497	5.395	-3.792	-5.479	-6.145	-3.364	-4.525
12180	403Sep199	0.461	-2.561	-16.921	-0.086	-0.206	-6.495	-2.906	-1.674	-4.858
12190	403Sep199	2.122	-2.205	-2.520	-4.285	-1.960	1.358	-10.198	-0.430	2.490
12200	403Sep199	-1.376	-12.022	2.603	0.690	-10.588	-2.032	-3.479	-0.944	2.551
12210	403Sep199	13.344	-6.785	-1.539	1.813	-5.887	3.527	-7.251	-8.119	-3.269
12220	403Sep199	19.882	-3.826	5.508	-1.866	4.912	-8.255	0.489	-3.839	2.616
12230	403Sep199	-7.010	2.308	13.436	6.831	-6.187	0.229	0.303	-5.734	-10.530
12240	403Sep199	-4.536	1.675	-0.240	3.947	3.367	-13.124	2.570	-7.243	-3.974
12250	403Sep199	1.183	6.211	-6.123	2.503	-12.471	-2.315	-8.002	-8.347	1.410
12260	403Sep199	-25.711	-5.550	-8.271	-1.375	-4.962	-13.944	-5.067	-1.875	-6.086
12270	403Sep199	10.905	0.007	-3.420	6.539	-3.498	-4.535	-8.009	-11.285	-2.528
12280	403Sep199	-12.722	4.822	-13.453	3.087	0.253	-6.735	-0.765	5.083	-6.903
12290	403Sep199	-6.327	1.986	-2.738	6.383	8.883	-2.082	-6.787	-7.129	0.140
12300	403Sep199	5.093	-3.336	-12.005	1.602	-5.692	3.624	-4.640	5.854	-1.259
12310	302Sep199	5.106	5.944	6.206	-13.923	4.565	2.263	-0.967	-3.959	-5.526
12320	302Sep199	-9.768	1.599	-10.663	3.310	0.034	6.307	0.214	0.951	0.841
12330	302Sep199	-12.108	-9.579	-27.456	-2.100	-3.045	-3.820	-6.154	-13.837	12.677
12340	302Sep199	8.122	2.042	2.421	2.899	-4.333	2.378	0.503	1.536	-4.169
12350	302Sep199	12.089	-2.784	-10.291	-13.093	-8.870	-2.838	-5.544	-2.907	-6.702
12360	302Sep199	-4.224	-0.989	-3.044	-2.891	-4.071	-2.103	-0.520	-6.223	-30.920
12370	302Sep199	3.839	-0.935	2.457	1.334	2.233	0.384	-3.309	0.243	-18.933
12380	302Sep199	-8.299	-6.336	2.658	0.398	-4.282	-4.379	4.261	-5.848	-2.645
12390	302Sep199	-8.069	-1.110	-4.629	8.438	0.582	2.936	-6.393	-4.140	-13.301
12400	302Sep199	11.181	-0.470	-4.686	-2.226	-0.082	8.333	-1.549	-0.804	-2.969
12410	302Sep199	-1.628	-0.588	-7.390	8.428	-1.663	4.160	2.628	5.635	-13.847
12420	302Sep199	-28.158	7.782	-9.535	-3.873	0.383	2.096	-0.740	-7.906	-0.110
12430	302Sep199	2.978	-4.019	1.488	-3.677	-4.512	-0.994	-6.253	-7.120	-2.586
12440	302Sep199	-17.809	-0.592	1.301	-4.061	4.839	-0.331	-6.489	-5.388	-1.169
12450	302Sep199	-1.811	-0.234	3.375	-6.495	-1.749	3.316	-5.435	-7.646	0.644
12460	302Sep199	-6.612	1.057	1.035	-6.008	5.826	-0.452	-3.664	-7.550	-1.369
12470	302Sep199	0.604	-2.563	2.583	10.214	-1.096	-6.323	-2.128	-3.180	0.042

12900	1515Sep199	6.851	-25.078	7.701	-9.315	-24.451	3.331	5.223	-3.978	-3.537
12910	1515Sep199	20.868	-12.303	15.936	-8.981	3.064	-3.522	-15.843	-9.867	6.584
12920	1515Sep199	6.243	-34.131	-2.663	-4.177	-19.634	-2.297	-1.159	-15.594	-9.190
12930	1515Sep199	-18.247	-24.893	1.973	-22.723	-16.994	-7.662	-1.889	-0.971	-3.874
12941	1515Sep199	29.324	-2.395	-9.585	4.705	-11.659	-4.186	6.279	-8.317	5.490
20010	1414Sep199	U	U	15.264	8.819	-0.446	-7.383	U	U	U
20020	1414Sep199	U	U	2.062	7.099	4.323	U	U	U	U
20030	1414Sep199	U	U	12.584	5.746	-5.091	-14.684	U	U	U
20040	1414Sep199	U	-1.785	3.059	-4.243	-1.511	U	U	U	U
20050	1414Sep199	U	U	5.592	3.706	6.058	U	U	U	U
20060	1414Sep199	U	U	8.573	-1.842	2.858	U	U	U	U
20070	1414Sep199	U	U	1.837	6.384	5.056	7.618	U	U	U
20080	1414Sep199	U	U	-2.181	0.366	11.176	U	U	U	U
20090	1414Sep199	U	U	1.485	9.743	13.374	U	U	U	U
20100	1414Sep199	U	U	5.164	12.213	5.983	U	U	U	U
20110	1414Sep199	U	U	6.389	11.134	11.206	-2.587	U	U	U
20120	1414Sep199	U	U	5.503	10.820	2.557	U	U	U	U
20130	1414Sep199	U	U	2.393	7.937	-0.811	U	U	U	U
20140	1414Sep199	U	U	7.168	5.129	20.842	U	U	U	U
20150	1414Sep199	U	U	5.639	5.592	-2.342	-2.570	U	U	U
20160	1414Sep199	U	U	3.814	4.189	1.395	U	U	U	U
20170	1414Sep199	U	U	5.547	2.462	1.685	-11.432	U	U	U
20180	1414Sep199	U	5.805	7.403	7.036	-0.979	U	U	U	U
20190	1414Sep199	U	U	4.525	0.434	-0.579	3.011	U	U	U
20200	1414Sep199	U	5.118	-2.257	4.253	-8.089	U	U	U	U
20210	1414Sep199	U	U	4.821	6.493	5.368	22.500	U	U	U
20220	1414Sep199	U	4.916	1.314	6.623	-2.801	U	U	U	U
		251	255	273	273	273	259	251	251	251
		-2.018	-0.737	0.474	0.525	-0.718	-1.349	0.223	-2.735	-1.017
		9.856	9.110	6.560	5.737	6.287	6.084	6.605	8.359	9.885

Altitude difference

17110	17120	17130	17140	17150	17160	17170	17180	17190		
16	16	16	16	15	16	16	16	16		
16Sep1999	16Sep1999	16Sep1999	16Sep1999	15Sep1999	16Sep1999	16Sep1999	16Sep1999	16Sep1999		
10020	1515Sep199	-0.066	-5.187	0.716	-8.621	4.451	-16.945	-8.811	-0.889	-6.680
10040	1515Sep199	1.201	1.072	-5.756	-1.601	4.853	-13.924	5.011	6.737	2.590
10060	1515Sep199	-8.553	-6.381	-2.858	-8.176	2.283	-7.520	-3.245	-0.771	5.403
10080	1515Sep199	0.382	-5.343	0.073	-7.074	-1.294	-10.428	-3.219	3.635	-16.816

10100	1515Sep199	-6.253	-10.278	0.172	-8.173	-7.860	-4.152	-8.316	-6.771	4.579
10120	1515Sep199	2.057	-6.855	6.876	-6.152	-16.656	-15.808	-1.692	2.356	-1.769
10140	1515Sep199	-5.284	-8.512	-3.624	2.019	-17.499	-3.809	0.967	-3.548	0.829
10160	1515Sep199	3.657	4.512	-4.841	-2.803	-4.011	-9.598	-4.692	-0.865	20.121
10180	1515Sep199	-1.678	-3.035	0.377	-1.712	-16.602	-2.130	1.052	-5.654	6.377
10200	1515Sep199	-3.721	-13.469	4.708	-0.824	1.202	-10.702	2.420	-5.638	-5.882
10220	1515Sep199	-4.128	-2.974	-3.780	-2.528	-6.970	-10.231	-8.569	-1.988	-4.749
10240	1312Sep199	-15.562	-1.840	-8.804	-1.626	-17.881	-5.537	-6.629	-4.474	-7.486
10260	1312Sep199	5.520	-6.851	-3.114	-3.419	-8.030	-7.328	-1.188	-3.560	0.588
10280	1312Sep199	-9.403	5.338	-7.929	8.279	-16.943	-5.339	2.124	-4.777	-29.666
10300	1312Sep199	1.021	3.964	5.369	-3.695	-1.564	0.926	-0.134	5.844	-28.845
10320	1312Sep199	5.193	9.005	0.557	-3.362	-14.366	4.871	-4.534	-3.814	-25.621
10340	1312Sep199	-0.041	-11.560	0.392	0.508	5.482	-2.160	-0.498	-4.984	-12.874
10360	1312Sep199	1.448	2.123	0.481	-2.815	8.489	-2.967	3.596	1.756	-6.370
10380	1312Sep199	9.925	4.528	-9.833	2.342	-2.626	2.182	-10.416	-2.596	0.919
10400	1312Sep199	10.957	35.655	0.403	12.864	-9.002	-2.338	-8.489	-0.603	6.417
10420	1312Sep199	7.851	45.819	3.527	10.815	-8.246	-7.870	6.387	0.018	-3.107
10440	1312Sep199	2.461	56.633	1.535	-2.505	-5.981	-5.029	0.061	-4.539	4.456
10460	1312Sep199	15.730	24.143	-6.549	4.112	-15.097	-9.085	4.338	-2.589	-4.474
10480	1312Sep199	-5.550	22.750	-2.661	-4.949	-20.550	-7.222	-4.377	-6.374	21.129
10500	1312Sep199	8.384	14.183	5.981	-8.641	-2.611	-7.469	-0.391	6.855	2.537
10520	1211Sep199	16.930	22.450	-3.718	-17.458	-19.904	-37.086	0.411	-13.270	-28.801
10540	1211Sep199	3.255	18.128	19.215	1.874	12.510	-8.520	1.697	-11.387	-0.997
10560	1211Sep199	-0.615	15.261	11.065	-9.729	-7.781	2.236	-1.875	3.454	-10.351
10580	1211Sep199	2.416	6.552	9.951	-0.551	0.848	0.147	5.584	0.766	-3.673
10600	1211Sep199	-2.555	13.015	20.588	1.473	-25.151	-3.387	-5.214	-10.215	-0.003
10620	1211Sep199	4.855	4.864	16.079	2.571	-9.896	-5.857	-15.226	1.893	-6.357
10640	1211Sep199	0.133	15.097	-3.687	-1.384	6.428	-38.212	-11.393	-26.375	4.669
10660	1211Sep199	2.723	2.520	2.126	8.268	-20.388	14.613	-39.344	-5.415	-7.954
10680	1211Sep199	-5.564	2.657	0.319	3.883	-12.353	-23.234	-11.511	-37.597	-12.176
10700	1211Sep199	1.510	1.085	-3.236	-3.468	-6.927	-4.231	-26.174	-8.180	-9.396
10720	1211Sep199	-3.849	-0.538	4.030	-7.825	11.593	-3.820	-3.293	-10.700	-4.980
10740	1211Sep199	-1.113	-0.469	-2.898	-10.154	1.215	-19.462	-4.766	-3.098	-16.857
10760	1211Sep199	4.140	-5.949	-4.280	-7.948	-3.578	1.043	-5.457	-6.395	-21.823
10780	1211Sep199	-5.077	-6.636	5.824	-8.986	-8.107	-2.897	-7.840	-7.537	10.072
10800	1110Sep199	5.417	-10.877	18.978	4.963	3.214	-5.204	-31.643	-7.579	7.099
10820	1110Sep199	-6.508	-8.549	35.693	17.672	5.697	-4.447	0.958	-43.966	-10.414
10840	1110Sep199	2.304	-0.843	15.181	-0.033	3.428	-5.762	-22.983	-18.355	1.702
10860	1110Sep199	-2.096	-7.341	-8.080	-4.658	19.033	-8.258	-6.860	-27.233	-1.822
10870	1110Sep199	-6.925	-3.403	0.915	4.610	19.526	-4.954	-19.469	-5.602	9.314
10880	1110Sep199	-4.231	-5.852	-6.483	2.042	6.681	-2.810	-0.703	-29.571	-2.447
10890	1110Sep199	-6.495	-1.487	-9.352	3.097	7.368	12.775	-8.078	-3.109	-5.050

10900	1110Sep199	-4.202	2.229	-11.023	-4.370	7.448	5.574	-7.262	-21.074	-14.820
10910	1110Sep199	-3.600	1.827	-10.225	9.205	-7.031	-6.359	-23.885	1.367	-2.639
10920	1110Sep199	-3.688	9.280	8.992	-0.612	-5.065	-3.766	-9.806	4.152	-22.345
10930	1110Sep199	2.194	11.707	5.199	7.935	-1.354	-0.875	-4.309	0.031	-6.516
10940	1110Sep199	-0.671	2.736	-7.031	-4.584	2.358	4.388	-1.583	-5.887	-1.858
10950	1110Sep199	5.594	1.440	-6.169	-7.589	1.212	0.422	2.034	-4.788	1.619
10960	1110Sep199	-1.138	-0.831	-0.084	-11.550	-4.339	-1.048	4.279	-6.892	-4.238
10970	1110Sep199	-5.672	-2.070	-3.799	-10.429	-10.312	-3.219	-21.982	-30.431	-13.266
10980	1009Sep199	-0.619	4.869	-4.635	-6.617	6.295	2.308	9.580	-3.121	-11.313
10990	1009Sep199	-8.627	-0.384	2.289	-9.263	2.828	0.551	-8.048	-50.481	-15.335
11000	1009Sep199	-1.138	-6.627	-5.516	1.177	0.653	4.535	-13.800	-23.302	-35.524
11010	1009Sep199	0.887	-1.593	2.726	-7.569	-4.115	-14.009	-10.872	-34.819	-15.215
11020	1009Sep199	-5.483	-3.181	1.230	3.318	-3.876	-7.826	-12.144	3.284	-19.809
11030	1009Sep199	-4.280	1.270	-11.234	3.137	2.104	-20.460	6.684	5.627	-6.944
11040	1009Sep199	-0.854	-5.897	-11.038	-28.740	-6.113	-21.523	-19.227	5.581	0.407
11050	1009Sep199	1.368	-4.738	-4.065	-22.003	-11.048	-25.438	-6.981	-5.853	-4.388
11060	1009Sep199	-1.615	-3.742	-0.665	-43.151	-12.805	-26.250	4.593	-1.049	-14.186
11070	1009Sep199	-0.286	1.617	-22.831	-18.521	0.475	-33.540	-5.802	-13.965	-7.271
11080	1009Sep199	-0.749	-3.024	-7.767	-42.399	10.564	-25.346	-13.570	-2.779	2.776
11090	1009Sep199	-5.598	-8.635	-17.250	-23.297	14.574	-33.345	-11.893	-4.297	-0.110
11100	908Sep199	-6.913	-7.447	-17.125	-25.262	4.520	-13.940	-18.363	-19.683	-6.144
11110	908Sep199	2.676	-2.776	2.729	8.077	2.789	-4.134	-8.132	12.978	-1.602
11120	908Sep199	-2.698	-4.131	12.893	-16.718	-6.360	-0.238	-8.037	-6.425	1.110
11130	908Sep199	1.868	5.201	-9.605	-13.840	-3.594	4.220	8.091	-0.216	-4.881
11140	908Sep199	-1.540	5.640	-3.585	-20.710	2.350	12.759	-5.406	4.631	-5.774
11150	908Sep199	-5.988	10.324	-1.199	0.202	-1.449	2.887	-12.381	-21.902	-2.352
11160	908Sep199	-7.864	-3.336	-6.341	-44.079	7.169	4.067	-27.373	-6.535	-13.682
11170	908Sep199	-2.697	-6.105	-5.157	-7.865	4.187	-17.615	-21.846	-17.464	-13.410
11180	908Sep199	-5.915	-1.301	-13.797	-47.108	-5.498	-30.971	-20.330	-7.354	-17.697
11190	908Sep199	-7.142	-2.526	-7.380	-10.955	-1.499	-1.746	-8.767	-6.648	-3.141
11200	908Sep199	-6.270	3.170	-7.865	-24.281	-3.271	4.247	-6.419	-0.398	-4.403
11210	908Sep199	-3.299	-6.097	6.902	-0.869	-3.142	-15.827	-22.706	1.725	8.157
11220	908Sep199	-6.806	-2.393	-8.377	-21.318	-6.956	-15.269	-3.751	-7.829	5.968
11230	908Sep199	-6.273	-7.621	-7.021	-21.639	-8.716	-31.506	4.716	3.227	-1.315
11240	908Sep199	-7.116	-0.786	-8.815	2.387	-10.539	-16.072	18.192	-8.201	-8.466
11250	908Sep199	10.751	-11.666	-7.357	16.506	4.983	-23.972	24.915	-0.778	-9.389
11260	807Sep199	2.921	-20.927	-8.450	22.701	-6.469	-16.140	22.106	7.792	-2.944
11270	807Sep199	12.635	-4.974	-2.542	4.340	-4.343	-10.863	26.452	3.724	-11.977
11280	807Sep199	11.734	-0.591	1.517	-4.136	-2.745	-25.169	14.587	-7.954	-9.351
11290	807Sep199	19.598	-8.505	-9.199	-1.658	2.518	-28.905	-11.062	-5.385	-8.485
11300	706Sep199	9.804	-5.306	-8.601	-1.518	-6.634	-35.102	4.725	-13.126	0.942
11310	706Sep199	9.451	-4.601	-7.634	-5.550	-25.438	-33.996	0.785	4.070	-0.317

11320	706Sep199	-5.860	-2.749	-10.723	-12.679	-0.694	-19.025	-15.242	-12.032	-5.220
11330	706Sep199	0.214	6.297	-5.777	-11.376	-16.482	-6.281	-5.130	-2.296	3.017
11340	706Sep199	0.962	-0.832	-12.265	-6.078	7.053	7.877	0.105	-4.429	5.908
11350	706Sep199	7.666	6.905	5.878	-13.943	-17.111	-12.156	0.854	6.929	11.694
11360	706Sep199	-8.475	14.060	6.943	-12.408	-12.823	8.487	2.201	3.507	-18.573
11370	706Sep199	0.380	0.757	-8.216	-4.613	-17.670	13.304	5.901	-7.846	-3.166
11380	706Sep199	7.778	-4.233	-5.634	-4.099	-7.048	36.193	-5.072	-0.984	-9.693
11390	706Sep199	7.004	-1.125	-1.133	-3.632	-9.750	5.824	-1.951	-5.094	9.711
11400	706Sep199	4.707	-0.058	-12.156	-9.441	-25.154	-6.811	-3.801	-2.985	35.147
11410	706Sep199	6.875	-4.906	-4.615	-7.196	3.496	-5.762	-8.527	6.670	16.038
11420	706Sep199	-0.691	14.478	-0.840	-3.576	-18.932	-5.168	-2.599	-12.633	4.736
11430	706Sep199	-2.267	1.022	-1.411	4.200	-9.211	-2.746	-2.760	-7.374	-15.452
11440	706Sep199	-1.062	0.095	0.141	-0.474	7.617	-4.995	4.490	-3.660	1.454
11450	706Sep199	-1.064	3.460	16.916	10.461	5.750	9.733	0.705	-10.473	21.769
11460	706Sep199	5.441	0.440	5.183	3.410	10.108	0.729	-1.035	-9.113	2.055
11470	706Sep199	0.498	1.687	14.085	-8.010	5.521	-3.522	-0.010	-8.125	-5.901
11480	706Sep199	-6.668	-1.759	8.139	-5.910	-5.648	-3.066	3.273	-6.049	-10.003
11490	706Sep199	2.370	-4.279	9.767	-5.627	15.353	-9.924	-0.200	-0.536	-25.485
11500	706Sep199	-3.719	-9.023	2.037	-4.338	30.273	-6.497	-10.831	6.743	-16.698
11510	706Sep199	-3.595	2.183	-3.858	-3.865	8.419	-5.822	-3.658	-0.407	-9.326
11520	706Sep199	0.442	10.325	-9.973	-5.746	-4.153	-4.640	-6.469	5.427	-10.049
11530	706Sep199	-5.711	0.789	1.460	-11.855	-6.045	-11.778	1.050	6.496	-1.329
11540	605Sep199	-11.610	4.298	11.047	-6.863	-15.850	-7.231	-0.689	-24.809	1.452
11550	605Sep199	-0.089	7.625	9.415	-13.811	-30.362	-11.080	-0.816	6.384	-2.784
11560	605Sep199	-1.213	21.103	13.624	2.465	-33.265	-7.700	-7.222	-9.588	-9.176
11570	605Sep199	0.659	4.768	3.777	-12.594	-12.981	-4.726	-6.194	6.603	7.950
11580	605Sep199	5.519	-5.267	6.775	-2.044	-23.703	-6.733	-2.467	-16.627	-4.351
11590	605Sep199	-7.818	-2.166	-1.941	-5.760	-6.538	-1.271	-3.495	-7.427	3.112
11600	605Sep199	-5.645	4.334	1.044	-3.024	-14.627	3.081	-6.936	-5.730	4.839
11610	605Sep199	14.583	8.621	13.682	-11.440	-35.651	-3.528	-3.044	10.339	0.482
11620	605Sep199	-4.063	6.275	-1.323	-8.734	-16.589	-5.592	-1.615	-15.210	2.115
11630	605Sep199	-15.051	2.245	-0.244	-4.930	-47.126	5.907	2.035	7.194	2.576
11640	605Sep199	2.505	4.884	-8.723	17.473	-11.052	1.549	-3.529	-2.293	-1.338
11650	605Sep199	-11.860	7.057	-8.599	12.387	-12.941	-6.141	2.421	-8.882	1.302
11660	605Sep199	2.011	12.427	-6.449	4.972	-1.239	7.432	5.990	-8.491	6.098
11670	605Sep199	3.111	18.491	7.493	4.248	-2.382	5.899	3.278	-4.715	-4.203
11680	605Sep199	-2.248	15.636	5.887	-24.109	2.398	9.213	6.488	-5.437	-0.174
11690	605Sep199	5.747	13.231	7.881	-26.556	1.370	-0.502	3.858	-9.425	-8.096
11700	605Sep199	3.233	11.262	14.321	-12.452	-2.915	-1.029	-0.946	-2.763	-3.077
11710	605Sep199	-30.371	-3.059	-4.471	-23.393	-5.181	-1.233	-0.528	1.611	-2.688
11720	605Sep199	-6.514	6.265	14.569	-10.899	0.776	6.306	1.353	0.305	-0.622
11730	605Sep199	-43.978	0.537	-5.985	-0.115	1.576	-0.249	-8.252	-0.925	-3.545

11740	605Sep199	6.008	1.219	18.625	-8.247	-3.880	8.797	-4.882	0.646	-4.806
11750	605Sep199	3.412	3.734	5.838	-15.650	1.384	5.610	-1.599	6.653	-6.915
11760	605Sep199	4.478	-16.998	2.156	6.446	15.364	-0.526	-0.667	4.489	-3.517
11770	605Sep199	1.364	-16.001	-15.225	-22.330	5.954	-5.383	0.757	7.688	3.048
11780	605Sep199	4.740	-11.692	-13.428	3.090	-1.878	-11.552	-4.477	4.964	1.310
11790	706Sep199	8.356	-16.659	-10.292	7.485	-7.063	1.243	-8.955	4.131	-1.894
11800	605Sep199	6.060	2.747	5.079	-10.572	-21.011	-4.245	2.889	4.059	-3.214
11811	605Sep199	4.043	1.960	-33.017	-18.915	-6.289	-2.307	2.817	3.603	3.019
11821	504Sep199	-1.790	-0.886	-8.082	-3.955	2.876	-11.371	1.067	4.001	-2.701
11830	504Sep199	1.752	14.569	-8.438	-2.743	7.089	-3.647	1.632	7.162	-8.441
11840	504Sep199	0.691	11.854	-2.691	-3.071	9.916	-1.446	-16.303	2.729	-2.359
11850	504Sep199	2.380	10.616	-23.957	-0.777	0.687	-0.335	-3.016	0.413	-11.268
11860	504Sep199	0.138	-1.737	9.178	-15.224	-2.870	1.392	-3.030	1.263	-4.698
11870	504Sep199	2.333	-21.507	-16.234	-17.657	-4.238	-10.132	-4.143	-1.970	-1.206
11880	504Sep199	-7.376	-16.683	13.826	-10.664	6.841	-10.889	-5.752	-12.426	-2.401
11890	504Sep199	2.906	-3.023	0.501	-10.634	2.179	0.612	-4.739	-6.504	-0.135
11900	504Sep199	0.247	-20.961	-7.988	-7.970	1.531	5.632	-6.305	-5.383	-6.015
11910	504Sep199	-6.340	-18.593	-8.518	-8.955	-4.241	5.519	-6.422	-5.646	3.717
11920	504Sep199	-0.456	-7.193	-12.683	3.113	9.363	-1.205	-0.036	-10.443	3.334
11930	504Sep199	4.186	3.813	-10.249	0.727	-4.869	-5.079	0.127	-7.634	2.359
11940	504Sep199	3.197	-8.873	-26.758	-3.998	3.942	-5.628	2.747	-5.612	3.468
11950	504Sep199	5.303	-3.186	21.289	-6.534	-6.528	-6.246	0.793	-7.125	1.235
11960	504Sep199	-1.144	-22.282	-16.317	-6.046	-9.727	0.303	1.858	-1.162	5.841
11970	504Sep199	-1.277	9.331	-6.068	-4.035	1.585	-0.959	-4.682	3.536	3.886
11980	504Sep199	-2.342	-7.725	-21.266	0.874	13.743	0.254	5.900	-1.825	0.262
11990	504Sep199	-1.879	5.803	-1.393	-0.226	-10.666	2.938	10.815	-5.700	-2.925
12000	504Sep199	-9.144	12.066	-11.463	-1.878	5.014	6.769	5.409	-7.475	-3.677
12010	504Sep199	-6.258	-6.399	-10.203	-3.875	1.140	-0.553	-1.879	-1.362	-5.367
12020	504Sep199	6.109	-0.583	-17.630	-2.679	-11.783	11.690	1.147	2.800	-6.901
12030	504Sep199	6.755	-15.219	-14.445	-13.837	-2.586	10.278	-0.227	-7.132	-3.988
12040	504Sep199	8.404	-9.885	-16.750	-4.069	-1.150	-2.613	-0.745	-3.160	-7.172
12050	504Sep199	-2.962	-13.691	-4.013	4.255	-37.525	-14.556	7.278	-1.967	-4.129
12060	504Sep199	-10.094	-7.674	-17.802	-7.283	-25.349	-2.647	10.563	2.434	-10.412
12071	504Sep199	4.638	-15.835	-18.820	-6.081	-16.150	-5.454	10.463	1.610	-1.434
12080	403Sep199	-4.776	-27.370	-18.229	-14.433	-7.709	-12.243	-6.513	6.490	-4.077
12090	403Sep199	-13.168	-23.667	-4.694	-3.297	-5.280	-4.887	-4.084	-5.517	1.513
12100	403Sep199	-3.125	7.049	0.942	4.335	0.123	0.049	10.922	-9.314	-11.532
12110	403Sep199	-15.023	-8.109	-4.226	-3.186	-11.976	-3.169	-7.558	-12.381	-8.128
12120	403Sep199	-6.868	14.152	-3.173	3.099	5.167	-5.335	0.791	-12.228	-12.483
12130	403Sep199	-6.106	-23.314	0.789	3.652	-11.044	-5.567	15.960	-5.755	-2.125
12140	403Sep199	-2.104	-4.766	-8.609	3.322	4.190	-6.933	-3.930	-2.363	9.075
12150	403Sep199	-3.443	-40.243	-1.759	0.302	3.559	-7.976	-9.114	-6.699	1.157

12160	403Sep199	-12.693	-1.211	-21.609	-0.362	4.393	-13.949	-7.897	-2.129	6.203
12170	403Sep199	-10.532	-29.648	-3.563	-7.612	-5.608	-9.364	0.551	-1.593	1.558
12180	403Sep199	-2.093	-21.715	-9.341	-2.914	-9.058	-11.755	-2.741	2.188	-2.717
12190	403Sep199	-5.815	-17.473	-16.063	-6.182	-0.174	-10.740	-5.896	-0.451	3.818
12200	403Sep199	-14.918	-5.989	-25.324	-0.458	-8.041	-12.874	-9.494	-7.809	-4.210
12210	403Sep199	-4.233	-12.294	-14.026	-8.232	-4.807	-6.398	-6.769	-4.588	-2.055
12220	403Sep199	-11.947	-2.516	-13.476	-4.862	-12.091	-7.705	-12.086	-7.489	-9.221
12230	403Sep199	-1.913	1.669	-10.216	-5.440	1.307	-0.743	-0.136	-4.731	-8.825
12240	403Sep199	-6.725	-5.226	-9.849	-10.074	-7.465	-2.909	-4.735	-6.221	-4.417
12250	403Sep199	-13.460	-6.131	-6.670	-13.869	-1.138	5.967	5.872	-1.789	-4.475
12260	403Sep199	-10.217	-8.394	-5.679	-5.402	-13.253	-8.672	-13.112	-9.409	-9.352
12270	403Sep199	-3.019	-7.665	-5.349	-6.264	-11.124	-7.170	-5.640	-8.218	-12.467
12280	403Sep199	-5.141	-10.063	7.326	-9.542	-2.576	-8.605	-8.527	-12.573	-7.379
12290	403Sep199	-6.662	-1.682	-4.668	-13.011	5.782	-13.601	-2.344	-11.483	-3.568
12300	403Sep199	5.593	-3.314	-3.773	-6.126	-0.457	-13.061	-9.296	-14.456	1.483
12310	302Sep199	3.509	13.614	-10.962	-7.409	-1.234	-20.308	10.014	-2.101	1.827
12320	302Sep199	-1.295	11.002	-5.693	-4.387	-10.272	-19.243	-7.497	-6.788	-2.690
12330	302Sep199	11.989	1.926	-5.549	-5.241	3.479	-5.714	-0.051	-2.748	0.523
12340	302Sep199	-8.817	3.610	10.189	-8.272	-2.652	-5.065	3.134	0.199	-2.388
12350	302Sep199	-10.090	-2.057	15.105	-9.172	1.216	-5.454	7.547	-11.332	0.455
12360	302Sep199	-11.399	-6.916	-11.304	-0.944	18.958	1.686	-8.069	-11.953	-0.778
12370	302Sep199	-12.474	-3.603	15.511	-1.112	0.624	-1.527	-16.707	-7.166	2.524
12380	302Sep199	-6.250	7.589	16.159	-6.546	-42.889	-1.234	3.455	-7.855	-0.521
12390	302Sep199	-19.259	5.180	5.993	-7.950	-25.257	1.608	-7.522	-2.139	-2.588
12400	302Sep199	-34.675	-0.635	14.196	-18.470	17.916	-1.817	-2.424	-3.153	-11.183
12410	302Sep199	-16.967	11.903	8.136	1.487	-18.454	-7.451	1.207	-7.469	-7.173
12420	302Sep199	-13.777	13.387	15.245	-27.880	-55.867	-5.682	-17.741	-0.540	-3.002
12430	302Sep199	-5.841	6.903	14.560	1.360	0.345	U	U	U	U
12440	302Sep199	-3.103	14.960	1.286	-40.477	-20.255	U	U	U	U
12450	302Sep199	-8.470	1.883	-9.426	-40.247	-37.758	U	U	U	U
12460	302Sep199	-1.073	12.592	10.034	-21.799	-12.066	U	U	U	U
12470	302Sep199	-16.985	25.459	3.356	-4.340	-16.395	U	U	U	U
12480	302Sep199	-23.794	-7.112	-8.697	-1.002	9.293	U	U	U	U
12490	302Sep199	-17.793	-12.867	-5.789	-10.454	-6.631	U	U	U	U
12500	302Sep199	-4.179	-0.703	0.409	-2.244	17.773	U	U	U	U
12510	302Sep199	-3.004	6.011	6.849	-11.303	-3.040	U	U	U	U
12520	302Sep199	-4.846	1.478	-7.605	-7.961	-0.196	U	U	U	U
12530	302Sep199	4.547	6.057	-15.014	2.063	-8.513	U	U	U	U
12540	201Sep199	-6.187	11.411	-12.838	-10.156	-5.068	U	U	U	U
12550	201Sep199	8.290	-2.346	-15.591	-6.826	2.343	U	U	U	U
12560	201Sep199	1.166	-15.873	-25.991	-4.883	-8.747	U	U	U	U
12570	201Sep199	-10.680	-4.511	-34.634	-2.220	-9.985	U	U	U	U

12580	201Sep199	10.965	11.742	-22.650	4.386	-12.412	U	U	U
12590	201Sep199	-19.945	-1.076	-1.012	7.071	6.785	U	U	U
12600	201Sep199	-8.295	-12.513	-12.300	6.943	-26.671	U	U	U
12610	201Sep199	-16.789	1.820	-3.354	-0.643	-20.942	U	U	U
12620	201Sep199	-20.766	1.036	-7.669	-11.235	-16.193	U	U	U
12630	201Sep199	-13.785	-7.760	-4.658	12.923	-2.361	U	U	U
12640	201Sep199	-30.242	1.538	-7.733	-2.643	6.985	U	U	U
12651	201Sep199	-6.748	-12.441	-2.543	-2.691	-35.588	U	U	U
12660	807Sep199	-11.713	17.850	3.391	-4.495	0.716	U	U	U
12670	807Sep199	-9.547	3.334	-16.308	-6.112	-0.880	U	U	U
12680	807Sep199	-2.572	-5.781	-8.109	1.632	-9.650	U	U	U
12690	807Sep199	-23.036	-5.178	-3.031	0.268	-1.603	U	U	U
12700	807Sep199	11.041	-0.771	17.570	-5.067	-1.741	U	U	U
12710	807Sep199	-10.422	-9.021	-16.633	-7.027	-1.691	U	U	U
12720	807Sep199	-5.410	-8.358	1.335	-4.738	-6.191	U	U	U
12731	807Sep199	-13.833	-4.436	-2.487	-0.623	0.646	U	U	U
12742	807Sep199	-18.030	14.598	26.793	3.724	-19.510	U	U	U
12751	807Sep199	-9.550	-7.001	10.003	-4.829	-3.088	U	U	U
12761	807Sep199	-20.927	-3.837	10.207	12.241	-5.074	U	U	U
12771	807Sep199	-10.927	3.328	15.575	-53.616	-3.191	U	U	U
12781	807Sep199	-2.717	-8.797	-14.615	-22.324	-6.662	U	U	U
12791	807Sep199	11.319	15.437	-2.890	-15.010	-15.431	U	U	U
12801	807Sep199	5.321	21.222	-13.238	4.511	-3.364	U	U	U
12811	807Sep199	-2.033	13.702	-7.023	-17.706	-10.782	U	U	U
12821	807Sep199	-1.577	-10.943	5.988	0.055	0.810	U	U	U
12831	807Sep199	-9.766	-27.197	-1.426	-8.823	-0.921	U	U	U
12841	807Sep199	-6.012	30.965	-22.936	7.688	27.423	U	U	U
12850	807Sep199	-26.822	-53.340	22.016	17.969	1.143	U	U	U
12860	1515Sep199	-2.156	12.362	-25.184	-9.558	-31.566	U	U	U
12870	1515Sep199	6.959	-14.744	4.417	-4.175	-4.103	U	U	U
12880	1515Sep199	-3.075	9.744	-10.105	-5.617	-3.042	U	U	U
12890	1515Sep199	-0.180	3.536	-2.871	3.231	-5.893	U	U	U
12900	1515Sep199	-17.545	-1.296	26.663	-9.275	14.461	U	U	U
12910	1515Sep199	-7.367	7.624	8.570	-11.393	0.452	U	U	U
12920	1515Sep199	-4.716	-10.686	-18.785	13.946	3.588	U	U	U
12930	1515Sep199	-6.994	-13.947	-13.269	-6.384	25.953	U	U	U
12941	1515Sep199	4.522	-9.319	-35.521	10.208	-28.516	U	U	U
20010	1414Sep199	U	U	U	U	U	U	U	U
20020	1414Sep199	U	U	U	U	U	U	U	U
20030	1414Sep199	U	U	U	U	U	U	U	U
20040	1414Sep199	U	U	U	U	U	U	U	U
20050	1414Sep199	U	U	U	U	U	U	U	U

10300	1312Sep199	-20.680	-0.882	9.581	21	-0.643	9.128
10320	1312Sep199	-10.233	-1.541	1.339	21	-0.209	8.595
10340	1312Sep199	-3.497	-2.500	6.430	21	-0.891	4.891
10360	1312Sep199	0.631	-1.106	11.788	21	3.317	7.236
10380	1312Sep199	1.645	-5.298	-6.360	21	2.373	8.168
10400	1312Sep199	2.540	-6.055	4.044	21	3.642	10.093
10420	1312Sep199	-6.231	-6.684	-15.554	21	2.134	12.335
10440	1312Sep199	-2.193	-4.091	-13.439	21	3.067	14.396
10460	1312Sep199	-9.835	-3.869	9.237	21	0.082	9.941
10480	1312Sep199	-2.669	-6.750	-12.295	21	-0.184	11.485
10500	1312Sep199	-5.482	-6.489	1.883	21	3.085	9.319
10520	1211Sep199	-6.896	-11.491	-0.614	21	-4.972	13.494
10540	1211Sep199	-3.466	1.469	14.293	21	2.165	8.436
10560	1211Sep199	-5.423	-7.416	6.909	21	0.328	7.193
10580	1211Sep199	0.751	-8.698	-3.491	21	-0.657	5.092
10600	1211Sep199	-6.686	9.450	1.323	21	-1.596	9.078
10620	1211Sep199	-3.017	-2.305	5.092	21	-1.072	6.896
10640	1211Sep199	-2.293	-4.886	0.263	21	-3.135	11.373
10660	1211Sep199	-2.606	0.500	2.369	21	-2.965	10.806
10680	1211Sep199	-2.364	-9.085	-7.984	21	-5.496	10.155
10700	1211Sep199	-5.972	-4.206	-8.429	21	-4.312	7.069
10720	1211Sep199	4.812	-9.495	6.544	21	-1.329	5.535
10740	1211Sep199	5.597	-4.892	-3.484	21	-2.761	6.189
10760	1211Sep199	-2.255	-3.841	5.957	21	-1.809	6.172
10780	1211Sep199	-3.505	4.771	-4.421	21	-1.998	5.120
10800	1110Sep199	-5.033	5.083	-1.055	21	-1.503	9.845
10820	1110Sep199	2.382	6.285	3.332	21	0.566	14.045
10840	1110Sep199	-1.964	-4.109	9.402	21	0.581	8.988
10860	1110Sep199	-5.001	-3.628	8.785	21	-2.646	8.742
10870	1110Sep199	-3.114	-7.250	9.963	21	0.337	8.205
10880	1110Sep199	-2.896	1.166	-2.718	21	-3.444	7.070
10890	1110Sep199	4.671	-6.778	-2.509	21	-1.859	5.416
10900	1110Sep199	9.032	2.919	-6.022	21	-2.524	7.337
10910	1110Sep199	6.592	5.720	0.829	21	-0.535	7.487
10920	1110Sep199	2.682	-0.491	1.279	21	-1.013	8.342
10930	1110Sep199	-3.294	2.068	-4.617	21	0.924	4.985
10940	1110Sep199	1.303	-6.395	-0.890	21	-2.023	4.146
10950	1110Sep199	6.413	-5.171	3.339	21	-0.172	4.926
10960	1110Sep199	-5.657	-0.983	-1.839	21	-1.230	4.031
10970	1110Sep199	-1.930	-3.236	-0.928	21	-4.802	8.789
10980	1009Sep199	-1.002	-0.203	-10.871	21	0.121	5.792
10990	1009Sep199	9.622	-0.686	3.699	21	-1.736	12.950

11000	1009Sep199	0.739	-4.527	-4.018	21	-4.581	9.669
11010	1009Sep199	-4.911	1.484	1.188	21	-3.526	9.271
11020	1009Sep199	3.605	-3.238	1.568	21	-0.872	6.808
11030	1009Sep199	2.158	-5.462	2.541	21	-0.917	6.659
11040	1009Sep199	-1.925	-8.303	-0.397	21	-3.852	9.452
11050	1009Sep199	-3.623	-21.335	-1.028	21	-4.974	8.801
11060	1009Sep199	-4.066	4.947	4.752	21	-3.725	12.182
11070	1009Sep199	2.300	1.303	5.950	21	-3.829	11.051
11080	1009Sep199	1.703	-5.800	4.566	21	-3.670	11.825
11090	1009Sep199	7.550	1.470	6.679	21	-2.336	11.543
11100	908Sep199	-0.304	16.338	-8.068	21	-4.362	10.677
11110	908Sep199	-0.918	-0.218	-4.620	21	1.431	5.473
11120	908Sep199	-3.496	-4.046	-0.132	21	-1.727	7.118
11130	908Sep199	3.427	-8.688	-1.195	21	-0.505	5.909
11140	908Sep199	1.164	-2.770	-7.691	21	-0.745	6.705
11150	908Sep199	-1.411	-4.139	-5.853	21	-0.948	7.588
11160	908Sep199	0.524	-3.223	1.917	21	-3.843	12.123
11170	908Sep199	-6.607	-9.628	0.130	21	-3.969	8.589
11180	908Sep199	-0.394	0.022	0.162	21	-6.162	13.470
11190	908Sep199	-1.332	-4.690	-3.086	21	-1.870	5.886
11200	908Sep199	0.389	-1.628	0.207	21	-1.753	7.049
11210	908Sep199	-4.032	-6.504	4.919	21	-1.333	7.635
11220	908Sep199	-7.307	-1.058	2.267	21	-3.858	7.290
11230	908Sep199	-1.975	-9.997	4.620	21	-2.588	10.547
11240	908Sep199	-1.236	-9.429	-4.168	21	-2.987	7.090
11250	908Sep199	-1.768	-4.578	3.965	21	0.661	10.379
11260	807Sep199	0.835	1.178	1.973	21	0.213	10.340
11270	807Sep199	6.571	0.849	11.510	21	1.948	8.572
11280	807Sep199	-10.425	-10.923	1.501	21	-2.949	8.385
11290	807Sep199	-4.548	-6.506	-3.539	21	-2.908	10.060
11300	706Sep199	-1.988	-4.034	4.733	21	-3.690	9.678
11310	706Sep199	-4.591	-17.893	0.799	21	-4.425	11.748
11320	706Sep199	-0.007	-13.885	-9.006	21	-5.383	6.895
11330	706Sep199	0.299	-1.140	3.781	21	-1.999	7.148
11340	706Sep199	-5.285	-9.335	-5.310	21	-0.142	6.179
11350	706Sep199	1.474	-2.451	-2.744	21	1.305	7.927
11360	706Sep199	0.542	-11.134	1.015	21	-1.036	8.507
11370	706Sep199	6.039	-4.452	3.981	21	-1.036	6.369
11380	706Sep199	-2.788	-1.419	10.731	21	-0.294	9.600
11390	706Sep199	7.144	-7.585	6.607	21	1.901	5.658
11400	706Sep199	-9.769	-3.527	6.135	21	0.027	11.218
11410	706Sep199	20.867	-8.475	6.528	21	0.954	9.354

11420	706Sep199	2.536	0.837	5.439	21	0.087	7.946
11430	706Sep199	12.649	-5.216	3.143	21	-2.047	7.179
11440	706Sep199	1.297	-2.960	3.338	21	0.567	4.429
11450	706Sep199	6.958	-6.810	0.341	21	2.993	7.399
11460	706Sep199	-7.327	-2.183	1.459	21	-0.869	7.179
11470	706Sep199	-5.185	-4.909	1.104	21	-1.399	5.781
11480	706Sep199	-12.229	-3.275	-4.061	21	-2.189	6.218
11490	706Sep199	-1.175	1.178	4.437	21	0.047	8.406
11500	706Sep199	-10.503	-7.062	6.346	21	-1.558	9.692
11510	706Sep199	-8.026	-2.139	8.484	21	-0.702	5.354
11520	706Sep199	-15.924	-2.489	-5.536	21	-0.631	7.633
11530	706Sep199	-1.493	-4.990	0.730	21	-0.755	5.483
11540	605Sep199	-11.423	4.746	5.486	21	-1.651	9.142
11550	605Sep199	3.222	-7.930	1.729	21	-2.475	9.716
11560	605Sep199	3.338	0.953	-6.464	21	-2.489	11.188
11570	605Sep199	-7.275	0.143	-6.047	21	-1.998	6.741
11580	605Sep199	-2.384	-5.058	4.868	21	-3.605	8.481
11590	605Sep199	3.235	-1.481	-5.067	21	-1.708	4.330
11600	605Sep199	-1.240	-0.561	-4.048	21	-1.516	5.713
11610	605Sep199	-1.615	-8.548	2.702	21	-0.363	10.552
11620	605Sep199	-3.072	-8.425	4.263	21	-3.536	8.610
11630	605Sep199	-3.208	-3.282	1.240	21	-1.991	11.745
11640	605Sep199	-0.838	1.922	2.150	21	0.404	6.547
11650	605Sep199	0.281	-5.399	-2.164	21	-1.321	7.999
11660	605Sep199	-0.054	-2.215	9.073	21	3.226	7.508
11670	605Sep199	1.065	-3.235	11.500	21	1.777	6.035
11680	605Sep199	-3.762	-2.878	4.671	21	0.995	8.679
11690	605Sep199	-4.723	-0.696	4.275	21	-1.547	8.864
11700	605Sep199	-7.874	-2.972	3.172	21	-2.493	15.801
11710	605Sep199	-0.631	0.189	1.238	21	-5.480	12.386
11720	605Sep199	6.177	-0.882	7.785	21	-3.268	20.186
11730	605Sep199	-4.756	7.542	-1.463	21	-6.190	12.752
11740	605Sep199	-4.360	0.639	5.723	21	1.505	14.950
11750	605Sep199	-3.120	3.412	-1.356	21	2.722	11.420
11760	605Sep199	-3.229	0.550	-0.883	21	-0.268	9.200
11770	605Sep199	-0.422	0.881	-7.504	21	-0.775	8.852
11780	605Sep199	0.199	-0.401	4.122	21	0.460	7.081
11790	706Sep199	0.289	-1.460	11.472	21	0.273	7.713
11800	605Sep199	-2.821	-4.908	4.965	21	1.504	8.225
11811	605Sep199	1.314	-2.631	-3.683	21	-1.539	9.743
11821	504Sep199	-1.754	-2.014	-0.363	21	-0.778	7.553
11830	504Sep199	-4.596	-0.389	-3.415	21	-1.049	7.226

11840	504Sep199	-6.342	-7.061	3.801	21	1.655	8.426
11850	504Sep199	-2.600	-11.426	4.105	21	-1.777	7.170
11860	504Sep199	1.036	-2.474	1.468	21	0.131	5.601
11870	504Sep199	0.819	-7.065	-4.562	21	-3.789	8.355
11880	504Sep199	-1.309	-1.550	4.173	21	0.455	9.179
11890	504Sep199	-1.830	-4.279	0.726	21	-0.531	6.038
11900	504Sep199	-5.344	2.680	-6.853	21	-2.147	6.971
11910	504Sep199	-1.942	-6.332	1.497	21	-1.657	7.153
11920	504Sep199	5.043	-9.657	-8.119	21	0.849	8.501
11930	504Sep199	5.209	-2.150	4.558	21	-0.340	6.290
11940	504Sep199	3.205	2.462	-4.792	21	-2.576	7.555
11950	504Sep199	-0.780	7.744	3.089	21	0.988	7.377
11960	504Sep199	5.762	1.456	2.274	21	-1.448	7.665
11970	504Sep199	-5.376	-4.205	4.841	21	-0.196	5.021
11980	504Sep199	1.340	4.587	2.248	21	-0.899	7.325
11990	504Sep199	0.011	-0.303	1.734	21	-2.713	6.791
12000	504Sep199	-3.829	-3.012	6.941	21	-1.964	7.158
12010	504Sep199	-5.621	-2.065	-4.196	21	-2.402	4.992
12020	504Sep199	-1.487	-2.493	3.744	21	-2.366	7.974
12030	504Sep199	-5.002	-3.813	-2.172	21	-4.284	10.667
12040	504Sep199	0.061	-1.253	2.252	21	-2.084	6.743
12050	504Sep199	-1.849	1.079	4.052	21	-4.274	10.980
12060	504Sep199	-0.555	-1.558	7.958	21	-4.608	8.351
12071	504Sep199	-2.741	-0.526	-0.036	21	-2.255	8.360
12080	403Sep199	-16.604	5.006	3.276	21	-5.999	8.812
12090	403Sep199	-7.303	-10.493	-5.625	21	-6.408	8.491
12100	403Sep199	-5.101	-4.239	-8.785	21	-3.315	7.055
12110	403Sep199	-4.655	-8.945	3.734	21	-5.973	6.990
12120	403Sep199	-4.976	-1.968	5.453	21	-2.443	7.489
12130	403Sep199	2.815	2.580	5.941	21	-2.642	9.234
12140	403Sep199	-2.382	-1.268	2.794	21	-2.294	7.183
12150	403Sep199	-2.867	-0.231	2.346	21	-6.384	9.973
12160	403Sep199	-8.204	-10.838	0.555	21	-2.581	9.019
12170	403Sep199	-0.176	-4.199	1.121	21	-3.825	7.837
12180	403Sep199	-9.830	-6.999	-1.495	21	-5.415	5.974
12190	403Sep199	-2.561	-3.946	0.763	21	-3.826	5.769
12200	403Sep199	-6.235	-1.057	-0.429	21	-5.783	6.806
12210	403Sep199	-11.077	1.674	0.475	21	-4.119	6.100
12220	403Sep199	-11.672	-5.798	-2.812	21	-4.098	7.842
12230	403Sep199	-3.493	-3.172	-9.733	21	-2.466	5.900
12240	403Sep199	-6.150	-9.179	2.594	21	-4.186	4.869
12250	403Sep199	-2.583	-6.860	1.970	21	-3.291	6.167

12260	403Sep199	-3.248	-3.780	7.212	21	-7.435	6.318
12270	403Sep199	-2.764	-7.116	-5.512	21	-4.673	5.476
12280	403Sep199	-11.469	-4.580	-0.136	21	-4.790	6.341
12290	403Sep199	-9.967	-6.080	4.913	21	-3.335	6.348
12300	403Sep199	-6.530	-2.761	2.202	21	-2.917	6.023
12310	302Sep199	-11.287	-4.409	0.459	21	-1.361	8.276
12320	302Sep199	-6.119	-4.208	1.080	21	-3.014	6.668
12330	302Sep199	-10.731	-11.669	3.489	21	-4.082	8.895
12340	302Sep199	-3.520	-1.200	-3.235	21	-0.315	4.808
12350	302Sep199	-16.077	-1.515	-2.468	21	-3.561	7.867
12360	302Sep199	-5.544	-5.255	-2.785	21	-4.728	8.736
12370	302Sep199	-12.579	-2.517	-0.693	21	-2.496	7.689
12380	302Sep199	1.280	-3.201	0.124	21	-3.065	10.824
12390	302Sep199	0.260	0.135	-3.352	21	-3.837	8.094
12400	302Sep199	4.755	-6.878	-1.560	21	-1.771	11.069
12410	302Sep199	-10.314	-9.593	4.022	21	-2.616	8.523
12420	302Sep199	-7.615	-1.293	-4.320	21	-7.102	15.656
12430	302Sep199	U	U	U	14	-0.526	5.886
12440	302Sep199	U	U	U	14	-5.521	13.269
12450	302Sep199	U	U	U	14	-7.861	13.878
12460	302Sep199	U	U	U	14	-2.146	8.793
12470	302Sep199	U	U	U	14	-0.768	10.381
12480	302Sep199	U	U	U	14	-2.071	8.193
12490	302Sep199	U	U	U	14	-6.074	8.571
12500	302Sep199	U	U	U	14	-3.431	7.731
12510	302Sep199	U	U	U	14	-3.014	6.810
12520	302Sep199	U	U	U	14	-1.515	9.071
12530	302Sep199	U	U	U	14	-0.455	7.755
12540	201Sep199	U	U	U	14	-1.267	6.573
12550	201Sep199	U	U	U	14	-4.387	6.540
12560	201Sep199	U	U	U	14	-6.022	8.096
12570	201Sep199	U	U	U	14	-5.495	10.278
12580	201Sep199	U	U	U	14	-0.032	11.721
12590	201Sep199	U	U	U	14	-5.340	9.410
12600	201Sep199	U	U	U	14	-9.985	9.062
12610	201Sep199	U	U	U	14	-4.348	11.144
12620	201Sep199	U	U	U	14	-8.011	7.795
12630	201Sep199	U	U	U	14	-5.101	11.050
12640	201Sep199	U	U	U	14	-3.825	11.551
12651	201Sep199	U	U	U	14	-3.483	11.867
12660	807Sep199	U	U	U	14	0.535	7.706
12670	807Sep199	U	U	U	14	-4.048	8.723

12680	807Sep199	U	U	U	14	-5.071	4.994
12690	807Sep199	U	U	U	14	-3.328	9.160
12700	807Sep199	U	U	U	14	-0.305	8.501
12710	807Sep199	U	U	U	14	-5.353	6.306
12720	807Sep199	U	U	U	14	-0.579	5.453
12731	807Sep199	U	U	U	14	-1.675	6.236
12742	807Sep199	U	U	U	14	0.052	11.756
12751	807Sep199	U	U	U	14	-2.443	6.815
12761	807Sep199	U	U	U	14	-3.727	9.728
12771	807Sep199	U	U	U	14	-8.589	16.384
12781	807Sep199	U	U	U	14	-7.142	6.376
12791	807Sep199	U	U	U	14	-3.961	13.082
12801	807Sep199	U	U	U	14	-3.506	11.530
12811	807Sep199	U	U	U	14	-1.690	9.958
12821	807Sep199	U	U	U	14	-1.975	7.298
12831	807Sep199	U	U	U	14	-8.906	7.707
12841	807Sep199	U	U	U	14	0.201	16.084
12850	807Sep199	U	U	U	14	-4.968	19.069
12860	1515Sep199	U	U	U	14	-12.678	13.372
12870	1515Sep199	U	U	U	14	-4.732	7.006
12880	1515Sep199	U	U	U	14	-7.273	7.981
12890	1515Sep199	U	U	U	14	-5.824	8.074
12900	1515Sep199	U	U	U	14	-2.160	14.509
12910	1515Sep199	U	U	U	14	-0.441	11.259
12920	1515Sep199	U	U	U	14	-7.090	12.220
12930	1515Sep199	U	U	U	14	-7.852	12.742
12941	1515Sep199	U	U	U	14	-3.498	16.141
20010	1414Sep199	U	U	U	4	4.063	9.991
20020	1414Sep199	U	U	U	3	4.495	2.522
20030	1414Sep199	U	U	U	4	-0.361	12.005
20040	1414Sep199	U	U	U	4	-1.120	3.045
20050	1414Sep199	U	U	U	3	5.119	1.245
20060	1414Sep199	U	U	U	3	3.196	5.216
20070	1414Sep199	U	U	U	4	5.224	2.488
20080	1414Sep199	U	U	U	3	3.120	7.092
20090	1414Sep199	U	U	U	3	8.200	6.093
20100	1414Sep199	U	U	U	3	7.786	3.855
20110	1414Sep199	U	U	U	4	6.535	6.486
20120	1414Sep199	U	U	U	3	6.293	4.188
20130	1414Sep199	U	U	U	3	3.173	4.426
20140	1414Sep199	U	U	U	3	11.046	8.545
20150	1414Sep199	U	U	U	4	1.580	4.661

APPENDIX E

MAGNETOMETER TESTS

Magnetometer Test

Level = 1 Control file = Cal/Comp/AZG/19990901/PF/2
 Line = 18110002 First fiducial = -U Last fiducial = U
 Line = 18122002 First fiducial = -U Last fiducial = U
 Line = 18130002 First fiducial = -U Last fiducial = U
 Line = 18141002 First fiducial = -U Last fiducial = U
 Level = 0 Control file = /a00/gps2/GPS/C/MagComp/Control/Comp
 Maximum observations = 50000
 Method = 2
 Filter increment = 4
 Kernel size = 11
 Leave ends = 49
 Number of terms = 17
 Header skipped
 Reject: XFlux undefined
 2459 points from Cal/Comp/AZG/19990901/Ascii/18110002
 Average heading = 183.19 degrees SOUTH
 Header skipped
 Reject: XFlux undefined
 2159 points from Cal/Comp/AZG/19990901/Ascii/18122002
 Average heading = 278.42 degrees WEST
 Header skipped
 Reject: XFlux undefined
 2309 points from Cal/Comp/AZG/19990901/Ascii/18130002
 Average heading = 3.3 degrees NORTH
 Header skipped
 Reject: XFlux undefined
 2189 points from Cal/Comp/AZG/19990901/Ascii/18141002
 Average heading = 90.42 degrees EAST
 Number of files for NORTH heading = 1
 Number of files for SOUTH heading = 1
 Number of files for EAST heading = 1
 Number of files for WEST heading = 1
 Processing ALL headings
 Processing NORTH heading
 Processing SOUTH heading
 Processing EAST heading
 Processing WEST heading

	N	S	E	W
Data points	2210	2360	2090	2060
RMS hp raw	0.25844	0.38383	0.22379	0.27490
RMS hp comp all	0.02258	0.01962	0.02218	0.02075
RMS hp comp ind	0.02221	0.01670	0.01998	0.01922
Average raw mag	47093.95	47071.45	47028.16	47055.15
Head error rel north	0.000	5.930	-4.307	0.909
Vert grad ind	-0.0268	-0.0122	-0.0199	-0.0226
Vert grad all	-0.0225			

Coefficient file = (Cal/Comp/AZG/19990901/Coef/All/2) for NORTH for ALL headings
 Coefficient file = (Cal/Comp/AZG/19990901/Coef/All/4) for SOUTH for ALL headings
 Coefficient file = (Cal/Comp/AZG/19990901/Coef/All/1) for EAST for ALL headings
 Coefficient file = (Cal/Comp/AZG/19990901/Coef/All/3) for WEST for ALL headings
 Coefficient file = (Cal/Comp/AZG/19990901/Coef/Ind/2) for NORTH for INDIVIDUAL headings
 Coefficient file = (Cal/Comp/AZG/19990901/Coef/Ind/4) for SOUTH for INDIVIDUAL headings
 Coefficient file = (Cal/Comp/AZG/19990901/Coef/Ind/1) for EAST for INDIVIDUAL headings
 Coefficient file = (Cal/Comp/AZG/19990901/Coef/Ind/3) for WEST for INDIVIDUAL headings

APPENDIX F

SURVEY TEST LINE

AVERAGE POSITION of LOW LEVEL TEST LINE 130.923°E 13.0721°S

APPENDIX G

PRINTOUTS OF METADATA FILES

SUMMARY OF DATA PROVIDED ON EXABYTE TAPE

```

COMM GENERAL
COMM
COMM Project                RUM JUNGLE
COMM Survey area            RUM JUNGLE
COMM Located data type      Radiometrics
COMM
COMM Surveyed by            World Geoscience Corporation Limited
COMM Job number             1406
COMM Processed by           World Geoscience Corporation Limited
COMM Creation date           December 1999
COMM
COMM GENERAL
COMM
COMM Dataset                PINE CREEK Multiclient
COMM Located data type      Radiometrics
COMM
COMM Compiled by            World Geoscience Corporation Limited
COMM Creation date           December 1999
COMM
COMM This media contains the following directory structure and files
:LineData                  RumJungleMagneticsA.(dat,des,dfn)
Line number range 10000 - 17999
RumJungleMagneticsB.(dat,des,dfn)                               Line
number range 110000 - 177999
RumJungleRadiometrics.(dat,des,dfn)
RumJungle256Channel.(dat,des,dfn) 1999 survey onlyGrids
RumJungleMag(,.ers)           RumJungleFVD(,.ers)
RumJungleAGC(,.ers)           RumJungleRTP(,.ers)
RumJungleTot(,.ers)           RumJunglePot(,.ers)
RumJungleUra(,.ers)           RumJungleTho(,.ers)
RumJungleElev(,.ers) 1999 survey onlySURVEY SPECIFICATIONS
COMM
COMM Multiclient survey flown 1987/1988
COMM Traverse line spacing    200 m
COMM Traverse line direction  090 - 270 degrees
COMM Tie line spacing         5000 m
COMM Tie line direction       000 - 180 degrees
COMM Survey height            60 metres
COMM
COMM Multiclient survey flown 1989
COMM Traverse line spacing    200 m
COMM Traverse line direction  090 - 270 degrees
COMM Tie line spacing         2000 m
COMM Tie line direction       000 - 180 degrees
COMM Survey height            60 metres
COMM
COMM Multiclient survey flown 1990
COMM Traverse line spacing    200 m
COMM Traverse line direction  090 - 270 degrees
COMM Tie line spacing         2000 m
COMM Tie line direction       000 - 180 degrees
COMM Survey height            80 metres
COMM
COMM Multiclient survey flown 1992
COMM Traverse line spacing    200 m
COMM Traverse line direction  090 - 270 degrees
COMM Tie line spacing         2000 m
COMM Tie line direction       000 - 180 degrees
COMM Survey height            60 metres
COMM

```

COMM SURVEY SPECIFICATIONS

COMM

COMM Survey flown	September, 1999
COMM Traverse line spacing	100 m
COMM Traverse line direction	090 - 270 degrees
COMM Tie line spacing	1000 m
COMM Tie line direction	000 - 180 degrees
COMM Survey height	60 metres

COMM

COMM Survey flown	September, 1999
COMM Traverse line spacing	200 m
COMM Traverse line direction	090 - 270 degrees
COMM Tie line spacing	2000 m
COMM Tie line direction	000 - 180 degrees
COMM Survey height	60 metres

COMM

COMM Survey flown	September, 1999
COMM Traverse line spacing	400 m
COMM Traverse line direction	090 - 270 degrees
COMM Tie line spacing	2000 m
COMM Tie line direction	000 - 180 degrees
COMM Survey height	60 metres

COMM

COMM DATA ACQUISITION

COMM

COMM 1987/1988 Survey	
COMM Magnetism cycle rate	0.2 seconds
COMM Radiometrics cycle rate	1.0 seconds
COMM Flight path navigation	Syledis UHF radio positioning

COMM

COMM 1989 Survey	
COMM Magnetism cycle rate	0.2 seconds
COMM Radiometrics cycle rate	0.8 seconds
COMM Flight path navigation	Syledis UHF radio positioning

COMM

COMM 1990 Survey	
COMM Magnetism cycle rate	0.2 seconds
COMM Radiometrics cycle rate	1.0 seconds
COMM Flight path navigation	Syledis UHF radio positioning

COMM

COMM 1992 Surveys	
COMM Magnetism cycle rate	0.1 seconds
COMM Radiometrics cycle rate	1.0 seconds
COMM Flight path navigation	Differential GPS satellite

COMM

COMM 1999 SURVEY

COMM

COMM DATA ACQUISITION

COMM

COMM Aircraft	VH-AZG CESSNA U206G STATIONAIR
---------------	--------------------------------

COMM

COMM Data acquisition system	Picodas PDAS-1000
------------------------------	-------------------

COMM

COMM MAGNETOMETER

COMM

COMM Type	SCINTREX model CS-2 cesium vapour
COMM Resolution	0.001 nanotesla
COMM Installation	Stinger
COMM Recording interval	0.1 seconds
COMM	AZG - 5.8 m along ground
COMM Active compensation	Picodas PDAS-1000

COMM Real time compensation and post
 processing
 COMM Effective noise envelope mostly <
 0.05 nT
 COMM
 COMM GAMMA SPECTROMETER
 COMM
 COMM Type 1024 channel Picodas PGAM-1000
 COMM Crystal volume 33.56 litres
 COMM Recording interval 1 second
 COMM AZG - 58 m along ground
 COMM Spectral windows Channels
 Energy (KeV)
 COMM

From	To	From	To
COMM Total Count		139.9467	959.1467
410.0	2810.0		
COMM K (40)		467.6267	535.8933
1370.0	1570.0		
COMM Bi (214)		566.6133	634.8800
1660.0	1860.0		
COMM Tl (208)		822.6133	959.1467
2410.0	2810.0		
COMM Cs (137)		187.7333	256.0000
550.0	750.0		
COMM Cosmic			
3000.0	6000.0		

 COMM Calibration Post processing of 1024 channels for
 each crystal
 COMM
 COMM NAVIGATION
 COMM
 COMM Flight path navigation Real time satellite, differential GPS
 system
 COMM Navigation equipment Novatel GPSCard 3915R
 COMM GPS base station location(s) Batchelor (Postprocessing)
 COMM WGS84 13:02:30.77 S 131:01:25.75 E
 COMM Racal, Darwin (Real Time DGPS)
 COMM Radar altimeter AZG - COLLINS ALT-50
 COMM
 COMM LINE NUMBERING
 COMM Line numbers are in the form (012345) where:
 COMM 01 = WGC Area number
 COMM 234 = line sequence number
 COMM 5 = attempt number
 COMM
 COMM NORTHERN TERRITORY COPYRIGHT RESERVED
 COMM
 COMM Project supervision by the Northern Territory Geological Survey
 COMM Published by Department of Mines and Energy
 COMM Issued under the authority of the Hon. Daryl Manzie, M.L.A.
 COMM Minister for Natural Resources
 COMM

Magnetic Data Format

```
DEFN    ST=RECD,RT=COMM;RT:A4;COMMENTS:A76
DEFN0  ST=RECD,RT=DATA;RT:A4;LINE:I7:NULL=9999999:NAME=Line number
DEFN1  ST=RECD,RT=DATA;FLT:I4:NULL=999:NAME=Flight number
DEFN2  ST=RECD,RT=DATA;JULIAN:I8:NULL=9999999:NAME=Julian day (YYYYDDD)
DEFN3  ST=RECD,RT=DATA;DATE:I9:NULL=9999999:NAME=Date (YYYYMMDD)
DEFN4  ST=RECD,RT=DATA;USEFLAG:I2:NULL=9:NAME=Use flag (0=not used, 1=used)
DEFN5  ST=RECD,RT=DATA;FID:F7.0:NULL=999999:UNIT::NAME=Fiducial
DEFN6  ST=RECD,RT=DATA;TIME:F8.1:NULL=99999.9:UNIT:seconds:NAME=Time (CST)
DEFN7
ST=RECD,RT=DATA;LONGGDA94:F12.6:NULL=9999.999999:UNIT:degrees:NAME=Longitude
(GDA94)
DEFN8  ST=RECD,RT=DATA;LATGDA94:F11.6:NULL=999.999999:UNIT:degrees:NAME=Latitude
(GDA94)
DEFN9  ST=RECD,RT=DATA;EASTMGA:F11.2:NULL=9999999.99:UNIT:metres:NAME=Easting
(MGA52)
DEFN10 ST=RECD,RT=DATA;NORTHMGA:F11.2:NULL=9999999.99:UNIT:metres:NAME=Northing
(MGA52)
DEFN11 ST=RECD,RT=DATA;RALT:F7.1:NULL=9999.9:UNIT:metres:NAME=Radar altimeter
DEFN12 ST=RECD,RT=DATA;BARO:F7.1:NULL=9999.9:UNIT:metres:NAME=Barometric height
DEFN13 ST=RECD,RT=DATA;GALT:F7.1:NULL=9999.9:UNIT:metres:NAME=GPS altitude
DEFN14 ST=RECD,RT=DATA;MAGRAW:F10.3:NULL=99999.999:UNIT:nT:NAME=Raw magnetics
DEFN15 ST=RECD,RT=DATA;DIUR:F10.3:NULL=99999.999:UNIT:nT:NAME=Diurnal
DEFN16 ST=RECD,RT=DATA;MAGFIN:F10.3:NULL=99999.999:UNIT:nT:NAME=Final magnetics
DEFN17 ST=RECD,RT=DATA;MAGFIN1VD:F11.4:NULL=99999.9999:UNIT:nT/m:NAME=Final
magnetics 1VD
DEFN18 ST=RECD,RT=DATA;ELEVFIN:F8.1:NULL=99999.9:UNIT:metres:NAME=Final
elevation;END DEFN
```

DESCRIPTION OF MAGNETIC DATA

```

COMM GENERAL
COMM
COMM Dataset                RUM JUNGLE
COMM Located data type      Magnetics
COMM
COMM Compiled by            World Geoscience Corporation Limited
COMM Creation date          November 1999
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM Survey flown           September, 1999
COMM Traverse line spacing  100 m
COMM Traverse line direction 090 - 270 degrees
COMM Tie line spacing       1000 m
COMM Tie line direction     000 - 180 degrees
COMM
COMM Survey flown           September, 1999
COMM Traverse line spacing  200 m
COMM Traverse line direction 090 - 270 degrees
COMM Tie line spacing       2000 m
COMM Tie line direction     000 - 180 degrees
COMM
COMM Survey flown           September, 1999
COMM Traverse line spacing  400 m
COMM Traverse line direction 090 - 270 degrees
COMM Tie line spacing       2000 m
COMM Tie line direction     000 - 180 degrees
COMM
COMM Survey height          60 metres
COMM
COMM Multiclient surveys flown 1987/1988 1989 1990 1992
COMM Traverse line spacing  200 m
COMM Traverse line direction 090 - 270 degrees
COMM Tie line spacing       2000 m
COMM Tie line direction     000 - 180 degrees
COMM
COMM Survey height          60 - 80 metres
COMM
COMM LOCATED DATA FORMAT
COMM
COMM Variable                Units                Undefined      From To
Format
COMM
COMM Data type                1              4
A4
COMM Line number              99999999       5              11
I7
COMM Flight number            999            12              15
I4
COMM Julian day (YYYYDDD)     99999999       16              23
I8
COMM Date (YYYYMMDD)          999999999      24              32
I9
COMM Use flag (0=not used, 1=used) 9              33              34
I2
COMM Fiducial                 999999         35              41
I7
COMM Time (CST)                seconds        99999.9         42              49
F8.1

```

COMM Longitude (GDA94)	degrees	9999.999999	50	61
F12.6				
COMM Latitude (GDA94)	degrees	999.999999	62	72
F11.6				
COMM Easting (MGA52)	metres	9999999.99	73	83
F11.2				
COMM Northing (MGA52)	metres	9999999.99	84	94
F11.2				
COMM Radar altimeter	metres	9999.9	95	
101 F7.1				
COMM Barometric height	metres	9999.9	102	
108 F7.1				
COMM GPS altitude	metres	9999.9	109	
115 F7.1				
COMM Raw magnetics	nT	99999.999	116	
125 F10.3				
COMM Diurnal	nT	99999.999	126	
135 F10.3				
COMM Final magnetics	nT	99999.999	136	
145 F10.3				
COMM Final magnetics 1VD	nT/m	99999.9999	146	
156 F11.4				
COMM Final elevation	metres	99999.9	157	
164 F8.1				

COMM

COMM LINE NUMBERING

COMM Line numbers are in the form (012345) where:

COMM 01 = WGC Area number

COMM 234 = line sequence number

COMM 5 = attempt number

COMM

COMM NORTHERN TERRITORY COPYRIGHT RESERVED

COMM

COMM Project supervision by the Northern Territory Geological Survey

COMM Published by Department of Mines and Energy

COMM Issued under the authority of the Hon. Daryl Manzie, M.L.A.

COMM Minister for Natural Resources

COMM

Radiometric Data Format

DEFN ST=RECD,RT=COMM;RT:A4;COMMENTS:A76
DEFN0 ST=RECD,RT=DATA;RT:A4;LINE:I7:NULL=9999999:NAME=Line number
DEFN1 ST=RECD,RT=DATA;FLT:I4:NULL=999:NAME=Flight number
DEFN2 ST=RECD,RT=DATA;JULIAN:I8:NULL=9999999:NAME=Julian day (YYYYDDD)
DEFN3 ST=RECD,RT=DATA;DATE:I9:NULL=9999999:NAME=Date (YYYYMMDD)
DEFN4 ST=RECD,RT=DATA;USEFLAG:I2:NULL=9:NAME=Use flag (0=not used, 1=used)
DEFN5 ST=RECD,RT=DATA;FID:F7.0:NULL=999999:UNIT::NAME=Fiducial
DEFN6 ST=RECD,RT=DATA;TIME:F8.1:NULL=99999.9:UNIT:seconds:NAME=Time (CST)
DEFN7
ST=RECD,RT=DATA;LONGGDA94:F12.6:NULL=9999.999999:UNIT:degrees:NAME=Longitude
(GDA94)
DEFN8 ST=RECD,RT=DATA;LATGDA94:F11.6:NULL=999.999999:UNIT:degrees:NAME=Latitude
(GDA94)
DEFN9 ST=RECD,RT=DATA;EASTMGA:F11.2:NULL=9999999.99:UNIT:metres:NAME=Easting
(MGA52)
DEFN10 ST=RECD,RT=DATA;NORTHMGA:F11.2:NULL=9999999.99:UNIT:metres:NAME=Northing
(MGA52)
DEFN11 ST=RECD,RT=DATA;RALT:F7.1:NULL=9999.9:UNIT:metres:NAME=Radar altimeter
DEFN12 ST=RECD,RT=DATA;BARO:F7.1:NULL=9999.9:UNIT:metres:NAME=Barometric height
DEFN13 ST=RECD,RT=DATA;GALT:F7.1:NULL=9999.9:UNIT:metres:NAME=GPS altitude
DEFN14 ST=RECD,RT=DATA;PRESS:F7.1:NULL=9999.9:UNIT:hPa:NAME=Pressure
DEFN15 ST=RECD,RT=DATA;TEMP:F5.1:NULL=99.9:UNIT:celcius:NAME=Temperature
DEFN16 ST=RECD,RT=DATA;HUMID:F5.1:NULL=99.9:UNIT:percentage:NAME=Humidity
DEFN17 ST=RECD,RT=DATA;TOTRAW:F8.1:NULL=99999.9:UNIT:cps:NAME=Raw total count
DEFN18 ST=RECD,RT=DATA;POTRAW:F8.1:NULL=99999.9:UNIT:cps:NAME=Raw potassium
DEFN19 ST=RECD,RT=DATA;URARAW:F8.1:NULL=99999.9:UNIT:cps:NAME=Raw uranium
DEFN20 ST=RECD,RT=DATA;THORAW:F8.1:NULL=99999.9:UNIT:cps:NAME=Raw thorium
DEFN21 ST=RECD,RT=DATA;COSRAW:F8.1:NULL=99999.9:UNIT:cps:NAME=Raw cosmic
DEFN22 ST=RECD,RT=DATA;TOTFIN:F12.5:NULL=99999.99999:UNIT:nGy/h:NAME=Final total
count
DEFN23 ST=RECD,RT=DATA;POTFIN:F12.5:NULL=99999.99999:UNIT:percent:NAME=Final
potassium
DEFN24 ST=RECD,RT=DATA;URAFIN:F12.5:NULL=99999.99999:UNIT:eppm:NAME=Final
uranium
DEFN25 ST=RECD,RT=DATA;THOFIN:F12.5:NULL=99999.99999:UNIT:eppm:NAME=Final
thorium;END DEFN

DESCRIPTION OF RADIOMETRIC DATA

COMM GENERAL	
COMM	
COMM Project	RUM JUNGLE
COMM Survey area	RUM JUNGLE
COMM Located data type	Radiometrics
COMM	
COMM Surveyed by	World Geoscience Corporation Limited
COMM Job number	1406
COMM Processed by	World Geoscience Corporation Limited
COMM Creation date	December 1999
COMM	
COMM GENERAL	
COMM	
COMM Dataset	PINE CREEK Multiclient
COMM Located data type	Radiometrics
COMM	
COMM Compiled by	World Geoscience Corporation Limited
COMM Creation date	December 1999
COMM	
COMM SURVEY SPECIFICATIONS	
COMM	
COMM Multiclient survey flown	1987/1988
COMM Traverse line spacing	200 m
COMM Traverse line direction	090 - 270 degrees
COMM Tie line spacing	5000 m
COMM Tie line direction	000 - 180 degrees
COMM Survey height	60 metres
COMM	
COMM Multiclient survey flown	1989
COMM Traverse line spacing	200 m
COMM Traverse line direction	090 - 270 degrees
COMM Tie line spacing	2000 m
COMM Tie line direction	000 - 180 degrees
COMM Survey height	60 metres
COMM	
COMM Multiclient survey flown	1990
COMM Traverse line spacing	200 m
COMM Traverse line direction	090 - 270 degrees
COMM Tie line spacing	2000 m
COMM Tie line direction	000 - 180 degrees
COMM Survey height	80 metres
COMM	
COMM Multiclient survey flown	1992
COMM Traverse line spacing	200 m
COMM Traverse line direction	090 - 270 degrees
COMM Tie line spacing	2000 m
COMM Tie line direction	000 - 180 degrees
COMM Survey height	60 metres
COMM	
COMM SURVEY SPECIFICATIONS	
COMM	
COMM Survey flown	September, 1999
COMM Traverse line spacing	100 m
COMM Traverse line direction	090 - 270 degrees
COMM Tie line spacing	1000 m
COMM Tie line direction	000 - 180 degrees
COMM Survey height	60 metres
COMM	
COMM Survey flown	September, 1999

COMM Traverse line spacing 200 m
 COMM Traverse line direction 090 - 270 degrees
 COMM Tie line spacing 2000 m
 COMM Tie line direction 000 - 180 degrees
 COMM Survey height 60 metres

COMM

COMM Survey flown September, 1999

COMM Traverse line spacing 400 m
 COMM Traverse line direction 090 - 270 degrees
 COMM Tie line spacing 2000 m
 COMM Tie line direction 000 - 180 degrees
 COMM Survey height 60 metres

COMM

COMM LOCATED DATA FORMAT

COMM

COMM Variable	Units	Undefined	From	To
---------------	-------	-----------	------	----

Format

COMM

COMM Data type			1	4
----------------	--	--	---	---

A4

COMM Line number		9999999	5	11
------------------	--	---------	---	----

I7

COMM Flight number		999	12	15
--------------------	--	-----	----	----

I4

COMM Julian day (YYYYDDD)		9999999	16	23
---------------------------	--	---------	----	----

I8

COMM Date (YYYYMMDD)		99999999	24	32
----------------------	--	----------	----	----

I9

COMM Use flag (0=not used, 1=used)		9	33	34
------------------------------------	--	---	----	----

I2

COMM Fiducial		999999	35	41
---------------	--	--------	----	----

I7

COMM Time (CST)	seconds	99999.9	42	49
-----------------	---------	---------	----	----

F8.1

COMM Longitude (GDA94)	degrees	9999.999999	50	61
------------------------	---------	-------------	----	----

F12.6

COMM Latitude (GDA94)	degrees	999.999999	62	72
-----------------------	---------	------------	----	----

F11.6

COMM Easting (MGA52)	metres	9999999.99	73	83
----------------------	--------	------------	----	----

F11.2

COMM Northing (MGA52)	metres	9999999.99	84	94
-----------------------	--------	------------	----	----

F11.2

COMM Radar altimeter	metres	9999.9	95	
----------------------	--------	--------	----	--

101 F7.1

COMM Barometric height	metres	9999.9	102	
------------------------	--------	--------	-----	--

108 F7.1

COMM GPS altitude	metres	9999.9	109	
-------------------	--------	--------	-----	--

115 F7.1

COMM Pressure	hPa	9999.9	116	
---------------	-----	--------	-----	--

122 F7.1

COMM Temperature	celcius	99.9	123	
------------------	---------	------	-----	--

127 F5.1

COMM Humidity	percentage	99.9	128	
---------------	------------	------	-----	--

132 F5.1

COMM Raw total count	cps	99999.9	133	
----------------------	-----	---------	-----	--

140 F8.1

COMM Raw potassium	cps	99999.9	141	
--------------------	-----	---------	-----	--

148 F8.1

COMM Raw uranium	cps	99999.9	149	
------------------	-----	---------	-----	--

156 F8.1

COMM Raw thorium	cps	99999.9	157
164 F8.1			
COMM Raw cosmic	cps	99999.9	165
172 F8.1			
COMM Final total count	nGy/h	99999.99999	173
184 F12.5			
COMM Final potassium	percent	99999.99999	185
196 F12.5			
COMM Final uranium	eppm	99999.99999	197
208 F12.5			
COMM Final thorium	eppm	99999.99999	209
220 F12.5			
COMM			
COMM DATA ACQUISITION			
COMM			
COMM 1987/1988 Survey			
COMM Magnetism cycle rate	0.2 seconds		
COMM Radiometrics cycle rate	1.0 seconds		
COMM Flight path navigation	Syledis UHF radio positioning		
COMM			
COMM 1989 Survey			
COMM Magnetism cycle rate	0.2 seconds		
COMM Radiometrics cycle rate	0.8 seconds		
COMM Flight path navigation	Syledis UHF radio positioning		
COMM			
COMM 1990 Survey			
COMM Magnetism cycle rate	0.2 seconds		
COMM Radiometrics cycle rate	1.0 seconds		
COMM Flight path navigation	Syledis UHF radio positioning		
COMM			
COMM 1992 Surveys			
COMM Magnetism cycle rate	0.1 seconds		
COMM Radiometrics cycle rate	1.0 seconds		
COMM Flight path navigation	Differential GPS satellite		
COMM			
COMM 1999 SURVEY			
COMM			
COMM DATA ACQUISITION			
COMM			
COMM Aircraft	VH-AZG CESSNA U206G STATIONAIR		
COMM			
COMM Data acquisition system	Picodas PDAS-1000		
COMM			
COMM MAGNETOMETER			
COMM			
COMM Type	SCINTREX model CS-2 cesium vapour		
COMM Resolution	0.001 nanotesla		
COMM Installation	Stinger		
COMM Recording interval	0.1 seconds		
COMM	AZG - 5.8 m along ground		
COMM Active compensation	Picodas PDAS-1000		
COMM	Real time compensation and post		
processing			
COMM	Effective noise envelope mostly <		
0.05 nT			
COMM			
COMM GAMMA SPECTROMETER			
COMM			
COMM Type	1024 channel Picodas PGAM-1000		
COMM Crystal volume	33.56 litres		
COMM Recording interval	1 second		

COMM		AZG - 58 m along ground
COMM Spectral windows		Channels
Energy (KeV)		
COMM		
From		From To
COMM Total Count		
410.0	2810.0	139.9467 959.1467
COMM K (40)		
1370.0	1570.0	467.6267 535.8933
COMM Bi (214)		
1660.0	1860.0	566.6133 634.8800
COMM Tl (208)		
2410.0	2810.0	822.6133 959.1467
COMM Cs (137)		
550.0	750.0	187.7333 256.0000
COMM Cosmic		
3000.0	6000.0	
COMM Calibration		Post processing of 1024 channels for
each crystal		
COMM		
COMM NAVIGATION		
COMM		
COMM Flight path navigation		Real time satellite, differential GPS
system		
COMM Navigation equipment		Novatel GPSCard 3915R
COMM GPS base station location(s)		Batchelor (Postprocessing)
COMM		WGS84 13:02:30.77 S 131:01:25.75 E
COMM		Racal, Darwin (Real Time DGPS)
COMM Radar altimeter		AZG - COLLINS ALT-50
COMM		
COMM LINE NUMBERING		
COMM Line numbers are in the form (012345) where:		
COMM 01 = WGC Area number		
COMM 234 = line sequence number		
COMM 5 = attempt number		
COMM		
COMM NORTHERN TERRITORY COPYRIGHT RESERVED		
COMM		
COMM Project supervision by the Northern Territory Geological Survey		
COMM Published by Department of Mines and Energy		
COMM Issued under the authority of the Hon. Daryl Manzie, M.L.A.		
COMM Minister for Natural Resources		
COMM		

Radiometric 256 Channel Data Format

DEFN ST=RECD,RT=COMM;RT:A4;COMMENTS:A76
DEFN0 ST=RECD,RT=DATA;RT:A4;LINE:I7:NULL=9999999:NAME=Line number
DEFN1 ST=RECD,RT=DATA;FLT:I4:NULL=999:NAME=Flight number
DEFN2 ST=RECD,RT=DATA;JULIAN:I8:NULL=99999999:NAME=Julian day (YYYYDDD)
DEFN3 ST=RECD,RT=DATA;DATE:I9:NULL=99999999:NAME=Date (YYYYMMDD)
DEFN4 ST=RECD,RT=DATA;USEFLAG:I2:NULL=9:NAME=Use flag (0=not used, 1=used)
DEFN5 ST=RECD,RT=DATA;FID:F7.0:NULL=999999:UNIT::NAME=Fiducial
DEFN6 ST=RECD,RT=DATA;TIME:F8.1:NULL=99999.9:UNIT:seconds:NAME=Time (CST)
DEFN7
ST=RECD,RT=DATA;LONGGDA94:F12.6:NULL=9999.999999:UNIT:degrees:NAME=Longitude
(GDA94)
DEFN8 ST=RECD,RT=DATA;LATGDA94:F11.6:NULL=999.999999:UNIT:degrees:NAME=Latitude
(GDA94)
DEFN9 ST=RECD,RT=DATA;EASTMGA:F11.2:NULL=99999999.99:UNIT:metres:NAME=Easting
(MGA52)
DEFN10 ST=RECD,RT=DATA;NORTHMGA:F11.2:NULL=99999999.99:UNIT:metres:NAME=Northing
(MGA52)
DEFN11 ST=RECD,RT=DATA;RALT:F7.1:NULL=9999.9:UNIT:metres:NAME=Radar altimeter
DEFN12 ST=RECD,RT=DATA;BARO:F7.1:NULL=9999.9:UNIT:metres:NAME=Barometric height
DEFN13 ST=RECD,RT=DATA;GALT:F7.1:NULL=9999.9:UNIT:metres:NAME=GPS altitude
DEFN14 ST=RECD,RT=DATA;PRESS:F7.1:NULL=9999.9:UNIT:hPa:NAME=Pressure
DEFN15 ST=RECD,RT=DATA;TEMP:F5.1:NULL=99.9:UNIT:celcius:NAME=Temperature
DEFN16 ST=RECD,RT=DATA;HUMID:F5.1:NULL=99.9:UNIT:percentage:NAME=Humidity
DEFN17 ST=RECD,RT=DATA;TOTRAW:F8.1:NULL=99999.9:UNIT:cps:NAME=Raw total count
DEFN18 ST=RECD,RT=DATA;POTRAW:F8.1:NULL=99999.9:UNIT:cps:NAME=Raw potassium
DEFN19 ST=RECD,RT=DATA;URARAW:F8.1:NULL=99999.9:UNIT:cps:NAME=Raw uranium
DEFN20 ST=RECD,RT=DATA;THORAW:F8.1:NULL=99999.9:UNIT:cps:NAME=Raw thorium
DEFN21 ST=RECD,RT=DATA;COSRAW:F8.1:NULL=99999.9:UNIT:cps:NAME=Raw cosmic
DEFN22 ST=RECD,RT=DATA;TOTFIN:F12.5:NULL=99999.99999:UNIT:nGy/h:NAME=Final total
count
DEFN23 ST=RECD,RT=DATA;POTFIN:F12.5:NULL=99999.99999:UNIT:percent:NAME=Final
potassium
DEFN24 ST=RECD,RT=DATA;URAFIN:F12.5:NULL=99999.99999:UNIT:eppm:NAME=Final
uranium
DEFN25 ST=RECD,RT=DATA;THOFIN:F12.5:NULL=99999.99999:UNIT:eppm:NAME=Final
thorium
DEFN26 ST=RECD,RT=DATA;MC_fin:256F7.1:NULL=9999.9:UNIT:cps:NAME=Spectrum;END
DEFN

DESCRIPTION OF 256 CHANNEL RADIOMETRIC DATA

```

COMM GENERAL
COMM
COMM Project                RUM JUNGLE
COMM Survey area            RUM JUNGLE
COMM Located data type      1 second 256 channel spectrometer
data
COMM
COMM Surveyed by            World Geoscience Corporation Limited
COMM Job number              1406
COMM Processed by            World Geoscience Corporation Limited
COMM Creation date           December 1999
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM Survey flown            September, 1999
COMM Traverse line spacing    100 m
COMM Traverse line direction 090 - 270 degrees
COMM Tie line spacing         1000 m
COMM Tie line direction       000 - 180 degrees
COMM Survey height            60 metres
COMM
COMM Survey flown            September, 1999
COMM Traverse line spacing    200 m
COMM Traverse line direction 090 - 270 degrees
COMM Tie line spacing         2000 m
COMM Tie line direction       000 - 180 degrees
COMM Survey height            60 metres
COMM
COMM Survey flown            September, 1999
COMM Traverse line spacing    400 m
COMM Traverse line direction 090 - 270 degrees
COMM Tie line spacing         2000 m
COMM Tie line direction       000 - 180 degrees
COMM Survey height            60 metres
COMM
COMM LOCATED DATA FORMAT
COMM
COMM Variable                Units                Undefined        From To
Format
COMM
COMM Data type                1            4
A4
COMM Line number              9999999          5            11
I7
COMM Flight number            999              12            15
I4
COMM Julian day (YYYYDDD)     9999999          16            23
I8
COMM Date (YYYYMMDD)          999999999        24            32
I9
COMM Use flag (0=not used, 1=used) 9              33            34
I2
COMM Fiducial                 999999          35            41
I7
COMM Time (CST)                seconds          99999.9        42            49
F8.1
COMM Longitude (GDA94)        degrees          9999.999999    50            61
F12.6
COMM Latitude (GDA94)         degrees          999.999999     62            72
F11.6

```

COMM Easting (MGA52)	metres	9999999.99	73	83
F11.2				
COMM Northing (MGA52)	metres	9999999.99	84	94
F11.2				
COMM Radar altimeter	metres	9999.9	95	
101 F7.1				
COMM Barometric height	metres	9999.9	102	
108 F7.1				
COMM GPS altitude	metres	9999.9	109	
115 F7.1				
COMM Pressure	hPa	9999.9	116	
122 F7.1				
COMM Temperature	celcius	99.9	123	
127 F5.1				
COMM Humidity	percentage	99.9	128	
132 F5.1				
COMM Raw total count	cps	99999.9	133	
140 F8.1				
COMM Raw potassium	cps	99999.9	141	
148 F8.1				
COMM Raw uranium	cps	99999.9	149	
156 F8.1				
COMM Raw thorium	cps	99999.9	157	
164 F8.1				
COMM Raw cosmic	cps	99999.9	165	
172 F8.1				
COMM Final total count	nGy/h	99999.99999	173	
184 F12.5				
COMM Final potassium	percent	99999.99999	185	
196 F12.5				
COMM Final uranium	eppm	99999.99999	197	
208 F12.5				
COMM Final thorium	eppm	99999.99999	209	
220 F12.5				
COMM Spectrum	cps	9999.9	221	
2011 256F7.1				
COMM				
COMM DATA ACQUISITION				
COMM				
COMM Aircraft	VH-AZG CESSNA U206G STATIONAIR			
COMM				
COMM Data acquisition system	Picodas PDAS-1000			
COMM				
COMM MAGNETOMETER				
COMM				
COMM Type	SCINTREX model CS-2 cesium vapour			
COMM Resolution	0.001 nanotesla			
COMM Installation	Stinger			
COMM Recording interval	0.1 seconds			
COMM	AZG - 5.8 m along ground			
COMM Active compensation	Picodas PDAS-1000			
COMM	Real time compensation and post			
processing				
COMM	Effective noise envelope mostly <			
0.05 nT				
COMM				
COMM GAMMA SPECTROMETER				
COMM				
COMM Type	1024 channel Picodas PGAM-1000			
COMM Crystal volume	33.56 litres			
COMM Recording interval	1 second			

COMM	AZG - 58 m along ground	
COMM Spectral windows	Channels	
Energy (KeV)		
COMM	From	To
From To		
COMM Total Count	139.9467	959.1467
410.0 2810.0		
COMM K (40)	467.6267	535.8933
1370.0 1570.0		
COMM Bi (214)	566.6133	634.8800
1660.0 1860.0		
COMM Tl (208)	822.6133	959.1467
2410.0 2810.0		
COMM Cs (137)	187.7333	256.0000
550.0 750.0		
COMM Cosmic		
3000.0 6000.0		
COMM Calibration	Post processing of 1024 channels for	
each crystal		
COMM		
COMM NAVIGATION		
COMM		
COMM Flight path navigation	Real time satellite, differential GPS	
system		
COMM Navigation equipment	Novatel GPSCard 3915R	
COMM GPS base station location(s)	Batchelor (Postprocessing)	
COMM	WGS84 13:02:30.77 S 131:01:25.75 E	
COMM	Racal, Darwin (Real Time DGPS)	
COMM Radar altimeter	AZG - COLLINS ALT-50	
COMM		
COMM DATA PROCESSING		
COMM		
COMM MAGNETIC DATA		
COMM		
COMM The magnetic data has been corrected for regional gradient by	subtraction	
COMM of IGRF model 1995 computed continuously over the whole area at a	constant height (GRS67) of 0 metres. Diurnal magnetic variations	
COMM have been	removed. System parallax has been removed. Tie-line levelling has	
COMM been	applied. Microlevelling has been applied.	
COMM		
COMM RADIOMETRIC DATA		
COMM		
COMM Height attenuated to 60m AGL		
COMM Airborne radon removed		
COMM AIRCRAFT BACKGROUND	AZG	UNITS
COMM Total Count	62.0	cps
COMM Potassium	10.5	cps
COMM Uranium	1.5	cps
COMM Thorium	1.0	cps
COMM COSMIC STRIPPING RATIOS		
COMM Total Count	1.4900	
COMM Potassium	0.0855	
COMM Uranium	0.0670	
COMM Thorium	0.0740	
COMM COMPTON STRIPPING RATIOS		
COMM alpha	0.245014	
COMM beta	0.335061	
COMM gamma	0.710699	

COMM a 0.03578
 COMM HEIGHT ATTENUATION COEFFICIENT
 COMM Total Count 0.00747 per metre
 COMM Potassium 0.00994 per metre
 COMM Uranium 0.00670 per metre
 COMM Thorium 0.00760 per metre
 COMM SENSITIVITY CONSTANTS
 COMM Total Count - nGy/h 21.0 cps
 COMM Potassium - 1% 80.2 cps
 COMM Uranium - 1ppm 6.4 cps
 COMM Thorium - 1ppm 4.7 cps
 COMM CALIBRATION RANGE Carnamah Radiometric Calibration
 Range
 COMM AGD84 29:44:00.00 S 115:58:40.00 E
 COMM
 COMM DIGITAL ELEVATION MODEL DATA
 COMM
 COMM DIGITAL ELEVATION MODEL CALCULATION
 COMM The radar altimeter data was subtracted from the GPS heights to
 provide
 COMM a digital elevation model which is height above the WGS84
 spheroid. Using
 COMM AUSLIG Geoid model corrections for AHD1998, interpolated from a 120
 second
 COMM by 120 second grid, a correction was subtracted from the WGS84 data
 COMM to convert to AHD1998.
 COMM
 COMM DATA RELIABILITY
 COMM This Digital Elevation Model (DEM) has been computed from data
 generated
 COMM during the course of an airborne geophysical survey flown at a
 nominal
 COMM spacing of 100/200/400m and data has been interpolated between such
 lines.
 COMM Every effort has been made to make this model a useful general
 reference.
 COMM No guarantee can be made that this model is a true representation
 of height
 COMM above sea level as it contains radar altimeter responses from
 buildings
 COMM and in some instances dense timber. Users of the product should be
 aware
 COMM of the topographic limitations mapped herewithin. Do not use this
 DEM for
 COMM navigation purposes.
 COMM
 COMM LINE NUMBERING
 COMM Line numbers are in the form (012345) where:
 COMM 01 = WGC Area number
 COMM 234 = line sequence number
 COMM 5 = attempt number
 COMM
 COMM NORTHERN TERRITORY COPYRIGHT RESERVED
 COMM
 COMM Project supervision by the Northern Territory Geological Survey
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 COMM