# Arnhem Land, Northern Territory TEMPEST Geophysical Survey

## Acquisition and Processing Report

for

## Cameco Australia Pty Ltd


| | | |
|---|---|---|
| Prepared by : | M. Owers | ………………………….. |
| | L. Stenning | ………………………….. |
| Authorised for release by : | | ………………………….. |
| | | ………………………….. |


Survey flown: June - July 2006

by


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**FAS JOB # 1788**

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# 1. SURVEY OPERATIONS AND LOGISTICS

## 1.1 Introduction

Between the 14th of June 2006 and the 7th of July 2006, Fugro Airborne Surveys Pty. Ltd. (FAS) undertook an airborne TEMPEST electromagnetic and magnetic survey for Cameco Australia Pty Ltd, over five areas in Arnhem Land Northern Territory. Total coverage of the survey area amounted to 4300 line kilometres flown in 20 flights. The survey was flown using a CASA C212-200 Turbo Prop aircraft, registration VH-TEM owned and operated by FAS. This report summarises the procedures and equipment used by FAS in the acquisition, verification and processing of the airborne geophysical data.

## 1.2 Survey Base

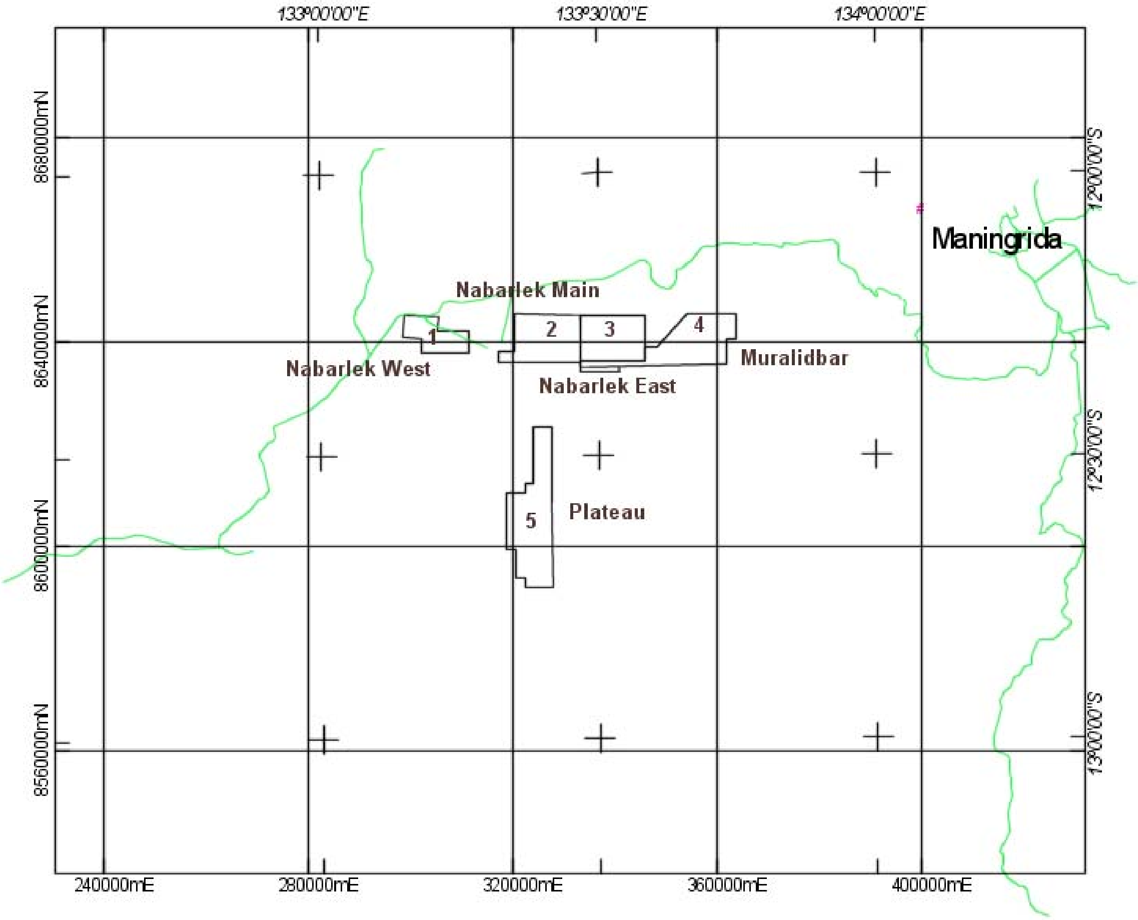
The survey was based out of Jabiru, Northern Territory. The survey aircraft was operated from the Jabiru airport with the aircraft fuel available on site. A temporary office was set up in a room at the Aurora Kakadu, South Alligator, where all survey operations were run and the post-flight data verification was performed.

## 1.3 Survey Personnel

The following personnel were involved in this project:

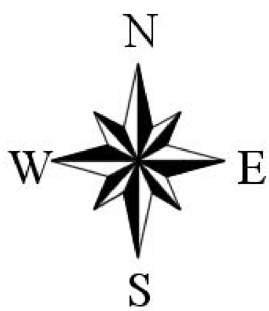
| | |
|---|---|
| Project Supervision - Acquisition | Bart Anderson |
| - Processing | Kathlene Oliver |
| On-site Crew Leader | Andrew Carpenter |
| Pilot/s | Tim Haldane, Mel Cote |
| System Operator | Andrew Carpenter |
| Technician/s | Andrew Carpenter / Scott Miller |
| Field Data Processing | Glenn Gooch |
| Office Data Processing | Matthew Owers |

## 1.4 Area Maps




Client : Cameco Australia
Survey Name : Arnhem Land
Survey Type : 25Hz TEMPEST

Datum : WGS84
Projection : UTM
Zone : 53



# 2. SURVEY SPECIFICATIONS AND PARAMETERS

## 2.1 Area Co-ordinates

The survey area was located within UTM Zone 53S, Central Meridian = 135
(Note - Co-ordinates in WGS84 Zone 53)

**Area 1 – Nabarlek West**

| Easting | Northing |
|---|---|
| 302444 | 8637762 |
| 302409 | 8640655 |
| 298655 | 8640754 |
| 298753 | 8645298 |
| 305570 | 8645001 |
| 305273 | 8641939 |
| 311505 | 8642189 |
| 311505 | 8637762 |

**Area 2 – Nabarlek Main**

| Easting | Northing |
|---|---|
| 333511 | 8645220 |
| 333600 | 8637062 |
| 337457 | 8637062 |
| 337398 | 8635875 |
| 333511 | 8635905 |
| 317492 | 8635891 |
| 317526 | 8638154 |
| 320577 | 8638160 |
| 320547 | 8645339 |

**Area 3 – Nabarlek East**

| Easting | Northing |
|---|---|
| 333513 | 8635904 |
| 333513 | 8645219 |
| 345922 | 8645263 |
| 345922 | 8635935 |
| 340964 | 8635935 |
| 340976 | 8634014 |
| 333513 | 8634034 |

**Area 4 – Muralidbar**

| Easting | Northing |
|---|---|
| 333513 | 8635013 |
| 333483 | 8636259 |
| 345902 | 8636376 |
| 346004 | 8638995 |
| 348574 | 8639008 |
| 354312 | 8645493 |
| 364060 | 8645444 |
| 364041 | 8640528 |
| 362025 | 8640462 |
| 362023 | 8635461 |

**Area 5 – Plateau**

| Easting | Northing |
|---|---|
| 327998 | 8608427 |
| 328110 | 8591831 |
| 322622 | 8591848 |
| 322612 | 8593636 |
| 320860 | 8593654 |
| 320764 | 8599163 |
| 319002 | 8599152 |
| 318943 | 8608371 |
| 318932 | 8610215 |

| | |
|---|---|
| 322683 | 8610395 |
| 322672 | 8612239 |
| 324271 | 8612258 |
| 324300 | 8623166 |
| 327804 | 8623165 |
| 327998 | 8608427 |

## 2.2 Survey Area Parameters

| | | |
|---|---|---|
| Job Number | - | 1788 |
| Survey Company | - | Fugro Airborne Surveys Pty Ltd |
| Date Flown | - | 16th June 2006 – 7th July 2006 |
| Client | - | Cameco Australia Pty Ltd |
| EM System | - | 25 Hz TEMPEST |
| Navigation | - | Real-time differential GPS |
| Datum | - | AGD66 (Zone 53) |
| Area Name | - | Arnhem Land, Northern Territory |
| Nominal Terrain Clearance | - | 120 m |
| Total Survey Line Kilometres | - | 4300 km |

| Area Name | Traverse Line Spacing | Traverse Line Direction | Traverse Line Numbers | Tie Line Spacing | Tie Line Direction | Tie Line Numbers | Line km's |
|---|---|---|---|---|---|---|---|
| Nabarlek West | 200 m | 90 – 270 | 10010 – 10400 | 2000 m | 0 – 180 | 17010 – 17050 | 450.6 |
| Nabarlek Main | 200 m | 90 – 270 | 20010 – 20500 | 2000 m | 0 – 180 | 27010 – 27070 | 823.6 |
| Nabarlek East | 200 m | 0 -180 | 30010 – 30640 | 2000 m | 90 – 270 | 37010 – 37030 | 774.0 |
| Muralidbar | 200 m | 89 – 269 | 40010 – 40550 | 2000 m | 179 – 359 | 47010 – 47070 | 1041.0 |
| Plateau | 200 m | 0 -180 | 50010 - 50491 | 1800 m | 90 – 270 | 57010 - 57060 | 1210.5 |

## 2.3 Flight Plans

The flight plans are given in Appendix 1.

## 2.4 Job Safety Plan

A Job Safety Plan was prepared and implemented in accordance with the Fugro Airborne Surveys Occupational Safety & Health Management System.

# 3. AIRCRAFT EQUIPMENT AND SPECIFICATIONS

## 3.1 Aircraft

| | | |
|---|---|---|
| Manufacturer | - | CASA |
| Model | - | C212-200 Turbo Prop |
| Registration | - | VH-TEM |
| Ownership | - | Fugro Airborne Surveys Pty Ltd |

## 3.2 TEMPEST System Specifications

Specifications of the TEMPEST Airborne EM System (Lane et al., 2000) are:

- Base frequency - 25 Hz
- Transmitter area - 244 $m^2$
- Transmitter turns - 1
- Waveform - Square
- Duty cycle - 50%
- Transmitter pulse width - 10 ms
- Transmitter off-time - 10 ms
- Peak current - 280 A
- Peak moment - 68,320 $Am^2$
- Average moment - 34,160 $Am^2$
- Sample rate - 75 kHz on X and Z
- Sample interval - 13 microseconds
- Samples per half-cycle - 1500
- System bandwidth - 25 Hz to 37.5 kHz
- Flying height - 120 m (subject to safety considerations)
- EM sensor - Towed bird with 3 component dB/dt coils
- Tx-Rx horizontal separation - 120 m (nominal)
- Tx-Rx vertical separation - 35 m (nominal)
- Stacked data output interval - 200 ms (~12 m)
- Number of output windows - 15
- Window centre times - 13 µs to 16.2 ms
- Magnetometer - Stinger-mounted cesium vapour
- Magnetometer compensation - Fully digital
- Magnetometer output interval - 200 ms (~12 m)
- Magnetometer resolution - 0.001 nT
- Typical noise level - 0.2 nT
- GPS cycle rate - 1 second

### 3.2.1 EM Receiver and Logging Computer

The EM receiver computer is a Picodas PDAS-1000 data acquisition system. The EM receiver computer executes a proprietary program for system control, timing, data acquisition and recording. Control, triggering and timing is provided to the TEMPEST transmitter and DSP signal processing boards by the timing card, which ensures that all waveform generation and sampling is accomplished with high accuracy. The timing card is synchronised to GPS through the use of the PPS output from the system GPS card. Synchronisation is also provided to the magnetometer processor card for the purpose of accurate magnetic sampling with respect to the EM transmitter waveform.

The EM receiver computer displays information on the main screen during system calibrations and survey line acquisition to enable the airborne operator to assess the data quality and performance of the system.

### 3.2.2 TEMPEST Transmitter

The transmitted waveform is a square wave of alternating polarity, which is triggered directly from the EM receiver computer. The nominal transmitter base frequency was 25 Hz with a pulse width of 10ms (50 % duty cycle). Loop current waveform monitoring is provided by a current transformer located directly in the loop current path to allow for full logging of the waveform shape and amplitude, which is sampled by the EM receiver.

### 3.2.3 TEMPEST 3-Axis Towed Bird Assembly

The TEMPEST 3-axis towed bird assembly provides accurate low noise sampling of the X (horizontal in line), Y (horizontal transverse) and Z (vertical) components of the electromagnetic field. The receiver coils measure the time rate of change of the magnetic field (dB/dt). Signals from each axis are transferred to the aircraft through a tow cable specifically designed for its electrical and mechanical properties.

## 3.3 PDAS 1000 Survey Computer

The SURVEY computer is a PICODAS PDAS 1000 data acquisition system. The SURVEY computer executes a proprietary program for acquisition and recording of location, magnetic and ancillary data. Data are presented both numerically and graphically in real time on the VGA LCD display, which provides an on-line display capability. The operator may alter the sensitivity of the displays on-line to assist in quality control. Selected EM data are transferred from the EM receiver computer to the SURVEY computer for QC display.

### 3.3.1 Cesium Vapour Magnetometer Sensor

A cesium vapour magnetometer sensor is utilised on the aircraft and consists of the sensor head and cable, and the sensor electronics. The sensor head is housed at the end of a composite material tail stinger.

### 3.3.2 Magnetometer Processor Board

A Picodas magnetometer processor board is used for de-coupling and processing the Larmor frequency output of the magnetometer sensor. The processor board interfaces with the PDAS 1000 survey computer, which initiates data sampling and transfer for precise sample intervals and also with the EM receiver computer to ensure that the magnetic samples remain synchronised with the EM system.

### 3.3.3 Fluxgate Magnetometer

A tail stinger mounted Bartington MAG-03MC three-axis fluxgate magnetometer is used to provide information on the attitude of the aircraft. This information is used for compensation of the measured magnetic total field.

### 3.3.4 GPS Receiver

A Novatel GPScard 951R is utilised for airborne positioning and navigation. Satellite range data are recorded for generating post processed differential solutions.

### 3.3.5 Differential GPS Demodulator

The OMNISTAR differential GPS service provides real time differential corrections.

### 3.4 Navigation System

A Picodas PNAV 2001 Navigation Computer is used for real-time navigation. The PNAV computer loads a pre-programmed flight plan from disk which contains boundary co-ordinates, line start and end co-ordinates, local co-ordinate system parameters, line spacing, and cross track definitions. The WGS-84 latitude and longitude positional data received from the Novatel GPScard contained in the SURVEY computer is transformed to the local co-ordinate 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 a LCD screen in conjunction with a pictorial representation of the survey area, survey lines, and ongoing flight path.

The PNAV is interlocked to the SURVEY computer for auto selection and verification of the line to be flown. The GPS information passed to the PNAV 2001 navigation computer is corrected using the received real time differential data, enabling the aircraft to fly as close to the intended track as possible.

### 3.5 Altimeter System

#### 3.5.1 Radar Altimeter

| | |
|---|---|
| Model: | Sperry RT-200 radio altimeter system |
| Sample interval: | 1.0 second |
| Accuracy: | +/- 1.5 % of indicated altitude. |

The Sperry radio altimeter is a high quality instrument whose output is factory calibrated. It is fitted with a test function which checks the calibration of a terrain clearance of 100 feet, and altitudes which are multiples of 100 feet. The aircraft radio altitude is recorded onto digital tape as well as displayed on the aircraft chart recorder. The recorded value is the average of the altimeters output during the previous second.

#### 3.5.2 Barometric Altimeter

Output of a Digiquartz 215A-101pressure transducer is used for calculating the barometric altitude of the aircraft. The atmospheric pressure is taken from a gimbal-mounted probe projecting 0.5 metres from the wing tip of the aircraft and fed to the transducer mounted in the aircraft wingtip.

### 3.6 Video Tracking System

The video tape recorded by a PAL VHS colour video system is synchronised with the geophysical record by a digital fiducial display, which is recorded along with GPS latitude and longitude information and survey line number.

### 3.7 Data Recorded by the Airborne Acquisition Equipment

Raw EM data including fiducial, local time, X, Y, Z axis sensor response, current monitor and bird auxiliary sensor output are recorded on the EM receiver computer as “**G**” EM files.

The Survey computer records all other survey data including aeromagnetic and GPS data using as “**S**” Survey files, and “**R**” Rover files containing GPS raw range data for post processing.

# 4. GROUND DATA ACQUISITION EQUIPMENT AND SPECIFICATIONS

## 4.1 Magnetic Base Station

Two Geometrics G856 magnetometers were used to measure the daily variations of the Earth's magnetic field. The base stations were established in an area of low gradient, away from cultural influences. The base stations were run continuously throughout the survey flying period with a sampling interval of 5 seconds at a sensitivity of 0.01 nT. The base station data were closely examined after each day's production flying to determine if any data had been acquired during periods of out-of-specification diurnal variation. The base stations were located approximately 80 m apart at Jabiru airport.

## 4.2 GPS Base Station

A GPS base logging station was set up at the survey base office. The GPS antenna was positioned on the roof of the Aurora Kakadu, South Alligator, above room 49.

The GPS base system was comprised of a Novatel GPS PC card mounted in a portable IBM computer. The computer is connected to a mains UPS backup, with a reserve capacity of approximately 100 minutes, to ensure continuous data logging in the event of mains power interruptions.

The GPS base station position was calculated by logging data continuously at the base position over a period of 24 hours. These data were then statistically averaged to obtain the position of the base station using GrafNav software.

The calculated GPS base position was (in WGS84):

Lat: 12° 40' 33.28874" S
Long: 132° 28' 44.24058" E
Height: 70.734 m. (WGS84 Ellipsoidal Height)

# 5. EM AND OTHER CALIBRATIONS AND MONITORING

At the beginning and end of each individual survey flight, the EM system is checked for background noise levels and performance. All of these checks are conducted at a nominal terrain clearance of 600 m (2000 ft) to eliminate ground response.

These checks include:-

## 5.1 Pre-Flight Barometer Calibration: Line C1511

A recording of the barometer output at a known elevation is carried out before take-off to assist with calibration and determination of drift during the flight. The barometer is used as a back-up to the GPS for aircraft altitude.

## 5.2 Pre-Flight Zero: Line C9001

This manoeuvre is performed once the aircraft is established en route to the survey area. Background EM levels are recorded and assessed by the airborne operator to determine if:-

a. the system noise level is acceptable,
b. the response had not varied significantly from previous flights, and
c. the sferic level is acceptable.

These data are recorded for approximately 90 seconds.

## 5.3 Pre-Flight Swoops: Line C9002

This manoeuvre is conducted immediately after the pre sortie zero. During this manoeuvre the relative position of the towed sensor is deliberately made to vary relative to the aircraft. The EM data are monitored by the airborne operator to confirm correct operation of the system during the manoeuvre.

## 5.4 Post-Flight Zero: Line C9003

This calibration is performed immediately following the completion of the survey sorties. Background EM levels are recorded to characterise any changes occurred in the system over the duration of the flight. These data are recorded for approximately 90 seconds.

## 5.5 Post-Flight Barometer Calibration: Line C1611

A recording of the barometer output is repeated following landing at the end of the flight to assist with calibration and determination of drift during the flight.

## 5.6 Additive EM Measurements: Lines C9004, C9005, and C9007

A recording of the background signal through the X, Y and Z receiver coil inputs is carried out before and/or after acquisition of data for survey lines on each flight. These measurements may be made with the transmitter on (C9004, C9005) or with the transmitter off (C9007). The signal from the receiver coils is removed from the signal pathway by disconnecting the power to the bird at the winch inside the aircraft.

## 5.7 Dynamic Magnetometer Compensation

To limit aircraft manoeuvre effects on the magnetic data that can be of the same spatial wavelength as the signals from geological sources, compensation calibration lines are flown in a low magnetic gradient area close to the survey. This involves flying a series of tests on the survey line heading and approximately 15 degrees either side to accommodate small heading variations whilst flying survey lines. The data for each heading consists of a series of aircraft manoeuvres, including pitches, rolls and yaws. This is done to artificially create the most extreme possible attitude the aircraft may encounter whilst on survey. Data from these lines are used to derive compensation coefficients for removing magnetic noise induced by the aircraft's attitude in the naturally occurring magnetic field.

Compensation data were acquired on the 16th of June 2006.

### 5.8 Parallax Checks

Due to the relative positions of the EM towed bird and the magnetometer instruments on the aircraft and to processing / recording time lags, raw readings from each vary in position. To correct for this and to align selected anomaly features on lines flown in opposite directions, magnetics, EM data and the altimeters are 'parallaxed' with respect to the position information. System parallax is checked occasionally or following any major changes in the aircraft system which are likely to affect the parallax values.

### 5.9 Radar Altimeter Calibration

The radar altimeter is checked for accuracy and linearity every 12 months or when any change in a key system component requires this procedure to be carried out. This calibration allows the radar altimeter data to be compared and assessed with other height data (GPS and barometric) to confirm the accuracy of the radar altimeter over it's operating range.

Absolute radar and barometric altimeter calibration was carried out over water at Mandurah, WA and was successful in calibrating the radar altimeter to information provided by the GPS and barometer instrument. Calibration factors were as expected. The calibration procedure also provides parallax information required for positional correction of the radar and GPS altimeters.

### 5.10 Heading Error Checks

Historically, heading error checks have been part of the aeromagnetic data acquisition procedure but they are no longer used. Fugro Airborne Surveys now calculates these effects using the aircraft magnetic compensation system and specially developed software. The precision to which these effects are now calculated and corrected for is far in excess of the manual methods used in the past.

### 5.11 Repeat Calibration Line

From previous surveys in the region, a low-level calibration line has been located in order to validate the repeatability of the EM system at the start of each day's acquisition. The line was flown in the same direction and at the nominal survey altitude, then processed right through to produce a CDI which was emailed to the client daily. The line coordinates are: 318000mE to 315000 at 8627400mN.

# 6. DATA PROCESSING

## 6.1 Field Data Processing

### 6.1.1 Quality Control Specifications

#### 6.1.1.1 Navigation Tolerance

The re-flight specifications applied for the duration of the survey were:

Electronic Navigation - absence of electronic navigation data (e.g. GPS base station fails).

Traverse Lines Separation - actual flight line spacing exceeds 125% of the nominal spacing over a continuous distance exceeding 5 kilometres or where lines cross.
- flight lines are more than 20 metres off course over a continuous distance of 1500 m or more unless the deviation is required by civil aviation requirements.

Altitude - terrain clearance continuously exceeds the nominal terrain clearance by plus or minus 20 m over a distance of 2 km or more unless to do so would, in the sole opinion of the pilot, jeopardise the safety of the aircraft or the crew or the equipment or would be in contravention of the Civil Aviation Safety Authority regulation such as those pertaining to built up areas.

#### 6.1.1.2 Electromagnetic Data

The quality control checks on the electromagnetic data were:

Noise - where RMS noise in the last channel of the raw EM data exceeds 0.1 fT over 3 km for B-field (assessed in a resistive region) or where FAS believes an important anomaly is rendered un-interpretable.

Sferics – where sferic activity renders a potential anomaly un-interpretable.

### 6.1.2 In-Field Data Processing

Following acquisition, multiple copies of the EM data are made onto DVDs or CDs. The EM, location, magnetic and ancillary data are then processed at the field base to the point that the quality of the data from each flight can be fully assessed. Copies of the raw and processed data are then transferred to Perth for final data processing. A more comprehensive statement of EM data processing is given in section 6.2.3.

## *6.2* Final Data Processing

### 6.2.1 Magnetics

Magnetic data were compensated for aircraft manoeuvre noise using coefficients derived from the appropriate compensation flight. Base station data is edited so that all significant spikes, level shifts and null data are eliminated.

A diurnal base value was then added.

| Area | Base Value |
|---|---|
| All areas | 46350 nT |

A lag was applied to synchronise the magnetic data with the navigation data (see section 6.2.5.2).

The International Geomagnetic Reference Field (IGRF) 2005 model (updated for secular variation 2006.5) was removed from the levelled total field magnetics. An IGRF base value was then added to the data.

| Area | Base Value |
|---|---|
| All areas | 46139 nT |

### 6.2.2 Derived Topography

Aircraft navigation whilst in survey mode is via real time differential GPS, obtained by combining broadcast differential corrections with on-board GPS measurements. Terrain clearance is measured with a radar altimeter.

The ground elevation, relative to the WGS84 spheroid used by GPS receiver units, is obtained by subtracting the terrain clearance from the aircraft altitude, noting the vertical separation between the GPS antenna and the radar altimeter, and applying suitable parallax corrections between the two measurements (see section 6.2.3.2).

The digital elevation model derived from this survey can be expected to have an absolute accuracy of +/- several metres in areas of low to moderate topographic relief. Sources of error include uncertainty in the location of the GPS base station, variations in the radar altimeter characteristics over ground of varying surface texture, and the finite footprint of the radar altimeter.

The accuracy of the elevation calculation is directly dependent on the accuracy of the two input parameters, radar altitude and GPS altitude. The radar altitude value may be erroneous in areas of heavy tree cover, where the altimeter reflects the distance to the tree canopy rather than the ground. The GPS altitude value is primarily dependent on the number of available satellites. Although post-processing of GPS data will yield X and Y accuracies in the order of 1-2 metres, the accuracy of the altitude value is usually much less, sometimes in the ±5 metre range. Further inaccuracies may be introduced during the interpolation and gridding process.

Because of the inherent inaccuracies of this method, no guarantee is made or implied that the information displayed is a true representation of the height above sea level. Although this product may be of some use as a general reference, THIS PRODUCT MUST NOT BE USED FOR NAVIGATION PURPOSES.

### 6.2.3 Electromagnetic Data Processing

Details of the pre-processing applied to TEMPEST data can be found in Lane et al. (2000).

#### 6.2.3.1 Standard EM Processing

**Calibration**
High altitude calibration data are used to characterise the system response in the absence of any ground response.

**Cleaning and Stacking**
Routines to suppress sferic noise, powerline noise, VLF noise, coil motion noise (collectively termed “cleaning”) and to stack the data are applied to the survey line data. Output from the stacking filter is drawn at 0.2 second intervals. The stacked data are saved to file as an internal data management practice.

**Deconvolution and Binning**
The survey height stacked data are deconvolved using the high altitude reference waveform. The effect of currents in the transmitter loop and airframe (“primary”) are then removed, leaving a “pure” ground response. The deconvolved ground response data are then transformed to B-field response for a perfect 100% duty cycle square wave. Finally, the evenly spaced samples are binned into a number of windows.

**Table of TEMPEST window information for 25Hz base frequency**

| Window # | Start sample | End sample | No of samples | start time (s) | End time (s) | centre time (s) | centre time (ms) |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 2 | 2 | 0.000007 | 0.000020 | 0.000013 | 0.013 |
| 2 | 3 | 4 | 2 | 0.000033 | 0.000047 | 0.000040 | 0.040 |
| 3 | 5 | 6 | 2 | 0.000060 | 0.000073 | 0.000067 | 0.067 |
| 4 | 7 | 10 | 4 | 0.000087 | 0.000127 | 0.000107 | 0.107 |
| 5 | 11 | 16 | 6 | 0.000140 | 0.000207 | 0.000173 | 0.173 |
| 6 | 17 | 26 | 10 | 0.000220 | 0.000340 | 0.000280 | 0.280 |
| 7 | 27 | 42 | 16 | 0.000353 | 0.000553 | 0.000453 | 0.453 |
| 8 | 43 | 66 | 24 | 0.000567 | 0.000873 | 0.000720 | 0.720 |
| 9 | 67 | 102 | 36 | 0.000887 | 0.001353 | 0.001120 | 1.120 |
| 10 | 103 | 158 | 56 | 0.001367 | 0.002100 | 0.001733 | 1.733 |
| 11 | 159 | 246 | 88 | 0.002113 | 0.003273 | 0.002693 | 2.693 |
| 12 | 247 | 384 | 138 | 0.003287 | 0.005113 | 0.004200 | 4.200 |
| 13 | 385 | 600 | 216 | 0.005127 | 0.007993 | 0.006560 | 6.560 |
| 14 | 601 | 930 | 330 | 0.008007 | 0.012393 | 0.010200 | 10.200 |
| 15 | 931 | 1500 | 570 | 0.012407 | 0.019993 | 0.016200 | 16.200 |

The data are reviewed after windowing. Any decisions involving re-flights due to AEM factors are made at this point.

**Raw and Final EM Data**
The “raw” or “uncorrected” EM amplitudes reflect, not only the variations in ground conductivity, but the variations in geometry of the various parts of the EM measurements (i.e. transmitter loop pitch, transmitter loop roll, transmitter loop terrain clearance, transmitter loop to receiver coil horizontal longitudinal separation, transmitter loop to receiver coil horizontal transverse separation, and transmitter loop to receiver coil vertical separation) during the survey. For example, the largest influence on the early time EM amplitude is the terrain clearance of the transmitter loop. The larger the terrain clearance, the smaller the amplitude. Later window times (larger window number) show diminished variations due to terrain clearance.

“Final” or “geometry-corrected” located data are produced for optimum presentation of the EM amplitude data in image format (e.g. window amplitude images, principal component analysis images derived from the window amplitudes (Green,1998b)). Between “raw” and “final” states, the ground response data undergo an approximate correction to produce data from a nominated standard geometry. A dipole-image method (Green, 1998a) is used to adjust the data to the response that would be expected at a standard terrain clearance (120m), standard transmitter loop pitch and roll (zero degrees), and a standard transmitter loop to receiver coil geometry (120m behind and 35m below the aircraft). These variables have been set to their respective standard values in the “final” located data (whereas the “raw” located data file contains the variable field data). Zero parallax is applied to transmitter loop pitch, roll, terrain clearance, X component EM and Z component EM data prior to geometry correction. Over extremely conductive ground (e.g. > 100 S conductance), the estimates for transmitter loop to receiver coil separation determined from the primary field coupling factors may be in error at the metre scale due to uncertainty in the estimation of the primary field. This will influence the accuracy of very early time window amplitude information in the “geometry-corrected” located data. Receiver coil pitch has a significant effect on early time Z component response and late time X component response (Green and Lin, 1996). Receiver coil roll impacts early time Z component response.

**Levelling**
Limited range micro-levelling may be applied to the final window amplitudes for presentation purposes, principally for multi-flight surveys or when isolated re-flight lines are present.

#### 6.2.3.2 Factors and Corrections

**Geometric Factor**
The geometric factor gives the ratio of the strength of the primary field coupling between the transmitter loop and the receiver coil at each observation relative to the coupling observed at high altitude during acquisition of reference waveform data. Variations in this factor indicate a change in the attitude and/or relative separation of the transmitter loop and the receiver coil.

**Transmitter-Receiver Geometry**
Transmitter to receiver geometry values for each observation are derived from the high altitude reference waveforms and knowledge of the system characteristics. These data are available in the located data (see section 6.2.6.1 for "standardised" values)

**GPS Antenna, Laser Altimeter and Transmitter Loop Offset Corrections**
The transmitter loop was mounted 0.1m above the GPS antenna on the aircraft. The GPS antenna is 2.3m above the belly of the aircraft. The laser altimeter sensor is mounted in the belly of the aircraft. Therefore a total of 2.4m (0.1m + 2.3m) was added to the laser altimeter data to determine the transmitter loop height above the ground.

**Transmitter Loop Pitch and Roll Correction**
Measured vertical gyro aircraft pitch and roll attitude measurements are converted to transmitter loop pitch and roll by adding -0.9 degrees for pitch and -0.1 degrees for roll. Nose up is positive for pitch, and left wing up is positive for roll.

#### 6.2.3.3 Primary Sources of EM Noise

A number of "monitor" values are calculated during processing to assist with interpretation. They generally represent quantities that have been removed as far as is practical from the data, but may still be present in trace amounts. These are more significant for interpretation of discrete conductors than for general mapping applications.

**Sferic Monitor**
Sferics are the electromagnetic signals associated with lightning activity. These signals travel large distances around the Earth. Background levels of sferics are recorded at all times from lightning activity in tropical areas of the world (eg tropical parts of Asia, South America and Africa). Additional higher amplitude signals are produced by "local" lightning activity (ie at distances of kilometres to hundreds of kilometres).

The sferic monitor is the sum of the absolute differences brought about by the sferic filter operations, summed over 0.2 second intervals, normalised by the receiver effective area. It is given in units of uV/sq.m/0.2s. Many sferics have a characteristic form that is well illustrated by figure 2 in Garner and Thiel (2000). The high frequency, initial part of a sferic event can be detected and filtered more easily than the later, low frequency portion. The sferic monitor indicates where at least the high frequency portion of a sferic has been successfully removed, but it is quite possible that lower frequency elements of the sferic event may have eluded detection, passing through to the window amplitude data. Thus, discrete anomalies coincident with sferic activity as indicated by the sferic monitor should be down-weighted relative to features clear of any sign of sferic activity.

**Low Frequency Monitor**
The Low Frequency Monitor (LFM) makes use of amplitudes at frequencies below the base frequency which are present in the streamed data to estimate the amplitude of coil motion (Earth magnetic field) noise at the base frequency in log10(pV/sqrt(Hz)/sq.m). The coil motion noise below the base frequency is rejected through the use of tapered stacking, but the coil motion noise at the base frequency itself is not easily removed. A sharp spike in the LFM can be an indicator of a coil motion event (eg the bird passing through extremely turbulent air). Note that the LFM will also respond to sferic events with an appreciable low frequency (sub-base frequency) component. This situation can be inferred when both the LFM and sferic monitors show a discrete kick.

**Powerline Monitor**

The powerline monitor gives the amplitude of the received signal at the powerline frequency (50 or 60 Hz) in log10(pV/sqrt(Hz)/sq.m). Careful selection of the base frequency (such that the powerline frequency is an even harmonic of the base frequency) and tapered stacking combine to strongly attenuate powerline signals. When passing directly over a powerline, the rapid lateral variations in the strength and direction of the magnetic fields associated with the powerline can result in imperfect cancellation of the powerline response during stacking. Some powerline-related interference can manifest itself in a form that is similar to the response of a discrete conductor. The exact form of the monitor profile over a powerline depends on the line direction, powerline direction, powerline current, and receiver component, but the monitor will show a general increase in amplitude approaching the powerline.

Grids (or images) of the powerline monitor reveal the location of the transmission lines. Note that the X component (horizontal receiver coil axis parallel with the flight line direction) does not register any response from powerlines parallel to the flight line direction since the magnetic fields associated with powerlines only vary in a direction perpendicular to the powerline. Note also that the Z component (vertical receiver coil axis) shows a narrow low directly over the powerline where the magnetic fields are purely horizontal.

**Very Low Frequency Monitors**

Wide area VLF communication signals in the 15 to 25 kHz frequency band are monitored by the TEMPEST system. In the Australian region, signals at 18.2 kHz, 19.8 kHz, 21.4 kHz and 22.2 kHz are monitored as the amplitude of the received signal at these frequencies in log10(pV/sqrt(Hz)/sq.m). The strongest signal comes from North West Cape (19.8 kHz). The signal at 18.2 kHz is often observed to pulse in a regular sequence. These strong narrow band signals have some impact on the high frequency response of the system, but they are strongly attenuated by selection of the base frequency and tapered stacking. The VLF transmissions are strongest in amplitude, in the horizontal direction at right angles to the direction to the VLF transmitter. This directional dependence enables the VLF monitors to be used to indicate the receiver coil attitude.

#### 6.2.3.4 Other Sources of EM Noise

**Man-made periodic discharges**

If an image of the Z component sferic monitor shows the presence of spatially coherent events, then pulsed cultural interference would be strongly suspected. Since sferic signals are much stronger in the horizontal plane than in the vertical plane, few sferics of significant amplitude are recorded in Z component data. In contrast, evidence of cultural interference is generally swamped by true sferics in X component sferic monitor images.

Electric fences are the most common source of pulsed cultural interference. Periodic discharges (eg every second or so) into a large wire loop (fence) produce very large spikes in raw data. These are attenuated to a large degree by the sferic filter, but a residual artefact can still be present in the processed data.

**Coil motion / Earth field noise**

A change in coupling between the receiver coil and the ambient magnetic field will induce a voltage in the receiver coil. This noise is referred to as coil motion or Earth field noise. Receiver coils in the towed bird are suspended in a fashion that attempts to keep this noise below the noise floor at frequencies equal to and above the base frequency of the system. Severe turbulence, however, can result in ‘coil knock events’ that introduce noise into the processed data.

**Grounded metal objects**

Grounded extensive metal objects such as pipelines and rail lines can qualify as conductors and may produce a response that is visible in processed data. Grounded metal objects produce a response similar to shallow, highly conductive, steeply dipping conductors. These objects can sometimes be identified from good quality topographic maps, from aerial photographs, by viewing the tracking video, from their unusual spatial distribution (ie often a series of linear segments) and in some circumstances from their effect on the powerline monitor. A powerline running close to a long metal object will induce a 50 Hz response in the object.

### 6.2.4 Conductivity Depth Images (CDI)

CDI conductivity sections for TEMPEST data were calculated using EMFlow and then modified to reflect the finite depth of investigation using an in-house routine, *Sigtime*.

The *Sigtime* routine removes many of the spurious conductive features that appear at depth as a result of fitting long time constant exponential decays to very small amplitude features in the late times. For each observation, the time when the response falls below a signal threshold amplitude is determined. This time is transformed into a diffusion depth with reference to the conductivity values determined for that observation. Anomalous conductivity values below this depth are replaced by background values or set to undefined, reflecting the uncertainty in their origin. The settings and options applied are indicated in the appropriate header files for *Sigtime* output. This procedure is different to that which would be obtained by filtering conductivity values using either a constant time or constant depth across the entire line.

The “raw” (ie. uncorrected) data for each area were input into version 5.10 of EMFlow to calculate Conductivity Depth Images (CDI). Conductivity values were calculated to a depth of 500m below surface at each point, using a depth increment of 5m, then run through *Sigtime.* This processing was completed for both the X and the Z component data.

EMFlow was developed within the CRC-AMET through AMIRA research projects (Macnae et al, 1998, Macnae and Zonghou, 1998, Stolz and Macnae, 1998). The software has been commercialised by Encom Technology Pty Ltd. Examples of TEMPEST conductivity data can be seen in Lane et al. (2000), Lane et al. (1999), and Lane and Pracillio (2000).

### 6.2.5 System Specifications for Modelling TEMPEST Data

Differences between the specifications for the acquisition system, and those of the virtual system for which processed results are given, must be kept in mind when forward modelling, transforming or inverting TEMPEST data.

Acquisition is carried out with a 50% duty cycle square transmitter current waveform and dB/dt sensors.

During processing, TEMPEST EM data are transformed to the response that would be obtained with a B-field sensor for a 100% duty cycle square waveform at the base frequency, involving a 1A change in current (from -0.5A to +0.5A to -0.5A) in a 1sq.m transmitter. Data are given in units of femtotesla (fT = $10^{-15}$ Tesla). It is this configuration, rather than the actual acquisition configuration, which must be specified when modelling TEMPEST data.

Window timing information is given above (see section 6.2.3).

#### 6.2.5.1 Standard Height and Geometry

The “final” EM data have been standardised through an approximate transformation to a standard transmitter loop terrain clearance, transmitter loop pitch and roll of zero degrees, and a fixed transmitter loop to receiver coil geometry (roughly equal to the average “raw” geometry values). Transmitter loop pitch, transmitter loop roll and transmitter loop terrain clearance values for each observation have been modified to reflect the standard values. Hence, the “final” (fixed) geometry values should be used if modelling with the final X- and Z-component amplitude data - the following table summarises the values used to correct the transmitter height/pitch/roll/geometry to.

**Table of values used to standardise transmitter loop height, pitch, roll and geometry**

| Variable | Standardised value |
|---|---|
| Transmitter loop pitch | 0 degrees |
| Transmitter loop roll | 0 degrees |
| Transmitter loop terrain clearance | 120 metres |
| Transmitter loop – to – receiver coil geometry | Area 1: 125m behind and 35m below the aircraft |
| “ “ “ “ “ “ | Areas 2-5: 120m behind and 35m below the aircraft |

### 6.2.5.2 Parallax

The located data files utilise the following parallax values :-

- magnetics = 0.6 fiducials (3 observations from the zero parallax position),
- radar altimeter = 0.6 fiducials (3 observations from the zero parallax position),
- EM X-component = 0.2 fiducials (1 observation from the zero parallax position),
- EM Z-component = 1.4 fiducials (7 observations from the zero parallax position),

These EM parallax values are optimised for aligning the EM response amplitudes for horizontal or broad steeply dipping conductors, which account for the majority of responses in regolith-dominated terrains such as this.

(NB Positive parallax values are defined in this case as shifting the indicated quantity back along line to smaller fiducial values. Location information remains in the zero parallax state.)

### 6.2.6 Delivered Products

Appendix V contains a complete list of all data supplied digitally.

Digital ascii located data in flat ascii format and Geosoft GDB format files were produced, containing the raw and final, X and Z EM amplitude & conductivity data as well as magnetics and digital elevation. The header files can be found in Appendix IV.

Stacked CDI sections and CDI-multiplots (of EM X and Z-component) were produced and delivered as hardcopy plots and digital png images and hpg plotfiles.

ER-mapper grids of DTM, X & Z EM window amplitudes and X & Z time constants were also supplied.

A flight path map was also produced and delivered as a digital png image and prn plotfile.

Acquisition and processing report in hardcopy and digital pdf format.

### 6.2.7 Comments on Processing this Survey

As with previous surveys in the area, it was deemed advantageous to use the “raw” EM data (see section 6.2.3 for explanation) rather than the “final” EM data. Appendix VI displays the contents of the Emflow *descriptor* (.dsc) files. The tau range used was 0.002ms to 10ms, and the conductivity range chosen was 0.1mS/m to 100mS/m. A transmitter-receiver offset of (120, 35) was used for all areas except area 1 (Nabarlek West) where an offset of (125,35) meters was used in correcting the EM data for transmitter height/pitch/roll and geometry variations.

The Sigtime (see section 6.2.4) parameters were set differently for the X and Z-component data (due to their differing coupling strengths): the *depth factor* being 0.8 for the X-component EM data and 0.5 for the Z-component EM data.

Time constant data were plotted as profiles on the CDI-multiplots too (this is a recent addition).

# REFERENCES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Lane, R., Pracilio, G., 2000: Visualisation of sub-surface conductivity derived from airborne EM, SAGEEP 2000, 101-111.

# APPENDIX I – Flight Plans

## AREA 1 – NABARLEK WEST

```
JOB_Number  1788                                                                    *
CLIENT      Cameco                                                                  *
AREA_NAME   Nabarlek West                                                           *
PLANNED_BY  gps2                                                                    *
|                                                                                   *
SPHEROID    22  W.G.S_1984 6378137.0 298.257223563 0.9996                           *
DELTAXYZ    0.0 0.0 0.0 0.0 0.0 0.0 0.0                                             *
HEMISPHERE  SOUTH                                                                   *
UTM_ORIGIN  53   135   135                                                          *
BOUNDARY    1   301945  8640197 -12.294621 +133.178904 -121740.6 +1331044.1 12 *
BOUNDARY    2   298175  8640296 -12.293494 +133.144263 -121736.6 +1330839.3 12 *
BOUNDARY    3   298293  8645789 -12.243853 +133.145699 -121437.9 +1330844.5 12 *
BOUNDARY    4   306086  8645450 -12.247391 +133.217288 -121450.6 +1331302.2 12 *
BOUNDARY    5   305793  8642431 -12.274662 +133.214413 -121628.8 +1331251.9 12 *
BOUNDARY    6   311975  8642679 -12.272785 +133.271249 -121622.0 +1331616.5 12 *
BOUNDARY    7   311975  8637292 -12.321478 +133.270931 -121917.3 +1331615.4 12 *
BOUNDARY    8   301980  8637292 -12.320880 +133.179046 -121915.2 +1331044.6 12 *
SQUARE_KMS  84.973                                                                  *
|                                                                                   *
NAVTYPE     NOVATEL                                                                 *
NAVMODE     U.T.M                                                                   *
PLAN_TYPE   Normal                                                                  *
LINE_TYPE   S.LINE    X.LINE    0         0                                         *
HEADING     90        180                                                           *
SPACING     200       1930      200       200                                       *
OVER_LINE   1         1                                                             *
OVERFLY     0         0                                                             *
MIN_LENGTH  2         2                                                             *
FIRST_LINE  10        10                                                            *
INCREMENT   1         1                                                             *
X_TRACK     100       100                                                           *
MASTER_PT   1   301945  8640197 -12.294621 +133.178904                              *
MASTER_NEW  0  Not implemented.                                                     *
KM_IN_AREA  407       33                                                            *
KM+OVERFLY  407       33                                                            *
```

## AREA 2 – NABARLEK MAIN

```
JOB_Number  1788                                                                    *
CLIENT      Cameco                                                                  *
AREA_NAME   Nabarlek Main                                                           *
PLANNED_BY  gps2                                                                    *
|                                                                                   *
SPHEROID    22  W.G.S_1984 6378137.0 298.257223563 0.9996                           *
DELTAXYZ    0.0 0.0 0.0 0.0 0.0 0.0 0.0                                             *
HEMISPHERE  SOUTH                                                                   *
UTM_ORIGIN  53   135   135                                                          *
BOUNDARY    1   333867  8637332 -12.322317 +133.472198 -121920.3 +1332819.9 12 *
BOUNDARY    2   337741  8637332 -12.322514 +133.507813 -121921.1 +1333028.1 12 *
BOUNDARY    3   337655  8635603 -12.338140 +133.506934 -122017.3 +1333025.0 12 *
BOUNDARY    4   333509  8635635 -12.337639 +133.468818 -122015.5 +1332807.7 12 *
BOUNDARY    5   317218  8635620 -12.336893 +133.319033 -122012.8 +1331908.5 12 *
BOUNDARY    6   317260  8638424 -12.311549 +133.319582 -121841.6 +1331910.5 12 *
BOUNDARY    7   320306  8638429 -12.311674 +133.347583 -121842.0 +1332051.3 12 *
BOUNDARY    8   320276  8645612 -12.246743 +133.347712 -121448.3 +1332051.8 12 *
BOUNDARY    9   333778  8645488 -12.248582 +133.471806 -121454.9 +1332818.5 12 *
SQUARE_KMS  149.448                                                                 *
|                                                                                   *
NAVTYPE     NOVATEL                                                                 *
NAVMODE     U.T.M                                                                   *
PLAN_TYPE   Normal                                                                  *
LINE_TYPE   S.LINE    X.LINE    0         0                                         *
HEADING     90        180                                                           *
```

```
SPACING     200       1900      200       200                                          *
OVER_LINE   1         1                                                                *
OVERFLY     0         0                                                                *
MIN_LENGTH  2         2                                                                *
FIRST_LINE  10        10                                                               *
INCREMENT   1         1                                                                *
X_TRACK     100       100                                                              *
MASTER_PT   1   333867  8637332 -12.322317 +133.472198                                 *
MASTER_NEW  0  Not implemented.                                                        *
KM_IN_AREA  754       69                                                               *
KM+OVERFLY  754       69                                                               *
```

## AREA 3 – NABARLEK EAST

```
JOB_Number  1788                                                                       *
CLIENT      Cameco                                                                     *
AREA_NAME   Nabarlek East                                                              *
PLANNED_BY  gps2                                                                       *
|                                                                                      *
SPHEROID    22  W.G.S_1984 6378137.0 298.257223563 0.9996                              *
DELTAXYZ    0.0 0.0 0.0 0.0 0.0 0.0 0.0                                                *
HEMISPHERE  SOUTH                                                                      *
UTM_ORIGIN  53   135   135                                                             *
BOUNDARY    1   333243  8645488 -12.248555 +133.466887 -121454.8 +1332800.8 12 *
BOUNDARY    2   346192  8645534 -12.248778 +133.585912 -121455.6 +1333509.3 12 *
BOUNDARY    3   346192  8635665 -12.337998 +133.585435 -122016.8 +1333507.6 12 *
BOUNDARY    4   341236  8635665 -12.337758 +133.539863 -122015.9 +1333223.5 12 *
BOUNDARY    5   341248  8633743 -12.355134 +133.539877 -122118.5 +1333223.6 12 *
BOUNDARY    6   333243  8633765 -12.354530 +133.466273 -122116.3 +1332758.6 12 *
BOUNDARY    7   333243  8635904 -12.335194 +133.466385 -122006.7 +1332759.0 12 *
SQUARE_KMS  142.781                                                                    *
|                                                                                      *
NAVTYPE     NOVATEL                                                                    *
NAVMODE     U.T.M                                                                      *
PLAN_TYPE   Normal                                                                     *
LINE_TYPE   S.LINE    X.LINE    0         0                                            *
HEADING     0         90                                                               *
SPACING     200       1900      200       200                                          *
OVER_LINE   1         1                                                                *
OVERFLY     0         0                                                                *
MIN_LENGTH  2         2                                                                *
FIRST_LINE  10        10                                                               *
INCREMENT   1         1                                                                *
X_TRACK     100       100                                                              *
MASTER_PT   1   333243  8645488 -12.248555 +133.466887                                 *
MASTER_NEW  0  Not implemented.                                                        *
KM_IN_AREA  707       39                                                               *
KM+OVERFLY  707       39                                                               *
```

## AREA 4 – MURALIDBAR

```
JOB_Number  1788                                                                       *
CLIENT      Cameco                                                                     *
AREA_NAME   Muralidbar                                                                 *
PLANNED_BY  gps2                                                                       *
|                                                                                      *
SPHEROID    22  W.G.S_1984 6378137.0 298.257223563 0.9996                              *
DELTAXYZ    0.0 0.0 0.0 0.0 0.0 0.0 0.0                                                *
HEMISPHERE  SOUTH                                                                      *
UTM_ORIGIN  53   135   135                                                             *
BOUNDARY    1   333002  8636724 -12.327769 +133.464210 -121940.0 +1332751.2 12 *
BOUNDARY    2   345450  8636842 -12.327322 +133.578668 -121938.4 +1333443.2 12 *
BOUNDARY    3   345552  8639463 -12.303632 +133.579734 -121813.1 +1333447.0 12 *
BOUNDARY    4   348362  8639477 -12.303638 +133.605568 -121813.1 +1333620.0 12 *
BOUNDARY    5   354102  8645965 -12.245246 +133.658638 -121442.9 +1333931.1 12 *
BOUNDARY    6   364532  8645911 -12.246186 +133.754512 -121446.3 +1334516.2 12 *
BOUNDARY    7   364509  8640073 -12.298967 +133.754056 -121756.3 +1334514.6 12 *
BOUNDARY    8   362495  8640007 -12.299479 +133.735532 -121758.1 +1334407.9 12 *
BOUNDARY    9   362493  8634998 -12.344765 +133.735297 -122041.2 +1334407.1 12 *
BOUNDARY   10   333054  8634536 -12.347551 +133.464579 -122051.2 +1332752.5 12 *
SQUARE_KMS  189.968                                                                    *
```

```
|                                                                             *
NAVTYPE     NOVATEL                                                           *
NAVMODE     U.T.M                                                             *
PLAN_TYPE   Normal                                                            *
LINE_TYPE   S.LINE    X.LINE    0         0                                   *
HEADING     89        179                                                     *
SPACING     200       2000      200       200                                 *
OVER_LINE   1         1                                                       *
OVERFLY     0         0                                                       *
MIN_LENGTH  2         2                                                       *
FIRST_LINE  10        10                                                      *
INCREMENT   1         1                                                       *
X_TRACK     100       100                                                     *
MASTER_PT   1   333002  8636724 -12.327769 +133.464210                        *
MASTER_NEW  0  Not implemented.                                               *
KM_IN_AREA  946       64                                                      *
KM+OVERFLY  946       64                                                      *
```

**AREA 5 – PLATEAU**

```
JOB_Number  1788                                                              *
CLIENT      Cameco                                                            *
AREA_NAME   Plateau                                                           *
PLANNED_BY  gps2                                                              *
|                                                                             *
SPHEROID    22  W.G.S_1984 6378137.0 298.257223563 0.9996                     *
DELTAXYZ    0.0 0.0 0.0 0.0 0.0 0.0 0.0                                       *
HEMISPHERE  SOUTH                                                             *
UTM_ORIGIN  53   135   135                                                    *
BOUNDARY    1   328583  8591359 -12.737618 +133.421091 -124415.4 +1332515.9 12 *
BOUNDARY    2   322155  8591379 -12.737077 +133.361896 -124413.5 +1332142.8 12 *
BOUNDARY    3   322145  8593171 -12.720878 +133.361908 -124315.2 +1332142.9 12 *
BOUNDARY    4   320398  8593189 -12.720616 +133.345827 -124314.2 +1332045.0 12 *
BOUNDARY    5   320302  8598690 -12.670886 +133.345266 -124015.2 +1332043.0 12 *
BOUNDARY    6   318535  8598679 -12.670884 +133.328997 -124015.2 +1331944.4 12 *
BOUNDARY    7   318473  8608368 -12.583300 +133.328996 -123459.9 +1331944.4 12 *
BOUNDARY    8   318459  8610662 -12.562564 +133.329004 -123345.2 +1331944.4 12 *
BOUNDARY    9   322210  8610842 -12.561150 +133.363530 -123340.1 +1332148.7 12 *
BOUNDARY   10   322199  8612704 -12.544318 +133.363534 -123239.5 +1332148.7 12 *
BOUNDARY   11   323802  8612723 -12.544235 +133.378286 -123239.2 +1332241.8 12 *
BOUNDARY   12   323831  8623636 -12.445590 +133.379167 -122644.1 +1332245.0 12 *
BOUNDARY   13   328268  8623635 -12.445840 +133.419975 -122645.0 +1332511.9 12 *
BOUNDARY   14   328468  8608432 -12.583280 +133.420980 -123459.8 +1332515.5 12 *
SQUARE_KMS  239.005                                                           *
|                                                                             *
NAVTYPE     NOVATEL                                                           *
NAVMODE     U.T.M                                                             *
PLAN_TYPE   Normal                                                            *
LINE_TYPE   S.LINE    X.LINE    0         0                                   *
HEADING     0         90                                                      *
SPACING     200       1800      200       200                                 *
OVER_LINE   1         1                                                       *
OVERFLY     0         0                                                       *
MIN_LENGTH  2         2                                                       *
FIRST_LINE  10        10                                                      *
INCREMENT   1         1                                                       *
X_TRACK     100       100                                                     *
MASTER_PT   1   328583  8591359 -12.737618 +133.421091                        *
MASTER_NEW  0  Not implemented.                                               *
KM_IN_AREA  1182      49                                                      *
KM+OVERFLY  1182      49                                                      *
```

# APPENDIX II – Weekly Acquisition Reports

Week Commencing: **Monday 12-Jun-06**
Job Number: 1788
Total km: 4250.0

Aircraft: VH-TEM
Base: Jabiru
Country: Australia
Area Name: Jabiru

Operators: A.C, S.M
Data Proc: Glen Gooch
Crew Leader: Andrew Carpenter
Accom: Aurora Kakadu

Pilots: T.H, M.C
Techs: A.C, S.M
Client: Cameco
Contact #: A.C 08 879 0166 Room 52

| Date | | Flight | Crew | | Time | | M/R | Oil | | Fuel | This Flight | | To Date | | Standby | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number | Plt(s) | Op | T/O | Land | Hrs | L | R | Burn | Prod | Refly | Prod | Refly | (0, 0.5, 1) | |
| Monday | 12-Jun-06 | | | | | | | | | | | | | | | Weather: |
| | | | | | | | | | | | | | | | | Remarks: |
| Julian | 11-Jun-00 | | | | | | | | | | | | | | | |
| Day | 1 | | | | Hours Today | | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | | Safety Meeting: |
| Tuesday | 13-Jun-06 | | | | | | | | | | | | | | | Weather: |
| | | | | | | | | | | | | | | | | Remarks: |
| Julian | 164 | | | | | | | | | | | | | | | |
| Day | 2 | | | | Hours Today | | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | | Safety Meeting: |
| Wednesday | 14-Jun-06 | | | | | | | | | | | | | | | Weather: |
| | | | | | | | | | | | | | | | | Remarks: |
| Julian | 165 | | | | | | | | | | | | | | | |
| Day | 3 | | | | Hours Today | | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | | Safety Meeting: |
| Thursday | 15-Jun-06 | 1 | T.H, M.C | A.C | 7:48 | 10:26 | 2.6 | | | 3870 | | | | | | Weather:Warm and Humid |
| | | | | | | | | | | | | | | | | Remarks:Comp Box, Check Box, Rad Alt Cals and Repeat Line Completed |
| Julian | 166 | | | | | | | | | | | | | | | |
| Day | 4 | | | | Hours Today | | 2.6 | | | | 0.0 | 0.0 | 0.0 | 0.0 | | Safety Meeting:Please see meeting minutes |
| Friday | 16-Jun-06 | | | | | | | | | | | | | | 1.0 | Weather: |
| | | | | | | | | | | | | | | | | Remarks:Stand Down due to lack of fuel, Pilots day off. |
| Julian | 167 | | | | | | | | | | | | | | | |
| Day | 5 | | | | Hours Today | | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | | Safety Meeting: No new issues |
| Saturday | 17-Jun-06 | 2 | T.H, M.C | A.C | 6:20 | 10:25 | 4.1 | | | 1555 | | | | | | Weather: Warm, Humid |
| | | | | | | | | | | | | | | | | Remarks: Good production (526 line KM's) achieved despite some severe turbulence. |
| Julian | 168 | | | | | | | | | | | | | | | Entire flight scrubbed due to high noise threshold in Z coil AC and SM to fix. |
| Day | 6 | | | | Hours Today | | 4.1 | | | | 0.0 | 0.0 | 0.0 | 0.0 | | Safety Meeting: No new issues |
| Sunday | 18-Jun-06 | 3 | T.H, M.C | A.C | 8:30 | 9:25 | 0.9 | | | 345 | | | | | | Weather:Fine, Humid |
| | | | | | | | | | | | | | | | | Remarks: The bird is working however the fix is only temporary. AC to contact |
| Julian | 169 | | | | | | | | | | | | | | | Chris golding in regards to urgent spare requirements |
| Day | 7 | | | | Hours Today | | 0.9 | | | | 0.0 | 0.0 | 0.0 | 0.0 | | Safety Meeting: Please see safety meeting minutes |
| Total Job Hours | | 7.6 | Weekly Totals | | | | 7.6 | 0 | 0 | 5769 | 0.0 | 0.0 | | | 1.0 | |
| | | | Total Aircraft Hours | | | | | Ltrs/Hr | | 756 | | | Total Standby | | 1.0 | |
| | | | Hours to Next Periodic | | | | 80 | Running Avg | | | 0.0 km/day | | % Complete | | 0.0 | |
| | | | Anticipated Hours Next week | | | | | | | | 0.0 km/hr | | km Remaining | | 4250.0 km | |

Week Commencing: **Monday 19-Jun-06**
Job Number: 1788
Total km: 4250

Aircraft: VH-TEM
Base: Jabiru
Country: Australia
Area Name: Jabiru

Operators: A.C, S.M
Data Proc: Glen Gooch
Crew Leader: Andrew Carpenter
Accom: Aurora Kakadu

Pilots: T.H, M.C
Techs: A.C, S.M
Client: Cameco
Contact #: A.C 08 879 0166 Room 52

| Date | | Flight | Crew | | Time | | M/R | Oil | | Fuel | This Flight | | To Date | | Standby | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number | Plt(s) | Op | T/O | Land | Hrs | L | R | Burn | Prod | Refly | Prod | Refly | (0, 0.5, 1) | |
| Monday | 19-Jun-06 | 4 | T.H, M.C | A.C,S.M | 6:34 | 9:05 | 2.5 | | | 996 | | | | | | Weather:Fine but Turbulent |
| | | | | | | | | | | | | | | | | Remarks:Production of 266.1km lost due to poor Bird Performance. |
| Julian | 170 | | | | | | | | | | | | | | | S.M and A.C to rectify by replacing tow loom and various connectors. |
| Day | 8 | | | | Hours Today | | 2.5 | | | | 0.0 | 0.0 | 0.0 | 0.0 | | Safety Meeting:No New Issues |
| Tuesday | 20-Jun-06 | | | | | | | | | | | | | | 1.0 | Weather:Warm humid |
| | | | | | | | | | | | | | | | | Remarks:Standby |
| Julian | 171 | | | | | | | | | | | | | | | |
| Day | 9 | | | | Hours Today | | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | | Safety Meeting:No new issues |
| Wednesday | 21-Jun-06 | | | | | | | | | | | | | | | Weather:Warm, Humid |
| | | | | | | | | | | | | | | | 1.0 | Remarks:Standby |
| Julian | 172 | | | | | | | | | | | | | | | S.M, A.C performing repaairs to system including replacement of the tow cable |
| Day | 10 | | | | Hours Today | | 0.0 | | | | 0.0 | 0.0 | 0.0 | 0.0 | | Safety Meeting: No new issues. |
| Thursday | 22-Jun-06 | 5 | T.H, M.C | A.C,S.M | 6:26 | 7:36 | 1.2 | | | 328 | | | | | | Weather:Warm, Humid Gusty Wind |
| | | 6 | T.H, M.C | A.C,S.M | 9:15 | 10:20 | 1.5 | | | 589 | 64.6 | | | | | Remarks:FLT 005 test flight all ok |
| Julian | 173 | | | | | | | | | | | | | | | FLT 006 short flight due to turbulence, 53.4kms scrubed due to coil knocks. |
| Day | 11 | | | | Hours Today | | 2.7 | | | | 64.6 | 0.0 | 64.6 | 0.0 | | Safety Meeting:No new issues |
| Friday | 23-Jun-06 | 7 | T.H, M.C | S.M | 6:35 | | -6.6 | | | | 452.9 | | | | | Weather:Fine Some Cloud |
| | | 8 | T.H, M.C | S.M | 15:00 | | -15.0 | | | | 186.7 | | | | | Remarks: Scott Miller operating, AC in Darwin to pick up spares. |
| Julian | 174 | | | | | | | | | | | | | | | System operating well. |
| Day | 12 | | | | Hours Today | | -21.6 | | | | 639.6 | 0.0 | 704.2 | 0.0 | | Safety Meeting: No new issues. |
| Saturday | 24-Jun-06 | 9 | T.H, M.C | A.C | 6:27 | 10:40 | 4.2 | | | 1589 | 452.9 | | | | | Weather:Fine Some Cloud |
| | | | | | | | | | | | | | | | | Remarks: AC operating, S.M demobing to Perth via Darwin |
| Julian | 175 | | | | | | | | | | | | | | | |
| Day | 13 | | | | Hours Today | | 4.2 | | | | 452.9 | 0.0 | 1157.1 | 0.0 | | Safety Meeting: No New issues |
| Sunday | 25-Jun-06 | 10 | T.H, M.C | A.C | 6:40 | 9:31 | 2.9 | | | 1090 | 137.6 | | | | | Weather:Fine some cloud |
| | | | | | | | | | | | | | | | | Remarks: Heavy turbulence several area's tried for best production. |
| Julian | 176 | | | | | | | | | | | | | | | |
| Day | 14 | | | | Hours Today | | 2.9 | | | | 137.6 | 0.0 | 1294.7 | 0.0 | | Safety Meeting: Please see safety meeting minutes. |
| Total Job Hours | | -1.7 | Weekly Totals | | | | -9.3 | 0 | 0 | 4591 | 1294.7 | 0.0 | | | 2.0 | |

Total Aircraft Hours
Hours to Next Periodic
Anticipated Hours Next week

Ltrs/Hr -492
Running Avg 185.0 km/day
-138.7 km/hr

Total Standby 3.0
% Complete 30.5 %
km Remaining 2955.3 km

| | | | |
|---|---|---|---|
| Week Commencing: **Monday 26-Jun-06** | Aircraft: VH-TEM | Operators: A.C, S.M | Pilots: T.H, M.C |
| Job Number: 1788 | Base: Jabiru | Data Proc: Glen Gooch | Techs: A.C, S.M |
| Total km: 4250 | Country: Australia | Crew Leader: Andrew Carpenter | Client: Cameco |
| | Area Name: Jabiru | Accom: Aurora Kakadu | Contact #: A.C 08 879 0166 Room 52 |

| **Date** | | **Flight** | **Crew** | | **Time** | | **M/R** | **Oil** | | **Fuel** | **This Flight** | | **To Date** | | **Standby** | **Comments** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Number** | **Plt(s)** | **Op** | **T/O** | **Land** | **Hrs** | **L** | **R** | **BURN** | **Prod** | **Refly** | **Prod** | **Refly** | **(0, 0.5, 1)** | |
| Monday | 26-Jun-06 | 11 | T.H, M.C | A.C | 6:44 | 10:24 | 3.7 | | | 1400 | 351.0 | | | | | Weather: Hot, Humid, Some Cloud, wind building up |
| | | | | | | | | | | | | | | | | Remarks:Ops normal |
| Julian | 177 | | | | | | | | | | | | | | | |
| Day | 15 | | | | Hours Today | | 3.7 | | | | 351.0 | 0.0 | 1645.7 | 0.0 | | Safety Meeting: No new issues. |
| Tuesday | 27-Jun-06 | 12 | T.H, G.K | AC | | | | | | | | | | | | Weather:Fine no cloud some wind turning gusty by 10:30 |
| | | | | | | | | | | | | | | | | Remarks:Flight aborted due to faulty Tourque gauge on right hand engine. |
| Julian | 178 | | | | | | | | | | | | | | | Issue resolved and tested, T.H and G.T completed pilot handover |
| Day | 16 | | | | Hours Today | | 0.0 | | | | 0.0 | 0.0 | 1645.7 | 0.0 | | Safety Meeting:No new issues, pilot handover completed. |
| Wednesday | 28-Jun-06 | 12.1 | G.K, M.C | A.C | 6:49 | 10:26 | 3.6 | | | 1409 | 344.4 | | | | | Weather:Some cloud warm with increasing wind |
| | | | | | | | | | | | | | | | | Remarks:data looks good still pending QC |
| Julian | 179 | | | | | | | | | | | | | | | |
| Day | 17 | | | | Hours Today | | 3.6 | | | | 344.4 | 0.0 | 1990.1 | 0.0 | | Safety Meeting:no new issues |
| Thursday | 29-Jun-06 | 13 | G.K, M.C | A.C | 6:39 | 11:11 | 4.5 | | | 1752 | 355.7 | 30.5 | | | | Weather:Fine some clouds |
| | | | | | | | | | | | | | | | | Remarks:Production pending QC |
| Julian | 180 | | | | | | | | | | | | | | | |
| Day | 18 | | | | Hours Today | | 4.5 | | | | 355.7 | 30.5 | 2345.8 | 30.5 | | Safety Meeting:No new issues |
| Friday | 30-Jun-06 | 14 | G.K, M.C | A.C | 6:44 | 10:34 | 3.8 | | | 1498 | 269.5 | 37.8 | | | | Weather:Fine some clouds |
| | | | | | | | | | | | | | | | | Remarks:Flight cut short due to omnistar account running out |
| Julian | 181 | | | | | | | | | | | | | | | |
| Day | 19 | | | | Hours Today | | 3.8 | | | | 269.5 | 37.8 | 2615.3 | 68.3 | | Safety Meeting:No new issues |
| Saturday | 1-Jul-06 | 15 | G.K, M.C | A.C | 6:43 | 9:42 | 3.0 | | | 1155 | 186.1 | | | | | Weather:Fine, strong winds |
| | | | | | | | | | | | | | | | | Remarks: Flight cut short due to turbulence |
| Julian | 182 | | | | | | | | | | | | | | | |
| Day | 20 | | | | Hours Today | | 3.0 | | | | 186.1 | 0.0 | 2801.4 | 68.3 | | Safety Meeting:No new issues |
| Sunday | 2-Jul-06 | 16 | G.K, M.C | A.C | 6:40 | 11:02 | 4.4 | | | 1672 | 413.3 | | | | | Weather:Fine Some Winds building during morning |
| | | | | | | | | | | | | | | | | Remarks: Survey went well despite turbulance, (pending QC) |
| Julian | 183 | | | | | | | | | | | | | | | |
| Day | 21 | | | | Hours Today | | 4.4 | | | | 413.3 | 0.0 | 3214.7 | 68.3 | | Safety Meeting:Please see safety meeting minutes |
| Total Job Hours | | 21.3 | Weekly Totals | | | | 23.0 | 0 | 0 | 8885 | 1920.0 | 68.3 | | | 0.0 | |
| | | | Total Aircraft Hours | | | | | | Ltrs/Hr | 386 | | | | Total Standby | 3.0 | |
| | | | Hours to Next Periodic | | | | | | Running Avg | | 274.3 km/day | | | % Complete | 75.6 % | |
| | | | Anticipated Hours Next week | | | | | | | | 83.5 km/hr | | | km Remaining | 1035.3 km | |

Week Commencing: **Monday 3-Jul-06**
Job Number: 1788
Total km: 4250

Aircraft: VH-TEM
Base: Jabiru
Country: Australia
Area Name: Jabiru

Operators: A.C, S.M
Data Proc: Glen Gooch
Crew Leader: Andrew Carpenter
Accom: Aurora Kakadu

Pilots: T.H, M.C
Techs: A.C, S.M
Client: Cameco
Contact #: A.C 08 879 0166 Room 52

| Date | | Flight | Crew | | Time | | M/R | Oil | | Fuel | This Flight | | To Date | | Standby | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Number | Plt(s) | Op | T/O | Land | Hrs | L | R | BURN | Prod | Refly | Prod | Refly | (0, 0.5, 1) | |
| Monday | 3-Jul-06 | | | | | | | | | | | | | | | Weather: |
| | | | | | | | | | | | | | | | | Remarks:PDO Andrew Carpenter in Darwin to pick up freight. |
| Julian | 184 | | | | | | | | | | | | | | | |
| Day | 22 | | | | Hours Today | | 0.0 | | | | 0.0 | 0.0 | 3214.7 | 68.3 | | Safety Meeting:No new issues. |
| Tuesday | 4-Jul-06 | 17 | G.K, M.C | A.C | 6:41 | 9:42 | 3.0 | | | 1117 | 212.6 | | | | | Weather:Warm gusty winds |
| | | | | | | | | | | | | | | | | Remarks: Flight cut short due to turbulence and resulting coil knocks |
| Julian | 185 | | | | | | | | | | | | | | | |
| Day | 23 | | | | Hours Today | | 3.0 | | | | 212.6 | 0.0 | 3427.3 | 68.3 | | Safety Meeting: No new issues. |
| Wednesday | 5-Jul-06 | 18 | G.K, M.C | A.C | 6:45 | 11:04 | 4.3 | | | 1687 | 363.2 | 14.8 | | | | Weather:Warm gusty wind |
| | | | | | | | | | | | | | | | | Remarks:Very turbulent conditions |
| Julian | 186 | | | | | | | | | | | | | | | |
| Day | 24 | | | | Hours Today | | 4.3 | | | | 363.2 | 14.8 | 3790.5 | 83.1 | | Safety Meeting:No new issues |
| Thursday | 6-Jul-06 | 19 | G.K, M.C | A.C | 3:15 | 6:23 | 3.1 | | | 1239 | 242.4 | 0.0 | | | | Weather:Warm and strong winds |
| | | | | | | | | | | | | | | | | Remarks:Morning flight cancled due to extreme turbulence |
| Julian | 187 | | | | | | | | | | | | | | | |
| Day | 25 | | | | Hours Today | | 3.1 | | | | 242.4 | 0.0 | 4032.9 | 83.1 | | Safety Meeting:No new issues |
| Friday | 7-Jul-06 | 20 | G.K, M.C | A.C | 6:39 | 9:49 | 3.2 | | | 1205 | 216.7 | 39.6 | | | | Weather:Warm and strong winds |
| | | | | | | | | | | | | | | | | Remarks: Job completed pending QC |
| Julian | 188 | | | | | | | | | | | | | | | |
| Day | 26 | | | | Hours Today | | 3.2 | | | | 216.7 | 39.6 | 4249.6 | 122.7 | | Safety Meeting:See meeting minutes |
| Saturday | 8-Jul-06 | Mobilisation | | | 8:30 | 16:20 | 7.8 | | | | | | | | | Weather:Warm Windy |
| | | | | | | | | | | | | | | | | Remarks:Job completed crew to mobilise to Coober Pedy |
| Julian | 189 | | | | | | | | | | | | | | | |
| Day | 27 | | | | Hours Today | | 7.8 | | | | 0.0 | 0.0 | 4249.6 | 122.7 | | Safety Meeting:No new updates |
| Sunday | 9-Jul-06 | | | | | | | | | | | | | | | Weather: |
| | | | | | | | | | | | | | | | | Remarks: |
| Julian | 190 | | | | | | | | | | | | | | | |
| Day | 28 | | | | Hours Today | | 0.0 | | | | 0.0 | 0.0 | 4249.6 | 122.7 | | Safety Meeting: |
| Total Job Hours | | 42.8 | Weekly Totals | | | | 21.5 | 0 | 0 | 5248 | 1034.9 | 54.4 | | | 0.0 | |
| | | | Total Aircraft Hours | | | | | Ltrs/Hr | | 244 | | | Total Standby | | 3.0 | |
| | | | Hours to Next Periodic | | | | | Running Avg | | | 147.8 km/day | | % Complete | | 100.0 % | |
| | | | Anticipated Hours Next week | | | | | | | | 48.2 km/hr | | km Remaining | | 0.4 km | |

# APPENDIX III – Flight Summary (Line Listing)

**AREA 1 – NABARLEK WEST**

```
COMM  Total number of lines :   45
COMM
COMM   Flt    Line   Start X   Start Y     End X     End Y       Kms
COMM
COMM    10   10010    306119   8645310    298040   8645275      8.08
COMM    10   10020    297993   8645083    306044   8645069      8.05
COMM    10   10030    306071   8644852    298062   8644871      8.01
COMM    10   10040    297982   8644667    306020   8644680      8.04
COMM    14   10051    306005   8644481    298028   8644486      7.98
COMM    10   10060    298023   8644272    305968   8644270      7.95
COMM    10   10070    305956   8644081    298029   8644056      7.93
COMM    10   10080    297978   8643866    305903   8643881      7.93
COMM    11   10091    305967   8643676    298056   8643675      7.91
COMM    11   10100    297981   8643476    305848   8643466      7.87
COMM    11   10110    305918   8643268    298019   8643255      7.90
COMM    11   10120    297954   8643065    305842   8643077      7.89
COMM    11   10130    305884   8642872    298028   8642887      7.86
COMM    11   10140    297978   8642674    305792   8642676      7.81
COMM    11   10150    305836   8642472    298012   8642457      7.82
COMM    11   10160    297962   8642267    311933   8642266     13.97
COMM    11   10170    312011   8642098    297970   8642092     14.04
COMM    11   10180    297967   8641882    311960   8641873     13.99
COMM    11   10190    312004   8641664    298008   8641668     14.00
COMM    11   10200    297936   8641483    311946   8641471     14.01
COMM    11   10210    312019   8641292    297975   8641278     14.04
COMM    15   10221    297947   8641081    311936   8641051     13.99
COMM    16   10232    311951   8640884    297956   8640864     14.00
COMM    11   10240    297935   8640675    311972   8640658     14.04
COMM    11   10250    311994   8640471    297984   8640468     14.01
COMM    11   10260    297886   8640273    311967   8640275     14.08
COMM    11   10270    312014   8640077    301683   8640050     10.33
COMM    11   10280    301661   8639872    311919   8639859     10.26
COMM    11   10290    311950   8639695    301708   8639679     10.24
COMM    11   10300    301660   8639479    311956   8639485     10.30
COMM    13   10311    312017   8639301    301746   8639281     10.27
COMM    11   10320    301691   8639061    311943   8639059     10.25
COMM    11   10330    312016   8638881    301703   8638889     10.31
COMM    11   10340    301678   8638673    311967   8638683     10.29
COMM    11   10350    312022   8638456    301777   8638466     10.25
COMM    11   10360    301688   8638277    311956   8638269     10.27
COMM    11   10370    311985   8638002    301774   8638058     10.21
COMM    11   10380    301698   8637864    311962   8637869     10.26
COMM    11   10390    312002   8637677    301748   8637666     10.25
COMM    11   10400    301725   8637464    311970   8637476     10.25
COMM    13   17010    300199   8640030    300196   8645645      5.62
COMM    13   17020    302117   8645661    302125   8637016      8.65
COMM    13   17030    304029   8636972    304070   8645553      8.58
COMM    13   17040    309821   8642489    309857   8637045      5.44
COMM    13   17050    311802   8637001    311796   8642415      5.41
COMM
COMM  Total Kilometres :        450.62
```

**AREA 2 – NABARLEK MAIN**

| COMM | Flt | Line | Start X | Start Y | End X | End Y | Kms |
|---|---|---|---|---|---|---|---|
| COMM | | | | | | | |
| COMM | 14 | 20010 | 320144 | 8645312 | 333658 | 8645310 | 13.51 |
| COMM | 14 | 20020 | 333644 | 8645115 | 320149 | 8645109 | 13.50 |
| COMM | 14 | 20030 | 320145 | 8644909 | 333607 | 8644909 | 13.46 |
| COMM | 14 | 20040 | 333667 | 8644718 | 320158 | 8644714 | 13.51 |
| COMM | 14 | 20050 | 320134 | 8644500 | 333611 | 8644494 | 13.48 |
| COMM | 15 | 20062 | 333669 | 8644314 | 320204 | 8644308 | 13.47 |
| COMM | 14 | 20070 | 320150 | 8644112 | 333647 | 8644102 | 13.50 |
| COMM | 14 | 20080 | 333699 | 8643899 | 320167 | 8643917 | 13.53 |
| COMM | 14 | 20090 | 320127 | 8643706 | 333664 | 8643695 | 13.54 |
| COMM | 14 | 20100 | 333681 | 8643560 | 320181 | 8643533 | 13.50 |
| COMM | 14 | 20110 | 320127 | 8643295 | 333679 | 8643303 | 13.55 |
| COMM | 14 | 20120 | 333704 | 8643100 | 320150 | 8643110 | 13.55 |
| COMM | 14 | 20130 | 320111 | 8642909 | 333644 | 8642907 | 13.53 |
| COMM | 14 | 20140 | 333729 | 8642720 | 320148 | 8642712 | 13.58 |
| COMM | 14 | 20150 | 320159 | 8642510 | 333633 | 8642511 | 13.47 |
| COMM | 14 | 20160 | 333667 | 8642307 | 320172 | 8642317 | 13.50 |
| COMM | 14 | 20170 | 320145 | 8642106 | 333660 | 8642102 | 13.52 |
| COMM | 13 | 20180 | 333671 | 8641915 | 320213 | 8641914 | 13.46 |
| COMM | 13 | 20190 | 320154 | 8641706 | 333653 | 8641699 | 13.50 |
| COMM | 13 | 20200 | 333730 | 8641520 | 320205 | 8641513 | 13.53 |
| COMM | 13 | 20210 | 320131 | 8641304 | 333644 | 8641306 | 13.51 |
| COMM | 13 | 20220 | 333703 | 8641105 | 320206 | 8641108 | 13.50 |
| COMM | 13 | 20230 | 320163 | 8640896 | 333670 | 8640904 | 13.51 |
| COMM | 13 | 20240 | 333741 | 8640716 | 320199 | 8640716 | 13.54 |
| COMM | 13 | 20250 | 320126 | 8640521 | 333655 | 8640505 | 13.53 |
| COMM | 13 | 20260 | 333694 | 8640312 | 320160 | 8640308 | 13.53 |
| COMM | 13 | 20270 | 320166 | 8640086 | 333699 | 8640104 | 13.53 |
| COMM | 13 | 20280 | 333709 | 8639911 | 320199 | 8639916 | 13.51 |
| COMM | 13 | 20290 | 320173 | 8639697 | 333689 | 8639710 | 13.52 |
| COMM | 13 | 20300 | 333723 | 8639504 | 320169 | 8639515 | 13.55 |
| COMM | 13 | 20310 | 320132 | 8639304 | 333678 | 8639307 | 13.55 |
| COMM | 14 | 20321 | 333750 | 8639109 | 320160 | 8639117 | 13.59 |
| COMM | 13 | 20331 | 320121 | 8638906 | 333675 | 8638912 | 13.55 |
| COMM | 13 | 20340 | 333744 | 8638714 | 320220 | 8638717 | 13.52 |
| COMM | 13 | 20350 | 320170 | 8638505 | 333706 | 8638501 | 13.54 |
| COMM | 13 | 20360 | 333727 | 8638313 | 320180 | 8638325 | 13.55 |
| COMM | 13 | 20370 | 317108 | 8638097 | 333716 | 8638106 | 16.61 |
| COMM | 13 | 20380 | 333727 | 8637898 | 317140 | 8637908 | 16.59 |
| COMM | 13 | 20390 | 317104 | 8637699 | 333720 | 8637704 | 16.62 |
| COMM | 14 | 20401 | 333770 | 8637507 | 317122 | 8637498 | 16.65 |
| COMM | 12 | 20410 | 317118 | 8637284 | 333730 | 8637298 | 16.61 |
| COMM | 12 | 20420 | 337647 | 8637111 | 317167 | 8637087 | 20.48 |
| COMM | 12 | 20430 | 317087 | 8636904 | 337605 | 8636898 | 20.52 |
| COMM | 13 | 20441 | 337579 | 8636712 | 317152 | 8636710 | 20.43 |
| COMM | 12 | 20450 | 317075 | 8636506 | 337557 | 8636508 | 20.48 |
| COMM | 12 | 20460 | 337593 | 8636305 | 317148 | 8636298 | 20.45 |
| COMM | 12 | 20470 | 317054 | 8636100 | 337513 | 8636112 | 20.46 |
| COMM | 12 | 20480 | 337535 | 8635910 | 317136 | 8635912 | 20.40 |
| COMM | 12 | 20490 | 317069 | 8635703 | 337532 | 8635719 | 20.46 |
| COMM | 12 | 20500 | 337520 | 8635507 | 317118 | 8635495 | 20.40 |
| COMM | 15 | 27010 | 321493 | 8635444 | 321399 | 8645445 | 10.00 |
| COMM | 15 | 27020 | 323293 | 8645455 | 323284 | 8635456 | 10.00 |
| COMM | 15 | 27030 | 325193 | 8635457 | 325198 | 8645403 | 9.95 |
| COMM | 14 | 27040 | 327083 | 8645440 | 327084 | 8635503 | 9.94 |
| COMM | 14 | 27050 | 328989 | 8635465 | 328983 | 8645386 | 9.92 |
| COMM | 15 | 27061 | 330877 | 8645434 | 330843 | 8635486 | 9.95 |
| COMM | 14 | 27070 | 332772 | 8635468 | 332782 | 8645433 | 9.97 |
| COMM | | | | | | | |
| COMM | Total Kilometres : | | | 823.57 | | | |

**AREA 3 – NABARLEK EAST**

```
COMM  Total number of lines :   67
COMM
COMM   Flt     Line    Start X    Start Y      End X      End Y        Kms
COMM
COMM    12    30010     333270    8633361     333277    8645500      12.14
COMM    12    30020     333465    8645562     333484    8633397      12.17
COMM    12    30030     333658    8633410     333675    8645536      12.13
COMM    12    30040     333874    8645559     333873    8633421      12.14
COMM    12    30050     334084    8633390     334071    8645493      12.10
COMM    12    30060     334253    8645534     334266    8633445      12.09
COMM    12    30070     334488    8633380     334478    8645474      12.09
COMM    12    30080     334662    8645554     334643    8633409      12.15
COMM    12    30090     334862    8633339     334887    8645496      12.16
COMM    12    30100     335069    8645570     335066    8633417      12.15
COMM    12    30110     335257    8633344     335276    8645522      12.18
COMM    12    30120     335479    8645564     335465    8633417      12.15
COMM    17    30130     335681    8633361     335677    8645502      12.14
COMM    17    30140     335861    8645539     335884    8633435      12.10
COMM    17    30150     336075    8633366     336066    8645496      12.13
COMM    17    30160     336277    8645526     336274    8633414      12.11
COMM    17    30170     336433    8633350     336471    8645527      12.18
COMM    17    30180     336660    8645528     336672    8633425      12.10
COMM    17    30190     336861    8633348     336863    8645513      12.16
COMM    17    30200     337067    8645529     337058    8633424      12.11
COMM    17    30210     337274    8633374     337273    8645517      12.14
COMM    17    30220     337452    8645566     337476    8633431      12.14
COMM    18    30230     337676    8633333     337684    8645519      12.19
COMM    18    30240     337856    8645572     337872    8633396      12.18
COMM    18    30250     338080    8633337     338079    8645518      12.18
COMM    18    30260     338268    8645572     338272    8633400      12.17
COMM    20    30271     338462    8633336     338468    8645553      12.22
COMM    19    30280     338676    8645583     338667    8633396      12.19
COMM    19    30290     338788    8633351     338884    8645525      12.17
COMM    19    30300     339069    8645598     339068    8633408      12.19
COMM    19    30310     339269    8633378     339274    8645501      12.12
COMM    19    30320     339456    8645571     339460    8633377      12.19
COMM    19    30330     339661    8633352     339671    8645535      12.18
COMM    19    30340     339870    8645550     339871    8633431      12.12
COMM    19    30350     340061    8633368     340064    8645551      12.18
COMM    19    30360     340273    8645596     340274    8633399      12.20
COMM    19    30370     340468    8633384     340473    8645533      12.15
COMM    19    30380     340655    8645548     340668    8633435      12.11
COMM    19    30390     340881    8633328     340864    8645504      12.18
COMM    19    30400     341067    8645557     341068    8633398      12.16
COMM    19    30410     341263    8633785     341275    8645515      11.73
COMM    19    30420     341475    8645589     341489    8635395      10.19
COMM    19    30430     341678    8635257     341667    8645523      10.27
COMM    19    30440     341869    8645553     341870    8635348      10.20
COMM    19    30451     342092    8635261     342073    8645520      10.26
COMM    19    30460     342266    8645595     342273    8635318      10.28
COMM    19    30470     342473    8635289     342468    8645557      10.27
COMM    19    30480     342661    8645565     342664    8635330      10.23
COMM    20    30490     342874    8635240     342871    8645543      10.30
COMM    20    30500     343070    8645565     343071    8635319      10.25
COMM    20    30510     343265    8635247     343271    8645530      10.28
COMM    20    30520     343469    8645558     343458    8635330      10.23
COMM    20    30530     343680    8635269     343674    8645515      10.25
COMM    20    30540     343882    8645564     343884    8635303      10.26
COMM    20    30550     344017    8635244     344074    8645504      10.26
COMM    20    30560     344279    8645614     344271    8635308      10.31
COMM    20    30570     344468    8635277     344475    8645510      10.23
COMM    20    30580     344672    8645567     344659    8635328      10.24
COMM    20    30590     344876    8635294     344872    8645516      10.22
```

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| COMM | 20 | 30600 | 345069 | 8645560 | 345082 | 8635342 | 10.22 |
| COMM | 20 | 30610 | 345262 | 8635244 | 345269 | 8645577 | 10.33 |
| COMM | 20 | 30620 | 345466 | 8645571 | 345464 | 8635293 | 10.28 |
| COMM | 20 | 30630 | 345657 | 8635311 | 345668 | 8645575 | 10.26 |
| COMM | 20 | 30640 | 345880 | 8645566 | 345874 | 8635326 | 10.24 |
| COMM | 18 | 37010 | 346299 | 8641394 | 332949 | 8641369 | 13.35 |
| COMM | 18 | 37020 | 332865 | 8639418 | 346247 | 8639471 | 13.38 |
| COMM | 18 | 37030 | 346252 | 8637572 | 332950 | 8637558 | 13.30 |

COMM
COMM Total Kilometres : 773.66

**AREA 4 – MURALIDBAR**

COMM Total number of lines : 62
COMM

| COMM | Flt | Line | Start X | Start Y | End X | End Y | Kms |
|---|---|---|---|---|---|---|---|
| COMM | | | | | | | |
| COMM | 10 | 40010 | 353368 | 8645468 | 364590 | 8645678 | 11.22 |
| COMM | 10 | 40020 | 364615 | 8645486 | 353290 | 8645280 | 11.33 |
| COMM | 18 | 40031 | 353068 | 8645083 | 364598 | 8645282 | 11.53 |
| COMM | 10 | 40040 | 364599 | 8645067 | 352903 | 8644885 | 11.70 |
| COMM | 18 | 40050 | 352700 | 8644683 | 364601 | 8644894 | 11.90 |
| COMM | 18 | 40060 | 364624 | 8644695 | 352559 | 8644505 | 12.07 |
| COMM | 18 | 40070 | 352339 | 8644281 | 364552 | 8644483 | 12.21 |
| COMM | 18 | 40080 | 364581 | 8644267 | 352192 | 8644073 | 12.39 |
| COMM | 18 | 40090 | 351947 | 8643869 | 364585 | 8644096 | 12.64 |
| COMM | 18 | 40100 | 364585 | 8643880 | 351850 | 8643657 | 12.74 |
| COMM | 18 | 40110 | 351582 | 8643441 | 364576 | 8643682 | 13.00 |
| COMM | 19 | 40121 | 364634 | 8643485 | 351496 | 8643252 | 13.14 |
| COMM | 18 | 40130 | 351231 | 8643038 | 364584 | 8643276 | 13.36 |
| COMM | 18 | 40140 | 364627 | 8643083 | 351124 | 8642848 | 13.51 |
| COMM | 18 | 40150 | 350913 | 8642662 | 364593 | 8642880 | 13.68 |
| COMM | 18 | 40160 | 364646 | 8642692 | 350750 | 8642433 | 13.90 |
| COMM | 18 | 40170 | 350521 | 8642223 | 364566 | 8642457 | 14.05 |
| COMM | 18 | 40180 | 364605 | 8642307 | 350374 | 8642045 | 14.23 |
| COMM | 18 | 40190 | 350192 | 8641840 | 364554 | 8642087 | 14.36 |
| COMM | 18 | 40200 | 364573 | 8641882 | 350017 | 8641604 | 14.56 |
| COMM | 18 | 40210 | 349795 | 8641418 | 364558 | 8641686 | 14.77 |
| COMM | 18 | 40220 | 364576 | 8641474 | 349692 | 8641224 | 14.89 |
| COMM | 18 | 40230 | 349431 | 8641026 | 364577 | 8641280 | 15.15 |
| COMM | 18 | 40240 | 364644 | 8641067 | 349357 | 8640833 | 15.29 |
| COMM | 18 | 40252 | 349096 | 8640614 | 364586 | 8640891 | 15.49 |
| COMM | 18 | 40262 | 364577 | 8640711 | 348949 | 8640417 | 15.63 |
| COMM | 17 | 40270 | 348747 | 8640224 | 364576 | 8640479 | 15.83 |
| COMM | 17 | 40280 | 364570 | 8640282 | 348589 | 8640006 | 15.98 |
| COMM | 17 | 40290 | 348383 | 8639805 | 364554 | 8640086 | 16.17 |
| COMM | 17 | 40300 | 364211 | 8639873 | 348257 | 8639608 | 15.96 |
| COMM | 17 | 40310 | 347281 | 8639385 | 362540 | 8639639 | 15.26 |
| COMM | 17 | 40320 | 362605 | 8639463 | 345234 | 8639153 | 17.37 |
| COMM | 16 | 40330 | 345192 | 8638944 | 362562 | 8639256 | 17.37 |
| COMM | 16 | 40340 | 362596 | 8639057 | 345233 | 8638743 | 17.37 |
| COMM | 16 | 40350 | 345144 | 8638530 | 362571 | 8638846 | 17.43 |
| COMM | 16 | 40360 | 362560 | 8638645 | 345192 | 8638352 | 17.37 |
| COMM | 16 | 40370 | 345170 | 8638097 | 362574 | 8638453 | 17.41 |
| COMM | 16 | 40380 | 362607 | 8638227 | 345168 | 8637943 | 17.44 |
| COMM | 16 | 40390 | 345167 | 8637741 | 362556 | 8638031 | 17.39 |
| COMM | 16 | 40400 | 362554 | 8637865 | 345183 | 8637537 | 17.37 |
| COMM | 16 | 40410 | 345142 | 8637329 | 362558 | 8637650 | 17.42 |
| COMM | 16 | 40420 | 362578 | 8637440 | 345152 | 8637136 | 17.43 |
| COMM | 16 | 40430 | 345113 | 8636933 | 362532 | 8637239 | 17.42 |
| COMM | 16 | 40440 | 362622 | 8637067 | 332679 | 8636544 | 29.95 |
| COMM | 16 | 40450 | 332683 | 8636322 | 362535 | 8636849 | 29.86 |
| COMM | 16 | 40460 | 362591 | 8636631 | 332734 | 8636120 | 29.86 |

```
COMM    16   40470     332657   8635928    362520   8636446    29.87
COMM    16   40480     362585   8636233    332715   8635718    29.87
COMM    16   40490     332685   8635524    362525   8636045    29.84
COMM    16   40501     362575   8635848    332744   8635325    29.84
COMM    15   40510     332703   8635131    362532   8635643    29.83
COMM    15   40520     362549   8635451    332767   8634933    29.79
COMM    15   40530     332700   8634734    362567   8635251    29.87
COMM    15   40540     362559   8635040    332762   8634527    29.80
COMM    15   40550     353639   8634693    362562   8634847     8.92
COMM    16   47010     349615   8634417    349519   8641014     6.60
COMM    16   47020     351470   8643292    351610   8634461     8.83
COMM    16   47030     353658   8634449    353417   8645458    11.01
COMM    16   47040     355407   8646008    355600   8634565    11.44
COMM    16   47050     357613   8634533    357409   8645928    11.40
COMM    16   47060     359418   8646016    359611   8634622    11.40
COMM    16   47070     363520   8639683    363408   8645924     6.24
COMM
COMM  Total Kilometres :      1040.95
```

**AREA 5 – PLATEAU**

```
COMM  Total number of lines :   55
COMM
COMM   Flt    Line   Start X   Start Y     End X     End Y       Kms
COMM
COMM     9   50010    318686   8610518    318671   8598651    11.87
COMM     9   50020    318900   8598579    318889   8610531    11.95
COMM     9   50030    319083   8610542    319084   8598631    11.91
COMM     9   50040    319325   8598591    319278   8610526    11.94
COMM     9   50050    319511   8610567    319484   8598635    11.93
COMM     9   50060    319695   8598577    319680   8610533    11.96
COMM     9   50070    319884   8610619    319875   8598663    11.96
COMM    10   50081    320097   8598633    320104   8610545    11.91
COMM     9   50090    320282   8610622    320268   8598658    11.96
COMM     9   50100    320502   8593100    320494   8610570    17.47
COMM     9   50110    320674   8610608    320684   8593145    17.46
COMM     9   50120    320885   8593102    320890   8610572    17.47
COMM     9   50130    321087   8610661    321079   8593105    17.56
COMM     9   50140    321291   8593127    321284   8610630    17.50
COMM     9   50150    321485   8610693    321487   8593132    17.56
COMM     9   50160    321686   8593101    321675   8610628    17.53
COMM     9   50170    321884   8610661    321887   8593125    17.54
COMM     9   50180    322092   8593054    322100   8610657    17.60
COMM     9   50190    322259   8612483    322277   8591360    21.12
COMM     9   50200    322504   8591287    322496   8612390    21.10
COMM     9   50210    322670   8612470    322683   8591348    21.12
COMM     9   50221    322883   8591308    322896   8612438    21.13
COMM     8   50230    323099   8612477    323082   8591321    21.16
COMM     8   50240    323283   8591297    323283   8612418    21.12
COMM     8   50250    323498   8612497    323484   8591361    21.14
COMM     8   50260    323680   8591306    323669   8612406    21.10
COMM     8   50270    323877   8623418    323876   8591312    32.11
COMM     8   50280    324088   8591279    324071   8623323    32.04
COMM     8   50291    324282   8623405    324288   8591360    32.04
COMM     7   50300    324497   8591254    324476   8623344    32.09
COMM     9   50311    324689   8623371    324671   8591304    32.07
COMM     7   50320    324877   8591304    324874   8623328    32.02
COMM     7   50330    325084   8623371    325081   8591318    32.05
COMM     7   50340    325296   8591283    325307   8623369    32.09
COMM     7   50350    325482   8623393    325485   8591347    32.05
COMM     7   50360    325676   8591247    325695   8623326    32.08
COMM     7   50370    325865   8623388    325882   8591310    32.08
COMM     7   50380    326073   8591313    326081   8623371    32.06
COMM     7   50390    326270   8623414    326314   8591298    32.12
```

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| COMM | 7 | 50400 | 326477 | 8591263 | 326485 | 8623374 | 32.11 |
| COMM | 7 | 50410 | 326680 | 8623384 | 326687 | 8591302 | 32.08 |
| COMM | 7 | 50420 | 326892 | 8591273 | 326882 | 8623343 | 32.07 |
| COMM | 7 | 50430 | 327059 | 8623423 | 327082 | 8591315 | 32.11 |
| COMM | 7 | 50440 | 327285 | 8591242 | 327301 | 8623336 | 32.09 |
| COMM | 7 | 50451 | 327476 | 8623416 | 327473 | 8591294 | 32.12 |
| COMM | 9 | 50461 | 327690 | 8591291 | 327679 | 8623351 | 32.06 |
| COMM | 6 | 50470 | 327867 | 8623385 | 327873 | 8591342 | 32.04 |
| COMM | 6 | 50480 | 328071 | 8591270 | 328083 | 8623318 | 32.05 |
| COMM | 9 | 50491 | 328285 | 8613631 | 328282 | 8591288 | 22.34 |
| COMM | 10 | 57010 | 323774 | 8617668 | 328234 | 8617647 | 4.46 |
| COMM | 10 | 57020 | 328354 | 8612226 | 322197 | 8612277 | 6.16 |
| COMM | 10 | 57030 | 318395 | 8610492 | 328306 | 8610478 | 9.91 |
| COMM | 10 | 57040 | 328396 | 8608566 | 318473 | 8608673 | 9.92 |
| COMM | 9 | 57050 | 328370 | 8606881 | 318459 | 8606881 | 9.91 |
| COMM | 9 | 57060 | 320352 | 8596072 | 328415 | 8596063 | 8.06 |
| COMM | | | | | | | |
| COMM | Total Kilometres : | | 1210.46 | | | | |

# APPENDIX IV – Located Data Formats

## Headers for final data files

### AREA 1 – NABARLEK WEST

```
COMM JOB NUMBER:                                                    1788
COMM AREA NUMBER:                                                      1
COMM SURVEY COMPANY:                                 Fugro Airborne Surveys
COMM CLIENT:                                       Cameco Australia Pty Ltd
COMM SURVEY TYPE:                                      25Hz TEMPEST Survey
COMM AREA NAME:                                              Nabarlek West
COMM STATE:                                                             NT
COMM COUNTRY:                                                    Australia
COMM SURVEY FLOWN:                                               July 2006
COMM LOCATED DATA CREATED:                                        Sep 2006
COMM
COMM DATUM:                                                          AGD66
COMM PROJECTION:                                                       AMG
COMM ZONE:                                                              53
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:                                          200 m
COMM TRAVERSE LINE DIRECTION:                                  090-270 deg
COMM TIE LINE SPACING:                                              2000 m
COMM TIE LINE DIRECTION:                                       000-180 deg
COMM NOMINAL TERRAIN CLEARANCE:                                      120 m
COMM FINAL LINE KILOMETRES:                                       450.6 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:                                  10010 - 10400
COMM TIE LINE NUMBERS:                                       17010 - 17050
COMM
COMM AREA BOUNDARY (WGS84, UTM53)
COMM
COMM    302444    8637762
COMM    302409    8640655
COMM    298655    8640754
COMM    298753    8645298
COMM    305570    8645001
COMM    305273    8641939
COMM    311505    8642189
COMM    311505    8637762
COMM
COMM SURVEY EQUIPMENT
COMM
COMM AIRCRAFT:                                 CASA C212 Turbo Prop, VH-TEM
COMM
COMM MAGNETOMETER:                              Scintrex Cs-2 Cesium Vapour
COMM INSTALLATION:                                           stinger mount
COMM RESOLUTION:                                                  0.001 nT
COMM RECORDING INTERVAL:                                             0.2 s
COMM
COMM ELECTROMAGNETIC SYSTEM:                                   25Hz TEMPEST
COMM INSTALLATION:                   Transmitter loop mounted on the aircraft
COMM                                          Receiver coils in a towed bird
COMM COIL ORIENTATION:                                                 X,Z
COMM RECORDING INTERVAL:                                             0.2 s
COMM SYSTEM GEOMETRY:
```

```
COMM RECEIVER DISTANCE BEHIND THE TRANSMITTER:                         -121 m
COMM RECEIVER DISTANCE BELOW THE TRANSMITTER:                           -32 m
COMM
COMM RADAR ALTIMETER:                                           Sperry RT-220
COMM RECORDING INTERVAL:                                                0.2 s
COMM
COMM NAVIGATION:                                  real-time differential GPS
COMM RECORDING INTERVAL:                                                1.0 s
COMM
COMM ACQUISITION SYSTEM:                                            PDAS-1000
COMM
COMM DATA PROCESSING
COMM
COMM MAGNETIC DATA
COMM DIURNAL BASE VALUE APPLIED                                      46350 nT
COMM PARALLAX CORRECTION APPLIED                                        0.6 s
COMM IGRF BASE VALUE APPLIED                                         46139 nT
COMM IGRF MODEL 2005 EXTRAPOLATED TO                                   2006.5
COMM DATA HAVE BEEN MICROLEVELLED
COMM
COMM ELECTROMAGNETIC DATA
COMM SYSTEM PARALLAX REMOVED, AS FOLLOWS
COMM X-COMPONENT EM DATA                                                0.2 s
COMM Z-COMPONENT EM DATA                                                1.4 s
COMM DATA CORRECTED FOR TRANSMITTER HEIGHT, PITCH AND ROLL
COMM DATA CORRECTED FOR TRANSMITTER-RECEIVER GEOMETRY VARIATIONS
COMM DATA HAVE BEEN MICROLEVELLED
COMM CONDUCTIVITY DEPTH INVERSION CALCULATED                     EMFlow V5.10
COMM CONDUCTIVITIES CALCULATED USING un-corrected EMZ DATA
COMM
COMM DIGITAL TERRAIN DATA
COMM PARALLAX CORRECTION APPLIED TO RADAR ALIMETER DATA                 0.6 s
COMM PARALLAX CORRECTION APPLIED TO GPS ALIMETER DATA                   0.0 s
COMM DTM CALCULATED [DTM = GPS ALTITUDE - RADAR ALTITUDE]
COMM DATA HAVE BEEN MICROLEVELLED
COMM ---------------------------------------------------------------------
COMM The accuracy of the elevation calculation is directly dependent on
COMM the accuracy of the two input parameters, radar altitude and GPS
COMM altitude.  The radar altitude value may be erroneous in areas of heavy
COMM tree cover, where the altimeter reflects the distance to the tree
COMM canopy rather than the ground.  The GPS altitude value is primarily
COMM dependent on the number of available satellites. Although
COMM post-processing of GPS data will yield X and Y accuracies in the
COMM order of 1-2 metres, the accuracy of the altitude value is usually
COMM much less, sometimes in the ±5 metre range.  Further inaccuracies
COMM may be introduced during the interpolation and gridding process.
COMM Because of the inherent inaccuracies of this method, no guarantee is
COMM made or implied that the information displayed is a true
COMM representation of the height above sea level.  Although this product
COMM may be of some use as a general reference,
COMM THIS PRODUCT MUST NOT BE USED FOR NAVIGATION PURPOSES.
COMM ---------------------------------------------------------------------
COMM
COMM ELECTROMAGNETIC SYSTEM
COMM
COMM TEMPEST IS A TIME-DOMAIN SQUARE-WAVE SYSTEM,
COMM TRANSMITTING AT A BASE FREQUENCY OF 25Hz,
COMM WITH 2 ORTHOGONAL-AXIS RECEIVER COILS IN A TOWED BIRD.
COMM FINAL EM OUTPUT IS RECORDED 5 TIMES PER SECOND.
COMM THE TIMES (IN MILLISECONDS) FOR THE 15 WINDOWS ARE:
COMM
COMM WINDOW      START       END      CENTRE
COMM    1        0.007      0.020      0.013
COMM    2        0.033      0.047      0.040
```

```
COMM    3         0.060      0.073      0.067
COMM    4         0.087      0.127      0.107
COMM    5         0.140      0.207      0.173
COMM    6         0.220      0.340      0.280
COMM    7         0.353      0.553      0.453
COMM    8         0.567      0.873      0.720
COMM    9         0.887      1.353      1.120
COMM   10         1.367      2.100      1.733
COMM   11         2.113      3.273      2.693
COMM   12         3.287      5.113      4.200
COMM   13         5.127      7.993      6.560
COMM   14         8.007     12.393     10.200
COMM   15        12.407     19.993     16.200
COMM
COMM PULSE WIDTH: 10 ms
COMM
COMM TEMPEST EM data are transformed to the response that would be
COMM obtained with a B-field sensor for a 100% duty cycle square
COMM waveform at the base frequency, involving a 1A change in
COMM current (from -0.5A to +0.5A to -0.5A) in a 1sq.m transmitter.
COMM It is this configuration, rather than the actual acquisition
COMM configuration, which must be specified when modelling TEMPEST data.
COMM
COMM LOCATED DATA FORMAT
COMM
COMM  Output field format : DOS  - Flat ascii
COMM  Number of fields    : 300
COMM
COMM Field  Channel         Description                         Units  Undefined Format
COMM -----  -------         -----------                         -----  --------- ------
COMM
COMM     1  LINE            Line                                        -9999999  i6
COMM     2  FLIGHT          Flight                                      -9999999  i4
COMM     3  FID             Fiducial                              (s)   -9999999  f8.1
COMM     4  LATITUDE        Latitude  AGD66                     (deg)   -9999999  f13.6
COMM     5  LONGITUDE       Longitude AGD66                     (deg)   -9999999  f13.6
COMM     6  EASTING         Easting   AMG53                      (m)    -9999999  f11.2
COMM     7  NORTHING        Northing  AMG53                      (m)    -9999999  f12.2
COMM     8  TxHeight        GPS height                            (m)   -9999999  f8.2
COMM     9  Baro            Barometric Altitude                   (m)   -9999999  f8.2
COMM    10  TxRalt_raw      Raw Radar Altimeter                   (m)   -9999999  f8.2
COMM    11  TxRalt_final    Final Radar Altimeter                 (m)   -9999999  f8.2
COMM    12  DTM             DTM                                   (m)   -9999999  f8.2
COMM    13  MAG             Compensated TMI                      (nT)   -9999999  f10.3
COMM    14  MAG_1VD         Levelled TMI 1VD                   (nT/m)   -9999999  f12.5
COMM    15  Pitch_Raw       Raw Tx loop pitch                   (deg)   -9999999  f10.5
COMM    16  Roll_Raw        Raw Tx loop roll                    (deg)   -9999999  f10.5
COMM    17  HSep_Raw        Raw Tx-Rx horizontal separation       (m)   -9999999  f8.2
COMM    18  VSep_Raw        Raw Tx-Rx vertical separation         (m)   -9999999  f8.2
COMM    19  Pitch_Final     Final Tx loop pitch                 (deg)   -9999999  f10.5
COMM    20  Roll_Final      Final Tx loop roll                  (deg)   -9999999  f10.5
COMM    21  HSep_Final      Final Tx-Rx horizontal separation     (m)   -9999999  f8.2
COMM    22  VSep_Final      Final Tx-Rx vertical separation       (m)   -9999999  f8.2
COMM    23  X_TConst        X_Time Constant                      (ms)   -9999999  f8.3
COMM    24  EMX_Raw[1]      Raw EMX01 Window                     (fT)   -9999999  f12.6
COMM    25  EMX_Raw[2]      Raw EMX02 Window                     (fT)   -9999999  f12.6
COMM    26  EMX_Raw[3]      Raw EMX03 Window                     (fT)   -9999999  f12.6
COMM    27  EMX_Raw[4]      Raw EMX04 Window                     (fT)   -9999999  f12.6
COMM    28  EMX_Raw[5]      Raw EMX05 Window                     (fT)   -9999999  f12.6
COMM    29  EMX_Raw[6]      Raw EMX06 Window                     (fT)   -9999999  f12.6
COMM    30  EMX_Raw[7]      Raw EMX07 Window                     (fT)   -9999999  f12.6
COMM    31  EMX_Raw[8]      Raw EMX08 Window                     (fT)   -9999999  f12.6
COMM    32  EMX_Raw[9]      Raw EMX09 Window                     (fT)   -9999999  f12.6
COMM    33  EMX_Raw[10]     Raw EMX10 Window                     (fT)   -9999999  f12.6
COMM    34  EMX_Raw[11]     Raw EMX11 Window                     (fT)   -9999999  f12.6
COMM    35  EMX_Raw[12]     Raw EMX12 Window                     (fT)   -9999999  f12.6
COMM    36  EMX_Raw[13]     Raw EMX13 Window                     (fT)   -9999999  f12.6
COMM    37  EMX_Raw[14]     Raw EMX14 Window                     (fT)   -9999999  f12.6
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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| COMM | 38 | EMX_Raw[15] | Raw EMX15 Window | | (fT) | -9999999 | f12.6 |
| COMM | 39 | EMX_Final[1] | Final EMX01 Window | | (fT) | -9999999 | f12.6 |
| COMM | 40 | EMX_Final[2] | Final EMX02 Window | | (fT) | -9999999 | f12.6 |
| COMM | 41 | EMX_Final[3] | Final EMX03 Window | | (fT) | -9999999 | f12.6 |
| COMM | 42 | EMX_Final[4] | Final EMX04 Window | | (fT) | -9999999 | f12.6 |
| COMM | 43 | EMX_Final[5] | Final EMX05 Window | | (fT) | -9999999 | f12.6 |
| COMM | 44 | EMX_Final[6] | Final EMX06 Window | | (fT) | -9999999 | f12.6 |
| COMM | 45 | EMX_Final[7] | Final EMX07 Window | | (fT) | -9999999 | f12.6 |
| COMM | 46 | EMX_Final[8] | Final EMX08 Window | | (fT) | -9999999 | f12.6 |
| COMM | 47 | EMX_Final[9] | Final EMX09 Window | | (fT) | -9999999 | f12.6 |
| COMM | 48 | EMX_Final[10] | Final EMX10 Window | | (fT) | -9999999 | f12.6 |
| COMM | 49 | EMX_Final[11] | Final EMX11 Window | | (fT) | -9999999 | f12.6 |
| COMM | 50 | EMX_Final[12] | Final EMX12 Window | | (fT) | -9999999 | f12.6 |
| COMM | 51 | EMX_Final[13] | Final EMX13 Window | | (fT) | -9999999 | f12.6 |
| COMM | 52 | EMX_Final[14] | Final EMX14 Window | | (fT) | -9999999 | f12.6 |
| COMM | 53 | EMX_Final[15] | Final EMX15 Window | | (fT) | -9999999 | f12.6 |
| COMM | 54 | X_Sferics | X_Sferics | | | -9999999 | f10.3 |
| COMM | 55 | X_Lowfreq | X_Lowfreq | | | -9999999 | f10.3 |
| COMM | 56 | X_Powerline | X_Powerline | | | -9999999 | f10.3 |
| COMM | 57 | X_VLF1 | X_18.2kHz | | | -9999999 | f10.3 |
| COMM | 58 | X_VLF2 | X_19.8kHz | | | -9999999 | f10.3 |
| COMM | 59 | X_VLF3 | X_21.4kHz | | | -9999999 | f10.3 |
| COMM | 60 | X_VLF4 | X_22.2kHz | | | -9999999 | f10.3 |
| COMM | 61 | X_Geofact | X_Geometric factor | | | -9999999 | f10.3 |
| COMM | 62 | Z_TConst | Z_Time Constant | | (ms) | -9999999 | f8.3 |
| COMM | 63 | EMZ_Raw[1] | Raw EMZ01 Window | | (fT) | -9999999 | f12.6 |
| COMM | 64 | EMZ_Raw[2] | Raw EMZ02 Window | | (fT) | -9999999 | f12.6 |
| COMM | 65 | EMZ_Raw[3] | Raw EMZ03 Window | | (fT) | -9999999 | f12.6 |
| COMM | 66 | EMZ_Raw[4] | Raw EMZ04 Window | | (fT) | -9999999 | f12.6 |
| COMM | 67 | EMZ_Raw[5] | Raw EMZ05 Window | | (fT) | -9999999 | f12.6 |
| COMM | 68 | EMZ_Raw[6] | Raw EMZ06 Window | | (fT) | -9999999 | f12.6 |
| COMM | 69 | EMZ_Raw[7] | Raw EMZ07 Window | | (fT) | -9999999 | f12.6 |
| COMM | 70 | EMZ_Raw[8] | Raw EMZ08 Window | | (fT) | -9999999 | f12.6 |
| COMM | 71 | EMZ_Raw[9] | Raw EMZ09 Window | | (fT) | -9999999 | f12.6 |
| COMM | 72 | EMZ_Raw[10] | Raw EMZ10 Window | | (fT) | -9999999 | f12.6 |
| COMM | 73 | EMZ_Raw[11] | Raw EMZ11 Window | | (fT) | -9999999 | f12.6 |
| COMM | 74 | EMZ_Raw[12] | Raw EMZ12 Window | | (fT) | -9999999 | f12.6 |
| COMM | 75 | EMZ_Raw[13] | Raw EMZ13 Window | | (fT) | -9999999 | f12.6 |
| COMM | 76 | EMZ_Raw[14] | Raw EMZ14 Window | | (fT) | -9999999 | f12.6 |
| COMM | 77 | EMZ_Raw[15] | Raw EMZ15 Window | | (fT) | -9999999 | f12.6 |
| COMM | 78 | EMZ_Final[1] | Final EMZ01 Window | | (fT) | -9999999 | f12.6 |
| COMM | 79 | EMZ_Final[2] | Final EMZ02 Window | | (fT) | -9999999 | f12.6 |
| COMM | 80 | EMZ_Final[3] | Final EMZ03 Window | | (fT) | -9999999 | f12.6 |
| COMM | 81 | EMZ_Final[4] | Final EMZ04 Window | | (fT) | -9999999 | f12.6 |
| COMM | 82 | EMZ_Final[5] | Final EMZ05 Window | | (fT) | -9999999 | f12.6 |
| COMM | 83 | EMZ_Final[6] | Final EMZ06 Window | | (fT) | -9999999 | f12.6 |
| COMM | 84 | EMZ_Final[7] | Final EMZ07 Window | | (fT) | -9999999 | f12.6 |
| COMM | 85 | EMZ_Final[8] | Final EMZ08 Window | | (fT) | -9999999 | f12.6 |
| COMM | 86 | EMZ_Final[9] | Final EMZ09 Window | | (fT) | -9999999 | f12.6 |
| COMM | 87 | EMZ_Final[10] | Final EMZ10 Window | | (fT) | -9999999 | f12.6 |
| COMM | 88 | EMZ_Final[11] | Final EMZ11 Window | | (fT) | -9999999 | f12.6 |
| COMM | 89 | EMZ_Final[12] | Final EMZ12 Window | | (fT) | -9999999 | f12.6 |
| COMM | 90 | EMZ_Final[13] | Final EMZ13 Window | | (fT) | -9999999 | f12.6 |
| COMM | 91 | EMZ_Final[14] | Final EMZ14 Window | | (fT) | -9999999 | f12.6 |
| COMM | 92 | EMZ_Final[15] | Final EMZ15 Window | | (fT) | -9999999 | f12.6 |
| COMM | 93 | Z_Sferics | Z_Sferics | | | -9999999 | f10.3 |
| COMM | 94 | Z_Lowfreq | Z_Lowfreq | | | -9999999 | f10.3 |
| COMM | 95 | Z_Powerline | Z_Powerline | | | -9999999 | f10.3 |
| COMM | 96 | Z_VLF1 | Z_18.2kHz | | | -9999999 | f10.3 |
| COMM | 97 | Z_VLF2 | Z_19.8kHz | | | -9999999 | f10.3 |
| COMM | 98 | Z_VLF3 | Z_21.4kHz | | | -9999999 | f10.3 |
| COMM | 99 | Z_VLF4 | Z_22.2kHz | | | -9999999 | f10.3 |
| COMM | 100 | Z_Geofact | Z_Geometric factor | | | -9999999 | f10.3 |
| COMM | 101 | CNDX[1] | Conductivity_X001 | 0- 5 m | (mS/m) | -9999999 | f10.3 |
| COMM | 102 | CNDX[2] | Conductivity_X002 | 5- 10 m | (mS/m) | -9999999 | f10.3 |
| COMM | 103 | CNDX[3] | Conductivity_X003 | 10- 15 m | (mS/m) | -9999999 | f10.3 |
| COMM | 104 | CNDX[4] | Conductivity_X004 | 15- 20 m | (mS/m) | -9999999 | f10.3 |
| COMM | 105 | CNDX[5] | Conductivity_X005 | 20- 25 m | (mS/m) | -9999999 | f10.3 |
| COMM | 106 | CNDX[6] | Conductivity_X006 | 25- 30 m | (mS/m) | -9999999 | f10.3 |
| COMM | 107 | CNDX[7] | Conductivity_X007 | 30- 35 m | (mS/m) | -9999999 | f10.3 |
| COMM | 108 | CNDX[8] | Conductivity_X008 | 35- 40 m | (mS/m) | -9999999 | f10.3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| COMM | 109 | CNDX[9] | Conductivity_X009 | 40- 45 m | (mS/m) | -9999999 | f10.3 |
| COMM | 110 | CNDX[10] | Conductivity_X010 | 45- 50 m | (mS/m) | -9999999 | f10.3 |
| COMM | 111 | CNDX[11] | Conductivity_X011 | 50- 55 m | (mS/m) | -9999999 | f10.3 |
| COMM | 112 | CNDX[12] | Conductivity_X012 | 55- 60 m | (mS/m) | -9999999 | f10.3 |
| COMM | 113 | CNDX[13] | Conductivity_X013 | 60- 65 m | (mS/m) | -9999999 | f10.3 |
| COMM | 114 | CNDX[14] | Conductivity_X014 | 65- 70 m | (mS/m) | -9999999 | f10.3 |
| COMM | 115 | CNDX[15] | Conductivity_X015 | 70- 75 m | (mS/m) | -9999999 | f10.3 |
| COMM | 116 | CNDX[16] | Conductivity_X016 | 75- 80 m | (mS/m) | -9999999 | f10.3 |
| COMM | 117 | CNDX[17] | Conductivity_X017 | 80- 85 m | (mS/m) | -9999999 | f10.3 |
| COMM | 118 | CNDX[18] | Conductivity_X018 | 85- 90 m | (mS/m) | -9999999 | f10.3 |
| COMM | 119 | CNDX[19] | Conductivity_X019 | 90- 95 m | (mS/m) | -9999999 | f10.3 |
| COMM | 120 | CNDX[20] | Conductivity_X020 | 95-100 m | (mS/m) | -9999999 | f10.3 |
| COMM | 121 | CNDX[21] | Conductivity_X021 | 100-105 m | (mS/m) | -9999999 | f10.3 |
| COMM | 122 | CNDX[22] | Conductivity_X022 | 105-110 m | (mS/m) | -9999999 | f10.3 |
| COMM | 123 | CNDX[23] | Conductivity_X023 | 110-115 m | (mS/m) | -9999999 | f10.3 |
| COMM | 124 | CNDX[24] | Conductivity_X024 | 115-120 m | (mS/m) | -9999999 | f10.3 |
| COMM | 125 | CNDX[25] | Conductivity_X025 | 120-125 m | (mS/m) | -9999999 | f10.3 |
| COMM | 126 | CNDX[26] | Conductivity_X026 | 125-130 m | (mS/m) | -9999999 | f10.3 |
| COMM | 127 | CNDX[27] | Conductivity_X027 | 130-135 m | (mS/m) | -9999999 | f10.3 |
| COMM | 128 | CNDX[28] | Conductivity_X028 | 135-140 m | (mS/m) | -9999999 | f10.3 |
| COMM | 129 | CNDX[29] | Conductivity_X029 | 140-145 m | (mS/m) | -9999999 | f10.3 |
| COMM | 130 | CNDX[30] | Conductivity_X030 | 145-150 m | (mS/m) | -9999999 | f10.3 |
| COMM | 131 | CNDX[31] | Conductivity_X031 | 150-155 m | (mS/m) | -9999999 | f10.3 |
| COMM | 132 | CNDX[32] | Conductivity_X032 | 155-160 m | (mS/m) | -9999999 | f10.3 |
| COMM | 133 | CNDX[33] | Conductivity_X033 | 160-165 m | (mS/m) | -9999999 | f10.3 |
| COMM | 134 | CNDX[34] | Conductivity_X034 | 165-170 m | (mS/m) | -9999999 | f10.3 |
| COMM | 135 | CNDX[35] | Conductivity_X035 | 170-175 m | (mS/m) | -9999999 | f10.3 |
| COMM | 136 | CNDX[36] | Conductivity_X036 | 175-180 m | (mS/m) | -9999999 | f10.3 |
| COMM | 137 | CNDX[37] | Conductivity_X037 | 180-185 m | (mS/m) | -9999999 | f10.3 |
| COMM | 138 | CNDX[38] | Conductivity_X038 | 185-190 m | (mS/m) | -9999999 | f10.3 |
| COMM | 139 | CNDX[39] | Conductivity_X039 | 190-195 m | (mS/m) | -9999999 | f10.3 |
| COMM | 140 | CNDX[40] | Conductivity_X040 | 195-200 m | (mS/m) | -9999999 | f10.3 |
| COMM | 141 | CNDX[41] | Conductivity_X041 | 200-205 m | (mS/m) | -9999999 | f10.3 |
| COMM | 142 | CNDX[42] | Conductivity_X042 | 205-210 m | (mS/m) | -9999999 | f10.3 |
| COMM | 143 | CNDX[43] | Conductivity_X043 | 210-215 m | (mS/m) | -9999999 | f10.3 |
| COMM | 144 | CNDX[44] | Conductivity_X044 | 215-220 m | (mS/m) | -9999999 | f10.3 |
| COMM | 145 | CNDX[45] | Conductivity_X045 | 220-225 m | (mS/m) | -9999999 | f10.3 |
| COMM | 146 | CNDX[46] | Conductivity_X046 | 225-230 m | (mS/m) | -9999999 | f10.3 |
| COMM | 147 | CNDX[47] | Conductivity_X047 | 230-235 m | (mS/m) | -9999999 | f10.3 |
| COMM | 148 | CNDX[48] | Conductivity_X048 | 235-240 m | (mS/m) | -9999999 | f10.3 |
| COMM | 149 | CNDX[49] | Conductivity_X049 | 240-245 m | (mS/m) | -9999999 | f10.3 |
| COMM | 150 | CNDX[50] | Conductivity_X050 | 245-250 m | (mS/m) | -9999999 | f10.3 |
| COMM | 151 | CNDX[51] | Conductivity_X051 | 250-255 m | (mS/m) | -9999999 | f10.3 |
| COMM | 152 | CNDX[52] | Conductivity_X052 | 255-260 m | (mS/m) | -9999999 | f10.3 |
| COMM | 153 | CNDX[53] | Conductivity_X053 | 260-265 m | (mS/m) | -9999999 | f10.3 |
| COMM | 154 | CNDX[54] | Conductivity_X054 | 265-270 m | (mS/m) | -9999999 | f10.3 |
| COMM | 155 | CNDX[55] | Conductivity_X055 | 270-275 m | (mS/m) | -9999999 | f10.3 |
| COMM | 156 | CNDX[56] | Conductivity_X056 | 275-280 m | (mS/m) | -9999999 | f10.3 |
| COMM | 157 | CNDX[57] | Conductivity_X057 | 280-285 m | (mS/m) | -9999999 | f10.3 |
| COMM | 158 | CNDX[58] | Conductivity_X058 | 285-290 m | (mS/m) | -9999999 | f10.3 |
| COMM | 159 | CNDX[59] | Conductivity_X059 | 290-295 m | (mS/m) | -9999999 | f10.3 |
| COMM | 160 | CNDX[60] | Conductivity_X060 | 295-300 m | (mS/m) | -9999999 | f10.3 |
| COMM | 161 | CNDX[61] | Conductivity_X061 | 300-305 m | (mS/m) | -9999999 | f10.3 |
| COMM | 162 | CNDX[62] | Conductivity_X062 | 305-310 m | (mS/m) | -9999999 | f10.3 |
| COMM | 163 | CNDX[63] | Conductivity_X063 | 310-315 m | (mS/m) | -9999999 | f10.3 |
| COMM | 164 | CNDX[64] | Conductivity_X064 | 315-320 m | (mS/m) | -9999999 | f10.3 |
| COMM | 165 | CNDX[65] | Conductivity_X065 | 320-325 m | (mS/m) | -9999999 | f10.3 |
| COMM | 166 | CNDX[66] | Conductivity_X066 | 325-330 m | (mS/m) | -9999999 | f10.3 |
| COMM | 167 | CNDX[67] | Conductivity_X067 | 330-335 m | (mS/m) | -9999999 | f10.3 |
| COMM | 168 | CNDX[68] | Conductivity_X068 | 335-340 m | (mS/m) | -9999999 | f10.3 |
| COMM | 169 | CNDX[69] | Conductivity_X069 | 340-345 m | (mS/m) | -9999999 | f10.3 |
| COMM | 170 | CNDX[70] | Conductivity_X070 | 345-350 m | (mS/m) | -9999999 | f10.3 |
| COMM | 171 | CNDX[71] | Conductivity_X071 | 350-355 m | (mS/m) | -9999999 | f10.3 |
| COMM | 172 | CNDX[72] | Conductivity_X072 | 355-360 m | (mS/m) | -9999999 | f10.3 |
| COMM | 173 | CNDX[73] | Conductivity_X073 | 360-365 m | (mS/m) | -9999999 | f10.3 |
| COMM | 174 | CNDX[74] | Conductivity_X074 | 365-370 m | (mS/m) | -9999999 | f10.3 |
| COMM | 175 | CNDX[75] | Conductivity_X075 | 370-375 m | (mS/m) | -9999999 | f10.3 |
| COMM | 176 | CNDX[76] | Conductivity_X076 | 375-380 m | (mS/m) | -9999999 | f10.3 |
| COMM | 177 | CNDX[77] | Conductivity_X077 | 380-385 m | (mS/m) | -9999999 | f10.3 |
| COMM | 178 | CNDX[78] | Conductivity_X078 | 385-390 m | (mS/m) | -9999999 | f10.3 |
| COMM | 179 | CNDX[79] | Conductivity_X079 | 390-395 m | (mS/m) | -9999999 | f10.3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| COMM | 180 | CNDX[80] | Conductivity_X080 | 395-400 m | (mS/m) | -9999999 | f10.3 |
| COMM | 181 | CNDX[81] | Conductivity_X081 | 400-405 m | (mS/m) | -9999999 | f10.3 |
| COMM | 182 | CNDX[82] | Conductivity_X082 | 405-410 m | (mS/m) | -9999999 | f10.3 |
| COMM | 183 | CNDX[83] | Conductivity_X083 | 410-415 m | (mS/m) | -9999999 | f10.3 |
| COMM | 184 | CNDX[84] | Conductivity_X084 | 415-420 m | (mS/m) | -9999999 | f10.3 |
| COMM | 185 | CNDX[85] | Conductivity_X085 | 420-425 m | (mS/m) | -9999999 | f10.3 |
| COMM | 186 | CNDX[86] | Conductivity_X086 | 425-430 m | (mS/m) | -9999999 | f10.3 |
| COMM | 187 | CNDX[87] | Conductivity_X087 | 430-435 m | (mS/m) | -9999999 | f10.3 |
| COMM | 188 | CNDX[88] | Conductivity_X088 | 435-440 m | (mS/m) | -9999999 | f10.3 |
| COMM | 189 | CNDX[89] | Conductivity_X089 | 440-445 m | (mS/m) | -9999999 | f10.3 |
| COMM | 190 | CNDX[90] | Conductivity_X090 | 445-450 m | (mS/m) | -9999999 | f10.3 |
| COMM | 191 | CNDX[91] | Conductivity_X091 | 450-455 m | (mS/m) | -9999999 | f10.3 |
| COMM | 192 | CNDX[92] | Conductivity_X092 | 455-460 m | (mS/m) | -9999999 | f10.3 |
| COMM | 193 | CNDX[93] | Conductivity_X093 | 460-465 m | (mS/m) | -9999999 | f10.3 |
| COMM | 194 | CNDX[94] | Conductivity_X094 | 465-470 m | (mS/m) | -9999999 | f10.3 |
| COMM | 195 | CNDX[95] | Conductivity_X095 | 470-475 m | (mS/m) | -9999999 | f10.3 |
| COMM | 196 | CNDX[96] | Conductivity_X096 | 475-480 m | (mS/m) | -9999999 | f10.3 |
| COMM | 197 | CNDX[97] | Conductivity_X097 | 480-485 m | (mS/m) | -9999999 | f10.3 |
| COMM | 198 | CNDX[98] | Conductivity_X098 | 485-490 m | (mS/m) | -9999999 | f10.3 |
| COMM | 199 | CNDX[99] | Conductivity_X099 | 490-495 m | (mS/m) | -9999999 | f10.3 |
| COMM | 200 | CNDX[100] | Conductivity_X100 | 495-500 m | (mS/m) | -9999999 | f10.3 |
| COMM | 201 | CNDZ[1] | Conductivity_Z001 | 0- 5 m | (mS/m) | -9999999 | f10.3 |
| COMM | 202 | CNDZ[2] | Conductivity_Z002 | 5- 10 m | (mS/m) | -9999999 | f10.3 |
| COMM | 203 | CNDZ[3] | Conductivity_Z003 | 10- 15 m | (mS/m) | -9999999 | f10.3 |
| COMM | 204 | CNDZ[4] | Conductivity_Z004 | 15- 20 m | (mS/m) | -9999999 | f10.3 |
| COMM | 205 | CNDZ[5] | Conductivity_Z005 | 20- 25 m | (mS/m) | -9999999 | f10.3 |
| COMM | 206 | CNDZ[6] | Conductivity_Z006 | 25- 30 m | (mS/m) | -9999999 | f10.3 |
| COMM | 207 | CNDZ[7] | Conductivity_Z007 | 30- 35 m | (mS/m) | -9999999 | f10.3 |
| COMM | 208 | CNDZ[8] | Conductivity_Z008 | 35- 40 m | (mS/m) | -9999999 | f10.3 |
| COMM | 209 | CNDZ[9] | Conductivity_Z009 | 40- 45 m | (mS/m) | -9999999 | f10.3 |
| COMM | 210 | CNDZ[10] | Conductivity_Z010 | 45- 50 m | (mS/m) | -9999999 | f10.3 |
| COMM | 211 | CNDZ[11] | Conductivity_Z011 | 50- 55 m | (mS/m) | -9999999 | f10.3 |
| COMM | 212 | CNDZ[12] | Conductivity_Z012 | 55- 60 m | (mS/m) | -9999999 | f10.3 |
| COMM | 213 | CNDZ[13] | Conductivity_Z013 | 60- 65 m | (mS/m) | -9999999 | f10.3 |
| COMM | 214 | CNDZ[14] | Conductivity_Z014 | 65- 70 m | (mS/m) | -9999999 | f10.3 |
| COMM | 215 | CNDZ[15] | Conductivity_Z015 | 70- 75 m | (mS/m) | -9999999 | f10.3 |
| COMM | 216 | CNDZ[16] | Conductivity_Z016 | 75- 80 m | (mS/m) | -9999999 | f10.3 |
| COMM | 217 | CNDZ[17] | Conductivity_Z017 | 80- 85 m | (mS/m) | -9999999 | f10.3 |
| COMM | 218 | CNDZ[18] | Conductivity_Z018 | 85- 90 m | (mS/m) | -9999999 | f10.3 |
| COMM | 219 | CNDZ[19] | Conductivity_Z019 | 90- 95 m | (mS/m) | -9999999 | f10.3 |
| COMM | 220 | CNDZ[20] | Conductivity_Z020 | 95-100 m | (mS/m) | -9999999 | f10.3 |
| COMM | 221 | CNDZ[21] | Conductivity_Z021 | 100-105 m | (mS/m) | -9999999 | f10.3 |
| COMM | 222 | CNDZ[22] | Conductivity_Z022 | 105-110 m | (mS/m) | -9999999 | f10.3 |
| COMM | 223 | CNDZ[23] | Conductivity_Z023 | 110-115 m | (mS/m) | -9999999 | f10.3 |
| COMM | 224 | CNDZ[24] | Conductivity_Z024 | 115-120 m | (mS/m) | -9999999 | f10.3 |
| COMM | 225 | CNDZ[25] | Conductivity_Z025 | 120-125 m | (mS/m) | -9999999 | f10.3 |
| COMM | 226 | CNDZ[26] | Conductivity_Z026 | 125-130 m | (mS/m) | -9999999 | f10.3 |
| COMM | 227 | CNDZ[27] | Conductivity_Z027 | 130-135 m | (mS/m) | -9999999 | f10.3 |
| COMM | 228 | CNDZ[28] | Conductivity_Z028 | 135-140 m | (mS/m) | -9999999 | f10.3 |
| COMM | 229 | CNDZ[29] | Conductivity_Z029 | 140-145 m | (mS/m) | -9999999 | f10.3 |
| COMM | 230 | CNDZ[30] | Conductivity_Z030 | 145-150 m | (mS/m) | -9999999 | f10.3 |
| COMM | 231 | CNDZ[31] | Conductivity_Z031 | 150-155 m | (mS/m) | -9999999 | f10.3 |
| COMM | 232 | CNDZ[32] | Conductivity_Z032 | 155-160 m | (mS/m) | -9999999 | f10.3 |
| COMM | 233 | CNDZ[33] | Conductivity_Z033 | 160-165 m | (mS/m) | -9999999 | f10.3 |
| COMM | 234 | CNDZ[34] | Conductivity_Z034 | 165-170 m | (mS/m) | -9999999 | f10.3 |
| COMM | 235 | CNDZ[35] | Conductivity_Z035 | 170-175 m | (mS/m) | -9999999 | f10.3 |
| COMM | 236 | CNDZ[36] | Conductivity_Z036 | 175-180 m | (mS/m) | -9999999 | f10.3 |
| COMM | 237 | CNDZ[37] | Conductivity_Z037 | 180-185 m | (mS/m) | -9999999 | f10.3 |
| COMM | 238 | CNDZ[38] | Conductivity_Z038 | 185-190 m | (mS/m) | -9999999 | f10.3 |
| COMM | 239 | CNDZ[39] | Conductivity_Z039 | 190-195 m | (mS/m) | -9999999 | f10.3 |
| COMM | 240 | CNDZ[40] | Conductivity_Z040 | 195-200 m | (mS/m) | -9999999 | f10.3 |
| COMM | 241 | CNDZ[41] | Conductivity_Z041 | 200-205 m | (mS/m) | -9999999 | f10.3 |
| COMM | 242 | CNDZ[42] | Conductivity_Z042 | 205-210 m | (mS/m) | -9999999 | f10.3 |
| COMM | 243 | CNDZ[43] | Conductivity_Z043 | 210-215 m | (mS/m) | -9999999 | f10.3 |
| COMM | 244 | CNDZ[44] | Conductivity_Z044 | 215-220 m | (mS/m) | -9999999 | f10.3 |
| COMM | 245 | CNDZ[45] | Conductivity_Z045 | 220-225 m | (mS/m) | -9999999 | f10.3 |
| COMM | 246 | CNDZ[46] | Conductivity_Z046 | 225-230 m | (mS/m) | -9999999 | f10.3 |
| COMM | 247 | CNDZ[47] | Conductivity_Z047 | 230-235 m | (mS/m) | -9999999 | f10.3 |
| COMM | 248 | CNDZ[48] | Conductivity_Z048 | 235-240 m | (mS/m) | -9999999 | f10.3 |
| COMM | 249 | CNDZ[49] | Conductivity_Z049 | 240-245 m | (mS/m) | -9999999 | f10.3 |
| COMM | 250 | CNDZ[50] | Conductivity_Z050 | 245-250 m | (mS/m) | -9999999 | f10.3 |

```
COMM   251  CNDZ[51]        Conductivity_Z051     250-255 m   (mS/m)  -9999999  f10.3
COMM   252  CNDZ[52]        Conductivity_Z052     255-260 m   (mS/m)  -9999999  f10.3
COMM   253  CNDZ[53]        Conductivity_Z053     260-265 m   (mS/m)  -9999999  f10.3
COMM   254  CNDZ[54]        Conductivity_Z054     265-270 m   (mS/m)  -9999999  f10.3
COMM   255  CNDZ[55]        Conductivity_Z055     270-275 m   (mS/m)  -9999999  f10.3
COMM   256  CNDZ[56]        Conductivity_Z056     275-280 m   (mS/m)  -9999999  f10.3
COMM   257  CNDZ[57]        Conductivity_Z057     280-285 m   (mS/m)  -9999999  f10.3
COMM   258  CNDZ[58]        Conductivity_Z058     285-290 m   (mS/m)  -9999999  f10.3
COMM   259  CNDZ[59]        Conductivity_Z059     290-295 m   (mS/m)  -9999999  f10.3
COMM   260  CNDZ[60]        Conductivity_Z060     295-300 m   (mS/m)  -9999999  f10.3
COMM   261  CNDZ[61]        Conductivity_Z061     300-305 m   (mS/m)  -9999999  f10.3
COMM   262  CNDZ[62]        Conductivity_Z062     305-310 m   (mS/m)  -9999999  f10.3
COMM   263  CNDZ[63]        Conductivity_Z063     310-315 m   (mS/m)  -9999999  f10.3
COMM   264  CNDZ[64]        Conductivity_Z064     315-320 m   (mS/m)  -9999999  f10.3
COMM   265  CNDZ[65]        Conductivity_Z065     320-325 m   (mS/m)  -9999999  f10.3
COMM   266  CNDZ[66]        Conductivity_Z066     325-330 m   (mS/m)  -9999999  f10.3
COMM   267  CNDZ[67]        Conductivity_Z067     330-335 m   (mS/m)  -9999999  f10.3
COMM   268  CNDZ[68]        Conductivity_Z068     335-340 m   (mS/m)  -9999999  f10.3
COMM   269  CNDZ[69]        Conductivity_Z069     340-345 m   (mS/m)  -9999999  f10.3
COMM   270  CNDZ[70]        Conductivity_Z070     345-350 m   (mS/m)  -9999999  f10.3
COMM   271  CNDZ[71]        Conductivity_Z071     350-355 m   (mS/m)  -9999999  f10.3
COMM   272  CNDZ[72]        Conductivity_Z072     355-360 m   (mS/m)  -9999999  f10.3
COMM   273  CNDZ[73]        Conductivity_Z073     360-365 m   (mS/m)  -9999999  f10.3
COMM   274  CNDZ[74]        Conductivity_Z074     365-370 m   (mS/m)  -9999999  f10.3
COMM   275  CNDZ[75]        Conductivity_Z075     370-375 m   (mS/m)  -9999999  f10.3
COMM   276  CNDZ[76]        Conductivity_Z076     375-380 m   (mS/m)  -9999999  f10.3
COMM   277  CNDZ[77]        Conductivity_Z077     380-385 m   (mS/m)  -9999999  f10.3
COMM   278  CNDZ[78]        Conductivity_Z078     385-390 m   (mS/m)  -9999999  f10.3
COMM   279  CNDZ[79]        Conductivity_Z079     390-395 m   (mS/m)  -9999999  f10.3
COMM   280  CNDZ[80]        Conductivity_Z080     395-400 m   (mS/m)  -9999999  f10.3
COMM   281  CNDZ[81]        Conductivity_Z081     400-405 m   (mS/m)  -9999999  f10.3
COMM   282  CNDZ[82]        Conductivity_Z082     405-410 m   (mS/m)  -9999999  f10.3
COMM   283  CNDZ[83]        Conductivity_Z083     410-415 m   (mS/m)  -9999999  f10.3
COMM   284  CNDZ[84]        Conductivity_Z084     415-420 m   (mS/m)  -9999999  f10.3
COMM   285  CNDZ[85]        Conductivity_Z085     420-425 m   (mS/m)  -9999999  f10.3
COMM   286  CNDZ[86]        Conductivity_Z086     425-430 m   (mS/m)  -9999999  f10.3
COMM   287  CNDZ[87]        Conductivity_Z087     430-435 m   (mS/m)  -9999999  f10.3
COMM   288  CNDZ[88]        Conductivity_Z088     435-440 m   (mS/m)  -9999999  f10.3
COMM   289  CNDZ[89]        Conductivity_Z089     440-445 m   (mS/m)  -9999999  f10.3
COMM   290  CNDZ[90]        Conductivity_Z090     445-450 m   (mS/m)  -9999999  f10.3
COMM   291  CNDZ[91]        Conductivity_Z091     450-455 m   (mS/m)  -9999999  f10.3
COMM   292  CNDZ[92]        Conductivity_Z092     455-460 m   (mS/m)  -9999999  f10.3
COMM   293  CNDZ[93]        Conductivity_Z093     460-465 m   (mS/m)  -9999999  f10.3
COMM   294  CNDZ[94]        Conductivity_Z094     465-470 m   (mS/m)  -9999999  f10.3
COMM   295  CNDZ[95]        Conductivity_Z095     470-475 m   (mS/m)  -9999999  f10.3
COMM   296  CNDZ[96]        Conductivity_Z096     475-480 m   (mS/m)  -9999999  f10.3
COMM   297  CNDZ[97]        Conductivity_Z097     480-485 m   (mS/m)  -9999999  f10.3
COMM   298  CNDZ[98]        Conductivity_Z098     485-490 m   (mS/m)  -9999999  f10.3
COMM   299  CNDZ[99]        Conductivity_Z099     490-495 m   (mS/m)  -9999999  f10.3
COMM   300  CNDZ[100]       Conductivity_Z100     495-500 m   (mS/m)  -9999999  f10.3
COMM
```

## AREA 2 – NABARLEK MAIN

```
COMM JOB NUMBER:                                                  1788
COMM AREA NUMBER:                                                    2
COMM SURVEY COMPANY:                            Fugro Airborne Surveys
COMM CLIENT:                                  Cameco Australia Pty Ltd
COMM SURVEY TYPE:                                  25Hz TEMPEST Survey
COMM AREA NAME:                                           Nabarlek Main
COMM STATE:                                                Arnhem Land
COMM COUNTRY:                                                Australia
COMM SURVEY FLOWN:                                           June 2006
COMM LOCATED DATA CREATED:                                    Oct 2006
COMM
COMM DATUM:                                                      AGD66
COMM PROJECTION:                                                   AMG
COMM ZONE:                                                          53
```

```
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:                                200 m
COMM TRAVERSE LINE DIRECTION:                         090-270 deg
COMM TIE LINE SPACING:                                    1900 m
COMM TIE LINE DIRECTION:                              000-180 deg
COMM NOMINAL TERRAIN CLEARANCE:                            120 m
COMM FINAL LINE KILOMETRES:                             823.6 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:                         20010 - 20500
COMM TIE LINE NUMBERS:                              27010 - 27070
COMM
COMM AREA BOUNDARY (WGS84, UTM53)
COMM
COMM    333511    8645220
COMM    333600    8637062
COMM    337457    8637062
COMM    337398    8635875
COMM    333511    8635905
COMM    317492    8635891
COMM    317526    8638154
COMM    320577    8638160
COMM    320547    8645339
COMM    333511    8645220
COMM
COMM SURVEY EQUIPMENT   <as for Area 1>
```

## AREA 3 – NABARLEK EAST

```
COMM JOB NUMBER:                                            1788
COMM AREA NUMBER:                                              3
COMM SURVEY COMPANY:                        Fugro Airborne Surveys
COMM CLIENT:                              Cameco Australia Pty Ltd
COMM SURVEY TYPE:                            25Hz TEMPEST Survey
COMM AREA NAME:                                    Nabarlek East
COMM STATE:                                                   NT
COMM COUNTRY:                                          Australia
COMM SURVEY FLOWN:                                June/July 2006
COMM LOCATED DATA CREATED:                              Aug 2006
COMM
COMM DATUM:                                                AGD66
COMM PROJECTION:                                             AMG
COMM ZONE:                                                    53
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:                                200 m
COMM TRAVERSE LINE DIRECTION:                         000-180 deg
COMM TIE LINE SPACING:                                    2000 m
COMM TIE LINE DIRECTION:                              090-270 deg
COMM NOMINAL TERRAIN CLEARANCE:                            120 m
COMM FINAL LINE KILOMETRES:                               774 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:                         30010 - 30640
COMM TIE LINE NUMBERS:                              37010 - 37030
COMM
COMM AREA BOUNDARY (WGS84, UTM53)
COMM
COMM   333243.00  8645488.00
```

```
COMM   346192.00  8645534.00
COMM   346192.00  8635665.00
COMM   341236.00  8635665.00
COMM   341248.00  8633743.00
COMM   333243.00  8633765.00
COMM   333243.00  8635904.00
COMM
COMM SURVEY EQUIPMENT   <as for Area 1>
```

## AREA 4 – MURALIDBAR

```
COMM JOB NUMBER:                                                1788
COMM AREA NUMBER:                                                  4
COMM SURVEY COMPANY:                          Fugro Airborne Surveys
COMM CLIENT:                                Cameco Australia Pty Ltd
COMM SURVEY TYPE:                                25Hz TEMPEST Survey
COMM AREA NAME:                                           Muralidbar
COMM STATE:                                                       NT
COMM COUNTRY:                                              Australia
COMM SURVEY FLOWN:                                         July 2006
COMM LOCATED DATA CREATED:                                  Sep 2006
COMM
COMM DATUM:                                                    AGD66
COMM PROJECTION:                                                 AMG
COMM ZONE:                                                        53
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:                                    200 m
COMM TRAVERSE LINE DIRECTION:                            089-269 deg
COMM TIE LINE SPACING:                                        2000 m
COMM TIE LINE DIRECTION:                                 179-359 deg
COMM NOMINAL TERRAIN CLEARANCE:                                120 m
COMM FINAL LINE KILOMETRES:                                  1041 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:                            40010 - 40550
COMM TIE LINE NUMBERS:                                 47010 - 47070
COMM
COMM AREA BOUNDARY (WGS84, UTM53)
COMM
COMM    333002  8636724
COMM    345450  8636842
COMM    345552  8639463
COMM    348362  8639477
COMM    354102  8645965
COMM    364532  8645911
COMM    364509  8640073
COMM    362495  8640007
COMM    362493  8634998
COMM    333054  8634536
COMM
COMM SURVEY EQUIPMENT   <as for Area 1>
```

## AREA 5 – PLATEAU

```
COMM JOB NUMBER:                                                1788
COMM AREA NUMBER:                                                  5
COMM SURVEY COMPANY:                          Fugro Airborne Surveys
COMM CLIENT:                                Cameco Australia Pty Ltd
COMM SURVEY TYPE:                                25Hz TEMPEST Survey
COMM AREA NAME:                                              Plateau
```

```
COMM STATE:                                              Arnhem Land, NT
COMM COUNTRY:                                                  Australia
COMM SURVEY FLOWN:                                             June 2006
COMM LOCATED DATA CREATED:                                      Sep 2006
COMM
COMM DATUM:                                                        AGD66
COMM PROJECTION:                                                     AMG
COMM ZONE:                                                            53
COMM
COMM SURVEY SPECIFICATIONS
COMM
COMM TRAVERSE LINE SPACING:                                        200 m
COMM TRAVERSE LINE DIRECTION:                                000-180 deg
COMM TIE LINE SPACING:                                            1800 m
COMM TIE LINE DIRECTION:                                     090-270 deg
COMM NOMINAL TERRAIN CLEARANCE:                                    120 m
COMM FINAL LINE KILOMETRES:                                    1210.5 km
COMM
COMM LINE NUMBERING
COMM
COMM TRAVERSE LINE NUMBERS:                                50010 - 50491
COMM TIE LINE NUMBERS:                                     57010 - 57060
COMM
COMM AREA BOUNDARY (WGS84, UTM53)
COMM
COMM   327998   8608427
COMM   328110   8591831
COMM   322622   8591848
COMM   322612   8593636
COMM   320860   8593654
COMM   320764   8599163
COMM   319002   8599152
COMM   318943   8608371
COMM   318932   8610215
COMM   322683   8610395
COMM   322672   8612239
COMM   324271   8612258
COMM   324300   8623166
COMM   327804   8623165
COMM   327998   8608427
COMM
COMM SURVEY EQUIPMENT   <as for Area 1>
```

# APPENDIX V – List of all Supplied Data and Products

**Final Located Data:**

| | | |
|---|---|---|
| Nabarlek_West_raw.hdr | - | EM, conductivities, magnetics and digital elevation data |
| Nabarlek_Main_raw.hdr | - | EM, conductivities, magnetics and digital elevation data |
| Nabarlek_East_raw.hdr | - | EM, conductivities, magnetics and digital elevation data |
| Muralidbar_raw.hdr | - | EM, conductivities, magnetics and digital elevation data |
| Plateau_raw.hdr | - | EM, conductivities, magnetics and digital elevation data |

Final located data is in flat ASCII format. Contents are shown in Appendix IV.

Data also delivered in Geosoft GDB format.

**Final Gridded Data:** final grids supplied in ER-mapper format

X & Z EM window amplitudes
X & Z time constants
Digital terrain

**Final Plotfile and Digital Products:**

Flight Path
X and Z component CDI Multiplots of each line
X and Z component CDI stacked sections

**Digital and hardcopy of Acquisition and Processing Report**