

# Acquisition and Processing Report

for

## Cameco Australia Pty Ltd

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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 14<sup>th</sup> of June 2006 and the 7<sup>th</sup> 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

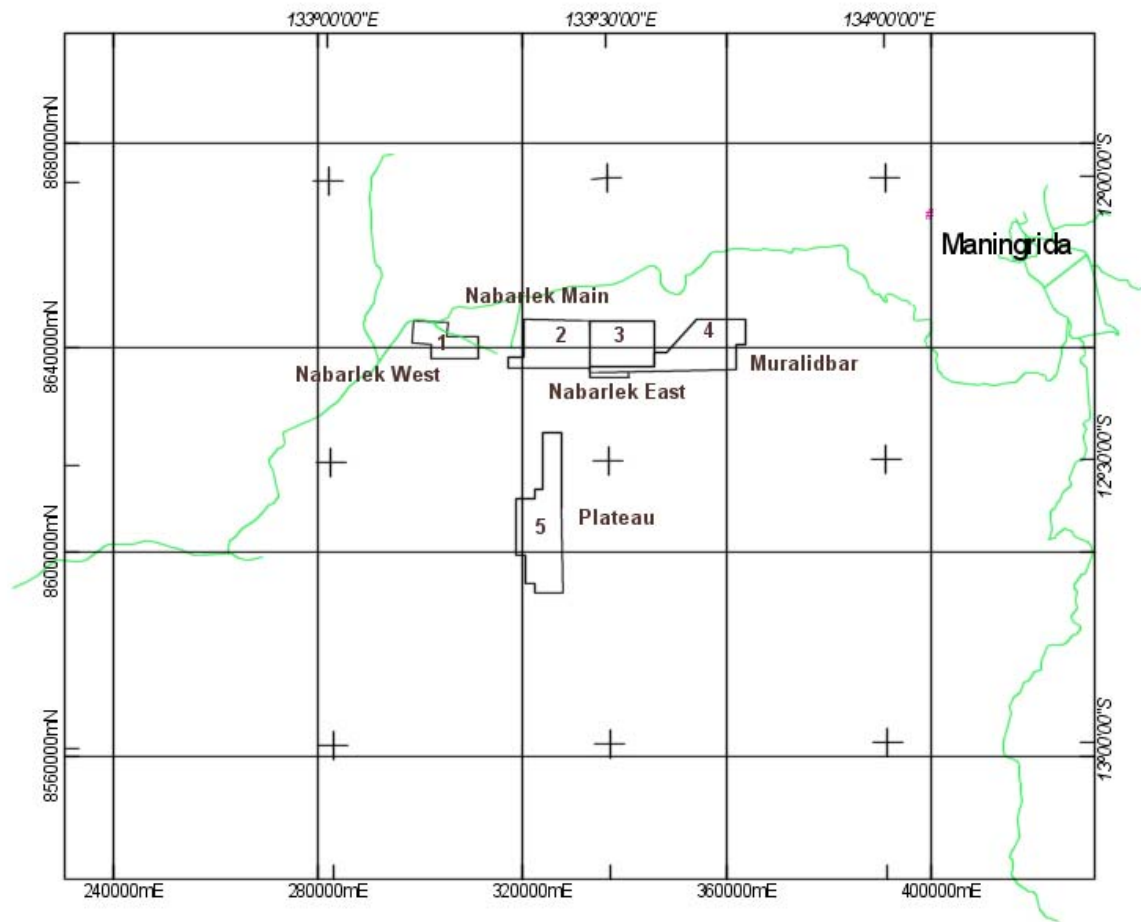
The survey was based out of Jabiru, Northern Territory. The survey aircraft was operated from the Jabiru airport with the aircraft fuel available on site. A temporary office was set up in a room at the Aurora Kakadu, South Alligator, where all survey operations were run and the post-flight data verification 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	-	16 <sup>th</sup> June 2006 – 7 <sup>th</sup> 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 <sup>2</sup>
• 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 <sup>2</sup>
• Average moment	-	34,160 Am <sup>2</sup>
• 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-101 pressure 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 spheric 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 16<sup>th</sup> 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 its 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.

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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  $\pm 5$  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.**

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## 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  $\mu\text{V}/\text{sq.m}/0.2\text{s}$ . 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  $\log_{10}(\text{pV}/\sqrt{\text{Hz}}/\text{sq.m})$ . 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  $\log_{10}(\text{pV}/\sqrt{\text{Hz}}/\text{sq.m})$ . 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  $\log_{10}(\text{pV}/\sqrt{\text{Hz}}/\text{sq.m})$ . 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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## 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 *
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 *
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 Number	Crew		Time		M/R	Oil		Fuel	This Flight		To Date		Standby (0, 0.5, 1)	Comments
		Plt(s)	Op	T/O	Land	Hrs	L	R	Burn	Prod	Refly	Prod	Refly		
Monday	12-Jun-06														Weather: Remarks:
Julian	11-Jun-00														
Day	1					Hours Today	0.0			0.0	0.0	0.0	0.0		
Tuesday	13-Jun-06														Weather: Remarks:
Julian	164														
Day	2					Hours Today	0.0			0.0	0.0	0.0	0.0		
Wednesday	14-Jun-06														Weather: Remarks:
Julian	165														
Day	3					Hours Today	0.0			0.0	0.0	0.0	0.0		
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		
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		
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. Entire flight scrubbed due to high noise threshold in Z coil AC and SM to fix. Safety Meeting: No new issues
Julian	168														
Day	6					Hours Today	4.1			0.0	0.0	0.0	0.0		
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 Chris golding in regards to urgent spare requirements Safety Meeting: Please see safety meeting minutes
Julian	169														
Day	7					Hours Today	0.9			0.0	0.0	0.0	0.0		
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			% Complete				0.0	
			Anticipated Hours Next week							0.0 km/day					
										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 Number	Crew		Time		M/R	Oil		Fuel	This Flight		To Date		Standby (0, 0.5, 1)	Comments
		Plt(s)	Op	T/O	Land	Hrs	L	R	Burn	Prod	Refly	Prod	Refly		
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. S.M and A.C to rectify by replacing tow loom and various connectors. Safety Meeting:No New Issues
Julian	170														
Day	8														
				Hours Today		2.5				0.0	0.0	0.0	0.0		
Tuesday 20-Jun-06														1.0	Weather:Warm humid Remarks:Standby  Safety Meeting:No new issues
Julian	171														
Day	9														
				Hours Today		0.0				0.0	0.0	0.0	0.0		
Wednesday 21-Jun-06														1.0	Weather:Warm, Humid Remarks:Standby S.M, A.C performing repairs to system including replacement of the tow cable Safety Meeting: No new issues.
Julian	172														
Day	10														
				Hours Today		0.0				0.0	0.0	0.0	0.0		
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 Remarks:FLT 005 test flight all ok FLT 006 short flight due to turbulence, 53.4kms scrubed due to coil knocks. Safety Meeting:No new issues
Julian	173	T.H, M.C	A.C,S.M	9:15	10:20	1.5			589	64.6					
Day	11														
				Hours Today		2.7				64.6	0.0	64.6	0.0		
Friday 23-Jun-06	7	T.H, M.C	S.M	6:35		-6.6				452.9					Weather:Fine Some Cloud Remarks: Scott Miller operating, AC in Darwin to pick up spares. System operating well. Safety Meeting: No new issues.
Julian	174	T.H, M.C	S.M	15:00		-15.0				186.7					
Day	12														
				Hours Today		-21.6				639.6	0.0	704.2	0.0		
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  Safety Meeting: No New issues
Julian	175														
Day	13														
				Hours Today		4.2				452.9	0.0	1157.1	0.0		
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.  Safety Meeting: Please see safety meeting minutes.
Julian	176														
Day	14														
				Hours Today		2.9				137.6	0.0	1294.7	0.0		
Total Job Hours		-1.7	Weekly Totals			-9.3	0	0	4591	1294.7	0.0			2.0	
			Total Aircraft Hours				Ltrs/Hr		-492			Total Standby		3.0	
			Hours to Next Periodic				Running Avg		185.0 km/day			% Complete		30.5 %	
			Anticipated Hours Next week						-138.7 km/hr			km Remaining		2955.3 km	

Week Commencing: **Monday 26-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 Number	Crew		Time		M/R	Oil		Fuel	This Flight		To Date		Standby (0, 0.5, 1)	Comments
		Plt(s)	Op	T/O	Land	Hrs	L	R	BURN	Prod	Refly	Prod	Refly		
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. Issue resolved and tested, T.H and G.T completed pilot handover Safety Meeting:No new issues, pilot handover completed.
Julian	178														
Day	16														
				Hours Today		0.0				0.0	0.0	1645.7	0.0		
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 turbulence, (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 Number	Crew		Time		M/R	Oil		Fuel	This Flight		To Date		Standby (0, 0.5, 1)	Comments
		Plt(s)	Op	T/O	Land	Hrs	L	R	BURN	Prod	Refly	Prod	Refly		
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 canceled 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	

<b>APPENDIX III – Flight Summary (Line Listing)</b>
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**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	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	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  $\pm 5$  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	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_lVD	Levelled TMI lVD	(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

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**