Logistics Report

for a

DETAILED AIRBORNE MAGNETIC, RADIOMETRIC AND DIGITAL TERRAIN SURVEY

for the

SHEPPARD AND HOLSTEINS PROJECTS

carried out on behalf of

ARAFURA RESOURCES LTD.

(Aeroquest Airborne Job # B334)

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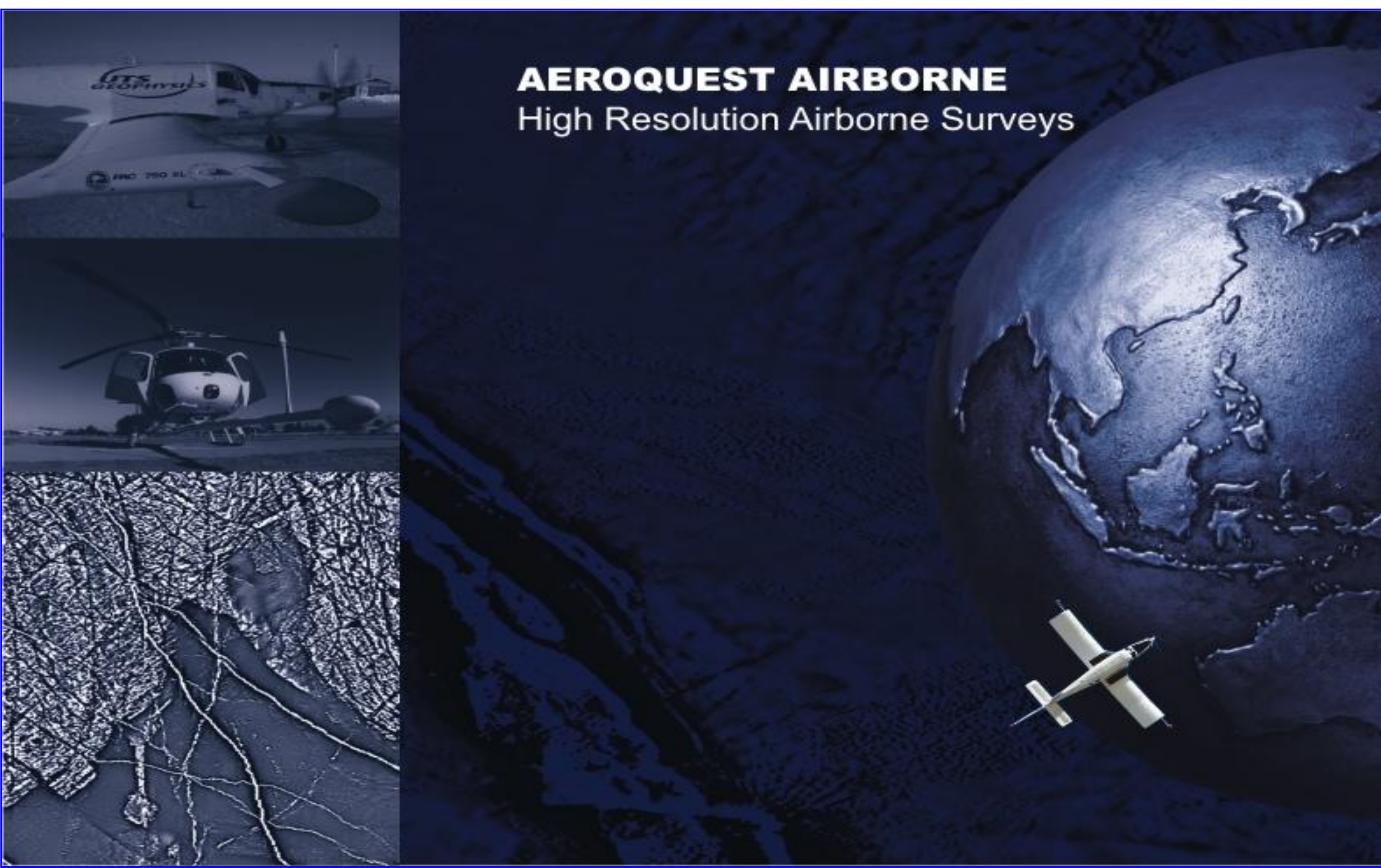

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1 GENERAL SURVEY INFORMATION

Aeroquest Airborne conducted a low level airborne geophysical survey for the following company:

Arafura Resources Ltd.
Level 5, 16 St Georges Terrace
Perth WA 6000

Acquisition for this survey commenced on the 4th of December 2011 and was completed on the 12th of December 2011. The base location used for operating the aircraft and performing in-field quality control was Alice Springs.

2 SURVEY SPECIFICATIONS

The first area surveyed, Sheppard, was located about 89km east of Lake Lewis, Alice Springs. The second one, Holsteins, was about 19km southeast of Hart, also in Alice Springs. The survey was flown using the WGS84 coordinate system (a Universal Transverse Mercator projection) derived from the World Geodetic System and was contained within zone 53 with a central meridian of 135 degrees. Details of the datum and projection system are provided in Appendix B of this report. Survey boundary coordinates are listed in Appendix C.

The survey data acquisition specifications for each area flown are specified in the following table:

PROJECT NAME	LINE SPACING	LINE DIRECTION	TIE LINE SPACING	TIE LINE DIRECTION	SENSOR HEIGHT	TOTAL LINE KM
Sheppard	100m	000-180	1000m	090-270	30m	2,929
Holsteins	100m	000-180	1000m	090-270	30m	994
TOTAL						**3,923**

The specified sensor height for the magnetic samples is as stated in the above table. This sensor height may be varied where topographic relief or laws pertaining to built up areas do not allow this altitude to be maintained, or where the safety of the aircraft and equipment is endangered.

3 AIRCRAFT AND SURVEY EQUIPMENT

The Aeroquest Airborne navigation flight control computer, data acquisition system and geophysical sensors were installed into a specialised geophysical survey aircraft.

The list of geophysical and navigation equipment used for the survey is as follows:

General Survey Equipment

- PAC-750XL fixed wing survey aircraft.
- Aeroquest Airborne flight planning and survey navigation system.
- Aeroquest Airborne high speed digital data acquisition system.
- Novatel, 12 channel precision navigation GPS.
- OMNISTAR real time differential GPS system.
- Aeroquest Airborne LCD pilot navigation display and external track guidance display.
- Aeroquest Airborne post mission data verification and processing system.
- Bendix/King KRA-405B radar altimeter.

Magnetic Data Acquisition Equipment

- Aeroquest Airborne tail stinger magnetometer installation.
- Cesium Vapour total field magnetometer.
- Fluxgate three component vector magnetometer.
- RMS Aeromagnetic Automatic Digital Compensator (AADC II).
- Diurnal monitoring magnetometer (Scintrex Envimag or Geometrics GR-856).

Radiometric Data Acquisition Equipment

- RS-500 advanced digital gamma-ray spectrometer consisting of 8 x 4L Nal(TI) gamma ray detectors.
- Barometer
- Temperature and humidity sensor.

3.1 Survey Aircraft

The aircraft used for this survey was a PAC-750XL series fixed wing survey aircraft, operated by Aeroxcel, registration VH-KZC. The specifications are as follows:

Power Plant

- Engine Type Pratt and Whitney PT-6-34AG
- Shaft Horse Power 750 shp
- Fuel Type JET-A1

Performance

- Cruise speed 155 Kn
- Survey speed 140 Kn
- Stall speed 50 Kn
- Range 2550 Km
- Endurance (no reserves) 10.5 hours
- Fuel tank capacity 1800 litres

3.2 Data Positioning and Flight Navigation

Survey data positioning and flight line navigation was derived using real-time differential GPS (Global Positioning System).

Navigation was performed using a Aeroquest Airborne designed and built electronic pilot navigation system providing computer controlled digital navigation instrumentation mounted in the cockpit as well as an externally mounted track guidance system.

GPS derived positions were used to provide both aircraft navigation and survey data location information.

The GPS systems used for the survey were:

- Aircraft GPS Model Novatel
- Sample rate 0.5 Seconds (2 Hz)
- GPS satellite tracking channels 12 parallel
- Typical differentially corrected accuracy 1-2 metres (horizontal)
  3-5 metres (vertical)

3.3 Aeroquest Airborne Data Acquisition System and Digital Recording

All geophysical sensor data and positional information measured during the survey was recorded using a Aeroquest Airborne developed, high speed, precision data acquisition system. Survey data was downloaded onto magnetic tape on completion of each survey flight.

Instrument synchronisation times were measured and removed in real-time by the Aeroquest Airborne data acquisition system.

3.4 Altitude Readings

Accurate survey heights above the terrain were measured using a King radar altimeter installed in the aircraft. The height of each survey data point was measured by the radar altimeter and stored by the Aeroquest Airborne data acquisition system.

- Radar altimeter models Bendix/King KRA-405B
- Accuracy 0.3 metres
- Resolution 0.1 metres
- Range 0 - 762 metres
- Sample rate 0.1 Seconds (10Hz)

The digital terrain model is calculated by subtracting the terrain clearance (radar altimeter) from the GPS height (interpolated to 0.1 Hz), and as such the accuracy is constrained by the differentially corrected GPS position.

3.5 Aeroquest Airborne Stinger Mounted Magnetometer System

The installation platform used for the acquisition of magnetic data was a tail mounted stinger. This stinger system was constructed of carbon fibre and designed for maximum rigidity and stability.

Both the total field magnetometer and three component vector magnetometer were located within the tail stinger.

3.6 Total Field Magnetometer

Total field magnetic data readings for the survey were made using a Cesium Vapour Magnetometer. This precision sensor has the following specifications:

- Model Cesium Vapour Magnetometer
- Sample Rate 0.1 seconds (10Hz)
- Resolution 0.001nT
- Operating Range 15,000nT to 100,000nT

3.7 Three Component Vector Magnetometer

Three component vector magnetic data readings for the survey were made using a Fluxgate Magnetometer. This precision sensor has the following specifications:

- Model Fluxgate Magnetometer
- Sample Rate 0.1 seconds (10Hz)
- Resolution 0.1nT
- Operating Range ± 100 µT

3.8 Aircraft Magnetic Compensation

At the start of the survey, the system was calibrated for reduction of magnetic heading error. The heading and manoeuvre effects of the aircraft on the magnetic data was removed using an RMS Automatic Airborne Digital Compensator (AADC II).

Calibration of the aircraft heading effects were measured by flying a series of pitch, roll and yaw manoeuvres at high altitude while monitoring changes in the three axis magnetometer and the effect on total field readings. A 26 term model of the aircraft magnetic noise covering permanent, induced and eddy current fields was determined. These coefficients were then applied to the data collected during the survey in real-time.
Aeroquest Airborne static compensation techniques were also employed to reduce the initial magnetic effects of the aircraft upon the survey data.

3.9 Diurnal Monitoring Magnetometer

A base station magnetometer was located in a low gradient area beyond the region of influence of any man made interference to monitor diurnal variations during the survey.

The specifications for the magnetometer used are as follows:

- Model — Scintrex Envimag or Geometrics GR-856
- Resolution — 0.1 nT
- Sample interval — 5 seconds (0.2 Hz)
- Operating range — 20,000nT to 90,000nT
- Temperature — -20^oC to $+50^oC$

3.10 Barometric Altitude

An Air DB barometric altimeter was installed in the aircraft so as to record and monitor barometric height and pressure. The data was recorded at 0.10 second intervals and is used for the reduction of the radiometric data.

- Model — Air DB barometric altimeter
- Accuracy — 2 metres
- Height resolution — 0.1 metres
- Height range — 0 - 3500 metres
- Maximum operating pressure — 1,300 mb
- Pressure resolution: — 0.01 mb
- Sample rate — 10 Hz

3.11 Temperature and Humidity

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

3.12 Radiometric Data Acquisition

The gamma ray spectrometer used for the survey was capable of recording 256 channels and was self stabilising in order to minimise spectral drift. The detectors used contain thallium activated sodium iodide crystals.

Thorium source measurements were made each survey day to monitor system resolution and sensitivity. A calibration line was also flown at the start and end of each survey day to monitor ground moisture levels and system performance.

- Spectrometer model RSI RSX-500
- Detector volume 32 litres
- Sample rate 0.5-1 Hz

3.13

4 PROJECT MANAGEMENT

Arafura Resources Ltd	Richard Brescianini
Aeroquest Airborne Perth Office	David Abbott Cameron Johnston Todd Shield

DATA PROCESSING PROCEDURES

4.1 Data Pre-processing

The raw survey data was loaded from the SD cards and the recorded data trimmed to the correct survey boundary extents. Any survey lines subsequently reflown were removed from the dataset.

At the commencement of each acquisition flight, all the instrumentation clocks were synchronized to local time, and the error and latency of each instrument in providing its data measurement calculated. The results of these latency measurements were recorded into a synchronisation file, and the results used to assign GPS positions to the magnetic, radiometric and elevation data.

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

4.2 Magnetic Data Processing

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

The filtered diurnal measurements were subtracted from the diurnal base field and the residual corrections applied to the survey data by synchronising the diurnal data time and the aircraft survey time. The average diurnal base station value was added to the survey data.

The X and Y positioning of the data was then checked for spikes before applying the IGRF correction. Any spikes in the positions were manually edited. The updated IGRF 2010 correction was calculated at each data point (taking into account the height above sea level).

This regional magnetic gradient was subtracted from the survey data points.

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

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

Final micro-levelling techniques were then selectively applied to the tie line levelled data to remove minor residual variations in profile intensity

Located and gridded data were generated from the final processed magnetic data.

4.3 Radiometric Data Processing

Statistical noise reduction of the 256 channel data was performed using the Noise Adjusted Singular Variable Decomposition (NASVD) method described by Hovgaard and Grasty (1997).

Noise-adjusted singular value decomposition is performed, and the number of components to be used is determined by inspection of plots of the spectral components and by a statistical analysis of the contributions of the components. If the spectral shapes show any unusual characteristics, further analysis of the concentrations of the spectral components in the line data is performed in order to identify and eliminate any corrupt spectra. If such spectra were eliminated, the NASVD process is re-performed, in order to obtain spectral components free of any bias from corrupt spectra.

Only the dominant spectral shapes (identified as described above) were used in the spectral reconstruction process. The first 8 NASVD components were used for this process.

Channels 30-250 only are spectrally smoothed, as these contain the regions of interest and are not dominated by the lower end of the Compton continuum. The energy spectrum between the potassium and thorium peaks was recalibrated from the spectrally smoothed 256 channel measurements.

The aircraft background spectrum and the scaled unit cosmic spectrum were then subtracted from the 256 channel data. This 256 channel data was then windowed to the 5 primary channels of total count, potassium, uranium, thorium and low-energy uranium. Dead time corrections were then applied to the data. Radon background removal was performed using the Minty Spectral Ratio method (1992).

The radar altimeter data was corrected to standard temperature and pressure, and height corrected spectral stripping was then applied to the windowed data. Height attenuation corrections based on the STP radar altimeter were then performed to remove any altitude variation effects from the data.

The Uranium and Total Count channels were tie-levelled to remove the effects of residual radon background. The tie-levelling process employed was a least-squares/median filter procedure, which generated a single correction for each line of data. Mis-matches were calculated at each tie-traverse intersection and the median mismatch for each flight line was calculated as the residual levelling error for that line.

4.4 Digital Terrain Model Data Processing

The radar altimeter data was subtracted from the GPS altimeter data leaving digital terrain data.

The digital terrain data thus derived was tie line levelled and gridded. Tie line levelled data was then examined and selectively microlevelled to produce a grid without line dependent artifacts.

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

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P.O. Box 126
BELMONT WA 6984

Quoting reference number: B334

5 APPENDIX A - LOCATED DATA FORMATS

MAGNETIC LOCATED DATA

FIELD	FORMAT	DESCRIPTION	UNITS
1	I8	LINE NUMBER	
2	I4	FLIGHT/AREA NUMBER	AAFF (Area/Flight)
3	I9	DATE	YYMMDD
4	F10.1	TIME	sec
5	I8	FIDUCIAL NUMBER	
6	I4	UTM ZONE	
7	F12.6	LATITUDE (GDA94)	degrees
8	F12.6	LONGITUDE (GDA94)	degrees
9	F12.2	EASTING (MGA53)	metres
10	F12.2	NORTHING (MGA53)	metres
11	F8.1	RADAR ALTIMETER HEIGHT	metres
12	F8.1	GPS HEIGHT (WGS84)	metres
13	F8.1	TERRAIN HEIGHT (WGS84)	metres
14	F10.3	RAW MAGNETIC INTENSITY	nT
15	F10.3	DIURNAL CORRECTED TMI	nT
16	F10.3	DIURNAL AND IGRF CORRECTED TMI	nT
17	F10.3	TIE LINE LEVELLED TMI	nT
18	F10.3	FINAL TOTAL MAGNETIC INTENSITY	nT

RADIOMETRIC LOCATED DATA

FIELD	FORMAT	DESCRIPTION	UNITS
1	I8	LINE NUMBER	
2	I4	FLIGHT/AREA NUMBER	AAFF (Area/Flight)
3	I9	DATE	YYMMDD
4	F10.1	TIME	sec
5	I8	FIDUCIAL NUMBER	
6	I4	UTM ZONE	
7	F12.6	LATITUDE (GDA94)	degrees
8	F12.6	LONGITUDE (GDA94)	degrees
9	F12.2	EASTING (MGA53)	metres
10	F12.2	NORTHING (MGA53)	metres
11	F8.1	RADAR ALTIMETER HEIGHT	metres
12	F8.1	GPS HEIGHT (WGS84)	metres
13	I5	LIVE TIME	milli sec
14	F8.1	PRESSURE	hPa
15	F6.1	TEMPERATURE	Degrees Celcius
16	F6.1	HUMIDITY	percent
17	I6	TOTAL COUNT (RAW)	Counts/sec
18	I6	POTASSIUM (RAW)	Counts/sec
19	I6	URANIUM (RAW)	Counts/sec
20	I6	THORIUM (RAW)	Counts/sec
21	I6	COSMIC (RAW)	Counts/sec
22	F8.1	TOTAL COUNT (CORRECTED)	Counts/sec
23	F8.1	POTASSIUM (CORRECTED)	Counts/sec
24	F8.1	URANIUM (CORRECTED)	Counts/sec
25	F8.1	THORIUM (CORRECTED)	Counts/sec
26	F9.4	DOSE RATE	nGy/hr
27	F9.4	POTASSIUM GRND CONCENTRATION	%
28	F9.4	URANIUM GRND CONCENTRATION	ppm
29	F9.4	THORIUM GRND CONCENTRATION	ppm

GRIDDED DATASET FORMATS

Gridding was performed using a bicubic spline algorithm.

The following grid formats have been provided:

- ER-Mapper format

LINE NUMBER FORMATS

Line numbers are identified with a six digit composite line number and have the following format - AALLLLB, where:

A or AA	Survey area number
LLLL	Survey line number
	0001-8999 reserved for traverse lines
	9001-9999 reserved for tie lines
B	Line attempt number, 0 is attempt 1, 1 is attempt 2 etc..

AEROQUEST AIRBORNE FILE NAMING FORMATS

Located and gridded data provided by Aeroquest Airborne uses the following 8 character file naming convention to be compatible with PC DOS based systems.

File names have the following general format - JJJJAABB.EEE, where:

JJJJ	Aeroquest Airborne Job number	
AA	Area number if the survey is broken into blocks	
BB	M	Magnetic data
	R	Radiometric data
	TC	Total count data
	K	Potassium counts
	U	Uranium counts
	Th	Thorium counts
	DT	Digital terrain data
EEE	File name extension	
	DAT	Located digital data file
	DFN	Located data definition file
	ERS	Ermapper gridded data header file
		Ermapper data portion has no extension
	GRD	Geosoft gridded data file

6 APPENDIX B - COORDINATE SYSTEM DETAILS

Locations for the survey data are provided in both geographical latitude and longitude and Universal Transverse Mercator metric projection coordinate systems.

MGA94	Map Grid of Australia 1994
Coordinate type	Universal Transverse Mercator Projection Grid
Geodetic datum	Geocentric Datum of Australia
Semi major axis	6378137m
Flattening	1/298.257222101

7 APPENDIX C - SURVEY BOUNDARY DETAILS

Coordinates

Sheppard
Coordinates in MGA94
Grid Zone: 53

Easting	Northing
316810	7481410
325590	7481410
325590	7479640
332530	7479640
332530	7470190
330930	7470190
330930	7460850
320410	7460850
320410	7466360
318630	7466360
318630	7471880
316810	7471880

Holsteins
Coordinates in MGA94
Grid Zone: 53

Easting	Northing
530640	7456550
537610	7456550
542790	7450920
542790	7443400
539150	7443400
539150	7447110
535750	7447110
535750	7448960
534040	7448960
534040	7452650
532350	7452650
532350	7453400
530640	7453400

8 APPENDIX E – PROCESSING PARAMETERS

Magnetic Processing Parameters

Sheppard

IGRF Date:	IGRF 2011.90
Average Declination:	4.6836 degrees
Average Inclination:	-54.4579 degrees
Average Field strength:	52,650 nT
Average diurnal:	53,220 nT

Holsteins

IGRF Date:	IGRF 2011.90
Average Declination:	5.235 degrees
Average Inclination:	-54.5135 degrees
Average Field strength:	52,617.37 nT
Average diurnal:	53,220 nT

Radiometric Processing Parameters

Height Attenuation Coefficients

Total Count:	-0.0074
Potassium:	-0.0094
Uranium:	-0.0084
Thorium:	-0.0074

Cosmic Correction Coefficients

Total Count:	1.1210
Potassium:	0.0600
Uranium:	0.0516
Thorium:	0.0654

Aircraft Background Coefficients

Total Count:	117.41
Potassium:	24.769
Uranium:	1.3277
Thorium:	0.1397

Sensitivity Coefficients

Total Count:	39.84 cps/dose rate
Potassium:	134.2 cps/%k
Uranium:	11.18 cps/ppm
Thorium:	7.8 cps/ppm

Radiometric Stripping Coefficients

Alpha:	0.2940
Beta:	0.4056
Gamma:	0.6988
a:	0.0491

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