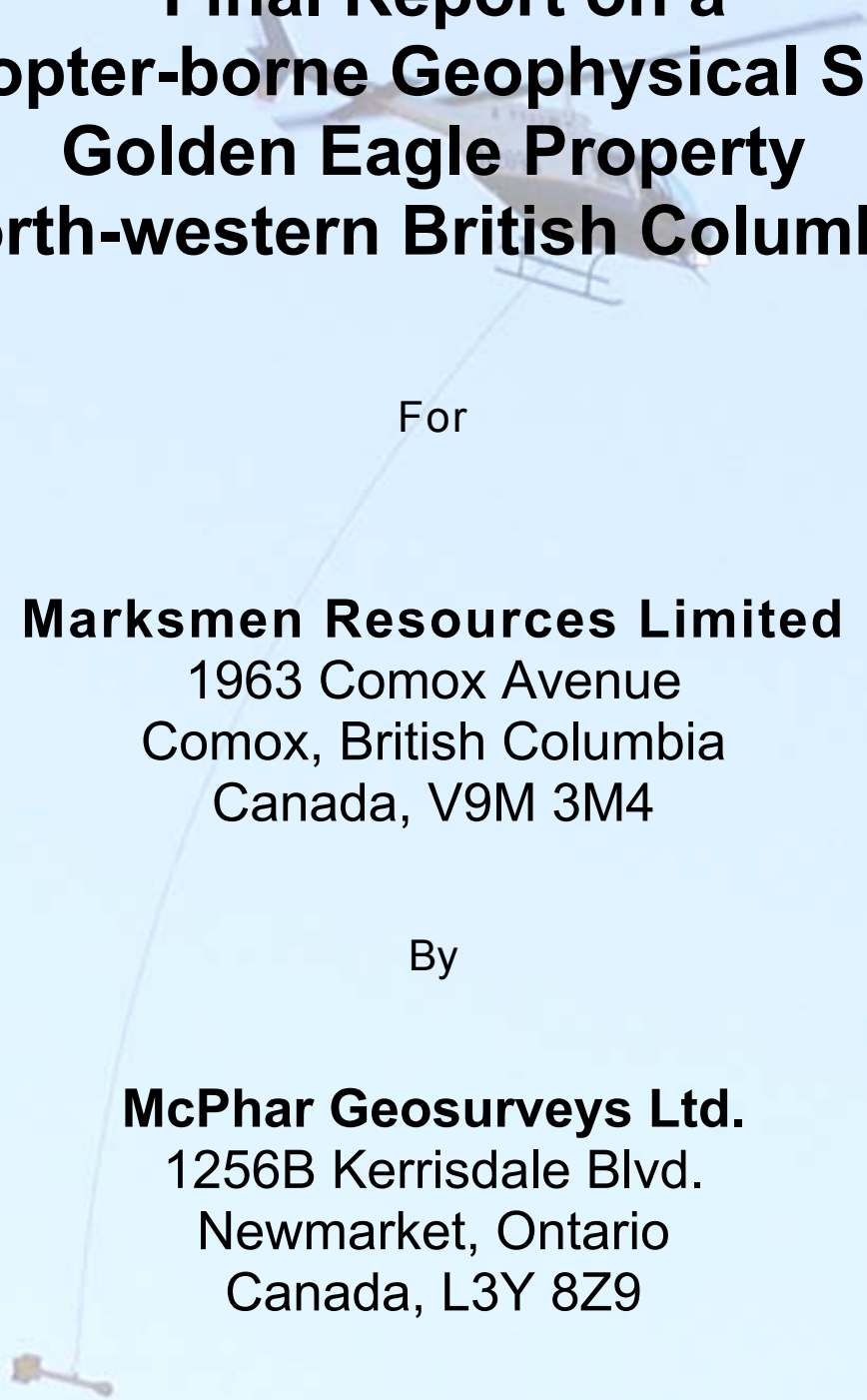
Final Report on a Helicopter-borne Geophysical Survey Golden Eagle Property North-western British Columbia



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SUMMARY

An airborne geophysical survey program was completed on the Golden Eagle Property situated approximately 75 km west of Atlin, B.C. and 50 km south of Carcross, YT in north-western B.C., under contract to Marksmen Resources Limited, signed July 2004. The program consisted of a high-resolution helicopter magnetic, electromagnetic (HEM) and radiometric survey.

First tests and calibration flights were completed on August 17, 2004 with data acquisition initiated on the same date. The final survey flight was completed on September 1, 2004. The survey area was flown in three blocks: the Bennett Lake - Tannis Block (Main Block) to the west of Tutshi Lake; the Golden Eagle Block to the south and east of Tutshi Lake; and the Reconnaissance Lines to the north and south of the Tannis Block.

During the course of the project, the Operations Base was moved from Whitehorse, Yukon Territory to the Carcross area, Yukon Territory, closer to the survey area.

A total of 661 line-kilometres of geophysical data were acquired, covering an area of approximately 139 square kilometres.

1. INTRODUCTION

This report describes a detailed high-resolution helicopter-borne magnetic, Electromagnetic and radiometric survey was carried out during the period of August 17, 2004 to September 1, 2004 on behalf of Marksmen Resources Limited, hereinafter referred to as "MRL", by McPhar Geosurveys Ltd, hereinafter referred to as "McPhar", over the survey area approximately 50 kilometres south of Carcross, Yukon Territory, and 75 kilometres west of Atlin, British Columbia in the Atlin Mining District, British Columbia.

The purpose of the survey was to acquire high-resolution geophysical data to map the geophysical characteristics of the geology and structure in an effort to provide an insight into geologic and geophysical settings conducive to economic (Au) mineralisation.

Table 1: Marksmen Resources Limited Golden Eagle Property Survey Description

AREA NAME	APPROX AREA KM^2	LINE /T.L. SPACING	FLIGHT LINE LINE-KM	TIE LINE LINE-KM	TOTAL LINE-KM	PRIMARY FLIGHT DIRECTION
Bennett Lake Tannis Block (Main Block)	69	150 m x 1,500 m	358	40	324	070^o / 250^o
Golden Eagle Block	26	150 m x 1,500 m	164	18	185	070^o / 250^o
Reconnaissance Lines	44	1000 m x 1,500 m	81	N/A	81	070^o / 250^o
Totals	**139**		**603**	**58**	**661**	

The data acquisition involved the use of precision differential GPS positioning, a high sensitivity magnetometer system incorporated into the *HUMMINGBIRD*^{TM} five (5) frequency helicopter electromagnetic (HEM) system towed beneath a helicopter and a Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer system mounted in the cabin of the aircraft.

Mobilization of the helicopter, equipment and personnel was originally completed to Whitehorse, Yukon Territory on August 15, 2004. A fuel cache was established at the survey project site and production flights commenced on August 17, 2004. The final production flight was completed on September 1, 2004. Inclement weather and high wind conditions precluded flights during the periods of August 19 to August 20 and August 26 to August 30.

The location of the operations base was moved from Whitehorse, Yukon Territory to the Spirit Lake Wilderness Camp north of Carcross, Yukon Territory on August 30, 2004. The reason for the move was to locate the closer to the survey area and be better able to judge weather conditions over the survey area without having to make a lengthy helicopter ferry flight to the project site.

2. SURVEY AREA

The survey consisted of three areas identified by MRL as the Bennett Lake / Tannis (Main), Golden Eagle and Reconnaissance Survey areas, located to the east and west of the western arm of Tutshi Lake in the Taki Forest and Tagish Highland of British Columbia. The project area follows the strike of the Llewellyn Fault that strikes north northwest – south-southeast. The Klondike Highway that runs from Skagway, Alaska to Carcross, Yukon Territory transects the project area along the west shore of Tutshi Lake.

The Bennett Lake / Tannis Survey Area was bounded on the east by the western shore of Tutshi Lake, to the west by Bennett Lake and included Paddy Pass. The Survey Area comprised the mountainous area separating Bennett Lake from Tutshi Lake and the associated drainage basins. Elevations varied from 700 metres at the shoreline of Bennett Lake to over 2200 metres.

The Golden Eagle Survey Area was located to the east of Tutshi Lake, occupying the high ground between Tutshi Lake (west), Moon Lake (east), Shelly Lake (south) and the Moon River (north). Elevations varied from approximately 800 metres at Tutshi Lake to 2300 metres.

The Reconnaissance Lines comprised traverses to the north and south of the Bennett Lake / Tannis Area flown in the same orientation as the survey flight lines but at a nominal separation of 1000 metres for the flight lines and 1500 metres for the tie lines. The frequency and location of the reconnaissance lines was determined in the field in consultation with the MRL representative present. A total of 18 reconnaissance lines were completed; 5 lines off of the southern edge of the Bennett Lake / Tannis Block (2 lines at 70^{o} azimuth and 3 lines at 160^{o} azimuth) and 13 lines extending from the north and east edge of the Bennett Lake / Tannis Block (7 lines at 70^{o} azimuth and 6 lines at 160^{o} azimuth).

The primary objective of the survey was to acquire geophysical data in support of exploration for gold and silver that may be associated with tellerides and sulphidic base metal mineralisation.

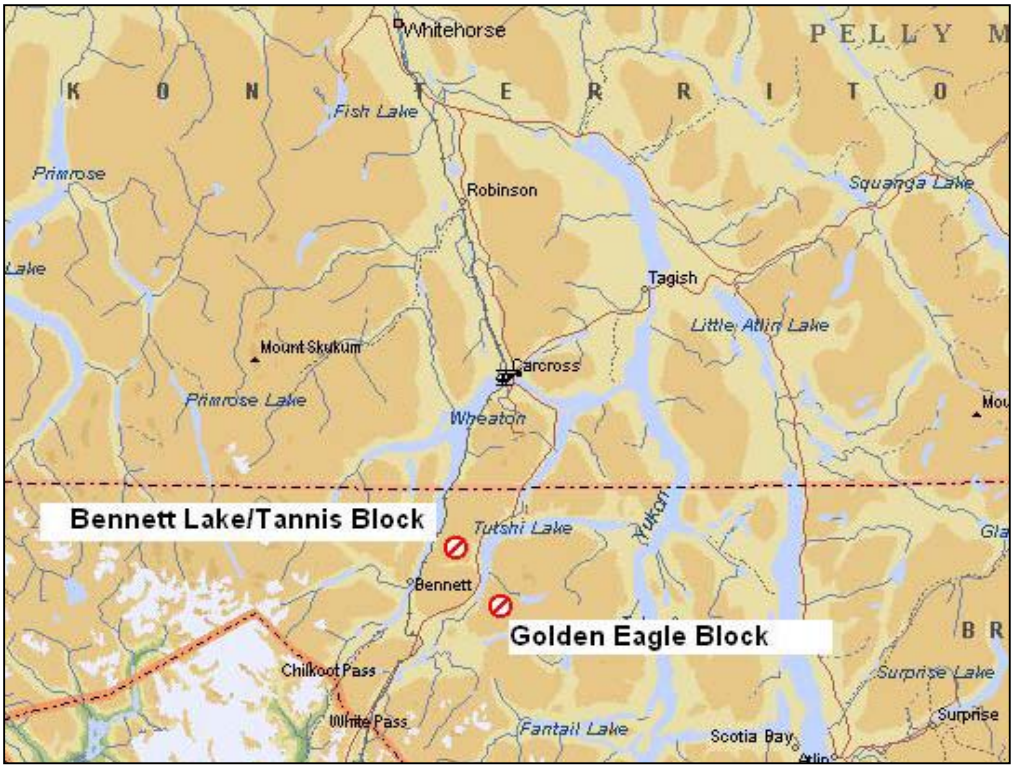

Figure 1: Location of the Golden Eagle Property and survey blocks.

The survey block corner coordinates were provided by MRL in WGS84/NAD83, Zone 8N UTM easting and northing. Final maps were required in NAD83, Zone 8N UTM easting and northing. The following tables contain the survey block corner coordinates in NAD83.

Table 2: Marksmen Resources Limited Bennett Lake / Tannis Survey Area Boundary Coordinates

Bennett Lake / Tannis Survey Area		
Corner	**UTM Easting**	**UTM Northing**
1	503432	6644853
2	507685	6644838
3	507700	6643693
4	510243	6643693
5	510180	6639801
6	511733	6639817
7	511686	6635172
8	507873	6633540
9	507355	6633524
10	507355	6633555
11	507370	6637980
12	505111	6637965
13	503448	6637965

Table 3: Marksmen Resources Limited Golden Eagle Survey Area Boundary Coordinates

Golden Eagle Survey Area		
Corner	UTM Easting	UTM Northing
1	512099	6632787
2	517615	6632790
3	517615	6630806
4	519613	6630806
5	519613	6628301
6	515608	6628301
7	515608	6629799
8	512099	6629796

Table 4: Marksmen Resources Limited Reconnaissance Line End Point Coordinates

Reconnaissance Lines				
Line	UTM Easting (Start)	UTM Northing (Start)	UTM Easting (End)	UTM Northing (End)
100	510367	6649513	513280	6641573
200	508920	6649200	510827	6643973
201	510894	6643786	511977	6640842
300	507545	6648506	509307	6643732
400	506179	6647854	507295	6644920
500	505219	6646314	505831	6644440
3000	510883	6635026	511556	6633139
3010	509465	6634524	510147	6632541
3020	508044	6633967	508790	6631920
5000	505760	6647609	510459	6649478
5010	505123	6645976	510197	6648009
5031	503988	6644811	510179	6646996
5041	506417	6644684	510139	6646035
5051	507591	6644158	511329	6645522
5060	508228	6643440	512365	6644961
5070	509244	6641570	511505	6642356
5081	507316	6632571	510901	6633847
5090	507485	6631686	511629	6633146

The high-resolution magnetic survey lines were flown N70^{o}E azimuthal direction at a flight-line spacing of 150 metres with tie lines flown perpendicular to the main survey lines at N160^{o}E with a line spacing of 1,500 metres.

The Bennett Lake / Tannis Survey Area covered a total of approximately 69 km^{2}.

The Bennett Lake / Tannis Survey Area included all or part of the following 16 claims:

LEW 1 – 342440
LEW 2 – 342441
LEW 3 – 342442
LEW 9 – 347981
LEW 10 – 347982
LEW 11 – 347983
LQ – 202412
TANNIS 5 – 392801
TANNIS 6 – 392802
TANNIS 7 – 392803
TANNIS 8 – 395713
TANNIS 9 – 395714
TANNIS 11 – 395715
TANNIS 12 – 408598
TANNIS 13 – 408599

The Golden Eagle Survey Area covered a total of approximately 26 km².

The Golden Eagle Survey Area included all of the following 8 claims:

CONNOR 1 – 389673
CONNOR 2 – 408593
CONNOR 3 – 408594
CONNOR 4 – 408595
CONNOR 5 – 408596
CONNOR 6 – 408597
GOLDEN EAGLE 1 – 367761
GOLDEN EAGLE 2 – 367760

The Reconnaissance Lines covered a total of approximately 44 km².

The Reconnaissance Lines were flown almost exclusively over Crown Land with the exception of the TANNIS 9 claim that was partially overflown by Line 3000.

Previous geophysical airborne surveying in the area has included magnetic surveys completed by the Geological Survey of Canada.

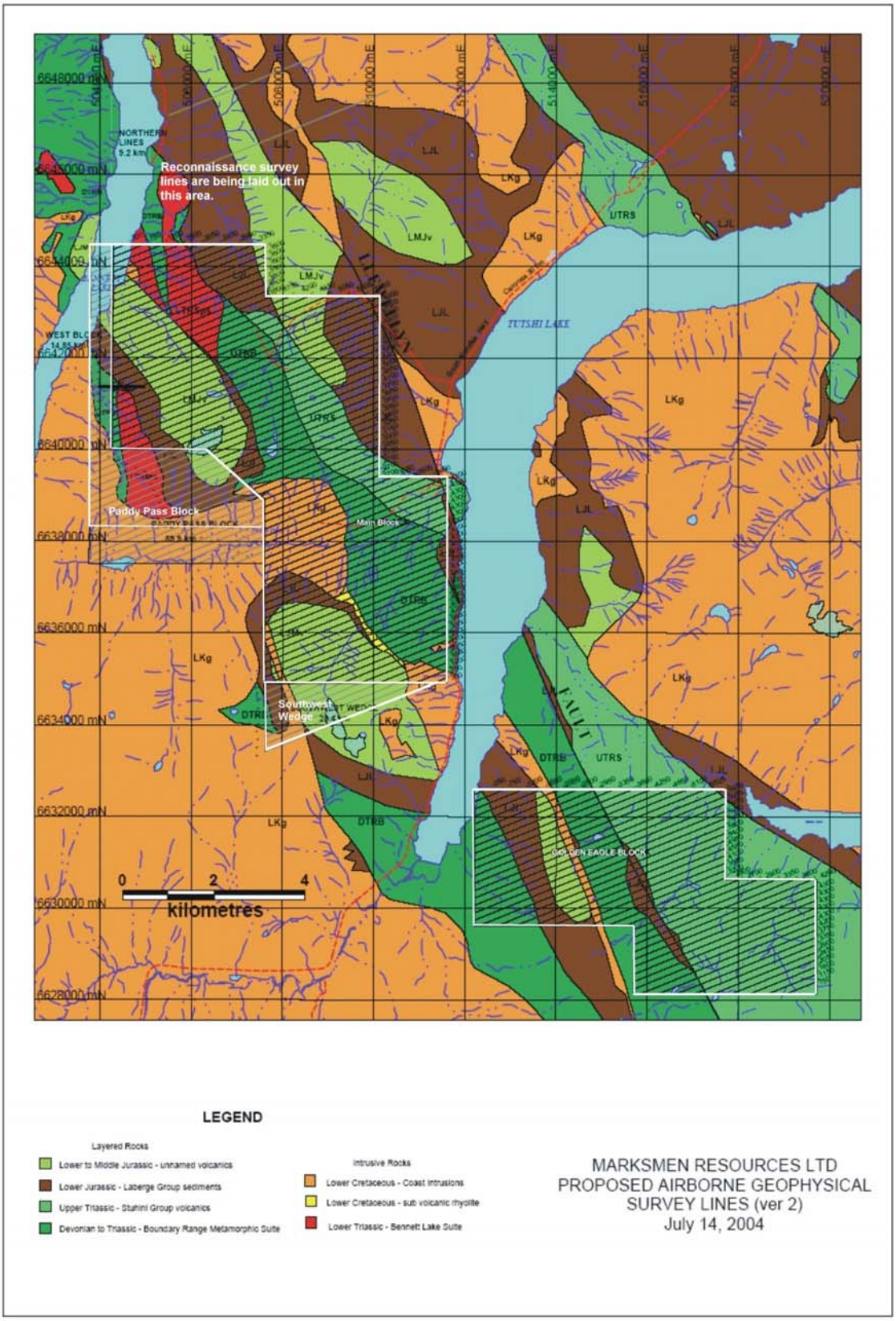

Figure 2: Flight path map of the Golden Eagle Property area

3. SURVEY OPERATIONS

3.1 Operations Base

Survey operations for one-half (1/2) of the survey were based out of Whitehorse, Yukon Territory, approximately 100 km north of the survey area. In order to decrease the ferry time from Whitehorse to the project area, the base camp was moved to the Spirit Lake Wilderness Camp located 6 km north of Carcross, Yukon Territory on August 30, 2004. Permission was obtained to operate the helicopter and to park it overnight at both the Whitehorse Airport and the Spirit Lake Wilderness Camp. The magnetometer base station and the GPS base station were operated initially from the Whitehorse Airport and transferred to the Spirit Lake Wilderness Camp during the course of the survey.

Quality Control and preliminary data processing was undertaken by the crew at the temporary field office established initially in rooms at the Gold Rush Inn Best Western Hotel, Whitehorse and finally at the Spirit Lake Wilderness Camp.

3.2 Survey Conditions

Weather conditions during the survey were highly variable. Generally the temperatures were in the med to low 10's Celsius. Winds, low cloud ceiling, and rain were major obstacles in the completion of the survey. High winds, particularly over ridge tops, with accompanying updrafts and downdrafts were a challenge for both helicopter and system. The result was several instances of external damage to the HEM bird and aborted survey flights.

Sunspot activity, and hence diurnal geomagnetic activity, was quiet during the entire data acquisition period. No data were lost due to the geomagnetic activity being out of contract specification. The infield magnetic base station data was supplemented with diurnal magnetic data obtained from the Sitka, Alaska observatory of the USGS and the Pacific Geoscience Centre Observatory of the GSC in Victoria, British Columbia.

3.3 Navigation

The nominal data acquisition speed was approximately 110 kilometres per hour. Scan rates for magnetic and electromagnetic data acquisition was 0.1 second, 1.0 second for the spectrometer, radar and barometric altimeters, and 1.0 second for the GPS navigation/positioning system. Therefore, a magnetic/electromagnetic value was recorded approximately every 3.0 meters and a position fix recorded every 30 meters along the flight track.

Navigation was assisted by a GPS receiver system that reports GPS co-ordinates as WGS-84 latitude and longitude and directs the pilot over the pre-programmed two-dimensional (2-D) survey grid. The x-y position of the aircraft as reported by the GPS system is recorded together with the terrain clearance as reported by the radar altimeter.

Vertical navigation along flight lines was established using the radar altimeter. The optimum terrain clearance during normal survey flying was 60 m for the helicopter, 30m for the towed-bird magnetometer. However, due to rugged terrain in some areas, and the pilot's judgment of safe flying conditions in these areas, these terrain clearances were not possible 100% of the time.

The final vertical and horizontal survey positions were differentially corrected post flight, computed using the data from the onboard GPS receiver and the GPS base station receiver, to a precision of approximately +/- 1.5m.

3.4 Field Processing & Quality Control

The survey data was transferred to portable magnetic media on a flight-by-flight basis, and then copied to the field data processing workstation. In-field data processing included reduction of the data to GEOSOFT GDB database format and inspection of the magnetometer data for adherence to contract specifications. Survey lines that exhibited excessive deviation after differential correction, or that were considered to be of inferior quality, were flagged and reflown.

3.5 Survey Statistics and Project Diary

The survey entailed a total of seventeen (17) flights; all of which were production flights. The first production flight was Flt#01 on August 17, 2004, with the last production flight, Flt#17 on September 1, 2004. These flights also included ferry, test and/or calibration segments.

Table 5: Project Diary

Date	Flt #	Hours Flown	Line-Km Accepted	Comments
17 Aug.	1	2:01	17.1	Fuel cache established in survey area, initial tests and calibration completed, survey commenced on Golden Eagle Survey Area.
18 Aug.	2 3	2:39 0:20	78.0 0.0	Production flight Ferry flight
19 Aug.				No flights as ground wet from rain in area. Active geomagnetic field
20 Aug.				No flights, ground wet from rain, low cloud ceiling obscuring mountain tops in survey area. Active geomagnetic field.
21 Aug.	4 5	2:29 0:29	86.0 0.0	Golden Eagle Survey Area completed. Ferry flight.
22 Aug.	6	1:31	2.3	Commenced survey of Bennett Lake / Tannis Area. Flying terminated due to dangerous winds over mountain ridges.
23 Aug.	7	3:08	19.9	Production flight, HEM bird grazed on rocks in severe downdraft situation.
24 Aug.	8 9	2:48 2:03	44.2 45.0	Production flight, strong wind over ridges. Production flight, strong winds over ridges, difficult for helicopter to ascend and descend due to wind; HEM bird damaged.

Date	Flt #	Hours Flown	Line-Km Accepted	Comments
25 Aug.	10	2:04	45.4	Production flight, low cloud and poor visibility due to smoke.
	11	1:45	40.0	Production flight, low cloud and poor visibility due to smoke. HEM bird sustained external damage.
26 Aug.				No flights due to low cloud, drizzle and rain in survey area.
27 Aug.				No flights due to low cloud, drizzle and rain in survey area.
28 Aug.				No flights due to low cloud, drizzle and rain accompanied with gusting winds in survey area.
29 Aug.	12	1:25		Flight aborted due to low cloud in survey area.
30 Aug.	13	0:23		Ferry flight, operations base moved to Spirit Lake Wilderness Camp north of Carcross
31 Aug.	14	2:51	90.0	Production flight
	15	2:08	75.0	Production flight
	16	1:16	50.3	Production flight
01 Sept.	17	0:43	70.1	Completed survey, Reconnaissance lines completed.
Totals		**29:53**	**661.4**	

The following personnel were the onsite crew for the MRL project:

Table 6: Field Personnel

Title	Name	Days Onsite
Data Processor/QC Geophysicist	Dr. Andy Anderson	16
Technician/Operator	Barry Levy	16
Operator	Daniel McKinnon	9
Helicopter Pilot	Ken Knight	16
AME	Bruce Gairns	8
AME	Trevor Moore	8
Client QC (Aurora Geosciences)	Mike Power	16
Marksmen Resources Representative	Kieran Downes	16

McPhar Geosurveys Ltd. of Newmarket, Ontario, Canada, was responsible for the field operations, all geophysical matters and the overall coordination and management of the survey.

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4. HELICOPTER AND EQUIPMENT

4.1 The Helicopter

The survey was flown using a Eurocopter AS350BA A-Star helicopter, with Canadian registration C-GPWK provided by Pacific Western Helicopters of Dease Lake, British Columbia. This helicopter featured up to 2.5 hours flight duration with the geophysical system and a crew of 2 persons onboard.

The installation of the geophysical and ancillary equipment was carried out by McPhar personnel at the Johnson's Crossing Base Camp, with final adjustments, calibration and testing completed prior to production survey flights.

Aircraft Registration:	-	Canadian, C-GPWK
Engine:	-	Turbomeca Arriel 1B
Empty weight:	-	2,550 lbs
Gross weight:	-	4,630 lbs
Max cruise:	-	123 knots
HIGE:	-	8,500 ft
HOGE:	-	6,000 ft
Service ceiling:	-	15,000 ft
Standard fuel:	-	143 gal
Survey duration:	-	4.55 hours

4.2 The Survey Instrumentation

4.2.1 Survey System Overview

The instrumentation installed in the helicopter included:

- A Geometrics G822A high-sensitivity Cesium magnetometer mounted in the HUMMINGBIRD™ towed-bird airfoil, 0.001 nT / 20 Hz resolution
- A Geotech HUMMINGBIRD™ five (5) frequency electromagnetic system in a towed-bird airfoil.
- A Pico-Envirotec GRS-410 self-stabilizing multi-channel gamma-ray spectrometer with 16.8 litres "downward looking" NaI sensor and 4.2 litres "upward looking" NaI sensor.
- A DGPS Navigation System, comprising a CSIRadio DGPSMAX 12-channel GPS system, and a GEONAV GPS computer and pilot steering indicator (PSI)
- A Geotech Data Acquisition System
- A Terra TRA-3000/TRI-300 Radar Altimeter
- A DevTech Geo-iMAGe-Lite Colour Digital Imaging System for capturing images of the flight path during the survey.

The processing and base stations comprised:

- A Field Workstation, comprising a Pentium PC, printer and full data processing software

- A Magnetometer / GPS Base Station, comprising a Gem Systems GSM-19 Overhauser base station magnetometer and NovAtel 3751R GPS system.

A complement of spare parts and test equipment were maintained at the survey site.

4.2.2 The Helicopter-borne *HUMMINGBIRD™* Digital Electromagnetic System

The Geotech *HUMMINGBIRD™* multi-frequency, multi-coil electromagnetic system (HEM), which measures the in-phase and quadrature responses from a number of coil-pairs installed in a tubular bird, towed beneath a helicopter. The *HUMMINGBIRD™* features horizontal coplanar coil sets operating at frequencies of 880 Hz, 6.6 kHz, and 34 kHz and vertical coaxial coil sets operating at frequencies of 7 kHz and 34 kHz. The in-phase and quadrature signals were measured simultaneously for the five (5) frequencies with a time constant of 0.1 seconds. The HEM bird is towed on a long-line 30 m below the helicopter.

Figure 3: HUMMINGBIRD™ electromagnetic sensor

The system noise of the EM sensor is less than 2 ppm of the transmitted field, under ideal conditions. A total of ten (10) EM channels of information are sampled at 0.025-second intervals (40 Hz) or approximately every 0.75 metres along the survey line (at survey airspeed of approximately 110 kph), with a time constant of 0.1 second.

The EM system was calibrated with an external coil at the start and end of each survey and with an internal coil approximately three times per hour during survey flights. The phasing of the EM system was checked with an external ferrite rod before each survey flight.

Sferic activity can be reduced by post-survey processing to less than 2.0 ppm.

The electromagnetic system and ancillary equipment were operated for a sufficient time period prior to survey flying to allow for warm-up and thermal stabilization of the equipment. Nulling, ferrite and

external Q-coil calibration for the EM system were performed after the system had stabilized following the-warm-up period. All of these ground calibrations were completed before commencement of each flight. Internal calibrations were performed frequently throughout the survey flight.

The table below lists the arrangement of the coils inside the bird:

Table 7: HUMMINGBIRD™ Coil Configuration

COIL FREQUENCY	COIL ORIENTATION	COIL SEPARATION	CHANNELS (I In-Phase, Q Quadrature)
880 Hz	Coplanar	6.025 meters (20 ft)	I, Q
980 Hz	Coaxial	6.025 meters (20 ft)	I, Q
6630 Hz	Coplanar	6.300 meters (21 ft)	I, Q
7001 Hz	Coaxial	6.300 meters (21 ft)	I, Q
34133 Hz	Coplanar	4.875 meters (16 ft)	I, Q

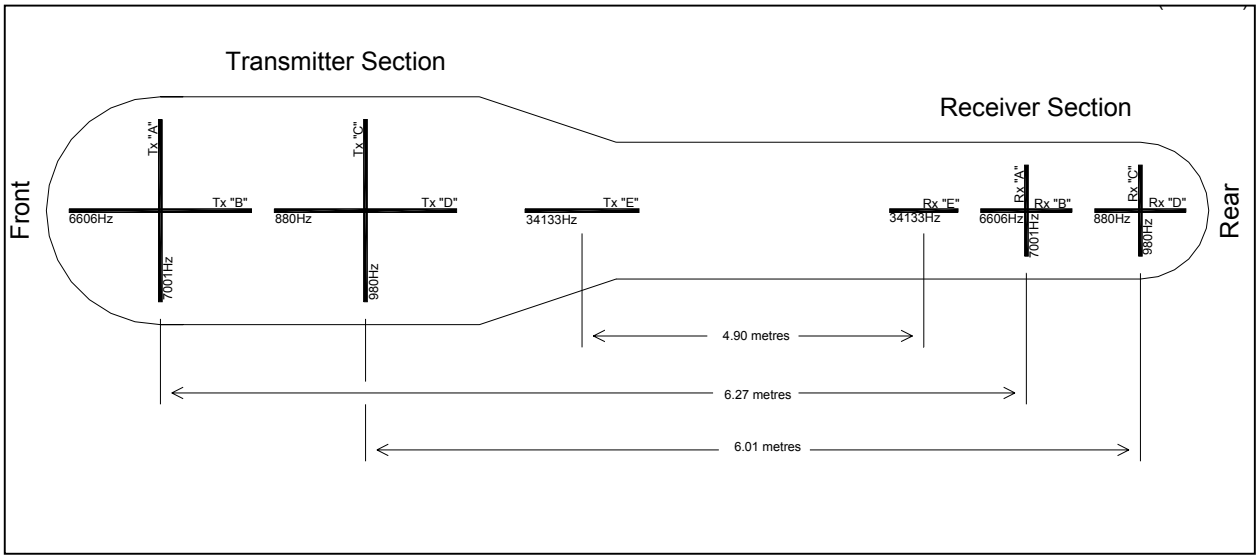

Figure 4: HUMMINGBIRD™ electromagnetic sensor coil configuration

4.2.3 Airborne Magnetometer

A Geometrics G822A cesium split-beam total-field magnetometer was employed, installed in the *HUMMINGBIRD*™ airfoil. Sampling rate was ten times per second with an in-flight sensitivity of 0.01 nT. Aerodynamic magnetometer noise was 0.25 nT or less. The sensitivity of the magnetometer is documented at 0.001 nT when operated at a sampling rate of 0.1-second.

The Geometrics G822A magnetometer is described in Appendix 3.

4.2.4 Gamma-ray Spectrometer System

A Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 litres "downward

looking" NaI sensor and 4.2 litres "upward looking" NaI sensor sampling at one sample per second. The thermally isolated NaI crystal sensors were installed in the cabin of the helicopter.

The GRS-410 is a 512 channel, self-stabilizing spectrometer that tracks and corrects for the spectral drift of the system by following a Thorium spectral peak. The standard regions of interest for Total Count (TC), Potassium (K), Uranium (U), Thorium (Th) and cosmic radiation were recorded for post survey processing. The standard regions of interest recorded with window limits in MeV are provided in following table:

Table 8: Standard Gamma-ray Spectrometer Data Acquisition Windows

Standard Gamma-ray Spectrometer Data Acquisition Windows		
Element	**Lower Boundary (MeV)**	**Upper Boundary (MeV)**
Total Count	0.41	2.81
Potassium	1.37	1.57
Uranium	1.66	1.86
Thorium	2.41	2.81
Cosmic	3.00	∞
Upward-looking Uranium	1.66	1.86

The spectrometer was calibrated on a daily basis using standard calibration sources for Thorium (Th), Cesium (Cs) and Uranium (U).

The recommendations in the International Atomic Energy Agency – IAEA – TECDOC-1363 – *Guidelines for radioelement mapping using gamma ray spectrometry* were followed throughout the survey.

4.2.5 The Towed-Bird Airfoil and Tow-Cable

The Towed-Bird Airfoil is basically a hollow Kevlar tube, 6.6 meters long, with a bulbous nose into which the electromagnetic system components and electronics are installed along with the magnetometer Cesium sensor mounted in a 3D hand-aligned gimbal. A skirt is used at the tail of the airfoil to stabilize the bird in flight.

The Tow Cable is constructed of coaxial cables complete with a strain member. The length of this tow cable is nominally 30 metres. The tow cable is attached to the helicopter by means of a weak link assembly. The on-board section of the tow cable consists of coaxial cable, the length customized to suit the helicopter.

4.2.6 The Base Station Magnetometer

The magnetometer base station used was comprised of a GEM Systems GSM-19 Overhauser magnetometer to monitor and record diurnal variations of the Earth's magnetic field. The base station magnetometer was set up at Johnson's Crossing in an open field. Every effort was made to ensure that the magnetometer sensor was placed in a location with a low magnetic gradient and sited away from electric transmission lines, and moving ferrous objects, such as motor vehicles and aircraft, without

compromising safety and airport operations.

The base-station magnetometer, with digital recording, was operated continuously throughout the airborne data acquisition work with a sensitivity of 0.01 nT. The ground and airborne system clocks were synchronised using GPS time, to an accuracy of 1 second or better. The sample rate was once per second. A continuously updated profile plot of the base station values was presented on the base station screen. At the end of the day, the digital data was transferred from the base station's data-logger to the fieldwork station.

Specifications are included in Appendix 3.

4.2.7 Altimeter

A Terra TRA-3000/TRI-30 radar altimeter was used to record terrain clearance to an accuracy of about 1 ft (30 cm), over a range of 12 metres to 762 metres. The antenna was mounted beneath the bubble of the helicopter cockpit. The recorded value of terrain clearance was adjusted to give bird height above ground. This was possible given the fixed tow cable length of 30 metres.

A Setra Model 276 Barometric Pressure altimeter measured the elevation above sea level, and is calibrated in units of height (metres). This altimeter has a published accuracy of ± 0.02% and a resolution of 0.5 metres.

The altimeters are interfaced to the data acquisition system with an output repetition rate of 0.1 second, and are digitally recorded.

The altimeters are further described in Appendix 3.

4.2.8 The GPS Satellite Navigation System

A CSIRadio DGPS-Max real-time OmniSTAR GPS navigation system with navigation computer and pilot steering indicator (PSI) provided in-flight navigation control. This navigation system operated on 12-channels. A pilot steering indicator (PSI) installed on top of the cockpit dashboard, in front of the pilot provided steering and cross-track guidance to the pilot. The pilot was therefore provided with GPS, and altimeter data to aid in the flying of the helicopter.

This navigation system yields a real-time positional accuracy of better than ± 2 m.

Survey co-ordinates are set-up prior to survey and the information is fed into the airborne navigation system. The co-ordinate system employed in the survey design and digital recording is WGS-84 latitude and longitude. The GPS positional data is recorded at one-second intervals and used with the base station data to calculate differentially corrected locations.

The GPS receiver is fully described in Appendix 3.

4.2.9 Data Acquisition/Recording System

A Geotech *HUMMINGBIRD*^{TM} data acquisition system recorded the digital survey data on an internal hard disk drive. Data is displayed on an LCD screen as traces to allow the operator to monitor the integrity of the system. Sampling rates are as indicated in Table 3.

Table 9: Sampling Rates of Digital data

SYSTEM and No. of CHANNELS	SAMPLING RATE (second)
Total Field Magnetometer (1 channel)	0.1
E.M. - 880 Hz (2 channels) Coplanar	0.1
E.M. – 980 Hz (2 channels) Coaxial	0.1
E.M. – 6.6 kHz (2 channels) Coplanar	0.1
E.M. – 7 kHz (2 channels) Coaxial	0.1
E.M. – 34 kHz (2 channels) Coplanar	0.1
Gamma-ray Spectrometer (512 channels plus U, Th, K, TC and cosmic)	1.0
Radar Altimeter (1 channel)	1.0
DGPS Navigation	1.0

All data collection routines, checking, buffering, recording and verification are software controlled for maximum flexibility. The recorded data is monitored on a colour LCD display as pseudo-analog traces to verify quality and functionality of the system.

4.2.10 Colour Digital Video Imaging System

A record of the flight path was acquired using a DevTech Geo-iMAGe-Lite Colour Digital Imaging System, comprised of the following:

- Stand alone rack mountable mini-computer system, Pentium III 1.0 GHz clock speed c/w 256 MB RAM memory, 20 GB HDD, LCD TFT screen, keyboard and mouse.
- Windows 2000 Professional Operating System software.
- Custom software to enable acquisition of .JPG video frames at a resolution of up to 800 x 600 pixel x 256 colours.
- Frame acquisition rate controlled by 1 PPS signal from GPS receiver - 1 frame per second.
- User-selectable video formats including NTSC.
- Sony digital colour video camera with 1/3 inch CCD video element.
- 2.8- to 4-mm focal length auto-iris lens for low-level video acquisition (47^{o} to 96^{o} viewing angle).

A set of digital images of the ground was taken. The video frames are stored on a large capacity hard disk. A naming convention for each frame has been developed utilizing GPS time as the reference. The frames are numbered in the format SSSSSSS.DDD where SSSSSSS represents the GPS seconds of the day past midnight and DDD represents the Julian day of the year. In the interests of maximum compatibility with other computer processing systems the frame naming system has been kept within

the "DOS" naming convention. The system includes a CD-RW writer and appropriate software to allow storage of the imagery on CD-ROM media for long-term archival purposes.

4.2.11 Field Computer Workstations

A Data Processing Field Workstation (FWS) comprised of a dedicated PC- based notebook computer for use at the technical base in the field, was used on this project. The FWS is designed for use with Geosoft OASIS/Montaj Data Processing Software. The FWS has a data replot capability, and may be used to produce pseudo-analogue charts from the recorded digital data within less than 12 hours after the completion of a survey flight, if this is necessary. It is also capable of processing and imaging all the geophysical and navigation data acquired during the survey, producing semi-final, preliminary-levelled maps.

The FWS was used to accomplish the following:

- **Quality Control/Digital Data Verification** - flight data quality and completeness were assured by both statistical and graphical means on a daily basis
- **Flight Path Plots** - flight path plots were generated from the GPS satellite data to verify the completeness and accuracy of each day's flying
- **Preliminary Maps -** the Geosoft software system permitted preliminary maps to be quickly and efficiently created for noise and coherency checks.

The FWS is fully described in Appendix 3.

The Montaj software is designed for airborne data editing, compilation, processing and plotting. The software reads the portable data media from the airborne system, checks them for gaps, spikes or other defects and permits the data to be edited where necessary. The base station GPS/magnetometer data is checked, edited, processed and then merged with the airborne data. GPS flight path plots are created and plotted for both flight planning and flight path verification.

4.2.12 Spares

A normal compliment of spare parts, tools, back-up software, and necessary test instrumentation was available in the office at the airport.

5. INSTRUMENT CHECKS AND CALIBRATIONS

5.1 Airborne Magnetic System Tests and Calibrations

5.1.1 Magnetic Heading Effect

The magnetic heading effect was determined by flying a cloverleaf pattern oriented in the same direction as the survey lines and tie lines. Two passes in each direction were flown over a recognizable feature on the ground in order to obtain sufficient statistical information to estimate the heading error. The heading error was determined from a test completed on a subsequent survey completed in September in the same area of the Yukon Territory.

5.1.2 Lag Tests

A Lag Test was performed on a subsequent survey in September to ascertain the time difference between the magnetometer readings and the operation of the GPS System. The lag test is included in Appendix 2.

5.2 Airborne Electromagnetic System Tests and Calibrations

The *HUMMINGBIRD*^{TM} EM system was:

- calibrated at the start of the survey day, on the ground, using a ferrite rod and calibration coil;
- at the beginning of each flight internal Q-coil calibrations were performed by the onboard technician;
- at the beginning of each flight, the helicopter climbed to 500 m (1500 ft) AGL to allow the onboard technician to perform background and drift checks.

5.3 Airborne Gamma-ray Spectrometer System Tests and Calibrations

5.3.1 Test Line

A test line was flown and recorded at the start and end of each survey flight to test the repeatability of the gamma-ray spectrometer system. The minimum, maximum and average deviation for each of the four windows (TC, U, Th and K) shall be calculated and stored in a database for future reference and use.

5.3.2 Altitude Attenuation Coefficient

The altitude attenuation coefficient was derived prior to the survey. This was be done by flying a test line at various altitudes from 100' (30 m) up to 1,000' (305 m) above the test line. The coefficients used are included in Appendix 2.

5.3.3 Cosmic Window Calibrations

Cosmic window calibrations or Background Attenuation Coefficients were measured and calculated for the detector crystal packs prior to the survey. The coefficients were calculated from a sequence of passes flown at various altitudes over a large body of water (from 250 ft up to 5,000 ft at intervals of 1,000 ft), with each altitude flown for a minimum of 2 minutes.

The average values of the counts measured in each of the 4 windows (TC, U, Th and K) are compared against the average counts for the cosmic window at each of the altitudes flown. The results of this calibration are presented in Appendix 2.

5.3.4 Spectral Resolution Test

The resolution of the spectrometer was determined before and after each survey flight, using the 662 keV gamma rays from a Cs^{137} source. The pre flight measurements were to be completed after any detector gain adjustments had been applied. The post flight measurement was to be completed without any gain adjustment being made. Unfortunately the field crew did not record these tests digitally and the results cannot be reported.

5.3.5 Daily Source Checks

The spectrometer was calibrated before the first survey flight of the day and after the last survey flight of the day using standard calibration sources, comprised of Cesium (Cs137), Uranium (Bi214) and Thorium (Th208). A background measurement was to be recorded, then each of the sources recorded, followed by a background measurement. Each measurement was to have a duration of 60 seconds. The sources were placed in exactly the same position relative to the gamma-ray sensors each time the source check were completed. Unfortunately the field crew did not complete the final background measurement and the results of this test could not be tabulated and presented.

5.4 Altimeter Calibration Checks

Checks of the radar altimeter calibration were undertaken during a subsequent survey in September. Calibrations were determined by comparing the radar altitude with a suitable reading from the GPS system during a radar "stack" over a suitable feature.

A vertical calibration test of the radar altimeter was repeated each day of operation immediately upon take-off and prior to landing.

5.5 GPS Static Test

In addition to carefully selecting a magnetically suitable area for the positioning of the magnetometer base station, care was taken to ensure that the exact position of the base station is known. The GPS system itself was used, over a period of time, to calculate the coordinates of the base station. Care was taken to ensure that the base station GPS had a maximum field-of-view to the NAVSTAR satellites.

6. QC AND DATA PROCESSING

Daily quality control, initial processing and archiving of the data were completed on-site at the base of operations at the Operations Base (initially in Whitehorse, YT; final location Spirit Lake Wilderness Camp, Carcross, YT) using Geosoft MONTAJ software and a notebook PC computer. All data were verified upon receipt, and checked against the operator's flight logs.

The pre-processing or infield processing sequence included the following quality control measures:

a) Examination and checking of all incoming data to ensure completeness of data sets.
b) The production of preliminary flight path maps, speed checks, terrain clearance checks.
c) Full profile quality control of all acquired traces for noise levels, data completeness, spike editing, and adherence to contract specifications.

The final data processing, map generation and report was completed by McPhar at the Newmarket, Ontario office.

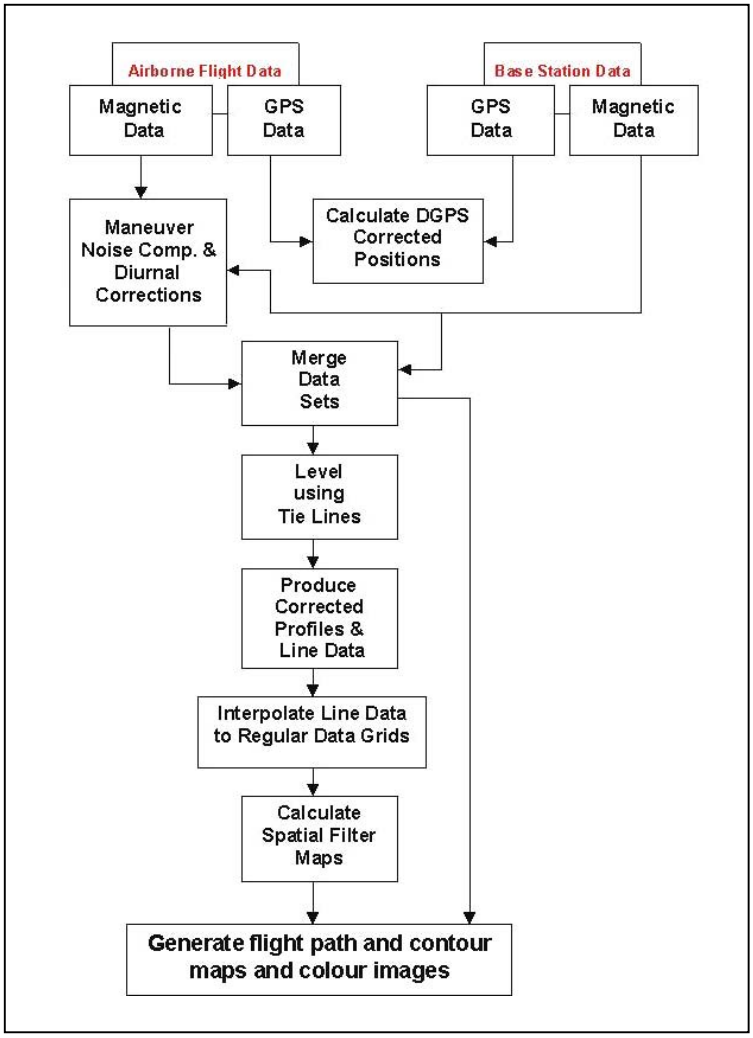

Figure 6: Data processing flow chart for magnetic data

6.1 Flight Path Compilation

The flight path was derived from differentially corrected GPS positions using the real-time airborne GPS data. A position was calculated each 1.0 second (approx. each 30 meters along the flight path) to an accuracy of better than +/- 1.5 meter. These position data were merged into magnetic and ancillary data in the Geosoft GDB database.

6.2 Base Station Magnetic Data

The base station magnetometer data was edited, plotted and merged into the GDB database on a daily basis.

6.3 Corrections to the Magnetic Data

The processing of the data involved the application of the following corrections:

- Correction for diurnal variation using the digitally recorded ground base station magnetic values
- Adjustment of the data for the time lag between the GPS position and the position of the magnetic sensor
- Correction for the heading effect and
- Network adjustment using the flight line and tie line information to level the survey data set.

The corrected data was then used to generate the Total Magnetic Intensity grid.

6.3.1 Additional Corrections Applied to Profile Data

After applying the above corrections to the profile data residual line-direction-related noise was removed through application of microlevelling. The microlevelling technique consists of applying directional and high pass filters to produce a grid containing noise-only in the line direction. In order to differentiate between the two of them, the grid is extracted to the profile database, and an amplitude limit and a filter length are determined, so that the final error channel reflects only noise present on the grid without removing or changing geological signal. This error channel is then subtracted from the initial data channel in order to obtain the final microlevelled channel. The resulting grid is free of line direction noise.

6.3.2 Gridding

The corrected magnetic line data was interpolated between survey lines using a random point minimum curvature gridding algorithm to yield x-y grid values for a standard grid cell size of $1/5^{th}$ of the line spacing (30 metres). For final map production at the required scale of 1:20,000, the grids were regridded to a grid cell size of 15 metres for presentation purposes.

6.3.3 Filter Derivatives

The Total Magnetic Intensity (TMI) data were subjected to:

- IGRF removal
- Reduction-to-the-pole
- Calculation of the First Vertical Derivative (1VD)
- Calculation of the Second Vertical Derivative (2VD)
- Calculation of the Analytic Signal

Colour/contour images were produced for all the above listed magnetic products.

All of these spatial filtering techniques were completed using the Oasis Montaj Magmap and IGRF modules for filtering in the 2D FFT domain.

6.3.3.1 IGRF Removal

The International Geomagnetic Reference Field (IGRF) is a long-wavelength regional magnetic field calculated from permanent magnetic observatory data collected around the world. The IGRF is updated and determined by an international committee of geophysicists every 5 years. Secular variations in the Earth's magnetic field are incorporated into the determination of the IGRF.

Through the removal of the IGRF from the observed Total Magnetic Intensity (TMI), the resulting residual magnetic intensity allows for more valid modelling of individual near surface anomalies. Additionally, the data can be more easily incorporated into databases of magnetic data acquired in the past or to be acquired in the future.

6.3.3.2 Reduction-to-the-Pole

To compensate for the shift of the true anomaly position over the causative source, due to the magnetic inclination and declination, the magnetic data was recomputed so that magnetic anomalies will appear as they would if located at the north magnetic pole. The result of this operation is that in theory, the magnetic anomaly is located directly overtop of the causative source. The computation is referred to as "reduction-to-the-pole" (RTP). The reduction-to-the-pole is computed using a FFT (Fast Fourier Transform) operator.

The RTP not only shifts the anomalies to their correct position with respect to the causative magnetic bodies, but assists in the direct correlation and comparison of magnetic anomalies, trends, structural axis, and discontinuities with mapped geologic surface expression.

The RTP was calculated using the following parameters for the survey area:

Geomagnetic Inclination:	75.8^{o} N
Geomagnetic Declination:	24.6^{o} E

6.3.3.3 Calculation of the First Vertical Derivative (1VD)

Vertical derivatives compute the rate of change of the field as it drops off when measured vertically over the same point (upward continuation). Potential field data obeys Laplace's equation, which allows for the computation, through the FFT package, to take advantage of this symmetry and solve for the vertical or "z" component of the field. The First Vertical Derivative (1VD) has the effect of sharpening anomalies, which allows for better spatial location of source axes and boundaries

6.3.3.4 Calculation of the Second Vertical Derivative (2VD)

To enhance local anomalies and to outline the edges of anomalous bodies within the data, a Second Vertical Derivative (2VD) is computed. The 2VD is a powerful interpretive tool and that is used to assist in the delineation of causative bodies and to accurately locate changes in the magnetic field gradients. Better definition of discontinuities and their relationship to geology can be gained from the use of this tool. A 2VD will show steep gradients over faults and positive closures over the "up thrown" blocks.

6.3.3.5 Calculation of the Analytic Signal

The analytic signal is the square root of the sum of the squares of the derivatives in the x, y, and z directions:

*Asig = sqrt (dx*dx + dy*dy + dz*dz)*

where: asig is the Analytic Signal
sqrt is the square root of
dx is the horizontal gradient in the x direction
dy is the horizontal gradient in the y direction
dz is the vertical gradient in the z direction

The analytic signal is useful in locating the edges of magnetic source bodies, particularly where remanence and/or low magnetic latitude complicates interpretation.

6.4 Corrections to Electromagnetic Data

A two stage digital filtering process was used to reject major sferic events and to reduce system noise.

Local sferic activity can produce sharp, large amplitude events that cannot be removed by conventional filtering procedures. Smoothing or stacking will reduce their amplitude but leave a broader residual response that can be confused with geological phenomena. To avoid this possibility, a computer algorithm searches out and rejects the major sferic events. The filter used was a non-linear filter. The signal-to-noise ratio was further improved by the application of a low-pass linear digital filter. This filter has zero phase shift that prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than about 0.3 seconds or approximately 30 metres.

EM channels were filtered with the following specification:

Table 10: EM Filtering Specifications

EM CHANNEL (Ip# - In-phase, recording channel) (Q# - Quadrature, recording channel)	APPLIED FILTERS
Ip1, Q1 (7 kHz coaxial)	Non-linear 0.3 s Low-pass 4.0 s
Ip2, Q2 (6 kHz coplanar)	Non-linear 0.3 s Low-pass 4.0 s
Ip3, Q3 (980 Hz coaxial)	Non-linear 0.3 s Low-pass 4.0 s
Ip4, Q4 (880 Hz coplanar)	Non-linear 0.3 s Low-pass 4.0 s
Ip5, Q5 (34 kHz coaxial)	Non-linear 0.3 s Low-pass 4.0 s

Following the filtering process, a base level correction was made using EM zero levels determined during the high altitude calibration sequences. The correction applied is a linear function of time that ensures the corrected amplitude of the various in-phase and quadrature components is zero when no conductive or permeable source is present. The filtered and levelled data were used in the

determination of apparent resistivity and anomaly picking. Manually picked zero-levels were used during the intervening period between high-level calibrations.

6.4.1 Apparent Conductivity

The apparent conductivity is calculated by assuming a uniform resistive half-space model. The computer program determines the conductivity that would be consistent with the recorded in-phase and quadrature response amplitudes at the selected frequency. The conductivity channel values were calculated in Log (base10).

6.4.2 EM Anomaly Selection and Analysis

The main purpose of EM anomaly selection is to identify possible near-vertical or dipping thin sheet bedrock conductors. If the source conductance is not large, such anomalies may not register on the apparent resistivity maps as a distinctive resistivity low.

The response type expected from a vertical thin sheet conductor is a positive anomaly in the coaxial EM channels with a coincident low in the coplanar channels.

In some cases a negative in-phase anomaly will be accompanied by a positive quadrature response that suggests a source that is both conductive and magnetic (or conductors and magnetic sources which are in close proximity to each other). In rare instances, the coaxial in-phase trace will exhibit a small positive peak superimposed on a larger negative response in both coaxial and coplanar channels. Such anomalies are often of special exploration interest.

EM anomalies were automatically picked from the offset profiles using Geosoft HEM software. Most anomalies have a response in the 980 Hz coaxial channel. The coaxial channels are more sensitive to vertical thin conductors typified by sulphide mineralisation.

6.4.3 Line Profiles

After levelling the EM channels, stacked profile maps were prepared with the following specifications:

- For 880 Hz coplanar and 980 Hz coaxial frequencies the in-phase and quadrature profiles utilized a vertical scale of 5 ppm/mm;
- For 6600 Hz coplanar and 7000 Hz coaxial frequencies the in-phase and quadrature profiles utilized a vertical scale of 5 ppm/mm;
- For the 34 kHz coplanar frequency, the in-phase and quadrature profiles utilized a vertical scale of 5 ppm/mm.

6.4.4 Gridding

The corrected conductivity line data was interpolated between survey lines using a random point minimum curvature gridding algorithm to yield x-y grid values for a standard grid cell size of 1/5th of the line spacing (30 metres).

6.5 Corrections to Radiometric Data

6.5.1 Background to Corrections and Processing

Gamma-ray spectrometer surveys are utilized for mapping the concentration and distribution of naturally occurring radioelements. The use of an airborne gamma-ray spectrometer allows for the in-situ analysis of radioelement concentrations of naturally occurring Potassium (K), Uranium (U) and Thorium (Th) in the field.

To the geologist, maps of the concentrations of K, U, and Th can prove diagnostic in the mapping of rocks and soils as an aid in geologic mapping and in the exploration for uranium, gold, tin and tungsten deposits where the primary mineralisation process is often related to K metasomatism.

Radioactivity measurements from an airborne platform are dependent upon the detection of gamma rays produced through radioactive decay of the nuclide to be detected. Only three radioactive elements emit sufficient gamma radiation to be measured by airborne methods. The three major sources are:

- Potassium-40 (^{40}K) which comprises 0.011% of all potassium
- Daughter products from the ^{238}U decay series,
- Daughter products from the ^{232}Th decay series.

High-energy cosmic rays of non-terrestrial origin can be detected by airborne gamma-ray spectrometer surveys. This cosmic radiation interacts with molecules in the atmosphere, the aircraft, and the NaI detectors resulting in the production of high-energy radiation. This radiation is detectable and increases exponentially with height above sea level and must be compensated for to obtain reliable and repeatable measurements and detection of terrestrial radiation sources.

The traditional energy windows used to detect gamma ray radiation from K, Th, and U sources have overlapping areas where the energy recorded for a given element contains some contribution from all three radioelements. A correction procedure, known as stripping, is applied to the data to compensate for this spectral overlapping.

The natural gamma ray spectrum over the range of 0 to approximately 3000 keV is resolved by the spectrometer used into 511 channels, each channel ranging from 5 to 6.5 KeV in width. A separate channel records all high-energy radiation above 3000 KeV, the cosmic radiation contribution. Within the defined radioelement windows, the counts recorded are summed over a given time period.

Care must be taken during the acquisition of gamma-ray spectrometer data as the contribution from radon gas and it's related decay products in the atmosphere can result in misleading count rates. Radon gas can also diffuse from the ground, but only one radon nuclide is the directly related to the Uranium decay series. In order to minimise the impact of radon "contamination", radiometric surveys are not completed during rain ("washes" radon from the air and increases ground concentrations) or fog conditions and for a period of not less than 2 hours after precipitation has finished in order to allow for dispersion of radon gas to normal background levels.

Radiometric surveys have limited depth penetration; most radioactive sources being within the upper 1.5 metres of the ground. Radiometric surveys are therefore not effective over water bodies or snow covered areas, the presence of water (in either liquid or solid state) effectively masking radiometric sources.

Spectrometer data are typically acquired in units measured in counts per second. The instrumentation used requires some time each second to process the incoming data – during this time period no counts are recorded. This time period is referred to as "*equipment down time or system dead-time"*. A correction is applied to compensate for this time period.

6.5.2 Processing Applied Using Geosoft Radiometric Processing System

The reduction of radiometric data followed standard processing steps as outlined in the recommendations of IAEA-TECDOC-1363 - Guidelines for radioelement mapping using gamma ray spectrometry data.

The processing of radiometric data involved:

1. correction for system dead-time,
2. background removal,
3. Cosmic correction (Compton scattering correction)
4. Stripping ratios
5. effective height calculation (correct for pressure/temperature change),
6. conversion of count rates to ppm values

Note that the terrain clearance correction is limited to 250 metres to prevent unstable amplification of low counts.

As part of the processing step the digital elevation model (DEM) is calculated via the subtraction of the radar altimeter from the barometric altimeter. The barometric altimeter is levelled using the GPS altimeter. The DEM is calculated as a check on the barometers and to provide information on the topography for interpretation of the radiometric data.

Microlevelling of the radiometric data was completed to eliminate and/or reduce streaking on final gridded images of the individual channels.

7. DELIVERABLE PRODUCTS

The survey data are presented as colour/contour maps on paper, produced at a scale of 1:20,000. A set of report-sized colour/contour images, on paper, is included as Appendix 5. The basic co-ordinate system used is Universal Transverse Mercator, referenced to the longitude & latitude (NAD83). All digital data are also presented on CD-ROM in ASCII format.

The deliverable items of this survey are:

7.1 Maps

The following maps, at a scale of 1:20,000, were delivered as five (5) colour and one (1) black and white paper copy per product. A single copy of the Flight Path map was delivered on mylar film.

- Flight Path (on a topographic base)
- Digital Terrain Model (DTM) Calculated from Altimeter Data
- Total Magnetic Intensity (IGRF removed)
- Reduction to the Magnetic Pole (RTP) of the Total Magnetic Intensity
- Calculated First Vertical Derivative (1VD) of the Total Magnetic Intensity
- Calculated Second Vertical Derivative (2VD) of the Total Magnetic Intensity
- Analytic Signal of the Total Magnetic Intensity
- Total Count
- Thorium
- Potassium
- Uranium
- Thorium/Potassium (Th/K) Ratio
- Offset Profiles of Horizontal Coplanar 34 kHz Coil
- Offset Profiles of Horizontal Coplanar 880 Hz Coil and Vertical Coaxial 980 Hz Coil
- Conductivity of Horizontal Coplanar 6600 Hz Coil with Vertical Coaxial 7000 Hz Coil Conductance Anomalies
- Apparent Resistivity Horizontal Coplanar 6600 Hz

The Reconnaissance survey lines were plotted in profile form on a line-by-line basis. Each profile consisted of four panels with a common Fiducial axis. The panels consisted of spectrometer coaxial EM response, coplanar EM response and Altimeter with Magnetic data. The Reconnaissance lines are included as Appendix 7.

7.2 Digital Data

The edited field and processed digital data are delivered in two (2) copies, in ASCII code, on CD-ROM. The final processed line and grid data, in GEOSOFT format, are also delivered in three (3) copies on CD-ROM. Full descriptions of the digital data formats are included in this final report (see below) and as text files on each CD-ROM. Each CD-ROM has a README.TXT file describing the contents and the file formats.

7.3 Report

Five (5) copies of the survey report were delivered, complete including final copies of all maps as page size maps. The report provides information about the acquisition, processing and presentation of the survey data.

Respectfully submitted,
McPhar Geosurveys Ltd.

Robert Hearst, M.Sc., P.Geoph. (NAPEG)
Consulting Geophysicist

APPENDICES

APPENDIX 1 **Statement of Qualifications**

APPENDIX 2 **Lag Test, Heading Table, Flight Logs, Daily Reports**

APPENDIX 3 **Equipment Documentation**

- Hummingbird HEM System Specifications
- Geometrics G-822A Cesium Magnetometer
- Pico-Envirotec GRS 410 Gamma Spectrometer
- DGPS Max
- Terra TRA-3000 / TRI-30 Radar Altimeter
- Tetra Model 276 Pressure Transducer
- Geo-iMAGe Lite CDIS
- GSM-19 Overhauser Magnetometer
- NovAtel GPSCards
- Field Data Processing Workstations

APPENDIX 4 **Personnel Resumes**

- Tim Bodger
- Robert Hearst
- Henrik T. Anderson
- Barry Levy
- Daniel McKinnon
- Tonia Bojkova
- Asif Mirza

APPENDIX 5 **Digital Data Specifications**

- **HEM Data File Description**
- **Spectrometer Data File Description**
- **HEM Anomaly Listing**

APPENDIX 6 **Page Size Maps**

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- Apparent Resistivity Horizontal Coplanar 6600 Hz

APPENDIX 7 **Reconnaissance Line Geophysical Profiles**

- Golden Eagle Survey, Reconnaissance Line 100
- Golden Eagle Survey, Reconnaissance Line 200
- Golden Eagle Survey, Reconnaissance Line 201
- Golden Eagle Survey, Reconnaissance Line 300
- Golden Eagle Survey, Reconnaissance Line 400
- Golden Eagle Survey, Reconnaissance Line 500
- Golden Eagle Survey, Reconnaissance Line 3000
- Golden Eagle Survey, Reconnaissance Line 3010
- Golden Eagle Survey, Reconnaissance Line 3020
- Golden Eagle Survey, Reconnaissance Line 5000
- Golden Eagle Survey, Reconnaissance Line 5010
- Golden Eagle Survey, Reconnaissance Line 5030
- Golden Eagle Survey, Reconnaissance Line 5031
- Golden Eagle Survey, Reconnaissance Line 5041
- Golden Eagle Survey, Reconnaissance Line 5051
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- Golden Eagle Survey, Reconnaissance Line 3000
- Golden Eagle Survey, Reconnaissance Line 3010
- Golden Eagle Survey, Reconnaissance Line 3020
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- Golden Eagle Survey, Reconnaissance Line 5070
- Golden Eagle Survey, Reconnaissance Line 5081
- Golden Eagle Survey, Reconnaissance Line 5090

APPENDIX 1

Statement of Qualifications

Statement of Qualifications

I, Robert Bruce Hearst, P.Geoph. do hereby certify that:

1. I am currently employed as Senior Geophysicist / Data Processing Manager by:

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2. I graduated with a H.BSc. Geophysics, Geology and Geophysics option from the University of Western Ontario in 1983. In addition, I have obtained a M.Sc. Geology and Geophysics from McMaster University in 1996.

3. I am a member of the CIM (National and Toronto Branches), KEGS (Canadian Exploration Geophysical Society, Past President), SEG (Society of Exploration Geophysicists), EEGS (Environmental and Engineering Geophysicists Society), PDAC (Prospectors and Developers Association of Canada) and a Licensee of NAPEGG (Association of Professional Engineers, Geolo gists and Geophysicists of the Northwest Territories).

4. I have worked as a geophysicist for a total of 21 years since my graduation from the University of Western Ontario.

5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined by NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

6. I am responsible for the preparation of the *Final report on a Helicopter-borne Geophysical Survey, Golden Eagle Property, North-western British Columbia.* Dated January 7, 2005 (the "Technical Report") relating to the Connor, Golden Eagle, Lew, and Tannis Claims of Marksmen Resources Limited. I have not visited the property.

7. ! am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Technical Report, the omission to disclose which makes the Technical Report misleading.

8. I am independent of the issuer applying all of the tests in section 1.5 of NI 43-101.

9. I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

10. I consent to the filing of the Technical report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

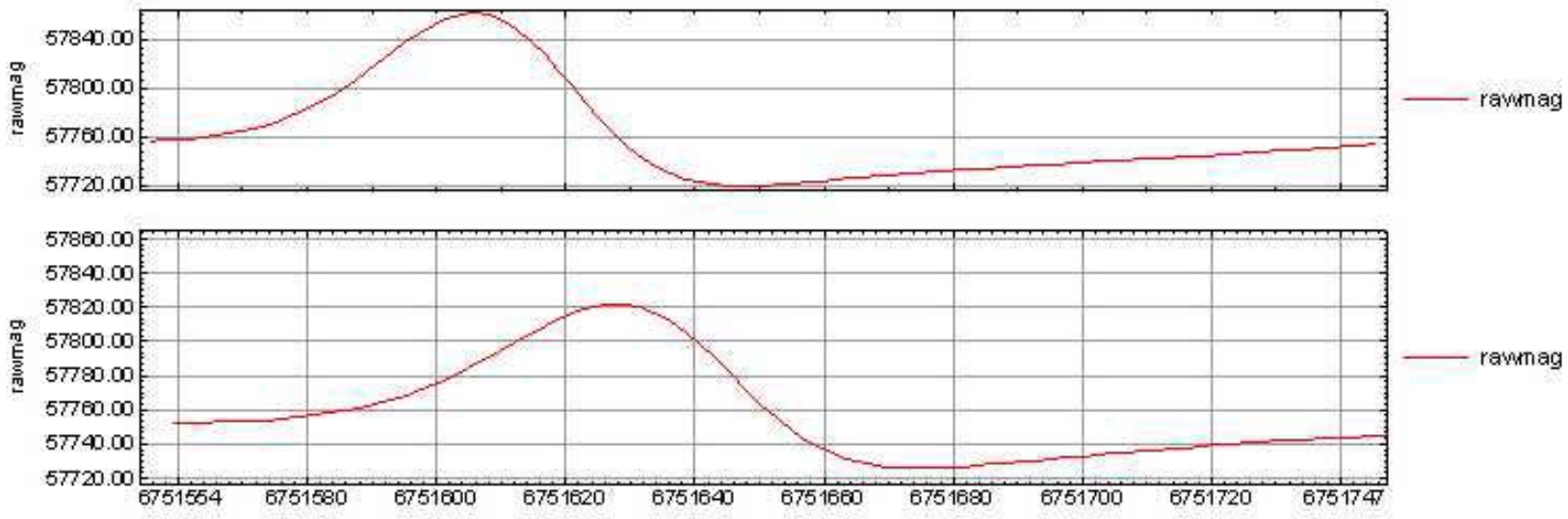
Dated this 7th Day of January, 2005.

Signature of Qualified Person

APPENDIX 2

Lag Test
Heading Table
Flight Logs
Daily Reports

Lag test



database: C:\JOBS_15September\Work_Cordillera\Lag_Head.gdb line/group: L2

2004/11/12

McPHAR

Geosoft Magnetic Heading Correction Table

Direction (real, ^{o})	Correction (real, nT)
0^{o}	-3.47
90^{o}	-0.78
180^{o}	+4.11
270^{o}	+0.58
0^{o}	-3.45

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : GE	JOB: 417	PAGE 1 OF 2

FLT #: 1 DATE: 18/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 28 / A/C REG: C-GPWK

DEPART TIME: 0:34 RETURN TIME: 2:35 TOTAL FLT TIME: 2:01

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
CALS	0	184		Phase & Cals = ok
BKD	0	400		
Th	790	1300		
U	1400	1800		
Cs	1900	2300		
BKD	2300	2700		
CAL	9522	9575		
NULL	9578	9800		
CAL	9807			
7040	11931	12050		Not EM 6H Phase
7041	12055	12225		Wind Deviation
7050	12390	12514		
7030	12735	12905		
7020	13090	13285		High wind in night
7010	13420	13490		Break line
7011	13538	13595		Off Ln 0147
CAL	14114	14155		I CAL
NUL	14156	14183		NULL ALL
CAL	14185	14225		I CAL

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : GE	JOB: 417	PAGE 2 OF 2

FLT #: 1 DATE: 18/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 28 / A/C REG: C-GPWK

DEPART TIME: 0:34 RETURN TIME: 2:35 TOTAL FLT TIME: 2:01

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
RADIO	15555			Radio crossing
500 ft	15988	16044		500 ft over Rwy (547-550)
400 ft	16100	16140		400 ft over Rwy (465-470)
300 ft	16222	16295		300 ft over Rwy (355-700)
200 ft	16368	16420		200 ft over Rwy (250-000)
CAL	16817	16870		Cal All
NULL	16880	17253		Null All
CAL	17270			Cal All
BKD	15000	15400		Post Flt
Th	15400	15800		Spec Cal
U	16000	16200		
Cs	16300	16700		
BKD	16800	17200		
Phase	18000	18160		Phase Check
CAL	18300	18550		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : GE	JOB: 417	PAGE 1 OF 3

FLT #: 2 DATE: 18/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: / A/C REG: C-GPWK

DEPART TIME: 20:12 RETURN TIME: 22:58 TOTAL FLT TIME: 2:46

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
Spec				
BKD	0	400		Back Ground
Th	540	1200		
U	1300	1700		
Cs	3000	3400		
BKD				
CAL	515	553		I Cal
NULL	561	588		Null All
CAL	590	635		I Cal
Phase	800	1110		
Cals	1216	1853		
				New files- 08182000.hum,,4081821.P00
1111	880	975		200 ft over Rwy
CAL	1410	1450		I Cal @ 1000 ft
NULL	1451	1515		Null All
CAL	1520	1568		I Cal
1010	3720	3750		St Ln 2101
1020	3790	3845		
1030	3915	3970		Rain
1040	4020	4120		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : GE	JOB: 417	PAGE 2 OF 3

FLT #: 2 DATE: 18/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: / A/C REG: C-GPWK

DEPART TIME: 20:12 RETURN TIME: 22:58 TOTAL FLT TIME: 2:46

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
1050	4240	4340		Wind & Rain
1060	4400	4570		
1070	4660	4815		
1080	4860	5085		
1090	5180	5360		
1100	5438	5483		Break line
1101	5518	5705		
CAL	5748	5785		I Cal @ 1000 ft
NULL	5789	5830		Null All
CAL	5850	5888		I Cal
1110	5940	6150		
1120	6220	6340		Break Line
1121	6371	6550		
1130	6595	6855		
1140	6925	7037		Breal Line
1141	7084	7275		
1150	7328	7590		
1160	7650	7740		
1161	7830	8050		
1170	8080	8410		
1180	8465	8537		
1181	8580	8703		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : GE	JOB: 417	PAGE 3 OF 3

FLT #: 2 DATE: 18/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: / A/C REG: C-GPWK

DEPART TIME: 20:12 RETURN TIME: 22:58 TOTAL FLT TIME: 2:46

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
1182	8737	8895		
1190	8970	9306		
1200	9380	9420		Break Line
1201	9460	9522		Break Line
1202	9569			Break Line
1203	9646	9820		
CAL	9935	9975		I Cal @ 1000 ft
NULL	9995	10033		Null All
CAL	10053	10092		I Cal
				Went for fuel, shut engine down,, lost power
2222	3542	3610		200 ft oever Rwy
Phase	8620	8670		Phasing test
Cal	8655	8750		Cal check
Spec				
BKD	7000	7800		
Th	7800	8200		
U	8200	8600		
Cs	8600	9000		
BKD	9000	9400		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : GE	JOB: 417	PAGE 1 OF 2

FLT #: 3 DATE: 22/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 27 / A/C REG: C-GPWK

DEPART TIME: 0:51 RETURN TIME: 4:08 TOTAL FLT TIME: 3:17

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
BKD	0	400		
Th	500	950		
U	1030	1450		
Cs	1500	1900		
BKD	1950	2400		
Phase	205	700		
CAL	700	850		
CAL	2501	2547		I Cal
NULL	2575	2795		Null All
CAL	2827	2872		I Cal
1210	4471	4795		Rain Shower, High wind St Ln 0133
1220	4975	5026		Break line
1221	5099	5300		
1230	5360	5590		
1240	5800	5965		High wind
1250	6050	6275		
1260	6333	6455		
1270	6524	6670		
1280	6700	6850		
1290	6910	7081		
1300	7130	7285		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : GE	JOB: 417	PAGE 2 OF 2

FLT #: 3 DATE: 22/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 27 / A/C REG: C-GPWK

DEPART TIME: 0:51 RETURN TIME: 4:08 TOTAL FLT TIME: 3:17

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
1310	7325	7512		
1320	7520	7743		
1330	7788	8045		
1340	8088	8293		
1350	8342	8570		
1360	8590	8815		
1370	8865	9063		
1380	9085	9260		
1390	9290	9425		
1400	9490	9625		
1410	9688	9767		
1420	9825	9950		
1430	10150	10258		
1440	10282	10320		
1450	10370	10412		
1460	10415	10440		
CAL	10525	10560		I Cal
NULL	10585	10612		Null All
CAL	10632	10675		I Cal

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 1 OF 1

FLT #: 4 DATE: 22/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 20 / A/C REG: C-GPWK

DEPART TIME: 22:41 RETURN TIME: 0:12 TOTAL FLT TIME: 1:29

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
BKD	0	400		
Th	420	820		
U	940	1340		
Cs	1390	1790		
BKD	1800	2200		
Phase	12	62		
CAL	80	855		
I CAL	886	930		
1111	1077	1160		200 ft over Rwy 13R
CAL	1719	1768		I Cal @ 1000 ft AGL
NULL	1790	1818		Null All
CAL	1840	1881		I Cal
1020	3544	3640		
1050	3772	3877		Severe Downdraft
1100	4155			Break line Updraft,, Unable to process
2222	6257	6334		200 ft over Rwy

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 1 OF 1

FLT #: 5 DATE: 23/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 7 / 12 A/C REG: C-GPWK

DEPART TIME: 20:21 RETURN TIME: 23:29 TOTAL FLT TIME: 3:18

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
BKD	0	400		
Th	4000	4400		
U	4450	4850		
Cs	4902	5302		
BKD	5320	5781		Complete sample Cal & Background
Phase	0	800		
CAL	900	2255		
1111	180	257		200 ft over Rwy
CAL	1398	1454		
NULL	1544	1570		
CAL	1595	1633		I Cal
				Null All
1100	2757	3090		I Cal
1101	4983	5140		
1200	5200	5690		
1250	6095	6458		Severe Downdraft
				Break line Updraft,, Unable to process
CAL	6478	6515		
NULL	6540	6570		200 ft over Rwy
CAL	6626	6660		
1300	6760	6878		Downdraft
1301	6970			Land to recover nosecone & evaluate

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 1 OF 4

FLT #: 6 DATE: 24/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 12 / A/C REG: C-GPWK

DEPART TIME: 22:31 RETURN TIME: 3:30 TOTAL FLT TIME: 4:59

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
BKD	0	400		Spec Cal- system recording error
Th	0	400		
U	455	855		
Cs	900	1300		
BKD	1342	1742		Complete sample Cal & Background
Phase	331	372		Phase check
CAL		1178		on reverse
1111	317	366		200 ft over Rwy
CAL	1033	1069		
NULL	1095	1125		
CAL	1175	1215		
1303	2599	2695		Break line Ln 2309
1304	2730	2772		Break line
1305	2810			
1350	3130	3154		
1351	3180	3225		
1352	3267	3290		
1353	3335	3595		
1400	3703	4050		
1450	4122	4159		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 2 OF 4

FLT #: 6 DATE: 24/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 12 / A/C REG: C-GPWK

DEPART TIME: 22:31 RETURN TIME: 3:30 TOTAL FLT TIME: 4:59

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
1451	4200	4400		
1500	4512	4700		
1550	4745	4925		
1600	5000	5140		
1650	5229	5432		Break line
1651	5490	5584		
CAL	5610	5650		
NULL	5675	5715		
CAL	5735	5775		
1700	5900	6068		
1750	6140	6177		Break line
1751	6235	6266		Break line
1752	6300	6377		Break line
1753	6425	6474		Break line
1754	6522	6655		
1780	6740	6950		
1730	7022	7061		Break line
1731	7107	7170		Break line
1732	7220	7337		Break line
1733	7380	7429		Break line
1680	7514	7685		
1630	7763	7920		Break line,, Gamma Freeze

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 3 OF 4

FLT #: 6 DATE: 24/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 12 / A/C REG: C-GPWK

DEPART TIME: 22:31 RETURN TIME: 3:30 TOTAL FLT TIME: 4:59

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
1631	7960	8037		
1580	8113	8260		
1530	8315	8465		
1480	8560	8690		Break line
1481	8731	8825		
1430	8830	8966		Breal line
1431	9010	9052		Breal line
1432	9100	9285		
1380	9450	9766		
				Refuel
CAL	11176	11215		I Cal
NULL	11240	11275		Null
CAL	11300	11337		I Cal
1330	11340	11517		Radio Crossing Break line
1331	11580	11721		Break line
1332	11766	11990		
1280	12062	12124		Break line
1281	12173	12267		Break line
1282	12330	12520		
1230	12648	12995		
1180	13052	12245		
1130	13345	13533		
1080	13600	13690		Break line
1081	13740	14020		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 4 OF 4

FLT #: 6 DATE: 24/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 12 / A/C REG: C-GPWK

DEPART TIME: 22:31 RETURN TIME: 3:30 TOTAL FLT TIME: 4:59

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
1030	13970	14020		
1040	14665	14720		
1090	14990	15140		
1140	15200	15440		
1190	15540	15800		Off line 0250
CAL	15955	15995		
NULL	1625	16066		
CAL	10090	16127		
2222	17941	18034		200 ft oever Rwy
BKD	10500	10900		
Th	11000	11400		
U	11450	11850		
Cs	11895	12295		
BKD	12335	12735		Completed spec cal @ 0413 UTC

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 1 OF 3

FLT #: 7 DATE: 25/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 15 / A/C REG: C-GPWK

DEPART TIME: 22:40 RETURN TIME: 2:39 TOTAL FLT TIME: 3:59

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
BKD	0	400		
Th	440	840		
U	895	1295		
Cs	1355	1755		
BKD	1800	2200		Completion of background calebration
Phase	0	447		
CAL	500	1000		
1111	327	382		200 ft over Rwy 13R
CAL	1152	1190		I CAL
NULL	1220	1320		Null All Smoke free Fire
CAL	1350	1390		I Cal
1010	2735	3113		ON LN 2315
1070	3238	3640		
1060	3684	3856		
1110	4000	4200		
1130	4251	4760		
1190	4845	5300		
1170	5380	5600		
1160	5664	5838		
1120	5900	6220		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 2 OF 3

FLT #: 7 DATE: 25/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 15 / A/C REG: C-GPWK

DEPART TIME: 22:40 RETURN TIME: 2:39 TOTAL FLT TIME: 3:59

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
1210	6354	6670		
1220	6728	7120		Off line 0038
CAL	7185	7222		I Cal
NULL	7230	7250		Null All
CALL	7293	7327		I Cal
				Re-fuel
CAL	8507	8555		
NULL	8585	8615		
CAL	8645	8685		
				ON LN 0059
1240	8811	9087		
1241	9122	9275		
1260	9370	9408		
1261	9460	9506		
1262	9565	9765		
1290	9813	9854		
1291	9898	10148		
1292	0	0		
1470	10429	10475		
1471	10510	10665		
1460	10719	10939		
1490	11040	11084		
1491	11139	1132		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 3 OF 3

FLT #: 7 DATE: 25/08/04 OPERATOR: Barry

PILOT: Ken Knight O.A.T.: 15 / A/C REG: C-GPWK

DEPART TIME: 22:40 RETURN TIME: 2:39 TOTAL FLT TIME: 3:59

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
1510	11390	11479		
1511	11518	11600		
1520	11653	11842		
1540	11860	12060		
1560	12100	12302		Off Ln 0203
CAL	12440	12478		I Cal
NULL	12510	12538		Null All
CAL	12560	12600		I Cal
2222	14344	14385		200 ft over Rwy
BKD	14700	15100		
Th	15300	15700		
U	15800	16120		
Cs	16245	16645		
BKD	16645	17045		
Phase	16082	16120		
Cal 34K	16204	16220		
6K	16234	16245		
880	16260	16270		
7K	16280	16290		
980	16290	16310		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 1 OF 1

FLT #: 8 DATE: 29/08/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: / A/C REG: C-GPWK

DEPART TIME: 16:30 RETURN TIME: 17:55 TOTAL FLT TIME: 1:25

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
				Shut power off
	273	334		200 ft @ runway
	1098	1155		I Cal
	1163	1220		Null All
	1340	1356		I Cal
	3940	3990		I Cal All

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 1 OF 2

FLT #: 9 DATE: 31/08/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: 4° / A/C REG: C-GPWK

DEPART TIME: 10:03 RETURN TIME: 12:54 TOTAL FLT TIME: 2:51

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
BKD	0	400		
Th	450	950		
U	1020	1420		
Cs	1480	1880		
BKD	1950	2350		End of spec
	3438	5046		Bord Phasing 3438
				Didn't phase perfected due to external noise
				Spec time 15 sec behind
				Hum 1 min 50 sec behind
	6282	6350		I Cal
	6355	6413		Null All
	6428	6488		I Cal
	6480	6546		Null All
	6555	6650		I Cal
1150	1722	1724		Time not fids
1250	1726	7790		Time not fids
1270	7796	8245		Fids start broke @ 8113 Pick up @ 8155
1310	8377	8834		Broke @ 8570 pickup @ 8594
1320	8920	9337		Broke @ 8990 pickup @ 9033

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 2 OF 2

FLT #: 9 DATE: 31/08/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: 4° / A/C REG: C-GPWK

DEPART TIME: 10:03 RETURN TIME: 12:54 TOTAL FLT TIME: 2:51

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
1340	9405	9715		Broke @ 9856
1360	9730	10187		
1370	10281	10562		
1390	10652	11076		Broke @ 10000, pickup @ 10828
9094	1111	11180		I Cal
		11245		Null All
	11255	11329		I Cal
1410	11430	11780		
1420	11800	12249		
1440	12327	12615		
1570	10295	12984		12780 car taking pictures
1590	13055	13195		
1610	13268	13526		70°
1620	13597	13795		250°
1640	13870	14117		
1660	14183	14390		missed start of line
1630	14478	14695		
1690	14802	14970		
1710	15058	15330		Buss @ out of line
	15400	15637		I Cal
	15680	15739		Null All
	15770	15810		I Cal
	15820	15870		Null All
	15880	15970		I Cal Go for fuel

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 1 OF 1
FLT #: 10	DATE: 31/08/04	OPERATOR:	Daniel
PILOT: Ken Knight	O.A.T.: 9° /	A/C REG:	C-GPWK
DEPART TIME: 1:14	RETURN TIME: 3:22	TOTAL FLT TIME:	2:08
SURVEY HEIGHT: 200 ft			

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
9098	17600	17690		I Cal All
1720	17824	18245		First line after fuel
1740	18324	18588		Break off: 17944 pickup 17980 on (1720)
1760	18655	18990		Break off: 18050 pickup 18080
1770	19052	19275		Break off: 18813 pickup 18856 (1760)
1790	19555	19800		
1910	19810	20075		First extension
1850	20315	20678		
1790	20825	21045		20190-20200 shut 880 down it is almost too full
1190	21563	21949		I Call All * 21140
1130	21955	22400		I Null All * missed all togather
1070	22520	22811		I Call All
1010	22820	23175		
7010	23496	23990		Just kept flying
7020	23995	24195		
7030	24324	24715		
	24800	24880		I Call All

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 1 OF 2

FLT #: 11 DATE: 31/08/04 OPERATOR: Denial

PILOT: Ken Knight O.A.T.: 9° / A/C REG: C-GPWK

DEPART TIME: 3:34 RETURN TIME: 4:50 TOTAL FLT TIME: 1:16

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
7040	25910	25990		I Cal
7040	26166	26986		Break @ 24463
7050	27168	27812		Ln # 7060 is the map # 7050
7060	27875	28540		
7070				
				very much updraft on 7060 to get dwon in the gully
				stayed at heigher Alt in order to get up
				other side of mountain
				Return to the base due to low fuel
				Have to come back anyway
	28665	28735		I Cal 28665
9099	28740	28795		I Null 28740
	28800	28890		I Cal

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 2 OF 2

FLT #: 11 DATE: 31/08/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: 9° / A/C REG: C-GPWK

DEPART TIME: 3:34 RETURN TIME: 4:50 TOTAL FLT TIME: 1:16

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
BKD	0	400		
Th	476	876		
U	1065	1465		
Cs	1525	1925		
BKD	1920	2370		End of spec cals
	758	763		Check phaze
	767	787		Vertical
	790	810		Horizontal
	815	820		Vertical
				Phasing = ok
7 k	1038	1062		40, -62, -75, -178 = 125 & 116
980	1080	1113		48, -161, 1196, 1100 = 61
880	1152	1195		
6 k	1208	1228		796- 379 744-440
34 k	1240	1261		5876 5176 5826 5115

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 1 OF 2

FLT #: 12 DATE: 01/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: 4° / A/C REG: C-GPWK

DEPART TIME: RETURN TIME: TOTAL FLT TIME:

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
NKD	0	400		
Th	450	850		
U	910	1310		
Cs	1365	1765		
BKD	1805	2205		Spec Cals
	238	285		Null All
		342		Repeat
				Phazing
	1528	1580		(a) -18, 4 -178, 4
	1605	1612		(c) -35, 9 -448, 8
	1620	1737		(b) -139, 11 -202, 11
		1772		(d) -8, 5, ok
		1857		(e) 30, 30
				(b) (d) & (e) hard to phazed due to external noise
7 k	1940			Celebration
				coax coils are great
				Too much noise in 880 & 34 k to get exact figures
				to calculate cals.
				Calibrated the frequencies and go to block

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Marksmen	BLOCK # : MB	JOB: 417	PAGE 2 OF 2
FLT #: 12	DATE: 01/09/04	OPERATOR:	Daniel
PILOT: Ken Knight	O.A.T.: 4° /	A/C REG:	C-GPWK
DEPART TIME:	RETURN TIME:	TOTAL FLT TIME:	
SURVEY HEIGHT: 200 ft			

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
	4340	4415		I Cal All
	4420	4475		I Null All
9120	4480	4550		I Cal All
	4575	4625		I Cal All by error
	4630	4690		I Null All
	4695	4780		I Cal All
5010	5010			1955: 26 st line
				p line @ tracko @ 5812
				2010 end of block
				I Cal All

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	17-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	1	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Bruce Gairns	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Barry Levy	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:		17.1				17.1	Field Data QC:	Andy Andersen	
Accumulated km:		17.1				17.1			
Percent Completed:		9.5%				2.6%	Client QC(Aurora Geosciences)	Mike Power	
Lines flown:		Golden Eagle	L7010, L7020, L7030, L7040 & L7050 (all ties completed)				Marksmen Resources	Kieran Downes	
Flight #		Take off Time	First line start		Last line end		Land Time		Hours Flown
calibs & survey	Flt-01	0:34	1:19		1:47		2:35		2:01
Weather:	Clear and warm. Strong gusty winds over ridges.						Hours Flown Today:		2:01
Accum. Standby:		Accumulated Survey Days:					Accumulated Project Hours:		

COMMENTS Established fuel cache at survey site, and completed all start-up tests & calibrations.
Several "turn-out" and line restarts due to steep terrain & high winds in the mountains.

Local time = GMT - 7 hours

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(720)271-1493	htandersen@compuserve.com
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HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
Lodging	Gold Rush Inn (Best Western)	(867)668-4500	

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Please note that kilometres flown are estimates.

Exact kilometres will be calculated upon completion of survey, and will be based on GPS measurements & contractual boundaries

Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	18-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	2	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Bruce Gairns	
Survey Type:	Helicopter EM & Magnetic Survey								
Survey Areas:	Golden Eagle	Main Block				Totals	Operator	Barry Levy	
Project Km:	181.0	480.4				661.4	Systems Engineer:	Barry Levy	
Km flown today:	78.0					78.0	Field Data QC:	Andy Andersen	
Accumulated km:	95.1					95.1			
Percent Completed:	52.5%					14.4%	Client QC(Aurora Geosciences)	Mike Power	
Lines flown:	GE Blk;- L1010 thru L1200						Marksmen Resources	Kieran Downes	

Flight #		Take off Time	First line start		Last line end	Land Time		Hours Flown
survey	Flt-02	20:12	21:01		22:43	22:51		2:39
ferry	Flt-03	23:38		return after refuel at field cache		23:58		0:20

Weather:	gusty winds over ridges, with patches of rain in survey area. Light rain during night.	Hours Flown Today:		2:59
Accum. Standby:	Accumulated Survey Days:	Accumulated Project Hours:		

COMMENTS

Momentary loss of electric power from the helicopter during refueling;- returned to base for system check and recalibration.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
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Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	19-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	3	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Bruce Gairns	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Barry Levy	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:							Field Data QC:	Andy Andersen	
Accumulated km:		95.1				95.1			
Percent Completed:		52.5%				14.4%	Client QC(Aurora Geosciences)	Mike Power	
Lines flown:							Marksmen Resources	Kieran Downes	
Flight #		Take off Time	First line start			Last line end	Land Time		Hours Flown
				**** no flights, ground still wet in patches ****					
Weather:	Partly overcast with rain late afternoon & evening.						Hours Flown Today:		
Accum. Standby:	1	Accumulated Survey Days:	2				Accumulated Project Hours:		

COMMENTS

Ground still wet in patches. Mild geomag activity until early afternoon.
Used time for maintenance & tests.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel			
General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
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Please note that kilometres flown are estimates.

Exact kilometres will be calculated upon completion of survey, and will be based on GPS measurements & contractual boundaries

Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	20-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	4	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Bruce Gairns	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Barry Levy	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:							Field Data QC:	Andy Andersen	
Accumulated km:		95.1				95.1			
Percent Completed:		52.5%				14.4%	Client QC(Aurora Geosciences)	Mike Power	
Lines flown:							Marksmen Resources	Kieran Downes	
Flight #		Take off Time	First line start			Last line end	Land Time		Hours Flown
				**** no flights, wet ground & poor WX ****					
Weather: Low clouds with occasional rain through the day.							Hours Flown Today:		
Accum. Standby:	3	Accumulated Survey Days:	2				Accumulated Project Hours:		

COMMENTS

Cloud height below mtn ridges.
Active geomag until apprx 16:00 local time.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
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Please note that kilometres flown are estimates.

Exact kilometres will be calculated upon completion of survey, and will be based on GPS measurements & contractual boundaries

Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	21-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK		SURVEY PERSONNEL			
Report Number:	5	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.			Pilot	Ken Knight		
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC		AME:	Bruce Gairnce		
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Barry Levy	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:		86.0				86.0	Field Data QC:	Andy Andersen	
Accumulated km:		181.0				181.0			
Percent Completed:		100.0%				27.4%	Client QC(Aurora Geosciences)	Mike Power	
Lines flown:							Marksmen Resources	Kieran Downes	
Flight #		Take off Time	First line start		Last line end		Land Time		Hours Flown
survey	Flt-04	0:51	1:33		3:13		3:20		2:29
ferry	Flt-05	3:31					4:00		0:29
Weather:	Windy over ridges, and patches of light rain at start of sortie						Hours Flown Today:		2:58
Accum. Standby:	3	Accumulated Survey Days:	2				Accumulated Project Hours:		

COMMENTS

Moderate geomagnetic activity into early afternoon (local time)

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
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Please note that kilometres flown are estimates.

Exact kilometres will be calculated upon completion of survey, and will be based on GPS measurements & contractual boundaries

Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	22-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	6	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Bruce Gairns	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Barry Levy	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:			2.3			2.3	Field Data QC:	Andy Andersen	
Accumulated km:		181.0	2.3			183.4			
Percent Completed:		100.0%	0.5%			27.7%	Client QC(Aurora Geosciences)	Mike Power	
Lines flown:		Main Blk: 1020 & 1050					Marksmen Resources	Kieran Downes	
Flight #		Take off Time	First line start			Last line end	Land Time		Hours Flown
survey	Flt-06	22:41	23:23	*** end flying:- dangerous winds over ridges!		23:35	0:12		1:31
Weather:	Strong winds over ridges, helicopter unable to ascend & descend "on-line & altitude"						Hours Flown Today:		1:31
Accum. Standby:	5	Accumulated Survey Days:	2				Accumulated Project Hours:		

COMMENTS

Geomagnetic activity into early afternoon (local time)
Operator, McKinnon, arrives in Whitehorse.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
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Please note that kilometres flown are estimates.

Exact kilometres will be calculated upon completion of survey, and will be based on GPS measurements & contractual boundaries

Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	23-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	7	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Bruce Gairns	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Daniel McKinnon	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:			19.9			19.9	Field Data QC:	Andy Andersen	
Accumulated km:		181.0	22.2			203.2			
Percent Completed:		100.0%	4.6%			30.7%	Client QC(Aurora Geosciences)	Mike Power	
Lines flown:		Main Blk: 1100, 1200, 1250 & part of 1300					Marksmen Resources	Kieran Downes	

Flight #		Take off Time	First line start		Last line end	Land Time		Hours Flown
survey	Flt-07	20:21		*** HEM bird grazed rocks in severe downdraft:-		23:29		3:08
Weather: Strong winds over ridges, helicopter unable to ascend & descend "on-line & altitude"						Hours Flown Today:		3:08
Accum. Standby:	5	Accumulated Survey Days:	2			Accumulated Project Hours:		

COMMENTS

Geomagnetic activity into early afternoon (local time)
HEM bird sustained external damage. Nose cone was retrieved. System dissassembled and being checked for damage.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
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Please note that kilometres flown are estimates.

Exact kilometres will be calculated upon completion of survey, and will be based on GPS measurements & contractual boundaries

Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	24-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	8	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Bruce Gairns	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Daniel McKinnon	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:			89.2			89.2	Field Data QC:	Andy Andersen	
Accumulated km:		181.0	111.4			292.4			
Percent Completed:		100.0%	23.2%			44.2%	Client QC(Aurora Geosciences)	Mike Power	
Lines flown:		Main Blk: 30 lines.					Marksmen Resources	Kieran Downes	

Flight #		Take off Time	First line start		Last line end	Land Time		Hours Flown
survey	Flt-08	22:31	23:09		1:08	1:19		2:48
survey	Flt-09	1:27	1:35		2:50	3:30		2:03

Weather: Strong winds over ridges, helicopter unable to ascend & descend "on-line & altitude"			Hours Flown Today:		4:51
Accum. Standby:	5	Accumulated Survey Days: 3	Accumulated Project Hours:		

COMMENTS

Geomagnetic activity until approx noon.
HEM bird sustained external damage. Nose cone was retrieved. System dissassembled and being checked for damage.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
Lodging	Gold Rush Inn (Best Western)	(867)668-4500	

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Please note that kilometres flown are estimates.

Exact kilometres will be calculated upon completion of survey, and will be based on GPS measurements & contractual boundaries

Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	25-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	9	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Trevor Moore	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Daniel McKinnon	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:			85.4			85.4	Field Data QC:	Andy Andersen	
Accumulated km:		181.0	196.8			377.9			
Percent Completed:		100.0%	41.0%			57.1%	Client QC(Aurora Geosciences)	Mike Power	
Lines flown:		Main Blk: 18 lines.					Marksmen Resources	Kieran Downes	

Flight #		Take off Time	First line start		Last line end	Land Time		Hours Flown
survey	Flt-10	22:40	23:15		0:38	0:44		2:04
survey	Flt-11	0:54	0:59		2:03	2:39		1:45

Weather: Low cloud & smoke;- poor visibility!				Hours Flown Today:		3:49
Accum. Standby:	5	Accumulated Survey Days:	4	Accumulated Project Hours:		

COMMENTS

Geomagnetic activity early part of day.
HEM bird sustained only external damage. Nose-cone was replaced, & plug-in circuit boards reseated. System checked & recalibrated.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
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Please note that kilometres flown are estimates.

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Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	26-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	10	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Trevor Moore	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Daniel McKinnon	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:							Field Data QC:	Andy Andersen	
Accumulated km:		181.0	196.8			377.9			
Percent Completed:		100.0%	41.0%			57.1%	Client QC(Aurora Geosciences)	Mike Power	
Lines flown:		Main Blk:					Marksmen Resources	Kieran Downes	
Flight #		Take off Time	First line start			Last line end	Land Time		Hours Flown
				*** no flights due to poor weather conditions ***					
Weather: Low cloud with drizzle & rain throughout the day.							Hours Flown Today:		
Accum. Standby:	6	Accumulated Survey Days:	4				Accumulated Project Hours:		

COMMENTS

Mild geomagnetic activity through the day.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
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Please note that kilometres flown are estimates.

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Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	27-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	11	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Trevor Moore	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Daniel McKinnon	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:							Field Data QC:	Andy Andersen	
Accumulated km:		181.0	196.8			377.9			
Percent Completed:		100.0%	41.0%			57.1%	Client QC(Aurora Geosciences)	Mike Power	
Lines flown:		Main Blk:					Marksmen Resources	Kieran Downes	
Flight #		Take off Time	First line start			Last line end	Land Time		Hours Flown
				*** no flights due to poor weather conditions ***					
Weather: Low cloud with rain throughout the day.							Hours Flown Today:		
Accum. Standby:	7	Accumulated Survey Days:	4				Accumulated Project Hours:		

COMMENTS

Mild geomagnetic activity most of the day.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
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Please note that kilometres flown are estimates.

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Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	28-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	12	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Trevor Moore	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Daniel McKinnon	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:							Field Data QC:	Andy Andersen	
Accumulated km:		181.0	196.8			377.8			
Percent Completed:		100.0%	41.0%			57.1%	Client QC (Aurora Geosciences)	Mike Power	
Lines flown:		Main Blk:					Marksmen Resources	Kieran Downes	
Flight #		Take off Time	First line start			Last line end	Land Time		Hours Flown
				*** no flights due to poor weather conditions ***					
Weather: Low cloud with drizzle & rain, clearing in the afternoon. Gusty winds.							Hours Flown Today:		
Accum. Standby:	8	Accumulated Survey Days:	4				Accumulated Project Hours:		

COMMENTS

Geomagnetic activity early morning, extending into afternoon (local time)

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
Lodging	Gold Rush Inn (Best Western)	(867)668-4500	

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Please note that kilometres flown are estimates.

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Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	29-Aug-04	Aircraft:	A-Star AS-350BA		C-GPWK		SURVEY PERSONNEL		
Report Number:	13	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Trevor Moore	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Daniel McKinnon	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:							Field Data QC:	Andy Andersen	
Accumulated km:		181.0	196.8			377.8			
Percent Completed:		100.0%	41.0%			57.1%	Client QC (Aurora Geosciences)	Mike Power	
Lines flown:		Main Blk:					Marksmen Resources	Kieran Downes	
Flight #		Take off Time	First line start			Last line end	Land Time		Hours Flown
survey	Flt-12	16:30		*** flight aborted due to low cloud over ridges!			17:55		1:25
Weather: Low cloud over most of remaining survey lines, with drizzle & rain in afternoon.							Hours Flown Today:		1:25
Accum. Standby:	9	Accumulated Survey Days:	4				Accumulated Project Hours:		

COMMENTS

Flew to the survey area, and had to return to base, as low cloud covered survey area. Sent scout by road to see whether there be a window of opportunity for at least part of the area. Cloud & rain in the afternoon. Mild geomagnetic activity through the day.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel			
General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
Lodging	Gold Rush Inn (Best Western)	(867)668-4500	

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Please note that kilometres flown are estimates.

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Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	30-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	14	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Trevor Moore	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Daniel McKinnon	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:							Field Data QC:	Andy Andersen	
Accumulated km:		181.0	196.8			377.8			
Percent Completed:		100.0%	41.0%			57.1%	Client QC (Aurora Geosciences)	Mike Power	
Lines flown:		Main Blk:					Marksmen Resources	Kieran Downes	
Flight #		Take off Time	First line start			Last line end	Land Time		Hours Flown
ferry	Flt-13	20:50		*** geomag active through most of day ***			21:13		0:23
Weather: Low cloud cleared by noon. Light wind over survey area.							Hours Flown Today:		0:23
Accum. Standby:	10	Accumulated Survey Days:	4				Accumulated Project Hours:		

COMMENTS

Moved operations base to Spirit Lake camp ground, 6kms N of Carcross.
Moderate to strong geomagnetic activity through into the afternoon.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
Lodging	SpiritLake Wilderness Resort	(867)821-4337	

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Please note that kilometres flown are estimates.

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Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	31-Aug-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	15	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Trevor Moore	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Daniel McKinnon	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:			215.3			215.3	Field Data QC:	Andy Andersen	
Accumulated km:		181.0	412.1			593.1			
Percent Completed:		100.0%	85.8%			89.7%	Client QC (Aurora Geosciences)	Mike Power	
Lines flown:		Main Blk:	41 lines flown				Marksmen Resources	Kieran Downes	

Flight #		Take off Time	First line start		Last line end	Land Time		Hours Flown
survey	Flt14	17:03				19:54		2:51
survey	Flt-15	20:14				22:22		2:08
survey	Flt-16	22:34				23:50		1:16
Weather: Light wind, patches of drizzle over parts of survey area. Visibility fair.						Hours Flown Today:		6:15
Accum. Standby:	10	Accumulated Survey Days:		5		Accumulated Project Hours:		

COMMENTS

Some geomagnetic activity early in the day.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
Lodging	SpiritLake Wilderness Resort	(867)821-4337	

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Please note that kilometres flown are estimates.

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Project #: 0417 Marksmen		Daily Field Production Report							
Report Date:	01-Sep-04	Aircraft:	A-Star AS-350BA		C-GPWK		SURVEY PERSONNEL		
Report Number:	16	Ops Base:	Pacific Western Helicopters, Dease Lake, BC.				Pilot	Ken Knight	
Client:	Marksmen Resources Ltd	Country:	Canada	NW BC			AME:	Trevor Moore	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Golden Eagle	Main Block			Totals	Operator	Daniel McKinnon	
Project Km:		181.0	480.4			661.4	Systems Engineer:	Barry Levy	
Km flown today:			70.1			70.1	Field Data QC:	Andy Andersen	
Accumulated km:		181.0	482.2			663.2			
Percent Completed:		100.0%	100.4%			100.3%	Client QC (Aurora Geosciences)	Mike Power	
Lines flown:		Main Blk:	Completed all extended Lines.				Marksmen Resources	Kieran Downes	

Flight #		Take off Time	First line start		Last line end	Land Time		Hours Flown
survey	Flt-17a	19:40				20:23		0:43

Weather: Early morning ground fog. Increasing winds in afternoon.				Hours Flown Today:		0:43
Accum. Standby:	10	Accumulated Survey Days:	6	Accumulated Project Hours:		

COMMENTS

Some geomagnetic activity early in the day.

*** **This is the Last & Final Field Production Report** ***

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel

General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)668-4500x233	htandersen@compuserve.com
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Please note that kilometres flown are estimates.

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APPENDIX 3

Equipment Documentation

- Hummingbird HEM System Specifications
- Geometrics G-822A Cesium Magnetometer
- Pico-Envirotec GRS 410 Gamma Spectrometer
- DGPS Max
- Terra TRA-3000 / TRI-30 Radar Altimeter
- Tetra Model 276 Pressure Transducer
- Geo-iMAGe Lite CDIS
- GSM-19 Overhauser Magnetometer
- NovAtel GPSCards
- Field Data Processing Workstations

DATA PROCESSING

McPhar is dedicated to processing geophysical data in the field.

For this purpose all our airborne systems are sent to the field with a geophysicist and a PC-based data processing system to support them. The Field Data Verification Workstation (FWS), as this system is known, can process airborne magnetic, radiometric and EM data, and produce plots and maps in full-color of the survey data, often within hours of the survey flight ending.

The FWS software, which is the core of this system, permits our field geophysicists to differentially correct the GPS navigation data; carry out flight path recovery; perform magnetic compensation and leveling; undertake radiometric corrections and preliminary processing; electromagnetic processing; and generally to perform filtering, gridding and contouring of data, imaging of selected data and plotting to any map scale and layout.

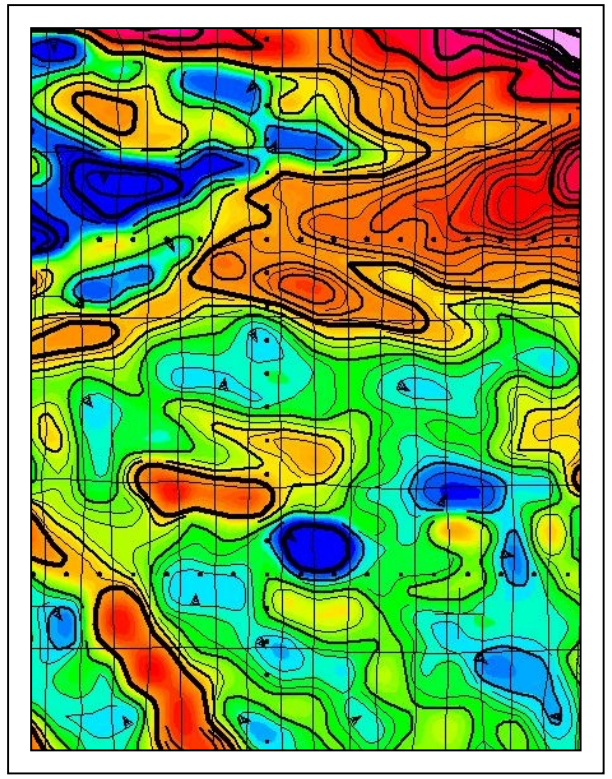
INTERPRETATION

The interpretation of geophysical results into meaningful geological parameters is the prime function of any of our interpreters.

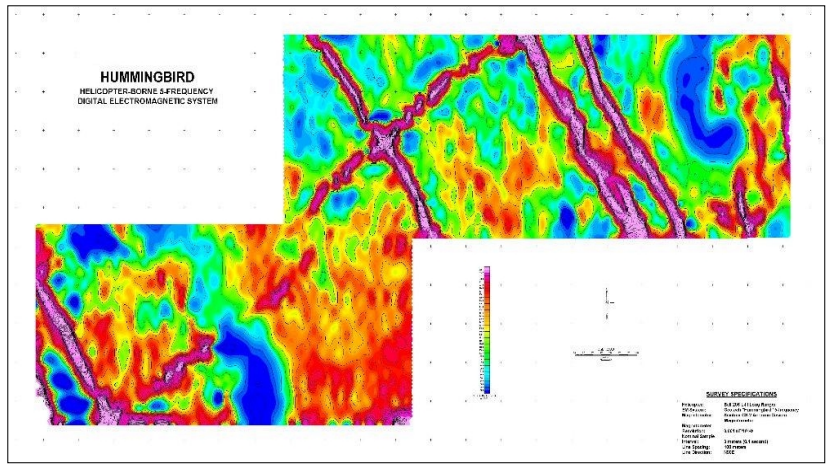
The many highly qualified geophysicists and technicians on our staff share a strong geological back-ground. The manipulation of geophysical data is only a means to an end, and the final product of the interpretation is the compilation of a series of maps showing interpreted geological parameters. The data processing routines and mathematical operators applied to the data are not the end product of the interpretation; they help delineate geologic and economic targets to be discussed in the final report.

We bring many techniques to bear on an interpretation project in order to determine depths to causative sources, to delineate discontinuities and boundaries, and to draw conclusions regarding geological structure beneath the survey.

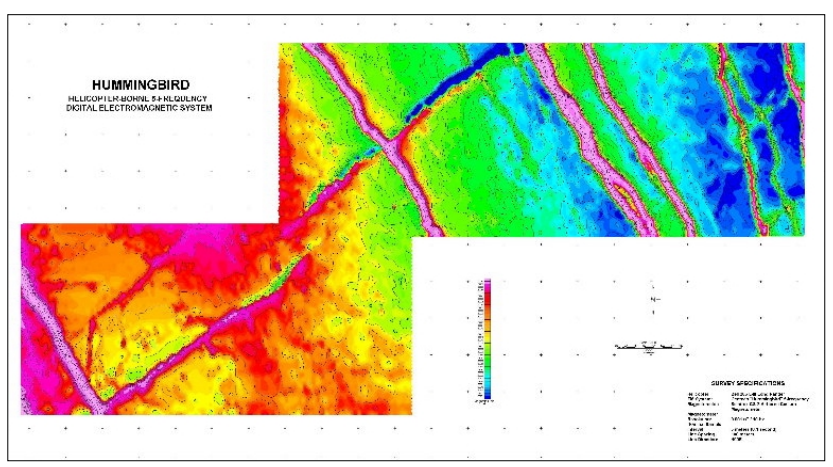
A wide variety of contour and interpretation maps, profiles, cross-sections and models, and a written report are the result of the interpretation.



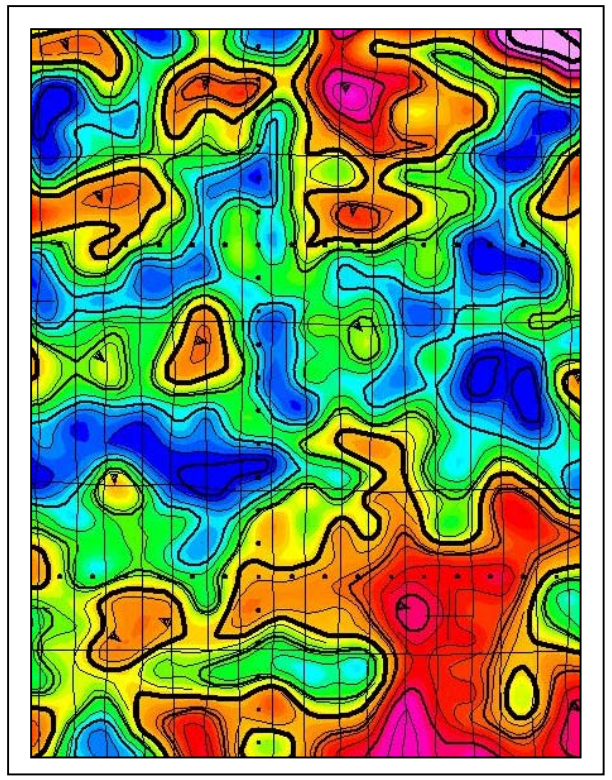
Magnetics



EM - Resistivity



Magnetics



EM – Resistivity3

HUMMINGBIRD

Helicopter-borne Digital Electromagnetic System

Undoubtedly, helicopter-borne electromagnetics (EM), combined with total field magnetics and often gamma-ray spectrometry, have been one of the most productive and useful of airborne system developments to date, and have accounted for the discovery of billions of dollars worth of mineral resources, tapped into numerous ground water reservoirs and provided immense volumes of data for environmental site evaluations. These systems are ideally suited for working in rugged, mountainous terrain, or over small claim block-sized properties.

Currently, electromagnetics (EM) combined with a high-sensitivity magnetometer are the techniques of choice for most mining companies worldwide, to locate and define diamondiferous kimberlite pipes and base and precious metal deposits.

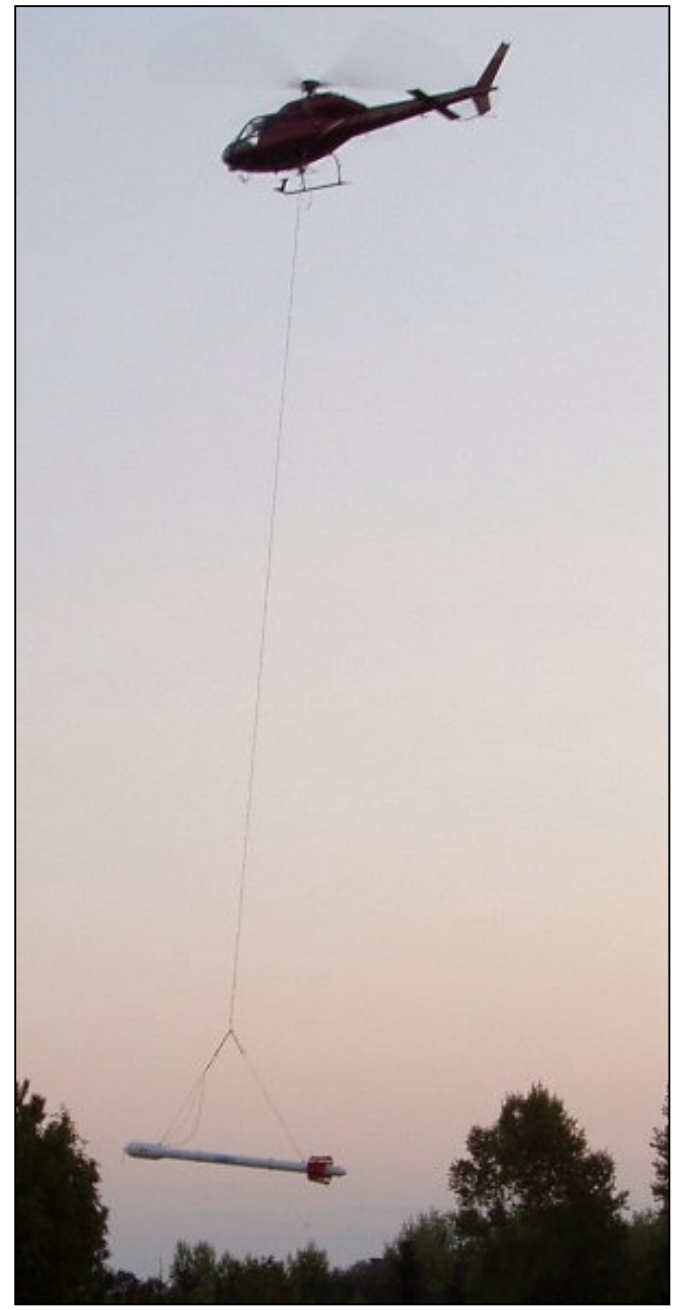
McPhar's electromagnetic survey systems are integrated around the HUMMINGBIRD EM sensor, which are available in either 4- or 5-frequency configurations.

The HUMMINGBIRD EM sensor, which is the heart of this system, can be simply described as a multi-frequency, multi-coil electromagnetic system, which measures the inphase and quadrature responses from a number of coil-pairs installed in a tubular bird, towed beneath a helicopter.

All components of the HEM instrumentation are digitally controlled. The HUMMINGBIRD is currently the only operating HEM system that is 100% digital from front to back. All digital samples generated by the instrumentation are supplied as inphase and quadrature measurements.

Data is telemetered on a lightweight serial cable to the data acquisition console onboard the helicopter, where it is displayed on a LCD colour screen and recorded on a removable PCMCIA hard disk.

Pilot guidance and DGPS navigation systems are integrated into the package together with a gammaray spectrometer (optional). Other flight control instruments include radar or laser altimeters and a barometric altimeter and a digital colour video imaging system.



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The depth in the earth to which a single frequency can penetrate is a function of the frequency and the conductivity of the earth. [Skin Depth » 503 / (frequency x conductivity)$^{1/2}$] Lower frequencies penetrate deeper into the earth than higher frequencies. The higher frequencies are more sensitive to weakly conductive geology, and to subtle changes in the conductivity of the ground.

A HUMMINGBIRD system measures the in-phase "I" and quadrature "Q" (sometimes called out-of-phase) components of the total EM field. The amplitude of these components are always given as a value that is relative to the transmitted primary. The ratio of in-phase to quadrature (I/Q) depends mostly on the conductivity of the geology and the operating frequency; the amplitude depends mostly on the depth of the conductor below the sensor. (While this description of the relationship is only an approximation, it is a good start from which to understand changes in I and Q measurements.)

Two 5-frequency and a 4-frequency (in yellow) HUMMINGBIRD sensors undergoing preparations for the field at McPhar's offices in Newmarket, Ontario

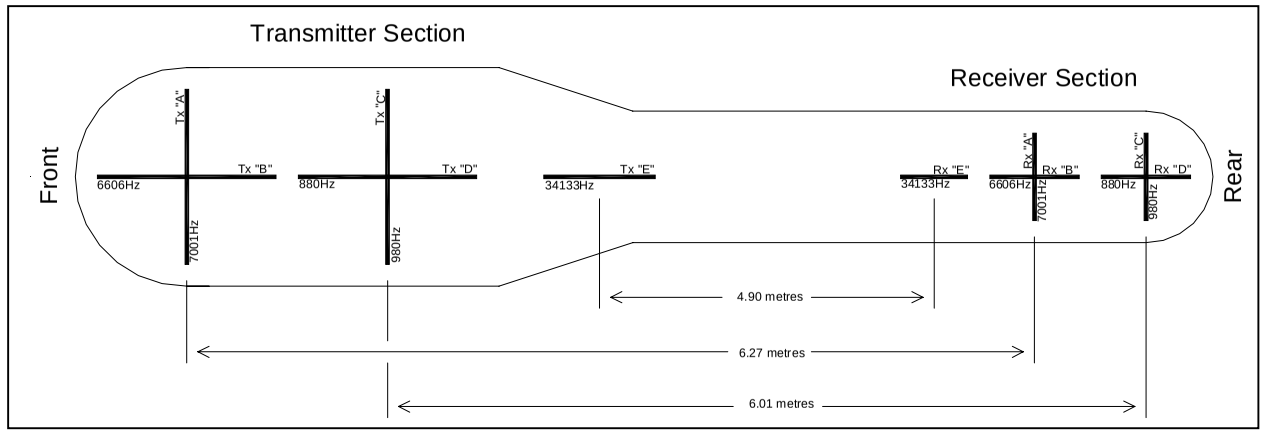
Operator's screen/keyboard assembly – HUMMINGBIRD system

Typical system configuration is:

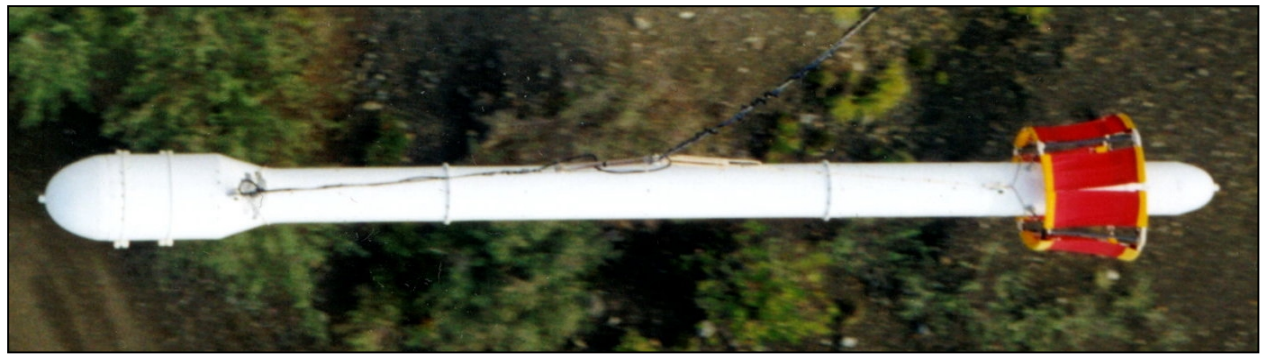
- 5-frequency HUMMINGBIRD EM sensor, 880 Hz, 980 Hz, 6.6 kHz, 7 kHz and 34 kHz frequencies
- high-sensitivity cesium magnetometer, 0.001 nT/10 Hz resolution
- 12-channel real-time differential GPS navigation system
- PC-based data acquisition system
- radar (*optional* laser) & barometric altimeters
- colour digital video imaging system
- *optional* gammaray spectrometer and 16.8/4.2 litres sensor

Cockpit displays for the pilot – HUMMINGBIRD system

COIL FREQUENCY	COIL ORIENTATION	COIL SEPARATION	CHANNELS
880 Hz	Coplanar	6.0 meters (19.5ft)	I, Q
980 Hz	Coaxial	6.0 meters (19.5ft)	I, Q
6.6 kHz	Coplanar	6.3 meters (20.5ft)	I, Q
7 kHz	Coaxial	6.3 meters (20.5ft)	I, Q
34 kHz	Coplanar	4.9 meters (16ft)	I, Q



Layout and dimensions of the transmitter and receiver coils in the HUMMINGBIRD



Vertical view of the 5-frequency HUMMINGBIRD sensor

SPECIFICATIONS

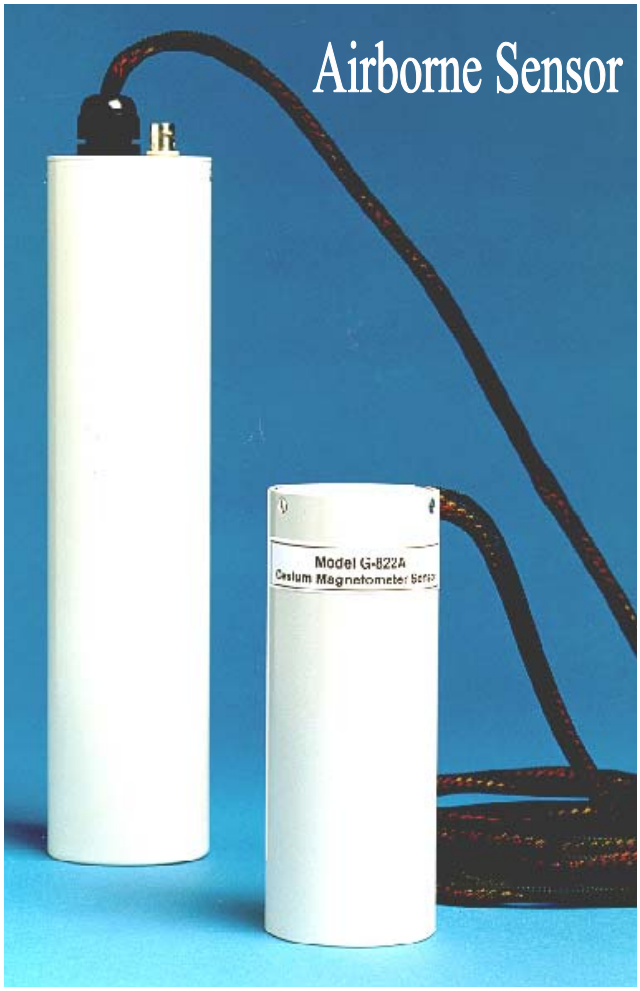
Frequency Range:	5 frequencies, 880 Hz, 980 Hz, 6.6 kHz, 7 kHz, 35 kHz
Coil Orientations:	Horizontal coplanar and vertical coaxial coil-sets
Output:	Inphase and Quadrature samples (ppm)
Sampling Rate:	10 Hz
Noise Levels:	2 –4 ppm under ideal conditions
Time Constant:	0.1 second
Filters:	50/60 Hz power line, spheric rejection, 4th order digital, 15Hz 2nd order analog and 5Hz Low Pass 6th order digital
Data Recording:	On removable PCMCIA hard disk or flash card
Data Acquisition:	Pentium-PC based
Display:	Sunlight visible colour TFT back-lit LCD
Power Requirements:	12-36 VDC, maximum 30 Amps
Temperature Range:	-40°C to +40°C
Bird/Cable Weight:	Approx. 180 kg (400 lb) including tow-cable
Bird Length:	7.5 meters (3 joined sections each of approx. 2.5 m)

Specifications may be subject to change without notice

GEOMETRICS

G-822A CESIUM MAGNETOMETER

- ***Airborne and Vehicle Applications with Multi-Sensor Array Capability***
- ***Automatic Hemisphere Switching***
- ***Highest Sensitivity – 0.0005 nT/√Hz RMS with the G-822A Super-Counter***
- ***Highest Versatility – Full Aircraft Compensation with RMS AADCII or Button-on Towed Bird system with CM-201 Internal Mini-Counter, with 6 Channel 12 bit A to D converters***
- ***Very low heading error – ±0.15nT over entire 360˚ Equatorial and Polar spins***
- ***Gradiometer arrays offering simultaneous operation of up to four separate sensors with the RMS Instruments AADCII , Geometrics' G-822A Super-Counter or CM-201 Internal Mini-counter (See 823A Data Sheet)***
- ***Geometrics offers complete turnkey systems including Birds, Stingers, Wingtip installation accessories as well as Digital Data Acquisition Systems, Flight Path Recovery, GPS Navigation, Gamma Ray Spectrometers, VLF EM , Post Acquisition Data Processing Software and Training***



The G-822A is designed for all airborne or mobile applications where the unique combination of high sensitivity and very rapid sampling of the earth's magnetic field are required. Applications include mapping geologic structure for mining, oil and gas exploration, and the detection and delineation of target bodies in environmental or military type surveys. The unit consists of a high performance low heading error cesium vapor sensor with its associated cables and driver electronics package.

The G-822A sensor uses a precise well-proven design, carefully selected and tested components to insure the very best specifications in sensitivity, noise, heading error and absolute accuracy. A proven record of stable and reliable operation over long periods is the hallmark of the industry standard G-822A. A single coaxial cable of up to 50 meters length supplies both 28 VDC power and Larmor signal transmission from the sensor driver electronics to the 822A Super-Counter or the RMS Instruments' AADCII Automatic Aeromagnetic Digital Compensator. Internal or external signal/power filter-decoupler assemblies are available to provide extremely low noise operation.

The interconnect cable from the driver/electronics to the sensor may be supplied in lengths of 82 and 136 inches. Tuning throughout the earth's field range is fully automatic, and includes automatic hemisphere switching for equatorial surveys.

The sensor/electronics package is watertight, temperature controlled, and delivers full performance under extreme operating conditions. Accessories include special mounting clamps and orientation platforms for installation into a variety of vehicle or aircraft mounting configurations, as well as Birds, Stingers and Wing Tip fairings.

MODEL G-822A AIRBORNE CESIUM MAGNETOMETER SENSOR SPECIFICATIONS

OPERATING PRINCIPLE:	Self-oscillating split-beam Cesium Vapor (non-radioactive)
OPERATING RANGE:	20,000 to 100,000 nT
OPERATING ZONES:	The earth's field vector should be at an angle greater than 6 from the sensor's equator and greater than 6° away from the sensor's long axis. Automatic hemisphere switching.
SENSITIVITY:	<0.0005 nT/√Hz rms. Typically 0.003 nT P-P at a 0.1 second sample rate using 822A Supercounter, 0.02nT P-P for CM-201
HEADING ERROR:	±0.15 nT (over entire 360° polar and equatorial spin)
ABSOLUTE ACCURACY:	<3 nT throughout range
OUTPUT:	Cycle of Larmor frequency = 3.498572 Hz/nT, 2V P-P coupled through the sensor power input
MECHANICAL:	
Sensor:	2.375" (60.32 mm) dia., 6.25" (158.75 mm) long, 12 oz (339 g) - any orientation in 7" dia. stinger
Sensor Electronics*:*	2.5" (63.5 mm) dia., 11" (279.4 mm) long, 22 oz (623 g)
Cables:	
Sensor to electronics*:*	70" (1.78 m) or additional 40" (1.1 m) increments with quick disconnect on electronic end. Longer lengths available - Up to 19.5 ft (6.1m)
Sensor Electronics to Counter:	Up to 220 ft (70 m)
OPERATING TEMPERATURE:	-30°F to +122°F (-35°C to +50°C)
STORAGE TEMPERATURE:	-48°F to +158°F (-45°C to +70°C)
ALTITUDE:	Up to 30,000 ft (9,000 m)
WATER TIGHT:	Sealed for up to 2 ft (0.9 m) depth
POWER:	24 to 32 VDC, 0.75 amp at turn-on and 0.5 amp thereafter
ACCESSORIES:	
Standard:	Power/Larmor coaxial cable (electronics to counter), lengths to be specified, spare O rings, operation manual and carrying case
Optional:	
Signal/Power Decoupler:	Separates the Larmor signal from the power (28 V) to enable connection to RMS Instruments' AADCII Automatic Aeromagnetic Compensator or Customer supplied counter
Internal Decoupler:	P/N 27504 - up to two sensor installation
External Decoupler:	P/N 27560 - three and four sensor installation
Internal CM-201 Counter	See G-823 A Data Sheet
Stinger, Wingtip, Bird	Contact Factory for complete system integration information
Base Station Accessories	Non-magnetic Tripod, clamps cables

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE **2/04**

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GRS410 Intelligent Gamma Spectrometer

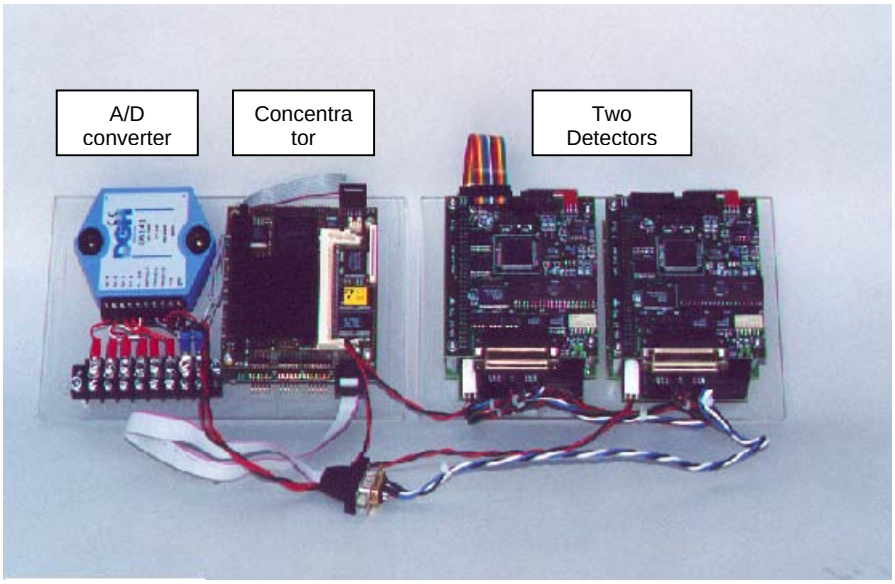
The GRS410 Gamma spectrometer is an advanced Spectrometer utilizing the NaI(Tl) detectors with the newest technology. It is hardware-software designed system, exhibiting simplicity, easy interfacing and substantial versatility. It is based on the experience with the individual detector signal processing reducing potential hazards (or complex circuitry) of "zero base shift" and practically eliminating the "dead time". It is achieved through a special design feature almost completely eliminating the decaying part of each detected and eliminating any internal DC coupling and completely digital peak detector unit.
New - natural peak detection algorithm provides safe and fast system stabilization without temperature stabilization of the detector housing and without implanted radioactive sources in the detector housing. No implanted sources (usually Cs137) for stabilization means no spectra pollution on low energies and therefore better sensitivity of the system for low energies - mostly for man-made sources.
When calibrated (with Th source about once a year) linearity of the each detector is measured and linearity correction coefficients are calculated. When operating in real time, collecting data, the linearity of each detector is mathematically corrected for each measurement.
Individual detector tracking (tuning) and linearity correction provides better fit of the individual spectra that are being summed and therefore sharper (better resolution) spectrum is obtained.
Optionally the GRS410 system can be controlled by the altitude of the aircraft and calculate absolute values of contamination by individual radionuclei related to the ground and provide the dose rate related to 1meter above the ground.
Interfacing via single RS232 communication channel makes the system very flexible.

Technical parameters:

Spectra resolution:	256/512 channels Individual spectra recording in 256 or 512 channels
Data sampling:	1sec and longer, 0.5sec optional
Energy spectra:	50keV to 3MeV with threshold adjustable from 50keV 300keV. All energies above 3MeV are detected as Cosmic Rays.
Anticoincidence:	For improvement peak-valley ratio on lower energies, Coincidental pulses detected among neighboring

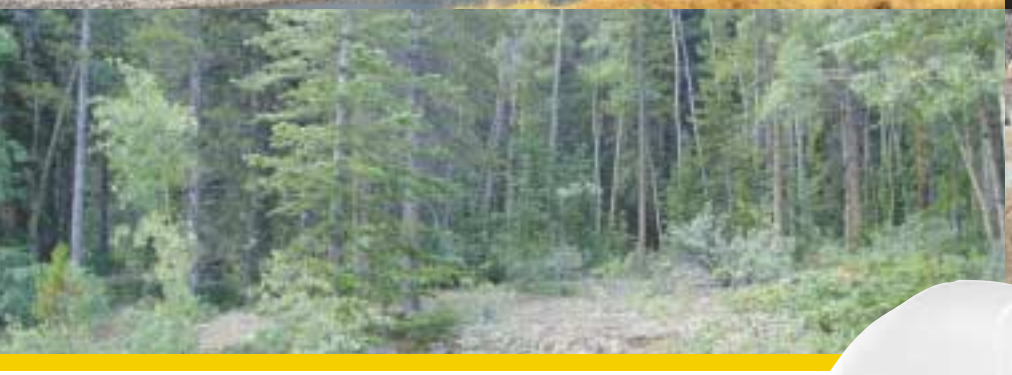
	detectors are removed and placed in a special channel.
Spectra tracking:	Individual detectors. with recorded status of tuning
Time to stabilization:	Automatic on natural radionuclei. Usually less than 30 sec on the ground and less than 2minutes in the air at 100 m altitude. In case of a system failure old tracking because of low counts, parameters (not more than 15 minutes) are used till new tracking is re-established.
Spectra linearization:	Automatic after system calibration. Calibration is required once a year or when a detector or electronics are replaced.
Windows (ROIs):	Additionally to the full spectra up to 22 special windows can be collected (4 are IAEA standard windows, 8 are optional activities altitude related).
Detector Box:	For logical distribution of detectors one detector box may contain up to six individual detectors served by one concentrator. Physically the detectors may be packaged differently.
Recommended Detectors:	4x4x16inch NaI(Tl);
Max. number of detectors	
With one Concentrator:	Ten (10)
With a Superconcentrator:	Four (4) Concentrators or Forty(40) detectors. Any of the detectors may used as down or up looking.
Signal sampling:	20 MHz by an internal 12bit A to D for each detector.
Peak detector:	Digital - time resolution 50nsec.
Dead time:	Negligible for up to 60000 pulses/sec/detector
Pulse rate per detector:	> 60000 pulses per second with negligible dead time.
Channel capacity:	65500 counts/sampling period.
Communication:	Serial among all units (Detector,Concentrator, Superconcentrator and Host).
Test programs:	Supplied with hardware
Interfacing:	Supplied with the hardware
Operating temperature:	-10 to 55 deg. C.

Two-detector GRS4 Gamma Spectrometer with IRIS (Integrated Radiation Information System).



DGPS MAX

Feature-packed sub-meter GPS positioning



DGPS MAX

- Receives GPS, SBAS, OmniSTAR, and beacon signals
- Automatic dual channel SBAS tracking for more reliable reception
- Sub-meter positioning at rates of up to 5 Hz
- Raw measurement data for post-processing applications
- COAST™ technology allows use of corrections for up to 40 minutes without significant performance loss
- Easy configuration using the Setup Wizard
- User-defined profiles save receiver configurations for later use

ESRI Technology
AUTHORIZED BUSINESS PARTNER

csi wireless™
www.csi-wireless.com

DGPS MAX

Feature-packed sub-meter GPS positioning

GPS Sensor Specifications

Receiver Type:	L1, C/A code, with carrier phase smoothing
Channels:	12-channel, parallel tracking (10-channel when tracking WAAS)
WAAS Tracking:	2-channel, parallel tracking
Update Rate:	1 Hz default, 5 Hz max
Horizontal Accuracy:	<1 m 95% confidence (DGPS*) <5 m 95% confidence** (autonomous, no SA)
Cold Start:	1 min typical
Antenna Input Impedance:	50 Ω

L-band Sensor Specifications

Frequency Range:	1525 to 1559 MHz
Sensitivity:	-120 dBm for $<10^{-3}$ BER
Tuning Mode:	Manual or automatic
Adjacent Channel Rejection:	50 kHz spacing >25 dB, 1 MHz spacing >60 dB

Beacon Sensor Specifications

Channels:	2-channel, parallel tracking
Frequency Range:	283.5 to 325 kHz
Channel Spacing:	500 Hz
MSK Bit Rates:	50, 100, and 200 bps
Operating Modes:	Manual, automatic, semi-automatic
Cold Start Time:	< 1 minute typical
Reacquisition Time:	< 2 seconds typical
Demodulation:	Minimum shift keying (MSK)
Sensitivity:	2.5 µV/m for 6 dB SNR @ 200 bps
Dynamic Range:	100 dB
Frequency Offset:	± 8 Hz (~ 27 ppm)
Adjacent Channel Rejection:	61 dB ± 1 dB @ f_o ± 400 Hz

Communications

Serial ports:	1 full duplex, 1 RTCM input
Interface Level:	RS-232C
Baud Rates:	4800, 9600, 19200
CAN Bus:	CAN 2.0B
Correction Input / Output Protocol:	RTCM SC-104
Data Input / Output Protocol:	NMEA 0183
Raw Measurement Data:	Proprietary binary (RINEX utility available)
Timing Output:	1 PPS (HCMOS, active high, rising edge sync, 10 kΩ, 10 pF load)
Event Marker Input:	HCMOS, active low, falling edge sync,10 kΩ, 10 pF load

Environmental

Operating Temperature:	-32°C to +74°C
Storage Temperature:	-40°C to +85°C
Humidity:	95% non-condensing
EMC:	FCC Part 15, Subpart B, Class B CISPR 22

Power

Input Voltage Range:	9.2 to 48 VDC
Reverse Polarity Protection:	Yes
Power Consumption:	< 4.8 W
Current Consumption:	< 400 mA @ 12 VDC
Load Dump Protection:	Up to 86 VDC
Antenna Voltage Output:	5 VDC
Antenna Short Circuit Protection:	Yes

Mechanical

Enclosure:	Powder-coated aluminum
Dimensions:	203 mm L x 125 mm W x 51 mm H (8.0" L x 4.9" W x 2.0" H)
Weight:	0.80 kg (1.76 lb)
Display:	2-line x 16-character LCD
Keypad:	3-button
Power Switch:	Push-button
Power Connector:	2-pin miniature
Data Connector:	DB9-socket
Antenna Connector:	TNC-socket

Pin-out

Main Port

Pin 2	Transmit data (TXD)
Pin 3	Receive data (RXD)
Pin 5	Signal ground

RTCM Input Port

Pin 2	Transmit data (TXD)
Pin 3	Receive data (RXD)
Pin 5	Signal ground
Pin 6	Event marker input
Pin 9	1 PPS

CDA-3 Antenna

GPS Freq. Range:	L1 (1575 MHz ± 20 MHz)
GPS LNA Gain:	27 dB
L-band Freq. Range:	1525 to 1585 MHz
L-band LNA Gain:	28 dB
Beacon Freq. Range:	283.5 to 325 kHz
Beacon LNA Gain:	34 dB
Dimensions:	141 mm dia x 127 mm H (5.57" dia 5.00" H)
Weight:	0.478 kg (1.1 lb)
Antenna Connector:	TNC-socket
Enclosure:	polycarbonate
Mounting Thread:	1-14-UNS-2B
Input Voltage:	5.0 to 15.0 VDC
Input Current:	50 to 60 mA
Operating Temp.:	-40°C to +85°C
Storage Temp.:	-40°C to +85°C
Relative Humidity:	100% condensing

* SVs > 5, HDOP < 2, RTCM SC-104 correction data from a dual frequency reference station, short baseline, and low multipath environment.

** Dependent upon ionospheric activity and multipath

Warranty: Each CSI Wireless product is covered by a limited one-year warranty on parts and labor.

CSI Wireless Dealer

Avery label #05260 (laser print)

Printed in Canada.

csi wireless™

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TERRA TRA-3000 / TRI-30 Radar Altimeter

The Terra TRA-3000 Radar Altimeter unit provides AGL (Above Ground Level) altitude information from 40 feet (12.3 m) up to 2,500 feet (769 m). The system consists of a single TRA-3000 receiver/transmitter/antenna unit and a TRI-30 indicator.

SPECIFICATIONS

TRA-3000 Unit

Type:	Single antenna, FMCW
Altitude Range:	40 to 2,500 ft
System Accuracy:	
• **40 to 100 ft**	+/- 5 ft
• **100 to 500 ft**	+/- 5%
• **500 to 2,500 ft**	+/- 7%
Frequency Range:	100 MHz sweep within 4,200 to 4,400 GHz range
Input Voltage:	Approx. 20 VDC from indicator
Input Current:	600 ma
Altitude Output:	Digital
Self-Test:	Ground or flight, initiated at indicator
Transmitter/Receiver/Antenna:	All solid-state, microstrip antenna,
Physical:	Size - 1" H x 5" W x 7.625" L, Weight - 1.5 lb.
Environment:	-40° C to + 70° C
Unlock display:	Altitude – 45,000 ft

TRI-30 Indicator

Power Supply:	Input voltage – 27.5 VDC +/- 20%
Environment:	Power – 16 watts nominal (includes power to T/R/A unit
Physical:	Size – 3.25" H x 3.25" W x 4" L, Weight – 1 lb.
Mounting:	Front panel mounting; requires a 3" ATI mounting space
Altitude range:	40 ft. to 2,500 ft (linear); 40 – 500 ft (enlarged linear)
Analog display:	Servo; pointer and dial type Needle will go off scale on the high-end
Decision height:	Bug, continuous setting from 40 to 2,500 ft.
Display update rate:	continuous
Analog output:	2.5 mv/ft., 100 mv = 40 ft.
Display disable:	One strut switch input, ground to enable
Altitude accuracy:	
• **40 to 100 ft**	+/- 5 ft
• **100 to 500 ft**	+/- 5%
• **500 to 2,500 ft**	+/- 7%
Aural Decision Height alert:	1 KHz tone for 2 sec. (500 ohms) adjustable audio level
Self-test:	Indicates 40 ft., DH operates normally
Visual alert:	Amber lamp with automatic adjustable intensity; internal LED standard; external lamp operation available.

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Setra Model 276
Pressure Transducer

Specifications:

Pressure Media: Clean dry non-conductive, non-corrosive gas

Accuracy:

accuracy[1]	+/- 0.02% full scale at 70°F (21°C)
nonlinearity	+/- 0.012% full scale (end point)
hysteresis	0.010% full scale
non-repeatability	+/- 0.010% full scale
thermal zero shift[2]	+/- 0.002% FS/ °F (+/- 0.004% FS/ °C)
thermal span shift[2]	+/- 0.001% FS/ °F (+/- 0.002% FS/ °C)
altitude resolution	1 ft (30.5cm) - 4 ft (1.23 m) for 100 psi range
stability, 24 hours	+/- 0.005% full scale
stability, 30 days	+/- 0.02% full scale
stability, 1 year	+/- 0.05% full scale

Output: Bidirectional RS-232 interface

Physical:

pressure fitting	1/8th barbed male fitting
pressure port	10-32 internal thread
height	4 in (10 cm)
width	3.5 in (8.9 cm)
depth	5.25 in (13.3 cm)
weight	2.4 lb (1.09 kg)

Power: 5 VDC +/1%, 70 mA; 17 mA w/200
Microampere sleep mode option

Notes:

1. Accuracy as RSS of non-Linearity, hysteresis and non-repeatability.
2. Unit calibrated at 70 °F. Maximum thermal error is computed from this datum.
3. Specifications are subject to change without notice.

DEV-TECH

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Geo-iMAGe Lite Colour Digital Imaging System

The airborne geophysical survey industry has traditionally acquired flight path imagery to document the position of the aircraft and sensor array with respect to the ground. The technology has progressed from 35 mm continuous-strip or frame film camera to videotape and VCR's, usually in the VHS - NTSC format. Current technology overlays the acquired video imagery with GPS position data as well as information from the geophysical data acquisition system, permitting correlation of the video imagery to the ground surface.

This technology has not progressed much since the early 1970's, and although digital camera systems have been available for some time, the industry has not utilized them for many reasons, mainly the inability to store the large volumes of video data in real time. Due to advances in the computer technology industry, this limitation has been overcome. Now that more versatile computer systems are available for use in the aircraft and the capacity to store large volumes of data quickly has become readily and affordably available, digital video has taken on a far more attractive role in airborne geophysics.

The older videotape systems generated imagery that was usually of poor quality, and there was no way to quickly find any given ground location on the tape without playing the entire tape. The video data was good for little more than proving that the aircraft had passed over a given point on a flight line. Certainly it was not of any use in creating any kind of map or photo-mosaic.

Today, however, we can acquire and record high-resolution video images in a format that can be read on any standard PC type computer. These images, combined with suitable information (GPS position, time, height above ground, height above sea level, pitch and roll axis tilt) will now permit the generation of digital 3D terrain models that can be integrated into the geophysical data set.

Most of the areas currently being explored for minerals or hydrocarbons have, at best, very poor topographical information. In many areas no useable information is available at all. Satellite imagery while available, is very costly and usually takes many months to acquire and process, and yields imagery with typically ten meters (or worse) pixel resolution.

Our goal is to provide simultaneously, with the acquisition of the geophysical data, medium to high resolution digital video frames (sub 3-meter pixels) with sufficient horizontal and vertical overlap to allow generation of video stereo pairs, and with the addition of the GPS and altimeter information to create a 3D terrain model.

Figure 1: Sony Digital Colour Camera

The basic Geo-iMAGe Lite module comprises a stand-alone rack-mountable console that contains a powerful micro-computer, hard disk drive

comprises the following:

- Stand alone, 1 "U" high, rack mountable computer system, c/w Pentium III 1.0 GHz clock speed (or faster) processor,256 MB RAM memory, 20 GB HDD, 2 RS-232 serial ports, 2 IEEE 1394 firewire ports, 2 LAN ports, and CD-RW drive
- Windows 2000 Professional Operating System software
- Proprietary video image and GPS data acquisition software to enable acquisition of JPEG, TIF, BMP or PNG format video frames with a resolutionof 640 x 480, 320 x 240 or 160 x 120 pixel resolutions, user selectable.
- User selectable video frame and GPS data acquisition rate - from 1 frame per second to 1 frame every 10 seconds – synchronized with GPS time
- Sony digital video camera with 1/3 inch CCD video element
- 5.64 to 64.8 mm focal length lens with wide angle adapter (0.6 X increase in view angle)

Optional modules for use with Geo-iMAGe Lite include:

Geo-iMAGe GPS module

- Comprises a NovAtel OEM-4 GPSCard receiver, 12-channel, L1 code, imbedded in the Geo-iMAGe console.
- Novatel 511 aircraft certified active GPS antenna or Novatel 521 land vehicle active antenna, and cabling

Geo-iMAGe Screen/Keyboard module

Comprises a 19", 1 "U" high, rack-mount drawer containing a folding 15" LCD TFT (1024 x 768 pixel resolution) screen, keyboard and touchpad "mouse" p ointing device. Permits as up to 5 different PC devices to be attached to the screen and keyboard, eliminating the need for multiple screens and keyboards in the system.

Figures 2 & 3: Geo-iMAGe Screen/Keyboard module comprising a 19", 1 "U" high, rack-mount drawer containing a folding 15" LCD TFT (1024 x 768 pixel resolution) screen, keyboard and touchpad "mouse" pointing device.

BASIC SYSTEM OVERVIEW

Typical video frame acquisition rate is in the order of 1 frame per second but may be user selected from a range of 1 frame/second to 1 frame every 10 seconds, in increments of 1.0 second. This will allow for variations in flight height above ground, aircraft ground speed and the viewing angle of the camera. Cameras typically used have 47° to 96° angle-of-view.

The system will import a serial data string from a GPS receiver (NEMA format GPGGA string). Rather than overlay the data string on the border of each image frame, a separate GPS data file is created with the same file name as the video frame but with the file extension GEO. The GPS data is available at rates of up to 10 HZ. The GPS receiver has several RS-232 serial ports available to transmit data strings to other equipment should the user so desire.

The video frames are stored on a large capacity hard disk. A naming convention for each frame has been developed utilizing GPS time as the reference. The frames are numbered in the format YYYYMMDDHHMMSSS.XXX where YYYY represents the year, MM the month, DD the day, HH the hour, MM, the minutes, SSS the seconds and decimal seconds of GPS time when the frame was captured. The system includes a CD-RW writer and appropriate software to allow storage of the imagery on CD media for long-term archival purposes.

The primary focus of this product is to replace the traditional "VCR" with a digital picture recording mechanism. Any standard image display software may be used to view the frame or frames of choice on a computer.

Figures 6 & 7: Digital images acquired over farmland in South America

Figures 8 & 9: Digital images acquired over desert village in North Africa

System Specifications:

OPERATING SYSTEM & DEDICATED SOFTWARE

Operating System:	Microsoft Windows 2000 PRO or ME
Video Acquisition Software:	GEOIMAGE LITE

POWER REQUIREMENTS: 24 –32 Volts DC at 50 watts power consumption
12 VDC or 115 / 230 VAC optionally available

GEO-iMAGe LITE:

Frame capture rate:	frame / second to 1 frame every 60 seconds, software selectable
Video format:	JPG, TIF, BMP, PNG, user selectable (JPG recommended)
GPS data:	internal dedicated GPS receiver, Novatel OEM-4, 12 channel L1 - NMEA 0183 GPGGA data string GPS data collected at same rate as video frame data User selectable baud rate for GPS data
File naming:	
Video file:	YYYYMMDDHHMMSSS.XXX, where: YYYY= Year MM= Month DD= Day HH= Hour MM= Minute SSS= seconds,tenths of seconds XXX= video extension, JPG, BMP, PNG etc (automatic)
GPS data:	same as above except file extension automatically selected as GEO

Digital Camera:

Model:	Sony DFW-V500 or equivalent
Interface Format:	IEEE 1394
Data format:	640x480 YUV (4.2.2) 640x480 YUV(4.1.1) 320x240 YUV(4.2.2) 160x120 YUV(4.4.4) all formats user selectable
Image Device:	CCD
White Balance:	Automatic or Manual
Hue:	variable
Saturation:	variable
Lens focal length:	5.64 to 64.8 mm, F:1.18
Wide angle adapter:	VCL-0637H (0.6 X increase in view angle)
Zoom:	12X range, manual, user selectable
Focus:	manual, user selectable
CCD Iris:	ON/OFF selectable
Shutter Speed:	1/30 to 1/100000 sec
Gain:	Automatic or manual
Power:	8-30 VDC (supplied through 1394 cable)
Power Consumption:	4 watts
Operating Temp:	-20 to +50 DEG C
Dimensions:	60 x 61 x 118 mm (w/h/d)
Mass:	335 grams

LCD display and keyboard

Full keyboard function
SynapticsTouchpad
Microsoft Mouse compatible with PS/2 mouse interface
15.1" high brightness TFT LCD display

Resolution :	1024 x 768 (36-bit colors)
Brightness :	200 cd/m2
LCD MTBF :	50,000 hrs
On Screen Display:	built-in OSD for user adjustment, including H/V position, Color, size, etc.
Power Supply :	Built-in universal AC input adapter (LKM-926x / 9265x) -48VDC (LKM-926xT / 9265xT)
Operating Temp:	0º ~ 50ºC

Up to five VGA / Keyboard / Mouse / Audio inputs (5 PCs)
Built-in Manual or Auto Scan function

CPU Processor and Peripherals:

CPU :	Socket-370 base support CeleronTM / Pentium® III up to 1.33GHz FSB
System Memory :	One 168-pin DIMM socket up to 512MB SDRAM / VCM
System Chipset :	SiS 630
Video Controller :	up to 1600 x 1200, 16 bits colors, resolution 1394: Fully supports provisions of IEEE 1394-1995 standard for high performance serial bus and the P1394a supplement. Two P1394a fully compliant cable ports at 100/200/400 Mbps
Super I/O :	3 x RS-232 and one RS-232/422/485 (auto-direction RS-485) One parallel port Floppy Disk Controller
USB Ports :	Two ports meets USB ver.1 standard by pin header
Digital I/O :	4 DI and 4 DO
Ethernet :	Dual 10/100Mbps LANS with one integrated in Support ATX function PC/104 expansion by LPC to ISA controller Support one PCI slot
SSD :	Support CompactFlash Type II socket
IDE :	ATA66 interface by one 40-pin connector
Power:	6.5A/5V, 170mA/12V (PIII-933MHz and 256MB SDRAM)
Operating temp:	0 ~ 60ºC (CPU needs cooler)

CD-WRITER:	HP 8200 CD-RW
MEDIA:	20 GB, 2.5 INCH DRIVE Optional 250 MB IOMEGA ZIP DRIVE

NovAtel OEM-4 GPSCard:

position accuracy - single point	
SA off:	11 m CEP 3
SA on:	48 m CEP 4
DGPS:	(L1, C/A)5 0.45 m CEP
measurement precision	
L1 C/A code:	6 cm RMS
L1 carrier phase:	0.75 mm RMS (differential channel)
data rates	
measurements:	10 Hz
position:	10 Hz
time to first fix - cold start:	60 seconds (typical)
signal re-acquisition:	0.5 s (typical)
time accuracy:	
SA off:	102 ns RMS 3
SA on:	173 ns RMS
Size:	85 mm x 125 mm x 16 mm
Weight:	120 g
Input Voltage:	6.0 -18.0 VDC
Power Consumption:	2.7 W typical, 3.2 W max

GSM-19 Overhauser Magnetometer

Features of the magnetometer

- **Sensitivity = 0.02 nT**
- **Absolute Accuracy = 0.2 nT**
- **Sample Rates up to 5 Hz**
- **Low Power Consumption**

General

"Overhauser" Once you experience it, you'll never go back to proton. Overhauser technology brings you sensitivities one to two orders of magnitude better than proton, yet in a light weight package. This is because the overhauser magnetometer consumes an order of magnitude less power than proton magnetometer, allowing a lighter weight for batteries.

What is the Overhauser technique? The Overhauser sensor contains the electrons' fluid that has been added to a hydrogen rich in the form of "free radial". The resulting mixture yields a sensor with 5000 times gain in proton polarization. Since the Overhauser polarization effect does not require static magnetic fields, but uses radio frequency fields transparent to protons, measurement can be done concurrently with polarization. The result is a sensor with much greater sensitivity, that can be sampled much more rapidly than the standard proton sensor.

Overhauser magnetometer systems therefore maximize resolution while minimizing power consumption. Even with Walking Gradiometer systems, sampling at rates of once per second or betterare posible; Even in cold temperatures of minus 40 zero degrees Celsius and greater, the internal rechargeable battery can still be relied on for a 10 hour day, or longer.

The GSM-19 Overhauser magnetometer is thus truly a State-of-the-Art Magnetometer / VLF system. The GSM-19 offers the data quality, reliability, and extensive list of capabilities, and options, that allow it to meet a very wide spectrum of applications.

Standard Features of the magnetometer

The GSM-19 magnetometer console features a real time graphic display of the current profile. In addition digital display of the current reading, current position, and warning messages are provided. The console design, with internal rechargeable battery pack, allows the unit to be completely sealed against the elements. With the built in heater for the display the GSM-19 magnetometer is ready to go wherever your surveys may take you.

Tuning is automatic worldwide, with provision for manual override. In high gradient conditions the GSM-19 magnetometer monitors the signal decay rate and displays a warning message when the gradient becomes too great. Filters for rejection of 50 or 60 Hz noise are provided.

Diurnal corrections may be done in traditional fashion with one magnetometer unit as a base station and a second unit used as the mobile field unit. At the end of the survey the two units are connected and the field unit creates a corrected data file (which still includes the raw data file) based on the temporal drift recorded by the base station.

As a standard feature GSM-19 magnetometer also offer the capability of making tie point measurements for automatic diurnal corrections. To use this feature the operator records a base value and then loops back to this point periodically during the survey to record another measurement, and thus build a file of the drift. In this way a single instrument may be used to make diurnal corrections.

The RS-232 port on the GSM-19 magnetometer will output data as it is collected. This allows interface to GPS loggers that will accept RS232 data. The standard GSM-19 magnetometer may be operated in a remote mode via computer. Memory storage is 512 K in the standard unit, and may be upgraded to 2 MB.

Grid coordinates are stored with either numeric or compass designations. A seven digit number may be used to designate lines and positions. Line and position spacing is entered so that with every reading the position may be automatically updated. An End of Line feature allows the next line to be quickly selected, plus changes the sign on the position spacing. If the previous line had been adding positions as the operator moved, then on the next line, positions will be subtracted as the operator moves. The operator may also easily manually enter his grid position for cases where gaps in the line are necessary.

SPECIFICATIONS

Performance

	Overhauser	Proton
Resolution:	0.01 nT	0.01 nT
Relative Sensitivity:	0.02 nT	0.2 nT
Absolute Accuracy:	0.2 nT	1 nT
Range:	20,000 to 120,000 nT	20,000 to 120,000 nT
Gradient Tolerance:	Over 10,000 nT/m	Over 7,000 nT/m

Storage Capacity (readings)

	Overhauser	Proton
Std. Magnetometer:	32,000 to 131,000	16,000 to 32,000
With 3 VLF stations:	12,000 to 58,000	6,000 to 12,000
Base Station:	170,000 to 700,000	84,000 to 170,000
Gradiometer:	25,000 to 110,000	12,000 to 25,000
With 3 VLF stations:	12,000 to 46,000	6,000 to 12,000

Operating Modes

Manual:	Coordinates, time, date and reading stored automatically at a minimum 3 second interval.
Base Station:	Time, date and reading stored at 3 to 60 second interval (higher speeds available).
Walking:	Time, date and reading stored at coordinates of fiducial with 0.5, 1 or 2 second cycle time.
Hip Chain:	Equidistant coordinates, time, date and reading stored automatically. Distance interval of readings is programmable.
Remote Control:	Optional remote control using RS-232 interface.
Input/Output:	RS-232 or analog (optional) output using 6 pin weatherproof connector.

Operating Parameters

Power Consumption:	Only 2 Ws per reading for Overhauser, and 12 Ws per reading for Proton magnetometer. Will operate continuously for 45 hours on standby.
Power Source:	12V 2.6 Ah sealed lead acid battery standard, other batteries available.
Operating Temperature:	Overhauser: -50°C to +60°C. Proton: -40°C to +60°C.

Dimensions and Weight

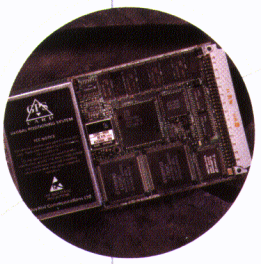
Dimensions:
- Console 223 x 69 x 240 mm.
- Sensor 170 x 71 mm diameter cylinder. Omnidirectional sensor 180 x 80mm.

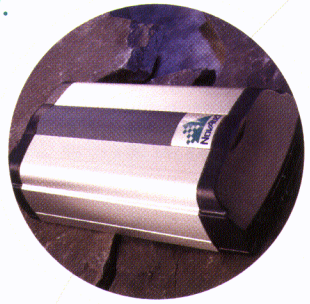
Weight:
- Console 2.1 kg.
- Sensor and staff assembly 2.0 kg.

A Standard package includes a console with batteries, harness, battery charger, case, sensor with 2m cable, and staff.

Look into NovAtel's Performance Series

They're a range of advanced technology, high performance L1 GPSCards featuring NovAtel's patented Narrow Correlator® technology and providing sub-meter differential accuracy in real-time. High data output rates, fast signal reacquisition, and superior multipath mitigation techniques support even the most demanding GPS applications.





ADVANTAGES

- 12 channel "all in view" parallel tracking
- L1-C/A code and carrier measurements
- Narrow Correlator technology
- Multipath Elimination Technology (MET®)
- Sub-meter real-time DGPS accuracy
- High data output rates
- Low data latency
- High dynamics
- Ease of use
- OEM, PC Card, or standalone configurations
- Flexible integration
- Upgradable

Performance Series

Performance Series

NovAtel's PC Performance 3900 Series features a 2/3 length personal computer card designed for installation in PC compatible computers. This series offers a choice of two full DGPS Card models – the 12 channel 3911R, providing core functionality common to all GPSCard™ models, and the full data model 3951R.

NovAtel's OEM Performance 3100 Series features a Eurocard form-factor designed for standalone and embedded applications. This series offers a selection of GPSCard models ranging from the 12 channel 3111R, providing core functionality, to the advanced full data model 3151R. All OEM Performance Series receivers are DGPS capable and are rated for use at -40°C to +85°C temperatures. Available as a software option is NovAtel's Multipath Elimination Technology (MET) which reduces pseudorange multipath error by a further 25% to 50% over NovAtel's existing multipath resistant Narrow Correlator.

NovAtel's PowerPak™ Performance 3100 Series provides GPS integrators with an effective, self-contained system. Each PowerPak includes an OEM Performance Series GPSCard and a power supply.

NovAtel ProPak® Performance 3100 Series provides a rugged water, shock and vibration resistant housing for outdoor applications which provides all the same functionality of PowerPak.

Features

- 0.75 meter real-time differential accuracy
- L1-C/A code and carrier tracking
- 12 channel "all in view" parallel tracking
- Fast reacquisition
- Patented Narrow Correlator technology
- Optional Multipath Elimination Technology (MET)
- 10 Hz position output rate
- 20 Hz raw data output rate
- 1 PPS output
- Event marker
- RTCM SC104 v 2.1/2.2
- RTCA SC159
- RINEX v 2.0
- NMEA 0183 v 2.0
- GPSolution™ – Windows® compatible graphical user interface

Windows is a registered trademark of Microsoft Corporation.

Specifications[1]

• position accuracy[2]	
standalone	
SA off	15 m CEP
SA on	40 m CEP
differential	0.75 m CEP
• post-processed (315IRE/3951R models only)[2]	±5mm +2ppm ±5mm +1ppm (horizontal) ±10mm +1ppm (vertical)
• time to first fix	
cold start	70 s (typical)
• reacquisition	
warm start	1 s (typical)
• data rates	
raw measurements	20 Hz
computed position	10 Hz
• time accuracy	
SA off	50 ns RMS
SA on	250 ns RMS
• velocity accuracy	
standalone	0.20 m/s RMS
differential	0.03 m/s RMS
• measurement precision	
C/A code phase	10 cm RMS
carrier phase	
single channel	3 mm RMS
differential channel	0.75 mm RMS
• dynamics (OEM Card Series only)	
acceleration	4 g
velocity[3]	515 m/s

1. Performance specifications are subject to GPS system characteristics & U.S. DOD operational degradation.
2. Accuracy is dependent upon ionospheric and tropospheric conditions, satellite geometry, baseline length, occupation time, number of svs tracked and multipath effects.
3. Export licensing restricts operation to 60,000 feet maximum and 1,000 nautical miles/hour maximum.

PC Card 3900 Series

• physical	
size	21.6 cm x 10.7 cm x 1.9 cm
weight	220 g
• temperature	
operating	0°C to +70°C
storage	-40°C to +85°C
• interface	
PC ISA bus	8 bit/8 MHz
dual RS232 ports	
connectors	DB-9 male
baud rates	300 to 115,200 bps
TTL Strobes I/O	DB-9 female
RF input	SMA female
• power consumption	6 watts

OEM Card 3100 Series

• physical (Eurocard)	
size	16.7 cm x 10.0 cm x 1.5 cm
weight	175 g
• temperature	
operating	-40°C to +85°C
storage	-40°C to +85°C
• humidity	95% non-condensing
• interface	
types	RS232/RS422/NMEA
baud rates	300 to 115,200 bps
strobe I/O	TTL level
• connector type	
edge	64 pin 0.1" DIN 41612 type B
antenna	SMB male
• input voltage	5 VDC, ±12 VDC
• power consumption	5 watts

PowerPak 3100 Series

• physical	
size	20.8 cm x 11.1 cm x 4.7 cm
weight	1 Kg
• temperature	
operating	-40°C to +65°C
storage	-40°C to +85°C
• humidity	95% non-condensing
• interface	
communications	RS232/RS422/NMEA
baud rate	300 to 115,200 bps
strobe I/O	TTL level
• connector type	
communications	2 x DB9P
strobes I/O	DB9S
antenna	TNC female
power	2.1 mm threaded plug (center +)
• input voltage range	10-36 VDC
• power consumption	8 watts
• accessories include	
RS232 "Y" type null modem cable	
automotive power cable	
• optional accessories	
110/220 Volt AC adaptor	

ProPak 3100 Series

• physical	
size	24.5 cm x 13.0 cm x 6.2 cm
weight	1.2 Kg
• temperature	
operating	-40°C to +65°C
storage	-40°C to +85°C
• humidity	95% non-condensing
• interface	
communications	RS232
baud rates	300 to 115,200 bps
strobes I/O	TTL level
• connector type	
communications	2 x 10 pin LEMO
strobes I/O	8 pin LEMO
antenna	TNC female
power	4 pin LEMO
• input voltage range	10-36 VDC
• power consumption	8 watts
• accessories include	
RS232 null modem and straight cable	
strobe I/O cable	
automotive power cable	
• optional accessories	
110/220 Volt AC adaptor	

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For detailed product technical specifications, please call:

1-800-NovAtel

in U.S. or Canada or +1-403-295-4900
email: sales@novatel.ca
internet: www.novatel.ca

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NovAtel

Now, what's tomorrow's challenge?

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FIELD DATA PROCESSING WORKSTATIONS

Our Field Data Processing Workstations (FWS) are dedicated PC-based microcomputer systems for use at the technical base in the field. The workstations are designed for use with Geosoft OASIS, MPS and MONTAJ, ENCOM, and other data processing software, as well as in-house developed software and utilities.

The FWS has a data replot capability, and may be used to produce pseudo analog charts from the recorded digital data within less than 12 hours after the completion of a survey flight, if this is necessary. It is also capable of processing and imaging all the geophysical and navigation data acquired during the survey, producing semi-final, preliminary-levelled maps in either black-line contours on Mylar or full colour contours on paper.

FWS FEATURES

- Portability - the workstations can be packaged and transported to the field with a minimum of effort
- Digital Data Verification - flight data quality and completeness can be assured by both statistical and graphical means
- Flight Path Plots - flight path plots can be quickly generated from the GPS satellite data to verify the completeness and accuracy of a day's flying
- Versatility - the FWS can be used in both the field and the office. Data pre-processed in the field can be up-loaded to the computers at the Data Processing Centre to speed data turnaround.
- QC and Preliminary Maps - the software will permit preliminary maps of the magnetic and gamma-ray spectrometer data to be quickly and efficiently created in the field, providing a quick and efficient method to undertake QC Verification of newly acquired data.

THE HARDWARE

The workstations are PC-compatible PENTIUM microcomputers with a 2GHz or faster processor, 512 MB of memory, a large capacity hard disk drive, an extended VGA graphics card with VGA monitor and a colour inkjet plotter for generating maps and/or profiles, and ZIP, JAZZ and writeable CD-ROM drives to backup data.

THE SOFTWARE

The FWS software enables the user to read the FLASH cards, ZIP cartridges or PCMCIA removable hard disks from the airborne system, check the data for gaps, spikes or other defects and permits editing where necessary.

The base station GPS/magnetometer data is checked and edited, and where necessary merged with the airborne data. Post-survey differential GPS corrections are made using either C^{3}NAV and/or WAYPOINT software. GPS flight path plots may be created and plotted. Multi-channel stacked profiles of the recorded and edited data may be produced on the dot-matrix printer.

The Software includes:

- Geosoft OASIS/Montaj Airborne Processing Software
- PC-based airborne data compilation and binary database system for in-field processing and compilation of large volumes of time or fiducial based airborne data
- Proprietary data for processing HEM data
- GrafNAV GPS processing/differential GPS correction software
- McPhar's proprietary software and utilities
- General Utility software (WINDOWS 200 PRO, Norton Utilities, Norton Anti-virus, Xtree Gold, LapLink, etc.)

APPENDIX 4

Personnel Resumes

- Tim Bodger
- Robert Hearst
- Henrik T. Anderson
- Barry Levy
- Daniel McKinnon
- Tonia Bojkova
- Asif Mirza

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WebSite: www.mgssurveys.com

RÉSUMÉ

Name: Timothy R. Bodger

Profession: Manager, Administrator, Sales and Marketing

RELEVANT EMPLOYMENT HISTORY:

2003 – present McPhar Geosurveys Ltd., Newmarket, Ontario, Canada – General Manager - responsible for the day-to-day administration, operations and sales and marketing activities of the company.

1998 – 2002 **EDCON Aero Surveys, Inc., Denver, USA - Vice President, Sales & Marketing** - a joint venture company between Aero Surveys Inc. and EDCON Inc., responsible for sales and marketing activities of the company.

1996 – 2002 **Aero Surveys Inc., Uxbridge, Canada - Vice President, Sales & Marketing** - In August 1996, Aero Surveys was acquired by GeoeXperT Geosciences C.A., and at that time, Bodger became the Vice President responsible for sales and marketing activities of the company. In 1997, was instrumental in introducing Aero Surveys to Airborne Gravity surveys, and assisted in the creation of the EDCON Aero Surveys joint venture to undertake Airborne Gravity Surveys.

1995 - 1996 **Aero Surveys Inc., Richmond Hill, Canada - Founder, Director and Vice-President** - Joined the newly formed company as President, responsible for the day-to-day management of the company, determining the company's future business plans, sales and marketing of its services and products, supervising a staff of 12 plus employees, and maintaining budgets and cash-flow.

1994 - 1995: **Scintrex Limited, Toronto, Canada - Promoted to General Manager, Systems & Surveys Division**, a new division of Scintrex created to provide contract airborne and ground geophysical surveys. Responsible for budgets, sales and marketing of the division, project costs and profits, supervising staff of 30 persons, including a Joint Venture Company in Cuba (Scintrex-Caribe).

1992 - 1994: **Scintrex Limited, Toronto, Canada - Promoted to Director of Sales**, responsible for the sales and marketing of all Scintrex Products and Services, including contract airborne and ground geophysical surveys. Supervised a staff of 16 persons, and a network of 74 agents and representatives, worldwide.

1989 - 1991: **Scintrex Limited, Toronto, Canada - Promoted to General Sales Manager, Earth Science Products**, responsible for the sales and marketing of all products and services of the Earth Science Division. Supervised sales and marketing staff of 9 persons.

1985 - 1989: **Scintrex Limited, Toronto, Canada - Airborne Instrumentation Sales Manager,** responsible for the sales and marketing of Scintrex' airborne geophysical instrumentation and services.

1982 - 1985: **Questor Surveys Ltd., Mississauga - Projects Manager** of 210,000 km aeromagnetic survey of the Philippines from 1982 to 1984, and various small projects around Canada/USA in 1984/85.

1981 - 1982: **Geosurvey International, Kenya - Assistant Project Manager**, assisted in managing a large nation-wide regional survey in Guinea, West Africa, responsible for the operations of 3 aircraft and a crew of 25 persons.

1977 - 1980: **Questor Surveys Ltd., Mississauga, Canada - Data Compilation Manager,** responsible for supervising Datamen in field on INPUT (TDEM) surveys, as well as for the compilation of all INPUT survey data into maps and other products. Worked primarily in Canada, USA and South Africa.

1974 - 1977: **Northway Survey Ltd., Toronto, Canada - Dataman and Crew Chief** on various airborne projects in Canada, Niger, Nigeria, Venezuela, Dominican Republic, Lesotho, South Africa, Senegal and USA.

1973 - 1974: **Geometrics Inc., California, USA - Dataman** on various airborne projects in USA, Alaska, Zambia and Australia.

1971 - 1973: **Aero Service Corporation, Philadelphia, USA - Dataman** on large airborne regional survey of Algeria.

PROFESSIONAL AFFILIATIONS:

- Past President, Currently Member, Canadian Exploration Geophysical Society (KEGS)
- Member, Society of Exploration Geophysicists (SEG)
- Member, Prospectors & Developers Association of Canada (PDAC)

TECHNICAL PAPERS/PUBLICATIONS:

Between 1994 and 1998, has written and/or published eight technical papers on airborne geophysical surveying topics.

LANGUAGES:

English and French

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RÉSUMÉ

NAME: **Robert Hearst**

PROFESSION: Geophysicist

EDUCATION:

1996 M.Sc., Geophysics and Geology, McMaster University
1983 B.Sc. (Honours), Geophysics and Geology, University of Western Ontario

WORK EXPERIENCE:

2004 - present **McPhar Geosurveys Ltd., Senior Geophysicist/Data Processing Manager**– Responsible for supervising McPhar's Data Processing Dept., responsible for processing data acquired by ground and airborne (installed in either rotary- or fixed-wing aircraft) electromagnetic, magnetic, radiometric, or other geophysical survey systems at the company's Data Processing Centre in Newmarket, using OASIS, MONTAJ, INTREPID and other software; quality control (QC) of acquired geophysical data; geophysical interpretations; operational logistics

2002 – 2004 **Consulting Geophysicist, Toronto** - servicing various international and local clients. Quality Control / Quality Assurance for Saudi Aramco on the World's largest multiple gradient airborne magnetic survey (approx. 1.7 million line-kms of data acquisition). Supervision and field quality control of data acquired by multiple aircraft on a daily basis including the acceptability and necessary re-flights / modifications required to meet contract specifications. Evaluation and specification of all final deliverable products including acceptability of final products and processing steps. Design, Quality Control / Quality Assurance and Interpretation of several smaller airborne and ground geophysical surveys completed in Canada and Venezuela for several Junior Mining Companies.

1997 - 2002 **Stratagex Ltd., Geophysical Consulting, Toronto, Senior Geophysicist** - Survey design, management, interpretation and client liaison for numerous mining companies involved in geophysical exploration for diamonds, gold and base metals in Canada, Central America, South America and Africa. Including the selection of contractor(s), writing of survey specifications, review of contracts, quality control (QC)/quality assurance (QA) activities for ground and airborne data sets and interaction with project geologists.

1995 - 1997 **Guaniamo Mining Company Limited, C/O Toco Mining Company Limited, Fort Lauderdale, Florida, USA, Chief Geophysicist and Project Manager** - Design and management of an integrated geological and geophysical grassroots exploration program for hard rock and alluvial gold and diamonds in the Guyana Shield of Venezuela. Responsibilities included the assembly of a balanced geological and geophysical exploration team; selection of contractors and consultants (international and local); planning and execution of ground follow-up areas for geological,

geochemical and geophysical surveying; analysis of results; selection of drill sites, selection of bulk sampling sites; selection of possible alluvial plant sites; preparation of exploration budgets. Selection of appropriate geological and geophysical methodologies for the follow-up of high resolution aeromagnetic and radiometric surveys on the concessions. Analysis of country-wide and concession-scale aeromagnetic, radiometric, and satellite databases with selection of prospective areas for gold and diamond potential.

1983 – 1995 **Paterson, Grant & Watson Limited, Consulting Geophysicists, Toronto - Senior Staff Geophysicist (1987-1995) Staff Geophysicist (1983-1987) -** Development of new client base; responsible for the design, implementation, acquisition, compilation, processing, interpretation and presentation of geophysical and geological exploration and development surveys for precious metals, diamonds, base metals and petroleum. Management of government contracts. Assembly and coordination of field work crews (worldwide) and data processing teams. Geophysical data processing and interpretation; organization, supervision, coordination and participation in geophysical data processing projects conducted by teams of three to four individuals. Responsible for scheduling assigned projects, team selection, quality control of the product and presentation and delivery of final products to the clients.

ACADEMIC AWARDS:

- McMaster University Department of Geology Graduate Scholarship 1991 - 1992, 1992 - 1993.
- Canadian Society of Exploration Geophysicists Trust Fund Scholarship, donated by Chevron Standard Limited, 1982.

PROFESSIONAL AFFILIATIONS:

- Society of Exploration Geophysicists (SEG).
- Past President, Canadian Exploration Geophysicists Society (KEGS).
- Environmental and Engineering Geophysicists Society (EEGS)
- Canadian Institute of Mining and Metallurgy (CIM) (National and Toronto Branch).
- Prospectors and Developers Association of Canada (PDAC).
- Registered Professional Geophysicist, NAPEGG.

PROFESSIONAL EXPERIENCE:

- 22 years of continuous experience in the geophysical survey industry
- Good management skills
- Extensive international experience
- Extensive experience processing and interpreting airborne magnetic and/or magnetics/ radiometric data
- Excellent computer skills, experienced programmer

TECHNICAL PUBLICATIONS:

More than 15 technical publications between 1983 and 2003, list available on request.

LANGUAGES: English, working knowledge of French and Spanish

McPhar Geosurveys Ltd.
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Ontario, Canada L3Y 8Z9
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WebSite: www.mgssurveys.com

RÉSUMÉ

NAME: HENRIK TOFT ANDERSEN

PROFESSION: Geophysicist

EDUCATION:

1987	Ph.D. Geophysics, Colorado School of Mines, Golden, Colorado.
1978	M.S. Geophysics, Colorado School of Mines, Golden, Colorado.
1973	B.S.(hons) Geophysics, Bernard Price Inst. for Geoph. Research, University of the Witwatersrand, Johannesburg, South Africa.
1968	B.S. Geology, University of Pretoria, Pretoria, South Africa.

WORK EXPERIENCE:

2003 - **McPhar Geosurveys Ltd., Newmarket, Ontario, Canada - Consulting Chief Geophysicist -** supervising all geophysical activities of the company, including research and development of instrumentation and software; data processing, interpretation and reporting.

1996 - 2002 **Aero Surveys Inc., President and Chief Geophysicist -** responsible for the day-to-day management of the company; determining the company's future business plans; strategic planning; supervising a staff of 12 plus employees; maintaining budgets and cash-flow; supervising all geophysical activities of the company, including data processing, interpretation and reporting.

1998 - 2002 **EDCON Aero Surveys, Inc., Vice President and Chief Geophysicist** – a joint-venture company between Aero Surveys Inc. and EDCON Inc. Responsible for the day-to-day geophysical activities of the company, including data processing, interpretation and reporting.

1993 - 1996 **GeoeXperT C.A. and Digitus International, Ltd., Vice President.** Research Project: Imaging and Pattern recognition in the interpretation of Transient Electromagnetic data for Idaho National Engineering Labs. **Consultant to GeoeXperT, Venezuela**, on mineral exploration in tropical terranes, **Consultant to: (a) TerraSoft**, Sunnyvale, California,

on interpretation of Electromagnetic Offset Logging, (b) **Sandia National Labs**., Albuquerque, New Mexico, on application of electrical methods to map and characterize the disturbed rock zone around underground excavations and its associated fluid redistribution.

1990 - 1993 **Department of Geophysics, Colorado School of Mines, Assist. Research Professor.** Research Projects: (a) Imaging and Pattern recognition in the interpretation of Transient Electromagnetic data for Idaho National Engineering Labs, (b) Mapping of fluid redistribution in the Disturbed Rock Zone around underground excavations for Sandia National Lab. Vice President and consultant to GeoeXperT, Venezuela, on precious- and base metal exploration in tropical terranes.

1988 - 1990 **Department of Geophysics, Colorado School of Mines, Professional Research Assistant**. Research Projects: (a) Characterization of the Disturbed rock Zone around underground excavations for Sandia National Labs., test of exploration methods for oil and gas beneath the pre-Cambrian overthrust in upstate New York, (c) application of electrical exploration methods for oil and gas exploration in Venezuela. Consultant to MINDECO and The Nuclear Fuels and Reactor Corp. of Japan.

1987 - 1988: **Department of Geophysics, Colorado School of Mines, Post Doctoral Fellow**. Research Projects: (a) Application of Electrical methods to Oil and Gas exploration in Venezuela, (b) Geothermal exploration in Iceland, and (c) Site characterization of the Waste Isolation Pilot Plant in SE New Mexico. Consultant to GeoPacific Resources for MINDECO on geothermal exploration in Japan.

1981- 1987 **Department of Geophysics, Colorado School of Mines, Teaching and Research Assistant.** (a) Teaching assistant for Electrical Exploration Methods during Summer Field Camp, (b) Research assist. on Electromagnetic and Gravity project over pre-Cambrian overthrust in New York, (b) Research assist. on the development of multi-component electromagnetic application and interpretation systems, and (c) Project Manager on Transient Electromagnetic studies of deep structural features below volcanic cover in the states of Washington and Colorado. Consultant to Newmont Overseas Exploration in Spain and Peru.

1970 - 1981 **Tsumeb Corporation Ltd. (Newmont Mining), Senior Exploration Geophysicist** for base metals in Namibia and Namaqualand. Commonly used methods on integrated surveys included ground- and airborne magnetics, radiometrics, IP/resistivity, frequency and transient electromagnetics and gravimetry.

1969 - 1970 **Falconbridge Exploration (South Africa); Field Geologist/**

	Geophysicist on base metal exploration in Namibia and Zimbabwe.
1968 - 1969	**Kennecott Exploration (South Africa); Field Geologist** on base metal exploration in Namibia.
1963 - 1968	**Geological Survey of South Africa; Geophysical Field Technician** on gravity surveying and electrical logging of shallow wells.
1962 - 1963	**Federal Vanadium Corp. (South Africa); Laboratory Technician** in chemical production control laboratory.

PUBLICATIONS:

Authored/co-Authored and published more than 20 technical papers. List available on request.

PROFESSIONAL EXPERIENCE:

- More than thirty years professional experience in the collection, processing and interpretation of ground and airborne geophysical data for a wide range of applications, including: oil and gas exploration; mineral exploration; ground water exploration; and environmental studies.
- Considerable management experience, supervising staff of up to 20 persons, as well as extensive experience as an in-field Project Manager and/or consultant.
- Extensive computer skills, experienced with AutoCAD, GEOSOFT OASIS/MPS/MONTAJ data processing software, and FORTRAN, C, and other programming languages.
- Experienced in the planning and design of geological and geophysical exploration programs for both oil and gas and minerals exploration.
- Extensive experience in teaching and training personnel to do data processing and in the application of geophysical surveying techniques.
- Considerable experience in designing and managing Research and Development programs.

PROFESSIONAL SOCIETIES:

- American Geophysical Union
- Geological Society of America
- Venezuelan Geophysical Society
- Sigma Xi
- Aircraft Owners and Pilots Association

LANGUAGES:

English, Danish, Afrikaans, some Spanish

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RÉSUMÉ

NAME: Barry Levy

PROFESSION: Electronic Technologist

EDUCATION: Seneca College, Toronto
Carnegie Institute

LANGUAGES: English

WORK EXPERIENCE

2003 - **Contract / Consulting Electronics Technologist/Operator -** responsible for installing, maintaining and operating airborne geophysical systems in the field. Experienced in operating both helicopter-borne EM systems and fixed-wing magnetometer and multi-sensor systems, including aerogravity/magnetics and HEM/Magnetics/Radiometrics.

1995 - 2002 **Aero Surveys Inc., Uxbridge, Canada - Electronics Technologist/Operator** - responsible for maintaining and operating airborne geophysical systems in the field. Experienced in operating both helicopter-borne EM systems and fixed-wing magnetometer and multi-sensor systems, including aerogravity/magnetics. Has worked in Angola, Argentina, Bolivia, Botswana, Chile, Ecuador, Eritrea, Libya, Mexico, Oman, South Africa, Peru, USA.

1994 - 1995 **Independent Contractor/Consultant** - worked on several contracts providing services and consulting to clients in Canada, USA and England.

1993 - 1994 **Premier Telecom, West Sussex, England - Electronics Technologist** - responsible for the purchase, integration, testing and set-up of GSM telephones for clients in Hong Kong and England.

1990 - 1994 **NovAtel Communications Ltd., Ontario - Field Support Representative** - selected and set-up service centres for NovAtel Products and cellular systems. Conducted service seminars, approved warranty claims from dealers, assisted in setting-up variety of cellular networks with Northern Telecom, Ericsson and Cantel. Re-designed and re-installed a Rural Radiotelephone network in Republic of Rwanda under UN contract. Set-up Service

Centre for NovAtel UK in Wiltshire, England.

1986 - 1990 **Canadian Marconi Company, Burlington Regional Office, Ontario - Service Manager** operated and serviced CMC's VHF and UHF RCC's in Mississauga.

1983 - 1986 **Motorola, Toronto - Field Tech. Rep. -** responsible for servicing Gulf and BP's Motorola Data Acquisition and Control Systems at bulk loading terminals in Toronto, Ottawa and Montreal.

1980 - 1983 **Scintrex Limited, Toronto - Shop Technician -** worked on the repair, calibration and testing of magnetometers and electromagnetic systems and small lasers. Built coils for electromagnetic systems, operated and tested airborne systems for delivery to clients.

1976 - 1980 **Motorola, Toronto - Special Products Service -** installed and service "Voice Privacy" Scrambler systems, Voting Receiver Systems, CCD camera systems, Image Intensifier and Low-Light Products.

PROFESSIONAL EXPERIENCE

- Seven years experience as a technologist/operator of airborne geophysical systems.
- More than twenty five years professional experience in the installation, repair and service of sophisticated electronic systems
- Eight years experience in the installation, repair and operation of geophysical systems
- Extensive experience working in Europe, Canada, Africa and South and Central America
- Good computer skills, familiar with DOS, WINDOWS, AutoCAD and a variety of other software.

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RÉSUMÉ

NAME: **Daniel J. Mckinnon**

HIGHLIGHTS

- Acquired extensive knowledge in the Manufacturing Industry
- Experience in mining operations, security, general labour, carpentry, electrical, electronics, plumbing, fabricating, and welding
- Excellent communication skills when dealing with customers, co-workers and managers
- Proven capacity to identify problems and develop effective solutions
- Honest, reliable, and hardworking with strong interpersonal skills
- Committed driven team player, bringing enthusiasm and energy into group efforts
- Bilingual in French and English, both written and verbal

SKILLS AND EXPERIENCE

PRODUCTION SUPERVISOR

- Coordinated with various departments the accounts payable, accounts receivable and data entry
- Continued involvement in Research and Development, designing, manufacturing, prototyping and testing products
- Responsible for the quality control of manufactured parts and final testing of the finished products
- Acquired extensive knowledge in the use of all conventional measurement instruments, and interpreting mechanical drawings
- Solid knowledge of geometric tolerancing and interpretation
- Developed product parts manual including mechanical drawings, exploded views, troubleshooting guide, basic operation, warranties and maintenance requirements
- Develop and maintain improvements toward shop floor quality
- Ensured that all employees' issues and concerns are addressed in a timely manor to maintain a positive working environment
- As Safety Representative, conducted departmental floor meetings covering current product quality and/or safety issues
- Ensured all employee orientation, versatility training requirements within the department are met
- Maintained close communication, correspondence and coordination with other production and non-production departments to assure schedule attainment
- Designed, developed and implemented the inventory control system along with the management team
- Responsible for the maintenance of all inventory count procedures
- Direct contact with clients for the installation, training and foregoing service requirements for all customers throughout North America

GENERAL LABOUR

- Operated heavy equipment such as excavator, front-end loader, dozer and back-hoe
- Acquired basic knowledge and experience in home renovation, drywall, woodworking, trim, doors, mouldings, and preparing cost estimates
- Experienced in basic plumbing including measuring, cutting, joining, and testing pipes, as well as locating and marking positions for pipe connections and passage holes
- Skilled in residential electrical work such as interpreting drawings and code specifications, installation and testing circuit

MINING OPERATIONS

- Operated a variety of underground and surface mining heavy equipment
- Performed various mining production and development duties including blasting, rock bolting, reconditioning, raise bore, long hole drilling, mucking, trucking, tramming, crushing, utility construction work and various other underground duties
- Maintained underground roadways, pumping systems, and monitored water levels

EDUCATION

ATLANTIC TRANSPORT TRAINING ACADEMY, Miramichi, N.B 1999
Heavy Equipment Operator Certificate
Alcohol and Drug Testing: Training and Awareness for Supervisors and Employees Certificate
Highway Signalers Course Certificate

NEW BRUNSWICK COMMUNITY COLLEGE, St. Andrews, N.B 1995
Electrical Appliance and Refrigeration Repair Diploma
Block 1 Apprenticeship - Electrical

JAMES M. HILL MEMORIAL HIGH SCHOOL, Miramichi, N.B 1994
High School Diploma

ADDITIONAL TRAINING

- Lockout (600V, 2300V)
- WHMIS
- Forklift Operation
- Standard First Aid Certificate
- Scaling
- Emergency Preparedness
- Blasting/Explosives
- Oscenco Self Rescuer
- Noranda Environmental Awareness
- Air Quality Testing
- Mining Industry Training and Adjustment Council – Canada (MITAC) Certified in conjunction with New Brunswick Community College – Bathurst. Modules MUH000 – MUH005 and MUH009

EMPLOYMENT HISTORY

McPHAR GEOSURVEYS LTD. 2003-Present
Geophysical Survey Technician

COMPRESSARIO CORPORATION, Newmarket, ON
Production Manager / North American Service Representative 2001-2003
Assembly/Electronics Technician 1999 - 2001

NORANDA – HEATH STEELE MINES, Miramichi, N.B 1996 - 1999

Heavy Equipment Operator – Production/Development Miner

CITY of MIRAMICHI 911, Miramichi, N.B
Addressing Co-coordinator 1994

JEAN COUTU PHARMACY, Miramichi, N.B
Stock Room / Shipping receiving 1993

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RÉSUMÉ

NAME: **Tonia Bojkova**

PROFESSION: Geophysicist

EDUCATION:

2001	Geosoft Data Processing and Analysis Software, Guildford, United Kingdom
1998	GeoPak Data Processing Software, HSG Ltd., Toronto, Canada
1978 – 1980	M.Sc., Applied Mathematics, Technical University, Sofia, Bulgaria
1973 – 1978	M.Sc., Geophysics, University of Mining and Geology, Sofia, Bulgaria

WORK EXPERIENCE:

2004 - **McPhar Geosurveys Ltd., Geophysicist/Data Processor** - responsible for processing of airborne geophysical data; quality control (QC) of acquired geophysical data; geophysical interpretations; operational logistics

2000 – 2002 **Fugro Airborne Survey (FAS), United Kingdom – Office in Sofia, Bulgaria, Geophysicist** - Processed and analyzed radiometric and magnetic data, and produced corresponding maps in Bulgaria and in the UK (Guildford). Prepared final reports.

1992 - 2000 **Airborne Geophysical Survey (AGS) Ltd., Bulgaria** (a Joint Venture between the Government of Bulgaria and High-Sense Geophysics Ltd., Toronto, Canada), **Geophysicist** - Planned and managed airborne surveys; collected, processed, and analyzed airborne radiometric and magnetic data, produced the corresponding maps and prepared final reports; reprocessed archive data from Namibia, performed environment projects - gamma-ray monitoring of the Bulgarian NPP, Kozloduy using 2048-channel gamma-ray spectrum analyzer

1980 – 1992 **Airborne Geophysical Department of the Enterprise for Geophysical Explorations and Geological Mapping, Sofia, Bulgaria, Geophysicist** - collected, processed, and analyzed airborne radiometric and magnetic data; produced the corresponding maps and prepared final reports; performed gamma-ray monitoring of Bulgaria after Chernobyl NPP fallout

INTERNATIONAL EXPERIENCE:

Canada, Bulgaria, Macedonia, Congo, Zimbabwe, Zambia, Botswana

PROFESSIONAL EXPERIENCE:

- 24 years of continuous experience in the geophysical survey industry
- Extensive international experience
- Extensive experience processing and interpreting airborne magnetic and/or magnetics/ radiometric data
- Excellent computer skills, experienced programmer

LANGUAGES: Bulgarian, English

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Name: **ASIF M. MIRZA**
Profession: **Geophysicist**

HIGHLIGHTS OF QUALIFICATION

- Experience as a field geophysicist
- Airborne geophysical data management and processing
- Seismic reflection data processing experience in Geophysical Investigations for the demarcation of overburden from the bedrock and concerning oil resources
- Extensive experience in 2-D seismic reflection data interpretation
- Experience in seismic data interpretation with the help of Seismic Straitigraphy, Borehole logging, Gravity and Resistivity methods
- Data acquisition with the help of different environmental instruments
- Research about new environmental issues
- Risk assessments and cost estimates related to environmental clean up
- Evaluation of groundwater potential along sea shoreline, environmental investigations, remedial activities
- Master's in Environmental Science, Master's in Geophysics and Bachelor of Applied Geology
- Knowledge and work experience of the software's, Geosoft Montaj, DOS, Windows XP/NT/2000, M.S.Office, Corel DRAW 9, Arc view GIS
- Well organized, self motivated, honest and goal oriented
- Excellent team player with proven communication and interpersonal skills

PROFESSIONAL EXPERIENCE

Geophysicist
McPhar Geosurveys Ltd, Newmarket, Ont, Canada 2004

- Airborne geophysical field data management and preliminary processing, of different projects, using Geosoft Oasis Montaj
- Quality control decisions of survey data within the specification laid down with clients and McPhar's standards
- Gridding, contouring and leveling of magnetic and electromagnetic geophysical data to produce profiles and contours maps
- Set up and operate ground base station system, comprising magnetometer and GPS system
- Producing of backup CD-ROM's of the processed data for forwarding clients via internet or company network site
- Making final reports of the processed geophysical data for clients

Field Geophysicist 2000-2001
SEFEC (Pvt.) Ltd, Karachi, Pakistan

- Seismic reflection data acquisition with the help of dynamite in Attock Area, Pakistan
- Seismic reflection data recorded in the field using well-defined field parameters, i.e. source and spread configuration
- Seismic spread and geophone arrays designed using walk away test and spectral analysis
- Performed field seismic data processing Attock Area, Pakistan

EDUCATION

- Master's in Applied Environmental Measurement Techniques, Chalmers University of Technology, Sweden
- Master's in Applied Geophysics Dept. of Earth Science, Quaid-I-Azam University, Islamabad, Pakistan
- Bachelor of Applied Geology, Institute of Geology, University of the Punjab, Lahore, Pakistan

GEOLOGICAL & ENVIRONMENTAL FIELD EXCURSIONS

- Fieldwork about the Local Human Stresses on three lakes in Molandal Area, Sweden.
- Field about Soil Farmation Analysing Aten Kapell, Vastergotland, Sweden.
- Field study of the Air Quality at Universeum and Chalmers, Gothenburg, Sweden.
- Geological & Geophysical Field Works in Northern Pakistan.

TRAINING

Internship:

- Seismic Data Processing, OGDCL, Islamabad, Pakistan

Technical Courses:

- Evaluation of Aggregates as constructional material, Course arranged by the Kent State University, Ohio, USA and Institute of Geology, University of the Punjab, Lahore, Pakistan
- Course on Geographical Information System (GIS), Course arranged by the National University of Science and Technology, Islamabad, Pakistan
- Course on Seismic Stratigraphy and Tectonics (Basin Analysis and Computer Modelling), Course arranged by Petroleum Geology Investigators ApS, Copenhagen, Denmark and the Dept. of Earth Sciences, Quaid-i-Azam University, Islamabad, Pakistan
- Well Logging interpretation, Course arranged by Petroleum Geology Investigators ApS, Copenhagen, Denmark and the Dept. of Earth Sciences, Quaid-i-Azam University, Islamabad, Pakistan

SCHOLASTIC ACHIEVEMENTS

- 2nd position in Fieldwork, B.Sc. Geology
- 4th position in B.Sc. Applied Geology

EXTRA CURRICULAR ACTIVITIES

- Member Quaid-I-Azam Blood Donor Society (QBDS)
- Member Dramatic Club QAU
- Member of the University Cricket Team
- Class representative during M.Sc. in University
- Certificate of 2nd position in Cricket, Annual Sports 95
- Certificate of service for National Cadet Corp. (NCC)

LANGUAGES

English, Urdu, Hindi and Punjabi

APPENDIX 5

Digital Data Specifications

- HEM data file description
- Spectrometer data file description
- Reconnaissance Line HEM Data File Description
- Reconnaissance Line Spectrometer Data File Description
- HEM Anomaly listing

HEM Data File Description

FILE: Marksmen_MB_final.XYZ and GE_hem_final.XYZ

Name of channel	Explanation
X	X coordinate-UTM zone 8N
Y	Y coordinate-UTM zone 8N
Lat_I	Latitude
Long_I	Longitude
Fid	Fiducial
Galt_m	GPS Height in metres
Ral_m	Radar altimeter in metres
Gpstimesec	GPS Time in seconds
DTM	Digital Terrain Model in metres
Magedited	Raw edited magnetic data
IGRF	IGRF (International Geomagnetic Reference Field)
Maglev	Leveled magnetic data
TMI	Leveled and microleveled IGRF removed magnetic data
Ip1_F	Raw edited In-Phase component 7 kHz
Q1_F	Raw edited Quadrature component 7 kHz
Ip1_F_7kHz	Leveled In-Phase component 7 kHz
Q1_F_7kHz	Leveled Quadrature component 7 kHz
Ip2_F	Raw edited In-Phase component 6600Hz
Q2_F	Raw edited Quadrature component 6600 Hz
Ip2_F_6600Hz	Leveled In-Phase component 6600 Hz
Q2_F_6600Hz	Leveled Quadrature component 6600 Hz
Ip3_F	Raw edited In-Phase component 980 Hz
Q3_F	Raw edited Quadrature component 980 Hz
Ip3_F_980Hz	Leveled In-Phase component 980 Hz
Q3_F_980Hz	Leveled Quadrature component 980 Hz
Ip4_F	Raw edited In-Phase component 880 Hz
Q4_F	Raw edited Quadrature component 880 Hz
Ip4_F_880Hz	Leveled In-Phase component 880 Hz
Q4_F_880Hz	Leveled Quadrature component 880 Hz
Ip5_F	Raw edited In-Phase component 34 kHz
Q5_F	Raw edited Quadrature component 34 kHz
Ip5_F_34kHz	Leveled In-Phase component 34 kHz
Q5_F_34kHz	Leveled Quadrature component 34 kHz
Resist6600	Calculated resistivity for 6600 Hz
Resist880	Calculated resistivity for 880 Hz (only for Main block)

MARKSMEN Reconnaissance Lines HEM Data File Description

FILE: ReconnaissL_final.gdb(xyz)

Name of channel	Explanation
X	X coordinate-UTM Zone 8N
Y	Y coordinate-UTM Zone 8N
Lat_I	Latitude
Long_I	Longitude
Fid	Fiducial
Galt_m	GPS Height in metres
Ralt_f	Radar Altimeter in metres
Gpstimesec	GPS Time in seconds
Magedited	Raw edited magnetic data
IGRF	IGRF (International Geomagnetic Reference Field)
TMI	Leveled and microleveled IGRF Removed magnetic data
Ip_7kHz	Leveled In-Phase component 7000 Hz
Q_7kHz	Leveled Quadrature component 7000 Hz
Ip_6600Hz	Leveled In-Phase component 6600 Hz
Q_6600Hz	Leveled Quadrature component 6600 Hz
Ip_980Hz	Leveled In-Phase component 980 Hz
Q_980Hz	Leveled Quadrature component 980 Hz
Ip_880Hz	Leveled In-Phase component 880 Hz
Q_880Hz	Leveled Quadrature component 880 Hz
Ip_34kHz	Leveled In-Phase component 34 kHz
Q_34kHz	Leveled Quadrature component 34 kHz

MARKSMEN Reconnaissance Lines Spectrometer Data File Description

FILES: ReconnaissL_spec_final.gdb(xyz)

Name of channel	Explanation
X	X coordinate-UTM Zone 8N
Y	Y coordinate-UTM Zone 8N
Lat_deg	Latitude
Long_deg	Longitude
Fid	Fiducial
Galt_m	GPS Height in metres
Gpstm_sec	GPS Time in seconds
RALTSTP	Corrected Radar Altimeter Data to Standard Temperature and Pressure
K	Corrected Potassium channel (%K)
U	Corrected Uranium channel (eU ppm)
TH	Corrected Thorium channel (eTh ppm)
TC	Corrected Total Count channel (cps)

HEM Anomaly Listing

UTM Easting (metres, Zone 8N)	UTM Northing (metres, Zone 8N)	Flight Line	7000 Hz Anomaly Classification	980 Hz Anomaly Classification	7000 Hz Conductivity (Siemens)	980 Hz Conductivity (Siemens)	7000 Hz Anomaly Label	980 Hz Anomaly Label
506865.6935	6640220.615	L1361:9	2		3.061851263		A	
506868.3025	6640221.714	L1361:9		3		9.124775887		A
505391.2842	6640008.338	L1340:9	2		2.174670696		A	
505449.9668	6640030.227	L1340:9		4		18.14632988		A
504116.5075	6642577.366	L1200.1:5	3		4.947029591		A	
504233.3356	6642616.285	L1200.1:5		2		7.926952839		A
507265.3109	6643726.492	L1200.1:5	6		14.3611393		B	
508538.0244	6642614.632	L1250.1:5			0.674986601			
504465.14	6639478.794	L1353:6		3		13.62986946		A
504398.516	6639451.516	L1353:6	1		1.328673959		A	
509155.48	6639589.492	L1451:6		4		18.08364487		A
507013.09	6638885.831	L1451:6		5		32.67854309		B
508344.14	6634539.345	L1754:6	1		1.052188635		A	
508686.092	6640537.004	L1380:6		2		6.102852821		A
508696.49	6640539.5	L1380:6	6		10.71755695		A	
508933.733	6641482.076	L1331:6		3		11.45449448		A
508226.198	6641198.98	L1331:6		2		7.725356579		B
508162.727	6641171.974	L1331:6	3		4.505558491		A	
505120.99	6640875.17	L1281:6		2		3.731249094		A
505123.219	6640876.175	L1281:6	1		1.506615281		A	
505692.847	6643319.164	L1140:6		4		16.44237137		A
505698.51	6643323.07	L1140:6	5		8.063043594		A	
504270.8335	6642319.204	L1170:7	8		22.75527763		A	
504314.5087	6642331.371	L1170:7		4		20.47502518		A
504222.7857	6642448.125	L1160:7		4		21.28937531		A
504245.929	6642455.17	L1160:7	5		8.746015549		A	
504698.6923	6643267.192	L1120:7	4		7.955751419		A	
506953.9937	6644050.401	L1120:7			0.434376836			
504320.93	6641546.476	L1220:7	1		1.353886962		A	
504323.7533	6641547.928	L1220:7		2		4.602460861		A
506446.4844	6641981.996	L1240:7	2		3.17138195		A	
508508.0822	6642740.536	L1240:7	2		2.553415775		B	
508684.805	6642805.895	L1240:7		7		817.8568115		A
506721.2524	6641279.005	L1291:7		3		8.656301498		A
506746.8936	6641289.305	L1291:7	2		2.046803951		A	
508627.9071	6641975.038	L1291:7		6		44.40718079		B
506587.3817	6641582.257	L1270:9		3		8.821822166		A
506593.7237	6641584.918	L1270:9	3		5.669887543		A	
509078.5074	6642455.268	L1270:9		7		79.75927734		B
509078.9286	6642455.388	L1270:9	2		3.032998562		B	
506850.3944	6641045.916	L1311:9	2		3.169667482		A	
506898.846	6641065.908	L1311:9		3		12.22428703		A
506955.4092	6640887.807	L1321:9		2		7.793001175		A
506960.0808	6640889.361	L1321:9	2		2.909082413		A	
508883.452	6641597.565	L1321:9	2		2.250314713		B	
506978.7616	6640121.006	L1370:9	4		7.86975956		A	
506992.8641	6640126.866	L1370:9		3		12.20770836		A
507123.662	6639811.99	L1391:9		2		6.9211936		A
507132.3613	6639816.282	L1391:9	3		5.603978634		A	
507032.8338	6639484.081	L1410:9	1		1.241566181		A	
506916.8644	6638956.658	L1440:9	2		3.761915684		A	
508210.7864	6637043.796	L1590:9		5		25.60318947		A
507933.3397	6636592.908	L1610:9		2		4.632815838		A
507969.0211	6636607.319	L1610:9	2		2.171713114		A	
508657.5169	6636893.854	L1610:9		3		9.284935951		B
508669.4354	6636899.413	L1610:9	2		3.03394413		B	
508762.2099	6636933.688	L1610:9	1		1.377192259		C	
509944.7862	6637359.23	L1610:9		2		6.043379307		C
510005.6521	6637385.578	L1610:9	1		1.673597217		D	
507762.1001	6634487.789	L1740:9			0.838902533			
507898.1898	6634223.987	L1761:9			0.638994753			
508071.3809	6634105.209	L1770:9			0.611633539			

LEGEND

SURVEY PARAMETERS:
HELICOPTER TYPE: A-star AS-350 B3
SURVEY DATE: August 2014
TRAVERSE LINE SPACING: 100 m
TRAVERSE LINE DIRECTION: 15°/ 225°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 105°/ 285°

ELECTROMAGNETIC SYSTEM:
Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 readings/second

AIRBORNE MAGNETOMETER:
Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD Unit

AIRBORNE GAMMARAY SPECTROMETER:
Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" NaI sensor and 4.2 liters "upward looking" NaI sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 80 m above ground level

ACQUISITION SYSTEM:
Iwatsu Data Acquisition System
Radio Altimeter: Terra TDA-3000/TDI-300

AIRBORNE NAVIGATION SYSTEM:

Survey Lines

Reconnaissance Lines

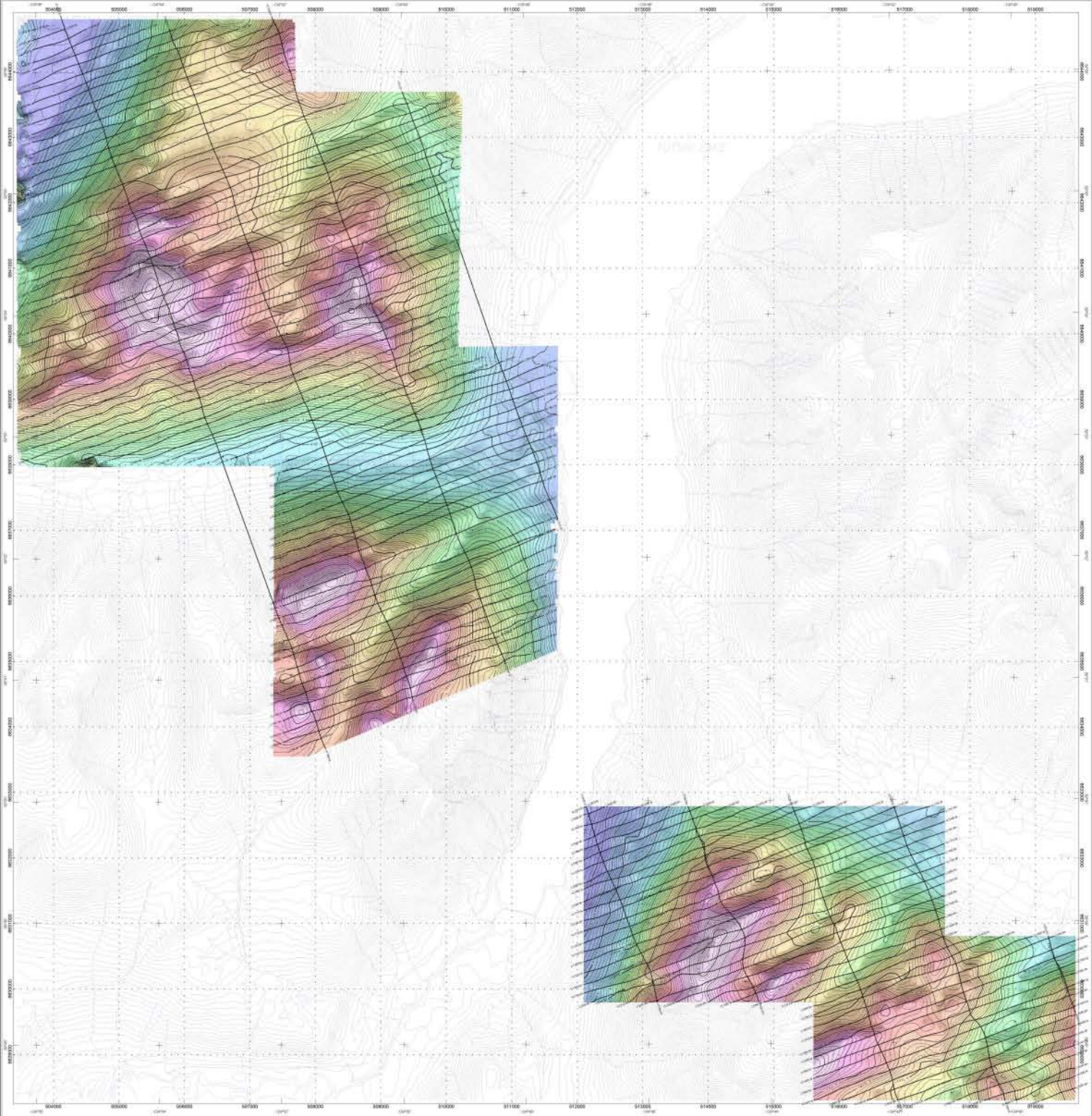
Topographic base supplied by Marksmen Resources Limited

McPHAR

Marksmen Resources Limited

FLIGHT PATH MAP
Survey Lines and Reconnaissance Lines

McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2008
TRAVERSE LINE SPACING: 100 m
TRAVERSE LINE DIRECTION: 78°/258°
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 168°/348°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 readings/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Exploranium/Radiation Solutions GR-820 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" NaI sensor and 4.2 liters "upward looking" NaI sensor
Sampling Rate: 1 readings/second
Sensor Height: Nominally 90 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DGPSMAX 12-channel GPS System
Sampling Rate: 1 readings/second

BASE STATION GPS RECEIVER:

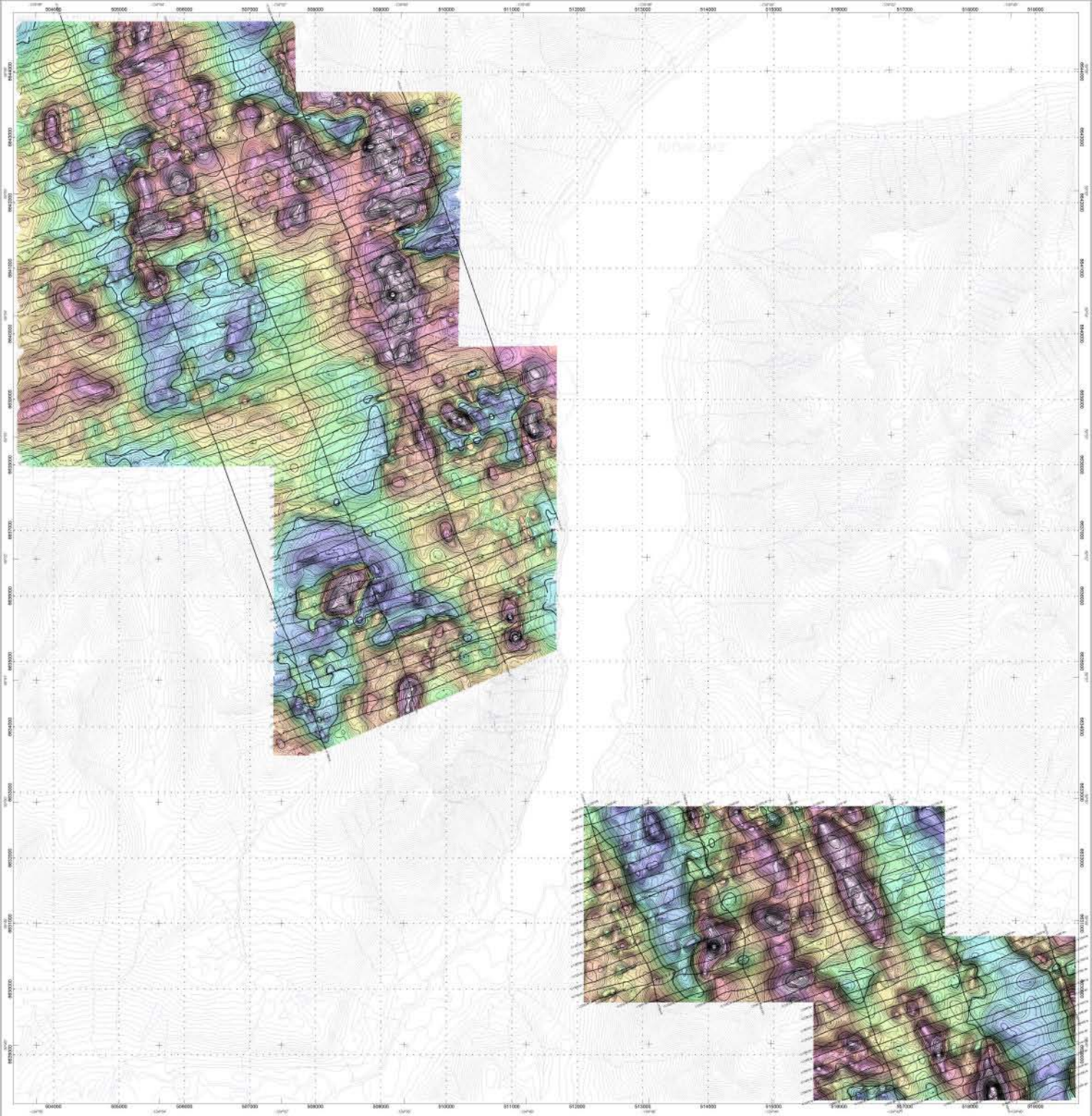
Sampling Rate: 1 readings/second
NovAtel 3751 R GPS System

Digital Terrain Model
metres (m)

Scale 1:20000

McPHAR

Marksmen Resources Limited
Digital Terrain Model
Contour Intervals: 20, 100, 500, 2500 m Sun angle: 180°
McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:
HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 156 m
TRAVERSE LINE DIRECTION: 78°/258°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 168°/348°

ELECTROMAGNETIC SYSTEM:
Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 readings/second

AIRBORNE MAGNETOMETER:
Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:
Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" NaI sensor and 4.2 liters "upward looking" NaI sensor
Sampling Rate: 1 readings/second
Sensor Height: Nominally 90 m above ground level

ACQUISITION SYSTEM:
Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 readings/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 readings/second
NovAtel 3751 R GPS System

Total Magnetic Intensity
nanoTesla (nT)

Scale 1:20000

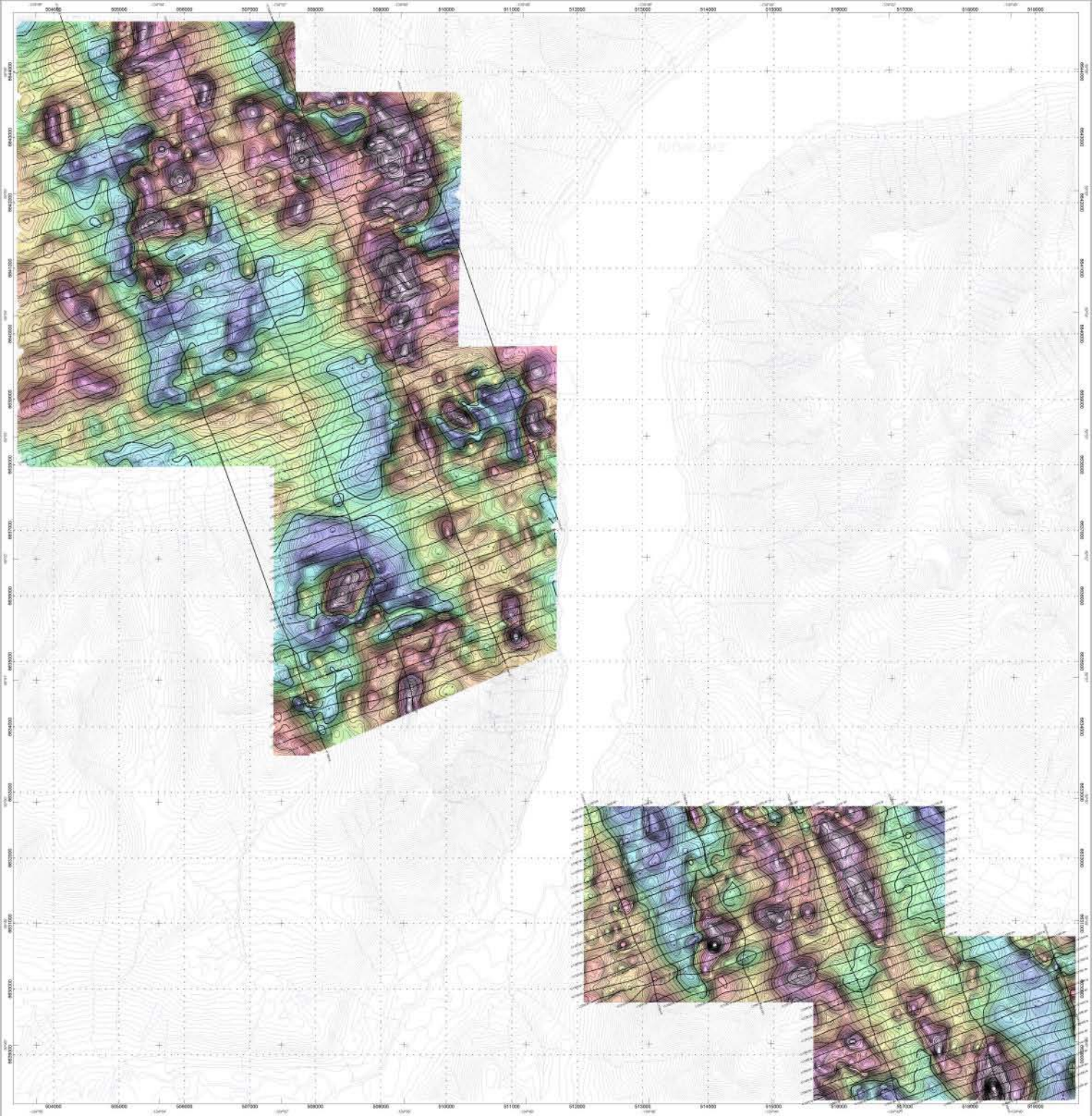
McPHAR

Marksmen Resources Limited

Total Magnetic Intensity IGRF removed

Contour Intervals: 10, 50, 250, 1000 nT
Sun angle: 180°

McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:
HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 150 m
TRAVERSE LINE DIRECTION: 70°/250°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 160°/340°

ELECTROMAGNETIC SYSTEM:
Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 readings/second

AIRBORNE MAGNETOMETER:
Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:
Rico-Envirotec GRS-810 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" Nal sensor and 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 90 m above ground level

ACQUISITION SYSTEM:
Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 readings/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

Reduced to the Pole (Total Magnetic Intensity)
nano Tesla (nT)

Scale 1:20000

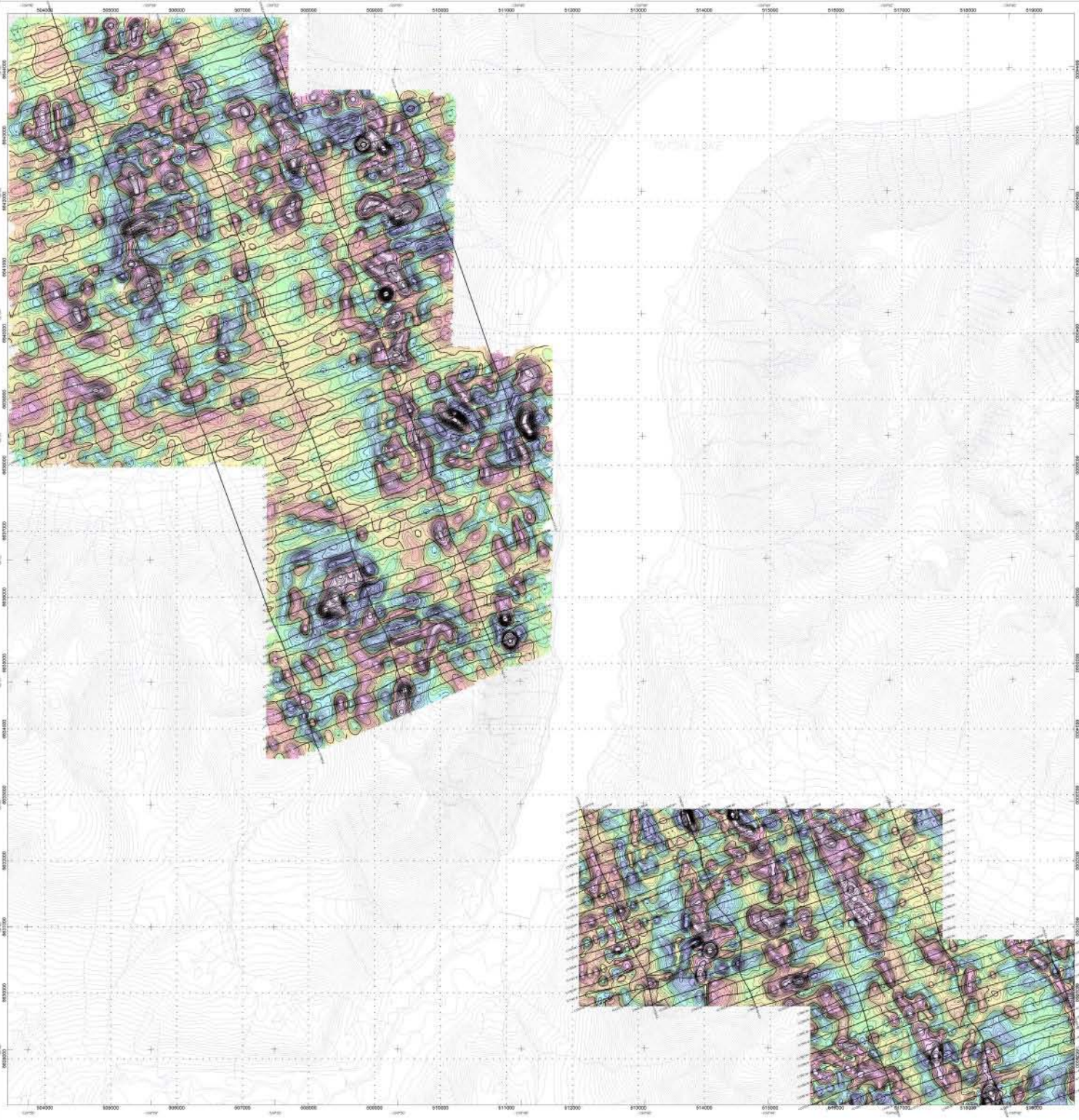
McPHAR

Marksmen Resources Limited

Total Magnetic Intensity Reduced to the Magnetic Pole

Contour Intervals: 10, 50, 250, 1000 nT
Sun-angle: 180°

McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 150 m
TRAVERSE LINE DIRECTION: 76°/256°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 166°/346°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 readings/second

AIRBORNE MAGNETOMETER:

Geometrics GEDA Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 37 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 litres "downward looking" Nal sensor and 4.2 litres "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 80 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Trimo TRA-2000/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DGPSMAX 12-channel GPS System
Sampling Rate: 1 readings/second

BASE STATION GPS RECEIVER:

Sampling Rate: 1 readings/second
Novatel 3751 K GPS System

First Vertical Derivative of Total Magnetic Intensity
nano Teslas/meter (nT/m)

Scale 1:20000

McPHAR

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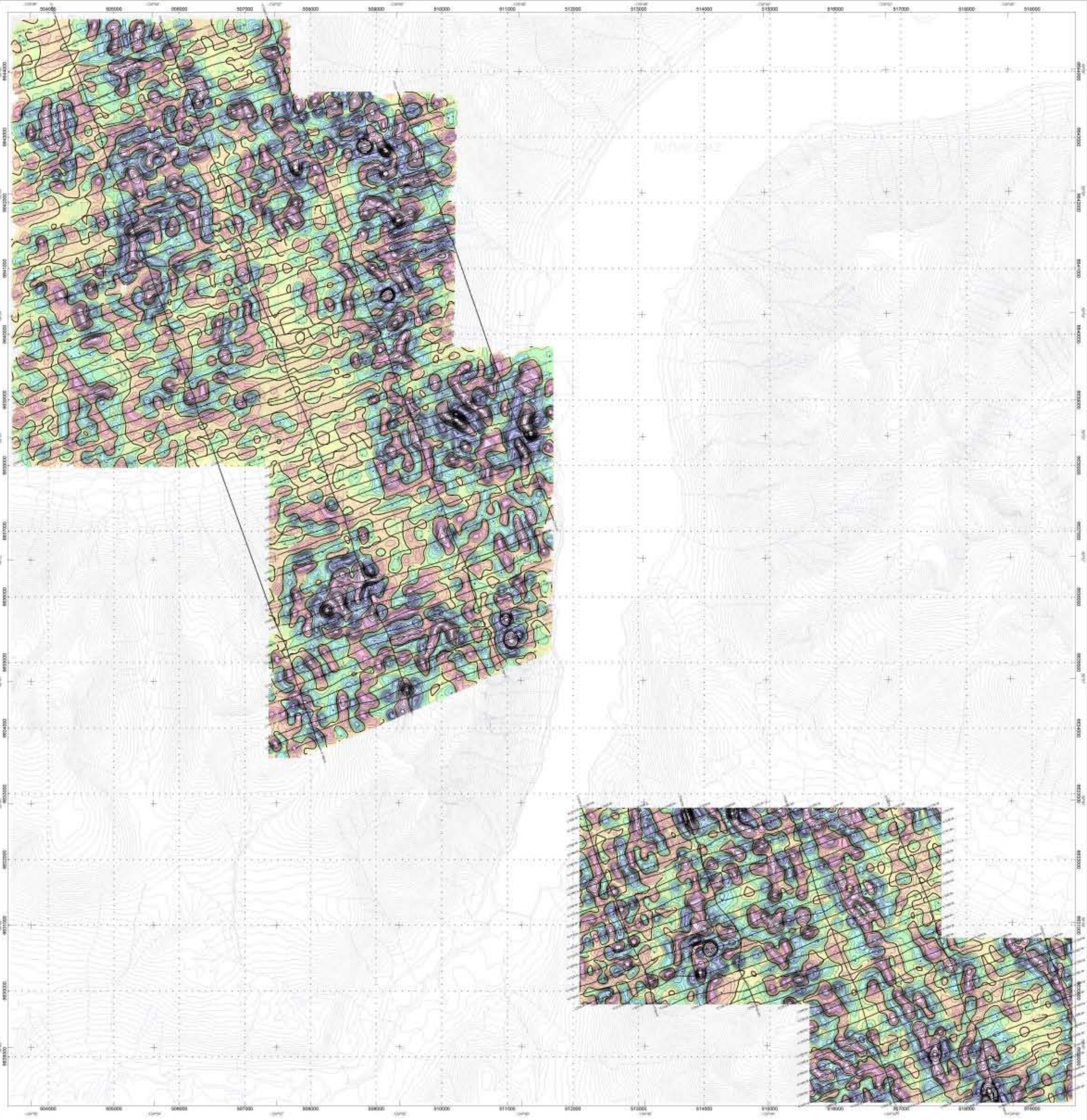
Calculated First Vertical Derivative of the Total Magnetic Intensity

Contour Intervals: 0, 0.5, 2.0 nT/m

McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 150 m
TRAVERSE LINE DIRECTION: 78°/258°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 168°/348°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 33 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" NaI sensor and 4.2 liters "upward looking" NaI sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:

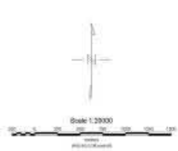
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:

Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

Second Vertical Derivative of Total Magnetic Intensity

nano Tesla/meter^2 (nT/m^2)



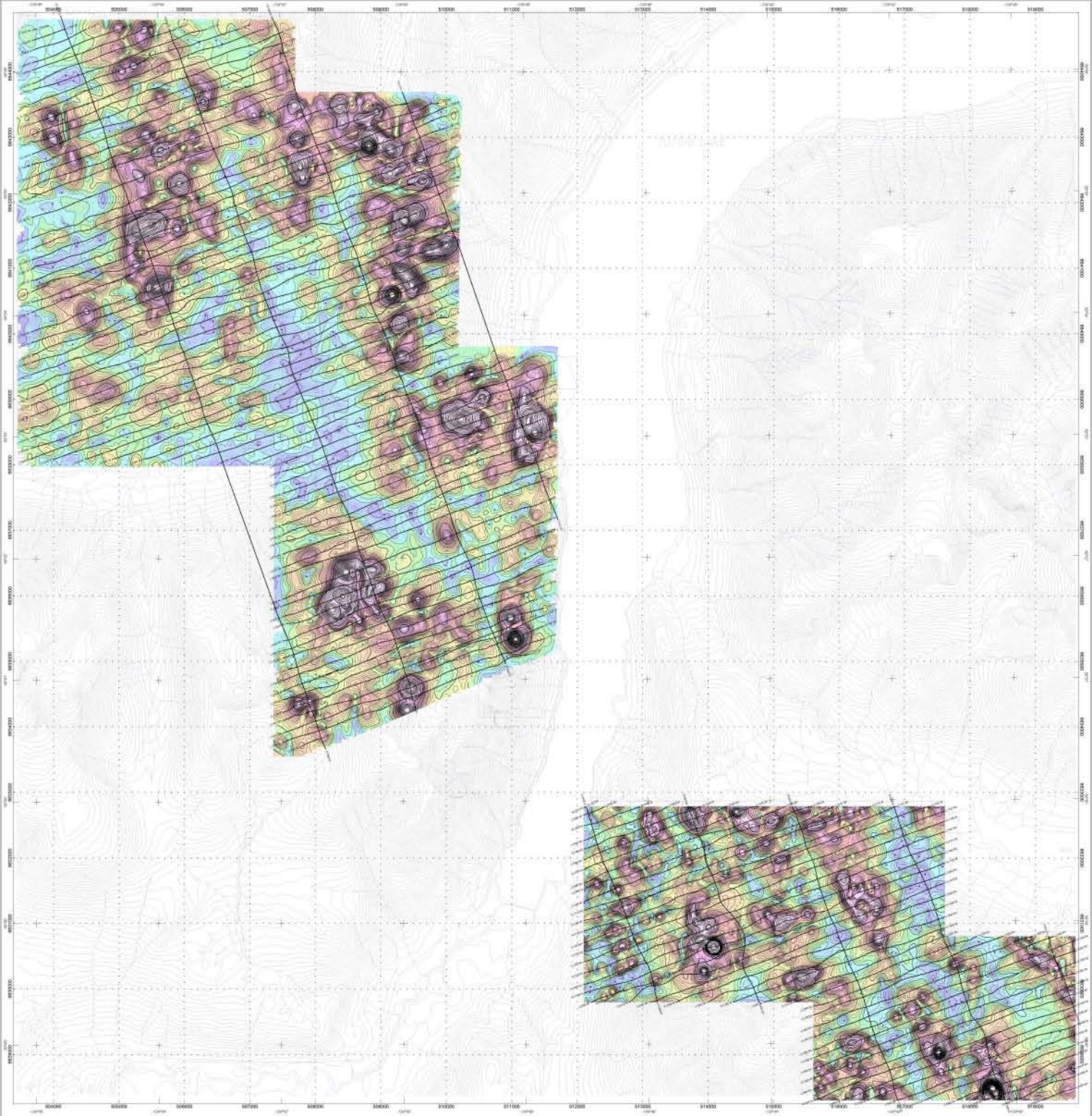
Scale 1:20000

Marksmen Resources Limited

Calculated Second Vertical Derivative of the Total Magnetic Intensity

Contour Intervals: 0.002, 0.01, 0.05, 0.25 nT/m^2

McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 150 m
TRAVERSE LINE DIRECTION: 79°/259°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 168°/348°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 readings/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" Nal sensor and 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 readings/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3500/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DGPSMAX 12-channel GPS System
Sampling Rate: 1 readings/second

BASE STATION GPS RECEIVER:

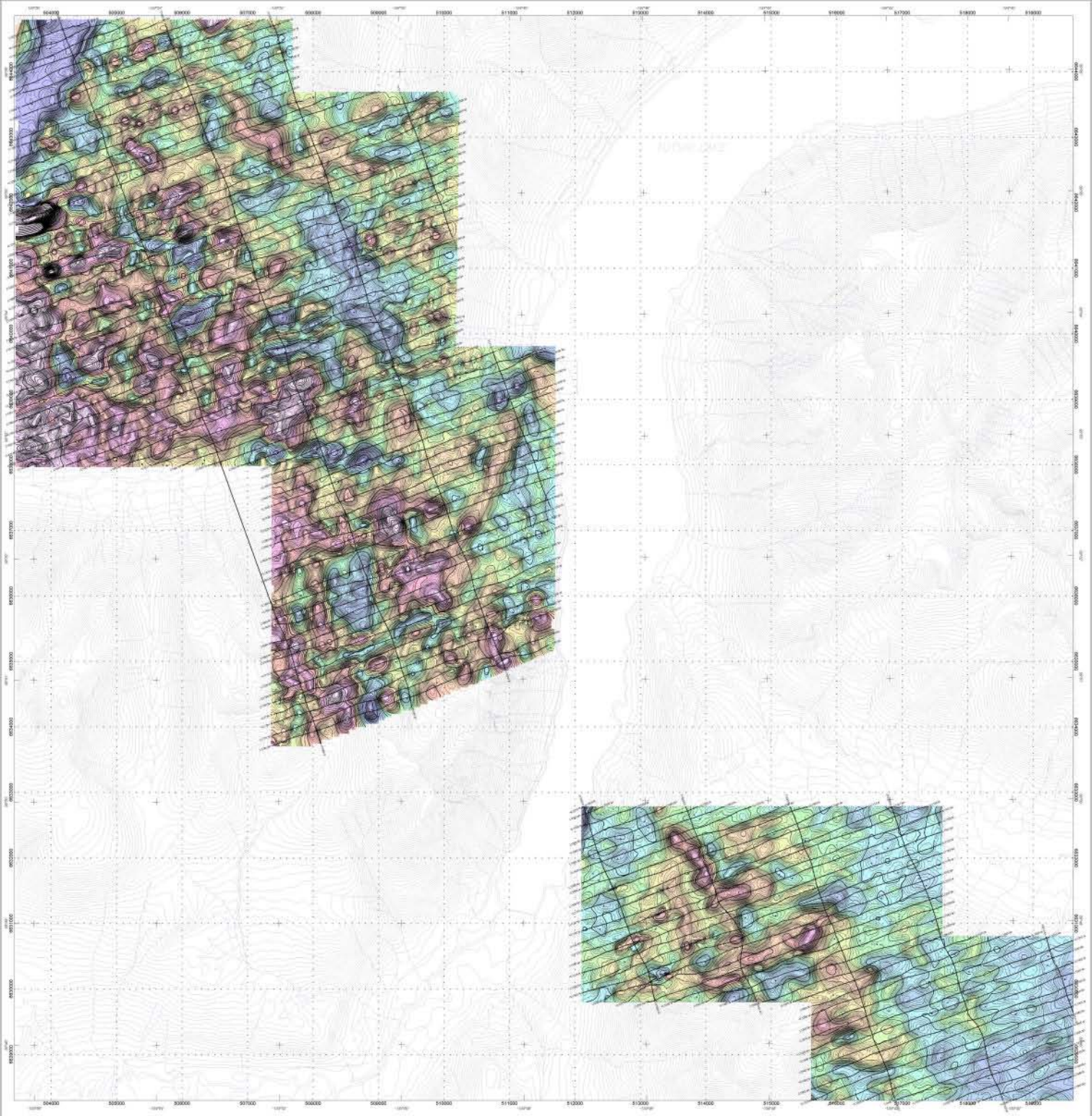
Sampling Rate: 1 readings/second
NovAtel 3751 R GPS System

Analytic Signal of Total Magnetic Intensity
nanoTesla/meter (nT/m)

Scale 1:20000

McPHAR

Marksmen Resources Limited
Analytic Signal of Total Magnetic Intensity
Contour Intervals: 0.1, 0.5, 2.5 nT/m
McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 150 m
TRAVERSE LINE DIRECTION: 75°/255°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 165°/345°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 readings/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" Nal sensor and 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 80 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DGPSMAX 12-channel GPS System
Sampling Rate: 1 readings/second

BASE STATION GPS RECEIVER:

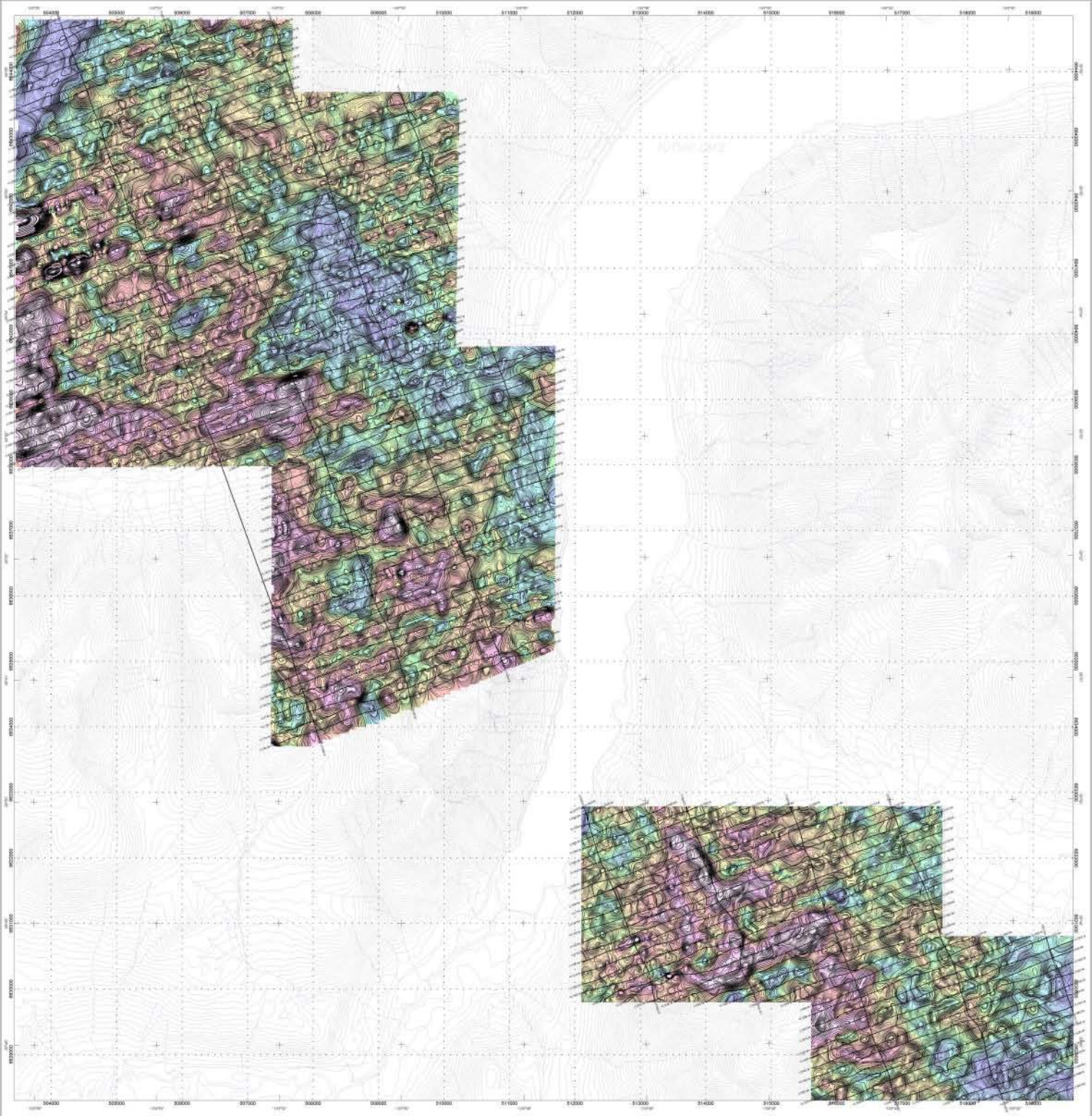
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

Total Count
counts per second (cps)

Scale 1:25000

McPHAR

Marksmen Resources Limited
Total Count map
Contour Intervals: 20, 150, 500 counts per second (cps)
McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 150 m
TRAVERSE LINE DIRECTION: 78°/258°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 168°/348°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 readings/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-810 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" Nal sensor and 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 readings/second
Sensor Height: Nominally 90 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DGPSMAX 12-channel GPS System
Sampling Rate: 1 readings/second

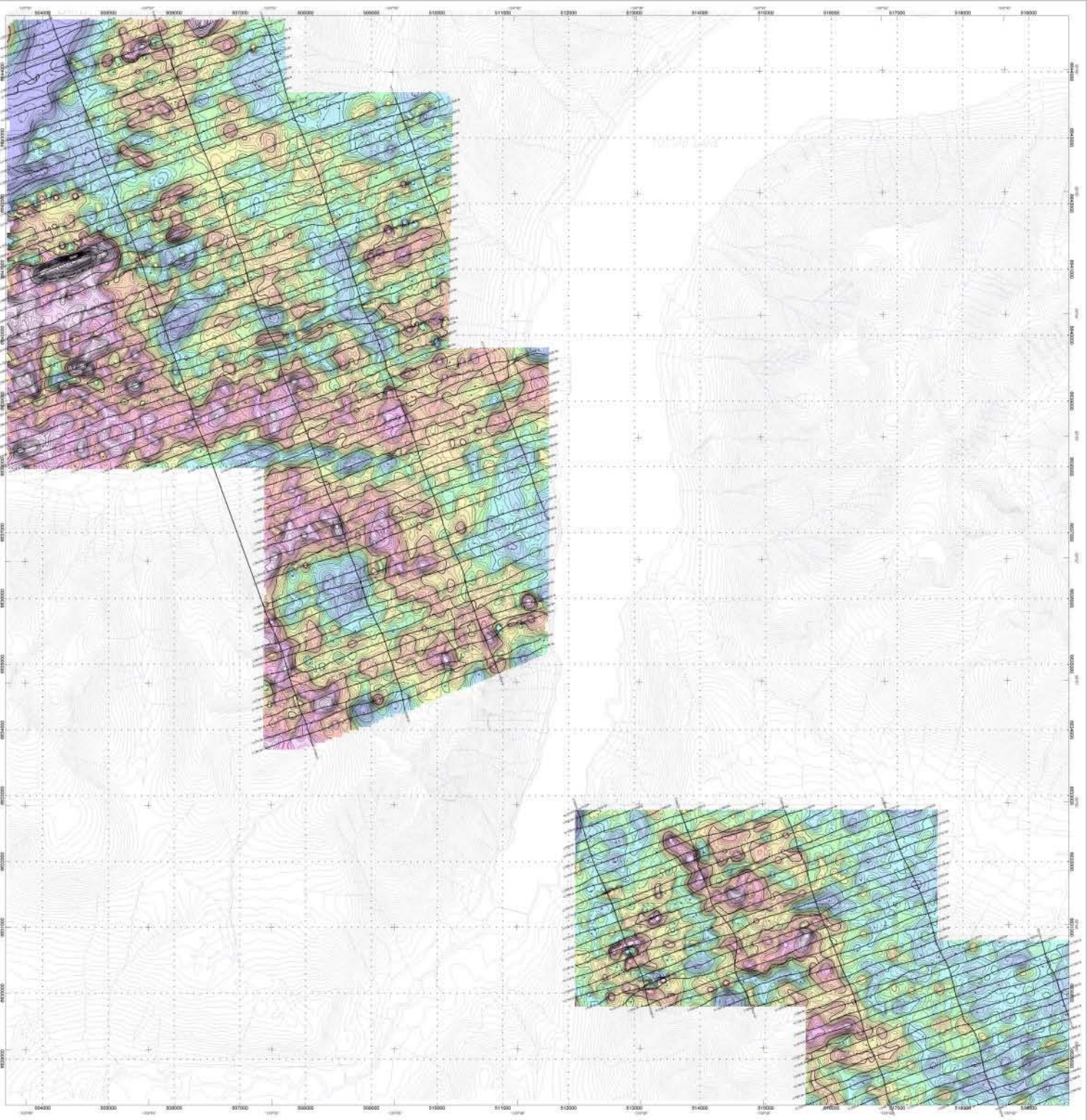
BASE STATION GPS RECEIVER:

Sampling Rate: 1 readings/second
NovAtel 3751 R GPS System

Thorium
ppm equivalent Th

Scale 1:20000

Marksmen Resources Limited	
Thorium map	
Contour Intervals: 0.1, 0.5, 2.5 ppm equivalent Th	
McPhar Geosurveys Ltd.	



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 150 m
TRAVERSE LINE DIRECTION: 75°/255°
CONTROL LINE SPACING: 1266 m
CONTROL LINE DIRECTION: 158°/338°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 readings/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Rico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" Nal sensor and 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 readings/second
Sensor Height: Nominally 90 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DGPSMAX 12-channel GPS System
Sampling Rate: 1 readings/second

BASE STATION GPS RECEIVER:

Sampling Rate: 1 readings/second
NovAtel 3751 R GPS System

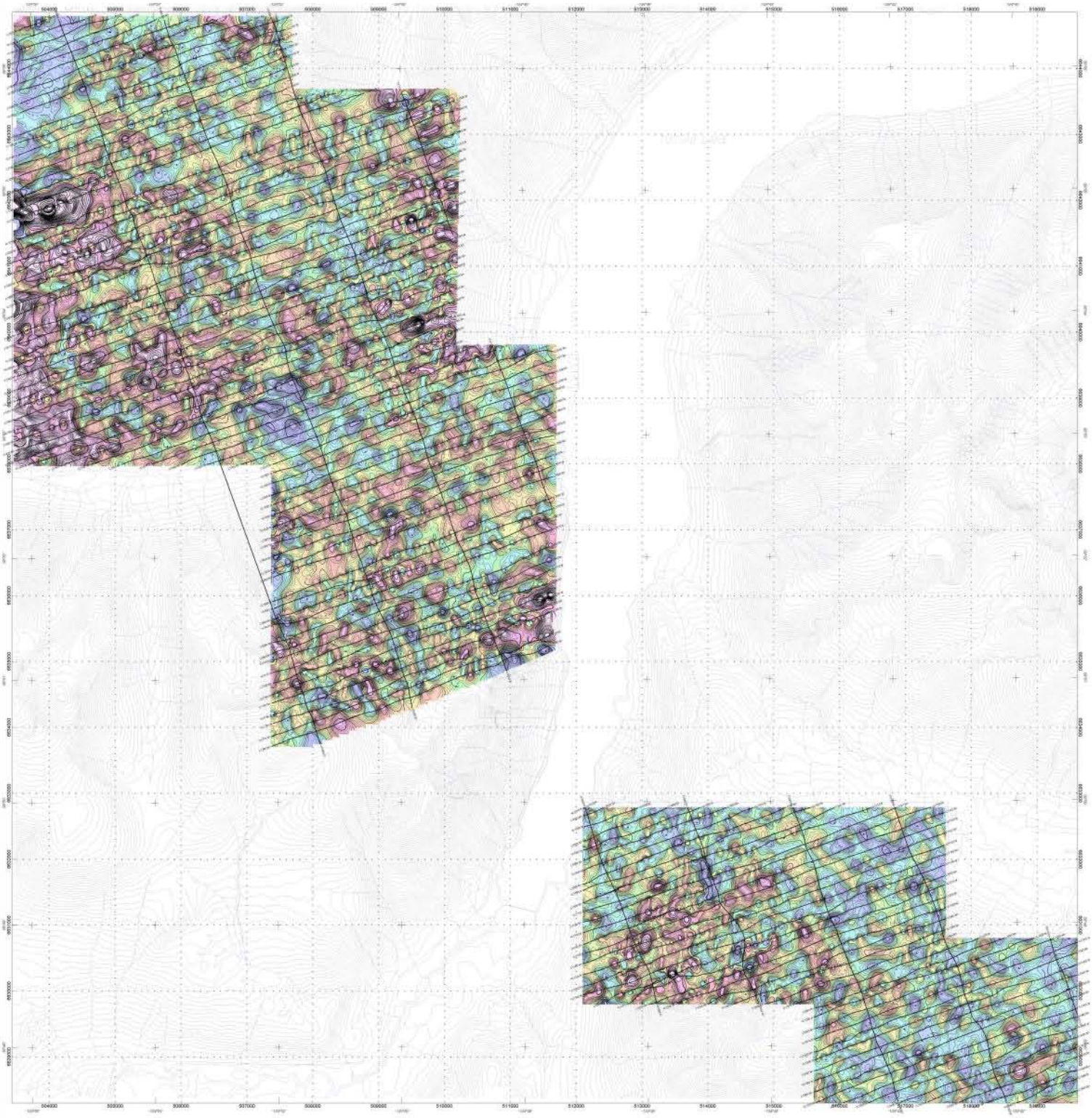
Potassium

%K

Scale 1:20000

McPHAR

Marksmen Resources Limited
Potassium map
Contour Intervals: 0.2, 1.0, 5.0 %K
McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:

SURVEY DATE: August 2008
HELICOPTER TYPE: A-Star AS-350 BA
TRAVERSE LINE SPACING: 100 m
TRAVERSE LINE DIRECTION: 78°/258°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 168°/348°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 readings/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" Nal sensor and 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 readings/second
Sensor Height: Nominally 90 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DGPSMAX 12-channel GPS System
Sampling Rate: 1 readings/second

BASE STATION GPS RECEIVER:

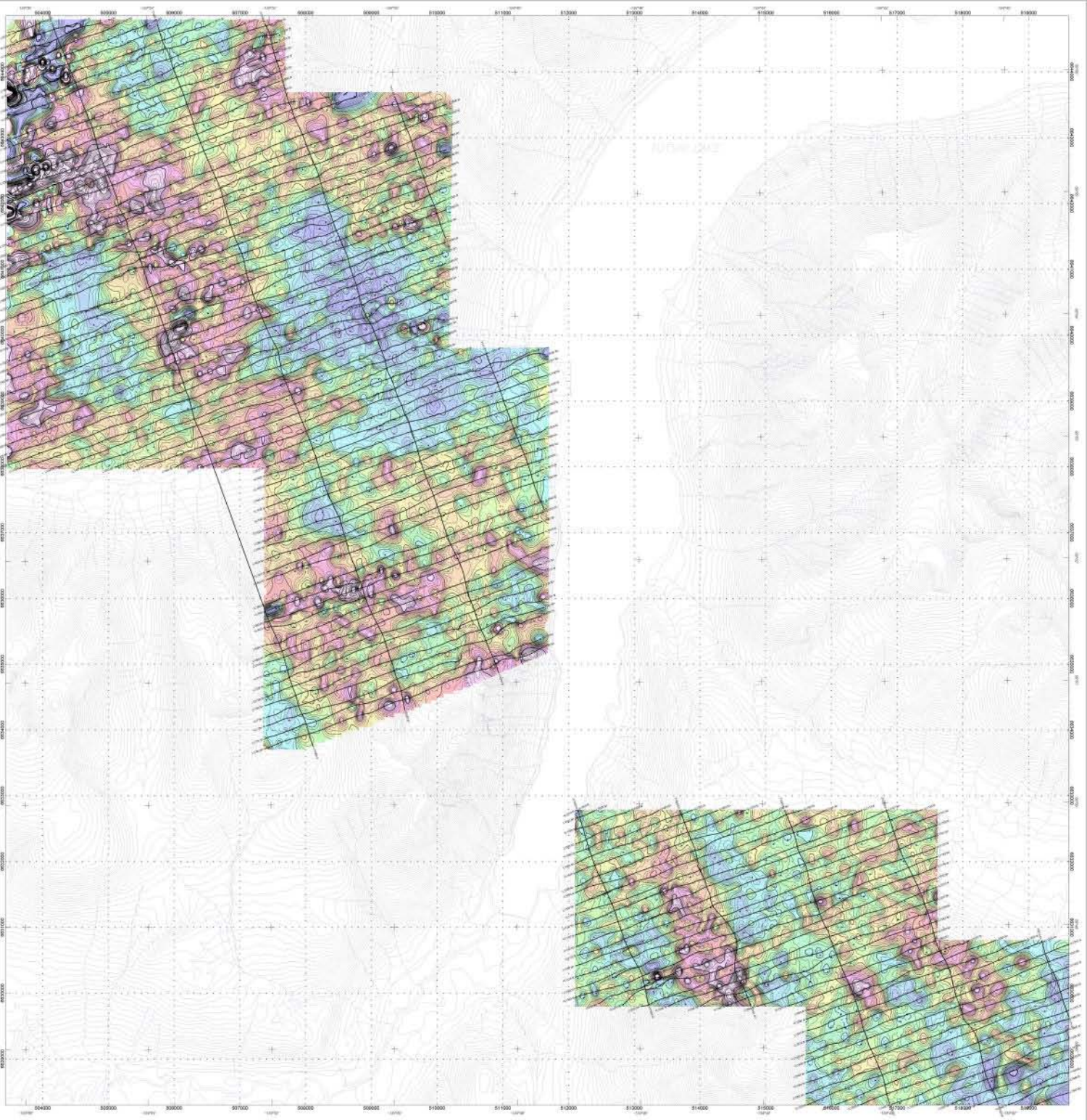
Sampling Rate: 1 readings/second
NovAtel 3751 R GPS System

Uranium
equivalent U

Scale 1:20000

McPHAR

Marksmen Resources Limited
Uranium map
Contours: 0.5, 1, 2 ppm equivalent U
McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 150 m
TRAVERSE LINE DIRECTION: 70°/250°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 160°/340°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 readings/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" NaI sensor and 4.2 liters "upward looking" NaI sensor
Sampling Rate: 1 readings/second
Sensor Height: Nominally 90 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DGPSMAX 12-channel GPS System
Sampling Rate: 1 readings/second

BASE STATION GPS RECEIVER:

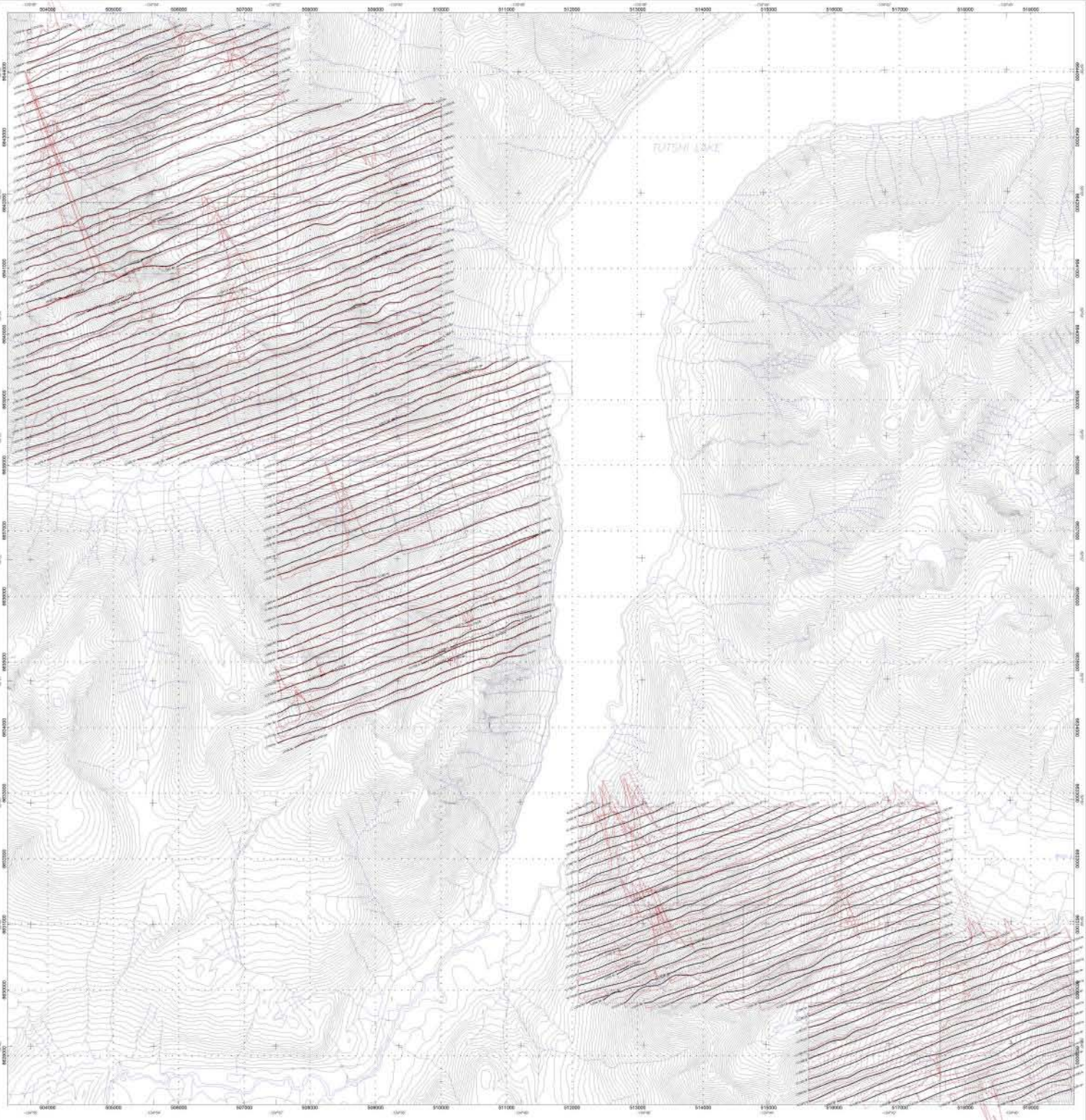
Sampling Rate: 1 readings/second
NovAtel 3751 R GPS System

Thorium/Potassium Ratio (Th/K)

Scale 1:20000

McPHAR

Marksmen Resources Limited
Thorium/Potassium Ratio map
Contour Intervals: 0.1, 0.3, 2.5, 10
McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 150 m
TRAVERSE LINE DIRECTION: 76°/256°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 166°/346°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics GEOA Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" 1Sd sensor and 4.2 liters "upward looking" 1Sd sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3500/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DSP/SMART 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:

Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

In Phase 34 kHz 5ppm/nm

Quadrature 34 kHz 5ppm/nm

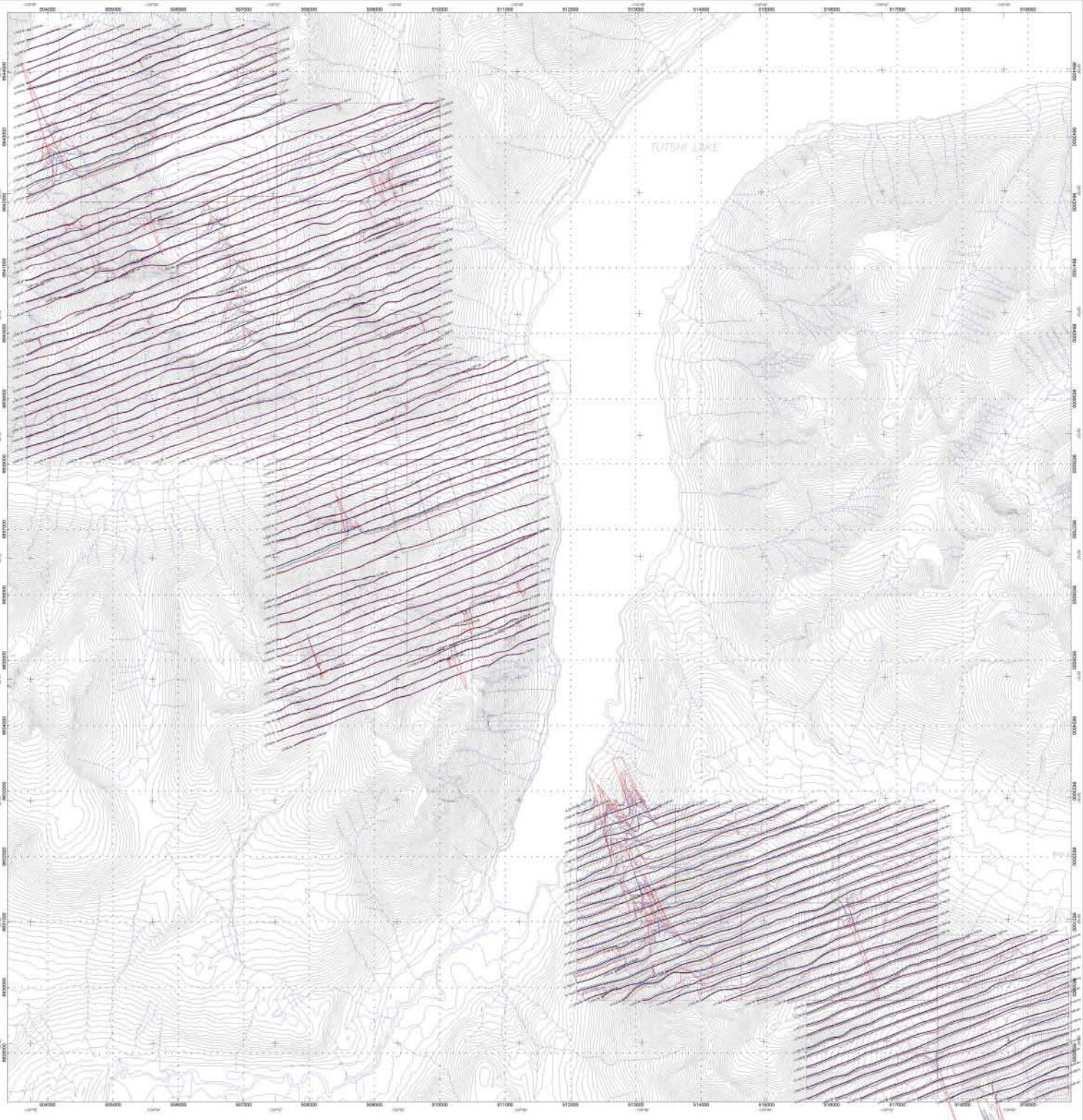
Scale 1:20000

McPHAR

Marksmen Resources Limited

Offset Profiles of Horizontal Coplanar 34 kHz Coil

McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 150 m
TRAVERSE LINE DIRECTION: 76°/256°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 166°/346°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics GEOA Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" Nal sensor and 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3500/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DGPS NAV 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:

Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

In Phase 880 Hz 5ppm/mm

Quadrature 880 Hz 5ppm/mm

In Phase 980 Hz 5ppm/mm

Quadrature 980 Hz 5ppm/mm

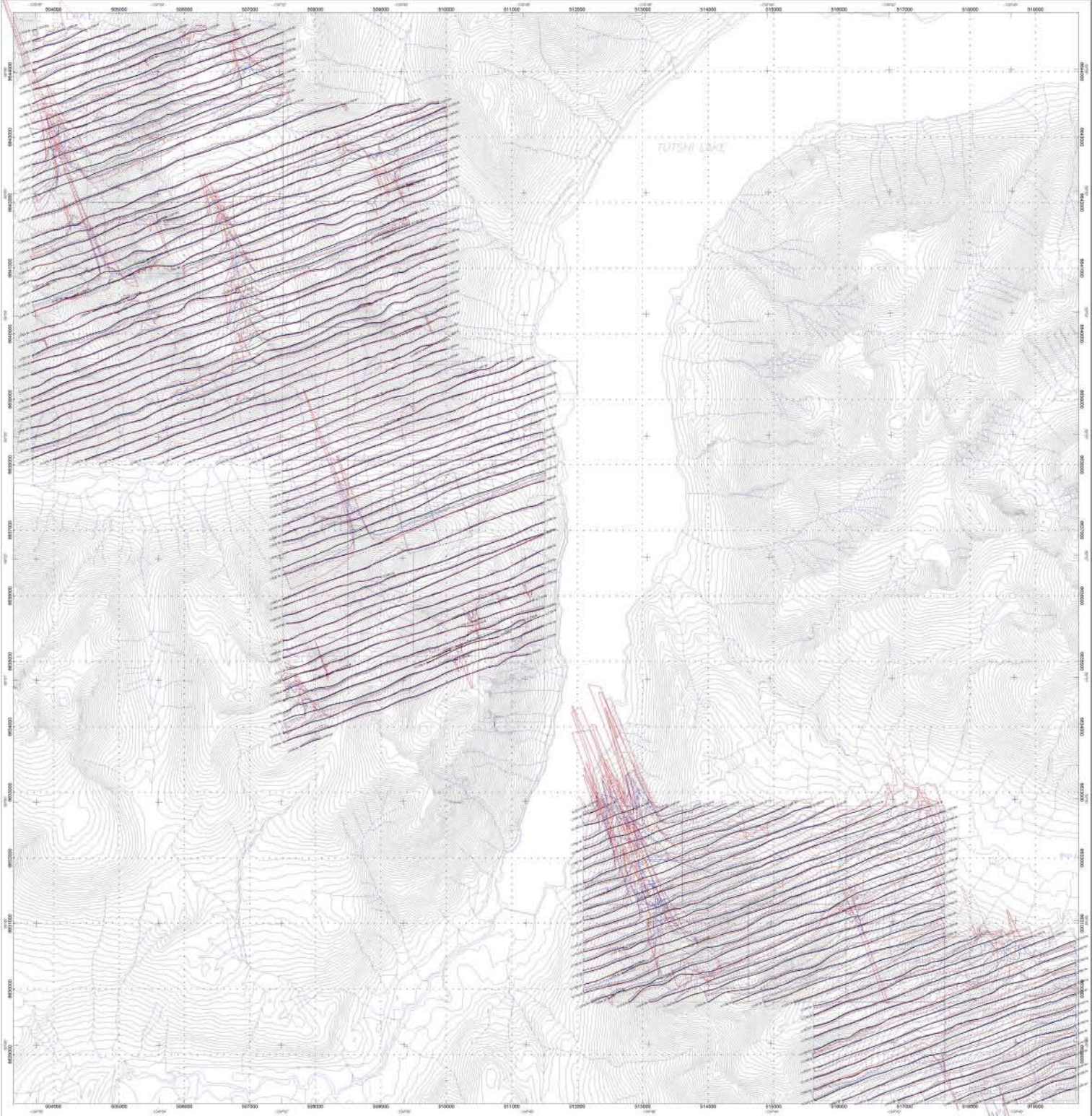
Scale 1:20000

McPHAR

Marksmen Resources Limited

Offset Profiles of Horizontal Coplanar 880 Hz Coil and Vertical Coaxial 980 Hz Coil

McPhar Geosurveys Ltd.



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 150 m
TRAVERSE LINE DIRECTION: 76°/256°
CONTROL LINE SPACING: 1500 m
CONTROL LINE DIRECTION: 166°/346°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics GEOA Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" Nal sensor and 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3500/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DGPS/MAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:

Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

In Phase 6600 Hz 5ppm/mm

Quadrature 6600Hz 5ppm/mm

In Phase 7000Hz 5ppm/mm

Quadrature 7000 Hz 5ppm/mm

Scale 1:20000

McPHAR

Marksmen Resources Limited

Offset Profiles of Horizontal Coplanar 6600 Hz Coil and Vertical Coaxial 7000 Hz Coil

McPhar Geosurveys Ltd.

LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: August 2004
TRAVERSE LINE SPACING: 100 m
TRAVERSE LINE DIRECTION: 75°/255°
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 165°/345°

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 liters "downward looking" NaI sensor and 4.2 liters "upward looking" NaI sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:

DGPS/MAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:

Sampling Rate: 1 reading/second
Novatel 3751 R GPS System

Apparent Resistivity
(Ohm-metre, Ohm-m)

Coaxial Coil Anomaly 980 Hz (Conductance, S)

> 45
35 - 45
25 - 35
15 - 25
8 - 15
2 - 8
< 2

Coaxial Coil Anomaly 7 kHz (Conductance, S)

> 25
20 - 25
16 - 20
10 - 16
8 - 10
6 - 8
4 - 6
2 - 4
1 - 2
<1

Scale 1:20000

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Apparent Resistivity
Horizontal Coplanar Coil 6600 Hz

Logarithmic Contour Interval: 0.25, 1, 10, 100, 1000, 10000, 100000

McPhar Geosurveys Ltd.

APPENDIX 7

Reconnaissance Line Geophysical Profiles

- Golden Eagle Survey, Reconnaissance Line 100
- Golden Eagle Survey, Reconnaissance Line 200
- Golden Eagle Survey, Reconnaissance Line 201
- Golden Eagle Survey, Reconnaissance Line 300
- Golden Eagle Survey, Reconnaissance Line 400
- Golden Eagle Survey, Reconnaissance Line 500
- Golden Eagle Survey, Reconnaissance Line 3000
- Golden Eagle Survey, Reconnaissance Line 3010
- Golden Eagle Survey, Reconnaissance Line 3020
- Golden Eagle Survey, Reconnaissance Line 5000
- Golden Eagle Survey, Reconnaissance Line 5010
- Golden Eagle Survey, Reconnaissance Line 5030
- Golden Eagle Survey, Reconnaissance Line 5031
- Golden Eagle Survey, Reconnaissance Line 5041
- Golden Eagle Survey, Reconnaissance Line 5051
- Golden Eagle Survey, Reconnaissance Line 5060
- Golden Eagle Survey, Reconnaissance Line 5070
- Golden Eagle Survey, Reconnaissance Line 5081
- Golden Eagle Survey, Reconnaissance Line 5090

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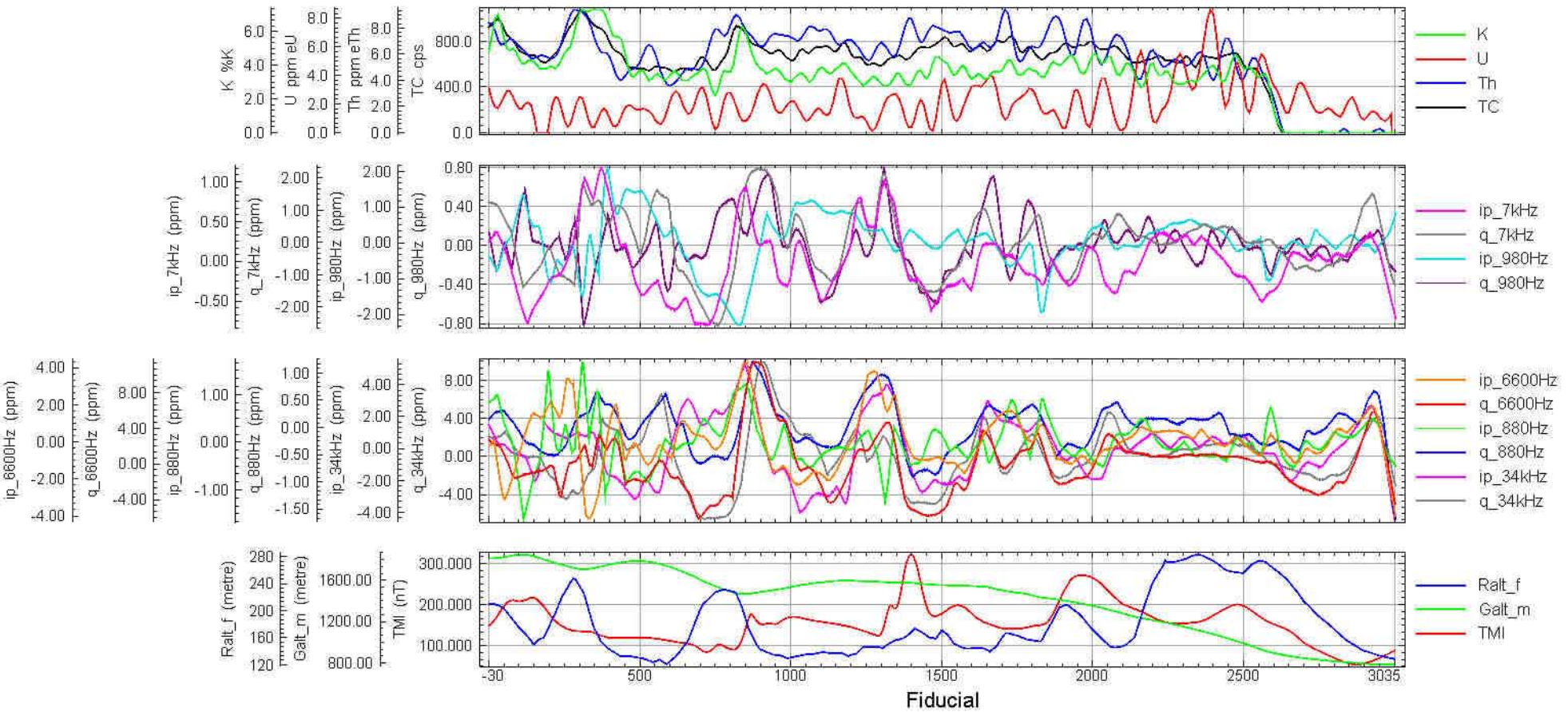
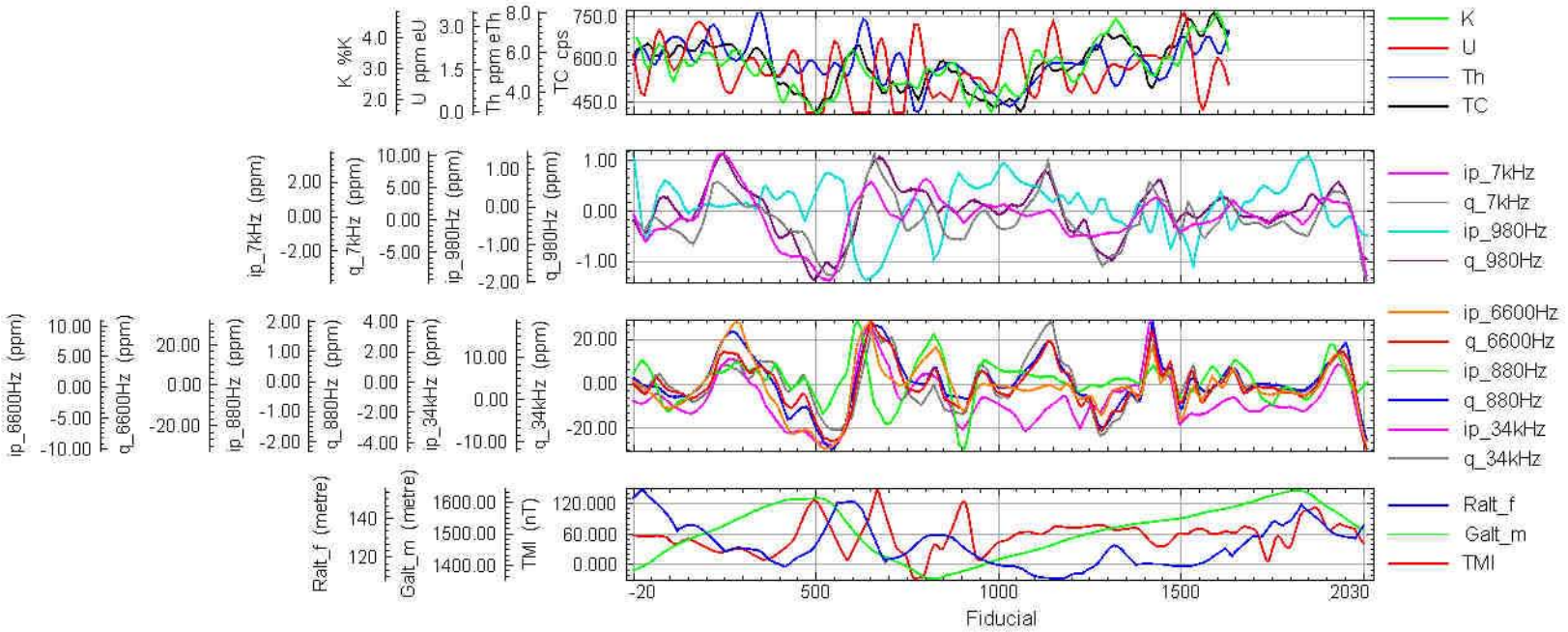
Golden Eagle Survey, Reconnaissance Line # 100



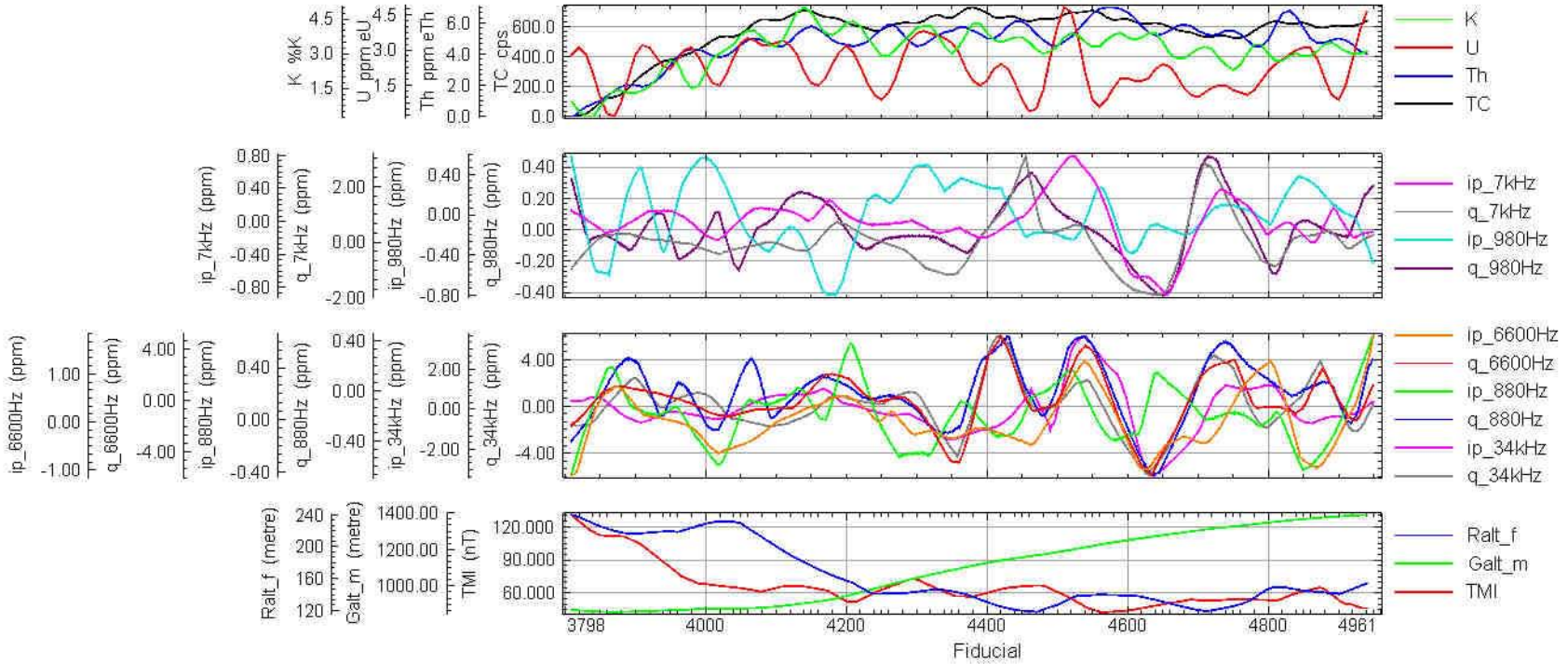
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 200



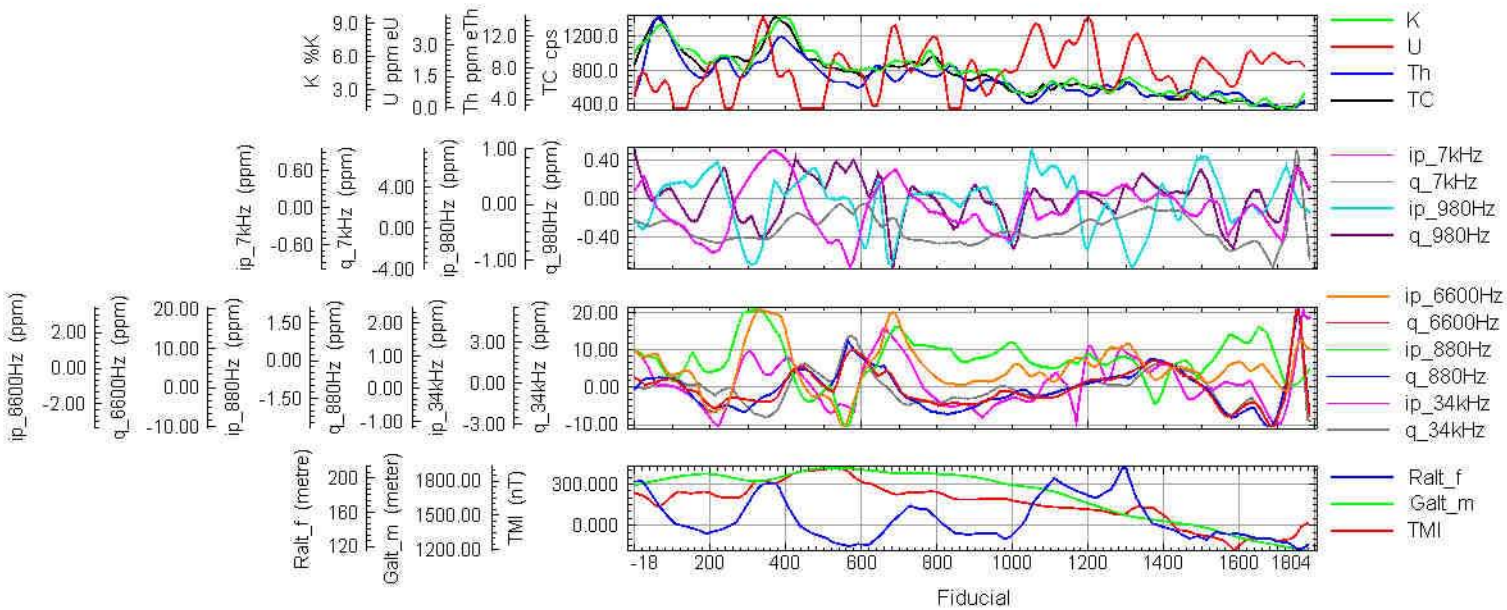
Marksmen Resources Limited

Golden eagle Survey, Reconnaissance Line # 201



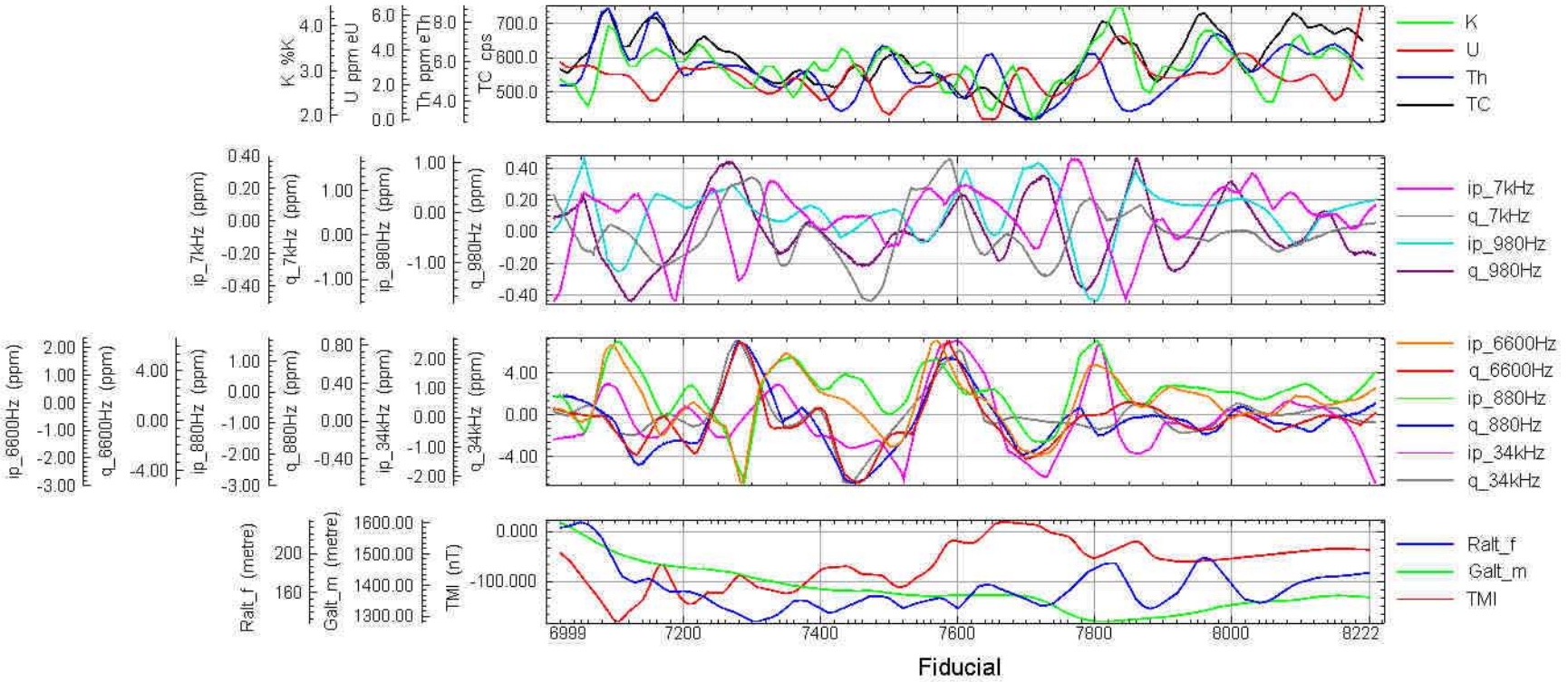
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 300



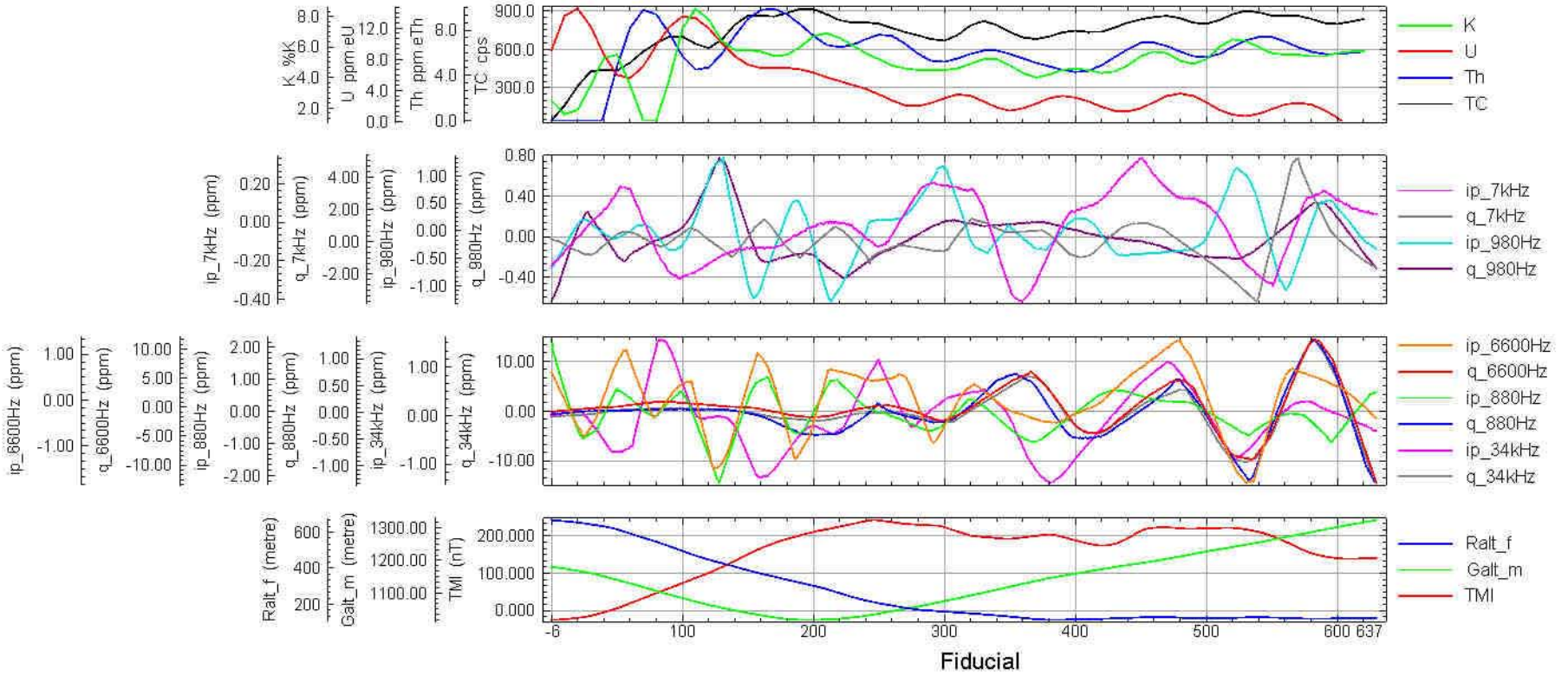
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 400



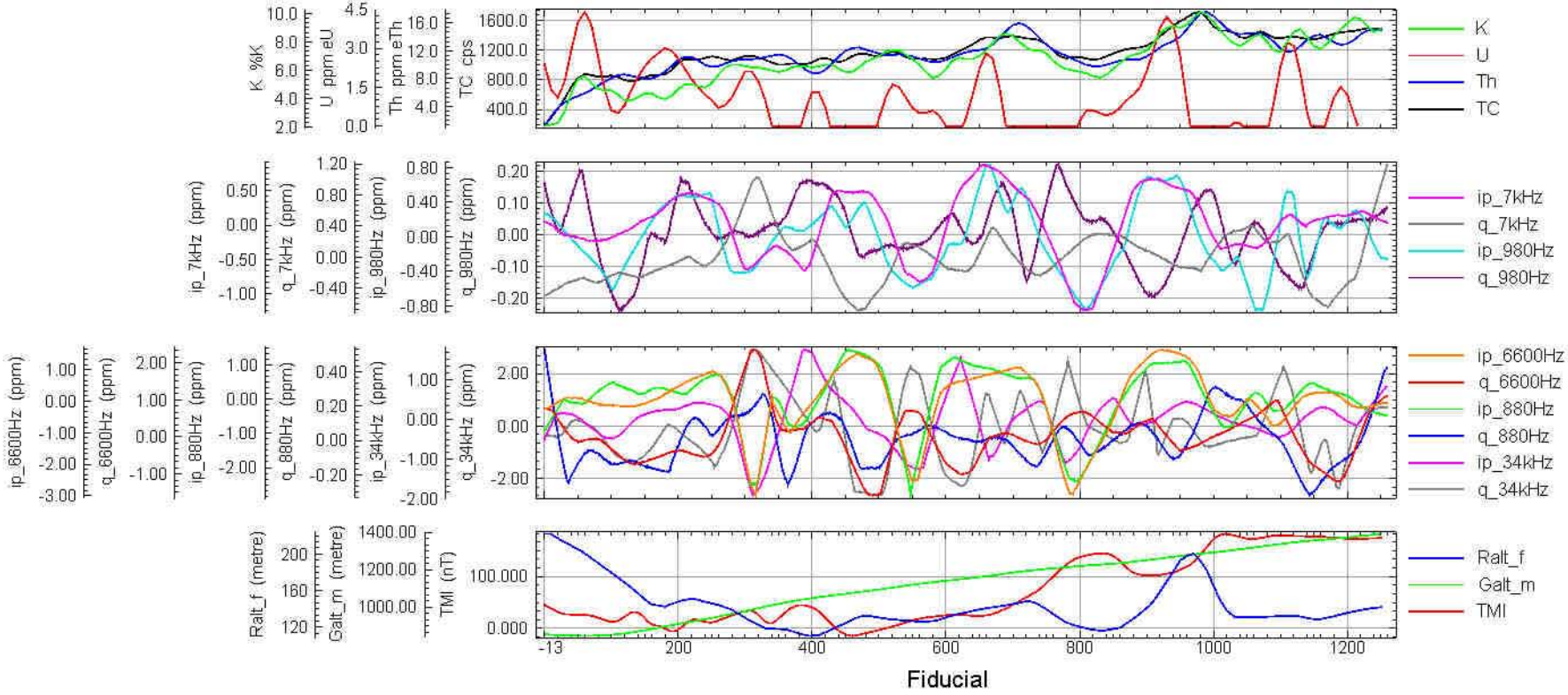
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 500



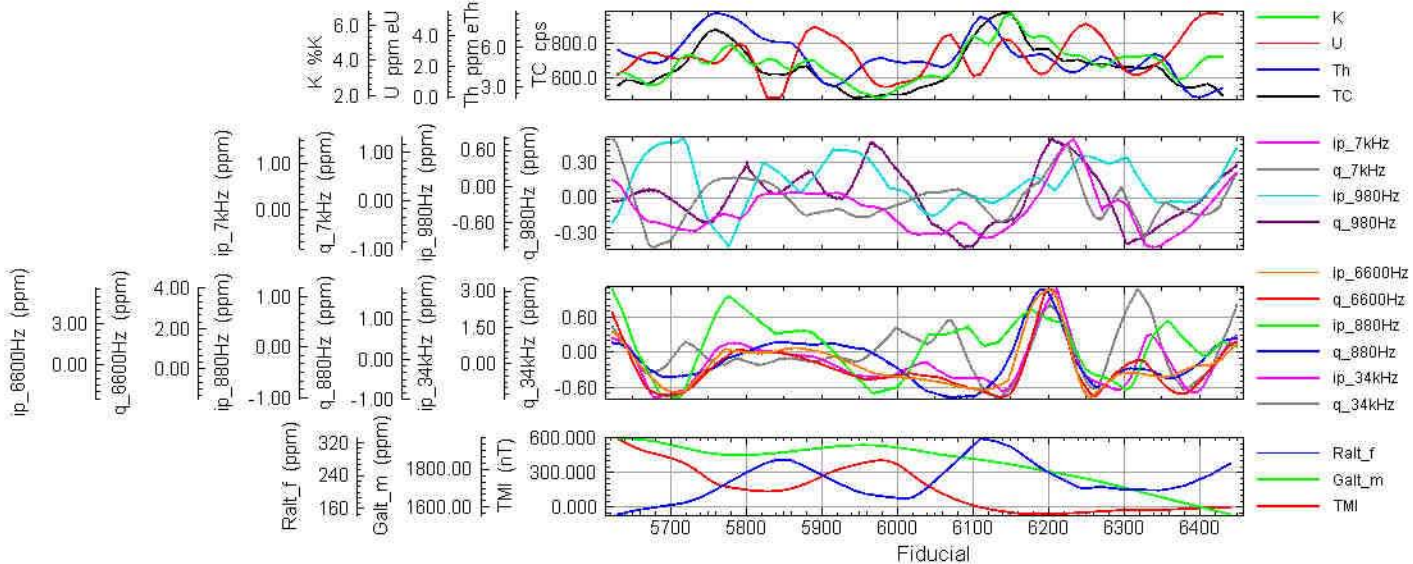
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 3000



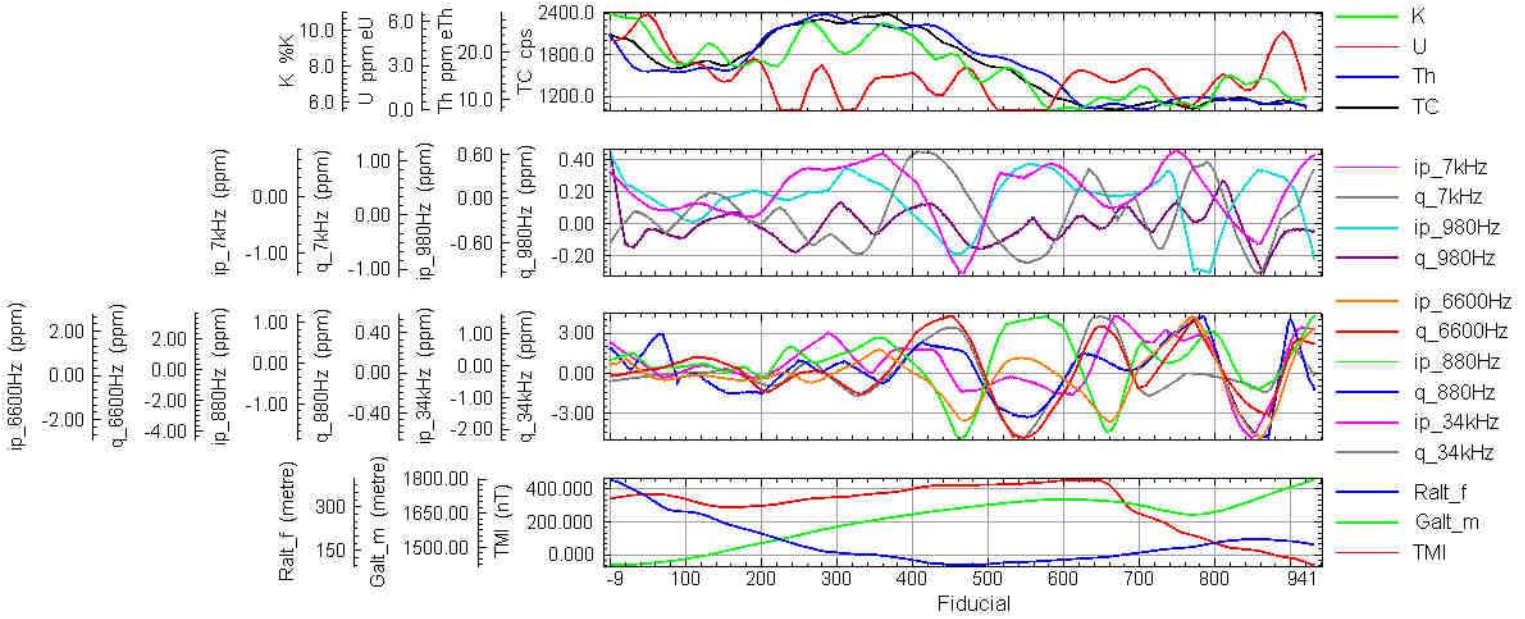
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 3010



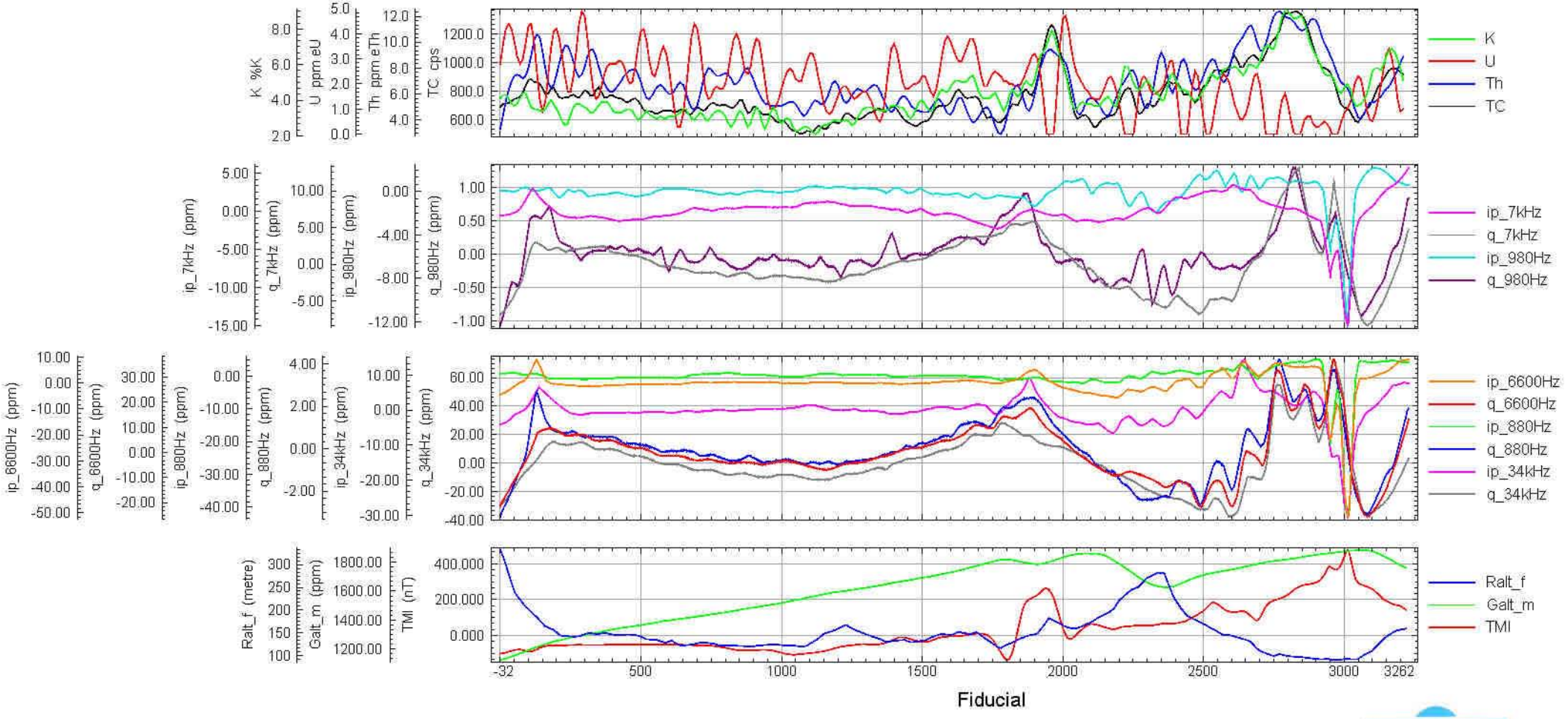
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 3020



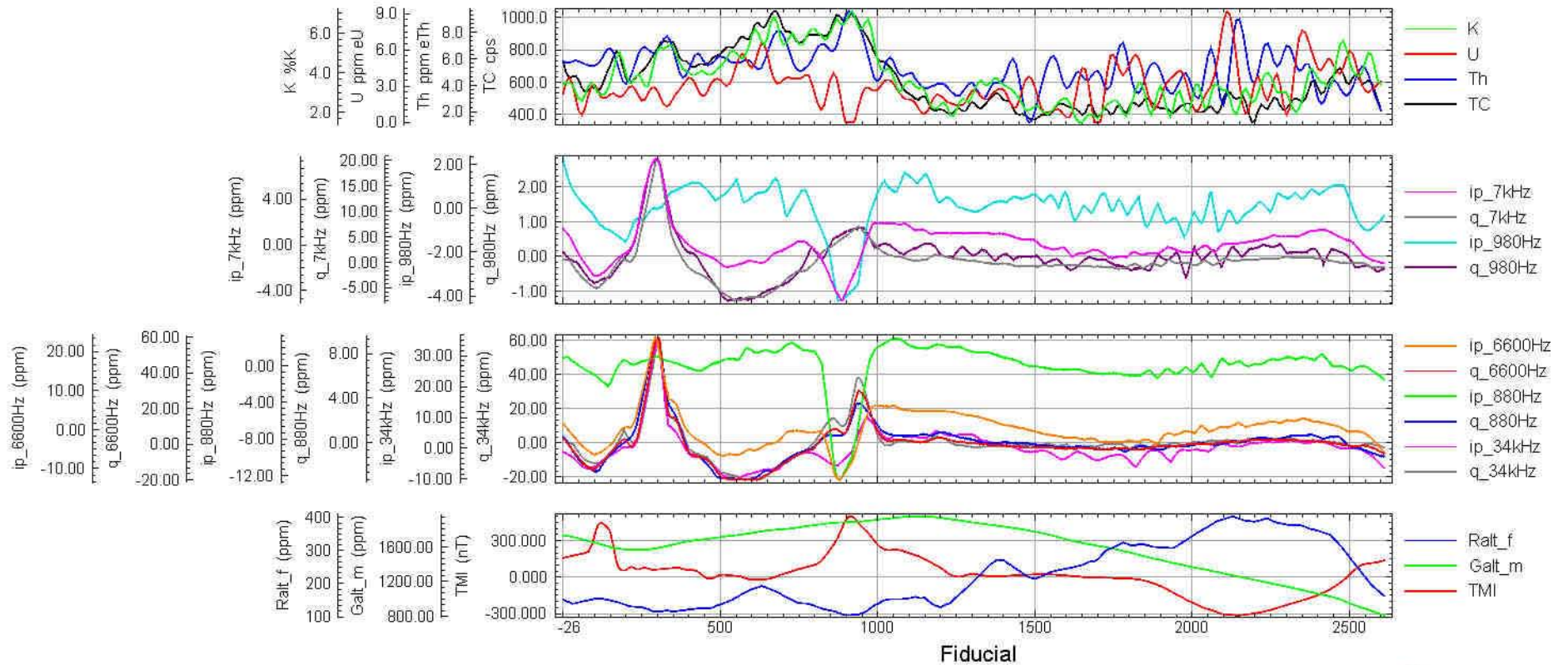
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 5000



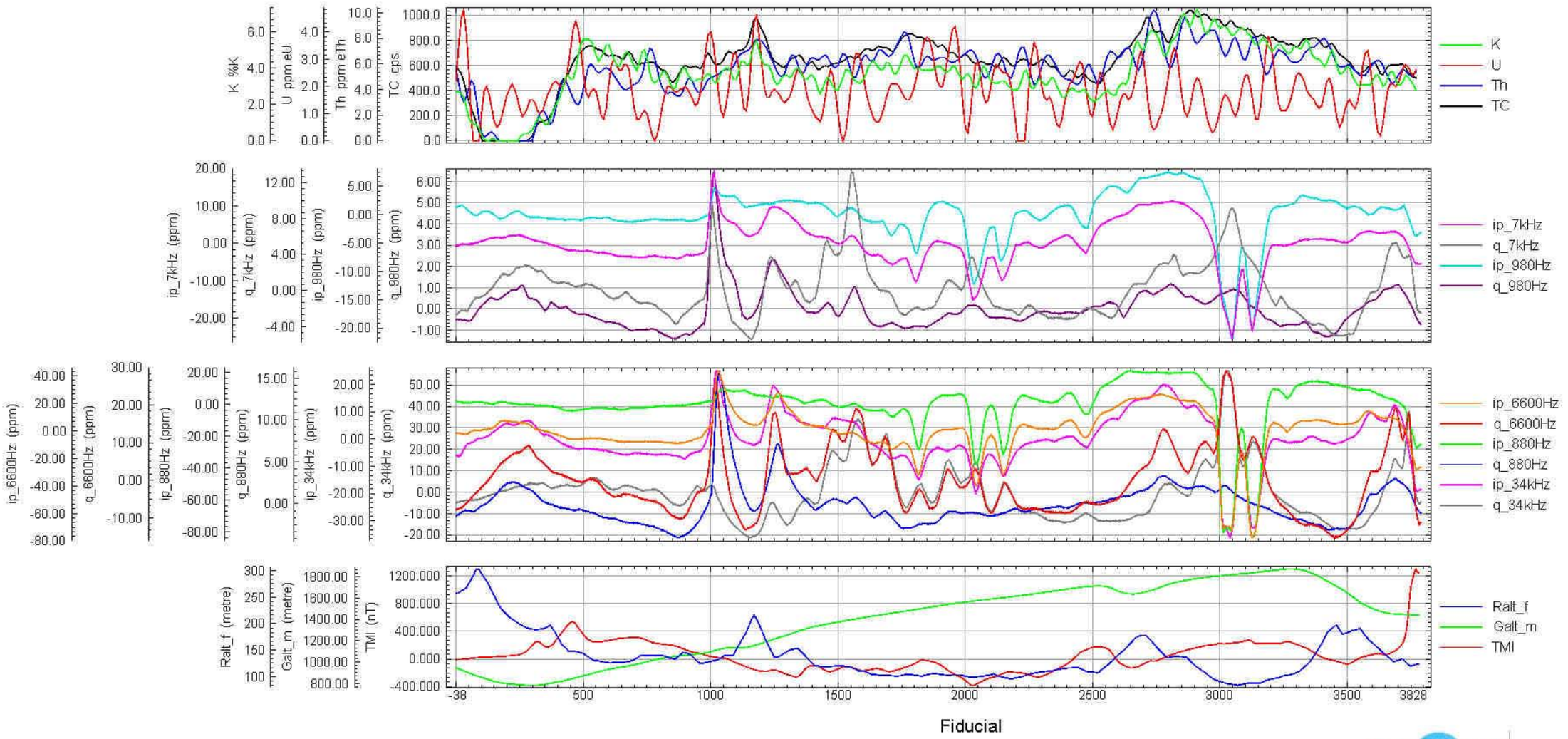
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 5010



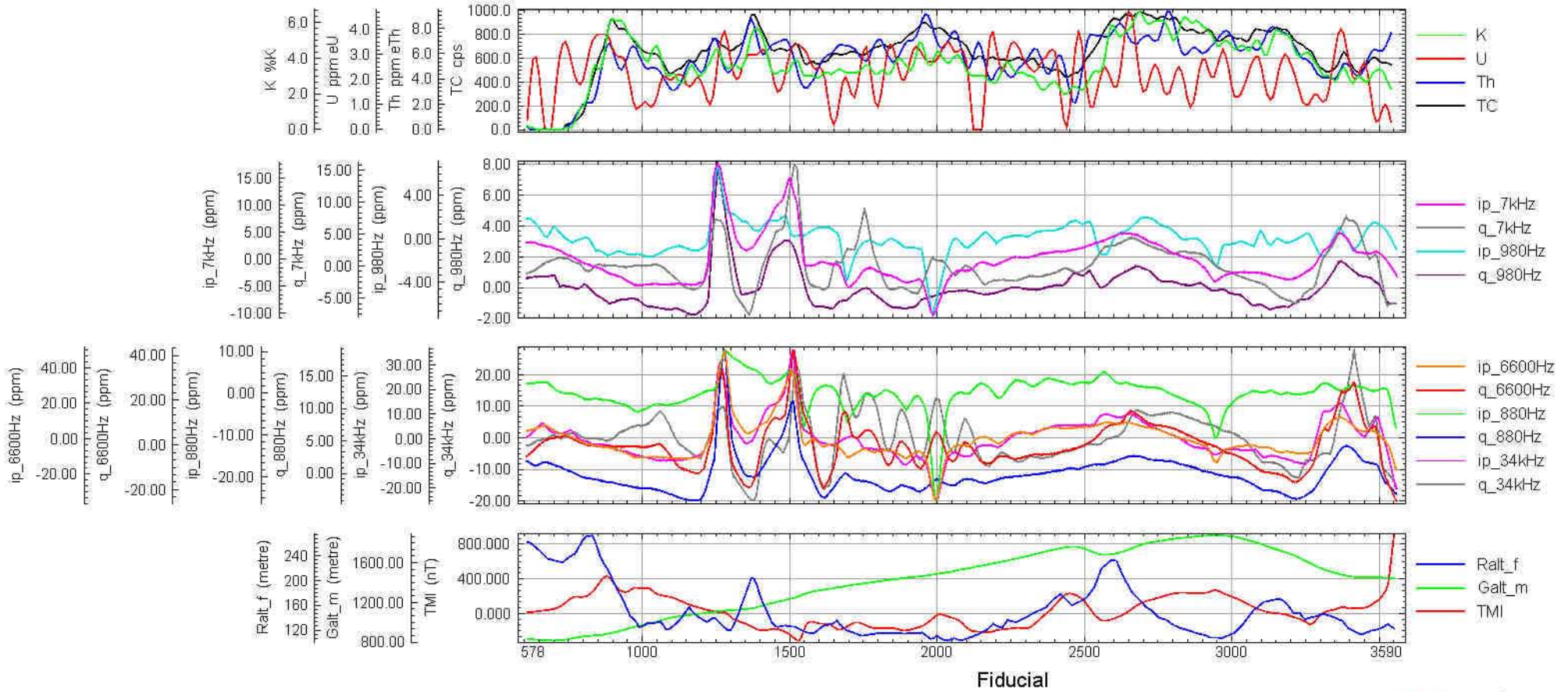
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 5030



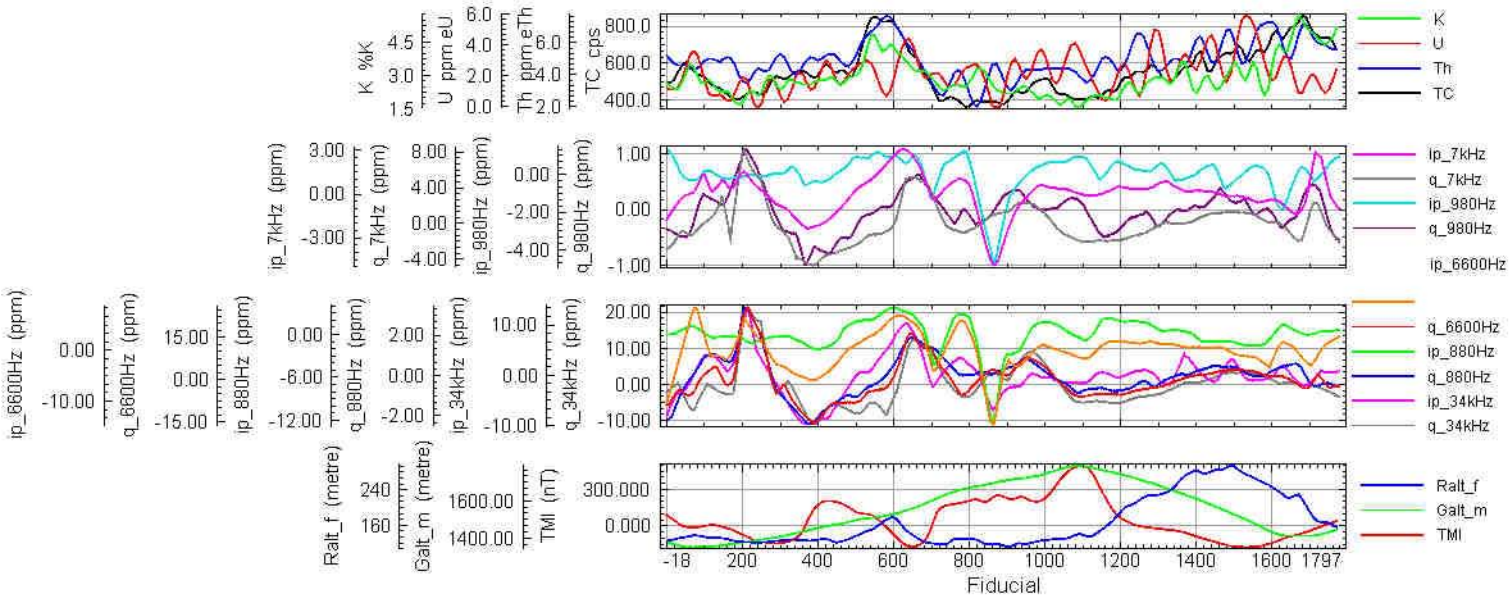
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 5031



Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 5041



Marksmen Resources Limited

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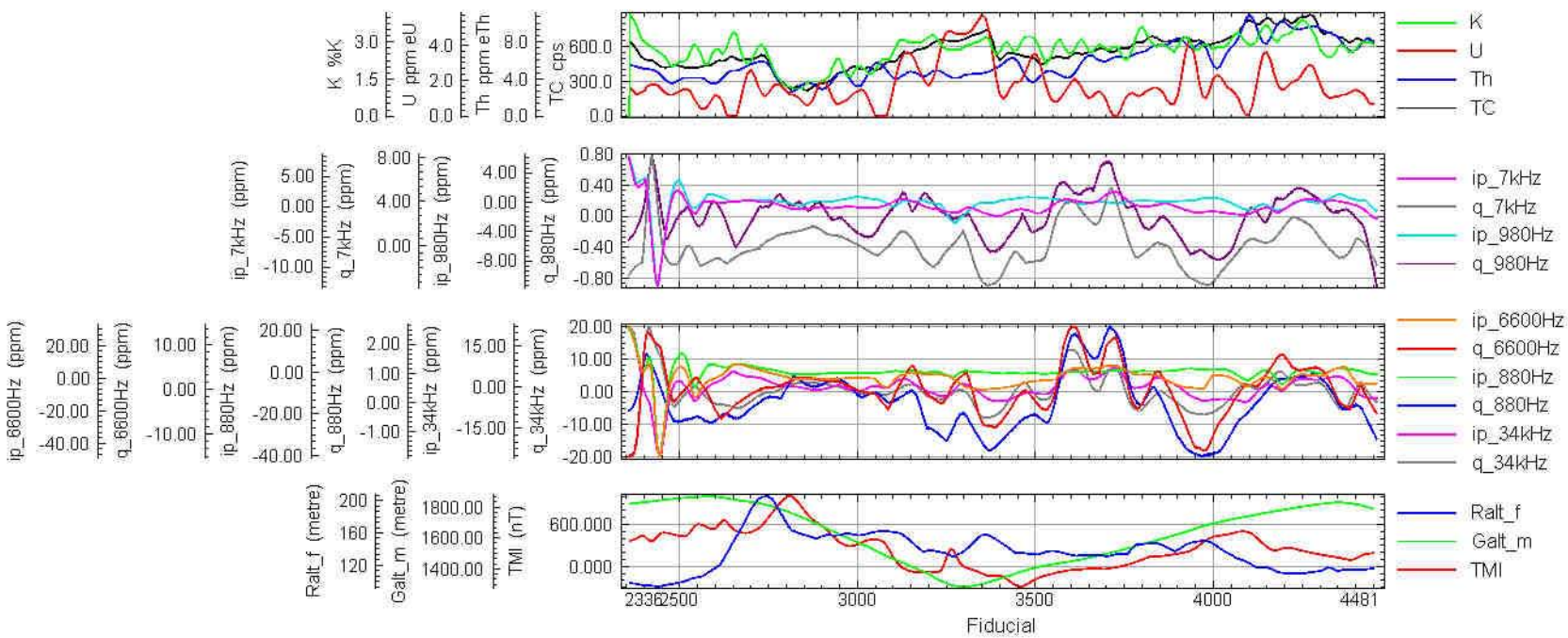
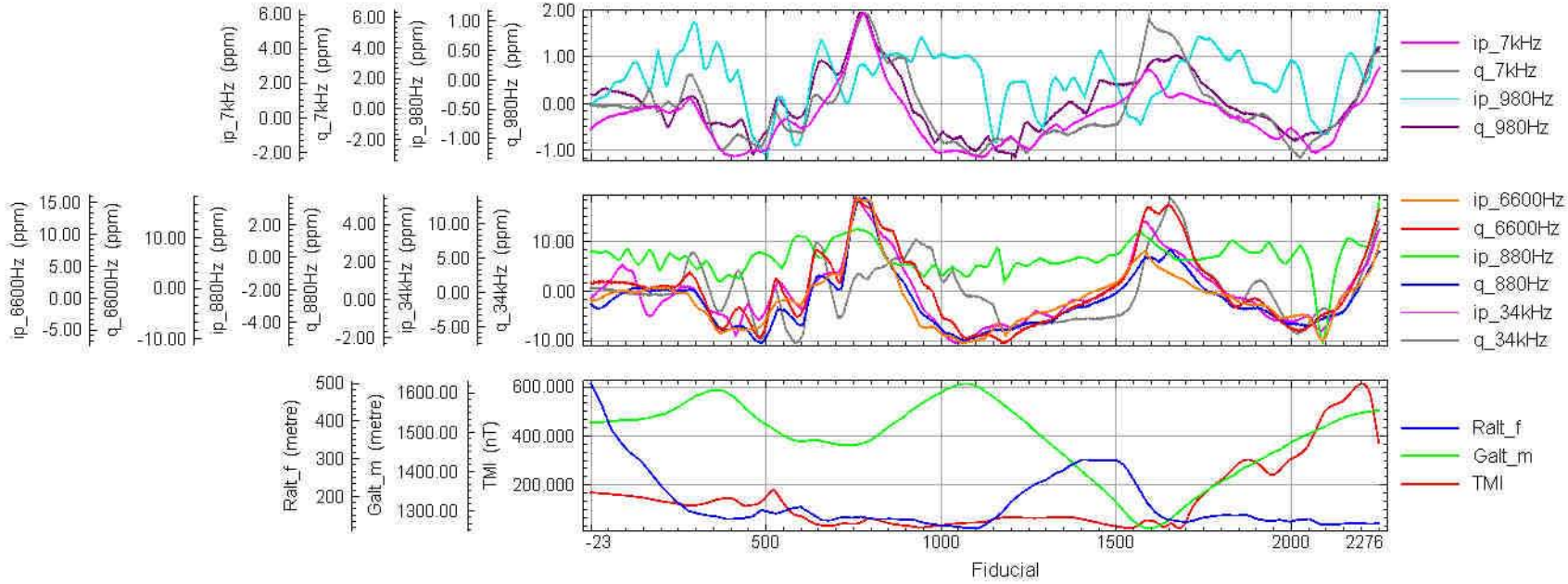


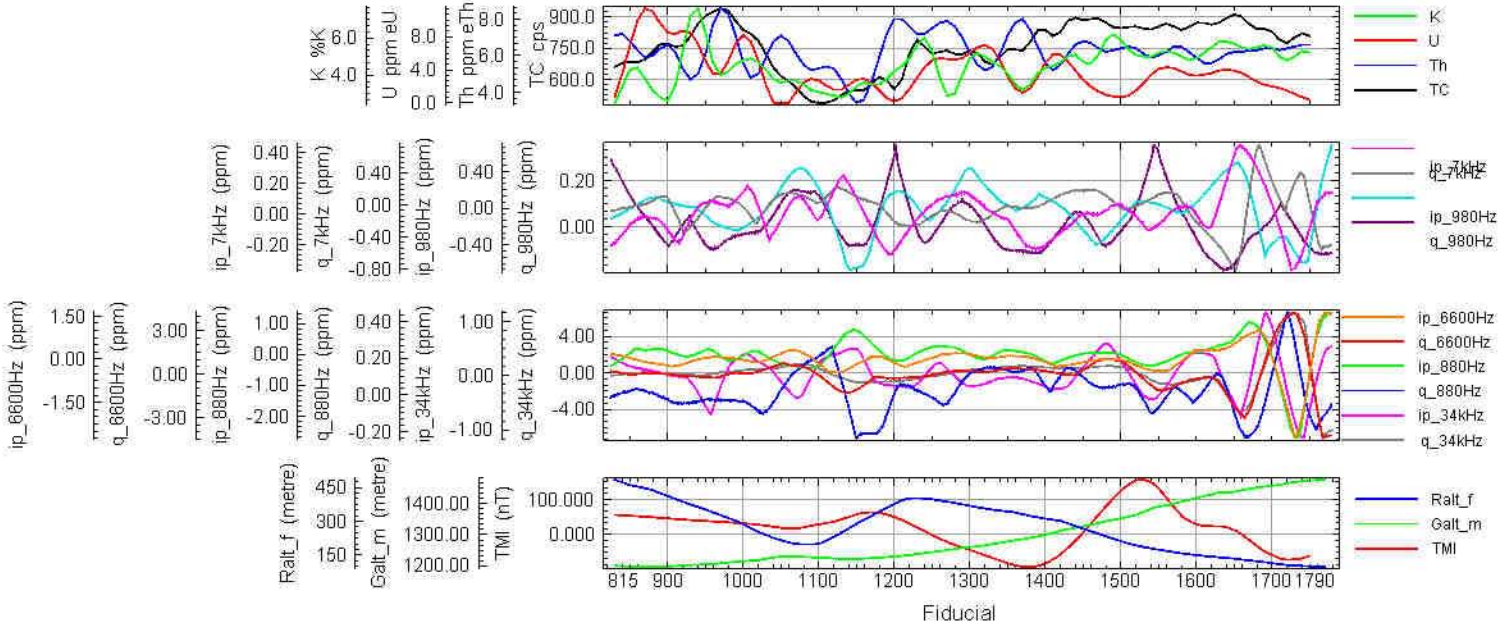
Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 5060



Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 5070



Marksmen Resources Limited

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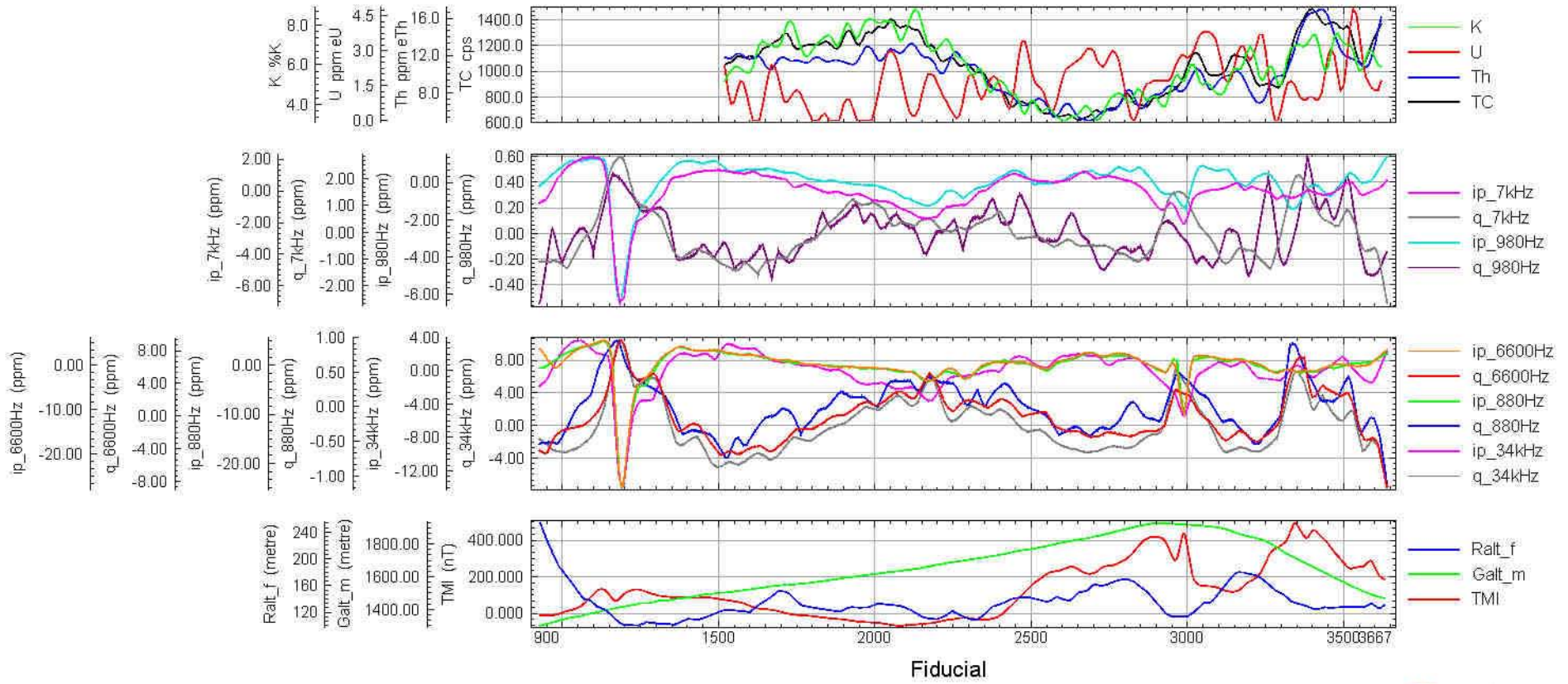

Marksmen Resources Limited

Golden Eagle Survey, Reconnaissance Line # 5090