

**HELICOPTER MAGNETIC, SPECTROMETRY AND VLF SURVEY  
NTS 320/10  
DATA ACQUISITION REPORT**

Presented to:

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**JANUARY 2007**

**M-06278**



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## 1. **INTRODUCTION**

During October and November of 2006, **Geophysics GPR International Inc.** flew a helicopter-borne magnetic, gamma ray spectrometry and VLF geophysical survey for **FanCamp Exploration Ltd**. The survey was composed of a single block with a minimum coverage of 274 line-km, located north of the Rupert River, Quebec, on the NTS sheet 32O/10.

The Helimager™ system is a towed bird system configured with three caesium vapour magnetometers, two at the end of the lateral arms, and one above the central body of the bird. DGPS positioning and radar altimeter data were measured at the bird, allowing a digital elevation model to be produced. The system also includes a Totem-2A VLF receiver mounted on the bird and a Pico GRS-10 gamma ray spectrometer located in the helicopter's storage compartment.

The printed maps are provided in Appendix A, this report is intended to be read in association with the printed maps.

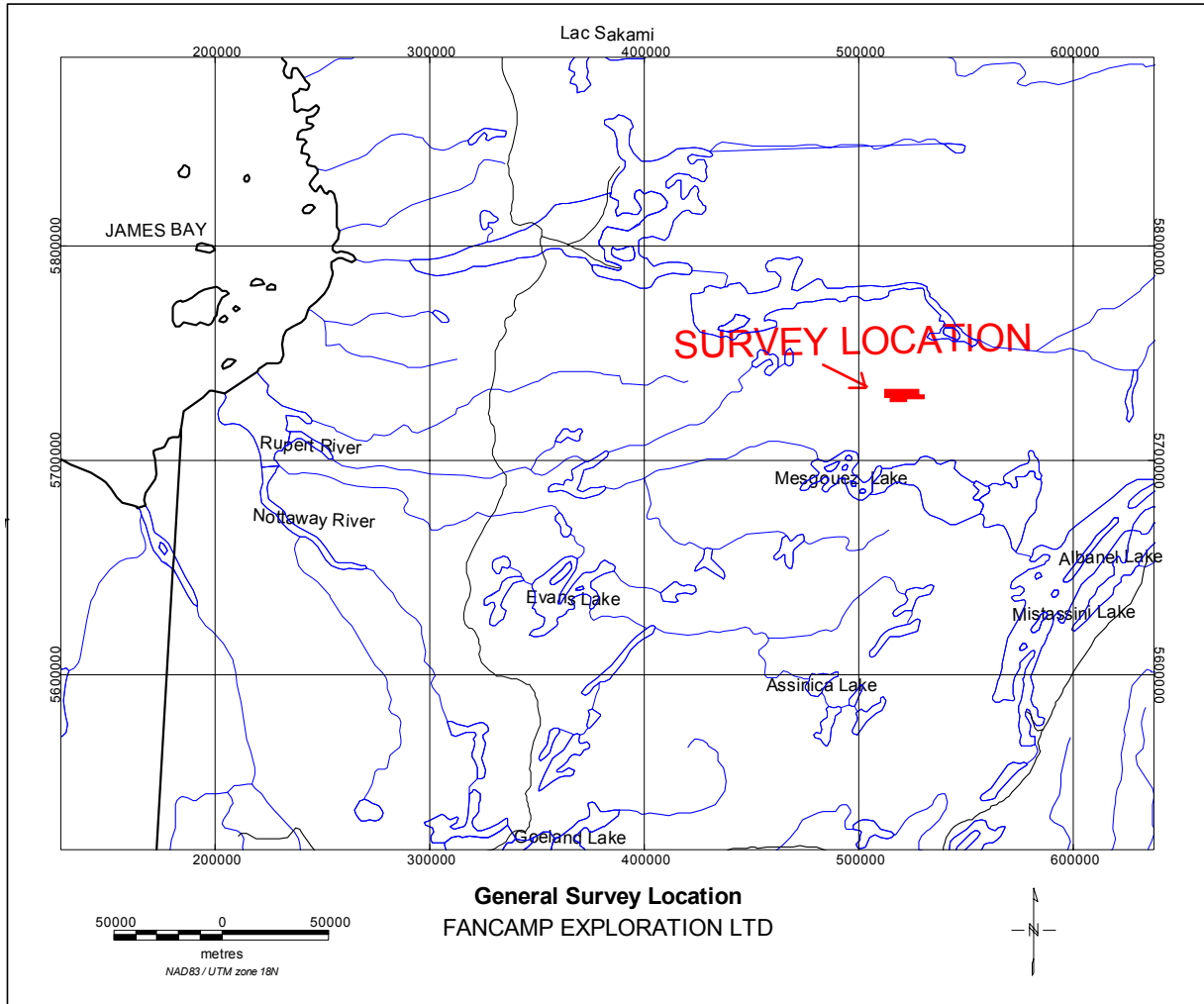
Data processing and quality control were carried out by Marc Rousseau, phys. and Olivier Létourneau, phys., and the report was written by Isabelle D'Amours, Eng. M.A.Sc.



## 2. SURVEY DETAILS

### 2.1 Survey Area

The survey area is located just north of Mesgouez Lake, along the Rupert River, Quebec, Canada (Figure 1). The survey consists of a single block on the NTS map sheets 32O/10.



**Figure 1 – General survey area**



## 2.2 Survey block parameters

The direction of the flight lines is  $0^{\circ}$  -  $180^{\circ}$  (N-S), with respect to UTM coordinates. The direction of the tie-lines is  $90^{\circ}$  -  $270^{\circ}$  (E-W), with respect to UTM coordinates.

The coordinates given in Table 1 represent the outline of the zone to be flown. **All coordinates are given in UTM zone 18N (NAD83).**

X (m)	Y (m)
522455	5727714
514973	5727694
514967	5729547
512119	5729540
512080	5733247
528187	5733305
528203	5730531
530505	5730545
530517	5728691
522455	5728649

**Table 1 – Survey block coordinates**

A single block was scheduled for surveying, for a total of **274 line kilometers**, based on 250 meter and 500 meter line spacing and 2500 meter tie-line spacing.

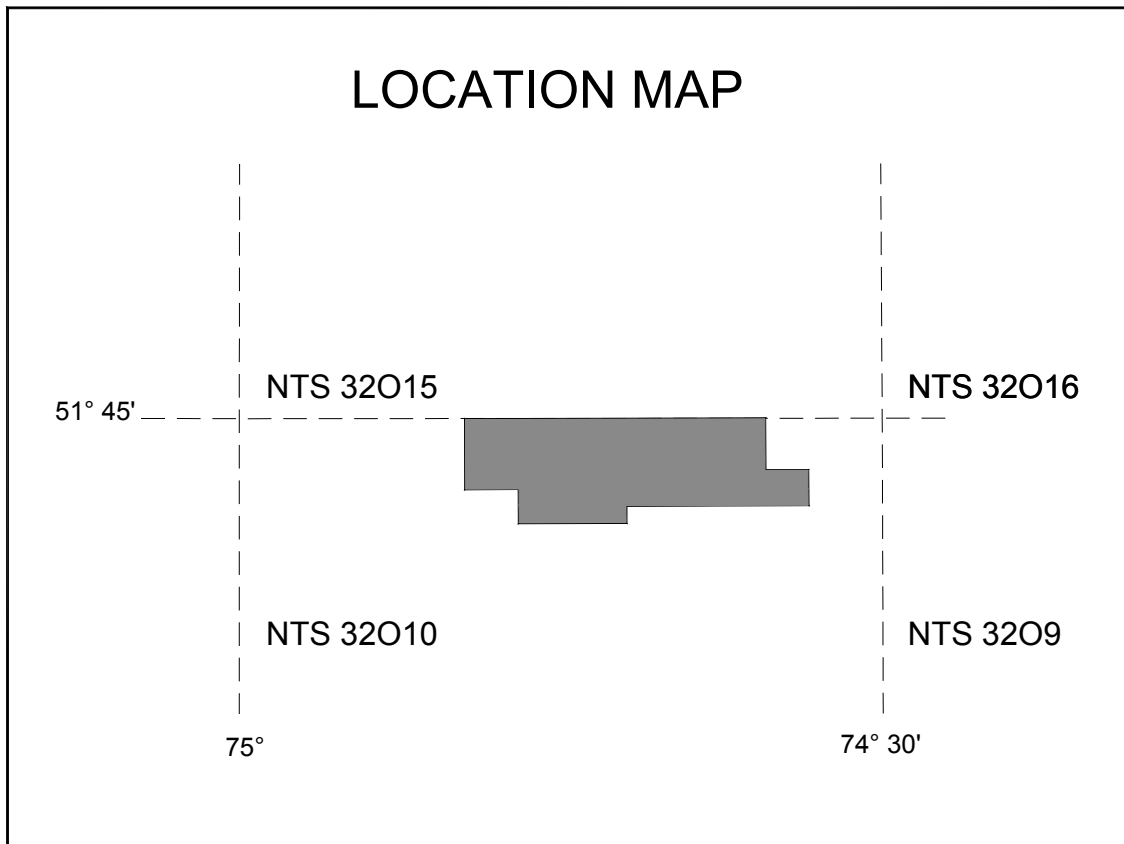
## 2.3 Survey geodetic parameters

Table 2 below presents the geodetic parameters that were used for data acquisition. The parameters were pre-defined in the navigation software so that no subsequent coordinate transformations were necessary.

Datum:	NAD83
Spheroid:	GRS-80
Projection:	UTM
Zone:	18N
Central meridian:	-75
False Easting:	500 000
False Northing:	0
Scale factor:	0.9996

**Table 2 – Geodetic parameters**





**Figure 2 – FanCamp Exploration Ltd  
detailed survey area and map sheet location**



### 3. LOGISTICS

#### 3.1 Survey helicopter

- Type : Bell 206 Long Ranger
- Call sign : **C-GVHX**
- Operated by: **Canadian Helicopters Inc.**, based at Les Cèdres, Quebec

#### 3.2 Survey crew

The survey crew consisted of the following personnel:

<i>Operator</i>	<i>Christian Chatel, tech.</i>
<i>Operator and field data processing</i>	<i>Marc Rousseau, phys.</i>
<i>Processing, map QC and Report</i>	<i>Isabelle D'Amours, Eng., M.A.Sc.</i>
<i>Data Processing</i>	<i>Olivier Létourneau, phys.</i>
<i>Drafting</i>	<i>André Beaudoin, tech.</i>
<i>Project Manager</i>	<i>Réjean Paul, Eng.</i>
<i>Pilot</i>	<i>Alexandre Fouillit</i>

**Table 3 – Survey personnel**

#### 3.3 Preparation

The helicopter installation was carried out at the base of Canadian Helicopters Ltd. at Les Cèdres, Québec. The installation consisted of mounting the radar altimeter underneath the aircraft, running cabling for power to the acquisition system, mounting the bright bar and radar display unit on the dashboard. The Helimager™ system was assembled and a test flight was carried out. Spectrometer calibrations, including pad tests and the Breckenridge test range were carried out on May 29<sup>th</sup> and 30<sup>th</sup>, 2006 from the ProAv hangar at the Ottawa International Airport. Results from this test will be presented in Appendix B. A radar calibration was performed before the survey at Les Cèdres, the result from this calibration is also presented in Appendix B.





### 3.4 Operating base & fuel cache

The helicopter and geophysical crew were based at Albanel Camp. A neighbouring field was used for take-off and landing operations with the bird attached.



**Figure 3 – Helicopter operating base and fuel cache**

### 3.5 Flight dates

A test flight was flown after mobilisation in order to validate the orientation of the sensors, calibrate the radar altimeter, and check the data acquisition system operation.

Mobilisation was completed for a prior project on October 5<sup>th</sup>. Production flying was carried out over the period from October 28<sup>th</sup> to November 4<sup>th</sup>, 2006.

The equivalent of four days was lost due to bad weather conditions, one day was lost because the VLF transmitting station was not available (station closed on Mondays) and finally, no production day was lost due to equipment failure.



#### 4. **DATA ACQUISITION**

##### 4.1 **Planned survey parameters**

Table 3 below shows the planned survey parameters for the project.

Parameter	Specification
Mag. Sampling Interval	2.5m (0.1s)
Flight-line Spacing	250m and 500m
Flight-line Direction	0° - 180° (N-S)
Control-line Spacing	2500 m
Control-line Direction	90-270° (E-W)
Aircraft MTC	60m +/- 6m
Mag. Sensor MTC	30m +/- 6m
Ground speed	80 km/h +/- 20 km/h

**Table 4 – Planned survey parameters**

##### 4.2 **Quality control**

During data acquisition, quality control was carried out on the data on a daily basis by GPR's data processor to ensure that quality remained within specifications. At the end of the planned survey, the data were reviewed by GPR's team leader and re-flight lines were identified. Profiles were checked after each production day to ensure correct flight path recovery, instrument noise was evaluated and average spectral peaks were verified using Geosoft Oasis Montaj Software.



## 5. SURVEY EQUIPMENT

### 5.1 The HELIMAGER™ Gradiometer system

The **HELIMAGER™** system consists of a tri-axial magnetic gradiometer, developed by **Geophysics GPR International Inc.** The gradiometer was installed on a stable helicopter-borne vector platform capable of accepting a range of different sensors / instruments, particularly for the mapping and exploration of mountainous regions. The platform allows the arrangement of the sensors in three orthogonal directions. A photograph of the platform is presented below (Figure 4).

For the current survey, vertical and lateral gradiometer data were acquired. Advantages of measuring the vertical and lateral gradients include the production of a measured vertical gradient maps that are free from all diurnal variations, as well as allowing enhanced total field gridding if data quality permits it.



Figure 4 – Helimager™ in flight with a Bell 206-B



## **5.2 Helicopter-borne magnetometers**

Three Geometrics G-823A caesium vapour total field magnetic sensors, with a sampling interval of 0.1 second were mounted on the gradiometer for the survey. The sensors were installed at each end of the horizontal boom and one to the upper pod, in order to measure the lateral and vertical gradients.

## **5.3 Base-station magnetometer**

A Geometrics G-856 Ax (proton precession) total field magnetic sensor, with a sampling interval of 1 second was used to record the diurnal variation of the magnetic field at the base-station's location. The base-station was set up at a location away from power lines and the main road to avoid interference from traffic. The location of the base-station was a few kilometers north of the Albanel Post.

## **5.4 Radar altimeters**

A radar altimeter system comprising a Free-flight TRA-3000 antenna with a TRI-40 indicator was installed in the helicopter. A second radar altimeter comprising the same elements was mounted on the bird, along with the GPS and magnetic sensors.

## **5.5 DGPS positioning**

A real time DGPS Trimble AgGPS 132 receiver system with the satellite-based WAAS (Wide Area Augmentation System) reference signal for differential corrections was used for in-flight navigation. The antenna was mounted directly on the bird and allowed accurate positioning of the bird.

A second DGPS Novatel ProPak L-Band signal receiver system which provides various types of correction data for increased accuracy was used for spectrometer positioning. The antenna was mounted onto the helicopter near the spectrometer and allowed an accurate positioning of the spectrometer.

Both DGPS systems provide an accurate positioning as well as the height above the WGS-84 ellipsoid. A LED-type track bar (from AG-NAV Inc.) was used by the pilot for efficient line tracking in any lighting conditions.

## **5.6 Airborne Gamma Ray Spectrometer**

The PICO GRS-10 system is an intelligent, self calibrating gamma ray spectrometer using NaI (TI) large volume detector arrays. All dedicated electronics modules are housed within the detector container. The GRS-10 series of gamma spectrometers are widely used in geological and geophysical exploration and



mapping as well as in environmental and nuclear surveillance.

Individual, independent, detector processing provides real time gain and linearity correction. The system stabilization algorithms make these spectrometer systems fully automated and self stabilizing on natural radioactive elements. This eliminates the requirement for regular, time consuming, and frequent system checking and re-calibration. Furthermore it provides excellent accuracy and reliability of the gamma measurements.

Individual crystal detector signal processing provides an accurate control over each contributing sensor providing the user with the best possible spectra alignment for the complete system. New design techniques for the peak detection electronics almost completely eliminate 'pulse pile up' and 'Dead Time' effects.

The technique used for radon removal is the spectral ratio method (Minty, B.R.S., 1992: *Airborne gamma ray spectrometric background estimation using full spectrum analysis*. Geophysics, 57, 279-287) and does not require the use of an upward looking detector.

#### **System specifications:**

- Resolution: 256 channels
- Four NaI crystal detectors, each with individual electronics, for a total of 16.8 litres (1025in<sup>3</sup>) of crystals "downward looking"
- Individual detector tracking and linearity correction
- Energy spectra from 36 keV to 3 MeV with adjustable threshold
- Data sampling rate: 1 Hz
- Signal sampling: 25 MHz by internal 12 bit ADC for each detector
- Pulse rate per detector : > 60000 pulses per second with negligible dead time
- Channel capacity : 65500 counts/sampling period
- Operating temperature range: -10° to +55° Celsius

#### **5.7 Herz TOTEM-2A multi-channel airborne VLF system**

The TOTEM-2A employs state-of-the-art, unique digital and linear integrated circuits to implement the functions of crystal-controlled phase-locked loop frequency synthesizers, dual frequency heterodyne conversion and proprietary time domain sampling vector computation techniques.

The measured parameters are: vertical, horizontal and longitudinal quadrature, and total field.



**System specifications:**

- Capability of simultaneous measurement of two VLF stations
- Accurate frequency selection: from 15 kHz to 25 kHz; selectable for each channel in 100 Hz steps
- Sensitivity range: from 130  $\mu\text{V m}$  to 100 mV m at 20 kHz; 3dB down at 14 kHz and 24 kHz
- VLF signal bandpass: -3dB at  $\pm 80$  Hz; < 4% variation at  $\pm 50$  Hz
- Internal Noise: 1.3  $\mu\text{V m RMS}$

**5.8 Helicopter Data Acquisition and Recording System**

The Helicopter data acquisition and recording system is composed of proprietary hardware developed by **Geophysics GPR International Inc.** and an industry standard navigation / recording software package (Hypack Max 4.3). Data were recorded on hard disk and backed up after each flight.

**5.9 Field computer workstation**

A dedicated laptop computer was used on site for the purpose of displaying geophysical data for quality control, calculating and displaying the navigation, producing preliminary magnetic, spectrometry and VLF maps and backing up the digital data.



## 6. DATA PROCESSING

### 6.1 Magnetic data

#### 1) *Data checking, editing, reformatting and flight path recovery*

Data recorded on the helicopter were transferred after each flight to the processing computer for verification and quality control. The raw GPS data (longitude, latitude and height) were recorded in the WGS-84 datum. These coordinates were transformed into the NAD83 datum, UTM projection, Zone 18-N by the navigation software and compared in real-time to the theoretical coordinates of the flight paths to provide a correction to the pilot. The DGPS data (1.0 s interval) were interpolated at the same rate as the magnetic data (0.1 s interval) and exported for flight path recovery and quality control.

The raw line data was transformed into Oasis Montaj .XYZ format by a proprietary software program.

#### 2) *Diurnal corrections*

The magnetic data recorded at the base-station were synchronized, using the GPS time and merged with the helicopter-borne data. Subsequently, the diurnal corrections obtained by subtracting the mean value of the base-station readings were applied to the data after low pass filtering.

#### 3) *Tie-line levelling*

Classical tie-line levelling was not performed on the block since the initially corrected data were of sufficient quality and it was not considered a worthwhile exercise.

#### 4) *Final levelling corrections (micro-levelling)*

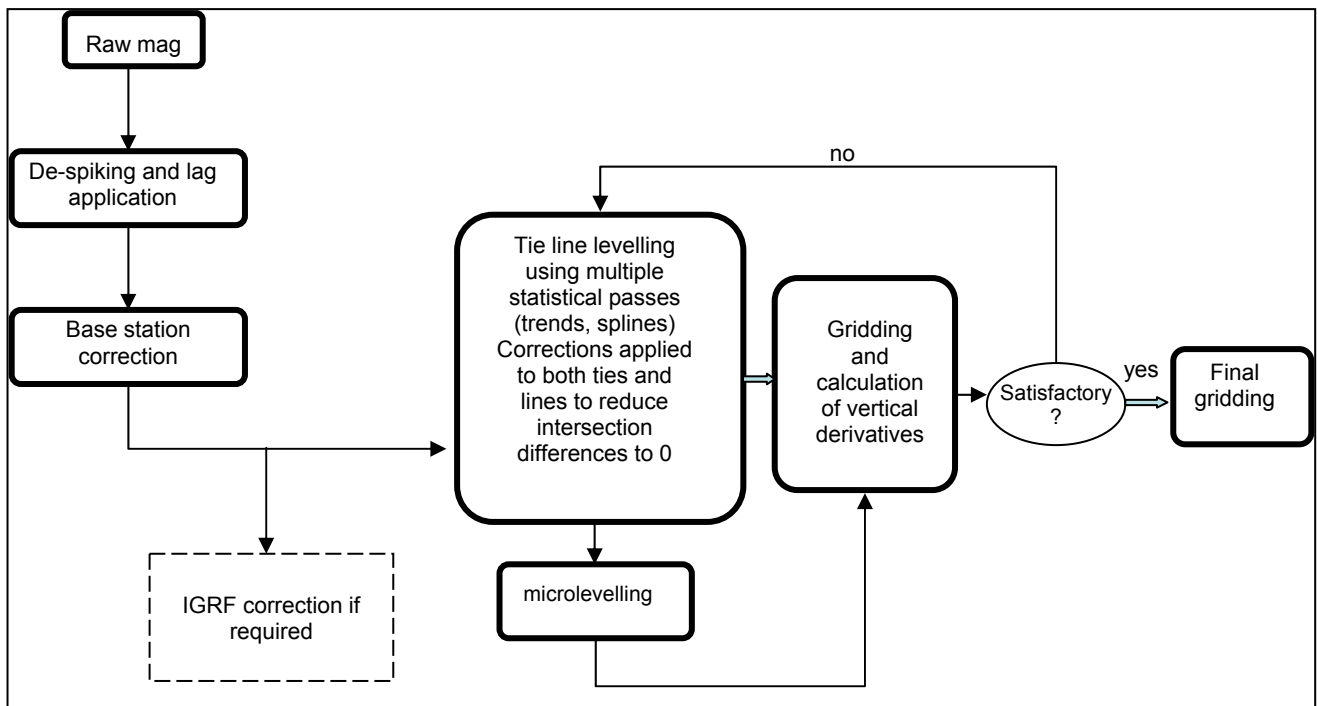
The final step was to remove any minor line to line effects (most probably caused by different flight altitudes between the lines). This is most effectively done by applying a filter on the grid in the frequency domain. The MAGMAP processing module in Oasis Montaj was used to carry out these operations. A standard combination of a Butterworth low-pass filter followed by a directional cosine filter was used to obtain the residual error grid, which was subtracted from the original to obtain the final de-corrugated grid.



### 5) Measured vertical gradient

The measured vertical gradient was obtained by subtraction of the top sensor reading from the average of the two bottom sensors divided by sensor separation (1.5m) and this value was micro-levelled with the help of the 2D-FFT first magnetic derivative calculated from the total magnetic field.

Figure 4 presents a summary of the processing sequence used to obtain the final magnetic grid.



**Figure 5 – Standard Magnetic data processing flow**

## 6.2 Gamma Ray Spectrometry

The preliminary data processing and quality control of airborne gamma ray spectrometry was performed using the Geosoft Oasis Montaj RPS suite.

The following checks were performed in the field:

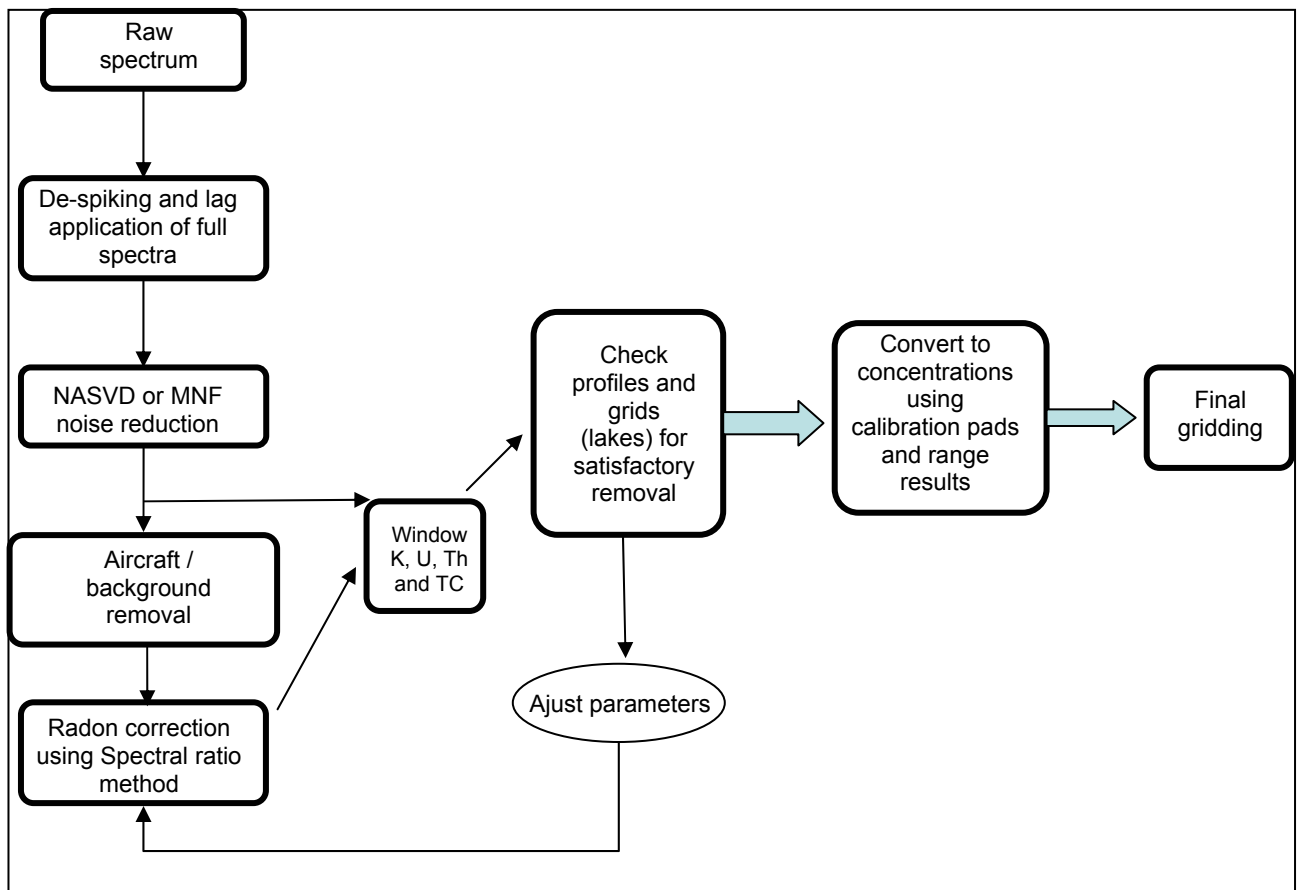
- 1) Careful verification of each profile (and spectra) to spot spikes, jumps or interruptions in the readings.
- 2) Statistical calculation of the mean spectra for each line to insure peak stability.
- 3) Gridding windowed elements (K, U, Th) and total count to evaluate data coherence and consistence.





- 4) A background over water flight was flown in the morning and at the end of the flying to check daily variation in the radon content.

The final processing of the gamma ray spectrometry data was performed with the Praga3 software. This program is specially designed to process Pico Envirotec spectrometer acquired data and interfaces directly with Geosoft Oasis Montaj. The Praga3 program uses the spectral ratio method to calculate the radon component, which eliminates the necessity to use an upward looking detector in a survey. The following diagram summarizes the processing of the airborne gamma ray spectrometry data including conversion to equivalent concentration units using the calibration pads and range results.



**Figure 6 – Gamma ray spectrometry processing flow**

This survey was flown at the end of the fall season, and at this time, there was presence of a snow cover sometimes exceeding 10 cm in some areas. It is believed that a thickness of more than 10 cm of snow will obstruct a significant amount of the ground radiation. It is therefore possible that this had an effect on the overall quality of the spectrometry data and made the radon removal process uncertain.



A second issue with this survey is that with the help of the Praga3 spectrum viewer, an unusual peak was observed left from the potassium peak (around 1120 keV) in some of the spectrum for the helicopter spectrometry survey. This appears to have a small effect on potassium and thorium counts, and has no observable effect on uranium and total counts. Potassium and thorium counts seem to drop proportionally with the rise of this additional peak. As said before, this has not affected the total of gamma-ray detected and implies that the gamma-ray counts are simply miss-distributed on the spectrum. The detail of the ground radioactivity observed is not disturbed by this and only its intensity is diminished. The potassium and thorium were corrected by levelling data to the tie-lines and subsequent micro-levelling. The resulting details of the ground radioactivity are clear and the values seem realistic.

### **6.3 Digital Terrain Model (DTM) data processing**

The height above the ground surface, provided by the radar altimeter's antenna (mounted in the helicopter) was subtracted from the ellipsoid height provided by the GPS antenna (mounted in the helicopter) in order to produce a Digital Terrain Model (DTM) relative to the WGS-84 ellipsoid. This correction was carried out using Oasis Montaj. The radar altimeter has a significant lag associated to it, estimated to be around 1.5 seconds. This lag was corrected in processing and as a final step a decorrugation filter was applied to the grid to remove line to line effects and provide a smooth DTM.

### **6.4 VLF**

VLF transmission antenna used was the NAA in Cutler Maine.

VLF data was zero-levelled. For quadrature, the data were sorted into line directions and polarity was switched on one direction and then, the total field and quadrature data were gridded with minimum curvature algorithm and a transversal decorrugation filter was applied for presentation purposes.



## 7. **FINAL PRODUCTS**

### 7.1 **Paper products**

A standard set of geophysical maps was produced at a scale of **1: 50 000**. The flight path is presented on a separate map. The claims boundaries and claims numbers are displayed on this map. The names of each line, as well as its direction are indicated at the beginning and end of each line.

The maps were drawn in the UTM projection Zone 18 north, NAD83 datum. Coordinate units are in meters, unless indicated otherwise.

The final paper products consist of ten maps for the area. Two copies are provided to the client.

The final maps produced are as follows:

- 1) Black and white Flight path recovery and property limits map
- 2) Colour contour map of the Total Magnetic Intensity
- 3) Colour contour map of the Measured Vertical Gradient
- 4) Colour contour map of the equivalent Potassium Concentration
- 5) Colour contour map of the equivalent Uranium Concentration and maximum regional Uranium values location plot
- 6) Colour contour map of the equivalent Thorium Concentration
- 7) Colour contour map of the Air Absorbed Dose Rate derived from total count
- 8) Colour contour map of the VLF quadrature component
- 9) Colour contour map of the VLF Total Field component
- 10) Colour contour map of the Digital Terrain Model

The digital data are included on CD-ROM along with the printed maps.

The paper map size is A1. Table 5 on the following page lists each map type and its associated drawing number.



Drawing title	Drawing number
Flight path Recovery and Property limits	07-01-156 - 00
Total Magnetic Intensity, (nT)	07-01-157 - 00
Measured Vertical Gradient, (nT/m)	07-01-158 - 00
Potassium Concentration, (%)	07-01-159 - 00
Uranium Concentration, (ppm)	07-01-160 - 00
Thorium Concentration, (ppm)	07-01-161 - 00
Air Absorbed Dose Rate from Total Count (nGy/h)	07-01-162 - 00
VLF quadrature, (ppm)	07-01-164 - 00
VLF total field, (ppm)	07-01-164 - 00
Digital Terrain Model, (m)	07-01-165 - 00

**Table 5 – Drawing titles and numbers**

## 7.2 Digital products

Below is a list of the products delivered on CD-ROM

- 1) Final magnetic database (Geosoft .XYZ and .GDB format)
- 2) Final spectrometric database (Geosoft .XYZ and .GDB format)
- 3) Maximum regional equivalent Uranium concentration database (Geosoft .XYZ and .GDB format)
- 4) Final VLF database (Geosoft .XYZ and .GDB format)
- 5) A final processed Total Magnetic Intensity grid (Geosoft .GRD format)
- 6) A final processed Measured Vertical Gradient grid (Geosoft .GRD format)
- 7) A final processed equivalent Uranium Concentration grid (Geosoft .GRD format)
- 8) A final processed equivalent Thorium Concentration grid (Geosoft .GRD format)
- 9) A final processed equivalent Potassium Concentration grid (Geosoft .GRD format)
- 10) A final processed Air Absorbed Dose Rate derived from Total Count grid (Geosoft .GRD format)
- 11) A final processed VLF quadrature grid (Geosoft .GRD format)
- 12) A final processed VLF Total Field grid (Geosoft .GRD format)
- 13) A final processed Digital Terrain Model grid (Geosoft .GRD format)
- 14) All final Geosoft maps in .MAP format

The final processed databases were archived in Oasis Montaj™ ASCII .XYZ format. The final grids were archived in Oasis Montaj™ GRD binary grid format. All these data, as well as this report, were archived onto a CD-ROM.



## 8. CONCLUSION AND RECOMMENDATIONS

A helicopter-borne magnetic, gamma ray spectrometry and VLF geophysical survey was flown for **FanCamp Exploration Ltd.** The survey was composed of a single block, north of the Rupert River, Quebec. A total linear distance of **274 line-km** was flown over the period from October 28<sup>th</sup> to November 5<sup>th</sup>, 2006.

The total magnetic field intensity was measured by each of the three magnetic sensors of the gradiometer system. DGPS positioning and radar altimeter data were collected and a Digital Terrain Model was produced from this information. The spectrometry data collected was corrected for radon content and conversion to equivalent concentrations were calculated using pad calibration results.

The final paper products consist of maps at a scale of 1:50 000. A total of ten (10) maps was produced. The digital products consist of raw and final databases, metadata files and final grid files for each block. The digital data are included on CD-ROM and the content is described in Appendix C.

It is hoped that the information presented in this report and on the accompanying maps will be useful both in planning subsequent exploration efforts and interpretation of related exploration data.

This report was written by Isabelle D'Amours, Eng., M.A.Sc., and was approved by Jean-Luc Arsenault, Eng., M.A.Sc.

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Isabelle D'Amours, Eng. M.A.Sc.

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Jean-Luc Arsenault, Eng. M.A.Sc.



## **REFERENCES**

Grasty, R.L. Minty, B.R.S., 1995, A Guide to The Technical Specifications for Airborne Gamma-Ray Surveys, Australian Geological Survey Organisation

McNeill, J.D. Labson, V.F., 1992, Geological Mapping Using VLF radio Fields in Electromagnetic Methods in Applied Geophysics, ed. Misac Nabighian, vol. 2., Society of Exploration Geophysicists, Tulsa.

Minty, B.R.S., 1992, Airborne gamma ray spectrometric background estimation using full spectrum analysis, Geophysics, 57(2), 279-287



## **CERTIFICATE OF QUALIFICATION**

1. I, the undersigned, Isabelle D'Amours, residing at 185 Mazarin, Montreal, Quebec graduated with a B. Ing. in geological Engineering from École Polytechnique de Montreal in 1996 and I obtained a M.A.Sc. in Applied geophysics in 1998 also from École Polytechnique de Montreal and I have worked in airborne geophysics since year 2000.
2. I am a member of the Quebec Order of Engineers (number 118513) and of the Society of Exploration geophysicist.
3. I have no direct or indirect interests in the mining claims owned by Fancamp Exploration Ltd, nor in the securities of this company and have no interest in receiving such interest.
4. My company, I.D. Geophysics Inc. is hired by GPR Geophysics Inc. for consulting and training purposes.

Signed in Montreal, on the \_\_\_\_\_

Respectfully submitted,

\_\_\_\_\_  
Isabelle D'Amours, Eng. M.A.Sc. (# 118513)



## **APPENDIX A**

### **Equipment Calibration and Tests**





**CALIBRATION RESULTS OF K-U-TH AND TC WINDOW COUNTS FROM PAD**  
**MEASUREMENTS**

Spectrometer: GRS-10 from Pico Envirotec

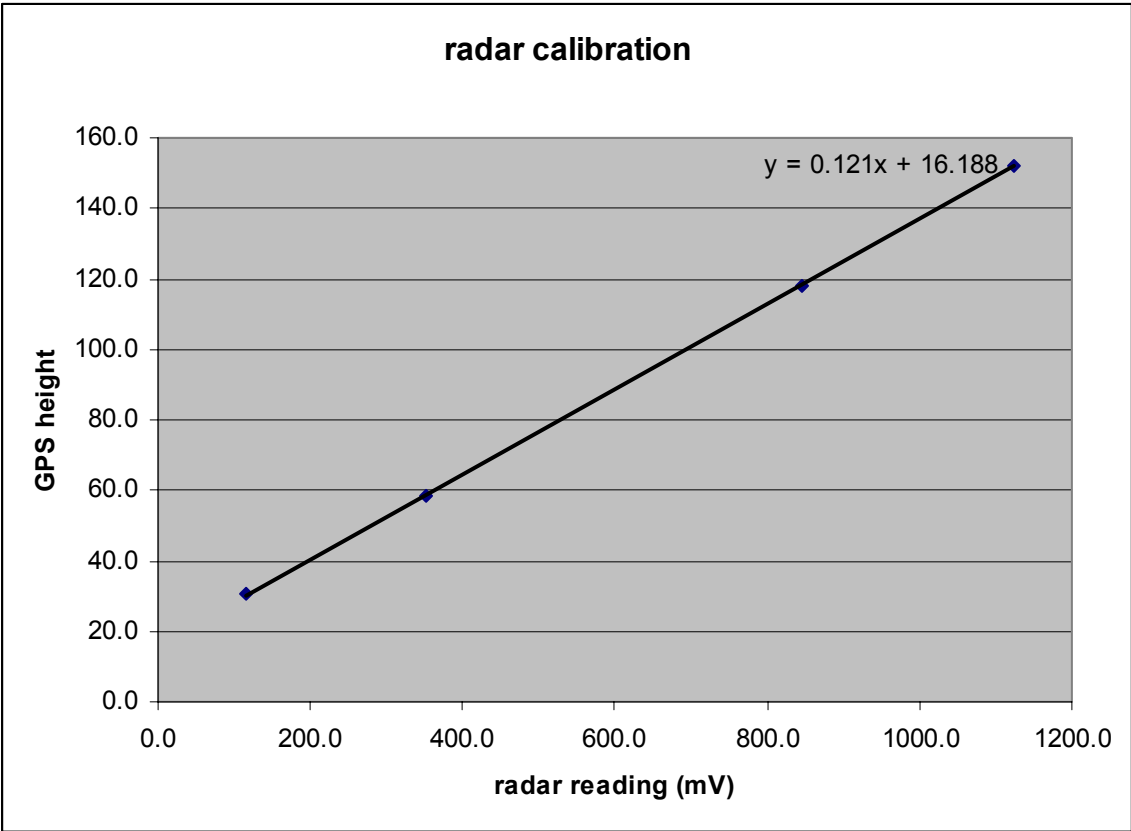
Stripping Ratios

Th into U	$\alpha$ (alpha)	0.2401
Th into K	$\beta$ (beta)	0.4144
U into K	$\gamma$ (gamma)	0.7092
U into Th	a	0.0263
K into Th	b	-0.011
K into U	g	0.0047

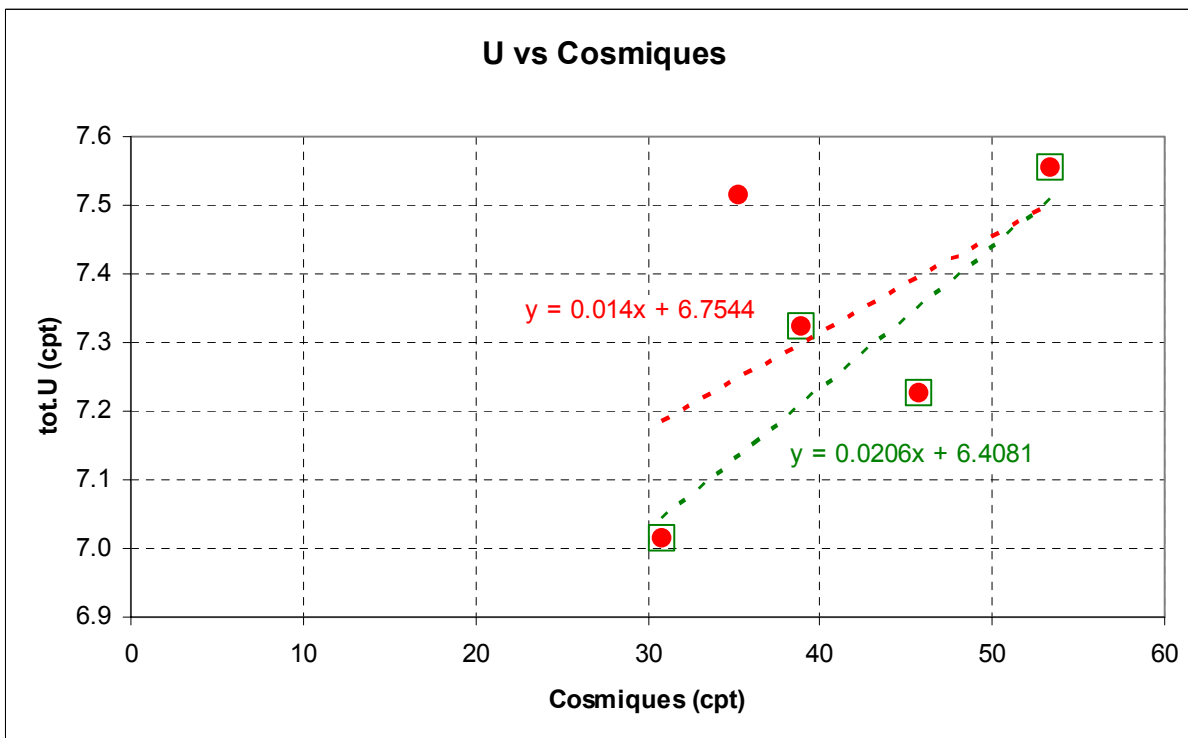
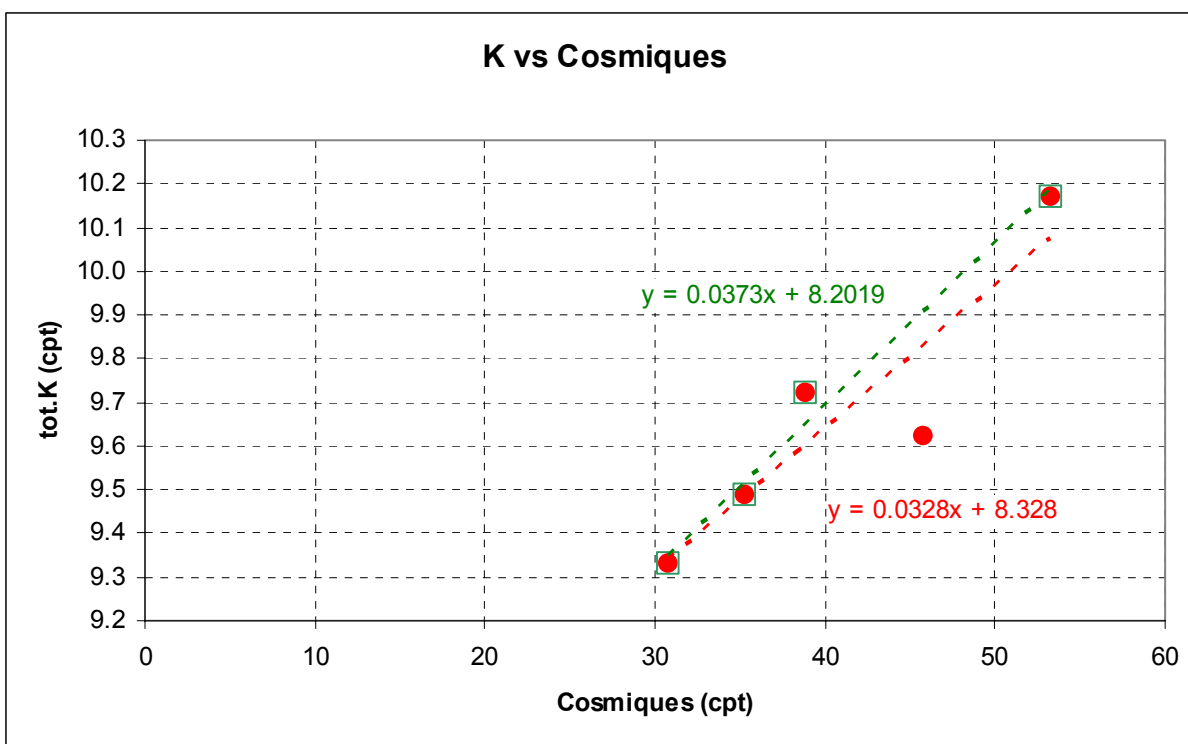
System Sensitivities (60m ground clearance)

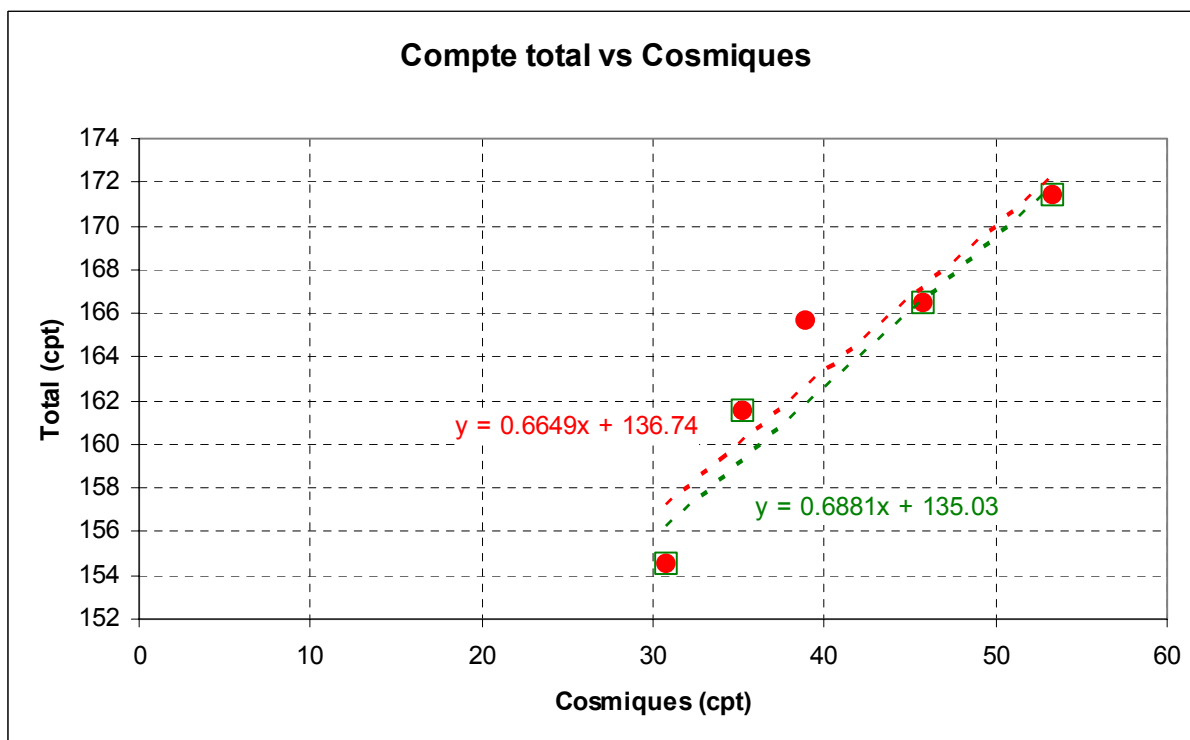
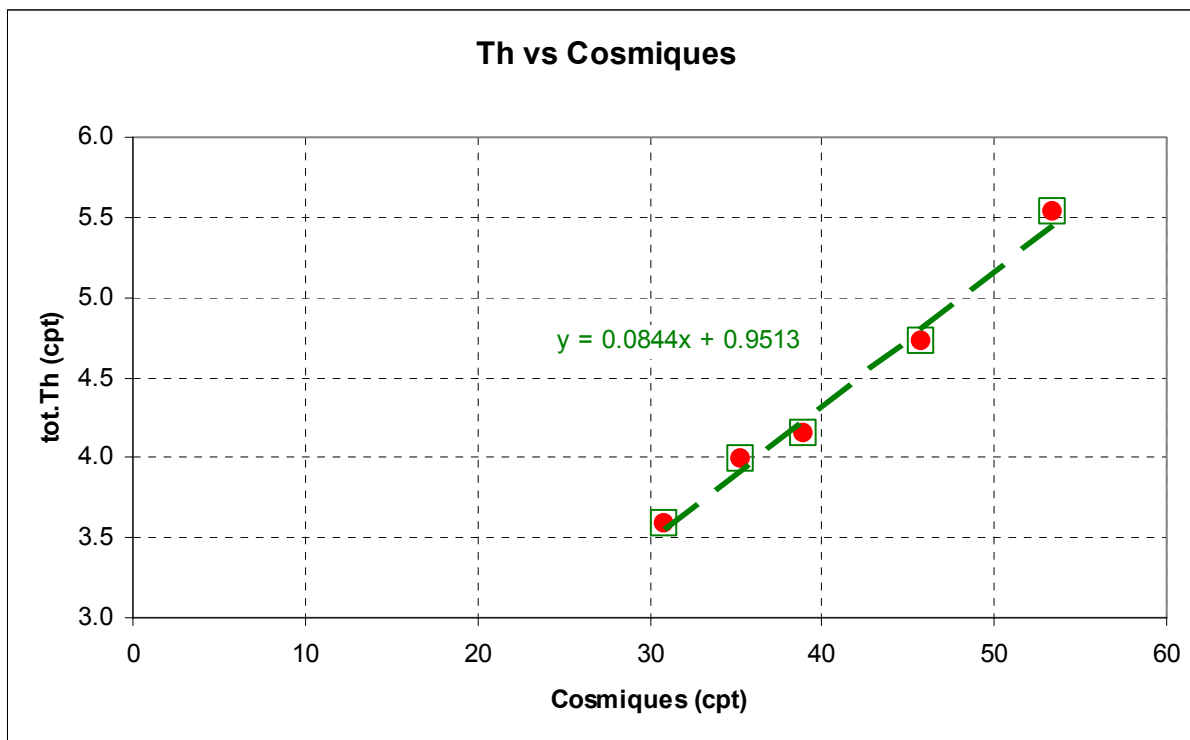
	Sensitivity	Attenuation
TC	20.95 cps/nGy/h	-0.0076 /m
K	47.22 cps/%K	-0.0104 /m
U	5.87 cps/ppm eU	-0.0090 /m
Th	3.01cps/ppm eTh	-0.0073 /m

**RADAR CALIBRATION**



**Pico system calibration for cosmic rays above Saint Lawrence River (Baie Johan Beetz, August 15th 2006, Bell 206 Long Ranger, Canadian, C-GVHX)**





## **APPENDIX B**

### **Maps**



## **APPENDIX C**

### **Digital Data on CD-ROM**



## CD contents

File Name	Description	Format
Report_M06278.pdf	Data acquisition report	
Production.xls	Production information	
DATABASE_CHANNEL_DESCRIPTION.doc	List of database channels of mag, spectro and VLF databases and corresponding units	
<b>\MAG\</b>		
Magfinal.xyz Magfinal.gdb	Final magnetic database	Geosoft .XYZ and .GDB
Magfinal.grd	Final processed total magnetic intensity grid	Geosoft .GRD
GradZfinal.grd	Final processed measured vertical gradient grid	Geosoft .GRD
GIs	Including all projection information files	MapInfo and other .GI
Magfinal.map	Final Total magnetic intensity map, (nT)	Geosoft .MAP
Gradfinal.map	Final Measured vertical gradient map, (nT/m)	Geosoft .MAP
GMs	Including all GM files used in the MapInfo software to distinguish a Geosoft map file from a MapInfo file	Geosoft .GM
<b>\Spectro\</b>		
Spectrofinal.xyz Spectrofinal.gdb	Final spectrometric database	Geosoft .XYZ and .GDB
Umax.gdb Umax.xyz	Database containing all equivalent Uranium concentration readings above 10 ppm	Geosoft .XYZ and .GDB
Ufinal.grd	Final processed equivalent uranium concentration grid	Geosoft .GRD
Thfinal.grd	Final processed equivalent thorium concentration grid	Geosoft .GRD
Kfinal.grd	Final processed equivalent potassium concentration grid	Geosoft .GRD
TCfinal.grd	Final processed air absorbed dose rate derived from total count grid	Geosoft .GRD
DTMfinal.grd	Final processed Digital Terrain Model grid	Geosoft .GRD
Umax.dxf	Final maximum regional equivalent Uranium concentration map	AutoCAD .DXF
GIs	Including all projection information files	MapInfo and other .GI
Base_map.map	Blocks flight path recovery and property limits map	Geosoft .MAP
Uranium.map	Final Uranium concentration map, (ppm)	Geosoft .MAP
Thorium.map	Final Thorium concentration map, (ppm)	Geosoft .MAP
Potassium.map	Final Potassium concentration map, (%)	Geosoft .MAP
Total_Count.map	Final air absorbed dose rate from total count map (nGy/hr)	Geosoft .MAP
DTM.map	Final Digital Terrain Model map, (m)	Geosoft .MAP
GMs	Including all GM files used in the MapInfo	Geosoft .GM

	software to distinguish a Geosoft map file from a MapInfo file	
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VLF\		
VLFfinal.xyz VLFfinal.gdb	Final VLF database	Geosoft .XYZ and .GDB
Totfinal.grd	VLF total field grid	Geosoft .GRD
Quadfinal.grd	VLF quadrature grid	Geosoft .GRD
GIs	Including all projection information files	MapInfo and other .GI
VLF_Tot.map	Final VLF Total field map, (ppm)	Geosoft .MAP
VLF_Quad.map	Final VLF quadrature map, (ppm)	Geosoft .MAP
GMs	Including all GM files used in the MapInfo software to distinguish a Geosoft map file from a MapInfo file	Geosoft .GM



### MAGNETIC DATABASE CHANNEL DESCRIPTION

Channel name	Unit	Description
Fiducial		Fiducial increments
X	meters	UTM Easting (NAD 83 zone 18N)
Y	meters	UTM Northing (NAD 83 zone 18N)
Z	meters	GPS height (in bird)
lat	Dec. degrees	Latitude WGS84
lon	Dec. degrees	Longitude WGS84
Time_PC	HH:MM:SS.SS	Computer time
Time_GPS	HH:MM:SS.SS	GPS time
right	nT	Despiked right mag sensor
top	nT	Despiked top mag sensor
left	nT	Despiked left mag sensor
FFright	nT	Despiked and filtered right sensor raw mag
FFtop	nT	Despiked and filtered top sensor raw mag
FFleft	nT	Despiked and filtered left sensor raw mag
Basemag	nT	Final base station magnetic readings
Magfinal	nT	Final magnetic total field
GradZfinal	nT/m	Final measured vertical magnetic gradient

### SPECTROMETRY DATABASE CHANNEL DESCRIPTION

Channel name	Unit	Description
Fiducial		Fiducial increments
X	meters	UTM Easting (NAD 83 zone 18N)
Y	meters	UTM Northing (NAD 83 zone 18N)
Z	meters	GPS height (in helicopter)
lat	Dec. degrees	Latitude WGS84
lon	Dec. degrees	Longitude WGS84
Compu_time	HH:MM:SS.SS	Computer time
GPS_time	HH:MM:SS.SS	GPS time
Temperature	Celsius	Temperature converted to Celsius
RALTm	meters	Radar Altimeter (in helicopter)
Pressure	mBar	Pressure
Spectro	256 channel	Measured spectrum raw but despiked (database only) in 256 channel vector array format
SVDspec	256 channel	Processed spectrum using NASVD (database only) in 256 channel vector array format
TCfinal	nGy/h	Final Dose rate derived from total count reading
Kfinal	% eK	Final Potassium concentration reading
Ufinal	ppm eU	Final Uranium concentration reading
Thfinal	ppm eTH	Final Thorium concentration reading
DTMfinal	meters	Final Digital Terrain Model
Umax	ppm	Ufinal above 10 ppm

### VLF DATABASE CHANNEL DESCRIPTION

Channel name	Unit	Description
Fiducial		Fiducial increments
X	meters	UTM Easting (NAD 83 zone 18N)
Y	meters	UTM Northing (NAD 83 zone 18N)
lat	Dec. degrees	Latitude WGS84
lon	Dec. degrees	Longitude WGS84
Compu_time	HH:MM:SS.SS	PC time
GPS_time	HH:MM:SS.SS	GPS time
Tot1	ppm	VLF Total field raw (1)
Quad1	ppm	VLF Quadrature raw (1)
Tot2	ppm	VLF Total field raw (2)
Quad2	ppm	VLF Quadrature raw(2)
Totfinal	ppm	Final VLF total field data
Quadfinal	ppm	Final VLF quadrature data