GM 64509

HELICOPTER-BORNE MAGNETIC AND GAMMA-RAY SPECTROMETRY GEOPHYSICAL SURVEY, DATA ACQUISITION REPORT, KANGIQ PROJECT

HELICOPTER-BORNE
MAGNETIC AND GAMMA-RAY SPECTROMETRY GEOPHYSICAL SURVEY
TORNGAT AREA, QUÉBEC
NTS MAP SHEETS 024I/02, 024I/03, 024I/05, 024I/06 AND 024I/07

DATA ACQUISITION REPORT
KANGIQ PROJECT

Presented to:

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SEPTEMBER 2008 **M-08516**

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1. INTRODUCTION

During June and July 2008, **Geophysics GPR International Inc**. flew a helicopter-borne magnetic and gamma-ray spectrometry geophysical survey for **AZIMUT EXPLORATION INC.** The survey was composed of three (3) blocks for a minimum coverage of 2407 line-km, located South-East of Kangiqsualujjuaq, (Québec) on the NTS sheets 024I/02, 024I/03, 024I/05, 024I/06 and 024I/07. A total of **3048.2 line-km** was flown from June 29th to July 17th, 2008. The difference between the between the proposed line-km and the flown line-km is due to the fact that some tie-lines were added.

The Helimager™ system is a towed bird system configured with one (1) caesium vapour magnetometers at the end of the lateral arm and with a DGPS system. Also, a gamma-ray spectrometer, a radar altimeter, and a DGPS system were mounted onto the helicopter.

This report is intended to be read in association with the printed maps provided in Appendix C.

Data processing was carried out by Josianne Morel, Jr. Eng. and Olivier Létourneau, Phys. Quality control was carried out by Réjean Paul, Eng., Geoph., and this report was written by Olivier Létourneau, Phys.

2. SURVEY DETAILS

2.1 Survey Area

The survey area is located South-East of Kangiqsualujjuaq, Québec, Canada (*Figure 1*). The survey consists of three (3) blocks on the NTS map sheets 024I/02, 024I/03, 024I/05, 024I/06 and 024I/07.

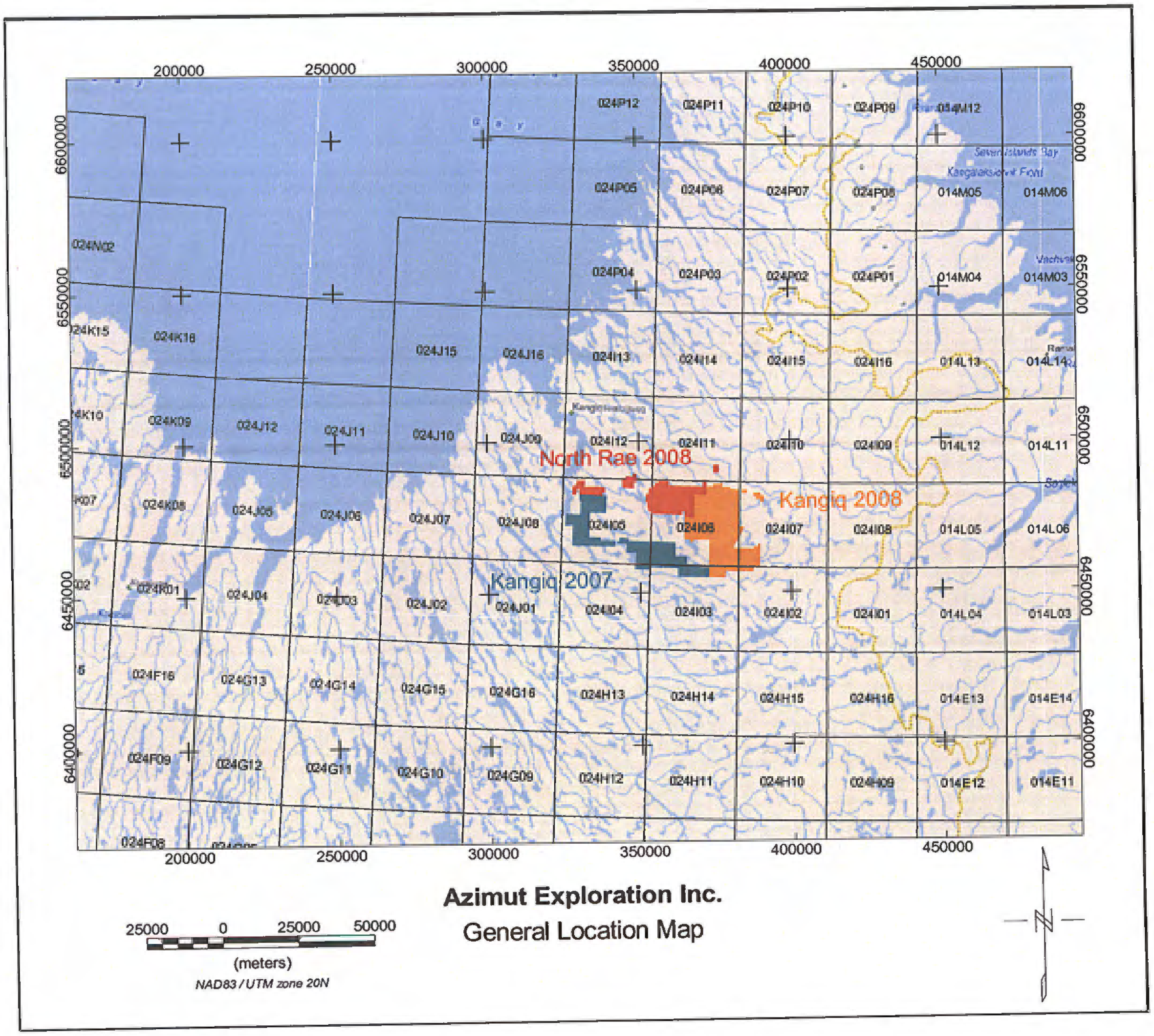

Figure 1 – General survey area

2.2 Survey block parameters

The direction of the flight lines is (0°-180°). The direction of the tie-lines is (90°-270°), with respect to UTM coordinates.

The coordinates given in *Tables 1.1 to 1.3* represent the outline of the zones to be flown. **All coordinates are given in UTM zone 20N (NAD83).**

X(m)	Y(m)
387268	6458154
389463	6458089
389671	6465510
389183	6465523
389157	6464596
387692	6464637
387666	6463710
380829	6463910
380857	6464838
381346	6464823
381374	6465751
381862	6465736
381889	6466664
382377	6466649
382405	6467577
382893	6467562
382921	6468490
383408	6468475
383436	6469403
383923	6469388
383951	6470316
384438	6470302
384465	6471229
382516	6471287
382876	6483345
379961	6483434
379989	6484361
377560	6484436
377618	6486291
377133	6486307
377104	6485379
374675	6485456
374646	6484529
372217	6484607
372126	6481824
368237	6481956
367988	6474533
365066	6474632
364811	6467212
366275	6467163
366243	6466235
367708	6466186
367739	6467113
373106	6466937
372715	6454845
377996	6454692
378073	6456602
387201	6456309

Table 1.1: Block A1 coordinates

X(m)	Y(m)
383848	6483317
385792	6483259
385764	6482332
383820	6482389

Table 1.2: Block D coordinates

X(m)	Y(m)
387709	6482276
390139	6482207
390113	6481279
391085	6481252
391033	6479397
390061	6479424
390087	6480352
388628	6480393
388654	6481320
387682	6481348

Table 1.3: Block E coordinates

Three (3) blocks were scheduled for surveying for a total of 3048 linear kilometres, based on 200 meters line spacing, with 200 and 2000 m tie-line spacing.

2.3 Survey geodetic parameters

The DGPS data were acquired as longitude and latitude format in WGS84 coordinates system. The coordinates were re-projected as NAD83 Zone 20 North using Geosoft's Oasis Montaj software. *Table* 2 below presents the geodetic parameters that were used for data processing.

Datum:	NAD83
Ellipsoid:	GRS-80
Projection:	UTM
Zone:	20N
Central meridian:	-63°
False Easting:	500 000
False Northing:	0
Scale factor:	0.9996

Table 2 – Geodetic parameters

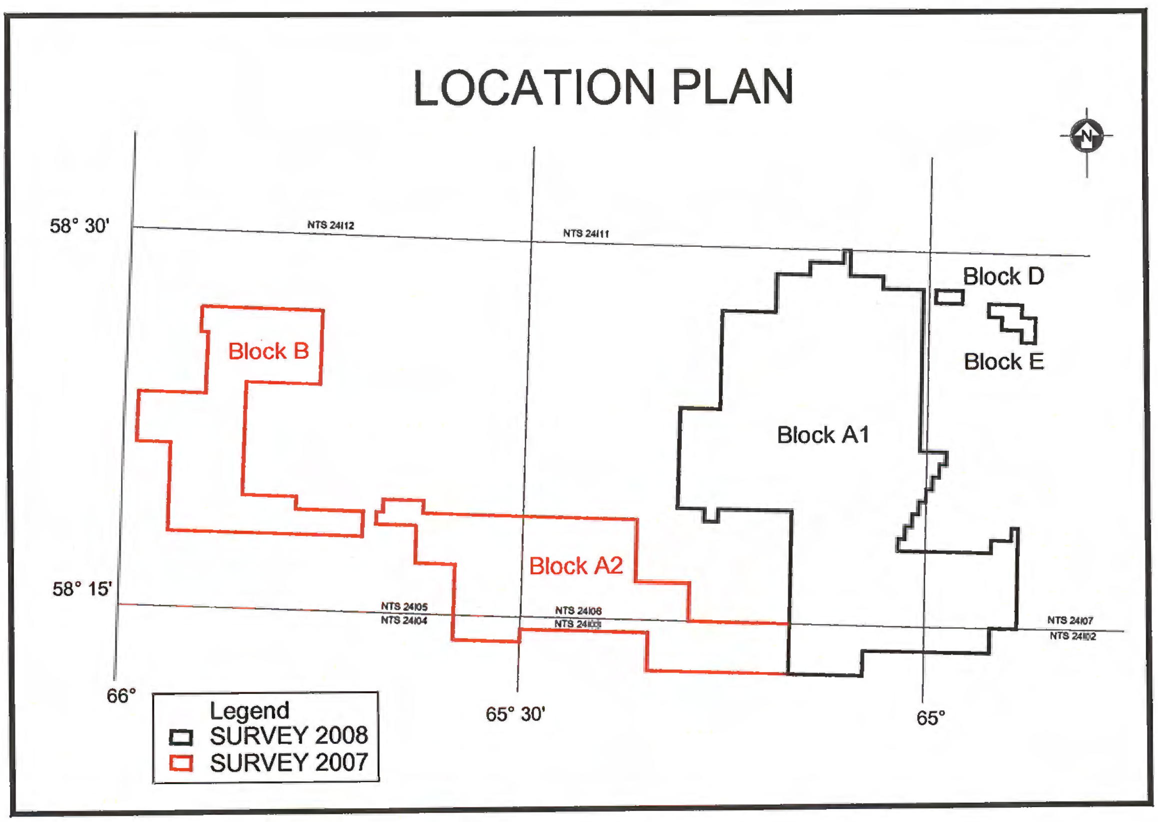

Figure 2 – Survey area and map sheets location

3. LOGISTICS

3.1 Survey helicopter

- Type : A-Star 350 B2
- Call sign : **C-GFBW**
- Operated by: **Héli-Boréal Inc.,** based in Sept-Îles, Québec

3.2 Survey personnel

The survey personnel consisted of the following: (Table 3):

Operators	*Guillaume Perron, tech.* *Marc Hétu*
Data Processing	*Olivier Létourneau, Phys.* *Josianne Morel, Jr. Eng.*
Report & QC Control	*Olivier Létourneau, Phys.*
Drafting	*André Beaudoin, tech.*
Project Manager	*Réjean Paul, Eng.*
Mechanics	*Mathieu Leblanc*
Pilots	*Michel Séguin*

Table 3 – Survey personnel

3.3 Preparation

The helicopter's installation was carried out at the base of Héli-Boréal Inc. located in Sept-Îles, Québec. The Helimager™ system was assembled and a test flight was carried out.

3.4 Operating base & fuel cache

The crew was based at Barnoin Camp, Québec. A neighbouring field was used for take-off and landing operations with the bird attached.

3.5 Flight dates

The crew finished mobilization on June 28th. Flying production was carried from June 29th to July 17th, 2008. The crew demobilized on July 18th. Five and a half (5.5) days were lost due to bad weather conditions.

4. DATA ACQUISITION

4.1 Planned survey parameters

Table 4 below shows the planned survey parameters for the project.

Parameters	Specifications	
Block #	D and E	A1
Mag. Sampling Interval	0.1s (~2.5 m)	
Spectro. Sampling Interval	1.0s (~25 m)	
Flight-line Spacing	200 m	200 m
Flight-line Direction	0°-180°	
Control-line Spacing	2000 m	500 m
Control-line Direction	90°-270°	
Aircraft MTC*	60m +/- 6m	
Mag. Sensor MTC*	30m +/- 6m	
Ground speed	80 km/h +/- 20 km/h	

* Mean Terrain Clearance

Table 4 – Planned survey parameters

4.2 Quality control

During data acquisition, quality control was carried out on data on a daily basis by GPR's data processor to ensure that quality remained within specifications. At the end of the planned survey, 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 and instrument noise was verified using Geosoft Oasis Montaj Software.

5. SURVEY EQUIPMENT

5.1 The HELIMAGER™ Gradiometer system

The HELIMAGER™ system consists in a stable helicopter-borne vector platform, developed by Geophysics GPR International Inc., capable of accepting a range of different sensors / instruments, particularly useful for the mapping and exploration of mountainous regions (Mouge and Chalifoux, 2005). The platform allows the arrangement of the sensors in three orthogonal directions. For this particular survey, the system was configured with one single magnetometer. A photograph of the platform is presented below (Figure 3).

Advantages of measuring the horizontal gradients allow the production of the Enhanced Total Magnetic Field map which provides more spatial information than the total magnetic field. Enhanced Total Magnetic Field data is useful in identifying more accurately the location of small anomalies, contacts, dykes and faults between flight lines.

Figure 3 – Helimager™ in flight with a Bell 206-L

5.2 Helicopter-borne magnetic gradiometer

Airborne magnetometers are used to detect magnetic anomalies in the Earth's local magnetic field. The anomalies may be an indication of concentrations of ferromagnetic minerals in the Earth's crust and may be used to visualize the geological structure of the upper crust in the subsurface, particularly the spatial geometry of bodies of rock and the presence of faults and folds. This is a particularly useful tool for geological mapping for the areas where bedrock is obscured by overburden or water.

A Helicopter-borne magnetic gradiometer was used to record high resolution magnetic data of the anomalies in the Earth's local magnetic field. The total magnetic field and the diurnal free horizontal gradients were recorded at the same time.

For this survey, one single Geometrics G-823A (optically pumped caesium vapour) total magnetic field sensor with a sampling interval of 0.1 second was mounted on the bird, below a 30 meters cable under the helicopter. The magnetometer includes the well proven high performance G-822A sensor with the small size CM-201 Larmor counter. The magnetometer directly sends the measured magnetic field strength as nanoTesla (nT) units to the data acquisition system via a RS-232 port. It provides unmatched versatility of performance, size, function, and cost effectiveness.

5.3 Base-station magnetometer

As the aircraft flies, the magnetometer records tiny variations in the amplitude of the ambient magnetic field due to the temporal effects of the constantly varying solar wind and spatial variations in the Earth's magnetic field (diurnal), the latter being due both to the regional magnetic field, and the local effect of magnetic minerals in the Earth's crust. By subtracting the diurnal effects, one obtains the spatial distribution and relative abundance of ferromagnetic minerals in the upper levels of the crust alone.

A Geometrics G-856 Ax (proton precession) total magnetic field sensor, with a sampling interval of 4 seconds 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 main roads to avoid interference from traffic. It was located a few hundred meters from the helipads in a nearby wooden area.

5.4 Airborne Gamma-ray Spectrometer

Airborne Gamma-ray spectrometry surveys consist in mapping the occurrence of naturally occurring Potassium^{40} (K) concentration and equivalent Uranium^{238} (U) and Thorium^{232} (Th) concentration on the survey's surface.

The 256-channel gamma-ray spectrometer detects gamma-rays originating from the disintegration of radioactive element's nuclide. Out of the three main geological radioactive elements, only the Potassium^{40} emits gamma-rays directly. The Uranium^{238} and Thorium^{232} emit gamma-rays through their decay series. It is the 1.76MeV gamma-ray emitted by Bi^{214} which is considered diagnostic of U^{238} and the 2.61MeV gamma-ray emitted by Tl^{208} that is considered diagnostic for the Th^{232}. The reason for this is that neither U^{238} nor Th^{232} emit gamma-ray and those given off by the daughters between U^{238} and Bi^{214} or Th^{232} and Tl^{208} in their decay series are of lower energy and are difficult to resolve.

This is the reason why the concentrations of Uranium and Thorium are considered equivalent assuming the U^{238} and Th^{232} and their daughters are in equilibrium, which happens after 2 million years for U^{238} and after 100 years for Th^{232}, if none of the decay series' elements are removed during that time.

The gamma-ray spectrometer chosen for this survey is the PICO GRS-10. It is an intelligent, self calibrating gamma-ray spectrometer using NaI (Tl) large volume detector. All dedicated electronics modules are housed within the detector's container. The GRS-10 series of gamma-ray spectrometers are widely used in geological and geophysical exploration and mapping as well as environmental and nuclear surveillance.

Individual, independent, detector processing provides real time gain and linearity correction. The system's stabilization algorithm makes 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-ray measurements. New design techniques for the peak detection electronics almost completely eliminate 'pulse pile up' and 'Dead Time' effects.

System specifications:

- Resolution: 256 channels
- Four NaI crystal detectors, each with individual electronics, for a total of 16.8 litres (1025in^3) 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 no dead time
- Channel capacity : 65500 counts/sampling period
- Operating temperature range: -10° to +55° Celsius

5.5 DGPS positioning

A Crescent R120 DGPS receiver that offers many differential correction options for various environments and worldwide coverage was used for in-flight navigation, with a sampling interval of 0.1 second. The antenna was mounted directly on the helicopter. The DGPS system provides 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 Radar altimeter

A FreeFlight TRA3000 radar altimeter, combined with a TRI40 Indicator unit mounted on the helicopter provides the pilot with highly accurate altitude-above-ground-level (AGL) information.

5.7 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 6.2). Data were recorded on hard disk and backed up after each flight.

5.8 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 and spectrometric maps, and backing up digital data.

6. DATA PROCESSING

6.1 Magnetic data

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

Data recorded were transferred after each flight to the processing computer for verification and quality control. Raw GPS data (longitude, latitude and height) were recorded in the WGS-84 geodetic system. These coordinates were transformed into the NAD83 datum, UTM projection, Zone 20 North 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 were recorded at 10 Hz (0.1 s interval) and exported for flight path recovery and quality control.

Raw line data was transformed into Oasis Montaj .XYZ format by a proprietary software program. Data coordinates were re-projected in NAD83 datum, UTM projection Zone 20 North using Oasis Montaj.

2) Lag corrections

Residual errors of positioning, generated by the delay of time (lag) between the magnetometer and GPS readings, generate a systematic position shift between reading values. For this particular system, a lag correction of 1 second was applied to the magnetic data base on the lag calibration found in Appendix A.

3) 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.

4) Heading corrections

No heading correction was applied to the magnetic data since the original data were of sufficient quality.

5) Tie-line levelling

Classical tie-line levelling was performed on the original TMF data. The LevTieLine module in Oasis Montaj was used to carry out these operations.

6) IGRF Removal

The earth's magnetic field (the International Geophysical Reference Field, or IGRF) was removed from the total magnetic field magnetic data. This operation corrects the base magnetic field from the 40,000 – 70,000 nT range to an average value near zero nT. The IGRF module in Oasis Montaj was used to carry out these operations.

7) First Vertical Derivative (FVD).

The first vertical derivative was obtained with the help of the 2D-FFT first vertical derivative calculated from the total magnetic field. The MAGMAP module in Oasis Montaj was used to carry out these operations.

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

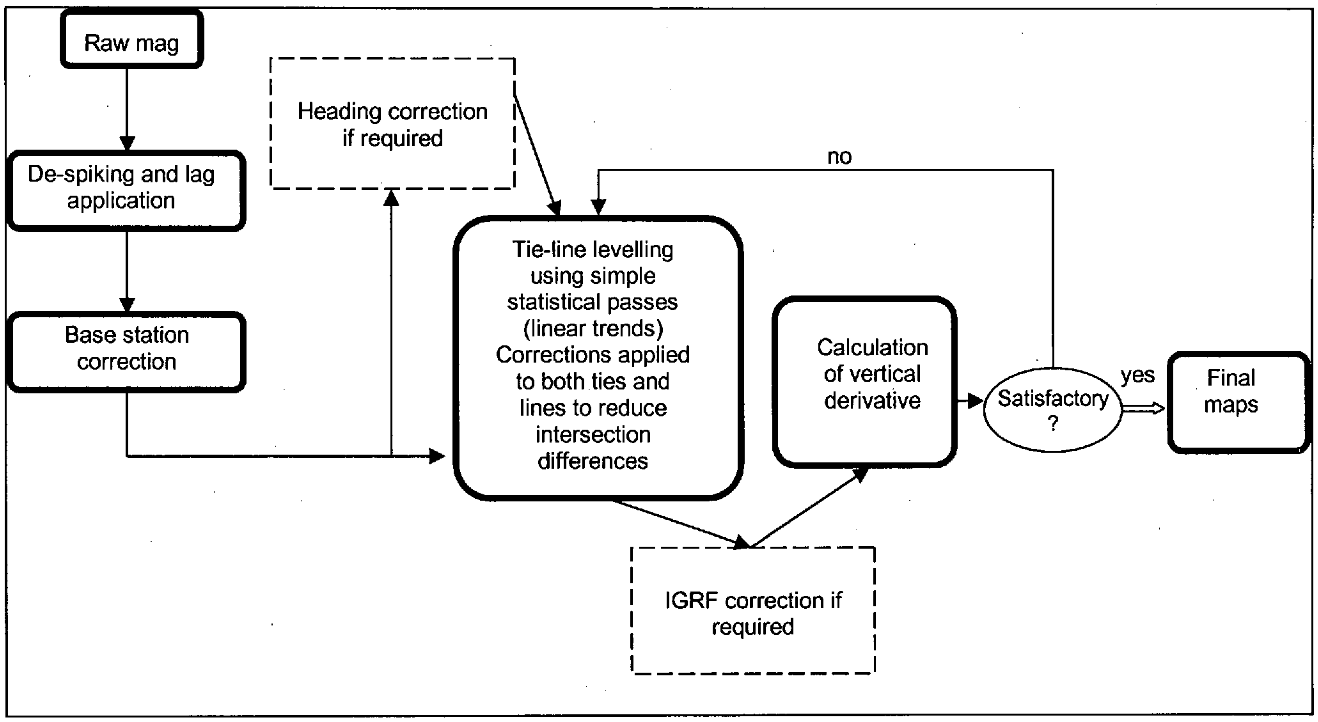

Figure 4 – Standard magnetic data processing flow

6.2 Digital Terrain Model (DTM) data processing

The Digital Terrain Model was obtained by subtracting the radar altimeter readings (helicopter mounted) from the DGPS height (helicopter mounted). The radar altimeter was corrected, for a lag estimated to be 3 seconds.

The obtained DTM was micro-levelled using a standard combination of a Butterworth high-pass filter followed by a directional cosine filter, used to obtain the residual error grid, which was imported in the Oasis Montaj database, filtered and subtracted from the original to obtain the smooth de-corrugated DTM data.

6.3 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) Lag correction (estimated to be 1.5s).
3) Statistical calculation of the mean spectra at each line to ensure peak stability.
4) Gridding windowed elements (K, U, Th) and total count to evaluate data coherence and consistence.
5) A background over lakes flight was flown at the beginning and at the end of the flight to check daily variations 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 following resumes the final processing.

1) Principal component NASVD noise reduction

To reduce the spectrometer's noise, NASVD noise reduction filter was used on the actual dataset. The spectrum is converted into a 256x256 covariance matrix from which 256 spectrum components (eigenvectors) were extracted and ordered by variance. The last 245 eigenvectors are eliminated, which are considered as statistical and instrumental noise components. Finally, the filtered spectrum is reconstructed based on the

11 first eigenvectors less theoretical noise expected to be Poisson distributed.

2) Full spectrum background removal

Full-spectrum processing uses weighted least-squares fitting algorithm to find contributions of individual radionuclide (K, U, Th), 511-1022 KeV peaks, Aircraft and cosmic components using experimental calibration constants, and subtract it to the NASVD filter spectrum. For cosmic-rays corrections, since their energies are higher then the spectrometer's standard limit of 3.0 MeV, the 256^{th} channel was used to count them individually.

3) Radon correction using spectral ratio method

Other non-terrestrial gamma-rays detected by the spectrometer which need to be removed are emitted by $Radon^{222}$. The Spectral-ratio method (Minty, B.R.S., 1992), which eliminates the necessity to use an upward looking detector in a survey, which compares count rates of low and high-energy uranium peaks, was used to remove the gamma-ray counts due to $Radon^{222}$. Spectral-ratio method uses low-energy Pb^{214} (0.352 MeV) and Bi^{214} (0.609 MeV) photo-peaks.

4) Extracting window for radioelement (K, U, Th) and TC, and height attenuation correction

The full-spectrum was windowed for (K, U, Th) and Total Counts. The windowed data was corrected for height attenuations using the count rate attenuation factors and standard temperature and pressure (STP) altitude readings; the count rate at the observed terrain clearance is converted to an equivalent count rate at the planned flying height (60m).The count rate attenuation factors can be found in Appendix A.

5) Convert to concentrations using calibration pads and range results

Airborne instruments are calibrated using Geological Survey of Canada's calibration pads based on international, to ensure consistent, accurate estimates of K, eU and eTh. This calibration procedure yields the sensitivity of the spectrometer (count rate per unit of potassium, equivalent uranium & equivalent thorium concentration) measured in cps/ppm or cps/%, which can be found in Appendix A.

The following diagram summarizes the processing of the airborne gamma-ray spectrometry data.

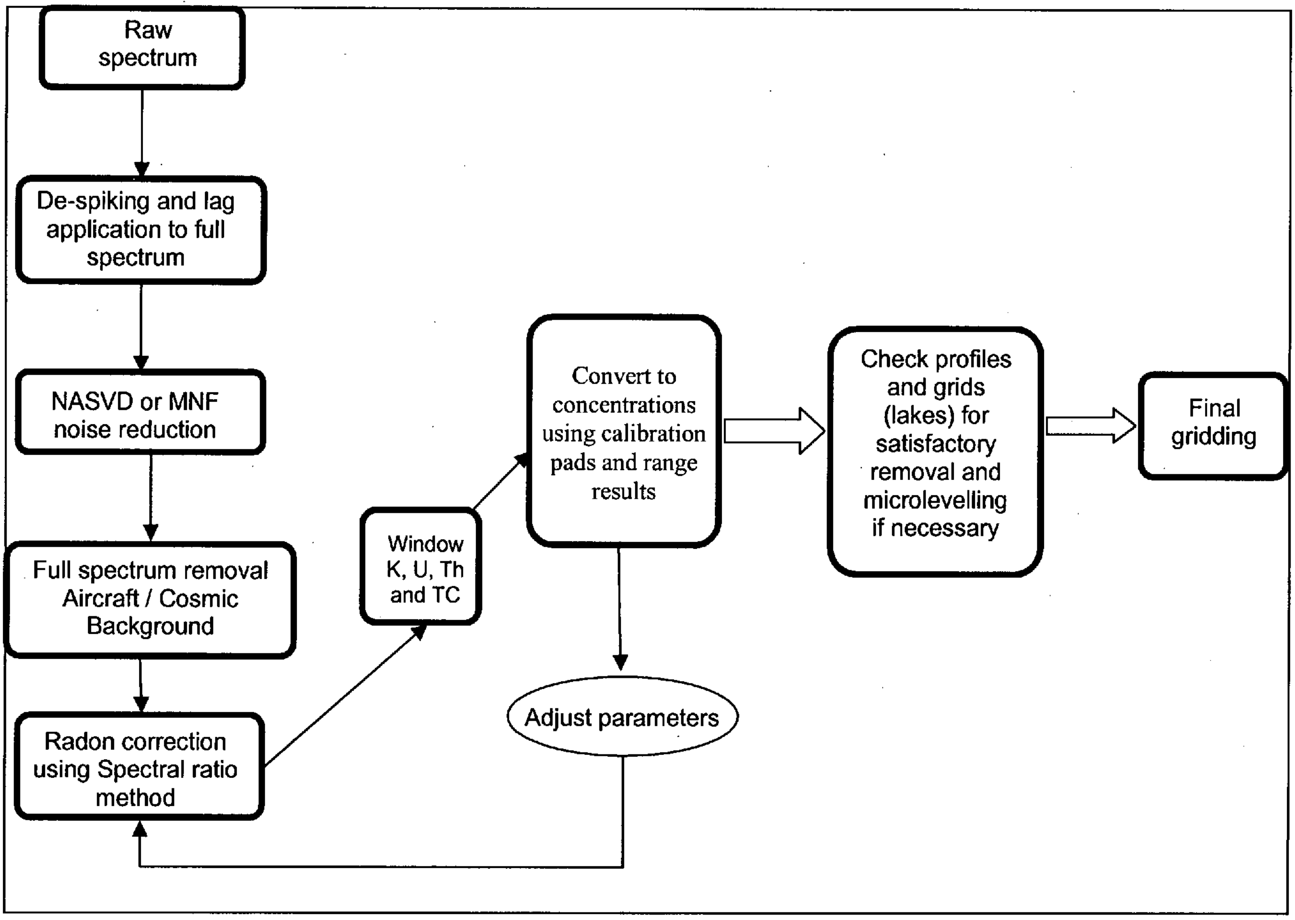

Figure 5 – Gamma-ray spectrometry processing flow

6.4 Presentation

The IGRF-corrected Total Magnetic Field, First Vertical Derivative, DTM and spectrometric data were gridded using a 40 meters size cell. Oasis Montaj's Minimum Curvature was used for all griddings except for spectrometric data which were gridded using Oasis Montaj's Kriging module.

7. FINAL PRODUCTS

7.1 Paper products

A standard set of geophysical maps was produced at a scale of **1: 50 000** (Appendix C). The flight path is presented on a separate map. The claims boundaries and their numbers are displayed on this map. The name and direction of the lines are indicated at the beginning and end of each line.

The maps were drawn in the UTM projection Zone 20 North, NAD83 datum. Coordinate units are in meters, unless indicated otherwise.

The final paper products consist of nine (9) maps.

The final maps produced for each map sheet are as follows:

1) Flight path recovery and property limits map
2) Colour contour map of the IGRF-corrected Total Magnetic Field
3) Colour map of the First Vertical Derivative
4) Colour map of the Potassium concentration
5) Colour map of the equivalent Uranium concentration
6) Colour map of the equivalent Thorium concentration
7) Colour map of the air absorbed dose rate derived from total counts
8) Colour contour map of the Digital Terrain Model
9) Colour map of the equivalent Uranium / Thorium concentration ratio

The digital data are included on a CD-ROM along with the printed maps. *Table 5* below lists each map type and its associated drawing number.

Drawing titles	Numbers
Flight path and base map	08-09-113-00
IGRF-corrected Total Magnetic Field, (nT)	08-09-114-00
First Vertical Derivative, (nT/m)	08-09-115-00
Potassium concentration, (ppm)	08-09-116-00
Equivalent Uranium concentration, (ppm)	08-09-117-00
Equivalent Thorium concentration, (ppm)	08-09-118-00
Air absorbed dose rate, (nGy/h)	08-09-119-00
Digital Terrain Model, (m)	08-09-120-00
Equivalent Uranium / Thorium concentration ratio	08-09-121-00

Table 5 – Drawing titles and numbers

7.2 Digital products

Below is a list of the products delivered on CD-ROM (More detailed in Appendix D).

There are two (2) main directories:

Data/Block/

Contains for Mag. and Spectro.:

- Databases (Oasis Montaj™ .GDB and ASCII.XYZ)
- Grids (Montaj™ .GRD binary grid format)
- Projection information files (MapInfo and other .GI)
- Maps (Oasis Montaj™ .MAP)
- Files used in the MapInfo software to distinguish a Geosoft map file from a MapInfo file (MapInfo and other .GM)
- Geo referenced image map (Montaj™ .TIFF)

Report/

Contains:

- Copy of the report (Adobe Acrobat .PDF)
- Daily flight log (Adobe Acrobat .PDF)
- Report on the cosmic test (Adobe Acrobat .PDF)
- Lag calibration report (Adobe Acrobat .PDF)
- Description of the database's Channel (Adobe Acrobat .PDF)

8. CONCLUSION

A helicopter-borne magnetic and gamma-ray spectrometric geophysical survey was flown for **Azimut Exploration Inc.** The survey was composed of three (3) blocks, located South-East of Kangiqsualujjuaq, (Québec). A total linear distance of **3048.2 km** was flown from June 28th to July 17th, 2008.

The total magnetic field and gamma-ray spectrum were measured by the helicopter-borne system. DGPS positioning, magnetic diurnal changes and radar altitude data were also collected.

The final paper products consist of maps at a scale of 1:50 000. A total of nine (9) maps was produced. The digital products consist of final databases, maps, metadata files and final grid files. Digital data are included on the CD-ROM and the content is described in Appendix D.

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 Olivier Létourneau, Phys. and approved by Réjean Paul, Eng., Geoph.

Olivier Létourneau, Phys.

Réjean Paul, Eng., Geoph.
President
(O.I.Q. No.: 23848)

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CERTIFICATE OF QUALIFICATION

1. I, the undersigned, Réjean Paul, graduated with a B. Sc. A. in physics from École Polytechnique de Montréal in 1972 and the cofounder of Geophysics GPR International Inc. since 1974. I have worked in airborne geophysics since the year 1978.
2. I am a member of the Ordre des ingénieurs du Québec (O.I.Q. No.: 23848) and of the Society of Exploration Geophysicists.
3. I have no direct or indirect interests in the mining claims owned by **Azimut Exploration Inc.**, nor in the securities of this company and have no interest in receiving such interest.

Signed in Longueuil, on October 17, 2008

Respectfully submitted,

Réjean Paul, Eng., Geoph.
President
(O.I.Q. No.: 23848)

APPENDIX A

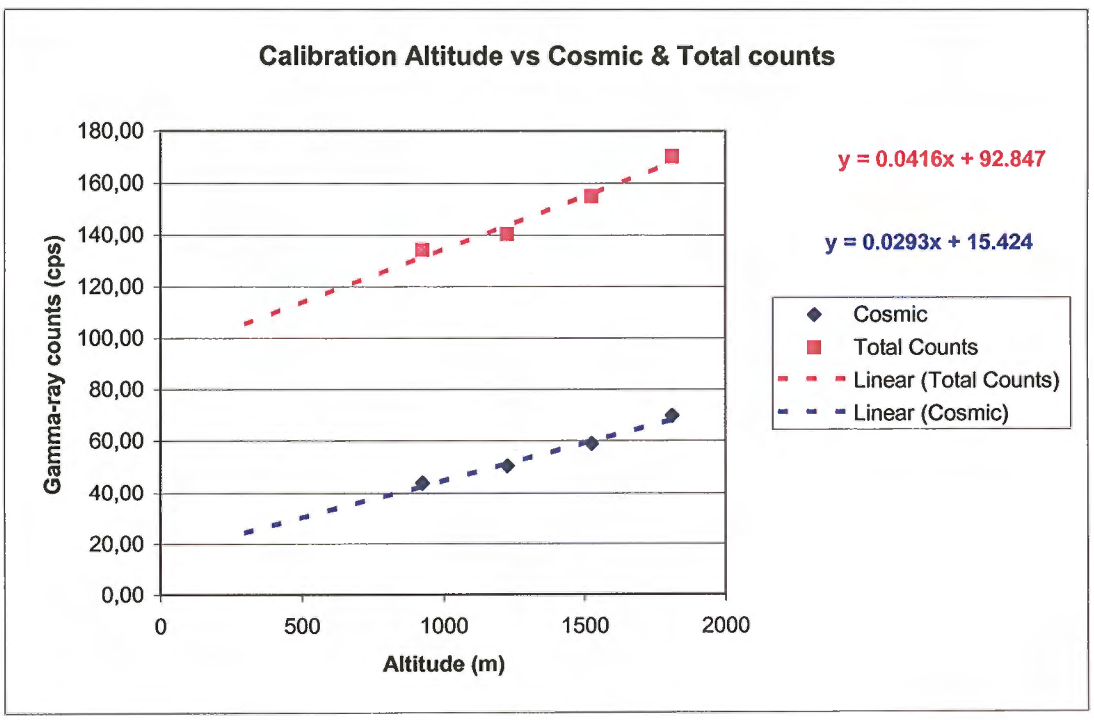
Equipment Calibration and Tests

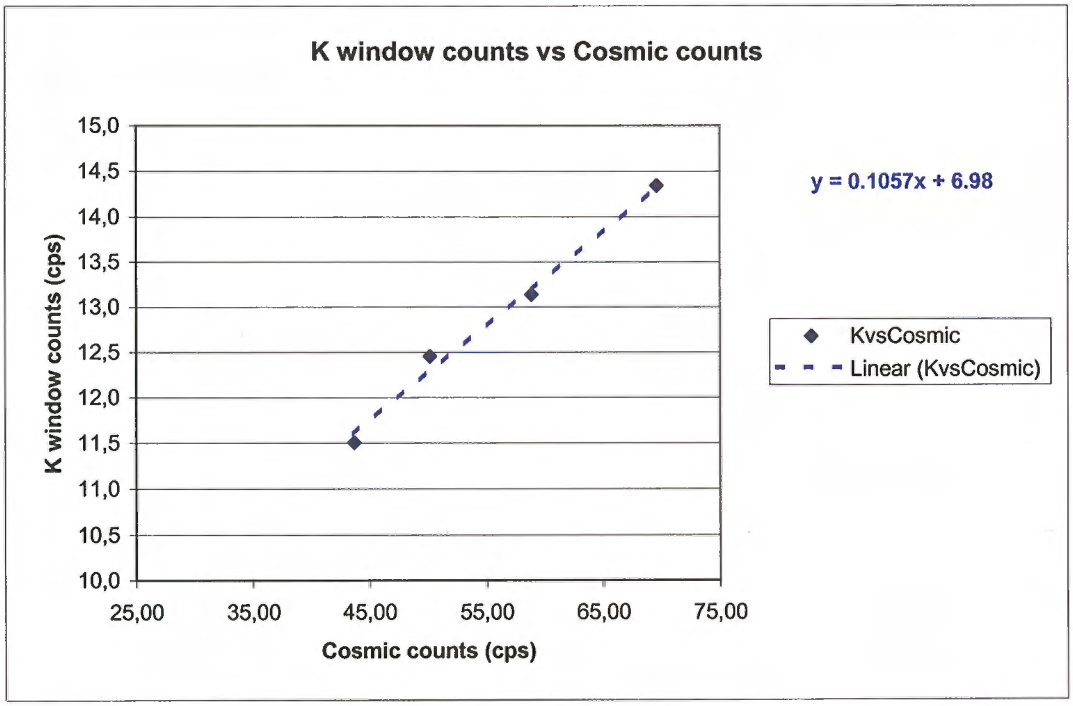
Cosmic-ray Calibration for Pico System
Juin 2nd 2010, Barnoin Camp, QC. A-Star C-GFBW

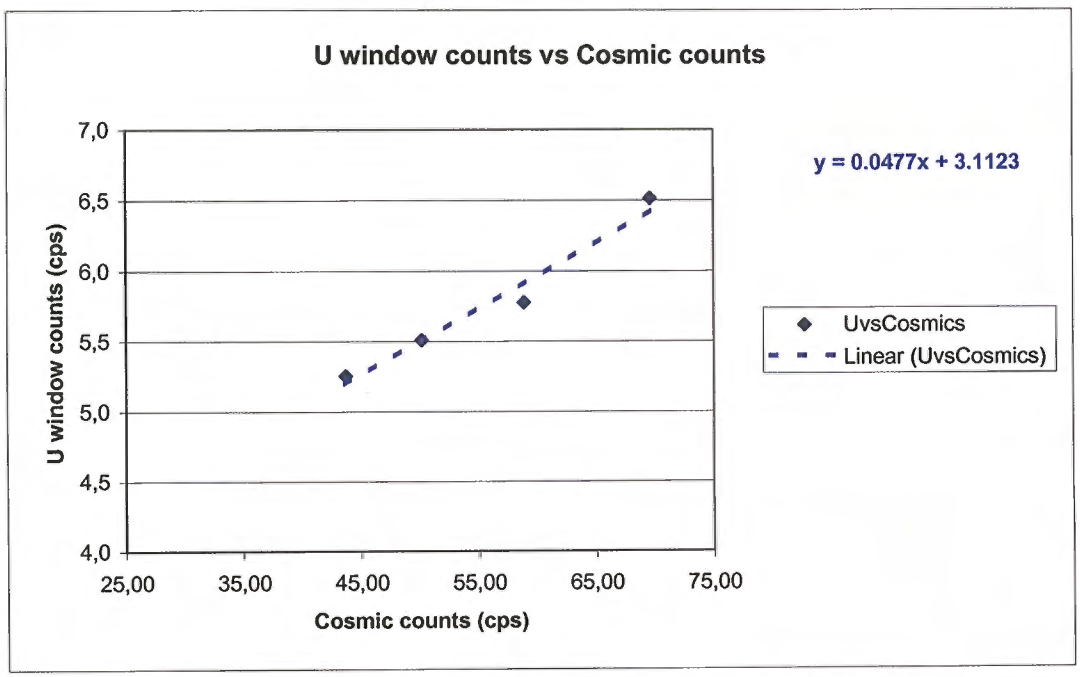
Altitude (ft)	Altitude (m)	K (cps)	U (cps)	Th (cps)	TC (cps)	Cosmic (cps)
995	303					
1983	604					
3038	926	11,5	5,3	5,1	134,0	43,68
4022	1226	12,5	5,5	5,7	140,4	50,15
5002	1525	13,1	5,8	6,7	154,9	58,86
5938	1810	14,3	6,5	7,4	170,1	69,59

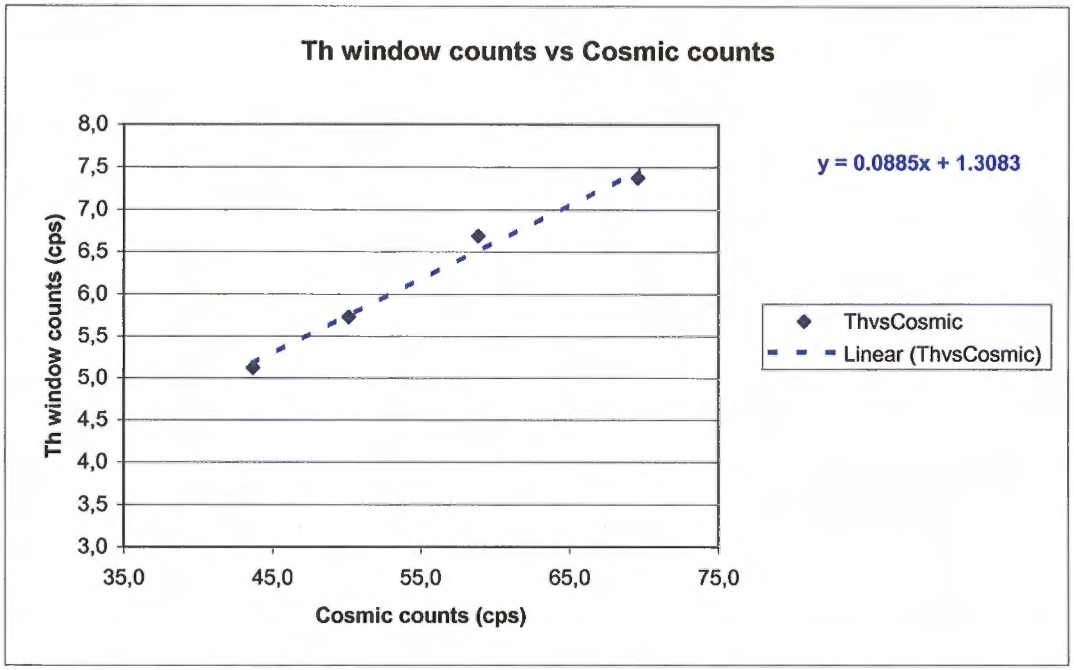
Calibration summary

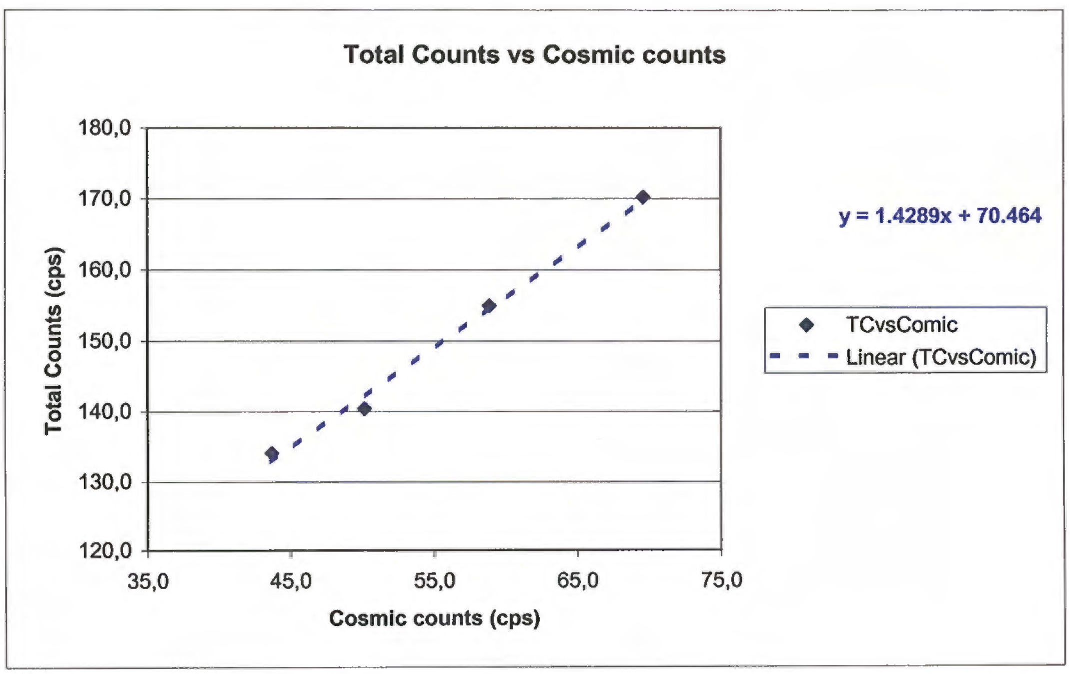
Window	Aircraft (cps)	Cosmic (cps/comic cps)
K	7,0	0,106
U	3,1	0,048
Th	1,3	0,089
TC	70,5	1,429




K window counts vs Cosmic counts
y = 0.1057x + 6.98
KvsCosmic
Linear (KvsCosmic)
K window counts (cps)
15,0
14,5
14,0
13,5
13,0
12,5
12,0
11,5
11,0
10,5
10,0
25,00
35,00
45,00
55,00
65,00
75,00
Cosmic counts (cps)

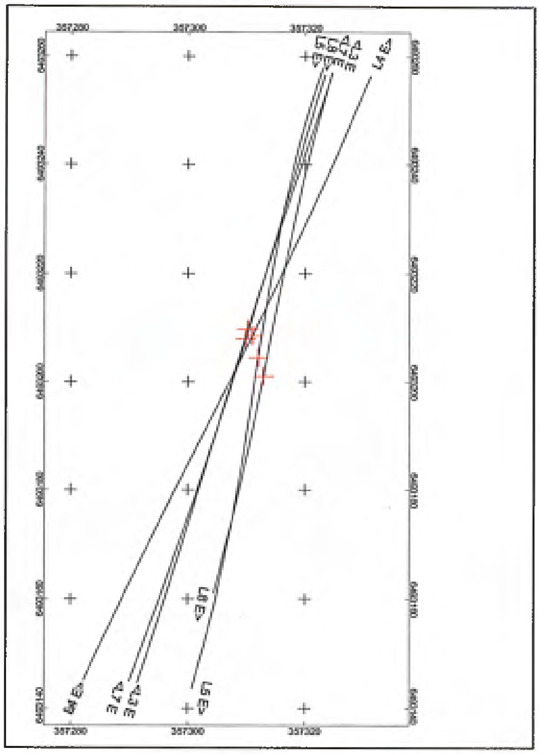

U window counts vs Cosmic counts
y = 0.0477x + 3.1123
UvsCosmics
Linear (UvsCosmics)
U window counts (cps)
7,0
6,5
6,0
5,5
5,0
4,5
4,0
25,00
35,00
45,00
55,00
65,00
75,00
Cosmic counts (cps)


Th window counts vs Cosmic counts
8,0
7,5
7,0
6,5
6,0
5,5
5,0
4,5
4,0
3,5
3,0
Th window counts (cps)
35,0
45,0
55,0
65,0
75,0
Cosmic counts (cps)
y = 0.0885x + 1.3083
ThvsCosmic
Linear (ThvsCosmic)


Total Counts vs Cosmic counts
180,0
170,0
160,0
150,0
140,0
130,0
120,0
Total Counts (cps)
35,0
45,0
55,0
65,0
75,0
Cosmic counts (cps)
y = 1.4289x + 70.464
TCvsComic
Linear (TCvsComic)

Calibration et tests effectués:

Test de lag:



Project:	M08516	Pilot:	Michel Séguin
Location:	Kangiq, QC	Operator :	Guillaume Perron, tech.
Client:	Azimut Exploration Inc.	Compiled :	Josianne Morel, Ing Jr.
Date:	July 23th 2008	Aircraft:	AS350-B2

Line	X (m)	Y (m)	Vitesse (nT)
3-7	357300,6	6493191,5	16,5
4-8	357318,7	6493223,2	18,5
		Vitesse Moyenne (m/s)	17,5
		Distance (m)	36,5
		Lag (s)	1,0

Tableau 1 : Résultats du test de lag

RAPPORT JOURNALIER

Contrat:	M08516	*# Bloc*	Kangiq(A1,D,E)	*Modèle:*	AS350 B2	*Levé:*	Mag, Spectro	*Équipe GPR*
Client:	Azimut			*Immatriculation:*	C-GFBW	*Position station de base*		*Responsable:* Guillaume Perron
Endroit:	Camp Barnoin			*Pilote:*	Michel Séguin	*Long.:*	65° 27' 21"	*Opérateur:* Marc Hetu
Hélipad:	Camp Barnoin			*Mécano:*	Mathieu Leblanc	*Lat.:*	58° 33' 19"	

Jour #	Date	Équipiers	Activités et commentaires *	Prévus: Opé.	Hélico (heures)	Jour de levé	Levé (km)	Météo (Journée)	Carburant (Baril)
							4376,3		
1	28-Jun-2008	GP, MH	Installation des équipements et vol d'essai		0,8		0,0		
2	29-Jun-2008	GP, MH	Resolution du problème le matin. 2 Vols en après-midi et soirée. Bloc A1	GP	5,3		317,1	0	
3	30-Jun-2008	GP, MH	1 vol le matin. Vent trop fort en après-midi. Bloc A1	MH	2,8		176,8	0	
4	1-Jul-2008	GP, MH	Pluie et vent		0,0		0,0	1	
5	2-Jul-2008	GP, MH	Pluie et vent. Test de cosmic et altimetre.		0,7		0,0	1	
6	3-Jul-2008	GP, MH	Pluie et vent fort. Recuperation du stock envoyé a george river		0,0		0,0	1	
7	4-Jul-2008	GP, MH	Pluie et plafond bas. Tentative en après.midi, pluie sur le bloc.		0,2		0,0	1	
8	5-Jul-2008	GP, MH	Pluie et plafond bas. 1 Vol en soirée, Tie lines.	GP	3,1		188,0	0	
9	6-Jul-2008	GP, MH	Humide le matin. 2 Vols en après-midi.	MH	6,8		433,2	0	
10	7-Jul-2008	GP, MH	Vent fort, plui et bruine.		0,0		0,0	1	
11	8-Jul-2008	GP, MH	Vent fort, pluie, bruine et neige.		0,0		0,0	1	
12	9-Jul-2008	GP, MH	Pluie et plafond bas.		0,0		0,0	1	
13	10-Jul-2008	GP, MH	3 Vols!	MH	9,6		600,0	0	
14	11-Jul-2008	GP, MH	3 Vols!	MH	8,9		523,7	0	
15	12-Jul-2008	GP, MH	3 Vols! Début de l'extension pour les Blocs 1,2,3 et 4.	MH	9,9		477,5	0	
16	13-Jul-2008	GP, MH	3 vols! Vol du bloc 3 avec les lignes modifiées E-O aux 200m.	MH	8,2		568,0	0	
17	14-Jul-2008	GP, MH	Humide la matin. 1 Vol en fin d'avant midi et 1 en après-midi. Test de trèfle et de Lag.	MH	6,0		307,0	0	
18	15-Jul-2008	GP, MH	Humide et plafond bas		0,0		0,0	1	
19	16-Jul-2008	GP, MH		MH	10,1		577,2	0	
20	17-Jul-2008	GP, MH		MH	3,3		207,8	0	
21	18-Jul-2008	GP, MH							
				TOTAL jours 1 à 20	75,7		4376,3	8,0	

15,5	jours de levé, attente et installation incluse
1,0	Jour d'installation et vol d'essai
0	Jours d'Attente , station VLF
5,5	Jours d'Attente , Météo
0	Jours d'Attente , Canadien Hélicoptère
0	Jours d'Attente , Bris d'équipement
0	Jours de préparation et mob / démob
6	Total des Jours d'Attente, rechargeables
9,0	jours de levé excluant l'installation sur site, sans attente

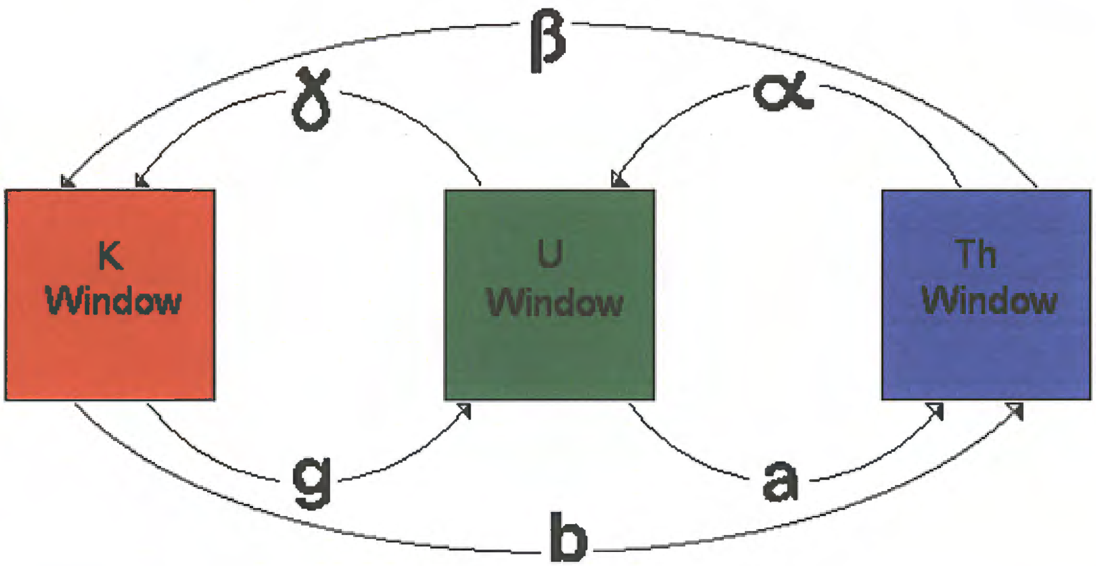
GP=Guillaume Perron

MH=Marc Hetu

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

Spectrometer: GRS-10 from Pico Envirotec

Stripping Ratios



Th into U	α (alpha)	0.2431
Th into K	β (beta)	0.4074
U into K	γ (gamma)	0.7174
U into Th	a	0.0344
K into Th	b	0.0000
K into U	g	0.0000

System Sensitivities (60 m ground clearance)

Window	Sensitivity	Attenuation
TC	16.46 cps/nGy/h	-0.0076 /m
K	49.86 cps/e%K	-0.0078 /m
U	6.07 cps/ppm eU	-0.0058 /m
Th	2.89 cps/ppm eTh	-0.0060 /m

APPENDIX B

Miniature map samples

NUMÉRIQUE

PAGE(S) DE DIMENSION HORS STANDARD
NUMÉRISÉE ET POSITIONNÉE À LA SUITE DES
PRÉSENTES PAGES STANDARDS.

APPENDIX C
Maps

Drawing numbers:

08-09-113-00 to 08-09-121-00

APPENDIX D

Digital Data on CD-ROM

CD contents

File Name	Description	Format
REPORT		
M08516_Report.pdf	Data acquisition report	Acrobat
M08516_Lag_Calibration.pdf	Lag calibration report	Acrobat
M08516_Production.pdf	Production information	Acrobat
M08516_Cosmic_test.pdf	Cosmic Calibration test	Acrobat
Database_Channel_Description.pdf	List of database channels of magnetic and spectrometric databases and corresponding units	Acrobat

DATA\MAG		
M08516_MAG.XYZ M08516_MAG.GDB	Magnetic database	Geosoft .XYZ and .GDB
TMF.grd	Total Magnetic Field grid	Geosoft .GRD
FVD.grd	First Vertical Derivative	Geosoft .GRD
GIs	Including all projection information files	MapInfo and other .GI
M08516_TMF-(08-09-114-00).map	IGRF-corrected Total Magnetic Field map, (nT)	Geosoft .MAP
M08516_FVD-(08-09-115-00).map	First Vertical Derivative map, (nT/m)	Geosoft .MAP
M08516_BASE_EAST-(08-08-113-00).map	Flight path Recovery and Property limits	Geosoft .MAP
TIFFs	Geo referenced images	.TIFF
GMs	Including all GM files used in the MapInfo software to distinguish a Geosoft map file from a MapInfo file	Geosoft .GM

\Spectro		
M08516_RAD.GDB M08516_RAD.XYZ	Spectrometric database	Geosoft .XYZ and .GDB
U.grd	Processed equivalent uranium concentration grid	Geosoft .GRD
Th.grd	Processed equivalent thorium concentration grid	Geosoft .GRD
K.grd	Processed potassium concentration grid	Geosoft .GRD
TC.grd	Processed air absorbed dose rate from total count grid	Geosoft .GRD
UTh.grd	Uranium / Thorium ratio	Geosoft .GRD
DTM.grd	Digital Terrain Model	Geosoft .GRD
GIs	Including all projection information files	MapInfo and other .GI
M08516_U-(08-09-117-00).map	Equivalent Uranium concentration map, (ppm)	Geosoft .MAP
M08516_Th-(08-09-118-00).map	Equivalent Thorium concentration map, (ppm)	Geosoft .MAP
M08516_K-(08-09-116-00).map	Potassium concentration map, (%)	Geosoft .MAP
M08516_TC-(08-09-119-00).map	Air absorbed dose rate from total count map, (nGy/h)	Geosoft .MAP
M08516_DTM-(08-09-120-00).map	Digital Terrain Model map, (m)	Geosoft .MAP
M08516_UTh_-(08-09-121-00).map	Equivalent Uranium / Thorium ratio	Geosoft .MAP
TIFFs	Geo referenced images	.TIFF
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	m	UTM Northing (NAD 83 zone 20N)
Y	m	UTM Northing (NAD 83 zone 20N)
Z	m	GPS height (in helicopter)
Lat	Dec. degrees	Latitude WGS84
Lon	Dec. degrees	Longitude WGS84
Time_GPS	HH:MM:SS.SS	GPS time
Left	nT	Despiked left mag sensor
Right	nT	Despiked right mag sensor
Basemag	nT	base station magnetic readings
TMF	nT	IGRF-corrected Total Magnetic Field
IGRF	nT	International Geo Reference Field
FVD	nT/m	First Vertical Derivative

SPECTROMETRY DATABASE CHANNEL DESCRIPTION

Channel name	Unit	Description
Fiducial		Fiducial increments
X	m	UTM Easting (NAD 83 zone 20N)
Y	m	UTM Northing (NAD 83 zone 20N)
Z	m	GPS height (in helicopter)
Lat	Dec. degrees	Latitude WGS84
Lon	Dec. degrees	Longitude WGS84
Time_GPS	HH:MM:SS.SS	GPS time
Temperature	celsius	Temperature converted to Celsius
Altitude	m	Radar Altimeter (in helicopter)
Pressure	mBar	Pressure
Spectro	256 channel	Measured spectrum raw but lagged and despiked (database only) in 256 channel vector array format
SVDspec	256 channel	Processed spectrum using NASVD (database only) in 256 channel vector array format
TC	nGy/h	Absorbed dose rate derived from total count readings
K	%	Potassium concentration reading
U	ppm	Equivalent Uranium concentration reading
Th	ppm	Equivalent Thorium concentration reading
DTM	Meters	Digital Terrain Model