Report on a Helicopter-Borne AeroTEM II Electromagnetic & Magnetometer Survey

Aeroquest Job # 07032
Lac Panache Project
Ontario
NTS 041I03,05,06

for

ARGOSY
MINERALS INC

by

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Report date: September, 2006

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2. INTRODUCTION

This report describes a helicopter-borne geophysical survey carried out on behalf of Argosy Minerals Inc. on the Lac Panache Project, Ontario.

The principal geophysical sensor is Aeroquest's exclusive AeroTEM II time domain helicopter electromagnetic system which is employed in conjunction with a high-sensitivity cesium vapour magnetometer. The AeroTEM II 'Bravo' system was used in this survey. Ancillary equipment includes a real-time differential GPS navigation system, radar altimeter, video recorder, and a base station magnetometer. Full-waveform streaming EM data is recorded at 38,400 samples per second. The streaming data comprise the transmitted waveform, and the X component and Z component of the resultant field at the receivers. A secondary acquisition system (RMS) records the ancillary data.

The total line kilometres presented in the maps and data totalled 340.2 of which 323.9 km fell within the defined project areas (Appendix 1). The survey flying described in this report took place between July 23rd and July 24th , 2006.

3. SURVEY AREA

The project area is located approximately 50km southwest of Sudbury along Highway 17 or the Trans-Canada Highway (Figure 1). The nearest town to the area is Espanola just a few kms to the west of the most westerly block (map Plate 1) (Figure 2). Access to the project area is good with the above mentioned Highway 17 running E-W just a few kms to the north. Highway 6 runs south through Espanola and there are a number of smaller roads and tracks also in the area. The terrain is fairly flat to undulating with a number of lakes and streams in the vicinity, most notably Lake Panache, which gives the project its name, located close to the eastern blocks and Wabagishek Lake to the west.

The surveying conducted consisted of three regular shaped blocks with areas of 17.5, 2.5 and 9km² respectively for Blocks 1,2 and 3. Each area has a number of mining claims as outlined in table 1.

The base of operations was Sudbury and the field crew stayed at the Holiday Inn. Fuel chaching was located at N 46 26.381, W 081 29.935. The survey helicopter was provided by Gateway Helicopters, North Bay, Ontario.
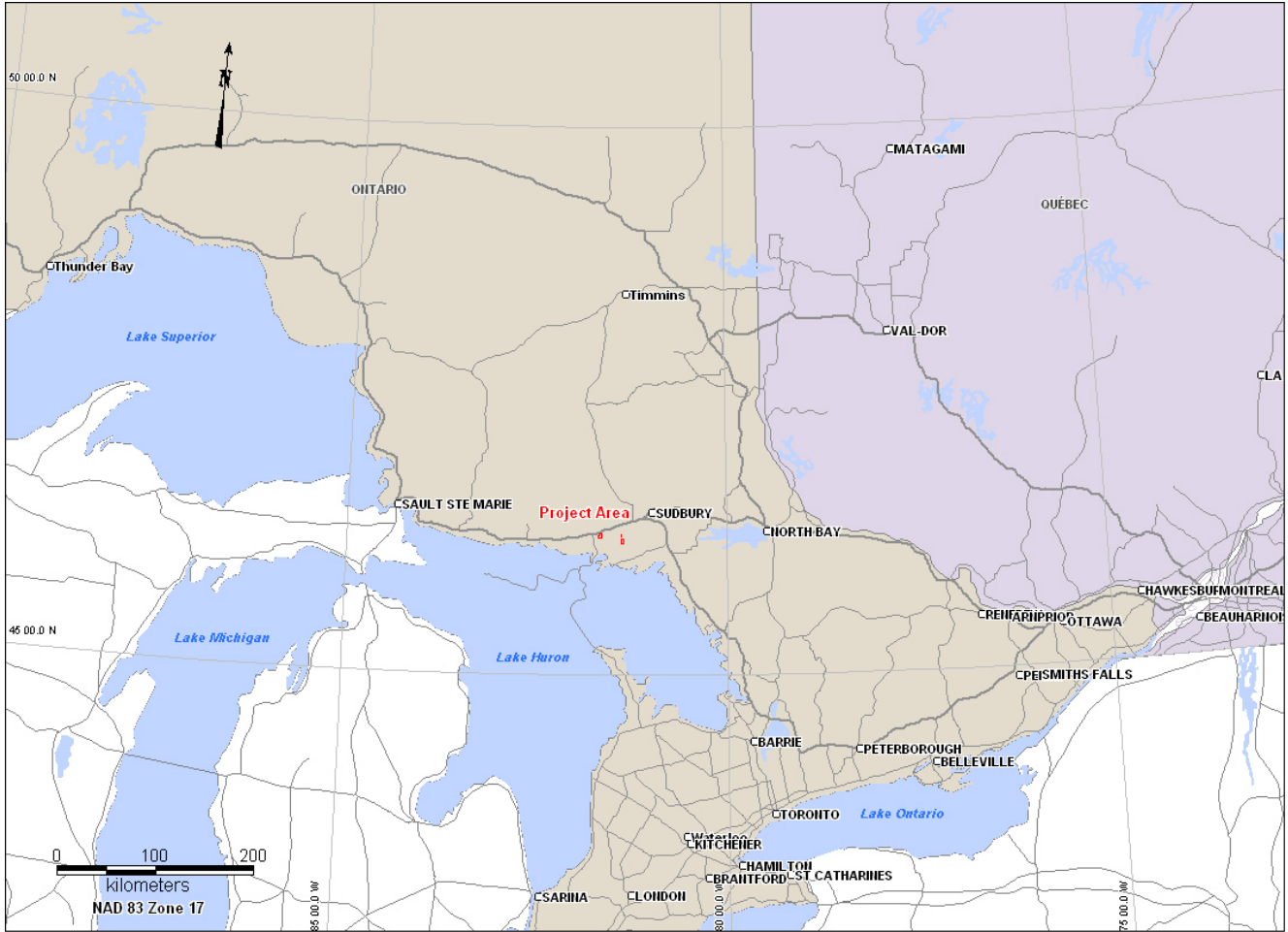
Figure 1. Regional location map of the project area.
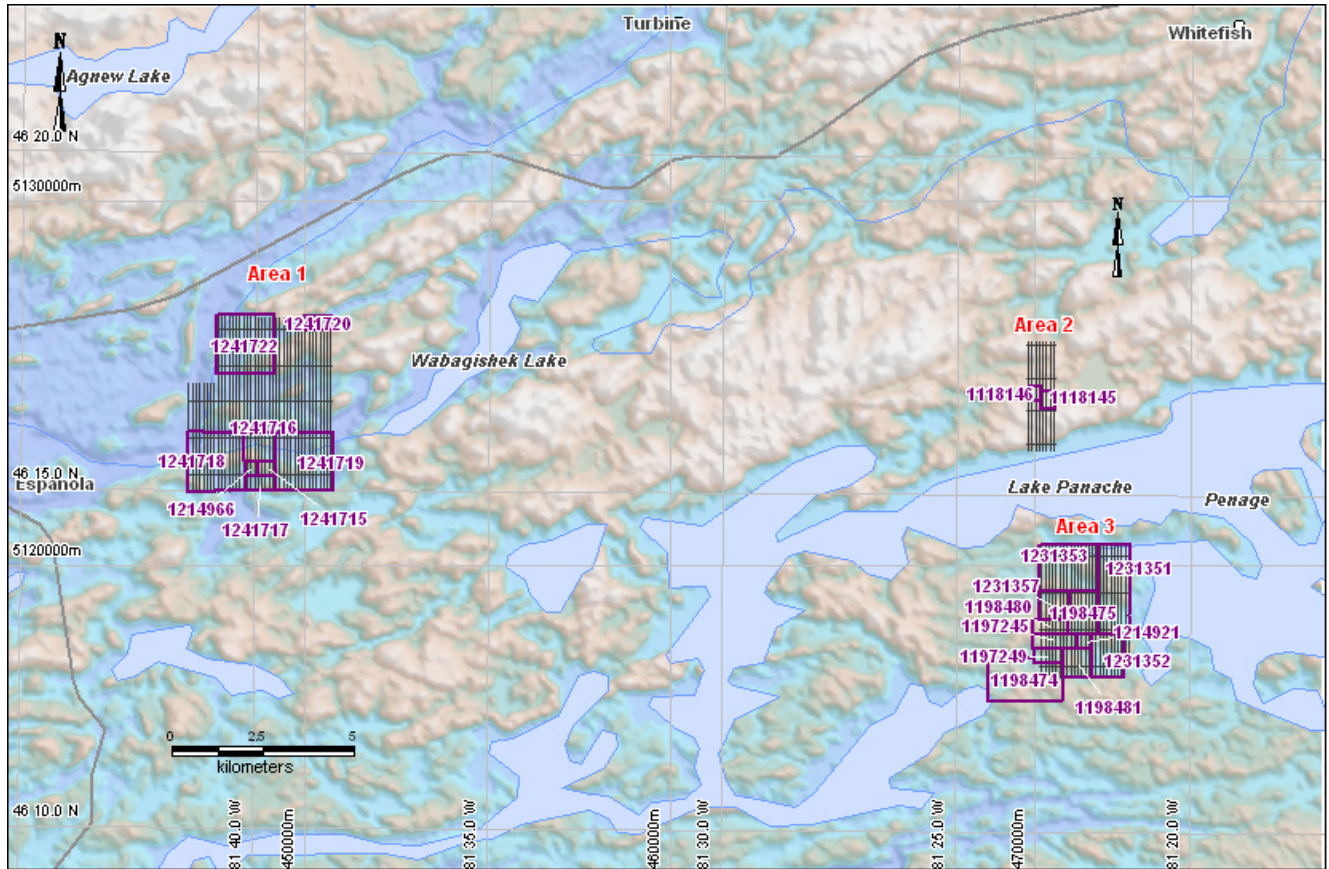
Figure 2. Project Flight Paths and mining claims

Township/Area	Claim Number	Claim Due Date	Owner	Block
FOSTER	1214966	2009-Apr-20	SALO, GORDON RICHARD	Area 1
FOSTER	1241715	2007-Apr-20	SALO, GORDON RICHARD	Area 1
FOSTER	1241716	2007-Apr-20	SALO, GORDON RICHARD	Area 1
FOSTER	1241717	2007-Apr-20	SALO, GORDON RICHARD	Area 1
FOSTER	1241718	2007-Apr-20	SALO, GORDON RICHARD	Area 1
FOSTER	1241719	2007-Apr-20	SALO, GORDON RICHARD	Area 1
NAIRN	1241720	2007-Dec-14	SALO, GORDON RICHARD	Area 1
NAIRN	1241722	2007-Dec-14	SALO, GORDON RICHARD	Area 1
DIEPPE	1118145	2010-Apr-18	SALO, GORDON RICHARD	Area 2
DIEPPE	1118146	2010-Apr-18	SALO, GORDON RICHARD	Area 2
DIEPPE	1197245	2008-Mar-06	SALO, GORDON RICHARD	Area 3
DIEPPE	1197249	2008-Mar-06	SALO, GORDON RICHARD	Area 3
DIEPPE	1198474	2008-Apr-15	SALO, GORDON RICHARD	Area 3
DIEPPE	1198475	2008-Apr-15	SALO, GORDON RICHARD	Area 3
DIEPPE	1198480	2007-Jun-14	SALO, GORDON RICHARD	Area 3
DIEPPE	1198481	2007-Jun-14	SALO, GORDON RICHARD	Area 3
DIEPPE	1214921	2007-Jun-14	SALO, GORDON RICHARD	Area 3
DIEPPE	1231351	2008-Apr-14	SALO, GORDON RICHARD	Area 3
DIEPPE	1231352	2008-Apr-14	SALO, GORDON RICHARD	Area 3
DIEPPE	1231353	2008-Apr-14	SALO, GORDON RICHARD	Area 3
DIEPPE	1231357	2007-Jun-07	SALO, GORDON RICHARD	Area 3

Table 1. Mining Claims in the project area

4. LOCAL GEOLOGY

(taken from Argosy Minerals Inc. website www.argosyminerals.com, September, 2006)

The Lac Panache property lies within the Southern Province of the Canadian Precambrian Shield where folded metasedimentary rocks of the early Proterozoic (2.3 - 2.4 billion year old) Huronian Supergroup have been intruded by 2.2 billion year mafic intrusive rocks of the Nipissing Suite.

The geological model envisages disseminated sulphide-bearing magma intruding into a chamber via an in flow feeder dyke. Within the magma chamber magmatic segregation occurs resulting in the possible deposition of massive sulphides. These massive sulphides are subject to erosion via further magma pulses and there is evidence of "ripped" massive sulphide fragments removed from the magma chamber in renewed magma pulses.

Central to the project area is a 6.5 km long by up to 2 km wide gabbro intrusion within which reconnaissance check sampling by Argosy has returned grades reaching 0.47 g/t platinum, 1.15 g/t palladium, 0.3% copper and 0.25 g/t gold in gabbros carrying disseminated coarse clots of sulphides (pyrrhotite - chalcopyrite). Elsewhere within the project area massive sulphides and quartz-sulphide veins have returned grades with up to 9.16% cobalt and 3.56% nickel (in sampling by the Ontario Geological Survey) and 8.0 g/t gold (in a sulphide-quartz vein).

5. SURVEY SPECIFICATIONS AND PROCEDURES

The survey specifications are summarized in the following table:

Survey Block	Line Spacing (m)	Line direction	Survey Coverage (line-km)	Dates Flown
Area 1	100	N-S (0º)	196.6	July 23-24, 2006
Area 2	100	N-S (0º)	27.4	July 23-24, 2006
Area 3	100	N-S (0º)	99.9	July 23-24, 2006

The survey coverage was calculated by adding up the along-line distance of the survey lines and control (tie) lines as presented in the final Geosoft database. The survey was flown with a line spacing of 100 m. The control (tie) lines were flown perpendicular to the survey lines with a spacing of 1 km. The nominal EM bird terrain clearance is 30m, but can be higher in more rugged terrain due to safety considerations and the capabilities of the aircraft. The magnetometer sensor is mounted in a smaller bird connected to the tow rope 17 metres above the EM bird and 21 metres below the helicopter (Figure 4). Nominal survey speed over relatively flat terrain is 75 km/hr and is generally lower in rougher terrain. Scan rates for ancillary data acquisition is 0.1 second for the magnetometer and altimeter, and 0.2 second for the GPS determined position. The EM data is acquired as a data stream at a sampling rate of 38,400 samples per second and is processed to generate final data at 10 samples per

second. The 10 samples per second translates to a geophysical reading about every 1.5 to 2.5 metres along the flight path.

5.1. Navigation

Navigation is carried out using a GPS receiver, an AGNAV2 system for navigation control, and an RMS DGR-33 data acquisition system which records the GPS coordinates. The x-y-z position of the aircraft, as reported by the GPS, is recorded at 0.2 second intervals. The system has a published accuracy of under 3 metres. A recent static ground test of the Mid-Tech WAAS GPS yielded a standard deviation in x and y of under 0.6 metres and for z under 1.5 metres over a two-hour period.

5.2. System Drift

Unlike frequency domain electromagnetic systems, the AeroTEM II system has negligible drift due to thermal expansion. The operator is responsible for ensuring the instrument is properly warmed up prior to departure and that the instruments are operated properly throughout the flight. The operator maintains a detailed flight log during the survey noting the times of the flight and any unusual geophysical or topographic features. Each flight included at least two high elevation 'background' checks. During the high elevation checks, an internal 5 second wide calibration pulse in all EM channels was generated in order to ensure that the gain of the system remained constant and within specifications.

5.3. Field QA/QC Procedures

On return of the pilot and operator to the base, usually after each flight, the AeroDAS streaming EM data and the RMS data are carried on removable hard drives and FlashCards, respectively and transferred to the data processing work station. At the end of each day, the base station magnetometer data on FlashCard is retrieved from the base station unit.

Data verification and quality control includes a comparison of the acquired GPS data with the flight plan; verification and conversion of the RMS data to an ASCII format XYZ data file; verification of the base station magnetometer data and conversion to ASCII format XYZ data; and loading, processing and conversion of the steaming EM data from the removable hard drive. All data is then merged to an ASCII XYZ format file which is then imported to an Oasis database for further QA/QC and for the production of preliminary EM, magnetic contour, and flight path maps.

Survey lines which show excessive deviation from the intended flight path are re-flown. Any line or portion of a line on which the data quality did not meet the contract specification was noted and reflown.

6. AIRCRAFT AND EQUIPMENT

6.1. Aircraft

A Eurocopter (Aerospatiale) AS350B2 "A-Star" helicopter - registration C-FXFU was used as survey platform (Figure 3). The helicopter was operated by Gateway Helicopters, north bay, Ontario. The survey aircraft was flown at a nominal terrain clearance of 220 ft (70 m).

Figure 3. Helicopter of the type used in the survey.

6.2.   Magnetometer

The Aeroquest airborne survey system employs the Geometrics G-823A cesium vapour magnetometer sensor installed in a two metre towed bird airfoil attached to the main tow line, 17 metres below the helicopter (Figure 4A). The sensitivity of the magnetometer is 0.001 nanoTesla at a 0.1 second sampling rate. The nominal ground clearance of the magnetometer bird is 51 metres (170 ft.). The magnetic data is recorded at 10Hz by the RMS DGR-33.

6.3.   Electromagnetic System

The electromagnetic system is an AeroQuest AeroTEM© II time domain towed-bird system (Figure 4B). The current AeroTEM© transmitter dipole moment is 38.8 kNIA. The AeroTEM© bird is towed 38 m (125 ft) below the helicopter. More technical details of the system may be found in Appendix 4.

The wave-form is triangular with a symmetric transmitter on-time pulse of 1.10 ms and a base frequency of 150 Hz (Figure 5). The current alternates polarity every on-time pulse. During every Tx on-off cycle (300 per second), 128 contiguous channels of raw x and z component (and a transmitter current monitor, itx) of the received waveform are measured. Each channel width is 26.04 microseconds starting at the beginning of the transmitter pulse. This 128 channel data is referred to as the raw streaming data. The AeroTEM© system has two separate EM data recording streams, the conventional RMS DGR-33 and the AeroDAS system which records the full waveform.
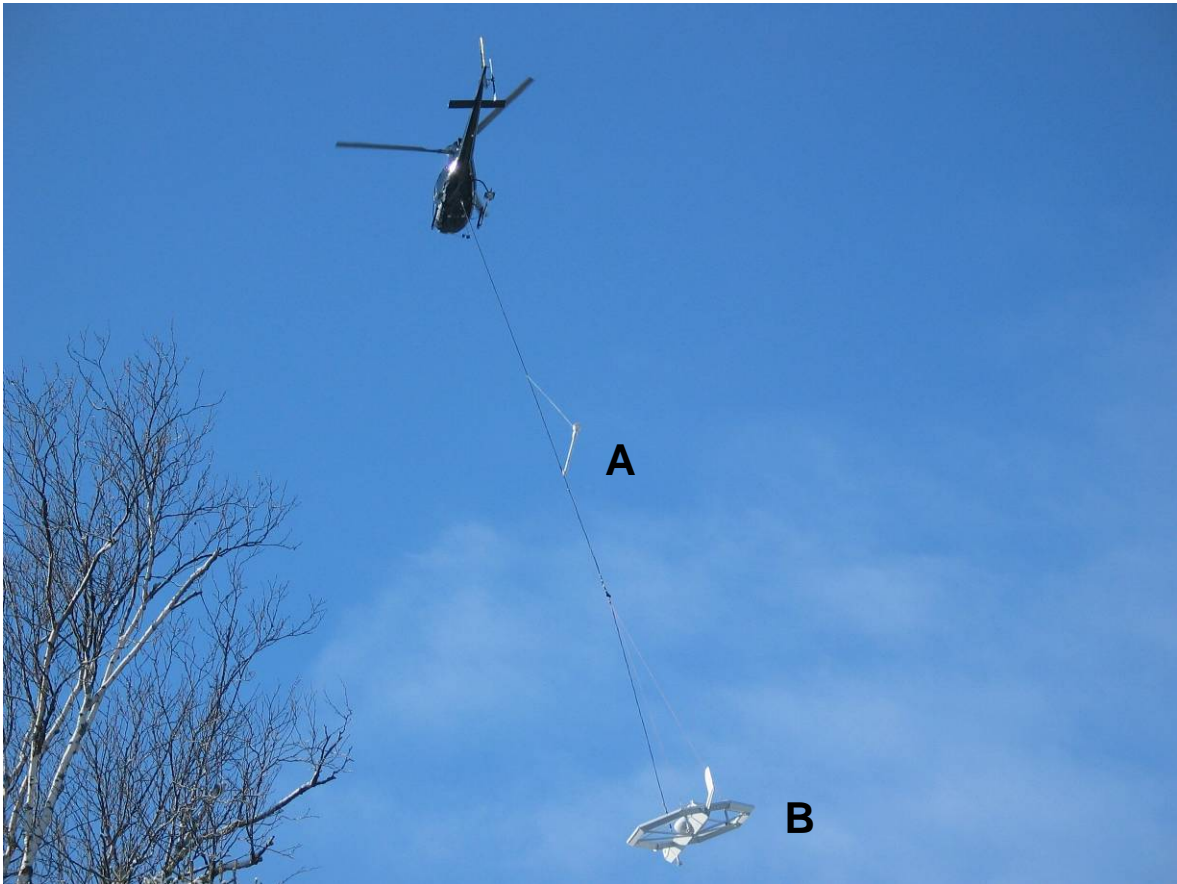
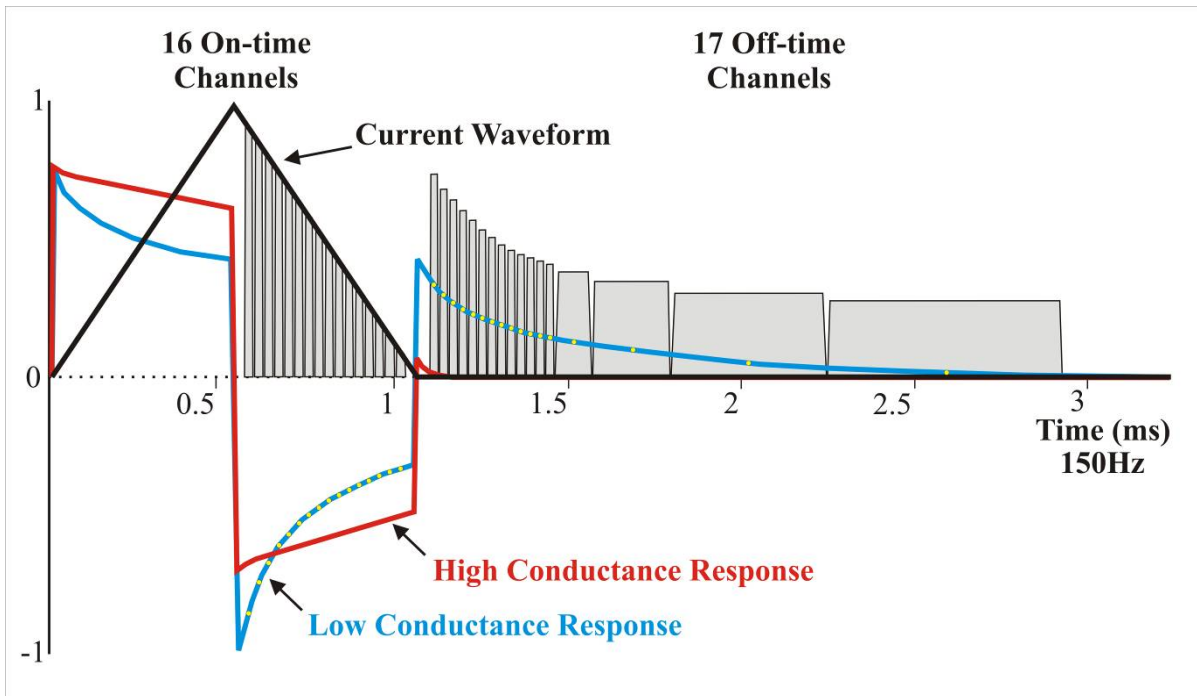Figure 4. The magnetometer bird (A) and AeroTEM II EM bird (B)

Figure 5. Schematic of Transmitter and Receiver waveforms

6.4. AERODAS Acquisition System

The 128 channels of raw streaming data are recorded by the AeroDAS acquisition system (Figure 6) onto a removable hard drive. The streaming data are processed post-survey to yield 33 stacked and binned on-time and off-time channels at a 10 Hz sample rate. The timing of the final processed EM channels is described in the following table:

Channel:	Start Gate	End Gate	Start (us)	Stop (us)	Mid (us)	Width (us)
1 ON	25	25	651.0	677.0	664.0	26.0
2 ON	26	26	677.0	703.1	690.1	26.0
3 ON	27	27	703.1	729.1	716.1	26.0
4 ON	28	28	729.1	755.2	742.1	26.0
5 ON	29	29	755.2	781.2	768.2	26.0
6 ON	30	30	781.2	807.2	794.2	26.0
7 ON	31	31	807.2	833.3	820.3	26.0
8 ON	32	32	833.3	859.3	846.3	26.0
9 ON	33	33	859.3	885.4	872.3	26.0
10 ON	34	34	885.4	911.4	898.4	26.0
11 ON	35	35	911.4	937.4	924.4	26.0
12 ON	36	36	937.4	963.5	950.5	26.0
13 ON	37	37	963.5	989.5	976.5	26.0
14 ON	38	38	989.5	1015.6	1002.5	26.0
15 ON	39	39	1015.6	1041.6	1028.6	26.0
16 ON	40	40	1041.6	1067.6	1054.6	26.0
0 OFF	44	44	1145.8	1171.8	1158.8	26.0
1 OFF	45	45	1171.8	1197.8	1184.8	26.0
2 OFF	46	46	1197.8	1223.9	1210.9	26.0
3 OFF	47	47	1223.9	1249.9	1236.9	26.0
4 OFF	48	48	1249.9	1276.0	1262.9	26.0
5 OFF	49	49	1276.0	1302.0	1289.0	26.0
6 OFF	50	50	1302.0	1328.0	1315.0	26.0
7 OFF	51	51	1328.0	1354.1	1341.1	26.0
8 OFF	52	52	1354.1	1380.1	1367.1	26.0
9 OFF	53	53	1380.1	1406.2	1393.1	26.0
10 OFF	54	54	1406.2	1432.2	1419.2	26.0
11 OFF	55	55	1432.2	1458.2	1445.2	26.0
12 OFF	56	56	1458.2	1484.3	1471.3	26.0
13 OFF	57	60	1484.3	1588.4	1536.4	104.2
14 OFF	61	68	1588.4	1796.8	1692.6	208.3
15 OFF	69	84	1796.8	2213.4	2005.1	416.6
16 OFF	85	110	2213.4	2890.4	2551.9	677.0

6.5. RMS DGR-33 Acquisition System

In addition to the magnetics, altimeter and position data, six channels of real time processed off-time EM decay in the Z direction and one in the X direction are recorded by the RMS DGR-33 acquisition system at 10 samples per second and plotted real-time on the analogue chart recorder. These channels are derived by a binning, stacking and filtering procedure on the raw streaming data. The primary use of the RMS EM data (Z1 to Z6, X1) is to provide for real-time QA/QC on board the aircraft.

The channel window timing of the RMS DGR-33 6 channel system is described in the table below.

RMS Channel	Start time (microsec)	End time (microsec)	Width (microsec)	Streaming Channels
Z1, X1	1269.8	1322.8	52.9	48-50
Z2	1322.8	1455.0	132.2	50-54
Z3	1428.6	1587.3	158.7	54-59
Z4	1587.3	1746.0	158.7	60-65
Z5	1746.0	2063.5	317.5	66-77
Z6	2063.5	2698.4	634.9	78-101

Figure 6. AeroTEM II Instrument Rack. Includes (AeroDAS system and RMS DGR-33 and AeroTEM power supply, data acquisition computer and AG-NAV2 navigation)

6.6.   Magnetometer Base Station

The base magnetometer was a Geometerics G-858 cesium vapour magnetometer. Data logging and UTC time syncronisation was carried out within an external data logging computer, with an external GPS providing the timing signal. That data logging was configured to measure at 0.1 second intervals (10Hz). Digital recording resolution was 0.001 nT. The sensor was placed on a tripod in an area free of cultural noise sources. A continuously updated display of the base station values was available for viewing and regularly monitored to ensure acceptable data quality and diurnal levels.

6.7.   Radar Altimeter

A Terra TRA 3500/TRI-30 radar altimeter is used to record terrain clearance. The antenna was mounted on the outside of the helicopter beneath the cockpit. The recorded data represents the height of the antenna, i.e. helicopter, above the ground. The Terra altimeter has an altitude accuracy of +/- 1.5 metres.

6.8.   Video Tracking and Recording System

A high resolution colour digital video camera is used to record the helicopter ground flight path along the survey lines. The video is digitally annotated with GPS position and time and can be used to verify ground positioning information and cultural causes of anomalous geophysical responses.
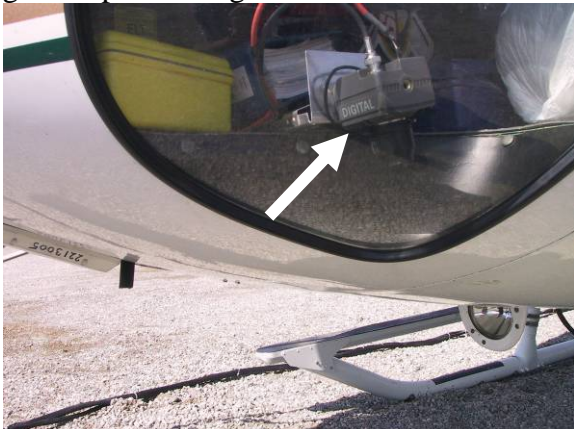

Figure 7. Digital video camera typical mounting location.

6.9.   GPS Navigation System

The navigation system consists of an Ag-Nav Incorporated AG-NAV2 GPS navigation system comprising a PC-based acquisition system, navigation software, a deviation indicator in front of the aircraft pilot to direct the flight, a full screen display with controls in front of the operator, a Mid-Tech RX400p WAAS-enabled GPS receiver mounted on the instrument rack and an antenna mounted on the magnetometer bird. WAAS (Wide Area Augmentation System) consists of approximately 25 ground reference stations positioned across the United States that monitor GPS satellite data. Two master stations, located on the east and west coasts, collect data from the reference stations and create a GPS correction message. This correction accounts for GPS satellite orbit and clock drift plus signal delays caused by the atmosphere and ionosphere. The corrected differential message is then broadcast through one of two geostationary satellites, or satellites with a fixed position over the equator. The corrected position has a published accuracy of under 3 metres. A recent static ground test of the Mid-

Tech WAAS GPS yielded a standard deviation in x and y of under 0.6 metres and for z under 1.5 metres over a two-hour period.

Survey co-ordinates are set up prior to the survey and the information is fed into the airborne navigation system. The co-ordinate system employed in the survey design was WGS84 [World] using the UTM zone 17N projection. The real-time differentially corrected GPS positional data was recorded by the RMS DGR-33 in geodetic coordinates (latitude and longitude using WGS84) at 0.2 second intervals.

6.10.   Digital Acquisition System

The AeroTEM received waveform sampled during on and off-time at 128 channels per decay, 300 times per second, was logged by the proprietary AeroDAS data acquisition system. The channel sampling commences at the start of the Tx cycle and the width of each channel is 26.04 microseconds. The streaming data was recorded on a removable hard-drive and was later backed-up onto DVD-ROM from the field-processing computer.

The RMS Instruments DGR33A data acquisition system was used to collect and record the analogue data stream, i.e. the positional and secondary geophysical data, including processed 6 channel EM, magnetics, radar altimeter, GPS position, and time. The data was recorded on 128Mb capacity FlashCard. The RMS output was also directed to a thermal chart recorder.

7. PERSONNEL

The following Aeroquest personnel were involved in the project:
• 　　　Manager of Operations: Bert Simon
• 　　　Field Data Processors: Chris Kahue
• 　　　Field Operator: Marcus Watson
• 　　　Data Interpretation and Reporting: Gord Smith, Marion Bishop

The survey pilot Dave Lauzon was employed directly by the helicopter operator – Gateway Helicopters, North Bay, Ontario.

8. DELIVERABLES

8.1. Hardcopy Map Products

The report includes a set of four (4) 1:10,000 maps. The survey area is covered by three (3) map plates. Each map plate has four (4) geophysical data products. The geophysical products are listed below:

- **MAG -** Coloured Total Magnetic Intensity (TMI) with line contours and EM anomaly symbols.
- **TDR –**Tilt Derivative of the measured Total Magnetic Intensity with line contours and EM anomaly symbols.
- **ZOFF1** – AeroTEM Z1 Off-time with line contours and EM anomaly symbols
- **EM** - AeroTEM off-time profiles Z2 –Z12 and EM anomaly symbols

The coordinate/projection system for the maps is NAD83 Universal Transverse Mercator Zone 17 (for Canada; Central America; Mexico; USA (ex Hawaii Aleutian Islands)). For reference, the latitude and longitude in WGS84 are also noted on the maps. All the maps show flight path trace, skeletal topography, and conductor picks represented by an anomaly symbol classified according to calculated on-time conductance. The anomaly symbol is accompanied by postings denoting the calculated off-time conductance, a thick or thin classification and an anomaly identifier label. The anomaly symbol legend is given in the margin of the maps. The magnetic field data is presented as superimposed line contours with a minimum contour interval of 5 nT. Bold contour lines are separated by 250 nT.

8.2. Digital Deliverables

Final Database of Survey Data (.GDB, .XYZ)
The geophysical profile data is archived digitally in Geosoft GDB binary format database(s). The database has also been exported into Geosoft XYZ format, which is text file format offering greater compatibility with other viewing software. A description of the contents of the individual channels in the database can be found in Appendix 2. A copy of this digital data is archived at the Aeroquest head office in Milton.

- Geosoft Grid files (.GRD)
Leveled Grid products used to generate the geophysical map images. Cell size for all grid files is 20 meters.

- Total Magnetic Intensity (TF Mag)
- Tilt Derivative (TDR)
- AeroTEM Z Offtime Channel 1 (ZOFF1)

- Digital Versions of Final Maps (.MAP, .PDF)
Map files in Geosoft .map and Adobe PDF format

- Free Viewing Software
Geosoft Oasis Montaj Viewing Software

Adobe Acrobat Reader

- Digital Copy of this Document (.PDF)

9. DATA PROCESSING AND PRESENTATION

All in-field and post-field data processing was carried out using Aeroquest proprietary data processing software, and Geosoft Oasis montaj software. Maps were generated using 36-inch wide Hewlett Packard ink-jet plotters.

9.1. Base Map

The geophysical maps accompanying this report are based on positioning in the datum of NAD83. The survey geodetic GPS positions have been projected using the Universal Transverse Mercator projection in Zone 17N. A summary of the map datum and projection specifications are as follows:

- Ellipse: GRS 1980
- Ellipse major axis: 6378137m eccentricity: 0.081819191
- Datum: North American 1983 - Canada Mean
- Datum Shifts (x,y,z) : 0, 0, 0 metres
- Map Projection: Universal Transverse Mercator Zone 17 (Central Meridian 81ºW)
- Central Scale Factor: 0.9996
- False Easting, Northing: 500,000m, 0m

9.2. Flight Path & Terrain Clearance

The position of the survey helicopter was directed by use of the Global Positioning System (GPS). Positions were updated five times per second (5Hz) and expressed as WGS84 latitude and longitude calculated from the raw pseudo range derived from the C/A code signal. The instantaneous GPS flight path, after conversion to UTM co-ordinates, is drawn using linear interpolation between the x/y positions. The terrain clearance was maintained with reference to the radar altimeter. The raw Digital Terrain Model (DTM) was derived by taking the GPS survey elevation and subtracting the radar altimeter terrain clearance values. The calculated topography elevation values are relative to WGS84 (GPS) altitude and are not tied in to surveyed geodetic heights.

Each flight included at least two high elevation 'background' checks. During the high elevation checks, an internal 5 second wide calibration pulse in all EM channels was generated in order to ensure that the gain of the system remained constant and within specifications.

9.3. Electromagnetic Data

The raw streaming data, sampled at a rate of 38,400 Hz (128 channels, 300 times per second) was reprocessed using a proprietary software algorithm developed and owned by Aeroquest Limited. Processing involves the compensation of the X and Z component data for the primary field waveform.

Coefficients for this compensation for the system transient are determined and applied to the stream data. The stream data are then pre-filtered, stacked, binned to the 33 on and off-time channels and checked for the effectiveness of the compensation and stacking processes. The stacked data is then filtered, leveled and split up into the individual line segments. Further base level adjustments may be carried out at this stage.

The final field processing step was to merge the processed EM data with the other data sets into a Geosoft GDB file. The EM fiducial is used to synchronize the two datasets. The processed channels are mergered into 'array format; channels in the final Geosoft database as Zon, Zoff, Xon, and Xoff

The filtering of the stacked data is designed to remove or minimize high frequency noise that can not be sourced from the geology. Apparent bedrock EM anomalies were interpreted with the aid of an auto-pick from positive peaks and troughs in the on-time Z channel responses correlated with X channel responses. The auto-picked anomalies were reviewed and edited by a geophysicist on a line by line basis to discriminate between thin and thick conductor types. Anomaly picks locations were migrated and removed as required. This process ensures the optimal representation of the conductor centres on the maps.

At each conductor pick, estimates of the off-time conductance have been generated based on a horizontal plate source model for those data points along the line where the response amplitude is sufficient to yield an acceptable estimate. Some of the EM anomaly picks do not display a tau value; this is due to the inability to properly define the decay of the conductor usually because of low signal amplitudes. Each conductor pick was then classified according to a set of seven ranges of calculated off-time conductance values. For high conductance sources, the on-time conductance values may be used, since it provides a more accurate measure of high-conductance sources. Each symbol is also given an identification letter label, unique to each flight line. Conductor picks that did not yield an acceptable estimate of off-time conductance due to a low amplitude response were classified as a low conductance source. Please refer to the anomaly symbol legend located in the margin of the maps.

9.4.   Magnetic Data

Prior to any leveling the magnetic data was subjected to a lag correction of -0.1 seconds and a spike removal filter. The filtered aeromagnetic data were then corrected for diurnal variations using the magnetic base station and the intersections of the tie lines. No corrections for the regional reference field (IGRF) were applied. The corrected profile data were interpolated on to a grid using a random grid technique with a grid cell size of 20 metres. The final leveled grid provided the basis for threading the presented contours which have a minimum contour interval of 5 nT.

In order to enhance subtle magnetic trends a 'tilt' derivative grid was calculated from the total magnetic intensity (TMI) grid. The Tilt Derivative (TDR) of the TMI enhances low amplitude and small wavelength magnetic features which define shallow basement structures as well as potential mineral exploration targets. The TILT derivative can be though of as a combination of the first vertical derivative and the total horizontal derivative of the total magnetic intensity.

Mathematically, the TDR is defined as:

$$TDR = \arctan\left(\frac{VDR}{THDR}\right)$$, where VDR and THDR are first vertical and total horizontal derivatives, respectively, of the total magnetic intensity T.

$$VDR = \frac{dT}{dz}$$

$$THDR = \sqrt{\left(\frac{dT}{dx}\right)^2 + \left(\frac{dT}{dy}\right)^2}$$

Due to the nature of the arctan trigonometric function in the filter, all amplitudes are restricted to $+\pi/2$ and $-\pi/2$ radians. This gives the Tilt derivative the added advantage of acting like an automatic gain control (AGC) filter. The calculated TDR grid is presented a colour sun-shaded image (illumination from the north-northeast). Line contours are also overlain which have a minimum contour interval of 0.05 radians.

10.General Comments

The survey was successful in mapping the magnetic and conductive properties of the geology throughout the survey area. Below is a brief interpretation of the results. For a detailed interpretation please contact Aeroquest Limited.

10.1.   Magnetic Response

The magnetic data provide a high resolution map of the distribution of the magnetic mineral content of the survey area. This data can be used to interpret the location of geological contacts and other structural features such as faults and zones of magnetic alteration.   The sources for anomalous magnetic responses are generally thought to be predominantly magnetite because of the relative abundance and strength of response (high magnetic susceptibility) of magnetite over other magnetic minerals such as pyrrhotite.

10.2.   EM Anomalies

The EM anomalies on the maps are classified by conductance (as described earlier in the report) and also by the thickness of the source. A thin, vertically orientated source produces a double peak anomaly in the z-component response and a positive to negative crossover in the x-component response (Figure 8). For a vertically orientated thick source (say, greater than 10m), the response is a single peak in the z-component response and a negative to positive crossover in the x-component response (Figure 8).

 Because of these differing responses, the AeroTEM system provides discrimination of thin and thick sources and this distinction is indicated on the EM anomaly symbols (N = thin and K = thick). Where multiple, closely spaced conductive sources occur, or where the source has a shallow dip, it can be difficult to uniquely determine the type (thick vs. thin) of the source (Figure 10). In these cases both possible source types may be indicated by picking both thick and thin response styles. For shallow dipping conductors the 'thin' pick will be located over the edge of the source, whereas the 'thick' pick will fall over the downdip 'heart' of the anomaly.
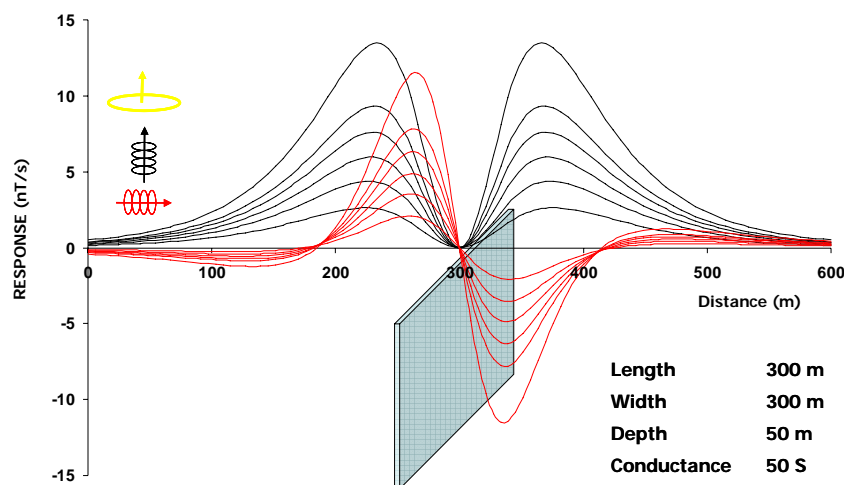
Figure 8. AeroTEM response to a 'thin' vertical conductor.

Length	300 m
Width	300 m
Thickness	50 m
Depth	50 m
Conductance	50 S
Dip	90º
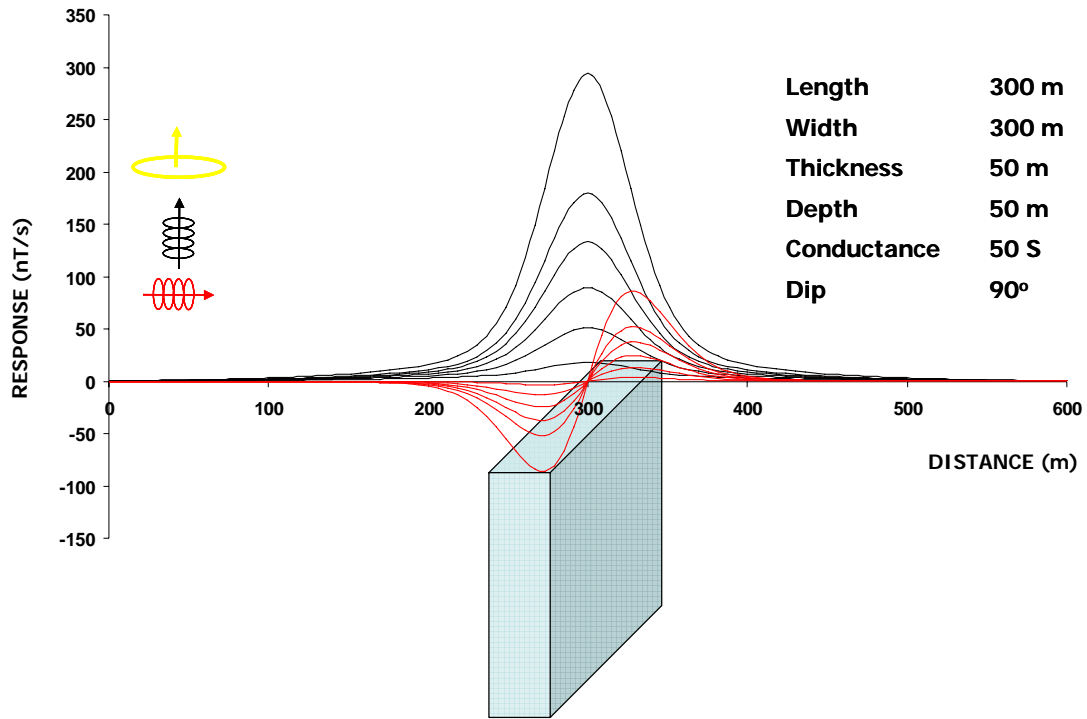
Figure 9. AeroTEM response for a 'thick' vertical conductor.

Length	300 m
Width	300 m
Depth	50 m
Conductance	50 S
Dip	45º
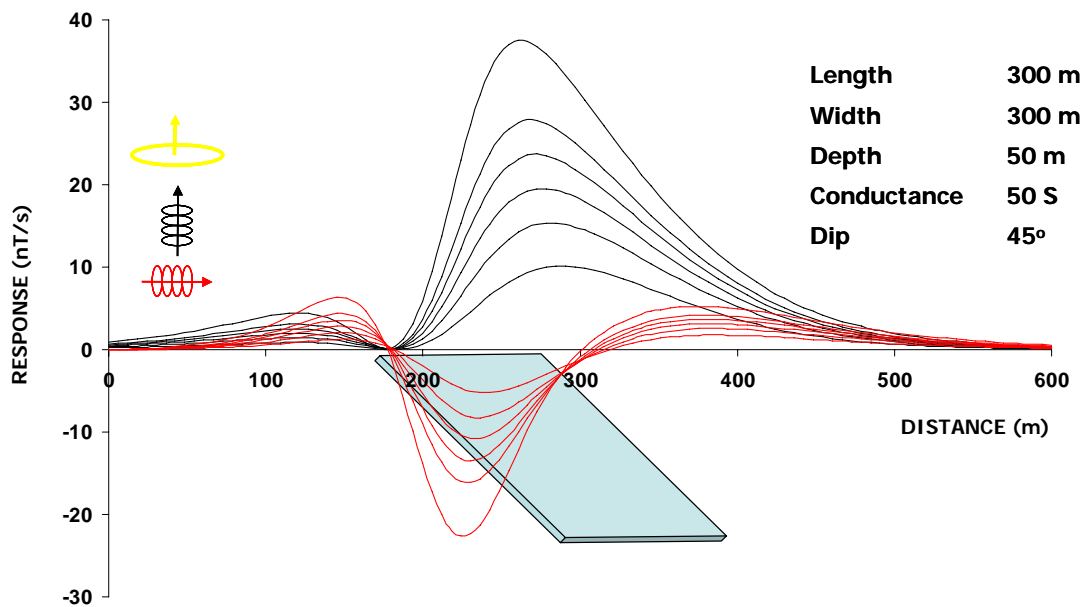
Figure 10. AeroTEM response over a 'thick' dipping conductor.

All cases should be considered when analyzing the interpreted picks and prioritizing for follow-up. Specific anomalous responses which remain as high priority should be subjected to numerical modeling prior to drill testing to determine the dip, depth and probable geometry of the source.

Respectfully submitted,

Gord Smith,

Aeroquest Limited
September, 2006

Advanced Airborne Geophysics

AQL

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APPENDIX 1 – PROJECT CORNER COORDINATES

The Project consists of 3 blocks with boundaries as defined in the following table. Positions are in UTM Zone 17 – NAD83.

Area 1
X	Y
446772.2	5122039.4
446781.4	5125064.3
447565.4	5125066.4
447563.9	5126871.5
450743.1	5126852.5
450768.2	5122055.4

Area 2
X	Y
469791.43	5126180.33
470611.16	5126181.73
470611.16	5123181.53
469778.85	5123181.53

Area 3
X	Y
470148.9	5120561.5
472634.2	5120561.5
472634.7	5117630.0
472463.6	5117630.0
472452.9	5116918.5
470144.7	5116917.2

APPENDIX 2 - Description of Database Fields

The GDB file is a Geosoft binary database. In the database, the Survey lines and Tie Lines are prefixed with an "L" for "Line" and "T" for "Tie".

Database (07032_Argosy_Final.gdb):

Column	Units	Description
Line		Line number
Flight		Flight #
emfid		AERODAS Fiducial
utctime	hh:mm:ss.ss	UTC time
X	m	UTM Easting (NAD83, zone 17N)
Y	m	UTM Northing (NAD83, zone 17N)
bheight	m	Terrain clearance of EM bird
Dtm	m	Digital Terrain Model
magf	nT	Final leveled total magnetic intensity
Basemagf	nT	Base station total magnetic intensity
Zon	nT/s	Processed Streaming On-Time Z component Channels 1-16
Zoff	nT/s	Processed Streaming Off-Time Z component Channels 0-16
Xon	nT/s	Processed Streaming On-Time X component Channels 1-16
Xoff	nT/s	Processed Streaming Off-Time X component Channels 0-16
Anom_labels		Alphanumeric label of conductor pick
Off_Con	S	Off-time conductance at conductor pick
Off_Tau	S	Off-time decay constant at conductor pick
Anom_ID	S	Anomaly Character (K= thicK, N = thiN)
grade		Classification from 1-7 based on conductance of conductor pick
pwrline		powrline monitor data channel
Galtf	m	Height above ellipsoid (WGS84)
Lat_wgs84	dd.mm.ss.ss	Latitude (WGS84)
Lon_wgs84	dd.mm.ss.ss	Longitude (WGS84)

APPENDIX 3: AEROTEM ANOMALY LISTING

line	emfid	Anomaly	thicK/thiN	Grade	Off_Con	Off_Tau	Altimeter	UTME	UTMN
1010	807500	A	K	1	0.02	12.51	35.56	446816.2	5121970.9
1010	825740	B	K	1	0.06	23.35	34.32	446805.4	5123295.2
1010	848240	C	K	1	0.05	22.07	38.82	446810.5	5125009.1
1020	893330	A	K	1	0.06	23.63	33.36	446895	5123311.7
1020	908270	B	K	1	0.03	17.76	37.77	446895.9	5121942.2
1030	548310	A	K	1	0.21	45.73	36.06	447009.4	5125033.6
1030	570360	B	K	1	0.04	20.89	33.04	447001.4	5123307.7
1040	615510	A	K	1	0.05	21.85	36.98	447094.9	5123307.9
1040	631260	B	K	1	0.04	21.32	24.32	447101.3	5124527.2
1040	638190	C	K	1	0.28	53.32	46.07	447102.4	5125024
1050	651930	A	K	1	0.39	62.66	45.33	447211	5125094.7
1050	674040	B	K	1	0.05	22.43	33.51	447206.9	5123369.8
1060	704370	A	K	2	2.85	168.77	41.67	447299.5	5122052.3
1060	723900	B	K	1	0.04	20.56	35.17	447306.1	5123425.3
1060	748710	C	K	1	0.4	63.07	41.25	447302.2	5125147.6
1070	782880	A	K	1	0.05	22.46	43.71	447411.5	5123479.5
1080	820830	A	K	1	0.01	11.93	35.29	447492.4	5122514.4
1080	834780	B	K	1	0.03	16.26	42.7	447507.2	5123492.2
1080	859320	C	K	1	0.27	52.08	39.43	447490.8	5125280.1
1090	899850	A	K	1	0.74	85.82	40.07	447598.7	5126786.8
1090	919170	B	K	1	0.3	55.24	37.32	447593.3	5125316.6
1090	942390	C	K	1	0.02	15.53	28.82	447607.1	5123512.5
1090	956940	D	K	1	0.03	16.68	29.91	447587.8	5122455.9
1100	975870	A	K	1	0.08	27.52	24.42	447704.9	5122349.1
1100	1013580	B	K	1	0.16	39.45	38.07	447716.2	5124824.3
1100	1020570	C	K	1	0.13	35.48	37.95	447694.8	5125355
1100	1041390	D	K	1	0.69	83.21	46.68	447705	5126862.1
1110	1054680	A	K	1	0.59	76.76	33.18	447807.9	5126884.9
1110	1081980	B	K	1	0.11	33.02	46.08	447802.7	5124849.5
1110	1118130	C	K	1	0.08	28.33	29.19	447801.2	5122317.6
1120	1136190	A	K	1	0.04	20.05	35.69	447902	5122324.2
1120	1174470	B	K	1	0.13	36	30.74	447904.2	5124884.2
1120	1204890	C	K	1	0.58	76.32	40.03	447894.6	5126963.6
1130	1213200	A	K	1	0.3	55.27	41.53	448014.4	5126952
1130	1243500	B	K	1	0.11	32.84	42.51	448006.8	5124880.4
1140	1340610	A	K	1	0.06	24.02	40.33	448103.5	5124855.9
1150	1410420	A	K	1	0.04	21.25	33.84	448199.5	5124840
1150	1445880	B	K	1	0.06	23.55	44.3	448192.9	5122406
1160	1467060	A	K	1	0.05	21.55	63.89	448300.4	5122391.2
1160	1505220	B	K	1	0.04	20.11	40.9	448311.4	5124811.8

1160	1531710	C	K	1	0.11	33.51	31.95	448302.4	5126656.1
1170	1576770	A	K	1	0.05	22.3	41.36	448401.6	5124842
1170	1610430	B	K	1	0.05	21.69	42.47	448396.6	5122386.8
1170	1616460	C	K	4	17.95	423.67	45.43	448408.3	5121948.3
1180	1668330	A	K	1	0.05	22.54	38.33	448505.9	5124842.9
1190	1714290	A	K	1	0.01	11.43	33.69	448601	5126524.1
1190	1736310	B	K	1	0.05	23.23	39.66	448595.4	5124848.2
1200	1809180	A	K	1	0.01	10.32	35.18	448694.4	5123897.1
1200	1823130	B	K	1	0.05	21.34	39.43	448710.8	5124882.4
1200	1844700	C	K	1	0.04	19.84	45.68	448696.7	5126538.7
1210	1867410	A	K	1	0.05	23.07	38.96	448797.2	5126515.7
1210	1888800	B	K	1	0.05	23.3	39.29	448797	5124905.8
1210	1902540	C	K	1	0.04	20.31	44.45	448807	5123816
1220	1964040	A	N	1	0.04	18.83	43.02	448816.2	5123782.5
1220	1981620	B	K	1	0.05	23.16	39.17	448906	5124912.1
1220	2003160	C	K	1	0.04	19.13	41.68	448893.3	5126430
1230	2049180	A	K	1	0.08	28.61	43.66	449009.9	5124945.1
1230	2063100	B	K	1	0.01	11.95	42.83	448987.6	5123842.8
1240	2144550	A	K	1	0.06	25.33	34.93	449103.9	5124916
1250	2232180	A	K	1	0.05	21.99	39.5	449212.9	5124950.8
1260	2327040	A	K	1	0.04	19.68	30.59	449296.8	5124954.6
1270	2369400	A	K	2	2.88	169.64	29.41	449400.4	5126792.4
1270	2396880	B	K	1	0.03	18.31	29.23	449408.8	5124975
1270	2421420	C	K	1	0.03	17.34	44.96	449398	5123265.1
1280	2458500	A	K	2	1.15	107.17	44.5	449505.7	5122431.5
1280	2471400	B	K	1	0.05	23.04	40.58	449490.6	5123244.5
1280	2499450	C	K	1	0.01	9.79	30.65	449496.5	5125023.5
1290	334770	A	K	1	0.09	29.48	29.9	449596.7	5123283.2
1300	380610	A	K	1	0.1	31.08	36.72	449702.4	5123220.4
1310	501420	A	K	1	0.05	22.53	38.33	449797.8	5123161.3
1320	546960	A	K	1	0.04	20.67	36.13	449904.4	5123092.9
1320	578550	B	K	1	0.01	11.92	69.41	449908.6	5125191.8
1330	636930	A	K	1	0.03	16.46	37.16	450004.8	5125212.4
1330	665190	B	K	1	0.03	17.81	37.48	450002	5123060.2
1340	742290	A	K	1	0.03	17.6	33.42	450105.9	5125262.2
1380	1022100	A	K	1	0.01	9.41	38.75	450497.2	5122374.7
1390	432960	A	K	1	0.03	17.82	32.9	450593.3	5122445.2
1400	390300	A	K	1	0.02	15.38	28.03	450698.6	5123741.7
1400	406230	B	K	1	0.05	22.53	41.93	450707.3	5122503.4
2050	1342350	A	K	3	9.2	300	50.79	470258.8	5123329.2
2050	1361760	B	K	3	9.53	308.64	37.49	470247.9	5124527.6
2070	1453620	A	K	1	0.15	38.3	44.81	470458.8	5123098.1
2070	1476840	B	K	1	0.15	37.67	52.73	470462.8	5124537
2070	1495290	C	K	1	1	99.83	41.97	470435.7	5125824.6

2080	1042620	A	N	1	0.42	65.04	37.48	470533.3	5125792.8
2080	1057860	B	K	1	0.8	89.66	45.16	470544.4	5124541.9
3010	597690	A	K	2	3.67	191.61	46.71	470205.1	5117234.5
3010	598890	B	K	3	8.19	286.1	44.25	470201.5	5117319
3010	603090	C	K	3	8.6	293.18	38.56	470203.4	5117613.9
3010	609660	D	N	2	4.39	209.6	52.78	470194.3	5118048.7
3020	699810	A	K	5	20.23	449.82	43.44	470303	5117982.8
3020	706440	B	K	5	21.54	464.07	37	470298.7	5117484.3
3020	711810	C	K	1	0.03	15.68	35.39	470304.4	5117054
3030	728730	A	K	1	0.1	32.28	45.96	470421.9	5117111.4
3030	730170	B	K	4	12.17	348.81	42.8	470422.7	5117211.4
3030	734190	C	K	3	5.47	233.93	40.59	470414	5117477.3
3030	740940	D	K	2	3.21	179.03	41.29	470399.2	5117899.5
3030	742380	E	K	3	5.39	232.25	43.46	470403.1	5117997.7
3030	742680	F	K	3	6.01	245.2	43.45	470404.7	5118018.6
3030	750150	G	K	1	0.17	41.37	37.21	470397.1	5118551.2
3040	827550	A	K	1	0.94	97.14	42.16	470496.5	5118164.2
3040	831330	B	K	3	7.93	281.61	39.99	470502.8	5117861.7
3040	836310	C	K	2	3.87	196.63	41.04	470510.6	5117479.7
3040	841320	D	K	1	0.02	13.68	42.48	470503.3	5117089
3050	859350	A	K	1	0.02	15.18	43.64	470616.8	5117051.9
3050	868560	B	K	3	5.22	228.43	36.92	470599.5	5117657.7
3050	871470	C	N	3	6.26	250.16	39.62	470593.4	5117862
3050	875820	D	N	1	0.41	64.17	41.05	470597.6	5118170.6
3050	880020	E	N	1	0.42	64.57	37.47	470599.5	5118456.6
3060	922380	A	K	1	0.01	7.61	39.51	470719.5	5120559.7
3060	960870	B	N	2	4.59	214.14	38.02	470697.1	5117891.5
3060	964740	C	K	3	5.31	230.47	35.71	470699.1	5117600.1
3070	993660	A	K	5	27.93	528.47	45.51	470800.6	5117484.1
3070	995550	B	K	4	10.35	321.66	35.64	470794.2	5117617.1
3070	999720	C	K	3	7.81	279.47	40.3	470790.1	5117901.8
3070	1010340	D	N	4	14.68	383.2	35.53	470806.2	5118631.7
3070	1037850	E	K	1	0.01	10.29	37.05	470802.7	5120558.3
3080	1051080	A	K	1	0.02	13.9	42.71	470907.6	5120575.5
3080	1088100	B	K	3	8.14	285.26	40.33	470897.2	5117859.1
3080	1089900	C	K	5	26.06	510.51	37.28	470897.3	5117718.3
3090	1128600	A	N	4	11.88	344.7	40.85	470992.8	5117845.4
3090	1168260	B	K	1	0.01	11.09	38.9	470998.6	5120608.1
3100	1218690	A	N	3	7.52	274.2	41.01	471096.7	5117993.7
3100	1220070	B	K	3	8.53	292.05	39.33	471095.5	5117887
3110	1269180	A	N	3	5.09	225.73	38.86	471194.2	5118102.2
3120	1340070	A	K	2	2.35	153.3	36.62	471292.2	5119492.9
3120	1354950	B	K	1	0.06	24.05	33.91	471301.6	5118475.8
3120	1359690	C	N	1	0.05	21.43	33.88	471302.7	5118133.9

3130	1413570	A	K	4	12.7	356.38	36.97	471402.4	5118262.4
3130	1427460	B	K	4	12.66	355.85	40.18	471398.7	5119144.7
3130	1432230	C	K	4	11.03	332.04	44.17	471405.1	5119465.5
3130	1438650	D	K	2	2.06	143.69	39.34	471401.6	5119896.7
3140	1475160	A	K	2	2.5	158.17	49.53	471509.7	5119866
3140	1481310	B	K	2	2.7	164.25	45.04	471498.4	5119449.9
3140	1485330	C	K	5	30.11	548.76	39.52	471495.5	5119174
3140	1497840	D	K	6	39.94	632	36.51	471504.8	5118387.5
3150	1556580	A	K	4	11.78	343.16	42.17	471600.7	5118416.3
3150	1571700	B	K	1	0.02	13.28	38.99	471600.9	5119413.6
3150	1579320	C	K	2	4.03	200.63	34.19	471593.2	5119902.5
3170	1680180	A	K	1	0.01	10.54	42.3	471805.3	5117422.1
3210	553230	A	K	2	3.59	189.46	53.06	472206.9	5117179.6
3220	658230	A	K	3	7.93	281.53	48.81	472306	5117112.7
3230	676830	A	K	3	5.18	227.6	44.79	472410	5117104.8
1910	422750	A	K	1	0.02	14.31	45.87	449595	5126509.5
1910	433700	B	K	1	0.05	22.81	50.45	448850.3	5126523.7
1910	448460	C	K	1	0.34	58.56	50.93	447621.2	5126496.3
1920	536240	A	K	1	0.03	17.04	65.43	450072.7	5125493.8
1930	582050	A	K	1	0.02	14.78	39.69	449865	5124520.6
1930	616880	B	K	1	0.05	22.83	47.99	447088.5	5124497.1
1940	651020	A	K	1	0.05	22.03	46.7	447411.3	5123494.3
1940	658280	B	K	1	0.02	13.79	47.43	448090.2	5123493.7
1940	675260	C	K	1	0.03	17.55	46.45	449618.8	5123501
1940	678740	D	K	1	0.02	15.35	52.09	449960.6	5123501.5
1940	688640	E	K	1	0.03	15.7	48.2	450834.5	5123499.7
1950	711560	A	K	1	0.05	21.98		450681.3	5122524
1950	750590	B	K	1	0.03	17.66	37.1	447549.3	5122501.5
3920	398910	A	K	4	10.17	318.86	50.17	471492.2	5119261.4
3930	440250	A	K	1	0.08	28.78	39.45	470380.2	5118277.1
3930	443370	B	K	2	1.09	104.17	34.08	470578.7	5118270.1
3930	455220	C	K	3	8.36	289.06	33.07	471408.5	5118266.7
3940	521670	A	K	3	8.09	284.38	45.09	470403.3	5117278.1
3940	523680	B	K	2	2.7	164.31	49.83	470220.4	5117271.8

APPENDIX 4: AEROTEM DESIGN CONSIDERATIONS

Helicopter-borne EM systems offer an advantage that cannot be matched from a fixed-wing platform. The ability to fly at slower speed and collect data with high spatial resolution, and with great accuracy, means the helicopter EM systems provide more detail than any other EM configuration, airborne or ground-based. Spatial resolution is especially important in areas of complex geology and in the search for discrete conductors. With the advent of helicopter-borne high-moment time domain EM systems the fixed wing platforms are losing their *only* advantage – depth penetration.

Advantage 1 – Spatial Resolution

The AeroTEM system is specifically designed to have a small footprint. This is accomplished through the use of concentric transmitter-receiver coils and a relatively small diameter transmitter coil (5 m). The result is a highly focused exploration footprint, which allows for more accurate "mapping" of discrete conductors. Consider the transmitter primary field images shown in Figure 1, for AeroTEM versus a fixed-wing transmitter.
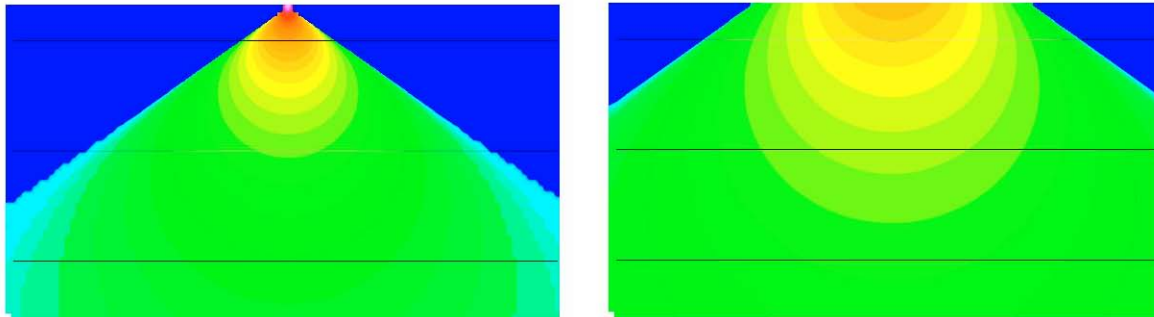
The footprint of AeroTEM at the earth's surface is roughly 50m on either side of transmitter

The footprint of a fixed-wing system is roughly 150 m on either side of the transmitter

Figure 1. A comparison of the footprint between AeroTEM and a fixed-wing system, highlights the greater resolution that is achievable with a transmitter located closer to the earth's surface. The AeroTEM footprint is one third that of a fixed-wing system and is symmetric, while the fixed-wing system has even lower spatial resolution along the flight line because of the separated transmitter and receiver configuration.

At first glance one may want to believe that a transmitter footprint that is distributed more evenly over a larger area is of benefit in mineral exploration. In fact, the opposite is true; by energizing a larger surface area, the ability to energize and detect discrete conductors is reduced. Consider, for example, a comparison between AeroTEM and a fixed-wing system over the Mesamax Deposit (1,450,000 tonnes of 2.1% Ni, 2.7% Cu, 5.2 g/t Pt/Pd). In a test survey over three flight lines spaced 100 m apart, AeroTEM detected the Deposit on all three flight lines. The fixed-wing system detected the Deposit only on two flight lines. In exploration programs that seek to expand the flight line spacing in an effort to reduce the cost of the airborne survey, discrete conductors such as the Mesamax Deposit can go undetected. The argument often put forward in favor of using fixed-wing systems is that because of their larger footprint, the flight line spacing can indeed be widened. Many fixed-wing surveys are flown at 200 m or 400 m. Much of the survey work performed by Aeroquest has been to survey in areas that were previously flown at these wider line spacings. One of the reasons for AeroTEM's impressive discovery record has been the strategy of flying closely spaced lines and finding all the discrete near-surface conductors. These higher resolution surveys are being flown within existing mining camps, areas that improve the chances of discovery.
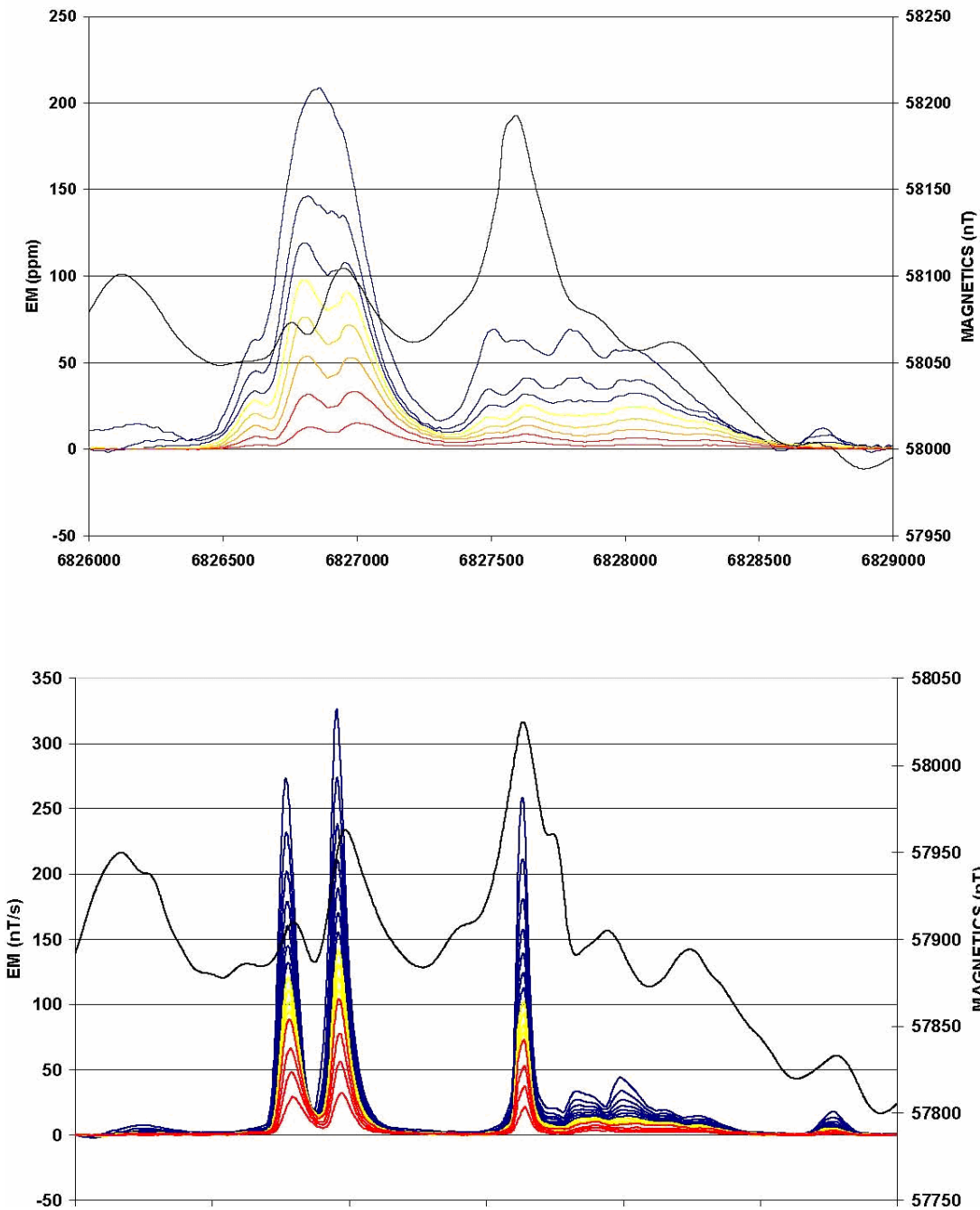
Figure 2. Fixed-wing (upper) and AeroTEM (lower) comparison over the eastern limit of the Mesamax Deposit, a Ni-Cu-PGE zone located in the Raglan nickel belt and owned by Canadian Royalties. Both systems detected the Deposit further to the west where it is closer to surface.

The small footprint of AeroTEM combined with the high signal to noise ratio (S/N) makes the system more suitable to surveying in areas where local infrastructure produces electromagnetic noise, such as power lines and railways. In 2002

Aeroquest flew four exploration properties in the Sudbury Basin that were under option by FNX Mining Company Inc. from Inco Limited. One such property, the Victoria Property, contained three major power line corridors.

The resulting AeroTEM survey identified all the known zones of Ni-Cu-PGE mineralization, and detected a response between two of the major power line corridors but in an area of favorable geology. Three boreholes were drilled to test the anomaly, and all three intersected sulphide. The third borehole encountered 1.3% Ni, 6.7% Cu, and 13.3 g/t TPMs over 42.3 ft. The mineralization was subsequently named the Powerline Deposit.

The success of AeroTEM in Sudbury highlights the advantage of having a system with a small footprint, but also one with a high S/N. This latter advantage is achieved through a combination of a high-moment (high signal) transmitter and a rigid geometry (low noise). Figure 3 shows the Powerline Deposit response and the response from the power line corridor at full scale. The width of power line response is less than 75 m.
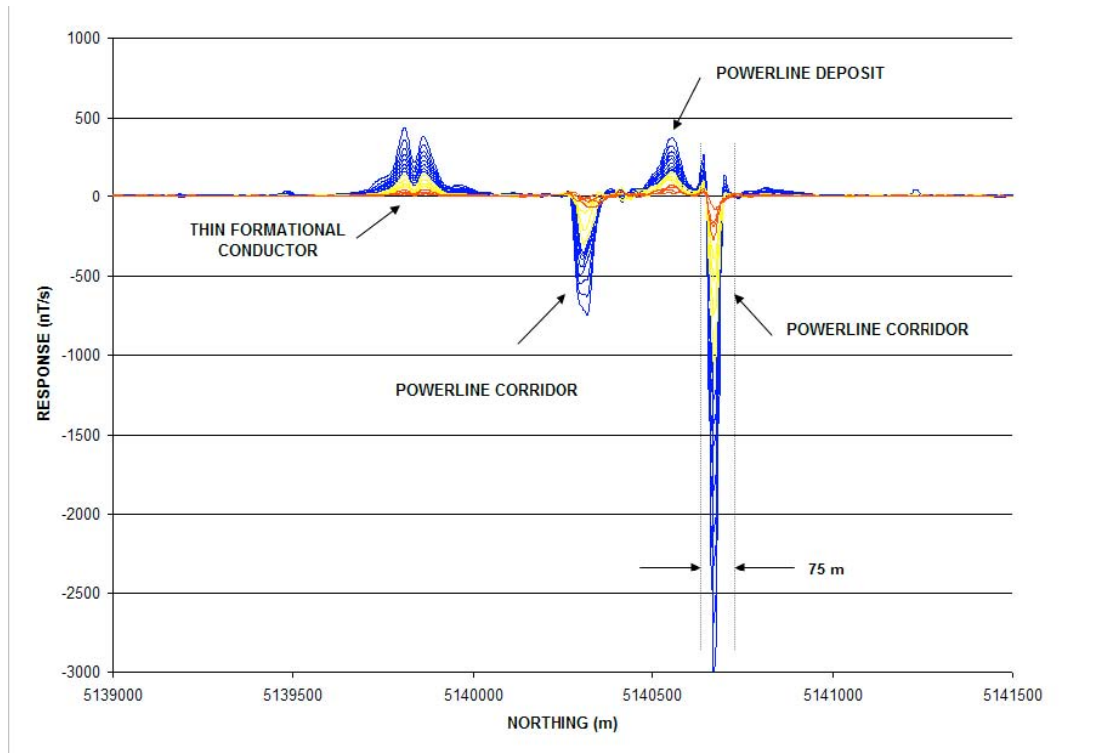
Figure 3. The Powerline Deposit is located between two major power line corridors, which make EM surveying problematic. Despite the strong response from the power line, the anomaly from the Deposit is clearly detected. Note the thin formational conductor located to the south. The only way to distinguish this response from that of two closely spaced conductors is by interpreting the X-axis coil response.

Advantage 2 – Conductance Discrimination

The AeroTEM system features full waveform recording and as such is able to measure the on-time response due to high conductance targets. Due to the processing method (primary field removal), there is attenuation of the response with increasing conductance, but the AeroTEM on-time measurement is still superior to systems that rely on lower base frequencies to detect high conductance targets, but do not measure in the on-time.

The peak response of a conductive target to an EM system is a function of the target conductance and the EM system base frequency. For time domain EM systems that measure only in the off-time, there is a drop in the peak response of a target as the base frequency is lowered for all conductance values below the peak system response. For example, the AeroTEM peak response occurs for a 10 S conductor in the early off-time and 100 S in the late off-time for a 150 Hz base frequency. Because base frequency and conductance form a linear relationship when considering the peak response of any EM system, a drop in base frequency of 50% will double the conductance at which an EM system shows its peak response. If

the base frequency were lowered from 150 Hz to 30 Hz there would be a fivefold increase in conductance at which the peak response of an EM occurred.

However, in the search for highly conductive targets, such as pyrrhotite-related Ni-Cu-PGM deposits, a fivefold increase in conductance range is a high price to pay because the signal level to lower conductance targets is reduced by the same factor of five. For this reason, EM systems that operate with low base frequencies are not suitable for general exploration unless the target conductance is more than 100 S, or the target is covered by conductive overburden.

Despite the excellent progress that has been made in modeling software over the past two decades, there has been little work done on determining the optimum form of an EM system for mineral exploration. For example, the optimum configuration in terms of geometry, base frequency and so remain unknown. Many geophysicists would argue that there is no single ideal configuration, and that each system has its advantages and disadvantages. We disagree.

When it comes to detecting and discriminating high-conductance targets, it is necessary to measure the pure inphase response of the target conductor. This measurement requires that the measured primary field from the transmitter be subtracted from the total measured response such that the secondary field from the target conductor can be determined. Because this secondary field is in-phase with the transmitter primary field, it must be made while the transmitter is turned on and the transmitter current is changing. The transmitted primary field is several orders of magnitude larger than the secondary field. AeroTEM uses a bucking coil to reduce the primary field at the receiver coils. The only practical way of removing the primary field is to maintain a rigid geometry between the transmitter, bucking and receiver coils. This is the main design consideration of the AeroTEM airframe and it is the only time domain airborne system to have this configuration.
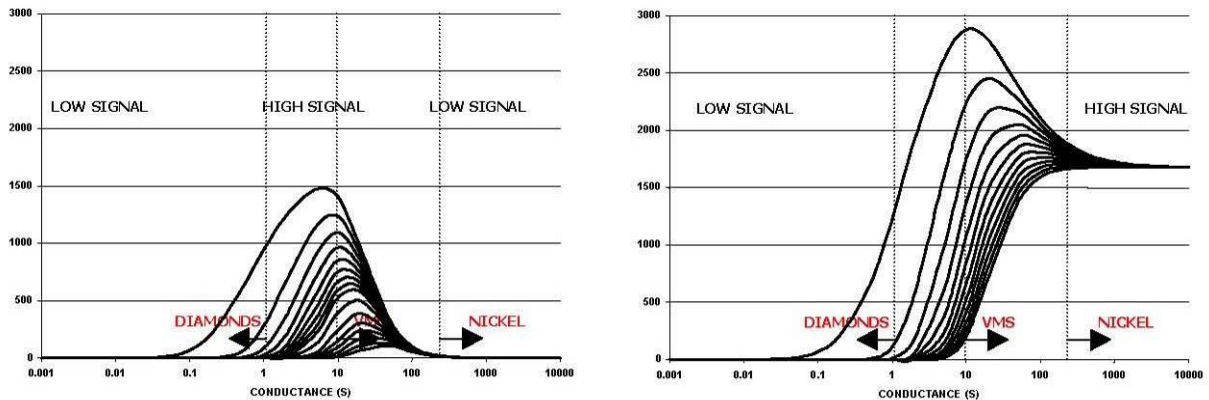
The off-time AeroTEM response for the 16 channel configuration.

The on-time response assuming 100% removal of the measured primary field.

Figure 4. The off-time and on-time response nomogram of AeroTEM for a base frequency of 150 Hz. The on-time response is much stronger for higher conductance targets and this is why on-time measurements are more important than lower frequencies when considering high conductance targets in a resistive environment.

Advantage 3 – Multiple Receiver Coils

AeroTEM employs two receiver coil orientations. The Z-axis coil is oriented parallel to the transmitter coil and both are horizontal to the ground. This is known as a maximum coupled configuration and is optimal for detection. The X-axis coil is oriented at right angles to the transmitter coil and is oriented along the line-of-flight. This is known as a minimum coupled configuration, and provides information on conductor orientation and thickness. These two coil configurations combined provide important information on the position, orientation, depth, and thickness of a conductor that cannot be matched by the traditional geometries of the HEM or fixed-wing systems. The responses are free from a system geometric effect and can be easily compared to model type curves in most cases. In other words, AeroTEM data is very easy to interpret. Consider, for example, the following modeled profile:
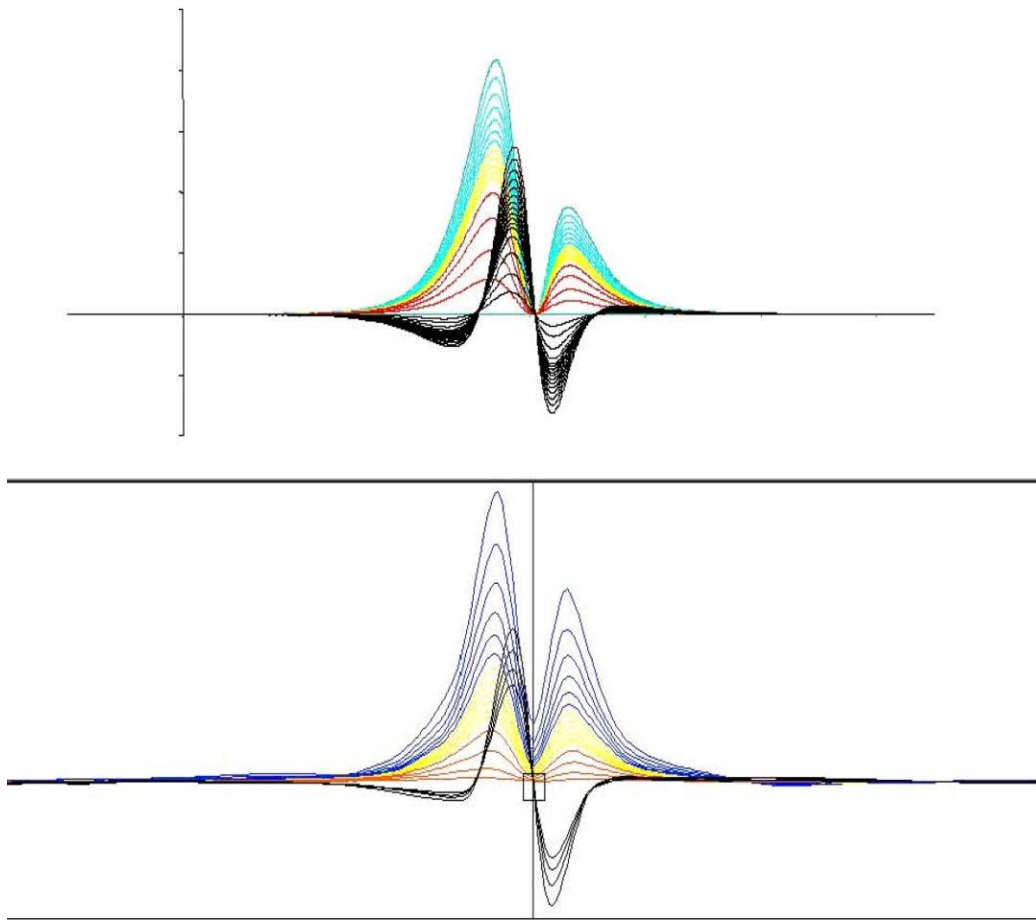
Figure 5. Measured (lower) and modeled (upper) AeroTEM responses are compared for a thin steeply dipping conductor. The response is characterized by two peaks in the Z-axis coil, and a cross-over in the X-axis coil that is centered between the two Z-axis peaks. The conductor dips toward the higher amplitude Z-axis peak. Using the X-axis cross-over is the only way of differentiating the Z-axis response from being two closely spaced conductors.

HEM versus AeroTEM

Traditional helicopter EM systems operate in the frequency domain and benefit from the fact that they use narrowband as opposed to wide-band transmitters. Thus all of the energy from the transmitter is concentrated in a few discrete frequencies. This allows the systems to achieve excellent depth penetration (up to 100 m) from a transmitter of modest power. The Aeroquest Impulse system is one implementation of this technology.

The AeroTEM system uses a wide-band transmitter and delivers more power over a wide frequency range. This frequency range is then captured into 16 time channels, the early channels containing the high frequency information and the late time channels containing the low frequency information down to the system base frequency. Because frequency domain HEM systems employ two coil configurations (coplanar and coaxial) there are only a maximum of three comparable frequencies per configuration, compared to 16 AeroTEM off-time and 12 AeroTEM on-time channels.

Figure 6 shows a comparison between the Dighem HEM system (900 Hz and 7200 Hz coplanar) and AeroTEM (Zaxis) from surveys flown in Raglan, in search of highly conductive Ni-Cu-PGM sulphide. In general, the AeroTEM peaks are sharper and better defined, in part due to the greater S/N ratio of the AeroTEM system over HEM, and also due to the modestly filtered AeroTEM data compared to HEM. The base levels are also better defined in the AeroTEM data. AeroTEM filtering is limited to spike removal and a 5-point smoothing filter. Clients are also given copies of the raw, unfiltered data.
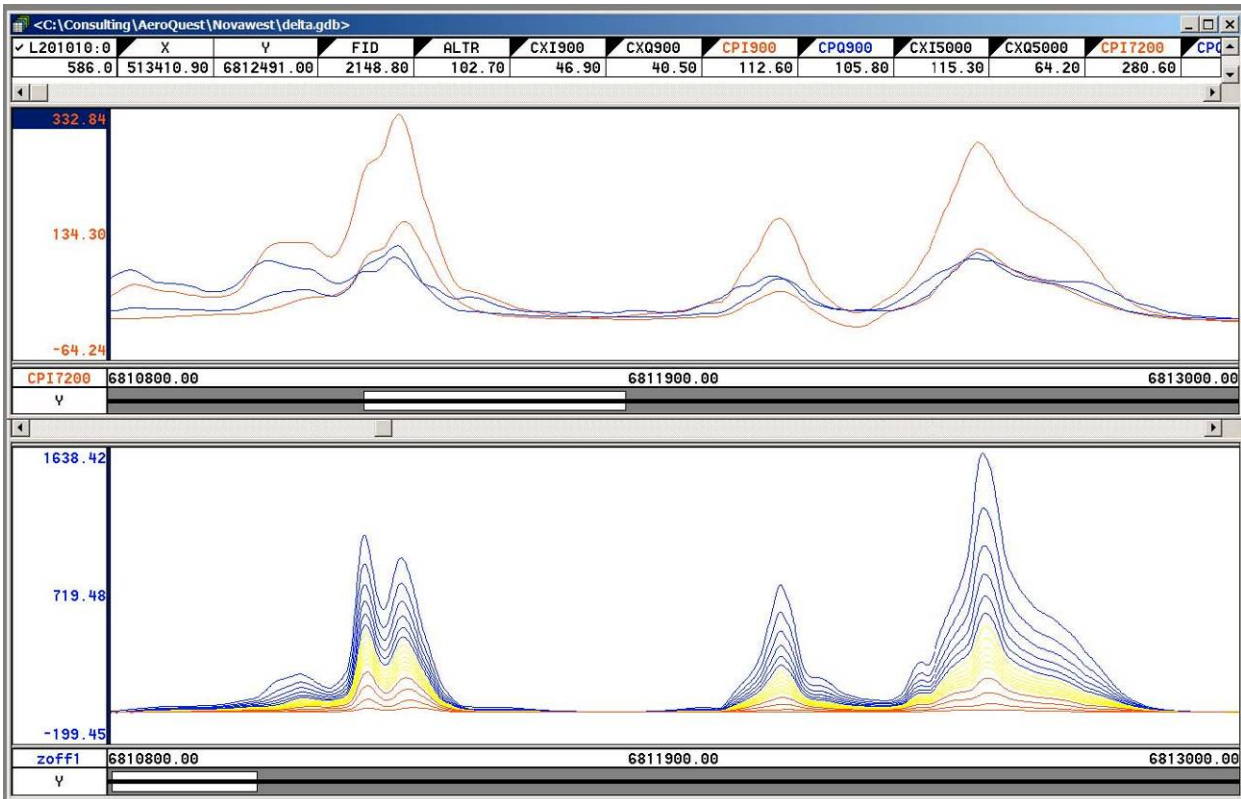
Figure 6. Comparison between Dighem HEM (upper) and AeroTEM (lower) surveys flown in the Raglan area. The AeroTEM responses appear to be more discrete, suggesting that the data is not as heavily filtered as the HEM data. The S/N advantage of AeroTEM over HEM is about 5:1.

Aeroquest Limited is grateful to the following companies for permission to publish some of the data from their respective surveys: Wolfden Resources, FNX Mining Company Inc, Canadian Royalties, Nova West Resources, Aurogin Resources, Spectrem Air. Permission does not imply an endorsement of the AeroTEM system by these companies.

APPENDIX 5: AeroTEM Instrumentation Specification Sheet

AEROTEM Helicopter Electromagnetic System

System Characteristics

- Transmitter: Triangular Pulse Shape Base Frequency 150 Hz
- Tx On Time - 1,150 (150Hz) μs
- Tx Off Time - 2,183 (150Hz) μs
- Loop Diameter - 5 m
- Peak Current - 250 A
- Peak Moment - 38,800 NIA
- Typical Z Axis Noise at Survey Speed = 5 nT peak to peak
- Sling Weight: 270 Kg
- Length of Tow Cable: 40 m
- Bird Survey Height: 30 m nominal

Receiver

- Two Axis Receiver Coils (x, z) positioned at centre of transmitter loop
- Selectable Time Delay to start of first channel 21.3 , 42.7, or 64.0 ms

Display & Acquisition

- AERODAS Digital recording at 128 samples per decay curve at a maximum of 300 curves per second (26.455 μs channel width)
- RMS Channel Widths: 52.9,132.3, 158.7, 158.7, 317.5, 634.9 μs
- Recording & Display Rate = 10 readings per second.
- On-board display - six channels Z-component and 1 X-component

System Considerations

Comparing a fixed-wing time domain transmitter with a typical moment of 500,000 NIA flying at an altitude of 120 m with a Helicopter TDEM at 30 m, notwithstanding the substantial moment loss in the airframe of the fixed wing, the same penetration by the lower flying helicopter system would only require a sixty-fourth of the moment. Clearly the AeroTEM system with nearly 40,000 NIA has more than sufficient moment. The airframe of the fixed wing presents a response to the towed bird, which requires dynamic compensation. This problem is non-existent for AeroTEM since transmitter and receiver positions are fixed. The AeroTEM system is completely portable, and can be assembled at the survey site within half a day.

Tel: +1 905 693-9129. Fax: +1 905 693-9128.
Email: sales@aeroquestsurveys.com

TOTAL MAGNETIC INTENSITY
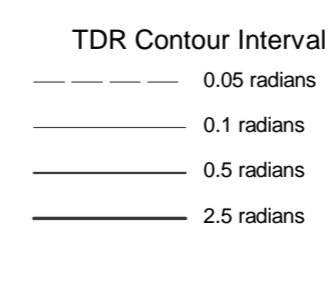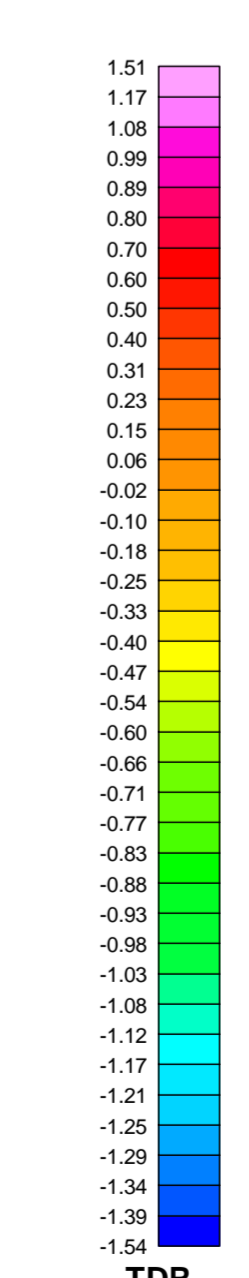
Grid North
NAD83 - Zone 17

The topographic data base was derived from 1:20000 Ontario
Ministry of Natural Resources data.
Background shading from NASA SRTM data.
Inset data derived from Natural Resources Canada 'Atlas of Canada Base Maps'

This map accompanies the technical report entitled 'Report on a
Helicopter-Borne Magnetic and Electromagnetic Survey, Lac Panache Project,
Sudbury area, Ontario', by Aeroquest Limited

Scale 1:10,000,000

TMI
nT

TMI nT
56455
56329
56292
56259
56236
56216
56201
56190
56180
56170
56161
56153
56145
56139
56133
56128
56123
56119
56115
56108
56104
56100
56097
56094
56091
56088
56085
56081
56077
56073
56068
56064
56060
56054
56048
56042
56036
56028
55979

TMI Contour Interval
- 5 nT
- 10 nT
- 50 nT
- 250 nT

TILT DERIVATIVE OF TMI

TDR
radians

TDR radians
1.51
1.17
1.08
0.99
0.89
0.80
0.70
0.60
0.50
0.40
0.31
0.23
0.10
-0.02
-0.10
-0.25
-0.33
-0.47
-0.54
-0.60
-0.66
-0.71
-0.83
-0.88
-0.93
-0.98
-1.03
-1.08
-1.12
-1.17
-1.21
-1.25
-1.29
-1.34
-1.39
-1.44
-1.54

TDR Contour Interval
- 0.05 radians
- 0.1 radians
- 0.5 radians
- 2.5 radians

Off-Time Anomaly Symbols

>50S	⬢
35-50S	◕
20-35S	◑
10-20S	◔
5-10S	⊕
1-5S	◇
<1S	✕

anomaly label — decay constant (µs)
thicK/thiN source — off-time conductance (S)

SURVEY SPECIFICATIONS:
- Survey flown: July 23, 2006
- Traverse line spacing: 100 metres
- Traverse line direction: 0° Azimuth (N-S)
- Nominal EM bird height: 30 metres
- Aircraft: Aerospatiale A-Star 350B2 (C-FXFU)

INSTRUMENTATION:
- Data acquisition: ADAS & RMS DGR-33
- Magnetometer: Geometrics G-823A cesium vapour
- Installation: Towed bird 17 m above EM bird
- Sensitivity: .001 nanoTesla
- Electromagnetics: AeroTEM II System (BRAVO)
- Configuration: Towed bird

NAVIGATION:
- Navigation: Differential Global Positioning System (DGPS)
- Navigation equipment: AGNAV with MID-TECH RX400p receiver
- Radar Altimeter: Terra TRA3000/TRI-30

DATA PROCESSING
- Magnetics: diurnal, tieline and micro-leveling corrections

POSITIONING
- Datum: NAD83
- Major Axis: 6378137.000
- Eccentricity: 0.081819191

MAP PROJECTION
- Projection: Universal Transverse Mercator
- Central Meridian: 81°W (Zone 17)
- Central Scale Factor: 0.9996
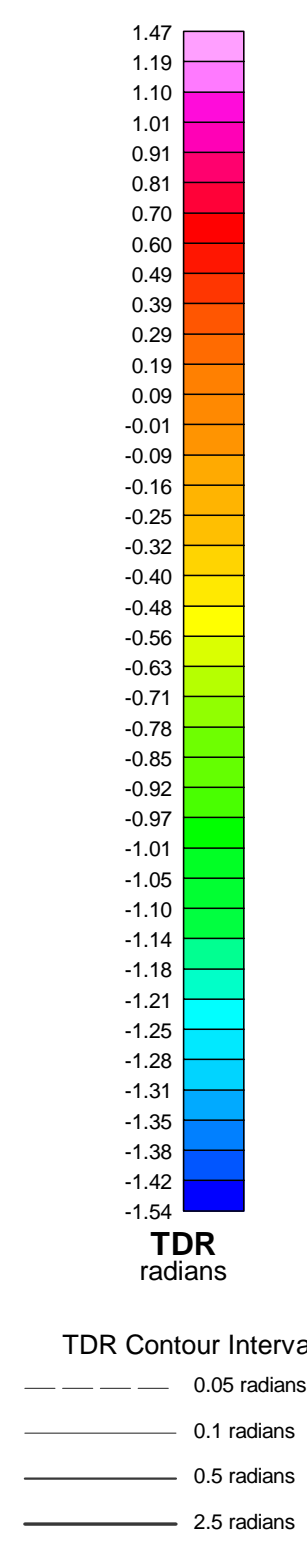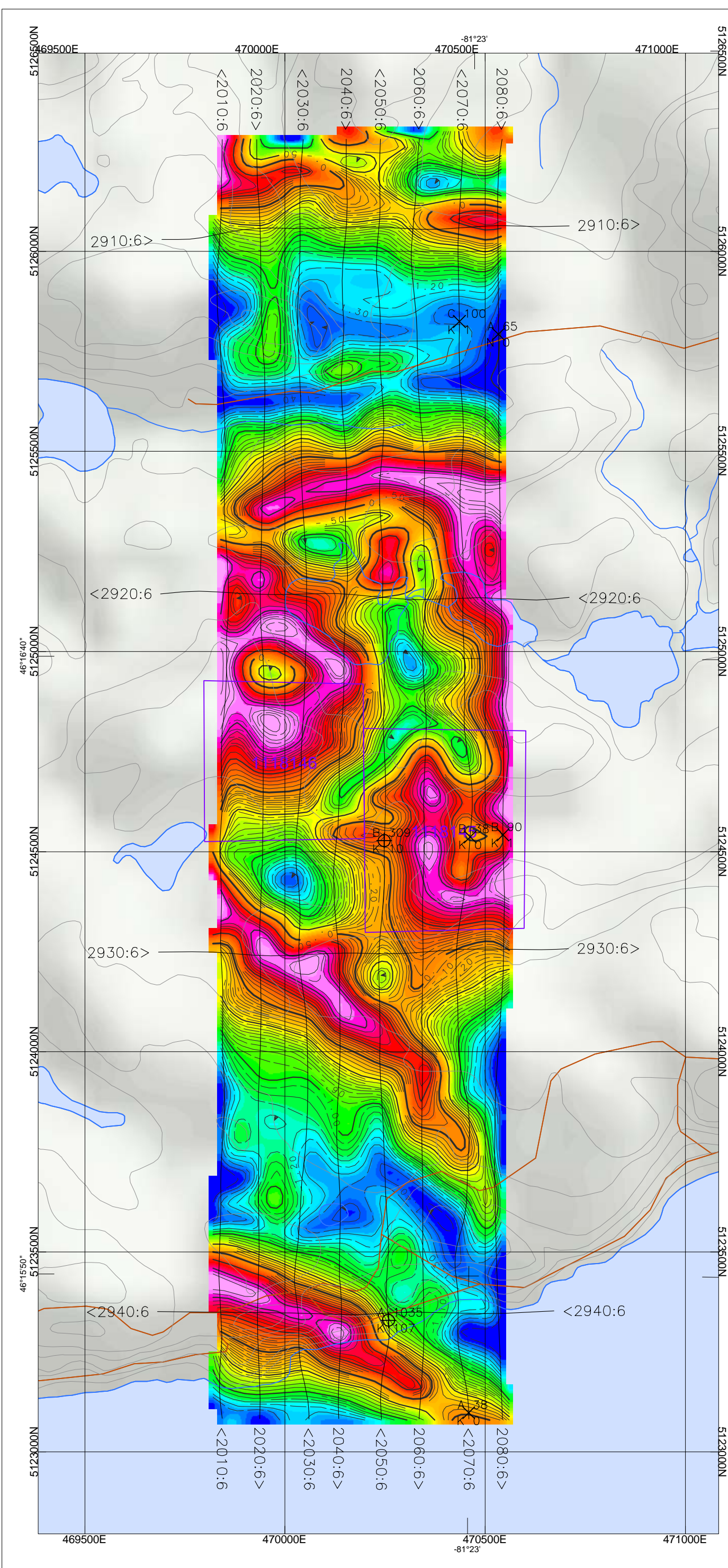- False Easting/Northing: 500,000m/0m

scale 1:10,000

Argosy Minerals Inc.
Sudbury Area, Ontario

MAGNETIC PRODUCTS
Lac Panache Block, Plate 3

NTS 041I03

Survey flown by:

AEROQUEST LIMITED
4-845 Main St. East
Milton, Ont., CANADA L9T 3Z3
Tel: (905) 693-9129 Fax: (905) 693-9128
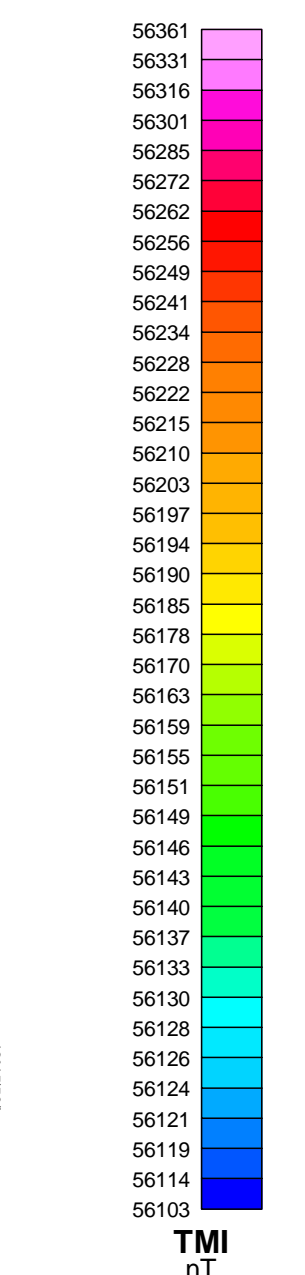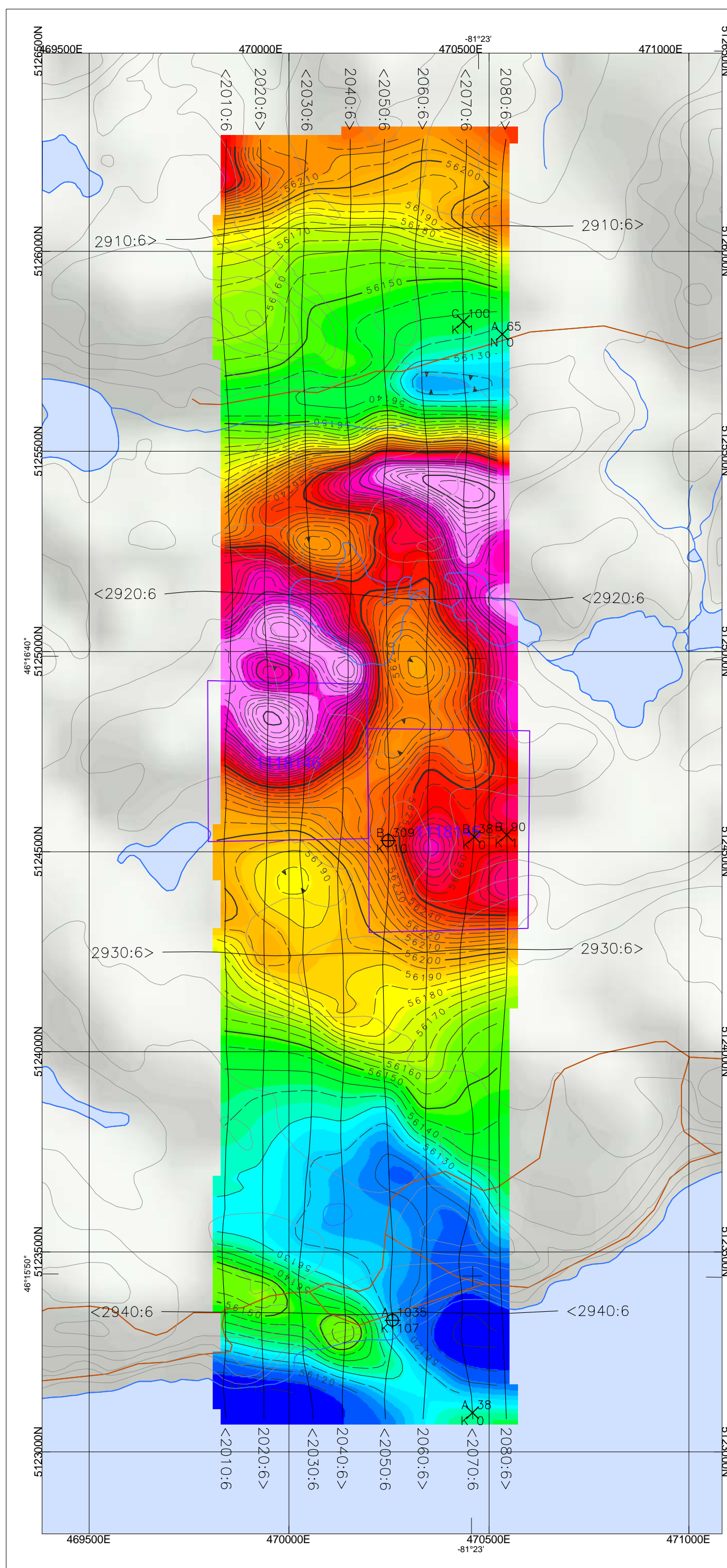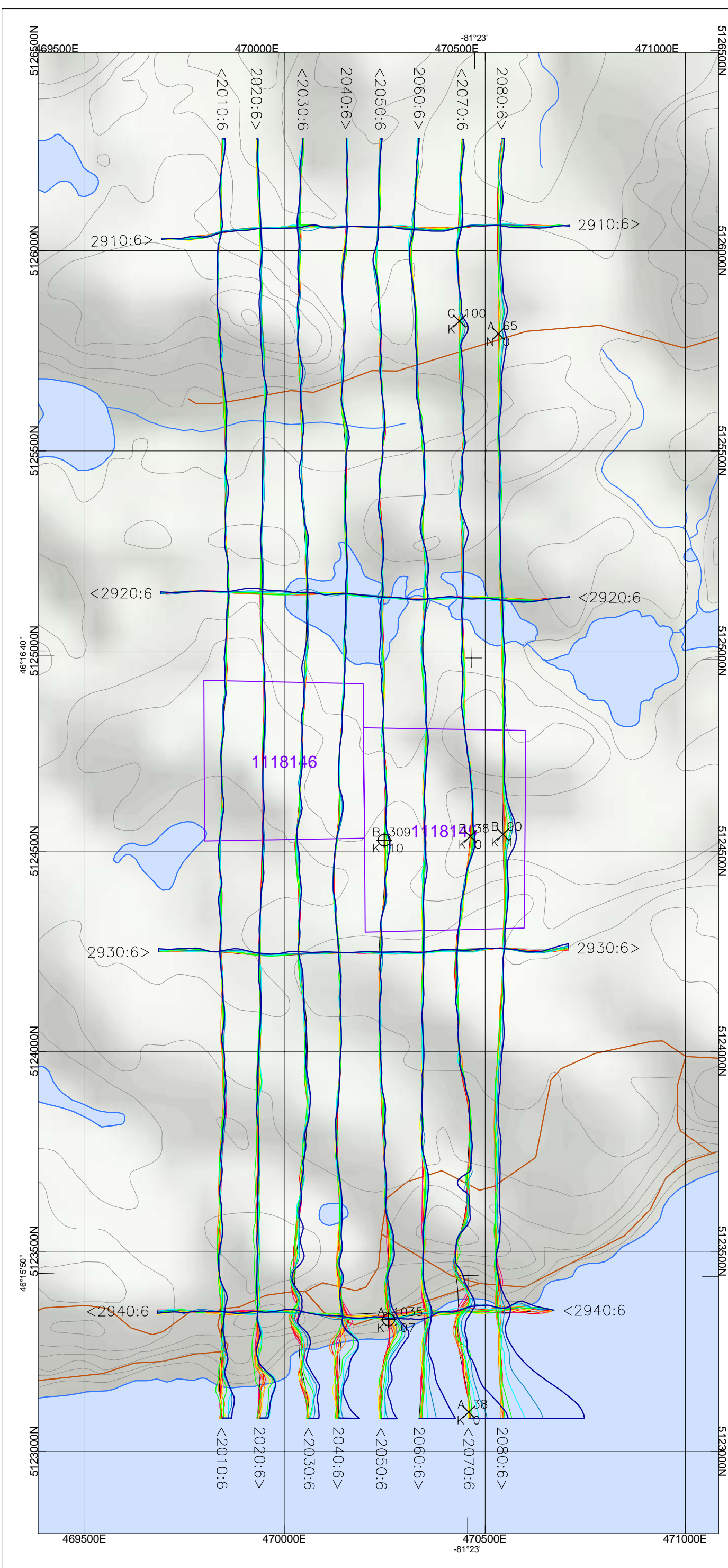www.aeroquestsurveys.com

September 2006

MAG_10k_Lac Panache.map

Lac Panache Block

TILT DERIVATIVE OF TMI

TDR
radians

1.47
1.19
1.10
1.01
0.91
0.81
0.70
0.60
0.49
0.39
0.28
0.19
0.09
-0.01
-0.11
-0.20
-0.25
-0.40
-0.48
-0.56
-0.71
-0.78
-0.85
-0.92
-0.97
-1.01
-1.05
-1.10
-1.14
-1.18
-1.25
-1.28
-1.31
-1.35
-1.38
-1.42
-1.54

TDR Contour Interval

- - - -	0.05 radians
– · – · –	0.1 radians
———	0.5 radians
———	2.5 radians

TOTAL MAGNETIC INTENSITY

TMI
nT

56361
56331
56316
56301
56285
56272
56262
56256
56249
56241
56234
56228
56222
56215
56203
56197
56194
56190
56185
56178
56170
56163
56159
56155
56149
56146
56143
56133
56130
56128
56126
56124
56121
56119
56114
56103

TMI Contour Interval

- - - -	5 nT
– · – · –	10 nT
———	50 nT
———	250 nT
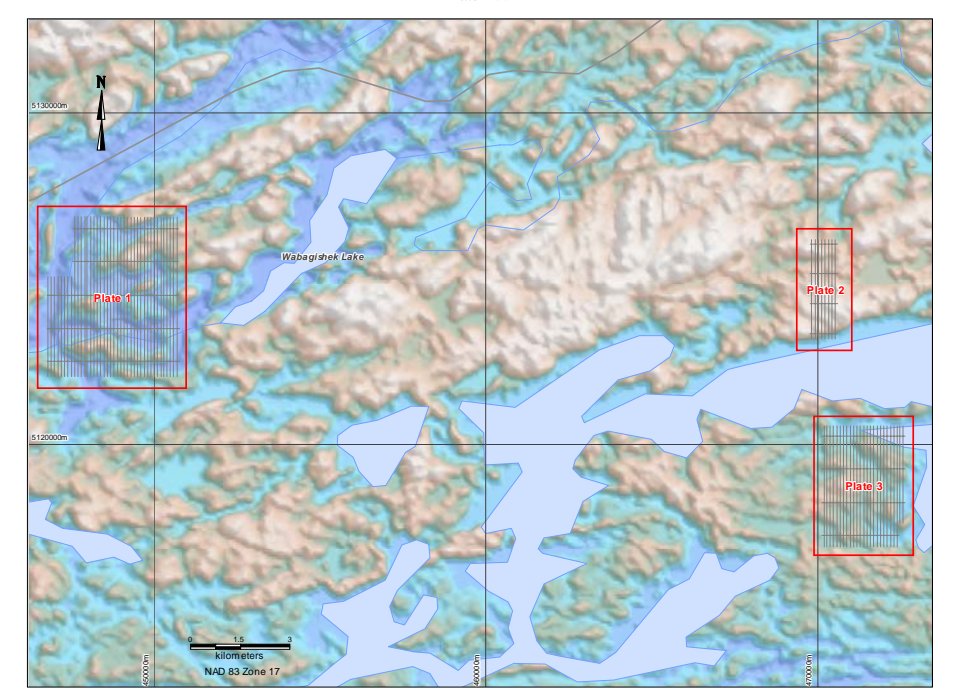
AEROTEM OFF-TIME PROFILES

AeroTEM Profiles
positive excursion to top and right, 1mm=10nT/s

	Z5 Off-Time Channel
	Z6 Off-Time Channel
	Z7 Off-Time Channel
	Z8 Off-Time Channel
	Z9 Off-Time Channel
	Z10 Off-Time Channel
	Z11 Off-Time Channel
	Z12 Off-Time Channel
	Z13 Off-Time Channel
	Z14 Off-Time Channel
	Z15 Off-Time Channel

AEROTEM Z1 OFF-TIME

Z1OFF
nT/s

4191.2
965.5
931.0
896.6
862.1
827.6
793.1
758.6
724.1
689.7
655.2
620.7
586.2
551.7
482.8
448.3
413.8
379.3
344.8
310.3
275.9
241.4
206.9
172.4
137.9
103.4
69.0
34.5

Z1OFF Contour Interval

- - - -	50nT/s
– · – · –	100nT/s
———	500nT/s
———	2500nT/s

Scale 1:10,000,000

Off-Time Anomaly Symbols

>50S	⬢
35-50S	◑
20-35S	◒
10-20S	⊕
5-10S	⊕
1-5S	◇
<1S	✕

anomaly label   A   125   decay constant (μs)
thicK/thiN source   K   36   off-time conductance (S)

SURVEY SPECIFICATIONS:
    Survey flown: July 23, 2006
    Traverse line spacing: 100 metres
    Traverse line direction: 0° Azimuth (N-S)
    Nominal EM bird height: 30 metres
    Aircraft: Aerospatiale A-Star 350B2 (C-FXFU)
INSTRUMENTATION:
    Data acquisition: ADAS & RMS DGR-33
    Magnetometer: Geometrics G-823A cesium vapour
    Installation: Towed bird 17 m above EM bird
    Sensitivity: .001 nanoTesla
    Electromagnetics: AeroTEM II System (BRAVO)
    Configuration: Towed bird
NAVIGATION:
    Navigation: Differential Global Positioning System (DGPS)
    Navigation equipment: AGNAV with MID-TECH RX400p receiver
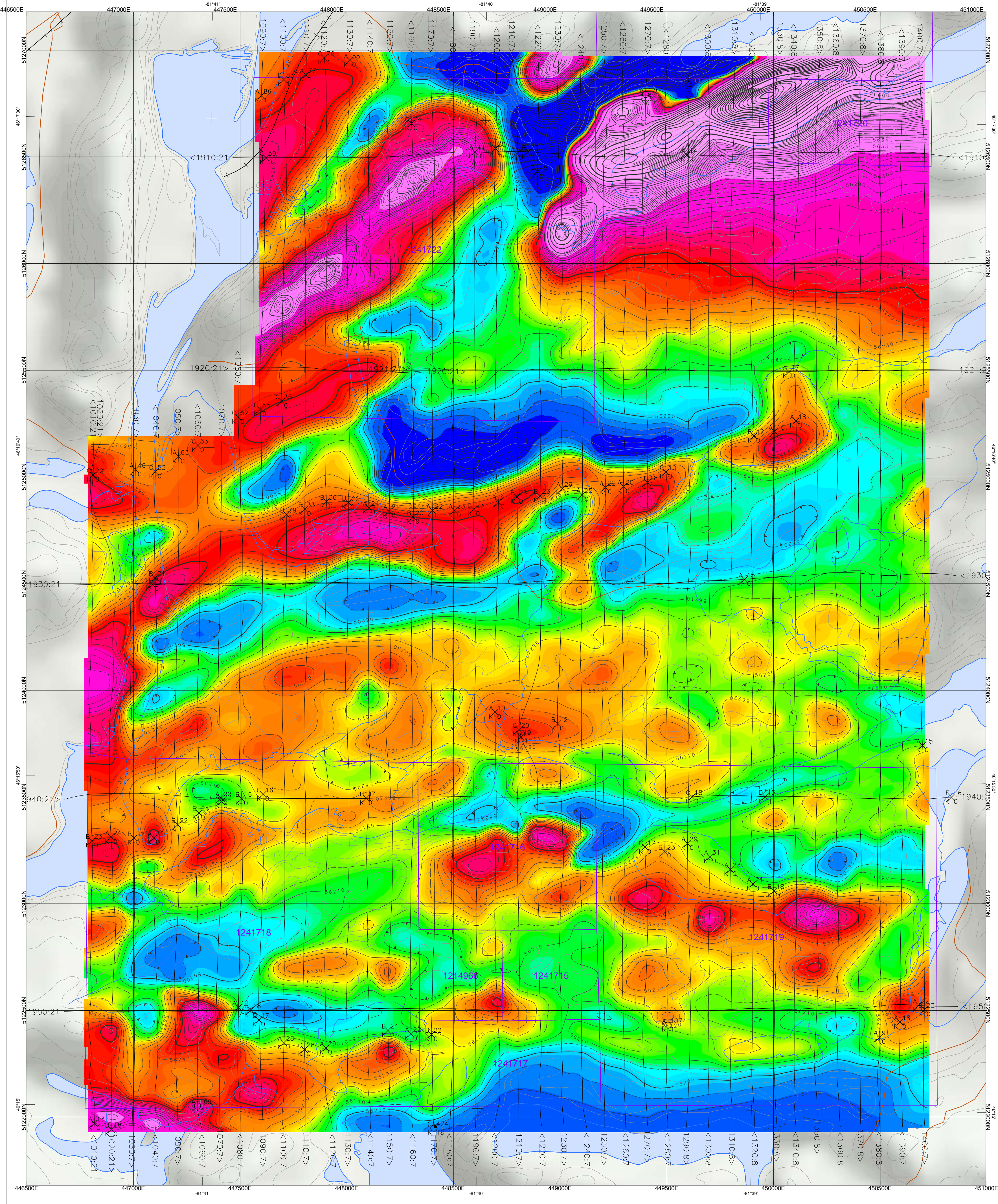   Radar Altimeter: Terra TRA3000/TRI-30
DATA PROCESSING
    Magnetics: diurnal, tieline and micro-leveling corrections
POSITIONING
    Datum: NAD83
    Major Axis: 6378137.000
    Eccentricity: 0.081819191
MAP PROJECTION
    Projection: Universal Transverse Mercator
    Central Meridian: 81°W (Zone 17)
    Central Scale Factor: 0.9996
    False Easting/Northing: 500,000m/0m

scale 1:10,000

200   0   200   400   600
metres
NAD83 / UTM zone 17N

Argosy Minerals Inc.
Sudbury Area, Ontario

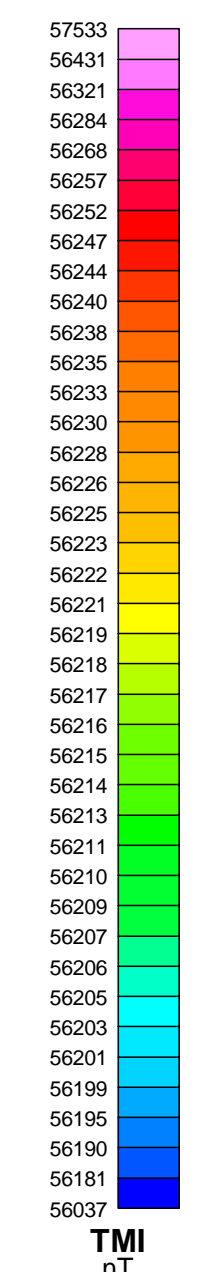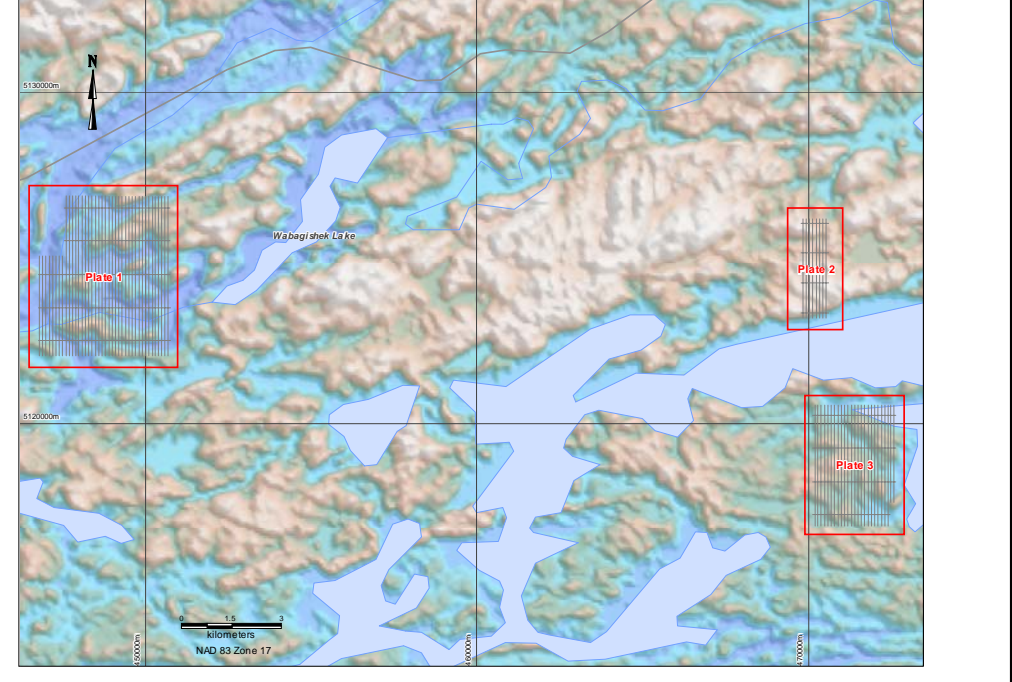## Lac Panache Block, Plate 2

NTS 041I06

Survey done by:

AEROQUEST LIMITED
4-845 Main St. East
Milton, Ont., CANADA L9T 3Z3
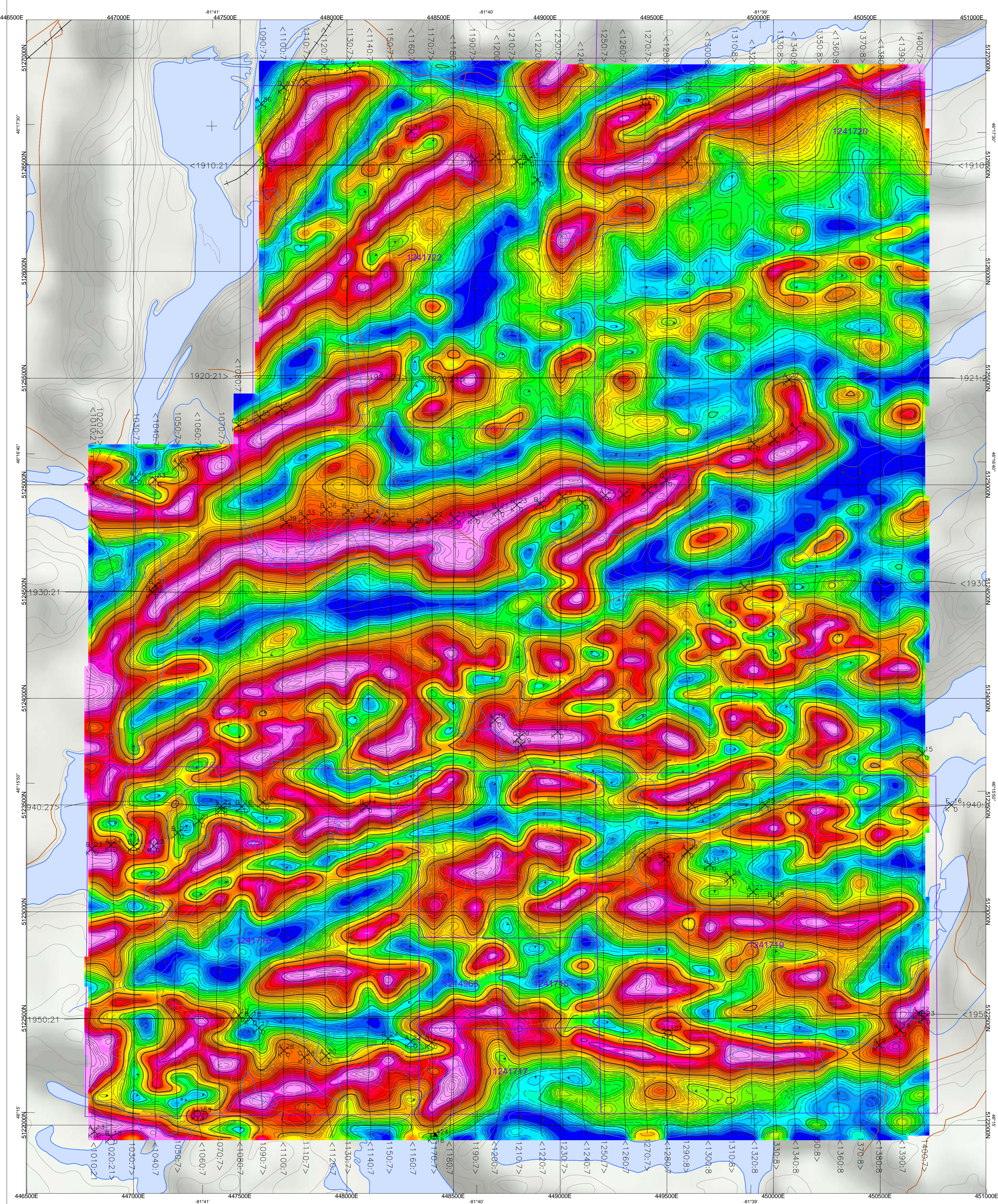Tel: (905) 693-9129 Fax: (905) 693-9128
www.aeroquestsurveys.com

September 2006

Lac Panache Block

Lac Panache_10k.map

TOTAL MAGNETIC INTENSITY

TMI
nT

57533
56431
56321
56284
56252
56247
56244
56240
56238
56235
56233
56230
56228
56226
56225
56223
56222
56221
56219
56218
56217
56216
56215
56214
56213
56211
56209
56207
56206
56205
56203
56201
56199
56195
56190
56181
56037

TMI Contour Interval
5 nT
10 nT
50 nT
250 nT

TILT DERIVATIVE OF TMI

TDR
radians

1.49
1.17
1.06
0.96
0.88
0.80
0.68
0.59
0.50
0.42
0.34
0.26
0.19
0.13
0.08
0.01
-0.06
-0.14
-0.22
-0.29
-0.35
-0.41
-0.48
-0.54
-0.60
-0.66
-0.71
-0.76
-0.80
-0.85
-0.90
-0.95
-1.00
-1.05
-1.10
-1.15
-1.20
-1.23
-1.29
-1.33
-1.50

TDR Contour Interval
0.05 radians
0.1 radians
0.5 radians
2.5 radians

N

Grid North
NAD83 - Zone 17

The topographic data base was derived from 1:20000 Ontario
Ministry of Natural Resources data.
Background shading from NASA SRTM data.
Inset data derived from Natural Resources Canada 'Atlas of Canada Base Maps'

This map accompanies the technical report entitled 'Report on a
Helicopter-Borne Magnetic and Electromagnetic Survey, Lac Panache Project,
Sudbury area, Ontario; by Aeroquest Limited

Survey Area

Scale 1:10,000,000

Off-Time Anomaly Symbols

>50S
35-50S
20-35S
10-20S
5-10S
1-5S
<1S

anomaly label — decay constant (µs)
thick/thin source — off-time conductance (S)

SURVEY SPECIFICATIONS:
Survey flown: July 24, 2006
Traverse line spacing: 100 metres
Traverse line direction: 0° Azimuth (N-S)
Nominal EM bird height: 30 metres
Aircraft: Aerospatiale A-Star 350B2 (C-FXFU)
INSTRUMENTATION:
Data acquisition: ADAS & RMS DGR-33
Magnetometer: Geometrics G-823A cesium vapour
Installation: Towed bird 17 m above EM bird
Sensitivity: .001 nanoTesla
Electromagnetics: AeroTEM II System (BRAVO)
Configuration: Towed bird
NAVIGATION:
Navigation: Differential Global Positioning System (DGPS)
Navigation equipment: AGNAV with MID-TECH RX400p receiver
Radar Altimeter: Terra TRA3000/TRI-30
DATA PROCESSING
Magnetics: diurnal, tieline and micro-leveling corrections
POSITIONING
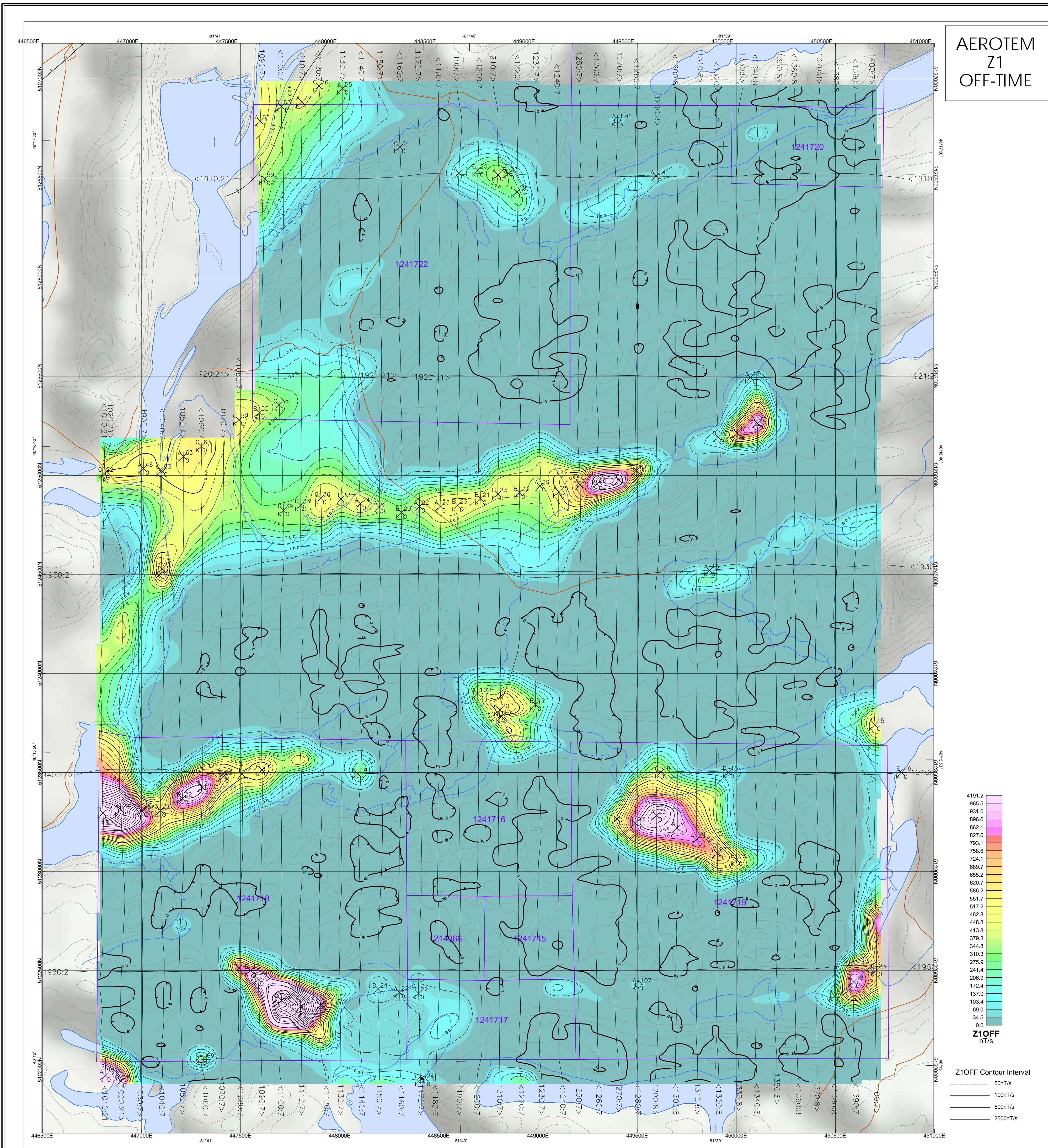Datum: NAD83
Major Axis: 6378137.000
Eccentricity: 0.081819191
MAP PROJECTION
Projection: Universal Transverse Mercator
Central Meridian: 81°W (Zone 17)
Central Scale Factor: 0.9996
False Easting/Northing: 500,000m/0m

scale 1:10,000

Argosy Minerals Inc.
Sudbury Area, Ontario

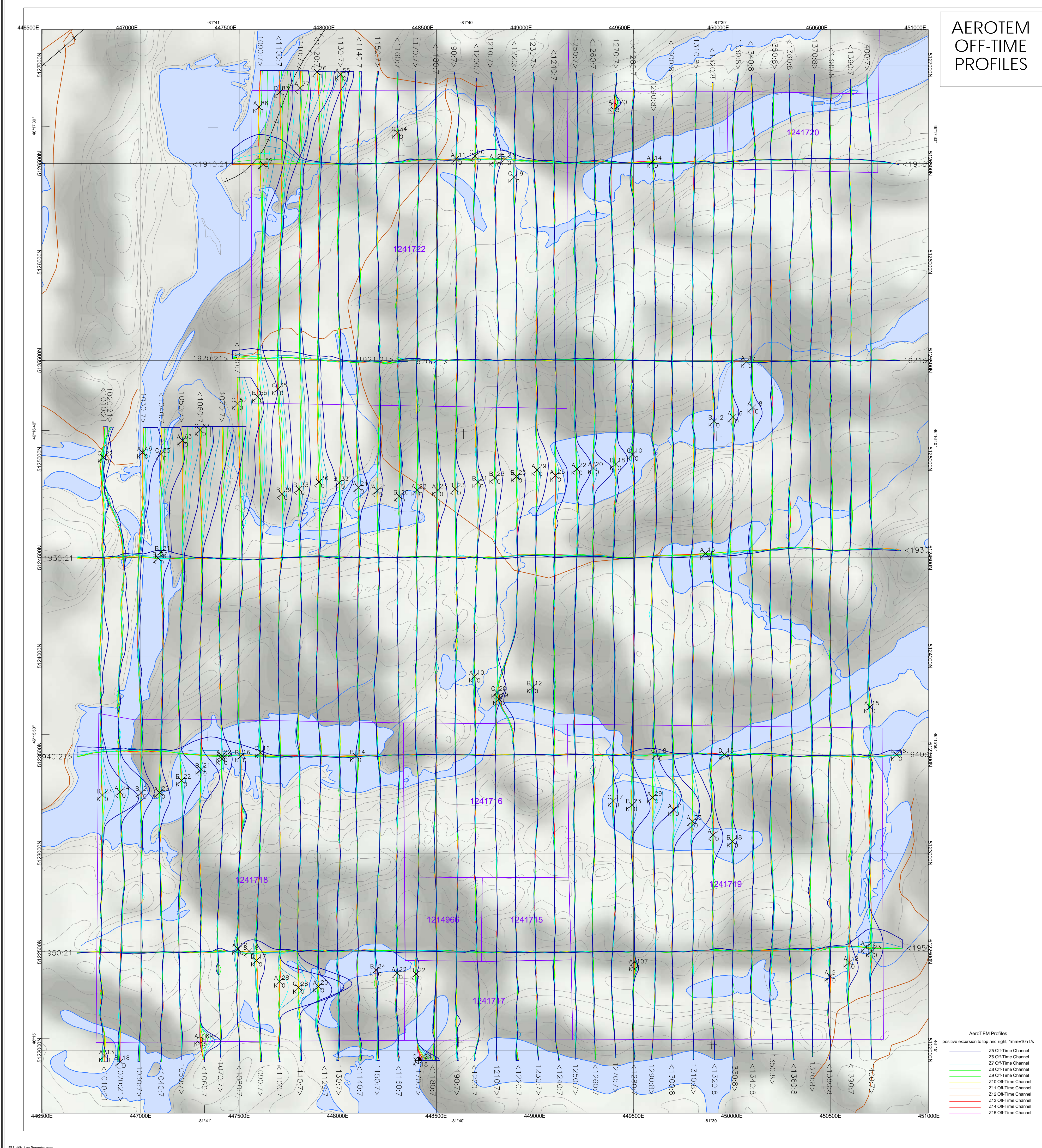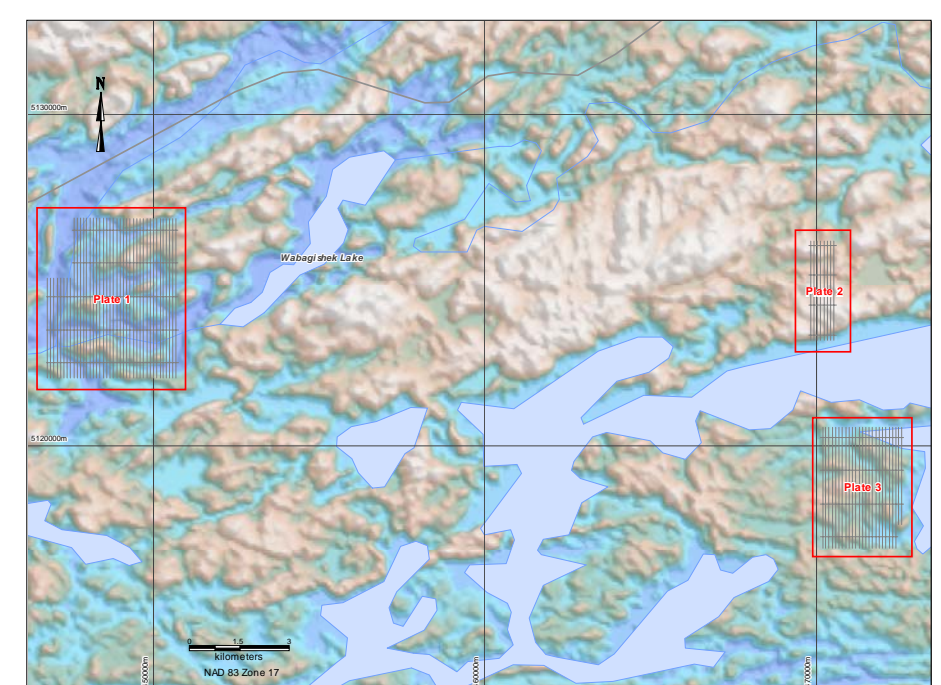# MAGNETIC PRODUCTS
Lac Panache Block, Plate 1
NTS 041I05,041I04

Survey flown by:

AEROQUEST LIMITED
4-845 Main St. East
Milton, Ont. CANADA L9T 3Z3
Tel: (905) 693-0105 Fax (905) 693-0128
www.aeroquestsurveys.com

September 2006

Lac Panache Block

AEROTEM
Z1
OFF-TIME

AEROTEM
OFF-TIME
PROFILES

Survey Area

Scale 1:10,000,000

Z1OFF

4191.2
995.5
931.0
896.6
862.1
827.6
793.1
758.6
724.1
689.7
655.2
620.7
586.2
551.7
517.2
482.8
448.3
413.8
379.3
344.8
310.3
275.9
241.4
206.9
172.4
137.9
103.4
69.0
34.5
0.0

Z1OFF
nT/s

Z1OFF Contour Interval
— 50nT/s
— 100nT/s
— 500nT/s
— 2500nT/s

AeroTEM Profiles
positive excursion to top and right, 1mm=10nT/s
Z5 Off-Time Channel
Z6 Off-Time Channel
Z7 Off-Time Channel
Z8 Off-Time Channel
Z9 Off-Time Channel
Z10 Off-Time Channel
Z11 Off-Time Channel
Z12 Off-Time Channel
Z13 Off-Time Channel
Z14 Off-Time Channel
Z15 Off-Time Channel

Off-Time Anomaly Symbols
>50S
35-50S
20-35S
10-20S
5-10S
1-5S
<1S

anomaly label   decay constant (μs)
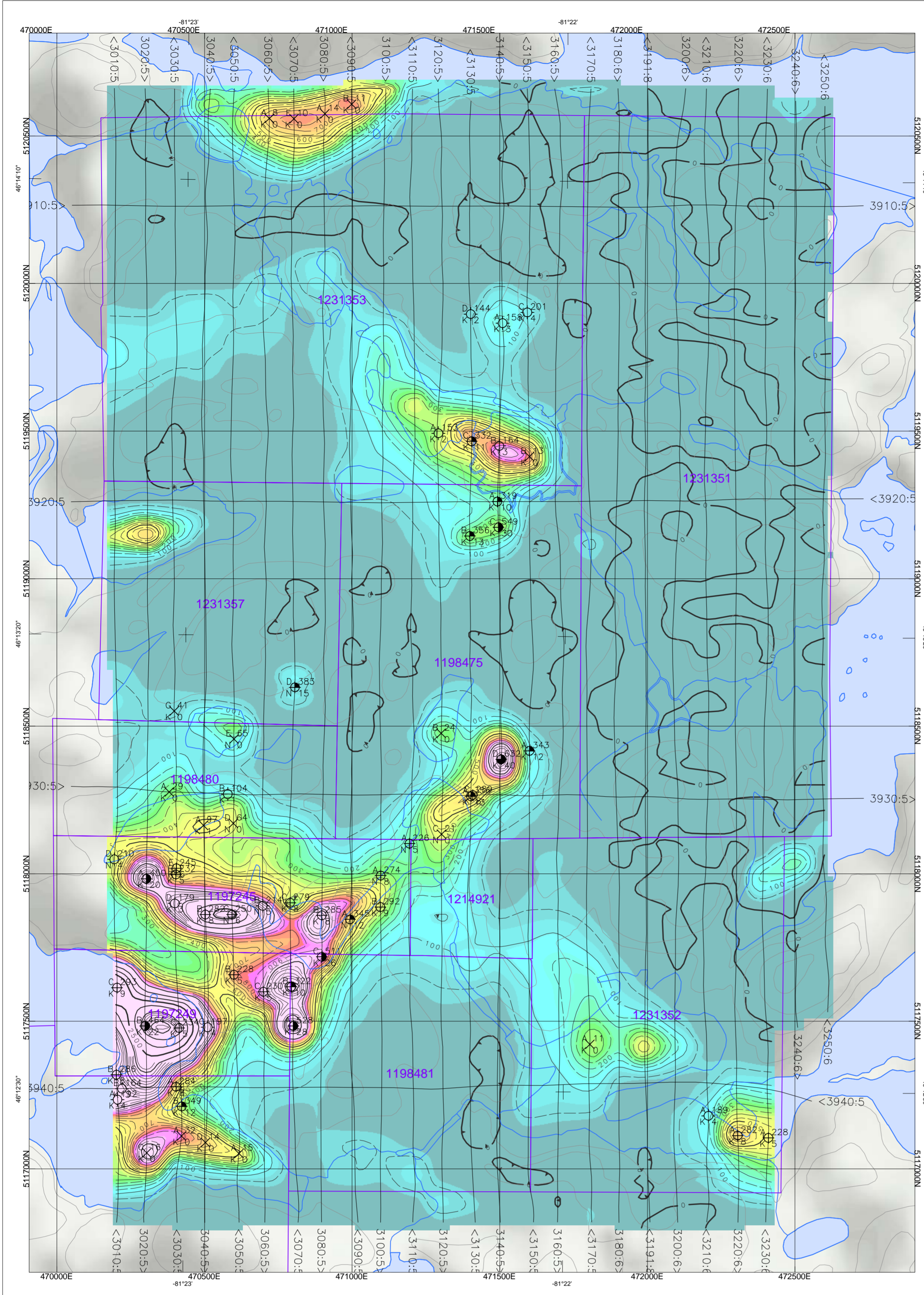thickX/thN source   off-time conductance (S)

Argosy Minerals Inc.
Sudbury Area, Ontario

EM PRODUCTS
Lac Panache Block, Plate 1
NTS 041I05,041I04

Survey flown by:

AEROQUEST LIMITED
4-845 Main St. East
Milton, ON, CANADA L9T 3Z3
Tel: (905) 693-0129 Fax: (905) 693-9128
www.aeroquestsurveys.com

September 2006

Lac Panache Block

AEROTEM Z1 OFF-TIME

N
Grid North
NAD83 - Zone 17
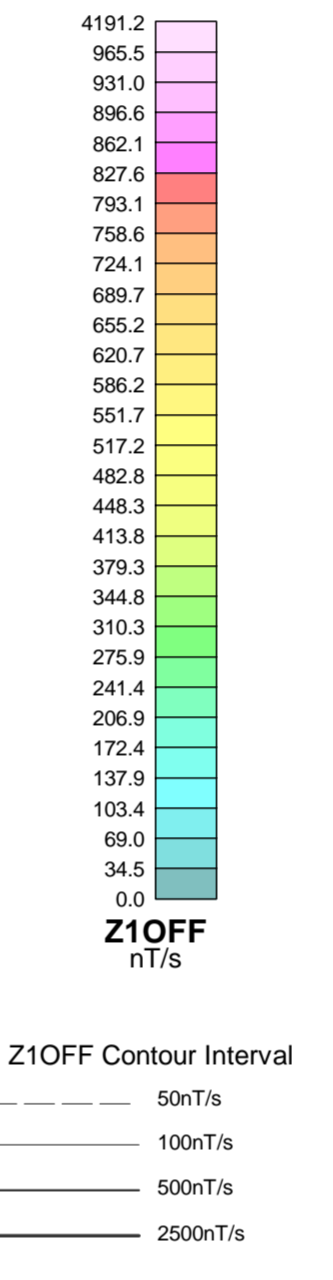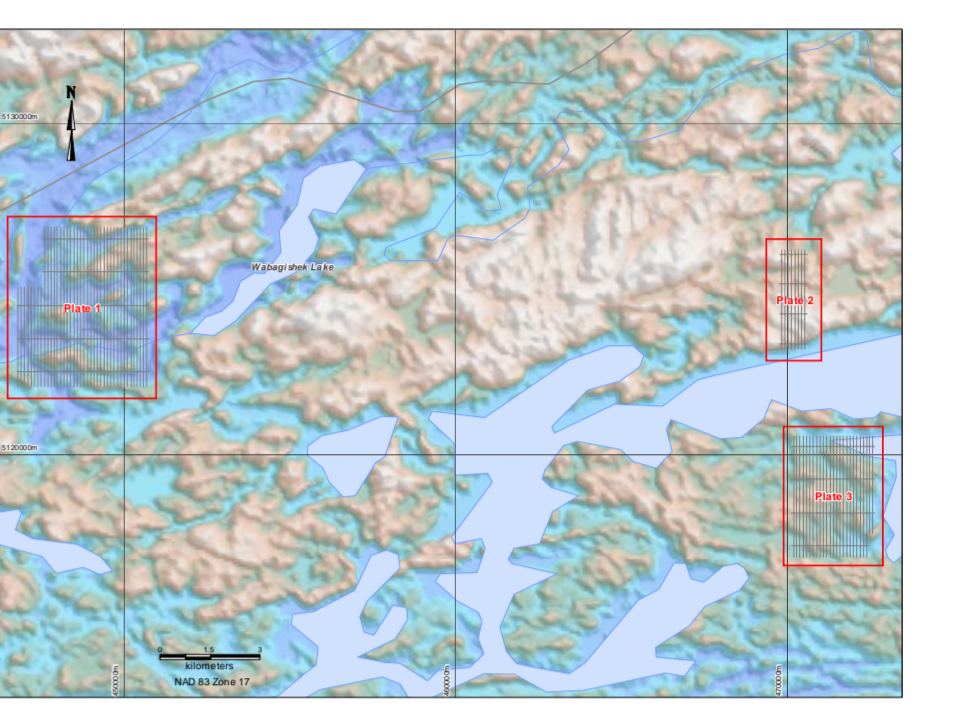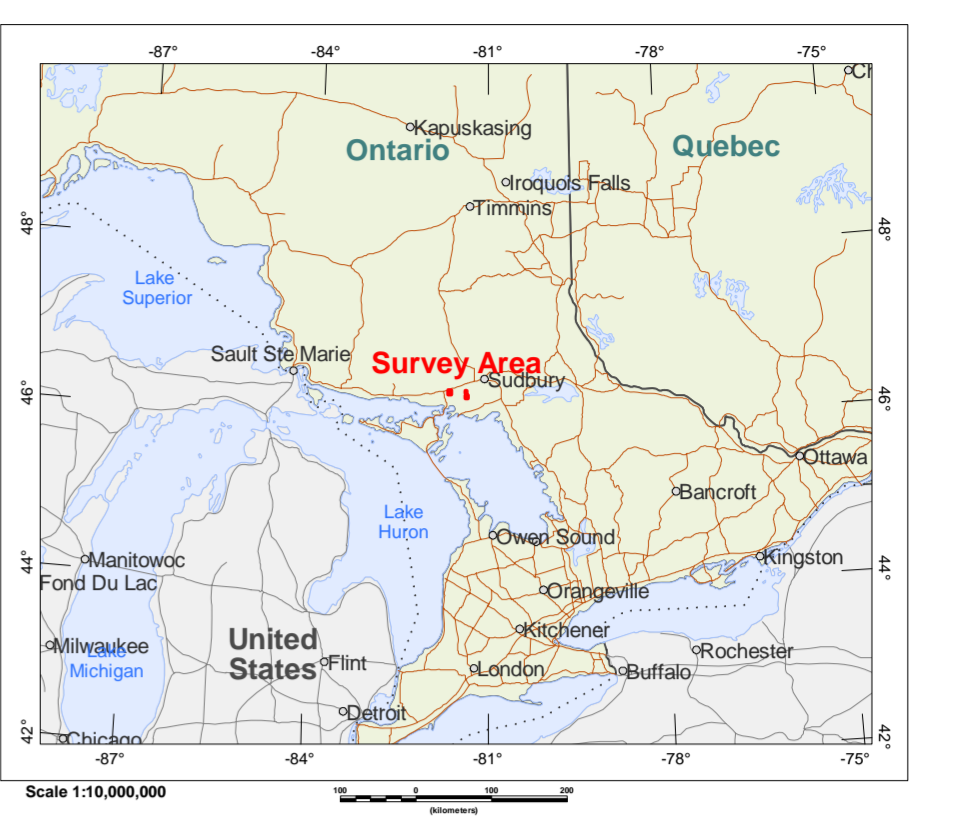
The topographic data base was derived from 1:20000 Ontario
Ministry of Natural Resources data.
Background shading from NASA SRTM data
Inset data derived from Natural Resources Canada 'Atlas of Canada Base Maps'

This map accompanies the technical report entitled 'Report on a
Helicopter-Borne Magnetic and Electromagnetic Survey, Lac Panache Project,
Sudbury area, Ontario', by Aeroquest Limited

Scale 1:10,000,000

Z1OFF nT/s

4191.2
965.5
931.0
896.6
862.1
827.6
793.1
758.6
724.1
689.7
655.2
620.7
586.2
551.7
517.2
482.8
448.3
413.8
379.3
344.8
310.3
275.9
241.4
206.9
172.4
137.9
103.4
69.0
34.5
0.0

Z1OFF Contour Interval

50nT/s
100nT/s
500nT/s
2500nT/s

AEROTEM OFF-TIME PROFILES

Off-Time Anomaly Symbols

>50S ....
35-50S ....
20-35S ....
10-20S ....
5-10S ....
1-5S ....
<1S ....

anomaly label   A   125   decay constant (µs)
thicK/thiN source   K   36   off-time conductance (S)

SURVEY SPECIFICATIONS:
Survey flown: July 23, 2006
Traverse line spacing: 100 metres
Traverse line direction: 0° Azimuth (N-S)
Nominal EM bird height: 30 metres
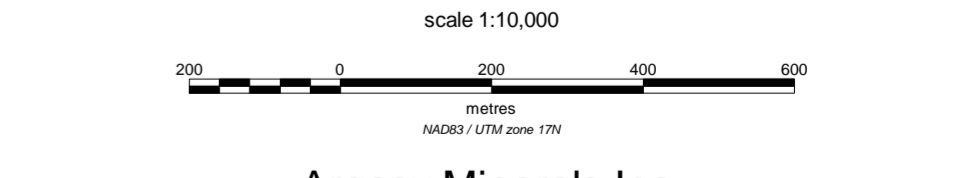Aircraft: Aerospatiale A-Star 350B2 (C-FXFU)
INSTRUMENTATION:
Data acquisition: ADAS & RMS DGR-33
Magnetometer: Geometrics G-823A cesium vapour
Installation: Towed bird 17 m above EM bird
Sensitivity: .001 nanoTesla
Electromagnetics: AeroTEM II System (BRAVO)
Configuration: Towed bird
NAVIGATION:
Navigation: Differential Global Positioning System (DGPS)
Navigation equipment: AGNAV with MID-TECH RX400p receiver
Radar Altimeter: Terra TRA3000/TRI-30
DATA PROCESSING
Magnetics: diurnal, tieline and micro-leveling corrections
POSITIONING
Datum: NAD83
Major Axis: 6378137.000
Eccentricity: 0.081819191
MAP PROJECTION
Projection: Universal Transverse Mercator
Central Meridian: 81°W (Zone 17)
Central Scale Factor: 0.9996
False Easting/Northing: 500,000m/0m

scale 1:10,000

NAD83 / UTM zone 17N

Argosy Minerals Inc.
Sudbury Area, Ontario

EM PRODUCTS
Lac Panache Block, Plate 3

NTS 041I03

Survey flown by:

AEROQUEST LIMITED
4-845 Main St. East
Milton, Ont. CANADA L9T 3Z3
Tel: (905) 693-9129 Fax (905) 693-9128
www.aeroquestsurveys.com

September 2006

Lac Panache Block

AeroTEM Profiles
positive excursion to top and right, 1mm=10nT/s

Z5 Off-Time Channel
Z6 Off-Time Channel
Z7 Off-Time Channel
Z8 Off-Time Channel
Z9 Off-Time Channel
Z10 Off-Time Channel
Z11 Off-Time Channel
Z12 Off-Time Channel
Z13 Off-Time Channel
Z14 Off-Time Channel
Z15 Off-Time Channel

EM_10k_Lac Panache.map