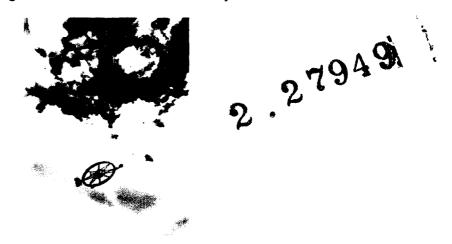
REPORT ON A HELICOPTER-BORNE MAGNETIC AND ELECTROMAGNETIC SURVEY

"featuring the AeroQuest AeroTEM® System"



Sinclair Property Nursey Township, Matachewan Area, Ontario

for

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April, 2004



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NURSEY

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MAPS

The results of the survey are presented in a series of black line and colour maps at a scale of 1:10,000. Map products are as follows:

- Plate 1. Flight path.
- Plate 2. Total Magnetic Intensity (TMI) colour grid w/line contours.
- Plate 3. Z1, Z3 & Z5(RMS) Off-time EM profiles.

All the maps show the flight path, skeletal topography, and where identified, EM anomalies. The anomalies are represented by symbols classified according to the number of responding conventional EM channels. An anomaly identifier label and the Z3 off-time channel peak amplitude, if applicable, is posted alongside the anomaly symbol. Colour contour maps show colour fill plus superimposed line contours.

DIGITAL DATA on CD-ROM

The results of the survey are archived on a single CD-ROM as Geosoft GDB (binary) databases and XYZ (ASCII) export files as well as Geosoft maps and magnetic grids. A *readme.txt* file may be found on the CD which describes the contents in more detail.

For the reader's convenience, a copy of Geosoft's Oasis Montaj Ver 5.0 Free Interface is included on the CD. To install the interface, unzip the two files and follow the instructions in the PDF format (Adobe Reader) guide.

The CD also contains a digital version of this report in PDF (Adobe Acrobat) format including the technical paper by Balch, et al, which is re-printed in the appendix of this report. Adobe Acrobat Reader Ver 5.0 has been included on the CD.

REPORT ON A HELICOPTER-BORNE MAGNETIC AND ELECTROMAGNETIC SURVEY

Sinclair Property Nursey Township, Matachewan Area, Ontario

1. INTRODUCTION

This report describes a helicopter-borne geophysical survey carried out on behalf of Mustang Minerals Corp. on the Sinclair property, in Nursey Township, in the Matchewan area of Ontario.

Principal geophysical sensors included AeroQuest's exclusive AeroTEM[©] time domain helicopter electromagnetic system and a high sensitivity cesium vapour magnetometer. Ancillary equipment included a GPS navigation system with GPS base station, radar altimeter, video recorder, and a base station magnetometer. Raw streaming EM data, consisting of 126 channels of Z and X component sampled at 300 times per second during both on-current and off-current times, was recorded. A second RMS "analogue" acquisition system recorded 6 Z-component and one X-component channels of semi-processed EM data at 7.5 times per second, in addition to recording GPS position, magnetic field, and terrain clearance.

Appendix 1 lists the UTM corner co-ordinates for the survey area. The total line kilometres (unwindowed) flown was 63.0 km. The survey flying described in this report took place on April 25, 2004.

Where identified, bedrock EM anomalies were picked from the conventional RMS Off-Time data and graded according to the number of channels of response. This report describes the survey, the data processing and presentation.

2. SURVEY AREA

The Sinclair property is located at the northeast end of Sinclair Lake in Nursey Township in northeastern Ontario. The property is situated approximately 50 km west-southwest of the village of Matachewan and 155 km north-northeast of the city of Sudbury (Figure 1). Access to the area is by numerous logging roads and trails connected to the north to Timmins and Hwy 144, south to Shining Tree and Hwy 560, and to the east to Matachewan via Hwy 566. The property is centred at 47°51'N latitude, 81°22'W longitude.

The Sinclair property consists of 1 unpatented mining claim for a total of 16 units covering 251 hectares. The claim lies in the Larder Lake Mining Division. The mining claim comprising the property was acquired from Roy Annett through an option agreement.

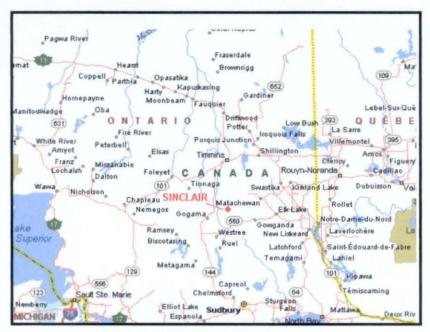


Figure 1 Regional Setting in Ontario

Sinclair Property Claims

Claim #	Units	Township	Due Dates	
1238791	16	Nursey (G-2282)	June 29, 2004	

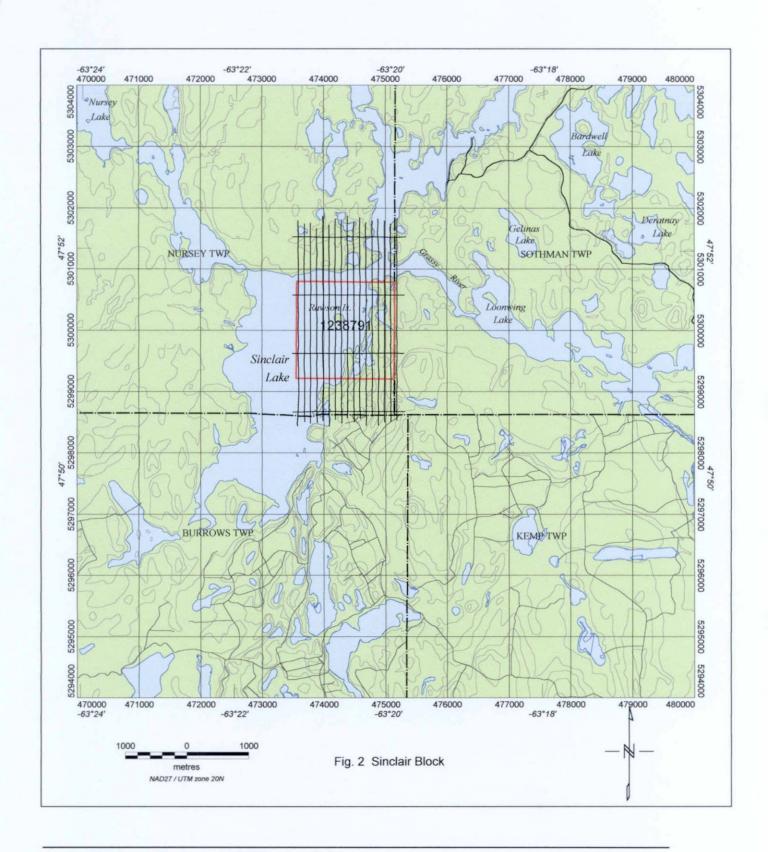
The survey crew was accommodated at the Camp Matachewan Fishing Lodge in Matachewan, Ontario. Survey specification details may be found in the next section of the report.

3. SURVEY SPECIFICATIONS AND PROCEDURES

The survey specifications are summarised in the following table:

Area Name	Line Spacing (m)	Line Direction	Unwindowed Total Survey (km)	Windowed Total Survey (km)	Dates Flown (2004)	
Sinclair Survey	100	N-S	63.0	28.5	April 25	

The unwindowed kilometres flown is calculated by adding up the survey and control (tie) line lengths as presented in the database. The windowed kilometres is determined in the same manner but after masking the database with an outline of the claims boundary, as found in the appendix of this report. All the survey lines were flown in the UTM grid North/South direction. The control (tie) lines were flown perpendicular to the survey lines.



Nominal EM bird terrain clearance was ~30m (100 ft). The magnetometer sensor was mounted in a smaller bird connected to the tow rope 21 metres above the EM bird and 17 metres below the helicopter. Nominal survey speed was 75 km/hr. Scan rates for data acquisition was 0.1 second for the magnetometer, electromagnetics and altimeter and 0.2 second for the GPS determined position. This translates to a geophysical reading about every 2-3 metres along flight track.

Navigation was assisted by a GPS receiver and the RMS data acquisition system which reports GPS co-ordinates as NAD83 latitude/longitude and directs the pilot over a pre-programmed survey grid. The x-y-z position of the aircraft, as reported by the GPS, is recorded at 0.2 second intervals.

Unlike frequency domain electromagnetic systems, the AeroTEM[©] system has negligible drift due to thermal expansion. The system static offset is removed by high altitude zero calibration lines and employing local levelling lines.

The operator was responsible for ensuring the instrument was properly warmed up prior to departure and that the instruments operated properly throughout the flight. He also maintained a detailed flight log during the survey noting the times of the flight as well as any unusual geophysical or topographic features.

On return of the aircrew to the base camp, the RMS acquisition system survey data on FlashCard was downloaded to the data processing work station. The MDAS recorded data, on removable hard-drive, was also downloaded to the processing station and archived onto DVD. In-field processing included flight preparation, transfer of the RMS acquired data to Geosoft GDB database format and production of preliminary EM, magnetic contour, and flight path maps. Survey lines which showed excessive deviation from the intended flight path were re-flown.

4. AIRCRAFT AND EQUIPMENT

4.1 Aircraft

A Eurocopter (Aerospatiale) AS350B2 "A-Star" helicopter - registration C-FAVI was used as survey platform. The helicopters was owned and operated by Abitibi Helicopters Ltd., LaSarre, P.Q. Installation of the geophysical and ancillary equipment was carried out by AeroQuest Limited



Fig.3 The mag bird (foreground) and EM bird

at the Gateway Helicopters Base in North Bay, Ont. then ferried to the survey area. The survey aircraft was flown at a nominal terrain clearance of 220 ft (70 m).

4.2 Magnetometer

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The AeroQuest airborne survey system employed 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. The sensitivity of the magnetometer is 0.001 nanoTesla at a 0.1 second sampling rate. The nominal ground clearance of the magnetometer bird was 51 metres (170 ft.). The magnetics data is recorded at 10Hz by the RMS DGR-33.



Fig.4 Instrument Rack

4.3 <u>Electromagnetic System</u>

The electromagnetic system employed was an AeroQuest AeroTEM[©] Time Domain towed bird system. A triangular transmitter on-time pulse of 1.150 millisecond is employed, at a base frequency of 150 Hz. During every tx on-off cycle (300 per second), 126 contiguous channels of raw x and z component (as well as a transmitter current monitor, itx) of the received waveform are measured. Each channel width is 26.455 microsec starting at the beginning of the Tx pulse on. This 126 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 MDAS system.

RMS DGR-33 Acquisition System

In addition to the magnetics, altimeter and position data, six time channels of on-board 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 7.5 samples per second. These channels are derived by a real-time binning, stacking and filtering procedure on the raw streaming data. The RMS data (Z1 to Z6, X1) is also sent to the analogue chart recorder and is often referred to as the analogue data. 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	Noise tolerance
Z1, X1	1269.8	1322.8	52.9	48-50	20 ppb
Z2	1322.8	1455.0	132.2	50-54	20 ppb
Z3	1428.6	1587.3	158.7	54-59	15 ppb
Z4	1587.3	1746.0	158.7	60-65	15 ppb
Z5	1746.0	2063.5	317.5	66-77	10 ppb
Z6	2063.5	2698.4	634.9	78-101	10 ppb

MDAS Acquisition System

The 126 channels of raw streaming are recorded by the MDAS acquisition system onto a removeable hard drive. The streaming data may undergo post-survey processing to yield 33 stacked and binned on-time and off-time channels at a 10 Hz sample rate.

The timing of those reduced streaming channels is described in the following table.

Processed Start Channel (microsec)		Stop (microsec)	Mid (microsec)	Width (microsec)	
1 ON	687.8	714.3	701.1	26.5	
2 ON	714.3	740.7	727.5	26.5	
3 ON	740.7	767.2	754.0	26.5	
4 ON	767.2	793.7	780.4	26.5	
5 ON	793.7	820.1	806.9	26.5	
6 ON	820.1	846.6	833.3	26.5	
7 ON	846.6	873.0	859.8	26.5	
8 ON	873.0	899.5	886.2	26.5	
9 ON	899.5	925.9	912.7	26.5	
10 ON	925.9	952.4	939.2	26.5	
11 ON	952.4	978.8	965.6	26.5	
12 ON	978.8	1005.3	992.1	26.5	
13 ON	1005.3	1031.7	1018.5	26.5	
14 ON	1031.7	1058.2	1045.0	26.5	
15 ON	1058.2	1084.7	1071.4	26.5	
16 ON	1084.7	1111.1	1097.9	26.5	
0 OFF	1164.0	1190.5	1177.2	26.5	
1 OFF	1190.5	1216.9	1203.7	26.5	
2 OFF	1216.9	1243.4	1230.2	26.5	
3 OFF	1243.4	1269.8	1256.6	26.5	
4 OFF	1269.8	1296.3	1283.1	26.5	
5 OFF	1296.3	1322.8	1309.5	26.5	
6 OFF	1322.8	1349.2	1336.0	26.5	
7 OFF	1349.2	1375.7	1362.4	26.5	
8 OFF	1375.7	1402.1	1388.9	26.5	
9 OFF	1402.1	1428.6	1415.3	26.5	
10 OFF	1428.6	1455.0	1441.8	26.5	
11 OFF	1455.0	1481.5	1468.3	26.5	
12 OFF	1481.5	1507.9	1494.7	26.5	
13 OFF	1507.9	1640.2	1574.1	132.3	
14 OFF	1613.8	1825.4	1719.6	211.6	
15 OFF	1825.4	2248.7	2037.0	423.3	
16 OFF	2248.7	3095.2	2672.0	846.6	

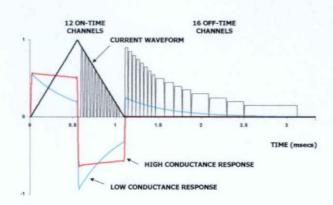


Fig. 5 Schematic of Tx and Rx waveforms

The picked EM anomalies plotted on the survey maps were generated from the conventional EM channel data logged by the RMS acquisition system.

The current AeroTEM® Transmitter Dipole moment is 38.8 kNIA. The AeroTEM® bird was towed 38 metres (125 ft) below the helicopter. More technical details of the system may be found in the technical paper in the Appendix.

4.4 Ancillary Systems

Magnetometer and GPS Base Station

An integrated GPS and magnetometer base station was set up to monitor the static position GPS errors to permit differential post-processing and to record the diurnal variations of the earth's magnetic field. Each sensor, GPS and magnetic, receiver/signal processor was attached to a dedicated laptop computer for purposes of instrument control and/or data display and recording. The laptops were, in turn, linked together to provide a common recording time reference using the GPS clock.

The base magnetometer was a Scintrex CS-2 cesium precession magnetometer coupled with a Picodas MEP-710 frequency counter/decoupler. Data logging and magnetometer control was provided by the Picodas *basemag.exe* software. The logging was configured to measure at 0.5 second intervals. Digital recording resolution was 0.1 nT. The sensor was placed on a tripod away from potential noise sources near the Lodge. A continuously updated profile plot of the base station values was available for viewing on the base station display.

The GPS base station employed a Leica Mx9212 12 channel GPS receiver with external antenna mounted near the magnetometer sensor. Although the GPS receiver was controlled by the Picodas *cdu510.exe* software, logging was not engaged as the aircraft employed a real-time differential GPS receiver. The base GPS was used only for the GPS clock for synchronisation purposes.

Radar Altimeter

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

Video Tracking and Recording System

A high resolution colour VHS/8mm video camera was 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 data.

GPS Navigation System

The navigation system consisted of an Ag-Nav Inc. 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 Trimble AgGPS132 WAAS enabled GPS receiver mounted on the instrument rack and a Trimble 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 either coast, 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 Trimble 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 survey and the information is fed into the airborne navigation system. The co-ordinate system employed in the survey design was NAD83 UTM. The real-time differentially corrected GPS positional data was recorded by the RMS DGR-33 in NAD83 latitude and longitude at 0.2 second intervals directly in the analogue geophysical data file. The datum of the recorded latitude/longitude depended on the datum defined in the navigation file used to guide the survey aircraft.

Digital Acquisition System

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The RMS Instruments DGR33A data acquisition system was used to collect and record the analogue data stream, i.e. the geophysical and positional data, including processed 6 channel EM, magnetic, 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.

The AeroTEM received waveform sampled during on and off-time at 126 channels per decay, 300 times per second, was logged in parallel by the proprietary MDAS data acquisition system. The channel sampling commences at start of the Tx cycle and the width of each channel is 26.445 microseconds. The streaming data was recorded on a removable hard-drive and was later backed-up onto DVD-ROM on the field-processing computer.

5. PERSONNEL

The following AeroQuest personnel were involved in the project

Field -

Party Chief: Bert Simon Data Processor: Chris Balch

Operator: Marcus Watson/Chris Kozak

Office-

Data Processing and Report: Neil Fiset/Chris Balch

The survey pilot, Kevin Jackson, was employed directly by the helicopter operator - Abitibi Helicopters Ltd.

6. DELIVERABLES

The report includes a set of three geophysical maps plotted at 1:10,000 scale. The map types are as follows:

- · Plate 1. Flight path.
- Plate 2. Total Magnetic Intensity (TMI) colour grid w/line contours.
- Plate 3. Z1, Z3 & Z5 (RMS) Off-time EM profiles.

The basic map coordinate/projection system used to create the maps is NAD27 Canada Mean Universal Transverse Mercator Zone 17. For reference, the latitude and longitude are also noted on the maps.

All the maps show flight path trace with time reference fiducials marked at a 10 second interval, skeletal topography, and conductor picks represented by an anomaly symbol classified according to the number of RMS EM Z component channels of response. The anomaly symbol is accompanied by an anomaly identifier label and, where applicable, the Z3 channel amplitude in ppb. The anomaly symbol legend may be found in the margin of the maps. Colour contour maps show colour fill plus superimposed line contours.

The geophysical profile data is archived digitally in a Geosoft GDB binary format database as well as an exported Geosoft Ascii format XYZ file. A description of the various channels found in the database may be found in the appendices of this report.

An archive CD complements the hard copy report and maps. It contains the digital databases as well as the geophysical maps and grids in Geosoft format.

7. DATA PROCESSING AND PRESENTATION

All in-field and post-field data processing was carried out using Geosoft Montaj as well as AeroQuest proprietary data processing software. Plotting was on a 36 inch wide HP650C ink-jet plotter.

7.1 Base Map

The geophysical maps accompanying this report are based on positioning in the datum of NAD27 Canada Mean. The survey geodetic GPS positions have been map projected using the Universal Transverse Mercator projection in Zone 17.

A summary of the map datum and projection specifications are as follows:

Ellipse: Clark 1866

Ellipse major axis: 6378206.4m eccentricity: 0.082271854

Datum: North American 1927 - Canada Mean Datum Shifts (x,y,z): 10, -158, -187 metres

Map Projection: Universal Transverse Mercator Zone 17 (Central Meridian 81°W)

Central Scale Factor: 0.9996

False Easting, Northing: 500,000m, 0m

The skeletal topography, provided by Mustang Minerals Corp., was derived from the digital Ontario Base Map (OBM) 1:20,000 map series.

7.2 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 NAD83 latitude and longitude calculated from the raw pseudorange derived from the C/A code signal.

The instantaneous GPS flight path, after conversion to NAD27 Canada Mean local datum UTM co-ordinates, is drawn using linear interpolation between the x/y positions. The time reference fiducials are drawn on the map at appropriate intervals and are used to reference the digital data files to the plan map.

The raw Digital Terrain Model (DTM) was derived by simply taking the satellite position altitude and subtracting the radar altimeter. The calculated values are relative and are not tied into to surveyed geodetic heights.

7.3 Electromagnetic Data

The six Z-component and single X-component conventional RMS EM channels underwent a two stage digital filtering process to reject major sferic events and to reduce system noise.

Local sferic activity can produce sharp, large amplitude events that cannot be removed by conventional filtering procedures. Smoothing or stacking will reduce their amplitude but leave a broader residual response that can be confused with geological phenomena. To avoid this possibility, a computer algorithm searches out and rejects the major sferic events. The filter used was a 0.4 sec non-linear filter.

The signal to noise ratio was further improved by the application of a low pass linear digital filter. This filter has zero phase shift which prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than about 1 second or 30 metres over the ground. This filter is referred to as a 10 point linear filter.

The EM channels have been levelled to remove the residual zero offset by the use of a short background line at the beginning and end of each flight. The background line is flown at high altitude (>1000 ft), theoretically far enough away from any ground conductivity response. Any residual response is therefore a system offset and can be removed from the on-line response by virtue of linear interpolation between the start and end of flight checks. If any non-linear drift remains in the data then artificial local levelling lines were employed.

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.

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Where identified, apparent bedrock EM anomalies have been manually picked from the analogue profiles. Each anomaly has been given a letter label and is graded according to the channels in which the anomaly is discernible. The anomalies are plotted on the plan maps with a symbol denoting the number of channels of response. Beside the symbol is posted the Z3 channel amplitude. EM Anomalies that are discernible but questionable as they lie within the noise envelope are plotted with an x-symbol.

Nine EM anomalies, that may be related to bedrock mineralisation, were identified on the Sinclair block and warrant follow-up on the ground.

7.4 Magnetic Data

Prior to any levelling 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 25 metres. The final levelled grid provided the basis for threading the presented contours which have a minimum contour interval of 5 nT.

The Sinclair survey block is marked by a number of moderately strong, isolated, circular to oval shaped magnetic anomalies. The general magnetic trend is northeast-southwest

Respectfully submitted,

Neil Fiset, B.Sc., AeroQuest Limited

June 21, 2004

APPENDIX 1

Survey Block corner co-ordinates (UTM Zone 17)

Sinclair Survey Block - NAD83

473598.0mE 5298850.0mN 473598.0mE 5301850.0mN 475202.0mE 5301850.0mN 475202.0mE 5298850.0mN

Sinclair Claim No. 1238791 - NAD27 Canada Mean

474741.4mE 5300788.1mN 475158.9mE 5300786.1mN 475136.2mE 5299206.1mN 473549.8mE 5299215.1mN 473564.9mE 5300795.1mN

Sinclair Claim No. 1238791 - NAD83

474756mE 5301012mN 475173mE 5301010mN 475150mE 5299430mN 473564mE 5299439mN 473579mE 5301019mN

APPENDIX 2 Description of Database Fields

The GDB file is a Geosoft binary database. The RMS database has been exported to a Geosoft XYZ ASCII format file.

In the databases the Survey lines, Tie Lines, and High Altitude/Internal Q coil lines are prefixed with an "L" or "Line", "T" or "Tie", and "S" or "Test", respectively.

RMS Database (Sinclair.gdb & Sinclair.xyz):

Column	Description
×	Zone 17 UTM Easting in metres (NAD27-Canada Mean)
у	Zone 17 UTM Northing in metres (NAD27-Canad Mean)
x83	Zone 17 UTM Easting in metres (NAD83)
y83	Zone 17 UTM Northing in metres (NAD83)
lat	Latitude in decimal degrees (NAD27-Canada Mean)
long	Longitude in decimal degrees (NAD27-Canada Mean)
lat83	Latitude in decimal degrees (NAD83)
long83	Longitude in decimal degrees (NAD83)
fiducial	Time reference fiducial in seconds
manfid	Manual Fiducial
chartfid	Chart Recorder Fiducial
emfid	Fiducial counter for streaming data synchronisation
utctime	UTC Time in seconds of the day
rtctime	Local (System) time in HH:MM:SS
fltno	Flight number
date	Date in YY/MM/DD format
galtf	GPS Altitude in metres
ralt	Radar Altimeter in metres
bheight	Terrain clearance of EM bird in feet
dtm	Raw Digital Terrain Model in metres
basemag	Base Station magnetic field in nT
rawmag	Raw total magnetic intensity in nT
mag	Diurnally corrected Total Magnetic Intensity in nT
x1flev	Smoothed and levelled RMS Off-Time EM-X component of channel 1 in ppb
z1flev-z6flev	Smoothed and levelled RMS Off-Time EM-Z component of channels 1 to 6 in ppb

Appendix 3: Technical Paper

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Mineral Exploration with the AeroTEM System

S.J. Balch, W.P. Boyko, G. Black, and R.N. Pedersen, AeroQuest Limited, Presented at the SEG Int'l Exposition and 72nd Annual Meeting, Salt Lake City, Utah, October 6-11, 2002

Mineral Exploration with the AeroTEM System

S.J. Balch*, W.P. Boyko, G. Black, and R.N. Pedersen, AeroQuest Limited.

Summary

AeroTEM is a concentric-loop time-domain EM system designed for mineral exploration and geologic mapping. The high dipole moment of the transmitter in combination with the unique superimposed dipole coil geometry allows the system to achieve a depth of exploration similar to fixed-wing systems, but with the resolution and target response symmetry that is typical of conventional helicopter-towed EM systems. AeroTEM has flown over 20,000 line-km since its introduction in 1999. Ground follow-up geophysical surveys and drilling programs have confirmed the depth of exploration to be in excess of 200 m with high spatial resolution of target conductors confirmed. The compact, rigid system geometry should provide for a true on-time measurement of secondary fields from highly conductive sources often associated with Ni-Cu-PGE mineralization, thereby gaining a considerable advantage over all towed-receiver fixed-wing airborne EM systems, which are known to be blind to such targets (Hanneson, 1998).

Introduction

Airborne EM systems, as they have evolved since the 1940's generally fall into one of two categories, namely, (1) the loosely coupled towed-bird systems on fixed-wing aircraft, and (2) the rigid transmitter-receiver configuration towed by helicopters (e.g., Fountain, 1998). The fixed-wing systems operate in the time domain and are characterized by a wideband high-moment transmitter to maximize depth penetration, especially in a resistive environment. The rigid helicopter systems operate in the frequency domain and are characterized by multiple narrow-band low-moment transmitters and closely spaced receivers to maximize spatial resolution and provide moderate depth penetration. Thus one system seeks to maximize signal while the other strives to minimize noise, both attempting to increase the signal-to-noise-ratio...this being the only determining factor of an EM system's level of performance.

The AeroTEM system is a wide-band time-domain EM design that draws on the rigid design of the frequency-domain systems and the high-moment transmitter design of the fixed-wing platforms. The system attempts to both maximize signal and minimize noise by incorporating the two major advantages of airborne EM systems –transmitter power and rigid coil geometry. As Duckworth (1993) so succinctly states, the optimum coupling to a target by a transmitter-receiver coil pair is achieved by only two possible coil configurations. The first optimum coupling is



Figure 1. The AeroTEM airborne electromagnetic system.

achieved when the coil separation is 0.6 times the distance to the target; the second optimum coupling is achieved when the coils are coincident. Because target depth cannot be known a priori, the coincident coil geometry is obviously preferred.

Method

The system (Figure 1) consists of a 3-axis receiver coil mounted centrally within a large 5-m diameter transmitter loop. The transmitter waveform is a triangular current pulse of 1.15 ms duration at a base frequency of 150 Hz with a peak current of 260 A for a total transmitter moment of 40,000 Am². The mutually orthogonal receiver coils are mounted with the X-axis along the flight line, Y transverse, and Z vertical. System waveforms and typical conductor responses are shown in Figure 2.

The system is towed 40 m below the helicopter at a nominal terrain clearance of 30 m. The present transmitter produces a peak primary field of 300 nT vertically below the transmitter at ground level. Because *both* the transmitter and receiver are located close to the ground, AeroTEM produces a stronger target response in the upper 50 m of the earth compared to a fixed-wing aircraft with a peak dipole moment of 500,000 Am² and a peak primary field of 55 nT at ground surface.

The strength of the primary field from an EM transmitter decreases rapidly with distance from the transmitter location. High moment transmitters on fixed-wing aircraft, such as GEOTEM, tend to have better depth penetration because the strength of the primary field – even at 300 m –

The AeroTEM System

is sufficiently high to energize a conductor and produce a measurable secondary field. Large loop ground EM systems have even greater depth penetration, owing to the lower rate at which the primary field falls off with distance from the transmitter for distances on the order of the loop dimensions. The strength of the primary field from the AeroTEM transmitter is compared with that of some common systems in Figure 3.

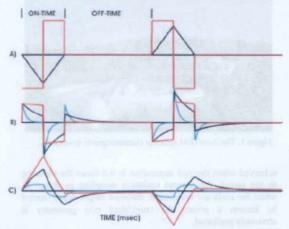


Figure 2. The AeroTEM system is characterized by a) a triangular current pulse at the transmitter and a step response at the receiver. The dB/dt response in b) and the B-field in c) are shown for conductor time constants of 0.1 ms (blue), 0.5 ms (black) and 5 ms (red).

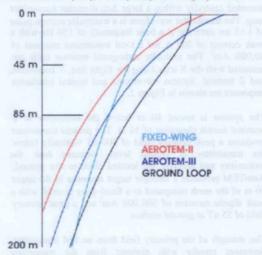


Figure 3: Primary field strength versus depth is compared for fixed-wing (500,000Am²), AeroTEM-II (40,000Am²), AeroTEM-III (80,000 Am²) and ground moving-loop (diameter 100 m, 15 A current, single turn) surface to 200 m.

Although the fixed-wing and ground EM systems gain an advantage in primary field at depth, this energy is diffused over a larger volume, thus reducing their effectiveness in energizing smaller conductors. For large loop ground EM systems, this is especially a problem where large regional conductors can mask the more subtle responses of smaller isolated targets.

Example One: Spatial Resolution

The vertical (Z-axis) component produces responses that are independent of the flight line direction. The close proximity of the transmitter and receiver coils produces very sharp anomaly edges. These two factors combine to produce images of the Z component channels that have high spatial resolution.

In the following example, the amplitude of the earliest offtime channel for the Z component receiver coil is shown in Figure 4. The survey was conducted for Nuinsco Resources in the Lac Rocher area of Quebec during an exploration program for Ni-Cu-PGE deposits.

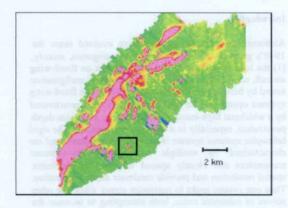


Figure 4. Color image of the earliest time channel, AeroTEM Z component. The black outline represents a conductor response from a near-surface target of limited strike extent.

One discrete anomaly detected from the Lac Rocher survey, and represented by the black outline in Figure 4, is shown in profile format in Figure 5. The approximate lateral extent of the conductor response is 50 m on the earliest time channel (width at half-maximum). The narrow response of this isolated conductor compares favorably with the spatial resolution achieved with conventional HEM systems.

The AeroTEM System

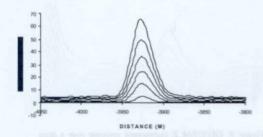


Figure 5: The high spatial resolution of AeroTEM is demonstrated by the EM response of an isolated conductor. The width of the response is less than 50 m on the earliest time channel (peak amplitude at half-maximum).

Example Two: Airborne - Ground Comparison

Aurogin Resources, in joint venture with Heron Mines, flew an 800 line-km AeroTEM survey over the Belledune Property in New Brunswick in the search for Cu-Zn-Pb deposits. Several AeroTEM airborne EM conductors were identified from that survey over two separate areas.

A ground follow-up program of Crone Pulse EM was conducted over one selected target in Area Two. The AeroTEM early-time Z component response is shown in Figure 6. The anomaly subjected to the ground follow-up program is outlined in black (Figure 6).

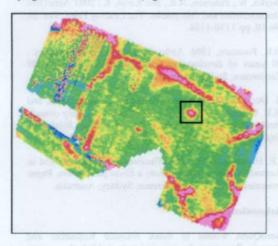


Figure 6: Early-time Z component AeroTEM response over the Belledune Survey Area Two. A detailed ground follow-up survey was centered over the response outlined in black.

An expanded view of the airborne response is shown in Figure 7. The Crone early-time response is shown in Figure 8. The conductor was located within an area of favorable geology. Modeling of the Crone response suggested a subhorizontal conductor dipping at -25° below the horizontal and located approximately 100 m below surface. The AeroTEM response also suggested a flat-lying conductor because of the symmetric Z component response.

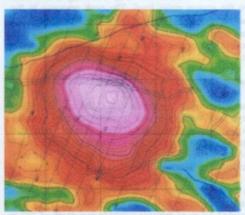


Figure 7. AeroTEM earliest time-channel Z component response, Belledune Property, New Brunswick. The survey was flown with a line spacing of 100 m.

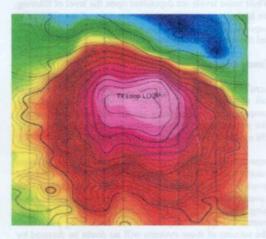


Figure 8: Crone Pulse EM vertical component, ampltide of time channel 10, from the Belledune Property, New Brunswick. The survey was performed in-loop with a 100 m line spacing.

The AeroTEM System

Two boreholes were drilled to then evaluate the EM responses and both intersected up to 15% sulphide containing significant Au-Ag-Cu within a volcanic rhyolite. Downhole Pulse EM surveys confirmed the intersection of a conductor approximately 170 m downhole, coincident with the intersected mineralization, and corresponding to a vertical depth of 145 m. The peak response in the earliest AeroTEM time channel was 90 ppb, or roughly 200 times above the system noise level. The peak response in the Crone survey was 110 nT/s, about 200 times above the system noise level. This is an example of a drilling program that could have proceeded directly from the airborne survey without the added expense of ground geophysics.

Example Three: Airborne - Airborne Comparison

Nuinsco Resources conducted GEOTEM and AeroTEM surveys over the Lac Rocher property covering both the known mineralized area and a larger area of unexplored claims. In one area of the survey both GEOTEM (Figure 9) and AeroTEM (Figure 10) recorded responses that were coincident with a large magnetic anomaly.

Both systems clearly show a distinct, multi-channel anomaly. Nuinsco drilled the conductor in 1999 and intersected 2.2 m of massive sulphide at a depth of 200 m below surface. The AeroTEM peak response was 3 ppb or 10 times the system noise level, while the GEOTEM peak response was 400 ppm or 40 times system noise level. While noise levels are dependent upon the level of filtering, the higher apparent signal-to-noise-ratio of the GEOTEM response can be attributed to its higher moment transmitter and the depth of the conductor.

Conclusions

AeroTEM shows a high spatial resolution, due to its unique coil configuration. The system produces responses that compare well with existing ground and airborne systems. The present depth of exploration is estimated to be up to 250 m with a typical noise level of +/-0.5 ppb.

Improvements to the system will come in the form of larger transmitter moments, decreased noise levels and the development of true on-time measurements through full waveform recording. There are numerous advantages of using helicopter-towed time-domain systems with a depth penetration approaching that of the fixed-wing platforms. The success of these systems will no doubt be dictated by the perceived needs of the mineral exploration industry for such techniques.

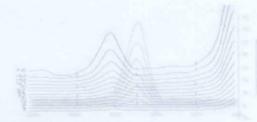


Figure 9: GEOTEM Z component response over a deep conductor at Lac Rocher.

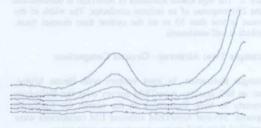


Figure 10: AeroTEM Z component response over a deep conductor at Lac Rocher.

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Acknowledgments

AeroQuest wishes to thank Nuinsco Resources and Aurogin Resources for permission to publish the survey data from their respective properties. Appendix 4: Instrumentation Specification Sheets

=AEROQUEST LIMITED

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AEROTEM Helicopter Electromagnetic System

System Characteristics

Transmitter: Triangular Pulse Shape Base Frequency 30 or 150 Hz.

Tx On Time - 5,750 (30Hz) or 1,150 (150Hz) microsec. Tx Off Time - 10,915 (30Hz) or 2,183 (150Hz) microsec.

Loop Diameter - 5 m. Peak Current - 250 A. Peak Moment - 38,800 NIA.

Typical Z Axis Noise at Survey Speed = 8 ppb peak.

Sling Weight: 270 Kg. Length of Tow Cable: 40 m.

Bird Survey Height: 30 m or less nominal.

Receiver

Three Axis Receiver Coils (x, y, z) positioned at centre of transmitter loop. Selectable Time Delay to start of first channel 21.3, 42.7, or 64.0 msec.

Analogue Display & Acquisition

Six Channels per Axis.

Analogue (RMS) Channel Widths: 52.9,132.3, 158.7, 158.7, 317.5, 634.9 microsec.

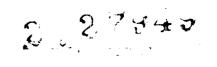
Recording & Display Rate = 10 readings per second.

MDAS Digital recording at 126 sample per decay curve at a maximum of 300 curves per second (26.455 microsec channel width).

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 must be compensated for dynamically. 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.



Author's Statement of Qualifications

- I, Neil Fiset, of 15 Valley Ridge St., Nepean, Ont, do hereby certify that :
- 1. I hold a Bachelor of Science degree in Geology(1976) from the University of New Brunswick, Fredericton, New Brunswick.
- 2. I am a member of the Canadian Exploration Geophysicists Society.
- 3. Since 1976 I have been an employee of Scintrex Limited, Noranda Exploration Co. Ltd., JVX Ltd. and the United Nations.
- 5. I have been a self-employed consultant since 1996.
- 4. I am presently a consulting Geophysicist, practising in Canada and overseas.
- 5. Permission is granted to Mustang Minerals Corp. to use this report in a prospectus or other financial offering.
- 6. I have not received, directly or indirectly, nor do I expect to receive any interest, direct or indirect, in the properties of Mustang Minerals Corp. or any affiliate thereof, nor do I beneficially own, directly or indirectly, any securities in Mustang Minerals Corp. or any affiliate thereof

Date on this 21st day of June, 2004 at Nepean, Ont.

Neil Fiset, BSc.

Consulting Geophysicist



Work Report Summary

Transaction No:

W0460.00992

Status: APPROVED

Recording Date:

2004-JUN-28

Work Done from: 2004-APR-20

Approval Date:

2004-JUL-05

to: 2004-APR-30

Client(s):

102630

ANNETT, ROY

Survey Type(s):

AEM

AMAG

Work Report Details:										
Cla	aim#	Perform	Perform Approve	Applied	Applied Approve	Assign	Assign Approve	Reserve	Reserve Approve	Due Date
Р	1238791	\$11,738	\$11,738	\$11,162	\$11,162	\$0	0	\$576	\$576	2004-NOV-27
		\$11,738	\$11,738	\$11,162	\$11,162	\$0	\$0	\$576	\$576	•

External Credits:

\$0

Reserve:

\$576 Reserve of Work Report#: W0460.00992

\$576

Total Remaining

Status of claim is based on information currently on record.

41P14SW2005 2.27949

NURSEY

Ministry of Northern Development and Mines Ministère du Développement du Nord et des Mines

Date: 2004-JUL-05



GEOSCIENCE ASSESSMENT OFFICE 933 RAMSEY LAKE ROAD, 6th FLOOR SUDBURY, ONTARIO P3E 6B5

Tel: (888) 415-9845 Fax:(877) 670-1555

Submission Number: 2.27949 Transaction Number(s): W0460.00992

ROY ANNETT GENERAL DELIVERY SHININGTREE, ONTARIO P0M 2X0 CANADA

Dear Sir or Madam

We have approved your Assessment Work Submission with the above noted Transaction Number(s). The attached Work Report Summary indicates the results of the approval.

At the discretion of the Ministry, the assessment work performed on the mining lands noted in this work report may be subject to inspection and/or investigation at any time.

If you have any question regarding this correspondence, please contact BRUCE GATES by email at bruce.gates@ndm.gov.on.ca or by phone at (705) 670-5856.

Yours Sincerely,

R. Schienbein

Senior Manager(A), Mining Lands Section

K. Seline

Subject: Approval of Assessment Work

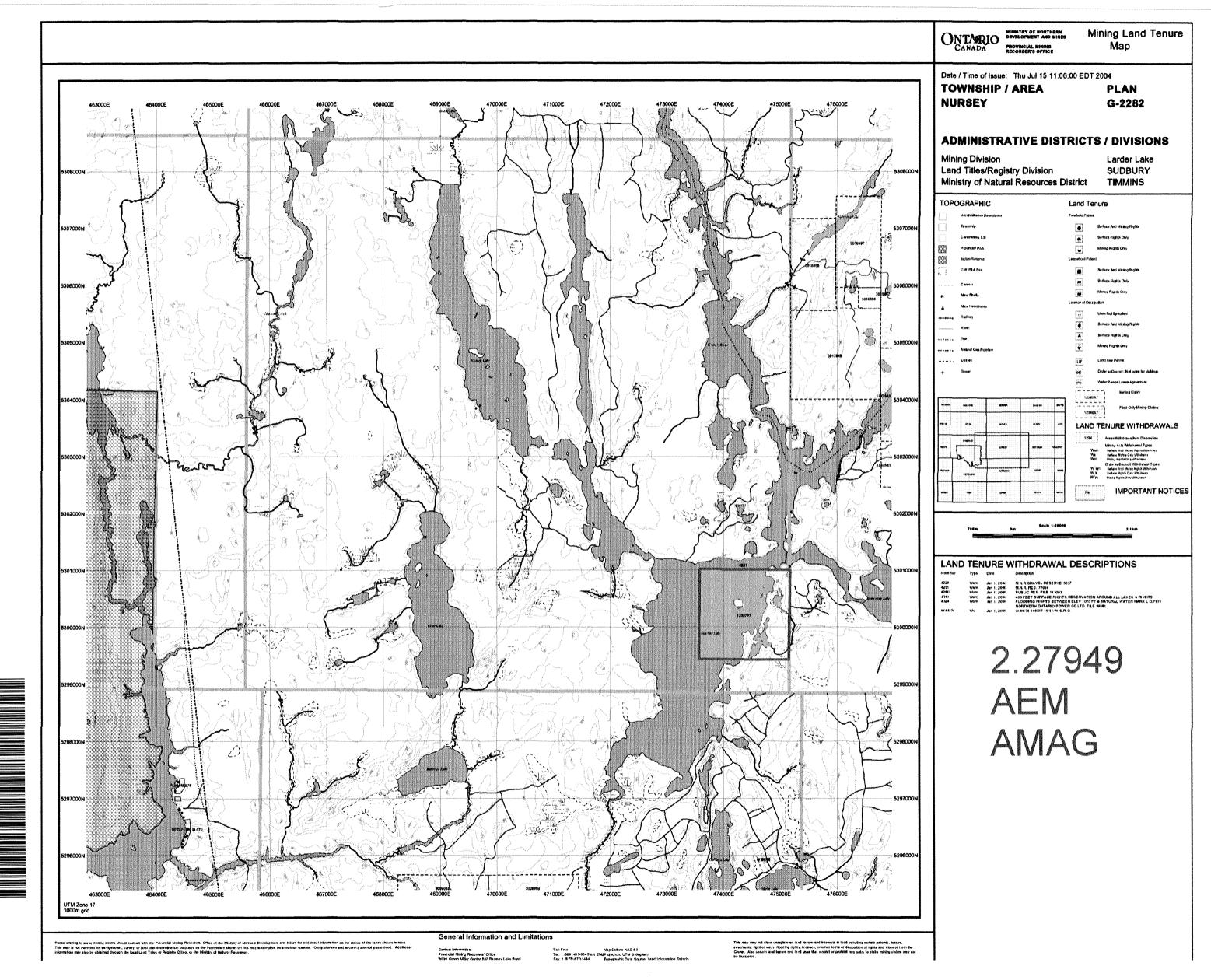
Cc: Resident Geologist

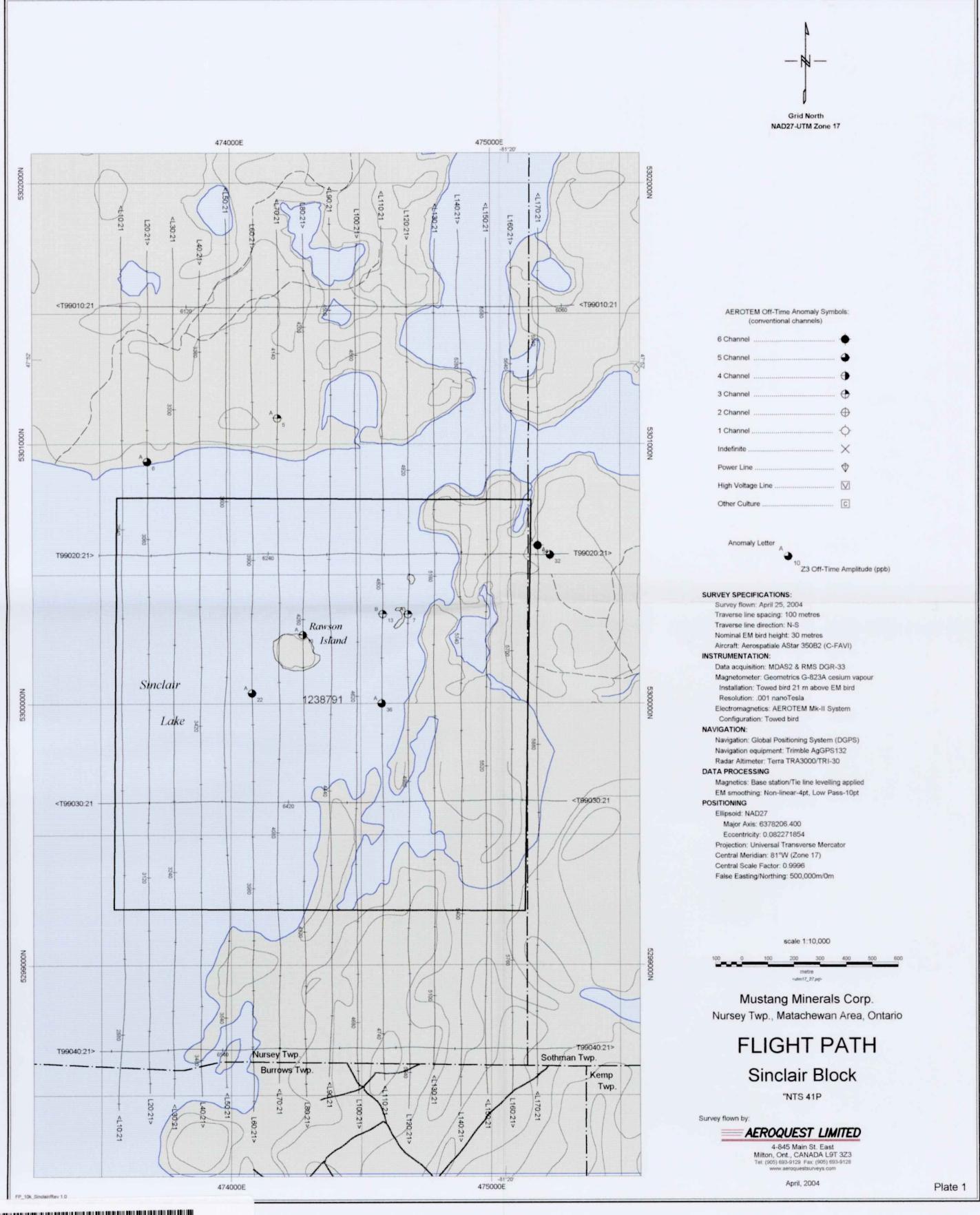
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