Operations Report for

Horizontal Aero-Magnetic Gradient & XDS VLF-EM Survey

CAIRO TOWNSHIP PROJECT
Kirkland Lake, Ontario

May 12, 2011

Report #: B-348

Requested by:
Mr. Jim Atkinson
GEOPHYSICAL CONSULTANT

Prepared by:
Charles Barrie, Managing Partner
Terraquest Ltd.

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1. INTRODUCTON

1.1. Executive Summary

This report describes the specifications and parameters of an airborne geophysical survey carried out for:

PRO MINERALS INC.
1600 – 543 Granville Street
Vancouver, BC
V6C 1X8

Attention: Christopher B. Chu
Phone: 604-683-6168
Email: chu@promineralsinc.com

The survey was performed by:

TERRAQUEST LTD.,
2-2800 John Street, Markham
ON, Canada
L3R 0E2

Phone: 905-477-2800 ext. 22
Email: hb@terraquest.ca.

The purpose of the survey of this type is to collect geophysical data that can be used to prospect directly for economic minerals that are characterized by anomalous magnetic or conductive responses. Secondly, the geophysical patterns can be used indirectly for exploration by mapping the geology in detail, including faults shear zones, folding, alteration zones and other structures. The data are carefully processed and contoured to produce grid files and maps that show distinctive patterns of the geophysical parameters.

To obtain this data, the area was systematically traversed by aircraft carrying geophysical equipment along parallel flight lines. The lines are oriented to intersect the geology and structure so as to provide optimum contour patterns of the geophysical data.

1.2. Location

The survey is located in northern Ontario, in Cairo Township approximately 180 kilometres north of Sudbury, 50 kilometres west of Kirkland Lake and 3 kilometres northeast of the town of Matachewan. Highway 66 passes through the southeast corner of the survey block and bush roads and power lines pass through the centre. The NTS map sheets are 41P/15 and 42A/2. The survey outline forms the shape of two offset rectangles with 8 corners; the maximum east-west dimension measures 6.2 kilometres and the maximum north-south dimension is 6 kilometres. The centre of the area is approximately 47 degrees 59 minutes north and 80 degrees 37 minutes west.

2. SURVEY SPECIFICATIONS

2.1. LINES AND DATA

Parameter	Specification	Instrument Precision
Aircraft Speed	60 m/sec 216 km/hr	
Sampling Interval	6-7 m (10Hz)	
Flight-line Interval	100 m	+/- 3m
Flight-line Direction	000/180 degrees	
Control-line Interval	100 m	+/- 3m
Control-line Direction	090/270 degrees	
Aircraft MTC	60 m	+/- 5m
Mag Sensor MTC	60 m	+/- 5m

2.2. SURVEY KILOMETRAGE

Kilometres	
62 Lines	286 km
60 Tie	284 km
Total	570 km

2.3. NAVIGATION SPECIFICATIONS

The following is the navigation parameter file for the survey lines and include the survey corner coordinates in NAD83 projection zone 17, line spacing, line direction, master line and other navigational parameters.

```
0  B348_Trav
1  U 279
2    525977.9   5318629.4      AREA CORNER 1
2    529508.2   5318629.9      AREA CORNER 2
2    529508.4   5316459.5      AREA CORNER 3
2    532548.4   5316459.1      AREA CORNER 4
2    532549.6   5312270.3      AREA CORNER 5
2    528672.3   5312269.0      AREA CORNER 6
2    528671.5   5313858.3      AREA CORNER 7
2    525978.8   5313860.3      AREA CORNER 8
2    525977.9   5318629.4      AREA CORNER 9
3    525977.9   5318629.4    SW WAYPOINTS 1
4          62                NUMBER OF LINES
5       100.0                 SPACING, m.
6    525977.9   5318629.4      MASTER LINE BL
7    525977.9   5318629.4      MASTER LINE TL
8          75                MAX CROSS TRACK, m.
9     0     0     0           DELTA X/Y/Z
10          1                LOG FPR EVERY 1 SECS
11 0.9996000000       0.0       0.0 K0, X/Y SHIFT
14          0                LINES EXTENDED BEYOND AREA
16         10                 FIRST LINE NUMBER
17  526188.10  5313860.10  00.00 MASTER POINT, HEADING
20 WGS-84      6378137.0   298.257223563 22      ELLIPSOID
21         0                 NO EQUATORIAL CROSSING
30         20    9600  N  1  8  RS-232 PORT 2 INCOMING FORMAT
31         20    9600  N  1  8  RS-232 PORT 1 OUTGOING FORMAT
38         0                 METRIC SYSTEM
39         5                 RACE TRACK
41       0.00                  SYSTEM LAG, Sec.
80      70.00                  PLANNED ALTITUDE, units
83         0                 GPS ALTITUDE FOR VERTICAL BAR
85         50                 MAX VERTICAL BAR SCALE
102  UTM                       UTM X/Y SCALE
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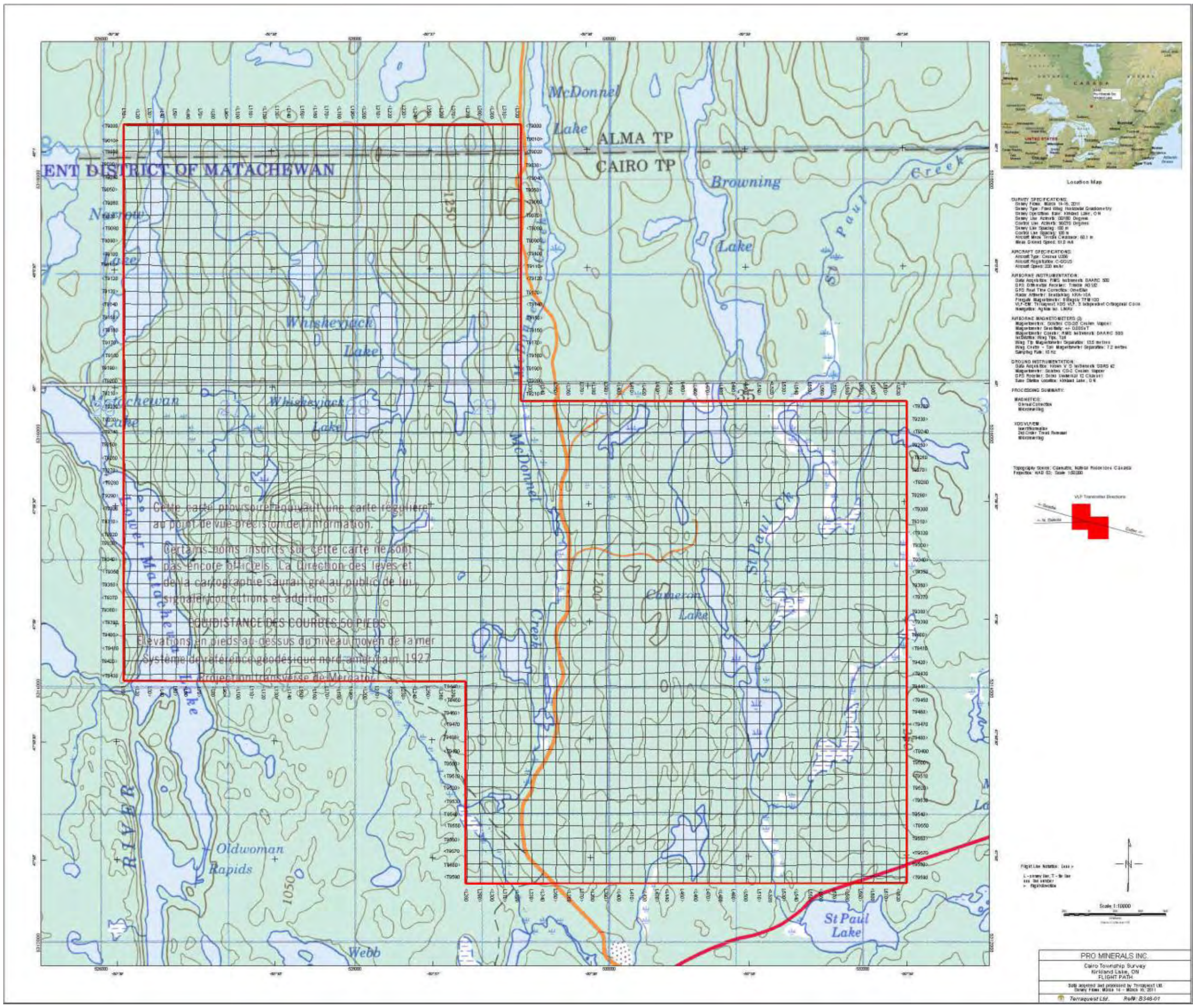
2.4. FLIGHT PLAN



2.5. TOLERANCES - REFLIGHT

1. **Traverse Line Interval**

   Re-flights would take place if the flight line separation of the final differentially corrected flight path is greater than 1.25 of the intended line separation over a distance greater than 1 kilometre.

2. **Terrain Clearance:**

   The aircraft mean terrain clearance was to be smoothly maintained at 70 metres MTC in a drape mode. Re-flights were done if the final differentially corrected altitude deviated from the specified flight altitude by +/-10m over a distance of 3 kilometres or more if, in the pilot's opinion, it was safe to do so.

3. Diurnal Variation:

Diurnal activity in the survey was limited to 20 nT deviations from 5-minute chord.

4. GPS Data:

GPS data included at least 4 satellites for navigation and flight path recovery. There were no significant gaps in any of the digital data including GPS and magnetic data.

5. Radio Transmission:

The aircraft pilot makes no radio transmission that interferes with magnetic response.

6. Sample Density:

A reflight is required if the sample density along one or more of the survey lines exceeds 10 metres over a cumulative total of 1000 metres.

2.6. NAVIGATION

The satellite navigation system was used to ferry to the survey sites and to survey along each line. The survey coordinates were supplied by the client and were used to establish the survey boundaries and the flight lines. The flight path guidance accuracy is variable depending upon the number and condition (health) of the satellites employed. With Omnistar real time correction the accuracy was for the most part better than 3 metres.

Prior to the survey a gridded drape surface was created to ensure that a smooth drape was achieved in all directions. The digital elevation model was downloaded from CanMatrix at www.geobase.ca and converted into UTM (WGS84) coordinates. The GSC software was applied to create a smooth drape surface.

3. AIRBORNE GEOPHYSICAL EQUIPMENT

3.1. SURVEY AIRCRAFT

The survey aircraft was a Cessna U206, registration C-GGLS, owned and operated by Terraquest Ltd. under full Canadian Ministry of Transport approval and certification for specialty flying including airborne geophysical surveys. The aircraft is maintained at base operations by a regulatory AMO facility, Leggat Aviation Inc.

The aircraft has been specifically modified with long-range fuel cells to provide up to 7 hours of range, outboard tanks, tundra tires, cargo door, and avionics as well as an array of sensors to carry out airborne geophysical surveys.

3.2. EQUIPMENT OVERVIEW

The primary airborne geophysical equipment includes three high sensitivity cesium vapour magnetometers, an XDS VLF-EM system and an experimental Low Frequency EM system. Ancillary support equipment includes a tri-axial fluxgate magnetometer, radar altimeter, barometric altimeter, GPS receiver with a real-time correction service, and a navigation system. The navigation system comprises a left/right indicator for the pilot and a screen showing the survey area, planned flight lines, and the real time flight path. All data were collected and stored by the data acquisition system. The following is a summary of the equipment specifications:

Aircraft	Cessna U206 / C-GGLS
Equipment:	
Magnetometers	Scintrex CS-2&3 Cesium Vapour
3-axis Fluxgate Magnetometer	Billingsley TFM100-LN
VLF-EM	Terraquest XDS VLF-EM

Low Frequency EM	Terraquest power monitor
GPS Receiver	Trimble AgGPS132
Radar Altimeter	King KRA 10A
Barometric Altimeter	Sensym LX18001AN
Acquisition	RMS Instruments DAARC 500
Navigation	AgNav Inc. P151 Linav system
Specifications:	
Lateral Sensor separation	13.5 metres
Longitudinal Sensor separation	7.2 metres
FOM	<1.5 nT
Sensitivity	0.001 nT

The 13.75 volts aircraft power is converted to 27.5 volts DC for the geophysical equipment by an ABS power supply.

3.3. EQUIMENT SPECIFICATIONS

1. Magnetics:

Three high-resolution cesium vapour magnetometers, manufactured by Scintrex, were mounted in a tail stinger and two wing tips extensions; the transverse separation was 13.5 metres and the longitudinal separation was 7.2 metres.

Cesium Vapour Magnetometer	(mounted in tail stinger and wing tip extensions)
Manufacturer	Scintrex
Models	CS-2, CS-3
Resolution	0.001 nT counting at 0.1 per second
Sensitivity	+/- 0.005 nT
Dynamic Range	15,000 to 100,000 nT
Fourth Difference	0.02 nT

2. Data Acquisition & Magnetic Compensation System

DAS & Compensation	Combined
Model	DAARC 500
Manufacturer	RMS Instruments
Operating System	QNX 6.3 or greater
Time	104 MHz temperature compensated crystal clock
Front End Magnetic Processing	Resolution 0.32pT; system noise <0.1pT; sample rate 160, 640, 800m or 1280 Hz
Front End - Fluxgate	I/F module; oversampling, self calibrating 16 bit A/D converter
Compensation	Improvement Ratio (total field) 10-20 typical
Input Serial	8 isolated RS232 channels; ASCII & Binary formats
Input Analog	16 bit, self calibrating A/D conv.
Input Events	Four latched event inputs
Raw Data Logging	At front end sampling rate, 1 MB buffer

Output/Recording	Rate **10**, 20 or 40 Hz; Serial up to 115.2 kbps; Recording media 1 GB Flash; 80 GB Hard Drive; Flash disk via USB; Display
Front Panel Indicators	8 LEDs for mag input; 2 LEDs for Front End status

3. Navigation System

Navigation System	
Model	P151
Manufacturer	AgNav Inc.
Operating System	Linex
Microprocessor	CPU Pentium based
Ports	RS232 for all devices
Graphic Display	Colour Screen
Pilot Display	P202: position, left/right, navigational info

4. Real-Time Correction GPS Receiver

GPS Differential Receiver	
Model	AgGPS132
Manufacturer	Trimble
Serial Number	02240-02249
Output	NMEA string, PPS
Channels	12 Channel DPGS, internal L-band
Position Update	0.5 second for navigation
Correction Service	Real time correction service subscription – Omnistar
Sample Rate	Up to 10hz, set at 5 hz
Broadcast Services	Omnistar Correction Service (AMSC) L band Broadcast (1557.845 MHz satellite band)

5. XDS VLF-EM System

The XDS VLF-EM System is a recently developed VLF system. It uses 3 orthogonal coils mounted in the pod of the tail stinger, and coupled with a receiver-console, tuned to a half power bandwidth of 22-26 kHz which includes Cutler Maine NAA frequency 24 kHz, La Moure North Dakota NML frequency 25.2 kHz and Seattle, WA NLK frequency 24.8 kHz. Recorded parameters are the separate X, Y and Z coils.

VLF / EM	
Model	XDS
Manufacturer	Terraquest Ltd.
Primary Source	Magnetic field component radiated from government VLF radio transmitters
Parameters Measured	X, Y and Z components, absolute field
Frequency Range	Half power 22.0 - 26.0 kHz
Gain	Constant gain setting
Filtering	No filtering

6. Tri-Axial Fluxgate Magnetic Sensor

The fluxgate tri-axial magnetometer was mounted in the rear of the aircraft cabin to monitor aircraft manoeuver and magnetic interference. This was used to compensate the high sensitivity data in real time.

Tri-Axial Fluxgate Magnetic Sensor	(for compensation, mounted in mid-section of tail stinger)
Model	TFM100-LN
Manufacturer	Billingsley Magnetics
Description	Low noise miniature triaxial fluxgate magnetometer
Axial Alignment	> Orthogonality > +/- 0.5 degree
Accuracy	< +/- 0.75% of full scale (0.5% typical)
Field Measurement	+/- 100,000 nanotesla
Linearity	< +/- 0.0035% of full scale
Sensitivity	100 microvolt/nanotesla
Noise	< 14 picotesla RMS/–Hz @ 1 Hz

7. Radar Altimeter

Radar Altimeter	
Model	KRA-10A
Manufacturer	King
Serial Number	071-1114-00
Accuracy	5% up to 2,500 feet
Calibrate Accuracy	1%
Output	Analog for pilot, converted to digital for data acquisition

8. Barometric Altimeter

Barometric Altimeter	
Model	LX18001AN
Manufacturer	Sensym Inc.
Source	Coupled to aircraft barometric system

9. Low Frequency EM

An experimental and proprietary Low Frequency EM system, designed and built by Terraquest Ltd. was included in this survey only as on-going research; it was not part of the contract. It is intended to monitor power lines and any magneto-telluric effect. It has a bandwidth of 20 – 400 Hz and a vertical co-axial coil mounted in the stinger.

10. Narrow Band Electric Field (24kHz)

An experimental and proprietary Narrow Band Electric Field system, designed and built by Terraquest Ltd. was included in this survey only as on-going research; it was not part of the contract.

4. BASE STATION EQUIPMENT

4.1. BASE STATION MAGNETOMETER / GPS RECEIVER

Magnetometer Type	Cesium Vapour
Model	CS-2
Manufacturer	Scintrex Ltd.
Sensitivity	0.022 nT / vHz@1Hz
Resolution	0.001 nT
Dynamic Range	15,000 – 120,000 nT
GPS model	Universal 12 channel
GPS manufacturer	Deluo

5. TESTS AND CALIBRATIONS

5.1. MAGNETIC FIGURE OF MERIT

Compensation calibration tests were performed to determine the magnetic influence of aircraft maneuvers and the effectiveness of the aircraft compensation method. The aircraft flew a square pattern in the four survey directions at a high altitude over a magnetically quiet area and perform pitches (± 5°), rolls (± 10°) and yaws (± 5°). The sum of the maximum peak-to-peak residual noise amplitudes in the total compensated signal resulting from the twelve maneuvers is referred to as the FOM. The FOM values for this survey were 1.30 nT, 1.16 nT and 0.82 nT for the left, right and tail sensors respectively (see Appendix).

5.2. MAGNETIC LAG

The magnetic lag was determined by examining discrete anomalies in the survey data, from line to line flown in opposite directions.

6. LOGISTICS

6.1. PERSONNEL

The contractor supplied the following properly qualified and experienced personnel to carry out the survey and to reduce, compile and report on the data:

Field:	Pilot	Chad Tiffin
	Operator	Tyler Diplock
	Office Geophysicist	Brian Sargent
Office:	Processing Geophysicists	
	Magnetics	John Charlton
	XDS and maps	Brian Sargent
	Manager	Charles Barrie

6.2. FLIGHT REPORTING

The aircraft arrived in Kirkland Lake in the afternoon of March 8, 2011 and the first FOM was flown on March 9th. It was unsuccessful and weather did not permit another FOM until March 14th. The survey was flown from March 14-16th. The data were approved and the crew demobbed on March 16, 2011.

6.3. BASE OF OPERATIONS

The main base of operations was at Kirkland Lake. The base station (combined high sensitivity magnetic and GPS) was set up in a quiet area at airport

Accommodations for the crew at Kirkland Lake Inn (tel 705-567-3241) were the responsibility and cost of Terraquest. High speed internet was available.

7. DATA PROCESSING

7.1. DATA QUALITY CONTROL

The field data were examined in the evening after each flight by a geophysicist to inspect the data for quality control and tolerances. All data were approved and checked for continuity and integrity. Magnetic data were corrected for diurnal to produce preliminary plots. The XDS VLF-EM data were subjected to median leveling and grid stacking to produce preliminary plots.

7.2. FINAL MAGNETIC DATA PROCESSING

The final magnetic processing was achieved by standard tie-line intersection leveling techniques. The intersections of the lines in both directions were calculated and the differences in observed magnetic values were attributed to residual diurnal variation and heading differences. In some active areas, with steep magnetic gradients, the difference also reflects errors due to small inaccuracies in both horizontal and vertical position at the line intersection. The corrections at individual intersections were adjusted as needed. The correction applied was a linear sloping datum between control line intersections. The final processed total magnetic field data from the tail sensor was gridded with a minimum curvature procedure with a grid cell size equal to ¼ of the line interval (20m). The vertical derivative is calculated from this final data set.

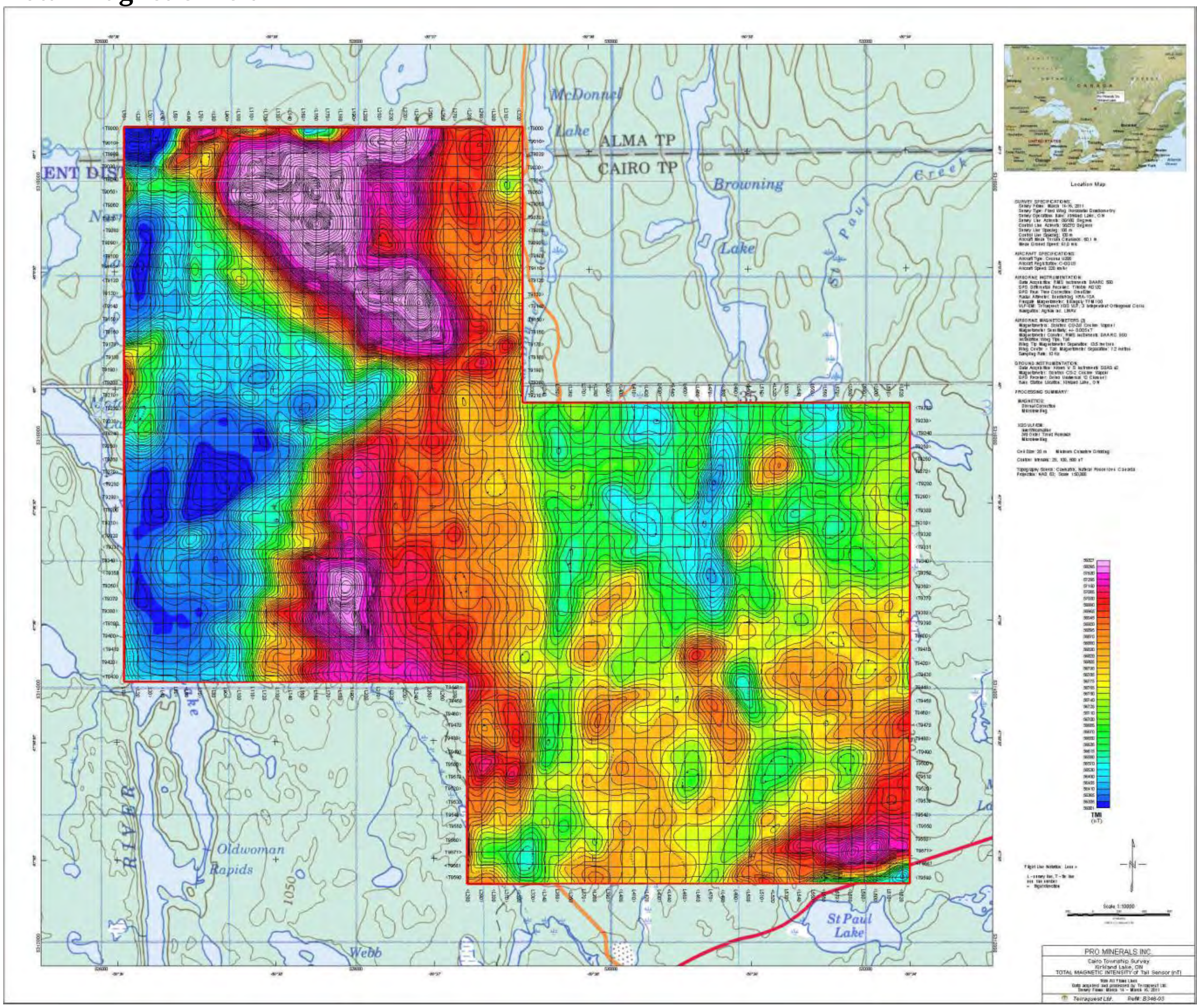
The transverse magnetic gradients for each flight direction were calculated by subtracting the left wing sensor reading from the right wing sensor reading and dividing the resulting value by the tip-to-tip separation (13.5 metres), yielding the measurement expressed as nT/m. The longitudinal gradient was calculated from successive readings from the tail sensor divided by the difference travelled (along line gradient). Two Horizontal Gradient maps were produced, an East Horizontal Gradient and a North Horizontal Gradient. The East Horizontal Gradient utilized the along-line gradient from the east-west lines and the transverse gradient from the north-south lines. The North Horizontal Gradient utilized the along-line gradient of the north-south lines and the transverse gradient of the east-west lines. Note that the East Horizontal Gradient suppresses the east-west magnetic features and enhances the north-south features, in this case intrusives. Similarly the North Horizontal Gradient suppresses the north-south magnetic features and enhances the east west features, in this case stratigraphy.

Reconstructed Total Field (RTF) has also been calculated from the East Horizontal Gradient and the North Horizontal gradient. Note that the RTF is a very good tool for high resolution, near surface features, but because the horizontal gradient does not respond well to long to medium wavelength features, it should not be used for quantitative modeling.

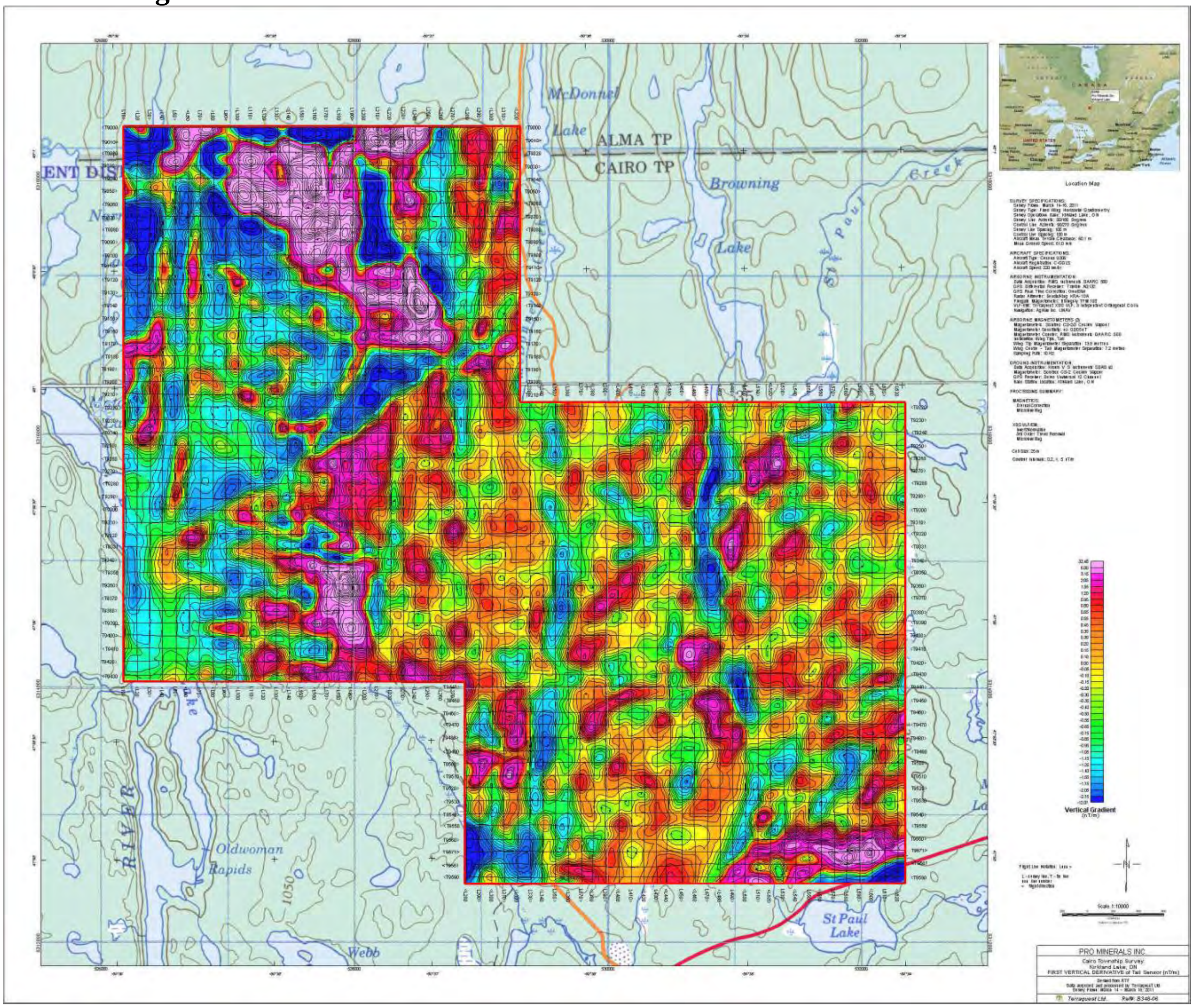
The tilt derivative is calculated from the total magnetic intensity (TMI) of the tail sensor using a Geosoft module. From the TMI, the vertical and horizontal derivatives are calculated, and the tilt derivative is the arctan of the ratio of these derivatives, vertical over horizontal.

Calculated in radians, a tilt derivative of zero represents no vertical gradient, only a horizontal gradient. A maximum value of the tilt derivative (+/- 1.57 radians or 90 degrees) represents a near zero horizontal gradient. The difference at map scale between 45 degrees (0.785 radians) and zero is an approximate indicator of the depth to top of source.

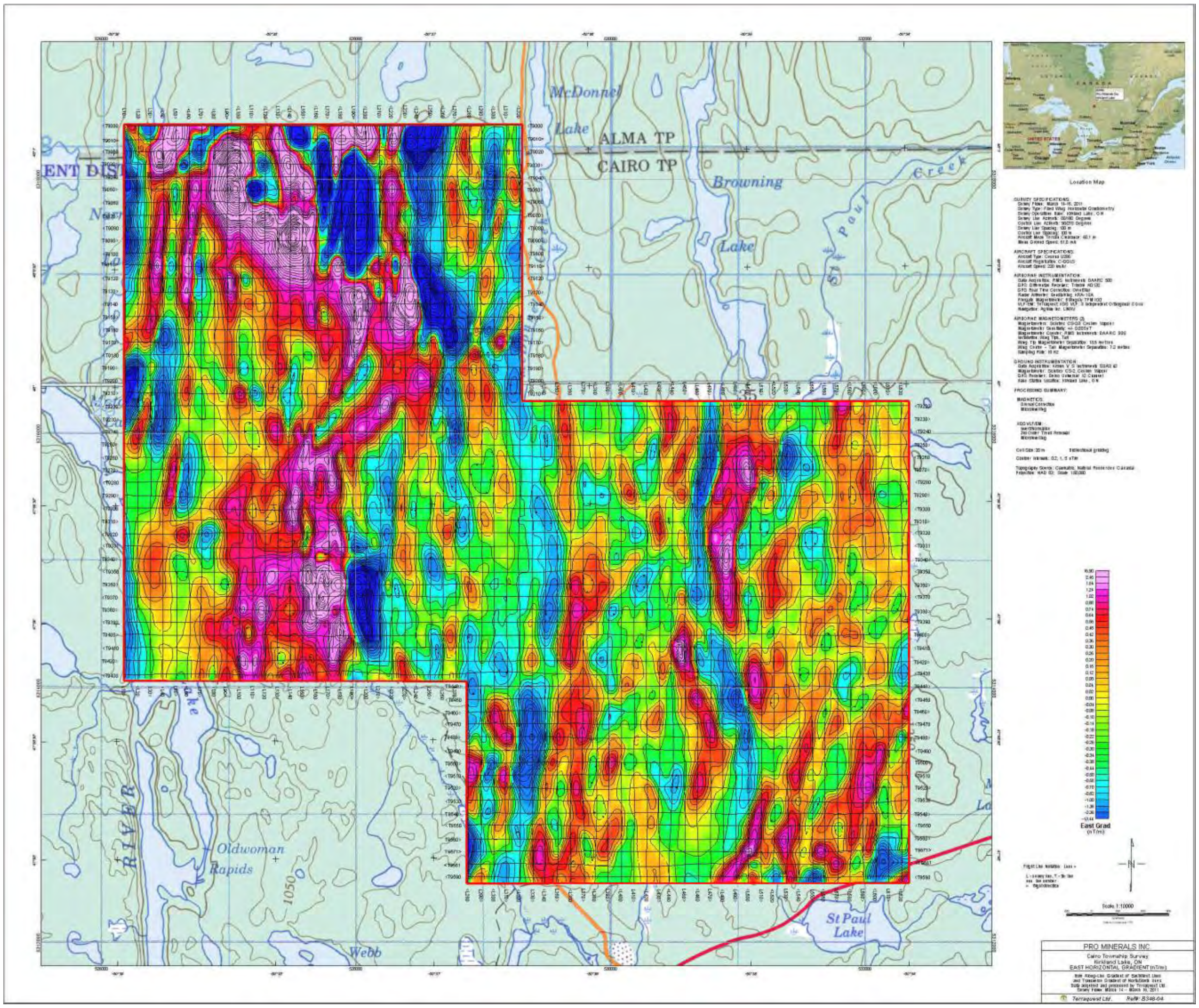
Total Magnetic Field



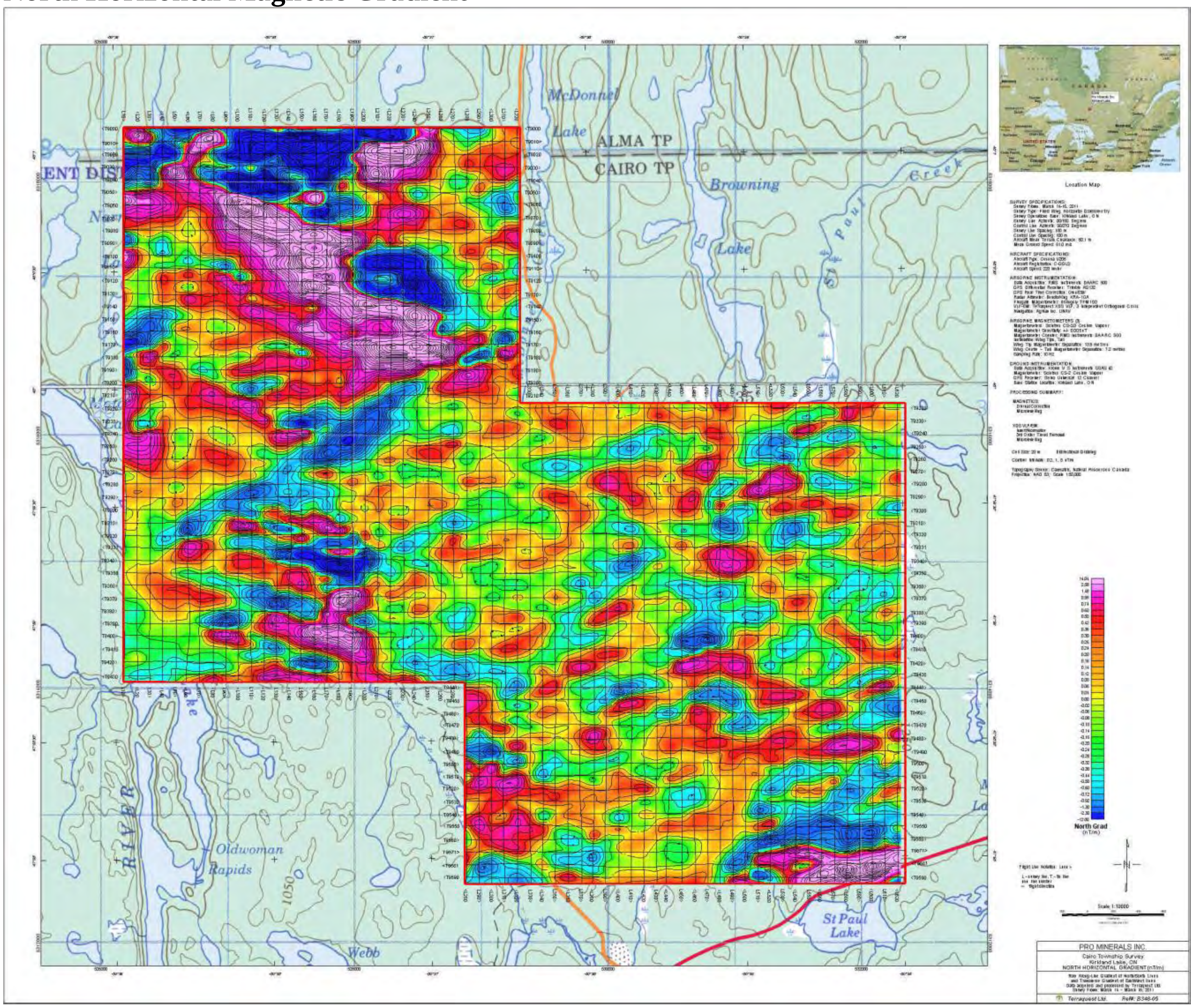
Vertical Magnetic Gradient



East Horizontal Magnetic Gradient



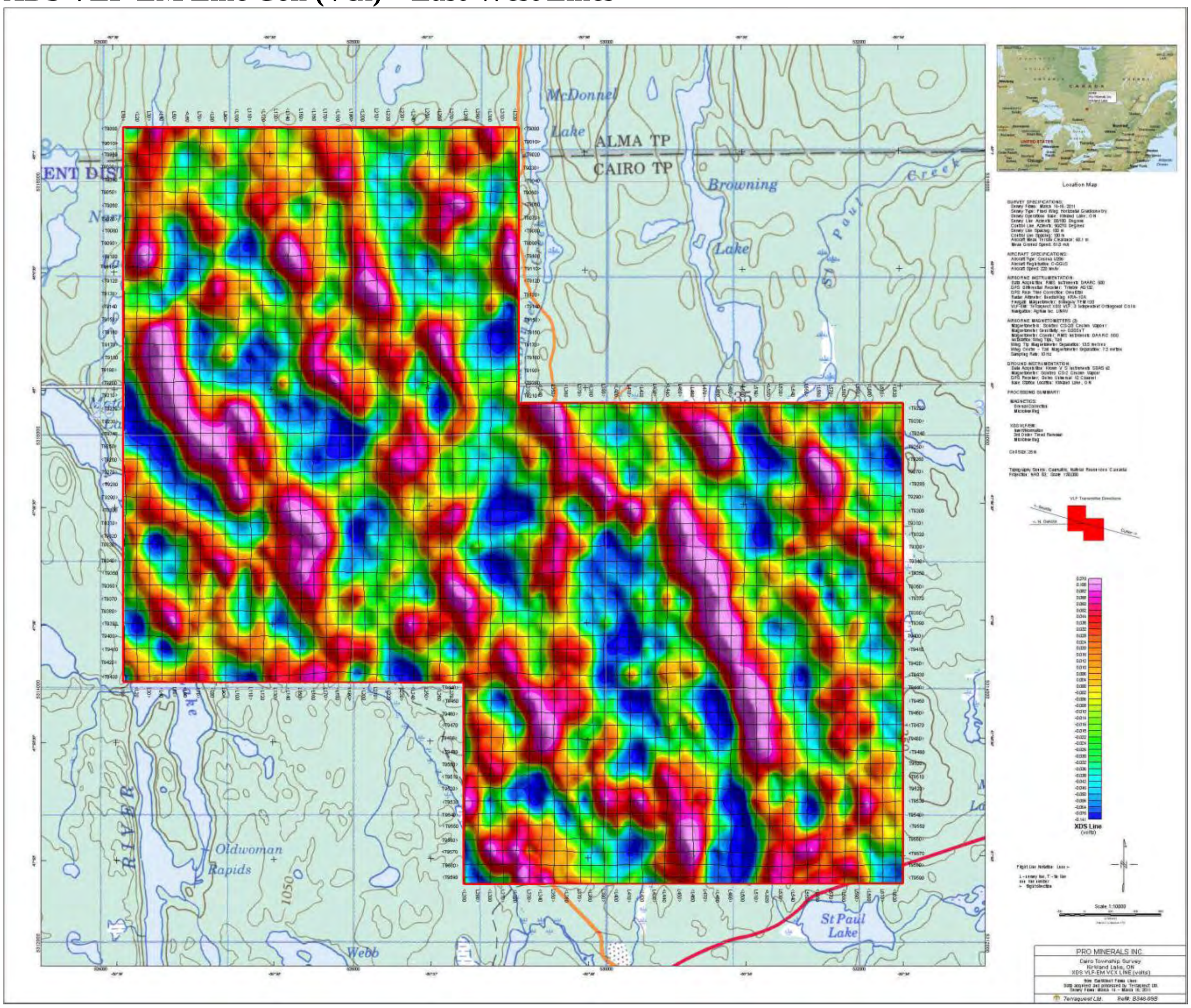
North Horizontal Magnetic Gradient



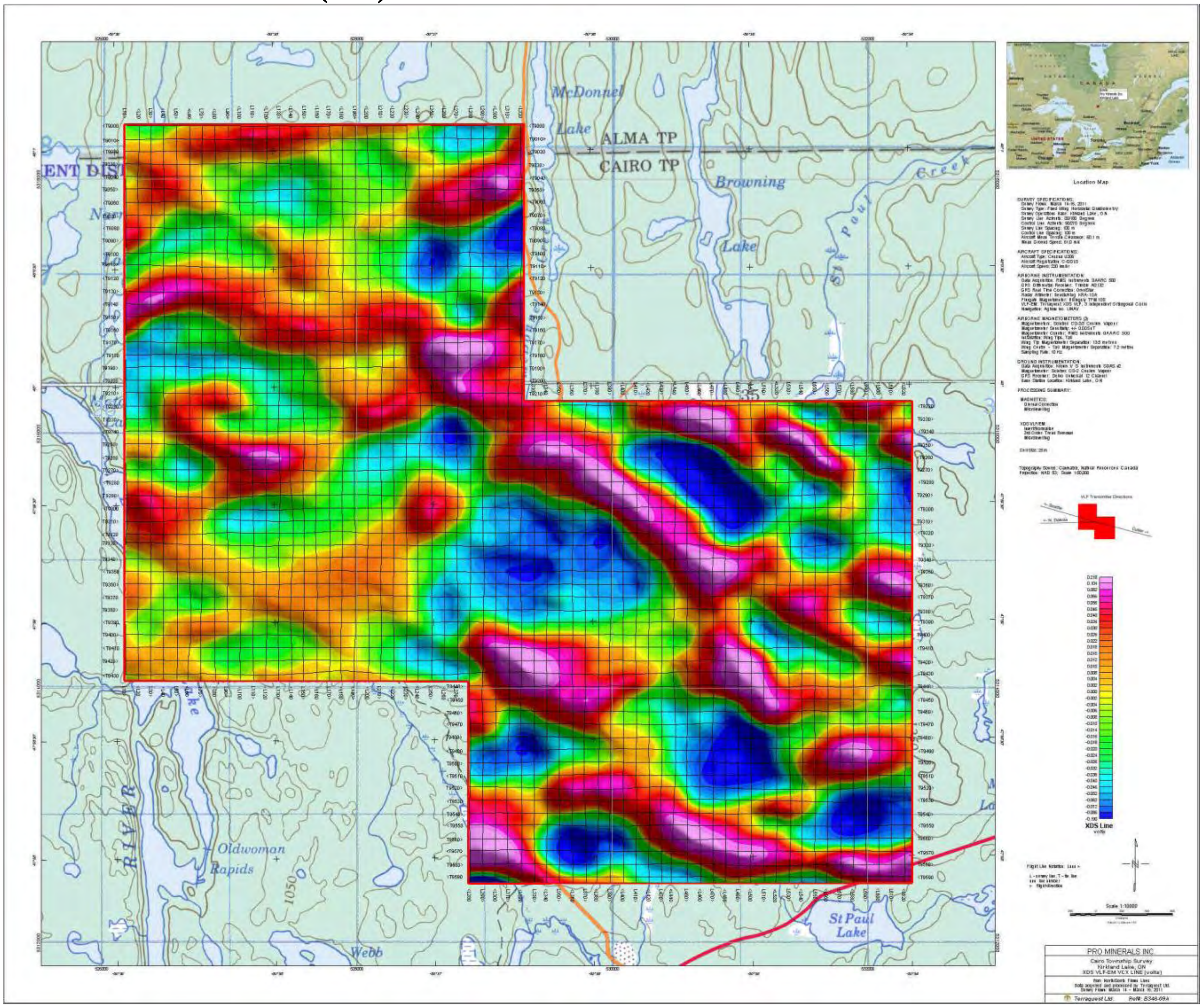
7.3. FINAL ELECTROMAGNETC DATA PROCESSING

The Terraquest XDS VLF-EM system produced good resolution and consistent results. The x, y and z components of the XDS VLF-EM data in the half power range of 22.0 to 26.0 kHz (which include Cutler, La Moure and Seattle transmitter signals), were rescaled (where required), low pass filtered, DC shift corrected and levelled. The data were presented as contour plots of the a) Line Field (Vcx) coil, b) Ortho Field (Vcp) coil and c) Vertical Field (Hcp) coil. Two selected maps are shown below.

XDS VLF-EM Line Coil (Vcx) – East-West Lines



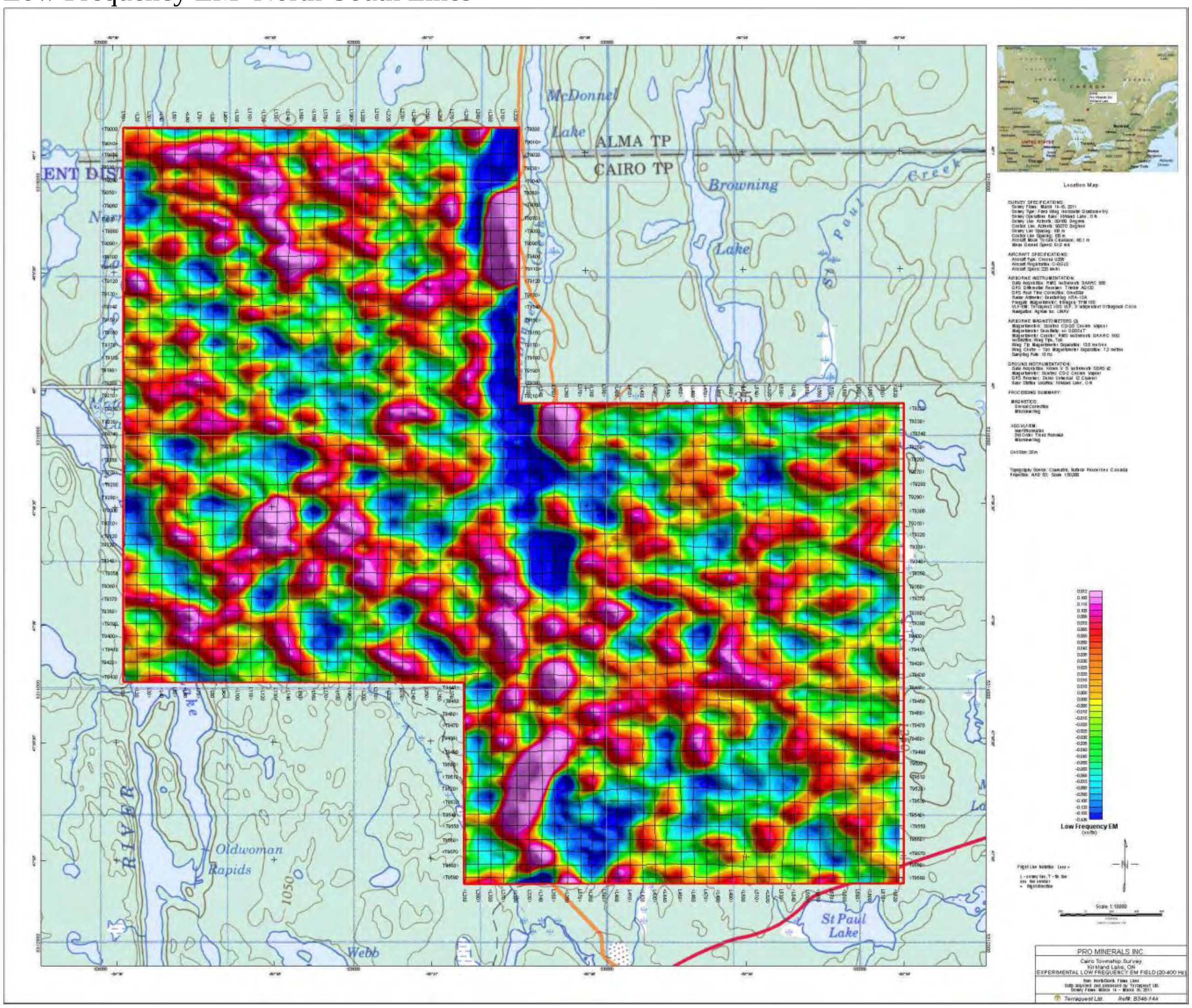
XDS VLF-EM Line Coil (Vcx) – North-South Lines



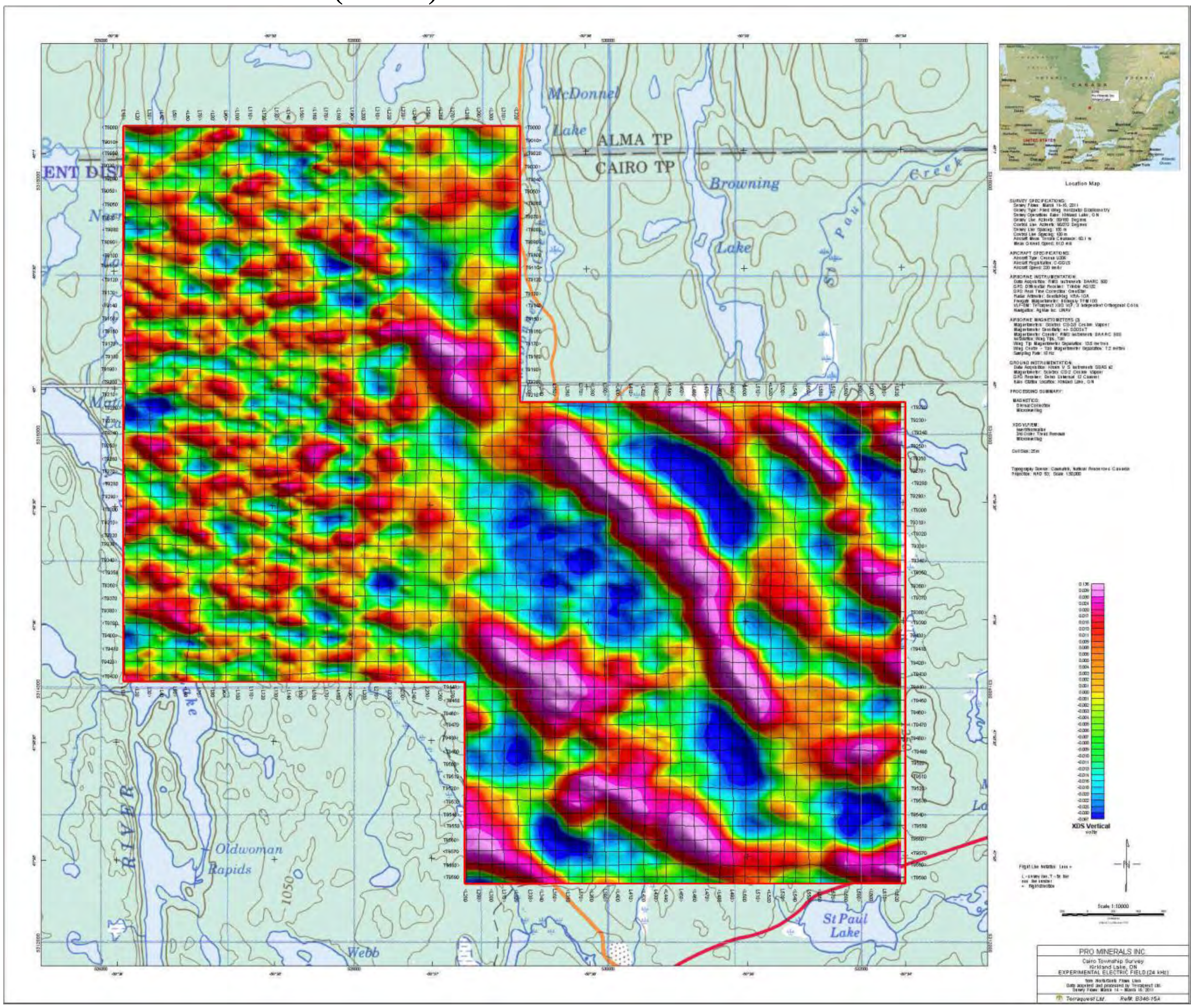
7.4. EXPERIMENTAL EM AND ELECTRIC FIELD DATA PROCESSING

Two experimental channels were recorded on this survey as part of ongoing research and development at Terraquest. These include Low Frequency EM Field (30-400 Hz) and Narrow Band Electric Field (24 kHz) which were processed in the same procedures as the XDS VLF. These products are not part of the contract and should be treated with due caution as they are experimental in nature. Both Fields are presented as maps for each direction; the north-south direction only is shown below. Terraquest requests any feedback on these four products, particularly any correlation with other airborne or ground information.

Low Frequency EM North-South Lines



Narrow Band Electric Field (24 kHz) North-South Lines



7.5. LIST OF FINAL PRODUCTS

Two copies of the following colour maps (22)were produced at a scale of 1:10,000 with a topographic underlay as follows:

1. Flight Path	
2. DTM	Digital Terrain Model (m)
3. TMI	Total magnetic intensity (nT)
4. E_grad	Derived from along-line gradient of east/west lines and transverse gradient of north/south lines nT/m)
5. N_grad	Derived from along-line gradient of north/south lines and transverse gradient of east/west lines nT/m)
6. Vert_Grad	Calculated vertical gradient of measured total magnetic intensity (nT/m)
7. Tilt_Dv	Tilt derivative derived from tail sensor TMI (radians)
8. RTF	Reconstructed Total Field (pseudo nT)
9A. XDS_Line_NS	XDS VLF line EM component (volts) from north/south lines
9B. XDS_Line_EW	XDS VLF line EM component (volts) from east/west lines
10A. XDS_Ortho_NS	XDS/VLF orthogonal EM component (volts) from north/south lines
10A. XDS_Ortho_EW	XDS/VLF orthogonal EM component (volts) from east/west lines
11A. XDS_Vertical_NS	XDS/VLF vertical EM component (volts) from north/south lines
11B. XDS_Vertical_EW	XDS/VLF vertical EM component (volts) from east/west lines
12A. XDS_Ternary_NS	Proportions of XDS/VLF line, orthogonal and vertical components from north/south lines
12B. XDS_Ternary_NS	Proportions of XDS/VLF line, orthogonal and vertical components from north/south lines
13A. XDS Horizontal_NS	XDS/VLF total horizontal component (volts) from north/south lines
13B. XDS Horizontal_NS	XDS/VLF total horizontal component (volts) from north/south lines
14A. LF_EM_NS	Low frequency EM (volts) from north/south lines
14B. LF_EM_EW	Low frequency EM (volts) from east/west lines
15A. E_Field_NS	Narrow band electric field (volts) from north/south lines
15B. E_Field_EW	Narrow band electric field (volts) from east/west lines

The following digital products were produced:

- Digital grid archives on CD-ROM in GEOSOFT
- All GEOSOFT MAP files used to generate the above listed final maps
- JPEG and PDF format of maps
- Digital Profile Archives on CD-ROM in GEOSOFT GDB format (compatible with 4.1 or higher)
- Operations Report in PDF format

8. SUMMARY

An airborne high sensitivity, horizontal gradient magnetic and XDS VLF-EM survey was performed over the Cairo Township Project in northern Ontario, located approximately 50 kilometres west of Kirkland Lake airport, with 60 metre mean terrain clearance, 100 metre lines and 100 metre tie line intervals, and with data sample points at 10 Hz to provide equivalent ground samples at approximately 6-7 metres along the flight lines. The base of operations was at Kirkland Lake airport. A high sensitivity magnetic and a GPS base station located at the airport recorded the diurnal magnetic activity and reference GPS time during the survey for adherence to survey tolerances.

The data were subjected to final processing to produce 2 copies of colour as follows:

a) **Magnetics**: total magnetic intensity of tail sensor, calculated vertical derivative, tilt derivative, east horizontal gradient, north horizontal gradient, reconstructed total magnetic field,
b) **XDS VLF-EM**: Line, Ortho and Vertical Fields plus XDS VLF-EM Ternary plot and XDS VLF-EM Total Horizontal Component for both east-west and north-south lines
c) **Experimental Products**: Low Frequency EM and Narrow Band Electric Field for both directions
d) **Flight Path** and **Digital Terrain Model**

All data have been archived as Geosoft database (GDB); all MAP and GRID files used to make the maps, JPEG and PDF formats and this report in PDF format are included in the archive.

Respectfully Submitted,

Charles Barrie, M.Sc.
Vice President
Terraquest Ltd.

9. APPENDICES

9.1. APPENDIX I - CERTIFICATE OF QUALIFICATION

I, Charles Barrie, certify that I:

1) am registered as a Fellow with the Geological Association of Canada, as P.Geo with Association of Professional Geoscientists of Ontario and work professionally as a geologist,
2) hold an Honours degree in Geology from McMaster University, Canada, obtained in 1977,
3) hold an M.Sc. in Geology from Dalhousie University, Canada, obtained in 1980,
4) am a member of the Prospectors and Developers Association of Canada,
5) am a member of the Canadian Institute of Mining , Metallurgy and Petroleum,
6) have worked as a geologist for over thirty years,
7) am employed by and am an owner of Terraquest Ltd., specializing in high sensitivity airborne geophysical surveys, and
8) have prepared this operations and specifications report pertaining to airborne data collected by Terraquest Ltd.

Markham, Ontario, Canada

Signed

Charles Q. Barrie, M.Sc.
Vice President, Terraquest Ltd.

9.2. APPENDIX II – DAILY LOG

OPERATOR'S DAILY LOG

. JOB #B-348
Kirkland Lake, Ontario
Aircraft: C-GGLS
Pilot: Chad Tiffin
Operator: Tyler Diplock
Geophysicist: Brian Sargent

Stayed at the Kirkland Lake Inn:
50 Government Road East
Kirkland Lake, ON P2N 1A5
(705) 567-3241

March 03, 2011
PM – Operator arrived in Kirkland Lake.

March 04, 2011
AM – Set up base station.
PM – No production as GLS was delayed in Markham due to weather.

March 05, 2011
AM – No production as GLS was delayed in Markham due to weather.
PM – No production as GLS was delayed in Markham due to weather.

March 06, 2011
AM – No production as GLS was delayed in Markham due to ice.
PM – No production as GLS was delayed in Markham due to ice.

March 07, 2011
AM – No production as GLS was delayed in Markham due to maintenance.
PM – No production as GLS was delayed in Markham due to maintenance.

March 08, 2011
AM – No production as GLS was delayed in Markham due to maintenance.
PM – GLS arrived in Kirkland Lake.

March 09, 2011
AM – FOM flown.
PM – Waited for FOM results from Brian, the FOM turned out negative. Snow storm moved into the area.

March 10, 2011
AM – Snow Storm still in area. Waited for Data Processors to dissect the FOM information and come up with a troubleshooting strategy.

PM – Went out to the airport and did a "Mock FOM" on ground power to eliminate the possibility of GLS' control surfaces causing spikes in the data.

March 11, 2011
AM – Bad weather still in the area. Did another series of "Mock FOM's" on the ground, one on ground power and the other on the aircrafts battery for further troubleshooting purposes.
PM – No production due to snow storm.

March 12, 2011
AM – Snow has abated but the ceilings are still low. We went out and did a troubleshooting FOM at roughly 700' AGL because of low cloud ceilings.
PM – Uploaded FOM information and waited for the data processors to access it.

March 13, 2011
AM – No production due to cloud ceilings.
PM – Cloud ceilings cleared up. We went to go and do an FOM but I noticed some issues with the EM console before we left the zone, so the flight was cancelled.

March 14, 2011
AM – Clear blue skies! After removing some experimental additions to the EM Console we went and flew a proper FOM; which turned out positive.
PM – Flew survey traverse line 10 to 580.

March 15, 2011
AM – Finished traverse lines and started tie lines.
PM – Continued flying and finished the tie lines.

March 16, 2011
AM – Went out to fly one tie line we accidentally skipped.
PM – After confirmation we de-mob'd and left Kirkland Lake.

9.3. APPENDIX III – MAGNETIC FIGURE OF MERIT (FOM)

FOM INDEX :C-GGLS - FLIGHT: GLS1289 14 Mar 2011 / BASE: Kirkland Lake, Ontario, Canada

FOM TEST #1

MAG 1

DIR	TRAV	LINE	PITCH		ROLL		YAW			P	R	Y	SUM
	FLG		MAX	MIN	MAX	MIN	MAX	MIN					
N	*	9010	0.07	-0.06	0.05	-0.03	0.02	-0.02		0.13	0.07	0.04	0.24
E		9020	0.05	-0.06	0.05	-0.05	0.03	-0.04		0.11	0.10	0.07	0.28
S	*	9030	0.10	-0.25	0.05	-0.08	0.02	-0.02		0.34	0.12	0.04	0.50
W		9040	0.04	-0.09	0.03	-0.05	0.03	-0.04		0.13	0.08	0.07	0.29
									SUM	0.710052	0.37532	0.217063	1.302435
									FOM	1.30			
							FOM TRAVERSE ONLY			0.74	(x2 :	1.48	)

MAG 2

DIR	TRAV	LINE	PITCH		ROLL		YAW			P	R	Y	SUM
	FLG		MAX	MIN	MAX	MIN	MAX	MIN					
N	*	9010	0.07	-0.06	0.04	-0.05	0.02	-0.02		0.13	0.09	0.05	0.26
E		9020	0.00	-0.09	0.09	-0.08	0.07	-0.10		0.09	0.16	0.17	0.42
S	*	9030	0.05	-0.05	0.03	-0.03	0.01	-0.03		0.10	0.06	0.04	0.19
W		9040	0.02	-0.04	0.04	-0.04	0.07	-0.07		0.07	0.08	0.13	0.28
									SUM	0.38	0.39	0.39	1.16
									FOM	1.16			
							FOM TRAVERSE ONLY			0.46	(x2 :	0.92	)

MAG 3

DIR	TRAV	LINE	PITCH		ROLL		YAW			P	R	Y	SUM
	FLG		MAX	MIN	MAX	MIN	MAX	MIN					
N	*	9010	0.05	-0.06	0.03	-0.03	0.05	-0.07		0.11	0.06	0.12	0.28
E		9020	0.03	-0.03	0.01	-0.03	0.04	-0.05		0.05	0.04	0.09	0.17
S	*	9030	0.043382	-0.04	0.01	-0.01	0.02	-0.03		0.09	0.01	0.05	0.15
W		9040	0.03	-0.04	0.01	-0.02	0.06	-0.06		0.06	0.02	0.12	0.21
									SUM	0.31	0.13	0.37	0.82
									FOM	0.82			
							FOM TRAVERSE ONLY			0.43	(x2 :	0.86	)

9.4. APPENDIX IV – README

Terraquest Ltd.
Aeromagnetic/XDS-VLF Survey Project B-348
May 12, 2011

for

PRO MINERALS INC.
Cairo Township Survey
Kirkland Lake, Ontario

FINAL DATA ARCHIVE

Folders in this project
1. Geosoft Databases
2. Geosoft Grids
3. Geosoft Maps
4. Map JPEGs
5. Report

1. Geosoft Databases

There are two Geosoft databases (.GDB file),
B348_Magnetics.GDB: channels for magnetics
B348_XDS.GDB: channels for XDS and survey parameters

Database Channel Description

The databases contain the following channels:

X	UTM zone 17N Easting [NAD 83] (m)
Y	UTM zone 17N Northing [NAD 83] (m)
TIME	Time (GPS day-sec)
LAT	Latitude [NAD 83] (decimal degrees)
LON	Longitude [NAD 83] (decimal degrees)
RMSFID	Fiducial (s)
RADAR_M	Aircraft radar terrain clearance (m)
ALT_GPS	Aircraft altimeter (m)
DTM_FNL	Final digital terrain model, UTM zone 17N [NAD 83] (m)
DRAPE	Drape surface (m)
DIURNAL_LP	Base station low pass filtered diurnal TMI (nT)
VMX	X-component of fluxgate magnetometer (mV)

VMY	Y-component of fluxgate magnetometer (mV)
VMZ	Z-component of fluxgate magnetometer (mV)
TF1RAW	Raw left wingtip sensor total magnetic field (nT)
TF2RAW	Raw right wingtip sensor total magnetic field (nT)
TF3RAW	Raw tail sensor total magnetic field (nT)
TF1CMP	Compensated left wingtip sensor total magnetic field (nT)
TF2CMP	Compensated right wingtip sensor total magnetic field (nT)
TF3CMP	Compensated tail sensor total magnetic field (nT)
TMI	Final levelled measured total magnetic field (tail sensor, nT)
VG	Calculated vertical gradient of measured total magnetic intensity (nT/m)
EGRAD_FNL	Final east-west gradient component of horizontal magnetic gradient (nT/m)
NGRAD_FNL	Final north-south component of horizontal magnetic gradient (nT/m)
RTF	Reconstructed total field (pseudo nT)

LINE_RAW	Raw XDS/VLF line component (volts)
ORTHO_RAW	Raw XDS/VLF orthogonal component (volts)
VERT_RAW	Raw XDS/VLF vertical component (volts)
LINE_FNL_EW	Processed XDS/VLF line component (volts) for east/west lines
LINE_FNL_NS	Processed XDS/VLF line component (volts) for north/south lines
ORTHO_FNL_EW	Processed XDS/VLF orthogonal component (volts) for east/west lines
ORTHO_FNL_NS	Processed XDS/VLF orthogonal component (volts) for north/south lines
VERT_FNL_EW	Processed XDS/VLF vertical component (volts) for east/west lines
VERT_FNL_NS	Processed XDS/VLF vertical component (volts) for north/south lines
XDS_NOR_EW	Processed XDS/VLF horizontal component (volts) for east/west lines
XDS_NOR_NS	Processed XDS/VLF horizontal component (volts) for north/south lines

Extra Product Channels

E_FIELD_RAW	Raw narrow band electric field centred on 24 khz (volts)
EFIELD_FNL_EW	Final processed narrow band electric field centred on 24 khz (volts) for east/west lines

EFIELD_FNL_NS	Final processed narrow band electric field centered on 24 khz (volts) for north/south lines
LF_EM_RAW	Raw low frequency EM field over bandwidth of 30-400 Hz (volts)
LFem_FNL_EW	Final processed low frequency em field over bandwidth of 30-400 Hz (volts) for east/west lines
LFem_FNL_EW	Final processed low frequency em field over bandwidth of 30-400 Hz (volts) for north/south lines

2. Geosoft Grids

DTM	Final digital terrain model (m)
TMI	Final Total Magnetic Intensity measured from the tail sensor (nT)
VG	Calculated vertical gradient of measured total magnetic field (nT/m)
Egrad	Derived from along-line gradient of east/west lines and transverse gradient of north/south lines (nT/m)
Ngrad	Derived from along-line gradient of north/south lines and transverse gradient of east/west lines (nT/m)
Tilt_Dv	Tilt derivative derived from tail sensor (degrees)
RTF	Reconstructed total field derived from gradients (pseudo nT)

XDS_Line_EW	XDS/VLF line EM component (volts) from east/west lines
XDS_Line_NS	XDS/VLF line EM component (volts) from north/south lines
XDS_Ortho_EW	XDS/VLF orthogonal EM component (volts) from east/west lines
XDS_Ortho_NS	XDS/VLF orthogonal EM component (volts) from north/south lines
XDS_Vert_EW	XDS/VLF vertical EM component (volts) from east/west lines
XDS_Vert_NS	XDS/VLF vertical EM component (volts) from north/south lines

XDS_Horizontal_EW	XDS/VLF total horizontal EM component (volts) from east/west lines
XDS_Horizontal_NS	XDS/VLF total horizontal EM component (volts) from north/south lines

LFem_EW	Low frequency EM field, from east/west lines, bandwidth 20 top 400 Hz (volts)
LFem_NS	Low frequency EM field, from north/south lines, bandwidth 20 top 400 Hz (volts)
E_field_EW	Experimental electric field, from east/west lines, centred at 24 kHz
E_field_NS	Experimental electric field, from east/west lines, centred at 24 kHz

3. Geosoft Maps and 4. Map Jpegs and PDFs

Maps are in Geosoft Packed format.

1. Flight Path	
2. DTM	Digital Terrain Model (m)
3. TMI	Total magnetic intensity (nT)
4. E_grad	Derived from along-line gradient of east/west lines and transverse gradient of north/south lines (nT/m)
5. N_grad	Derived from along-line gradient of north/south lines and transverse gradient of east/west lines (nT/m)
6. Vert_Grad	Calculated vertical gradient of measured total magnetic intensity (nT/m)
7. Tilt_Dv	Tilt derivative derived from tail sensor TMI (radians)
8. RTF	Reconstructed Total Field (pseudo nT)

9A. XDS_Line_NS	XDS VLF line EM component (volts) from north/south lines
9B. XDS_Line_EW	XDS VLF line EM component (volts) from east/west lines
10A. XDS_Ortho_NS	XDS/VLF orthogonal EM component (volts) from north/south lines
10A. XDS_Ortho_EW	XDS/VLF orthogonal EM component (volts) from east/west lines
11A. XDS_Vertical_NS	XDS/VLF vertical EM component (volts) from north/south lines
11B. XDS_Vertical_EW	XDS/VLF vertical EM component (volts) from east/west lines
12A. XDS_Ternary_NS	Proportions of XDS/VLF line, orthogonal and vertical components from north/south lines
12B. XDS_Ternary_NS	Proportions of XDS/VLF line, orthogonal and vertical components from north/south lines

13A.	XDS Horizontal_NS	XDS/VLF total horizontal component (volts) from north/south lines
13B.	XDS Horizontal_NS	XDS/VLF total horizontal component (volts) from north/south lines
14A.	LF_EM_NS	Low frequency EM (volts) from north/south lines
14B.	LF_EM_EW	Low frequency EM (volts) from east/west lines
15A.	E_Field_NS	Narrow band electric field (volts) from north/south lines
15B.	E_Field_EW	Narrow band electric field (volts) from east/west lines

5. Documents

Report in PDF format: B-348-gls-report.pdf
Readme file in Word format

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