

Technical Report

Heliborne Magnetic and TDEM Survey

Mt. Cameron Project

Frenchvale Area, Cape Breton County, Nova Scotia

2017

Exploration Licenses: 51234, 51211, 51229, 51208, 51901

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I. INTRODUCTION

PROSPECTAIR conducted a heliborne magnetic (MAG) and time-domain electromagnetic (TDEM) survey for the mineral exploration company 21Alpha Resources Inc. on its Mt. Cameron Property, located near the village of Frenchvale in the Cape Breton County, Province of Nova Scotia (Figure 1). The survey was flown on November 20th, 2017.

One survey block was flown for a total of 64 l-km. A total of 1 production flight was performed using PROSPECTAIR's Eurocopter EC120B, registration C-GEDI. The helicopter and survey crew operated out of the Sydney Airport located about 28 km east of the block (Figure 2).

Table 1: Survey block particulars

Block	NTS Mapsheet	Line-km flown	Flight number	Date Flown
Mt. Cameron	011K01	64 l-km	Flt 1	November 20 th

Figure 1: General Survey Location

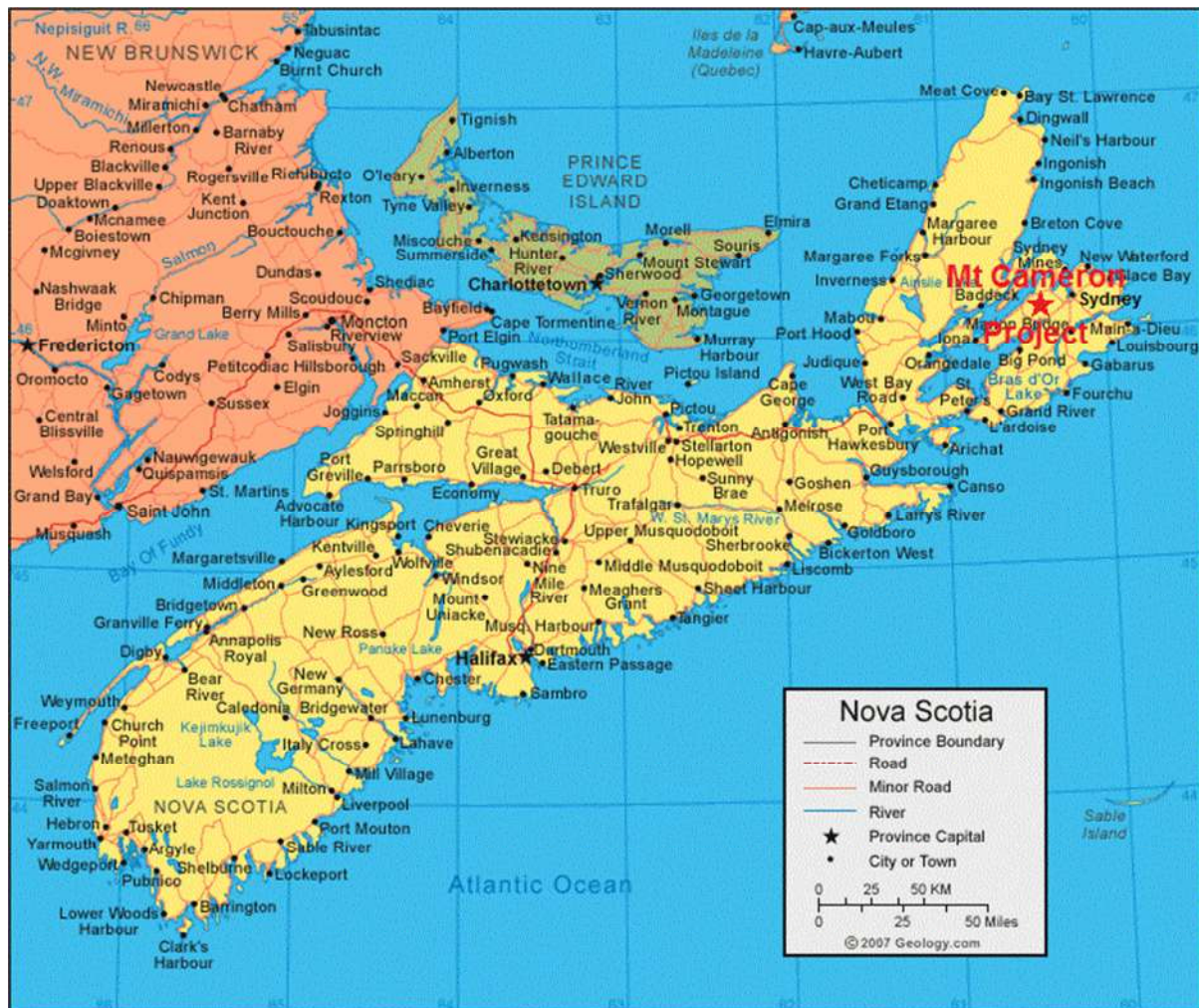
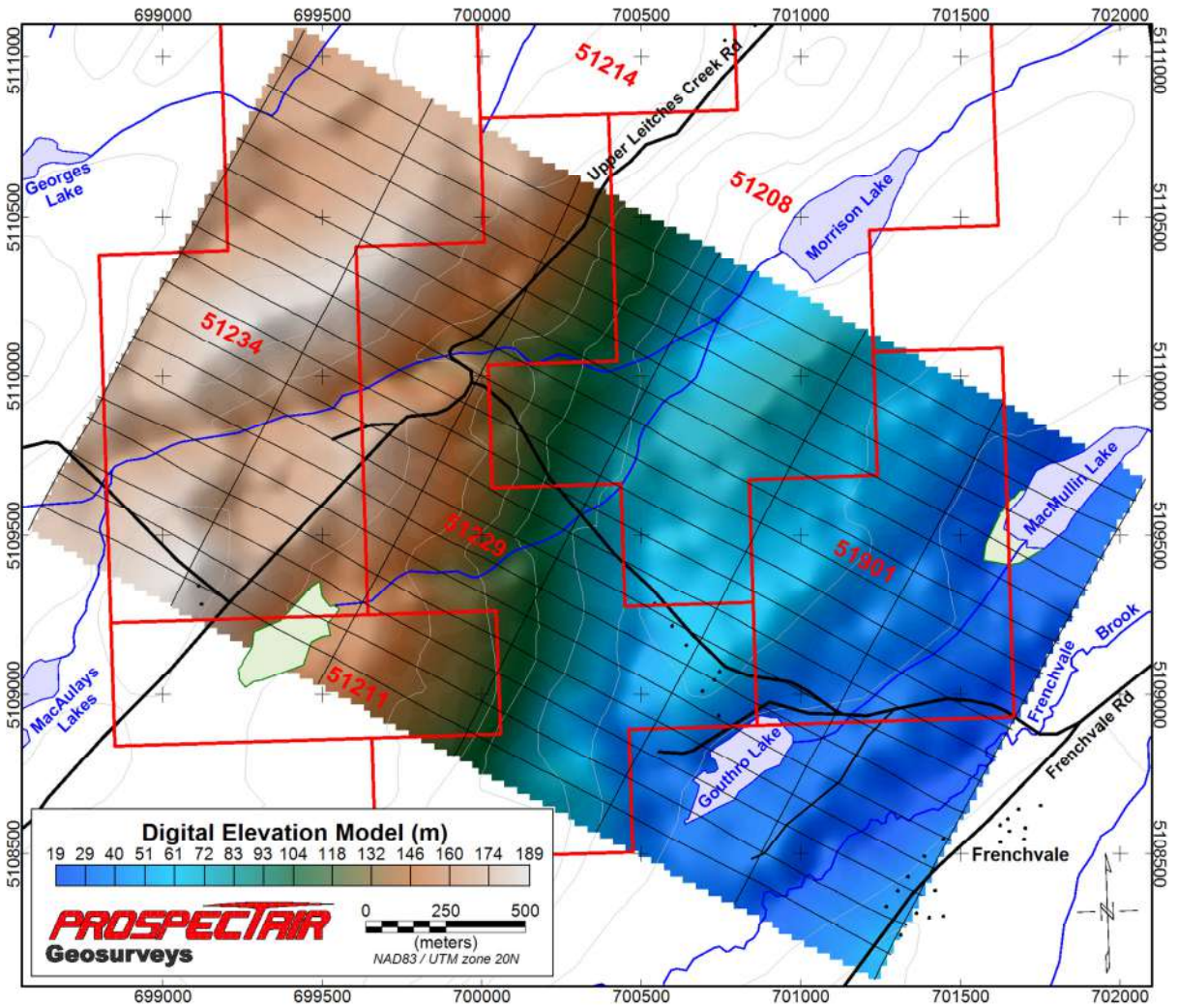


Figure 3: Survey lines and Mt. Cameron Property claims



II. SURVEY EQUIPMENT

PROSPECTAIR provided the following instrumentation for this survey.

Airborne Magnetometers

Geometrics G-822A

Both the ground and heliborne systems used a non-oriented (strap-down) optically-pumped Cesium split-beam sensor. These magnetometers have a sensitivity of 0.005 nT and a range of 15,000 to 100,000 nT with a sensor noise of less than 0.02 nT. The heliborne sensor was mounted in a bird made of non-magnetic material located 25 m below the helicopter when flying. Total magnetic field measurements were recorded at 10 Hz in the aircraft. The ground system was recording magnetic data at 1 sample every second.

Time-Domain Electromagnetic Transmitter and Receiver

ProspecTEM

Prospectair Geosurveys significantly modified and improved the *Emosquito II* that was built by THEM Geophysics of Gatineau (Québec) to develop ProspecTEM. It is a powerful light-weight system adapted for small size helicopters and easy manoeuvrability enabling the system to be flown as close to the ground as safely possible and ensuring maximum data resolution. Advanced signal processing technique and a full processing package was developed in house to optimize the ProspecTEM data. The technical specifications are listed below in Table 2.

ProspecTEM system employs a transient or time-domain electromagnetic transmitter that drives an alternating current through an insulated electrical coil system. The towing bridle is constructed from a Kevlar rope and multi-paired shielded cables. It is attached to the helicopter by a weak link assembly. An onboard harness with outboard connectors mounted on a plate allows for quick disconnection or connection of the exterior elements. The system uses a 4 KW generator and a large condenser to transmit alternating 2.75-ms half sine pulses with intervening off-times of 13.916 ms electric pulse, 60 pulses per second.

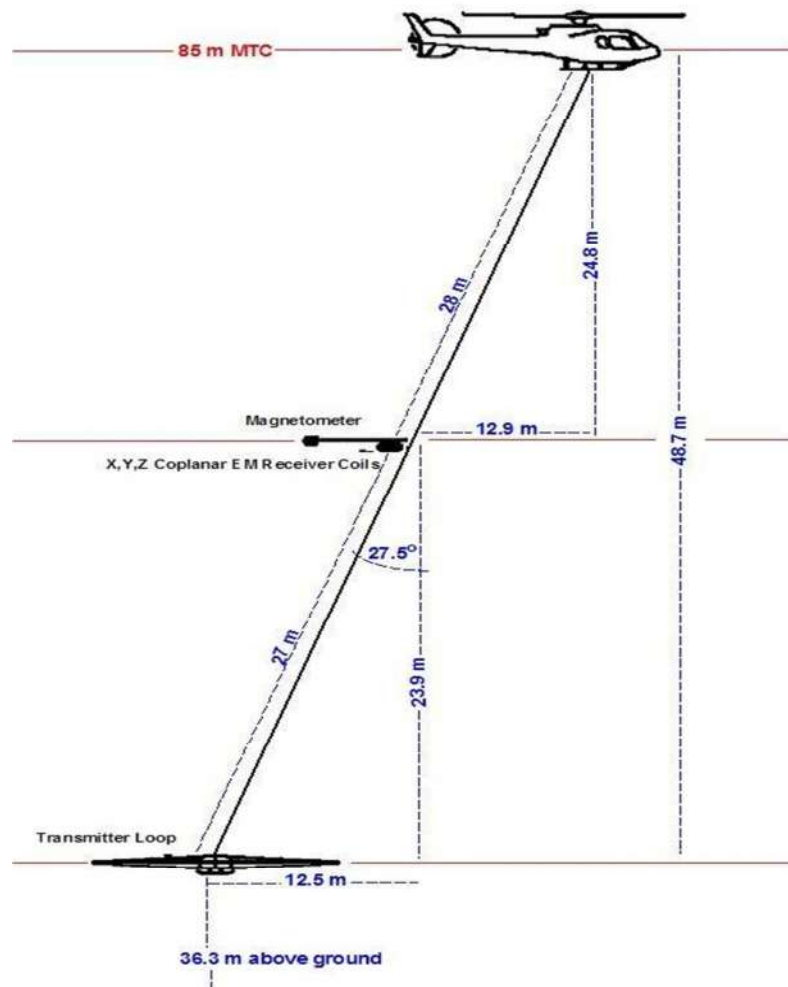
The current in the coil produces an electromagnetic field. Termination of the current flow is not instantaneous, but occurs over a very brief period of time (a few microseconds) known as the ramp time, during which the magnetic field is time-variant. The time-variant nature of the primary electromagnetic field, which propagates downward and outward into the subsurface, induces eddy currents which characteristics are governed by rocks conductivity distribution. These eddy currents generate a secondary electromagnetic field, in accordance with Faraday's Law. This secondary field immediately begins to decay in the process. Measurements of the secondary field are made only during the time-off period by a vertical component receiver located almost half way between the helicopter and the transmitter loop. It is placed with the magnetometer taped to a horizontal boom which supports the receiving coils tear-drop shape vessel at its end. The boom has an elastic suspension. A proprietary suspension system protects the orthogonal coils assembly and

limits the total field excursions. The tear-drop vessel acts as a vane and maintains the mast in the line of flight.

Depth of investigation depends on the time interval after shutoff of the current, since at later times the receiver is sensing eddy currents at progressively greater depths. The intensity of the eddy currents at specific times and depths is determined by the bulk conductivity of subsurface rock units and their contained fluids.

Table 2: **Technical specifications of the ProspecTEM Time-Domain system**

Item	Specification
Transmitter:	
Loop Diameter:	5.6 meters
Current Waveform:	Half-Sine
Turns:	2
Pulse Length	2.75 ms
Frequency	30 Hz
Loop Area	25 m ²
Peak Current	3000A
Tow Cable Length	65 meters
Self-Powered	13HP Honda coupled with 28 Volts Alternator
Receiver:	
Coils axis	Z
Configuration	Coaxial (Z)
Two channels	Current and Z
Max Sampling rate	1000 points per half cycle at 90 Hz
Survey sampling rate	1000 per half cycle at 30Hz
Sampling	Full waveform
Gates	Programmable
On time signal	Recorded
Mechanical:	
Maximum survey speed:	110 km per hour
Transmitter height	30 meters AGL
Receiver height	60 meters
Weight (Total)	200 kg

Figure 4: **ProspecTEM system configuration**

Real-Time Differential GPS

Omnistar DGPS

PROSPECTAIR uses an OmniStar differential GPS navigation system to provide real-time guidance for the pilot and to position data to an absolute accuracy of better than 5 m. The *Omnistar* receiver provides real-time differential GPS for the Agis on-board navigation system. The differential data set was relayed to the helicopter via the OmniStar network appropriate geosynchronous satellite for the survey location. The receiver optimizes the corrections for the current location.

Airborne Navigation and Data Acquisition System

Pico-Envirotec AGIS-XP system

The Airborne Geophysical Information System (AGIS-XP) is advanced, software driven instrument specifically designed for mobile aerial or ground geophysical survey work. The AGIS instrumentation package includes an advanced Satellite navigation (GPS), real-time flight path information that is displayed over a map image (BMP format) of the area, and reliable data acquisition software. Thanks to simple interfacing, the radar and barometric altimeters, the TDEM system and the Geometrics magnetometer are easily integrated into the system and digitally recorded. Automatic synchronization to the GPS position and time provides very close correlation between data and geographical position. The AGIS is equipped with a software suite allowing easy maintenance, upgrades, data QC, and project and survey area layout planning.

Magnetic Base Station

GEM GSM-19

A GEM GSM-19 Overhauser magnetometer, a computer workstation and a complement of spare parts and test equipment serve as the base station. PROSPECTAIR establish the base station in a secure location with low magnetic noise. The GSM-19 magnetometer has resolution of 0.01 nT, and 0.2 nT accuracy over its operating range of 20,000- to 100,000 nT. The ground system was recording magnetic data at 1 Hz.

Altimeters

Free Flight Radar Altimeter

The Free Flight radar altimeter measures height above ground to a resolution of 0.5 m and an accuracy of 5% over a range up to 2,500 ft. The radar altimeter data is recorded and sampled at 10 Hz.

Prospectair Digital Barometric Pressure Sensor

The barometric pressure sensor measures static pressure to an accuracy of ± 4 m and resolution of 2 m over a range up to 30,000 ft above sea level. The barometric altimeter data are sampled at 10 Hz.

Survey helicopter

Eurocopter EC120B (registration C-GEDI)

The survey was flown using Prospectair's EC120B helicopter that handles efficiently the equipment load and the required survey range. Table 3 presents the EC120B technical specifications and capacity, and the aircraft is shown in Figure 5.

Table 3: **Technical specifications of the EC120B Eurocopter helicopter**

Item	Specification
Powerplant	One 376kW (504hp) Turbomeca Arrius 2F
Rate of climb	1,150 ft/min
Cruise speed	223 km/h – 120 kts
Service ceiling	17,000 ft
Range with no reserve	710 km
Empty weight	991 kg
Maximum takeoff weight	1,715 kg

Figure 5: **Eurocopter EC120B**

III. SURVEY SPECIFICATIONS

Data Recording

The following parameters were recorded during the course of the survey:

In the helicopter:

- GPS positional data: (time, latitude, longitude, altitude, heading and accuracy (PDOP)) recorded at intervals of 0.1 s.
- Total magnetic field: recorded at intervals of 0.1 s.
- Terrain clearance as measured by the radar altimeter at intervals of 0.1 s.
- Z and Current TDEM channels at 90000Hz.

At the base and remote magnetic ground stations:

- Total magnetic field: recorded at intervals of 1 s.
- GPS time recorded every 1 s to synchronize with airborne data.

Technical Specifications

The data quality control was performed on a daily basis. The following technical specifications were adhered to:

- *Height* – 85m target terrain clearance for the MAG-TDEM survey except in areas where Transport Canada regulations prevent flying at this height, or as deemed necessary by the pilot to ensure safety. Traverse lines and control lines must be flown at the same altitude at points of intersection; the altitude tolerances are limited to no more than 30 m difference between traverse lines and control lines.
- *Airborne Magnetometer Data* - The noise envelope not to be exceeded 0.5 nT more than 500 m line-length without a reflight.
- *Diurnal Specifications* – A maximum tolerance of 5.0 nT (peak to peak) deviation from a long chord of one minute at the base station.
- *EM data* – No spikes on Z channel and constant current confirmed.
- *Flying Speed* – The average ground speed for the survey aircraft shall be 120 kph. The acceptable high limit is 160 kph over flat topography.
- *Radar Altimeter* – minimal accuracy of 5%, minimum range of 0-2500 m.
- *Barometer* – Absolute air pressure to 0.1 kPa.
- *Flight Path Following* – Maximum deviation of 30% of line spacing allowed over a maximum line distance of 300 m.

IV. SYSTEM TESTS

Magnetometer System Calibration

The survey configuration using a bird towed 25 m below any magnetic piece of the helicopter allows the simplification of the magnetic calibration requirement. Consequently, heading error and aircraft movement noise was considered negligible and no correction was applied to the data.

Instrumentation Lag

The data lag is a combination of two factors: 1) the time difference between when a reading is sensed, and when that value is recorded by the acquisition system, and 2) the time taken for the sensor to arrive at the location of the GPS antenna. The second factor is defined by the physical distance between the GPS antenna and any given sensor, and the speed of the aircraft. The total magnetic lag value for the AGIS acquisition system has been calculated to 0.15 s for this survey. The TDEM lag has been calculated to 0.95 s.

V. FIELD OPERATIONS

The survey operations were conducted out of the Sydney Airport on November 20th, 2017. The MAG-TDEM data acquisition required 1 flight. At the end of the production day, the data were sent to the DD GEOSCIENCE office via internet. The data were then checked for Quality Control to ensure they fulfilled contractual specifications. The full dataset was inspected prior to provide authorization for the field crew to demobilize. The GEM-19 magnetic base station was set up in a magnetically quiet area close to the airport, at latitude 46.1682011°N, longitude 60.0540059°W. The survey pilot was Alain Tremblay and the survey system technician was Jonathan Drolet.

Figure 6: **Example of a magnetic base station setup**



VI. DIGITAL DATA COMPILATION

Data compilation including editing and filtering, quality control, and final data processing was performed by Joël Dubé, P.Eng. Processing was performed on high performance desktop computers optimized for quick daily QC and processing tasks. Geosoft software Oasis Montaj version 9.2.3 and Matlab R2017a were used.

Magnetometer Data

The airborne magnetometer data, recorded at 10 Hz, were plotted and checked for spikes and noise on a flight basis. A 0.15 second lag correction was applied to all data to correct for the time delay between detection and recording of the airborne data.

Ground magnetometer data were recorded at 1 sample per second and interpolated by a spline function to 10 Hz to match airborne data. Data were inspected for cultural interference and edited where necessary. Some low-pass filtering was deemed necessary on the ground station magnetometer data to remove minor high frequency noise. The diurnal variations were removed by subtracting the ground magnetometer data to the airborne data and by adding back the average of the ground magnetometer value.

Levelling corrections were performed using intersection statistics from traverse and tie lines. After statistical levelling was considered satisfactory, decorrugation was applied on the data to remove any remaining subtle non-geological features oriented in the direction of the traverse lines.

Once the Total Magnetic Intensity (TMI) was gridded, its First Vertical Derivative (FVD) and Second Vertical Derivative (SVD) were calculated to enhance narrower geological features. Finally, the regional component of the Earth's magnetic field, described by the International Geomagnetic Reference Field (IGRF), has been removed from the TMI to yield the residual TMI. This ensures that the very long wavelength signal within the block is indeed originating from the local geology and not from the regional gradient.

Radar Altimeter Data

The terrain clearance measured by the radar altimeter in metres was recorded at 10 Hz. The data were filtered to remove high frequency noise using a 1 sec low pass filter. The final data were plotted and inspected for quality.

Positional Data

Real time DGPS correction provided by Omnistar was applied to the recorded GPS positional data.

Positional data (Lat, long, UTM X, UTM Y, geoid height) were recorded at 10 Hz sampling rate and all data processing was performed in the WGS-84 datum. The delivered data are provided in X, Y locations in UTM projection zone 20 North, with respect to the NAD-83

(CSRS) datum. Altitude data were initially recorded relative to the GRS-80 ellipsoid, but are delivered as orthometric heights (MSL elevation).

TDEM Data

The PicoEnvirotec EM Digital Acquisition System records the vertical component (Z) of the receiver coils at a sampling rate of 90000Hz. There is 30 full cycles (60 half cycles) of the full waveform (Tx ON and OFF time) every second.

The first data manipulation involves a stacking procedure where each half cycle is weighted with respect to the previous cycle ($\pm\frac{1}{4}$), the next cycle ($\pm\frac{1}{4}$) and its own value ($\pm\frac{1}{2}$). The positive and negative signs of the respective multiplication coefficients are used to make positive all negative half cycles. The next step is the half cycle averaging corresponding to the desired sampling rate. In the present case, from the 60 stacked positive half cycles per second, 6 consecutive half cycles are averaged to produce one sample every 0.1 sec.

The windowing settings for the 40 different channels are presented in Table 4. Channels 1 to 11 correspond to the ON-time measurements and channels 12 to 40 correspond to the OFF-time. Channel 12 isn't used for interpretation and mapping as some 'ramp-off' effects remain that alters the data quality. Each window is filtered with a median filter removing spikes and with a finite impulse response (FIR) selective filter of the 251th order improving the signal to noise ratio. A lag correction of 0.35 sec was applied to the data after being empirically determined by flying a sharp anomaly in two opposite direction.

Table 4: Setting used in the windowing of the full waveform

Channel #	Starting time (msec)	Width (msec)	Pulse	Channel #	Starting time (msec)	Width (msec)	Pulse
1	0.16667	0.01667	ON	21	3.15000	0.53333	OFF
2	0.25000	0.01667	ON	22	3.26667	0.53333	OFF
3	0.33333	0.01667	ON	23	3.40000	0.53333	OFF
4	1.30000	0.01667	ON	24	3.40000	1.10000	OFF
5	1.31667	0.01667	ON	25	3.45000	1.10000	OFF
6	1.33333	0.01667	ON	26	3.65000	1.10000	OFF
7	2.58333	0.01667	ON	27	3.88333	1.10000	OFF
8	2.66667	0.01667	ON	28	4.13333	1.10000	OFF
9	2.80000	0.08333	ON	29	4.43333	1.10000	OFF
10	2.81667	0.08333	ON	30	4.76667	1.10000	OFF
11	2.83333	0.08333	ON	31	5.16667	1.10000	OFF
12	2.85000	0.16667	RAMP	32	5.20000	2.20000	OFF
13	2.86667	0.18333	OFF	33	5.55000	2.20000	OFF
14	2.86667	0.25000	OFF	34	6.13333	2.20000	OFF
15	2.86667	0.36667	OFF	35	6.78333	2.20000	OFF
16	2.91667	0.36667	OFF	36	7.51667	2.20000	OFF
17	2.91667	0.53333	OFF	37	8.36667	2.20000	OFF
18	2.95000	0.53333	OFF	38	9.33333	2.20000	OFF
19	3.00000	0.53333	OFF	39	10.4500	2.20000	OFF
20	3.03333	0.53333	OFF	40	11.7000	2.20000	OFF

As for the magnetic data, levelling corrections were applied to the TDEM data using intersection statistics from traverse and tie lines, as well as light decorrugation based on gridded information, in order to remove base line offsets. The levelled TDEM data are delivered in the project's databases.

Gridding

The magnetic, early off-time TDEM (channel 13), mid off-time TDEM (channel 20), and late off-time TDEM (channel 27) data were interpolated onto a regular grid using a bi-directional gridding algorithm to create a two-dimensional grid equally incremented in x and y directions. Decorrugation was applied to the TDEM data prior to create the three off-time response grids, in order to attenuate base line offsets.

The final grids were created with 20 m grid cell size, appropriate for the survey lines spaced at 100 m. Traverse lines were used in the gridding process.

VII. RESULTS AND DISCUSSION

General

The following discussion presents the helicopter-borne MAG and TDEM data as well as a basic interpretation, which is solely based on the data acquired in this project. Further interpretation work should include other geoscience information, but is beyond the scope of this report. Nevertheless, the data was analysed to identify areas considered most prospective for mineralized occurrences.

Magnetic data presentation

The Residual Total Magnetic Intensity (TMI), together with interpreted TDEM anomalies and other interpreted features, is shown in Figure 7.

On the Mt. Cameron Block, the magnetic signal is rather settled and varies only from -110 to 165 nT, with a standard deviation of 46 nT and an average of -48 nT. Magnetic lineaments are predominantly striking NNE-SSW. Magnetic lineaments found in the block are related to rock formations that are enriched in magnetic minerals (magnetite and/or pyrrhotite).

In the surveyed area, it is possible to detect structural features offsetting observed magnetic lineaments and causing abrupt interruption or changes of the magnetic response. These features are typically caused by faults, fractures and shear zones. As well, narrow magnetic highs or lows can sometime indicate faults or shear zones enriched or depleted in magnetic minerals. If they are thought to be favorable structures in the exploration context of the Mt. Cameron Property, they should be paid particular attention and should be the object of a comprehensive structural interpretation, which is beyond the scope of this report. Shorter wavelength anomalies are greatly enhanced on the First Vertical Derivative (FVD) of the TMI (Figure 8). Since the FVD attenuates longer wavelength anomalies, it is the preferred product for structural interpretation.

Figure 7: Residual Total Magnetic Intensity and TDEM anomalies

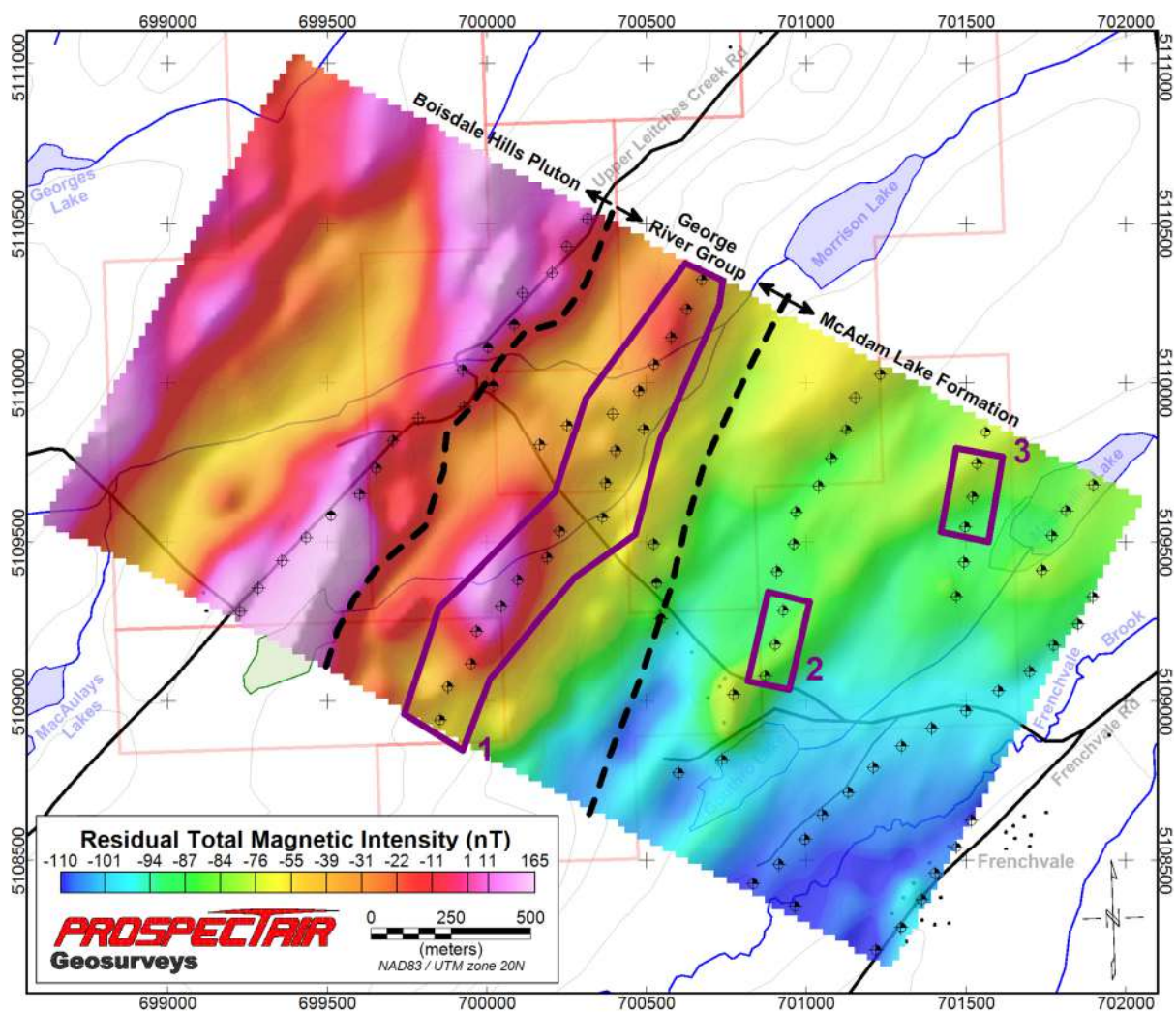
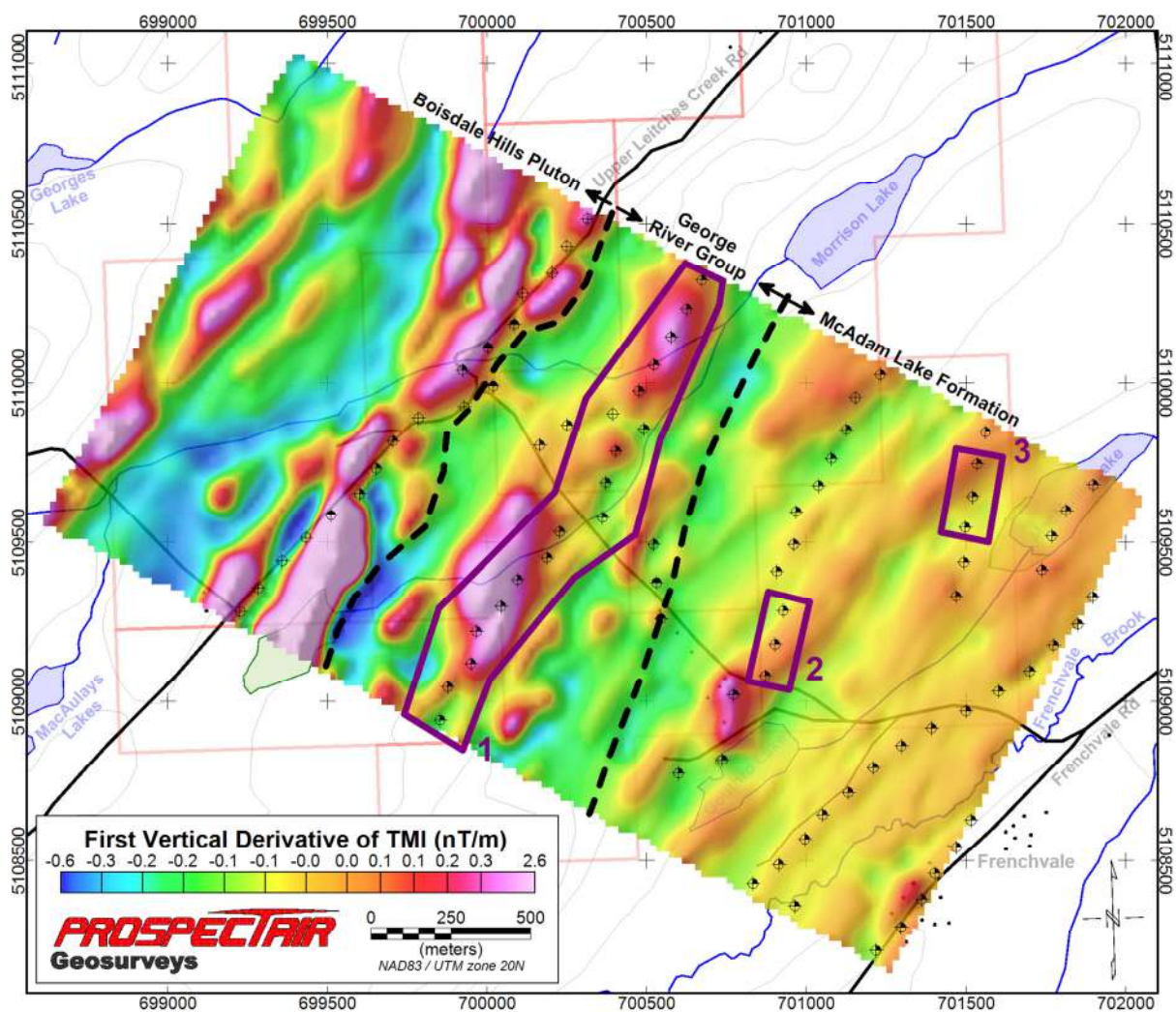


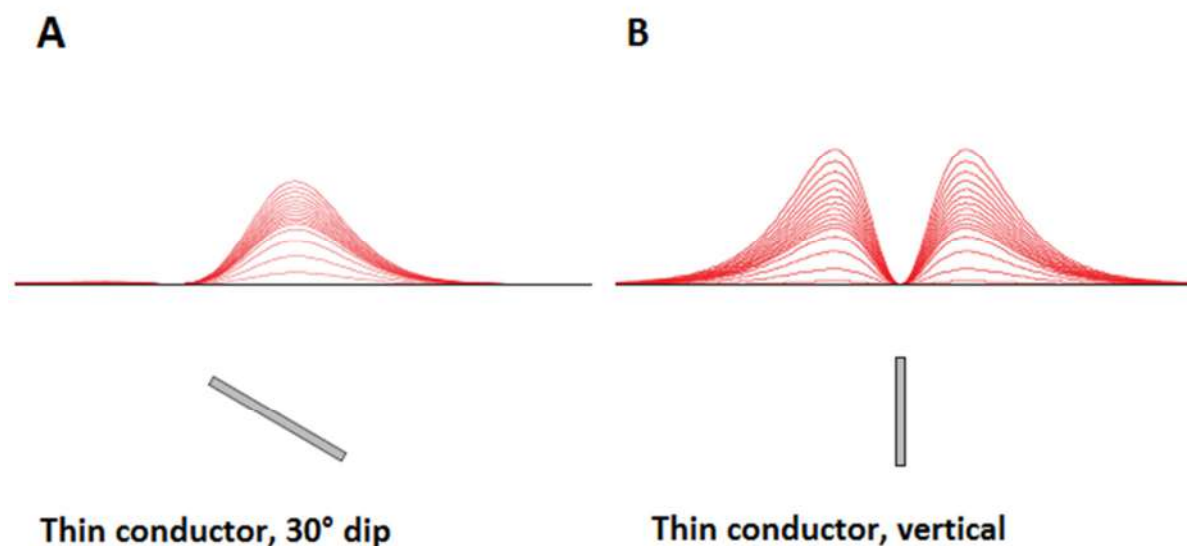
Figure 8: First Vertical Derivative of TMI and TDEM anomalies



Time-Domain Electromagnetic data presentation

There is no automatic picking program involved in the interpretation procedures of the ProspectorTEM system. Identification of the EM anomalies is made from the EM profiles. Most of the time, the location of anomalies is based on the assumption that the causative source is a somewhat thick or flat lying conductor, which would generate an anomaly mostly centered over the conductor (Figure 9, A). It is important to understand that some other conductive bodies could generate a strong EM response that is offset from the mass centre of the source. For instance, a thin conductor with a steep dip would generate an “M” shape anomaly (Figure 9, B), with the stronger shoulder on the dip side. Therefore, caution must be taken when planning work at the location of an anomaly. It is recommended to combine other available geoscientific information and to review the EM anomaly location before to investigate an anomaly of interest.

Figure 9: Example of EM response over thin conductors



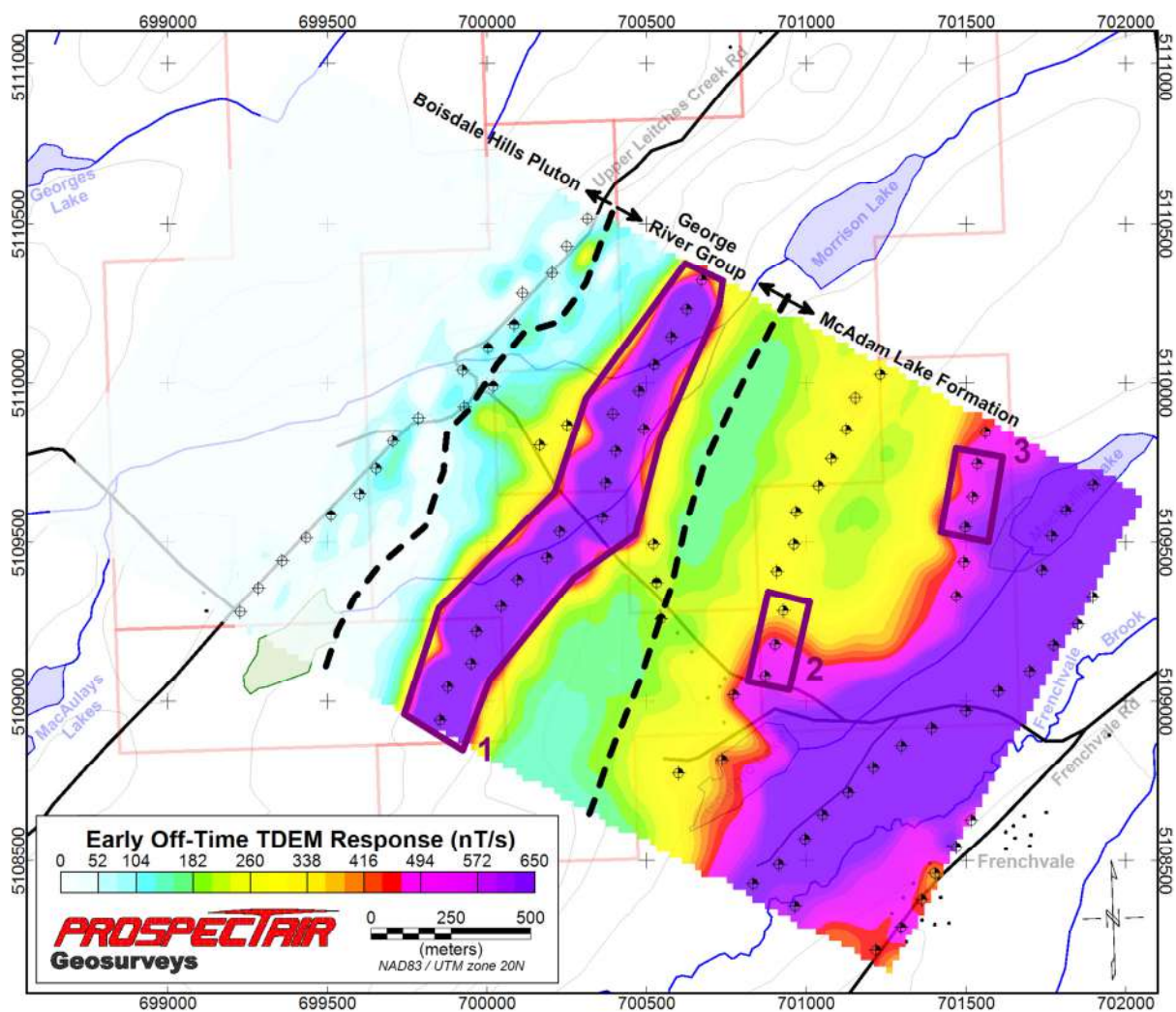
The classification of anomalies is based on the calculated time constant (TAU). The EM time constant is a general measure of the speed of decay of the electromagnetic response and reflects the “conductance quality” of a source. The decay rate of the secondary EM field recorded by the TDEM system is a function of the conductivity and geometry of conductors detected. A weak conductor, such as shallow conductive overburden, will show rapid response decay, thus a small value of the time constant. Conversely, a good conductor, such as a graphite or sulphide orebody, will have a response decaying slowly, relating to a large TAU value. The TAU is calculated using proprietary software and is derived from the best exponential least squares fit for channels Z13 to Z27. Calculating TAU for low amplitude anomalies that have their first off-time channel (channel 13) amplitude smaller than 75 nT/s can yield unreliable results given the weak response. No best fit were tried on these low signal anomalies and an arbitrary minimal time constant of 0.10 msec was attributed. Moreover, the resulting exponential best fit of the decay curve is extrapolated to the zero delay time, which can be used to compare the amplitude of anomalies.

On the Mt. Cameron block, 86 EM anomalies are identified, classified and listed (Appendix B). All marginal/weak anomalies with TAU lower than 0.25 msec are included in a group represented by an empty circle on the anomaly map. In total, 12 anomalies were reported in this class. The remaining anomalies were classified in 4 other groups, with time-constant considered small (0.25 to 0.50 msec, 68 anomalies), intermediate (0.50 to 0.75 msec, 6 anomalies), strong (0.75 to 1.00 msec, 0 anomalies) and very strong (over 1.00 msec, 0 anomalies). All interpreted anomalies are shown on the data figures of this section.

In areas where anomalies are very continuous along flight lines, anomaly symbols have been indicated where the strongest EM signal was obtained. It is recommended to use the early off-time map (Figure 10) to see the extents of anomalous areas. In many cases, EM anomalies can be followed on multiple lines, and are outlining conductive lineaments.

It is important to point that the TDEM response amplitude is governed by three main factors: the conductivity of the source, the volume of the conductive source, and the distance between the source and the TDEM sensor. The anomaly shape is also dependant on the geometry of the conductive source. The connectivity between the conductive minerals is also critical for a source to be highly conductive. As a result, disseminated graphite occurrences are not necessarily responding to EM techniques. Some rock properties analysis conducted on other graphite projects in Québec suggest that graphite mineralization grading above approximately 5-6% Cg is most often enough to respond to inductive techniques (Desaulniers, 2015) such as the TDEM system employed for this survey. It should also be kept to mind that sulphide rich zones (in stringer, semi-massive or massive form), associated or not to graphite mineralization, will also respond strongly to TDEM.

Figure 10: Early Off-Time TDEM response



Interpretation and geology

According to the Nova Scotia Department of Natural Resources (NSDNR), the survey area is underlain by three main geological units: a late proterozoic granitic intrusion referred to as the Boisdale Hills Pluton to the west, the George River Group carbonates of the same age in the center, and the Devonian McAdam Lake sediments to the east. The contacts between these three units is oriented NNE-SSW.

These three known rock units have very distinct geophysical signatures.

The Boisdale Hills Pluton unit is characterized by a stronger magnetic background and increased magnetic signal variability, especially for high frequency anomalies which indicates that the magnetic sources are sub-outcropping. These rocks are devoided of any significant EM signature, confirming their resistive nature. Note that these rocks are also found in an area of positive topographic elevation, which is expected given their weather resistant nature.

The George River Group rocks depict a slightly decreased magnetic background and signal variability compared to the Boisdale Hills Pluton. Magnetic anomalies wavelength also increases, suggesting that the magnetic sources are found at somewhat greater depth. They could be associated to granitic intrusive rocks found underneath the George River Group, to dykes intruding the sedimentary rocks or to some anomalous increase of magnetic minerals (magnetite or pyrrhotite) within them. This area is characterized by a global increase in the TDEM response, indicating that these rocks are generally more conductive. The area also hosts a high amplitude TDEM response that will be further discussed below.

The McAdam Lake Formation is characterized by a very low magnetic background and very few magnetic disturbances. The preferential strike of magnetic lineaments is also at a slightly different angle compared with the other units. While they are generally trending from N018 to N040 in the Proterozoic rocks, they are rather oriented N040 to N050 in this Devonian rock package. The TDEM response of this geological unit is relatively strong overall, suggesting that the rocks and/or overburden sediments found here are generally conductive. This area is mostly found in a rather flat topographic depression, where thicker overburden is likely to occur.

Based on these observations, the contact zones between each known geological units have been interpreted based on the geophysical data and are shown as thick dashed black lines on the figures of this section. Given the increased resolution of the data newly acquired with this survey, these contact zones may slightly differ from those mapped by the NSDNR. They may not represent the exact location of the actual outcropping contact zones, but they should not be far.

Interpretation and prospective areas

In the exploration context of the Mt. Cameron Property, high grade graphite is the targeted mineralization. Historical works carried out by Mt. Cameron Minerals Inc. further towards the southwest have shown that the graphite rich units are found within marbles of the George River Group (Wightman, 2011). These works have also shown that mineralized marbles could average 4 to 6 % in graphite, and contain up to 12 % in some instances. Given that graphite rich rocks with such grades are known to be particularly conductive, precedence is given to the TDEM data analysis in order to define exploration targets on this project. Moreover Wightman has provided evidence that the higher graphite content is invariably associated to tonalite dikes cutting through the marbles. This may be explained by the higher grade graphite being developed in zones of higher temperature generated by the dikes. Since the tonalite dikes are expected to be more magnetic than hosting marbles, this implies that strong conductors found relatively close to magnetic anomalies may represent prime targets for high grade flake graphite exploration.

Regarding the TDEM data acquired, three main types of anomalies can be identified on the basis of their location and the characteristics of their EM response.

The first type is characterized by very strong EM response amplitude over wide areas, which are well seen on the early off-time response maps (Figure 10), on the McAdam Lake Formation area. This type of response is typical of flat lying, tabular, conductive sources. These EM anomalies could be associated to conductive shales of the McAdam Lake Formation itself, or to more recent sediments such as Leda clays and Boulder clays of the Pleistocene which are known to occur within the Cape Breton Islands. The possible significant conductivity of these types of clays is well known, as EM techniques are sometimes employed to map their location and thickness (Brus et Al., 1992 and Hunter et Al., 2010). This type of response appears concentrated in the McAdam Lake Formation.

The second type consists in EM anomalies that are dispersed along human infrastructures such as roads, power lines and houses. It is for instance the case along the Frenchvale, Gouthro and Upper Leitches Creek roads, and over buildings found near them. They also seem to generate high frequency magnetic anomalies in some cases. Some anomalies may actually be associated to geological sources, at least partly, but most really appear as cultural interference and no follow-up of these anomalies is recommended.

The third type of EM anomalies is typical of graphite and sulphide conductors. They are most often narrow, of smaller amplitude than the wide anomalies of the first group, and with usually larger TAU values denoting good quality conductors. The orientation of the conductive lineaments of this group is better aligned with magnetic trends found in the Proterozoic rocks, which suggests that the conductive sources are indeed embedded in the bedrock. Some conductive lineaments also show a positive correlation to magnetic lineaments (Figures 8). Anomalies from this group are therefore considered of higher interest for graphite exploration. The strongest and most extensive anomaly of this type is found within the limits of the George River Group. It extends over a strike distance of about 1.7 km and is always found near small and discontinuous sub-parallel magnetic anomalies

possibly associated to local intrusive dykes. This outstanding anomaly has therefore been identified as the number 1 prospective area for graphite exploration in the survey area.

Some other weaker and narrower EM anomalies are found within the survey block. Because they tend to strike against the McAdam Lake Formation magnetic grain, but do conform with the dominant magnetic trend of Proterozoic rocks, two other areas (numbered 2 and 3) have been selected as potential prospective area. These conductors may simply be due to local thickening of conductive Devonian shales or Pleistocene clays, but it may also be the case that mineralized George River Group rocks come closer to surface underneath the McAdam Lake Formation, giving rise to these local, narrower, EM anomalies. As such they are considered of secondary interest compared with the main anomaly located within the mapped George River Group.

Selected prospective areas are outlined as thick burgundy polygons on the figures of this section. Their identification number also refers to their priority order, with a lower number indicating a higher priority (1 prioritized over 2 and so on).

Although graphite is of main interest for the Mt. Cameron Project, it is important to keep in mind that other mineralization types are also possible in the area. Therefore, even weak anomalies identified with this survey could deserve some attention.

VIII. WORK RECOMMENDATION

The discussion on the geological implication of the survey data is minimal in this report. A more general study including information regarding the local geology and all other geoscience data available in the area would be necessary to extract the full potential of the geophysical data and help to prioritize exploration target.

The prospective area 1 defined in this report should definitely be investigated with basic ground prospective methods at first. If the source is confirmed to be graphitic in nature, it is recommended to use ground resistivity/IP or EM techniques to accurately define individual targets for stripping and/or drilling.

Prospective areas 2 and 3 are considered of less interest, but could be summarily investigated nevertheless to confirm the nature of their source.

IX. FINAL PRODUCTS

Digital line data

The Geosoft database is provided with the channels detailed in Table 5.

Table 5: **MAG-TDEM line data channels**

No.	Name	Description	Units
1	UTM_X	UTM Easting, NAD-83, Zone 20N	m
2	UTM_Y	UTM Northing, NAD-83, Zone 20N	m
3	Lat_deg	Latitude in decimal degrees (WGS-84)	Deg
4	Long_deg	Longitude in decimal degrees (WGS-84)	Deg
5	GPS_Z	Helicopter altitude (w.r.t. MSL)	m
6	Gtm_sec	Second since midnight GMT	Sec
7	Radar	Ground clearance given by the radar altimeter	m
8	DEM	CDED Digital Elevation Model (w.r.t. MSL)	m
9	Terrain	Digital Elevation Model calculated from GPS and Radar	m
10	Mag_Raw	Raw magnetic data	nT
11	Mag_Lag	0.15s lagged magnetic data	nT
12	Gnd_mag	Base station magnetic data	nT
13	Mag_Cor	Magnetic data corrected for diurnal variation	nT
14	TMI	Fully levelled Total Magnetic Intensity	nT
15	TMIres	Residual TMI (IGRF removed)	nT
17	OFF_TIME	Amplitude of Off-time channels (13 to 36)	nT/s

Maps

All maps are referred to NAD-83 in the UTM projection Zone 20 North, with coordinates in metres. Maps are at a 1:10,000 scale. They are provided in PDF, PNG, Geotiff and Geosoft MAP formats for the products detailed in Table 6.

Table 6: **Maps delivered**

No.	Name	Description
1	DEM+FlightPath_Claims	Digital Elevation Model with flight path and properties claims
2	TMI+Contours	Residual Total Magnetic Intensity with contours
3	FVD	First Vertical Derivative of the TMI
4	Early_OffTime	Early_Off-Time TDEM response (Channel 13)
5	TDEM_Profiles+Anomalies	TDEM profiles with anomalies
6	TMI+TDEM_Anomalies	Residual Total Magnetic Intensity with TDEM anomalies

Grids

All grids are referred to NAD-83 in the UTM projection Zone 20 North, with coordinates in metres. Grids are provided in Geosoft GRD format, with a 20m grid cell size, for the products listed in Table 7.

Table 7: **Grids delivered**

No.	Name	Description	Units
1	DEM	CDED Digital Elevation Model	m
2	TERRAIN	Digital Elevation Model measured by helicopter	m
3	TMI	Total Magnetic Intensity	nT
4	FVD	First Vertical Derivative of TMI	nT/m
5	SVD	Second Vertical Derivative of TMI	nT/m ²
6	TMIres	Residual TMI (IGRF removed)	nT
7	Early_Off-Time	Early Off-Time TDEM response (Channel 13)	nT/s
8	Mid_Off-Time	Mid Off-Time TDEM response (Channel 20)	nT/s
9	Late_Off-Time	Late Off-Time TDEM response (Channel 27)	nT/s

Project report

The report is submitted in PDF format. The anomaly table is provided as a separate Excel file.

Prospective areas and geological contacts

The prospective areas outlined in this report for follow-up work, as well as interpreted geological contacts, are supplied in the Esri shapefile SHP format.

Respectfully submitted,



Joël Dubé, P.Eng.
December 1st 2017

X. Statement of Qualifications

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I, Joël Dubé, P.Eng., do hereby certify that:

1. I am a consultant in geophysics, President of Dynamic Discovery Geoscience Ltd., registered in Canada.
2. I earned a Bachelor of Engineering in Geological Engineering in 1999 from the École Polytechnique de Montréal.
3. I am an Engineer registered with the Ordre des Ingénieurs du Québec, No. 122937, and a Professional Engineer with Professional Engineers Ontario, No. 100194954 (CofA No. 100219617), with the Association of Professional Engineers and Geoscientists of New Brunswick, No. L5202 (CofA No. F1853), and with the Association of Professional Engineers of Nova Scotia, No. 11915 (CofC No. 51099).
4. I have practised my profession for 18 years in exploration geophysics.
5. I have not received and do not expect to receive a direct or indirect interest in the properties covered by this report.

Dated this 1st of December, 2017



Joël Dubé, P.Eng. #11915

XI. REFERENCES

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XII. Appendix A – Survey block outline

Mt. Cameron Block

Easting	Northing
698581	5109514
699420	5111092
702075	5109681
701235	5108102

XIII. Appendix B – Mt. Cameron TDEM anomaly table

Line	UTM_X (m)	UTM_Y (m)	ID	Time Constant (msec)	Amplitude at zero delay (nT/s)
10	699227	5109281	10.01	0.10	0
10	699853	5108942	10.02	0.26	3156
10	700833	5108429	10.03	0.31	1434
10	700964	5108359	10.04	0.28	1405
10	701218	5108220	10.05	0.32	962
20	699284	5109357	20.01	0.10	0
20	699877	5109046	20.02	0.26	3325
20	700914	5108488	20.03	0.28	1545
20	701297	5108292	20.04	0.39	868
30	699359	5109443	30.01	0.10	0
30	699950	5109120	30.02	0.33	1672
30	700600	5108775	30.03	0.39	578
30	700996	5108569	30.04	0.30	2376
30	701361	5108379	30.05	0.37	792
40	699433	5109515	40.01	0.10	0
40	699967	5109221	40.02	0.35	3173
40	700737	5108818	40.03	0.39	741
40	701051	5108645	40.04	0.34	2231
40	701402	5108461	40.05	0.41	680
50	699511	5109585	50.01	0.52	87
50	700044	5109299	50.02	0.34	2380
50	701131	5108715	50.03	0.42	1888
50	701470	5108543	50.04	0.33	1281
60	699601	5109653	60.01	0.36	114
60	700096	5109383	60.02	0.28	2357
60	700773	5109021	60.03	0.35	909
60	701210	5108792	60.04	0.41	2382
60	701516	5108628	60.05	0.30	1058
70	699653	5109732	70.01	0.28	167
70	700188	5109452	70.02	0.31	1651
70	700545	5109260	70.03	0.52	321
70	700871	5109082	70.04	0.37	1025
70	701298	5108862	70.05	0.43	2475
80	699705	5109818	80.01	0.36	113
80	700228	5109534	80.02	0.35	1470
80	700531	5109374	80.03	0.52	343
80	700902	5109180	80.04	0.35	942
80	701392	5108917	80.05	0.39	2961
90	699786	5109890	90.01	0.10	0
90	700362	5109578	90.02	0.30	2065
90	700521	5109494	90.03	0.39	494
90	700928	5109285	90.04	0.37	626
90	701500	5108971	90.05	0.36	3805
100	699929	5109925	100.01	0.18	391
100	700165	5109805	100.02	0.36	569
100	700372	5109687	100.03	0.28	1569
100	700907	5109409	100.04	0.33	612
100	701602	5109033	100.05	0.37	3666
110	699923	5110040	110.01	0.34	191

110	700019	5109991	110.02	0.73	121
110	700251	5109869	110.03	0.37	590
110	700403	5109787	110.04	0.31	1585
110	700961	5109494	110.05	0.33	572
110	701699	5109096	110.06	0.38	2980
120	700003	5110111	120.01	0.62	172
120	700394	5109904	120.02	0.25	2156
120	700492	5109856	120.03	0.27	1443
120	700968	5109596	120.04	0.32	567
120	701469	5109331	120.05	0.35	1050
120	701774	5109177	120.06	0.39	2154
130	700085	5110185	130.01	0.59	120
130	700476	5109976	130.02	0.31	1393
130	701038	5109678	130.03	0.30	552
130	701493	5109438	130.04	0.35	971
130	701850	5109243	130.05	0.39	1713
140	700111	5110283	140.01	0.10	0
140	700523	5110057	140.02	0.33	1485
140	701078	5109763	140.03	0.26	690
140	701497	5109547	140.04	0.31	1302
140	701737	5109414	140.05	0.35	1446
140	701896	5109329	140.06	0.38	1485
150	700204	5110345	150.01	0.10	0
150	700576	5110145	150.02	0.37	1694
150	701125	5109854	150.03	0.27	712
150	701521	5109644	150.04	0.33	1076
150	701768	5109520	150.05	0.30	1799
160	700249	5110430	160.01	0.10	0
160	700625	5110232	160.02	0.35	2271
160	701153	5109954	160.03	0.24	965
160	701535	5109747	160.04	0.32	1132
160	701813	5109600	160.05	0.32	1545
170	700314	5110516	170.01	0.10	0
170	700672	5110323	170.02	0.48	816
170	701231	5110027	170.03	0.27	677
170	701561	5109847	170.04	0.33	944
170	701899	5109681	170.05	0.26	2575