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Technical Report

High-Resolution Heliborne Magnetic Survey

Panama Property, Birch-Uchi Greenstone Belt Area,
Red Lake Mining Division, Ontario, 2019

Benton Resources Inc.
684 Squier St.
Thunder Bay, ON, Canada
P7B 4A8

Prospectair Geosurveys

Dynamic Discovery Geoscience

Prepared by:
Joël Dubé, P.Eng.

June 2019

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Survey flown by :
PROSPECTAIR

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(819)661-2029
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contact@prospectair.ca

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I. INTRODUCTION

Prospectair conducted a heliborne high-resolution magnetic (MAG) survey for the mineral exploration company Benton Resources Inc. on its Panama Property located in the Birch-Uchi Greenstone Belt area, Red Lake Mining Division, Province of Ontario (Figure 1). The survey was flown from May 6th to 14th 2019.

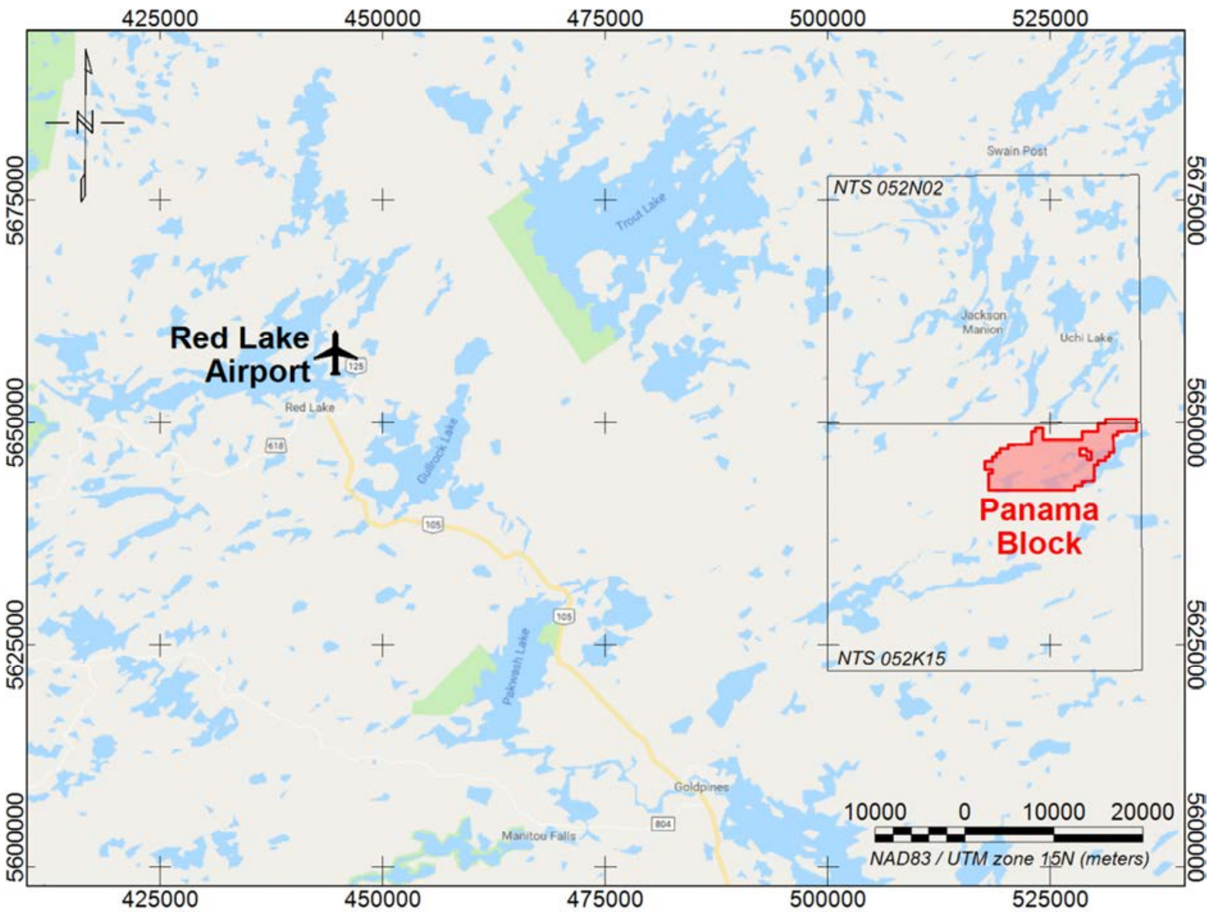
Figure 1: **General Survey Location**

One survey block was flown for a total of 1,638 l-km. A total of 9 production flights were performed using Prospectair's Robinson R-44, registration C-GBOU. The helicopter and survey crew operated out of the Red Lake Airport located 80 km to the west of the block (Figure 2).

Table 1: **Survey block particulars**

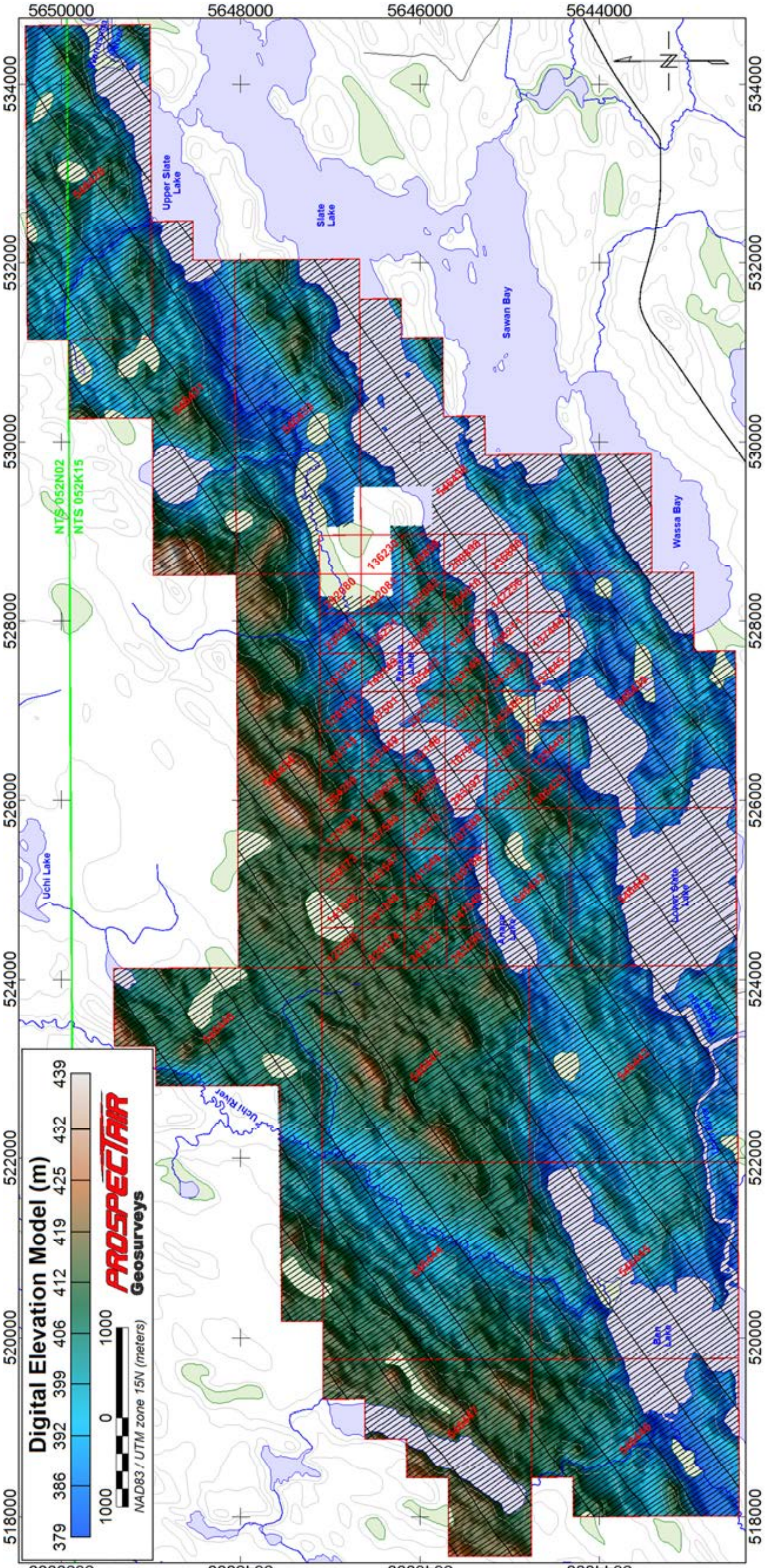
Block	NTS Mapsheet	Line-km flown	Flight numbers	Dates Flown
Panama	052K15 and 052N02	1,638 l-km	Flt 1 to 9	May 6th to 14th

Figure 2: **Survey Location and base of operation**



The Panama block was flown with traverse lines at 50 m spacing and control lines spaced every 500 m. The survey lines were oriented N145 and control lines were flown at an azimuth of N055. The average height above ground of the helicopter was 47 m and the magnetic sensor was at 26 m. The average survey flying speed was 30.9 m/s. The survey area is covered by forest, lakes and wetlands, and, aside from a few hills, the topography is mostly gently undulating, which are fairly typical characteristics of the area near Red Lake. The elevation is ranging from 379 to 439 m above mean sea level (MSL). The Panama Lake is found in the central part of the block and the Uchi River flows through its western part. The Property can be easily accessed by secondary forestry roads connecting to Ear Falls, located approximately 50 km to its south-west. Coordinates outlining the survey block are given in Appendix A, with respect to NAD-83 datum, UTM projection zone 15N. The location of the Panama Property claims (in red) and of the survey lines is shown on Figure 3. The Property claims numbers are also listed in Appendix B.

Figure 3: **Survey lines and Panama Property claims**



II. SURVEY EQUIPMENT

Prospectair provided the following instrumentation for this survey:

Airborne Magnetometer
Geometrics G-822A
The heliborne system 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 21 m below the helicopter when flying. Total magnetic field measurements were recorded at 10 Hz in the aircraft.

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 navigation system, real-time flight path information that is displayed over a map image of the area, and reliable data acquisition software. Thanks to simple interfacing, the radar and barometric altimeters 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 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.

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

Robinson R-44 (registration C-GBOU)

The survey was flown using Prospectair's Robinson R-44 helicopter that handles efficiently the light equipment load and the survey range for magnetic surveys. Table 2 presents the helicopter technical specifications and capacity, and the aircraft is shown in Figure 4.

Table 2: **Technical specifications of the R-44 Robinson helicopter**

Item	Specification
Powerplant	One 195kW (260hp) Textron Lycoming O-540
Rate of climb	1,000 ft/min
Cruise speed	223 km/h – 120 kts
Service ceiling	14,000 ft
Range with no reserve	645 km
Empty weight	635 kg
Maximum takeoff weight	1,090 kg

Figure 4: **C-GBOU Robinson R-44 at Red Lake Airport**

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;
- Pressure as measured by the barometric altimeter at intervals of 0.1 s;
- Terrain clearance as measured by the radar altimeter at intervals of 0.1 s;

At the base and remote magnetic ground stations:

- Total magnetic field: recorded at intervals of 1 s;
- GPS time recorded every 1s 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* – 50m mean terrain clearance for the helicopter except in areas where Transport Canada regulations prevent flying at this height, or as deemed 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* – A 0.5 nT noise envelope not to be exceeded for 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.
- *Flying Speed* – The average ground speed for the survey aircraft should be 120 kph. The acceptable high limit is 180 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* – The line spacing not to vary by more than 30% from the ideal spacing over a distance of more than 300 m, except as required for aviation safety.

  For Panama Block:

  Traverse lines: Azimuth N145, 50 m spacing.

  Control Lines: Azimuth N055, 500 m spacing.

IV. SYSTEM TESTS

Magnetometer System Calibration

The survey configuration using a bird towed 21 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 magnetometer 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 average total magnetic lag value for the AGIS acquisition system has been calculated to 1.95 s for this survey.

V. FIELD OPERATIONS

The survey operations were conducted out of the Red Lake Airport from May 6th to 14th, 2019, with a pause on May 9th and 10th to repair a damaged survey component. The data acquisition required 9 flights. At the end of each production day, the data were sent to the Dynamic Discovery 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 GSM-19 magnetic base station was set up close to the survey block, in a magnetically quiet area, at latitude 50.9242928°N, longitude 92.7466696°W. The survey pilot was Pierre Larose and the survey system technician was Jonathan Drolet.

Figure 5: **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 9.6 was used.

Magnetometer Data

General

The airborne magnetometer data, recorded at 10 Hz, were plotted and checked for spikes and noise on a flight basis. An average of 1.95 second lag correction was applied to the 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. 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 completely remove any 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 narrow and shallow geological features. Finally, the component of the normal Earth's magnetic field, described by the International Geomagnetic Reference Field (IGRF), has been removed from the TMI to yield the residual TMI.

Tilt Angle Derivative

In order to enhance the subtle magnetic features some more, the Tilt Angle Derivative (TILT) was also computed for this project.

It has been shown that it is possible to use the Tilt Angle Derivative to estimate both the location and depth of magnetic sources (Salem et al., 2007).

When two body of different magnetic susceptibility are in contact, the vertical and horizontal gradients along a horizontal line perpendicular to the vertical contact are governed by the following equations:

$\delta M/\delta h = 2KFc(z_c/(h^2+z_c^2))$

$\delta M/\delta z = 2KFc(h/(h^2+z_c^2))$

where
K = susceptibility contrast
F = magnetic field's strength
c = $1-\cos^2$(field Inclination)$\sin^2$(field Declination)
h = location along an horizontal axis perpendicular to the contact
z_c = contact depth
$\delta M/\delta h = \mathrm{sqrt}((\delta M/\delta x)^2+(\delta M/\delta y)^2)$

The Tilt Angle (θ) is defined as
$\theta = \tan^{-1}[(\delta M/\delta z)/(\delta M/\delta h]$

By substitution of the gradients we get
$\theta = \tan^{-1}[h/z_c]$

This has two main implications for any given anomaly:

1- The 0° angle line is located directly above the contact between a magnetic source and the surrounding rock. This allow for accurate estimation of source location.
2- The distance between the 0° and the +45° contour lines as well as the distance between the -45° and the 0° contour lines are equal to the depth of the source at the contact. This allow for a direct estimation of the depth of the source of the anomaly. The depth estimated with this method is actually the distance between the magnetic sensor and the top of the source. Knowing that the sensor was 26 m above the ground in average enables direct depth estimates.

In practice, the signal originating from multiple sources at different depth within a same area will cause juxtaposition of the Tilt Angle values, and complicate location and depth estimation. Nevertheless, the method remains an excellent tool for rapid assessment of sources characteristics, without the need for complex assumptions to be made or heavy computer requirements, as is the case with 3D Euler deconvolution or 3D data inversions.

Gridding
The magnetic 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. The final grids of the magnetic data are supplied with a 10 m grid cell size. Traverse lines were used in the gridding process.

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 were originally recorded at 10 Hz sampling rate in geographic longitude and latitude with respect to the WGS-84 datum. The delivered data locations are provided in X and Y using the UTM projection zone 15 North, with respect to the NAD-83 datum. Altitude data were initially recorded relative to the GRS-80 ellipsoid, but are delivered as orthometric heights (MSL elevation).

Terrain Data

Terrain elevation data are computed from the altitude of the helicopter, given by DGPS recordings, and the radar altimeter data.

VII. RESULTS AND DISCUSSION

The residual Total Magnetic Intensity (TMI) of the Panama block, presented in Figure 6, is very active and varies over a range of 11,934 nT, with an average of 38 nT and a standard deviation of 625 nT.

Most of the survey block is affected by linear magnetic features characteristic of alternating sequences of mafic volcanic rocks with sedimentary or intermediate to felsic volcanics, with probably some small size intrusive stocks or dykes locally. Some areas show settled magnetic signal variations and depressed background values, such as in the northeastern part of the block and near its southern edge, which is typical of sedimentary or felsic volcanic rocks. The strongest anomaly of the survey is found in the western part of the block and could relate to a mafic/ultramafic dyke or volcanic horizon. Stronger anomalies are best seen on Figure 7 which shows the residual TMI data with a linear color distribution.

The majority of magnetic lineaments found in the block are trending from NE-SW to ENE-WSW. This said, many lineaments are locally curved, such as in the central part of the block where heavy folding (with axial trace generally oriented ENE-WSW) seems to occur, as well as in the southern part of the block where evidences of shearing or gentle folding are found. In general terms, magnetic lineaments are related to rock formations that are enriched in magnetic minerals (magnetite and/or pyrrhotite).

Throughout the block, 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. If they are thought to be favorable structures in the exploration context of the Panama project, 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 FVD (Figure 8) and on the TILT (Figure 9) products. Since the FVD attenuates longer wavelength anomalies, and the TILT enhances very weak amplitude anomalies, they are the preferred products for structural interpretation.

Figure 6: **Residual Total Magnetic Intensity with equal area color distribution**

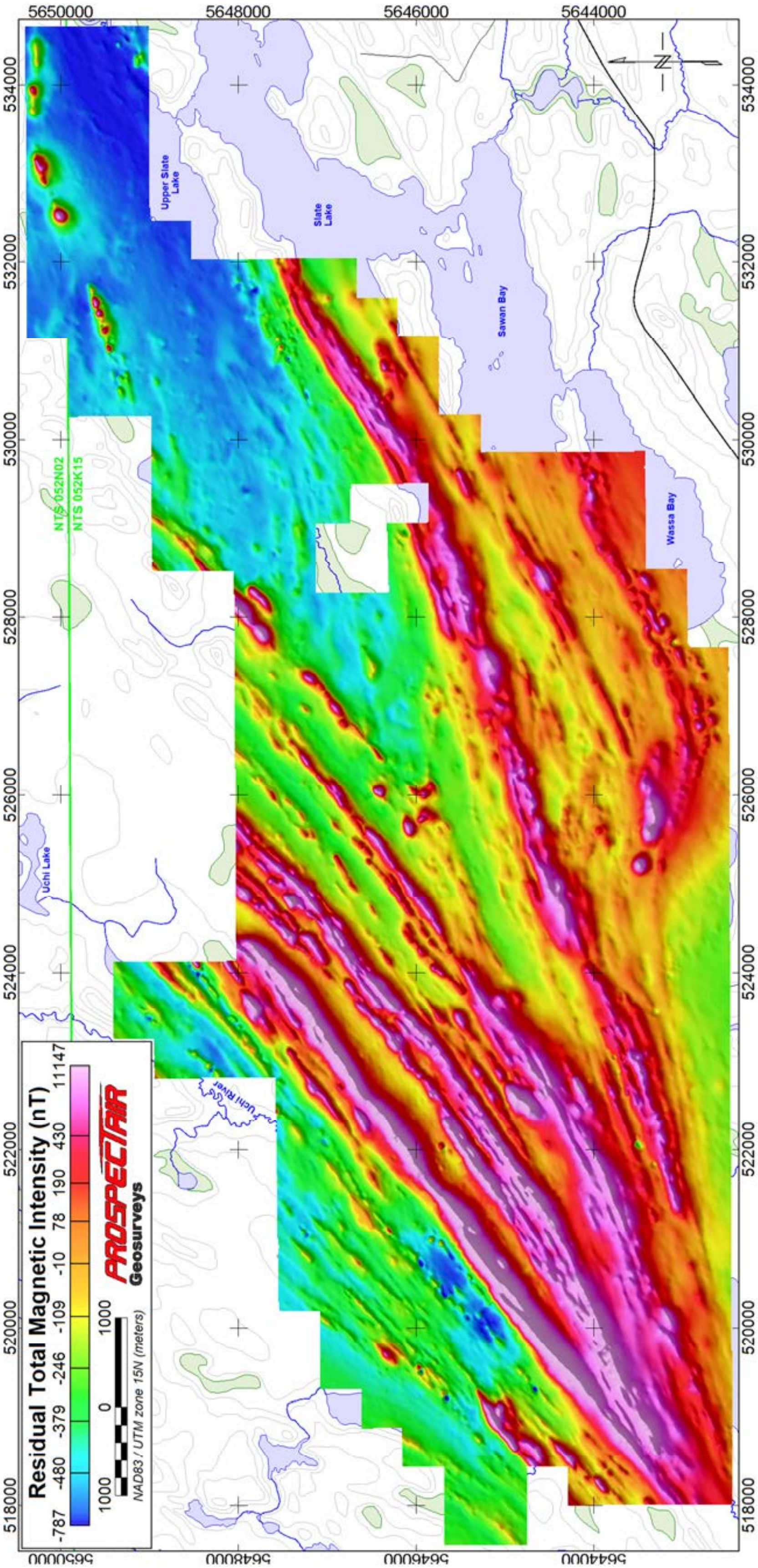


Figure 7: **Residual Total Magnetic Intensity with linear color distribution**

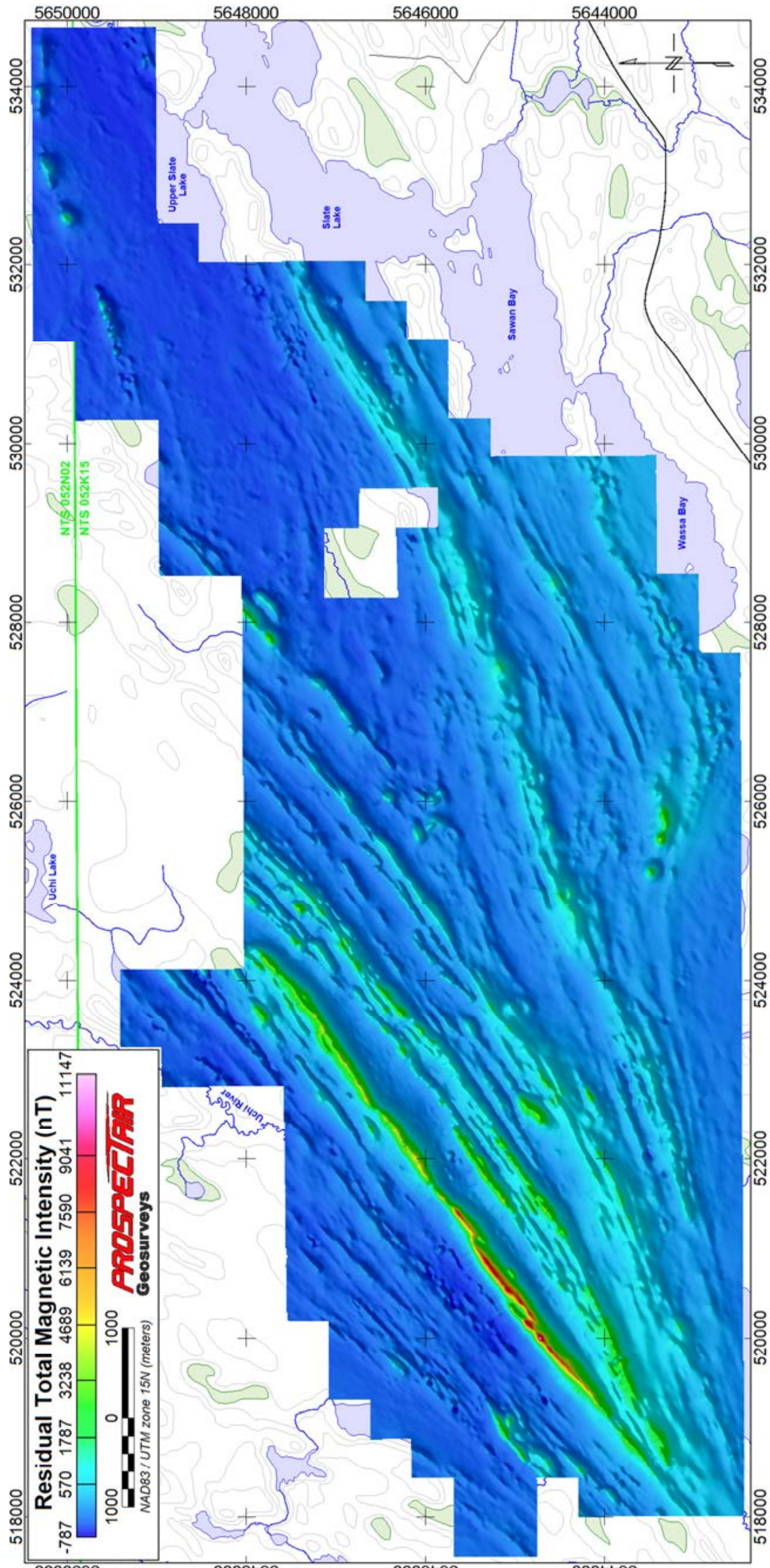


Figure 8: **First Vertical Derivative of TMI**

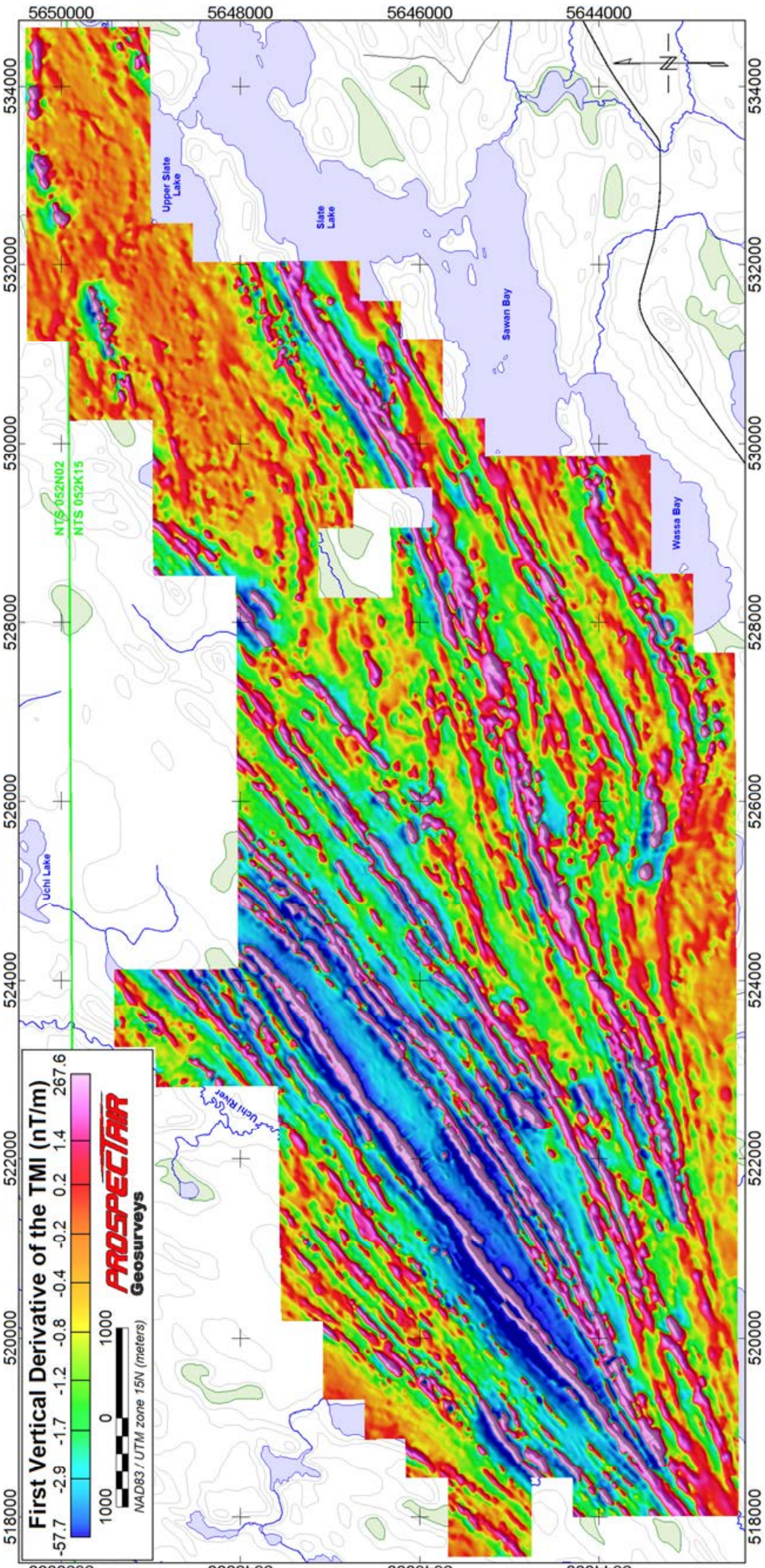
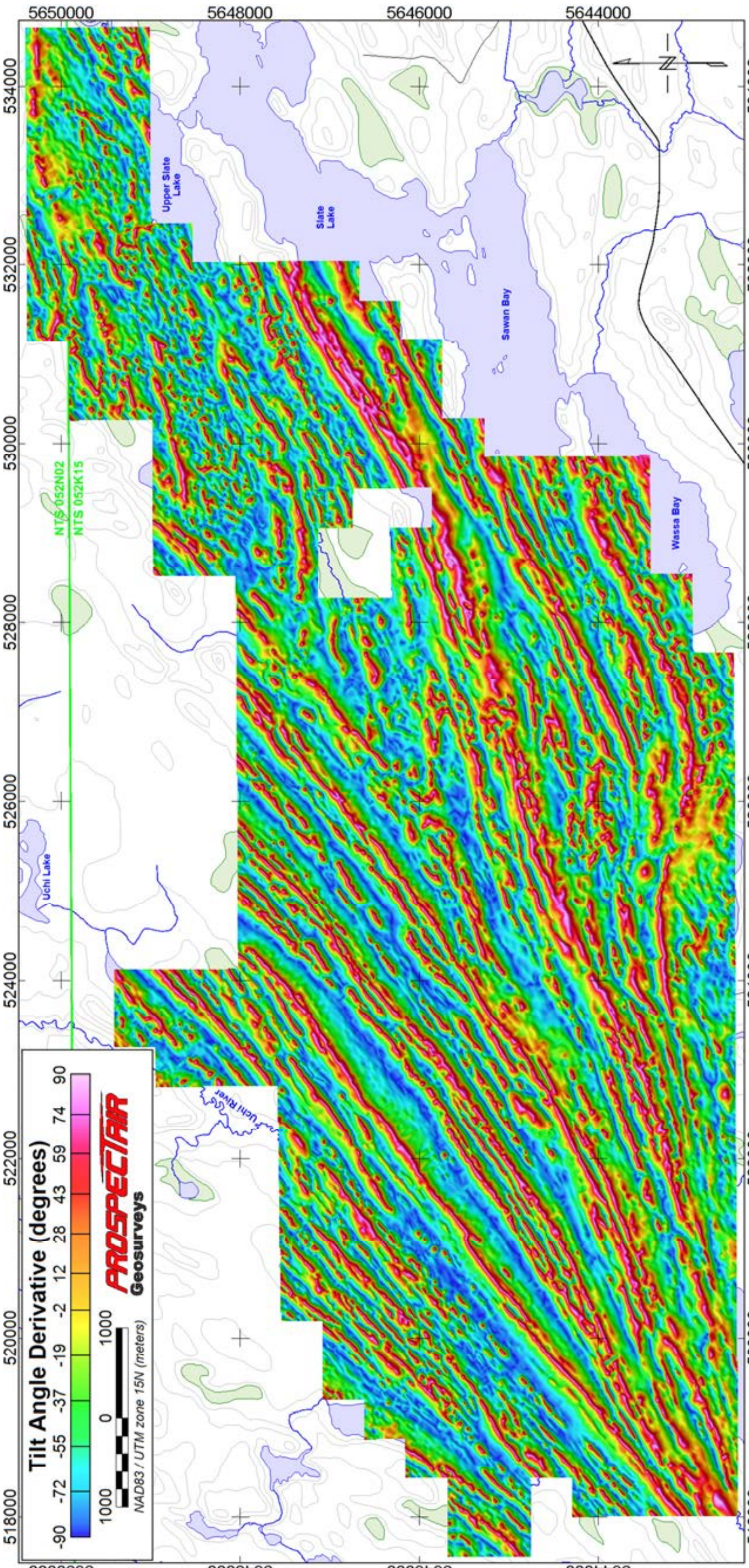


Figure 9: **Tilt Angle Derivative**



VIII. FINAL PRODUCTS

Digital Line Data

The Geosoft database is provided with the channels detailed in Table 3.

Table 3: **MAG line data channels**

No.	Name	Description	Units
1	UTM_X	UTM Easting, NAD-83, Zone 15N	m
2	UTM_Y	UTM Northing, NAD-83, Zone 15N	m
3	Lat_deg	Latitude in decimal degrees	Deg
4	Long_deg	Longitude in decimal degrees	Deg
5	Gtm_sec	Second since midnight GMT	Sec
6	Radar	Ground clearance given by the radar altimeter	m
7	CDED_DEM	CDED Digital Elevation Model (w.r.t. MSL)	m
8	Terrain	Calculated Digital Elevation Model (w.r.t. MSL)	m
9	GPS_Z	Helicopter altitude (w.r.t. MSL)	m
10	Mag_Raw	Raw magnetic data	nT
11	Mag_Lag	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

Maps

All maps are referred to NAD-83 datum in the UTM projection Zone 15 North, with coordinates in metres. Maps are at a 1:15,000 scale and are provided in PDF, PNG and Geosoft MAP formats for the products detailed in Table 4.

Table 4: **Maps delivered**

No.	Name	Description
1	DEM+FlightPath+Claims	Digital Elevation Model with flight path and property claims
2	TMI	Residual Total Magnetic Intensity
3	FVD	First Vertical Derivative of the TMI
4	TILT	Tilt Angle Derivative

Grids

All grids are referred to NAD-83 in the UTM projection Zone 15 North, with coordinates in metres. Grids are provided in Geosoft GRD format, with a 10 m grid cell size, as well as in the Geotiff format for the products listed in Table 5.

Table 5: **Grids delivered**

No.	Name	Description	Units
1	DEM	CDED Digital Elevation Model	m
2	Terrain	Calculated Digital Elevation Model	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	TILT	Tilt Angle Derivative	Degree

Project Report

The report is submitted in PDF format.

Respectfully submitted,

____

Joël Dubé, P.Eng.

June 12^{th}, 2019

IX. STATEMENT OF QUALIFICATIONS

Joël Dubé
7977 Décarie Drive
Ottawa, ON, Canada, K1C 3K3

Telephone: 819.598.8486
E-mail: jdube@ddgeoscience.ca

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

1. I am a Professional Engineer specialized 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), with the Association of Professional Engineers of Nova Scotia, No. 11915 (CofC No. 51099), and with Engineers Geoscientists Manitoba, No. 43414. (CofA No. 6897).

4. I have practised my profession for 20 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 12th of June, 2019

Joël Dubé, P.Eng. #100194954

X. Appendix A – Survey block outline

Panama Block

Easting	Northing
527670	5642484
518006	5642443
517999	5644297
518438	5644299
518437	5644757
518434	5644760
517559	5644757
517555	5645686
518433	5645689
518432	5646152
518873	5646164
518869	5646617
519308	5646618
519306	5647082
520184	5647085
520182	5647548
522813	5647586
522808	5648950
523237	5648951
523247	5648957
523245	5649415
524123	5649418
524131	5648029
528515	5648051
528511	5648978
530265	5648988
530259	5649915
531136	5649920
531134	5650383
534644	5650405
534653	5649014
532460	5648999
532463	5648535
532024	5648533
532036	5646680
531597	5646677
531600	5646214
531161	5646211
531164	5645748
530286	5645742
530289	5645279
529850	5645276
529861	5643423
528543	5643416

528546	5642952
527713	5642948
527667	5642915

XI. Appendix B – Property claims numbers covered by the survey

Tenure number	Holder
546438	(100) BENTON RESOURCES INC.
546446	(100) BENTON RESOURCES INC.
546447	(100) BENTON RESOURCES INC.
107994	(100) BENTON RESOURCES INC.
107586	(100) BENTON RESOURCES INC.
107587	(100) BENTON RESOURCES INC.
107588	(100) BENTON RESOURCES INC.
107501	(100) BENTON RESOURCES INC.
546431	(100) BENTON RESOURCES INC.
546439	(100) BENTON RESOURCES INC.
123504	(100) BENTON RESOURCES INC.
123505	(100) BENTON RESOURCES INC.
123506	(100) BENTON RESOURCES INC.
125449	(100) BENTON RESOURCES INC.
128106	(100) BENTON RESOURCES INC.
136230	(100) BENTON RESOURCES INC.
136231	(100) BENTON RESOURCES INC.
137444	(100) BENTON RESOURCES INC.
137445	(100) BENTON RESOURCES INC.
140149	(100) BENTON RESOURCES INC.
141546	(100) BENTON RESOURCES INC.
141547	(100) BENTON RESOURCES INC.
141548	(100) BENTON RESOURCES INC.
141549	(100) BENTON RESOURCES INC.
142255	(100) BENTON RESOURCES INC.
142256	(100) BENTON RESOURCES INC.
546426	(100) BENTON RESOURCES INC.
546432	(100) BENTON RESOURCES INC.
546444	(100) BENTON RESOURCES INC.
546445	(100) BENTON RESOURCES INC.
546434	(100) BENTON RESOURCES INC.
546442	(100) BENTON RESOURCES INC.
546443	(100) BENTON RESOURCES INC.
546433	(100) BENTON RESOURCES INC.
546440	(100) BENTON RESOURCES INC.
546441	(100) BENTON RESOURCES INC.
180708	(100) BENTON RESOURCES INC.
182148	(100) BENTON RESOURCES INC.
182149	(100) BENTON RESOURCES INC.
188211	(100) BENTON RESOURCES INC.
192164	(100) BENTON RESOURCES INC.
199695	(100) BENTON RESOURCES INC.
200897	(100) BENTON RESOURCES INC.
200898	(100) BENTON RESOURCES INC.
218811	(100) BENTON RESOURCES INC.
236859	(100) BENTON RESOURCES INC.
236860	(100) BENTON RESOURCES INC.

Tenure number	Holder
236003	(100) BENTON RESOURCES INC.
254269	(100) BENTON RESOURCES INC.
254270	(100) BENTON RESOURCES INC.
283297	(100) BENTON RESOURCES INC.
283298	(100) BENTON RESOURCES INC.
284010	(100) BENTON RESOURCES INC.
287449	(100) BENTON RESOURCES INC.
292760	(100) BENTON RESOURCES INC.
292080	(100) BENTON RESOURCES INC.
292081	(100) BENTON RESOURCES INC.
292082	(100) BENTON RESOURCES INC.
291348	(100) BENTON RESOURCES INC.
305422	(100) BENTON RESOURCES INC.
305423	(100) BENTON RESOURCES INC.
305424	(100) BENTON RESOURCES INC.
305425	(100) BENTON RESOURCES INC.
312177	(100) BENTON RESOURCES INC.
320173	(100) BENTON RESOURCES INC.
320174	(100) BENTON RESOURCES INC.
335743	(100) BENTON RESOURCES INC.
343664	(100) BENTON RESOURCES INC.
343665	(100) BENTON RESOURCES INC.
342242	(100) BENTON RESOURCES INC.

Legend

- Topographic contours (15m)
- Road, trail
- Wetland
- Water body
- Water stream
- Mineral claim

Survey Specifications

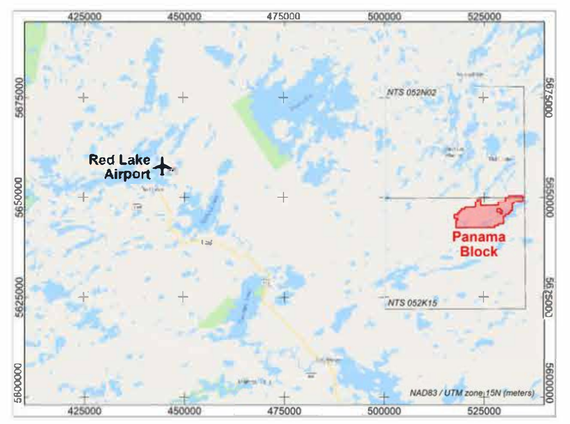
Line spacing	: 50 m
Line orientation	: N145
Tie-line spacing	: 500 m
Tie-line orientation	: N055
Average survey speed	: 30.9 m/s
Average helicopter height	: 47 m
Average Mag height	: 26 m
Sampling rate	: 10 Hz

Instrumentations

Helicopter	: Robinson R-44
Navigation&Acquisition	: PicoEnvirotec AGIS
Real-Time DGPS	: Fugro Omnistar
Magnetometer	: Geometrics G-822A

Digital Elevation Model
(meters)
379 383 386 390 393 397 401 404 408 411 415 418 422 425 429 433 436

Scale 1:15000
250 0 250 500 750 1000
(meters)
NAD83 / UTM zone 15N



BENTON RESOURCES INC.
Panama Project, Ontario, 2019

DIGITAL ELEVATION MODEL WITH FLIGHT PATH AND PROPERTY CLAIMS

HIGH RESOLUTION MAGNETIC HELIBORNE SURVEY

Flown by : PROSPECTAIR Geosurveys

Compiled by : *Joël Dubé, P.Eng.*
Dynamic Discovery Geoscience

Legend

- Topographic contours (15m)
- Road, trail
- Wetland
- Water body
- Water stream
- Mineral claim

Contours

Level 1	: 0.5 nT/m
Level 2	: 5 nT/m
Level 3	: 50 nT/m

Survey Specifications

Line spacing	: 50 m
Line orientation	: N145
Tie-line spacing	: 500 m
Tie-line orientation	: N055
Average survey speed	: 30.9 m/s
Average helicopter height	: 47 m
Average Mag height	: 26 m
Sampling rate	: 10 Hz

Instrumentations

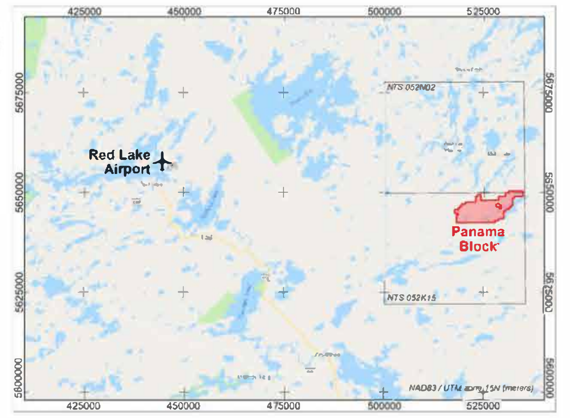
Helicopter	: Robinson R-44
Navigation&Acquisition	: PicoEnvirotec AGIS
Real-Time DGPS	: Fugro Omnistar
Magnetometer	: Geometrics G-822A

First Vertical Derivative of the TMI
(nT/m)

-15.8 -4.1 -2.6 -1.9 -1.5 -1.2 -0.9 -0.7 -0.5 -0.4 -0.2 -0.0 0.3 0.8 2.0 4.5 13.9

Scale 1:15000

250 0 250 500 750 1000
(meters)
NAD83 / UTM zone 15N



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Panama Project, Ontario, 2019

FIRST VERTICAL DERIVATIVE OF THE TMI

HIGH RESOLUTION MAGNETIC HELIBORNE SURVEY

Flown by : PROSPECTAIR Geosurveys

Compiled by : *Joël Dubé, P.Eng.*
Dynamic Discovery Geoscience

Legend

Topographic contours (15m)
Road, trail
Wetland
Water body
Water stream
Mineral claim

Contours

Level 1	: 45 degrees

Survey Specifications

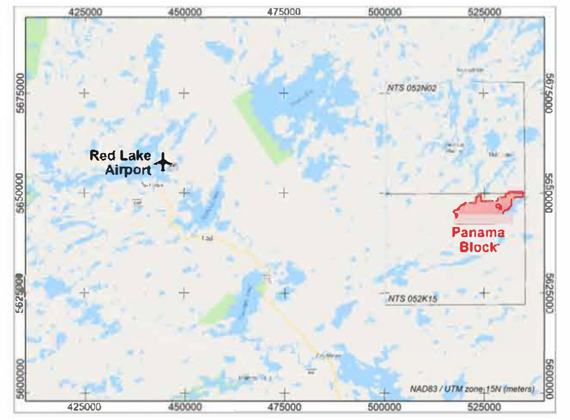
Line spacing	: 50 m
Line orientation	: N145
Tie-line spacing	: 500 m
Tie-line orientation	: N055
Average survey speed	: 30.9 m/s
Average helicopter height	: 47 m
Average Mag height	: 26 m
Sampling rate	: 10 Hz

Instrumentations

Helicopter	: Robinson R-44
Navigation&Acquisition	: PicoEnvirotec AGIS
Real-Time DGPS	: Fugro Omnistar
Magnetometer	: Geometrics G-822A

Tilt Angle Derivative
(degrees)
-89 -79 -70 -60 -50 -40 -30 -20 -10 -0 6 11 19 26 34 42 50 57 65 73 81 88

Scale 1:15000
250 0 250 500 750 1000
(meters)
NAD83 / UTM zone 15N



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TILT ANGLE DERIVATIVE

HIGH RESOLUTION MAGNETIC HELIBORNE SURVEY

Flown by : PROSPECTAIR Geosurveys

Compiled by : *Joël Dubé, P.Eng.*
Dynamic Discovery Geoscience

Legend

- Topographic contours (15m)
- Road, trail
- Wetland
- Water body
- Water stream
- Mineral claim

Contours

Level 1	: 20 nT
Level 2	: 200 nT
Level 3	: 2000 nT

Survey Specifications

Line spacing	: 50 m
Line orientation	: N145
Tie-line spacing	: 500 m
Tie-line orientation	: N055
Average survey speed	: 30.9 m/s
Average helicopter height	: 47 m
Average Mag height	: 26 m
Sampling rate	: 10 Hz

Instrumentations

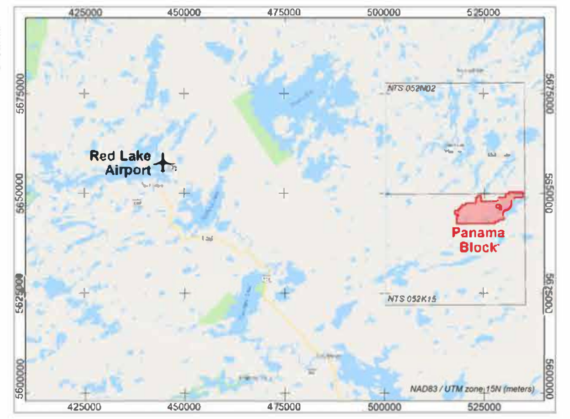
Helicopter	: Robinson R-44
Navigation&Acquisition	: PicoEnvirotec AGIS
Real-Time DGPS	: Fugro Omnistar
Magnetometer	: Geometrics G-822A

Residual Total Magnetic Intensity
(nT)

-619 -511 -450 -390 -316 -228 -138 -66 -22 23 66 116 204 330 511 809 2337

Scale 1:15000

250 0 250 500 750 1000
(meters)
NAD83 / UTM zone 15N



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RESIDUAL TOTAL MAGNETIC INTENSITY

HIGH RESOLUTION MAGNETIC HELIBORNE SURVEY

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