

# GM 71614

Report on a helicopter-borne magnetic gradiometer survey at Qikavik

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# **REPORT ON A HELICOPTER-BORNE MAGNETIC GRADIOMETER SURVEY AT QIKAVIK, QUEBEC**



**Project Name: Qikavik**

**Project Number: 2018-02-006**

**Client:**



**Contractor:**



**Date: July 25<sup>th</sup>, 2018**

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## **1.0 INTRODUCTION**

### **1.1 CONTRACTOR**

Balch Exploration Consulting Inc. (“BECI”, the “Contractor”) having its head office at 11500 Fifth Line, Rockwood, Ontario, Canada, N0B 2K0, has performed a helicopter-borne triaxial gradient magnetometer survey.

### **1.2 CLIENT**

Orford Mining Corporation (“Orford”, the “Client”) having its head office at 357 Bay Street, Suite 800, Toronto, Ontario, M5H 2T7, is a mineral exploration company with mineral claims approximately 80 km south of Salluit, Quebec known as the Qikavik Project.

### **1.3 SURVEY OBJECTIVES**

The Qikavik property is located in the volcanic-sedimentary unit of the Cape Smith Belt, itself dominated by interlayered sediments and volcanics and hosting the Raglan nickel, copper PGE deposits. The sediments within the Qikavik property are favorable for gold, silver, and copper, zinc. To date ten significant mineralized showings have been discovered.

The primary objective is to identify geologic units, contacts and structures that may be related to the known mineralized zones, so they can be expanded. A second objective is to identify new zones that have a similar geophysical response.

## **2.0 SURVEY AREA**

### **2.1 LOCATION AND ACCESS**

The survey area is located approximately 80 km south of the Inuit village of Salluit, Quebec. It is located within the NTS topographic sheet 35G and centered near 61° 35’ latitude and -75° 35’ longitude. Access to the property is by helicopter (Figure 1).

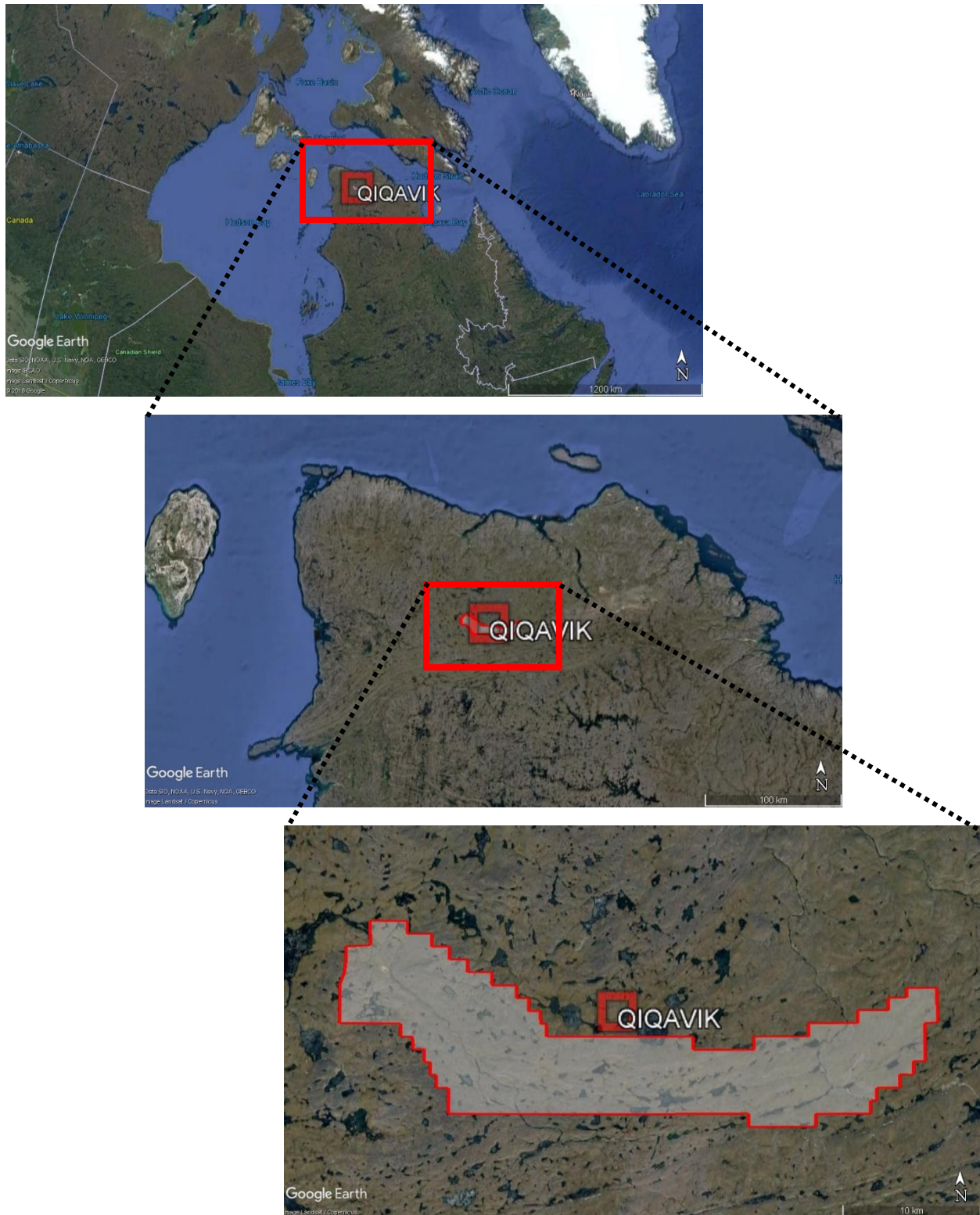


Figure 1 - Location map of the Qiqavik survey.

## **2.2 INFRASTRUCTURE**

Within the Qikavik Property there is no mine infrastructure or roads.

## **2.3 CLIMATE**

The area is designated a Tundra Climate with long cold winters and short moderate summers. Average winter temperature (December through February) is -25°C with summer temperature reaching +12°C (July-August).

Winter precipitation is variable but low with an average of less than 20 mm per month. Precipitation increases slightly in the early to mid spring with unpredictable weather patterns.

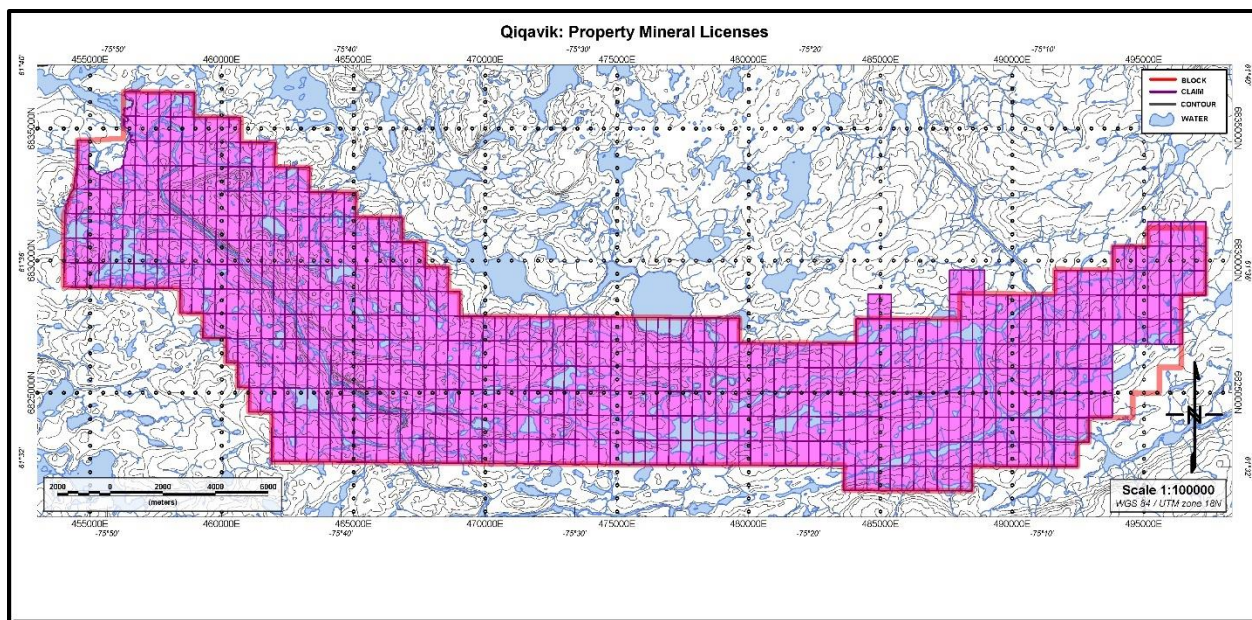
High winds are common especially in the winter months with up to 40 knots (gusting 60 knots) possible.

## **2.4 TOPOGRAPHY**

The general trend in topography is west with elevation ranging from a low of 710' in the west to a high of 1,570 ft to the east.

## **2.5 MINERAL AND MINING CLAIMS**

The mining claims within the survey area are shown in Figure 2.



**Figure 2 - Map of claim outlines over the survey area.**

## 2.6 FLIGHT AND TIE LINES

The survey was flown in one block with flight and tie line specifications summarized in Table 1. Figure 3 shows the survey lines superimposed over the mineral claims. The lines were clipped to the survey boundary post-flight from the Geosoft database.

## 2.7 DATUM AND PROJECTION

The survey was flown in the WGS-84 Datum, UTM Zone 18N projection. The database, digital maps, printed maps and coordinate references within this report are all WGS-84, Zone 18N unless otherwise noted.

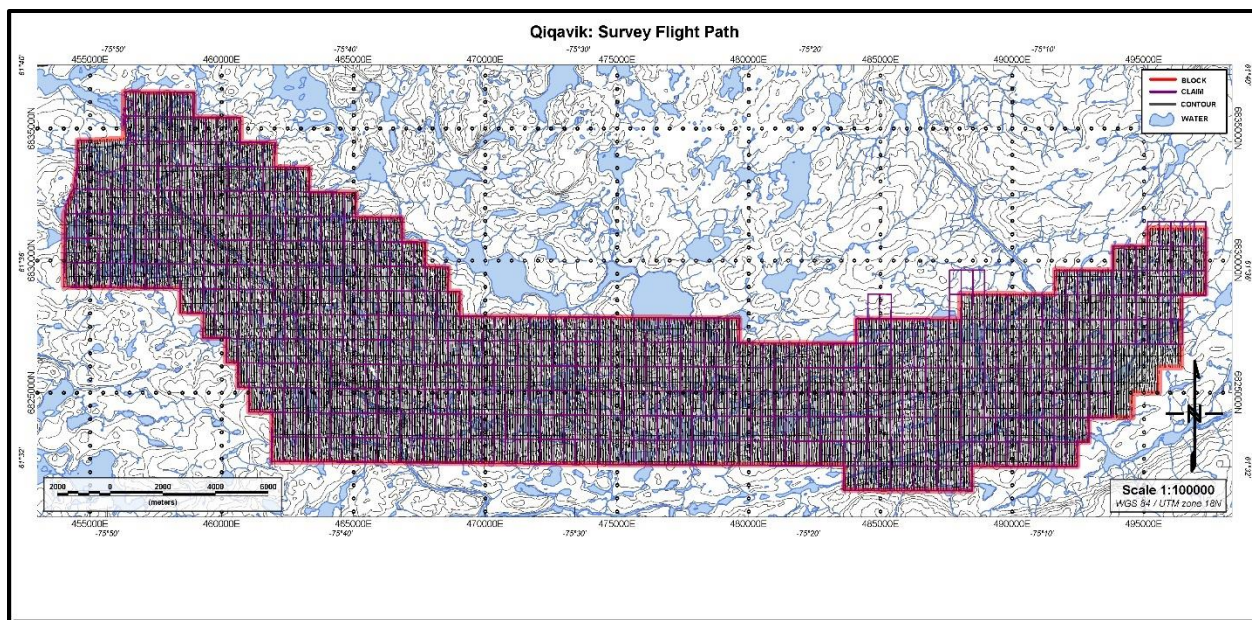


Figure 3 - Flight and tie lines over the Qiqavik claims.

Survey Block	Area (km <sup>2</sup> )	Line Type	Planned No. of Lines	Line Spacing (m)	Line Orientation	Nominal Survey Height (m)	Total Planned (km)	Total Actual (km)
Qikavik	287.5	Survey	860	50	0°/180°	28.6	5,748.7	5,768.4
		Tie	9	1000	90°/270°	30.1	305.2	303.5
		<b>Total</b>	<b>869</b>				<b>6,053.9</b>	<b>6,071.9</b>

Table 1 - Summary of flight and tie line specifications.

## 3.0 SURVEY SYSTEM

### 3.1 HELICOPTER

The helicopter used was an AS350-B3 (Figure 4) with registration C-FZAQ, owned and operated by Helicarrier, based in Quebec City, Quebec, Canada.



**Figure 4 – The survey used an AS350-B3 as shown above.**

Installation of the electronics into the helicopter and the power connection occurred at the Salluit airport, Quebec by Dan LeBlanc and under the supervision of the AME (Jean-François Kirouac) who was provided with the Supplemental Type Certificate (STC) approved by Transport Canada. A registration specific STC was requested by Helicarrier and was performed by Ken Smyth of Phoenix Aero Aviation Engineering Ltd and granted as Number O-LSH18-060/D.

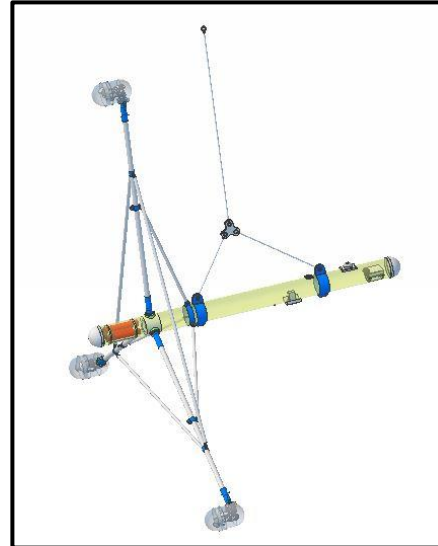
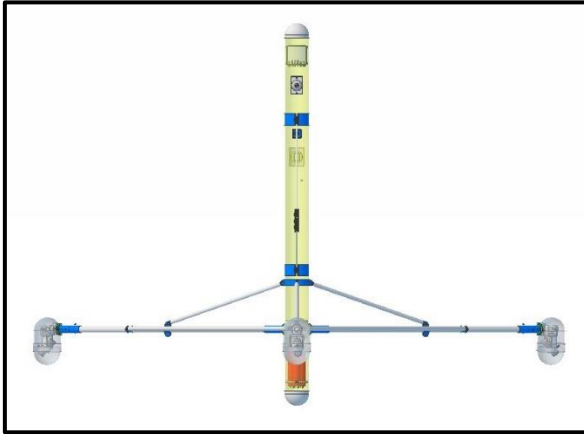
Assembly of the airborne system also took place at the Salluit airport. After the AME signed off on the installation there was a short test flight to check the configuration of the system. Production flights began the next day.

### **3.2 AIRBORNE SYSTEM**

The system used was developed by Triumph Instruments (Triumph) and is known as the MG-3 (magnetic gradiometer, 3-sensor), a helicopter magnetic gradiometer system that is designed for mineral exploration, oil & gas exploration and geologic mapping. The MG-3 uses Scintrex optical cesium total magnetic field sensors connected to a Triumph Larmour frequency counter and data control system, located in the airframe (or bird). Data acquisition was provided by the MAS-4 unit which was installed in the helicopter. The system is more specifically described below.

# MG-3

## AIRBORNE MAGNETIC OPTICAL GRADIOMETER AIRFRAME



### MAIN FEATURES

- ✓ High sensitivity optical sensors
- ✓ Full gradient measurement
- ✓ Calibrated total magnetic field
- ✓ 3 m (10 ft) sensor separation
- ✓ Light weight (under 170 Kg)
- ✓ Full ancillary equipment support
- ✓ Absolute magnetometer calibration
- ✓ Real-time compensation

### SUMMARY

The MG-3 airframe (Figure 5) is based on the proven Scintrex CS-3 cesium optical magnetometer sensor. The total field gradient is measured along the three principle axes. The on-board control unit features high sensitivity Larmor counters, RS 232 inputs for ancillary data such as GPS and Altimeter, on-board flux-gate magnetometer and tiltmeter and barometric altimeter. All data collected on the airframe is converted to digital format and transmitted to the helicopter using Can-Bus protocol. The light weight airframe can be towed by smaller, more efficient helicopters to reduce the overall cost of the survey. The frame is dismantled into pieces weighing less than 25 Kg each and 3 m maximum length for easy transport and shipping by ground or air.



**Figure 5 - Triumph MG-3 magnetic gradiometer.**

## SPECIFICATIONS

Sensors		
Total Field Magnetometer	Three (3) optical magnetometers	
Single Component Magnetometer	one 3-axis fluxgate sensor	
Sensitivity		
Optical sensor	+/- 0.001 nanotesla @ 10 Hz	
Gradients (unfiltered)	+/- 0.05 nT/m	
Fluxgate magnetometer	+/- 10 nanotesla @ 10 Hz	
Signal		
Total Field Gradients	<i>Hx, Hy, Hz</i>	
Total Field	<i>TMI</i>	
Recording	Laptop via USB	
A/D converters	24-bit, 1 kHz	
Sample period	100 msec	
Data output	USB @ 10 Hz	
Inputs		
Radar Altimeter	Helicopter	
GPS-NAV	Helicopter	
GPS-IMU	Airframe	
Total Field Magnetometer	Airframe	
Spectrometer	Helicopter	
Mechanical		
Temperature	-30°C to +40°C	
Dimensions	3 m by 3 m by 3 m	
Weight	170 Kg (375 lbs)	
Power required (typical)	50 A @ 28 VDC, 1.4 kW	

# MAS-4

## FOUR SENSOR OPTICAL MAGNETOMETER ACQUISITION SYSTEM



### FEATURES

- ✓ Navigation
- ✓ GPS and IMU
- ✓ Accelerometers
- ✓ Radiometrics support
- ✓ Radar altimeter
- ✓ Up to 4 optical magnetometers
- ✓ High sensitivity fluxgate sensor
- ✓ Computer interface & acquisition

### SUMMARY

The MAS-4 electronics unit is designed for fixed-wing or helicopter optical magnetometer array installations. The unit supports up to 4 optical magnetometers with a dedicated TNC input and Larmor counter for each sensor. Also included is a high sensitivity fluxgate sensor and accelerometers that allow for conventional real time magnetic compensation (i.e. Leliak coefficients), accelerometer and GPS compensation or a combination.

FRONT VIEW



REAR VIEW



SPECIFICATIONS

Signal

Optical magnetometer	Up to 4 Cesium
Counter sensitivity	< 0.001 nT @ 10 Hz
Fluxgate magnetometer	1 nT @ 10 Hz
Data output	10 Hz

Ancillary

Radar Altimeter	Helicopter/Aircraft
GPS	Helicopter/Aircraft
Navigation	Helicopter/Aircraft
Spectrometer	Helicopter/Aircraft

Mechanical

Temperature	-30°C to +40°C
Dimensions (W x D x H)	19" x 19" x 5.25"
Weight	8.6 Kg (19 lbs)
Maximum power	50 A @ 28 VDC, 1.4 kW

### 3.3 MAGNETOMETER SENSOR

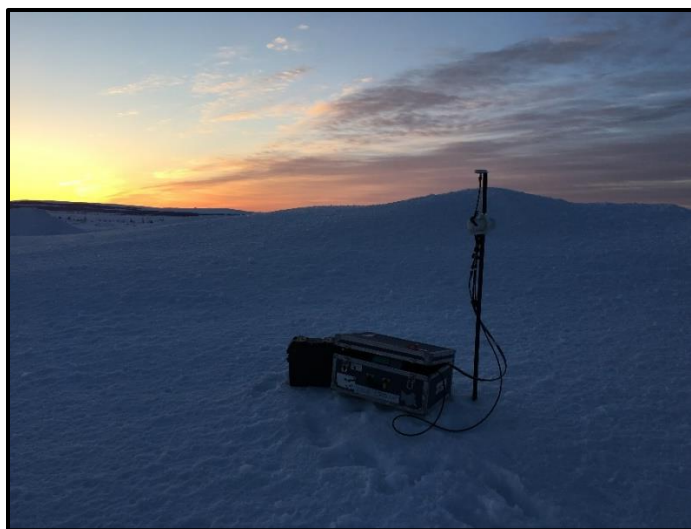
The magnetometer sensor is a model CS-3 made by Scintrex Limited. It is an optical split-beam cesium magnetometer and consists of a sensor head with a 3-m cable connected to a sensor driver. The output of the sensor driver is a larmour frequency which is linearly proportional to the earth's magnetic field. The CS-3 is shown in Figure 6 and the sensor specifications are given in Table 2.



**Figure 6 - Scintrex cesium (CS-3) magnetometer.**

### 3.4 BASE STATION MAGNETOMETER

A GSM-19 base station magnetometer (manufactured by Gem Systems) was used to record variations in the earth's magnetic field and referenced into the master database using a GPS UTC time stamp. This system is based on the Overhauser principle and records total magnetic field to within  $\pm 0.02$  nT at a one (1) second time interval. The unit used is shown in Figure 7 with specifications shown in Table 3.



**Figure 7 - GSM 19 base station used to record diurnal variations.**

<b>Operating Principal</b>	Self-oscillation split-beam Cesium Vapor (non-radioactive Cs-133)
<b>Operating Range</b>	15,000 to 105,000 nT
<b>Gradient Tolerance</b>	40,000 nT/meter
<b>Operating Zones</b>	10° to 85° and 95° to 170°
<b>Hemisphere Switching</b>	a) Automatic b) Control voltage c) Manual
<b>Sensitivity</b>	0.0006 nT $\sqrt{\text{Hz}}$ rms
<b>Noise Envelope</b>	Typically, 0.002 nT P-P, 0.1 to 1 Hz bandwidth
<b>Heading Error</b>	+/- 0.25 nT (inside the optical axis to the field direction angle range 15° to 75° and 105° to 165°)
<b>Absolute Accuracy</b>	<2.5 nT throughout range
<b>Output</b>	a) Continuous Larmor frequency proportional to the magnetic field (3.49857 Hz/nT) sine wave signal amplitude modulated on the power supply voltage b) Square wave signal at the I/O connector, TTL/CMOS compatible
<b>Information Bandwidth</b>	Only limited by the magnetometer processor used
<b>Sensor Head</b>	Diameter: 63 mm (2.5") Length: 160 mm (6.3") Weight: 1.15 kg (2.6 lb)
<b>Sensor Electronics</b>	Diameter: 63 mm (2.5") Length: 350 mm (13.8") Weight: 1.5 kg (3.3 lb)
<b>Cable, Sensor to Sensor Electronics</b>	3 m (9' 8"), lengths up to 5 m (16' 4") available
<b>Operating Temperature</b>	-40°C to +50°C
<b>Humidity</b>	Up to 100%, splash proof
<b>Supply Power</b>	24 to 35 Volts DC
<b>Supply Current</b>	Approx. 1.5 A at start up, decreasing to 0.5 A at 20°C
<b>Power Up Time</b>	Less than 15 minutes at -30°C

Table 2 - Scintrex CS-3 specifications.

<b>Configuration Options</b>	Set to Base station mode
<b>Cycle Time</b>	1.0 sec
<b>Environmental</b>	-40°C to +60°C
<b>Gradient Tolerance</b>	7,000 nT/m
<b>Magnetic Readings</b>	299,593
<b>Operating Range</b>	10,000 to 120,000 nT
<b>Power</b>	12 V @ 0.62 A
<b>Sensitivity</b>	0.1 nT @ 1 sec
<b>Weight (Console/Sensor)</b>	3.2 Kg
<b>Integrated GPS</b>	Yes

Table 3 - GSM-19 base station specifications.

### 3.5 RADAR ALTIMETER

The Triumph system used a Freeflight 4500 radio altimeter (Figure 8 left) to measure system height above ground. This information was available to the pilot during flight in the form of a digital readout on the TR-40 (Figure 8 right) and as stored digital data for later incorporation into the database.

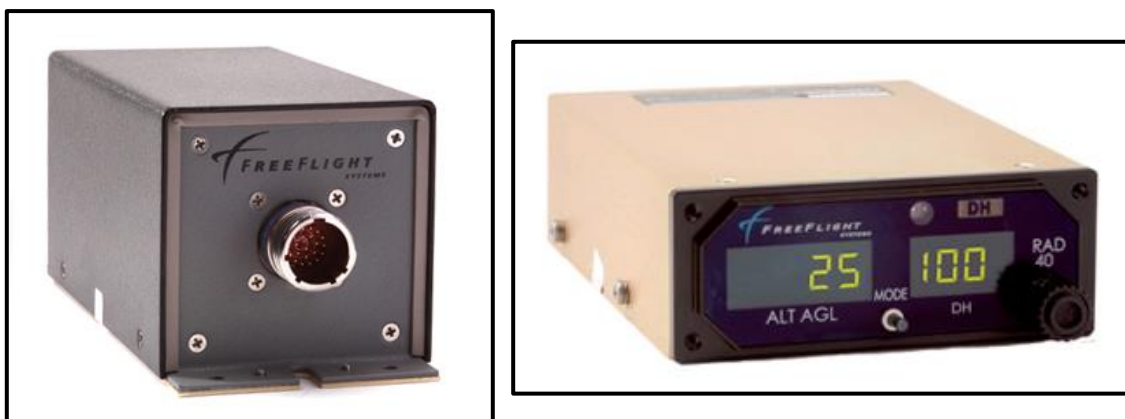


Figure 8 - Freeflight radar altimeter and digital readout module.

### 3.6 GPS NAVIGATION

Navigation was provided by the AgNav Incorporated (AgNav-2 version) GPS navigation system (see Figure 9) for real-time locating while surveying. The AgNav unit was connected to a Tee-Jet GPS system receiver that uses the WAAS system – considered to be a standard in aircraft navigation and accurate throughout a large portion of Canada.

Also used was a Garmin 19x GPS antenna and receiver, both located on the airframe. The Garmin antenna is capable of sub five-meter accuracy and was sampled at 10 Hz.



Figure 9 - AgNav navigation console mounted in helicopter.

## 4.0 PERSONNEL AND CALENDAR

### 4.1 PERSONNEL

The following personnel participated in the survey (see Table 4 below):

Crew Member	Position
Marie-Josée Lacroix	Helicopter survey pilot
Éric Lacasse	Helicopter survey pilot and Helicopter mechanic
Jean-François Kirouac	Helicopter mechanic
Daniel LeBlanc	Operator
Stephen Balch, B.Sc., P.Geo.	Geophysicist and data processor Final processing, report and interpretation
Camille St-Hilaire	Final processing, report and interpretation
Christopher Balch	GIS maps and images

Table 4 - List of survey personnel.

## 4.2 CALENDAR

Data was acquired over a 21-day period (Table 5) with six full days and two half days lost to bad weather conditions.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Apr. 9/18	Apr. 10/18	Apr. 11/18	Apr. 12/18	Apr. 13/18	Apr. 14/18	Apr. 15/18
-	mob	mob	install	test flight	72.0 l-km	530.0 l-km
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Apr. 16/18	Apr. 17/18	Apr. 18/18	Apr. 19/18	Apr. 20/18	Apr. 21/18	Apr. 22/18
728.0 l-km	428.0 l-km	weather	733.0 l-km	94.7 l-km	449.4 l-km	weather
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Apr. 23/18	Apr. 24/18	Apr. 25/18	Apr. 26/18	Apr. 27/18	Apr. 28/18	Apr. 29/18
733.9 l-km	443.8 l-km	weather	696.1 l-km	514.7 l-km	weather	weather
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Apr. 30/18	May 1/18	May 2/18	May 3/18	May 4/18	May 5/18	May 6/18
519.7 l-km	weather	104.9 l-km	de-install	pack	demob	-

**Table 5 - Time Schedule for survey.**

## 5.0 DATA PROCESSING

Data from the MAS-4 is transmitted to a laptop computer that acts as the data acquisition system. All data is stored in a single file in ASCII column by row format. The data rate is 10 Hz. Each row contains a GPS time stamp and increment counter that can be examined for any data loss.

Preliminary processing is through BECI proprietary software (MG3) that first checks for dropouts in each of the three sensors (where the sensor has lost lock on the earth's magnetic field). If the dropouts are small (less than 3 seconds or less than 90 m in duration) the sensor output is interpolated using the output from the. If more than one sensor has dropped out the output is masked with a dummy value (-9999) and the data is disregarded during processing. It is later interpolated in Geosoft. If the dropouts last more than

10 seconds that portion of the flight line is reflight if the gradients exceed 5 nT/m. If the sensor output is out of specification for a distance greater than 500 m then a minimum of 3 km of the flight line is reflight.

Once an initial data quality is performed and each sensor dropouts are identified, a compensation algorithm is applied that uses in-flight calibration procedures to determine sensor offsets and heading error. Conventional compensation is not required because the sensors are located 30 m away from the aircraft and the gradient within the airframe itself is below 0.1 nT/m on the crossline sensors and 0.25 nT/m on the vertical gradient. These gradients are of the same order of magnitude as the sensor heading error and are corrected for during the heading error correction.

After compensation is performed, the gradients are calculated as follows, where M1 is the central upper sensor, M2 is the left lower sensor and M3 is the right lower sensor:

Measurement	Description	Equation
Mc	Average of crossline sensors	$Mc = (M2+M3)/2$
Gx	In-line gradient	$Gx = (M2-M3)/3.556$
Gy	Cross-line gradient	$Gy = (Mc(i-1)-Mc(i+1))/GPSD$
Gz	Vertical gradient	$Gz = (Mc-M1)/3.048$
ASIG	Analytic signal	$Asig = (Gx^2+Gy^2+Gz^2)^{1/2}$

**Table 6 - Definitions and equations used to compute magnetic gradients.**

The values 3.556 and 3.048 represent the horizontal (M2 - M3) and vertical (Mc-M1) distances of the respective sensors in meters. GPSD represents the total distance the aircraft has traveled since the previous (i-1) and next (i+1) reading. The GPSD value is filtered with a one second boxcar filter to eliminate any short-term fluctuations in position from the GPS time sampling.

Prior to saving the processed data file, the base station data (1.0 sec sample rate) is merged with the airborne data (0.1 sec sample rate). The actual diurnal correction is normally performed in Geosoft.

Data files from each flight are processed using the above steps and then imported into Geosoft.

During this project the base station magnetometer was located approximately 80 km away from the survey area. During much of the survey there were strong diurnal variations in some cases exceeding 200 nT during a single flight. Due to the difficulty in accessing the property, the decision was made to continue with the survey and to then use tie-line leveling to correct for variations in the magnetic field. Note that only the total magnetic intensity (TMI) is affected by diurnal variation. The gradients Gx, Gy and Gz and the analytic signal are derived for simultaneous measurements where the diurnal effect is the same on all sensors and therefore subtracted out. The process is leveling the TMI is described as follows:

Sensor M2 (lower left) was chosen for the TMI because it showed the lowest number of dropouts. Using the tie-line data a regional grid was constructed by low-pass filtering of the raw TMI channel. Offset corrections were then applied to each flight line based on the average difference between the filtered TMI channel along the tie lines and the raw TMI of the flight lines at the intersection point. In theory this leaves only the variation in diurnal changes from the start to the end of the flight line and significantly reduces the magnitude of the tie line correction (by removing the zero offset). The tie line TMI channel and the flight line TMI channel were then used to calculate an intersection table where the tie and flight lines intersect. The intersection table computes a cross line difference and gradient value at each tie line intersection point. Leveling is negatively affected by high magnetic gradients at the intersection points and by large differences in the cross-line difference. The range for these values was limited to +/- 1.0

nT/m for the cross gradient and  $\pm 20$  nT for the cross difference. The cross-line difference was then subjected to a first order trend removal before the intersection points for the flight lines was calculated and full statistical leveling applied. The actual tie-line leveling was applied in Geosoft. Removal of the zero offsets for each flight line was performed using proprietary software.

Final processing of the TMI profiles involved a three-line de-corrugation algorithm developed by the author for removing heading error. This algorithm removes line to line variation without smoothing of the data.

Figure 10 shows the TMI data in raw format (left), after zero offset correction and tie-line leveling (center) and after de-corrugation (right).

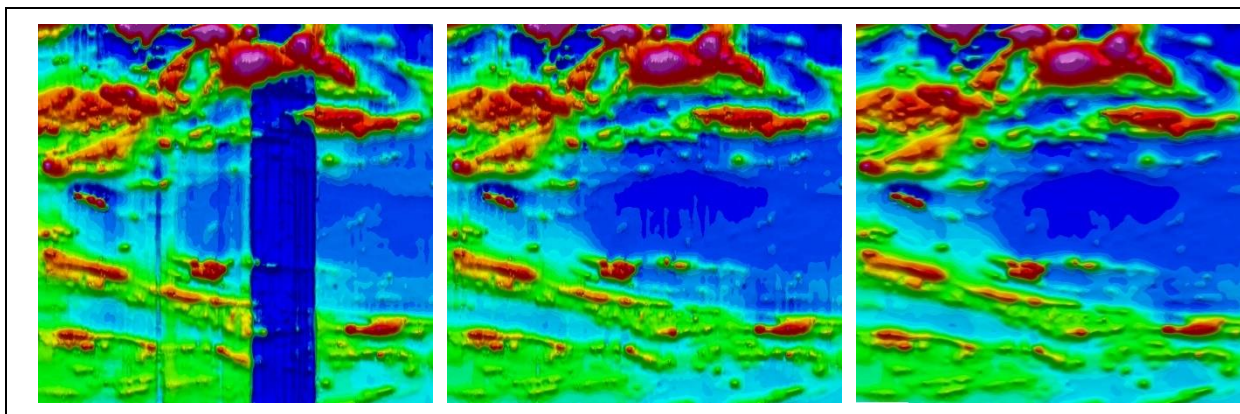
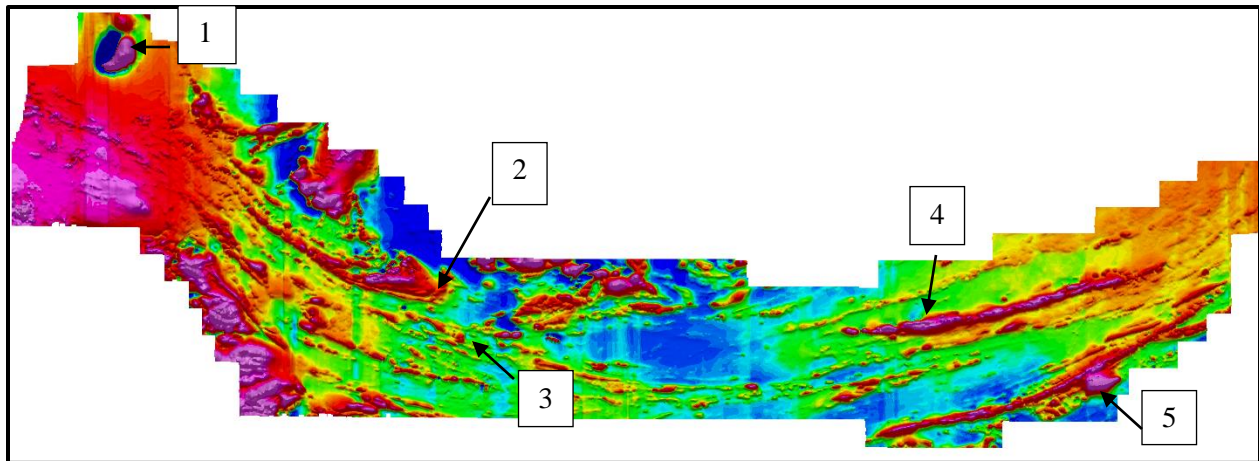


Figure 10 - TMI raw data (left), tie-line leveled (center) and de-corrugated (right).

## 6.0 RESULTS

In the current survey, measurements were made of the total magnetic intensity (TMI) from three separate sensors. From the three sensors the principal magnetic gradients were calculated. The resulting images highlight several geologic trends in the area, some high amplitude and having a long strike length and others being more discrete and/or having low amplitude. Figure 11 shows the TMI with a shading effect oriented north ( $0^\circ$  declination) and with a  $60^\circ$  inclination. The background field is high to the west, low in the center and high to the east, which is likely to be caused by deep regional changes in geology. In the western region of the survey area is located a prominent circular feature that shows a broad peak of 4,400 nT on flight line 770 at 457,797 mE and 6,834,810 mN. The outline of this feature is better shown in the analytic signal (Figure 11, feature 1) which is anomalous over 1.3 km. The most likely explanation for the source is iron formation.



**Figure 11 - Color shaded total magnetic intensity (TMI) over Qikavik.**

While the magnetic trends appear folded from southeast (on the west side) to east-northeast (on the east side) there is a prominent feature (Figure 11, feature 2) that could represent a fold axis.

An east-northeast trending feature appears to cut across the main geologic units and could be favorable for gold (Figure 11, feature 3). This feature is most evident on the TMI and may represent a fault rather than a magnetic intrusion.

Along the eastern portion of the survey area is a long strike length (12 km) linear magnetic trend that pinches and swells along strike. The amplitude of this trend is typically several hundred nT such as 800 nT on flight line 6370 at 485,800 mE and 6,825,632 mN suggesting magnetic volcanics or possibly even moderately serpentinized ultramafics.

A second, long strike length (12 km) linear magnetic trend located in the southeast corner of the survey area is associated with a prominent intrusion located at 491,647 mE and 6,823,421 mN. This feature shows a peak of 1,700 nT suggesting an ultramafic source.

In general, the total magnetic intensity (TMI – Figure 12) will display peaks over magnetic sources given the high inclination of the earth's magnetic field at this latitude. The analytic signal (ASIG – Figure 13) will peak directly over a magnetic source and is independent of the inclination and declination of the magnetizing field. The in-line gradient ( $G_x$  – Figure 14) highlights magnetic trends that are oriented at right angles to the flight line direction. These anomalies are often cross-overs with the cross-over being located closest to the magnetic source. The cross-line gradient ( $G_y$  – Figure 15) highlights magnetic trends that are sub-parallel to the flight line direction. This gradient is often useful for identifying faults that cross-cut the geologic strike. The measured vertical gradient ( $G_z$  – Figure 16) highlights the edges of magnetic features and can often reveal layering within intrusions that is not visible in the TMI or ASIG. The digital terrain model (DTM – Figure 17) is derived from the GPS elevation and the radar altimeter (which measures height above ground).

## 7.0 RECOMMENDATIONS

1. The magnetic and geologic data should be integrated to outline and expand the known mineralization;
2. New prospective areas could be identified based on trends, interpreted faults and intrusive features in a manner like the discussion in this report;
3. Ground truthing of selected targets can be accomplished using the profile database to specify exact locations based on the GPS position of the anomaly. These positions are considered accurate to within 3-5 m.

Respectfully submitted by,

A handwritten signature in dark ink, appearing to read 'S. Balch', is centered on the page. The signature is fluid and cursive, with a long horizontal stroke extending to the right.

-----  
Stephen Balch, P.Geo.

## 8.0 QUALIFICATIONS

I, Stephen Balch, do hereby claim the following to be true:

1. I am a professional geoscientist (P.Geo.) in good standing, registered with the Association of Geoscientists of Ontario (#2250);
2. I am a graduate of the University of Ontario with a degree in Honors Geophysics (B.Sc, 1985);
3. I am a practicing exploration geophysicist with more than 30 years experience and reside at 11500 Fifth Line, Rockwood, Ontario, N0B 2K0;
4. I have no direct interest in the Qikavik Project or in Orford Mining Corporation;
5. I am responsible for the content of this report.

Dated at Rockwood, Ontario this 27<sup>st</sup> of July 2018.

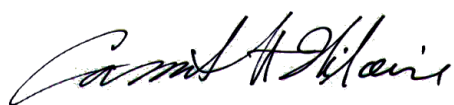


-----  
Stephen Balch, P.Geo.  
President  
Balch Exploration Consulting Inc.

I, Camille St-Hilaire, do hereby claim the following to be true:

1. I am a professional geophysicist (P.Geo.) in good standing, registered with the Quebec Association of Geologists (#339);
2. I am a graduate of the École Polytechnique of Montréal, Quebec, with a Master degree in Geophysics (M.Sc, A., 1975);
3. I am a practicing exploration geophysicist with more than 43 years experience and reside at 678 Route des Pionniers, Rouyn-Noranda, Quebec, J9Y 1G5;
4. I have no direct interest in the Qikavik Project or in Orford Mining Corporation;
5. I have read and agree to the contents of this technical report on the Qikavik Mining Property of Orford Mining Corporation.

Dated at Rouyn-Noranda, Quebec, this 28<sup>st</sup> of July 2018.



Camille St-Hilaire, P.Geo.  
PDG of Géophysique Camille St-Hilaire Inc.

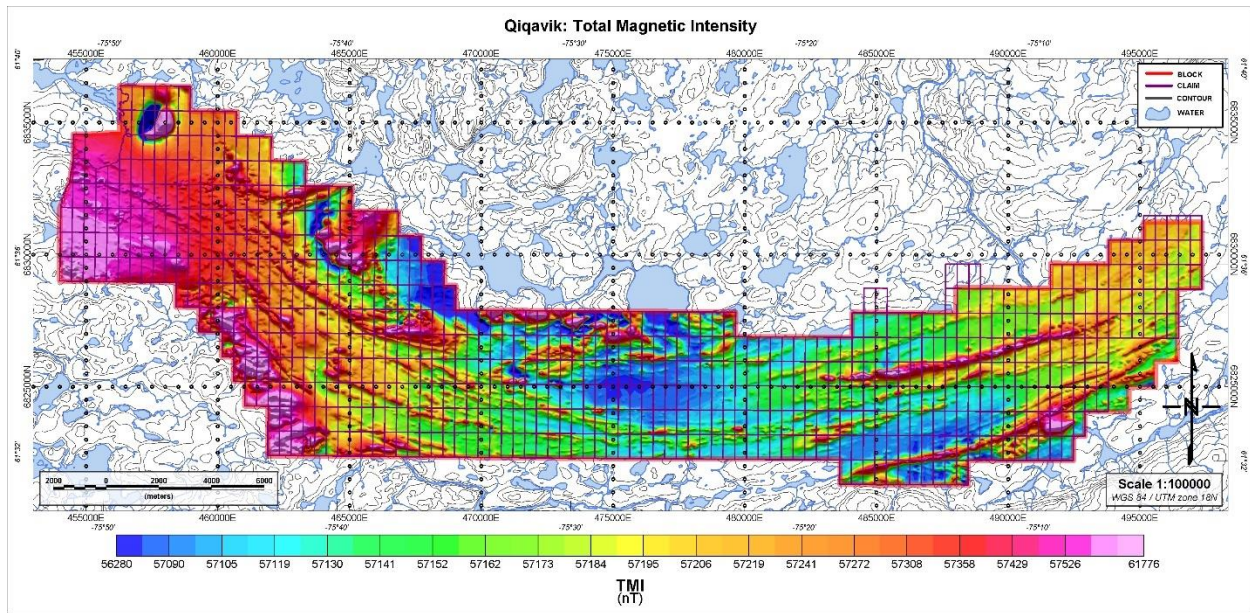


Figure 12 - Shaded image of the Total Magnetic Intensity (TMI) over the Qikavik survey area.

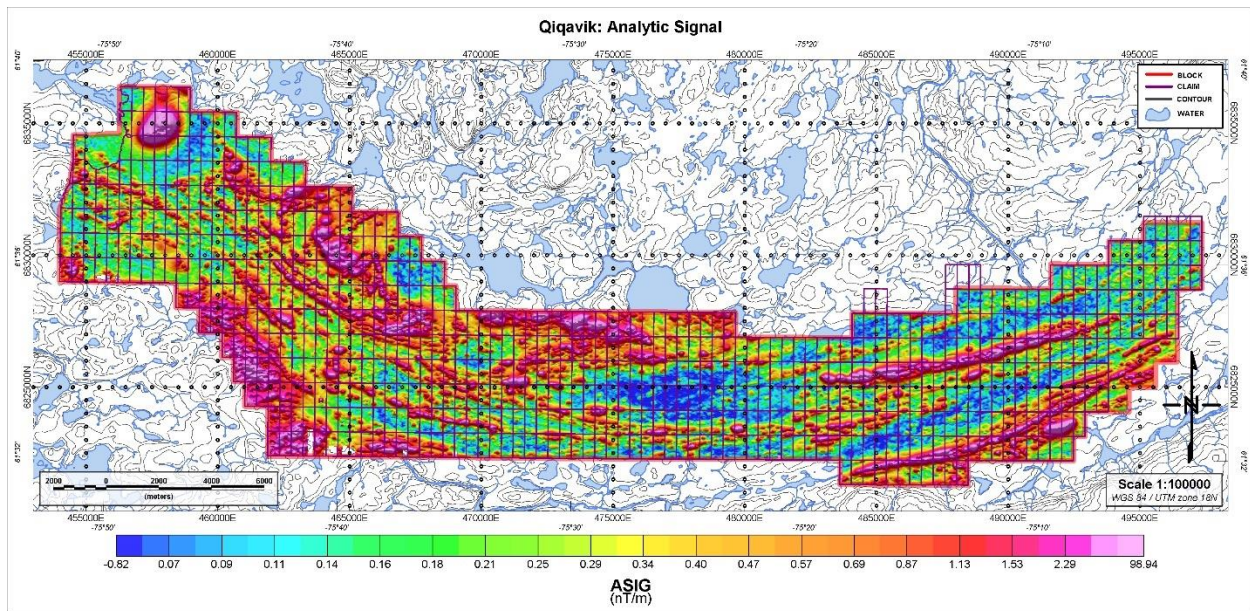


Figure 13 - Shaded image of the Analytic Signal (ASIG) over the Qikavik survey area.

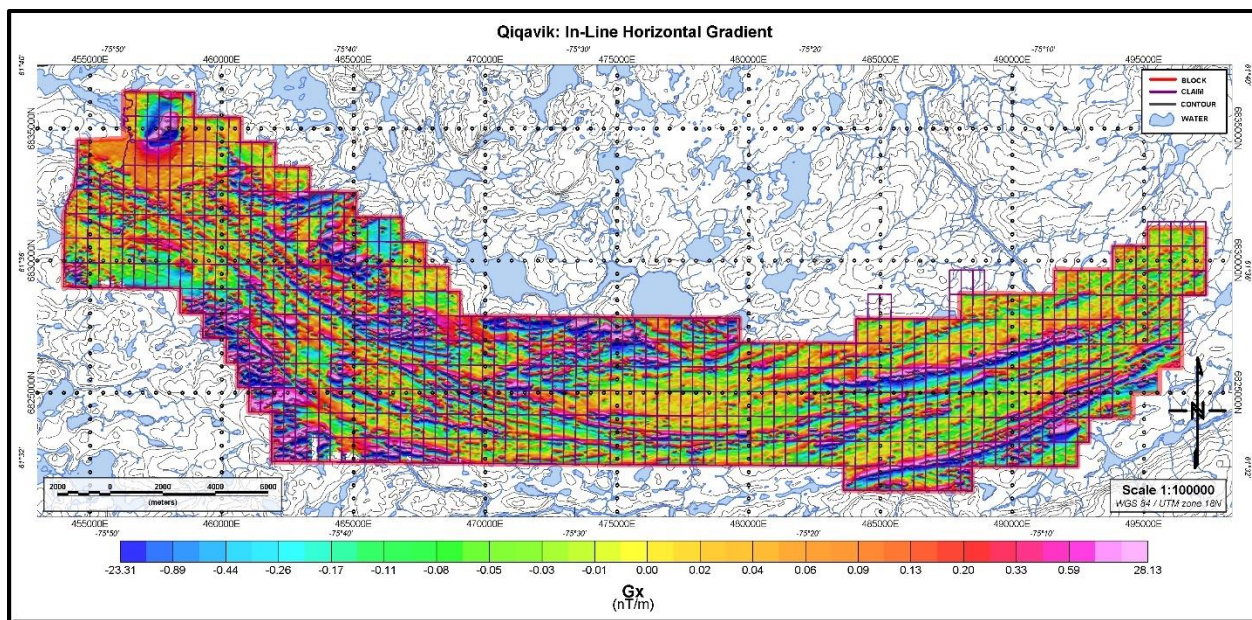


Figure 14 – Shaded image of the In-Line Horizontal Gradient ( $G_x$ ) over the Qikavik survey area.

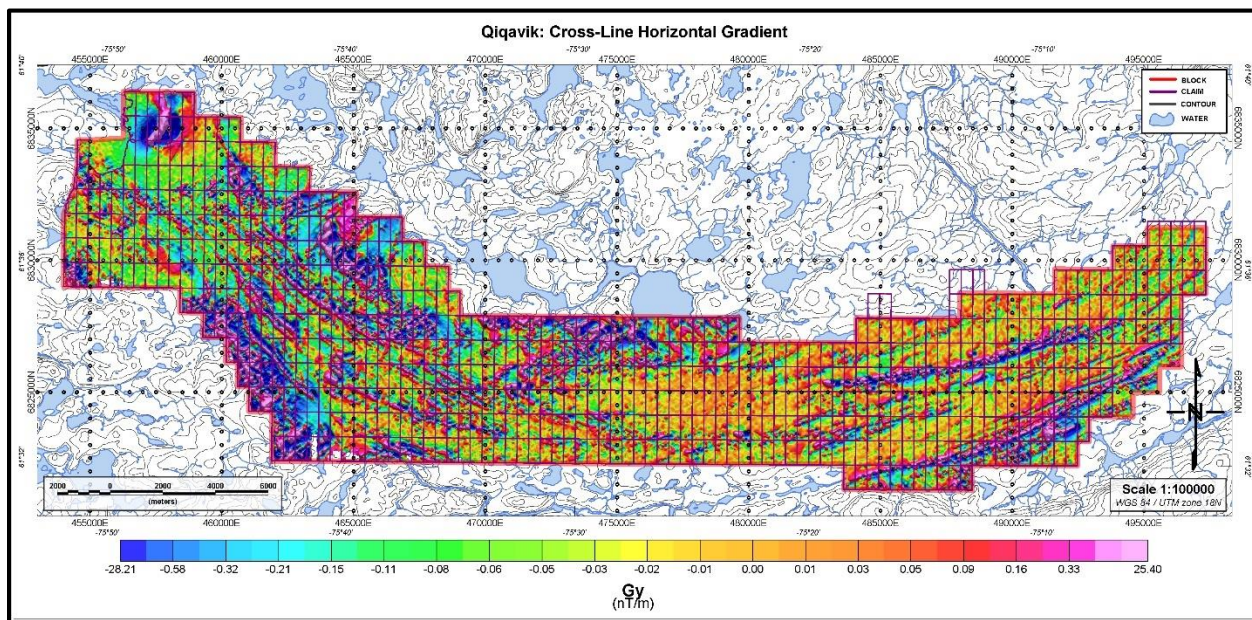


Figure 15 – Shaded Image of the Cross-Line Horizontal Gradient ( $G_y$ ) over the Qikavik survey area.

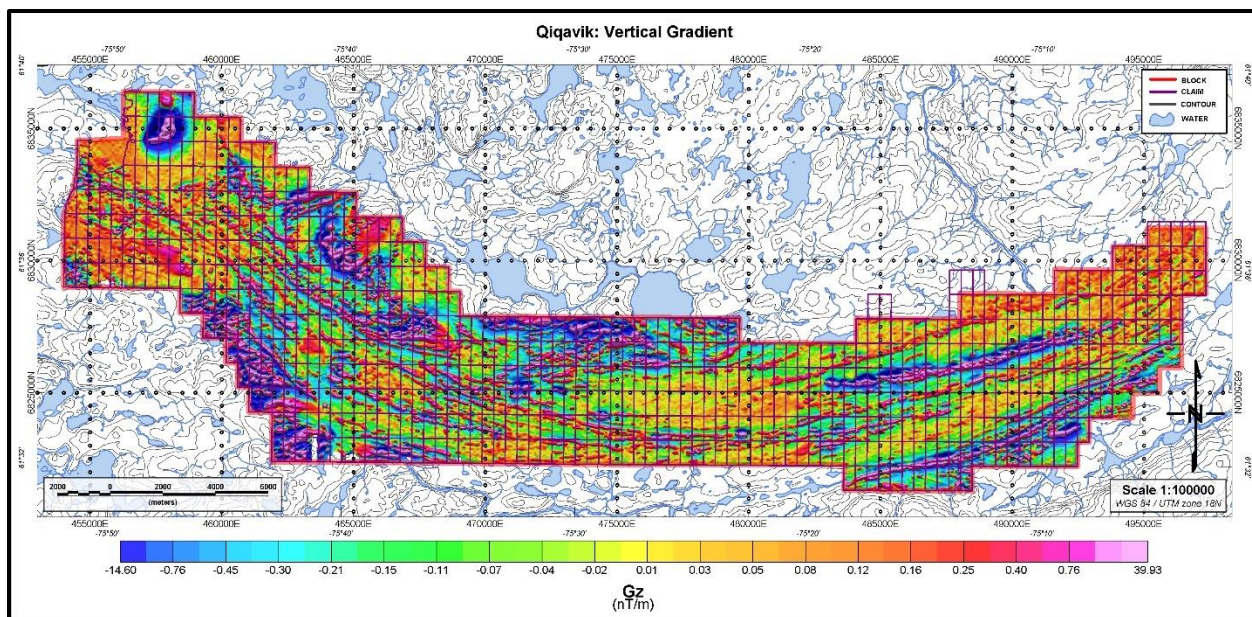


Figure 16 – Shaded image of the Vertical Gradient ( $G_z$ ) over the Qikavik survey area.

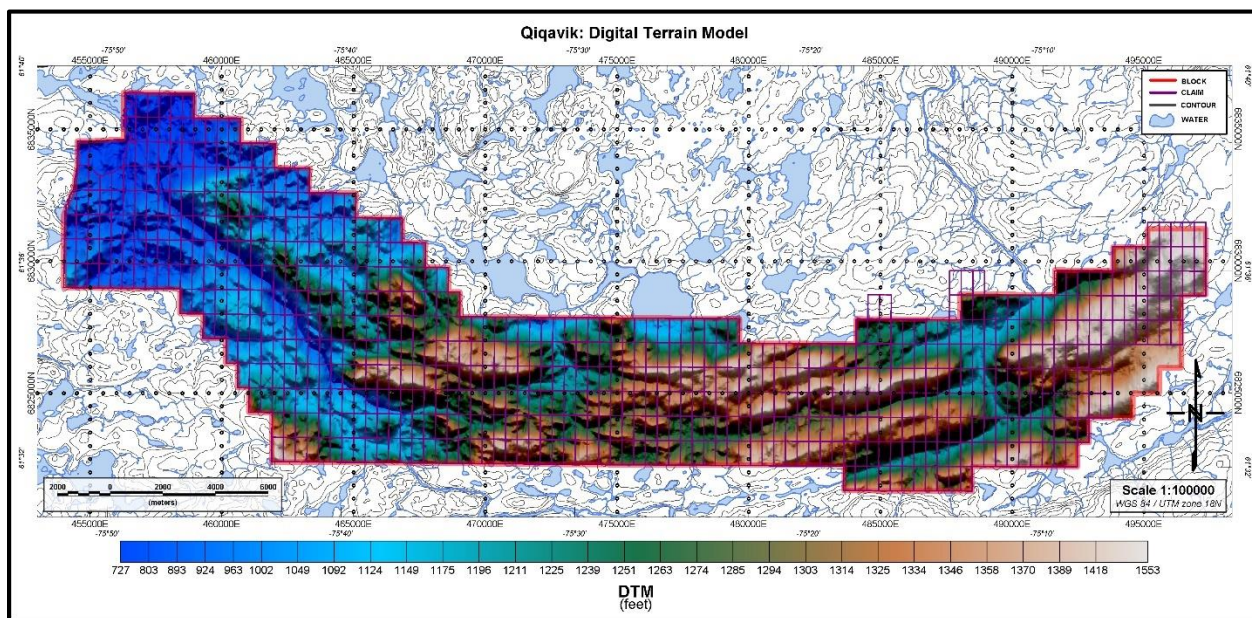


Figure 17 - Image of the Digital Terrain Model (DTM) over the Qikavik survey area.

**Appendix A****Outline of Survey Polygon**

Polygon corners are given in meters easting and northing, WGS-84, ZONE 18N.

<b>EASTING,   NORTHING</b>			
456748, 6836390	475667, 6827850	484486, 6821301	459286, 6828004
457189, 6836385	476109, 6827847	484043, 6821303	458855, 6828009
457630, 6836379	476552, 6827844	483621, 6821305	458413, 6828015
458072, 6836374	476994, 6827841	483621, 6822268	458413, 6828943
458513, 6836369	477436, 6827838	477843, 6822266	457981, 6828948
458943, 6836363	477879, 6827835	477400, 6822268	457539, 6828954
458943, 6835435	478321, 6827832	476957, 6822271	457097, 6828959
459385, 6835430	478764, 6827830	476514, 6822274	456655, 6828964
459826, 6835425	479206, 6827827	476071, 6822277	456212, 6828970
460268, 6835420	479648, 6827824	475628, 6822280	455770, 6828976
460720, 6835415	479643, 6826896	475184, 6822284	455328, 6828981
460721, 6834486	484068, 6826873	474741, 6822287	454886, 6828987
461140, 6834481	484083, 6827819	474298, 6822290	454443, 6828993
461582, 6834476	488020, 6827786	473855, 6822293	454001, 6828999
462023, 6834472	488002, 6828762	473412, 6822297	454000, 6829927
462013, 6833543	491607, 6828729	472969, 6822300	454000, 6830855
462455, 6833538	491606, 6829671	472526, 6822304	454000, 6831783
462897, 6833534	493823, 6829655	472082, 6822307	454351, 6832655
463338, 6833529	493823, 6830539	471639, 6822311	454360, 6832708
463328, 6832601	495136, 6830556	471196, 6822314	454504, 6833634
463770, 6832596	495136, 6831234	470753, 6822318	454517, 6834562
464212, 6832591	497352, 6831234	470310, 6822322	454958, 6834557
464654, 6832587	497351, 6828737	469867, 6822326	456266, 6834629
465096, 6832582	496422, 6828694	469424, 6822330	456266, 6836391
465086, 6831654	496423, 6825956	468981, 6822334	
465528, 6831650	495584, 6825956	468537, 6822338	
465970, 6831645	495583, 6824990	468094, 6822342	
466412, 6831641	494583, 6825004	467651, 6822346	
466854, 6831637	494583, 6824051	467208, 6822350	
466854, 6830708	493356, 6824058	466765, 6822354	
467287, 6830704	492914, 6824059	466322, 6822358	
467729, 6830700	492912, 6823130	465879, 6822363	
467721, 6829772	492469, 6823131	465436, 6822367	
468163, 6829768	492467, 6822203	464992, 6822372	
468605, 6829764	492024, 6822204	464549, 6822376	
468604, 6828835	491580, 6822205	464106, 6822381	
469039, 6828831	491137, 6822206	463663, 6822385	
469038, 6827903	490694, 6822207	463220, 6822390	
469473, 6827899	490251, 6822209	462777, 6822390	
469915, 6827895	489808, 6822210	462334, 6822389	
470358, 6827892	489365, 6822211	461891, 6822389	
470800, 6827888	488922, 6822213	461891, 6823333	
471243, 6827884	488478, 6822214	461890, 6824261	
471685, 6827880	488475, 6821286	461468, 6824266	
472127, 6827877	488032, 6821287	461025, 6824271	
472570, 6827873	487589, 6821289	461026, 6825199	
473012, 6827870	487146, 6821290	460593, 6825204	
473455, 6827866	486702, 6821292	460593, 6826132	
473897, 6827863	486259, 6821294	460151, 6826137	
474339, 6827860	485816, 6821296	460151, 6827065	
474782, 6827856	485373, 6821297	459729, 6827071	
475224, 6827853	484929, 6821299	459287, 6827076	