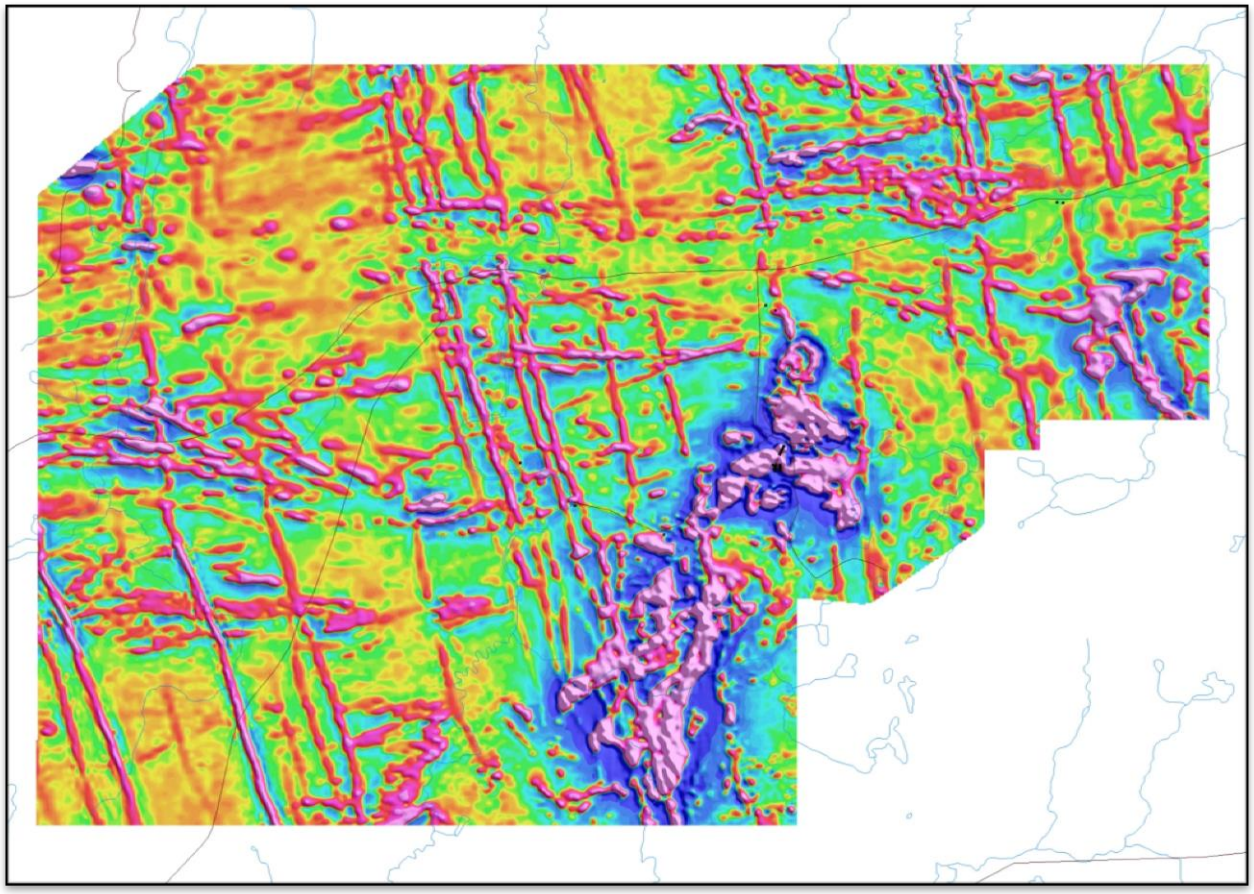
Rapier Gold Inc.

Heli-GT, 3 Axis Magnetic Gradient Survey

Pen Gold Project
Northern Ontario

Operations and Processing Report



BY

SCOTT HOGG & ASSOCIATES LTD

March 2015

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1 INTRODUCTION

In February 2015, Rapier Gold Inc. contracted Scott Hogg & Associates Ltd. to carry out a helicopter-towed aeromagnetic gradient survey over their Pen Gold project, located near the town of Foleyet, Ontario. Crew and equipment mobilized to Foleyet on February 18, 2015. During the period Feb 18th through Feb 21st, 2015, a total of 923 km of data was collected. Details of the airborne survey and compilation are documented in this report.

2 LOCATION

The survey area straddled Ontario highway 101 and was located approximately 60 km southwest of Timmins, Ontario and approximately 20km East-Southeast of the town of Foleyet, Ontario. See figure 1 below.

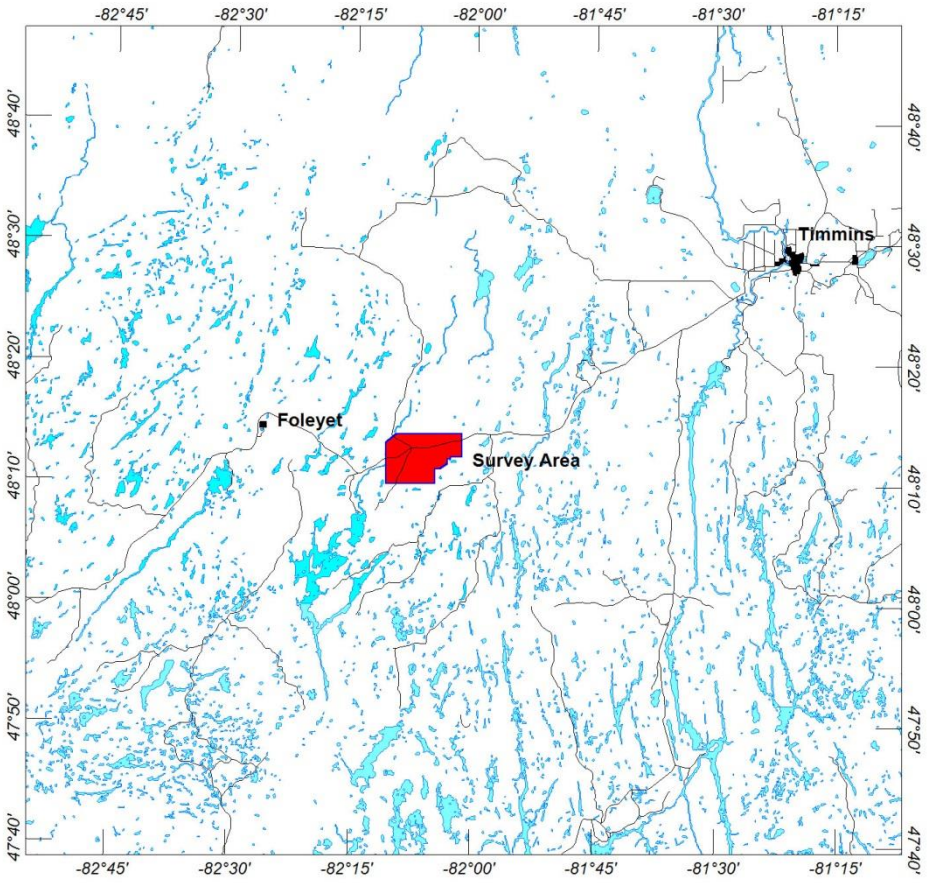

Figure 1 - Survey Location Map.

3 CLAIMS AND DISPOSITIONS

Claims

The following mining claims, registered in the Porcupine Mining Division, were covered in whole or in part by the airborne survey:

3015837, 3019028, 3019487, 3019488, 4201492, 4201493, 4207030, 4207032, 4207033, 4207034, 4207914, 4207916, 4212499, 4223266, 4240115, 4241832, 4242441, 4242442, 4242443, 4242444, 4242445, 4242446, 4246167, 4247071, 4247072, 4247073, 4247074, 4247075, 4247076, 4247077, 4247078, 4247079, 4247080, 4247630, 4247663, 4247691, 4247692, 4247693, 4247694, 4247696, 4247697, 4247698, 4247699, 4247700, 4253023, 4253030

Dispositions

The following dispositions were covered by the airborne survey:

P372078, P372079, P372080, P380230, P380231, P380233, S58288, S58474, S58863, S58864, S58865, S59017, S59719, S59720, S59721, S60442, S63908, S63909, S63910, S63911, S63912, S63913, S63914, S64063, S64064, S82787, S82788, S82789, S82790, S82791, S82796, S82797, S82798, S82799, S82800, S82801, S82802, S82803, S82804, S82805, S94205, S94206, S94211, S119680, S119682, S120230, S120231, S120242, S120244, S120744, S120747, S120748

4 AIRBORNE SURVEY

The airborne survey was based out of Foleyet, Ontario. The survey was carried out between Feb 18th and Feb 21st, 2015 over 6 flights. The final survey block was comprised of 923 line kilometers.

4.1 Flight Specifications

Traverse Line Direction	UTM 0° – 180°
Traverse Line Spacing	75m and 100m
Control Line Direction	UTM 90° – 270°
Control Line Spacing	2000 m
Terrain Clearance (sensors)	30m

4.2 Helicopter

Helicopter Owner / Operator	Expedition Helicopters
Helicopter Model	Bell 206 Long Ranger
Helicopter Registration	C-GKRS

4.3 Personnel

The following personnel were involved in the survey:

Field

Field Geophysicist	Steve Munro
Operator and Technician	Frazer Hogg
Pilot	Joel Breton

Office

Compilation and Reporting	Steve Munro
Project Management	Scott Hogg

5 GEOPHYSICAL SYSTEM

The airborne geophysical Heli-GT system consists of a towed bird that contains all of the geophysical sensors as well as altimeter and GPS antennae. A computer based recording and navigation system is located in the helicopter.

The Heli-GT bird is towed 25 m. below the helicopter. The basic orthogonal magnetic gradients G1, G2 and G3 are measured on 3 metre baselines. A radar altimeter and 4 GPS antennae are mounted on the towed bird. In the helicopter a computer logs the data and a touch screen display directs navigation.

5.1 Bird

All of the geophysical and ancillary equipment is housed in a towed bird designed by Scott Hogg & Associates Ltd. The bird is manufactured from non-magnetic FRP and breaks down for ease of transportation.

5.2 Magnetic sensors

Four Scintrex CS-3 cesium sensors are arranged in an orthogonal array with 3 m. sensor separation from the nose sensor to those at the end of each arm. The output from each sensor was processed by a KSM KMAG4 unit to resolve the magnetometer output to a resolution of about 0.005 nT at a rate of ten samples per second. The Heli-GT bird was flown at a nominal altitude of 30m.

5.3 Radar Altimeter

A Terra TRA 3500 / TR 140 radar altimeter was used to measure bird height above ground. The range of operation was from 0 to 2500 ft.

5.4 Fluxgate Magnetometer

A Billingsley TFM100G2 3-axis fluxgate magnetometer was used to record the orientation of the bird with respect to the earth's magnetic field. The range of each component of the fluxgate was +/- 100,000 nT.

5.5 Analog to Digital ADC

The analog output of the VLF, radar altimeter and fluxgate magnetometer were digitized with a KVS KANA8, eight channel differential ADC. The device provides 24 bit resolution and was operated at 10 Hz.

5.6 GPS System

The GPS was recorded by an array of 4, 12 channel receivers mounted on the Heli-GT bird. In addition to the measurement of Latitude, Longitude and Altitude, a calculation of bird pitch, roll and yaw was calculated from differences between antennae.

5.7 Navigation and Recording System

The navigation and recording system was developed by Scott Hogg and Associates. The system uses a PC processor with Linux operating system. The system disk has been replaced with flash memory and all data is logged on a separate flash disk. An LCD touch screen in the cockpit provides an operator interface for monitoring the geophysical and ancillary instrumentation as well as presenting graphic navigation information for the pilot. The pps pulse from the GPS system was recorded and tied to each of the sensors with an accuracy of about +/- 0.05 seconds

Data recorded included the following:

Magnetic sensors:	10 Hz
Fluxgate sensors:	10 Hz
Radar Altimeter:	10 Hz
GPS X/Y/Z:	5 Hz
GPS Pitch/ roll/ Yaw:	5 Hz

5.8 Base Station

A magnetic and GPS base station was established at the base of operations to monitor diurnal magnetic activity. A GEM SSM19TW proton magnetometer recorded the diurnal magnetic variation at 1 Hz with a resolution of 0.1 nT. A UBLOCK 12 channel GPS receiver provided a GPS time reference and recorded a differential correction file.

Severe cold temperatures compromised the performance of the base magnetometer battery and base station data was intermittent. The base station data was supplemented with diurnal data recorded by Natural Resources Canada in Ottawa. This data was recorded at a rate of one reading per minute.

6 DATA COMPILATION

6.1 Basic Processing

The data collected during flight, in the air and from the base station, was aligned with reference to GPS time. The basic magnetic gradients; G1, G2 and G3, measured from the nose sensor to each of the radial sensors were calculated. Any noise spikes, if present, were identified and removed.

6.2 Gradient Processing

The recorded pitch, roll and yaw of the bird were used to mathematically rotate the measured basic gradients to G-north, G-east and G-down.

The GPS altitude of the bird was used to calculate a smooth drape surface. This is a smooth theoretical surface above the terrain that the bird would follow under ideal conditions. There would be only smooth altitude changes, line to line and along the flight line. The difference between the GPS altitude of this smooth drape surface and the actual GPS altitude was combined with the measured vertical gradient to calculate an altitude correction. The altitude correction was applied to the magnetic profile recorded by the sensor in the bird's lower pod (Mag2) and the resulting profile was stored as *Mag_Alt_Cor*.

6.3 Magnetic Levelling

The altitude-corrected magnetic profile (i.e. *Mag_Alt_Cor*), was used as the input for the control line levelling. The intersections between traverse and control lines were calculated and the differences between the magnetic values measured. Ignoring unreliable differences in locations of steep magnetic gradient, a correction was calculated to eliminate the measured differences at the intersections. This correction profile was a piecewise linear function between intersections. The control line leveled profile was stored as *Mag_TL_Lev*. A final microlevel correction was calculated and applied. This final correction profile was limited to amplitudes less than 2nT and wavelengths longer than 2000m. The final magnetic profile data was stored as *Mag_Fin*.

6.4 Gradient Tensor Gridding (GT-GRID)

GT-Grid is a proprietary gridding program developed by Scott Hogg & Associates that uses total magnetic field data as well as horizontal gradient data to produce a total magnetic field grid. The total magnetic field grid produced by GT-Grid simultaneously honours the total field as well as the measured horizontal gradient profile data.

The final, leveled total field magnetic channel (*Mag_fin*) and the G-east (*Ge)* and G-north (*Gn*) gradient channels were used by the GT-GRID process to calculate the final total field magnetic grid; *Pen_Gold_GT_TMI*.

6.5 Pole Reduction of the Total Magnetic Field

The anomaly shape associated with a vertically dipping magnetic source varies with the inclination of the earth's magnetic field. At the north and south magnetic pole, the inclination is vertical and the anomaly is positive, symmetrical and centered directly over the source. At the equator, with a horizontal inducing field, the anomaly is negative, symmetrical and centered directly over the source. Between 0 and 90 degrees of inclination the anomaly is asymmetric, with a positive and negative component, and is not centered over the source. The pole reduction process reshapes the anomaly measured at intermediate inclinations to resemble the shape that would have been measured at vertical inclination. Thus a steeply dipping source, without remanent magnetization, would be transformed to a simple positive peak above the source.

A pole-reduced total field grid; *Pen_Gold_GT_TMI_RTP.grd* was created using an FFT filter.

6.6 Vertical Magnetic Gradient Grid

The vertical gradient accentuates shorter wavelengths and attenuates longer wavelengths. As a result the map enhances the anomalies associated with small near surface magnetic sources while suppressing large-scale regional variations. The vertical gradient presentation provides added visual detail, particularly for small anomalies superimposed on or adjacent to larger anomalies.

The measured or calculated vertical magnetic gradients are also sensitive to the inclination of the earth's magnetic field. In the same manner as the total field, the asymmetry and peak displacement, arising from an inclined field, is removed by the pole reduction process. The horizontal width of the vertical gradient anomaly is about one half of that of the total field anomaly. If the width of the magnetic source is significant, i.e. greater than the sensor height above the source, the zero contour of the pole reduced vertical gradient reflects the location of the magnetic contact and the response peak will lie directly above a steeply dipping source.

Using an FFT filter, the first vertical derivative grid; *Pen_Gold_CVG_RTP.grd* was calculated from the pole-reduced total field GT-Grid. A half-cosine roll-off filter was included with the vertical derivative operator to reduce short-wavelength noise. The full cut-off wavelength of the noise filter was 30m.

6.7 Digital Terrain Model

The digital terrain model was calculated by subtracting the radar altimeter profile from GPS altitude. Slight errors in GPS altitude were corrected by microlevelling. The digital terrain was gridded using a bi-directional Akima interpolation. The grid is named *Pen_Gold_DTM.grd*

7 DIGITAL DATA ARCHIVE

All of the maps, grid and profile data have been provided in digital form.

7.1 Profile Data

The profile data is in the Geosoft database format and includes the following channels:

Channel	Units	Content
GTime	seconds	GPS time in HHMMSS.S (GPS) format
GTime_s	seconds	GPS time in decimal seconds
x	metres	UTM easting NAD83, Zone 17N
y	metres	UTM northing NAD83, Zone 17N
lon	degrees	GPS Longitude WGS84
lat	degrees	GPS Latitude WGS84
GPS_Alt	metres	Levelled GPS bird altitude NAD83, Zone 17N
Rad_Alt	metres	Radar altimeter (bird height)
DTM	metres	Digital terrain model
Fx	nT	Fluxgate axis x (forward)
Fy	nT	Fluxgate axis y (port)
Fz	nT	Fluxgate axis z (up)
Heading	degrees	Bird heading
Pitch	degrees	Bird pitch
Roll	degrees	Bird roll
Basemag	nT	Base station magnetometer
Basemagf	nT	Filtered base station magnetometer
Ott_basemag	nT	Diurnal data from National Resources Canada
Mag1	nT	Upper port magnetometer
Mag2	nT	Down magnetometer
Mag3	nT	Upper starboard magnetometer
Mag4	nT	Nose magnetometer
G1	nT/m	Magnetic gradient: mag4 to mag1
G2	nT/m	Magnetic gradient: mag4 to mag2
G3	nT/m	Magnetic gradient: mag4 to mag3
Mag_Alt_Cor	nT	Altitude corrected mag (applied to Mag2)
Mag_TL_Lev	nT	Tie line network leveled mag
Mag_Fin	nT	Final microlevelled mag
Ge	nT/m	Measured magnetic East gradient
Gn	nT/m	Measured magnetic North gradient
Gv	nT/m	Measured magnetic Vertical gradient

7.2 Gridded Data

The grids, projected in NAD83 UTM Zone 17n coordinates, are in Geosoft format. The cell size in all grids is 15 metres. The following is a description of the grid set:

Grid Name	Units	Description
Pen_Gold_DTM	metres	Levelled digital terrain model
Pen_Gold _GT-TMI	nT	Total magnetic field GT-Grid
Pen_Gold _GT_TMI_RTP	nT	Total magnetic field GT-Grid reduced to pole
Pen_Gold _GT_CVG_RTP	nT/m	Calculated vertical derivative GT-Grid reduced to pole

7.3 Map Files

The following Geosoft format map files have been provided. The maps are presented at a scale of 1:20,000, in a NAD83, UTM Zone 17n projection.

- Flight path and Topography
- Digital Elevation
- GT-Grid of Total Magnetic Field
- GT-Grid of Calculated Vertical Derivative (Reduced to Pole)

JPEG images (at a resolution of 200 dpi) for each map are also included with this report.

Respectfully submitted,

Steve Munro
Geophysicist
Scott Hogg & Associates Ltd.
Toronto, Canada
March 17, 2015

The Heli-GT Magnetic System, developed by Scott Hogg & Associates Ltd., measures three orthogonal magnetic gradients to provide Grad-East, Grad-North and Grad-Vertical.

The bird contains 4 cesium sensors in an orthogonal array with 3 m. baselines.

Geo-reference is provided a radar altimeter, GPS position and bird pitch, roll and yaw.

The measurements are designed to optimize the GT-GRID mapping process that builds high resolution magnetic maps using total field and gradient information.

Scale 1:20000

250 0 250 500 750 1000 1250 1500

(meters)

NAD83 / UTM zone 17N

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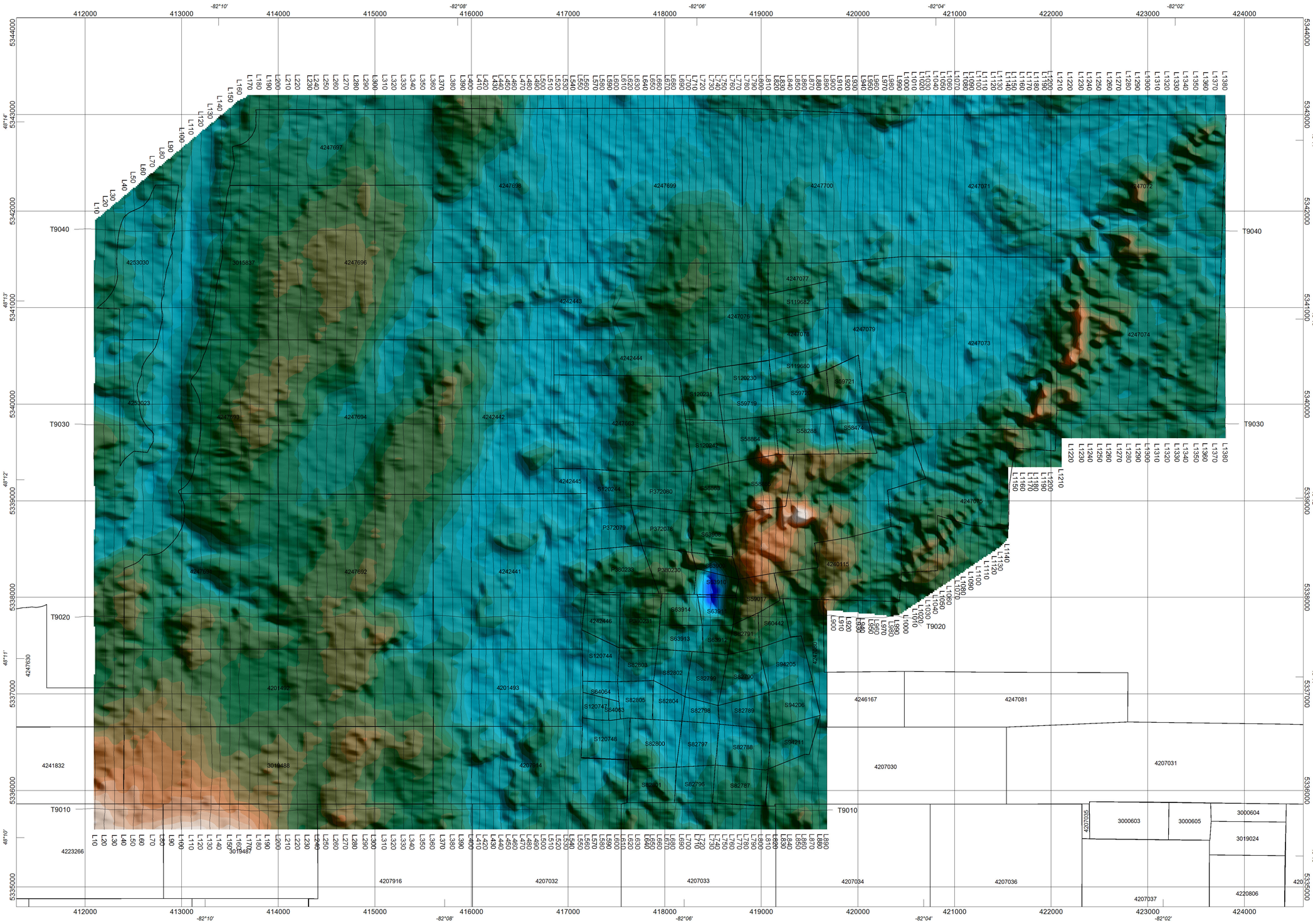
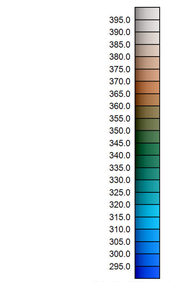
Pen Gold Project
Northern Ontario

Flight Path and Topography

Scott Hogg & Associates Ltd
Geophysical Services
shageophysics.com





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250 0 250 500 750 1000 1250 1500

(meters)

NAD83 / UTM zone 17N

Rapier Gold Inc.

Pen Gold Project

Northern Ontario

Digital Terrain Model

Scott Hogg & Associates Ltd

Geophysical Services

shageophysics.com

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TMI
nT

Scale 1:20000

(meters)

NAD83 / UTM zone 17N

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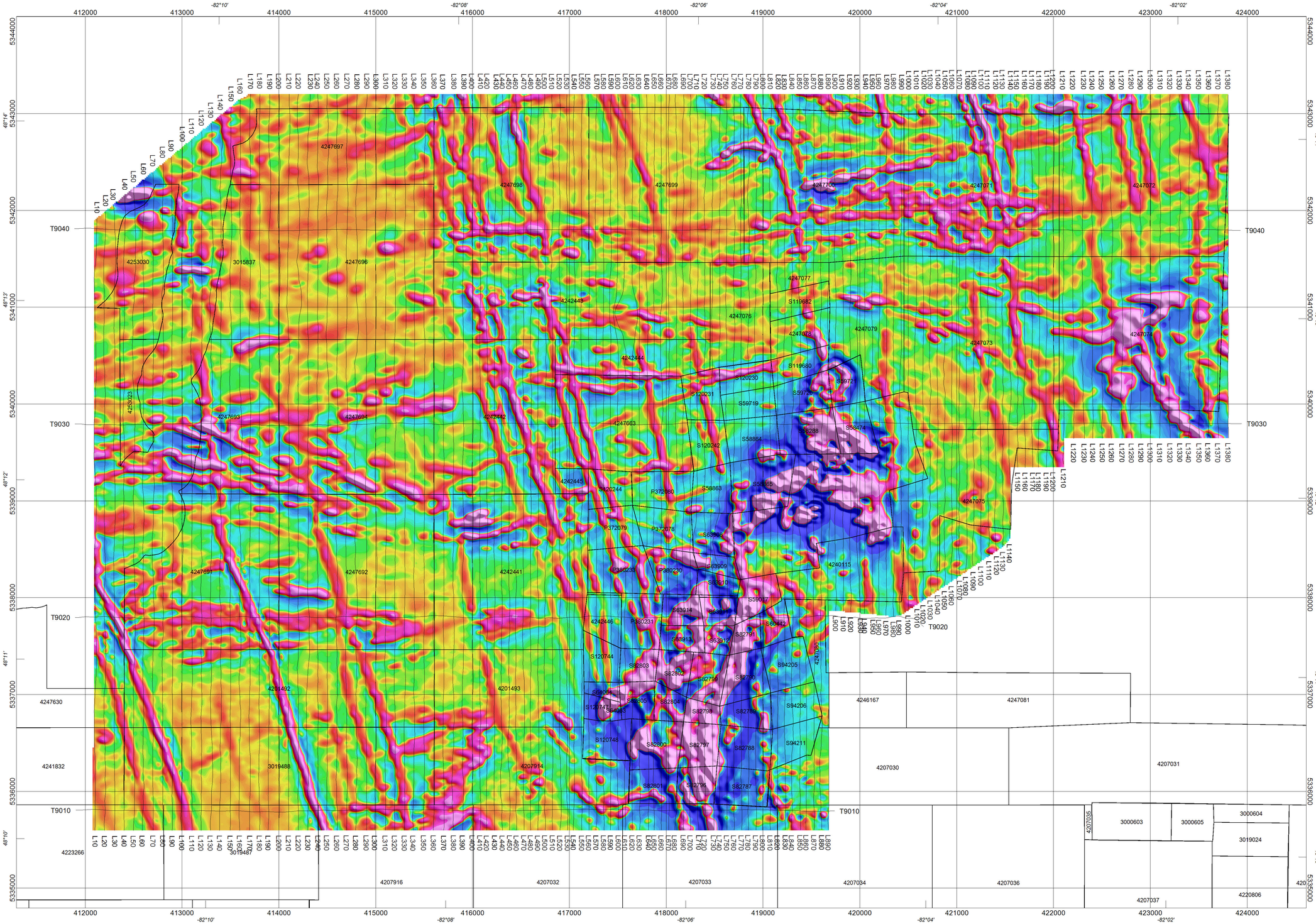
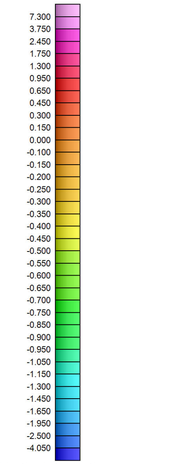
Pen Gold Project
Northern Ontario

GT-Grid of Total Magnetic Intensity

Scott Hogg & Associates Ltd
Geophysical Services
shageophysics.com





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Rapier Gold Inc.

Pen Gold Project
Northern Ontario

GT-Grid of Pole-Reduced Calculated Vertical Derivative

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