

SJ Geophysics Ltd. S.J.V. Consultants Ltd.



11966 – 95A Avenue, Delta B.C. CANADA, V4C 3W2 **Bus:** (604) 582-1100 E-mail: trent@sjgeophysics.com www.sjgeophysics.com

Memorandum

To: Thule Copper Corp.

Attn: Jim Cuttle, Ryan Sharpe

From: E. Trent Pezzot

Date: December 20, 2012

Re: Geophysical Interpretation of airborne magnetic and radiometric data – Craigmont Project, Merritt area, B.C.

This memo describes the results of the interpretation of airborne magnetic and radiometric data gathered across the Craigmont Project, centred some 15 km northwest of Merritt, B.C. The survey was conducted by Scott Hogg & Associates Ltd. (Hogg) in June, 2012 and used a Heli-GT system which consists of 3 cesium magnetic sensors arranged in an orthogonal array on a bird towed 60 metres below a helicopter. It also included a helicopter mounted spectrometer system and the normal ancillary equipment required for airborne survey operations. The survey gathered some 903 line kilometres of data, on north-south survey lines spaced at 100 metre intervals, covering a claim area of approximately 8,725 hectares. Details concerning the survey logistics, data processing and deliverables are documented in an Operations and Processing report by the contractor. The survey data was provided in geosoft formatted database, grid and map files.

Two additional technical reports on the project provided a historical overview and description of the exploration targets. One, authored by Garth Kirkham and John Fleming described the results of a geophysical program and drilling campaign completed in 2005. The other, authored by David Willms and Cliff Candy, described the IP and magnetic survey component of the 2005 surveys.

The Craigmont Mine is a copper and iron skarn that went into production in 1962 and closed in 1982. It is located along the southern margin of the Guichon Creek batholith and confined to calcareous sedimentary rocks of the Nicola Group. Five main ore bodies are identified along a 900 metre strike length and a vertical depth of 600 metres.



Figure 1: Geology Map – Craigmont Mine Area – Airborne Survey Grid Solid line shows outline of claim block and airborne survey grid.

The primary intention of this study was to use the airborne data to identify new exploration targets for similar mineralization along strike from the known deposits.

The geophysical databases were used to reconstruct the grids and maps to verify the accuracy of the maps provided by Hogg.



Figure 2: Total Magnetic Field Intensity colour contour map – linear distribution Dashed line shows geologically mapped contact between Nicola Group and Guichon Creek Batholith.

The magnetic data is dominated by a high amplitude band that strikes east-west across the eastern portion of the study area and widens to the west. At the western edge of the map, the magnetic high appears to swing sharply to the north. This response is attributed to the outer edge (border phase) of the Guichon Creek batholith and correlates well with the geologically mapped contact. The magnetic trend is comprised of several easterly elongated lenses of varying size. Breaks and discontinuities between these lenses suggest northwesterly and northerly striking faults. The inversion models (described below) show the southern edge of the batholith dips near vertically or steeply to the north.

Moderate and low magnetic amplitudes covering the area south of the batholith are attributed to the Nicola group rocks. The area is populated with narrow, moderate amplitude magnetic linears predominantly oriented to the northeast. Many of these trends coincide with geologically mapped contacts between various facies of Nicola group rocks. Numerous discontinuities along these trends reflect the same northwesterly and northerly striking faults that cut the Guichon batholith.

The airborne survey recorded magnetic gradients in three orthogonal directions (vertical, north and east). These data reveal narrow lineations that trace geological contacts. Combining false colour contouring and sun shadow imaging techniques produces effective displays to highlight these lineations and breaks and offsets along them that represent faulting. Analysis of these maps provides an interpretation of fault patterns that compliments the geological mapping.



Figure 3: Magnetic Vertical Gradient (measured) colour contour map – sun illumination from NE. Dashed lines reflect geologically mapped contacts. Black zig-zag lines reflect geologically mapped faults. White zig-zag lines reflect magnetically interpreted faults or contacts.

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(4a) Ge –East gradient highlights N-S structures (4b) Gn –North gradient highlights E-W structures Dashed lines reflect geologically mapped contacts.

The Craigmont deposit coincides with a localized strong magnetic high anomaly immediately south of Guichon Creek batholith. The inversion suggests this is a circular, pipe-like body extending from the surface to > 300m depth however it is likely that the magnetic signature has been altered from its' "natural" form by the mining activities. There are several magnetic high anomalies mapped along strike in same relative position with respect to the batholith. These are weaker in amplitude than the Craigmont signature. They are labelled as anomalies A through F of figure 5.



Figure 5: **Total Magnetic Field Intensity colour contour map – linear distribution** Dashed line shows geologically mapped contact between Nicola Group and Guichon Creek Batholith. White and purple ellipses highlight Craigmont type magnetic anomalies.

• A – 2000m east of the Craigmont deposit. This anomaly coincides with a geologically mapped lens of magnetite skarn. The airborne signature suggests this zone extends another 350m further east than shown on the geology map. This anomaly is close to the Guichon batholith and the magnetic responses likely interfere with each other.

• B - 650m east of the Craigmont deposit. This subtle response appears as bulge on southern edge of Border phase response.

• C - 1200m west-northwest of the Craigmont deposit. This anomaly is very close to the "inferred" border phase contact and may be in the Nicola rocks. It is probably comprised of two lobes totalling some 500m strike length.

Immediately west of C a northwesterly striking fault coincides with a change in the strike of the border phase unit, which rotates from east-west to a more southwesterly strike. This is accompanied by the development of a second magnetic high trend that gradually separates from the mapped border phase. Three localized magnetic highs are developed within this sub-parallel magnetic feature and are labelled as D, E and F. Several small, weaker anomalies could also be picked between these stronger anomalies.

- D Located 3500m west-southwest of the Craigmont deposit and 450m south of the batholith.
- E Located 5000m west-southwest of the Craigmont deposit and 530m south of batholith.
- F Located 5700m west-southwest of the Craigmont deposit and 820m south of batholith. This is the strongest of these three anomalies and closest in appearance to the anomaly associated with Craigmont. The anomaly is located on the edge of the survey and only partially defined. It may extend further to the southwest.

All six of these anomalies have potential for magnetite skarn development, similar to the Craigmont deposit. It is likely that a ground magnetic survey would provide more detailed information and more precisely locate the high susceptibility source material.

The airborne magnetic data was processed and used as input to the UBC 3D magnetic inversion software to produce 3D voxel models showing possible subsurface distributions of the magnetic susceptibility index parameter that might generate the observed data. A regional inversion, based on the entire survey, grid to 80 metre cells and inverted to 40 metre voxel cells was completed. Four (4) overlapping detail inversion windows, utilizing data grid to 40 metres were inverted to a 20 metre voxel grid as outlined on Figure 6. These were selected to focus on the Guichon Creek batholith contact with the Nicola Group. Current and historical plan maps, 3D inversion models and digitized drillhole traces were combined in 3D visualization programs for analysis.



Figure 6: Total Magnetic Field Intensity colour contour map – linear distribution Red Outlines show detail inversion windows 1 - 4. Black outline of regional inversion and claims.

The inversion models have been provided as digital files in both the native UBC format, suitable for viewing in the meshtools3d visualization program and in the VTK format, suitable for viewing in the Paraview and Mayavi 2 programs. Snapshots from these viewers are included as images below to illustrate some of the features interpreted from these models.

The regional model shows a slight increase in the magnetic susceptibility across the northern portion of the grid which is interpreted as reflecting the Guichon Creek batholith. The contact with

the Nicola Group rocks to the south is accentuated by a significant increase in the magnetic susceptibility associated with the border phase rocks, which form the outer rim of the batholith. This magnetic facies of the border phase appears to be somewhat discontinuous but where it is well defined it is modelled as a steep, northerly dipping plate like body.

Lower amplitude magnetic responses to the south, associated with the Nicola group rocks appear to form an antiformal structure that plunges slightly to the northeast. The northern flank of this anticline (hosting the Craigmont deposit) dips steeply to the north, paralleling the batholith contact. The southern flank of the anticline likely dips at a slightly shallower angle to the south.



Figure 7: **Regional Inversion–Isosurface Display–Top View** Isosurfaces from -0.03 SI to +0.05 SI at 0.01 intervals. Potential Craigmont type anomalies A to F.



Figure 8: **Regional Inversion–Isosurface Display–Side view from East. green = +.01 SI, blue = -.02 SI.** NNW-SSE Cross-section through model through western part of the block is displaced down for viewing.

Both of detail windows 1 and 2 encompass the Craigmont deposit. Both inversions show the magnetic source to be a steeply north dipping pipe-like body. Considering the extensive mining in the area, it is understood that the magnetic signature (and consequently the inversion model) is distorted from its' original, undisturbed state. Based on the geological descriptions, it is likely that the deposit formed an easterly elongated ellipsoid body but the vertical extent and orientation shown in the model is likely representative of the original deposit.



Figure 9: Win 1 Isosurface Display – Craigmont Deposit Area - Side view from Southwest - red = +0.05 SI, orange = +0.4 SI, yellow = +0.3 SI.

Colour contour map of Total Magnetic Field intensity draped over ground surface.

The easternmost magnetic anomaly (A) was located along the eastern edge of detail window 1. The inversion model suggests the source as being comprised of two narrow, northeasterly elongated lenses that parallel the Guichon Creek Batholith. The western most body is the smaller of the two and coincides with the eastern end of a narrow, magnetite skarn lineation mapped by surface geology for some 1200 metres. The inversion suggests this zone may continue (possibly offset by a fault) for another 350 metres to the northeast. This eastern lens appears to have a greater depth extent than the western lens.



Figure 10: Win 1 Isosurface Display – Anomaly A – elevated view from Southwest - red = +0.05 SI, orange = +0.4 SI, yellow = +0.3 SI.

Anomalies C and D have been tested by the IP and ground magnetic surveys. Anomaly C coincides with an easterly elongated chargeability high, centred between the magnetic high and the Guichon Creek batholith (figure 11). This conforms to the geological description that suggests the copper zone (chalcopyrite) forms along the periphery of the magnetite lens. Anomaly D is flanked to the south by a large, weak chargeability high. This IP anomaly is significantly larger than the magnetic anomaly. It is also noted that a few smaller chargeability highs are shown between anomalies C and D, immediately south of the batholith. These anomalies are loosely correlated with weak and poorly defined magnetic highs.



Figure 11: Win 2 Isosurface Display – Elevated view from west. Red solid = chargeability high > 15 ms. Magnetic Isosurfaces: orange = +0.04 SI, yellow = +0.03 SI, green = +0.01 SI.

Ground magnetic data gathered by Frontier Geosciences in 2005 was provided as an ASCII xyz data file of gridded (5m cells) data. The map produced by the gridded data is not as detailed as the map included in their report. It is likely that the report map was based on a more detailed gridding of the walking mag data.

Overlying the ground data with the more recent airborne data shows excellent correlation of the general magnetic trends. However, there appears to be a displacement that shifts the ground data some 285m to the east of the airborne data. Frontiers' report states their data was recorded in NAD83, Zone 10N and there is no obvious explanation for this apparent mistie. As a check, the ground data was re-registered to NAD 27, Zone 10N, another common projection, but this made the mistie even worse.



Figure 12: Ground Magnetic Data (Frontier, 2005)



Figure 13: Airborne Magnetic Data over area covered by ground magnetic survey (Frontier, 2005) Outline of Frontier ground survey as purple border. Frontier anomalies flagged as fA, fB, fC. Airborne anomalies C and D as red/white ellipses.

Comparison of the ground and airborne data demonstrates the difference in perceptions one gets from the regional and local perspectives. By ignoring the apparent displacement and focusing on the character of the responses it is clear that the same general magnetic trends and anomalies are mapped by the two surveys. The large magnetic high arcing around the northern and western sides of the ground grid are evident on the airborne data as the reflection of the border phase Guichon Creek batholith. The ground survey only mapped the southern edge of this trend and its' relationship to the batholith was not as clearly defined. The airborne anomalies C and D are clearly evident on the ground data but the interpretation of them being offset from the batholith was not apparent. Instead, Frontier interpreted two small dipole anomalies (fA, fB) and an easterly elongated magnetic high (fC) as potential magnetite skarns. The two small dipole anomalies are evident on the airborne data can be used to identify several similarly weak responses as

potential targets within a 2 km wide band along the southern flank of the batholith. Ground surveying would be required to identify these as dipole targets.

Detail window 3 modelled the responses across anomalies E and F. It shows anomaly E as a small, near surface lens, some 200 - 300 metres in length with very limited depth extent. It shows anomaly F, which is only partially defined, as being very similar to the Craigmont deposit anomaly in that it appears to extend to considerable depth. This target straddles the edge of the current claim group and likely extends to the west, off the current property.



Figure 14: Win 3 Isosurface Display – Side view from southeast. red = +0.05 SI, orange = +0.04 SI, yellow = +0.04 SI, green mesh = +0.02 SI Total Field Magnetic colour contour map draped over ground surface. Spectrometer data was also acquired and these results were examined briefly. The most distinctive patterns are evident on the ternary displays. The results show predominantly north-south trends across the area, defined by changes in the colour hues. These show no obvious correlation with the mapped geology. The most distinctive anomalous response is a large elliptical zone in the southeast corner of the map. This response coincides with the mine waste area. Several narrow lineations coincide with surface drainages.



Figure 15: **Ternary Radiometric Display – CMY = K-Th-U** Red-White line traces Guichon Creek Batholith – Nicola Group contact. Black lines trace general radiometric patterns.

The Th/K ratio is used to identify potassic (hydrothermal) alteration zones generated by a coincident increase in the potassium and decrease in the thorium isotopes. The most dramatic of these types of anomalies is associated with the mine waste area, located some 3.2 km southeast of the mine site. There is weaker anomaly centred some 800 metres south of the open pit. Both of these anomalies are within the workings of the mine and neither anomaly is considered to be a reflecting the natural (geological) conditions. They are also generated primarily by lows in the thorium isotope counts rather than highs in potassium. There are no obvious Th/K ratio anomalies

indicative of potassic alteration associated with the Craigmont deposit itself. There appears to be a general increase in the number of very small, localized Th/K anomalies in the west-central portion of the grid, south of the magnetic anomalies D, E and F. There is one weak, circular anomaly noted along the western edge of the survey. A more detailed study will be required to determine whether these responses are significant.



Figure 16: **Th/K ratio Colour Contour Map.** Blue areas (low Th/K ratio) are indications of possible potassic alteration. Red-White line traces Guichon Creek Batholith – Nicola Group contact.

The uranium isotope clearly outlines the maps the mine waste site area. The balance of the survey is nondescript.

Both the potassium and thorium isotopes have higher counts along the eastern portion of the survey block.

There is one significant potassium isotope anomaly mapped in the southwest portion of the survey. It coincides with a rhyolite volcanic unit shown on the geology map but differs in that other occurrences of this geological unit do not exhibit the same potassic signature.