ENGINEER MINING CORP.

INTERPRETATION OF AEROMAGNETIC DATA FROM THE SONORA PROPERTY, HAYES CREEK AREA, YUKON TERRITORY

Mike Power M.Sc. P. Geoph.

CLAIMS

STONE 1-48       YC14648-YC14695
S 1-16           YC14632-YC14647

Location: 62° 38' N 138° 00' W
NTS: 115 J /9 & I/12
Mining District: Whitehorse, Y.T.
This report has been examined by the Geological Evaluation Unit under Section 53 (4) Yukon Quartz Mining Act and is allowed as representation work in the amount of $ \text{[Redacted]}.

[Signature]

[Note: Regional Manager, Exploration and Geological Services for Commissioner of Yukon Territory.]
SUMMARY

This report describes an interpretation of aeromagnetic data collected by the Geological Survey of Canada over and around the Sonora Property, Hayes Creek area, Whitehorse Mining District. The Sonora Property hosts gold and base metal mineralization associated with Dawson Range and Prospector Suite intrusive rocks and within structurally controlled listwanite quartz-carbonate veins. The interpretation included the preparation of maps, the extraction of line profile data, the semi-automated interpretation of line profile data using forward modeling software and the assessment of results in light of available geological data.

The results of the interpretation provide constraints on the size, depths, location and nature of two ultramafic bodies mapped on the property. Two aeromagnetic highs coincident with ultramafic rocks appear to originate from a simple sill (western portion of the property) and from a series of perhaps 3 stacked sills in the central portion of the property. The ultramafic sources appear to be up to 300 m wide, 1500 m long and steeply south dipping. A large, low amplitude high in the eastern portion of the property is coincident with a large hill and appears to originate from a large, roughly equidimensional source of low magnetic susceptibility. This source appears to occur at a depth of 700 m and is cut by apparent faults defined by linear magnetic breaks. Similar breaks of regional structural size are coincident with several of the source bodies interpreted to be ultramafic rock units.
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1.0 INTRODUCTION

This report describes an interpretation of aeromagnetic data collected over the Sonora Property by the Geological Survey of Canada (GSC) during 1994. The Sonora Property hosts base metal and gold occurrences in veins and sulphide replacement zones. The aeromagnetic data was evaluated to identify bedrock units and structures which may control the location of mineralization on the property. The scope of this work was to identify geophysical anomalies of potential interest and assess their likely sources.

2.0 LOCATION AND ACCESS

The Sonora Property is centred at 62°38' N 138°00' W near Hayes Creek, Dawson Range, Yukon Territory on NTS Map Sheets 115 J-9 and I-12 (Figure 1). The property is 100 km NW of Carmacks and 270 km NNW of Whitehorse by air. Helicopter charter companies operate from both communities and fixed wing charter is available in Whitehorse. There is a short airstrip suitable for small aircraft on the property. By road, the property is accessible via the Casino Trail which branches from the Freegold Road at Prospector Mountain. This winter road is passable by AT during the summer months.

3.0 PROPERTY AND MINERAL TENURE

The Sonora claim consists of 131 mineral claims located in the Whitehorse Mining District. Claim locations are shown in Figure 2 and claim information is summarized below:

<table>
<thead>
<tr>
<th>Claim Name</th>
<th>Grant Numbers</th>
<th>Expiry Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swede 1-6</td>
<td>YA3779-YA03784</td>
<td>Oct. 28/00</td>
</tr>
<tr>
<td>SAM 1-18</td>
<td>YA03869-YA03886</td>
<td>Oct. 28/00</td>
</tr>
<tr>
<td>SAM20-35</td>
<td>YA03905-YA03912</td>
<td>Oct. 28/00</td>
</tr>
<tr>
<td>SAM37-44</td>
<td>YA03905-YA03912</td>
<td>Oct. 28/00</td>
</tr>
<tr>
<td>SAM 48</td>
<td>YA03916</td>
<td>Oct. 28/00</td>
</tr>
<tr>
<td>SAM 50</td>
<td>YA03918</td>
<td>Oct. 28/00</td>
</tr>
<tr>
<td>SAM 52</td>
<td>YA03920</td>
<td>Oct. 28/00</td>
</tr>
</tbody>
</table>
The claims are 100% owned by Engineering Mining Corp. of Whitehorse, Yukon Territory.

### 4.0 GEOLOGY AND ECONOMIC MINERALIZATION

The Sonora Property is located in the Dawson Range of the Yukon Plateau. The physiography of the region is characterized by long sinuous ridges cut by narrow valleys that open to wider swampy flat-bottomed valleys. Outcrop tends to be sparse and elevations on the property area range from 760 to 1280 metres.

Geology in the area of the Sonora Property is described by Davidson (1999). The Sonora Property is underlain by Paleozoic metamorphic rocks overlain and intruded by Mesozoic to Tertiary volcanic and plutonic rocks. Stratigraphy in the area of the property is summarized in Table I and the geology in the area of the property is shown in Figure 3.

Structure in the property area is dominated by major strike slip faults and features associated with the emplacement of intrusive bodies. The Big Creek and Hootchekoo Faults are the largest structures in the area and follow low ground along Hayes Creek. These Jurassic transpressional, dominantly transcurrent, right lateral faults trend 110° to 130°, and control the location of intrusive bodies emplaced following tectonism. Parasitic minor faults following this trend (Trend A) are common in the area. Subsequently, the Cretaceous Prospector Mountain Intrusive Suite was emplaced along the Big Creek Fault and around the Dawson Range Batholith. Intrusion triggered local collapse and uplift features. On the Sonora Property porphyry style Cu-Mo mineralization occurs in association with quartz eye porphyry stocks. During emplacement, both porphyry dykes and later stage mesothermal quartz veins and breccias sealed many faults in the area. Slickensides and brecciation within fault-hosted quartz veins indicate that these structures have been reactivated following quartz flooding. Later stage sulphide veins, following a dominant orientation of 45° to
(Trend B) show little evidence of subsequent deformation.

Table I. Regional Stratigraphy - Sonora Property
(after Davidson (1999))

<table>
<thead>
<tr>
<th>Formation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carmacks Group</strong></td>
<td><strong>uKC</strong>, undifferentiated mafic to intermediate volcanics with lesser felsic volcanic plugs and dykes. This unit consists of mafic flows and agglomerates, dark green andesite and andesite stock work and minor fine-grained flow banded rhyolite and fine-grained pink felsite: <strong>uKIC &amp; uKsC</strong>, black sediments and volcanics: mainly graphitic siltstone (<strong>uKsC</strong>) with very minor silty sandstone: intercalated with and intruded by a number of highly altered porphyritic volcanic bodies (<strong>uKIC</strong>) composed of quartz and feldspar phenocrysts in a muscovite matrix. In places sericite mats replace the feldspar. This unit hosts auriferous quartz veins at Caribou Creek.</td>
</tr>
<tr>
<td>(Mount Nansen group):</td>
<td></td>
</tr>
<tr>
<td>(Late Cretaceous to Tertiary)</td>
<td></td>
</tr>
<tr>
<td><strong>Prospector Mountain</strong></td>
<td><strong>Lkp</strong>, undifferentiated shallow level intrusions; <strong>Lkmp</strong> quartz monzonite and quartz porphyry, pink feldspar porphyry, granite porphyry; <strong>Lkup</strong>, ultramafic sills, dun weathering, dark green to black, spinel peridotite, potassic gabbro and diabase</td>
</tr>
<tr>
<td><strong>Plutonic Suite</strong></td>
<td></td>
</tr>
<tr>
<td>(Middle to Late Cretaceous)</td>
<td></td>
</tr>
<tr>
<td><strong>Dawson Range Batholith</strong></td>
<td><strong>mKD</strong>, granodiorite and quartz monzonite</td>
</tr>
<tr>
<td>(Early to Middle Cretaceous)</td>
<td></td>
</tr>
<tr>
<td><strong>Wolverine Creek</strong></td>
<td><strong>DMW</strong>, undifferentiated metaigneous schist and gneiss: includes augen orthogneiss; <strong>DMWv</strong>, orange to grey weathering, grey green to dark grey, fine grained, biotite and biotite hornblende quartz diorite and diorite schist and gneiss; <strong>DMWvi</strong>, intermediate to felsic metavolcanic and related finely layered metasedimentary rocks;</td>
</tr>
<tr>
<td><strong>Metamorphic Suite</strong></td>
<td></td>
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<tr>
<td>(Devonian -Mississippian)</td>
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</tbody>
</table>

Two styles of mineralization are found in the area of the Sonora Property. The first consists of structurally-hosted oxide and sulphide mineralization in sheared and fractured quartz porphyry associated with NW trending faults (i.e. Trend A). A second style consists of quartz-carbonate-sulphide veins in fractures, shear zones and
structures in quartz porphyry, metavolcanic rocks along the Big Creek Fault, and in listwanite alteration near ultramafic sills. These tend to follow Trend B (45° to 60°).

On the property, mineralization is associated with two ultramafic bodies well mapped by the aeromagnetic survey and within a Prospector Mountain Suite quartz-porphyry plug mapped from the source of Sonora Gulch to the mouth of Little Klines Gulch. Oxidation of mineralization associated with the latter occurrence persists to a depth of 80 m or more.

5.0 AEROMAGNETIC DATA

This report examines aeromagnetic data collected by the GSC during 1994 in the course of a regional combined aeromagnetic-radiometric-VLF survey of a large area centred on the Selwyn River (GSC 1994). Survey parameters were as follows:

- **Flight line spacing:** 500 m
- **Line azimuth:** 0°
- **Nominal bird height:** 120 m
- **Sampling interval:** 30 m

The digital data was parsed to a smaller data set in an area centred on the Sonora Property. This is included in the attached floppy disk in zipped ASCII format. All coordinates are in NAD27 Zones 7 and 8 UTM coordinates. This coordinate system was carried from NTS Sheet 115 J/9 across the eastern portion of the survey area covered by Sheet 115 I/12 for the sake of continuity.

6.0 INTERPRETATION

The interpretation of the data set was performed by preparing a series of standard plots, by extracting line profile data over anomalies of interest and interpreting the profile data to derive source parameters, and by identifying magnetic trends of potential economic interest on and immediately adjacent to the Sonora Property.
The following products are included with this report:

Figure 4. Stacked profile aeromagnetic data and colour contour map (back pocket)
Figure 5. Colour contour map and profile line locations (back pocket)
Figure 6. Shaded total magnetic field - Trend A (back pocket)
Figure 7. Shaded total magnetic field - Trend B (back pocket)
Figure 8. Calculated total magnetic field first vertical derivative (back pocket)
Figure 9. Magnetic modelling results - line PL-1
Figure 10. Magnetic modelling results - line PL-2
Figure 11. Magnetic modelling results - line PL-3
Figure 12. Magnetic anomaly map

Total field aeromagnetic response in the property area (Figure 5) is dominated by a large moderate amplitude (300 nT) high interpreted to be a Dawson Range granodiorite intrusion (Davidson 1999). North of this body on the Sonora Property are two smaller high amplitude (1000 - 2000 nT) highs interpreted to be associated with ultramafic bodies. Southeast of these two anomalies and also on the property is a broad (2000 x 1500 m) moderate (300 nT) high of uncertain origin. Profile lines PL-1 and PL-2 cut both of the aeromagnetic anomalies inferred to be associated with ultramafic bodies and line PL-3 transects the isolated high to the southeast.

The profile line data was extracted from the gridded data at 50 m intervals along the lines using Geopak RTICAD and was interpreted using the Geopak REVS forward modelling package. The measured aeromagnetic response was compared with the response from a forward model and the model parameters adjusted to derive a source body producing a response similar to the measured response. The modelled response is shown in blue with drop lines and the measured response is shown in a single read profile, scaled as shown on the left side of the profiles. Beneath the profiles is a drawing of the source body producing the modelled response and a tabulation of the source parameters. The models strike perpendicular to the profile lines (as these are principle profiles) and the strike length is constrained to that indicated by the strike of...
Figure 9. Magnetic model for profile PL-1.
Figure 10. Magnetic model for line PL-2.
Magnetic Dyke
1800 m (strike) x 1300 m (width)
Depth extent: 1000 m
Depth to top: 730 m
$\Delta \mu = 0.001$ SI Units

Figure 11. Magnetic model for line PL-3.
the aeromagnetic anomalies in Figure 5. In all three models there is a degree of misfit at the ends of the lines caused in part by the presence of adjacent off-line anomalies.

The aeromagnetic anomaly along profile line PL-1 can be well explained by a simple steeply-south-dipping tabular source. The magnetic susceptibility contrast of the source is relatively low suggesting that the source, if attributable to ultramafic rocks, probably consists of a series of smaller magnetic sills within non-magnetic host rocks.

The aeromagnetic anomaly along profile line PL-2 consists of two subsidiary peaks south of a strong northern peak. This anomaly cannot be explained by a simple source and requires the presence of a shallow source to the north and one or more sources to the south to account for the plateau in the field south of the northern peak. Three tabular sources were used as a geologically plausible source of the anomalies; this solution is by no means unique. The indicated magnetic susceptibility contrasts are low, perhaps for the same reasons cited for the source in the model for PL-1.

The aeromagnetic anomaly along line PL-3 differs significantly from those along PL-1 and PL-2. When compared to the latter two anomalies, PL-3 is wider, smoother and of significantly lower amplitude (300 nT versus 1000 - 3000 nT). In addition, there are flanking lows on both the north and south sides suggesting a body with depth extent in the order of the horizontal dimensions. The model derived for PL-3 consists of an roughly equidimensional source at depth (730 m) with a low magnetic susceptibility contrast. Such a source resembles a high level intrusion rather than an ultramafic body emplaced by fault action.

Figures 6 and 7 are shaded colour contoured total magnetic field images designed to enhance anomalies along the two principle trends associated with economic mineralization. Figure 6 shows the total field data illuminated to highlight features trending 110° to 130° (Trend A) and Figure 7 shows the total field illuminated to highlight features trending 45° to 60° (Trend B). In Figure 12, the axis of significant highs and lows along each of these trends are shown, colour coded by trend direction. In addition, the location of the magnetic source bodies derived from modelling are shown.

The large source inferred to be the cause of the anomaly along PL-3 (M5) is centred beneath a large hill in the centre of the STONE Claims. There are several inferred structurally associated magnetic anomalies which appear to cut this source. The known association of mesothermal vein systems with buried porphyry systems suggests that these trends may be of economic interest.

To the west, Source M4, an inferred ultramafic body, lies along a significant regional magnetic break and coincident with placer-gold-bearing Little Klines Gulch. In addition,
Sources M3 and M4 are cut by Sonora Gulch which is also known to carry placer gold. Given the known association of auriferous listwanite altered quartz-carbonate veins with ultramafic bodies, the results of the aeromagnetic survey suggest locations for further investigation.

7.0 CONCLUSIONS

The results of the interpretation of aeromagnetic data in the area of the Sonora Property support the following conclusions:

a. Two narrow, high amplitude aeromagnetic anomalies apparently associated with ultramafic sills are present on the Sonora Property.

b. The source of these sills may be a series of tabular, steeply south-dipping bodies up to 300 m wide consisting of a package of thin magnetic rocks within a larger mass of non-magnetic rocks.

c. The sills occur along regional scale magnetic breaks which may be faults or fault related breaks in stratigraphy. They occur at depths ranging from 100 to 600 m. Listwanite alteration frequently extends a considerable distance from ultramafic rock units and it is possible that auriferous quartz-carbonate veins related to these sources could be found near surface along the host structures.

d. A large low amplitude high beneath the STONE Claims appears to be caused by a large (1800 m x 1300 m x 1000 m) body with slight magnetic susceptibility at a depth of around 700 m. The source appears to be cut by a series of magnetic breaks which may be faults. The source is interpreted to be a small stock, possibly of Dawson Range granodiorite given its proximity to a known Dawson Range intrusion to the south. Overlying structures would be a favourable place to encounter economic mineralization in this setting.

e. Economic mineralization in the property area is hosted by structures following one of two dominant trends. There are numerous linear magnetic anomalies present in the aeromagnetic data which follow one or the other of these two trends. Further, the inferred ultramafic sources are localized along regional scale magnetic breaks which cut across the property.
8.0 RECOMMENDATIONS

The conclusions of this report support the following recommendations:

a. The aeromagnetic anomalies identified in this report should be evaluated together with the available geological, geochemical and ground geophysical data to determine locations for additional exploration.

Respectfully submitted,
AMEROK GEOSCIENCES LTD.

Geophysicist

N.W.T.
REFERENCES CITED


APPENDIX A. CERTIFICATE

I, Michael Allan Power, M.Sc. P.Geo., P.Geoph., with business and residence addresses in Whitehorse, Yukon Territory do hereby certify that:

1. I am a member of the Association of Professional Engineers and Geoscientists of British Columbia (registration number 21131) and a professional geophysicist registered by the Northwest Territories Association of Professional Engineers, Geologists and Geophysicists (licensee L942).

2. I am a graduate of the University of Alberta with a B.Sc. (Honours) degree in Geology obtained in 1986 and a M.Sc. in Geophysics obtained in 1988.

3. I have been actively involved in mineral exploration Northern Canada and Alaska since 1988. I performed the inversions and interpretations described in this report.

4. I have no interest, direct or indirect, nor do I hope to receive any interest, direct or indirect, in Engineer Mining Corp. or any of its properties.

Dated this 30th day of July, 2000 in Whitehorse, Yukon.

Respectfully Submitted,

Geophysicist
APPENDIX B. STATEMENT OF COSTS

The following expenses were incurred in the performance of the work described in this report:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital data purchase</td>
<td>$265</td>
</tr>
<tr>
<td>Interpretation and modelling</td>
<td>$860</td>
</tr>
<tr>
<td>Report</td>
<td>$750</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1875</strong></td>
</tr>
</tbody>
</table>

I certify these expenses to be true to the best of my knowledge.

Geophysicist
Data source: GSC Open File 3916

Illumination angle selected to identify structures trending 110 to 130, parallel to the Big Creek Fault.
Data source: GSC Open File 3816

Illumination angle selected to identify structures trending 045 to 060.
This trend is parallel to that of discontinuous mineralized veins in the area.