Assessment Report: Airborne Magnetic and Electromagnetic Survey

KROF PROPERTY

MINERAL TENURE: 507487
New Westminster Mining Division
British Columbia, Canada
NTS: 092H052

OWNERS: GERALD G. CARLSON
JOHN A. CHAPMAN

OPERATORS: SAME

AUTHOR: GERALD G. CARLSON, PH.D, P.ENG.

DATE: JANUARY 8, 2007
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1. INTRODUCTION

The Krof Property is located in southwestern British Columbia, Canada, in an area with a long mining history and has a mature infrastructure. This report provides a summary of the geology and mineralization of the property, as taken from historical documents, and describes the results of an airborne geophysical survey carried out over the claim group in June, 2006. Much of the historical information in this report is taken from Carlson et.al. (2001).

Nickel-copper mineralization was discovered in 1923 at the Pride of Emory deposit on Stulkawhits Creek, 12 km northwest of Hope and 20 kilometers southeast of the Krof Property, in southwestern British Columbia. Underground development at the Pride of Emory was begun in 1926, but it wasn’t until 1936 that commercial production was achieved. From 1936 to 1974, production totaled 26,573,090 kilograms of nickel and 13,212,770 kilograms of copper with silver, gold and cobalt credits.

Exploration in the vicinity of the Krof Property (B.C. Minfile No. 092HNW070, a.k.a. North Fork, see Appendix) began in the late 1960’s by the Nickel Syndicate (Giant Explorations Limited and Giant Mascot Mines Limited) and continued through 1975. The work focused on a series of ultramafic intrusions apparently related to the rocks that host the Pride of Emory. The area including the eastern portion of the Krof Property was flown as part of a regional magnetometer survey in 1970’s.

The Krof Property was originally staked in 1981 when massive sulphides were discovered during the construction of a logging road located on the property. Several exploration programs were completed on the Krof in the 1980’s including 11 diamond drill holes in the vicinity of the discovery showing.

In January 2000, while researching the Pride of Emory deposit, Mr. John Chapman recognized the mineral potential of the Krof Property. The original claims had lapsed and so the property was subsequently staked in May 2001. The property owners have visited and sampled the property and have compiled all of the available historical data into a three-dimensional database.

In June, 2006, Aeroquest Limited was contracted to fly an AeroTEM II electromagnetic (EM) and magnetic survey over the property. The survey was flown on June 29, 2006. The EM survey clearly detected the North Fork massive sulfide showing as well as a coincident magnetic high, likely representing basaltic volcanic rocks that are the predominant host to the massive sulphides. The survey suggests that the massive sulphides occur in the nose of this fold. Weaker conductors in the northeast corner of the claim block are associated with a similar magnetic pattern, suggesting a possible second fold and a repetition of the mineralized stratigraphy. A 1,200 m drill program is recommended to test for massive sulphide mineralization within the down plunge axis of the fold, while prospecting is recommended in the northeastern corner of the claim block to search for similar mineralization.

2. LOCATION & ACCESS

The Krof Property is located in southwestern British Columbia, approximately 120 kilometers east of Vancouver, near Harrison Hot Springs, British Columbia, Canada (see Figure 1). The
MINFILE showing in the center of the claim is positioned at 49° 34’ 33” N latitude and 121° 44’ 50” W longitude, UTM Zone 10N 5492000 mN, 590575 mE, in NTS sheet 092H052.

Note: 35,000 hectares of new mineral claims have recently been staked in the Krof region, centered on the Cogburn property at the headwaters of Talc Creek. These claims have been staked since February 2000, as part of a nickel and PGE exploration “rush” in the area.

The property is centered within the North Fork of Cogburn Creek drainage basin immediately east of Harrison Lake. The claim is readily accessible by a logging road along the east side of Harrison Lake to Lakeside Pacific Forest Products Ltd.’s Bear Creek Camp at the mouth of
Cogburn Creek (approximately 22.5 kilometers). Proceeding northeast along Cogburn Creek for approximately 1.5 kilometers the gravel road intersects the West Cogburn Creek Road. Taking the West Cogburn Creek Road for 5.8 kilometers it intersects the North Fork Road. The MINFILE showing 092HNW070 is a further 4.1 kilometers to the northwest via a series of switchbacks (see Photo 1).

The town of Harrison Hot Springs is approximately 34 kilometers south of the Krof Property. The Canadian Pacific Railway mainline, Provincial Highway No. 7 and Fraser River are located a further 15 kilometers to the south of Harrison Hot Springs. The Fraser River is a major transportation corridor with roads, railways, gas/oil pipelines and power transmission lines (see Figure 1).

The property is in moderately rugged, glaciated, mountainous terrain, with elevations ranging from 460 to over 1,320 meters above mean sea level (see Photo 2). The North Fork discovery showing is at an elevation of 800 meters above mean sea level.

In the past 20 years approximately 70% of the claim area has been clear-cut and active logging and construction of new logging road access continues in the area.

3. CLIMATE

The climate in the vicinity of the Krof deposit is typical of the area with cool summers and mild winters. Annual precipitation is approximately 300 cm, including average annual snowfall at 1,000 cm. Snowpack can reach 400 cm and remains on south slopes until April or May and on north slopes until June. Temperatures range from an average of minus one degree centigrade in winter to an average of plus 15 degrees centigrade in summer.

4. CLAIMS & OWNERSHIP

The Krof Property consists of 1 claim totaling 230.427 hectares (see Figure 2). It is located in the New Westminster Mining Division, British Columbia, NTS sheet 92H12W. The claim is entirely within the North Fork Creek drainage basin. The claim is owned by Gerald G. Carlson (50%) and John A. Chapman (50%). Gerald G. Carlson holds the claim on behalf of KGE Management Ltd. The claim statistics are shown below:

<table>
<thead>
<tr>
<th>Tenure Number</th>
<th>NTS Map Sheet</th>
<th>Area Ha.</th>
<th>Expiry</th>
</tr>
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<tr>
<td>507487</td>
<td>092H052</td>
<td>230.427</td>
<td>June 30, 2012</td>
</tr>
</tbody>
</table>

5. MINING HISTORY

5.1. Area Production

Twenty kilometers to the southeast of the Krof Property is the former Pride of Emory Mine (MINFILE No. 092HSW004) that was operated by Giant Mascot Mines Ltd. from 1958 to 1974 (see Figure 1). The mine produced 4.3 million tonnes of ore and recovered 26.6 million kilograms of nickel, 13.2 million kilograms of copper, 140 thousand kilograms of cobalt and
minor gold and silver. At closure in 1974 the resource estimate was 863 thousand tonnes grading 0.75 \% nickel, 0.30 \% copper and 0.03 \% cobalt.

Figure 2. Krof Property Claim Map.

Twenty-five kilometres south of the Krof Property, on the east shore of Harrison Lake, the Abo Property contains an estimated mineral resource of 3.5 million tonnes at a grade of 3.2 to 4.1 g/T Au (MINFILE No. 092HSW092).
The Cogburn Property is 8 kilometres south of the Krof Property, at the headwaters of Talc Creek (MINFILE No. 092HSW081). A very large nickel resource has been identified here in the 1970’s by Giant Explorations Ltd. More recently, Leader Mining International Inc. has defined a large magnesium resource at the headwaters of Talc Creek. In 2003, Leader completed a feasibility study that demonstrated that the Cogburn magnesium project was technically feasible and economically viable at an annual production rate of 131,000 tonnes of magnesium metal (Hatch Associates, 2003).

5.2. Krof History

Besshi-type polymetallic massive sulphides were discovered in 1981 during the construction of a logging road located on a ridge west and above the North Fork of Cogburn Creek (MINFILE - 092HNW070). A 50-meter thick zone of pyritized meta-basalts was uncovered at that time. The following is a brief history since the discovery.

- Mr. D. McCallum, Mr. H. Nickel and Mr. D. Crowhurst of Agassiz, B.C. originally staked the area around the showing in 1981.

- Silver Standard Mines Ltd. optioned the property in 1981. They conducted a limited soil geochemistry, self potential and HEM survey in 1981 (AR-9834). The surveys suggested that the sulphides had at least a 250 meter strike length and dipped steeply. The geophysical anomalies trend NNW-SSE.

- Orbex Minerals optioned the property in 1982. A limited geological mapping program and 4 drill holes (376.5 meters) were completed in the vicinity of the showing (Cameron et.al., 1982). All four holes intersected the mineralized horizon with one intersecting massive sulphides (NF-1: 3.0 m of 2.04 % Cu, 0.98 % Zn and 9.2 g/T Ag).

- Corporation Falconbridge Copper optioned the property in 1985 and completed geological mapping (Davidson et.al. 1985). Mapping was at a scale of 1:5000 which was reduced to 1:100 near the showing. The mapping suggested a steep (60° to 80°) southerly plunge and a near vertical dip.

- Minnova Incorporated optioned the claims in 1987 and completed geological mapping and an HLEM geophysical survey that indicated a conductive strike of 50 meters north and south of the showing. (Burge, 1988). They drilled 4 NQ diamond drill holes totaling 654 meters. Three out of four drill holes intersected massive sulphides and confirmed a 60° southerly plunge and a dip of 85° to the east. Intersections include:

<table>
<thead>
<tr>
<th>Hole No.</th>
<th>Width (m)</th>
<th>Copper (%)</th>
<th>Zinc (%)</th>
<th>Silver (g/T)</th>
<th>Gold (g/T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>87-1</td>
<td>1.8</td>
<td>1.09</td>
<td>2.57</td>
<td>13.25</td>
<td>0.07</td>
</tr>
<tr>
<td>87-2</td>
<td>1.9</td>
<td>3.67</td>
<td>0.90</td>
<td>17.002</td>
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<tr>
<td>87-4</td>
<td>2.2</td>
<td>4.82</td>
<td>0.46</td>
<td>19.94</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Sampling by Minnova of the surface showing gave 1.78 % Cu, .27 % Zn, 23.5 g/T Ag and .28 g/T Au over .9 meters and 3.72 % Cu, 1.41 % Zn, 48.0 g/T Ag and .35 g/T Au
over .8 meters over two discrete massive sulphide lenses over a 25-meter thick section of altered mineralized rock.

- Minnova Incorporated completed three NQ diamond drill holes for a total of 743 meters in 1988 (Burge, 1989). Major and minor trace elements as well as lithogeochemistry values were run on core samples. All three intersected a mineral horizon but did not contain massive sulphide mineralization. The conclusion was that this drilling was to the south of the steep southerly plunge of the massive sulphide zone. Although massive sulphides were not encountered Minnova thought that the North Fork mineralized horizon was still an excellent target.

### 1988 Diamond Drill Summary

<table>
<thead>
<tr>
<th>Hole No.</th>
<th>From (m)</th>
<th>To (m)</th>
<th>Width (m)</th>
<th>Copper (ppm)</th>
<th>Zinc (ppm)</th>
<th>Silver (ppm)</th>
<th>Gold (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NF-88-1</td>
<td>77.7</td>
<td>80.8</td>
<td>3.1</td>
<td>101</td>
<td>61</td>
<td>1.3</td>
<td>5</td>
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<tr>
<td>NF-88-2</td>
<td>179.0</td>
<td>181.0</td>
<td>2.0</td>
<td>158</td>
<td>196</td>
<td>1.4</td>
<td>5</td>
</tr>
<tr>
<td>NF-88-3</td>
<td>249.9</td>
<td>255.1</td>
<td>5.2</td>
<td>297</td>
<td>221</td>
<td>1.1</td>
<td>6</td>
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</tbody>
</table>

Note: All diamond drill holes are illustrated in Figure 4.

- The Krof property was acquired by the present owners by staking in May 2001. The owners have subsequently conducted limited sampling of the main showing area and hand cleared access roads.

- In June, 2006, the owners contracted Aeroquest Limited to fly and electromagnetic and magnetic survey over the property.

### 6. GEOLOGY

#### 7.1. Regional Geology

The geology in the region of the claim area is complex, dominated by northwest-trending fault bounded blocks of diverse geology. There appear to be at least three separate packages or terranes that underlie the claim group. These include, from west to east, the Harrison Terrane, the Cogburn Group and the Cayoosh Assemblage. These geological packages have been intruded by Middle Jurassic to Cretaceous Coast Plutonic Intrusives.

The Harrison Terrane includes a variety of sedimentary and arc volcanic rocks of Middle Triassic to Early Cretaceous age (see Figure 3). These rocks occur in a complex fault relationship with the Cogburn Group.

The property is underlain by the Cogburn Group, which has been correlated with the Bridge River Complex and the Hozameen Complex to the north, mainly on the basis of similar lithology. The Cogburn Group consists of bedded chert, argillite, basic volcanics and alpine-type ultramafic rocks with minor amounts of marble. This is a fault-emplaced assemblage of oceanic crust or ophiolite. Ages of rocks within the Bridge River Complex range from Mississippian to earliest
Figure 3. Regional Geology Map.
Jurassic, suggesting that it now represents the remnants of a long-lived (+190 Ma), large ocean basin.

The Settler Schist, which underlies the eastern part of the property, is part of the Lower to Middle Jurassic Cayoosh Assemblage, an upward-coarsening succession of argillite, siltstone and sandstone, possibly emplaced over the Bridge River Complex. The Settler Schist, believed to be a metamorphic equivalent, consists of pelitic and quartzofeldspathic schists, amphibolite and minor quartzite. The metamorphic grade is up to amphibolite with staurolite and, to the north, kyanite and sillimanite schists.

The main intrusive rocks in the area belong to the Spuzzum Pluton, a post-accretion (Mid-Cretaceous, approx. 100 Ma) quartz diorite body which lies to the east of and partially encloses the Cogburn Group ultramafic package and the adjacent Settler schist. The grade of metamorphism of this latter unit varies with proximity to the contact.

### 7.2. Claim Geology

The Krof deposit is underlain by Upper Paleozoic metavolcanic and metasedimentary rocks of the Cogburn Group (Chilliwack Group), intruded by Cretaceous and Tertiary granitic and ultramafic rocks (see Figure 5).

The Main North Fork discovery showing is classified as a Cu-Zn Besshi-type massive sulphide. It occurs within a northwest striking, steeply dipping sequence of schist, phyllite and recrystallized chert (see Title page photo and Figure 4). The massive sulphide zone has been interpreted to rake steeply to the south. The massive sulphides are associated within a 50 m thick unit of meta-basalt and recrystallized chert (Gibson et al., 1985) including flows, flow breccia and minor tuff, bounded above and below by chert and meta-sediments.

**Figure 4. Photo - North Fork Showing and Logging Road.**
Figure 5. Krof Property Geology.
Metamorphosed intrusive pyroxenite and peridotite has been mapped by Gibson and Davidson in 1985 (A.R. 14001) and is illustrated in Figure 5. Several gabbro intrusions have also been mapped within the immediate area of the Main Showing.

The British Columbia Geological Survey Branch mapped in this region as part of their 2001 field program.

7. AIRBORNE GEOPHYSICAL SURVEY

The property owners contracted Aeroquest Limited of Mississauga, Ontario to fly a helicopter-borne geophysical survey over the property. On June 29, 2006, a 44.3 line kilometer AeroTEM II electromagnetic and magnetic survey was flown (see Figure 6). The line spacing was 100 m and the nominal terrain clearance of the survey bird was 70 m. Lines were oriented in a northeasterly direction, normal to the dominant trend of the stratigraphy and the trend of the known mineralization. The survey report prepared by Aeroquest is included with this report as Appendix “A”.

Figure 6. Airborne Survey Grid Lines.
Figure 7. Total Magnetic Field Intensity Map.
Figure 8. Electromagnetic Conductor Intensity Map.
The results of the survey are presented in Figure 7, which shows the total magnetic field, and Figure 8, which shows the processed electromagnetic data and conductor picks.

The magnetic map shows a number of trends, the most interesting of which is a moderate intensity linear trend following the northern portion of the tie line and coincident with the North Fork Showing (on the tie line T29020E at L20050N). The likely cause of this anomaly is mafic volcanics and possibly related ultramafic rocks, which are known to occur in this stratigraphy and are the predominant host unit for the massive sulphide mineralization. The fact that the anomaly terminates to the south supports the interpretation that the massive sulphides occur within the nose of a tight, steeply plunging fold.

The strongest conductors detected by the survey occur in the immediate vicinity of the showing and correlate with the core of the magnetic anomaly and thus the axis of the interpreted fold. Thus, the understanding of this fold and its plunge attitude becomes a key exploration tool. The massive sulphides would not likely extend to the south, past the nose of the fold. To the north, the conductor does not extend with any strength past L20050N. Therefore, the best direction to explore for extensions to the massive sulphide are along the fold hinge, likely steeply plunging either to the north or to the south.

A similar magnetic trend, also with associated but weaker conductors, occurs in the northeast corner of the claim. The magnetic trend suggests that this could be a second fold involving the same stratigraphy that hosts the North Fork Showing.

Stronger magnetic anomalies occur both to the east and the west of the showing area. Because of a lack of detailed geological information in these areas, it is uncertain what the source of these anomalies is, but they could represent ultramafic rocks which occur extensively throughout this area, as part of the Cogburn Group stratigraphy, or perhaps younger magnetite-bearing intrusive rocks.

**8. ECONOMIC POTENTIAL**

The Krof showing and surrounding area has potential for discovery of a significant copper-rich VMS deposit, with economic by-product values of zinc, silver and gold. The typical Besshi-type massive sulphide deposit is often laterally zoned such that there are increasing values of zinc, silver and gold separate from higher copper grades. This potential has yet to be tested at the Krof Property.

Although ultramafic rocks occur on the property, PGE and nickel potential has not been explored for to-date. More than 35,000 hectares of mineral claims have been staked in the region in the past several years, mainly for nickel and PGE’s.

Major highways, high capacity electric transmission lines and a high capacity natural gas pipeline are all located within 25 kilometers of the deposit.

**9. NATIVE LAND CLAIMS**

Almost all of British Columbia’s lands are subject to treaty negotiations with the Status Indians. The Krof Property falls within the large “Yale” treaty area extending from the international border with the U.S.A., in the south, to the town of Boston Bar, in the north and from Manning Provincial Park in the east to the City of Chilliwack in the west.
10. **SOCIO-ECONOMIC IMPACT OF MINE DEVELOPMENT**

The development of a mine operation in this area would result in a significant positive impact on the economy of the Hope, Agassiz and Chilliwack regions as well as the Province of British Columbia.

The large population and infrastructure base in the region is conducive to efficient mine development and mine operations. The property is within 2 hours of downtown Vancouver. Development of a mine would provide a mutual benefit to the communities in the region, the Provincial and Federal governments (taxes on profits) and the Krof Property owners.

11. **CONCLUSIONS AND RECOMMENDATIONS**

The Krof Property, located in southwestern British Columbia, was discovered in 1981 when massive Cu-Zn-Au-Ag sulphides were discovered during the construction of a logging road located on the property. Several exploration programs were completed on the Krof in the 1980’s including 11 diamond drill holes in the vicinity of the discovery showing.

Little subsequent exploration has been carried out on the property until it was staked in 2000 by the current owners. In August, 2006, the property was flown by Aeroquest with a helicopter-borne, low-level mag and EM survey. The survey clearly detected the North Fork massive sulfide showing, indicating a narrow and moderately conductive anomaly on L20050N, more or less directly over the showing, and a thick and moderately conductive anomaly on L20060N, 100 m to the south. The coincident magnetic high, which terminates another 150 m to the south, likely represents basaltic volcanic rocks that are the predominant host to the massive sulphides. The magnetic pattern confirms the geological interpretations that the basalts have been tightly folded around a northwest trending axis and with a steep plunge. It also suggests that the massive sulphides occur in the nose of this fold, as they typically do when they occur in deformed stratigraphy. Weaker conductors in the northeast corner of the claim block are associated with a similar magnetic pattern, suggesting a possible second fold and a repetition of the mineralized stratigraphy.

The best grades from drilling beneath the North Fork massive sulphide showing are up to 4.8% copper and 2.6% zinc with credits in gold and silver and with widths ranging from one to three metres. Evidence from drilling, geological interpretations and the recent airborne geophysical survey suggest that the sulphides are localized in the nose of a fold that plunges steeply. If the widths of the massive sulphide are found to increase down plunge, an economically attractive copper-zinc-gold-silver deposit could be defined in relatively short order. A 1,000 to 1,500 m drill program is required to test for this possibility. Prospecting and geochemical sampling is required in the northeastern corner of the claim block and adjacent ground to determine if similar mineralization occurs in this area.

12. **STATEMENT OF COSTS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Aeroquest Survey (41.3 line km, includes mobilization, report and maps)</td>
<td>$7,023.47</td>
</tr>
<tr>
<td>Geological support (program planning, interpretation, report)</td>
<td>$1,000.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$8,023.47</strong></td>
</tr>
</tbody>
</table>
13. STATEMENT OF QUALIFICATIONS

I, Gerald G. Carlson, hereby certify that:

1. I am a consulting mineral exploration geologist and President of KGE Management Ltd. of 1740 Orchard Way, West Vancouver, B.C. V7V 4E8.

2. I am a graduate of the University of Toronto, with a degree in Geological Engineering (B.A.Sc., 1969). I attended graduate school at Michigan Technological University (M.Sc., 1974) and Dartmouth College (Ph.D., 1978). I have been involved in geological mapping, mineral exploration and the management of mineral exploration companies continuously since 1969, with the exception of time between 1972 and 1978 for graduate studies in economic geology.

3. I have practiced my profession as a mineral exploration geologist since 1969.

4. I am a member in good standing of the Association of Professional Engineers and Geoscientists of the Province of British Columbia, Registration No. 12513 and of the Association of Professional Engineers of Yukon, Registration No. 0198.

5. I am a Fellow of the Canadian Institute of Mining and Metallurgy and a Fellow of the Society of Economic Geologists.

6. I am the author of this report on the Krof Project, *Assessment Report on the 2006 Airborne Magnetic and Electromagnetic Survey*. The report is based on a literature review, on private company reports, on property visits during the period 2001 to 2005 and on a review of the Aeroquest report that is appended to this report.

7. I am the owner of a 50% interest in the Krof property and I hold that interest on behalf of KGE Management Ltd., a company of which I am President and principal shareholder.

8. I personally assisted in the planning for the 2006 airborne survey.

Dated at Vancouver, B.C. this 8th day of January, 2007,

Gerald G. Carlson, Ph.D., P. Eng.
KGE Management Ltd.
1740 Orchard Way
West Vancouver, B.C. V7V 4E8
604-816-3012
14. REFERENCES CITED


Cameron, R.S. and Fox, P.E., 1982, Drill Logs on the North Fork 1 & 2 Mineral Claims, Assessment Report #10,797.


APPENDIX “A”

Report on a Helicopter-Borne AeroTEM II Electromagnetic & Magnetometer Survey by Aeroquest Limited
Aeroquest Job # 07019
Krof Property
Southern British Columbia
NTS 092H12

For

KME Management Ltd. & John A. Chapman

by

AEROQUEST LIMITED

4-845 Main Street East
Milton, Ontario, L9T 3Z3
Tel: (905) 693-9129 Fax: (905) 693-9128
www.aeroquestsurveys.com
Report Date: September, 2006
Report on a Helicopter-Borne AeroTEM II Electromagnetic and Magnetic Survey

Aeroquest Job # 07019
Krof Property
Southern British Columbia
NTS 092H12

For

KME Management Ltd. & John A. Chapman
c/o Suite 810-400 5th Ave. S.W., Calgary, Alberta - T2P 0L6
Tel (403) 234-7501
Fax (403) 234-7504
www.leadermining.com

by

AEROQUEST LIMITED

4-845 Main Street East
Milton, Ontario, L9T 3Z3
Tel: (905) 693-9129 Fax: (905) 693-9128
www.aeroquestsurveys.com
September, 2006
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1.2. Appendices

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1.3. List of Maps (1:10,000)

- **MAG** - Coloured Total Magnetic Intensity (TMI) with line contours and EM anomaly symbols.
- **TDR** – Tilt Derivative of TMI with line contours and EM anomaly symbols.
- **ZOFF** – AeroTEM Z3 Off-Time with line contours and EM anomaly symbols.
- **EM** – EM profiles channels 5-15 with EM anomaly symbols.
2. INTRODUCTION

This report describes a helicopter-borne geophysical survey carried out on behalf of KME Management Ltd. & John A. Chapman on the Krof property, Southern British Columbia.

The principal geophysical sensor is Aeroquest's exclusive AeroTEM II time domain helicopter electromagnetic system which is employed in conjunction with a high-sensitivity cesium vapour magnetometer. Ancillary equipment includes a real-time differential GPS navigation system, radar altimeter, video recorder, and a base station magnetometer. Full-waveform streaming EM data is recorded at 38,400 samples per second. The streaming data comprise the transmitted waveform, and the X component and Z component of the resultant field at the receivers. A secondary acquisition system (RMS) records the ancillary data.

The total line kms presented in the maps and data totalled 44.3, of which 42.8 km fell within the project area. The survey flying described in this report took place on June 29th, 2006.

3. SURVEY AREA

The project area is located approximately 30km northwest of Hope, BC and 120 kms east of Vancouver (92H05, 12) (Figure 1. Regional location map of the project area. Harrison Lake lies 5km to the west of the area. There is good accessibility with Highway 1 (the Trans-Canada Highway) running N-S approximately 20km to the east of the area through Yale. Highway 7 is also closeby as are a number of smaller roads.

The survey consisted of a 5km² single block, the Krof property (Figure 2). The survey terrain is mountainous with elevations ranging from approximately 250 to 1600 m. There are 6 mining claims either wholly or partly within the project area. They are outlined in Table 1.

The field crew was based at the town of Hope, British Columbia. The base of operations was at the company helicopter hangar in Hope and the base magnetometer was located a few hundred metres from here.
Figure 1. Regional location map of the project area.

### Table 1. Mining Claims in the area

<table>
<thead>
<tr>
<th>Tenure Number</th>
<th>Owner</th>
<th>Tenure Type</th>
<th>Claim Name</th>
<th>Good To Date</th>
<th>Area (Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>503055</td>
<td>606896 BC LTD</td>
<td>Mineral</td>
<td>AT North Fork</td>
<td>2006/OCT/28</td>
<td>104.735</td>
</tr>
<tr>
<td>504971</td>
<td>606896 BC LTD</td>
<td>Mineral</td>
<td>NFCogburn</td>
<td>2006/OCT/28</td>
<td>188.573</td>
</tr>
<tr>
<td>512339</td>
<td>606896 BC LTD</td>
<td>Mineral</td>
<td>NFCOG</td>
<td>2006/OCT/28</td>
<td>356.104</td>
</tr>
<tr>
<td>512352</td>
<td>606896 BC LTD</td>
<td>Mineral</td>
<td>HC 20</td>
<td>2006/OCT/28</td>
<td>125.649</td>
</tr>
<tr>
<td>524354</td>
<td>Sutcliffe Resources Ltd.</td>
<td>Mineral</td>
<td></td>
<td>2006/DEC/23</td>
<td>523.752</td>
</tr>
</tbody>
</table>
4. LOCAL GEOLOGY & PREVIOUS WORK


**History**

In 1971, Giant Explorations Ltd. (a subsidiary of Giant Mascot Mines Ltd.) discovered a nickel deposit in the Talc Creek area while conducting a wide area airborne geophysical and stream silt geochemistry program (MINFILE No. 092HSW081). The survey area identified a number of ultramafic intrusions covering a 12 kilometre wide swath from the Giant Mascot nickel-copper-cobalt mine north of Hope to Harrison Lake to the northwest. This preliminary work was followed by grid surveys over the present Cogburn deposit area including soil geochemistry, magnetics and rock chip sampling and then core drilling between 1971 and 1975. No further work was carried out due to the low grade of the nickel deposit.
The area was staked by Mr. J. A. Chapman and KGE Management Ltd. (Mr. G. G. Carlson) in 2000 in the hope that platinum group elements (PGE) were present within the ultramafic rocks encompassed by the claims. Leader Mining International Inc. signed an option agreement with Mr. Chapman and KGE Management Ltd. to explore and develop the Cogburn Magnesium Project. It was subsequently discovered that the ultramafic rocks contained a very high-grade magnesium content. Initial drilling in 2001 identified a high-grade and high purity magnesium area within the ultramafic rocks which was subsequently named the Emory Zone (MINFILE No. 092HNE307). The drilled portion of the Emory Zone is approximately 350 metres by 250 metres at an elevation of 1000 metres. Hatch Limited, the world’s leading light metals consulting engineering firm completed a Scoping Study in October 2001, culminating in a Feasibility Study in May 2003. The results of the test work and engineering studies indicated that “the Cogburn Project is technically feasible and economically viable”.

Regional Geology

The regional geology of the Cogburn area is subdivided into three north to northwest trending tectonic and stratigraphic packages. These packages (Sloollicum Schist, the Cogburn Group and the Settler Schist) are intruded by mid-Cretaceous age intrusive stocks of Coast Plutonic Complex. These units are separated from each other by faulted, layer-parallel contacts and are distinguished by age, lithological associations and metamorphic grade. This area is significant because these units mark the boundary between Jurassic/Cretaceous island arc rocks to the west and Palaeozoic oceanic rocks to the east. The Sloollicum Schist-Cogburn Group contact has also been suggested to be a remnant of the main suture between the Alexander/Wrangellia terraine and North America (McGroder, 1991; Journey and Friedman, 1993).

The Sloollicum schist is described as a mid-Jurassic to early Cretaceous age, greenschist facies volcanic-sedimentary succession of meta-phyllite, psammite and schists of mafic to felsic volcanic origin (Troost, 1999). Age dates from the unit include 102 Ma (Bennett, 1989) and 146 Ma (Parish and Monger, 1992).

The Cogburn Group, which lies structurally above and to the northeast of the Sloollicum schist, is an ophiolitic mixture comprised of Triassic or older, chlorite-amphibole schist (mafic volcanic), grey meta-phyllite and metamorphosed ribboned chert. The Baird metadiorite is sometimes included in Cogburn Group (Gabites, 1985 and Bennett, 1989).

The upper age limit of the Cogburn Group is constrained by a 225 Ma orthogneiss (Monger, 1989) which intrudes the package. Metamorphism ranges from upper greenschist to amphibolite grade. Mapping indicates that the ultramafic rocks which comprise the Cogburn Magnesium Project (Emory Zone) should be included with the Baird metadiorite in the Cogburn Group, and not with the Cretaceous Sloollicum intrusive suite (Payne, 2001).

The Settler Schist is a pellitic unit lying east and structurally above the Cogburn Group. Metamorphism is amphibolite facies and locally up to sillimanite grade. The age of the Settler Schist is unknown.
5. SURVEY SPECIFICATIONS AND PROCEDURES

The survey specifications are summarized in the following table:

<table>
<thead>
<tr>
<th>Survey Block</th>
<th>Line Spacing (m)</th>
<th>Line direction</th>
<th>Survey Coverage (line-km)</th>
<th>Dates Flown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emory</td>
<td>100</td>
<td>E-W (90°)</td>
<td>44.3</td>
<td>June 29th, 2006</td>
</tr>
</tbody>
</table>

The survey coverage was calculated by adding up the along-line distance of the survey lines and control (tie) lines as presented in the final Geosoft database. The survey was flown with a line spacing of 100 m. The control (tie) lines were flown perpendicular to the survey lines with a spacing of 1 km.

The nominal EM bird terrain clearance is 30m, but can be higher in more rugged terrain due to safety considerations and the capabilities of the aircraft. The magnetometer sensor is mounted in a smaller bird connected to the tow rope 17 metres above the EM bird and 21 metres below the helicopter (Figure 4). A second magnetometer sensor is mounted in a compartment located on the tail of the AeroTEM II system, 37 metres below the helicopter (Figure 5). Nominal survey speed over relatively flat terrain is 75 km/hr and is generally lower in rougher terrain. Scan rates for ancillary data acquisition is 0.1 second for the magnetometer and altimeter, and 0.2 second for the GPS determined position. The EM data is acquired as a data stream at a sampling rate of 38,400 samples per second and is processed to generate final data at 10 samples per second. The 10 samples per second translates to a geophysical reading about every 1.5 to 2.5 metres along the flight path.

5.1. Navigation

Navigation is carried out using a GPS receiver, an AGNAV2 system for navigation control, and an RMS DGR-33 data acquisition system which records the GPS coordinates. The x-y-z position of the aircraft, as reported by the GPS, is recorded at 0.2 second intervals. The system has a published accuracy of under 3 metres. A recent static ground test of the Mid-Tech WAAS GPS yielded a standard deviation in x and y of under 0.6 metres and for z under 1.5 metres over a two-hour period.

5.2. System Drift

Unlike frequency domain electromagnetic systems, the AeroTEM II system has negligible drift due to thermal expansion. The operator is responsible for ensuring the instrument is properly warmed up prior to departure and that the instruments are operated properly throughout the flight. The operator maintains a detailed flight log during the survey noting the times of the flight and any unusual geophysical or topographic features. Each flight included at least two high elevation ‘background’ checks. During the high elevation checks, an internal 5 second wide calibration pulse in all EM channels was generated in order to ensure that the gain of the system remained constant and within specifications.
5.3. Field QA/QC Procedures

On return of the pilot and operator to the base, usually after each flight, the AeroDAS streaming EM data and the RMS data are carried on removable hard drives and FlashCards, respectively and transferred to the data processing work station. At the end of each day, the base station magnetometer data on FlashCard is retrieved from the base station unit.

Data verification and quality control includes a comparison of the acquired GPS data with the flight plan; verification and conversion of the RMS data to an ASCII format XYZ data file; verification of the base station magnetometer data and conversion to ASCII format XYZ data; and loading, processing and conversion of the steaming EM data from the removable hard drive. All data is then merged to an ASCII XYZ format file which is then imported to an Oasis database for further QA/QC and for the production of preliminary EM, magnetic contour, and flight path maps.

Survey lines which show excessive deviation from the intended flight path are re-flown. Any line or portion of a line on which the data quality did not meet the contract specification was noted and reflown.

6. AIRCRAFT AND EQUIPMENT

6.1. Aircraft

A Eurocopter (Aerospatiale) AS350B2 "A-Star" helicopter - registration C-GPTY was used as survey platform (Figure 3). The helicopter was owned and operated by Hi-Wood Helicopters, Okotose, Alberta. The survey aircraft was flown at a nominal terrain clearance of 220 ft (70 m).

![Survey helicopter C-GPTY.](image-url)
6.2. Magnetometer
The Aeroquest airborne survey system employs the Geometrics G-823A cesium vapour magnetometer sensor installed in a two metre towed bird airfoil attached to the main tow line, 17 metres below the helicopter (Figure 4A). The sensitivity of the magnetometer is 0.001 nanoTesla at a 0.1 second sampling rate. The nominal ground clearance of the magnetometer bird is 51 metres (170 ft.). The magnetic data is recorded at 10Hz by the RMS DGR-33.

6.3. Electromagnetic System
The electromagnetic system is an AeroQuest AeroTEM© II time domain towed-bird system (Figure 4B). The current AeroTEM transmitter dipole moment is 38.8 kNIA. The AeroTEM© bird is towed 38 m (125 ft) below the helicopter. More technical details of the system may be found in Appendix 4.

The wave-form is triangular with a symmetric transmitter on-time pulse of 1.10 ms and a base frequency of 150 Hz (Figure 6). The current alternates polarity every on-time pulse. During every Tx on-off cycle (300 per second), 128 contiguous channels of raw x and z component (and a transmitter current monitor, \(i_{tx}\)) of the received waveform are measured. Each channel width is 26.04 microseconds starting at the beginning of the transmitter pulse. This 128 channel data is referred to as the raw streaming data. The AeroTEM system has two separate EM data recording streams, the conventional RMS DGR-33 and the AeroDAS system which records the full waveform.

Figure 4. The magnetometer bird (A) and AeroTEM II EM bird (B)
6.4. AERODAS Acquisition System

The 128 channels of raw streaming data are recorded by the AeroDAS acquisition system (Figure 7) onto a removable hard drive. The streaming data are processed post-survey to yield 33 stacked and binned on-time and off-time channels at a 10 Hz sample rate. The timing of the final processed EM channels is described in the following table:

<table>
<thead>
<tr>
<th>Channel:</th>
<th>Start Gate</th>
<th>End Gate</th>
<th>Start (us)</th>
<th>Stop (us)</th>
<th>Mid (us)</th>
<th>Width (us)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ON</td>
<td>25</td>
<td>25</td>
<td>651.0</td>
<td>677.0</td>
<td>664.0</td>
<td>26.0</td>
</tr>
<tr>
<td>2 ON</td>
<td>26</td>
<td>26</td>
<td>677.0</td>
<td>703.1</td>
<td>690.1</td>
<td>26.0</td>
</tr>
</tbody>
</table>

Figure 5. The magnetometer (A) located on the tail of the AeroTEM II EM bird

Figure 6. Schematic of Transmitter and Receiver waveforms
6.5. RMS DGR-33 Acquisition System

In addition to the magnetics, altimeter and position data, six channels of real time processed off-time EM decay in the Z direction and one in the X direction are recorded by the RMS DGR-33 acquisition system at 10 samples per second and plotted real-time on the analogue chart recorder. These channels are derived by a binning, stacking and filtering procedure on the raw streaming data. The primary use of the RMS EM data (Z1 to Z6, X1) is to provide for real-time QA/QC on board the aircraft.

The channel window timing of the RMS DGR-33 6 channel system is described in the table below.
### Magnetometer Base Station

The base magnetometer was a Geometerics G-858 cesium vapour magnetometer. Data logging and UTC time synchronisation was carried out within an external data logging computer, with an external GPS providing the timing signal. That data logging was configured to measure at 0.1 second intervals (10Hz). Digital recording resolution was 0.001 nT. The sensor was placed on a tripod in an area free of cultural noise sources. A continuously updated display of the base station values was available for viewing and regularly monitored to ensure acceptable data quality and diurnal levels.
6.7. Radar Altimeter
A Terra TRA 3500/TRI-30 radar altimeter is used to record terrain clearance. The antenna was mounted on the outside of the helicopter beneath the cockpit. The recorded data represents the height of the antenna, i.e. helicopter, above the ground. The Terra altimeter has an altitude accuracy of +/- 1.5 metres.

6.8. Video Tracking and Recording System
A high resolution colour digital video camera is used to record the helicopter ground flight path along the survey lines. The video is digitally annotated with GPS position and time and can be used to verify ground positioning information and cultural causes of anomalous geophysical responses.

6.9. GPS Navigation System
The navigation system consists of an Ag-Nav Incorporated AG-NAV2 GPS navigation system comprising a PC-based acquisition system, navigation software, a deviation indicator in front of the aircraft pilot to direct the flight, a full screen display with controls in front of the operator, a Mid-Tech RX400p WAAS-enabled GPS receiver mounted on the instrument rack and an antenna mounted on the magnetometer bird. WAAS (Wide Area Augmentation System) consists of approximately 25 ground reference stations positioned across the United States that monitor GPS satellite data. Two master stations, located on the east and west coasts, collect data from the reference stations and create a GPS correction message. This correction accounts for GPS satellite orbit and clock drift plus signal delays caused by the atmosphere and ionosphere. The corrected differential message is then broadcast through one of two geostationary satellites, or satellites with a fixed position over the equator. The corrected position has a published accuracy of under 3 metres. A recent static ground test of the Mid-Tech WAAS GPS yielded a standard deviation in x and y of under 0.6 metres and for z under 1.5 metres over a two-hour period.

Survey co-ordinates are set up prior to the survey and the information is fed into the airborne navigation system. The co-ordinate system employed in the survey design was WGS84 [World] using the UTM zone 10N projection. The real-time differentially corrected GPS positional data was recorded by the RMS DGR-33 in geodetic coordinates (latitude and longitude using WGS84) at 0.2 second intervals.
6.10. Digital Acquisition System
The AeroTEM© received waveform sampled during on and off-time at 128 channels per decay, 300 times per second, was logged by the proprietary AeroDAS data acquisition system. The channel sampling commences at the start of the Tx cycle and the width of each channel is 26.04 microseconds. The streaming data was recorded on a removable hard-drive and was later backed-up onto DVD-ROM from the field-processing computer.

The RMS Instruments DGR33A data acquisition system was used to collect and record the analogue data stream, i.e. the positional and secondary geophysical data, including processed 6 channel EM, magnetics, radar altimeter, GPS position, and time. The data was recorded on 128Mb capacity FlashCard. The RMS output was also directed to a thermal chart recorder.

7. PERSONNEL
The following AeroQuest personnel were involved in the project:

• Manager of Operations: Bert Simon
• Field Data Processors: Emilio Schein
• Field Operator: Michael Blondin
• Data Interpretation and Reporting: Sean Walker, Emilio Schein, Marion Bishop

The survey pilot Remi Fashanu was employed directly by the helicopter operator – Hi-Wood Helicopters, Okotose, Alberta.

8. DELIVERABLES

8.1. Hardcopy Map Products
The report includes a set of two (2) 1:10,000 maps sheets. The survey area is covered by one map plates and each map sheet contains 2 plates. Four geophysical data products are delivered as listed below:

• MAG - Coloured Total Magnetic Intensity (TMI) with line contours and EM anomaly symbols.
• TDR – Tilt Derivative of TMI with line contours and EM anomaly symbols.
• ZOFF – AeroTEM Z3 Off-Time with line contours and EM anomaly symbols.
• EM Profiles – EM profiles channels 5-15 with EM anomaly symbols.

The coordinate/projection system for the maps is NAD83 Universal Transverse Mercator Zone 10 (for Canada; Central America; Mexico; USA (ex Hawaii Aleutian Islands). For reference, the latitude and longitude in WGS84 are also noted on the maps. All the maps show flight path trace, skeletal topography, and conductor picks represented by an anomaly symbol classified according to calculated on-time conductance. The anomaly symbol is accompanied by postings denoting the calculated off-
time conductance, a thick or thin classification and an anomaly identifier label. The anomaly symbol
legend is given in the margin of the maps. The magnetic field data is presented as superimposed line
contours with a minimum contour interval of 10 nT. Bold contour lines are separated by 1000 nT.

8.2. Digital Deliverables

Final Database of Survey Data
The geophysical profile data is archived digitally in Geosoft GDB binary format database(s). The
databases has also been exported into Geosoft XYZ format, which is text file format offering greater
compatibility with other viewing software. A description of the contents of the individual channels in
the database can be found in Appendix 3. A copy of this digital data is archived at the Aeroquest head
office in Milton.

Geosoft Grid files (GRD)
Leveled Grid products used to generate the geophysical map images. Cell size for all grid files is 25 meters.

- Total Magnetic Intensity (Mag)
- Tilt Derivative (TDR)
- Z3 Off-time (ZOFF)

Digital Versions of Final Maps
Map files in Geosoft .map and Adobe PDF format

Free Viewing Software
Geosoft Oasis Montaj Viewing Software
Adobe Acrobat Reader

Digital Copy of this Document

9. DATA PROCESSING AND PRESENTATION

All in-field and post-field data processing was carried out using Aeroquest proprietary data processing
software, and Geosoft Oasis montaj software. Maps were generated using 36-inch wide Hewlett
Packard ink-jet plotters.

9.1. Base Map
The geophysical maps accompanying this report are based on positioning in the datum of NAD83. The
survey geodetic GPS positions have been projected using the Universal Transverse Mercator
projection in Zone 10N. A summary of the map datum and projection specifications are as follows:
• Ellipse: GRS 1980
• Ellipse major axis: 6378137m eccentricity: 0.081819191
• Datum: North American 1983 - Canada Mean
• Datum Shifts (x,y,z) : 0, 0, 0 metres
• Map Projection: Universal Transverse Mercator Zone 10 (Central Meridian 123°W)
• Central Scale Factor: 0.9996
• False Easting, Northing: 500,000m, 0m

9.2. Flight Path & Terrain Clearance
The position of the survey helicopter was directed by use of the Global Positioning System (GPS). Positions were updated five times per second (5Hz) and expressed as WGS84 latitude and longitude calculated from the raw pseudo range derived from the C/A code signal. The instantaneous GPS flight path, after conversion to UTM co-ordinates, is drawn using linear interpolation between the x/y positions. The terrain clearance was maintained with reference to the radar altimeter. The raw Digital Terrain Model (DTM) was derived by taking the GPS survey elevation and subtracting the radar altimeter terrain clearance values. The calculated topography elevation values are relative to WGS84 (GPS) altitude and are not tied in to surveyed geodetic heights.

Each flight included at least two high elevation ‘background’ checks. During the high elevation checks, an internal 5 second wide calibration pulse in all EM channels was generated in order to ensure that the gain of the system remained constant and within specifications.

9.3. Electromagnetic Data
The raw streaming data, sampled at a rate of 38,400 Hz (128 channels, 300 times per second) was reprocessed using a proprietary software algorithm developed and owned by Aeroquest Limited. Processing involves the compensation of the X and Z component data for the primary field waveform. Coefficients for this compensation for the system transient are determined and applied to the stream data. The stream data are then pre-filtered, stacked, binned to the 33 on and off-time channels and checked for the effectiveness of the compensation and stacking processes. The stacked data is then filtered, leveled and split up into the individual line segments. Further base level adjustments may be carried out at this stage.

The final field processing step was to merge the processed EM data with the other data sets into a Geosoft GDB file. The EM fiducial is used to synchronize the two datasets. The processed channels are merged into ‘array format; channels in the final Geosoft database as Zon, Zoff, Xon, and Xoff

The filtering of the stacked data is designed to remove or minimize high frequency noise that can not be sourced from the geology. Apparent bedrock EM anomalies were interpreted with the aid of an auto-pick from positive peaks and troughs in the on-time Z channel responses correlated with X channel responses. The auto-picked anomalies were reviewed and edited by a geophysicist on a line by line basis to discriminate between thin and thick conductor types. Anomaly picks locations were migrated and removed as required. This process ensures the optimal representation of the conductor centres on the maps.
At each conductor pick, estimates of the off-time conductance have been generated based on a horizontal plate source model for those data points along the line where the response amplitude is sufficient to yield an acceptable estimate. Some of the EM anomaly picks do not display a tau value; this is due to the inability to properly define the decay of the conductor usually because of low signal amplitudes. Each conductor pick was then classified according to a set of seven ranges of calculated off-time conductance values. For high conductance sources, the on-time conductance values may be used, since it provides a more accurate measure of high-conductance sources. Each symbol is also given an identification letter label, unique to each flight line. Conductor picks that did not yield an acceptable estimate of off-time conductance due to a low amplitude response were classified as a low conductance source. Please refer to the anomaly symbol legend located in the margin of the maps.

9.4. Magnetic Data

Prior to any leveling the magnetic data was subjected to a lag correction of -0.1 seconds and a spike removal filter. The filtered aeromagnetic data were then corrected for diurnal variations using the magnetic base station and the intersections of the tie lines. No corrections for the regional reference field (IGRF) were applied. The corrected profile data were interpolated on to a grid using a random grid technique with a grid cell size of 25 metres. The final leveled grid provided the basis for threading the presented contours which have a minimum contour interval of 10 nT.

In order to enhance subtle magnetic trends a ‘tilt’ derivative grid was calculated from the total magnetic intensity (TMI) grid. The Tilt Derivative (TDR) of the TMI enhances low amplitude and small wavelength magnetic features which define shallow basement structures as well as potential mineral exploration targets. The TILT derivative can be though of as a combination of the first vertical derivative and the total horizontal derivative of the total magnetic intensity.

Mathematically, the TDR is defined as:

\[
TDR = \arctan \left( \frac{dT}{dz} \right), \text{ where VDR and THDR are first vertical and total horizontal derivatives, respectively, of the total magnetic intensity } T.
\]

\[
VDR = \frac{dT}{dz}
\]

\[
THDR = \sqrt{\left( \frac{dT}{dx} \right)^2 + \left( \frac{dT}{dy} \right)^2}
\]
Due to the nature of the arctan trigonometric function in the filter, all amplitudes are restricted to $+\pi/2$ and $-\pi/2$ radians. This gives the Tilt derivative the added advantage of acting like an automatic gain control (AGC) filter. The calculated TDR grid is presented a colour sun-shaded image (illumination from the north-northeast). Line contours are also overlain which have a minimum contour interval of 0.05 radians.

10. General Comments
The survey was successful in mapping the magnetic and conductive properties of the geology throughout the survey area. Below is a brief interpretation of the results. For a detailed interpretation please contact Aeroquest Limited.

10.1. Magnetic Response
The magnetic data provide a high resolution map of the distribution of the magnetic mineral content of the survey area. This data can be used to interpret the location of geological contacts and other structural features such as faults and zones of magnetic alteration. The sources for anomalous magnetic responses are generally thought to be predominantly magnetite because of the relative abundance and strength of response (high magnetic susceptibility) of magnetite over other magnetic minerals such as pyrrhotite.

10.2. EM Anomalies
The EM anomalies on the maps are classified by conductance (as described earlier in the report) and also by the thickness of the source. A thin, vertically orientated source produces a double peak anomaly in the z-component response and a positive to negative crossover in the x-component response (Figure 9). For a vertically orientated thick source (say, greater than 10m), the response is a single peak in the z-component response and a negative to positive crossover in the x-component response (Figure 10). Because of these differing responses, the AeroTEM system provides discrimination of thin and thick sources and this distinction is indicated on the EM anomaly symbols ($N =$ thin and $K =$ thick). Where multiple, closely spaced conductive sources occur, or where the source has a shallow dip, it can be difficult to uniquely determine the type (thick vs. thin) of the source (Figure 11). In these cases both possible source types may be indicated by picking both thick and thin response styles. For shallow dipping conductors the ‘thin’ pick will be located over the edge of the source, whereas the ‘thick’ pick will fall over the downdip ‘heart’ of the anomaly.
Figure 9. AeroTEM response to a ‘thin’ vertical conductor.

Figure 10. AeroTEM response for a ‘thick’ vertical conductor.

Aeroquest Limited - Report on an AeroTEM II Airborne Geophysical Survey
Figure 11. AeroTEM response over a ‘thick’ dipping conductor.

All cases should be considered when analyzing the interpreted picks and prioritizing for follow-up. Specific anomalous responses which remain as high priority should be subjected to numerical modeling prior to drill testing to determine the dip, depth and probable geometry of the source.

Respectfully submitted,

Marion Bishop

Aeroquest Limited
September, 2006
APPENDIX 1 – PROJECT CORNER COORDINATES

The Project consists of a rectangular block with boundaries as defined in the following table. Positions are in UTM Zone 10 – NAD83.

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>588797.6</td>
<td>5492195.5</td>
</tr>
<tr>
<td>591498.6</td>
<td>5493501.2</td>
</tr>
<tr>
<td>592258.7</td>
<td>5491945.2</td>
</tr>
<tr>
<td>589557.8</td>
<td>5490639.5</td>
</tr>
</tbody>
</table>
APPENDIX 2 - Description of Database Fields

The GDB file is a Geosoft binary database. In the database, the Survey lines and Tie Lines are prefixed with an "L" for "Line" and "T" for "Tie".

Database (07019_Krof_final.gdb):

<table>
<thead>
<tr>
<th>Column</th>
<th>Units</th>
<th>Description</th>
</tr>
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## APPENDIX 3: AEROTEM ANOMALY LISTING

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APPENDIX 4: AEROTEM DESIGN CONSIDERATIONS

Helicopter-borne EM systems offer an advantage that cannot be matched from a fixed-wing platform. The ability to fly at slower speed and collect data with high spatial resolution, and with great accuracy, means the helicopter EM systems provide more detail than any other EM configuration, airborne or ground-based. Spatial resolution is especially important in areas of complex geology and in the search for discrete conductors. With the advent of helicopter-borne high-moment time domain EM systems the fixed wing platforms are losing their only advantage – depth penetration.

Advantage 1 – Spatial Resolution

The AeroTEM system is specifically designed to have a small footprint. This is accomplished through the use of concentric transmitter-receiver coils and a relatively small diameter transmitter coil (5 m). The result is a highly focused exploration footprint, which allows for more accurate “mapping” of discrete conductors. Consider the transmitter primary field images shown in Figure 1, for AeroTEM versus a fixed-wing transmitter.

![AeroTEM vs Fixed-Wing Transmitter Footprint](image)

The footprint of AeroTEM at the earth’s surface is roughly 50m on either side of transmitter

The footprint of a fixed-wing system is roughly 150 m on either side of the transmitter

Figure 1. A comparison of the footprint between AeroTEM and a fixed-wing system, highlights the greater resolution that is achievable with a transmitter located closer to the earth’s surface. The AeroTEM footprint is one third that of a fixed-wing system and is symmetric, while the fixed-wing system has even lower spatial resolution along the flight line because of the separated transmitter and receiver configuration.

At first glance one may want to believe that a transmitter footprint that is distributed more evenly over a larger area is of benefit in mineral exploration. In fact, the opposite is true; by energizing a larger surface area, the ability to energize and detect discrete conductors is reduced. Consider, for example, a comparison between AeroTEM and a fixed-wing system over the Mesamax Deposit (1,450,000 tonnes of 2.1% Ni, 2.7% Cu, 5.2 g/t Pt/Pd). In a test survey over three flight lines spaced 100 m apart, AeroTEM detected the Deposit on all three flight lines. The fixed-wing system detected the Deposit only on two flight lines. In exploration programs that seek to expand the flight line spacing in an effort to reduce the cost of the airborne survey, discrete conductors such as the Mesamax Deposit can go undetected. The argument often put forward in favor of using fixed-wing systems is that because of their larger footprint, the flight line spacing can indeed be widened. Many fixed-wing surveys are flown at 200 m or 400 m. Much of the survey work performed by Aerquest has been to survey in areas that were previously flown at these wider line spacings. One of the reasons for AeroTEM’s impressive discovery record has been the strategy of flying closely spaced lines and finding all the discrete near-surface conductors. These higher resolution surveys are being flown within existing mining camps, areas that improve the chances of discovery.
Figure 2. Fixed-wing (upper) and AeroTEM (lower) comparison over the eastern limit of the Mesamax Deposit, a Ni-Cu-PGE zone located in the Raglan nickel belt and owned by Canadian Royalties. Both systems detected the Deposit further to the west where it is closer to surface.

The small footprint of AeroTEM combined with the high signal to noise ratio (S/N) makes the system more suitable to surveying in areas where local infrastructure produces electromagnetic noise, such as power lines and railways. In 2002
Aeroquest flew four exploration properties in the Sudbury Basin that were under option by FNX Mining Company Inc. from Inco Limited. One such property, the Victoria Property, contained three major power line corridors.

The resulting AeroTEM survey identified all the known zones of Ni-Cu-PGE mineralization, and detected a response between two of the major power line corridors but in an area of favorable geology. Three boreholes were drilled to test the anomaly, and all three intersected sulphide. The third borehole encountered 1.3% Ni, 6.7% Cu, and 13.3 g/t TPMs over 42.3 ft. The mineralization was subsequently named the Powerline Deposit.

The success of AeroTEM in Sudbury highlights the advantage of having a system with a small footprint, but also one with a high S/N. This latter advantage is achieved through a combination of a high-moment (high signal) transmitter and a rigid geometry (low noise). Figure 3 shows the Powerline Deposit response and the response from the power line corridor at full scale. The width of power line response is less than 75 m.

Figure 3. The Powerline Deposit is located between two major power line corridors, which make EM surveying problematic. Despite the strong response from the power line, the anomaly from the Deposit is clearly detected. Note the thin formation conductor located to the south. The only way to distinguish this response from that of two closely spaced conductors is by interpreting the X-axis coil response.

Advantage 2 – Conductance Discrimination

The AeroTEM system features full waveform recording and as such is able to measure the on-time response due to high conductance targets. Due to the processing method (primary field removal), there is attenuation of the response with increasing conductance, but the AeroTEM on-time measurement is still superior to systems that rely on lower base frequencies to detect high conductance targets, but do not measure in the on-time.

The peak response of a conductive target to an EM system is a function of the target conductance and the EM system base frequency. For time domain EM systems that measure only in the off-time, there is a drop in the peak response of a target as the base frequency is lowered for all conductance values below the peak system response. For example, the AeroTEM peak response occurs for a 10 S conductor in the early off-time and 100 S in the late off-time for a 150 Hz base frequency. Because base frequency and conductance form a linear relationship when considering the peak response of any EM system, a drop in base frequency of 50% will double the conductance at which an EM system shows its peak response. If
the base frequency were lowered from 150 Hz to 30 Hz there would be a fivefold increase in conductance at which the peak response of an EM occurred.

However, in the search for highly conductive targets, such as pyrrhotite-related Ni-Cu-PGM deposits, a fivefold increase in conductance range is a high price to pay because the signal level to lower conductance targets is reduced by the same factor of five. For this reason, EM systems that operate with low base frequencies are not suitable for general exploration unless the target conductance is more than 100 S, or the target is covered by conductive overburden.

Despite the excellent progress that has been made in modeling software over the past two decades, there has been little work done on determining the optimum form of an EM system for mineral exploration. For example, the optimum configuration in terms of geometry, base frequency and so remain unknown. Many geophysicists would argue that there is no single ideal configuration, and that each system has its advantages and disadvantages. We disagree.

When it comes to detecting and discriminating high-conductance targets, it is necessary to measure the pure inphase response of the target conductor. This measurement requires that the measured primary field from the transmitter be subtracted from the total measured response such that the secondary field from the target conductor can be determined. Because this secondary field is in-phase with the transmitter primary field, it must be made while the transmitter is turned on and the transmitter current is changing. The transmitted primary field is several orders of magnitude larger than the secondary field. AeroTEM uses a bucking coil to reduce the primary field at the receiver coils. The only practical way of removing the primary field is to maintain a rigid geometry between the transmitter, bucking and receiver coils. This is the main design consideration of the AeroTEM airframe and it is the only time domain airborne system to have this configuration.

Figure 4. The off-time and on-time response nomogram of AeroTEM for a base frequency of 150 Hz. The on-time response is much stronger for higher conductance targets and this is why on-time measurements are more important than lower frequencies when considering high conductance targets in a resistive environment.

Advantage 3 – Multiple Receiver Coils

AeroTEM employs two receiver coil orientations. The Z-axis coil is oriented parallel to the transmitter coil and both are horizontal to the ground. This is known as a maximum coupled configuration and is optimal for detection. The X-axis coil is oriented at right angles to the transmitter coil and is oriented along the line-of-flight. This is known as a minimum coupled configuration, and provides information on conductor orientation and thickness. These two coil configurations combined provide important information on the position, orientation, depth, and thickness of a conductor that cannot be matched by the traditional geometries of the HEM or fixed-wing systems. The responses are free from a system geometric effect and can be easily compared to model type curves in most cases. In other words, AeroTEM data is very easy to interpret. Consider, for example, the following modeled profile:
Figure 5. Measured (lower) and modeled (upper) AeroTEM responses are compared for a thin steeply dipping conductor. The response is characterized by two peaks in the Z-axis coil, and a cross-over in the X-axis coil that is centered between the two Z-axis peaks. The conductor dips toward the higher amplitude Z-axis peak. Using the X-axis cross-over is the only way of differentiating the Z-axis response from being two closely spaced conductors.

HEM versus AeroTEM

Traditional helicopter EM systems operate in the frequency domain and benefit from the fact that they use narrowband as opposed to wide-band transmitters. Thus all of the energy from the transmitter is concentrated in a few discrete frequencies. This allows the systems to achieve excellent depth penetration (up to 100 m) from a transmitter of modest power. The Aeroquest Impulse system is one implementation of this technology.

The AeroTEM system uses a wide-band transmitter and delivers more power over a wide frequency range. This frequency range is then captured into 16 time channels, the early channels containing the high frequency information and the late time channels containing the low frequency information down to the system base frequency. Because frequency domain HEM systems employ two coil configurations (coplanar and coaxial) there are only a maximum of three comparable frequencies per configuration, compared to 16 AeroTEM off-time and 12 AeroTEM on-time channels.
Figure 6 shows a comparison between the Dighem HEM system (900 Hz and 7200 Hz coplanar) and AeroTEM (Zaxis) from surveys flown in Raglan, in search of highly conductive Ni-Cu-PGM sulphide. In general, the AeroTEM peaks are sharper and better defined, in part due to the greater S/N ratio of the AeroTEM system over HEM, and also due to the modestly filtered AeroTEM data compared to HEM. The base levels are also better defined in the AeroTEM data. AeroTEM filtering is limited to spike removal and a 5-point smoothing filter. Clients are also given copies of the raw, unfiltered data.

**Figure 6. Comparison between Dighem HEM (upper) and AeroTEM (lower) surveys flown in the Raglan area. The AeroTEM responses appear to be more discrete, suggesting that the data is not as heavily filtered as the HEM data. The S/N advantage of AeroTEM over HEM is about 5:1.**

Aeroquest Limited is grateful to the following companies for permission to publish some of the data from their respective surveys: Wolfden Resources, FNX Mining Company Inc, Canadian Royalties, Nova West Resources, Aurogin Resources, Spectrem Air. Permission does not imply an endorsement of the AeroTEM system by these companies.
APPENDIX 5: AeroTEM Instrumentation Specification Sheet

AEROTEM Helicopter Electromagnetic System

System Characteristics

- Transmitter: Triangular Pulse Shape Base Frequency 150 Hz
- Tx On Time - 1,150 (150Hz) μs
- Tx Off Time - 2,183 (150Hz) μs
- Loop Diameter - 5 m
- Peak Current - 250 A
- Peak Moment - 38,800 NIA
- Typical Z Axis Noise at Survey Speed = 5 nT peak to peak
- Sling Weight: 270 Kg
- Length of Tow Cable: 40 m
- Bird Survey Height: 30 m nominal

Receiver

- Two Axis Receiver Coils (x, z) positioned at centre of transmitter loop
- Selectable Time Delay to start of first channel 21.3 , 42.7, or 64.0 ms

Display & Acquisition

- AERODAS Digital recording at 128 samples per decay curve at a maximum of 300 curves per second (26.455 μs channel width)
- RMS Channel Widths: 52.9,132.3, 158.7, 158.7, 317.5, 634.9 μs
- Recording & Display Rate = 10 readings per second.
- On-board display - six channels Z-component and 1 X-component

System Considerations

Comparing a fixed-wing time domain transmitter with a typical moment of 500,000 NIA flying at an altitude of 120 m with a Helicopter TDEM at 30 m, notwithstanding the substantial moment loss in the airframe of the fixed wing, the same penetration by the lower flying helicopter system would only require a sixty-fourth of the moment. Clearly the AeroTEM system with nearly 40,000 NIA has more than sufficient moment. The airframe of the fixed wing presents a response to the towed bird, which requires dynamic compensation. This problem is non-existent for AeroTEM since transmitter and receiver positions are fixed. The AeroTEM system is completely portable, and can be assembled at the survey site within half a day.

Tel: +1 905 693-9129. Fax: +1 905 693-9128
Email: sales@aeroquestsurveys.com