Report For: Falconbridge Copper Limited
Covering: Magnetometer and VLF-EM Surveys
Over Their: Hough Lake Claim Group
Savant Lake Area, Ontario
Report By: J. Duncan Crone, B.A., P. Eng., Geophysicist

Survey Methods & Instruments:

The magnetic survey used a Geometrics G816 PROTON Magnetometer measuring the total field. The stations on the base line were tied into a line of base stations. Reading accuracy of the magnetometer is 1 gamma and loop closures were corrected to within 5 gammas. A total of 8552 stations were read.

The VLF electromagnetic survey used Crone RADEM instruments that measure the tilt angle of the resultant field in degrees and the horizontal field strength with an approximate normal value of 200. There are rapid drift changes in the field strength for several hours at sunrise and sunset. Since this is a winter survey it is difficult to bring the base level to a fixed value over such a large survey. Base level corrections were applied in a series of loops and jumps between the loops occur due to the accumulated error in the drift corrections. The entire grid was read using Cutler, Maine transmitter at 17.8 KHz. Another survey was read using both Annapolis, Md at 21.4 KHz and Seattle, Washington at 18.6 KHz. The Annapolis station was used in the hope of detecting north-south striking conductors.

A change in strike direction of the conductors is indicated with one group striking approximately N70° and the main large conductors striking N100° to 110°. The most interesting area as outlined by the VLF are the conductors in the lake near TL20N from L4E to L10W.
A total of 8307 stations were read in each VLF survey. Survey operators were Shaun Parent, Karl Albrecht and Marcel La Freniere.

Survey period was February 28th to April 13th, 1979.

Respectfully Submitted,

Duncan Crone, B.A., P. Eng.,
Geophysicist.
**GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT**

To be attached as an appendix to technical report. Facts shown here need not be repeated in report. Technical report must contain interpretation, conclusions etc.

**Type of Survey**

**ELECTROMAGNETIC**

**Township or Area**

**Claim holder(s)**

**Author of Report**

J. DUNCAN CRONE

**Address**

3607 WOLFEDALE ROAD, MISSISSAUGA, ONTARIO

**Covering Dates of Survey**

(linecutting to office)

**Total Miles of Line cut**

<table>
<thead>
<tr>
<th>SPECIAL PROVISIONS CREDITS REQUESTED</th>
<th>DAYS per claim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geophysical</td>
<td></td>
</tr>
<tr>
<td>Enter 40 days (includes line cutting) for first survey.</td>
<td></td>
</tr>
<tr>
<td>Enter 20 days for each additional survey using same grid.</td>
<td></td>
</tr>
<tr>
<td>Magnetometer</td>
<td></td>
</tr>
<tr>
<td>Electromagnetic</td>
<td></td>
</tr>
<tr>
<td>- Other</td>
<td></td>
</tr>
<tr>
<td>- Radiometric</td>
<td></td>
</tr>
<tr>
<td>Geological</td>
<td></td>
</tr>
</tbody>
</table>

**AIRBORNE CREDITS** (Special provision credits do not apply to airborne surveys)

- Magnetometer
- Electromagnetic
- Radiometric

**DATE:** JUNE 13/79  **SIGNATURE:** Author of Report or Agent

**PROJECTS SECTION**

**Res. Geol.**

Qualifications

**Previous Surveys**

Checked by: date

**GEOLOGICAL BRANCH**

Approved by: date

**TOTAL CLAIMS**

If space insufficient, attach list...
**GEOPHYSICAL TECHNICAL DATA**

**GROUND SURVEYS**

- **Number of Stations**: 8,307
- **Number of Readings**: 16,614
- **Station interval**: 25M
- **Line spacing**: 100M
- **Profile scale or Contour intervals**: (specify for each type of survey)

**MAGNETIC**

- **Instrument**
- **Accuracy - Scale constant**
- **Diurnal correction method**
- **Base station location**

**ELECTROMAGNETIC**

- **Instrument**: CRONE RADEM VLF EM
- **Coil configuration**
- **Coil separation**
- **Accuracy**: ± 1°, ± 5°
- **Method**: [X] Fixed transmitter, [ ] Shoot back, [ ] In line, [ ] Parallel line
- **Frequency**: ANNEPOLIS, MD 21.4 Khz AND SEATTLE, WASH 18.6 Khz
  (specify V.L.F. station)
- **Parameters measured**: TILT ANGLE IN DEGREES, HORIZONTAL FIELD STRENGTH (%)

**GAS/MET**

- **Instrument**
- **Scale constant**
- ** Corrections made**
- **Base station value and location**

**Elevation accuracy**

**INDUCED POLARIZATION - RESISTIVITY**

- **Instrument**
- **Time domain**, **Frequency domain**
- **Frequency**
- **Range**
- **Power**
- **Electrode array**
- **Electrode spacing**
- **Type of electrode**
GEOPHYSICAL - GEOLOGICAL - GEOCHEMICAL
TECHNICAL DATA STATEMENT

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey: MAGNETIC

Township or Area

Claim holder(s)

Author of Report: J. DUNCAN CRONE

Address: 3607 WOLFE DALE ROAD, MISSISSAUGA, ONTARIO

Covering Dates of Survey

(line cutting to office)

Total Miles of Line cut

*SPECIAL PROVISIONS CREDITS REQUESTED*

<table>
<thead>
<tr>
<th>Special Provision</th>
<th>Geophysical</th>
<th>DAYS per claim</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTER 40 days (includes line cutting) for first survey.</td>
<td>Electromagnetic</td>
<td></td>
</tr>
<tr>
<td>ENTER 20 days for each additional survey using same grid.</td>
<td>Magnetometer</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Radiometric</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Geological</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Geochemical</td>
<td></td>
</tr>
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</table>

*AIRBORNE CREDITS* (Special provision credits do not apply to airborne surveys)

<table>
<thead>
<tr>
<th>Survey Type</th>
<th>DAYS per claim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnetometer</td>
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</tr>
<tr>
<td>Electromagnetic</td>
<td></td>
</tr>
<tr>
<td>Radiometric</td>
<td></td>
</tr>
</tbody>
</table>

DATE: JUNE 13/79

SIGNATURE: Author of Report or Agent

*PROJECTS SECTION*

Res. Geol. Qualifications

Previous Surveys

Checked by date

GEOLOGICAL BRANCH

Approved by date

GEOLOGICAL BRANCH

Approved by date

TOTAL CLAIMS

MINING CLAIMS TRAVERSED

List numerically

(prefix) (number)
**GEOPHYSICAL TECHNICAL DATA**

**GROUND SURVEYS**
- Number of Stations: 8552
- Number of Readings: 652
- Station interval: 25M, SOME DETAIL AT 125 M
- Line spacing: 100M
- Profile scale or Contour intervals: 500 GAMMA
  
**MAGNETIC**
- Instrument: GEOMETRICS G816 PROTON
- Accuracy: Scale constant = 1 GAMMA
- Diurnal correction method: BASE STATION LOOPS
- Base station location: ALL BASE LINE STATIONS

**ELECTROMAGNETIC**
- Instrument
- Coil configuration
- Coil separation
- Accuracy
- Method: □ Fixed transmitter, □ Shoot back, □ In line, □ Parallel line
- Frequency
  
**GRAVITY**
- Instrument
- Scale constant
- Corrections made
- Base station value and location
- Location accuracy

**INDUCED POLARIZATION — RESISTIVITY**
- Instrument
- Time domain
- Frequency domain
- Frequency
- Range
- Power
- Electrode array
- Electrode spacing
- Type of electrode
GEOPHYSICAL TECHNICAL DATA

**GROUND SURVEYS**

<table>
<thead>
<tr>
<th>Number of Stations</th>
<th>8307</th>
<th>Number of Readings</th>
<th>16,614</th>
</tr>
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<tbody>
<tr>
<td>Station interval</td>
<td>25M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line spacing</td>
<td>100M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profile scale or Contour intervals</td>
<td></td>
<td>(specify for each type of survey)</td>
<td></td>
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**MAGNETIC**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>CRONE RADEM VLF EM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy - Scale constant</td>
<td></td>
</tr>
<tr>
<td>Diurnal correction method</td>
<td></td>
</tr>
<tr>
<td>Base station location</td>
<td></td>
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</tbody>
</table>

**ELECTROMAGNETIC**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>CRONE RADEM VLF EM</th>
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</thead>
<tbody>
<tr>
<td>Coil configuration</td>
<td></td>
</tr>
<tr>
<td>Coil separation</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>±1°, ±5%</td>
</tr>
<tr>
<td>Method:</td>
<td>☒ Fixed transmitter ☐ Shoot back ☐ In line ☐ Parallel line</td>
</tr>
<tr>
<td>Frequency</td>
<td>CUTLER, MAINE 17.8Khz</td>
</tr>
<tr>
<td>Parameters measured</td>
<td>TILT ANGLE IN DEGREES, HORIZONTAL FIELD STRENGTH (B)</td>
</tr>
</tbody>
</table>

**GRAVITY**

<table>
<thead>
<tr>
<th>Instrument</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale constant</td>
<td></td>
</tr>
<tr>
<td>Corrections made</td>
<td></td>
</tr>
<tr>
<td>Base station value and location</td>
<td></td>
</tr>
</tbody>
</table>

**TIME AND POLARIZATION - RESISTIVITY**

<table>
<thead>
<tr>
<th>Instrument</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Time domain</td>
<td>Frequency domain</td>
</tr>
<tr>
<td>Frequency</td>
<td>Range</td>
</tr>
<tr>
<td>Power</td>
<td></td>
</tr>
<tr>
<td>Electrode array</td>
<td></td>
</tr>
<tr>
<td>Electrode spacing</td>
<td></td>
</tr>
<tr>
<td>Type of electrode</td>
<td></td>
</tr>
</tbody>
</table>
AN EM RECOVERY MEASURING THE FIELD STRENGTH, DIP ANGLE, AND QUADRATURE COMPONENTS OF THE VLF COMMUNICATION STATIONS
SPECIFICATIONS

SOURCE OF PRIMARY FIELD: VLF Communication Stations 12 to 24K Hz

NUMBER OF STATIONS: 7 switch selectable

STATIONS AVAILABLE: The seven stations may be selected from:

<table>
<thead>
<tr>
<th>Code</th>
<th>Station &amp; Location</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM</td>
<td>Cutler, Maine</td>
<td>17.8 KHz</td>
</tr>
<tr>
<td>SW</td>
<td>Seattle, Washington</td>
<td>18.6 KHz</td>
</tr>
<tr>
<td>AM</td>
<td>Annapolis, Maryland</td>
<td>21.4 KHz</td>
</tr>
<tr>
<td>H</td>
<td>Hauulaule, Hawaii</td>
<td>23.4 KHz</td>
</tr>
<tr>
<td>BOF</td>
<td>Bordeaux, France</td>
<td>15.1 KHz</td>
</tr>
<tr>
<td>E</td>
<td>Rugby, England</td>
<td>16.0 KHz</td>
</tr>
<tr>
<td>MS</td>
<td>Gorki, Russia</td>
<td>17.1 KHz</td>
</tr>
<tr>
<td>OD</td>
<td>Odessa (Black Sea)</td>
<td>15.6 KHz</td>
</tr>
<tr>
<td>NC</td>
<td>Australia, N.W.C.</td>
<td>22.3 KHz</td>
</tr>
<tr>
<td>YJ</td>
<td>Yosamai, Japan</td>
<td>17.4 KHz</td>
</tr>
<tr>
<td>HN</td>
<td>Hegaland, Norway</td>
<td>17.6 KHz</td>
</tr>
<tr>
<td>TJ</td>
<td>Tokyo, Japan</td>
<td>20.0 KHz</td>
</tr>
<tr>
<td>BA</td>
<td>Buenos Aires</td>
<td>23.6 KHz</td>
</tr>
</tbody>
</table>

CHECK THAT STATION IS TRANSMITTING: Audible signal from speaker.

PARAMETERS MEASURED:

1. DIP ANGLE in degrees of the magnetic field component, from the horizontal, of the major axis of the polarization ellipse. Detected by a minimum on the field strength meter and read from an inclinometer with a range of -90° and an accuracy of ±5°.

2. FIELD STRENGTH (total or horizontal) of the magnetic component of the VLF field, (amplitude of the major axis of the polarization ellipse). Measured as a percent of normal field strength established at a base station. Accuracy ± 2% dependent on signal. Meter has two ranges: 0 — 300% and 0 — 600%.

3. OUT-OF-PHASE component of the magnetic field, perpendicular in direction to the resultant field, as a percent of normal field strength, (amplitude of the minor axis of the polarization ellipse). This is the minimum reading of the Field Strength meter obtained when measuring the dip angle. Accuracy ± 2%.

OPERATING TEMPERATURE RANGE: -30°C (-20°F) to +50°C (120°F)

DIMENSIONS AND WEIGHT: 9 x 19 x 27cm — 2.7 Kg (6 lb)

SHIPPING: Instrument with foam lined wooden case, shipping wt. — 6.0 Kg (13 lb)

BATTERIES: 2 of 9 volt — Eveready 216
Average life expectancy — 20 hours for continuous operation

UNITS AVAILABLE ON A RENTAL OR PURCHASE BASIS.
CONTRACT SERVICES AVAILABLE FOR FIELD SURVEYS.
Ontario Ministry of Natural Resources

Technical Assessment

Work Credits

<table>
<thead>
<tr>
<th>Recorded Holder</th>
<th>Falconbridge Copper Limited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Township or Area</td>
<td>Evans and Houghton Lakes and Grebe Lake &amp; McCubbin Twp.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of survey and number of Assessment days credit per claim</th>
<th>Mining Claims Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annapolis/Seattle) (Cutler) 20 days Electromagnetic 20 days</td>
<td>Pa. 436369 to 72 inclusive</td>
</tr>
<tr>
<td>Magnometer 40 days</td>
<td>465008 to 24 &quot;</td>
</tr>
<tr>
<td>Radiometric days</td>
<td>465036 to 39 &quot;</td>
</tr>
<tr>
<td>Induced polarization days</td>
<td>465051 to 54 &quot;</td>
</tr>
<tr>
<td>Section 86 (18) days</td>
<td>465059 - 60 &quot;</td>
</tr>
<tr>
<td>Geological days</td>
<td>465526 to 32 inclusive</td>
</tr>
<tr>
<td>Geochemical days</td>
<td>513742 to 826 &quot;</td>
</tr>
</tbody>
</table>

Special provision X Ground 3

☐ Credits have been reduced because of partial coverage of claims.
☐ Credits have been reduced because of corrections to work dates and figures of applicant.

Special credits under section 86 (15a) for the following mining claims:

No credits have been allowed for the following mining claims:

☐ not sufficiently covered by the survey
☐ Insufficient technical data filed

NOTE:
The Mining Recorder may reduce the above credits if necessary in order that the total number of approved assessment days recorded on each claim does not exceed the maximum allowed as follows: Geophysical — 80; Geological — 40; Geochemical — 40; Section 86(18)-60.
Date of recording of work: __________

Recorded holder: Falconbridge Copper Limited

Address: Box 40 - Commerce Court West, Toronto, Ontario

Township or Area: Houghton Lake M-2165; Evans Lake M-1774; Grebe Lake & McCubbin Twp. M-1804

<table>
<thead>
<tr>
<th>Type of survey and number of assessment days credit per claim</th>
<th>Mining claims</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geophysical</strong></td>
<td>See Attached List</td>
</tr>
<tr>
<td>Electromagnetic 20 days</td>
<td>Pa. 465008 et al</td>
</tr>
<tr>
<td>Electromagnetic</td>
<td></td>
</tr>
<tr>
<td>Magnetometer 40 days</td>
<td></td>
</tr>
<tr>
<td>Radiometric days</td>
<td></td>
</tr>
<tr>
<td>Induced polarization days</td>
<td></td>
</tr>
<tr>
<td>Section 86 (18) days</td>
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<tr>
<td>Geological days</td>
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<tr>
<td>Geochemical days</td>
<td></td>
</tr>
<tr>
<td>Man days Airborne Ground Special provision</td>
<td></td>
</tr>
</tbody>
</table>

Notice to recorded holder:

☑ Survey reports and maps in duplicate be submitted to the Lands Administration Branch, Toronto within 60 days from the date of recording of this work.

☐ Reports and maps are being forwarded to the Lands Administration Branch with this letter.

RECEIVED
AUG 2 7 1979
MINING LANDS SECTION

August 2, 1979
Dear Sir:

Re: Mining Claims Pa. 436369 et al. Evans and Houghton Lakes and Grebe Lake and McCubbin Township, File 2.3007

The Geophysical (Electromagnetic & Magnetometer) assessment work credits as shown on the attached statement have been approved as of the above date.

Please inform the recorded holder of these mining claims and so indicate on your records.

Yours very truly,

E.E. Anderson
Director
Lands Administration Branch
Whitney Block, Room 6450
Queen's Park
Toronto, Ontario
M7A 1W3
Phone: 416/965-1316

cc: Falconbridge Copper Limited
Toronto, Ontario
Attn: Mr. Mario G. Manza

Mr. Paul Mattinen
Dryden, Ontario

Resident Geologist
Sioux Lookout, Ontario
For additional information, see maps:

525/0: 5W-0016 #1-#6
BASELINE'0 280 0
HORIZONTAL COMPONENT
OF THE RESULTANT FIELD
STATION DIRECTION
FALCONBRIDGE COPPER LIMITED
HOUGH LAKE CLAIM GROUP
SAVANT LAKE AREA, ONTARIO
VLF-E.M. SURVEY
TRANSMITTER STATION: ANNAPOLIS, MARYLAND (21-4KHE)

FALCONBRIDGE COPPER LIMITED
HOUGH LAKE CLAIM GROUP
SOUTH LAKE AREA (H.S. 1801)
VLF-E.M. SURVEY
TRANSMITTER STATION: ANNAPOLIS, MARYLAND (21-4KHE)

LEGEND
1. STRIPED LINES: UNEXAMINED SNOW AND ICE
2. DOTTED LINES: EXAMINED SNOW AND ICE
3. CONTOUR: 1:25000

SCALE: 1:250000

VIEWING DIRECTION

MAP B

FALCONBRIDGE COPPER LIMITED
HOUGH LAKE CLAIM GROUP
SOUTH LAKE AREA (H.S. 1801)
VLF-E.M. SURVEY
TRANSMITTER STATION: ANNAPOLIS, MARYLAND (21-4KHE)